GRAY
PLANT
MOOTY

INVESTIGATIVE REPORT TO JOINT COMMITTEE TO INVESTIGATE THE I-35W BRIDGE COLLAPSE

APPENDIX: Volume III

MAY 2008

Appendix Volumes II and III

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36	3 – Jerome Adams	12/3/02 J. Adams email regarding Rescheduled SP 2783-draft I-35W at Mississippi Bridge Replacement
37	4 – Jerome Adams; 15 – Gary Peterson	7/24/06 Mn/DOT minutes regarding Br. 9340 TH 35W over the Mississippi River Investment Strategy
38	5 – Jerome Adams	1/22/07 J. Adams email regarding SP 2783-116 TH 35W Br. 9340 Plating Project Changes with attached URS Bridge 9340 Study
39	6 – Jerome Adams	6/15/07 Mn/DOT Project Management Schedules and project documentation
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Tab Number	Transcript Exhibit Number	Description of Exhibit
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63	2 – Kurt Fuhrman	9/23/02 Quality Assurance Plan, Office of Bridges and Structures
64	5 – Kurt Fuhrman	1982 – 1985 Bridge Inspection Report
65	6 – Kurt Fuhrman; 15 – Daniel Dorgan (vol 2)	9/28 – 29/94 Report of the 1994 Annual Fracture Critical Inspection for Bridge No. 9340
66	7 – Kurt Fuhrman	7/12/96 Bridge Inspection Report
67	8 – Kurt Fuhrman	8/4/97 Bridge Inspection Report

Tab Number	Transcript Exhibit Number	Description of Exhibit
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74	5 – Kevin Gray; 3 – Roger Schultz	4/17/06 Technical Memorandum regarding Bridge Preservation, Improvement and Replacement Guidelines for Fiscal Year 2006 through 2008
75	6 – Kevin Gray; 5 – Robert McFarlin	11/2/05 Transportation Program Committee (TPC) Meeting Minutes with attachments
76	7 – Kevin Gray	1/5/06 Transportation Program Committee (TPC) Meeting Minutes with attachments
77	8 – Kevin Gray; 6 – Robert McFarlin	1/5/06 List - Statewide Bridge Preservation Fund
78	9 – Kevin Gray	Presentation: "Future Trends in Condition and Investment Needs"
79	10 – Kevin Gray; 7 – Robert McFarlin	2/27/06 Bridge Report for Commissioner's Staff Meeting
80	11 – Kevin Gray; 8 – Robert McFarlin	5/4/83 Mn/DOT Policy Position Statement and Guideline regarding Trunk Highways Bonds, Criteria for Issuance

Tab Number	Transcript Exhibit Number	Description of Exhibit
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82	13 – Kevin Gray; 10 – Robert McFarlin	7/06 Mn/DOT Draft Position Statement and Guideline regarding Trunk Highway Fund Balance
83	14 – Kevin Gray; 11 – Robert McFarlin	7/06 Mn/DOT Draft Policy Position Statement and Guideline regarding Federal Advance Construction
84	2 – Lowell Johnson	Special Counsel's Second Request for Production of Documents to the Minnesota Department of Transportation, Request 17
85	3 – Lowell Johnson	9/17/79 Bridge Rating and Load Posting Report
86	4 – Lowell Johnson	12/14/95 Bridge Rating and Load Posting Report
87	5 – Lowell Johnson	Input data from Bars report
88	6 – Lowell Johnson	8/17/97 Summary of Rating Calculations – Structure Member Inventory and/or Operating Analysis for Structure 9340
89	7 – Lowell Johnson	12/11/95 Summary of Rating Calculations – Structure Member Inventory and/or Operating Analysis
90	8 – Lowell Johnson	10/17/02 L. Johnson email regarding Br. 4654 Stillwater
91	9 – Lowell Johnson	8/16/05 L. Johnson email regarding Br. 4654 Stillwater
92	2 – Paul Kivisto	5/4/01 D. Dorgan memorandum regarding Metro Region Fracture Critical Bridge Repair Recommendations with attached 5/4/01 D. Dorgan memorandum re: Br #9600 Repair of Water Leakage Inside the Box Tie Girder

Tab Number	Transcript Exhibit Number	Description of Exhibit
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95	5 – Paul Kivisto	11/23/98 Meeting Minutes regarding Bridge #9340
96	6 – Paul Kivisto	11/28/01 S. Hunt email regarding Discussion of Possible Additional Fatigue Investigation Work on Br. 9340
97	7 – Paul Kivisto	11/25/02 R. Cekalla memorandum regarding Rescheduled SP 2783 draft I-35W at Mississippi Bridge Replacement
98	8 – Paul Kivisto	12/3/02 P. Kivisto memorandum regarding Draft RFI for Consultant Study on Br. #9340
99	3 – James Lilly	2003 Graph: Age Profile by Area of Structures, Trunk Highways Only, Structures 10 Ft and Over
100	4 – James Lilly	James A. Lilly, P. E. resume
101	2 – Robert McFarlin	2/28/2008 Organization chart – R. McFarlin Commissioner of Transportation
102	3 – Robert McFarlin	8/1/06 Organization chart – C. Molnau Commissioner of Transportation
103	4 – Robert McFarlin	2/93 Organization chart – J. Denn Commissioner of Transportation

Tab Number	Transcript Exhibit Number	Description of Exhibit
104	4 – Bill Nelson; 6 – Don Flemming; 6 – David Long; 6 - Brett McElwain; 6 – Ed Zhou	12/13/06 E. Zhou email regarding Recommended Actions for Br. 9340
105	3 – Todd Niemann; 4 – Arlen Ottman; 4 – Gary Peterson; 6 – Mark Pribula	12/1/97 G. Peterson memorandum regarding Installation of Strain Gauges to Measure Stress in Floorbeam Connections
106	4 – Todd Niemann; 3 – Arlen Ottman; 3 – Gary Peterson; 7 – Mark Pribula	12/17/97 B. Miller memorandum regarding Installation of Strain Gauges to Measure Stress in Floorbeam Connection
107	2 – Arlen Ottman	A. Ottman relevant experience summary
108	5 – Arlen Ottman	10/14/98 M. Pribula memorandum regarding Cracked Welds in Approach Spans & Diaphragms at Pier #9
109	6 – Arlen Ottman	11/5/98 P. Kivisto email regarding Br 9340, TH 35W over Mississippi, Short and Long Range Plan
110	8 – Arlen Ottman	8/13/06 DLD – Comments on Executive Summary – Bridge 9340 Study with attached 7/06 Draft Report Table of Contents and 6/06 Executive Summary
111	5 – Gary Peterson; 2 – Daniel Dorgan (vol 2)	5/2000 HNTB report – Proposed tasks to evaluate and increase the redundancy of Mn/DOT Bridge No. 9340
112	6 – Gary Peterson; 3 – Daniel Dorgan (vol 2)	Handwritten note regarding attached 9/5/00 S. Olson letter of transmittal and drawings
113	7 – Gary Peterson; 4 – Daniel Dorgan (vol 2)	List of Bridge 9340 Outstanding Issues
114	8 – Gary Peterson; 5 – Daniel Dorgan (vol 2)	10/2001 HNTB Proposal for Structural Evaluation of Bridge 9340

Tab Number	Transcript Exhibit Number	Description of Exhibit
115	9 – Gary Peterson; 6 – Daniel Dorgan (vol 2)	11/8/01 Handwritten notes
116	10 – Gary Peterson	11/28/01 S. Hunt email regarding Discussion of Possible Additional Fatigue Investigation Work on Br 9340, with handwritten notes
117	11 – Gary Peterson; 7 – Daniel Dorgan (vol 2)	11/28/01 Discussion Points, I-35W over Mississippi River Bridge (from R. Johnson)
118	8 – Daniel Dorgan (vol 2);	12/3/01 J. Fredrick email regarding Br. 9340 35W/Mississippi River in downtown Mpls.
119	12 – Gary Peterson; 9 – Daniel Dorgan (vol 2)	12/14/01 Handwritten notes from meeting at Waters Edge
120	10 – Daniel Dorgan (vol 2); 15 – Don Flemming	11/7/06 G. Peterson email regarding RFP for a monitoring system, with handwritten notes
121	11 – Daniel Dorgan (vol 2)	1/10/07 G. Peterson email regarding Bridge 9340 plating contract scope of work
122	12 – Daniel Dorgan (vol 2)	1/17/07 G. Peterson email regarding 9340 plating scope, with handwritten notes
123	13 – Daniel Dorgan (vol 2)	Mn/DOT In-Depth Fracture Critical Bridge Inspection, Quality Assurance of Inspections Performed by Mn/DOT Districts, with attached 7/30/02 D. Weiszhaar Technical Memorandum regarding Guidelines for In-Depth Inspection of Fracture Critical Bridges and Underwater Inspections

Tab Number	Transcript Exhibit Number	Description of Exhibit
124	13 – Gary Peterson	5/9 Office Information Memo to Bob from S. Pierson, with attached 4/18/05 D. Flemming letter attaching 4/18/05 URS Meeting Minutes for Evaluation of Bridge 9340 – Progress Meeting 4
125	14 – Gary Peterson	4/3/06 Mn/DOT Meeting Minutes regarding Bridge Preservation Recommendations for Bridge Number 9340
126	16 – Gary Peterson	11/1/06 Mn/DOT Minutes regarding Br. 9340 TH 35W over the Mississippi River Investment Strategy
127	2 – James Pierce	6/15/06 Bridge Inspection Report
128	2 – Scott Pierson	8/4/04 D. Flemming email regarding attached meeting Minutes of Evaluation of Bridge 9340 – Progress Meeting 1
129	3 – Scott Pierson	11/17/04 URS Meeting Minutes of Evaluation of Bridge 9340 – Progress Meeting 2
130	4 – Scott Pierson	1/10/05 URS Meeting Minutes of Evaluation of Bridge 9340 – Progress Meeting 3
131	5 – Scott Pierson	2/7/05 E. Zhou email regarding Request for Information with attached S. Pierson memorandum regarding Request for Information Verification with Mn/DOT (revised 1/24/05)
132	6 – Scott Pierson	4/4/05 URS Meeting Minutes of Evaluation of Bridge 9340 – Progress Meeting 4

Tab Number	Transcript Exhibit Number	Description of Exhibit
133	7 – Scott Pierson	3/24/06 D. Flemming letter regarding Preliminary Recommendations for Bridge 9340
134	2 – Geoffrey Prelgo	8/16/06 Preliminary Meeting Minutes – Staging of 35W Rehab Project, Traffic Detours and Timing Issues
135	3 – Geoffrey Prelgo	8/24/05 Meeting Minutes - Staging of 35W Rehab Project, Construction Issues, Clarification of Job Scope and Guard Rail
136	4 – Mark Pribula	9/26/01 Bridge Inspection Report
137	2 – Don Flemming; 2 – David Long; 2 – Brett McElwain; 2 – Ed Zhou	3/28/03 URS Report – Fatigue Evaluation Bridge 9340, 35W Over Mississippi River
138	3 – Don Flemming; 3 – David Long; 3 – Brett McElwain; 3 – Ed Zhou	5/21/03 E. Zhou fax regarding Inspection Check List for Bridge 9340 with attached Inspection List for 6/9 – 13/03 and drawings
139	5 – Don Flemming; 5 – David Long; 5 – Brett McElwain; 5 – Ed Zhou	11/17/04 E. Zhou email regarding Final Minutes
140	7 – Don Flemming; 7 – David Long; 7 – Brett McElwain; 7 – Ed Zhou	12/18/06 E. Zhou email regarding Retrofit Recommendations
141	8 – Don Flemming; 8 – David Long; 8 – Brett McElwain; 8 – Ed Zhou	2/1/07 B. McElwain email regarding MnDOT Bridge 9340 Retrofit Design
142	9 – Don Flemming; 9 – David Long; 9 – Brett McElwain; 9 – Ed Zhou	7/19/07 D. Flemming email regarding 9340

Tab Number	Transcript Exhibit Number	Description of Exhibit
143	10 – Don Flemming; 10 – David Long; 10 – Brett McElwain; 10 – Ed Zhou	9/6/05 handwritten notes – Evaluation of I-35W Bridge, Notes from Meeting
144	11 – Don Flemming; 11 – David Long; 11 – Brett McElwain	6/23/06 B. McElwain email regarding Br. 9340 TH 35W over the Mississippi River investment strategy
145	12 – Don Flemming; 12 – David Long	5/17/05 D. Long email regarding Bridge 9340
146	13 – Don Flemming	11/30/98 E. Power letter regarding working relationship with HDR Engineering, Inc., and attaching report on Allegheny River bridge
147	14 – Don Flemming	9/1/06 D. Flemming email regarding Response to MnDOT comments
148	16 – Don Flemming	2/27/06 E. Zhou email regarding Bridge 9340 Preliminary Recommendation

MINNESOTA DEPARTMENT OF TRANSPORTATION
Engineering Services Division
Technical Memorandum No. 06-10-B-01
April 17, 2006

EXHIBIT NO: 5
Date: 4-10-08
JULIE A RIXE
COURT REPORTER

To:	Distribution 57, 612, 618, 650
From:	Richard A. Stehr Division Director Engineering Services
Subject:	Bridge Preservation, Improvement and Replacement Guidelines for Fiscal Year 2006 through 2008

Expiration

This is a new Technical Memorandum and it will remain in effect until June 30, 2010, unless it is superseded before that date or suspended.

Implementation

The guidance and policy shall be effective on July 1, 2005.

Introduction

The attached Bridge Preservation, Improvement, and Replacement Guidelines (BPIR) replace the FY 2003 – 2004 guidelines.

Purpose

The Bridge Office has revised its Guidelines for Bridge Repair and Replacement to better describe when design exceptions must be approved on bridge improvement projects; the specific minimum permit load capacity for bridge improvement projects on Interregional Corridors (IRCs) and interstate highways was also revised; as was the bridge railing reconstruction policy (Appendix E). A new policy for repair and extension of Type W box culverts (Appendix J) has also been added, as well as a revised policy for Bridge Maintenance Painting of Steel Structures (Appendix H).

Guidelines

See attachment: Bridge Preservation, Improvement, and Replacement Guidelines (BPIR).

Questions:

For information on the technical contents of this memorandum, please contact Gary Peterson, Assistant State Bridge Engineer, Bridge Office, MS 610, (651) 747- 2107. Any questions regarding the publication and distribution of this Technical Memorandum should be referred to Sophia Wicklund, Design Standards Unit at 651-296-3190, or Michael Elle, Design Standards Engineer at 651-296-4859. All active Memoranda and a list of historical Technical Memoranda can be viewed at http://www.dot.state.mn.us/tecsup/tmemo/index.html

Attachment: BPIR Guidelines (52 pages)

-END-

BRIDGE OFFICE

MINNESOTA DEPARTMENT OF TRANSPORTATION

FISCAL YEAR 2006 THROUGH 2008

BRIDGE PRESERVATION, IMPROVEMENT AND REPLACEMENT

GUIDELINES

Approved ______________________________

Daniel L. Dorgan
State Bridge Engineer

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Date

CONTENTS

INTRODUCTION

The Mn/DOT Bridge Office prepared these Bridge Preservation, Improvement, and Replacement guidelines to replace the fiscal year 2003-2004 Bridge Preservation, Improvement and Replacement Guidelines. They are intended as an aid to District and Bridge Office personnel when selecting candidate projects and identifying the specific preservation, improvement, rehabilitation or replacement recommendations for an existing bridge. These guidelines have been formulated to coincide with current Area Transportation Partnership (ATP) programming procedures and Mn/DOT project development practices. Not all projects are part of the ATP process; however, the criteria contained herein are independent of the process used and funding category used. Districts are strongly encouraged to designate Federal Highway Bridge Rehabilitation and Replacement Program (HBRRP) funding for bridge projects developed in accordance with these guidelines (see definitions, below).

CHANGES MADE TO THIS EDITION

This edition of the guidelines includes several changes from previous editions. The more significant changes include:

- A revised section to describe when design exceptions must be approved on bridge improvement projects;
- A revised specific minimum permit load capacity for bridge improvement projects on Interregional Corridors (IRCs) and interstate highways;
- A revised bridge railing reconstruction policy (Appendix E).
- A new policy for repair and extension of Type W box culverts (Appendix J).
- A revised policy for Bridge Maintenance Painting of Steel Structures (Appendix H)

I. DEFINITION OF TERMS

The following terms are used in these guidelines:

Highway Bridge Replacement and Rehabilitation Program (HBRRP): A federal funding program available to fund the replacement or rehabilitation of bridges on any public road. To be eligible, the bridge must be on a public road, more than 6100 mm (20 ft) long, have a sufficiency rating of less than 50 for replacement or less than 80 for rehabilitation, and be classified as Structurally Deficient or Functionally Obsolete. Bridge preservation activities that are shown to be cost beneficial and extend the service life of a bridge are also eligible but they do not have to be on the federal selection list (i.e., they do not have to meet minimum sufficiency rating criteria) to qualify for funding. HBRRP funding can also be used for qualifying bridge improvements as defined later in these guidelines. Each state is apportioned funds annually for the BR program according to federal formulas (see Appendix I for more information).

Design Exception: It is the general policy of the Department that every reasonable effort will be made to meet design standards. The Design Exception process has been developed to provide a critical review of elements for which normal standards cannot be met. Design Exceptions are required for critical design elements that don't meet the requirements as indicated in Table G-1. They are used to justify design values that do not meet design standards. Design Exceptions should consider the effect of the design deviation on the safety and operation of the structure and its compatibility with adjacent sections of roadway. Since safety enhancement is an essential element of any project design, exceptions should not be approved if it will reduce the relative safety of the existing roadway or bridge. The cost of attaining full standards, as well as any other future improvements, should be taken into consideration.

Routine Bridge Maintenance - Routine bridge maintenance is maintenance that the District Bridge Maintenance Staff performs and is considered to be good practice but may be reactive, may have only a short-term impact by itself, or may need to be done frequently or repeatedly to appreciably extend bridge service life. Routine maintenance activities include bridge flushing, sweeping, debris removal, graffiti removal, and small quantities of spot painting or concrete and steel repairs. Routine bridge maintenance work is not described in these guidelines and is not eligible for funding under Mn/DOT's Bridge Improvement or Bridge Replacement Programs or federal HBRRP funding.

Bridge Preservation - Bridge preservation is the repair or protection against future deterioration of a structure or an element or nearby elements. It extends the service life of a bridge without significantly increasing the load-carrying capacity or improving the geometrics. Projects in this category need to meet the criteria listed in section IV of these guidelines, but do not have to meet all of the requirements of Table G-1. Examples of bridge preservation projects include painting, bridge joint repair and replacement, bridge deck overlays, repairs to bridge slope paving, etc. (See Section IV, part B)
Cost-beneficial bridge preservation programs or activities can be approved for Bridge Rehabilitation Funding under the Highway Bridge Rehabilitation and Replacement Program (HBRRP). Candidates for Bridge Preservation do not have to be on the Federal Selection list (i.e., meet the minimum sufficiency ratings) to qualify for HBRRP Federal Funding.

Bridge Improvement - Bridge improvement is a set of activities that fixes the deterioration found in a structure and improves the geometrics and load-carrying capacity to at least the minimum criteria set in these guidelines, but may not provide improvement that meets new construction standards. Some examples of bridge improvement projects are railing replacements and bridge deck replacements, which provide improved roadway widths.

To be eligible for federal funding under HBRRP, a design exception must be approved for some elements of bridge improvement projects that are not constructed to new construction standards (see Section V, part C of this document). Bridge Improvements projects are eligible for funding under the HBRRP if they are on the Federal Selection list (i.e., have a sufficiency rating below 80) and the improvement will remove the bridge from the list (see Appendix I for further information).

Mn/DOT Bridge Improvement and Repair Program (BI) - The Bridge Improvement and Repair Program focuses on the preservation and improvement of geometrics and load-carrying capacities of existing bridges.

Projects in this program are typically eligible for funding under the HBRRP.

Bridge Rehabilitation or Replacement - Bridge rehabilitation or replacement involves reconstructing an existing structure to meet current new construction standards or removing a structure and building a completely new one in its place. Upon completion of the work, the bridge is removed from the Federal HBRRP Bridge selection list.

Bridge rehabilitation or replacement projects are eligible for funding under the HBRRP if they have a sufficiency rating of less than 80 or 50, respectively.

Mn/DOT Bridge Replacement Program (BR) - The bridge replacement program rehabilitates or replaces bridges that have been identified as inadequate and/or substandard because of limited horizontal and vertical clearances, load restrictions, or substantial deterioration. Typical projects consist of construction of new bridges or extensive reconstruction that requires superstructure and substructure modifications. Projects in this program are typically eligible for bridge rehabilitation or bridge replacement funding under the HBRRP if they meet the requirements listed in the definition of HBRRP on page 2.

II. SCOPE OF GUIDELINES

BRIDGES

The modifications and updates contained in these guidelines are based on the continual accumulation of experience and data and the advent of new technology in bridge protection and bridge improvement. These guidelines have also been expanded and revised to define bridge preservation projects and to include criteria for the Bridge Replacement program. The "Policy for New Bridge Decks," "Policy for Bridge Railing on Bridge Construction and Reconstruction Projects," "Policy on Retrofit or Replacement of Fatigue Prone Components of Steel Bridges," and the "Guidelines for Bridge Deck Maintenance by Mn/DOT Forces" are attached as appendices since criteria from these policies/guidelines are also utilized in bridge improvement and replacement projects. "Bridge Maintenance Painting Guidelines" are also included in the appendix because the contract portion of this painting work is included in the BI Program.

CULVERTS

The repair or extension of culvert structures is exempt from these guidelines, except that special structural considerations for repair or extension of Type W concrete box culverts are provided in Appendix J.

III. PROJECT SELECTION AND PRIORITIZATION

A. Description of the Area Transportation Partnership (ATP) Process

The MnDOT Office of Investment Management (OIM) provides target funding based on factors such as system size and current and projected performance meeting Preservation, Safety, and Mobility objectives. Priority is given to meeting ATP Preservation needs. For more information on the 2007-2009 STIP Process refer to the Office of Investment Management Web page: http://www.oim.dot.state.mn.us/

B. Packaging Projects

Occasionally, the work needed on an individual structure is not sufficient to justify a separate contract. To take advantage of economies of scale that are inherent in large projects, "packaging" several bridges and including them with roadway work should be considered to provide cost-effective projects. Where traffic is detoured from a section of trunk highway, preservation work on other trunk highway bridges within the detour limits may be desirable. The necessity for packaging work may result in the increased priority of a particular bridge project that would otherwise not be considered. Packaging of bridgework to provide efficient project administration should also be considered in establishing priorities.

C. Project Planning and Design Activities

The preparation of final plans for bridge preservation, improvement, and rehabilitation or replacement projects requires action by both the District and the Bridge Office. A schedule for these activities is shown in Appendix C. Time frames for all activities should be met to ensure that the final design plan is delivered on time.

D. Repair Classification

The types of repairs that may be recommended are divided into 3 broad classifications as shown in the following table. Further detail regarding each repair classification is provided in the following sections.

	Preservation	**Improvement**	**Rehabilitation or Replacement**
Description	Maintain existing features	Improve geometrics & strength, but not necessarily to new design standards	Generally meet new design standards
Example	Paint, overlay, expansion joints	Redeck, Widening	Replace superstructure (beams and deck)
Cost	< 30% of cost of a new bridge	30% to 60% of the cost of a new bridge	Consider a new bridge if cost including approach work is >70% of new bridge

IV. GUIDELINES FOR BRIDGE PRESERVATION

Bridge preservation is defined on page 3, and is recommended when specific bridge element deterioration has occurred, and the structure must be repaired to slow or stop the deterioration rate and thus prolong the service life of the structure. The scope of work should maintain the existing design features of the bridge. Typical bridge preservation work may include:

- bridge painting;
- expansion joint repair/replacement;
- bridge deck overlays and re-overlays;
- railing/barrier repair/replacement (some improvement in shoulder width is permitted);
- partial deck replacement (maintain current width); and
- minor superstructure or substructure repair.

Bridge preservation projects are not required to bring a bridge up to all of the minimum criteria found under the Bridge Improvement Section of these guidelines (Table G-1), but they must maintain the existing design features of the bridge. However, there are 2 exceptions to the "no minimum" criteria;

1) Preservation projects must comply with the Mn/DOT policy on bridge railings as described in Appendix E.

2) If an existing structure is not permit load restricted the resulting preservation activities cannot result in a permit load restriction. If an existing structure is permit load restricted, the resulting preservation activities cannot result in a more restrictive permit load restriction.

A. Condition Criteria for Bridge Preservation

Bridge preservation activities should be considered when the Bridge Management System identifies bridge elements that have deteriorated to the extent that preservation-activity benefits outweigh the repair cost and such repairs will prevent or delay further deterioration of the element or nearby elements. (See Appendix G, "Guidelines for Bridge Deck Maintenance by Mn/DOT Forces.") Element conditions at the following levels could be candidates for preservation activities. (These conditions are guidelines only and actual field conditions may warrant preservation projects at other levels of deterioration):

Painted steel elements	A total of more than 20% of element* in condition 3, 4, and 5
Reinforced concrete elements	A total of more than 10% of element* in condition state 3 and 4
Timber elements	A total of more than 10% of element* in condition state 3 and 4
Deck and slab elements	Element* in condition state 3, 4, or 5
Expansion joints	More than 10% of element* in condition state 3

* Refers to PONTIS elements

B. Bridge Preservation Activities

The following activities are considered cost-effective bridge preservation activities that extend the useful life of a bridge:

1. Sealing or replacement of leaking joints or elimination of deck joints (to minimize the deterioration of superstructure and substructure elements beneath the joints);
2. Deck overlays consisting of proven effective systems, which significantly increase the service life of the deck by sealing the deck surface from aggressive solutions and reducing the impact of aging and weathering;
3. Spot and zone painting of structural steel (if unsound condition < 20%);
4. Painting of structural steel;
5. Cathodic Protection (CP) Systems;
6. Electrochemical Chloride Extraction (ECE) Treatment;

7. Installations of scour countermeasures;
8. Removal of large debris from channels;
9. Retrofit of fracture-critical details;
10. Retrofit of fatigue-prone details;
11. Concrete deck repairs including those used in conjunction with the installation of deck overlays, CP systems, or ECE treatment;
12. Substructure concrete repairs including those used in conjunction with installation of CP systems or ECE treatment;
13. Other concrete repairs that are necessary to improve element condition and are followed by the application of concrete sealants, coatings, and membranes for surface protection of the concrete, or are efficiently done when packaged with other preventative bridge maintenance activities;
14. Heat straightening of damaged load-carrying bridge members; and
15. Repairs to railings that extend element life and meet the railing policy presented in Appendix E.

C. Cost Criteria for Bridge Preservation

A project meets the cost criteria for Bridge Preservation if the total cost of preservation work is less than 30% of the cost of a new bridge. If the total cost of preservation work is 30% or more of the cost of a new bridge, consideration should be given to redefining the project as a Bridge Improvement to bring the bridge up to the minimum criteria list in Table G-1. If the final decision is still to proceed with a bridge preservation project, the Design Memorandum should reference information on the type of bridge improvements considered, the cost of such improvements, and other pertinent information supporting that decision. Bridge preservation projects are typically part of Mn/DOT's Bridge Improvement program.

D. Guidelines for Replacement of Inplace Deck Protective Systems

Low-slump concrete, latex concrete, latex mortar, and bituminous overlays with membrane-protective systems have been installed on many bridges throughout the State. The life of the low-slump concrete and latex concrete systems appears to be well over 20 years; however, the life of a bituminous overlay with a membrane or latex mortar system is approximately 10 years. When District maintenance forces come to the point where they can no longer maintain in-place deck protective systems effectively, they should replace them with low-slump or latex concrete overlays.

Districts should pay particular attention to monitoring the condition of inplace concrete overlays on box girder bridges and other structures for which deck replacement is cost prohibitive or presents significant constructability problems. Structures of this type should be monitored to determine the chloride content at various depths of the overlay at intervals not exceeding 10 years. As the chloride content at the base of the overlay begins to approach half the corrosion threshold, testing should be done more frequently. The bridge should be programmed for overlay replacement before the concrete at the level of the top rebar reaches half of the corrosion threshold (half of the corrosion threshold is equal to approximately 0.075 percent water-soluble chloride ion or 1500 ppm. For acid-soluble chloride ion half of threshold is approximately 0.0175 percent or 175 ppm. The Mn/DOT lab generally runs acid-soluble chloride ion tests). For information on chloride sampling methods contact the Bridge Office.

E. Guidelines for Bridge Deck Overlays

Decisions to overlay or re-overlay a bridge deck should consider life cycle costs and benefits. A decision to remove and replace a bridge deck will generally extend the "repair free" service life to the 75 year design life of a bridge. A decision to overlay a bridge deck will generally extend the service life another 10-25 years, depending on the prior condition of the deck. Placing bituminous overlays may help maintain rideability.

The priority guidelines in Appendix A do not apply to the replacement of in-place protective systems.

i. Short-Term Overlays

Where it is necessary to maintain rideability or minimize surface repairs, short-term overlays are frequently used to extend the service life of bridge decks. Usually short-term overlay preparation consists of scarifying 12 mm **(1/2 in)** from the deck thickness, but does not require removal of deteriorated concrete. Bituminous overlays of 50 to 100 mm **(2 to 4 in)** are expected to last a maximum of 5 years. Concrete overlays of 75 mm **(3 in)** over deteriorated concrete (with bituminous patches removed) may provide up to 10 years of service.

ii. Long-Term (Protective) Overlays

In locations with high traffic volumes and high de-icing-chemical usage, special emphasis should be given to the programming of deck protective systems for bridges that meet the criteria shown below and are currently unprotected. Grade-separation bridges with no access to mainline roadways should not be programmed for protective overlays unless high traffic volumes (ADT > 2,000), frequent use of de-icing chemicals, or evidence of deck deterioration warrant overlays. Consideration should also be given to the criteria listed in appendix D. Where overlays are not warranted, but leakage through existing joints is damaging the superstructure or substructure, waterproof joint installation should be considered.

iii. Priority Guidelines

Priority guidelines for deck repair by contract are provided in Appendix A. They are based on the premise that concrete overlays are most economically justified when:

- overlays or re-overlays are placed on basically intact decks as a protective measure; or

- deck replacements are deferred until full deck removal and replacement is warranted.

The following general categories and procedures have been established for protective overlay projects. (See Appendix A for priority guidelines)

If top rebar cover is less than 2 inches:

Category	Deck Condition	Procedure
I.	0-10% unsound (slight deterioration) - Pontis deck condition 2 or 3	Scarify, do spot removal and a 50-mm (2-in) low-slump concrete overlay.
II.	10-25% unsound (moderate deterioration) - Pontis deck condition 4	Scarify, do spot removal and a 50-mm (2-in) low-slump concrete overlay.
III.	25-50% unsound (severe deterioration) (only non-interstate highways with less than 10,000 ADT and with the bottom of the slab sound)	100% scarify 13-mm (0.5-in). (overlay with 75-mm (3-in) low-slump concrete. Schedule for deck removal after 10 years.
IV.	40+% unsound (critical deterioration) (25+% on interstate or where 10,000 ADT or more)	Schedule new deck after usable life of inplace deck is expended. It may require a bituminous overlay to maintain rideability.

If top rebar cover is 2 inches or more or the structure has an inplace overlay:

For category I, do nothing. For category II and III, consider a re-overlay. For category IV, schedule new deck after usable life of inplace deck is expended, which may require a bituminous overlay to maintain rideability.

V. GUIDELINES FOR BRIDGE IMPROVEMENT

Bridge improvement is a set of activities that fixes the deterioration found in a structure and improves the geometrics and load-carrying capacity to at least the minimum criteria set in these guidelines, but may not provide improvement that meets new construction standards. When determining whether or not to improve an existing bridge, the current geometrics of the structure, as well as the projected structural conditions must be considered. Specific features that must be considered include the vertical clearance, lateral underclearance, load capacity, permit load capacity, scour criticality, and the condition of the main structural elements. The criteria used may vary depending on the classification/type of highway and the ADT on the structure. The minimum criteria for the various features are shown in Table G-1 (column 4) for each type of highway. If a structure meets the criteria listed, further improvement is optional, subject to the design exception requirements discussed in Section C, "Design Exceptions for Bridge Improvement Projects". If a structure does not meet the minimum criteria listed, it should be improved to meet or exceed minimum criteria or considered for more substantial work including rehabilitation or replacement. The minimum criteria used for bridge conditions are based on element level inspection criteria. Typical bridge improvement work may include:

- full deck replacements;
- superstructure replacement;
- bridge widening;
- bridge raising; and
- renovations.

A. Condition and Cost Criteria for Bridge Improvements

Basic considerations for bridge improvement projects are:

1. Repairs to the existing structure will require an expenditure of 30% - 60% of the cost of a new structure; or
2. Load capacity has decreased due to deterioration or damage requiring strengthening of members; or
3. Geometric improvements are needed to match the approach roadway width or reduce accidents.

If any of these basic considerations are met, the bridge improvement criteria should be applied to the project. Bridge improvement projects should bring a structure up to the minimum criteria shown in column 4 of Table G-1, but they do not necessarily have to meet standards for new bridges (column 5).

If the total cost of a bridge improvement exceeds 60% of the cost of a new bridge, rehabilitation or replacement should be considered to bring the bridge up to current design standards. When deciding to do a bridge improvement that is in excess of 60% of the cost of a new bridge, the Design Memorandum should reference information on the type and cost of rehabilitation/replacement considered.

B. Geometrics and Load Capacity

At the time the scope of work is determined, improvement of substandard geometrics, load capacity, and deficient components of the bridge should be considered. Widening of structures should be considered to provide lane width of 3650 mm (12 ft). Consideration should also be given to adding shoulders, adding sidewalks, and extending acceleration/deceleration lanes. The improvement of load capacity must be considered for bridges with permit load restrictions. For bridges that are located on Interregional Corridors (IRCs) or interstate routes, the bridge improvement must result in a bridge that has no restrictions for overweight permit standard classes up to 158,000 pounds GVW. For all other routes the load rating must be at least HS 18 Inventory.

Projects whose primary purpose is to improve traffic capacity (additional traffic lanes including turn lanes) are included in the major construction (MC) program and are not covered by these guidelines. Such project should meet the standards and requirements for new bridges.

C. Design Exceptions for Bridge Improvement Projects

A Design Exception must be submitted and approved for Bridge Improvement projects that do not meet the criteria listed in the "Minimum Criteria For Bridge Improvements" (column 4) of Table G-1, or that do not meet the criteria listed below for HBRRP funded projects.

The State Bridge Engineer must recommend each bridge related design exception for approval. The minimum values given in column 4 of Table G-1 meet Federal minimum design standards for bridges that will be left in place, and when followed will effectively remove bridges from structurally deficient or functionally obsolete lists.

(See http://www.dot.state.mn.us/tecsup/xyz/plu/desstand/bridge/brimp1m.doc for the design exception worksheet and submittal format.) Refer to Section 2-6 of the Mn/DOT *Road Design Manual* for guidance on geometric design exceptions. See Appendix K for a blank Design Exception Form.

To be eligible for federal HBRRP funding, a Bridge Improvement project must meet the construction standards for a new bridge, as listed in the "Mn/DOT New Construction/Reconstruction Standards" (column 5) of Table G-1. As indicated in the table, HBRRP funded projects require higher minimum standards for the following features:

- Bridge roadway width
- Bridge structural capacity
- Bridge lane width
- Vertical clearance:

Approval of design exceptions for HBRRP funded Bridge Improvement projects that meet the "Minimum Criteria for Bridge Improvements" (column 4) in Table G-1, but not the "Mn/DOT New Construction/Reconstruction Standards" (column 5), should be routine as long as highway safety is maintained or improved, and the bridge does not have an accident history that relates directly to the critical design element.

1. Preparation and Submittal of Design Exceptions

- Design exceptions are usually submitted with the Design Memorandum or other environmental documents.

  Items requiring design exceptions should be noted with supporting rationale in the Preliminary and Final Bridge Repair Recommendations issued by the Bridge Office. If the Design Exception is recommended for approval by the State Bridge Engineer the Regional Bridge Construction Engineer from the Bridge Office will substantially complete the request for design exception (see Appendix K for a blank form) and will attach it to their Preliminary Repair Recommendations for District approval.

The District must complete the design exception form and address any relevant accident history on the bridge and other bridge related safety concerns before submitting it to the State Design Engineer for approval.

D. MINIMUM CRITERIA FOR BRIDGE IMPROVEMENTS

TABLE G-1

Column 1	Column 2	Column 3	Column 4	Column 5
Inventory Feature	**Type Hwy**	**Existing ADT**	**Minimum Criteria for Bridge Improvements****	**Mn/DOT New Construction/Reconstruction Standards**
*** Load Rating**	IRC and Interstate	All	No restictions for overweight permit standard classes.	HL 93 new, HS 20 Inventory - in place
	All Other	All	HS 18 Inventory	HL 93 new, HS 20 Inventory - in place
*** Vertical Underclearance (Right and Left)**	Interstate Urban	All	4570 mm **(15.0 ft)** except see note 1 below	4978 mm **(16.33 ft)** new, 4877 mm **(16.0 ft)** in place
	Interstate Rural	All	4880 mm **(16.0 ft)**	4978 mm **(16.33 ft)** new, 4877 mm **(16.0 ft)** in place
	Principal & Minor Arterial	All	4420 mm **(14.5 ft)**	4978 mm **(16.33 ft)** new, 4877 mm **(16.0 ft)** in place
	Major & Minor Collectors and Local Roads	All	4420 mm **(14.5 ft)**	4978 mm **(16.33 ft)** new, 4877 mm **(16.0 ft)** in place
	Railroad Under	All	6705 mm **(22.0 ft)**	
Lateral Underclearnce (Right and Left)	Interstate & Principal Arterials (one way)	All	1220 mm **(4 ft)** Left, 3000 mm **(10 ft)** Right	Not applicable as a New Construction/Reconstruction standard on Bridge Improvement or Rehabilitation Projects
	Interstate & Principal Arterials (Ramp)	All	610 mm **(2 ft)** Left, 1220 mm **(4 ft)** Right	
	Principal & Minor Arterials (two way)	All	2440 mm **(8 ft)**	
	Major and Minor Collectors (two way)	All	1830 mm **(6 ft)**	
	Railroad Under	All	2590 mm **(8.5 ft)**	
Scour Criticality	All	All	Rip rap and other required scour prevention methods are inplace.	Not applicable as a New Construction/Reconstruction standard on Bridge Improvement or Rehabilitation Projects

Continued on the next page...

TABLE G-1 (Cont'd)

Column 1	Column 2	Column 3	Column 4	Column 5
Inventory Feature	**Type Hwy**	**Existing ADT**	**Minimum Criteria for Bridge Improvements****	**Mn/DOT New Construction/Reconstruction Standards**
* **Deck Roadway Width*****	Trunk Highway 2 lanes	0 - 100	7315 mm (24 ft)	12(N) lanes + Design Standard Shoulder Widths
		101 - 400	8535 mm (28 ft)	
		401 - 2000	9145 mm (30 ft)	
		2001 - 5000	10,360 mm (34 ft)	
		5001+	11,580 mm (38 ft)	
	Interstate (2 lanes)	All	10,975 mm (36 ft)	See Appendix J: Road Design Manual, Table 9-2.01A "Dual Unit Bridge Shoulder Width Table"
	Interstate (3 lanes)	All	3600 N +4200 mm (12N + 14 ft)	
*** Lane Width**	All		3350 mm (11 ft)	
Steel Superstructure	All	Varies	Meets Mn/DOT Policy on Retrofit of Fatigue Prone Components	Not applicable as a New Construction/Reconstruction standard on Bridge Improvement or Rehabilitation Projects
Type of Railing and End Post	All	All	Meets Mn/DOT Railing Policy	Not applicable as a New Construction/Reconstruction standard on Bridge Improvement or Rehabilitation Projects
Superstructure Condition	All	All	No portion of main structural element in worst condition and portion in 2nd worst condition less than 10%	NA
Substructure Condition	All	All	No portion of main structural element in worst condition and portion in 2nd worst condition less than 10%	NA
Culvert Condition	All	All	No portion of culvert in worst condition and portion in 2nd worst conditions less than 10%	NA
Deck Condition	All	All	Deck is in PONTIS condition state 3 or better	NA

* An approved design exception is required for bridge improvement or bridge rehabilitation work that doesn't meet the requirements of column 4. An approved design exception is also required for such projects using HBRRP funding that don't meet the requirements of column 5.

** All BI projects should be improved to at least the minimum-condition criteria shown above, unless lower values are justified and a design exception is recommended for approval by the State Bridge Engineer.

*** For other types of roadways, see the *Road Design Manual*, Table 9-2.01A. Use 3660-mm (12-ft) lane widths.

Note 1. 4880 mm (16.0 ft) minimum clearance shall be maintained on the following routes: I-35E from S Jct. I-35W to I-494; I-494 from Jct. I-35E to East Jct. I-694; I-694 entire route; I-35E from Jct. I-694 to North Jct. With I-35W.

E. Exclusion from the Minimum Criteria Listed In Table G-1

1. Exclusion Based on Bridge Length

Bridge Improvement projects for bridges that are less than 150 m (500 ft) in length should meet the minimum requirements listed under "Minimum Criteria for Bridge Improvement Projects" in Table G-1 upon completion of the work.

Generally, bridges less than 150 m (500 ft) long that do not meet the minimum-width criteria should be programmed for minor widening to meet minimum-width criteria. If additional beams and substructures are required to meet minimum-width criteria, the bridge should be programmed for major widening to current width and load-capacity standards. Also, when vehicles must substantially reduce speed due to narrow bridge width in comparison to the approach roadway or substandard horizontal or vertical bridge alignment, the bridge should be programmed for improvement to current width standards.

The minimum deck width values shown in Table G-1 are from 1220 to 2440 mm (4 to 8 ft) wider than the minimum widths required to remove a structure from the FHWA list of deficient bridges. For the purposes of these guidelines, the 150 m (500-ft) limit extends the use of wider and safer shoulder width to most overpass bridges and stream crossings. For major structures or bridges over 150 m (500 ft) in length, particularly where additional beams and substructures are required to meet the wider shoulder width shown in Table G-1, the costs and benefits of wider shoulders should receive more careful consideration. Bridge Improvements on structures longer than 150 m (500 ft) that don't meet the minimum deck width requirements of Table G-1 will require approval of a Design Exception.

2. Bridge Ornamental Traffic Railing and Curbs

For bridges with posted speed limits over 64 km/hr **(40 mph)** all fully ornamental traffic railings should be replaced or have other intermediate traffic barriers meeting current standards placed between them and the traveled roadway. All bridge railings that have curbs wider than 230 mm **(9 in)** or do not meet the AASHTO 4.48 KN **(10-k)** strength requirement must be replaced or modified in accordance with the policy for railings on bridge projects if the posted speed limit is over 64 km/hr **(40 mph.)** (See Appendix E).

F. Guidelines for Bridge Deck Improvements

Deck replacement projects, due to their cost, should be considered carefully to ensure that completed structures do not result in the continuation of substandard conditions (below current Mn/DOT new construction standards) that will need to be addressed during the extended life of the new deck. Decks should be constructed in accordance with the policy for new bridge decks in Appendix D and the policy for bridge railing in Appendix E unless design-exception approval has been obtained.

Preparation of Project Memorandums and Study Reports that involve bridge deck reconstruction should include a thorough documentation of future construction plans in the vicinity of the bridge. The report should also discuss any remaining deficiencies in load, safety, or geometrics, such as protective guardrail, bridge width, vertical, or horizontal alignment, and pedestrian needs.

VI. GUIDELINES FOR REHABILITATION OR REPLACEMENT

The decision to replace or rehabilitate a bridge rests with the District, however, if work is extensive, cost studies should be made. The Bridge Office Regional Bridge Construction Engineers are available to assist District personnel in evaluating and conducting rehabilitation versus replacement studies. Factors other than those included in these guidelines may determine whether studies are necessary and decisions concerning the need for studies must be based on each individual situation.

A. Guidelines for Bridge Rehabilitation

Bridge rehabilitation is typically undertaken when parts of a structure are in poor condition, the geometrics or load capacity is inadequate, and the bridge can be widened or improved at a reasonable cost. Rehabilitation should both lengthen the overall lifespan of a bridge and correct deficiencies so that the existing structure is reconstructed to meet all current design criteria for new construction or reconstruction (see column 5 of Table G-1). When the rehabilitation has been completed, the portions of the superstructure and/or substructure not reconstructed should be in good condition and expected to last as long as the rehabilitated portion. Upon completion of the work, the bridge is removed from the Federal HBRRP Bridge selection list.

B. Condition Criteria for Bridge Rehabilitation

The criteria used to select bridge rehabilitation projects include the condition and geometrics of the structure. Specific criteria include:

- Poor deck condition (deck condition of 4 or 5 or under deck smart flag rating 3, 4, or 5) or;
- Geometrics or a load capacity needing improvement that can be improved by widening or other means at a reasonable cost, or;
- Poor superstructure condition (20% or more of major superstructure elements are in the worst two condition states).

C. Cost Criteria for Bridge Rehabilitation Projects

A cost comparison of rehabilitation versus replacement shall be made if rehabilitation is a feasible alternative. The cost of rehabilitation, including approach reconstruction, should be less than 70% of the cost of bridge replacement. If replacement is recommended for bridges with sufficiency ratings between 50 and 80, special FHWA approval is necessary to obtain HBRRP bridge replacement funding. Requests for funding should include a cost comparison of alternates, and other data supporting the decision to replace.

D. Design Exceptions for Bridge Rehabilitation Projects

Bridge Rehabilitation projects must meet the criteria listed in column 5 of Table G-1. The requirements for submitting requests for design exceptions for bridge rehabilitation projects are similar to those for bridge improvement projects, except that approval of design exceptions for bridge rehabilitation projects is not considered routine.

E. Guidelines for Bridge Replacement

The general criteria for developing a list of potential replacement candidates include condition, cost, age, and geometrics. The specific criteria include:

1. The bridge requires continuous maintenance by Mn/DOT forces to remain in service, and:
    a. one or more main structural elements are in poor condition (20% or more of an element in the worst two condition states); and
    b. the cost to rehabilitate the bridge is 70% or more of the replacement cost; or
    c. the bridge is nearing the 70-year average life of a structure.
2. The bridge is load posted and cannot be repaired to remove the restriction at a reasonable cost.
3. Horizontal or vertical clearances are substandard and have caused accidents and pose a potential safety problem. Rehabilitation is impractical or exceeds 70% of replacement cost.
4. Roadway realignment requires a new location for the structure.

When a structure is replaced, it shall be designed to meet the criteria for new bridges set forth in the *Mn/DOT LRFD Bridge Design Manual.*

Appendices

APPENDIX A

PRIORITY GUIDELINES FOR DECK REPAIR BY CONTRACT

(All concrete bridge decks except bridges with protective systems in place or bridges in service for 30 years or more)

CATEGORY	DECK CONDITION (Area estimated unsound at time of performing the	PROCEDURE ADTs shown below are current traffic counts		
		Greater than 10,000 ADT or Interstate	2000 to 10,000 ADT	Less than 2000 ADT
I	0 to 10% - Slight Deterioration	Priority 8 Spot removal and concrete overlay	Priority 9 Spot removal and concrete overlay	Priority 11 Spot removal and concrete overlay
II	10% to 25% - Moderate Deterioration	Priority 6 Spot removal and concrete overlay	Priority 7 Spot removal and concrete overlay	Priority 10 Spot removal and concrete overlay
III	25% to 40% - Severe Deterioration	Priority 1 **Schedule new deck	Priority 3 100% scarify 13mm (0.5 in)and add 75 mm (3 in) low-slump concrete overlay	Priority 5 100% scarify 13 mm (0.5 in) and add 75 mm (3 in) low-slump concrete overlay
IV	Greater than 40% Critical Deterioration	Priority 1 **Schedule new deck	Priority 2 **Schedule new deck	Priority 4 **Schedule new deck

APPENDIX A

These guidelines are modified for bridges where the deck is a portion of the main structural support member. (Some examples are concrete box-girder, concrete slab-span, and concrete deck-girder bridges). Since decks on these structures cannot be removed without supporting the structure on falsework, the amount of unsound concrete should be changed to 20 to 60% in Category 3, and full deck removal should not be considered in Category 4 until more than 60% of the deck surface is unsound. Every effort should be made to repair these bridge decks before deterioration requires full removal of the deck. Within any category in this table, these structures should receive priority over other bridges.

Category I and II decks with bituminous overlays (without membranes) should receive concrete overlays in accordance with the guidelines. Category III and IV decks with bituminous overlays should be scheduled for deck replacement at the end of their useful lives.

*Category III decks should be overlaid only if a thorough evaluation indicates that minimal unsound concrete extends below the top of rebars. If extensive areas of unsound concrete exist below the top of rebars, patch and repair and maintain the deck in accordance with the guidelines until the end of its useful life.

**When the useful service life of the deck has ended, a bituminous overlay may be required to maintain rideability.

APPENDIX B

APPRAISAL RATINGS FOR MINIMUM VERTICAL UNDERCLEARANCE – UNDER BRIDGE

Rating by comparison of minimum vertical underclearance UNDER the bridge deck and functional classification.

UNDER CLEARANCE APPRAISAL RATING	MINIMUM VERTICAL CLEARANCE			
	FUNCTIONAL CLASSIFICATION			RAILROAD UNDER
	INTERSTATES AND OTHER FREEWAYS	OTHER PRINCIPAL AND MINOR ARTERIALS	MAJOR AND MINOR COLLECTORS AND LOCAL ROUTES	
9	> 5180 mm **(>17.0 ft)**	>5030 mm **(>16.5 ft)**	>5030 mm **(>16.5 ft)**	>7010 mm **(>23.0 ft)**
8	5180 mm **(17.0 ft)**	5030 mm **(16.5 ft)**	5030 mm **(16.5 ft)**	7010 mm **(23.0 ft)**
7	5105 mm **(16.75 ft)**	4725 mm **(15.5 ft)**	4725 mm **(15.5 ft)**	6705 mm **(22.0 ft)**
6	5030 mm **(16.5 ft)**	4420 mm **(14.5 ft)**	4420 mm **(14.5 ft)**	6400 mm **(21.0 ft)**
5	4800 mm **(15.75 ft)**	4345 mm **(14.25 ft)**	4345 mm **(14.25 ft)**	6400 mm **(21.0 ft)**
4	4570 mm **(15.0 ft)**	4270 mm **(14.0 ft)**	4270 mm **(14.0 ft)**	6100 mm **(20.0 ft)**
3	Vertical underclearance is less than the value in rating code 4 AND requires CORRECTIVE ACTION.			
2	Vertical underclearance is less than the value in rating code 4 AND requires REPLACEMENT.			
0	Structure is CLOSED.			

NOTES:

1. For values between those listed in the table, use the lower rating code.
2. The functional classification of the underpassing route shall be used in the evaluation. If an "under" record is not coded, the underpassing route shall be considered a major or minor collector or local road.

APPENDIX B

APPRAISAL RATINGS FOR MINIMUM LATERAL UNDERCELARANCE – UNDER BRIDGE

Rating by comparison of minimum lateral underclearance RIGHT AND LEFT and functional classification of the underpassing route.

UNDER CLEARANCE APPRAISAL RATING	MINIMUM LATERAL UNDERCLERANCE						
	FUNCTIONAL CLASSIFICATION						RAILROAD UNDER
	ONE-WAY TRAFFIC				TWO-WAY TRAFFIC		
	INTERSTATES, FREEWAYS, PRINCIPAL ARTERIALS				OTHER PRINCIPAL AND MINOR ARTERIALS	MAJOR AND MINOR COLLECTORS AND LOCAL ROUTES	
	MAINLINE		RAMPS				
	LEFT	RIGHT	LEFT	RIGHT			
9	> 9145 mm (> 30.0 ft)	> 9145 mm (> 30.0 ft)	> 1220 mm (> 4.0 ft)	>3050 mm (> 10.0 ft)	> 9145 mm (> 30.0 ft)	> 3660 mm (> 12.0 ft)	> 6100 mm (> 20.0 ft)
8	9145 mm (30.0 ft)	9145 mm (30.0 ft)	1220 ft (4.0 mm)	3050 mm (10.0 ft)	9145 mm (30.0 ft)	3660 mm (12.0 ft)	6100 mm (20.0 ft)
7	5490 mm (18.0 ft)	6400 mm (21.0 ft)	915 mm (3.0 ft)	2745 mm (9.0 ft)	6400 mm (21.0 ft)	3350 mm (11.0 ft)	5180 mm (17.0 ft)
6	1830 mm (6.0 ft)	3660 mm (12.0 ft)	610 mm (2.0 ft)	2440 mm (8.0 ft)	3660 mm (12.0 ft)	3050 mm (10.0 ft)	4270 mm (14.0 ft)
5	1525 mm (5.0 ft)	3350 mm (11.0 ft)	610 mm (2.0 ft)	1830 mm (6.0 ft)	3050 mm (10.0 ft)	2440 mm (8.0 ft)	3350 mm (11.0 ft)
4	1220 mm (4.0 ft)	3050 mm (10.0 ft)	610 mm (2.0 ft)	1220 mm (4.0 ft)	2440 mm (8.0 ft)	1830 mm (6.0 ft)	2590 mm (8.5 ft)
3	Lateral underclearance is less than the value in rating code 4 AND requires CORRECTIVE ACTION.						
2	Lateral underclearance is less than the value in rating code 4 AND requires REPLACEMENT.						
0	Structure is CLOSED.						

NOTES:

1. For values between those listed in the table, use the lower rating code.
2. When acceleration or deceleration lanes or ramps are provided under two-way traffic, use the value from the RIGHT RAMP column to determine the code.
3. The functional classificiation of the underpassing route shall be used in the evaluation. If an UNDER record is note coded, the underpassing route shall be considered a major or minor collector or local route.

APPENDIX B

APPRAISAL RATINGS FOR WATERWAY ADEQUACY

9	9	9	Bridge deck and roadway approaches are above floodwater elevations (high water). Chance of overtopping is remote.
8	8	8	Bridge deck is above the roadway approaches. There is a remote chance of overtopping the roadway approaches. There is greater than 915 mm (3 ft) of freeboard.
6	6	7	Bridge deck is above the roadway approaches. There is a slight chance of overtopping the roadway approaches. There is 610 to 915 mm (2 to 3 ft) of freeboard.
4	5	6	Bridge deck is above the roadway approaches. There is a slight chance of overtopping the roadway approaches with insignificant traffic delays. There is 300 to 610 mm (1 to 2 ft) of freeboard.
3	4	5	Bridge deck is above the roadway approaches. There is occasional overtopping of the roadway approaches with significant traffic delays. There is 0 to 300 mm (0 to 1 ft) of freeboard.
2	3	4	There is occasional overtopping of the bridge deck and roadway approaches with significant traffic delays.
2	2	3	There is frequent overtopping of bridge deck and roadway approaches with significant traffic delays.
2	2	2	There is ocasional or frequent overtopping of bridge deck and roadway approaches with severe traffic delays.
0	0	0	Bridge is closed.

NOTES:

Freeboard is based on the distance from the low member elevation at the bottom of the superstructure to the water surface of the 50-year frequency design storm.

See FHWA publication "Recording and coding Guide for the Structure Inventory and Appraisal of the Nations Bridges" Report No. FHWA PD-96-001

APPENDIX C

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APPENDIX D

POLICY FOR NEW BRIDGE DECKS

New bridge decks will be designed to standards that insure a reasonably long maintenance-free life. The requirements for new bridge decks have been grouped into two categories with a protective system designed to be cost effective for the anticipated exposure to de-icing chemicals in each of these categories.

Category	**Protective System**
All bridges carrying interstate traffic. All interstate highway bridges at an interchange with access to the interstate. All bridges carrying trunk highway traffic in major metropolitan areas and municipalities with populations of 5,000 or greater. All bridges on highways with 20-year projected ADT greater than 2000.	Epoxy-coated reinforcing bars in both top and bottom mats with special concrete overlay (provide 75 mm (**3 in**) of total concrete cover). Consideration shall also be given to the use of full depth low permeability concrete mixes.
Bridges not meeting the above criteria.	Epoxy-coated reinforcement bars with 75 mm (**3 in**) of structural concrete cover (no special concrete overlay) Consideration shall also be given to the use of full depth low permeability concrete mixes.

APPENDIX E

*POLICY FOR BRIDGE RAILINGS ON BRIDGE CONSTRUCTION AND RECONSTRUCTION PROJECTS (1-02)

The current Mn/DOT Policy for bridge railings on bridge construction and reconstruction contracts is as follows:

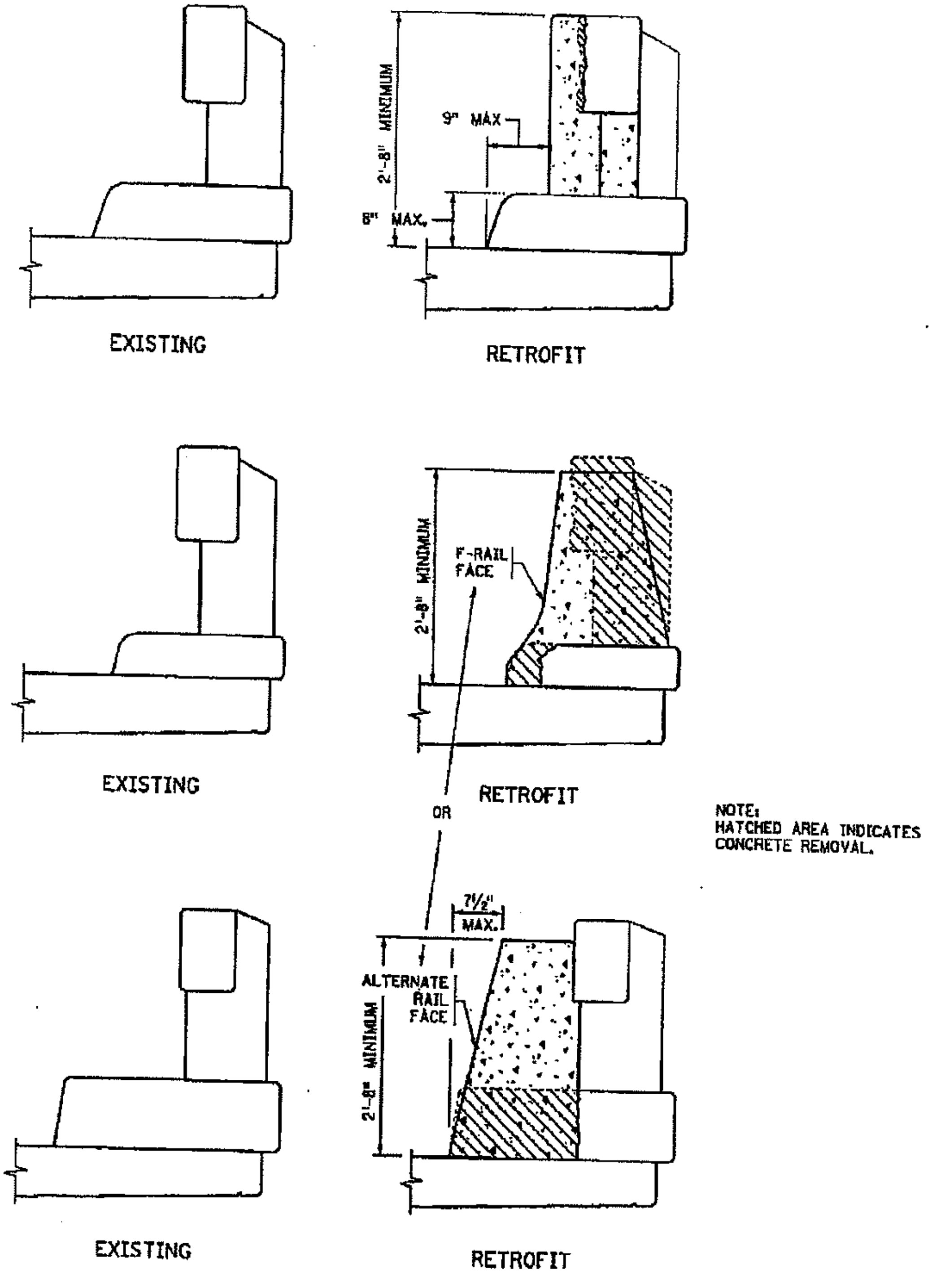
1) New Railings
   a. NCHRP Report 350 crash-tested traffic railing types will be used on new bridges, new sections of bridge widening, deck replacements and railing replacement projects in accordance with Section 13 of the *Mn/DOT LRFD Bridge Design Manual.*

2) In-Place Railings
   a. When any work is scheduled for a bridge not meeting the 4.45 kN (**10-kip**) design load requirements (1964 and later AASHTO Standard Specification), these railings will be modified (see attached examples) or replaced with railings meeting the crash-tested shape and strength requirements for new bridges.

   b. On bridges that have railings meeting the 4.45 kN (**10-kip**) design load, and where only minor structural work is scheduled, such as bridge deck overlays and bridge deck joint repair, the existing bridge railing will be replaced or modified when the existing railing is in poor structural condition; or site specific and railing performance data (i.e. accident data or curb projection > 9") indicate the need for railing revision. The end post and the approach guardrail transition will be upgraded as necessary to meet NCHRP Report 230 requirements.

   c. This policy is generally not applicable to through-truss-type bridges and other structures that would require extensive reconstruction or reduced roadway width or load capacity to comply with these criteria. However, modification of railings on through-truss bridges that are susceptible to collapse if a critical member is severely damaged should be considered on a case by case basis. This policy is also not applicable to bridges with design speeds of 64 km/hr (**40 mph**) or less, except that bridge railings that are in poor structural condition shall be strengthened or replaced to meet new design requirements.

*Note: This policy was reviewed after issuance in 1990 of FHWA requirements for use of NCHRP 350 crash-tested railing. Revisions made to this policy substantially comply with the requirements.



EXISTING

RETROFIT

EXISTING

RETROFIT

NOTE:
HATCHED AREA INDICATES CONCRETE REMOVAL.

EXISTING

RETROFIT

EXAMPLES OF MODIFICATIONS TO IN-PLACE RAILINGS TO CRASH TESTED SHAPE

APPENDIX F

MN/DOT POLICY ON RETROFIT OR REPLACEMENT OF FATIGUE-PRONE COMPONENTS OF STEEL BRIDGES

Non-Redundant Members
This policy applies only when all of the following listed conditions apply:

(1) The member is structural steel and is a primary load-carrying member.

(2) The member is composed of welded plates or has welded attachments, categorized as fatigue category D, E, or E' according to the AASHTO *Bridge Design Code*, or has welded attachments for floor beams or diaphragms which are not securely attached to both flanges.

(3) Heavy commercial average annual daily traffic (HCADT) is greater than or equal to 200 (ADT greater than or equal to 2000) or fatigue cracking is present in structural welds.

(4) Planned scope of work is classified as "improvement" or "rehabilitation" as defined in current Bridge Improvement and Replacement Guidelines.

Retrofitting in negative moment areas (Area "A") or replacements of non-redundant members shall be provided in bridge improvement or rehabilitation projects for members meeting the above criteria. The State Bridge Engineer shall approve any exceptions to this policy.

Redundant Members
Retrofitting or replacing redundant members is not required except when a fatigue-life analysis shows that the remaining life is significantly less than the expected service life of the bridge. If the remaining life is less than expected service life, the policy for retrofitting or replacing non-redundant members shall apply.

APPENDIX G

GUIDELINES FOR BRIDGE DECK MAINTENANCE BY MN/DOT FORCES

The guidelines for bridge deck maintenance by Mn/DOT forces are designed to extend the service life of inplace bridge decks that are not programmed for contract repairs. Bituminous overlays should not be placed on decks in Category A or B unless complete deck replacement is necessary due to failure to meet minimum width or load capacity requirements for concrete overlay. Maintenance repair should continue until the total usable life of the deck is expended and removal and replacement is warranted, as defined under the Bridge Improvement Guidelines.

Traffic	**Category**	**Deck Condition**	**Procedure**
>10,000 ADT	A	0% to 25% Unsound	Place low-slump or 50 mm (2 in) maximum slump concrete patches. *Apply approved sealer to curbs, sidewalks, and concrete railings.
>10,000 ADT	B	25% to 40% Unsound	Maintain rideability with concrete or bituminous patches.
>20,000 ADT	C	Greater than 40% Unsound	Schedule deck replacement and maintain rideability with bituminous mats.
< 10,000 ADT	A	0% to 40% Unsound	Place low-slump or 50 mm (2 in) maximum slump concrete patches. *Apply approved sealer to curbs, sidewalks, and concrete railings.
< 10,000 ADT	B	40% to 60% Unsound	Maintain rideability with concrete or bituminous patches.
< 10,000 ADT	C	Greater than 60% Unsound	Schedule deck replacement and maintain rideability with bituminous mats.
* Hand spray applications. Use sealer when patching is being done.			

APPENDIX H

FISCAL YEAR 2006-2008

BRIDGE MAINTENANCE PAINTING GUIDELINES

CONTENTS

INTRODUCTION

The corrosion of structural steel bridge members has been an ongoing concern to bridge and maintenance personnel. Not only does this corrosion mar the appearance of bridges, it can also seriously impair the structural capacity of the entire structure. The most widely used and most economical method to provide corrosion protection to steel bridge members is painting.

In the past, decisions regarding bridge maintenance painting methods, materials, priorities and needs have been based on individual opinions and have varied greatly statewide. These guidelines have been developed to (1) assist in the uniform and rational scheduling of paint projects; and (2) make available the latest technical procedures for maintenance painting. The primary consideration has been placed on the protection of the structural members with aesthetics complimenting this goal.

These guidelines for bridge maintenance painting have been prepared by the Bridge Office in cooperation with the Mn/DOT Bridge Maintenance Supervisor's Committee.

SCOPE OF BRIDGE MAINTENANCE PAINTING

Work covered by these guidelines includes contract bridge painting and painting by bridge maintenance forces. It is the intent of these guidelines to define the roles and responsibilities and to establish a closer complementary relationship between these two functions.

Preventative Maintenance Painting

Paint systems generally begin to fail first under expansion joints where steel is exposed to chlorides, frequent wet and dry cycles, and high humidity. Painted steel located away from joints, over roadways and streams, tends to fail and to corrode more slowly. A program of preventive maintenance including spot painting is useful to achieve the full design life of the paint system over the entire steel superstructure.

Preventive maintenance painting is typically done by Mn/DOT forces, but can be done by contract and generally involves preventative maintenance to repair small areas of paint failure to prolong the service life of the steel superstructure, it includes spot and touch-up painting of hinges, beam ends, bearings, fascia beams, and other critical or severely exposed areas of structural members.

Recent practice has indicated that Mn/DOT forces generally only work on non-lead based paint systems.

Contract Maintenance Painting

Contract bridge maintenance painting generally involves the complete or partial painting of bridges that cannot be reasonably or economically performed by Mn/DOT maintenance forces due to such factors as bridge size, complexity, location (height of structural steel, traffic considerations, especially stringent pollution requirements, etc.), hazardous paint removal and severity of paint deterioration.

After a paint system has reached the point of general failure, decisions to completely or partially repaint the bridge should be made after considering the life cycle costs and benefits. Maintaining the paint condition under joints and repainting visible fascia beam surfaces to improve aesthetics should be considered for bridges exhibiting little or no section loss and are estimated to be within 30 years of the end of their useful service life, or that have been fabricated with Mn/DOT 3309 weathering steel.

Minor or spot touch-up painting will be included under contract work only when it is performed in conjunction with other improvements (deck repair, overlay, etc.) on the same structure, or if the need for spot painting is judged to be critical and the work is beyond the capabilities of Mn/DOT maintenance forces.

Contract bridge maintenance painting is within the scope of, and included in, the Bridge Improvement Program.

Bridge maintenance painting by Mn/DOT forces may be included in the Road Repair Maintenance Preservation Program if funds are available.

GUIDELINES FOR BRIDGE MAINTENANCE PAINTING

The guidelines for bridge maintenance painting are based primarily on preserving the structural integrity of steel bridges in the most cost effective and practical manner possible.

APPLICATION AREA: Seven feet (7') either side of a bridge expansion joint or within the splash zone of truss through members.

- See the Structure Inventory Report to identify the in-place paint system or contact the Regional Bridge Engineer.
- The coating systems recommended below are based on an in-place specification 2478 zinc prime coat, epoxy mid coat and urethane top coat system. If spot painting other paint systems contact the Bridge Structural Metals Engineer for recommendations of compatible systems.
- "PDS" denotes Manufacturers Product Data Sheet(s).

Paint Condition (% Unsound)	**Procedures (See additional notes at the end of the tables)**	**Priority**	
		Contract	**Mn/DOT**
1% to 5%	Clean and prepare the affected areas per SSPC-SP 3 Power Tool Cleaning. All affected areas shall be prepared by feathering the edges and surrounding coatings to clean, sound material to eliminate lifting and delamination of the existing coatings prior to paint application. Place the following specified system(s) on all prepared surfaces: **For non-visible areas**, apply one coat of MACROPOXY 646 [Immersion grade] FAST CURE EPOXY high solids, high build, fast drying, polyamide epoxy intermediate coating. **For Visible areas (fascia girders)**, apply one coat of MACROPOXY 646 [Immersion grade] FAST CURE EPOXY high solids, high build, fast drying, polyamide epoxy intermediate coat, then one coat of ACROLON 218 HS polyester modified, aliphatic, acrylic polyurethane top coat. All materials to be applied in accordance with the mfg. PDS and application guide for those materials.	4	*1
6% to 20%	Clean affected area(s) with a soluble salt removal solution [Chlor-rid or equal] following mfg. guidelines. Clean and prepare the affected areas by abrasive	3	2

	blast cleaning per SSPC-SP 6 Commercial blast cleaning or SSPC-SP 3 Power Tool Cleaning. All affected areas shall be prepared by feathering the edges and surrounding coatings to clean, sound material to eliminate lifting and delamination of the existing coatings prior to paint application. Apply the following specified system(s) to all prepared surfaces: **For non-visible areas,** apply one coat of MACROPOXY 646[Immersion grade] FAST CURE EPOXY high solids, high build, fast drying, polyamide epoxy intermediate coating. **For Visible areas (fascia girders),** apply one coat of MACROPOXY 646[Immersion grade] FAST CURE EPOXY high solids, high build, fast drying, polyamide epoxy intermediate coat, then one coat of ACROLON 218 HS polyester modified, aliphatic, acrylic polyurethane top coat. All materials to be applied in accordance with the mfg. PDS and application guide for those materials.		
21% to 40%	Clean affected area(s) with a soluble salt removal solution [Chlor-rid or equal] following mfg. guidelines. Clean and prepare the affected areas by abrasive blast cleaning per SSPC-10 Near White Blast. All affected areas shall be prepared by feathering the edge(s) and surrounding coatings to clean, sound material to eliminate lifting and/or delamination of the existing coatings prior to paint application. Apply the following specified Mn/DOT 2478 system(s) to all prepared surfaces: Apply one coat of a two-component, polyamide epoxy, zinc-rich primer coating, one coat of a rust inhibitive high build catalyzed polyamide epoxy primer intermediate coating and one coat of a high solid polyester modified, aliphatic, acrylic polyurethane top coat. All materials to be applied in accordance with the mfg. "PDS" and application guide for those materials.	2	3

More than 40%	Clean affected area(s) with a soluble salt removal solution [Chlor-rid or equal] following mfg. guidelines. Remove all in place existing paint, rust and contaminants a minimum of 10' either direction of the affected area(s) by abrasive blast clean per SSPC-10 Near White Blast. Repaint all prepared surfaces with the following specified Mn/DOT 2478 system(s). Apply one coat of a two-component, polyamide epoxy, zinc-rich primer coat, one coat of a rust inhibitive high build catalyzed polyamide epoxy primer intermediate coating and one coat of a High solid polyester modified, aliphatic, acrylic polyurethane top coat. All materials to be applied in accordance with the mfg. "PDS" and Application guide for those materials	1	4

* Because of environmental concerns, paint systems on bridges over wild or scenic rivers and streams should be maintained with a compatible system in a condition such that paint deterioration is limited to less than 5% of the painted area (Mn/DOT forces Priority 1) whenever possible. Common truss-type bridges at these locations that have paint system deterioration above 5% should be painted by Mn/DOT forces (Priority 2 or 3) if the expected service life of the structure warrants.

APPLICATION AREA: Between Maintained Bridge Expansion Joint Areas (All areas not covered in the previous table).

- See the Structure Inventory Report to identify the in-place paint system or contact the Regional Bridge Engineer.
- The coating systems recommended below are based on an in-place specification 2478 zinc prime coat, epoxy mid coat and urethane top coat system. If spot painting other paint systems contact the Bridge Structural Metals Engineer for recommendations of compatible systems.
- "PDS" denotes Manufacturers Product Data Sheet(s).

Paint Condition (% Unsound)	**Procedures (See additional notes at the end of the tables)**	**Priority**	
		Contract	**Mn/DOT**
1% to 5%	NO REPAIR IS REQUIRED	N/A	**N/A
6% to 20%	Repairs are necessary only for aesthetic reasons. Limit repairs to painting of fascias and bottom flanges.	3	**N/A

21% to 40%	Repairs in this category will apply only to the exterior surfaces of fascia girders, and all surfaces of the bottom flanges of interior girders including 3” of the bottom portion of the web. Clean affected area(s) with a soluble salt removal solution [Chlor-rid or equal] following mfg. guidelines, Clean and prepare the affected areas by abrasive blast cleaning per SSPC-10 Near White Blast. All affected areas shall be prepared by feathering the edge(s) and surrounding coatings to clean, sound material to eliminate lifting and/or delamination of the existing coatings prior to paint application. Apply the following specified Mn/DOT 2478 system(s) to all prepared surfaces: Apply one coat of a two-component, polyamide epoxy, zinc-rich primer coating, one coat of a rust inhibitive high build catalyzed polyamide epoxy primer intermediate coating and one coat of a high solid polyester modified, aliphatic, acrylic polyurethane top coat, All materials to be applied in accordance with the mfg. “PDS” and application guide for those materials.	2	**N/A
More than 40%	Clean affected area(s) with a soluble salt removal solution [Chlor-rid or equal] following mfg. guidelines. Remove all in place existing paint, rust and contaminants. Abrasive blast clean specified area(s) per SSPC-10 Near White Blast. Repaint all prepared surfaces with the following specified Mn/DOT 2478 system(s): Apply one coat of a two-component, polyamide epoxy, zinc-rich primer coat, one coat of a rust inhibitive high build catalyzed polyamide epoxy primer intermediate coating and one coat of a High solid polyester modified, aliphatic, acrylic polyurethane top coat. All materials to be applied in accordance with the mfg. “PDS” and Application guide for those materials. __** Denotes No Mn/DOT forces or equipment to be used for Aesthetic damage repairs__	1	**N/A

Notes Related to the above Tables:

Feathering / Cleaning Procedure:

STEP 1- Clean damaged areas, which are to receive coating materials and which exhibit visible oil, grease or other soluble contaminants by methods described in SSPC-SP 1 "Methods of Solvent Cleaning"; Section 4.
If necessary, after performing Solvent Cleaning, visible contaminants are still present; clean area again until the surface is free of visible soluble contaminants.
STEP 2 - Remove any loosely adhered coating materials (at or near the damaged area) by scraping and brushing the surfaces and by methods described within SSPC-SP 2 "Hand Tool Cleaning" Sections 4 and 5. If necessary, after performing Hand Tool Cleaning, visible contaminants are still present; perform STEP 1 again to any affected areas until the surface is free of visible soluble contaminants.
STEP 3 - Feather out (blend) the damaged area using methods described in SSPC SP-3 Section 5 creating a smooth transition to the existing and surrounding coating materials. *NOTE: Welds shall be cleaned in the same manner but should be cleaned and feathered to the surrounding existing coating materials a minimum of 2" off either side of the centerline of the weld joint (further if damage is extensive).* Feather out (blend) any edges and other areas of the surrounding coatings which exhibit lifting and/or delamination.
STEP 4 - Clean areas to receive coating materials, by methods described within SSPC-SP 3 Power Tool Cleaning; Section 5. This would consist of the use of rotary power tool(s) to remove stratified rust scale, weld slag, and the use of power wire-brushing or other power rotary tools to remove **loose** mill scale and **non-adhering** rust, deleterious materials or contaminants. **Do not burnish the surface.**
This step should be used to remove any leftover heavy and/or loose materials on the surface, which were not removed by the previously performed Hand Tool cleaning method. Excessive power tool cleaning could result in a burnishing of the surface, which is not recommended.

Paint Condition

Potential paint projects can be initially identified when either the total percentage of failed paint area, as shown at the top of the inspection form, or when the Pontis elements in condition 3, 4, and 5 total 20% of the total superstructure area or of the total length of element.

A follow-up visit to the bridge should be made to estimate the percent paint failure located within 7 feet on each side of expansion joints. For the purposes of assessing the condition near the joints, the paint conditions listed in the table are generally based on the surface area of the most corroded beam under the joint, and not the average of all beams under the joint.

A separate estimate should also be made of paint failure on the remaining beam area. The paint conditions listed in the table are generally based on the percentage of paint failure on the fascia beam, or the area within the salt spray zone (i.e. within 5 feet of the deck surface) of through truss type bridges. The percentages should be computed based on the limits of areas of deteriorated paint and corrosion that must be removed to apply a subsequent paint system. For the purposes of making this estimate, deteriorated paint that must be removed is defined as paint that shows blistering, film embrittelment, loose paint or extensive staining.

Procedures

The procedures described above have been developed to reflect current technology in the field of bridge painting. The procedures are designed to provide the maximum degree of protection possible for the money expended for each category of paint system deterioration.

Moisture cured Zinc-Epoxy-Urethane paint systems may be specified for use on overpass beam type bridges to reduce curing times between paint coats.

When recoating or spot painting systems other than zinc-epoxy-urethane, contact the Structural Metals Engineer for recommended procedures or compatible systems.

Priorities

The above priorities were established to better coordinate the bridge maintenance painting operations performed by contract and Mn/DOT maintenance forces, taking into consideration the relative capabilities of each function. The preventative maintenance work performed by Mn/DOT forces minimizes the number of steel bridges that are advancing to a degree of paint system deterioration where the more extensive contract work is required.

Regardless of the above priorities, contract painting should not be performed on structures with a short service life expectancy or on any structure that is programmed for replacement in the near future. In addition, maintenance painting by Mn/DOT forces should be limited to only the critical structure areas of these structures.

When the total removal of the in-place paint system is the recommended procedures for beam span bridges and modern trusses, a Mn/DOT 2478 zinc-rich primer, epoxy intermediate and urethane finish coat paint system should be used. Seven standard colors for the urethane top coats for this system have been developed in conjunction with the Mn/DOT site and Development Section. These standard colors are as follows:

1. Light Blue (Fed. Std. No. 25526)
2. Dark Blue (Fed. Std. No. 15080)
3. Brown (Fed. Std. No. 10075)
4. Charcoal Grey (Fed. Std. No. 26008)

5. Black (Fed. Std. No. 27038)
6. Light Green (Fed. Std. No. 24325)
7. Dark Green (Fed. Std. No. 24227)

Standard samples of these colors are available on request from the Mn/DOT Materials Office.

Other colors for the urethane finish coats may be formulated for special conditions or considerations. However, due to the problems of reproducing the same paint shades for later touch-up maintenance painting, the use of nonstandard colors should be discouraged. Standard colors can be reproduced using color chips on file in the Mn/DOT Materials Office.

APPENDIX I

FUNDING ELIGIBILITY

Many different funding sources exist including federal funds, state funds, and local funds. Bridge projects may qualify for all or some of these funds depending on the type of highway they serve. Bridges also qualify for different funding depending upon the extent of work done to them.

Federal funds for bridge replacement and bridge improvement (repair) projects are available from a variety of federal program categories. Within Minnesota, bridge construction projects are commonly considered either Bridge Replacement (BR) projects or Bridge Improvement (BI) projects. The Area Transportation Partnership (ATP) prioritizes program categories to fund bridge projects that are included in the final State Transportation Improvement Program (STIP). The federal program categories that are available are listed below.

Highway Bridge Replacement and Rehabilitation Program (HBRRP)

The HBRRP is the federal funding program available to fund the replacement or rehabilitation of bridges on any public road. It is commonly known as the BR program. To be eligible, the bridge must be on a public road, more than 6100 mm (20 ft) long, have a sufficiency rating less than 50 percent for replacement or less than 80 for rehabilitation, and be classified as Structurally Deficient or Functionally Obsolete. Bridge preservation activities that can be shown to be cost beneficial and extend the service life of a bridge are also eligible but they do not have to be on the federal selection list (i.e., they do not have to meet minimum sufficiency rating criteria) to qualify for funding. Each state is apportioned funds annually for the BR program according to federal formulas.

Discretionary Bridge Program

Included in the HBRRP is the Discretionary Bridge Program. The Discretionary Bridge Program is an annual program administered by the Washington Office of FHWA where states can submit bridge projects if the bridge cost is over $10,000,000. Projects must meet the eligibility requirements of the HBRRP. The projects must be ready for letting in the upcoming federal fiscal year; therefore, projects should be in the STIP with the plans nearing completion.

Surface Transportation Program (STP)

Bridge replacement, rehabilitation, and new bridges can be funded with STP funds. Bridge projects using STP funds are not restricted to federal-aid roads but may be on any public road. Inplace bridges being replaced or repaired do not have to meet the sufficiency rating or other restrictions of the HBRRP.

National Highway System (NHS) and Interstate Maintenance (IM)

Bridge projects can be funded with NHS funds for projects on the National Highway System. Inplace bridges being replaced or repaired do not have to meet the sufficiency rating or other restrictions of the HBRRP. Bridges on the interstate system, which are part of the National Highway System, are also eligible for IM funding.

APPENDIX J

REPAIR OR EXTENSION OF TYPE W CONCRETE BOX CULVERTS

History

Box culverts designated in the bridge inventory with the prefix "W" (i.e.W10x10) were designed according to standard plan sheets that were developed from 1928 through 1939. The culverts were designed with a single layer of reinforcement in each of the sides with no moment reinforcement effective through the corners. The Type W culvert standards were replaced beginning in 1940 by Type C standards which, like current standards, include a top and bottom layer of reinforcement in each wall and moment reinforcement through the corners. It is unclear as to what standard was used prior to 1928.

Rating Analysis

Since Type W culverts are already 65 or more years old, analysis is necessary before making recommendations to repair or extend them. A new load rating should be determined for the current fill height. Use a 3000 psi concrete strength and 30,000 psi yield for reinforcement. The 10 foot culverts were designed for fills from 0'-10', 10' – 20', and 20'-35'. The 12 foot culverts started at 0'-8' fills. Since original plans or design data may not have been preserved for many of these culverts, when referencing the design standards designers should assume that fill has increased over time (perhaps 2 feet minimum). For example, if the inventory indicates 11 feet of fill over a Type W culvert, unless more information is available the 0-10' standard should be assumed.

Recommended Improvement or Replacement

Type W culverts with newly calculated operating ratings < HS 20 should not be extended.

Repairs or modifications to Type W culverts with newly calculated operating ratings greater than HS 20 should be scoped to raise the NBI condition evaluation for the culvert to at least 7 (satisfactory).

Culverts with newly calculated operating ratings < HS 20 and with an NBI condition evaluation of 5 or less should not be repaired except as needed to prevent collapse.

APPENDIX K

Design Standards - Bridge Improvement Project

(form updated 04/27/05)

This Bridge Improvement Project Involves:

	Full Deck Replacement
	Superstructure Replacement
	Bridge Widening
	Bridge Raising
	Renovation

Design Parameters:

Highway Type:	( ) Interstate, Urban	( ) Interstate, Rural	( ) Two lane rural
Highway Classification:	( ) Arterial	( ) Collector	( ) All others
Railroad:	( ) over RR	( ) under RR	

Traffic Volume: Current ADT ______ veh / day (based on ( ) actual counts, ( ) traffic flow map, dated __/__/__

( ) Bridge is less than 150 m (500 ft) long ( ) Bridge is greater than 150 m (500 ft) long

( ) Existing and Proposed Typical Sections are in the appendix.

( ) The cost of this bridge improvement project will not exceed 60% of the cost of a new bridge.
( ) The cost of this bridge improvement project exceeds 60% of the cost of a new bridge. Give reasons for not replacing or rehabilitating bridge.

Inventory Feature	Existing Condition, minimum	Proposed Condition, minimum	Minimum Value, ***FY 2006-2008 Bridge Preservation, Improvement and Replacement Guidelines***, Minimum Criteria for Bridge Improvements, Table G-1	Mn/DOT Standard for New Construction / Reconstruction	Reference in Mn/DOT Road Design Manual
Inventory Rating	MS __._ (HS __)	MS __._ (HS __)	MS 16.2 (HS 18)	MS 22.5 (HS 25) for new bridges MS 18.0 (HS 20) for existing bridges	Section 9-2.0
Vertical under clearance	___._ m (__ ft)	___._ m (__ ft)	Interstate, Urban - 4.57 m (15'-0") Interstate, Rural - 4.9 m (16'-0") All others - 4.4 m (14'-6") over RR - 6.71 m (22'-0")	Highway under bridge New bridges - 5.0 m (16 ft-4 in) Existing bridges – 4.9 m (16 ft – 0 in) [difference between new and existing allows for 4 in overlay] Railroad under bridge 7.0 m (23 ft-0 in) Highway under sign or pedestrian bridge New bridges - 5.3 m (17 ft-4 in) Existing bridges – 5.2 m (17 ft – 0 in) [difference between new and existing allows for 4 in overlay]	Table 9-2.01B

APPENDIX K

Inventory Feature	Existing Condition, minimum	Proposed Condition, minimum	Minimum Value, ***FY 2006-2008 Bridge Preservation, Improvement and Replacement Guidelines***, Minimum Criteria for Bridge Improvements, Table G-1	Mn/DOT Standard for New Construction / Reconstruction	Reference in Mn/DOT Road Design Manual
Lateral under clearance Right Left	 ___._ m (__ ft) ___._ m (__ ft)	 ___._ m (__ ft) ___._ m (__ ft)	Interstate (1 way) 1.2 m (4') lt, 3.0 m (10') rt Interstate (Ramp) 0.61 m (2') lt, 1.2 m (4') rt Principal and Minor Arterials 1.8 m (6') Major and Minor Collectors 1.2 m (4') Railroad Under 2.6 m (8'-6")	Not applicable as a New Construction / Reconstruction standard on Bridge Improvement projects	
Scour code			All scour prevention methods are inplace.	Not applicable as a New Construction / Reconstruction standard on Bridge Improvement projects	
Lane width	___._ m (__ ft)	___._ m (__ ft)	Not applicable	3.6 m (12 ft)	See
Deck Width (curb-to-curb)	___._ m (__ ft)	___._ m (__ ft)	see Table G-1	• Use Bridge shoulder width from RDM Table 9-2.01A. • Use lane width of 12 ft.	See Table 9-2.01A
Steel Superstructure			Meets Mn/DOT Policy on Retrofit of Fatigue Prone Components	Not applicable as a New Construction / Reconstruction standard on Bridge Improvement projects	Not applicable
Type of Railing			Meets Mn/DOT policy on bridge railings in Appendix E	Not applicable as a New Construction / Reconstruction standard on Bridge Improvement projects	Not applicable

Minimum Condition Criteria

Bridge Feature	**Minimum Condition Criteria**
Superstructure Condition	No portion of main structural element in worst condition and portion in 2nd worst condition less than 10%
Substructure Condition	No portion of main structural element in worst condition and portion in 2nd worst condition less than 10%
Culvert Condition	No portion of main structural element in worst condition and portion in 2nd worst condition less than 10%
Deck Condition	Deck is in condition state 3 or better

NOTES:
An asterisk preceding proposed condition indicates a Geometric Design Exception. ~~See Geometric Design Exception Justification below for additional information.~~

APPENDIX K

For Bridge Improvement Projects, two separate sets of standards apply, as noted in the in the table above:

- **Mn/DOT Standard for New Construction / Reconstruction**
- **Minimum Value,** ***FY 2006-2008 Bridge Preservation, Improvement and Replacement Guidelines*****, Minimum Criteria for Bridge Improvements,** Table G-1

Design Exception Justification - Mn/DOT Standard for New Construction / Reconstruction
On Bridge Improvement projects, where any of the inventory feature values listed in the Design Standards table are less than the Mn/DOT Standard for New Construction / Reconstruction, a design exception is required. Please justify the design exceptions (if any) noted in the Design Standards table below. Refer to section 2-6.01.01 of the MnDOT Road Design Manual for additional guidance on Geometric Design Exceptions.

Design Exception Justification - Minimum Value, ***FY 2006-2008 Bridge Preservation, Improvement and Replacement Guidelines*****, Minimum Criteria for Bridge Improvements,** Table G-1
On Bridge Improvement projects, where any of the inventory feature values listed in the Design Standards table are less than the Minimum Value, *FY 2006-2008 Bridge Preservation, Improvement and Replacement Guidelines*, Minimum Criteria for Bridge Improvements, Table G-1, a design exception is required. The criteria in Table G-1 is lower than the New Construction / Reconstruction standard. If the criteria in Table G-1 cannot be met, see Bridge Preservation, Improvement and Replacement Guielines, part V (Guidelines for Bridge Improvement), section D.

Design Exception recommended for approval by:

State Bridge Engineer Date

Interstate/STRAHNET system
( ) This project does not involve work on the Interstate/STRAHNET system.
( ) This project involves work on the Interstate/STRAHNET system.
    ( ) At the completion of this project, all bridges will meet the 4.9 m (16 foot) standard for vertical clearance over Interstate highways.
    ( ) At the completion of this project the vertical clearance of the bridge will remain unchanged. The scope of work involves limited repair of the bridge or roadway pavement. The project scope does not provide the opportunity to alter the vertical clearance situation. FHWA will be requested to coordinate with the Department of Defense - MTMCTEA at least three months before letting.

Traffic Handling During Construction (explain how traffic will be handled during construction; attach detour map if applicable)

Bicycle and Pedestrian Considerations
(Check all that apply)

1. Select one of the following (a or b) if bicycles and pedestrians will not be allowed on this roadway:
    ( ) a. crossing of this roadway by bicycles and pedestrians ( ) will be ( ) has been evaluated in the development of this project
    ( ) b. accommodation for crossing of bicycles and pedestrians has been evaluated and found to be not required for this project (see HPDP Bikeways and Pedestrians Guidance – Threshold Criteria).

2. ( ) Bicycles and pedestrians are not prohibited from this roadway, and accommodation of bicycles and pedestrians ( ) will be ( ) has been evaluated.

3. ( ) Existing access for bicycles or pedestrians will be eliminated by this project (an alternative route for bicycles and pedestrians must be provided).

4. If 1(a), 2 or 3 is checked, list the local units of government that ( ) will be ( ) have been contacted for information to coordinate this project with existing and proposed bikeways:

5. ( ) Preliminary layouts and/or draft layouts ( ) will be ( ) have been provided to the Bicycle and Pedestrian Section of the Transit Office for advisory comment in accordance with the HPDP project review guidelines (see HPDP Bikeways and Pedestrians Guidance – Threshold Criteria).

Layout Status:
( ) A geometric layout is not required for this project.
( ) A Level __ (1, 2, 3) Geometric Layout (and profile) ( ) will be ( ) has been prepared for this project.
The layout has received Mn/DOT ( ) staff review and concurrence ( ) staff approval (approved __/__/__).

( ) Municipal approval is required. Municipal approval received on __/__/__.

7

Transportation Program Committee (TPC)
Meeting Minutes
November 2, 2005

EXHIBIT NO: 6
Date: 4-10-08
JULIE A RIXE
COURT REPORTER

Attendees: Doug Differt, Julie Skallman, Bob Winter, Marthand Nookala, Dick Stehr, Randy Halvorson, Kevin Gray, Al Schenkelberg, Bob Hofstad, Linda Zemotel, Shawn Chambers, Lucy Kender, Sue Thompson, Pat Hughes, Duane Leurquin, Ed Idzorek, Bob McFarlin, Scott Peterson, Betsy Parker, Brad Larsen, Brian Gage, Dan Dorgan, Val Svensson

Federal Program and Programming Decisions

Obligation Authority Direction (Handout: Formula Obligation Authority Assumptions)

Bob Hofstad spoke of the information and guidance received since the passage of SAFETEA-LU. Higher formula apportionment levels received in FFY 06 and forecast for the remainder of the bill allows us to reduce obligation level assumption from 95% to 90% without significant impact to earlier formula OA forecast. Of particular note, both Formula and HPP obligation authority (OA) were received at an 85% level for FFY 2005.

Julie Skallman presented a letter received from the Association of Minnesota Counties (AMC) in which they question the reduced level of funding they will receive for local HPP projects. TEA-21 with its RABA adjustments resulted in an OA of approximately 91%. MnDOT made whole the difference for TEA-21 HPP's but due to the increase in number and value of HPP's in SAFETEA-LU, it is recommended that MnDOT cap its commitment for these projects at the actual FFY 2006 OA once received. For budgeting purpose 85% OA should be used until the final numbers are known.

Action: Approved the use of 90% OA for Federal Formula Funds and 85% OA for HPP. A letter describing past and future commitment including the Interim Earmark Guidance will be sent to AMC. OIM will draft the response for the Commissioner's signature.

Legislative Advisory Commission (Handout: LAC HPP Request)

Duane Leurquin presented a forecast of financial requirements estimated by the Districts as a result of receipt of nearly $500M HPP. The Operations budget needs to be increased by $3.5M in SFY 2006 and $5.0M in SFY 2007 to allow staff time to be charged to HPP dollars. In addition, the SRC Budget for SFY 2006 and 2007 were under requested by $38M and $31M for HPP projects, respectively.

Action: Approved the request with a change to the Operations title. The title should read Program Delivery to accurately reflect the request being made.

Earmarked Projects (Handouts: Detail of SAFETEA-LU HPP Funds for any Project that Involves a Trunk Highway, SAFETEA-LU Highway Earmark Funding)
Duane Leurquin presented data on the 47 projects (66 numbers issued, but some projects have multiple earmarks). Brad Larsen presented guidance on the funding of these projects. Brad would like to send out the guidance by November 4, 2005. The guidance will need to be updated as new data is received from FHWA.

Action: Requested the matrix provide additional comments on how much funding is required during the time frame identified. Approved guidance to be sent out reflecting changes to funding levels.

Special Programs (Handout: Select Special Programs in SAFETEA-LU)
Linda Zemotel addressed the new special programs authorized in SAFETEA-LU. There is still a question on the amount of match required for the Coordinated Border Infrastructure funds. Questions on these programs should be addressed to Linda and she will continue to work with FHWA to obtain additional guidance. It is recommended that TPC select projects for the special programs.

Action: Affirmed TPC will select projects for the two SAFETEA-LU Special Programs: Coordinated Border Infrastructure and Highways for LIFE.

Ten Year Highway Work Plan Schedule
Al Schenkelberg proposed the Ten Year Work Plan be forgone this year; however, it should remain on schedule for next year (Sept/Oct 2006). This still requires the Districts to enter into PPMS the letting dates and estimates for MC, RC and BR projects identified in the first planning period of the District Long Range Plan (thru 2014).

Action: Approved request as presented.

Target Formula

Federal Fund Distribution (Handouts: TPC Target Discussion Outline, Stakeholder Comments on the Target Formula Re-evaluation, Federal Target Formula Scenarios, Draft Statewide Bridge Preservation Program FY 2009-FY 2018, Draft Statewide Corridor Fund)
Ed Idzorek provided background on the Technical Work Team's process for recommendation of changes to the existing Federal Funds distributed. This was presented in three parts: the Federal Target Formula, the Statewide Bridge Preservation Fund, and the Statewide Corridor Fund.

Federal Target Formula
Ed summarized the stakeholder comments on the five Federal formula scenarios forwarded by the Technical Work Team to TPC for their consideration. He also described the recommendation for the base formula distribution of $345 million, the approximate $45 million adjustment to the base for preservation inflation (varies depending on specific formula), and the hold harmless adjustment (only applies to one ATP under one scenario).

TPC discussed the merits of the five scenarios and recommended adoption of Scenario EJ-B with the following revision: the Congested VMT factor will be revised to use year 2014 forecasted data. Note that this will adjust the percentages from those presented. Additional discussion points which impacted the recommendation were: 1) the selected formula is consistent with the Performance Based planning concept that has now been incorporated into the State and District Long Range plans; 2) the performance based approach has been explained to the legislature in the 2004 and 2005 sessions and was well received. Last session we testified in both the House and Senate that it will take an additional $1 billion per year to achieve our performance based targets in the next 20 years. The discussion focused on how to raise the additional funds; and 3) the process for selecting a new formula was open, lengthy and thorough.

Action: Scenario EJ-B will be advanced for use beginning in SFY 2009 with the Congested VMT factor revised to a Forecast Congested VMT for the year 2014 with network changes through 2009.

Statewide Bridge Preservation Fund

Ed presented the generally supportive stakeholder comments on the Statewide Bridge Preservation Fund. The fund is intended to address the large bridge preservation projects that the ATPs have found difficult to fund. The Statewide Bridge Preservation Fund will cover 50% of the project cost, with the ATP responsible for the remaining 50%. Dan Dorgan and Val Svensson provided a draft list of bridges for the period SFY 2009 through SFY 2018. The Office of Bridges and the District have jointly agreed to the must replace date and the project cost. The total cost of the bridges in the draft list was approximately $880 million. The Statewide Bridge Preservation Fund will be capitalized with $40 million annually. The list will be revisited annually with TPC approval required.

Action: A Statewide Bridge Preservation Fund program will be effective immediately to fund projects beginning in SFY 2009, and covering projects for ten years.

Statewide Corridor Fund

Ed presented the stakeholder comments on the proposed Statewide Corridor Fund. The fund is intended to address large mobility and safety projects. The Statewide Corridor Fund will cover 50% of the project cost, with the ATP responsible for the remaining 50%. The TPC subcommittee will be responsible for project selection. The funds available to capitalize this program will depend on the federal fund balance remaining after the base target and Statewide Bridge Preservation Fund takedowns.

The proposal for a Statewide Corridor Fund will be refined and discussed with the Districts over the next month. A detailed proposal will be presented to TPC on December 8, 2005.

Action: The concept of a Statewide Corridor Fund for mobility and safety beginning in SFY 2009 is approved.

State Trunk Highway Construction Fund Distribution (Handout: State Target Formula Scenarios)

Ed Idzorek stated that the current Target Formula is used for both Federal and State Funds. TPC recommended continuing that approach with the new formula. TPC recommended that the scenario factors for State funds should contain Trunk Highway data only, to the extent feasible. After discussing the purpose of the Transit factor in the scenarios TPC recommended that its 5% weight be transferred to Future Congested VMT. Under Scenario EJ-B, and assuming a State Fund level of $275 million, an additional $9.6M is needed to hold all Districts to at least their current State Trunk Highway Construction Fund level. TPC recommended that no District shall receive less than their current State Fund level.

Action: Scenario EJ-B, with the adjustments recommended by TPC, is approved for use beginning in SFY 2009.

ATP Process Recommendation (STIP Guidance) (Handouts: Direction for STIP Guidance)
Bob Hofstad provided preliminary guidance topics with a brief description of the Department's direction. The draft guidance will be sent out by the end of November and finalized in January 2006.

The next Transportation Program Committee meeting is scheduled for Thursday, December 8, 2005, 1:00 to 3:30 p.m..

TPC Target Discussion Outline

ATP Federal Fund Distribution

Background

- Process
- Technical Work Team
- Performance Based
  1. Preservation
  2. Safety
  3. Mobility

Federal Target Formula Selection

- Key ATP/District comments
- Base $ for formula distribution ($345m)
- Preservation inflation adjustment (~$45m)
- Hold harmless (~0.5m) (Federal funds only)
- Recommended scenario
- Implement for FY2009
- Congested VMT year
- Update frequency – populate formula with new data in 2009 for FY 2014

Statewide Bridge Preservation Fund

- Key ATP/District comments
- Definition of bridge preservation
- Ten year program (FY 2009 – FY 2018)
- 50% Statewide Bridge Preservation Fund / 50% ATP cost share
- Statewide share capped when project first enters STIP
- Local share eligible (no Local bridges currently identified)
- Identified about $880 million total
- Statewide share – $40 million per year for ten years
- Bridge Office and District agree to "Must replace" date
- TPC concurrence on projects
- Annual review

Statewide Corridor Fund

- Key ATP/District comments
- Definition
- Solicitation in Fall 2005 for FY 2009 and FY 2010 candidates
- Annual $ in program (~$45m depending on apportionment level and obligation authority. If more or less adjustment made in Statewide Corridor Fund)
- 50% Statewide Bridge Preservation Fund / 50% ATP cost share
- Statewide cost share capped when first enters STIP
- Local share eligible
- TPC selects projects
- Biennial review

State Trunk Highway Construction Fund Distribution

Trunk Highway Target Formula Selection

Key ATP/District comments
Same factors as Federal formula (TH data only, except Population)
Move Transit share to Congested VMT
Base $ for formula distribution ($275m)
Hold harmless ($6m to $11m to make up shortfall only)
Implement in FY2009

ATP Process Recommendations

Issues

Key ATP/District comments

STIP Guidance

DRAFT Statewide Corridor Fund

Introduction/Background

The Statewide Corridor Fund (SCF) is established beginning in FY 2009, to aid Districts and Area Transportation Partnerships (ATPs) in completing major transportation corridor projects of statewide significance. While important to the entire transportation system, these corridor projects have been difficult for individual Districts/ATPs, given their scale, total cost and multi-jurisdictional impact.

The SCF will use the Federal dollars remaining after distribution of the targeted federal funds to the Districts/ATPs (~$390 million per year) and capitalization of the Statewide Bridge Preservation Fund with $40 million per year. Depending on apportionment and obligation authority levels, it is forecast that between $45 million and $75 million per year will be available in FY 2009 and FY 2010.

Eligibility – Statewide Significance

- IRC Corridors - Projects of Statewide Significance.
  - IRC Corridor projects to address current or projected mobility or safety performance problems.
  - May involve investments on parallel supporting federal-aid eligible routes.
- Regional Trade Center - Projects of Statewide Significance
  - Projects on the freeway system, within the Twin Cities Metro area to address current or projected congestion performance problems.
  - Projects within Regional Trade Centers, Levels 1-2, to address current or projected mobility problems (map attached).
  - May involve investments on parallel supporting federal-aid eligible routes.
- New Major Bridges of Statewide Significance
  - New bridges to address mobility performance problems on IRCs or the Metro District freeway system.
  - May involve investments on parallel supporting federal-aid eligible routes.

Additional Eligibility Requirements

- Projects must be included in a District Long Range Plan, a MPO Long Range Plan, or a Local Transportation Plan. Mn/DOT projects must be in the first planning period of the fiscally constrained District Long Range Plan, 2009-2014.
- Projects must have total eligible project costs greater than 50% of an ATP's annual Targeted Federal Funds.
- A "New Major Bridge" project is a bridge on new alignment that adds lanes, with existing bridge left in service. Project Cost, including bridge approaches, greater than 50% of an ATP's annual Targeted Federal Funds.
- Projects must have a financial plan demonstrating that District/ATP share of funds is available and that priority preservation investments are maintained.

Funding Definitions and Limitations

- The SCF will participate in an amount up to 50% of the project cost.
- For Design-Bid-Build projects, project cost includes construction cost, including local share and bridge approaches, but excludes design, right-of-way and construction incentives.

- Local share of selected projects is eligible for SCF funding and can be included in the project cost estimate.
- Because the SCF is capitalized with Federal funds the ATP share must include the entire State/Local match.
- The SCF share (up to 50% of project cost) will be calculated after application of any Federal High Priority Project funds.
- The cost estimate used to cap SCF participation will be the "year of construction" project cost, when the project is submitted for application. Cost increases, overruns, and construction incentives will be covered by project proposer (Local jurisdiction or Mn/DOT District).
- "Year of construction" costs will be determined using OIM's construction inflation forecast.

Solicitation

SCF projects will be solicited for inclusion in the FY2009 and FY2010 years of the STIP currently under development. Project applications must be approved by the ATP. The next SCF solicitation is anticipated in 2007 for FY2011 and FY2012.

The first solicitation timeline follows:

- Dec 2005 / Jan, 2006 - During ATIP development ATPs identify SCF candidate projects for FY 2009 and FY 2010.
- Feb 1, 2006 - Nominations submitted to Office of Investment Management.
- Mar 1, 2006 - OIM provides technical ranking and financial analysis.
- Mar 15, 2006 - Selection Committee picks projects. ATPs notified of outcome.
- April 2006 - ATPs include selected FY 2009 and FY 2010 projects in their FY 2007 to FY 2010 ATIP.

Preliminary Ranking Criteria

- Severity of mobility performance problem, using measures in Long Range District Plans. (Current performance deficit ranked higher than projected deficit); and
- Severity of safety performance problem, using measures in Long Range District Plans. (Current performance deficit ranked higher than projected deficit); and
- Benefit-cost ratio, total net benefit; and
- Project development status (e.g.status of environmental review, design, municipal consent, and ROW acquisition)

Financial Considerations for Project Selection

- District/ATP funding above 50% share;
- District/ATP payback,i.e. use of SF for financing only;
- Multiple Districts/ATPs providing financial support;
- Funds available relative to cost of proposed project.

Selection Committee

Transportation Program Subcommittee of the Transportation Program Committee (TPC) consisting of the Division Directors for: Finance and Administration; Program Management; State-Aid for Local Transportation; and District Operations.

Stakeholder Comments on the Target Formula Re-evaluation

Written comments were received from Mn/DOT Districts and/or ATPs in D1, D3 (two sets), D6 (three sets), D7, D8 (two sets), and the Metro TAB. Written comments were also received from the Coalition of Greater Minnesota Cities.

Federal Target Formula

Formula should ensure funding reflects statewide performance goals and priorities (D1, D3, D6, Metro TAB)

- Preservation, safety, and mobility are the right factors (D1, D3)
  - Should fund them in that order of priority (D6)
- These formulas do NOT do reflect statewide performance goals/priorities (Metro TAB)
  - 83% of unmet needs are in Metro (Metro TAB)

Eliminate the formula completely, pay for preservation off the top and then distribute remaining funds state-wide based on performance needs. (Metro TAB)

Do not cut percentage of funding for Greater MN (CGMC)

If funding is not at the 95% level, fully fund the formula, then bridges, with remaining funds going into major mobility (D6)

Formula should remain in-place for life of the transportation bill – not updated every year. (D8)

- For the next transportation bill, evaluate whether to update data or make wholesale changes (D8)

Which Scenario?

- EJ-B and E-C are similar and best reflect preservation performance in District plans (D1)
- Prefer EJ-B (D6)
  - Performance basis matches department direction, district plans (D1, D6)
  - No need to transition to performance-based formula, 20-year bridge and pavement needs factor-levels fluctuations over time, etc. (D6)
- Any of the D scenarios (E-D, EJ-D, or J-D) because they blend size and performance (D8)
  - Bridge and mobility funds help D3 and Metro so this ensures balance (D8)
- E-D is worst, as weight is too low for preservation needs and too high for HCVMT (D1)
- None of these are truly performance-based or meet Metro's needs (Metro TAB)
- None meet D3's unconstrained needs (D3)

Formula factors:

- Use of system performance in formula is good (D3, D7, Metro TAB)
  - BUT pavement management system is still too loose, so combine with system size for now (D7)
- Need to be forward-looking (D3)
  - Use future congested VMT for 2014 (D3)
  - Use 2030 population forecast (D3)
  - Project design looks out 20 years (D3)

- Bus factor should use forecasted needs and be weighted by classification (D3)
- Use most recent crash data (D3)
- Update formula annually if new data is available (D3)

Formula should fully fund preservation

- Increase the amount distributed by formula (decrease funds for mobility) (D1)
    - Question the assumption that statewide preservation goals can be met with proposed target formula funding. (D1)
- Give D6 an additional $5m per year for preservation (from mobility or BAP/SAPP) (D6)
- Inflation: $45m is too low (D1)
- Increase in base will help off-set inflation (D7)
- Weight on preservation should be 60% (D7)
- System size needs to be a major component because preservation needs exist regardless of VMT (D7)
- Make sure these funds are actually spent for preservation (Metro TAB)

Not enough money for Level 1 and 2 Regional Trade Centers needs (D6)

Ensure a minimum return on revenue generated (D3)

- Done for federal bills (D3)
- Ensure return of 90% (D3)
- Consider this factor when programming statewide funds for bridges and mobility (D3)
- Metro raises more than 50% of revenue, so more revenue should be spent in Metro (Metro TAB)

Statewide Bridge Preservation Fund

Support the concept (D1, D6, D7, Metro TAB)

- Fund on a sliding scale for some large projects that need more funds (D6)
- Emphasize actual bridge needs and appropriate amount of approach work (D7)

Do not do this, instead distribute as much money as possible directly to the ATPs. (CGMC)

Statewide Corridor Fund

Support this concept (D1, D7, Metro TAB)

- Some benefit to doing this, but: (D6)
    - Underperforming speed is inadequate for prioritizing/selecting routes (D6)
    - Also use safety, regional connections, ADT, HCADT, and logical termini as criteria for rural projects (D6)
    - This is already factored into the distribution (D6)
- Need more information on the selection criteria (D8)

Needs more local input in its development: Have a task force address this (D8)

Do not do this, instead distribute as much money as possible directly to the ATPs. (CGMC)

Size of fund:

- Will the size of this fund increase if additional funding becomes available? (Metro TAB)
- Cap fund at $75 m with increases above that distributed to the ATPs by formula (D8)

Selection Criteria:

- Difficult to compare urban and rural projects (D6)
- Right-of-way should not be eligible – only projects ready for immediate construction (D8)
- Cost criteria of 50% or more of ATPs targeted federal funding is appropriate (D8)
- 50% cap is appropriate (D8)
- If only IRC and 0-2 RTCs are eligible, local projects can't compete. (D8)

Project selection should be one year prior to development of the ATP's ATIP (D8)
Projects should be solicited every year or two (D8)

Expand financing options to help right size projects and better leverage available dollars (D7)

State Road Construction Funding Formula (State TH)

Use old formula until funds are available to hold districts harmless (D1, D3, D7, D8)

- Establish policy so new formula will be used when adequate funds are available (D8)

Start in '09, this gives districts time to make the transition (D6)

- If new funds are available before that, using the new funds to start the formula sooner (D6)
- If TH data is used, could start transition in 2007 (D6)

Do NOT distribute by formula – distribute based on performance need (Metro TAB)

Factors Used:

- Use only TH factors for congested VMT (D6)
- Remove bus factor since these funds can't be spent on buses (D3)

Other Comments and Suggestions

Federal Fund Expenditures:

- Provide public and legislature with an annual report on all federal fund expenditures by ATP (D8)

STIP guidance:

- Don't mandate ATP membership based on population (D8)

EXHIBIT NO: 7
Date: 4-10-08
JULIE A RIXE
COURT REPORTER

Transportation Program Committee (TPC)
Meeting Minutes
January 5, 2006

Abby McKenzie

Attendees: Abby McKenzie, Rick Arnebeck, Bob McFarlin, Dick Stehr, Bob Hofstad, Sue Thompson, Brad Larsen, Robin Schroeder, Lucy Kender, Tim Henkel, Pat Hughes, Dan Dorgan, Ed Idzorek, Aaron Tag, Khani Sahebjam, Kevin Gray, Bob Winter, Linda Zemotel, Charlie Kettering, Duane Leurquin, Doug Differt, Julie Skallman

Redistribution of BAP Funds (Handout: BAP Expenditures, BAP and SAPP Reductions, BAP and SAPP Redistributions

Using the BAP Expenditures report Bob Hofstad explained that for the years 2005 through 2008 additional SAFETEA-LU funds are needed to compensate for the difference between the district BAP and SAPP reductions and total funding needs. Beginning in 2009 through 2017, BAP and SAPP reductions exceed BAP and SAPP funding needs. The second handout shows the reductions by district and year. The third handout shows the recommended redistribution by year for each district. In years 2009 and 2010, the target formula is used (this is what was sent in the November funding memo). For years 2011 through 2017, the redistribution is based on each district's proportion based on the level of projects advanced. Each district will receive 76% of their reduction during the 2009-17 period. The redistribution occurs over the same time frame for all districts.

Action: Redistribution is approved as presented.

Federal Obligation Authority (Formula Funds and SAFETEA-LU Earmarks

Brad Larsen stated the exact figure for Formula Obligation Authority percentage for 2006 is still unknown. According to the *Transportation Weekly* a reduction of 1% across the board occurred and the FHWA Notice may be revised downward by approximately $17M downward. All final apportionment notices are not published, and it is believed that we will receive an amount slightly less than 85%. Adding August redistribution to this should increase our amount to approximately 87%. Brad stated that if the 1% reduction occurs, FHWA would need to redo notices already published.

Robin Schroeder (FHWA) stated he thought we would have received this information by now. The Washington DC staff is very busy working through this.

Brad addressed Earmarks and the levels to be used in writing AC agreements for local projects. It is recommended that a level of 85% of 20% annually for the years 2007-09 be used and modified upward if the level exceeds 85% while using this amount as a minimum level.

Action: Approved Earmarks to use 85% (of annual 20%) for 2007-09 and will adjust upward if the actual obligation authority is greater.

Metro Shortfall – Update and Strategies (Handout: Metro District State Road Construction Program)

Tim Henkel reminded the group that at the December meeting it was recommended that a meeting be held with Met Council explaining the need for TAB's support of MnDOT's commitment to fund both the Wakota Bridge and Crosstown projects. The outcome is that TAB appears willing to help since MnDOT is making every effort to maintain the current STIP project schedules before including new projects. A meeting will occur later this month.

Tim presented information on each line item in the handout stressing that Metro will not be able to meet the 2014 target for pavement preservation under this scenario.

Action: Approved keeping Wakota and Crosstown projects on schedule and to obtain TAB's commitment.

Target Formula – Updated Data and Variables

Ed Idzorek stated the final numbers were to be presented but final pavement data will not be available for a couple of days.

Action: Approved the recommendation to have final numbers emailed to TPC members the week of January 9th for final approval.

Statewide Bridge Preservation Fund (Handout: Proposed Modification of Statewide Bridge Preservation Fund)

Ed Idzorek explained that through modification of this fund, ATP's will be accountable for approaches and the statewide bridge fund will pay 100% of the bridge costs. All bridges will see a decrease in the District/ATP cost share over the original funding method except for the Dresbach Bridge. Dick Stehr expressed concern about Dresbach. TPC will review the Dresbach bridge cost share, once a final design is developed.

Dan Dorgan spoke stating that under the proposed change, the bridge fund might pay a high share of the total bridge cost, up to 80% of costs in some cases. This might be a higher statewide fund participation that originally conceived.

Action: Approved the proposed modification to the Statewide Bridge Preservation Fund.

Statewide Corridor Fund (Handout: Proposed Modification of Statewide Corridor Fund)

Ed Idzorek proposed this fund be modified based on District comments and feedback. The modification would allow any project in the 2009-2030 fiscally constrained plan to compete as long as the performance deficit is in the 2009-14 timeframe. It was also recommended the solicitation cover two additional years, (proposed from SFY 2009-2012).

Action: Approved the modification as proposed. Solicitation to Districts/ATB's will proceed.

Transportation Revolving Loan Fund (TRLF) Solicitation Proposal (Handout: TRLF - TPC Proposal)

The TRLF has four accounts: Highway, Highway non-restricted, Transit and Trunk Highway. Brad Larsen explained that the Highway account requires loans to comply with Federal Title 23 and Federal Project Development requirements, as this is "first generation" funding. The Highway non-restricted account requires compliance with Federal Title 23 but does not require loans to comply with the Federal Project Development requirements.

Brad explained that the approximately $4.5 million (as of 6/30/06) in the Trunk Highway account obtain legislative authority to transfer these funds to the TH fund. The current language allows a transfer of up to $15 million per year from the TH fund to the TRLF TH account. This amendment would allow flexibility of the funds by allowing the funds to be used in the TH fund. Spending authority would also need to be requested when the funds would be used.

TRLF loans to locals from the non-restrictive highway account can be leveraged whereas TH loans cannot be leveraged and for this reason it is not recommended to terminate the TRLF.

Action: Approved proceeding with solicitation for highway non-restrictive and Transit accounts. Approved the recommendation to request legislative authority to change the language allowing TRLF TH account to be transferred to TH Fund and to learn of options available to change the terms on the current MnDOT TRLF loan for TH 212.

Information Items

Abby McKenzie stated the annual BAP Report will be presented at the Commissioner's January 9th meeting and invites TPC members that would not normally be present to attend.

Bob Winter extended thanks to Pat Hughes for his work and congratulated him on his upcoming retirement.

Next TPC meeting is February 22, 2006, 9:00-11:30 a.m., Room 461.

Proposed Modification of Statewide Corridor Fund

The Statewide Corridor Fund (SCF) is intended to address large mobility and safety projects with project costs (excluding right-of-way and design) greater than 50% of an ATPs annual targeted Federal funds. The SCF will fund up to 50% of the project cost.

As originally proposed SCF projects had to come from a District Long Range Plan (DLRP), a MPO Long Range Plan, or a Local Transportation Plan. The DLRP projects were limited to the 2009-2014 fiscally constrained plan. We propose to modify this so that a project may come from anywhere in the 2009-2030 fiscally constrained plan as long as the performance deficit is in the 2009-2014 timeframe.

The first solicitation for the SCF was proposed to cover FYs 2009 and 2010. Based on comments received we propose to expand the period covered to FY 2009 through 2012. This should allow Metro District to advance a major project. From an overall program standpoint this will make balancing the available Federal obligation authority between the Statewide Bridge Preservation Fund and the SCF easier.

Comments Received on Statewide Corridor Fund

D7

1. System continuity vitally important.
2. Criteria don't recognize prior investments in a corridor.
3. Performance data does not reflect value that an improved freight corridor provides.
4. SCF doesn't count safety improvements in intersections or on segments that are not on "top" safety lists.
5. Cost-effectiveness should include economics of scale, fewer construction stages, inflation savings and earlier traveler benefit.

TAB

1. SCF as currently defined (11/18/05) is unacceptable.
2. Metro would only capture $50m of SCF funds through 2014.
3. SCF should be modified to allow more Metro projects to compete possibly by extending timeframe.

Metro

1. Modify or delay implementation of SCF to allow major projects that meet the criteria, but are underfunded in the current STIP to qualify.

Statewide Bridge Preservation and Corridor Funds Available

(Obligation Authority in millions of $)

	2009	2010	2011	2012	Total
Federal Funds after Formula Distribution (1)	80	80	80	80	320
Statewide Bridge Preservation Fund (2)	4	6	29	45	84
Available for Statewide Corridor Fund	76	74	51	35	236

Statewide Corridor Fund Proposal

Extend solicitation to 2012, allocate $ on a one-time basis towards Metro 2009 and 2010 deficit; advance a major Metro project in 2011 or 2012

	2009	2010	2011	2012	Total
Available for Statewide Corridor Fund	76	74	51	35	236
Metro District	45 - 60	0 - 10	50 - 75		95 - 145
Max available for Greater MN	31 - 16	74 - 64	36 - 11		141 - 91

Pros/Cons:
- Addresses Metro 2009 and 2010 shortfalls.
- Allows advancing new Metro project(s).
- Allows Greater MN projects in 2009 & 2010.

Notes: (1) After ~ $390m in Federal Funds distributed to ATPs by formula (reduced if lower Obligation Authority)
(2) Assumes 100% funding of bridge proper under Statewide Bridge Preservation Fund

Proposed Modification of Statewide Bridge Preservation Fund

The SBPF is intended to address large bridge **preservation** projects (project cost greater than 50% of an ATPs annual targeted Federal funds). The project cost includes the bridge proper and the approaches necessary to connect the new bridge back into the roadway.

As originally proposed the SBPF would fund 50% of the **project cost**. We propose to modify this to fund 100% of the **bridge cost**, with the ATP being responsible for the approach cost.

The benefit of this change is that it simplifies the funding determination for Offices of Bridge and Investment Management, and avoids any protracted discussion with these Offices regarding the necessary approach. However, the bridge cost/approach cost share of these projects varies widely. In some cases the bridge cost represents on the order of 80% of the project cost, and in others as little as 30%.

In addition any Local share of the approach work remains the responsibility of the ATP. However, a Local bridge project that meets the cost threshold and the preservation requirements of the SBPF would still be eligible.

Comments Received on Proposed Modification

D2, D3, Metro, Bridge Office

1. Support change to 100% Bridge funding.
2. Approaches and non-bridge costs should be District responsibility.

D4

1. Fund should cover **up to 100%** of Bridge cost to retain flexibility.
2. Projects should be able to compete in both SBPF and SCF.

D6

1. Highway Project Development Process outcome is right design for bridge and approaches.
2. Difficult to break out bridge cost in Design-Build projects.
3. 100% Bridge funding will require $60m more than 50% Project funding.
4. 50% Project results in tighter range of ATP participation in major bridge projects.

D8

1. Concerned that Technical Work Team agreed to 50% Project funding, not 100% Bridge funding.
2. Added cost to cover 100% Bridge funding may reduce overall number of bridges the fund can cover, or require increase in $ dedicated to this program.

Statewide Bridge Preservation Fund

Estimated payouts with SBPF covering *50% Project Cost* compared to *100% Bridge Cost* (In millions of $)

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
50% Project Cost	2	3	25	39	30	24	21	20	37	101	105	34	441
100% Bridge Cost	4	6	29	45	27	16	24	30	48	114	114	36	494
Bridge - 0.5*Project	2	3	5	6	-3	-8	3	10	10	13	9	2	52

Notes:

Includes Saint Croix River bridge (MN 36) starting in 2018
Assumes 3 year payouts: 30% in year 1; 50% in year 2; and 20% in year 3
Project and Bridge Costs Inflated to Year of Construction

Estimated Year of Construction Bridge Preservation Cost (In millions of $)

Location	Robbin	Lafayette	Dresbach	St. Croix	Hastings	Mpls	Winona	DeSoto	Total
Route	MN 11	US 52	I-90	MN 36	US 61	I-35W	MN 43	MN 23	
District	2	6	M	M	M	M	6	3	
Total Project	14	156	95	218	125	197	47	31	883
50% Project	7	78	48	109	63	99	24	15	441
100% Bridge	12	90	31	118	62	120	32	27	494
Bridge - 0.5*Project	6	12	-16	9	0	21	9	12	52

Statewide Bridge Preservation Fund

EXHIBIT NO: 8
Date: 4-10-08
JULIE A RIXE
COURT REPORTER

Scope

The process described herein applies to Major Bridge Preservation projects. These bridges are structurally deficient. Functional obsolescence alone does not qualify.

Definitions:

- Major Bridge is a bridge with Project Cost greater than 50% of an ATP's annual Targeted Federal Funds.
- Project Cost includes bridge and approaches. Excludes design and right-of-way.

Funding

- Statewide Bridge Preservation Fund (SBPF) participation will be 100% of the bridge cost estimate. The SBPF participation level will be fixed when the project first enters the STIP. Cost overruns are the responsibility of the project proposer (Local jurisdiction or Mn/DOT District).
- The SBPF will be capitalized by taking $40 million off the top of Federal formula funds.

Eligibility

Any Trunk Highway or Local Major Bridge Preservation project included in a District Long Range Plan, a MPO Long Range Plan, or a Local Transportation Plan.

Solicitation

- Candidate list from Mn/DOT Office of Bridges for FY 2009 through FY 2018.
- Mn/DOT Office of Bridges identifies bridges and works with Districts/ATPs to agree on appropriate project timing.
- List will be updated annually for cost and construction year.

Selection Criteria

- Funds available (ATP and Statewide Bridge Preservation Fund).
- Structural condition (Must replace date from Office of Bridges).
- Deliverability.

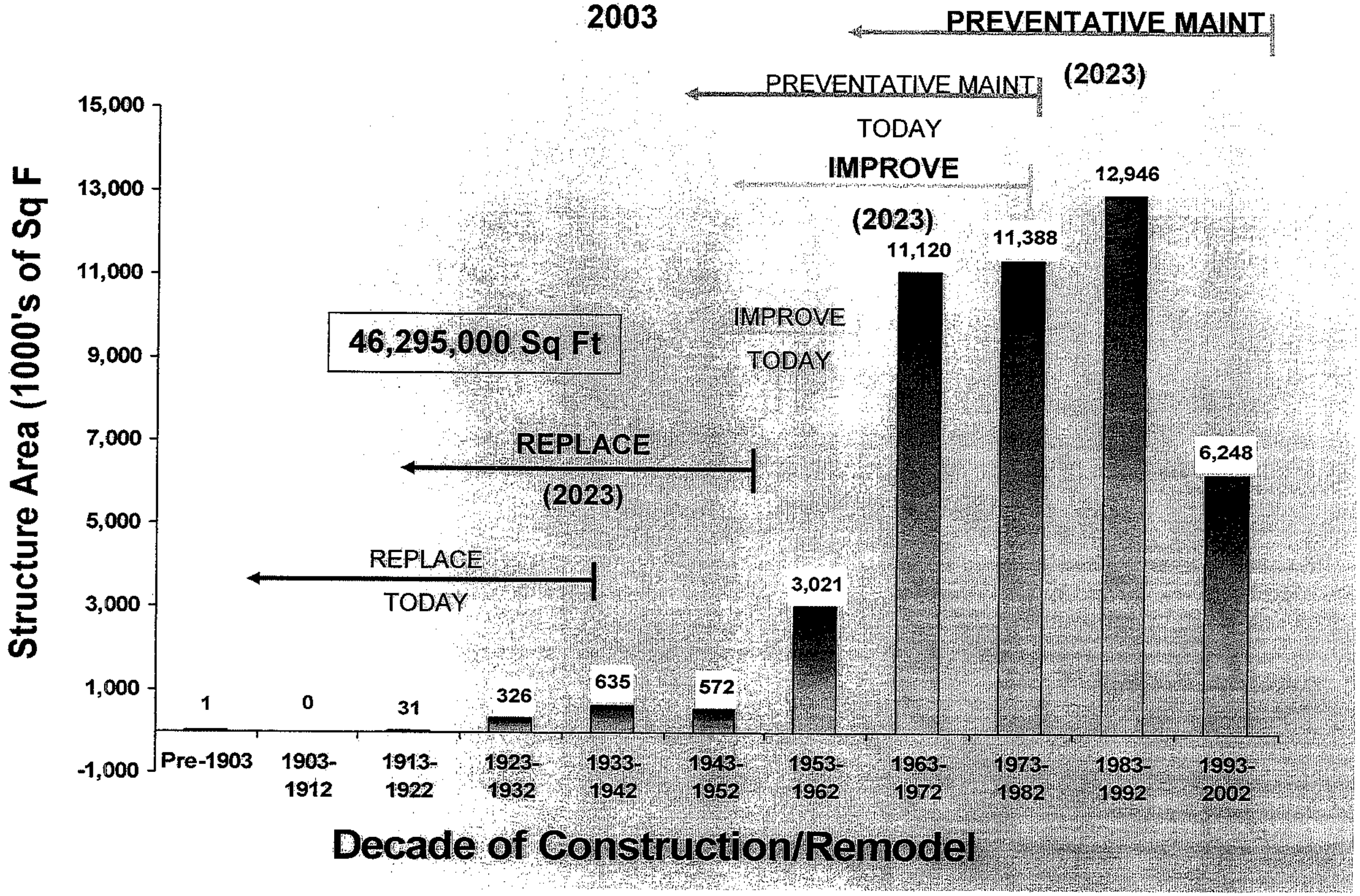
Selection Committee

Mn/DOT Office of Bridges to identifies eligible bridges. The majority of these structures are expected to be Mn/DOT bridges. TPC will approve the SBPF program.

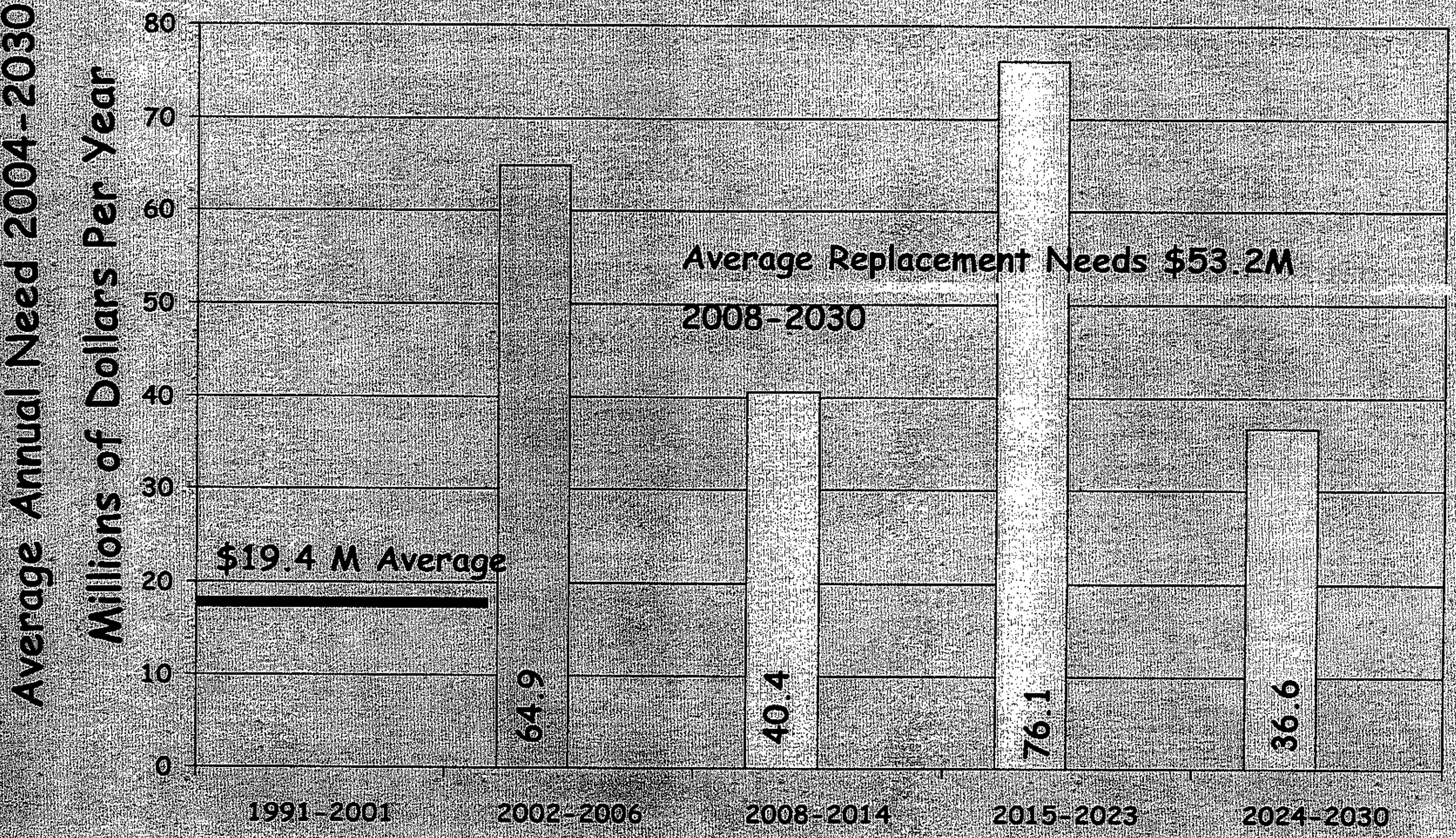
EXHIBIT NO: 9
Date: 4-10-08
JULIE A RIXE
COURT REPORTER

Future Trends in Condition and Investment Needs

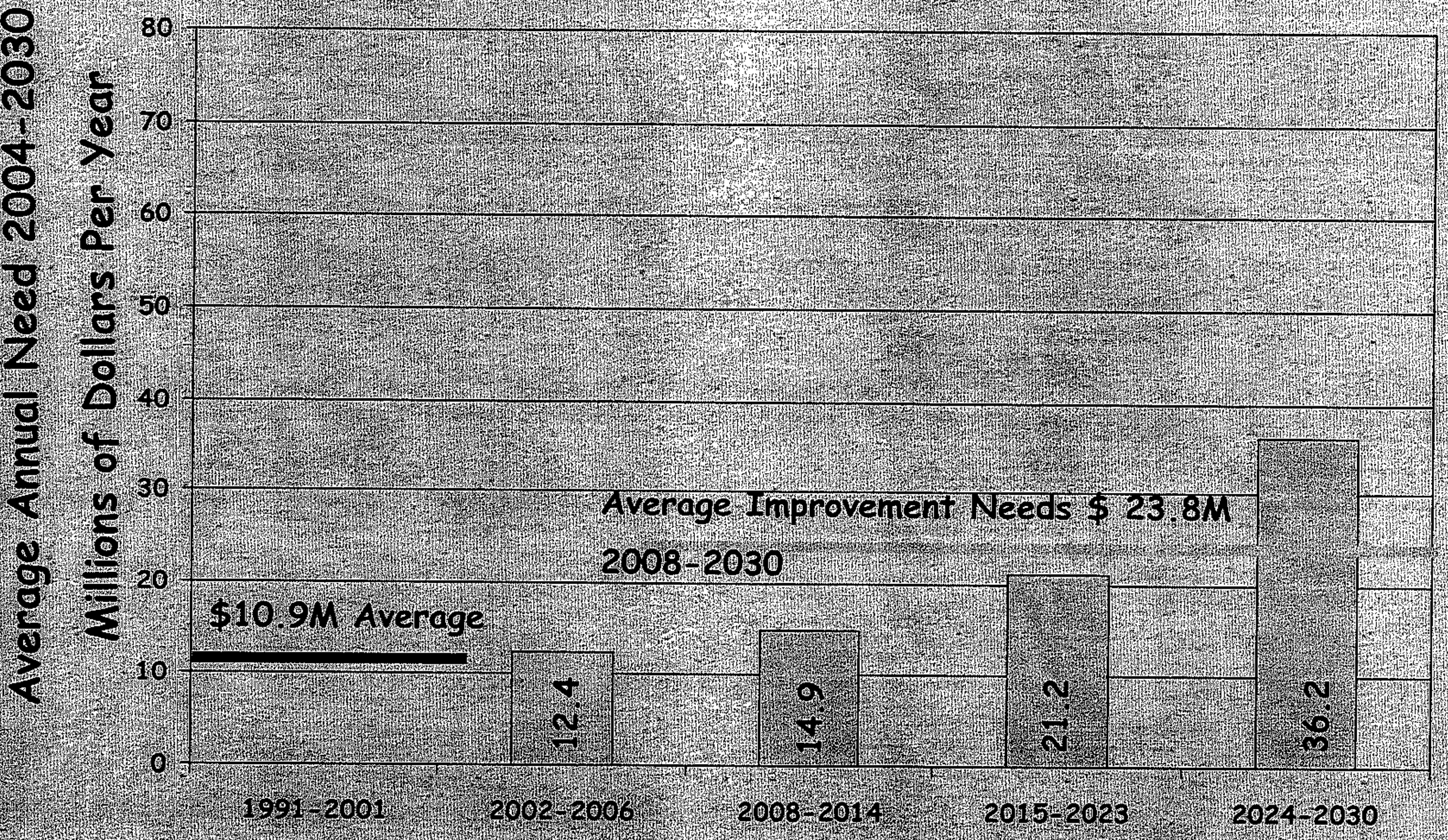
AGE PROFILE BY AREA OF STRUCTURES
TRUNK HIGHWAYS ONLY
STRUCTURES 10 FT AND OVER
2003



Statewide
Bridge Replacement



Statewide
Bridge Improvement



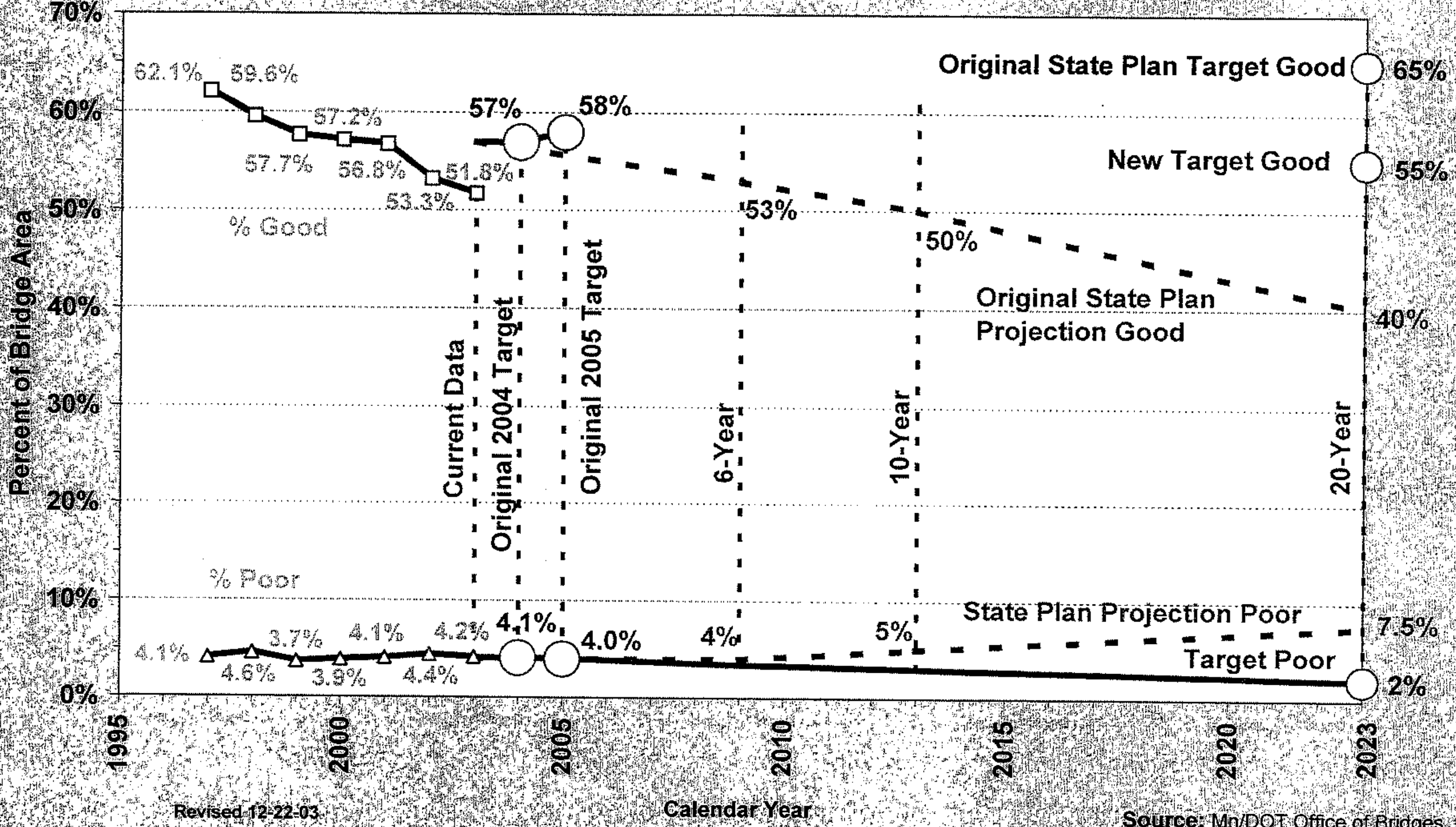
Increased Bridge Needs
2007-2030

Projected	**Compared to Past 15 Years**
▪ Bridge Replacements $53 Million/ year	▪ Up 58%
▪ Bridge Decks 14.8 Million/ year	▪ Up 90%
▪ Bridge Painting 9.0 Million/ year	▪ Up 160%
Total estimate 77+ Million/ year	▪ Up 73%

Prepared for the Statewide Transportation Plan

Structural Condition of Bridges

Principal Arterials



Revised 12-22-03

Source: Mn/DOT Office of Bridges

"Budget Buster"

Major TH Bridges Requiring Replacement or Renovation in the Next 10 Years

D7	TH 169/Minnesota at Le Sueur	2005
Metro	TH 36/St Croix at Stillwater	2007
D2	TH 11/Red River at Robbin	2008
Metro	TH 52/Mississippi in St Paul - Lafayette	2010
D6	I90/Mississippi at Dresbach	2010
Metro	I 35E/Cayuga St & RR in St Paul	2010
Metro	I35W/Mississippi in Minneapolis	2012
Metro	TH 61/Mississippi at Hastings	2014

"Budget Buster" Bridge Challenge

- Fracture Critical Issues and/or Deterioration Will Require Replacement/Renovation
- Districts Wills be Unable to Fund Major Bridges From Their Annual Investment Target
- Bridge Cost Alone Can be Over 1/3 of Annual Funds
- Additional Funding Sources Will Be Needed Such as High Priority Federal, District "C" Setasides, Legislative Action
- These Bridges Have Been Included in 2004 High Priority Congressional Request List

Statewide Preventative Maintenance Needs

- Current Maintenance Program is Largely Reactive, Less Focused on Preventative Maintenance:
  - Preventative Maintenance = Flushing Joints and Decks, Spot Painting, Sealing Cracks
  - $1.3 Million per year
  - 89 Bridge Workers Statewide
- District Operations Planning Process (HSOP) will Identify:
  - Cost effective PM strategies
  - Performance Measures and Targets and Gaps
  - Funding needed to meet targets,
  - Performance under constrained funding

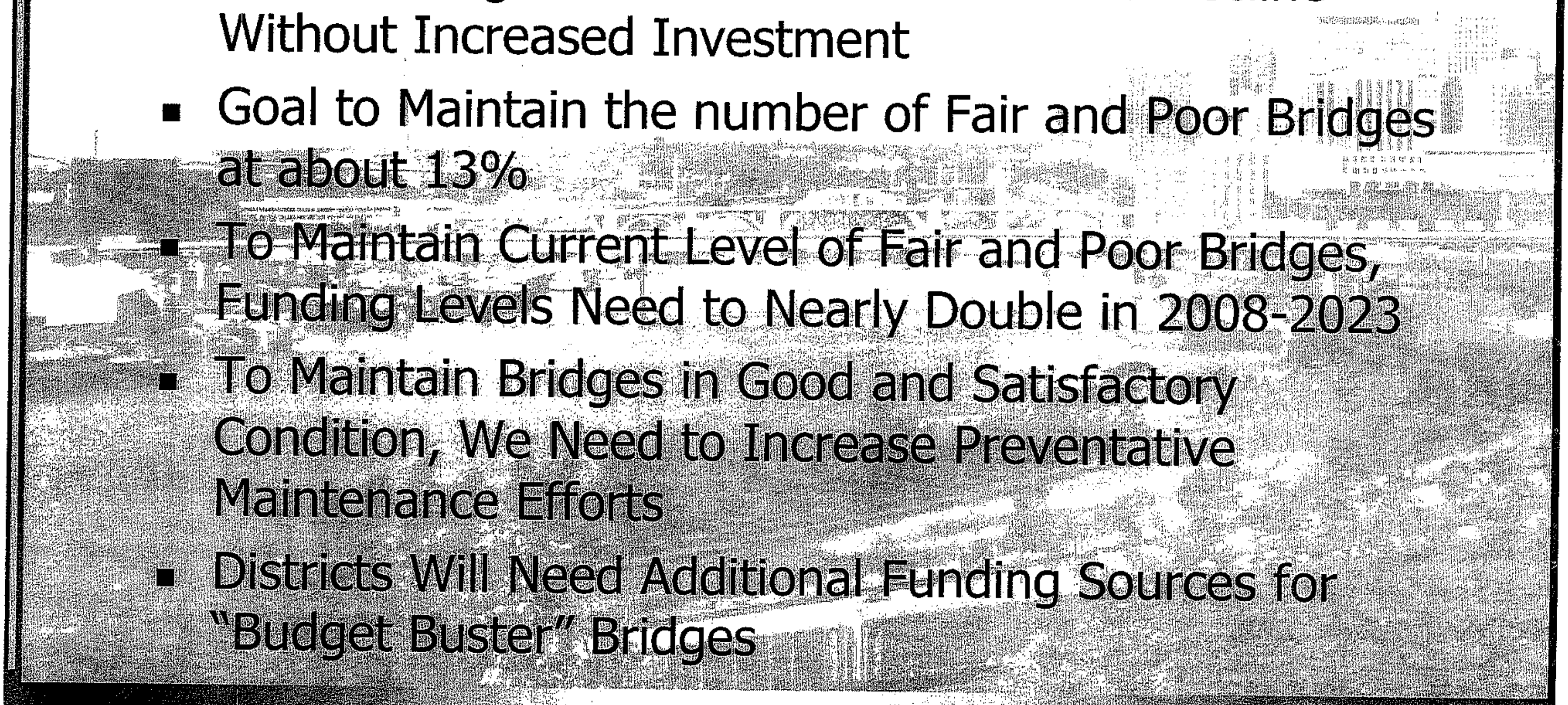
Statewide Investment in Bridges

Average 1997-2003

Average Spending/Year		**Part of each Bridge $1 Spent**
Bridge Replacements $34,123,000	=	72 cents
Bridge Improvement $11,625,000	=	25 cents
Staff Preventative Maintenance $1,317,000	=	3 cents
TOTAL	=	**$1.00**

Report for Commissioner's Staff Meeting

Summary



- Overall Bridge Condition Will Continue to Decline Without Increased Investment
- Goal to Maintain the number of Fair and Poor Bridges at about 13%
- To Maintain Current Level of Fair and Poor Bridges, Funding Levels Need to Nearly Double in 2008-2023
- To Maintain Bridges in Good and Satisfactory Condition, We Need to Increase Preventative Maintenance Efforts
- Districts Will Need Additional Funding Sources for "Budget Buster" Bridges

Mn/DOT & Local Bridges Compared to United States

Percentage of Bridges Structurally or Functionally Deficient ("Poor" Condition) from Better Roads Magazine

November 2003

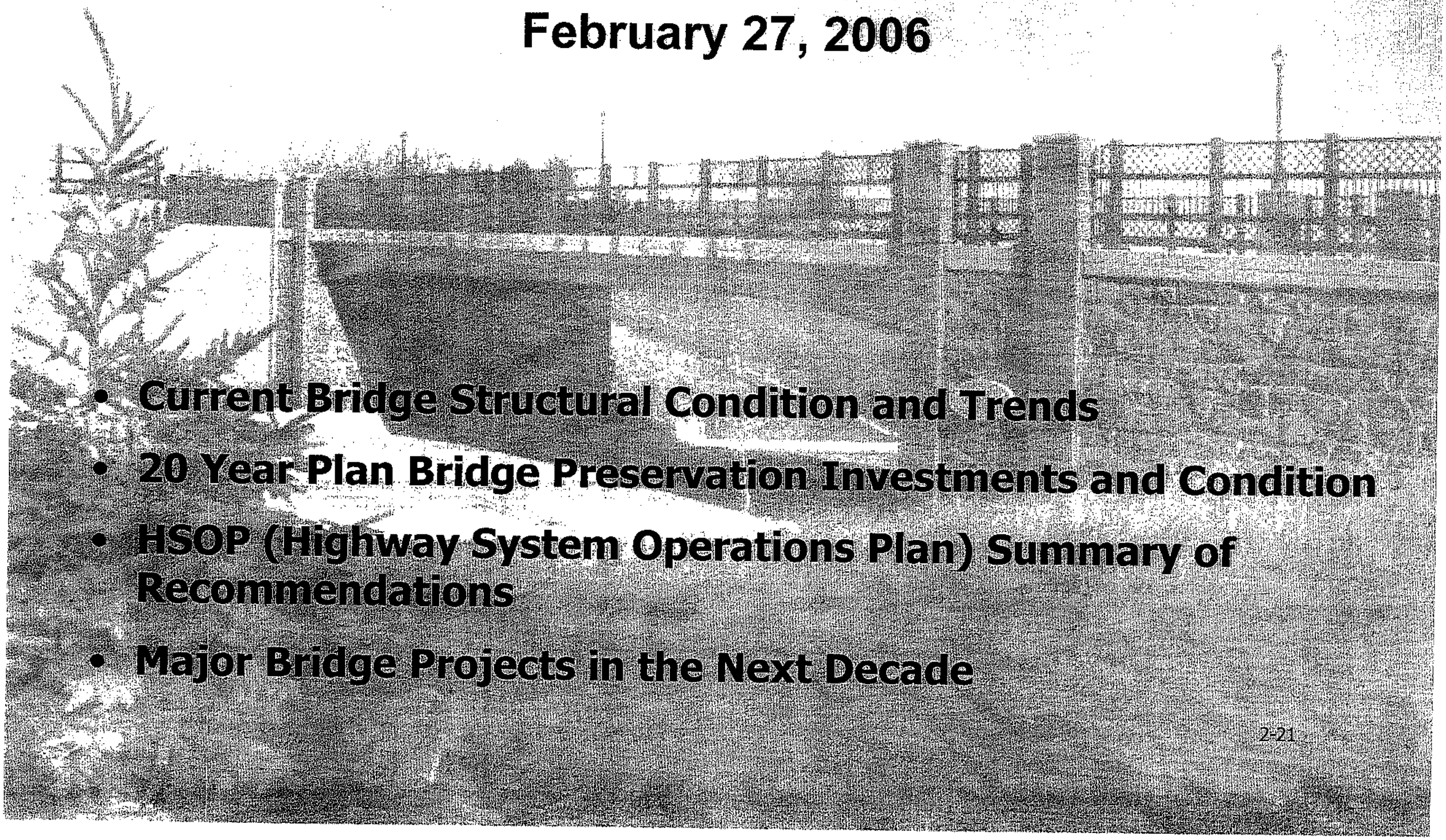
	Minnesota	US
State Bridges	10	22
County/City/Township	16	29
Overall	15	26

While Minnesota Bridges Are In Better Condition Than the National Average, US Bridges Overall Are In Poor Condition.

EXHIBIT NO. 10
Date: 4-10-08
JULIE A RIXE
COURT REPORTER

Bridge Report
for Commissioner's Staff Meeting

February 27, 2006



- Current Bridge Structural Condition and Trends
- 20 Year Plan Bridge Preservation Investments and Condition
- HSOP (Highway System Operations Plan) Summary of Recommendations
- Major Bridge Projects in the Next Decade

2005 Performance Summary for Bridge Structural Condition

- Statewide average for bridges in “Good” structural condition remained steady at 53.3%, indicating the current level of system expansion and bridge preservation investments have arrested the decline in condition that began in the mid 1990s.
- Statewide average of bridges in “Fair or Poor ” bridge condition declined from 12.8% to 11.3%, and bridges in Poor condition dropped from 4.2% to 3.9% reflecting a steady improvement in condition since 2003.
- Preservation investments are showing an impact on the Performance Measure.
- With Recommended 20-Year Plan and HSOP Investments, Mn/DOT can maintain overall statewide bridge condition measures

Bridge Measures

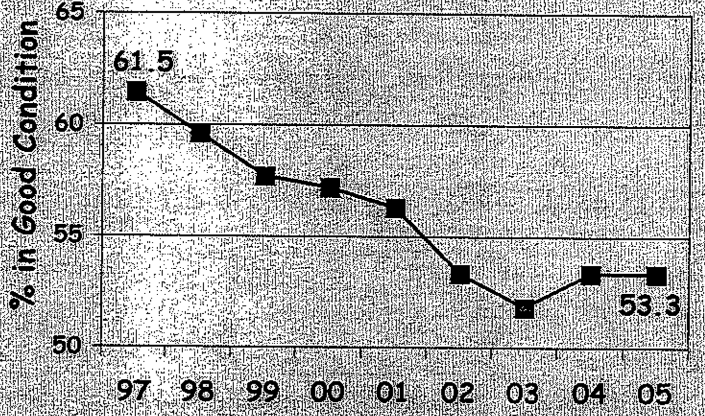
STATEWIDE STRUCTURAL BRIDGE CONDITION

TRUNK HIGHWAY PRINCIPAL ARTERIAL

20 FT AND OVER

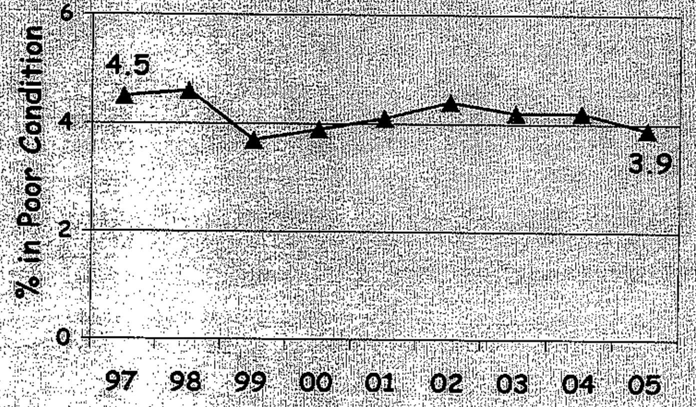
- % of Good Bridges is primarily an indicator of the age of the system.

  Trends are influenced by Preventive Maintenance Actions, Bridge Improvement, and also System Expansion

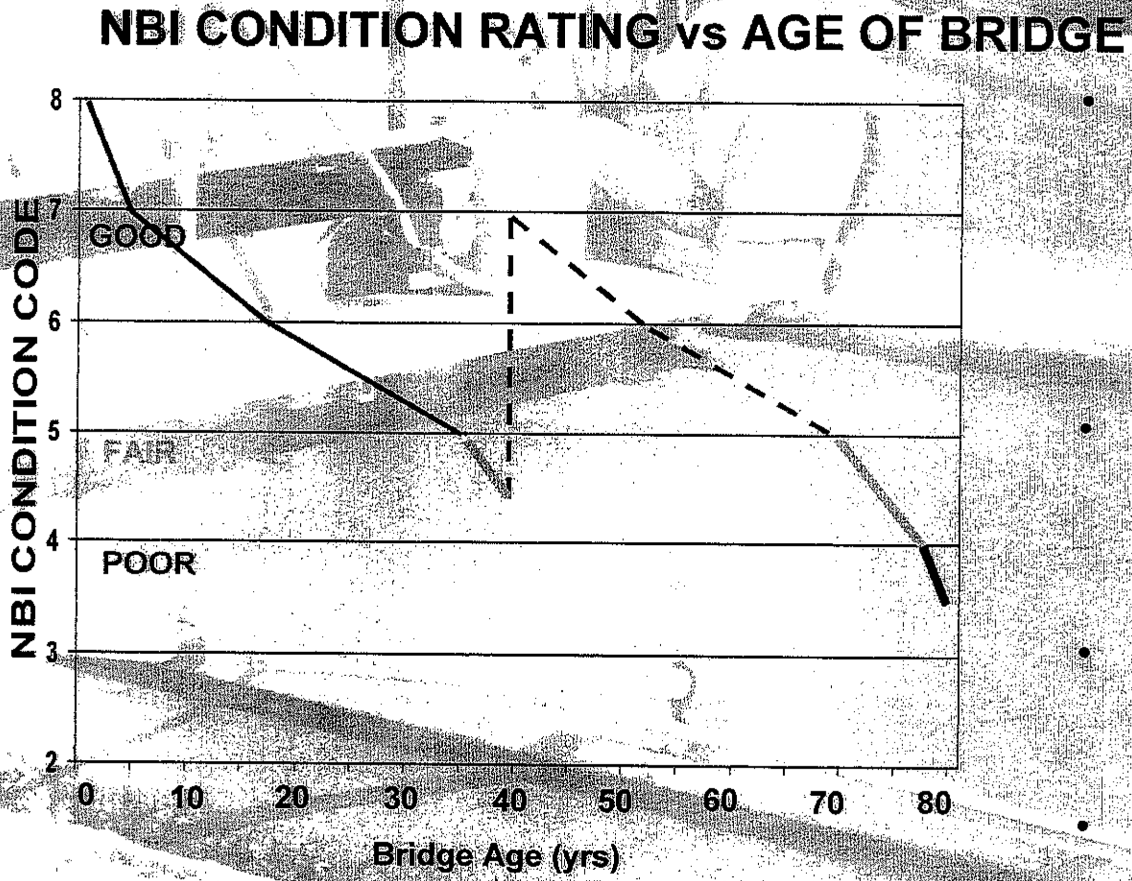


- % of Poor Bridges is primarily an indicator of Preservation Needs.

  Trends are primarily influenced by Bridge Replacement actions



ESTABLISHING A NEW TARGET
FOR FAIR AND POOR BRIDGES


NBI CONDITION RATING vs AGE OF BRIDGE

From "Economic Strategies for Repair and Replacement of Low Slump Overlays of Bridge Decks", Univ. of Mn, 2005

- The % of bridges in fair and poor condition is a more complete measure of preservation needs, influenced by Bridge Improvement and Replacement actions/

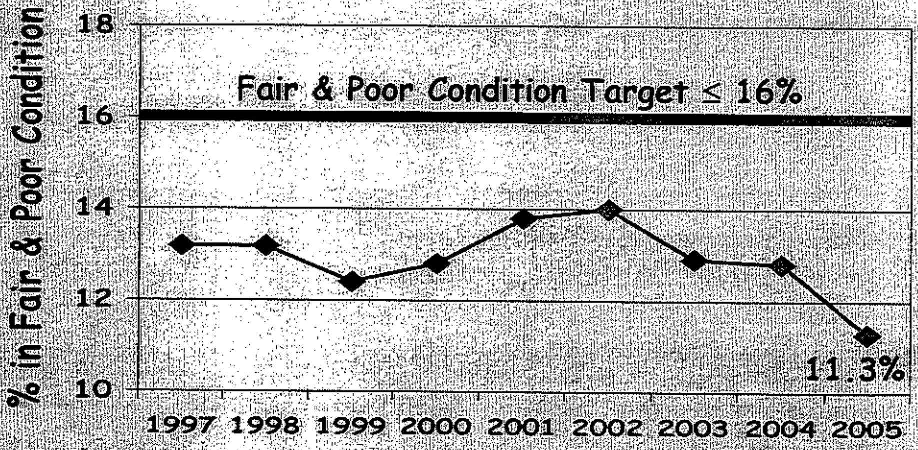
- Total Time in Fair condition is about 10 years or 14% of its design life.

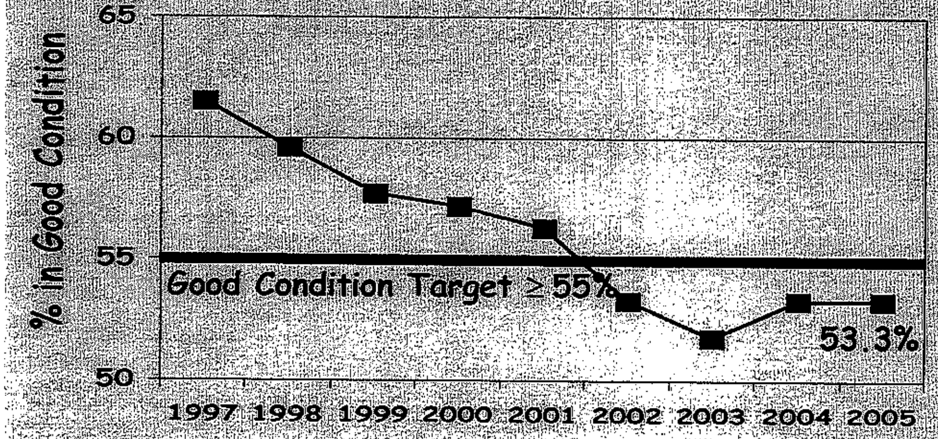
- Total time in Poor condition is about 2% of the bridge design life.

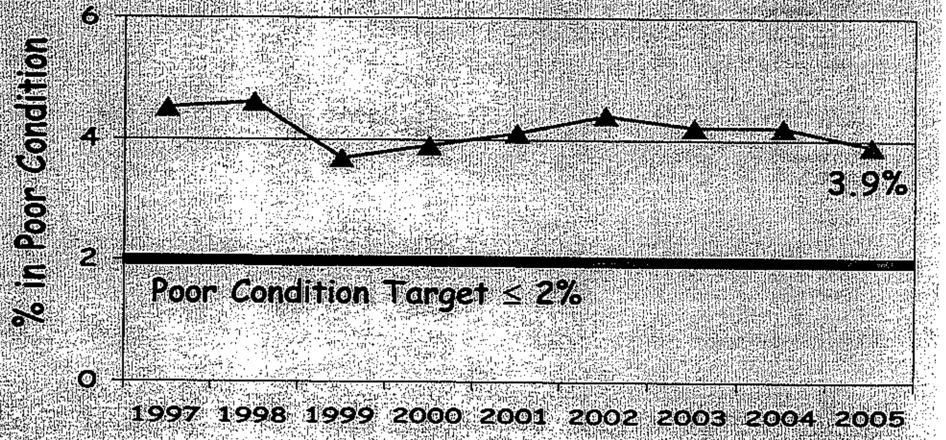
- The Proposed Target for bridges that are in Fair and Poor condition is 16%

STATEWIDE
Trunk Highway Principal Arterial Bridges
(20' and Over)
Structural Condition Performance Target
(Percentage by Area)

Principal Arterial = 85%
of TH Bridge Area



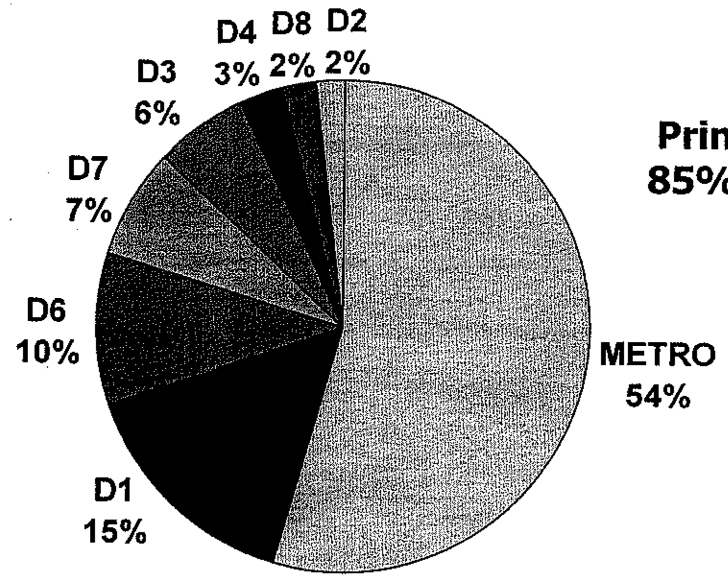




January 2006

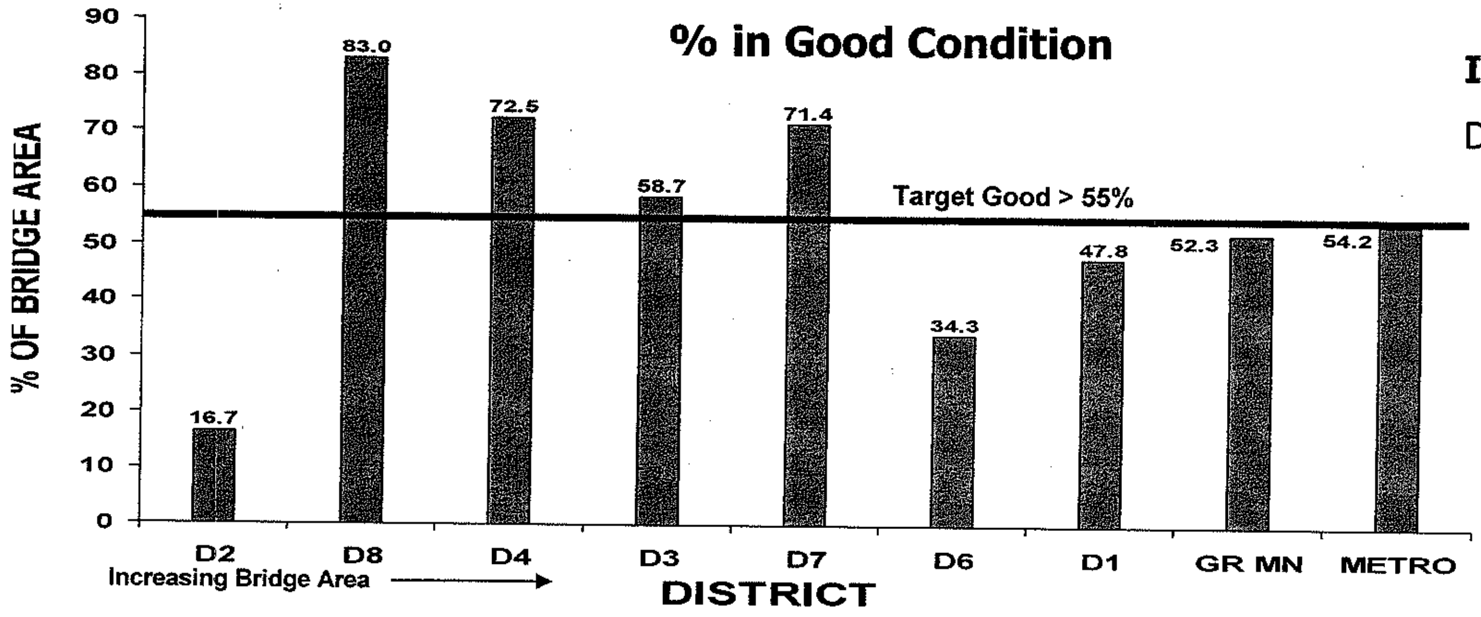
BRIDGE STRUCTURAL CONDITION – PRINCIPAL ARTERIALS – 2005

% of Total Principal Arterial Bridge Deck Area By District



Principal Arterials Account for 85% of Total Bridge Deck Area

% in Good Condition



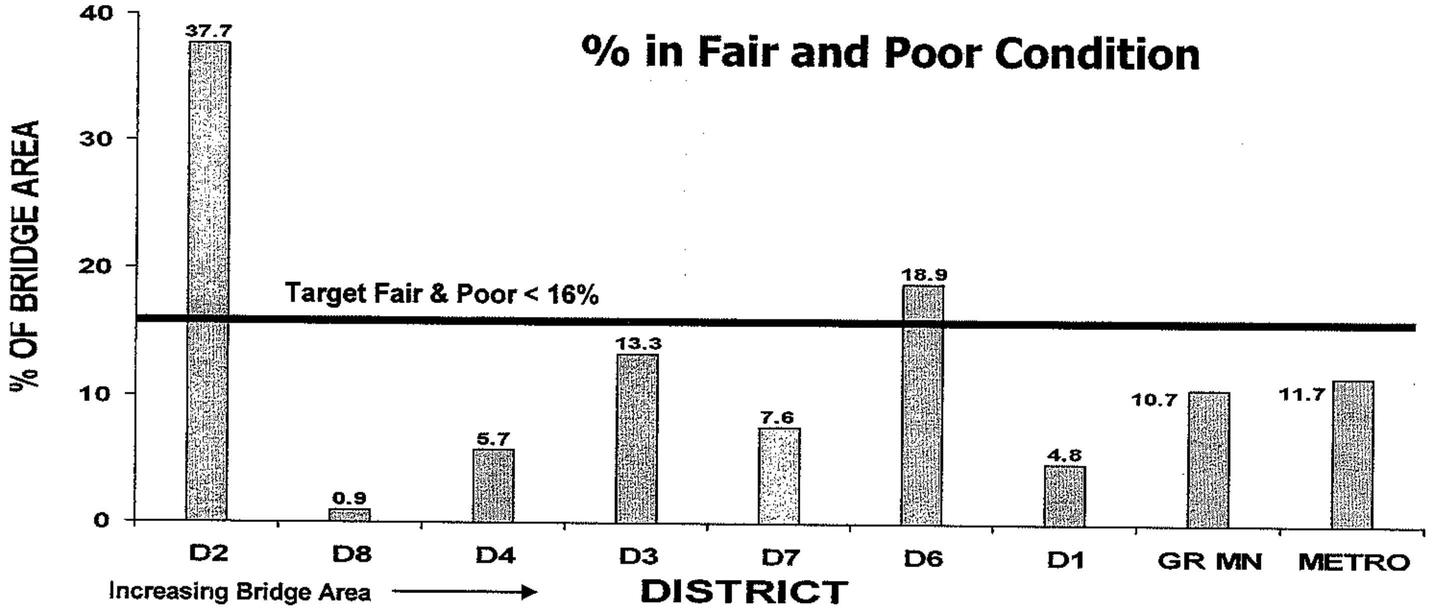
Improved in 2005:

Districts 1, 2, 4, 6, 8,
and Metro

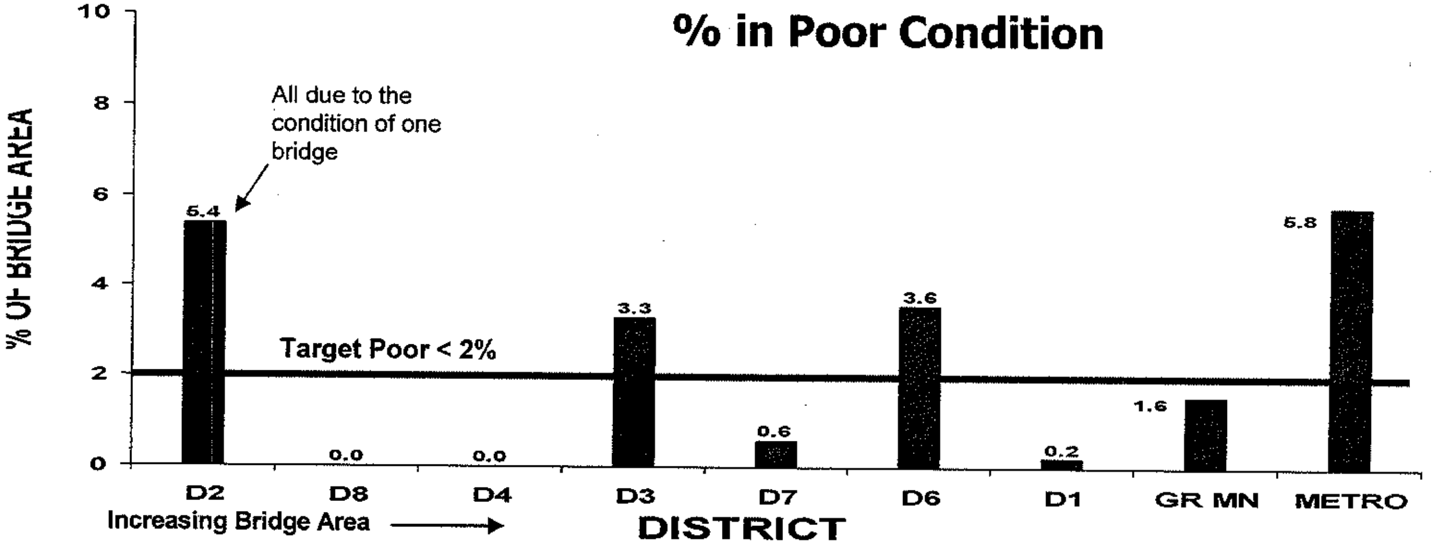
Declined in 2005:

Districts 3, 7

BRIDGE STRUCTURAL CONDITION – PRINCIPAL ARTERIALS – 2005



All but District 2 and 6
Meet the new Target



Improved in 2005:

Districts 1, 2, 8, and
Metro

Declined in 2005:

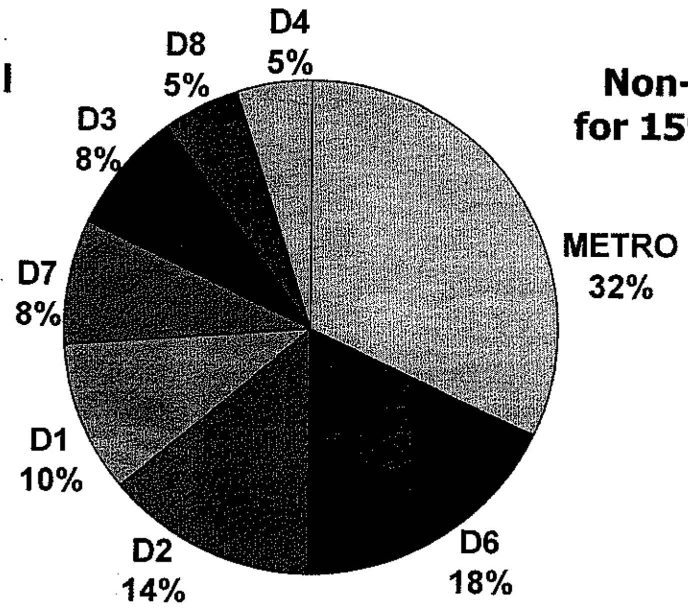
Districts 3, 6

No change in 2005:

Districts 4, 7

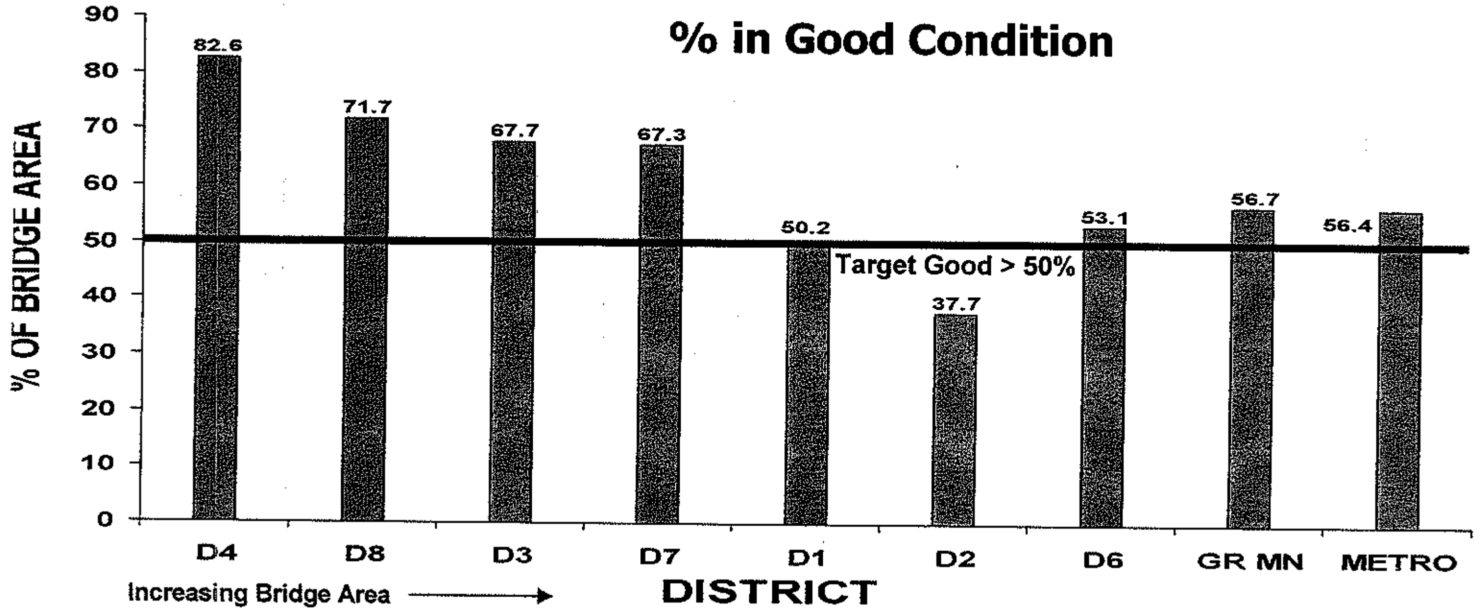
BRIDGE STRUCTURAL CONDITION - NON-PRINCIPAL ARTERIALS - 2005

% of Total Non-Principal Arterial Bridge Deck Area By District

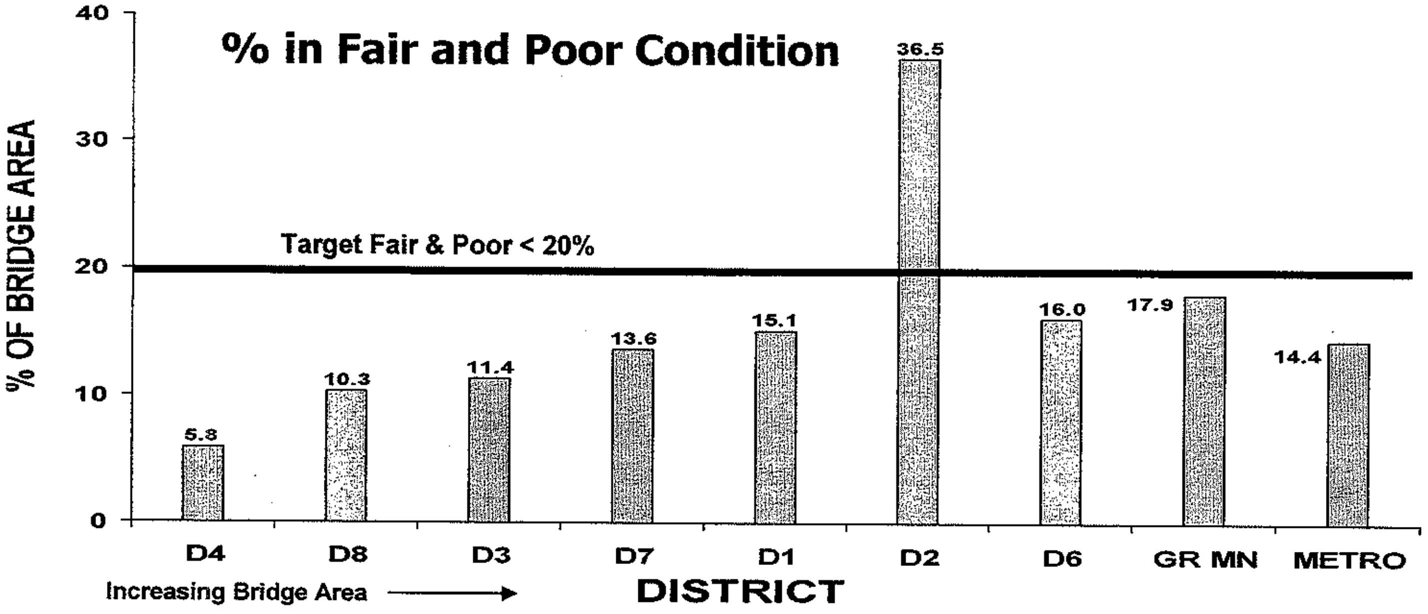


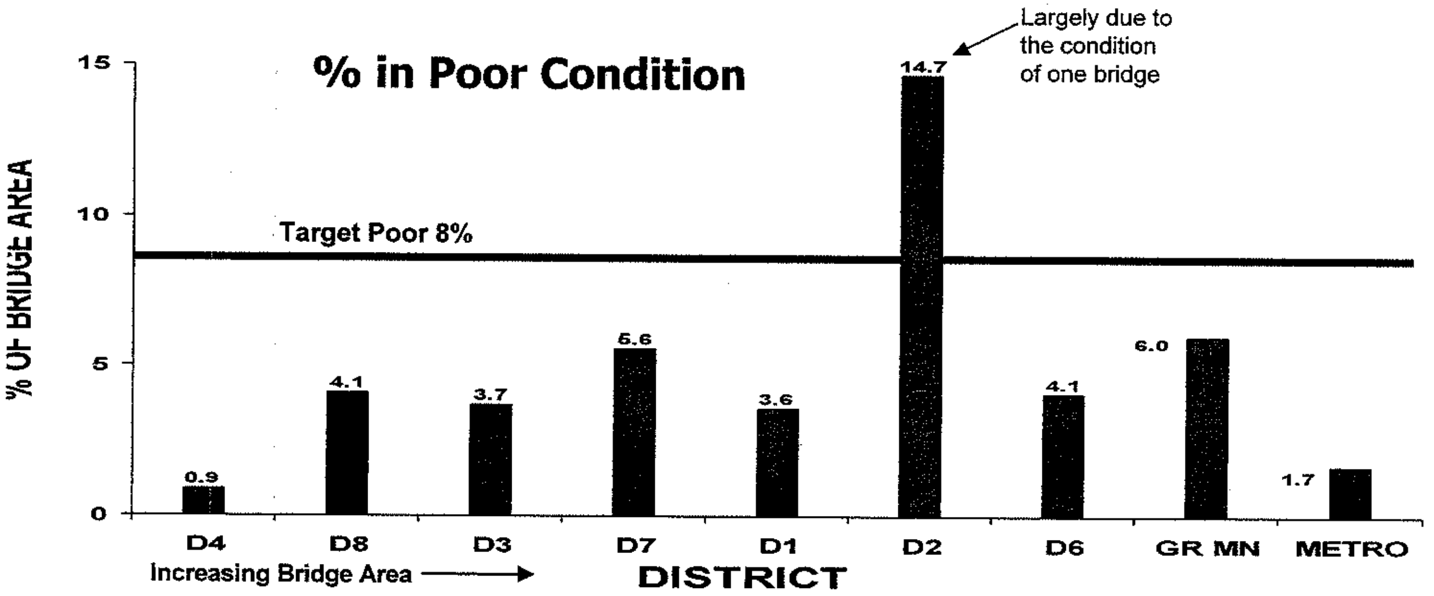
Non-Principal Arterials Account for 15% of Total Bridge Deck Area

% in Good Condition



BRIDGE STRUCTURAL CONDITION - NON-PRINCIPAL ARTERIALS - 2005

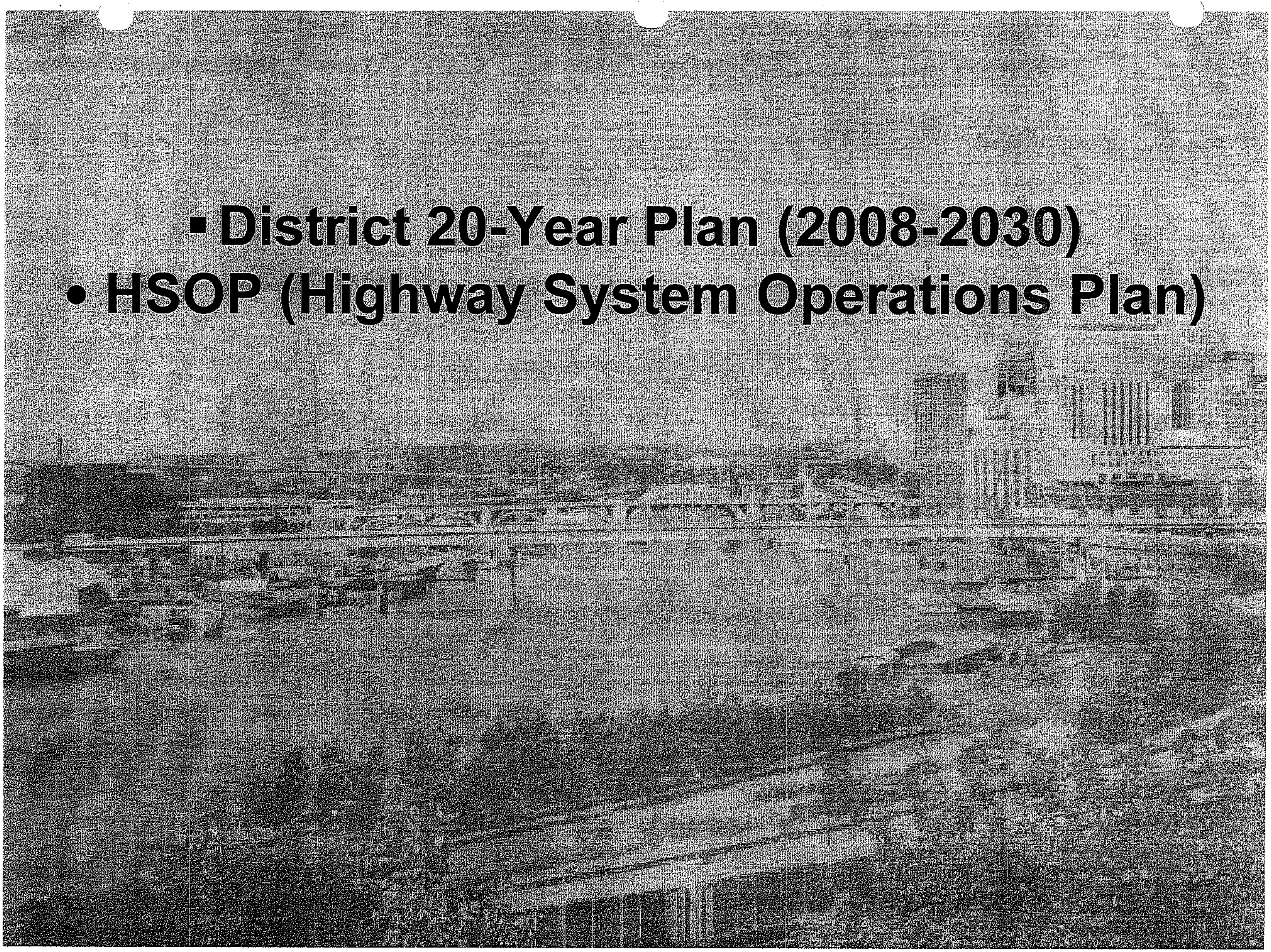

% in Fair and Poor Condition


% in Poor Condition

Largely due to the condition of one bridge

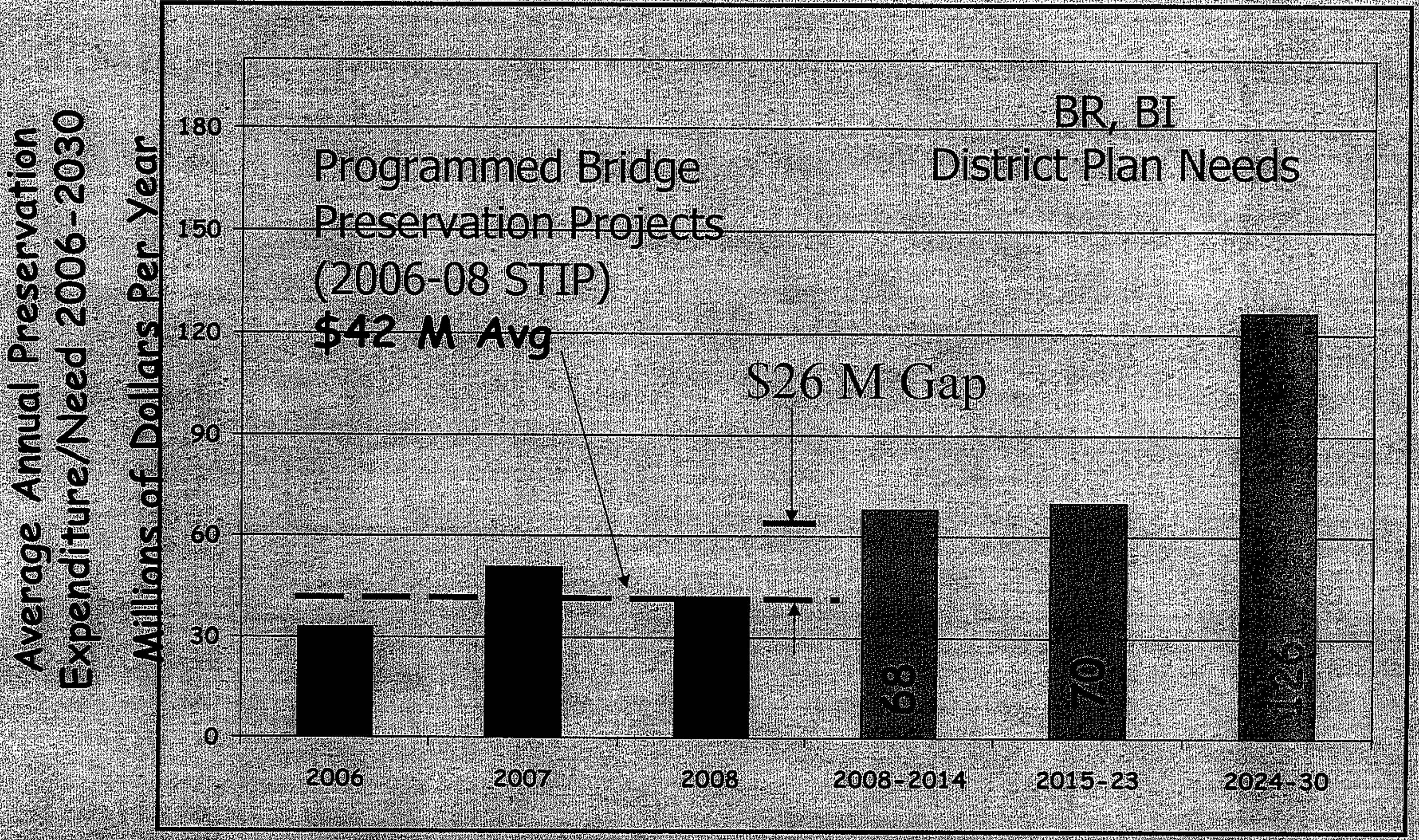
District 2 has one bridge in Poor condition that comprises 13% of the district's total non-principal arterial deck area

- District 20-Year Plan (2008-2030)
- HSOP (Highway System Operations Plan)



STATEWIDE

Annual TH Bridge Preservation Policy Expenditures and Projected Needs



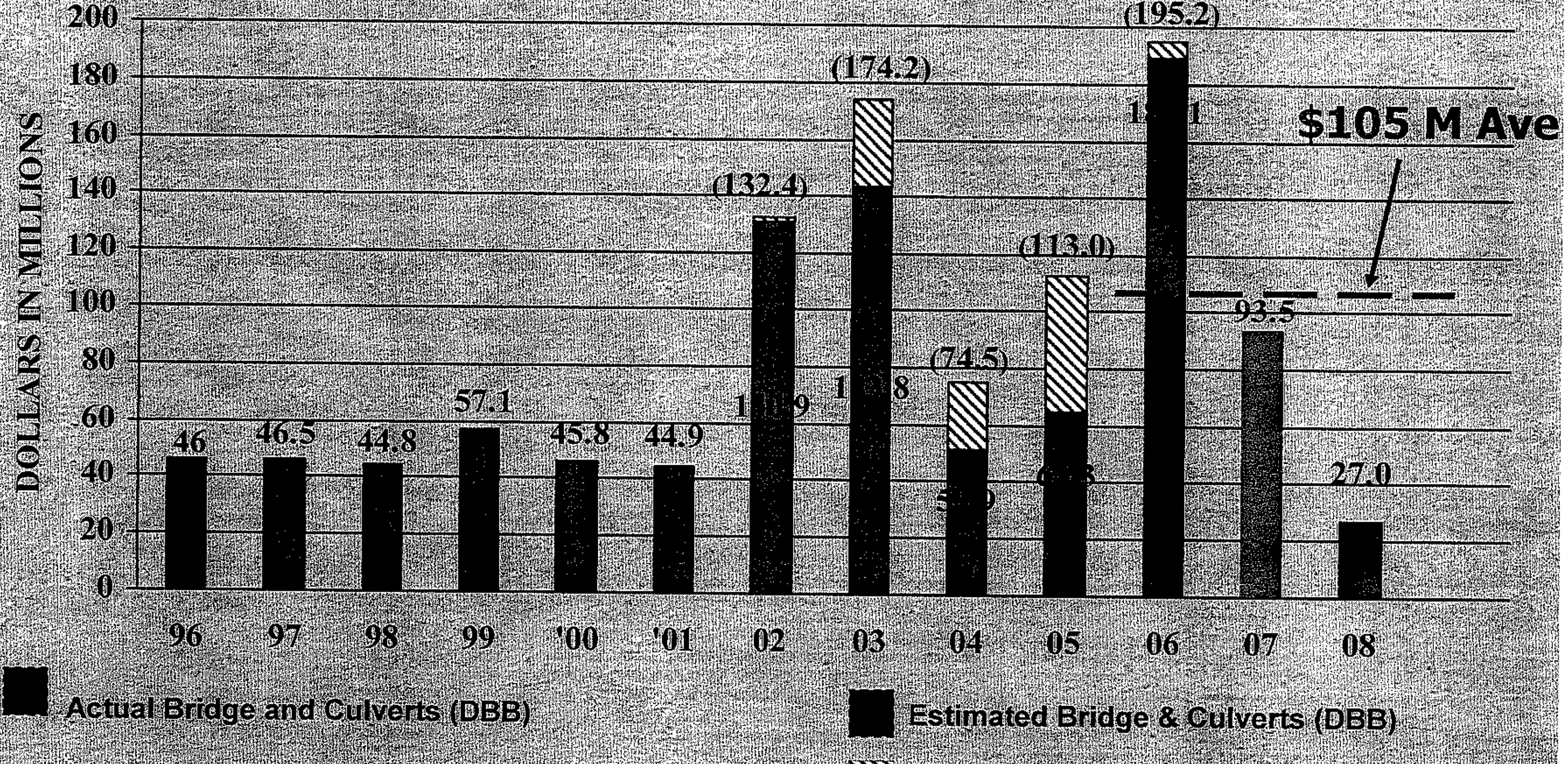
Preservation Includes Replacement, Renovation and Repair

MN/DOT BRIDGE CONSTRUCTION

Let or Programmed

Includes Expansion, Replacement, Preservation, Design Build and Culverts

Jan 12, 2006

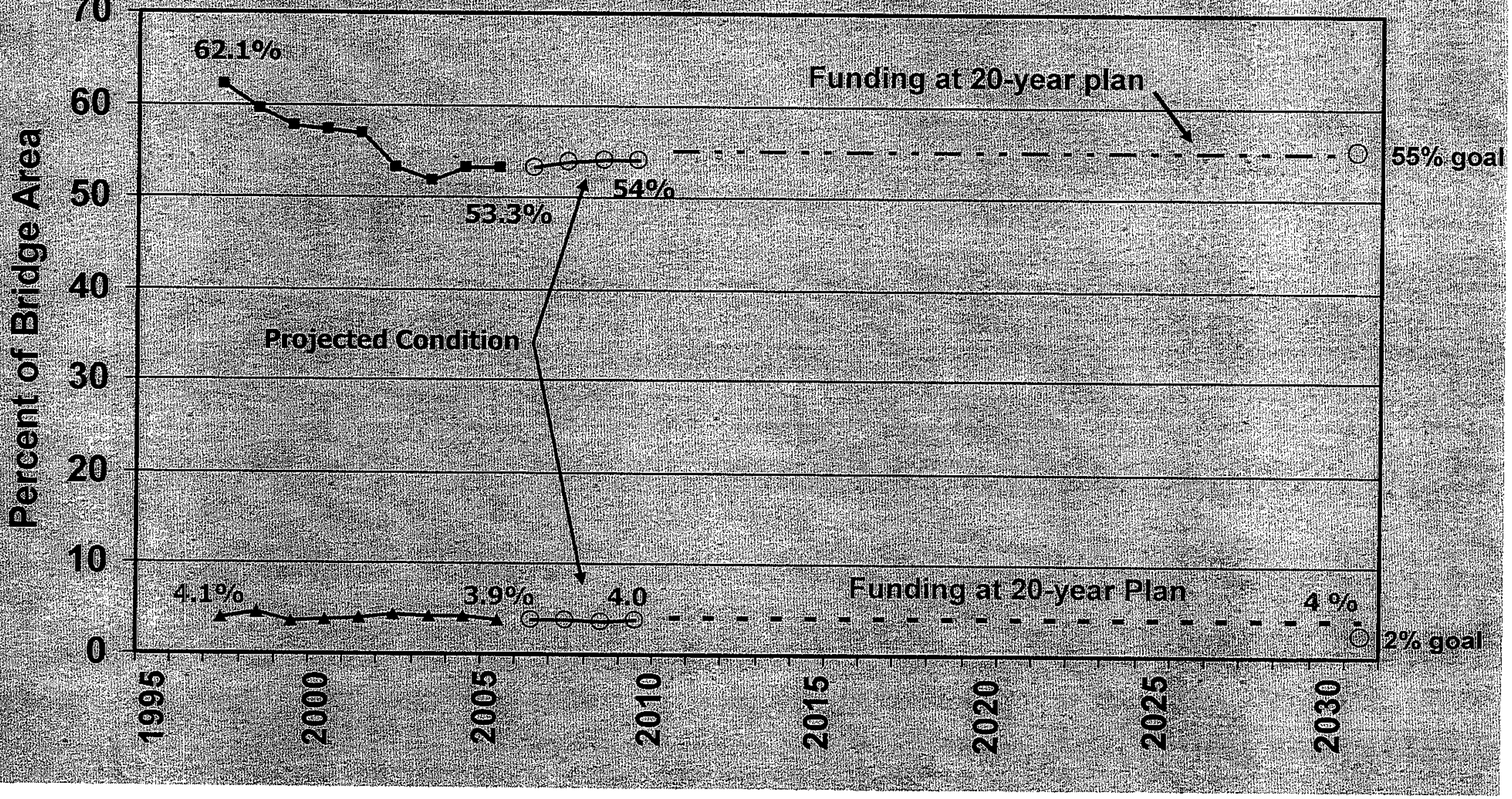


Note: ■ ■ Bridge and culvert construction cost only.

Annual Average for All Bridge Construction in the 2006-08 STIP is $105,000,000

Projected Condition Based on 2006-2008 STIP

Structural Condition of Bridges

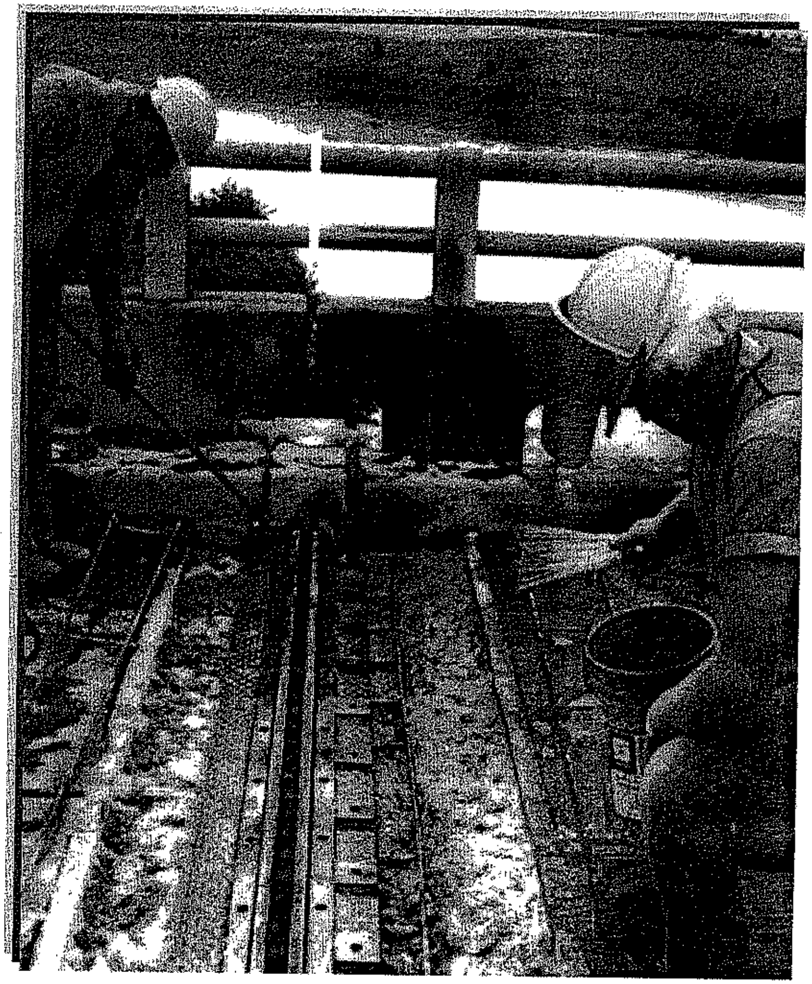


Principal Arterials

HSOP Bridge Preventative Maintenance Activities

• HSOP Funding	$2.5M
• District Funding	$1.0M
• Total	$3.5M
• Needs	$4.7M

Crack Sealing
Strip Seal Repairs
Poured Joint repairs
Flushing
Deck and Rail Sealing



HSOP Bridge PM Measures

ACTIVITY	% Good Condition	Target
Strip Seal Repairs	91%	96%
Poured Joint Repairs	74%	88%
Crack Sealing	49%	80%

	Frequency	
Deck Sealing	10 yrs	90%
Rail Sealing	10 yrs	90%
Flushing	1 yr	100%

Statewide Bridge Preservation Fund
2009-2018

- **Fund large Bridge Preservation Projects where project cost exceeds 50% of an ATP's annual Federal Funds.**
- **100% of Bridge costs eligible for funding**
- **Fund is capitalized with $40 Million annual in Fiscal 2009-2018**

District	Bridge	FY	Bridge Cost in Construction FY
2	TH 11 /Red River at Robbin	2009	12
M	TH 52/Mississippi River – Lafayette	2011	90
6	I90/Mississippi River – Dresbach	2013	31
6	TH 43/Mississippi River – Winona	2015	32
3	TH 23/Mississippi River – St Cloud	2015	27
M	I35W/Mississippi River – Minneapolis	2017	120
M	TH 61/Mississippi River – Hastings	2018	62
M	TH 36/St Croix River	2018	118
	TOTAL		**494 Million**

EXHIBIT NO: 11
Date: 4-10-08
JULIE A RIXE
COURT REPORTER

Mn/DOT POLICY
POSITION STATEMENT

Date: May 4, 1983

Reference: Highways No. 83-1
Trunk Highways Bonds
Criteria for Issuance

Position Statement:

The decision to sell Trunk Highway Bonds will be made only after conducting an analysis of a 10 year revenue and expenditure forecast which can demonstrate that, for the first six years of the 10 year period, debt costs for both existing and proposed bonds will not exceed 25% of estimated available capital funds for any one of the 6 years. Further, the proceeds from Trunk Highway Bonds will be used solely for long term capital investment purposes which have an expected useful life greater than the 20 year term of bonds.

Background:

In November, 1982 the electorate approved an amendment to the Minnesota Constitution relating to bonding for trunk highways. Approval of the constitutional question:

> "shall the Minnesota Constitution be amended to remove restrictions on the interest rate for and the amount of trunk highway bonds? Yes.... No...."

removed the long standing 5% interest limitation and $150 million debt ceiling on Trunk Highway Bonds.

Since approval of the constitutional amendment removed externally imposed interest and ceiling limitations, it would seem prudent that Mn/DOT address the question of self imposed limitations at least on the issue of the total amount of Trunk Highway debt to be outstanding at any time. The issue of interest rates is out of the hands of Mn/DOT since the Department of Finance makes the decision to sell or not sell bonds at a given interest rate and this is not known until bids on a specific bond offering are opened.

The following debt management policy guideline describes the purposes for which Mn/DOT would request the actual sale of bonds and the criteria which would be used in making the financial management decision to request such a sale.

R. P. Braun, Commissioner

Any questions regarding this position statement should be directed to:
Edwin H. Cohoon, Director, Office of Financial Management, Room 408 Transportation Building. Telephone: (612) 296-7942.

Mn/DOT POLICY
GUIDELINE

Date: May 4, 1983

Reference: Highways No. 83-1-G-1
Trunk Highway Bonds
Criteria Purposes

Guideline:

FINANCIAL MANAGEMENT CRITERIA FOR BOND SALE DECISIONS

The decision to request a Trunk Highway Bond sale by the Department of Finance for a given dollar value of bonds at a given time will be made in accordance with the following criteria:

TEN YEAR TIME HORIZON

An analysis of revenues and expenditures for the Trunk Highway Fund will be made for ten fiscal years following the year in which the bond sale takes place to determine the current and projected debt service with respect to total revenues, total expenditures, and total available capital funds.

25% Rule

Bonds MAY be sold if the total debt service projected for existing outstanding bonds and for the bond sale under consideration will not exceed twenty-five percent (25%) of available capital funds for any one of the next six future fiscal years. (Capital funds are defined as total state revenues less current operating expenses.)

Six years has been chosen for a time horizon because Mn/DOT has traditionally prepared six year revenue and expenditure plans, six year highway capital improvement proposals, and since 1980, six year capital building plans. A ten year time horizon, with bond sale decision based on the 25% rule applied to the first six years, will provide up to ten years advance warning of a potential debt service/capital funds crunch. During this ten year advance warning period steps can be taken to inform the governor, the legislature and other decision makers of the potential problem. Several legislative sessions will then be available to reach resolution of the problem.

PURPOSES FOR TRUNK HIGHWAY BONDING

Bonding with pay back from the Trunk Highway Fund will be restricted to long term capital investment purposes such as:

major river crossings
other key bridges
interstate completion
major construction and reconstruction
buildings

Each of these purposes includes capital improvements which have an expected useful life greater than the 20 year term of Trunk Highway Bonds. Purposes other than these are of course within the authority of the legislature to specify, however, to the extent that Mn/DOT determines the purposes for which Trunk Highway Bonds will be sold, the proceeds will be applied to projects which fall within categories of capital improvements similar to the above.

Position Statement Reference:

Issued under Mn/DOT Policy Position Statement Highways No. 83-1.

Background:

Refer to the above referenced position policy statement.

R. J. McDonald, Deputy Commissioner

Any questions regarding this position statement should be directed to:
Edwin H. Cohoon, Director, Office of Financial Management, Room 408 Transportation Building. Telephone (612) 297-7942.

EXHIBIT NO: 12
Date: 4-10-08
JULIE A RIXE
COURT REPORTER

Mn/DOT POLICY
POSITION STATEMENT

DATE:

Reference: Financial Administration
No.____
Debt Management

Position Statement:

In order to maximize the benefits of transportation improvements from available revenue sources through measured use of debt financing, Mn/DOT issues bonds to pay for project construction costs when prescribed conditions are met.

* This policy applies only to use of debt financing by Mn/DOT through issuance of trunk highway bonds and borrowing from the Transportation Revolving Loan Fund (TRLF). This policy does not cover use of Advance Construction financing or advances from local governments. Those financing options are covered by other policies.

Background:

Use of debt financing for constructing transportation improvements

Historically, Mn/DOT has financed construction of transportation improvement projects on a pay-as-you-go basis. However, the cost and scope of construction projects continues to grow relative to the availability of funds. Other financing approaches provide opportunities to use funds more effectively while completing projects sooner and taking advantage of economies of size than would otherwise be possible.

A primary part of the annual work of the department is to undertake construction projects that replace deteriorated portions or expand the capacity of the highway system. As a result, excessive use of debt financing is not sustainable on an on going basis. Debt financing also increases financial risk to department operations because it commits future funds, the amount of which is subject to more uncertainty, to current operations.

Two sources of debt financing are covered by this policy, trunk highway bonds and TRLF loans.

State law stipulates that all bonds issued to finance improvements to the trunk highway system are trunk highway bonds. These bonds are sold by the Department of Finance (DOF) and must be repaid with revenues from the trunk highway fund, which includes ferderal aid highway funds. The legislature must authorize these bonds before they can be issued. Bonds are sold as required to pay construction costs when they become due.

Bonds are typically repaid over 20 years with equal payments to principal plus interest on the outstanding balance. Only costs incurred for the completion of a capital improvement project on the trunk highway system are eligible for TH bonds. In addition, only projects with a minimum useful life equal to or greater than the repayment term are eligible for financing with bond proceeds.

Long-term debt financing has also been provided by the Mn/DOT Transportation Revolving Loan Fund (TRLF) program. The TRLF is a financing program administered jointly by Mn/DOT and the Public Facilities Authority (PFA) in the Department of Trade and Economic Development. This program was initiated with seed funding from the Federal Highway Administration and general fund appropriations from the Minnesota Legislature. Applications for loans are accepted periodically and evaluated using criteria defined in rule by a technical evaluation committee. Any governmental agency in Minnesota can apply for a loan if the project is meets eligibility requirements specified in Titles 23 or 49 of the United States Code.

Mn/DOT appproves and certifies applications to the Transportation Subcommittee of the PFA. The subcommittee approves the applications for financing and completes the loan agreements with the borrowing entities. When possible, the PFA issues bonds to finance projects, increasing the amount of funds available for loans. Interest rates on loans are determined by applying discounts to bond market index base interest rates and repayment terms vary. With the exception of funds used to repay bond holders, debt service payments by borrowers are returned to the TRLF to be used for future loans.

Mn/DOT can and has received loans from the TRLF. However, current law does not allow the PFA to sell bonds for Mn/DOT projects.

Mn/DOT's Principles for Use of Debt Financing

In addition to the federal and DOF requirements that limit use of debt financing, use of debt financing at Mn/DOT is guided by the following principles:

- Use of debt financing will be centrally managed on a statewide basis (
- Although use of debt financing will create fluctuations in annual transportation budget levels, financial management will strive to keep annual construction program funding levels as stable as possible.
- Use of debt financing will be based on sound financial management practices including cash flow projections and appropriate record keeping and reporting.
- Debt financing will be used to accelerate, expand, and package needed transportation projects, to facilitate the use of innovative project delivery techniques such as Design/Build and to construct buildings necessary to support efficient department operations.

- Mn/DOT will maintain its historic investment priorities, giving primacy to preservation. Use of debt financing will not supplant these priorities.
- Debt financing will only be used for projects that promise benefits to the public of a magnitude that clearly justifies the additional expense of debt financing.
- Debt financing will only be used as part of a financing plan for construction of projects where benefits exceed the costs, including interest costs.

Benefits of using Debt Financing

- Debt financing enables completion of projects earlier than under the traditional pay-as-you-go approach, reducing the impact of cost inflation while bringing the benefits of improved transportation facilities to the public at an earlier date.
- Debt financing allows consolidation of multiple staged projects into one contract, thereby advancing project delivery timetables and achieving operational and other economies of size (lower unit costs).
- Debt financing helps facilitate the funding of large projects and supports an environment where Design/Build contracts can be utilized successfully.
- Debt financing provides additional financial flexibility in handling unanticipated project cost increases and maximizing the use of available funds.

Costs and Risks of Debt Financing Use

The most obvious cost of using debt financing is the interest that must be paid to bond purchasers over the life of the bond. Over a 20 year amortization period at current interest rates, interest costs add as much as 50% in interest cost to the nominal value of the bond. In all cases, the real interest cost of borrowing is mitigated by inflation that occurs during the repayment period.

Use of debt financing also involves making some judgements about what will happen during the time period between when the bonds are issued and the debt is repaid. Since the future is impossible to predict accurately Mn/DOT incurs the risk that unfavorable future events will negatively impact the ability of the fund to repay the debt. This may result in reduction in funds available for construction projects and/or other departmental operations, since the law requires that bond holders be repaid before trunk highway funds can be spent for other purposes.

Debt financing does not create a new source of revenue. Without additional funding streams to pay the debt service, annual principal and interest payments will have to be made with funds currently planned for other purposes. If projected revenues do not meet expectations projects currently planned for future years may have to be deferred to free up funds to pay interest costs. Since bonds are issued for 20 years, the risk of unanticipated future events impacting Mn/DOT's ability to repay its debt is real, substantial, and unavoidable.

Debt financing requires sound fiscal management to ensure that sufficient cash exists to pay debt service when it becomes due. The balance of unobligated trunk highway funds and cash balances must be monitored carefully to ensure that contemplated or planned use of debt financing does not impose unexpected impacts on the Mn/DOT operating budget. As subsequent rounds of debt financing occur, careful management of cash flow is required for debt service payments. This is necessary to ensure that new debt service obligations can be assumed given debt service obligations previously incurred.

Use of bond financing or loans from the TRLF must be considered in conjunction with other departmental borrowing using Advanced Construction and local advances for trunk highway projects. Although use of these financing tools are covered by other departmental policies, they all impact the ability of the department to repay loans incurred to fund construction projects.

Finally, current revenue streams may change considerably over the life of any debt instrument. The current federal aid highway program could cease to exist, be altered dramatically or experience revenue shortages. Funds from this program are currently in the hundreds of millions of dollars and are used extensively to fund trunk highway construction projects. State revenue currently dedicated to the trunk highway fund may also change dramatically over this time frame. Technological changes, natural resource price fluctuations, political events, natural disasters, and societal behavior could change dramatically over a 20 year period significantly reducing revenue from existing sources.

One of the primary purposes for developing this debt management policy is to mitigate the risks outlined above.

Related Laws and Mn/DOT Policies include:

Carol Molnau, Commissioner of Transportation

Any questions regarding this position statement should be directed to:
Chief Financial Officer, MS 120, Transportation Building, 395 John Ireland Blvd., St. Paul, MN 55155

Mn/DOT POLICY
GUIDELINE

DATE:

Reference: Financial Administration
No. ____
Debt Management

Guideline:

I. Definitions:

A. Debt Service – required annual payments of interest and principal required to fully amortize the loan according to the loan agreement.

B. Trunk Highway Bonds – bonds sold to investors to acquire funds for construction of state trunk highway improvements. These bonds must be repaid from the Trunk Highway Fund.

C. Trunk Highway Fund – constitutionally dedicated source of revenue that must be used for a highway purpose. Principal sources of revenue are gas tax, vehicle registration fees, and federal aid funds.

D. State Revenues – revenue into the Trunk Highway Fund from sources created by Minnesota statute or constitution, such as motor fuel tax, motor vehicle registration tax and motor vehicle sales tax.

E. Cash Balance – the amount of cash in the State Trunk Highway (TH) Fund at any given time.

F. Unreserved Fund Balance – The amount of revenues less appropriations, reserves and other uses in the TH Fund at the end of a fiscal year and year end balances forecast in the Trunk Highway Fund Budgetary Fund Statement for future years.

G. State Road Construction Budget – portion of Mn/DOT's annual appropriation that is used for construction of improvements to the state transportation system.

II. Debt Management Policy:

A. In addition to state law and policy regarding debt financing by state agencies, debt incurred by Mn/DOT for trunk highway construction projects shall not exceed an amount where annual debt service obligations are greater than **15%** of the annual state revenues to the Trunk Highway Fund (THF) .

B. Debt service obligations for which the legislature has provided a new, dedicated source of repayment which is projected to provide sufficient coverage for future obligations, which provides adequate mitigation of financial risk to the THF, are not subject to the limit specified in section A. Sufficient coverage is defined as annual forecasted revenues equal to at least 1.25 times projected annual debt service commitments.

Deleted: to

C. At any given time, anticipated payments of principal and interest on debt should not reduce the projected TH Fund cash balance below Mn/DOT cash flow needs for 21 days, nor should debt repayment obligations reduce the TH Fund unreserved balance below 8% of annual state revenues to the fund.

D. Debt financing will only be used to a) complement existing financing and allow consolidation of multiple project stages to accelerate completion of a project, b) provide funds to take advantage of an opportunity to advance a project to an earlier year, c) allow use of the design/build delivery method on a project or d) finance construction of buildings necessary for efficient department operations.

Deleted:

E. Use of debt financing must result in anticipated project cost savings and reduction in user costs that exceed the interest paid on the debt.

F. Debt service payments should be taken first from funds appropriated for that purpose, then from the previously unreserved balance in the TH Fund. In no instance will debt repayment and AC conversions reduce the funds available for maintenance and preservation projects in the state road construction budget or the department maintenance and operations budget.

G. This Debt Management policy must be interpreted consistently with other Mn/DOT policies regarding financial management, including the Advance Construction Management Policy.

H. Bond proceeds used to purchase right of way should not be used when deposit with state district court is required.

III. **Responsibilities:**

A. Districts will submit candidate projects to OIM for consideration for debt financing. These candidate projects will be prioritized and recommended for debt financing.

B. The Office of Finance will review the requests for debt financing, prepare information and analyses of the impacts and report to the CFO on the financial implications of the debt financing proposal.

C. The CFO will evaluate the recommended projects and the financial capacity of the THF to assume additional debt service.

D. Debt financing use must be approved by TPC and Mn/DOT's CFO.

E. The Office of Finance will make construction contract payments from state funds and coordinate bond sales with the Department of Finance to ensure that proceeds are available to make these payments when they are due.

F. OIM will coordinate the tracking of reductions in District/ATP allocation targets when required for payment of debt service.

Carol Molnau, Commissioner of Transportation

Any questions regarding this position statement should be directed to:
Chief Financial Officer, MS 120, Transportation Building, 395 John Ireland Blvd., St. Paul, MN 55155

EXHIBIT NO: 13
Date: 4-10-08
JULIE A RIXE
COURT REPORTER

Mn/DOT POLICY
POSITION STATEMENT

DATE: July 2006

Reference: Financial
Administration
No. ____
Trunk Highway
Fund Balance

Position Statement:

In order to provide a financial management guideline that more predictably funds the construction, maintenance and operations of the state Trunk Highway System, it is necessary to maintain an adequate, projected, unreserved balance in the Trunk Highway Fund. This balance will mitigate against the impacts of the probable occurrence of negative unforeseen future events on agency operations.

Background:

The State's Trunk Highway Fund is the principal operating fund for the Minnesota Department of Transportation (Mn/DOT). The Trunk Highway Fund is a governmental fund that accounts for public monies used to construct, maintain, and operate most of the Minnesota Trunk Highway transportation infrastructure. It also accounts for transfers to pay Trunk Highway debt.

The Trunk Highway Fund is organized as a "special revenue" fund within the State accounts. The fund accounts for the flow of more than $1 Billion of public money each year.

State Statutes do not require a specific balance for funds other than the State General Fund but do not permit a deficit balance at the end of any biennium. Therefore setting an appropriate level of unreserved, undesignated fund balance is a necessary and important management decision that Statute reserves for the Commissioner.

Uses of revenue and fund balance:

In Governmental funds, undesignated, unreserved fund balance is used to:

i. Meet operating needs (pay bills)
ii. Meet debt service needs
iii. Allow for emergencies (natural and financial)
iv. Permit orderly adjustment to revenue fluctuations.

Systematic and thoughtful planning for use of revenues, including preparation of budgets and annual spending plans, provides the best opportunity for the department to maximize the value of the services it provides to transportation system users.

Financial risks are inherent in all plans as unknown future events threaten to disrupt this orderly use of resources and delivery of services. It is sound financial management, of which risk management is a significant part, to plan for a margin of safety to allow adjustment to future events without causing disruption of plans for provision of services.

Benefits of maintaining a fund balance:

Maintaining an unreserved fund balance while planning for spending of funds creates a reserve that can be used to mitigate significant deviations from expected future events. Revenue forecasts and projected spending levels are all subject to significant uncertainty due to several economic, operating, and legal uncertainties concerning the future operating environment.

Some specific sources of financial risk are revenue coming in below forecast. All three major sources of state revenue and revenue appropriated to Minnesota by the federal government can and do fluctuate. An adequate balance in the fund allows spending to continue at planned levels despite revenue decreases.

Inflation in input prices creates a constant erosion of the purchasing power of revenues received. Although operating plans attempt to incorporate the impacts of these price increases on future operations and spending, the actual level of price changes is very difficult to forecast. The department purchases significant quantities of inputs that have historically experienced extraordinary price increases, such as fuel, bituminous, steel, and trucks. An adequate fund balance provides an opportunity to request increases in spending levels to sustain planned operating levels despite major unexpected price increases.

Every year, unexpected natural and man-made disasters occur to which the department must respond. Floods, tornadoes, blizzards, and wild fires occur every year, although in unexpected magnitude and unpredictable locations. In addition, hazardous chemical spills and crashes that damage the infrastructure occur frequently. Adequate fund balance provides an opportunity for the department to respond to significant unforeseen demands on operating funds and at the same time remain adequate funding for planned operations.

Actions by elected officials are also a source of financial risk. Adequate fund balance provides an opportunity to respond to these directives and the associated expectations while also preserving adequate funding for planned operations.

Deleted: Frequently the department is directed to spend money in specific areas, through earmarks for example, whichh disrupt existing plans for use of resources.

Policy Precedents:

There are a number of precedents that help guide fund balance decision-making. The State of Minnesota (MSS 16A.152) requires its General Fund to maintain reserves for cash flow and budget reserves. A generally recognized principle of governmental financial management establishes a minimum balance for special revenue funds such that available unreserved fund balance plus budgeted revenues for a given period will be at least equal to expenditures for the period.

The Governmental Finance Officers' Association (GFOA) has established a fund balance "best practice" to guide governments in setting fund balance policy limits. Many governments have established fund balance policies.

Related Laws and Mn/DOT Policies include:

Mn/DOT Policy Position Statement , Financial Administration, Debt Management Policy, Advanced Construction Policy

Carol Molnau, Commissioner of Transportation

Any questions regarding this position statement should be directed to:
Chief Financial Officer, MS 120, Transportation Building, 395 John Ireland Blvd., St. Paul, MN 55155

Mn/DOT POLICY
GUIDELINE

DATE: July 2006

Reference: Financial
Administration
No. ____
Trunk Highway
Fund Balance

Guideline:

I. Definitions:

A. State Revenues – revenue into the Trunk Highway Fund from sources created by Minnesota statute or constitution, such as motor fuel tax, motor vehicle registration tax and motor vehicle sales tax.

B. Fund Balance – The amount of revenues less appropriations, reserves and other uses in the TH Fund at the end of a fiscal year and year end balances forecast in the Trunk Highway Fund Budgetary Fund Statement for future years.

C. Federal Funds – federal appropriations for transportation purposes received on a reimbursable basis through the Federal Highway Administration.

In order to promote the best standards of public financial stewardship, the Minnesota Department of Transportation has adopted a Fund Balance Policy as follows:

Trunk Highway Fund Balance Policy:

For ordinary operating needs, the Trunk Highway Fund will maintain an undesignated, unreserved Trunk Highway Fund Balance of not less than 8% of annual projected state revenues to the fund.

Deleted: for

Deleted: , excluding federal funds deposited in the Trunk Highway Fund or other "pass through" revenues.

ADMINISTRATION AND RESPONSIBILITIES:

A. It is the Commissioner's responsibility to ensure that adequate fund balance is maintained.

B. The Chief Financial Officer (CFO) and designees are responsible for establishing a sufficient internal control environment to ensure that financial management and budget processes provide adequate information for the Commissioner to meet the obligations of this policy.

C. Agency leaders of Mn/DOT are required to conduct agency business in a reasonably prudent manner to ensure funds are used as intended and achieve an adequate fund balance.

Deleted: All managers, supervisors, and employees

D. Beginning January 1, 2007, the Agency has a period of not more than five years to reach compliance with the specific limits of this policy.

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Carol Molnau, Commissioner of Transportation

Any questions regarding this position statement should be directed to:
Chief Financial Officer, MS 120, Transportation Building, 395 John Ireland Blvd.,
St. Paul, MN 55155

(Proposed)

MN/DOT position statement on fiscal accountability

At the Minnesota Department of Transportation, fiscal accountability is built on the following planks:

1. Resources used by Mn/DOT are "owned" by the Public; we are stewards of the public purse and, as good stewards, always act in the best interest of the owners.
2. All financial transactions must be authorized by the legislature through inclusion in the budget or other enabling legislation.
3. The Legislature appropriates public resources to the Commissioner.
4. The commissioner delegates authority for specific types of transactions through the management structure; all financial transactions must be approved by persons who have delegated authority.
5. Responsibility and accountability for decisions reside finally with designated individuals, never with a committee. .
6. Substantial business decisions are taken only on the basis of proper business planning informed by appropriately detailed risk assessments and due diligence review.
7. The CFO will provide budgeting and accounting systems necessary to document and report the financial effects (timing, certainty, and amounts of cash-flows) of the Agency's business decisions.
8. Managers with delegated authority to spend public money will use the official information , amended as necessary, to execute budgets to ensure that public funds are used as efficiently as possible to meet the unique needs and conditions in their areas of responsibility .
9. Because of its independence from operations, the CFO's office will be the official source of financial information to help Mn/DOT managers ensure they are using public resources effectively and efficiently to meet Minnesota's transportation needs.
10. All financial planning and reporting is coordinated through the Office of the CFO to avoid duplication in the preparation and collection of information.

EXHIBIT NO: 14
Date: 4-10-08
JULIE A RIXE
COURT REPORTER

Mn/DOT POLICY
POSITION STATEMENT

DATE: July 2006

Reference: Financial Administration
No. ____
Federal Advance
Construction

Position Statement:

In order to maximize the use of federal aid highway funding available to Minnesota, Mn/DOT will make the best possible use of federal Advance Construction (AC) procedures to help deliver needed transportation projects.

* This policy applies to all commitments of future federal funds through the use of AC, whether for trunk highway projects or other transportation investments. Local governments seeking to use AC must also comply with the requirements and policies set forth by Mn/DOT's State Aid for Local Transportation.

Background:

<u>Federal Requirements and Limits</u>

AC is an innovative financing method promulgated by the federal government under 23 U.S.C. § 115 (2002). The federal guidelines for using AC are set forth in the Federal Highway Administration (FHWA) *Guidance on Advance Construction of Federal-Aid Projects*, dated May 10, 1996.

Federal AC procedures provide states and local governments the flexibility to initiate (advance) transportation projects using non-federal funds while preserving eligibility for future federal aid highway funds. After an AC project is authorized by the FHWA, a State may fully or partially convert the project to federal aid highway funding provided federal funds are available for the project. Conversion (payback) is the process of converting AC to the obligation of actual federal funds.

Under traditional federal aid financing, Mn/DOT obligates the full federal share of a multi-year project, using current year federal appropriations, in the first year of the project. This method commits available federal funds even though much of it will not be needed until the later years of construction. AC allows the states to use only the federal funds that are needed for each year of project construction. Using AC produces a one time increase in funds available for the construction of additional projects in that first year using funds that would otherwise have been fully committed to other projects.

The necessary state funds to match the AC amount must be available when the project is authorized by FHWA.

Only certain federal highway programs are eligible for AC use. These programs include, but are not limited to, the following:

- National Highway System (includes Interstate Maintenance)
- Surface Transportation Program
- Bridge Replacement and Rehabilitation

Except for National Highway System and Interstate Maintenance, one of the following conditions must be met to qualify for advance construction:

- the State has obligated all the funds apportioned or allocated for the specific program,
- the State has exhausted its obligation authority, or
- the State can demonstrate it will use its obligation authority before the end of the fiscal year.

Federal funds that are transferred to the Federal Transit Administration (FTA) for transit projects are <u>not</u> eligible for AC.

AC projects must be included in or amended into the State Transportation Improvement Program (STIP) and meet the tests of financial constraint required by 23 U.S.C. § 135(f). AC must be shown in the STIP in the year incurred. and the conversion of the AC to the obligation of federal funds must be shown for each year in which a conversion is planned.

According to the FHWA's *Guidance on Advance Construction of Federal-Aid Projects*, the total amount a State can AC in any given year cannot exceed the sum of the State's current unobligated balance of apportionments plus the amount of Federal funds anticipated in the subsequent years of its approved STIP.

<u>Mn/DOT's Principles for AC Use</u>

In addition to the federal requirements and limits on using AC, Mn/DOT's AC use is guided by the following principles:

- ▶ AC use will be based on sound financial management practices including cash flow and AC conversion projections and appropriate record keeping and reporting.
- ▶ Programming of AC will be centrally managed on a statewide basis (Office of Investment Management staff will coordinate AC use by the District/Area Transportation Partnerships).
- ▶ Although AC use will create fluctuations in annual state road construction budget levels, AC management will strive to keep annual construction program funding levels as stable as possible.

- ▶ AC will be used to finance multi-year projects and for temporary federal fund management.
- ▶ Mn/DOT will maintain its historic investment priorities, giving primacy to preservation. AC use will not supplant these priorities.

Benefits of AC

- AC enables a one time acceleration of projects compared to the traditional pay-as-you-go approach, avoiding construction cost inflation and bringing the benefits of improved transportation facilities to the public at an earlier date.
- AC allows consolidation of multiple, staged projects to advance project delivery timetables and achieve operational and other economies of scale (lower unit costs).
- AC helps facilitate the funding of large projects and supports an environment where Design/Build contracts can be utilized successfully.
- AC gives states additional financial flexibility in handling unanticipated project cost increases.
- AC enables Mn/DOT to maximize its use of federal funds by only having to obligate the federal funds that are needed in each year of the project's construction.
- AC allows Mn/DOT to maximize receipt of federal funds through the August redistribution.

Costs and Risks of AC Use

The primary purposes of developing this AC policy are to establish management guidelines for use of AC to manage risk effectively and to mitigate impacts of the risks outlined below.

Plans for use of AC are based on an expectation of future federal funds, rather than currently available existing appropriations. Once the commitment of AC is made to encumber a project the department is committing to payments and assuming the risk that future appropriated federal revenues will be sufficient to meet these obligations. If future appropriations are below estimates adjustments in spending levels will be required and options will be more limited since substantial portions of the federal fund appropriation will have been committed in earlier years.

Cumulative federal fund commitments to large, multi-year projects are very large compared to revenues dedicated to support other operations in Mn/DOT. As a result, there is significant potential that unexpected developments in the use of AC could have significant impacts on spending in other areas of Mn/DOT operations.

Commitments of AC are also based on estimates of progress on large, complex multi-year construction projects involving hundreds of millions of dollars. The actual progress on these projects will be different than estimates due to changes in input prices, scope changes, discoveries during construction, and weather. These unforeseen future events will trigger greater financing and budget adjustments when combined with higher AC balances.

Plans for use of AC financing are based largely on the estimated revenue for an entire year, but the appropriation of federal funds regularly occurs in partial year appropriations. As a result, there is greater risk that the amount of federal funds available for conversion will not be sufficient to pay eligible project costs at the time they are paid by the department.

When federal funds are not available to reimburse eligible project costs, another revenue source must be used to cover payments on projects. State and local sources of revenue are required for 100% of the cash outlays, rather than receiving federal funds for (usually) 80% of these costs. This reduces the overall cash balances and results in lower investment income to the Trunk Highway and State Aid Funds from Invested Treasurer's Cash interest earnings.

AC is not a new source of revenue. It allows a one time advancement of projects that would have been built later by committing future federal funds to AC conversion. Therefore, those federal funds are not available for additional projects in the future, and a smaller program may result unless Mn/DOT continues to use AC at a level commensurate with conversions.

Use of AC may result in fluctuations in the dollar value of projects let from year to year. Because the total amount paid for costs on individual projects fluctuate annually through the construction period, use of federal funds for conversions will fluctuate as well, causing fluctuations in funds available for new construction projects.

The use of AC obligates the department to very substantial future payments on construction contracts which will be liquidated over 2 to 4 years. These commitments are very large compared to other uses of operating revenue. If future events vary from those anticipated when the commitment was made, the impact on other funding commitments could be severe due to the relative size of the AC commitments.

AC requires sound fiscal management to ensure that a sufficient cash balance exists when project costs must be paid. In addition, AC requires careful planning for use of anticipated federal funds to ensure adequate federal funds are available when needed for AC conversion.

Related Laws and Mn/DOT Policies include:

Minnesota Statutes § 161.36, Federal Aid
Mn/DOT Policy Position Statement , Financial Administration, Debt Management Policy

Doug Differt, Deputy Commissioner

Any questions regarding this position statement should be directed to:
Chief Financial Officer, MS 120, Transportation Building, 395 John Ireland Blvd., St. Paul, MN 55155

Mn/DOT POLICY
GUIDELINE

DATE: July 2006

Reference: Financial Administration
No. ____
Federal Advance
Construction

Guideline:

I. Definitions:

A. Apportionment – The statutorily prescribed US/DOT division of federal highway aid contract authority among the states.
B. Appropriation – The federal government's limit on how much federal highway aid it can obligate to a state in a federal fiscal year (obligation authority).
C. Obligation – The federal government's legal commitment (promise) to pay or reimburse a state for the federal share of an eligible project's costs.
D. Advance Construction (AC) – an innovative construction financing method (23 U.S.C. S 115 2002) in which the Federal Highway Administration (FHWA) authorizes use of future federal appropriations to finance current year projects. An AC obligation is incurred when the financing agreement is completed with FHWA.
E. Cash Balance – The amount of cash in the State Trunk Highway (TH) Fund at any given time as determined in the General Ledger Trial Balance.
F. Unreserved Fund Balance – The amount of revenues less appropriations, reserves and other uses in the TH Fund at the end of a fiscal year and year end balances forecast in the Trunk Highway Fund Budgetary Fund Statement for future years.

II. AC Policy:

A. The total AC balance in any state fiscal year should not exceed an amount equal to 125% of the amount of federal obligation authority forecast for that year as calculated to support the current Trunk Highway Fund forecast.
B. At the end of each state fiscal year, the AC balance cannot exceed 100% of the federal funds amount specified in paragraph A above.
C. Federal earmarked funds for local projects are exempted from this limit.

D. The use of AC to finance projects other than those on the Trunk Highway system must be included when calculating the total for compliance with this policy.

E. In addition, use of federal obligation authority for conversions for all projects must not exceed 50% of the official, estimated federal formula funds available for use during a state fiscal year unless approved by the Finance and Programming subcommittee of the TPC.

F. The use of AC should be limited to financing of multi-year, major construction projects and short term intra-year financing.

G. Plans for use of AC should be based on the expectation that federal appropriations are expected to be available when payments are made for project construction costs to ensure no long term impact on the cash balance of affected Funds or the projected unreserved fund balance(s) in those funds.

H. Conversions of AC must be initiated immediately when expenditures on eligible costs for a project exceed $500,000. Conversions should also be executed to minimize labor required to complete conversion and reimbursement transactions and minimize delays in receipt of federal fund cash. This policy specifically prohibits delaying conversions for expended project costs into the subsequent state fiscal year.

Deleted:

I. The limits of this policy will be phased in over four years, immediately following adoption by the Commissioner.

III. Responsibilities:

A. Each District/ATP's AC use, must be approved by the Office of Investment Management (OIM) of all planned AC use in their annual Area Transportation Improvement Plans and 10-Year Work Plans.

B. OIM will provide forecasts for AC use and conversions to the Office of Finance and the CFO for confirmation that the plan conforms to this policy prior to TPC approvals of the draft and final State Transportation Improvement Program (STIP).

C. All planned use of AC as depicted in the STIP will be approved by the Transportation Program Committee and the CFO annually

D. The Office of Finance must provide OIM with necessary cash flow reports and models, and prepare a financial analysis of AC use to OIM. OIM must provide Financial Management with all necessary project schedules and estimates.

E. All changes to the planned use of AC must be reported to the Office of Finance and the CFO quarterly to ensure that revised plans remain financially feasible.

Deleted: monthly

F. The Office of Financial Management makes construction contract payments and bills the federal government for reimbursement in the federal fiscal year in which the eligibility for reimbursement is incurred. OIM processes conversions of AC to federal funds.

G. OIM includes planned AC conversions in the STIP. Conversions are charged to the District/ATP targets.

Doug Differt, Deputy Commissioner

Any questions regarding this position statement should be directed to:
Chief Financial Officer, MS 120, Transportation Building, 395 John Ireland Blvd., St. Paul, MN 55155

SPECIAL COUNSEL'S SECOND REQUEST FOR PRODUCTION OF DOCUMENTS TO THE MINNESOTA DEPARTMENT OF TRANSPORTATION

DOCUMENT REQUEST

EXHIBIT NO: 2
Date: 4-21-08
JULIE A RIXE
COURT REPORTER

REQUEST NO. 17: All documents relating to any load bearing testing performed on the Bridge prior to the construction, modification or repair work on the Bridge in 1977, 1998 and 2007.

RESPONSE NO. 17: **It is not clear what Gray Plant Mooty is requesting regarding "All documents relating to any load bearing testing performed on the Bridge…". The term "load bearing testing" in bridge engineering is used to refer to soil testing to determine the capacity of in-situ soils to support foundation loads. If any such load bearing tests occurred it would be prior to construction in the 1960's and any records would be in the Electronic Data Management System (EDMS) files supplied previously.**

The bridge was instrumented and known loads driven over the spans in the late 1990's as part of the University of Minnesota study. That information has been previously supplied and is posted on our website.

Load rating calculations were done in the 1970's and 1990's. The repair in 2007 did not add weight to the bridge so a load rating was not applicable. Copies of the load rating documents are attached.

Mn/DOT 22107 (6-78)

DEPARTMENT OF TRANSPORTATION

BRIDGE RATING AND LOAD POSTING REPORT

BRIDGE LOCATION AND DESCRIPTION

dge No. 9340 & 9340A

T.H. No. 35W

Mile Point 18.43

Year Built 1961

Year Remodeled 1978 - New Slab W.C.

Type 401 & 404

Description 14 SPANS - 2-52' RDWYS OVER RR & Miss R. & 2nd ST.

Location 0.1 Mi. S. of Jct TH 47

DATA USED FOR BASIS OF REPORT (check)

☒ Bridge Inventory File

☒ Bridge Inspection Report (date 1978, by ______)

☐ Current Bridge Rating and Load Posting Report

☐ Bridge Plans (Original, Repair and Reconstruction)

☐ Bridge Letter File

Additional Field Information Required? ☐ Yes ☒ No

☒ Computer Analysis or ☐ Manual Analysis

EXHIBIT NO. 3
Date: 4-21-08
JULIE A RIXE
COURT REPORTER

SUMMARY OF RATING AND LOAD POSTING ANALYSIS

Bridge No. 9340-9340A

Structure: Group I/D & No. G65-005

Inventory Rating	Operating Rating	Load Posting Req'd?	LOAD POSTING LIMITS (Complete when load posting is required)		
			Vehicle Type M3 Weight = 23T	Semi-Trailer Comb. Type M3S2 Weight = 36T	Truck & Full Trailer Type M3-3 Weight = 36T
H ______ or HS 15.9	HS 30.6	______ Yes ✓ No	______ Tons	______ Tons	______ Tons

Design Load (Live load category for which bridge was designed) 6

Safe Load Capacity Appraisal Rating 8

CERTIFICATION

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the State of Minnesota.

Signed John W Dance

Date 9/17/79 Reg. No. 7425

RATED BY SH

CHECKED BY JWD

DATE 9/17/79

Note! New Rating for Jan 1998 CONTRACT - DOT Filed, See computer output

MINNESOTA DEPARTMENT OF TRANSPORTATION
BRIDGE RATING and LOAD POSTING REPORT

BRIDGE LOCATION and DESCRIPTION

Bridge No. 9340 - 9340A

T.H. No. 35W

Ref. Point 18+0.538

Year Built 1967

Year Remodeled

County 27

Type 404, 210

Description 14 Spans, 2-52' Rdwy over RR & Miss R. & 2nd ST

Location 1.0 M. NE of Jct TH94

DATA FOR BASIS OF REPORT
(check appropriate boxes)

☒ Bridge Inventory File

☒ Bridge Inspection Report (Date ______ By ______)

☒ Current Bridge Rating & Load Posting Report

☒ Bridge Plans (Original, Repair/Reconstruction)

☒ Computer Analysis

☐ Manual Analysis

WEARING COURSE

Type CONC

Thickness 2"

as of Date 1995

METHOD OF RATING
(check appropriate box)

☒ 1 Load Factor (LF)

☐ 2 Allowable Stress (AS)

☐ 3 Load & Resistance Factor (LRFD)

☐ 4 Load Testing

☐ 5 No Rating Analysis performed

B65005

GROUP I.D. & NUMBER

EXHIBIT NO: 4
Date: 4-21-08
JULIE A RIXE
COURT REPORTER

DESIGN LOAD = HS20
(Live load category for which the bridge was designed)

PERMIT CODES
(For overload permits)

A	B	C	D
1	1	1 P4	

SUMMARY OF RATING and LOAD POSTING ANALYSIS

INVENTORY RATING	OPERATING RATING	POSTING REQUIRED	LOAD POSTING LIMITS (Complete when load posting is required)		
			Vehicle Type M3 Wgt = 24 Ton	Semi-Trailer Type M3S2 Wgt = 40 Ton	Truck-Full Trailer Type M3-3 Wgt = 40 Ton
H ____ HS 20	HS 33	YES ____ NO ✓	____ Tons	____ Tons	____ Tons

CERTIFICATION

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the State of Minnesota.

Signed John W Dower

Date 12-14-95 Reg. No. 7425

12-14-95 JCAR
Rated by

Checked by

12-14-95
Date

Revised

MN/DOT 22107 (9/93)

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION
BRIDGE RATING SHEET

Mn/DOT 22135 (7-85)
Sheet No. 1 of 3
Rated By JWD
Checked By
Date 12-4-98

501

STEEL BEAM - COMPOSITE & NON-COMPOSITE LOAD FACTOR

SO. APPROACH 5 SPANS 1→5

BRIDGE LOCATION AND DESCRIPTION

Bridge No. 9340
T.H. No. 35W
Mile Point 18+0.538
Year Built 1967
Year Remodeled
Type 404
Description 14 Spans over RR, Miss. Riv. & 2nd St.
Location 1.0 M. N.E. of Jct TH 94

SUMMARY OF RATING AND LOAD POSTING

Structure: Group I/D & No. G68005

INVENTORY RATING	OPERATING RATING	LOAD POSTING REQUIRED?	LOAD POSTING LIMITS (Complete when load posting is required)		
			Vehicle Type M3 Weight = 24T	Semi-Trailer Comb. Type M3S2 Weight = 36T	Truck & Full Trailer Type M3-3 Weight = 40T
H ____ or HS 20	HS 33	Yes ____ No ✓	____ Tons	____ Tons	____ Tons

ANALYSIS DATA

RATING		INVENTORY	OPERATING RATING	
Distribution Lanes	number	2	2	1
Distribution Width	ft.	11	11	14
Allowable Stress - Steel (FY)	lbs./sq. in.	36000	do	do
Critical Point Location	Number	4.5	do	do
Controlling Rating Factor	Name	Mom't	do	do
Moment Available for Unfactored Live Load per Beam	ft.-kips	9624	11604	
Moment Available for Unfactored Live Load per Lane	ft.-kips	1296	2159	2740

DESCRIPTION OF SECTION

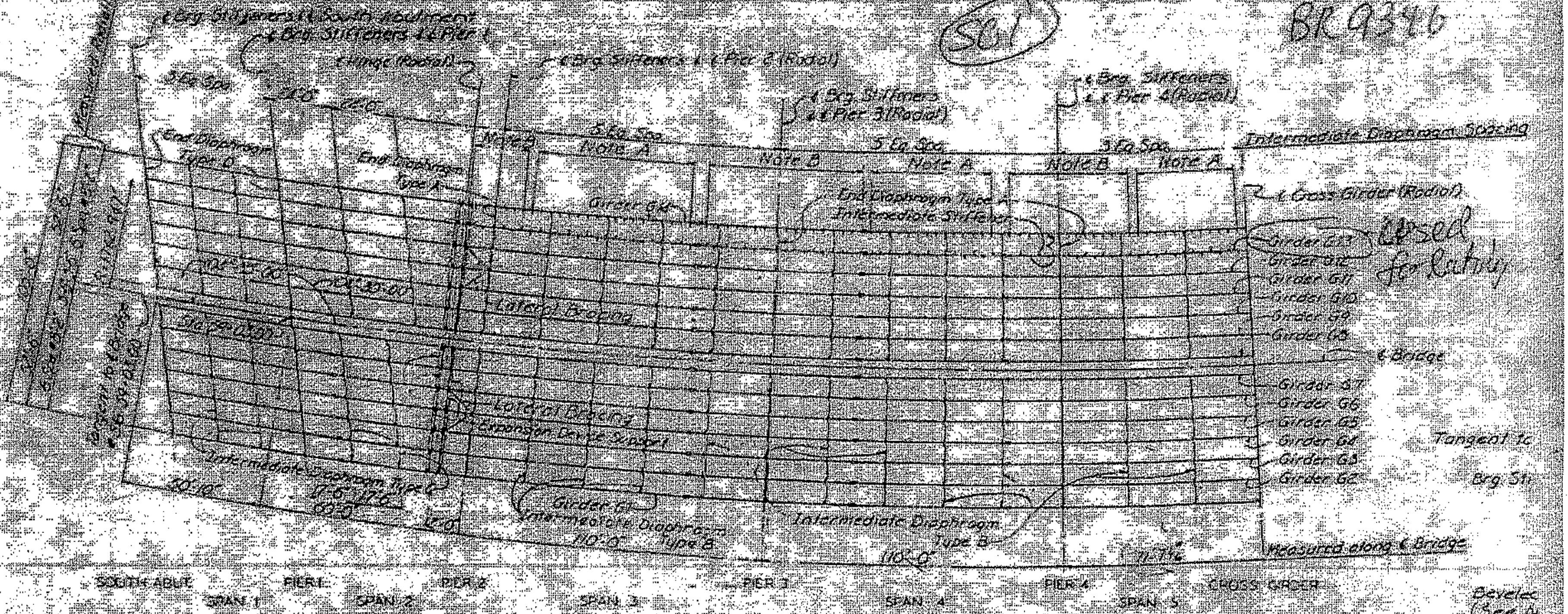
Span Length 50'-11, 81'-8, 107'-3, 107'-3, 69'-7 Impact 21.5%
Roadway Width 70.52' Slab Thicknes 6½-¼ = 6¼" W.C. Thickness 2" CONC.
Beams Size: See Backside Ctrs: 8'-2" Sect. Mod. for Live Load 960.4
D.L.: WC = 208, C&R = 137, Diaph = 13

Note A: Weld Intermediate Stiffeners to top flange, Girders G1 thru G14

Note B: Weld Intermediate Stiffeners to bottom flange, Girders G1 thru G14

SG1

BR9346



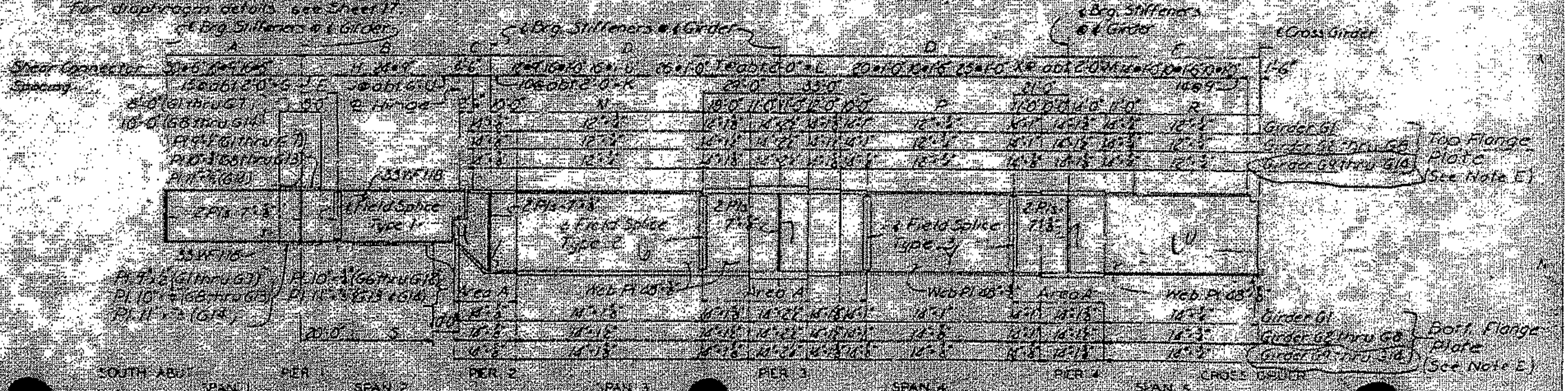
FRAMING PLAN

Note: Intermediate Stiffeners for Girders G1 and G14 shall be Pl. 4"×⅜". Space as shown for G14 and normal to web.
Intermediate Stiffeners for Girders G2 thru G13 shall be Pl. 4"×⅜". Space as shown for G13 and normal to web.
Diaphragms in Spans 1 and 2 shall be placed parallel to Pier 1.
Diaphragms in Spans 3, 4 and 5 shall be placed radially.
For diaphragm details see Sheet 17.

Note: Diaphragms may be shifted slightly to clear Field Splices.

Note: Shear Connectors may be omitted over flange splice plates.

Beveled (See N



GIRDER ELEVATION

Note: Intermediate Stiffeners [illegible] Splice flange plates not shown.

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION
BRIDGE RATING SHEET

Mn/DOT 22135 (7-85)

Sheet No. 2 of 3

Rated By JWN

Checked By

Date 12-14-95

S02

STEEL BEAM - COMPOSITE & NON-COMPOSITE LOAD FACTOR

NO. APPROACH 3SPANS 9,10,11

BRIDGE LOCATION AND DESCRIPTION

Bridge No. 9340
T. H. No. 35W
Mile Point 1870.538
Year Built 1967
Year Remodeled

Type 404
Description 14 Spans over RR, Miss Riv & 2nd St.
Location 1.0 Mi. N.E. of Jct TH 94

SUMMARY OF RATING AND LOAD POSTING

Structure: Group I/D & No. G68005

INVENTORY RATING	OPERATING RATING	LOAD POSTING REQUIRED?	LOAD POSTING LIMITS (Complete when load posting is required)		
			Vehicle Type M3 Weight = 24T	Semi-Trailer Comb. Type M3S2 Weight = 36T	Truck & Full Trailer Type M3-3 Weight = 40T
H ____ or HS 27	HS 45.5	Yes ____ No ✓	____ Tons	____ Tons	____ Tons

ANALYSIS DATA

RATING		INVENTORY	OPERATING RATING	
Distribution Lanes	number	2	2	1
Distribution Width	ft.	11	11	14
Fy = 36 Span 10,11, Fy = 45 Span 9 Allowable Stress - Steel (FY)	lbs./sq. in.	36000	do	do
Critical Point Location	Number	3.6	do	do
Controlling Rating Factor	Name			
Moment Available for Unfactored Live Load per Beam	ft.-kips	1035.6	1726	
Moment Available for Unfactored Live Load per Lane	ft.-kips	1394	2323	2957

DESCRIPTION OF SECTION

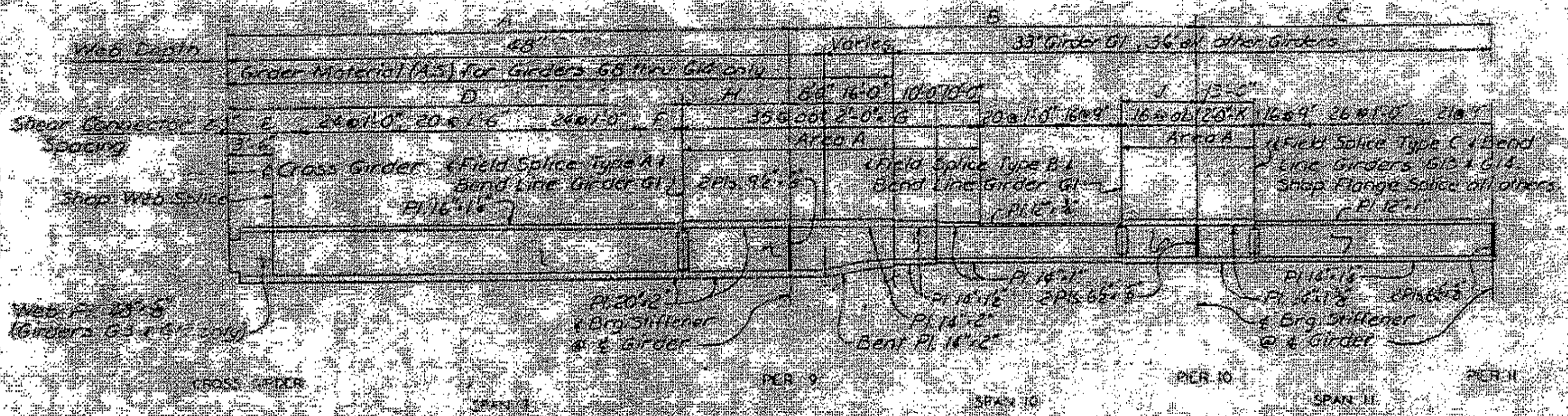
Span Length 137L, 110, 94, 67L5 Impact 26%

Roadway Width 20'52' Slab Thicknes 6½-¼ = 6¼" W. C. Thickness 2" Conc

Beams Size: See Sketch Back Side Ctrs 8'-2" Sect. Mod. for Live Load 1016.9

Ai: WC = 208, C&R = 137, Diaph = 12

BR9360 S02



ELEVATION - GIRDERS G1 THRU G14 & G1C

Note: Field Splice Flange Plates and Intermediate Stiffeners not shown.

Shear Connectors may be omitted over flange splice plates.

Web plates to be ⅜" thick except as noted.

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION
BRIDGE RATING SHEET

Mn/DOT 22134 (2-84)

Sheet No. 3 of 3

Rated By JWD

Checked By

Date 12-14-98

VOIDED 3 SPAN CONT,
CONCRETE SLAB – LOAD FACTOR RATING S03

BRIDGE LOCATION AND DESCRIPTION

Bridge No. 93402 & 93404

T. H. No. 35W

Mile Point 18+0.538

Year Built 1967

Year Remodeled

Type 210

Description 14 spans over RR, Miss Riv & 2nd St

Location 1.0 M. N.E. of Jct TH94

SUMMARY OF RATING AND LOAD POSTING ANALYSIS

Structure: Group I/D & No. 605008

INVENTORY RATING	OPERATING RATING	LOAD POSTING REQUIRED?	LOAD POSTING LIMITS (Complete when load posting is required)		
			Vehicle Type M3 Weight = 24T	Semi-Trailer Comb. Type M3S2 Weight = 36T	Truck & Full Trailer Type M3-3 Weight = 40T
H ____ or HS 20.2	HS 33.6	Yes ____ No ✓	____ Tons	____ Tons	____ Tons

ANALYSIS DATA

ITEM DESCRIPTION	UNIT	INVENTORY RATING	OPERATING RATING	
Distribution Lanes	Number	2	2	1
Distribution Width	Feet	13.57	13.57	Same
Allowable Stress - Reinf. (ø Fy)	Lbs./Sq. In.	36000	do.	
Dead Load Moment per Lane (Unfactored)	Foot Kips	757	757	
Moment Available for Unfactored Live Load per Lane	Foot Kips	616	1027	

DESCRIPTION OF SECTION

Point Rated 3.0

Span No. 2

Span Length 46'-2, 58'-2, 29'-2

Impact 29.6%

Roadway Width 52'

Slab Thickness 24"

W. C. Thickness 2" conc

As 5.07 "/' @ 1-10" SPAC

d 22"

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION
BRIDGE RATING SHEET

Mn/DOT 22135 (7 - 85)

Sheet No. 4 of 5

Rated By JWD

Checked By

Date 8-18-97

TRUSS STRINGERS . S04 = 4 Span Cont, . S05 = 6 Span Cont,

STEEL BEAM - COMPOSITE & NON-COMPOSITE LOAD FACTOR

BRIDGE LOCATION AND DESCRIPTION

Bridge No. 9340

T. H. No. 35W

Mile Point 184 0.538

Year Built 1967

Year Remodeled 1998

Type 401, 404, 210

Description 14 Spans,

Location 6 M. N.E. of Jct TH94

SUMMARY OF RATING AND LOAD POSTING

Structure: Group I/D & No. G65005

INVENTORY RATING	OPERATING RATING	LOAD POSTING REQUIRED?	LOAD POSTING LIMITS (Complete when load posting is required)		
			Vehicle Type M3 Weight = 24T	Semi-Trailer Comb. Type M3S2 Weight = 36T	Truck & Full Trailer Type M3-3 Weight = 40T
H ____ or HS 22.8	HS 38.1	Yes ____ No ✓	____ Tons	____ Tons	____ Tons

ANALYSIS DATA

RATING		INVENTORY	OPERATING RATING	
Distribution Lanes	number	2	2	1
Distribution Width	ft.	11	11	14
Allowable Stress - Steel (FY)	lbs./sq. in.	36000	do	do
Critical Point Location	Number	2.0	do	do
Controlling Rating Factor	Name	Moment	do	do
Moment Available for Unfactored Live Load per Beam	ft.-kips	856	1426	do
Moment Available for Unfactored Live Load per Lane	ft.-kips	1152	1920	2443

DESCRIPTION OF SECTION

BOTH SAME RATING . S04 GIVEN

Span Length S04=4@38', S05=6@38' Impact 30%

Roadway Width 52' Slab Thicknes 6 1/4" W. C. Thickness 2" CONC.

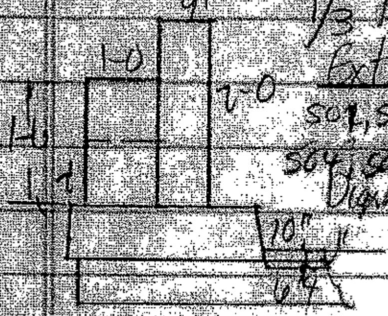
Beams Size: 27WF94 Ctrs: 8'-2" Sect. Mod. for Live Load 243

Sh 5 of 5
Br 9340
8-18-97 JCWD

New Solid Ext Rail & Dbl-J Rail added.

Dead Loads for Steel Str, 8'-2' Span.

WC: .17×8.17×150 = 208#/'



1/3 to Ext Str & Bm.

Ext Rail (1.75×1.5 + .5×.75 + .66×.85) 150/3 = 263 ~~258~~

S01, S02: .34×8.17/24 + 4 = 16

S04, S05 Diaphragm: .34×8.17/19 + 1 = 16

Typ. all Str & Bm's 487#/'
(S01, S02, S04, S05)

S03 Voided slab 1'-10" width

WC .17×1.83×150 = 47#/' TOTAL

C&R to Ext Portion

J-Rail (Med.)

$\left(\underset{top}{.54\times1} + .283\times1.15 - \frac{.17\times1.58}{2} - .58\times1.08 - \frac{.58\times1.3}{2}\right)\frac{150}{3} = 175\#/'$

Not Critical - Use Ext Solid Rail

Hold untill 1st Jan 1998 P4 = 1-1-2

INV HS 19

OPER HS 31.5

BARS-PC R5.5 - MOD

STRUCTURE I.D. = G65-005

(Note: Errors on US4 for Neg check points)

EXHIBIT NO: 5
Date: 4-21-08
JULIE A RIXE
COURT REPORTER

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*************************************************************************************************************
*                                      STRUCTURE HEADER AND DESCRIPTION                                     *
*************************************************************************************************************

   100-- 2                   RA/I/O/P = X            FILE REQUESTS AND OUTPUT DATA EXCEPTIONS
                 TYPE =     SS   YEAR =   64  LEN = 1907.00 FT.      WIDTH =   52.00 FT.      14 SPANS SP.LOAD =
                 INV.LL.TRK.=       OP.LL.TRK.=


*************************************************************************************************************
*                             STRUCTURE LOCATION AND PERMANENT IDENTIFICATION FACTORS                       *
*************************************************************************************************************

   200-- 5    BRIDGE=  9340    DIST./CO.= 5,   27  CONST. ROUTE =  TH 35W   CONST. SECT.=         CONST. STA.=   0+
              MICROFILM REEL NO.  DESIGN PLANS=         COMPUTATIONS=          CORRESPONDENCE=
                 ROUTE I.D.=            MARKED ROUTE =


*************************************************************************************************************
*                                               COMMENTS                                                    *
*************************************************************************************************************

   300-- 6    1   .17 FT WC  ARCH DECK TRUSS AND TRUSS FL BM'S NOT RATED. S01 IS 5 SPAN
   400-- 6    2   SO. APPR., S02 IS SPANS 9 TO 11 BOTH LINES G-13. S03 IS VOIDED CONC
   500-- 6    3  SPAN 12-14. BR 9340A IS SAME AS S03. S04, S05 = TRUSS STRG SPANS 4 & 6
   600-- 6    4  CONT SPANS RESP.  NEW MEDIAN JRAIL & SOLID EXT RAIL IN 1998. L.F.RATING


*************************************************************************************************************
*                    MEMBER SPECIFICATIONS AND REQUIRED ANALYSIS-GIRDER,STRINGER AND FLOOR BEAM             *
*************************************************************************************************************

          MEMBER SPANS  STIFF. SPAN 1      SPAN 2      SPAN 3   MATL   ALLOWABLE STRESS     LL DIST.  END  THRU  MAX  IMPACT  FACTOR
            ID          SYMM CODE (SPAN 4)  (SPAN 5)   (SPAN 6)  CODE      FY    FB FC* FC**  FACTOR FL.BN DECK  INV  OP.   POST  SPEC

    700-- 8   S 1    5   X      50.917     81.667    107.250   CSC         .00         .00    1.485               .00  .00  .00   .00
    800-- 8   S 1    0   X     107.250     69.583       .000               .00         .00     .000               .00  .00  .00   .00
    900-- 8   S 2    3   X     137.833     94.000     67.417   CSC  36000.00         .00    1.485               .00  .00  .00   .00
   1000-- 8   S 3    3          46.167     58.167     29.167   RC          .00         .00     .271               .00  .00  .00   .00
   1100-- 8   S 4    4 X        38.000     38.000       .000   CSC  36000.00         .00    1.485               .00  .00  .00   .00
   1200-- 8   S 5    6 X        38.000     38.000     38.000   CSC  36000.00         .00    1.485               .00  .00  .00   .00
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Add'l '98

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*************************************************************************************************************
*                           SUPERIMPOSED DEAD LOADS-GIRDERS,STRINGERS AND FLOOR BEAMS                       *
*************************************************************************************************************

           MEMBER SYMM. SPAN   DISTANCE FR. LOAD         LOAD             LENGTH
             ID           NO.    LEFT SUPP.  TYPE   P OR W(L)    W(R)

   1300--10    S 1        1        .000FT.    W      487.0        .0       50.917FT.
```

```
 1400--10    S 1          2        .000FT.   W    487.0      .0       81.667FT.
 1500--10    S 1          3        .000FT.   W    487.0      .0      107.250FT.
 1600--10    S 1          4        .000FT.   W    487.0      .0      107.250FT.
 1700--10    S 1          5        .000FT.   W    487.0      .0       69.583FT.
 1800--10    S 2          1        .000FT.   W    487.0      .0      137.833FT.
 1900--10    S 2          2        .000FT.   W    487.0      .0       94.000FT.
 2000--10    S 2          3        .000FT.   W    487.0      .0       67.417FT.
 2100--10    S 3          1        .000FT.   W     47.0      .0       46.167FT.
 2200--10    S 3          2        .000FT.   W     47.0      .0       58.167FT.
 2300--10    S 3          3        .000FT.   W     47.0      .0       29.167FT.
 2400--10    S 4          2        .000FT.   W    487.0      .0       38.000FT.
 2500--10    S 4    X     1        .000FT.   W    487.0      .0       38.000FT.
 2600--10    S 5          2        .000FT.   W    487.0      .0       38.000FT.
 2700--10    S 5          3        .000FT.   W    487.0      .0       38.000FT.
 2800--10    S 5    X     1        .000FT.   W    487.0      .0       38.000FT.
```

increased from 358 → 487

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*****************************************************************************************************************
*                                          SECTION RANGE SPECIFICATIONS                                         *
*****************************************************************************************************************

            MEMBER  SYMM.  SPAN  RANGE    RANGE      SECTION NO.  SEC. VAR.  HINGE   HINGE 1     HINGE 2          HYBRID GIRDER
              ID            NO.   NO.     LENGTH     LEFT RIGHT              CODE    DIST.       DIST.      CODE    FY     CODE     FY

 3000--11    S 1            1     1     40.917FT.    1    0                          .000FT.     .000FT.              0.             0.
 2900--11    S 1            1     2     10.000FT.    2    0                          .000FT.     .000FT.              0.             0.
 3200--11    S 1            2     1      8.000FT.    2    0                   1    70.000FT.     .000FT.              0.             0.
 3100--11    S 1            2     2     12.000FT.    1    0                          .000FT.     .000FT.              0.             0.
 3500--11    S 1            2     3     40.000FT.    3    0                          .000FT.     .000FT.              0.             0.
 3400--11    S 1            2     4     10.000FT.    1    0                          .000FT.     .000FT.              0.             0.
 3300--11    S 1            2     5     11.667FT.    4    5      RB                  .000FT.     .000FT.              0.             0.
 3600--11    S 1            3     1     10.000FT.    5    0                          .000FT.     .000FT.              0.             0.
 3800--11    S 1            3     2     86.250FT.    6    0                          .000FT.     .000FT.              0.             0.
 3700--11    S 1            3     3     11.000FT.    7    0                          .000FT.     .000FT.              0.             0.
 4000--11    S 1            4     1     11.000FT.    7    0                          .000FT.     .000FT.              0.             0.
 3900--11    S 1            4     2     86.250FT.    8    0                          .000FT.     .000FT.              0.             0.
 4100--11    S 1            4     3     10.000FT.    9    0                          .000FT.     .000FT.              0.             0.
 4200--11    S 1            5     1     14.000FT.    9    0                          .000FT.     .000FT.              0.             0.
 4300--11    S 1            5     2     55.583FT.   10    0                          .000FT.     .000FT.              0.             0.
 4400--11    S 2            1     1    112.833FT.    1    0                          .000FT.     .000FT.    A    45000.    W    50000.
 4500--11    S 2            1     2     25.000FT.    2    0                          .000FT.     .000FT.    A    45000.    W    50000.
 4600--11    S 2            2     1      8.000FT.    2    0                          .000FT.     .000FT.    A    45000.    W    50000.
 4800--11    S 2            2     2     16.000FT.    3    4      FB                  .000FT.     .000FT.    A    45000.    W    50000.
 4700--11    S 2            2     3     52.000FT.    5    0                          .000FT.     .000FT.              0.             0.
 4900--11    S 2            2     4     18.000FT.    6    0                          .000FT.     .000FT.              0.             0.
 5100--11    S 2            3     1     13.000FT.    6    0                          .000FT.     .000FT.              0.             0.
 5000--11    S 2            3     2     54.417FT.    7    0                          .000FT.     .000FT.              0.             0.
 5300--11    S 3            1     1      5.000FT.    1    0                          .000FT.     .000FT.              0.             0.
 5200--11    S 3            1     2     21.000FT.    2    0                          .000FT.     .000FT.              0.             0.
 5500--11    S 3            1     3     14.167FT.    3    0                          .000FT.     .000FT.              0.             0.
 5400--11    S 3            1     4      6.000FT.    1    0                          .000FT.     .000FT.              0.             0.
 5700--11    S 3            2     1      6.000FT.    1    0                          .000FT.     .000FT.              0.             0.
 5600--11    S 3            2     2     12.167FT.    3    0                          .000FT.     .000FT.              0.             0.
 6000--11    S 3            2     3     22.000FT.    4    0                          .000FT.     .000FT.              0.             0.
 5900--11    S 3            2     4     11.000FT.    3    0                          .000FT.     .000FT.              0.             0.
 5800--11    S 3            2     5      7.000FT.    5    0                          .000FT.     .000FT.              0.             0.
 6100--11    S 3            3     1     29.167FT.    6    0                          .000FT.     .000FT.              0.             0.
 6200--11    S 4            1     1     38.000FT.    1    0                          .000FT.     .000FT.              0.             0.
 6300--11    S 4            2     1     38.000FT.    1    0                          .000FT.     .000FT.              0.             0.
 6400--11    S 5            1     1     38.000FT.    1    0                          .000FT.     .000FT.              0.             0.
 6500--11    S 5            2     1     38.000FT.    1    0                          .000FT.     .000FT.              0.             0.
 6600--11    S 5            3     1     38.000FT.    1    0                          .000FT.     .000FT.              0.             0.
```

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*******************************************************************************************************************************
*                     SECTION PROPERTIES (STEEL OR TIMBER) - GIRDERS STRINGERS, FLOOR BEAMS                                   *
*******************************************************************************************************************************

          NUMBER -- NON-DETAILED DESCRIPTION ----------------------- DETAILED DESCRIPTION --------------------
               ID   SEC.    A          I        S      CODE  SAME ADR       H   BLK     A          IX         DY          DX

  6700--12    S 1    0     .00        .0       .0         1    0    32.86   1  11.50P         .7       32.6          .0
  6800--12    S 1    0     .00        .0       .0         1    0      .00   2    .55P       31.4       16.4          .0
  6900--12    S 1    0     .00        .0       .0         1    0      .00   3  11.50P         .7         .4          .0
  7000--12    S 1    0     .00        .0       .0         2    0    34.18   1  11.50P        1.4       33.5          .0
  7100--12    S 1    0     .00        .0       .0         2    0      .00   2    .55P       31.4       17.1          .0
  7200--12    S 1    0     .00        .0       .0         2    0      .00   3  11.50P        1.4         .7          .0
  7300--12    S 1    0     .00        .0       .0         3    0    34.54   1  11.50P        1.6       33.8          .0
  7400--12    S 1    0     .00        .0       .0         3    0      .00   2    .55P       31.4       17.3          .0
  7500--12    S 1    0     .00        .0       .0         3    0      .00   3  11.50P        1.6         .8          .0
  7600--12    S 1    0     .00        .0       .0         4    0    34.76   1  14.00P         .9       34.3          .0
  7700--12    S 1    0     .00        .0       .0         4    0      .00   2    .38P       33.0       17.4          .0
  7800--12    S 1    0     .00        .0       .0         4    0      .00   3  14.00P         .9         .4          .0
  7900--12    S 1    0     .00        .0       .0         5    0    49.76   1  14.00P         .9       49.3          .0
  8000--12    S 1    0     .00        .0       .0         5    0      .00   2    .38P       48.0       24.5          .0
  8100--12    S 1    0     .00        .0       .0         5    0      .00   3  14.00P         .9         .4          .0
  8200--12    S 1    0     .00        .0       .0         6    0    50.13   1  12.00P         .8       49.8          .0
  8300--12    S 1    0     .00        .0       .0         6    0      .00   2    .38P       48.0       25.4          .0
  8400--12    S 1    0     .00        .0       .0         6    0      .00   3  14.00P        1.4         .7          .0
  8500--12    S 1    0     .00        .0       .0         7    0    52.50   1  14.00P        2.3       51.4          .0
  8600--12    S 1    0     .00        .0       .0         7    0      .00   2    .38P       48.0       26.3          .0
  8700--12    S 1    0     .00        .0       .0         7    0      .00   3  14.00P        2.3        1.1          .0
  8800--12    S 1    0     .00        .0       .0         8    0    49.63   1  12.00P         .8       49.3          .0
  8900--12    S 1    0     .00        .0       .0         8    0      .00   2    .38P       48.0       24.3          .0
  9000--12    S 1    0     .00        .0       .0         8    0      .00   3  14.00P         .9         .4          .0
  9100--12    S 1    0     .00        .0       .0         9    0    50.75   1  14.00P        1.4       50.1          .0
  9200--12    S 1    0     .00        .0       .0         9    0      .00   2    .38P       48.0       25.4          .0
  9300--12    S 1    0     .00        .0       .0         9    0      .00   3  14.00P        1.4         .7          .0
  9400--12    S 1    0     .00        .0       .0        10    0    49.50   1  12.00P         .8       49.1          .0
  9500--12    S 1    0     .00        .0       .0        10    0      .00   2    .38P       48.0       24.8          .0
  9600--12    S 1    0     .00        .0       .0        10    0      .00   3  14.00P         .8         .4          .0
  9700--12    S 2    0     .00        .0       .0         1    0    51.25   1  16.00P        1.3       50.6          .0
  9800--12    S 2    0     .00        .0       .0         1    0      .00   2    .63P       48.0       25.0          .0
  9900--12    S 2    0     .00        .0       .0         1    0      .00   3  20.00P        2.0        1.0          .0
 10000--12    S 2    0     .00        .0       .0         2    0    52.00   1  20.00P        2.0       51.0          .0
 10100--12    S 2    0     .00        .0       .0         2    0      .00   2    .63P       48.0       26.0          .0
 10200--12    S 2    0     .00        .0       .0         2    0      .00   3  20.00P        2.0        1.0          .0
 10300--12    S 2    0     .00        .0       .0         3    0    52.00   1  14.00P        2.0       51.0          .0
 10400--12    S 2    0     .00        .0       .0         3    0      .00   2    .63P       48.0       26.0          .0
 10500--12    S 2    0     .00        .0       .0         3    0      .00   3  14.00P        2.0        1.0          .0
 10600--12    S 2    0     .00        .0       .0         4    0    40.00   1  14.00P        2.0       39.0          .0
 10700--12    S 2    0     .00        .0       .0         4    0      .00   2    .63P       36.0       20.0          .0
 10800--12    S 2    0     .00        .0       .0         4    0      .00   3  14.00P        2.0        1.0          .0
 10900--12    S 2    0     .00        .0       .0         5    0    37.75   1  12.00P         .8       37.4          .0
 11000--12    S 2    0     .00        .0       .0         5    0      .00   2    .63P       36.0       19.0          .0
 11100--12    S 2    0     .00        .0       .0         5    0      .00   3  14.00P        1.0         .5          .0
 11200--12    S 2    0     .00        .0       .0         6    0    38.75   1  14.00P        1.4       38.1          .0
 11300--12    S 2    0     .00        .0       .0         6    0      .00   2    .63P       36.0       19.4          .0
 11400--12    S 2    0     .00        .0       .0         6    0      .00   3  14.00P        1.4         .7          .0
 11500--12    S 2    0     .00        .0       .0         7    0    38.25   1  12.00P        1.0       37.8          .0
 11600--12    S 2    0     .00        .0       .0         7    0      .00   2    .63P       36.0       19.3          .0
 11700--12    S 2    0     .00        .0       .0         7    0      .00   3  14.00P        1.3         .6          .0
 11800--12    S 4    0     .00        .0       .0         1    0    26.92   1  10.00P         .8       26.5          .0
 11900--12    S 4    0     .00        .0       .0         1    0      .00   2    .49P       25.4       13.5          .0
 12000--12    S 4    0     .00        .0       .0         1    0      .00   3  10.00P         .8         .4          .0
 12100--12    S 5    0     .00        .0       .0         1    0    26.92   1  10.00P         .8       26.5          .0
 12200--12    S 5    0     .00        .0       .0         1    0      .00   2    .49P       25.4       13.5          .0
 12300--12    S 5    0     .00        .0       .0         1    0      .00   3  10.00P         .8         .4          .0
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**************************************************************************************************************
*                            SECTION PROPERTIES (REINFORCED CONCRETE) - GIRDERS, STRINGERS, FLOOR BEAMS              *
**************************************************************************************************************

             MEMBER SECT. SAME   RFL   H          A          B          B*         T       I       AS         D      COMP
               ID    NO.   AS ADR                                                              R                     CODE

 12800--13    S 3    1     0           24.00      .00      22.00      22.00      12.00    1        6.03      2.00
 13000--13    S 3    1     0             .00      .00      22.00        .00      12.00    2        2.00     22.50    X
 12700--13    S 3    2     0           24.00    22.50      22.00       9.63       4.25    1        1.93      2.00    X
 13100--13    S 3    2     0             .00      .00      22.00        .00       4.00    2        4.39     22.50
 12600--13    S 3    3     2   R       24.00    22.50      22.00      13.50       4.25    1        1.93      2.00    X
 12500--13    S 3    4     2   R         .00      .00        .00        .00        .00    1        2.54      2.00    X
 12400--13    S 3    5     1   R         .00      .00        .00        .00        .00    1        5.07      2.00
 12900--13    S 3    6     0           24.00      .00      22.00      22.00      12.00    1        5.07      2.00    X
 13200--13    S 3    6     0             .00      .00      22.00        .00      12.00    2        2.00     22.50


**************************************************************************************************************
*                                   SECTION PROPERTIES (COMPOSITE) - GIRDERS, STRINGERS, FLOOR BEAMS                 *
**************************************************************************************************************

             MEMBER   SPAN          RANGE     COMP N SECT       A      WIDTH     THICK    FILLET   FILLET   EFFECT.   EFFECT.   DIST TO
               ID SYMM  RANGE       LENGTH    CODE         SAME R               -NESS    WIDTH    THICK.   WIDTH     THICK.    TOP SECT.

 13400--14    S 1     1   1     40.000FT. C   0   1   0            98.00      6.25    18.00     1.00     93.00      7.75      4.50
 13300--14    S 1     1   2     10.917FT. N   0   1   0              .00       .00      .00      .00       .00       .00       .00
 13600--14    S 1     2   1     14.000FT. N   0   1   0              .00       .00      .00      .00       .00       .00       .00
 13500--14    S 1     2   2     56.000FT. C   0   1   0              .00       .00      .00      .00       .00       .00       .00
 13700--14    S 1     2   3     11.667FT. N   0   1   0              .00       .00      .00      .00       .00       .00       .00
 13800--14    S 1     3   1     10.000FT. N   0   1   0              .00       .00      .00      .00       .00       .00       .00
 14000--14    S 1     3   2     68.250FT. C   0   1   0              .00       .00      .00      .00       .00       .00       .00
 13900--14    S 1     3   3     29.000FT. N   0   1   0              .00       .00      .00      .00       .00       .00       .00
 14300--14    S 1     4   1     33.000FT. N   0   1   0              .00       .00      .00      .00       .00       .00       .00
 14200--14    S 1     4   2     53.250FT. C   0   1   0              .00       .00      .00      .00       .00       .00       .00
 14100--14    S 1     4   3     21.000FT. N   0   1   0              .00       .00      .00      .00       .00       .00       .00
 14400--14    S 1     5   1     14.000FT. N   0   1   0              .00       .00      .00      .00       .00       .00       .00
 14500--14    S 1     5   2     55.583FT. C   0   1   0              .00       .00      .00      .00       .00       .00       .00
 14600--14    S 2     1   1    112.833FT. C   0   1   0            98.00      6.25    18.00     1.00     93.00      7.75      4.50
 14700--14    S 2     1   2     25.000FT. N   0   1   0              .00       .00      .00      .00       .00       .00       .00
 14800--14    S 2     2   1     44.000FT. N   0   1   0              .00       .00      .00      .00       .00       .00       .00
 15000--14    S 2     2   2     32.000FT. C   0   1   0              .00       .00      .00      .00       .00       .00       .00
 14900--14    S 2     2   3     18.000FT. N   0   1   0              .00       .00      .00      .00       .00       .00       .00
 15200--14    S 2     3   1     13.000FT. N   0   1   0              .00       .00      .00      .00       .00       .00       .00
 15100--14    S 2     3   2     54.417FT. C   0   1   0              .00       .00      .00      .00       .00       .00       .00
 15300--14    S 4     1   1     31.000FT. C   0   1   0            98.00      6.25    15.00     1.00     93.00      7.75      4.50
 15400--14    S 4     1   2      7.000FT. N   0   1   0              .00       .00      .00      .00       .00       .00       .00
 15500--14    S 4     2   1     38.000FT. N   0   1   0              .00       .00      .00      .00       .00       .00       .00
 15600--14    S 5     1   1     31.000FT. C   0   1   0            98.00      6.25    15.00     1.00     93.00      7.75      4.50
 15700--14    S 5     1   2      7.000FT. N   0   1   0              .00       .00      .00      .00       .00       .00       .00
 15800--14    S 5     2   1     38.000FT. N   0   1   0              .00       .00      .00      .00       .00       .00       .00
 15900--14    S 5     3   1     38.000FT. N   0   1   0              .00       .00      .00      .00       .00       .00       .00


**************************************************************************************************************
*                                      BRACING LENGTH SPECIFICATIONS - LOAD FACTOR ANALYSIS                          *
**************************************************************************************************************

             MEMBER   SPAN RANGE     RANGE    SUPPORT COND. SPACES  SPACING    STIFF
               ID SYMM  T/B          LENGTH    LEFT RIGHT           DISTANCE  SPACING

 16000--16    S 1     1  T  1     50.917FT.C                  0        .000FT.    .000IN.
 16100--16    S 1     1  B  1     50.917FT.SP    SP           3      16.972FT. 290.375IN.
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16200--16    S 1    2  T  1     81.667FT.C              0     .000FT.     .000IN.
16300--16    S 1    2  B  1     72.000FT.SP             3   24.000FT.  288.000IN.
16400--16    S 1    2  B  2      9.667FT.SP    SP       0     .000FT.   38.666IN.
16500--16    S 1    3  T  1    107.250FT.C              0     .000FT.     .000IN.
16600--16    S 1    3  B  1    107.250FT.SP    SP       5   21.450FT.   42.900IN.
16700--16    S 1    4  T  1    107.250FT.C              0     .000FT.     .000IN.
16800--16    S 1    4  B  1    107.250FT.SP    SP       5   21.450FT.   42.900IN.
16900--16    S 1    5  T  1     69.583FT.C              0     .000FT.     .000IN.
17000--16    S 1    5  B  1     69.583FT.SP    SP       3   23.194FT.   46.388IN.
17100--16    S 2    1  T  1    137.833FT.C              0     .000FT.     .000IN.
17200--16    S 2    1  B  1     96.000FT.SP             4   24.000FT.   48.000IN.
17300--16    S 2    1  B  2     21.833FT.SP             0     .000FT.   43.667IN.
17400--16    S 2    1  B  3     20.000FT.SP    SP       0     .000FT.   40.000IN.
17500--16    S 2    2  T  1     94.000FT.C              0     .000FT.     .000IN.
17600--16    S 2    2  B  1     94.000FT.SP    SP       4   23.500FT.   35.250IN.
17700--16    S 2    3  T  1     67.417FT.C              0     .000FT.     .000IN.
17800--16    S 2    3  B  1     67.417FT.SP    SP       3   22.472FT.   33.708IN.
17900--16    S 4    1  T  1     38.000FT.C              0     .000FT.     .000IN.
18000--16    S 4    1  B  1     38.000FT.SP    SP       2   19.000FT.     .000IN.
18100--16    S 4    2  T  1     38.000FT.C              0     .000FT.     .000IN.
18200--16    S 4    2  B  1     38.000FT.SP    SP       2   19.000FT.     .000IN.
18300--16    S 5    1  T  1     38.000FT.C              0     .000FT.     .000IN.
18400--16    S 5    1  B  1     38.000FT.SP    SP       2   19.000FT.     .000IN.
18500--16    S 5    2  T  1     38.000FT.C              0     .000FT.     .000IN.
18600--16    S 5    2  B  1     38.000FT.SP    SP       2   19.000FT.     .000IN.
18700--16    S 5    3  T  1     38.000FT.C              0     .000FT.     .000IN.
18800--16    S 5    3  B  1     38.000FT.SP    SP       2   19.000FT.     .000IN.
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                              SUMMARY OF RATING CALCULATIONS-----STRUCTURE MEMBER.  S 1      BARS-PC RELEASE 5.5
                                     INVENTORY AND/OR OPERATING ANALYSIS

       INPUT CODING --

                                                   STRUCTURE   9340
         DATE  8/18/97                                                                  D/P STR. I.D.--   G65-005
         BY                             INVENTORY
                              LIVE LOAD    RATING                    OPERATING          ************************
                                                                LIVE LOAD    RATING     *  SPECIAL ATTENTION   *
                                                                                        *      OF LEAD         *
                               HS20       HS  18.93               HS20       HS  31.55  *  ENGINEER REQUIRED   *
                                                                                        ************************

      STRUCTURE DESCRIPTION --
                                                 LOCATION --
        IDENTIFICATION       9340                                                      MICROFILM REEL NUMBERS --
        TYPE                   SS                  DISTRICT          5
        YEAR OF CONSTR.     1964                   COUNTY            27                  DESIGN PLANS
        LENGTH              1907.00 FEET           CONSTR. RTE.      TH 35W              COMPUTATIONS
        ROADWAY WIDTH         52.00 FEET           CONSTR. SEC.                          CORRESPONDENCE
        NUMBER OF SPANS      14                    CONSTR. STA.       0+  .
                                                   KEY RTE.
                                                   MARKED RTE.

                    ANALYST REMARKS --

                               .17 FT WC  ARCH DECK TRUSS AND TRUSS FL BM'S NOT RATED. S01 IS 5 SPAN
                               SO. APPR., S02 IS SPANS 9 TO 11 BOTH LINES G-13. S03 IS VOIDED CONC
                               SPAN 12-14. BR 9340A IS SAME AS S02. S04, S05 = TRUSS STRG SPANS 4 & 6
                               CONT SPANS RESP.  NEW MEDIAN JRAIL & SOLID EXT RAIL IN 1998. L.F.RATING

    INVENTORY RATING SUMMARY --

      MEMBER ID.                S 1                                          OPERATING RATING SUMMARY --
      SPAN                        4
      CRITICAL C.P. DIST.     53.6 FEET                                        MEMBER ID.                S 1
      LIVE LOAD DESIGNATION   HS20                                             SPAN                        4
                                                                               CRITICAL C.P. DIST.     53.6 FEET
                                                                               LIVE LOAD DESIGNATION   HS20
                             MOMENT
                           (FT. KIPS)
     MEMBER CAPACITY          1339.4                                                                   MOMENT
     DL EFFECT                 563.3                                                                 (FT. KIPS)
                                                                              MEMBER CAPACITY          2232.3
                                                                              DL EFFECT                 563.3
     CAPACITY FOR (LL+I)       922.7
     ACTUAL (LL+I)             974.9
                                                                              CAPACITY FOR (LL+I)      1537.8
                                                                              ACTUAL (LL+I)             974.9
     INVENTORY RATING        HS 18.93

                                                                              OPERATING RATING        HS 31.55
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EXHIBIT NO: 6
Date: 4-21-08
JULIE A RIXE
COURT REPORTER

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                              SUMMARY OF RATING CALCULATIONS------STRUCTURE MEMBER   S 2      BARS-PC RELEASE 5.5
                                          INVENTORY AND/OR OPERATING ANALYSIS


INPUT CODING --                                     STRUCTURE   9340                          D/P STR. I.D.--  G65-005

   DATE  8/18/97                 INVENTORY                          OPERATING                 ***********************
   BY                        LIVE LOAD   RATING                 LIVE LOAD   RATING            *  SPECIAL ATTENTION   *
                                                                                              *      OF LEAD         *
                              HS20       HS  26.69               HS20       HS  44.48         *  ENGINEER REQUIRED   *
                                                                                              ***********************



STRUCTURE DESCRIPTION --                      LOCATION --                                  MICROFILM REEL NUMBERS --

   IDENTIFICATION      9340                      DISTRICT         5                           DESIGN PLANS
   TYPE                  88                      COUNTY            27                         COMPUTATIONS
   YEAR OF CONSTR.   1964                        CONSTR. RTE.      TH 35W                     CORRESPONDENCE
   LENGTH            1907.00 FEET                CONSTR. SEC.
   ROADWAY WIDTH       52.00 FEET                CONSTR. STA.          0+
   NUMBER OF SPANS     14                        KEY RTE.
                                                 MARKED RTE.

                  ANALYST REMARKS --

                                      17 FT WC  ARCH DECK TRUSS AND TRUSS FL BM'S NOT RATED. S01 IS 5 SPAN
                                      SO. APPR., S02 IS SPANS 9 TO 11 BOTH LINES G-13. S03 IS VOIDED CONC
                                     SPAN 12-14. BR 9340A IS SAME AS S03. S04, S05 = TRUSS STRG SPANS 4 & 6
                                     CONT SPANS RESP.  NEW MEDIAN JRAIL & SOLID EXT RAIL IN 1998. L.F.RATING


INVENTORY RATING SUMMARY --                                                          OPERATING RATING SUMMARY --

  MEMBER ID.                 S 2                                                       MEMBER ID.                 S 2
  SPAN                         3                                                       SPAN                         3
  CRITICAL C.P. DIST.     40.5 FEET                                                    CRITICAL C.P. DIST.     40.5 FEET
  LIVE LOAD DESIGNATION   HS20                                                         LIVE LOAD DESIGNATION   HS20


                            MOMENT                                                                               MOMENT
                          (FT. KIPS)                                                                           (FT. KIPS)
  MEMBER CAPACITY           1420.8                                                     MEMBER CAPACITY           2367.9
  DL EFFECT                  520.5                                                     DL EFFECT                  520.5


  CAPACITY FOR (LL+I)       1012.8                                                     CAPACITY FOR (LL+I)       1688.0
  ACTUAL (LL+I)              758.9                                                     ACTUAL (LL+I)              758.9


  INVENTORY RATING        HS 25.69                                                     OPERATING RATING        HS 44.48
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                    SUMMARY OF RATING CALCULATIONS------STRUCTURE MEMBER   S 3      BARS-PC RELEASE 5.5
                                  INVENTORY AND/OR OPERATING ANALYSIS

  INPUT CODING --                            STRUCTURE  9340                         D/F STR. I.D.--  G65-005

     DATE  8/18/97                 INVENTORY                     OPERATING            ************************
     BY                        LIVE LOAD   RATING           LIVE LOAD   RATING       *  SPECIAL ATTENTION  *
                                                                                    *       OF LEAD       *
                                 HS20     HS  20.17            HS20     HS  33.61    *  ENGINEER REQUIRED  *
                                                                                    ************************




  STRUCTURE DESCRIPTION --                      LOCATION --                          MICROFILM REEL NUMBERS --

     IDENTIFICATION      9340                     DISTRICT        5                     DESIGN PLANS
     TYPE                  89                     COUNTY          27                    COMPUTATIONS
     YEAR OF CONSTR.   1964                       CONSTR. RTE.    TH 35W                CORRESPONDENCE
     LENGTH            1907.00 FEET               CONSTR. SEC.
     ROADWAY WIDTH       52.00 FEET               CONSTR. STA.       0+
     NUMBER OF SPANS    14                        KEY RTE.
                                                  MARKED RTE.

                  ANALYST REMARKS --

                              .37 FT NO. ARCH DECK TRUSS AND TRUSS FL BM'S NOT RATED. S01 IS 5 SPAN
                               SO. APPR., S02 IS SPANS 9 TO 11 BOTH LINES U-13. S03 IS VOIDED CONC
                              SPAN 12-14. BR 9340A IS SAME AS S03. S04, S05 = TRUSS STRG SPANS 4 & 6
                              CONT SPANS RESP.  NEW MEDIAN JRAIL & SOLID RXT RAIL IN 1998. L.F.RATING


 INVENTORY RATING SUMMARY --                                               OPERATING RATING SUMMARY --

   MEMBER ID.              S 3                                               MEMBER ID.              S 3
   SPAN                    3                                                 SPAN                    3
   CRITICAL C.P. DIST.       .0 FEET                                         CRITICAL C.P. DIST.       .0 FEET
   LIVE LOAD DESIGNATION  HS20                                               LIVE LOAD DESIGNATION  HS20

                          MOMENT                                                                    MOMENT
                        (FT. KIPS)                                                                (FT. KIPS)
   MEMBER CAPACITY        -314.0                                             MEMBER CAPACITY        -314.0
   DL EFFECT              -102.5                                             DL EFFECT              -102.5


   CAPACITY FOR (LL+I)     -83.4                                             CAPACITY FOR (LL+I)    -139.0
   ACTUAL (LL+I)           -82.7                                             ACTUAL (LL+I)           -82.7


   INVENTORY RATING      HS 20.17                                            OPERATING RATING      HS 33.61
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                              SUMMARY OF RATING CALCULATIONS------STRUCTURE MEMBER   S 4      BARS-PC RELEASE 5.5
                                          INVENTORY AND/OR OPERATING ANALYSIS


     INPUT CODING --                                STRUCTURE  9340                             D/P STR. I.D.--  G65-005

        DATE  8/18/97                INVENTORY                        OPERATING                 ************************
        BY                       LIVE LOAD   RATING               LIVE LOAD   RATING            *  SPECIAL ATTENTION   *
                                                                                                *       OF LEAD        *
                                  HS20      HS  22.87              HS20      HS  38.12          *  ENGINEER REQUIRED   *
                                                                                                ************************



     STRUCTURE DESCRIPTION --                      LOCATION --                                MICROFILM REEL NUMBERS --

        IDENTIFICATION      9340                      DISTRICT        5                          DESIGN PLANS
        TYPE                  SS                      COUNTY           27                        COMPUTATIONS
        YEAR OF CONSTR.   1964                        CONSTR. RTE.     TH 35W                    CORRESPONDENCE
        LENGTH            1907.00 FEET                CONSTR. SEC.
        ROADWAY WIDTH       52.00 FEET                CONSTR. STA.        0+
        NUMBER OF SPANS     14                        KEY RTE.
                                                      MARKED RTE.

                    ANALYST REMARKS --

                                          .17 FT WC  ARCH DECK TRUSS AND TRUSS FL BM'S NOT RATED. S01 IS 5 SPAN
                                          SO. APPR., S02 IS SPANS 9 TO 11 BOTH LINES G-13. S03 IS VOIDED CONC
                                         SPAN 12-14. BR 9340A IS SAME AS S03. S04, S05 = TRUSS STRG SPANS 4 & 6
                                         CONT SPANS RESP.  NEW MEDIAN JRAIL & SOLID EXT RAIL IN 1998. L.F.RATING


    INVENTORY RATING SUMMARY --                                                       OPERATING RATING SUMMARY --

      MEMBER ID.              S 4                                                       MEMBER ID.              S 4
      SPAN                     2                                                        SPAN                    2
      CRITICAL C.P. DIST.     .0 FEET                                                   CRITICAL C.P. DIST.     .0 FEET
      LIVE LOAD DESIGNATION  HS20                                                       LIVE LOAD DESIGNATION  HS20


                             MOMENT                                                                            MOMENT
                           (FT. KIPS)                                                                        (FT. KIPS)
      MEMBER CAPACITY         336.4                                                     MEMBER CAPACITY         560.7
      DL EFFECT              -173.8                                                     DL EFFECT              -173.8


      CAPACITY FOR (LL+I)    -232.1                                                     CAPACITY FOR (LL+I)    -386.9
      ACTUAL (LL+I)          -203.0                                                     ACTUAL (LL+I)          -203.0


      INVENTORY RATING     HS 22.87                                                     OPERATING RATING     HS 38.12
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                    SUMMARY OF RATING CALCULATIONS------STRUCTURE MEMBER   S 5      BARS-PC RELEASE 5.5
                              INVENTORY AND/OR OPERATING ANALYSIS

INPUT CODING --                            STRUCTURE  9340                   D/P STR. I.D.--  065-005

   DATE  8/18/97            INVENTORY                    OPERATING           ************************
   BY                    LIVE LOAD    RATING          LIVE LOAD    RATING    *  SPECIAL ATTENTION   *
                                                                             *       OF LOAD        *
                           HS20      HS  22.91          HS20      HS  38.18  *  ENGINEER REQUIRED   *
                                                                             ************************


STRUCTURE DESCRIPTION --                 LOCATION --                         MICROFILM REEL NUMBERS --

   IDENTIFICATION      9340                 DISTRICT        5                   DESIGN PLANS
   TYPE                  39                 COUNTY          27                  COMPUTATIONS
   YEAR OF CONSTR.    1964                  CONSTR. RTE.    TH 35W              CORRESPONDENCE
   LENGTH             1907.00 FEET          CONSTR. SEC.
   ROADWAY WIDTH        52.00 FEET          CONSTR. STA.       0+
   NUMBER OF SPANS     14                   KEY RTE.
                                            MARKED RTE.

               ANALYST REMARKS --

                          .17 FT MC. ARCH DECK TRUSS AND TRUSS FL BM'S NOT RATED. S01 IS 5 SPAN
                           SO. APPR., S02 IS SPANS 9 TO 11 BOTH LINES G-13. S03 IS VOIDED CONC
                          SPAN 12-14. BR 9340A IS SAME AS S03. S04, S05 = TRUSS STRG SPANS 4 & 6
                          CONT SPANS RESP. NEW MEDIAN JRAIL & SOLID EXT RAIL IN 1996. L.F.RATING


INVENTORY RATING SUMMARY --                                       OPERATING RATING SUMMARY --

 MEMBER ID.                S 5                                     MEMBER ID.                S 5
 SPAN                        2                                     SPAN                        2
 CRITICAL C.P. DIST.       .0 FEET                                 CRITICAL C.P. DIST.       .0 FEET
 LIVE LOAD DESIGNATION  HS20                                       LIVE LOAD DESIGNATION  HS20


                          MOMENT                                                            MOMENT
                        (FT. KIPS)                                                        (FT. KIPS)
 MEMBER CAPACITY          336.4                                    MEMBER CAPACITY          560.7
 DL EFFECT               -172.4                                    DL EFFECT               -172.4


 CAPACITY FOR (LL+I)     -233.0                                    CAPACITY FOR (LL+I)     -388.3
 ACTUAL (LL+I)           -203.4                                    ACTUAL (LL+I)           -203.4


 INVENTORY RATING      HS 22.91                                    OPERATING RATING      HS 38.18
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          *** FINAL SUMMARY OF RATING RESULTS FOR --- STRUCTURE ID. G65-005   BARS-PC RELEASE 5.5
                            INVENTORY AND/OR OPERATING ANALYSIS

                                  STRUCTURE   9340                          D/P STR. ID--  G65-005
INPUT CODING--
                          INVENTORY                  OPERATING             **********************
   DATE   8/18/97      LIVE LOAD   RATING        LIVE LOAD    RATING       *  SPECIAL ATTENTION *
                         HS20    HS  18.9          HS20    HS  31.5
   BY                                                                      *      OF LEAD       *

                                                                           *  ENGINEER REQUIRED *
                                                                           **********************


STRUCTURE DESCRIPTION--                     LOCATION--                    MICROFILM REEL NUMBERS--

   IDENTIFICATION      9340                   DISTRICT         5             DESIGN PLANS
   TYPE                   BB                  COUNTY           27            COMPUTATIONS
   YEAR OF CONSTR.     1964                   CONSTR. RTE.     TH 35W        CORRESPONDENCE
   LENGTH              1907.00 FEET           CONSTR. SEC.
   ROADWAY WIDTH         52.00 FEET           CONSTR. STA.       09  -
   NUMBER OF SPANS       14                   KEY RTE.
                                              MARKED RTE.

                     ANALYST REMARKS--

                      .17 FT WC  ARCH DECK TRUSS AND TRUSS FL BM'S NOT RATED. S01 IS 5 SPAN
                      SO. APPR., S02 IS SPANS 9 TO 11 BOTH LINES G-13. S03 IS VOIDED CONC
                     SPAN 12-14. BR 9340A IS SAME AS S03. S04, S05 = TRUSS STRG SPANS 4 & 6
                     CONT SPANS RESP.  NEW MEDIAN JRAIL & SOLID EXT RAIL IN 1998. L.F.RATING




INVENTORY RATING SUMMARY                                                 OPERATING RATING SUMMARY
  MEMBER I.D.               S 1                                            MEMBER I.D.              S 1
  SPAN                      4                                              SPAN                     4
  CRITICAL C.P. DIST.     53.6 FEET                                        CRITICAL C.P. DIST.    53.6 FEET
  LIVE LOAD DESIGNATION     HS20                                           LIVE LOAD DESIGNATION    HS20


                            MOMENT                                                                MOMENT
                         (FOOT-KIPS)                                                            (FOOT-KIPS)
  MEMBER CAPACITY          1339.4                                          MEMBER CAPACITY        2232.3
  DL EFFECT                 563.3                                          DL EFFECT               563.3


  CAPACITY FOR (LL+I)       922.7                                          CAPACITY FOR (LL+I)    1537.8
  ACTUAL (LL+I)             974.9                                          ACTUAL (LL+I)           974.9


  INVENTORY RATING       HS  18.93                                         OPERATING RATING     HS  31.55
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                                  DETAIL DATA AT MOMENT CHECK POINT FOR              BARS-PC RELEASE 5.5
                           COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97                                                                     D/P STRUCTURE I.D. = G65-005
                                                                                     MEMBER I.D. --        8 1
                                                                                     C.P. LOCATION -       1.40

                                                                                                        PAGE 1
***** SECTION PROPERTIES IN COMPOSITE RANGE  1 OF SPAN  1   ******

                                -- STRUCTURAL STEEL PROPERTIES --
     H      Twab   H/Twab    D     D/Twab   - B' (IN) -    - B'/t -     Lb ( FT )     Ry ( IN )    - Lb / Ry    HYBRID RATIO, R
   (IN.)   (IN.)           (IN.)            TOP    BOT    TOP    BOT   TOP    BOT    TOP   BOT    TOP    BOT    +BEND   -BEND
   32.86    .55    59.75  31.38   57.05   5.47   5.47   7.40   7.40  CONT   16.97   3.32  3.32    .00  61.35  1.0000  1.0000

                                -- COMPOSITE CONCRETE PROPERTIES --
   EFF.WIDTH   EFF.THICK.  VALUE   (AS)C     (DS)C  VALUE  VALUE   Atf       Abf        Aw
    (IN.)        (IN.)       N    (SQ.IN.)  (IN.)     k      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
    93.0         7.8         8       .00      .00   3.90     .0    8.51      8.51     17.26

                                -- SECTION PROPERTIES --           --------- SECTION MODULUS ---------   ---- PLASTIC SECTION MODULUS ----
            GROSS     NET AREA       IX          IX       C       TOP       TOP      BOTT      BOTT      TOP       TOP       BOTT      BOTT
            AREA    +BEND  -BEND    +BEND       -BEND   (BOT)    +BEND     -BEND    +BEND     -BEND     +BEND     -BEND+     +BEND     -BEND
           SQ.IN.   SQ.IN. SQ.IN.   IN.**4      IN.**4   IN.     IN.**3    IN.**3   IN.**3    IN.**3    IN.**3    IN.**3    IN.**3    IN.**3
  NON-COM   34.28   34.28  34.28    5806.9      5806.9  16.43     353.4     353.4    353.4     353.4    408.74    408.74    408.74    408.7
  COM(N=N)                         17135.5          .0  31.59   13507.2    1900.0    542.4     542.4
  COM(N=3N)                        12969.5          .0  26.20    1948.5     900.3    494.9     494.9

                                -- ULTIMATE STRENGTH --
       Fy (PSI) f'c (PSI)   Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
        STEEL     CONC.      REBAR      TOP     BOT     TOP     BOT         BOT          TOP        WEB
                                       FLANGE  FLANGE  FLANGE FLANGE       FLANGE       FLANGE
       36000.     4000.      40000.    10.83   10.83    11.60  11.60       36000.       36000.     36000.

***** SECTION QUALIFICATION  *****
        STIFFENED   UNSTIFFENED  COMPACT    BRACED       UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
      LONG  TRANV                         NON-COMPACT  NON-COMPACT     FACTOR
  +BEND       X                               X                        1.0000          X
  -BEND       X                                            X           1.0000          X

***** SECTION CAPACITY  *****
        +BEND        ML =        .00 FT-KIPS,   MR =       .00 FT-KIPS
        -BEND        ML =      66.25 FT-KIPS,   MR =   -226.94 FT-KIPS,   M1/M2 =  -.2919       CB = 1.0
     --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---      -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --   -- SHEAR CAPACITY (KIPS) --

          TOP        TOP       BOTT       BOTT        MU        MAX. CAP.    MAX. CAP.     MU                  VU        VU
         +BEND      -BEND     +BEND      -BEND                    STEEL        CONC.                          LEFT      RIGHT
  INV.  18702.24    489.37    751.03     489.37       .00        408.74     13153.74    18702.24             360.37     360.37
  OPER. 31170.39    815.61   1251.72     815.61       .00        408.74     13153.74    31170.39             360.37     360.37

***** MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                             -- DEAD LOAD --
       M (DL)    M (SDL)     REDIS.    REDIS.     V (DL)     V (SDL)
                             M-(DL)----M-(SDL)
        94.85     83.15      94.85     83.15      -3.22        -.88
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                                         DETAIL DATA AT MOMENT CHECK POINT FOR
                              COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
     DATE  8/18/97                                                                        D/P STRUCTURE I.D. = 085-005
                                                                                          MEMBER I.D. --      S 1
                                                                                          C.P. LOCATION --    1.40

                                                                                                              PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR =  .284 FOR +BEND AND =  .212 FOR -BEND)

                                          -- LIVE LOAD --
                   --------------TRUCK MOMENT--------------  -------------LANE MOMENT------------  -----FIXED-----  ------MAX------
       LIVE        REDIS   LL+IMP   LL     LOC.NO.  DIR   LL+IMP     LL     LOC.CONC. LOC.CONC.      SHEAR              SHEAR
       LOAD         LD+I                   1 WHEEL                          LOAD #1   LOAD #2    +V          -V    +V         -V
                   FT-KIPS FT-KIPS FT-KIPS   FT.          FT-KIPS  FT-KIPS    FT.       FT.     KIPS        KIPS  KIPS       KIPS

INV.   HS20 +BEND    .00   526.6   410.1    6.367   L     362.5    282.3    20.367     .000   6.99        7.04
            -BEND 137.72   137.7   110.9   95.253   R     103.1     83.0    75.417     .000   6.76        6.76
                                                                                                               25.13      25.1
OPER.  HS20 +BEND    .00   526.6   410.1    6.367   L     362.5    282.3    20.367     .000   6.99        7.04
            -BEND 137.72   137.7   110.9   95.253   R     103.1     83.0    75.417     .000   6.76        6.76
                                                                                                               25.13      25.1

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
                 SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
        T 0      .000     .000     .000     .000     .000     .000
        E 1     2.732   -1.553     .116    -.040     .004     .000
        N 2     5.482   -2.122     .178    -.068     .007     .000
        T 3     8.265   -2.197     .212    -.077     .009     .000
        H 4    11.100   -2.093     .220    -.073     .009     .000
          5     8.310   -1.845     .209    -.055     .009     .000
        P 6     6.606   -1.485     .182    -.053     .008     .000
        O 7     4.803   -1.043     .145    -.039     .006     .000
        I 8     2.924    -.546     .099    -.024     .004     .000
        N 9     1.330    -.163     .048    -.010     .002     .000
        T 0      .000     .000     .000     .000     .000     .000

                                                                   AREA
                                                                  TOTALS
     POS AREA  266.6       .0     15.1       .0       .4       .0   282.1
     NEG AREA     .0    106.5       .0      4.8       .0       .0   111.3

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

        X-DIST (FT.)      .00       .00       .00  POS AREA =        .00
        Y-ORDINATE        .00       .00       .00
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                                   DETAIL DATA AT MOMENT CHECK POINT FOR
                        COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
    DATE 8/18/97
                                                                                 D/F STRUCTURE I.D. = G65-005
                                                                                 MEMBER I.D. --      B 1
                                                                                 C.P. LOCATION --    1.40

                                                                                                  PAGE 3


 *****  RATING FACTOR  *****
                        -- RATING FACTOR FOR MOMENT --
                 AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MOMENT
               TOP       TOP      BOTT      BOTT            TOP               BOTT                RATING     SAFE
              +BEND     -BEND    +BEND     -BEND      +BEND    -BEND    +BEND    -BEND            VALUE      LOAD
                                                                                                            CAP.(TONS)
 INV.   HS20  16181.4     596.2     609.0     596.2    30.7262   4.3290   1.1564   4.3290          HS 23.1     41.6

 OPER.  HS20  26968.9     993.6    1015.0     993.6    51.2104   7.2150   1.9274   7.2150          HS 38.5     69.4

                     -- RATING FACTOR FOR SERVICEABILITY --
                AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
               TOP       TOP      BOTT      BOTT            TOP               BOTT                RATING     SAFE
              +BEND     -BEND    +BEND     -BEND      +BEND    -BEND    +BEND    -BEND            VALUE      LOAD
                                                                                                            CAP.(TONS)
 INV.   HS20  20576.4     711.2     785.5     711.2    39.0718   5.1640   1.4916   5.1640

 OPER.  HS20  34294.0    1185.3    1309.2    1185.3    65.1197   8.6067   2.4859   8.6067

                        -- RATING FACTOR FOR SHEAR --
               AVAILABLE CAPACITY (KIPS)                   RATING FACTOR - SHEAR                  RATING     SAFE
                 LEFT      RIGHT                              LEFT     RIGHT                      VALUE      LOAD

 INV.   HS20     168.79    168.79                             6.7163   6.7163

 OPER.  HS20     281.31    281.31                            11.1938  11.1938
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                                   DETAIL DATA AT MOMENT CHECK POINT FOR              BARS-PC RELEASE 5.5
                          COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  6/10/97                                                                     D/P STRUCTURE I.D. = G65-005
                                                                                     MEMBER I.D. --      S 1
                                                                                     C.P. LOCATION -     2.00

                                                                                                         PAGE 1
*****  SECTION PROPERTIES IN COMPOSITE RANGE  1 OF SPAN  2  ******

                              -- STRUCTURAL STEEL PROPERTIES --
     H      Tweb   H/Tweb    D    D/Tweb   - B' (IN) -   - B'/t -    Lb ( FT )    Ry ( IN )    - Lb / Ry    HYBRID RATIO, R
   (IN.)   (IN.)           (IN.)            TOP   BOT    TOP   BOT  TOP    BOT    TOP   BOT    TOP   BOT    +BEND   -BEND
   34.18    .55    62.15  31.38   57.05    5.47  5.47   3.91  3.91  CONT  24.00   3.32  3.32    .00  86.75  1.0000  1.0000

                              -- COMPOSITE CONCRETE PROPERTIES --
   EFF.WIDTH   EFF.THICK.  VALUE   (AS)C    (DS)C  VALUE  VALUE   Acf       Abf       Aw
    (IN.)        (IN.)       N    (SQ.IN.)  (IN.)    a      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
    93.0         7.8         8      .00      .00   5.63    .0   16.10     16.10     17.26

                              -- SECTION PROPERTIES --          --------- SECTION MODULUS ---------    ---- PLASTIC SECTION MODULUS ----
            GROSS     NET AREA        IX         IX        C       TOP      TOP      BOTT     BOTT     TOP      TOP      BOTT     BOTT
            AREA    +BEND  -BEND    +BEND      -BEND     (BOT)   +BEND    -BEND    +BEND    -BEND    +BEND    -BEND+   +BEND    -BEND
            SQ.IN.  SQ.IN. SQ.IN.   IN.**4     IN.**4    IN.     IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3
NON-COM     49.46   49.46  49.46    10071.5    10071.5   17.09   589.3    589.3    589.3    589.3    663.15   663.15   663.15   663.1
COM(N=N)                            10071.5        .0    17.09   589.3       .0    589.3    589.3
COM(N=3N)                           10071.5        .0    17.09   589.3       .0    589.3    589.3

                              -- ULTIMATE STRENGTH --
   Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
    STEEL     CONC.     REBAR      TOP     BOT     TOP    BOT          BOT          TOP         WEB
                                 FLANGE  FLANGE  FLANGE FLANGE       FLANGE       FLANGE
   36000.    4000.     40000.    10.83   10.83   11.60  11.60        36000.       36000.      36000.

*****  SECTION QUALIFICATION  *****
        STIFFENED   UNSTIFFENED  COMPACT    BRACED       UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
        LONG  TRANV                       NON-COMPACT  NON-COMPACT    FACTOR
+BEND         X                              X                        1.0000          X
-BEND         X                                            X          1.0000          X

*****  SECTION CAPACITY  *****
        +BEND         ML =         .00 FT-KIPS,   MR =        .00 FT-KIPS
        -BEND         ML =     233.53 FT-KIPS,   MR =   -923.08 FT-KIPS,   M1/M2 =  -.2595        CB = 1.0
    --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---     -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --   -- SHEAR CAPACITY (KIPS) --

          TOP        TOP       BOTT       BOTT        MU        MAX. CAP.    MAX. CAP.       MU                VU        VU
         +BEND      -BEND     +BEND      -BEND                  STEEL        CONC.                          LEFT      RIGHT
INV.     815.98     815.98    815.98     815.98       .00       663.15          .00       815.98            360.37    360.37
OPER.   1359.97    1359.97   1359.97    1359.97       .00       663.15          .00      1359.97            360.37    360.37

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                           -- DEAD LOAD --
     M (DL)    M (SDL)     REDIS.    REDIS.      V (DL)     V (SDL)
                          M-(DL)---M-(SDL)
    -366.48   -170.88    -366.48   -170.88      33.78      19.54
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                                        DETAIL DATA AT MOMENT CHECK POINT FOR
                               COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97
                                                                                         D/F STRUCTURE I.D. = 065-005
                                                                                         MEMBER I.D. --       G 1
                                                                                         C.P. LOCATION --     2.00

                                                                                                             PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR =  .215 FOR +BEND AND =  .261 FOR -BEND)

                                                -- LIVE LOAD --
                          -------------TRUCK MOMENT------------  -------------LANE MOMENT------------  -----FIXED-----  ------MAX------
         LIVE             REDIS   LL+IMP    LL     LOC.NO.  DIR   LL+IMP     LL    LOC.CONC. LOC.CONC.     SHEAR             SHEAR
         LOAD              LL+I                    1 WHEEL                          LOAD #1   LOAD #2    +V        -V     +V        -V
                          FT-KIPS FT-KIPS FT-KIPS    FT.          FT-KIPS  FT-KIPS    FT.       FT.     KIPS      KIPS   KIPS      KIPS

INV.    HS20 +BEND      .00    34.4     28.3  192.759   R      31.6     26.0   175.483      .000  16.64       .49
             -BEND   385.71   349.7    277.2   95.253   R     385.7    305.8    75.417    30.550  17.27     17.27
                                                                                                                   62.99     62.9
OPER.   HS20 +BEND      .00    34.4     28.3  192.759   R      31.6     26.0   175.483      .000  16.64       .49
             -BEND   385.71   349.7    277.2   95.253   R     385.7    305.8    75.417    30.550  17.27     17.27
                                                                                                                   62.99     62.9

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
                SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
        T 0      .000      .000      .000      .000     .000      .000
        E 1     -.806    -3.883      .291     -.099     .011      .000
        N 2    -1.570    -5.305      .446     -.169     .018      .000
        T 3    -2.249    -5.491      .529     -.192     .022      .000
        H 4    -2.801    -5.232      .551     -.183     .023      .000
          5    -3.183    -4.613      .523     -.161     .022      .000
        P 6    -3.353    -3.711      .466     -.132     .019      .000
        O 7    -3.268    -2.607      .362     -.097     .016      .000
        I 8    -2.873    -1.365      .247     -.060     .011      .000
        N 9    -1.766     -.408      .119     -.026     .006      .000
        T 0      .000      .000      .000      .000     .000      .000

                                                                  AREA
                                                                 TOTALS
      POS AREA      .0        .0      37.8        .0      1.0        .0     38.8
      NEG AREA   111.3     266.4        .0      12.0       .0        .0    389.7

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

        X-DIST (FT.)        .00        .00        .00  POS AREA =       .00
        Y-ORDINATE          .00        .00        .00
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                                        DETAIL DATA AT MOMENT CHECK POINT FOR
                              COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
     DATE  8/18/97
                                                                                       D/P STRUCTURE I.D. = G65-005
                                                                                       MEMBER I.D. --       S 1
                                                                                       C.P. LOCATION --     2.00

                                                                                                            PAGE 3


***** RATING FACTOR  *****
                         -- RATING FACTOR FOR MOMENT --
                   AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR - MOMENT
                TOP       TOP       BOTT      BOTT           TOP               BOTT               RATING      SAFE
               +BEND     -BEND     +BEND     -BEND     +BEND    -BEND    +BEND    -BEND         VALUE       LOAD
                                                                                                        CAP.(TONS)
INV.   HS20   1138.4     493.6    1138.4     493.6    33.0791  1.2796  33.0791  1.2796          HS 25.6     46.1

OPER.  HS20   1897.3     822.6    1897.3     822.6    55.1318  2.1327  55.1318  2.1327          HS 42.7     76.8

                       -- RATING FACTOR FOR SERVICEABILITY --
                  AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
                TOP       TOP       BOTT      BOTT           TOP               BOTT               RATING      SAFE
               +BEND     -BEND     +BEND     -BEND     +BEND    -BEND    +BEND    -BEND         VALUE       LOAD
                                                                                                        CAP.(TONS)
INV.   HS20   1330.2     685.3    1330.2     685.3    38.6510  1.7767  38.6510  1.7767

OPER.  HS20   2216.9    1142.2    2216.9    1142.2    64.4184  2.9612  64.4184  2.9612

                           -- RATING FACTOR FOR SHEAR --
                AVAILABLE CAPACITY (KIPS)                      RATING FACTOR - SHEAR            RATING      SAFE
                  LEFT      RIGHT                               LEFT     RIGHT                  VALUE       LOAD

INV.   HS20      134.34    134.34                              2.1328   2.1328

OPER.  HS20      223.90    223.90                              3.5547   3.5547
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                                      DETAIL DATA AT MOMENT CHECK POINT FOR              BARS-PC RELEASE 5.5
                             COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
    DATE  8/18/97                                                                        D/P STRUCTURE I.D. = G65-005
                                                                                         MEMBER I.D. --       S 1
                                                                                         C.P. LOCATION -      2.50

                                                                                                             PAGE 1
***** SECTION PROPERTIES IN COMPOSITE RANGE  2 OF SPAN  2    ******

                                  -- STRUCTURAL STEEL PROPERTIES --
      H      Twab   H/Tweb    D     D/Tweb    - B' (IN) -     - B'/t -     Lb ( FT )      Ry ( IN )     - Lb / Ry     HYBRID RATIO, R
    (IN.)   (IN.)           (IN.)              TOP    BOT     TOP    BOT   TOP    BOT     TOP   BOT      TOP    BOT    +BEND    -BEND
    34.54    .55    62.80  31.38   57.05      5.47   5.47    3.47   3.47   CONT   24.00   3.32  3.32      .00  86.75  1.0000   1.0000

                                  -- COMPOSITE CONCRETE PROPERTIES --
    EFF.WIDTH   EFF.THICK.  VALUE    (AS)C     (DS)C  VALUE  VALUE    Atf       Abf       Aw
      (IN.)       (IN.)       N     (SQ.IN.)   (IN.)    a      Y    (SQ.IN.) (SQ.IN.) (SQ.IN.)
      93.0         7.8        8        .00       .00   6.10    .0    18.17     18.17     17.26

                                  -- SECTION PROPERTIES --           -------- SECTION MODULUS ---------    ---- PLASTIC SECTION MODULUS ----
             GROSS      NET AREA        IX         IX        C       TOP       TOP      BOTT      BOTT     TOP      TOP      BOTT     BOTT
             AREA    +BEND  -BEND     +BEND      -BEND     (BOT)    +BEND     -BEND    +BEND     -BEND   +BEND    -BEND+    +BEND    -BEND
            SQ.IN.  SQ.IN. SQ.IN.    IN.**4     IN.**4     IN.     IN.**3    IN.**3   IN.**3    IN.**3  IN.**3    IN.**3   IN.**3   IN.**3
NON-COM      53.60   53.60  53.60    11293.4    11293.4   17.27     653.9     653.9    653.9     653.9   734.28   734.28   734.28   734.2
COM(N=N)                             27671.3         .0   30.92    7643.1    2433.6    894.9     894.9
COM(N=3N)                            20565.6         .0   25.09    2175.7    1195.5    819.8     819.8

                                  -- ULTIMATE STRENGTH --
      Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
       STEEL     CONC.     REBAR     TOP      BOT     TOP     BOT        BOT         TOP         WEB
                                    FLANGE  FLANGE  FLANGE  FLANGE      FLANGE      FLANGE
      36000.     4000.     40000.   10.83    10.83   11.60   11.60      36000.      36000.      36000.

*****  SECTION QUALIFICATION  *****
           STIFFENED   UNSTIFFENED  COMPACT    BRACED        UNBRACED      REDUCTION    SYMMETRICAL UNSYMMETRICAL
         LONG  TRANV                         NON-COMPACT   NON-COMPACT      FACTOR
+BEND           X                               X                          1.0000           X
-BEND           X                               X                          1.0000           X

*****  SECTION CAPACITY  *****
           +BEND       ML =        .00 FT-KIPS,    MR =        .00 FT-KIPS
           -BEND       ML =     239.53 FT-KIPS,    MR =     459.74 FT-KIPS
     --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---     -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --    -- SHEAR CAPACITY (KIPS) --

           TOP        TOP        BOTT       BOTT         MU         MAX. CAP.    MAX. CAP.      MU                        VU         VU
          +BEND      -BEND      +BEND      -BEND                      STEEL        CONC.                                LEFT      RIGHT
INV.    10582.69     905.44    1239.16     905.44        .00         734.28      6989.12     10582.69                  360.37     360.37
OPER.   17637.82    1509.07    2065.26    1509.07        .00         734.28      6989.12     17637.82                  360.37     360.37

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                                  -- DEAD LOAD --
       M (DL)     M (SDL)      REDIS.     REDIS.       V (DL)      V (SDL)
                               M-(DL)---M-(SDL)
       338.90     221.12       338.90     221.12         .39         -.34
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                                  DETAIL DATA AT MOMENT CHECK POINT FOR
                      COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97                                                                    D/P STRUCTURE I.D. = G65-005
                                                                                    MEMBER I.D. --       S 1
                                                                                    C.P. LOCATION --     2.50

                                                                                                         PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR =  .256 FOR +BEND AND =  .256 FOR -BEND)

                                            -- LIVE LOAD --
                   -------------TRUCK MOMENT-------------  -------------LANE MOMENT------------  -----FIXED-----  ------MAX------
       LIVE         REDIS  LL+IMP   LL     LOC.NO.  DIR  LL+IMP     LL    LOC.CONC. LOC.CONC.      SHEAR            SHEAR
       LOAD          LL+I                  1 WHEEL                         LOAD #1   LOAD #2   +V        -V    +V        -V
                   FT-KIPS FT-KIPS FT-KIPS   FT.         FT-KIPS  FT-KIPS    FT.       FT.    KIPS      KIPS  KIPS      KIPS

INV.    HS20 +BEND     .00   773.8   615.9  105.750   R    561.2    446.7   91.750      .000  2.81     22.65
             -BEND   81.86    82.0    65.2   11.459   L     54.9     43.7   30.550      .000  2.81      2.81
                                                                                                            26.33     26.3
OPER.   HS20 +BEND     .00   773.8   615.9  105.750   R    561.2    446.7   91.750      .000  2.81     22.65
             -BEND   81.86    82.0    65.2   11.459   L     54.9     43.7   30.550      .000  2.81      2.81
                                                                                                            26.33     26.3

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE   LINE (CONTINUOUS SPAN) *****
              SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
       T 0      .000     .000     .000     .000     .000     .000
       E 1     -.336    1.785     .121    -.041     .005     .000
       N 2     -.654    4.595     .186    -.070     .008     .000
       T 3     -.937    7.920     .220    -.080     .009     .000
       H 4    -1.167   11.431     .230    -.076     .009     .000
         5    -1.326   15.092     .218    -.067     .009     .000
       P 6    -1.397   10.704     .190    -.055     .009     .000
       O 7    -1.362    6.400     .152    -.040     .007     .000
       I 8    -1.197    2.153     .103    -.025     .005     .000
       N 9     -.736    -.170     .050    -.011     .002     .000
       T 0      .000     .000     .000     .000     .000     .000

                                                                  AREA
                                                                 TOTALS
     POS AREA      .0    490.0     15.7       .0       .4       .0   506.2
     NEG AREA    46.4       .7       .0      5.0       .0       .0    52.1

*****  MONENT INFLUENCE LINE (SIMPLE SPAN)

       X-DIST (FT.)        .00        .00        .00 POS AREA =        .00
       Y-ORDINATE          .00        .00        .00
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                                              DETAIL DATA AT MOMENT CHECK POINT FOR
                                   COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97                                                                            D/P STRUCTURE I.D. = G65-005
                                                                                            MEMBER I.D. --      S 1
                                                                                            C.P. LOCATION --    2.50

                                                                                                                PAGE 3


 *****  RATING FACTOR  *****
                             -- RATING FACTOR FOR MOMENT --
                       AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MOMENT
                    TOP        TOP        BOTT       BOTT                TOP               BOTT                RATING     SAFE
                   +BEND      -BEND      +BEND      -BEND      +BEND     -BEND     +BEND     -BEND             VALUE      LOAD
                                                                                                                       CAP.(TONS)
 INV.    HS20    7740.0     1241.5      816.0     1241.5     10.0019   15.1467   1.0545   15.1467          HS 21.1      38.0

 OPER.   HS20   12900.0     2069.1     1360.0     2069.1     16.6699   25.2446   1.7575   25.2446          HS 35.2      63.3

                          -- RATING FACTOR FOR SERVICEABILITY --
                      AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
                    TOP        TOP        BOTT       BOTT                TOP               BOTT                RATING     SAFE
                   +BEND      -BEND      +BEND      -BEND      +BEND     -BEND     +BEND     -BEND             VALUE      LOAD
                                                                                                                       CAP.(TONS)
 INV.    HS20   10226.9     1454.2     1107.2     1454.2     13.2157   17.7428   1.4308   17.7428

 OPER.   HS20   17044.9     2423.7     1845.4     2423.7     22.0261   29.5714   2.3847   29.5714

                              -- RATING FACTOR FOR SHEAR --
                    AVAILABLE CAPACITY (KIPS)                      RATING FACTOR - SHEAR                    RATING     SAFE
                      LEFT       RIGHT                               LEFT      RIGHT                        VALUE      LOAD

 INV.    HS20        166.35     166.29                              6.3179    6.3179

 OPER.   HS20        277.25     277.16                             10.5299   10.5299
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                                   DETAIL DATA AT MOMENT CHECK POINT FOR                BARS-PC RELEASE 5.5
                          COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  6/10/97                                                                   D/F STRUCTURE I.D. = G65-005
                                                                                   MEMBER I.D. --        S 1
                                                                                   C.P. LOCATION -       3.00

                                                                                                         PAGE 1
*****  SECTION PROPERTIES IN COMPOSITE RANGE  1 OF SPAN  3   ******

                              -- STRUCTURAL STEEL PROPERTIES --
      H      Tweb    H/Tweb    D    D/Tweb   - B' (IN) -   - B'/t -     Lb ( FT )    Ry ( IN )     - Lb / Ry    HYBRID RATIO, R
    (IN.)   (IN.)            (IN.)            TOP   BOT    TOP   BOT   TOP    BOT    TOP   BOT     TOP    BOT    +BEND   -BEND
    49.76    .38   132.69  48.00  128.00   6.81  6.81   7.74  7.74  CONT   21.45   4.04  4.04     .00  63.69  1.0000  1.0000

                              -- COMPOSITE CONCRETE PROPERTIES --
    EFF.WIDTH   EFF.THICK.  VALUE   (AS)C    (DS)C  VALUE  VALUE   Atf      Abf       Aw
      (IN.)       (IN.)       N    (SQ.IN.)  (IN.)    a      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
      53.0         7.8        8       .00      .00  4.85    .0   12.32    12.32     18.00

                              -- SECTION PROPERTIES --        -------- SECTION MODULUS --------    ---- PLASTIC SECTION MODULUS ----
             GROSS     NET AREA        IX         IX      C      TOP      TOP      BOTT     BOTT     TOP      TOP      BOTT     BOTT
             AREA    +BEND  -BEND    +BEND      -BEND   (BOT)  +BEND    -BEND    +BEND    -BEND   +BEND    -BEND+   +BEND    -BEND
             SQ.IN.  SQ.IN. SQ.IN.   IN.**4     IN.**4   IN.   IN.**3   IN.**3   IN.**3   IN.**3  IN.**3   IN.**3   IN.**3   IN.**3
NON-COM      42.64   42.64  42.64   18175.4   18175.4  24.88    730.5    730.5    730.5    730.5   818.20   818.20   818.20   818.2
COM(N=N)                            18175.4        .0  24.88    730.5       .0    730.5    730.5
COM(N=3N)                           18175.4        .0  24.88    730.5       .0    730.5    730.5

                              -- ULTIMATE STRENGTH --
    Fy (PSI) F'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
     STEEL     CONC.     REBAR     TOP     BOT    TOP    BOT         BOT           TOP          WEB
                                  FLANGE  FLANGE FLANGE FLANGE      FLANGE        FLANGE
    36000.     4000.     40000.    10.83   10.83  11.60  11.60      36000.        36000.       36000.

*****  SECTION QUALIFICATION  *****
         STIFFENED   UNSTIFFENED  COMPACT   BRACED       UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
        LONG  TRANV                         NON-COMPACT  NON-COMPACT   FACTOR
+BEND         X                             X                          1.0000          X
-BEND         X                                          X             1.0000          X

*****  SECTION CAPACITY  *****
          +BEND        ML =       .00 FT-KIPS,   MR =        .00 FT-KIPS
          -BEND        ML =      4.92 FT-KIPS,   MR =  -1111.43 FT-KIPS,   M1/M2 =  -.0044       CB = 1.0
     ---- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---      -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --    -- SHEAR CAPACITY (KIPS) --

          TOP        TOP       BOTT       BOTT        MU        MAX. CAP.    MAX. CAP.      MU                  VU        VU
         +BEND      -BEND     +BEND      -BEND                   STEEL        CONC.                            LEFT      RIGHT
INV.    1011.49    1011.49   1011.49    1011.49       .00       818.20          .00     1011.49              353.26    353.26
OPER.   1685.82    1685.82   1685.82    1685.82       .00       818.20          .00     1685.82              353.26    353.26

*****  MONEMT (FT-KIPS) AND SHEAR (KIPS)  *****
                              -- DEAD LOAD --
       M (DL)    M (SDL)     REDIS.    REDIS.      V (DL)     V (SDL)
                             M-(DL)----M-(SDL)
      -328.99   -298.88    -328.99   -298.88     36.82       23.07
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                                      DETAIL DATA AT MOMENT CHECK POINT FOR
                               COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
     DATE  8/18/97
                                                                                            D/P STRUCTURE I.D. = G65-005
                                                                                            MEMBER I.D. --       S 1
                                                                                            C.P. LOCATION --     3.00

                                                                                                                 PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR =  .284 FOR +BEND AND =  .228 FOR -BEND)

                                           -- LIVE LOAD --
                     --------------TRUCK MOMENT------------    -------------LANE MOMENT------------  -----FIXED-----    ------MAX------
        LIVE         REDIS   LL+IMP   LL     LOC.NO.  DIR   LL+IMP    LL     LOC.CONC. LOC.CONC.       SHEAR              SHEAR
        LOAD         LL+I                    1 WHEEL                         LOAD #1   LOAD #2    +V          -V     +V         -V
                    FT-KIPS FT-KIPS FT-KIPS    FT.          FT-KIPS  FT-KIPS    FT.       FT.     KIPS        KIPS   KIPS       KIPS

INV.    HS20 +BEND     .00    33.5    26.1   11.459    L     22.3     17.3    30.550      .000    6.77         .37
             -BEND  583.56   583.6   475.3   88.250    L    430.7    350.8   116.250   175.483    6.47        6.47
                                                                                                                  62.59      62.5
OPER.   HS20 +BEND     .00    33.5    26.1   11.459    L     22.3     17.3    30.550      .000    6.77         .37
             -BEND  583.56   583.6   475.3   88.250    L    430.7    350.8   116.250   175.483    6.47        6.47
                                                                                                                  62.59      62.5

***** ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE   LINE (CONTINUOUS SPAN) *****
             SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
        T 0    .000     .000     .000     .000     .000     .000
        E 1    .134    -.714    -.048     .017    -.002     .000
        N 2    .262   -1.838    -.074     .028    -.003     .000
        T 3    .375   -3.168    -.088     .032    -.004     .000
        H 4    .467   -4.572    -.092     .030    -.004     .000
          5    .530   -6.037    -.087     .027    -.004     .000
        P 6    .559   -7.548    -.076     .022    -.003     .000
        O 7    .545   -9.093    -.060     .016    -.003     .000
        I 8    .479  -10.661    -.041     .010    -.002     .000
        N 9    .294   -8.099    -.020     .004    -.001     .000
        T 0    .000     .000     .000     .000     .000     .000

                                                                 AREA
                                                                TOTALS
      POS AREA    18.6       .0       .0      2.0       .0       .0   20.6
      NEG AREA      .0    422.5      6.3       .0       .2       .0  428.9

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

        X-DIST (FT.)        .00        .00        .00  POS AREA =         .00
        Y-ORDINATE          .00        .00        .00
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                                        DETAIL DATA AT MOMENT CHECK POINT FOR
                             COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97                                                                     D/F STRUCTURE I.D. = G65-005
                                                                                     MEMBER I.D. --      G 1
                                                                                     C.P. LOCATION --    3.00

                                                                                                         PAGE 3


***** RATING FACTOR  *****
                         -- RATING FACTOR FOR MOMENT --
                 AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MOMENT
               TOP       TOP       BOTT      BOTT            TOP                BOTT                RATING     SAFE
              +BEND     -BEND     +BEND     -BEND     +BEND    -BEND    +BEND    -BEND             VALUE      LOAD
                                                                                                             CAP.(TONS)
INV.   HS20   1328.2     694.8    1328.2     694.8    39.6357   1.1906  39.6357   1.1906           HS 23.8     42.9

OPER.  HS20   2213.7    1157.5    2213.7    1157.5    66.0595   1.9843  66.0595   1.9843           HS 39.7     71.4

                      -- RATING FACTOR FOR SERVICEABILITY --
                AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
               TOP       TOP       BOTT      BOTT            TOP                BOTT                RATING     SAFE
              +BEND     -BEND     +BEND     -BEND     +BEND    -BEND    +BEND    -BEND             VALUE      LOAD
                                                                                                             CAP.(TONS)
INV.   HS20   1565.9     932.5    1565.9     932.5    46.7290   1.5979  46.7290   1.5979

OPER.  HS20   2609.9    1554.1    2609.9    1554.1    77.8816   2.6632  77.8816   2.6632

                          -- RATING FACTOR FOR SHEAR --
              AVAILABLE CAPACITY (KIPS)                 RATING FACTOR - SHEAR                       RATING     SAFE
                 LEFT      RIGHT                          LEFT      RIGHT                           VALUE      LOAD

INV.   HS20     127.23    127.23                         2.0327    2.0327

OPER.  HS20     212.05    212.05                         3.3878    3.3878
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                                  DETAIL DATA AT MOMENT CHECK POINT FOR              BARS-PC RELEASE 5.5
                         COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
  DATE  8/18/97                                                                  D/P STRUCTURE I.D. = 065-005
                                                                                 MEMBER I.D. --        8 1
                                                                                 C.P. LOCATION -       3.50

                                                                                                     PAGE 1
***** SECTION PROPERTIES IN COMPOSITE RANGE  2 OF SPAN  3    ******

                            -- STRUCTURAL STEEL PROPERTIES --
    H      Tweb   H/Tweb    D    D/Tweb   - B' (IN) -    - B'/t -     Lb ( FT )    Ry ( IN )    - Lb / Ry    HYBRID RATIO, R
  (IN.)   (IN.)           (IN.)            TOP    BOT    TOP   BOT   TOP    BOT    TOP   BOT    TOP    BOT    +BEND   -BEND
  50.13    .38   133.67  48.00  128.00    5.81   6.81   7.75  4.95  CONT   21.45   3.46  4.04    .00  63.69  1.0000  1.0000

                            -- COMPOSITE CONCRETE PROPERTIES --
 EFF.WIDTH   EFF.THICK.  VALUE   (AS)C     (DS)C  VALUE  VALUE   Abf       Abf       AW
   (IN.)       (IN.)       N.   (SQ.IN.)  (IN.)    a      Y.  (SQ.IN.) (SQ.IN.) (SQ.IN.)
   93.0         7.8        8       .00      .00   5.27    .0    9.00     19.25     18.00

                            -- SECTION PROPERTIES --          -------- SECTION MODULUS --------   ---- PLASTIC SECTION MODULUS ----
          GROSS    NET AREA       IX         IX      C      TOP      TOP      BOTT     BOTT     TOP      TOP      BOTT     BOTT
          AREA   +BEND  -BEND   +BEND      -BEND   (BOT)   +BEND    -BEND    +BEND    -BEND    +BEND    -BEND+   +BEND    -BEND
          SQ.IN. SQ.IN. SQ.IN.  IN.**4     IN.**4   IN.    IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3
NON-COM   46.25  46.25  46.25  19124.0    13124.0  19.84    631.5    631.5    963.8    963.8   865.39   865.39   865.39   865.3
COM(N=N)                       56548.2        .0  42.83   7747.7   3757.7   1320.4   1320.4
COM(N=3N)                      41302.8        .0  33.54   2489.8   1697.0   1231.6   1231.6

                            -- ULTIMATE STRENGTH --
     Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
      STEEL     CONC.     REBAR     TOP      BOT     TOP    BOT        BOT         TOP        WEB
                                   FLANGE  FLANGE  FLANGE FLANGE      FLANGE      FLANGE
     36000.     4000.    40000.    10.83    10.83   11.60  11.60      36000.      36000.     36000.

*****  SECTION QUALIFICATION  *****
          STIFFENED    UNSTIFFENED  COMPACT    BRACED        UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
         LONG  TRANV                         NON-COMPACT  NON-COMPACT     FACTOR
+BEND           X                                 X                       1.0000                      X
-BEND           X                                              X          1.0000                      X

*****  SECTION CAPACITY  *****
         +BEND        ML =         .00 FT-KIPS,   MR =        .00 FT-KIPS
         -BEND        ML =     244.17 FT-KIPS,   MR =     468.07 FT-KIPS,   M1/M2 =    .5216        CB = 1.0
     --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---     -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --   -- SHEAR CAPACITY (KIPS) --

          TOP         TOP        BOTT       BOTT         MU          MAX. CAP.    MAX. CAP.     MU                      VU        VU
         +BEND       -BEND      +BEND      -BEND                      STEEL         CONC.                              LEFT     RIGHT
INV.   10727.57     874.42    1828.26    1334.46        .00         963.78       7116.17    10727.57                 353.26    353.26
OPER.  17879.29    1457.36    3047.10    2224.11        .00         963.78       7116.17    17879.29                 353.26    353.26

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                          -- DEAD LOAD --
     M (DL)    M (SDL)      REDIS.    REDIS.      V (DL)      V (SDL)
                           M-(DL)----M-(SDL)
     469.05     337.99      469.05    337.99      -6.94       -3.05
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                                   DETAIL DATA AT MOMENT CHECK POINT FOR
                       COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97                                                                        D/P STRUCTURE I.D. = G65-005
                                                                                        MEMBER I.D. --       S 1
                                                                                        C.P. LOCATION --     3.50

                                                                                                             PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR =  .215 FOR +BEND AND =  .215 FOR -BEND)

                                         -- LIVE LOAD --
                    ---------------TRUCK MOMENT-------------  --------------LANE MOMENT------------ -----FIXED-----  -------MAX------
        LIVE        REDIS   LL+IMP   LL    LOC.NO.  DIR   LL+IMP    LL    LOC.CONC. LOC.CONC.      SHEAR              SHEAR
        LOAD        LL+I                   1 WHEEL                        LOAD #1   LOAD #2    +V        -V      +V        -V
                   FT-KIPS FT-KIPS FT-KIPS   FT.          FT-KIPS FT-KIPS   FT.       FT.     KIPS      KIPS    KIPS      KIPS

INV.   HS20 +BEND     .00  1247.2  1026.3  200.208   R   1056.2   869.1  186.208      .000    .17      26.85
            -BEND  358.49   298.8   245.9  296.732   R    358.5   295.0  272.008      .000    .17        .17
                                                                                                              32.61     32.6
OPER.  HS20 +BEND     .00  1247.2  1026.3  200.208   R   1056.2   869.1  186.208      .000    .17      26.85
            -BEND  358.49   298.8   245.9  296.732   R    358.5   295.0  272.008      .000    .17        .17
                                                                                                              32.61     32.6

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
                 SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
        T 0      .000      .000      .000      .000      .000      .000
        E 1      .054     -.290     4.352    -2.523      .286      .000
        N 2      .106     -.745     8.772    -4.303      .462      .000
        T 3      .152    -1.285    13.298    -4.301      .549      .000
        H 4      .189    -1.854    17.947    -4.658      .578      .000
          5      .215    -2.448    22.793    -4.115      .557      .000
        P 6      .227    -3.061    17.145    -3.162      .495      .000
        O 7      .221    -3.687    11.774    -2.476      .400      .000
        I 8      .194    -4.323     6.908    -1.537      .280      .000
        N 9      .119    -3.404     3.099     -.652      .144      .000
        T 0      .000      .000      .000      .000      .000      .000

                                                                     AREA
                                                                    TOTALS
      POS AREA     7.5        .0    1137.7        .0      26.1        .0  1171.3
      NEG AREA      .0     171.3        .0     306.0        .0        .0   477.3

*****  MOMENT INFLUENCE LINE (SINGLE SPAN)

        X-DIST (FT.)         .00        .00        .00  POS AREA =        .00
        Y-ORDINATE           .00        .00        .00
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                                                DETAIL DATA AT MOMENT CHECK POINT FOR
                                  COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
    DATE  8/18/97
                                                                                                   D/P STRUCTURE I.D. = G85-005
                                                                                                   MEMBER I.D. --      8 1
                                                                                                   C.P. LOCATION --    3.50

                                                                                                                       PAGE 3


***** RATING FACTOR  *****
                                -- RATING FACTOR FOR MOMENT --
                        AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MOMENT
                  TOP        TOP        BOTT       BOTT              TOP                BOTT              RATING     SAFE
                 +BEND      -BEND      +BEND      -BEND      +BEND     -BEND     +BEND     -BEND       VALUE      LOAD
                                                                                                                CAP.(TONS)
INV.   HS20 111111.0     1358.6     1225.3     1818.7      4.1703    3.7899     .9824    5.0732       HS 19.6     35.4

OPER.  HS20 111111.0     2264.4     2042.1     3031.1      6.9505    6.3165    1.6373    8.4554       HS 32.7     58.9

                             -- RATING FACTOR FOR SERVICABILITY --
                       AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
                  TOP        TOP        BOTT       BOTT              TOP                BOTT              RATING     SAFE
                 +BEND      -BEND      +BEND      -BEND      +BEND     -BEND     +BEND     -BEND       VALUE      LOAD
                                                                                                                CAP.(TONS)
INV.   HS20   9164.8     1564.1     1654.9     2132.3      7.3482    4.3631    1.3269    5.9480

OPER.  HS20  15274.7     2606.9     2758.2     3553.8     12.2471    7.2719    2.2115    9.9133

                                   -- RATING FACTOR FOR SHEAR --
                  AVAILABLE CAPACITY (KIPS)                       RATING FACTOR - SHEAR                  RATING     SAFE
                     LEFT       RIGHT                                LEFT      RIGHT                     VALUE      LOAD

INV.   HS20        157.05     169.03                               4.8156    4.8156

OPER.  HS20        261.75     261.72                               8.0259    8.0259
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                                         DETAIL DATA AT MOMENT CHECK POINT FOR                 BARS-PC RELEASE 5.5
                              COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  9/18/97                                                                            D/F STRUCTURE I.D. = 065-005
                                                                                            MEMBER I.D. --       S 1
                                                                                            C.P. LOCATION -      4.00

                                                                                                                PAGE 1
*****  SECTION PROPERTIES IN COMPOSITE RANGE  1 OF SPAN  4   ******

                                 -- STRUCTURAL STEEL PROPERTIES --
      H      Tweb   H/Tweb    D    D/Tweb  - B' (IN) -   - B'/t -    Lb ( FT )    Ry ( IN )    - Lb / Ry    HYBRID RATIO, R
    (IN.)   (IN.)          (IN.)             TOP   BOT   TOP   BOT   TOP   BOT    TOP   BOT     TOP   BOT    +BEND   -BEND
    52.50    .38   140.00  48.00  128.00   6.81  6.81   3.03  3.03  CONT  21.45   4.04  4.04     .00  63.65  1.0000  1.0000

                                 -- COMPOSITE CONCRETE PROPERTIES --
   EFF.WIDTH   EFF.THICK.  VALUE   (AS)C    (DS)C  VALUE  VALUE   Ace       Abf       Aw
     (IN.)       (IN.)       N    (SQ.IN.)  (IN.)    a      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
     93.0         7.5        8       .00      .00    .00    .5   31.50    31.50    18.00

                                 -- SECTION PROPERTIES --         --------- SECTION MODULUS ---------  ---- PLASTIC SECTION MODULUS ----
             GROSS     NET AREA        IX        IX       C       TOP      TOP      BOTT     BOTT      TOP      TOP      BOTT     BOTT
             AREA    +BEND  -BEND    +BEND     -BEND    (BOT)   +BEND    -BEND    +BEND    -BEND    +BEND    -BEND+   +BEND    -BEND
             SQ.IN.  SQ.IN. SQ.IN.   IN.**4    IN.**4    IN.    IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3
NON-COM      81.00   81.00  81.00   43268.1   43268.1  26.25   1648.3   1648.3   1648.3   1648.3   1799.19  1799.19  1799.19  1799.1
COM(N=N)                            43268.1        .0  26.25   1648.3       .0   1648.3   1648.3
COM(N=3N)                           43268.1        .0  26.25   1648.3       .0   1648.3   1648.3

                                 -- ULTIMATE STRENGTH --
      Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)      -- YIELD STRESS, Fy (PSI) --
       STEEL     CONC.     REBAR     TOP     BOT     TOP     BOT         BOT          TOP          WEB
                                    FLANGE  FLANGE  FLANGE  FLANGE       FLANGE       FLANGE
      36000.     4000.    40000.    10.83   10.83   11.60   11.60        36000.       36000.      36000.

*****  SECTION QUALIFICATION  *****
        STIFFENED   UNSTIFFENED  COMPACT     BRACED       UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
        LONG  TRANV                        NON-COMPACT  NON-COMPACT    FACTOR
+BEND         X                                 X                      1.0000         X
-BEND         X                                 X                      1.0000         X

*****  SECTION CAPACITY  *****
        +BEND          ML =        .00 FT-KIPS,   MR =        .00 FT-KIPS
        -BEND          ML =    -692.84 FT-KIPS,   MR =   -2615.51 FT-KIPS
    --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---      -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --    -- SHEAR CAPACITY (KIPS) --

         TOP        TOP        BOTT       BOTT        MU         MAX. CAP.    MAX. CAP.      MU                   VU        VU
        +BEND      -BEND      +BEND      -BEND                    STEEL        CONC.                              LEFT      RIGHT
INV.    2282.28    2282.28    2282.28    2282.28       .00       1799.19        .00        2282.28               353.26    353.26
OPER.   3803.79    3803.79    3803.79    3803.79       .00       1799.19        .00        3803.79               353.26    353.26

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                                  -- DEAD LOAD --
      M (DL)    M (SDL)      REDIS.    REDIS.      V (DL)     V (SDL)
                             M (DL) -- M (SDL)
     -1084.71   -525.58    -1084.71   +525.58      46.44      27.99
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                                            DETAIL DATA AT MOMENT CHECK POINT FOR
                                 COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
      DATE  8/18/97
                                                                                      D/P STRUCTURE I.D. = G65-005
                                                                                      MEMBER I.D. --        S 1
                                                                                      C.P. LOCATION --      4.00

                                                                                                            PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR =  .242 FOR +BEND AND =  .215 FOR -BEND)

                                                  -- LIVE LOAD --
                     -------------TRUCK MOMENT------------  -------------LANE MOMENT------------  -----FIXED-----  ------MAX------
          LIVE         REDIS   LL+IMP   LL     LOC.NO.  DIR  LL+IMP      LL    LOC.CONC. LOC.CONC.      SHEAR           SHEAR
          LOAD          LL+I                   1 WHEEL                         LOAD #1   LOAD #2     +V        -V     +V      -V
                      FT-KIPS FT-KIPS FT-KIPS   FT.          FT-KIPS  FT-KIPS    FT.       FT.      KIPS      KIPS   KIPS    KIPS

INV.     HS20 +BEND      .00   111.5    89.8   88.250   L    112.6      90.6   116.250      .000    1.44       .29
              -BEND    1005.   599.6   493.4  296.732   R   1005.2     827.1   272.008   207.658    1.41      1.41
                                                                                                                 62.85   62.8
OPER.    HS20 +BEND      .00   111.5    89.8   88.250   L    112.6      90.6   116.250      .000    1.44       .29
              -BEND    1005.   599.6   493.4  296.732   R   1005.2     827.1   272.008   207.658    1.41      1.41
                                                                                                                 62.85   62.8

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE   LINE (CONTINUOUS SPAN) *****
                 SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
          T 0      .000     .000     .000     .000     .000     .000
          E 1     -.025     .135   -1.973   -5.062     .573     .000
          N 2     -.049     .347   -3.832   -8.634     .927     .000
          T 3     -.071     .599   -5.510   -9.834    1.101     .000
          H 4     -.088     .864   -6.914   -9.347    1.159     .000
            5     -.100    1.141   -7.953   -8.257    1.117     .000
          P 6     -.106    1.426   -8.534   -6.745     .993     .000
          O 7     -.103    1.718   -8.567   -4.969     .803     .000
          I 8     -.090    2.015   -7.593   -3.084     .563     .000
          N 9     -.056    1.530   -4.508   -1.309     .290     .000
          T 0      .000     .000     .000     .000     .000     .000

                                                                      AREA
                                                                     TOTALS
       POS AREA      .0     79.8       .0       .0     52.4      .0   132.2
       NEG AREA     3.5       .0    594.0    613.9       .0      .0  1211.4

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

          X-DIST (FT.)        .00        .00        .00  POS AREA =        .00
          Y-ORDINATE          .00        .00        .00
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                                           DETAIL DATA AT MOMENT CHECK POINT FOR
                                 COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
      DATE  8/18/97
                                                                                     D/P STRUCTURE I.D. = G65-005
                                                                                     MEMBER I.D. --       S 1
                                                                                     C.P. LOCATION --     4.00

                                                                                                          PAGE 3


***** RATING FACTOR  *****
                         -- RATING FACTOR FOR MOMENT --
                  AVAILABLE (LL+I) CAPACITY (FT-KIPS)     RATING FACTOR - MOMENT
               TOP       TOP       BOTT      BOTT              TOP                BOTT             RATING     SAFE
              +BEND     -BEND     +BEND     -BEND      +BEND    -BEND    +BEND    -BEND          VALUE      LOAD
                                                                                                          CAP.(TONS)
INV.   HS20   3248.5    1316.1    3248.5    1316.1    28.8617  1.3093  28.8617  1.3093          HS 26.2     47.1

OPER.  HS20   5414.1    2193.5    5414.1    2193.5    48.1028  2.1821  48.1028  2.1821          HS 43.6     78.6

                         -- RATING FACTOR FOR SERVICEABILITY --
                  AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
               TOP       TOP       BOTT      BOTT              TOP                BOTT             RATING     SAFE
              +BEND     -BEND     +BEND     -BEND      +BEND    -BEND    +BEND    -BEND          VALUE      LOAD
                                                                                                          CAP.(TONS)
INV.   HS20   3784.8    1852.4    3784.8    1852.4    33.6269  1.8428  33.6269  1.8428

OPER.  HS20   6308.0    3087.4    6308.0    3087.4    56.0448  3.0714  56.0448  3.0714

                           -- RATING FACTOR FOR SHEAR --
                 AVAILABLE CAPACITY (KIPS)                     RATING FACTOR - SHEAR             RATING     SAFE
                   LEFT      RIGHT                               LEFT     RIGHT                  VALUE      LOAD

INV.   HS20     117.18    117.18                                1.8645   1.8645

OPER.  HS20     195.31    195.31                                3.1075   3.1075
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                                        DETAIL DATA AT MOMENT CHECK POINT FOR                BARS-PC RELEASE 5.5
                              COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER -- LOAD FACTOR RATING
   DATE  8/18/97
                                                                                      D/P STRUCTURE I.D. = G65-005
                                                                                      MEMBER I.D. --        S 1
                                                                                      C.P. LOCATION -       4.50

                                                                                                             PAGE 1
***** SECTION PROPERTIES IN COMPOSITE RANGE  2 OF SPAN  4   ******

                           -- STRUCTURAL STEEL PROPERTIES --
     H      Tweb   H/Tweb    D    D/Tweb   - B' (IN) -    - B'/t -     Lb ( FT )     Ry ( IN )    - Lb / Ry    HYBRID RATIO, R
   (IN.)   (IN.)           (IN.)            TOP   BOT     TOP   BOT    TOP    BOT    TOP   BOT    TOP    BOT    +BEND   -BEND
   49.63    .38   132.33  48.00  128.00    5.81  6.81    7.75  7.79   CONT   21.45   3.46  4.04    .00  63.69  1.0000  1.0000

                           -- COMPOSITE CONCRETE PROPERTIES --
   EFF.WIDTH   EFF.THICK.  VALUE   (AS)C    (DS)C  VALUE  VALUE    Atf       Abf       Aw
    (IN.)       (IN.)       N    (SQ.IN.)  (IN.)    a      Y    (SQ.IN.) (SQ.IN.) (SQ.IN.)
    93.0         7.8        8       .00      .00   4.47    .0     9.00     12.25     18.00

                           -- SECTION PROPERTIES --        -------- SECTION MODULUS --------    ---- PLASTIC SECTION MODULUS ----
           GROSS     NET AREA        IX        IX       C      TOP      TOP      BOTT     BOTT     TOP      TOP      BOTT     BOTT
           AREA    +BEND  -BEND    +BEND     -BEND    (BOT)   +BEND    -BEND    +BEND    -BEND    +BEND    -BEND+   +BEND    -BEND
           SQ.IN.  SQ.IN. SQ.IN.   IN.**4    IN.**4    IN.    IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3
NON-COM    39.25   39.25  39.25   15957.3   15957.3   22.84    595.7    595.7    698.7    698.7   729.67   729.67   729.67   729.6
COM(N=N)                          43171.8        .0   44.63   8643.9   3387.5    967.3    967.3
COM(N=3N)                         32762.9        .0   36.40   2477.2   1562.0    900.1    900.1

                          -- ULTIMATE STRENGTH --
     Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
      STEEL     CONC.     REBAR     TOP     BOT     TOP    BOT        BOT         TOP        WEB
                                   FLANGE  FLANGE  FLANGE FLANGE     FLANGE      FLANGE
     36000.     4000.     40000.   10.83   10.83   11.60  11.60      36000.      36000.     36000.

*****  SECTION QUALIFICATION  *****
         STIFFENED   UNSTIFFENED  COMPACT    BRACED      UNBRACED    REDUCTION   SYMMETRICAL UNSYMMETRICAL
       LONG  TRANV                        NON-COMPACT  NON-COMPACT    FACTOR
+BEND          X                              X                       1.0000                  X
-BEND          X                                          X           1.0000                  X

*****  SECTION CAPACITY  *****
         +BEND        ML =       .00 FT-KIPS,    MR =       .00 FT-KIPS
         -BEND        ML =    161.18 FT-KIPS,    MR =    374.96 FT-KIPS,   M1/M2 =   .4299        CB = 1.0
   --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---      -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --   -- SHEAR CAPACITY (KIPS) --

          TOP        TOP       BOTT       BOTT        MU        MAX. CAP.    MAX. CAP.      MU                   VU        VU
         +BEND      -BEND     +BEND      -BEND                    STEEL        CONC.                             LEFT      RIGHT
INV.   11968.46     824.80   1339.36     967.50       .00        729.67      8048.20    11968.46               353.26    353.26
OPER.  19947.44    1374.67   2232.27    1612.50       .00        729.67      8048.20    19947.44               353.26    353.26

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                             -- DEAD LOAD --
      M (DL)    M (SDL)     REDIS.    REDIS.      V (DL)      V (SDL)
                            M-(DL)----M-(SDL)
      287.78    275.51      287.78    275.51       4.16        1.88
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                                        DETAIL DATA AT MOMENT CHECK POINT FOR
                              COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97
                                                                                     D/P STRUCTURE I.D. = G65-005
                                                                                     MEMBER I.D. --       S 1
                                                                                     C.P. LOCATION --     4.50

                                                                                                          PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR =  .215 FOR +BEND AND =  .215 FOR -BEND)

                                                -- LIVE LOAD --
                     -------------TRUCK MOMENT-------------  -------------LANE MOMENT------------  -----FIXED-----  ------MAX------
        LIVE        REDIS   LL+IMP   LL     LOC.NO.  DIR   LL+IMP    LL    LOC.CONC. LOC.CONC.        SHEAR              SHEAR
        LOAD        LL+I                    1 WHEEL                         LOAD #1   LOAD #2     +V        -V     +V          -V
                   FT-KIPS FT-KIPS FT-KIPS    FT.          FT-KIPS FT-KIPS    FT.       FT.      KIPS      KIPS   KIPS        KIPS

INV.   HS20 +BEND    .00    974.9   802.2  279.459   L     800.8   658.9  293.458      .000    1.41      6.96
            -BEND 215.61    189.6   156.0  179.658   L     215.6   177.4  207.658      .000    1.41      1.41
                                                                                                              27.17       27.1
OPER.  HS20 +BEND    .00    974.9   802.2  279.459   L     800.8   658.9  293.458      .000    1.41      6.96
            -BEND 215.61    189.6   156.0  179.658   L     215.6   177.4  207.658      .000    1.41      1.41
                                                                                                              27.17       27.1

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
                SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
        T 0      .000     .000     .000     .000     .000     .000
        E 1     -.009     .047    -.691    1.993    -.842     .000
        N 2     -.017     .122   -1.342    4.618   -1.362     .000
        T 3     -.025     .210   -1.929    8.428   -1.618     .000
        H 4     -.031     .302   -2.420   13.254   -1.703     .000
          5     -.035     .399   -2.784   18.561   -1.642     .000
        P 6     -.037     .499   -2.986   13.626   -1.459     .000
        O 7     -.036     .602   -2.309    9.162   -1.180     .000
        I 8     -.032     .705   -2.658    5.202    -.827     .000
        N 9     -.019     .536   -1.578    1.987    -.426     .000
        T 0      .000     .000     .000     .000     .000     .000

                                                                  AREA
                                                                 TOTALS
     POS AREA      .0     27.9       .0    823.9       .0       .0   851.8
     NEG AREA     1.2       .0    207.5       .0     76.9       .0   286.1

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

        X-DIST (FT.)        .00        .00        .00  POS AREA =        .00
        Y-ORDINATE          .00        .00        .00
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                                   DETAIL DATA AT MOMENT CHECK POINT FOR
                          COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97
                                                                                   D/P STRUCTURE I.D. = G65-005
                                                                                   MEMBER I.D. --      S 1
                                                                                   C.P. LOCATION --    4.50

                                                                                                       PAGE 3


*****  RATING FACTOR  *****
                     -- RATING FACTOR FOR MOMENT --
               AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MOMENT
               TOP      TOP      BOTT     BOTT            TOP               BOTT          RATING     SAFE
              +BEND    -BEND    +BEND    -BEND     +BEND    -BEND    +BEND    -BEND       VALUE      LOAD
                                                                                                  CAP.(TONS)
INV.   HS20   8886.2   1162.8    922.7   1305.5    9.1149   5.3930    .9464   6.0548     HS 18.9     34.1

OPER.  HS20  14810.3   1938.0   1537.8   2175.8   15.1915   8.9883   1.5774  10.0914     HS 31.5     56.8

                    -- RATING FACTOR FOR SERVICEABILITY --
              AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
               TOP      TOP      BOTT     BOTT            TOP               BOTT          RATING     SAFE
              +BEND    -BEND    +BEND    -BEND     +BEND    -BEND    +BEND    -BEND       VALUE      LOAD
                                                                                                  CAP.(TONS)
INV.   HS20  11698.7   1356.6   1237.4   1532.8   11.9999   6.2920   1.2693   7.1093

OPER.  HS20  19497.9   2261.0   2062.4   2554.7   19.9999  10.4866   2.1155  11.8489

                        -- RATING FACTOR FOR SHEAR --
             AVAILABLE CAPACITY (KIPS)                  RATING FACTOR - SHEAR             RATING     SAFE
                LEFT      RIGHT                            LEFT     RIGHT                 VALUE      LOAD

INV.   HS20    159.42    159.42                           5.8667    5.8667

OPER.  HS20    265.71    265.71                           9.7779    9.7779
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                                         DETAIL DATA AT MOMENT CHECK POINT FOR                 BARS-PC RELEASE 5.5
                            COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97                                                                              D/P STRUCTURE I.D. = 065-005
                                                                                              MEMBER I.D. =         S 1
                                                                                              C.P. LOCATION =       5.00

                                                                                                                 PAGE 1
*****  SECTION PROPERTIES IN COMPOSITE RANGE  1 OF SPAN  5   ******

                              -- STRUCTURAL STEEL PROPERTIES --
      H      Twab   H/Twab   D     D/Twab   - B' (IN) -   - B'/t -    Lb ( FT )    Ry ( IN )    - Lb / Ry    HYBRID RATIO, R
    (IN.)   (IN.)          (IN.)            TOP   BOT    TOP   BOT   TOP    BOT    TOP   BOT     TOP   BOT    +BEND   -BEND
    50.75    .38   135.33  48.00  128.00   6.81  6.81   4.95  4.95  CONT   23.19   4.04  4.04     .00  68.87  1.0000  1.0000

                              -- COMPOSITE CONCRETE PROPERTIES --
    EFF.WIDTH    EFF.THICK.  VALUE   (AS)C    (DS)C  VALUE  VALUE   Atf      Abf      Aw
      (IN.)        (IN.)       N    (SQ.IN.)  (IN.)    A      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
      93.0          7.8        8       .00      .00   6.43    .0   19.25    19.25    18.00

                              -- SECTION PROPERTIES --              --------- SECTION MODULUS ---------   ---- PLASTIC SECTION MODULUS ----
           GROSS     NET AREA        IX        IX       C      TOP       TOP      BOTT      BOTT      TOP      TOP      BOTT     BOTT
           AREA    +BEND  -BEND    +BEND     -BEND    (BOT)   +BEND     -BEND    +BEND     -BAND    +BEND    -BEND+    +BEND    -BEND
           SQ.IN.  SQ.IN. SQ.IN.   IN.**4    IN.**4    IN.    IN.**3    IN.**3   IN.**3    IN.**3   IN.**3   IN.**3   IN.**3   IN.**3
NON-COM    56.50   56.50  56.50   26927.7   26927.7   25.38   1061.2    1061.2   1061.2    1061.2  1166.49  1166.49  1166.49  1166.4
CON(N=N)                          26927.7        .0   25.38   1061.2        .0   1061.2    1061.2
CON(N=3N)                         26927.7        .0   25.38   1061.2        .0   1061.2    1061.2

                              -- ULTIMATE STRENGTH --
     Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
      STEEL      CONC.     REBAR     TOP     BOT     TOP     BOT       BOT          TOP          WEB
                                    FLANGE  FLANGE  FLANGE  FLANGE    FLANGE       FLANGE
     36000.     4000.     40000.    10.83   10.83   11.60   11.60     36000.       36000.       36000.

*****  SECTION QUALIFICATION  *****
        STIFFENED    UNSTIFFENED  COMPACT     BRACED       UNBRACED      REDUCTION   SYMMETRICAL UNSYMMETRICAL
        LONG  TRANV                         NON-COMPACT  NON-COMPACT     FACTOR
+BEND          X                                X                        1.0000         X
-BEND          X                                             X           1.0000         X

*****  SECTION CAPACITY  *****
        +BEND          ML =        .00 FT-KIPS,   MR =        .00 FT-KIPS
        -BEND          ML =    -327.35 FT-KIPS,   MR =   -1675.40 FT-KIPS,   M1/M2 =   .1953       CB = 1.0
     --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---     -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --    -- SHEAR CAPACITY (KIPS) --

        TOP        TOP        BOTT        BOTT        MU          MAX. CAP.     MAX. CAP.      MU                      VU          VU
       +BEND      -BEND      +BEND       -BEND                     STEEL         CONC.                                LEFT       RIGHT
INV.   1469.34    1469.34    1469.34    1469.34        .00        1166.49          .00       1469.34                  346.28      346.28
OPER.  2448.90    2448.90    2448.90    2448.90        .00        1166.49          .00       2448.90                  346.28      346.28

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                              -- DEAD LOAD --
     M (DL)    M (SDL)       REDIS.     REDIS.       V (DL)      V (SDL)
                             M-(DL)  ,  M-(SDL)
    -527.83    -323.83      -527.83    -323.83       37.21        21.60
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                                        DETAIL DATA AT MOMENT CHECK POINT FOR
                               COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
    DATE  8/18/97                                                                                        D/F STRUCTURE I.D. = G65-005
                                                                                                         MEMBER I.D. --       8 1
                                                                                                         C.P. LOCATION --     5.00

                                                                                                                              PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR =  .215 FOR +BEND AND =  .234 FOR -BEND)

                                                -- LIVE LOAD --
                        -------------TRUCK MOMENT------------   -------------LANE MOMENT------------  -----FIXED-----   ------MAX------
        LIVE            REDIS   LL+IMP   LL     LOC.NO.  DIR   LL+IMP      LL     LOC.CONC. LOC.CONC.       SHEAR               SHEAR
        LOAD             LL+I                   1 WHEEL                           LOAD #1   LOAD #2    +V         -V      +V         -V
                        FT-KIPS FT-KIPS FT-KIPS   FT.           FT-KIPS  FT-KIPS    FT.       FT.     KIPS       KIPS    KIPS       KIPS

INV.    HS20 +BEND      .00    162.4    133.6  179.658   L     146.2     120.3   207.658      .000  10.82       2.33
             -BEND  723.74    571.6    463.1  290.181   L     723.7     586.4   304.183   374.917  10.99      10.99
                                                                                                                          58.25      60.2
OPER.   HS20 +BEND      .00    162.4    133.6  179.658   L     146.2     120.3   207.658      .000  10.82       2.33
             -BEND  723.74    571.6    463.1  290.181   L     723.7     586.4   304.183   374.917  10.99      10.99
                                                                                                                          58.25      60.2

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
                 SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
         T 0       .000     .000     .000     .000     .000     .000
         E 1       .008    -.040     .592   -1.679   -2.256     .000
         N 2       .015    -.104    1.149   -3.580   -3.650     .000
         T 3       .021    -.180    1.652   -5.486   -4.338     .000
         H 4       .026    -.259    2.073   -7.045   -4.565     .000
           5       .030    -.342    2.385   -8.247   -4.401     .000
         P 6       .032    -.428    2.559   -8.919   -3.912     .000
         O 7       .031    -.515    2.569   -8.883   -3.162     .000
         I 8       .027    -.604    2.277   -7.962   -2.217     .000
         N 9       .017    -.459    1.352   -5.442   -1.141     .000
         T 0       .000     .000     .000     .000     .000     .000

                                                                        AREA
                                                                       TOTALS
      POS AREA      1.1       .0    178.1       .0       .0       .0    179.2
      NEG AREA       .0     23.9       .0    613.9    206.3       .0    844.1

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

         X-DIST (FT.)         .00       .00       .00  POS AREA =        .00
         Y-ORDINATE           .00       .00       .00
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                              DETAIL DATA AT MOMENT CHECK POINT FOR
                   COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97
                                                                        D/F STRUCTURE I.D. - G65-005
                                                                        MEMBER I.D. --       S 1
                                                                        C.P. LOCATION --     8.00

                                                                                             PAGE 3


***** RATING FACTOR  *****
                    -- RATING FACTOR FOR MOMENT --
               AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MONENT
            TOP      TOP       BOTT      BOTT           TOP              BOTT            RATING     SAFE
           +BEND    -BEND     +BEND     -BEND     +BEND    -BEND    +BEND    -BEND       VALUE      LOAD
                                                                                                CAP.(TONS)
INV.   HS20  2040.3    898.3    2040.3    898.3    12.5658  1.2413  12.5658  1.2413      HS 24.8    44.7

OPER.  HS20  3400.6   1497.2    3400.6   1497.2    20.9431  2.0688  20.9431  2.0688      HS 41.4    74.5

                   -- RATING FACTOR FOR SERVICEABILITY --
              AVAILABLE (LL+I) CAPACITY (FT-KIPS)  RATING FACTOR -SERVICEABILITY
            TOP      TOP       BOTT      BOTT           TOP              BOTT            RATING     SAFE
           +BEND    -BEND     +BEND     -BEND     +BEND    -BEND    +BEND    -BEND       VALUE      LOAD
                                                                                                CAP.(TONS)
INV.   HS20  2385.6   1243.6    2385.6   1243.6    14.6924  1.7184  14.6924  1.7184

OPER.  HS20  3976.1   2072.7    3976.1   2072.7    24.4873  2.8639  24.4873  2.8639

                       -- RATING FACTOR FOR SHEAR --
            AVAILABLE CAPACITY (KIPS)                  RATING FACTOR - SHEAR             RATING     SAFE
              LEFT     RIGHT                            LEFT     RIGHT                   VALUE      LOAD

INV.   HS20    124.53   124.53                           2.0672   2.0672

OPER.  HS20    207.55   207.55                           3.4453   3.4453
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                                               DETAIL DATA AT MOMENT CHECK POINT FOR              BARS-PC RELEASE 5.5
                                  COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
    DATE  8/18/97
                                                                                                  D/P STRUCTURE I.D. = G65-005
                                                                                                  MEMBER I.D. --       S 1
                                                                                                  C.P. LOCATION -      5.60

                                                                                                                     PAGE 1
*****  SECTION PROPERTIES IN COMPOSITE RANGE  2 OF SPAN  5   ******

                            -- STRUCTURAL STEEL PROPERTIES --
        H     Tweb   H/Tweb     D    D/Tweb   - B' (IN) -    - B'/t -     Lb ( FT )    Ry ( IN )    - Lb / Ry     HYBRID RATIO, R
      (IN.)   (IN.)          (IN.)            TOP    BOT     TOP    BOT   TOP    BOT   TOP    BOT     TOP    BOT    +BEND    -BEND
      49.50    .38   132.00  48.00  128.00    5.81   6.81    7.75   9.08  CONT   23.19  3.46   4.04     .00   68.87  1.0000   1.0000

                            -- COMPOSITE CONCRETE PROPERTIES --
     EFF.WIDTH   EFF.THICK.  VALUE   (AS)C    (DS)C  VALUE  VALUE   AtF      Abf      Aw
       (IN.)       (IN.)       N    (SQ.IN.)  (IN.)    a      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
       93.0         7.8        8       .00      .00   4.27    .0    9.00    10.50    18.00

                            -- SECTION PROPERTIES --             --------- SECTION MODULUS ---------   ---- PLASTIC SECTION MODULUS ----
          GROSS     NET AREA        IX         IX       C      TOP       TOP      BOTT      BOTT      TOP       TOP      BOTT      BOTT
          AREA    +BEND  -BEND    +BEND      -BEND    (BOT)   +BEND     -BEND    +BEND     -BEND     +BEND     -BEND+    +BEND     -BEND
          SQ.IN.  SQ.IN. SQ.IN.   IN.**4     IN.**4    IN.    IN.**3    IN.**3   IN.**3    IN.**3    IN.**3    IN.**3    IN.**3    IN.**3
NON-COM   37.50   37.50  37.50   15007.0    15007.0   23.77    583.4     583.4    631.2     631.2    690.21    690.21    690.21    690.2
CON(N=N)                         39647.6         .0   45.12   9045.4    3267.7    878.8     878.8
CON(N=3N)                        30392.0         .0   37.22   2474.1    1517.0    816.6     816.6

                            -- ULTIMATE STRENGTH --
      Fy (PSI)  f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
       STEEL      CONC.     REBAR     TOP      BOT     TOP     BOT        BOT           TOP         WEB
                                     FLANGE  FLANGE  FLANGE  FLANGE     FLANGE        FLANGE
      36000.     4000.     40000.    10.83    10.83   11.60   11.60     36000.        36000.      36000.

*****  SECTION QUALIFICATION  *****
         STIFFENED   UNSTIFFENED  COMPACT    BRACED      UNBRACED    REDUCTION   SYMMETRICAL UNSYMMETRICAL
        LONG  TRANV                        NON-COMPACT  NON-COMPACT    FACTOR
+BEND          X                              X                        1.0000                      X
-BEND          X                                           X           1.0000                      X

*****  SECTION CAPACITY  *****
         +BEND       ML =         .00 FT-KIPS,   MR =        .00 FT-KIPS
         -BEND       ML =      175.00 FT-KIPS,   MR =     -327.15 FT-KIPS,   M1/M2 =  -.5349        CB = 1.0
    --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---     -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --   -- SHEAR CAPACITY (KIPS) --

         TOP        TOP       BOTT       BOTT        MU       MAX. CAP.    MAX. CAP.      MU                VU       VU
        +BEND      -BEND     +BEND      -BEND                   STEEL        CONC.                          LEFT     RIGHT
INV.  12524.40    807.73    1216.77    873.38        .00      690.21      8462.04     12524.40            346.28    346.28
OPER. 20874.00   1346.22    2027.94   1456.64        .00      690.21      8462.04     20874.00            346.28    346.28

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                            -- DEAD LOAD --
      M (DL)    M (SDL)     REDIS.   REDIS.     V (DL)     V (SDL)
                            M-(DL)---M-(SDL)
      207.82     153.42     207.82   153.42      3.45        1.27
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                                        DETAIL DATA AT MOMENT CHECK POINT FOR
                               COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97                                                                     D/P STRUCTURE I.D. = 065-005
                                                                                     MEMBER I.D. --       S 1
                                                                                     C.P. LOCATION --     5.60

                                                                                                          PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR =  .257 FOR +BEND AND =  .215 FOR -BEND)

                                            -- LIVE LOAD --
                    ---------------TRUCK MOMENT-------------  ---------------LANE MOMENT-------------  -----FIXED-----   -----MAX-----
     LIVE           REDIS   LL+IMP   LL    LOC.NO.  DIR   LL+IMP    LL    LOC.CONC. LOC.CONC.     SHEAR            SHEAR
     LOAD            LL+I                  1 WHEEL                        LOAD #1   LOAD #2    +V        -V    +V         -V
                   FT-KIPS FT-KIPS FT-KIPS   FT.          FT-KIPS FT-KIPS    FT.       FT.     KIPS      KIPS  KIPS       KIPS

INV.   HS20 +BEND      .00   784.4   624.1  402.833  R    594.7   473.1   388.833      .000   8.37     24.47
            -BEND  225.11   225.1   185.2  290.181  L    207.2   170.5   304.183      .000   8.09      8.09
                                                                                                              28.21     28.2
OPER.  HS20 +BEND      .00   784.4   624.1  402.833  R    594.7   473.1   388.833      .000   8.37     24.47
            -BEND  225.11   225.1   185.2  290.181  L    207.2   170.5   304.183      .000   8.09      8.09
                                                                                                              28.21     28.2

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
              SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
      T 0      .000      .000      .000      .000      .000      .000
      E 1      .003     -.016      .237     -.672     1.881      .000
      N 2      .006     -.042      .460    -1.432     4.107      .000
      T 3      .008     -.072      .661    -2.194     6.615      .000
      H 4      .011     -.104      .829    -2.818     9.307      .000
        5      .012     -.137      .954    -3.299    12.156      .000
      P 6      .013     -.171     1.024    -3.567    15.155      .000
      O 7      .012     -.206     1.028    -3.553    11.260      .000
      I 8      .011     -.242      .911    -3.185     7.463      .000
      N 9      .007     -.144      .551    -1.177     3.719      .000
      T 0      .000      .000      .000      .000      .000      .000

                                                                AREA
                                                               TOTALS
    POS AREA        .4        .0      71.2        .0     498.5        .0    570.2
    NEG AREA        .0       3.6        .0     245.5        .0        .0    255.1

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

      X-DIST (FT.)          .00         .00         .00  POS AREA =         .00
      Y-ORDINATE            .00         .00         .00
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                                       DETAIL DATA AT MOMENT CHECK POINT FOR
                              COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
     DATE  8/18/97                                                                          D/P STRUCTURE I.D. = G65-005
                                                                                            MEMBER I.D. --      B 1
                                                                                            C.P. LOCATION --    5.60

                                                                                                                 PAGE 3


 *****  RATING FACTOR  *****
                           -- RATING FACTOR FOR MOMENT --
                      AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MOMENT
                  TOP       TOP       BOTT      BOTT          TOP                BOTT               RATING     SAFE
                 +BEND     -BEND     +BEND     -BEND     +BEND    -BEND     +BEND    -BEND          VALUE      LOAD
                                                                                                             CAP. (TONS)
 INV.   HS20  10254.5    1024.5     944.1    1090.7    13.0728   4.5509   1.2036   4.8452          HS 24.1     43.3

 OPER.  HS20  17090.8    1707.5    1573.5    1817.9    21.7880   7.5849   2.0060   8.0754          HS 40.1     72.2

                         -- RATING FACTOR FOR SERVICEABILITY --
                     AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
                  TOP       TOP       BOTT      BOTT          TOP                BOTT               RATING     SAFE
                 +BEND     -BEND     +BEND     -BEND     +BEND    -BEND     +BEND    -BEND          VALUE      LOAD
                                                                                                             CAP. (TONS)
 INV.   HS20  13197.7    1214.3    1230.1    1296.1    16.8250   5.3941   1.5681   5.7576

 OPER.  HS20  21996.2    2023.8    2050.1    2160.2    28.0416   8.9502   2.6135   9.5960

                             -- RATING FACTOR FOR SHEAR --
                 AVAILABLE CAPACITY (KIPS)                     RATING FACTOR - SHEAR                  RATING     SAFE
                     LEFT      RIGHT                              LEFT     RIGHT                      VALUE      LOAD

 INV.   HS20        162.65    156.99                             5.7650    5.7650

 OPER.  HS20        271.09    261.65                             9.6083    9.6083
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                                  DETAIL DATA AT MOMENT CHECK POINT FOR               BARS-PC RELEASE 5.5
                        COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/19/97                                                                      D/P STRUCTURE I.D. = 065-005
                                                                                      MEMBER I.D. --       S 1
                                                                                      C.P. LOCATION -      6.00

                                                                                                           PAGE 1
***** SECTION PROPERTIES IN COMPOSITE RANGE  2 OF SPAN  5   ******

                          -- STRUCTURAL STEEL PROPERTIES --
     H      Twab   H/Twab    D    D/Twab   - B' (IN) -    - B'/t -     Lb ( FT )   Ry ( IN )    - Lb / Ry    HYBRID RATIO, R
   (IN.)   (IN.)          (IN.)             TOP    BOT    TOP   BOT   TOP    BOT    TOP   BOT    TOP    BOT    +BEND   -BEND
   49.50    .38   132.00  48.00  128.00   5.81   6.81    7.75  9.08  CONT   23.19   3.46  4.04    .00  68.87  1.0000  1.0000

                          -- COMPOSITE CONCRETE PROPERTIES --
   EFF.WIDTH   EFF.THICK.  VALUE   (AS)C     (DS)C  VALUE  VALUE   Acf      Abf       Aw
    (IN.)        (IN.)       N    (SQ.IN.)  (IN.)    a       Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
    93.0         7.8         8       .00      .00   4.27    .0    9.00    10.50    18.00

                        -- SECTION PROPERTIES --        -------- SECTION MODULUS --------    ---- PLASTIC SECTION MODULUS ----
            GROSS    NET AREA        IX        IX       C      TOP      TOP      BOTT     BOTT     TOP      TOP      BOTT     BOTT
            AREA   +BEND  -BEND    +BEND     -BEND    (BOT)   +BEND    -BEND    +BEND    -BEND    +BEND   -BEND+    +BEND    -BEND
            SQ.IN. SQ.IN. SQ.IN.   IN.**4    IN.**4    IN.    IN.**3   IN.**3   IN.**3   IN.**3   IN.**3  IN.**3   IN.**3   IN.**3
NON-COM     37.50   37.50  37.50  15007.0   15007.0  23.77    583.4    583.4    631.2    631.2   690.21   690.21   690.21   690.2
COM(N=N)                          39647.6       .0   45.12   9045.4   3267.7    878.8    878.8
COM(N=3N)                         30392.0       .0   37.22   2474.1   1517.0    816.6    816.6

                        -- ULTIMATE STRENGTH --
     Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)      -- YIELD STRESS, Fy (PSI) --
      STEEL     CONC.     REBAR     TOP     BOT    TOP    BOT         BOT          TOP         WEB
                                  FLANGE  FLANGE  FLANGE FLANGE      FLANGE       FLANGE
     36000.    4000.     40000.    10.83   10.83   11.60  11.60      36000.       36000.     36000.

*****  SECTION QUALIFICATION  *****
        STIFFENED   UNSTIFFENED  COMPACT    BRACED      UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
        LONG  TRANV                       NON-COMPACT  NON-COMPACT    FACTOR
+BEND         X                               X                       1.0000                   X
-BEND         X                               X                       1.0000                   X

*****  SECTION CAPACITY  *****
        +BEND       ML =       .00 FT-KIPS,   MR =      .00 FT-KIPS
        -BEND       ML =       .00 FT-KIPS,   MR =      .00 FT-KIPS
    --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---    -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --   -- SHEAR CAPACITY (KIPS) --

        TOP        TOP       BOTT       BOTT       MU        MAX. CAP.    MAX. CAP.     MU                  VU       VU
       +BEND      -BEND     +BEND      -BEND                  STEEL        CONC.                           LEFT     RIGHT
INV.  12524.40    807.73   1216.77     873.38      .00       690.21      8462.04    12524.40              346.28   346.28
OPER. 20874.00   1346.22   2027.84    1456.64      .00       690.21      8462.04    20874.00              346.28   346.28

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                        -- DEAD LOAD --
     M (DL)   M (SDL)     REDIS.    REDIS.      V (DL)     V (SDL)
                          M-(DL)----M-(SDL)
       .00       .00        .00       .00      -18.38      -12.28
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                                                DETAIL DATA AT MOMENT CHECK POINT FOR                    BARS-PC RELEASE 5.5
                                  COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97                                                                                       D/P STRUCTURE I.D. = 065-005
                                                                                                       MEMBER I.D. --       S 2
                                                                                                       C.F. LOCATION -      1.40

                                                                                                                           PAGE 1
*****  SECTION PROPERTIES IN COMPOSITE RANGE  1 OF SPAN  1   ******

                              -- STRUCTURAL STEEL PROPERTIES --
      H      Twab   H/Twab     D     D/Twab    - B' (IN) -    - B'/t -     Lb ( FT )     Ry ( IN )     - Lb / Ry     HYBRID RATIO, R
    (IN.)   (IN.)            (IN.)              TOP    BOT    TOP    BOT   TOP    BOT    TOP   BOT     TOP    BOT     +BEND    -BEND
    51.25    .63     82.00  48.00    76.80     7.69   9.69   6.15  4.84  CONT   24.00   4.62  5.77     .00  49.83    .9971    .9956

                              -- COMPOSITE CONCRETE PROPERTIES --
    EFF.WIDTH   EFF.THICK.  VALUE   (AS)C    (DS)C  VALUE  VALUE   Atf      Abf       Aw
     (IN.)        (IN.)       N    (SQ.IN.)  (IN.)    a      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
     93.0          7.8        8      .00      .00    .00    1.2   20.00     40.00     30.00

                              -- SECTION PROPERTIES --          --------- SECTION MODULUS ---------    ---- PLASTIC SECTION MODULUS ----
            GROSS     NET AREA        IX        IX       C       TOP      TOP      BOTT     BOTT      TOP      TOP      BOTT     BOTT
            AREA    +BEND  -BEND    +BEND     -BEND    (BOT)   +BEND    -BEND    +BEND    -BEND     +BEND    -BEND+    +BEND    -BEND
            SQ.IN.  SQ.IN. SQ.IN.   IN.**4    IN.**4    IN.    IN.**3   IN.**3   IN.**3   IN.**3    IN.**3   IN.**3   IN.**3   IN.**3
NON-COM     90.00   90.00  90.00   39723.7   39723.7   20.03   1272.3   1272.3   1983.4   1983.4   1755.35  1755.35  1755.35  1755.3
COM(N=N)                           97628.0        .0   37.90   7312.0   4626.5   2576.1   2576.1
COM(N=3N)                          68608.1        .0   28.97   3078.7   2284.3   2368.6   2368.6

                              -- ULTIMATE STRENGTH --
     Fy (PSI)  f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)   2200/(SQRT Fy)      -- YIELD STRESS, Fy (PSI) --
      STEEL     CONC.      REBAR      TOP      BOT     TOP     BOT        BOT          TOP         WEB
                                    FLANGE   FLANGE  FLANGE FLANGE      FLANGE       FLANGE
     45000.    4000.      40000.     9.69     9.69    10.37  10.37      45000.       45000.      50000.

*****  SECTION QUALIFICATION  *****
         STIFFENED    UNSTIFFENED  COMPACT    BRACED        UNBRACED     REDUCTION    SYMMETRICAL UNSYMMETRICAL
        LONG  TRANV                         NON-COMPACT  NON-COMPACT      FACTOR
+BEND         X                                  X                        1.0000                     X
-BEND         X                                  X                        1.0000                     X

*****  SECTION CAPACITY  *****
         +BEND         ML =        .00 FT-KIPS,    MR =        .00 FT-KIPS
         -BEND         ML =    1781.05 FT-KIPS,    MR =    2004.13 FT-KIPS
    --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---      -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --    -- SHEAR CAPACITY (KIPS) --

         TOP        TOP        BOTT       BOTT        MU          MAX. CAP.     MAX. CAP.      MU                      VU         VU
        +BEND      -BEND      +BEND      -BEND                      STEEL         CONC.                               LEFT       RIGHT
INV.  12655.32    2202.04    4458.56    3447.44       .00         1983.43       6039.68     12655.32                  870.00     870.00
OPER. 21092.21    3670.06    7430.94    5745.73       .00         1983.43       6039.68     21092.21                  870.00     870.00

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                              -- DEAD LOAD --
      M (DL)     M (SDL)      REDIS.    REDIS.       V (DL)       V (SDL)
                              M-(DL)---M-(SDL)
     1558.99     844.20      1558.99    844.20        1.73          1.89
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                                     DETAIL DATA AT MOMENT CHECK POINT FOR
                          COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97                                                                         D/P STRUCTURE I.D. = G65-005
                                                                                         MEMBER I.D. --       8 2
                                                                                         C.P. LOCATION --     1.40

                                                                                                              PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR =  .190 FOR +BEND AND =  .228 FOR -BEND)

                                        -- LIVE LOAD --
                    -------------TRUCK MOMENT------------   -------------LANE MOMENT------------  -----FIXED-----  ------MAX------
      LIVE          REDIS  LL+IMP   LL     LOC.NO.  DIR   LL+IMP      LL     LOC.CONC. LOC.CONC.       SHEAR              SHEAR
      LOAD          LL+I                   1 WHEEL                           LOAD #1   LOAD #2    +V           -V    +V          -V
                    FT-KIPS FT-KIPS FT-KIPS  FT.          FT-KIPS  FT-KIPS    FT.       FT.      KIPS         KIPS  KIPS        KIPS

INV.   HS20 +BEND     .00  1717.6  1443.0   41.134   L   1637.9   1376.1    55.133      .000   6.10         2.40
            -BEND  346.85   346.9   282.4  194.033   R    274.6    223.6   175.433      .000   6.29         6.29
                                                                                                               32.92      31.9
OPER.  HS20 +BEND     .00  1717.5  1443.0   41.134   L   1637.9   1376.1    55.133      .000   6.10         2.40
            -BEND  346.85   346.9   282.4  194.033   R    274.6    223.6   175.433      .000   6.29         6.29
                                                                                                               32.92      31.9

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
                SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
        T 0      .000     .000     .000     .000     .000     .000
        E 1     7.518   -2.205     .381     .000     .000     .000
        N 2    15.079   -4.147     .577     .000     .000     .000
        T 3    22.726   -5.416     .672     .000     .000     .000
        H 4    30.502   -5.717     .700     .000     .000     .000
          S    24.656   -5.118     .671     .000     .000     .000
        P 6    19.045   -4.157     .534     .000     .000     .000
        O 7    13.682   -3.064     .473     .000     .000     .000
        I 8     8.619   -1.923     .335     .000     .000     .000
        N 9     3.974    -.843     .172     .000     .000     .000
        T 0      .000     .000     .000     .000     .000     .000

                                                                AREA
                                                               TOTALS
     POS AREA  2009.8       .0     30.9       .0       .0       .0   2040.7
     NEG AREA      .0    307.2       .0       .0       .0       .0    307.2

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

        X-DIST (FT.)        .00       .00       .00  POS AREA =        .00
        Y-ORDINATE          .00       .00       .00
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                                                DETAIL DATA AT MOMENT CHECK POINT FOR
                                  COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97                                                                                   D/P STRUCTURE I.D. = G65-005
                                                                                                   MEMBER I.D. --       S 2
                                                                                                   C.P. LOCATION --     1.40

                                                                                                                        PAGE 3


***** RATING FACTOR  *****
                            -- RATING FACTOR FOR MOMENT --
                    AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MOMENT
                TOP       TOP       BOTT      BOTT            TOP              BOTT              RATING      SAFE
               +BEND     -BEND     +BEND     -BEND      +BEND    -BEND    +BEND    -BEND         VALUE       LOAD
                                                                                                          CAP.(TONS)
INV.   HS20    6076.5    3644.0    2692.6    4874.8     3.5380  10.5057   1.5679  14.0542       HS 31.4      56.4

OPER.  HS20   10127.6    6073.3    4488.0    8124.6     5.8967  17.5095   2.6131  23.4237       HS 52.3      94.1

                         -- RATING FACTOR FOR SERVICABILITY --
                   AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
                TOP       TOP       BOTT      BOTT            TOP              BOTT              RATING      SAFE
               +BEND     -BEND     +BEND     -BEND      +BEND    -BEND    +BEND    -BEND         VALUE       LOAD
                                                                                                          CAP.(TONS)
INV.   HS20    9050.5    4161.4    3740.6    5681.5     5.2696  11.9976   2.1779  15.3801

OPER.  HS20   15084.2    6935.7    6234.3    9469.2     8.7827  19.9961   3.6299  27.3001

                              -- RATING FACTOR FOR SHEAR --
                AVAILABLE CAPACITY (KIPS)                  RATING FACTOR - SHEAR                   RATING      SAFE
                  LEFT      RIGHT                             LEFT     RIGHT                       VALUE       LOAD

INV.   HS20      399.37    399.37                          12.1300   12.1300

OPER.  HS20      665.61    665.61                          20.2166   20.2166
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                                        DETAIL DATA AT MOMENT CHECK POINT FOR                 BARS-PC RELEASE 5.5
                              COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
  DATE  8/18/97                                                                                D/F STRUCTURE I.D. = G65-005
                                                                                               MEMBER I.D. --        S 2
                                                                                               C.P. LOCATION -       2.00

                                                                                                                     PAGE 1
*****  SECTION PROPERTIES IN COMPOSITE RANGE  1 OF SPAN  2  ******

                              -- STRUCTURAL STEEL PROPERTIES --
    H      Tweb   H/Tweb    D    D/Tweb   - B' (IN) -    - B'/t -     Lb ( FT )    Ry ( IN )     - Lb / Ry    HYBRID RATIO, R
  (IN.)    (IN.)          (IN.)           TOP    BOT     TOP   BOT   TOP    BOT    TOP   BOT    TOP    BOT    +BEND   -BEND
  52.00     .63    83.20  48.00   76.80   9.69  9.69    4.84  4.84  CONT   23.59   5.77  5.77    .00  48.84   .9980   .9980

                              -- COMPOSITE CONCRETE PROPERTIES --
   EFF.WIDTH    EFF.THICK.  VALUE    (AS)C     (DS)C  VALUE  VALUE   Atf       Abf       Aw
     (IN.)        (IN.)       N     (SQ.IN.)   (IN.)    a      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
     93.0          7.8        8       .00       .00    .00   1.5   40.00     40.00     30.00

                              -- SECTION PROPERTIES --           --------- SECTION MODULUS ---------    ---- PLASTIC SECTION MODULUS ----
          GROSS     NET AREA        IX         IX       C       TOP       TOP       BOTT      BOTT      TOP       TOP       BOTT      BOTT
          AREA    +BEND  -BEND    +BEND      -BEND    (BOT)   +BEND     -BEND     +BEND     -BEND     +BEND     -BEND+    +BEND     -BEND
          SQ.IN.  SQ.IN. SQ.IN.   IN.**4     IN.**4    IN.    IN.**3    IN.**3    IN.**3    IN.**3    IN.**3    IN.**3    IN.**3    IN.**3
NON-COM  110.00  110.00 110.00   55786.7   55786.7  26.00   2145.6    2145.6    2145.6    2145.6   2360.00   2360.00   2360.00   2360.0
COM(N=N)                         55786.7        .0  26.00   2145.6        .0    2145.6    2145.6
COM(N=3N)                        55786.7        .0  26.00   2145.6        .0    2145.6    2145.6

                              -- ULTIMATE STRENGTH --
     Fy (PSI) F'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)      -- YIELD STRESS, Fy (PSI) --
      STEEL     CONC.     REBAR     TOP      BOT    TOP    BOT          BOT          TOP         WEB
                                   FLANGE  FLANGE  FLANGE FLANGE       FLANGE       FLANGE
     45000.     4000.     40000.    9.69    9.69   10.37  10.37        45000.       45000.      50000.

*****  SECTION QUALIFICATION  *****
       STIFFENED   UNSTIFFENED  COMPACT    BRACED       UNBRACED      REDUCTION   SYMMETRICAL UNSYMMETRICAL
      LONG  TRANV                        NON-COMPACT  NON-COMPACT     FACTOR
+BEND        X                               X                        1.0000         X
-BEND        X                               X                        1.0000         X

*****  SECTION CAPACITY  *****
       +BEND        MU =        .00 FT-KIPS,   MR =        .00 FT-KIPS
       -BEND        ML =   -3118.31 FT-KIPS,   MR =   -3464.56 FT-KIPS
    --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---      -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --    -- SHEAR CAPACITY (KIPS) --

         TOP        TOP        BOTT       BOTT        MU          MAX. CAP.    MAX. CAP.      MU                      VU         VU
        +BEND      -BEND      +BEND      -BEND                     STEEL        CONC.                                LEFT      RIGHT
INV.   3713.61    3713.61    3713.61    3721.20        .00        2360.00          .00      3713.61                 870.00     870.00
OPER.  6189.35    6189.35    6189.35    6202.00        .00        2360.00          .00      6189.35                 870.00     870.00

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                              -- DEAD LOAD --
      M (DL)    M (SDL)      REDIS.    REDIS.       V (DL)     V (SDL)
                             M-(DL)--+-M-(SDL)
    -1611.39    -685.10    -1611.39   -655.10       55.44      27.92
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                                        DETAIL DATA AT MOMENT CHECK POINT FOR
                              COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97                                                                           D/P STRUCTURE I.D. = G65-005
                                                                                           MEMBER I.D. --      S 2
                                                                                           C.P. LOCATION --    2.00

                                                                                                               PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR =  .260 FOR +BEND AND =  .208 FOR -BEND)

                                             -- LIVE LOAD --
                      -------------TRUCK MOMENT------------   -------------LANE MOMENT------------ ----FIXED----   ------MAX------
      LIVE            REDIS  LL+IMP   LL      LOC.NO.  DIR   LL+IMP      LL     LOC.CONC. LOC.CONC.      SHEAR            SHEAR
      LOAD            LL+I                    1 WHEEL                           LOAD #1   LOAD #2    +V          -V    +V         -V
                     FT-KIPS FT-KIPS FT-KIPS    FT.          FT-KIPS  FT-KIPS     FT.       FT.     KIPS        KIPS  KIPS       KIPS

INV.   HS20 +BEND     .00    108.7    86.3  279.543   R       76.3     60.6   258.800      .000    5.77        3.98
            -BEND   1188.    852.5   706.0  194.033   R     1188.1    983.9   175.433    82.700    5.53        5.53
                                                                                                                  60.67       62.6
OPER.  HS20 +BEND     .00    108.7    86.3  279.543   R       76.3     60.6   258.800      .000    5.77        3.98
            -BEND   1188.    852.5   706.0  194.033   R     1188.1    983.9   175.433    82.700    5.53        5.53
                                                                                                                  60.67       62.6

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
               SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
      T 0       .000      .000     .000     .000     .000     .000
      E 1     -1.879    -5.739     .951     .000     .000     .000
      N 2     -3.652   -10.368    1.443     .000     .000     .000
      T 3     -5.209   -13.541    1.681     .000     .000     .000
      H 4     -6.444   -14.293    1.751     .000     .000     .000
        5     -7.251   -12.795    1.678     .000     .000     .000
      P 6     -7.520   -10.394    1.485     .000     .000     .000
      O 7     -7.145    -7.659    1.198     .000     .000     .000
      I 8     -6.019    -4.808     .838     .000     .000     .000
      N 9     -3.848    -2.108     .431     .000     .000     .000
      T 0       .000      .000     .000     .000     .000     .000

                                                                    AREA
                                                                   TOTALS
   POS AREA       .0        .0     77.2       .0       .0       .0    77.2
   NEG AREA    674.9     768.0       .0       .0       .0       .0  1443.0

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

      X-DIST (FT.)        .00        .00        .00  POS AREA =        .00
      Y-ORDINATE          .00        .00        .00
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                                     DETAIL DATA AT MOMENT CHECK POINT FOR
                          COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
    DATE  8/18/97
                                                                                    D/P STRUCTURE I.D. = G65-005
                                                                                    MEMBER I.D. --       S 2
                                                                                    C.P. LOCATION --     2.00

                                                                                                         PAGE 3


***** RATING FACTOR  *****
                   -- RATING FACTOR FOR MOMENT --
              AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MOMENT
              TOP      TOP      BOTT     BOTT          TOP              BOTT              RATING     SAFE
             +BEND    -BEND    +BEND    -BEND    +BEND   -BEND    +BEND   -BEND           VALUE      LOAD
                                                                                                  CAP.(TONS)
INV.   HS20  5079.5   2347.7   5079.5   2347.7   46.7110  1.9761  46.7110  1.9761       HS 39.5     71.1

OPER.  HS20  8465.8   3912.9   8465.8   3912.9   77.8516  3.2935  77.8516  3.2935       HS 65.9    118.6

                   -- RATING FACTOR FOR SERVICEABILITY --
              AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
              TOP      TOP      BOTT     BOTT          TOP              BOTT              RATING     SAFE
             +BEND    -BEND    +BEND    -BEND    +BEND   -BEND    +BEND   -BEND           VALUE      LOAD
                                                                                                  CAP.(TONS)
INV.   HS20  5952.2   3220.4   5952.2   3220.4   54.7363  2.7106  54.7363  2.7106

OPER.  HS20  9920.3   5367.4   9920.3   5367.4   91.2271  4.5177  91.2271  4.5177

                   -- RATING FACTOR FOR SHEAR --
             AVAILABLE CAPACITY (KIPS)                  RATING FACTOR - SHEAR               RATING     SAFE
               LEFT      RIGHT                           LEFT     RIGHT                    VALUE      LOAD

INV.   HS20    351.53    351.53                         5.6144   5.6144

OPER.  HS20    585.88    585.88                         9.3573   9.3573
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                                        DETAIL DATA AT MOMENT CHECK POINT FOR              BARS-PC RELEASE 5.5
                              COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97                                                                          D/P STRUCTURE I.D. = G65-005
                                                                                          MEMBER I.D. --       S 2
                                                                                          C.P. LOCATION -      2.50

                                                                                                                PAGE 1
***** SECTION PROPERTIES IN COMPOSITE RANGE  2 OF SPAN  2   ******

                             -- STRUCTURAL STEEL PROPERTIES --
      H      Twab   H/Twab    D    D/Twab   - B' (IN) -   - B'/t -     Lb ( FT )     Ry ( IN )     - Lb / Ry    HYBRID RATIO, R
    (IN.)   (IN.)           (IN.)            TOP    BOT   TOP    BOT   TOP    BOT   TOP    BOT     TOP    BOT    +BEND    -BEND
    37.75    .63     60.40  36.00   57.60   5.69   6.69   7.58   6.69  CONT  23.50  3.46   4.04     .00  69.78  1.0000   1.0000

                             -- COMPOSITE CONCRETE PROPERTIES --
    EFF.WIDTH   EFF.THICK.  VALUE   (AS)C    (DS)C  VALUE  VALUE   Act      Abf      Aw
      (IN.)       (IN.)       N    (SQ.IN.)  (IN.)    a      Y  (SQ.IN.) (SQ.IN.) (SQ.IN.)
      93.0         7.8        8       .00      .00   5.18    .0    9.00    14.00     22.50

                             -- SECTION PROPERTIES --         -------- SECTION MODULUS ---------   ---- PLASTIC SECTION MODULUS ----
               GROSS     NET AREA       IX         IX       C      TOP      TOP      BOTT      BOTT      TOP       TOP      BOTT      BOTT
               AREA    +BEND  -BEND    +BEND      -BEND   (BOT)   +BEND    -BEND    +BEND     -BEND     +BEND     -BEND+   +BEND     -BEND
               SQ.IN.  SQ.IN. SQ.IN.   IN.**4     IN.**4   IN.    IN.**3   IN.**3   IN.**3    IN.**3    IN.**3    IN.**3   IN.**3    IN.**3
    NON-COM    45.50   45.50  45.50   10069.2    10069.2  16.94    483.9    483.9    594.3     594.3    619.23    619.23   619.23    619.2
    COM(N=N)                          29883.1        .0   33.76   7485.2   2544.9    885.2     885.2
    COM(N=3N)                         21806.3        .0   27.00   2029.4   1179.0    807.5     807.5

                             -- ULTIMATE STRENGTH --
      Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
       STEEL     CONC.     REBAR     TOP      BOT     TOP    BOT        BOT          TOP         WEB
                                    FLANGE   FLANGE  FLANGE FLANGE     FLANGE       FLANGE
      36000.    4000.     40000.    10.83    10.83   11.60  11.60     36000.       36000.      36000.

***** SECTION QUALIFICATION *****
        STIFFENED   UNSTIFFENED  COMPACT    BRACED      UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
       LONG  TRANV                        NON-COMPACT  NON-COMPACT    FACTOR
    +BEND       X                             X                       1.0000                   X
    -BEND       X                             X                       1.0000                   X

***** SECTION CAPACITY *****
        +BEND        ML =        .00 FT-KIPS,   MR =       .00 FT-KIPS
        -BEND        ML =        .00 FT-KIPS,   MR =       .00 FT-KIPS
     ---- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ----     -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --   -- SHEAR CAPACITY (KIPS) --

          TOP        TOP       BOTT      BOTT        MU        MAX. CAP.    MAX. CAP.       MU                 VU       VU
         +BEND      -BEND     +BEND     -BEND                   STEEL        CONC.                           LEFT     RIGHT
    INV.  10364.15   670.04   1225.69    822.91        .00      619.23      7001.30     10364.15            469.80    469.80
    OPER. 17273.59  1116.73   2042.82   1371.51        .00      619.23      7001.30     17273.59            469.80    469.80

***** MOMENT (FT-KIPS) AND SHEAR (KIPS) *****
                             -- DEAD LOAD --
       M (DL)   M (SDL)     REDIS.   REDIS.     V (DL)    V (SDL)
                            M-(DL)---M-(SDL)
       -39.11    109.20     -39.11   109.20      13.47      5.03
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                                         DETAIL DATA AT MOMENT CHECK POINT FOR
                              COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97
                                                                                   D/P STRUCTURE I.D. = 065-005
                                                                                   MEMBER I.D. --       S 2
                                                                                   C.P. LOCATION --     2.50

                                                                                                        PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR =  .228 FOR +BEND AND =  .190 FOR -BEND)

                                        -- LIVE LOAD --
                   ---------------TRUCK MOMENT---------------  ---------------LANE MOMENT-------------  ------FIXED------  -------MAX-------
      LIVE          REDIS   LL+IMP   LL      LOC.NO.  DIR   LL+IMP     LL     LOC.CONC.  LOC.CONC.        SHEAR                SHEAR
      LOAD           LL+I                    1 WHEEL                           LOAD #1    LOAD #2     +V          -V      +V         -V
                   FT-KIPS FT-KIPS FT-KIPS     FT.          FT-KIPS  FT-KIPS     FT.        FT.      KIPS        KIPS    KIPS       KIPS

INV.   HS20 +BEND      .00   696.0   566.7  170.834   L     526.4    428.6   184.833       .000    5.63        3.77
            -BEND   202.21   157.5   132.4   96.316   R     202.2    169.9    82.700       .000    5.45        5.45
                                                                                                                     30.11      30.1
OPER.  HS20 +BEND      .00   696.0   566.7  170.834   L     526.4    428.6   184.833       .000    5.63        3.77
            -BEND   202.21   157.5   132.4   96.316   R     202.2    169.9    82.700       .000    5.45        5.45
                                                                                                                     30.11      30.1

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
               SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
         T 0      .000     .000     .000     .000     .000     .000
         E 1     -.533    1.239    -.586     .000     .000     .000
         N 2    -1.230    2.900   -1.040     .000     .000     .000
         T 3    -1.754    5.194   -1.211     .000     .000     .000
         H 4    -2.170    8.743   -1.262     .000     .000     .000
           5    -2.442   13.707   -1.209     .000     .000     .000
         P 6    -2.533    9.950   -1.071     .000     .000     .000
         O 7    -2.406    6.724    -.863     .000     .000     .000
         I 8    -2.027    3.891    -.604     .000     .000     .000
         N 9    -1.296    1.572    -.311     .000     .000     .000
         T 0      .000     .000     .000     .000     .000     .000

                                                                     AREA
                                                                    TOTALS
     POS AREA       .0    507.2       .0       .0       .0       .0   507.2
     NEG AREA    227.3       .0     55.7       .0       .0       .0   283.0

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

         X-DIST (FT.)        .00       .00       .00  POS AREA =        .00
         Y-ORDINATE          .00       .00       .00
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                                        DETAIL DATA AT MOMENT CHECK POINT FOR
                              COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
     DATE  8/18/97                                                                              D/P STRUCTURE I.D. = G65-005
                                                                                                MEMBER I.D. --       S 2
                                                                                                C.P. LOCATION --     2.50

                                                                                                                   PAGE 3

 *****  RATING FACTOR  *****
                                 -- RATING FACTOR FOR MOMENT --
                         AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MOMENT
                  TOP        TOP       BOTT      BOTT          TOP                  BOTT               RATING      SAFE
                 +BEND      -BEND     +BEND     -BEND     +BEND     -BEND     +BEND     -BEND          VALUE       LOAD
                                                                                                                 CAP.(TONS)
 INV.   HS20   10485.4      712.1    1188.8     865.0    15.0642   3.5216    1.7079    4.2776         HS 34.2      61.5

 OPER.  HS20   17475.7     1186.8    1981.4    1441.6    25.1070   5.8693    2.8466    7.1293         HS 56.9     102.5

                              -- RATING FACTOR FOR SERVICEABILITY --
                        AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
                  TOP        TOP       BOTT      BOTT          TOP                  BOTT               RATING      SAFE
                 +BEND      -BEND     +BEND     -BEND     +BEND     -BEND     +BEND     -BEND          VALUE       LOAD
                                                                                                                 CAP.(TONS)
 INV.   HS20   12921.0      869.6    1476.8    1058.4    18.5633   4.3003    2.1218    5.2340

 OPER.  HS20   21535.0     1449.3    2461.4    1763.9    30.9389   7.1672    3.5363    8.7233

                                    -- RATING FACTOR FOR SHEAR --
                    AVAILABLE CAPACITY (KIPS)                       RATING FACTOR - SHEAR                RATING      SAFE
                       LEFT      RIGHT                                LEFT      RIGHT                    VALUE       LOAD

 INV.   HS20         205.73     205.73                               6.8315    6.8315

 OPER.  HS20         342.88     342.88                              11.3858   11.3858
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                                    DETAIL DATA AT MOMENT CHECK POINT FOR                 BARS-PC RELEASE 5.5
                           COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97                                                                       D/P STRUCTURE I.D. = 065-005
                                                                                       MEMBER I.D. --       G 2
                                                                                       C.P. LOCATION -      3.00

                                                                                                           PAGE 1
*****  SECTION PROPERTIES IN COMPOSITE RANGE  1 OF SPAN  3   ******

                           -- STRUCTURAL STEEL PROPERTIES --
     H      Twab   H/Twab    D    D/Twab   - B' (IN) -    - B'/t -     Lb ( FT )    Ry ( IN )     - Lb / Ry    HYBRID RATIO, R
   (IN.)   (IN.)           (IN.)            TOP   BOT    TOP   BOT   TOP    BOT    TOP   BOT      TOP    BOT    +BEND   -BEND
   38.75    .63    62.00  36.00   57.60   6.69  6.69   4.86  4.86  CONT   23.50   4.04  4.04      .00  69.78  1.0000  1.0000

                           -- COMPOSITE CONCRETE PROPERTIES --
   EFF.WIDTH   EFF.THICK.  VALUE   (AS)C    (DS)C  VALUE  VALUE   Atf      Abf      Aw
     (IN.)       (IN.)       N    (SQ.IN.)  (IN.)    a      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
     93.0         7.8        8       .00      .00   6.94    .0    19.25    19.25    22.50

                           -- SECTION PROPERTIES --          --------- SECTION MODULUS ---------   ---- PLASTIC SECTION MODULUS ----
             GROSS     NET AREA        IX         IX       C       TOP       TOP      BOTT      BOTT      TOP       TOP      BOTT      BOTT
             AREA    +BEND  -BEND    +BEND      -BEND    (BOT)    +BEND     -BEND    +BEND     -BEND    +BEND     -BEND+    +BEND     -BEND
             SQ.IN.  SQ.IN. SQ.IN.   IN.**4     IN.**4    IN.     IN.**3    IN.**3   IN.**3    IN.**3   IN.**3    IN.**3    IN.**3    IN.**3
NON-COM      61.00   61.00  61.00   15881.9    15881.9   19.38    819.7     819.7    819.7     819.7    921.99    921.99    921.99    921.9
CON(N=N)                            15881.9         .0   19.38    819.7        .0    819.7     819.7
CON(N=3N)                           15881.9         .0   19.38    819.7        .0    819.7     819.7

                           -- ULTIMATE STRENGTH --
     Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)      -- YIELD STRESS, Fy (PSI) --
      STEEL     CONC.     REBAR     TOP     BOT     TOP     BOT          BOT          TOP         WEB
                                   FLANGE  FLANGE  FLANGE FLANGE        FLANGE       FLANGE
     36000.     4000.    60000.    10.83   10.83   11.60  11.60         36000.       36000.      36000.

*****  SECTION QUALIFICATION  *****
        STIFFENED    UNSTIFFENED  COMPACT    BRACED        UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
        LONG  TRANV                       NON-COMPACT   NON-COMPACT     FACTOR
+BEND         X                               X                         1.0000        X
-BEND         X                                             X           1.0000        X

*****  SECTION CAPACITY  *****
        +BEND         ML =        .00 FT-KIPS,   MR =        .00 FT-KIPS
        -BEND         ML =      24.32 FT-KIPS,   MR =  -1060.56 FT-KIPS,   M1/M2 =  -.0229       CB = 1.0
    --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---       -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --    -- SHEAR CAPACITY (KIPS) --

        TOP        TOP       BOTT       BOTT         MU          MAX. CAP.    MAX. CAP.      MU                      VU        VU
       +BEND      -BEND     +BEND      -BEND                      STEEL        CONC.                               LEFT     RIGHT
INV.   1134.98    1134.98   1134.98    1134.98       .00          921.99         .00       1134.98                  469.80    469.80
OPER.  1891.64    1891.64   1891.64    1891.64       .00          921.99         .00       1891.64                  469.80    469.80

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                           -- DEAD LOAD --
     M (DL)    M (SDL)      REDIS.    REDIS.      V (DL)      V (SDL)
                            M-(DL)    M-(SDL)
    -309.54    -192.27    -309.54   -192.27       33.02        19.97
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                                            DETAIL DATA AT MOMENT CHECK POINT FOR
                                 COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97                                                                      D/P STRUCTURE I.D. = G65-005
                                                                                      MEMBER I.D. --       S 2
                                                                                      C.P. LOCATION --     3.00
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***** LIVE LOAD CALCULATIONS (IMPACT FACTOR =  .190 FOR +BEND AND =  .243 FOR -BEND)

                                                    -- LIVE LOAD --
                            -------------TRUCK MOMENT-------------   -------------LANE MOMENT-------------  -----FIXED-----   ------MAX------
      LIVE                 REDIS   LL+IMP   LL      LOC.NO.  DIR.  LL+IMP     LL     LOC.CONC. LOC.CONC.       SHEAR            SHEAR
      LOAD                  LL+I                    1 WHEEL                          LOAD #1   LOAD #2     +V          -V    +V         -V
                          FT-KIPS FT-KIPS FT-KIPS    FT.          FT-KIPS  FT-KIPS     FT.       FT.      KIPS        KIPS  KIPS       KIPS

INV.    HS20 +BEND       .00    152.7    128.3   96.916    R     165.1    138.7    82.700       .000   9.80          .76
             -BEND    558.75    459.8    369.9  175.635    L     558.7    449.5   194.233    258.800  10.23        10.23
                                                                                                                           58.58      60.0
OPER.   HS20 +BEND       .00    152.7    128.3   96.916    R     165.1    138.7    82.700       .000   9.80          .76
             -BEND    558.75    459.8    369.9  175.635    L     558.7    449.5   194.233    258.800  10.23        10.23
                                                                                                                           58.58      60.0

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
                SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
      T 0       .000      .000      .000      .000      .000      .000
      E 1       .514    -1.184    -2.323      .000      .000      .000
      N 2      1.192    -2.633    -3.524      .000      .000      .000
      T 3      1.700    -4.271    -4.103      .000      .000      .000
      H 4      2.104    -5.821    -4.275      .000      .000      .000
        5      2.367    -6.791    -4.096      .000      .000      .000
      P 6      2.455    -7.226    -3.627      .000      .000      .000
      O 7      2.332    -7.094    -2.924      .000      .000      .000
      I 8      1.965    -6.211    -2.046      .000      .000      .000
      N 9      1.256    -4.148    -1.052      .000      .000      .000
      T 0       .000      .000      .000      .000      .000      .000

                                                                         AREA
                                                                        TOTALS
   POS AREA    220.3        .0        .0        .0        .0        .0   220.3
   NEG AREA       .0     426.6     188.6        .0        .0        .0   615.1

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

      X-DIST (FT.)          .00        .00        .00  POS AREA =         .00
      Y-ORDINATE            .00        .00        .00
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                                     DETAIL DATA AT MOMENT CHECK POINT FOR
                          COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97
                                                                              D/P STRUCTURE I.D. = 085-005
                                                                              MEMBER I.D. --       S 2
                                                                              C.P. LOCATION --     3.00

                                                                                                   PAGE 3


***** RATING FACTOR  *****
                     -- RATING FACTOR FOR MOMENT --
                 AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MOMENT
              TOP       TOP       BOTT      BOTT            TOP                 BOTT              RATING     SAFE
             +BEND     -BEND     +BEND     -BEND     +BEND    -BEND    +BEND    -BEND           VALUE      LOAD
                                                                                                         CAP.(TONS)
INV.   HS20  1436.1     833.9    1436.1     833.9    8.6980   1.4924   8.6980   1.4924          HS 29.8     53.7

OPER.  HS20  2393.4    1389.8    2393.4    1389.8   14.4966   2.4874  14.4966   2.4874          HS 49.7     89.5

                  -- RATING FACTOR FOR SERVICEABILITY --
                AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
              TOP       TOP       BOTT      BOTT            TOP                 BOTT              RATING     SAFE
             +BEND     -BEND     +BEND     -BEND     +BEND    -BEND    +BEND    -BEND           VALUE      LOAD
                                                                                                         CAP.(TONS)
INV.   HS20  1702.8    1100.6    1702.8    1100.6   10.3134   1.9698  10.3134   1.9698

OPER.  HS20  2838.0    1834.4    2838.0    1834.4   17.1891   3.2830  17.1891   3.2830

                       -- RATING FACTOR FOR SHEAR --
            AVAILABLE CAPACITY (KIPS)                      RATING FACTOR - SHEAR                  RATING     SAFE
                LEFT      RIGHT                               LEFT     RIGHT                      VALUE      LOAD

INV.   HS20     185.46    185.46                              3.0866   3.0866

OPER.  HS20     309.09    309.09                              5.1444   5.1444
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                                          DETAIL DATA AT MOMENT CHECK POINT FOR               BARS-PC RELEASE 5.5
                             COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97                                                                            D/P STRUCTURE I.D. = G65-005
                                                                                            MEMBER I.D. --        S 2
                                                                                            C.P. LOCATION -       3.60

                                                                                                                  PAGE 1
*****  SECTION PROPERTIES IN COMPOSITE RANGE  2 OF SPAN  3   ******

                                  -- STRUCTURAL STEEL PROPERTIES --
     H      Twab   H/Twab    D    D/Twab    - B' (IN) -     - B'/t -      Lb ( FT )    Ry ( IN )    - Lb / Ry    HYBRID RATIO, R
   (IN.)   (IN.)           (IN.)            TOP   BOT     TOP   BOT    TOP    BOT    TOP   BOT     TOP    BOT    +BEND   -BEND
   38.25    .63    61.20  36.00   57.60    5.69  6.69    5.69  5.35   CONT   22.47   3.46  4.04     .00  66.73  1.0000  1.0000

                                  -- COMPOSITE CONCRETE PROPERTIES --
   EFF.WIDTH   EFF.THICK.  VALUE    (AS)C    (DS)C  VALUE  VALUE    Atf       Abf        Aw
    (IN.)        (IN.)       N     (SQ.IN.)  (IN.)    a      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
    93.0          7.8        8        .00      .00   5.92    .0   12.00     17.50      22.50

                                  -- SECTION PROPERTIES --          -------- SECTION MODULUS --------   ---- PLASTIC SECTION MODULUS ----
          GROSS     NET AREA        IX        IX       C      TOP      TOP      BOTT     BOTT      TOP      TOP      BOTT     BOTT
          AREA    +BEND  -BEND     +BEND     -BEND   (BOT)   +BEND    -BEND    +BEND    -BEND    +BEND    -BEND+   +BEND    -BEND
          SQ.IN.  SQ.IN. SQ.IN.    IN.**4    IN.**4   IN.    IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3
NON-COM   52.00   52.00  52.00   12403.1   12403.1  17.25    590.7    590.7    719.0    719.0   741.94   741.94   741.94   741.9
COM(N=N)                         34291.0        .0  33.42   7097.5   2725.5   1026.1   1026.1
COM(N=3N)                        24931.0        .0  26.59   2137.5   1284.2    937.7    937.7

                                  -- ULTIMATE STRENGTH --
     Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)      -- YIELD STRESS, Fy (PSI) --
      STEEL     CONC.     REBAR     TOP     BOT    TOP     BOT        BOT         TOP         WEB
                                  FLANGE  FLANGE  FLANGE  FLANGE     FLANGE      FLANGE
     36000.    4000.     40000.   10.83   10.83   11.60   11.60      36000.      36000.      36000.

*****  SECTION QUALIFICATION  *****
        STIFFENED   UNSTIFFENED  COMPACT    BRACED      UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
       LONG  TRANV                       NON-COMPACT  NON-COMPACT    FACTOR
+BEND        X                               X                       1.0000                 X
-BEND        X                                           X           1.0000                 X

*****  SECTION CAPACITY  *****
        +BEND       ML =        .00 FT-KIPS,   MR =       .00 FT-KIPS
        -BEND       ML =      24.32 FT-KIPS,   MR =    342.30 FT-KIPS,    M1/M2 =   .0710        CB = 1.0
    --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---     -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --    -- SHEAR CAPACITY (KIPS) --

         TOP       TOP       BOTT      BOTT        MU          MAX. CAP.    MAX. CAP.     MU                      VU       VU
        +BEND     -BEND     +BEND     -BEND                     STEEL        CONC.                               LEFT     RIGHT
INV.    9827.29    817.83   1420.76    955.50        .00        741.94      6506.83     9827.29                 469.80   469.80
OPER.  16378.81   1363.06   2367.94   1659.16        .00        741.94      6506.83    16378.81                 469.80   469.80

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                                  -- DEAD LOAD --
     M (DL)    M (SDL)     REDIS.    REDIS.       V (DL)      V (SDL)
                          M-(DL)---M-(SDL)
     331.76     188.70     331.76    188.70       -1.06         -.43
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                                    DETAIL DATA AT MOMENT CHECK POINT FOR
                         COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
    DATE  8/18/97
                                                                                   D/P STRUCTURE I.D. = G55-005
                                                                                   MEMBER I.D. --        S 2
                                                                                   C.P. LOCATION --      3.60

                                                                                                         PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR =  .250 FOR +BEND AND =  .228 FOR -BEND)

                                          -- LIVE LOAD --
                  -------------TRUCK MOMENT------------  -------------LANE MOMENT--------------  -----FIXED-----  ------MAX------
        LIVE        REDIS   LL+IMP   LL     LOC.NO.  DIR   LL+IMP    LL    LOC.CONC. LOC.CONC.      SHEAR              SHEAR
        LOAD         LL+I                   1 WHEEL                         LOAD #1   LOAD #2    +V          -V    +V          -V
                   FT-KIPS FT-KIPS FT-KIPS    FT.          FT-KIPS FT-KIPS    FT.       FT.     KIPS        KIPS  KIPS        KIPS

INV.   HS20 +BEND     .00   758.9   602.4  286.283   R     582.2   462.1   272.283      .000  6.91       24.54
            -BEND  181.73   181.7   148.0  175.635   L     148.2   120.7   184.233      .000  6.74        6.74
                                                                                                              28.08      28.0
OPER.  HS20 +BEND     .00   758.9   602.4  286.283   R     582.2   462.1   272.283      .000  6.91       24.54
            -BEND  181.73   181.7   148.0  175.635   L     148.2   120.7   184.233      .000  6.74        6.74
                                                                                                              28.08      28.0

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
               SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
       T 0      .000      .000      .000      .000      .000      .000
       E 1      .245     -.474     1.768      .000      .000      .000
       N 2      .477    -1.053     3.984      .000      .000      .000
       T 3      .680    -1.708     6.449      .000      .000      .000
       H 4      .841    -2.328     9.077      .000      .000      .000
         5      .947    -2.717    11.845      .000      .000      .000
       P 6      .982    -2.890    14.729      .000      .000      .000
       O 7      .933    -2.828    10.965      .000      .000      .000
       I 8      .796    -2.484     7.271      .000      .000      .000
       N 9      .502    -1.659     3.624      .000      .000      .000
       T 0      .000      .000      .000      .000      .000      .000

                                                                AREA
                                                               TOTALS
     POS AREA    88.1        .0     470.0        .0        .0        .0    558.1
     NEG AREA      .0     170.6        .0        .0        .0        .0    170.6

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

       X-DIST (FT.)       .00          .00          .00  POS AREA =          .00
       Y-ORDINATE         .00          .00          .00
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                                        DETAIL DATA AT MOMENT CHECK POINT FOR
                              COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
      DATE  8/18/97
                                                                                      D/P STRUCTURE I.D. = G65-005
                                                                                      MEMBER I.D. --       B 2
                                                                                      C.P. LOCATION --     3.60

                                                                                                           PAGE 3


  *****  RATING FACTOR  *****
                         -- RATING FACTOR FOR MOMENT --
                    AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MOMENT
                TOP       TOP       BOTT      BOTT              TOP                 BOTT            RATING     SAFE
               +BEND     -BEND     +BEND     -BEND      +BEND     -BEND     +BEND     -BEND       VALUE      LOAD
                                                                                                           CAP.(TONS)
  INV.   HS20 111111.0   1130.1    1012.8    1307.8     6.9365    6.2186    1.3345    7.1962     HS 26.7     48.0

  OPER.  HS20 111111.0   1883.5    1688.0    2179.6    11.5608   10.3643    2.2242   11.9937     HS 44.5     80.1

                       -- RATING FACTOR FOR SERVICEABILITY --
                   AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
                TOP       TOP       BOTT      BOTT              TOP                 BOTT            RATING     SAFE
               +BEND     -BEND     +BEND     -BEND      +BEND     -BEND     +BEND     -BEND       VALUE      LOAD
                                                                                                           CAP.(TONS)
  INV.   HS20   9368.8   1322.3    1346.7    1541.7    12.3452    7.2761    1.7745    8.4835

  OPER.  HS20  15614.7   2203.8    2244.4    2569.5    20.5753   12.1269    2.9575   14.1392

                          -- RATING FACTOR FOR SHEAR --
                AVAILABLE CAPACITY (KIPS)                      RATING FACTOR - SHEAR                   RATING     SAFE
                  LEFT       RIGHT                               LEFT      RIGHT                        VALUE      LOAD

  INV.   HS20    215.94     217.73                              7.6899    7.6899

  OPER.  HS20    359.89     362.88                             12.8164   12.8164
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                                      DETAIL DATA AT MOMENT CHECK POINT FOR               BARS-PC RELEASE 5.5
                          COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97                                                                      D/P STRUCTURE I.D. = 065-005
                                                                                      MEMBER I.D. --        S 2
                                                                                      C.P. LOCATION -       4.00

                                                                                                          PAGE 1
*****  SECTION PROPERTIES IN COMPOSITE RANGE  2 OF SPAN  3   ******

                            -- STRUCTURAL STEEL PROPERTIES --
     H      Twab   H/Twab    D    D/Twab   - B' (IN) -    - B'/t -     Lb ( FT )    Ry ( IN )    - Lb / Ry    HYBRID RATIO, R
   (IN.)   (IN.)           (IN.)            TOP   BOT    TOP   BOT   TOP    BOT   TOP   BOT    TOP    BOT    +BEND   -BEND
   38.25    .63    61.20  36.00   57.50   5.69  5.69    5.69  5.55  CONT  22.47   9.46  4.04    .00  66.73  1.0000  1.0000

                            -- COMPOSITE CONCRETE PROPERTIES --
   EFF.WIDTH   EFF.THICK.  VALUE   (AS)C   (DS)C  VALUE  VALUE   AEF     ADI      AW
    (IN.)        (IN.)       N    (SQ.IN.) (IN.)    a      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
    93.0          7.8        8       .00     .00  5.92    .0   12.00   17.50    22.50

                            -- SECTION PROPERTIES --         --------- SECTION MODULUS ---------    ---- PLASTIC SECTION MODULUS ----
            GROSS     NET AREA        IX        IX       C       TOP     TOP      BOTT     BOTT     TOP      TOP      BOTT     BOTT
            AREA    +BEND  -BEND    +BEND     -BEND    (BOT)    +BEND   -BEND    +BEND    -BEND    +BEND    -BEND+   +BEND    -BEND
            SQ.IN.  SQ.IN. SQ.IN.   IN.**4    IN.**4    IN.     IN.**3  IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3
NON-COM     52.60   52.00  52.00   12403.1   12403.1   17.25    590.7   590.7    719.0    719.0   741.94   741.94   741.94   741.9
CON(N=N)                           34231.0        .0   33.42   7097.5  2725.5   1026.1   1026.1
CON(N=3N)                          24931.0        .0   26.59   2137.5  1284.2    937.7    937.7

                            -- ULTIMATE STRENGTH --
     Fy (PSI) F'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
      STEEL     CONC.     REBAR     TOP      BOT     TOP    BOT         BOT         TOP        WEB
                                  FLANGE   FLANGE FLANGE FLANGE       FLANGE      FLANGE
     36000.    4000.     40000.    10.83    10.83   11.60  11.60       36000.      36000.     36000.

*****  SECTION QUALIFICATION  *****
        STIFFENED   UNSTIFFENED  COMPACT    BRACED       UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
       LONG  TRANV                         NON-COMPACT  NON-COMPACT    FACTOR
+BEND        X                                X                         1.0000                   X
-BEND        X                                X                         1.0000                   X

*****  SECTION CAPACITY  *****
          +BEND        ML =        .00 FT-KIPS,   MR =       .00 FT-KIPS
          -BEND        ML =        .00 FT-KIPS,   MR =       .00 FT-KIPS
      --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---     -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --    -- SHEAR CAPACITY (KIPS) --

          TOP        TOP       BOTT       BOTT        MU          MAX. CAP.    MAX. CAP.     MU                       VU        VU
         +BEND      -BEND     +BEND      -BEND                     STEEL        CONC.                                LEFT     RIGHT
INV.    9827.29     817.83   1420.76     995.50       .00          741.94      6506.83     9827.29                  469.80    469.80
OPER. 16378.81     1363.06   2367.94    1659.16       .00          741.94      6506.83    16378.81                  469.80    469.80

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                            -- DEAD LOAD --
       M (DL)    M (SDL)      REDIS.   REDIS.      V (DL)     V (SDL)
                             M-(DL)-->M+(SDL)
         .00        .00        .00       .00      -23.54      -13.55
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                                              DETAIL DATA AT MOMENT CHECK POINT FOR          BARS RELEASE 5.5
                                              REINFORCED CONCRETE FLEXURAL MEMBER
   DATE 08/18/97                                                                             D/P STRUCTURE I.D.  G65-005
                                                                                             MEMBER I.D.--S03
                                                                                             C.P. LOCATION                 2.00
***** SECTION PROPERTIES IN RANGE  1 OF SPAN  2

        H        B        T        BP              AREA      IX      AS       D      ASP      DP      A      K      J
       IN.      IN.      IN.      IN.             SQ.IN.   IN**4   SQ.IN.    IN.   SQ.IN.    IN.    IN.
      24.00    22.00    12.00    22.00    +BEND   528.0   25344.0   2.00   22.50    6.03    2.00   1.00   .000   .000
                                          -BEND   528.0   25344.0   6.03   22.00    2.00    1.50   1.00   .000   .000

*****  INFLUENCE LINE (SIMPLE SPAN)                              *****  ALLOWABLE STRESS  *****  MONENT CAPACITY
                                                                          REINF.  CONC        CONC   REINF   REINF    CONC
      X-DIST (FT.)                               POS AREA =                STEEL            + BEND  - BEND  + BEND  - BEND
      Y-ORDINATE                                                           PSI      PSI    FT-KIPS  FT-KIPS FT-KIPS FT-KIPS
                                                                INVENTORY 20000.0  1600.0  131.8   368.8   131.8   368.8
*****  ORDINATES OF AND AREAS UNDER INFLUENCE LINE (CONTINUOUS SPAN)  OPERATING 28000.0  2200.0  131.8   368.8   131.8   368.8
                SPAN  1   SPAN  2   SPAN  3  SPAN  4  SPAN  5  SPAN  6     POST VEH1      .0      .0      .0      .0      .0      .0
      T 0        .000      .000      .000     .000     .000     .000       POST VEH2      .0      .0      .0      .0      .0      .0
      E 1      -1.310    -2.507      .241     .000     .000     .000       POST VEH3      .0      .0      .0      .0      .0      .0
      N 2      -2.553    -4.192      .407     .000     .000     .000       POST SPEC      .0      .0      .0      .0      .0      .0
      T 3      -3.623    -5.028      .504     .000     .000     .000
      H 4      -4.431    -5.178      .542     .000     .000     .000      *****  TOTAL DL          *****  AVAIL.CAPAC.FOR LL+IMPACT
        S      -4.890    -4.725      .530     .000     .000     .000             MOMENT EFFECT               TOP     TOP     BOT     BOT
      P 6      -4.915    -3.860      .474     .000     .000     .000                                        +BEND   -BEND   +BEND   -BEN
      O 7      -4.491    -2.778      .386     .000     .000     .000                FT-KIPS                 F-KPS   F-KPS   F-KPS   F-KP
      I 8      -3.572    -1.671      .271     .000     .000     .000                -123.3      INVENTORY   134.8    96.3   134.8    96.
      N 9      -2.058     -.712      .140     .000     .000     .000                            OPERATING   224.6   160.4   224.6   160.
      T 0        .000      .000      .000     .000     .000     .000   AREA                     VEH. 1        .0      .0      .0      .
                                                                     TOTALS                     VEH. 2        .0      .0      .0      .
   POS AREA        .0        .0      10.2       .0       .0       .0    10.2                    VEH. 3        .0      .0      .0      .
   NEG AREA     147.0     178.3        .0       .0       .0       .0   325.3                    SPECIAL       .0      .0      .0      .

*****  LIVE LOAD AND RATING CALCULATIONS (IMPACT FACTOR =  .300 FOR +BEND AND =  .282 FOR -BEND)
                    ---------TRUCK LOAD----------------   -------LANE LOAD-------
      LIVE         LL+IMP    LL      LOC.NO.  DIR   AXLE   LL+IMP    LL    LOC.CONC  LOC.CONC          RATING  SAFE LOAD  RATING
      LOAD                           1 WHEEL        SPACE                    LOAD     LOAD 2            FACT.   CAPACITY   VALUE
                  FT-KIPS FT-KIPS      FT.           FT.  FT-KIPS FT-KIPS     FT.       FT.                         TONS
   INV  HS20 +BEND    4.6     3.5   138.750   R      .0      2.9     2.2  116.000
             -BEND   55.6    43.3    89.250   R      .0     68.1    53.1   69.433    27.700            1.414      50.9   HS 28.3

   OPER HS20 +BEND    4.6     3.5   138.750   R      .0      2.9     2.2  116.000
             -BEND   55.6    43.3    89.250   R      .0     68.1    53.1   69.433    27.700            2.357      84.8   HS 47.1

   POST      +BEND     .0      .0      .000                                                           .000        .0
             -BEND     .0      .0      .000

   POST      +BEND     .0      .0      .000                                                           .000        .0
             -BEND     .0      .0      .000

   POST      +BEND     .0      .0      .000                                                           .000        .0
             -BEND     .0      .0      .000

   POST SPEC +BEND     .0      .0      .000                                                           .000        .0
             -BEND     .0      .0      .000
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                                             DETAIL DATA AT MOMENT CHECK POINT FOR          BARS RELEASE 5.5
                                             REINFORCED CONCRETE FLEXURAL MEMBER
   DATE 08/18/97                                                                            D/F STRUCTURE I.D.  G65-005
                                                                                            MEMBER I.D.--S03
                                                                                            C.P. LOCATION             2.50
***** SECTION PROPERTIES IN RANGE  3 OF SPAN  2

      H        B        T        SP               AREA      IX      AS       D      ASP      DP      A      X      J
      IN.      IN.      IN.      IN.              SQ.IN.    IN**4   SQ.IN.   IN.    SQ.IN.   IN.     IN.
    24.00    22.00     4.00     3.63      +BEND   280.6   15235.2   4.39    22.50    2.54    2.00    1.00   .000   .000
                                          -BEND   231.1   11093.8   2.54    22.00    4.39    1.50     .98   .000   .000

***** INFLUENCE LINE (SIMPLE SPAN)                                ***** ALLOWABLE STRESS  ***** MOMENT CAPACITY
                                                                          REINF.  CONC       CONC   REINF   REINF    CONC
    X-DIST (FT.)                              POS AREA =                  STEEL              + BEND  - BEND + BEND  - BEND
    Y-ORDINATE                                                            PSI     PSI    FT-KIPS  FT-KIPS FT-KIPS FT-KIPS
                                                              INVENTORY  20000.0  1600.0  271.0   155.8   271.0   155.8
***** ORDINATES OF AND AREAS UNDER INFLUENCE LINE (CONTINUOUS SPAN) OPERATING 28000.0  2200.0  271.0   155.8   271.0   155.8
           SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6   POST VEH1     .0      .0      .0      .0      .0      .0
    T 0     .000     .000     .000     .000     .000     .000     POST VEH2     .0      .0      .0      .0      .0      .0
    E 1    -.390     .893    -.266     .000     .000     .000     POST VEH3     .0      .0      .0      .0      .0      .0
    N 2    -.760    2.289    -.448     .000     .000     .000     POST SPEC     .0      .0      .0      .0      .0      .0
    T 3   -1.078    3.970    -.565     .000     .000     .000
    H 4   -1.318    6.059    -.597     .000     .000     .000     ***** TOTAL DL      ***** AVAIL.CAPAC.FOR LL+IMPACT
      5   -1.455    8.641    -.583     .000     .000     .000          MOMENT EFFECT              TOP     TOP     BOT     BOT
    P 6   -1.462    5.920    -.522     .000     .000     .000                                    +BEND   -BEND   +BEND   -BEN
    O 7   -1.336    3.732    -.424     .000     .000     .000              FT-KIPS               F-KPS   F-KPS   F-KPS   F-KP
    I 8   -1.063    2.023    -.298     .000     .000     .000               50.3      INVENTORY   94.9   102.1    94.9   102.
    N 9    -.612     .803    -.154     .000     .000     .000                         OPERATING  158.2   170.2   158.2   170.
    T 0     .000     .000     .000     .000     .000     .000   AREA                  VEH. 1       .0      .0      .0
                                                                TOTALS                VEH. 2       .0      .0      .0
  POS AREA    .0    200.3       .0       .0       .0       .0    200.3                VEH. 3       .0      .0      .0
  NEG AREA  43.7       .0     11.2       .0       .0       .0     55.0                SPECIAL      .0      .0      .0

***** LIVE LOAD AND RATING CALCULATIONS (IMPACT FACTOR =  .273 FOR +BEND AND =  .292 FOR -BEND)
                  -----------TRUCK LOAD-----------------  --------LANE LOAD-------
  LIVE          LL+IMP   LL    LOC.NO.  DIR   AXLE   LL+IMP    LL    LOC.CONC  LOC.CONC         RATING  SAFE LOAD  RATING
  LOAD                         1 WHEEL        SPACE                    LOAD      LOAD 2           FACT.   CAPACITY   VALUE
                FT-KIPS FT-KIPS  FT.           FT.   FT-KIPS FT-KIPS    FT.       FT.                        TONS
INV  HS20 +BEND   70.0   55.0   89.249   R      .0     49.3    38.8   75.250                    1.356      48.8   HS 27.1
          -BEND   15.4   11.9    4.456   L      .0     10.8     8.4   27.700      .000

OPER HS20 +BEND   70.0   55.0   89.249   R      .0     49.3    38.8   75.250                    2.259      81.3   HS 45.2
          -BEND   15.4   11.9    4.456   L      .0     10.8     8.4   27.700      .000

POST      +BEND     .0     .0     .000                                                           .000        .0
          -BEND     .0     .0     .000

POST      +BEND     .0     .0     .000                                                           .000        .0
          -BEND     .0     .0     .000

POST      +BEND     .0     .0     .000                                                           .000        .0
          -BEND     .0     .0     .000

POST SPEC +BEND     .0     .0     .000                                                           .000        .0
          -BEND     .0     .0     .000
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                                           DETAIL DATA AT MOMENT CHECK POINT FOR               BARS RELEASE 5.5
                                           REINFORCED CONCRETE FLEXURAL MEMBER
     DATE 08/18/97                                                                             D/P STRUCTURE I.D.: G65-005
                                                                                               MEMBER I.D.--S03
                                                                                               C.P. LOCATION                 3.00
***** SECTION PROPERTIES IN RANGE  1 OF SPAN  3

          H        N        T       BP                 AREA       IX       AS       D       ASP       DP       A       K       J
         IN.      IN.      IN.      IN.               SQ.IN.    IN**4   SQ.IN.     IN.    SQ.IN.     IN.     IN.
        24.00    22.00    12.00    22.00      +BEND    528.0   25344.0   2.00    22.50     5.07     2.00    1.00    .000    .000
                                              -BEND    528.0   25344.0   5.07    22.00     2.00     1.50    1.00    .000    .000

***** INFLUENCE LINE (SIMPLE SPAN)                                             ***** ALLOWABLE STRESS ***** MOMENT CAPACITY
                                                                                    REINF.  CONC      CONC   REINF   REINF    CONC
      X-DIST (FT.)                                   POS AREA =                     STEEL           + BEND  - BEND  + BEND  - BEND
      Y-ORDINATE                                                                     PSI     PSI    FT-KIPS FT-KIPS FT-KIPS FT-KIPS
                                                                           INVENTORY 20000.0  1600.0 131.8   314.0   131.8   314.0
***** ORDINATES OF AND AREAS UNDER INFLUENCE LINE (CONTINUOUS SPAN)       OPERATING 28000.0  2200.0 131.8   314.0   131.8   314.0
                  SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6     POST VEH1       .0       .0     .0      .0      .0      .0
        T 0        .000     .000     .000     .000     .000     .000      POST VEH2       .0       .0     .0      .0      .0      .0
        E 1        .530   -1.324    -.773     .000     .000     .000      POST VEH3       .0       .0     .0      .0      .0      .0
        N 2       1.034   -2.864   -1.302     .000     .000     .000      POST SPEC       .0       .0     .0      .0      .0      .0
        T 3       1.467   -4.483   -1.614     .000     .000     .000
        H 4       1.794   -5.970   -1.736     .000     .000     .000      ***** TOTAL DL         ***** AVAIL.CAPAC.FOR LL+IMPACT
          5       1.980   -7.077   -1.695     .000     .000     .000            MOMENT EFFECT                TOP     TOP     BOT     BOT
        P 6       1.990   -7.566   -1.519     .000     .000     .000                                        +BEND   -BEND   +BEND   -BEN
        O 7       1.818   -7.207   -1.234     .000     .000     .000               FT-KIPS                  F-KPS   F-KPS   F-KPS   F-KP
        I 8       1.446   -5.916    -.868     .000     .000     .000               -102.5     INVENTORY   122.3    83.4   122.3   83.
        N 9        .833   -3.498    -.448     .000     .000     .000                          OPERATING   203.9   139.0   203.9   139.
        T 0        .000     .000     .000     .000     .000     .000   AREA                   VEH. 1        .0      .0      .0     .
                                                                      TOTALS                  VEH. 2        .0      .0      .0     .
     POS AREA     59.5       .0       .0       .0       .0       .0     59.5                  VEH. 3        .0      .0      .0     .
     NEG AREA       .0    267.0     32.6       .0       .0       .0    299.7                  SPECIAL       .0      .0      .0     .

***** LIVE LOAD AND RATING CALCULATIONS (IMPACT FACTOR =  .292 FOR +BEND AND =  .296 FOR -BEND)
                     ---------TRUCK LOAD-----------------   -------LANE LOAD-------
      LIVE           LL+IMP    LL     LOC.NO.  DIR   AXLE   LL+IMP    LL    LOC.CONC  LOC.CONC          RATING  SAFE LOAD  RATING
      LOAD                             1 WHEEL       SPACE                    LOAD     LOAD 2            FACT.   CAPACITY   VALUE
                    FT-KIPS FT-KIPS     FT.           FT.  FT-KIPS FT-KIPS    FT.       FT.                        TONS
INV  HS20  +BEND     20.9    16.2     4.466    L      .0     13.0    10.1   27.700
           -BEND     82.7    63.8    61.248    L      .0     63.4    48.9   81.067   116.000          1.008       36.3   HS 20.2

OPER HS20  +BEND     20.9    16.2     4.466    L      .0     13.0    10.1   27.700
           -BEND     82.7    63.8    61.248    L      .0     63.4    48.9   81.067   116.000          1.681       60.5   HS 33.6

POST       +BEND       .0      .0      .000                                                            .000         .0
           -BEND       .0      .0      .000

POST       +BEND       .0      .0      .000                                                            .000         .0
           -BEND       .0      .0      .000

POST       +BEND       .0      .0      .000                                                            .000         .0
           -BEND       .0      .0      .000

POST SPEC  +BEND       .0      .0      .000                                                            .000         .0
           -BEND       .0      .0      .000
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                                              DETAIL DATA AT MOMENT CHECK POINT FOR              BARS RELEASE 5.5
                                              REINFORCED CONCRETE FLEXURAL MEMBER
   DATE 08/18/97                                                                                 D/P STRUCTURE I.D.  065-005
                                                                                                 MEMBER I.D.--003
                                                                                                 C.P. LOCATION           3.60
***** SECTION PROPERTIES IN RANGE  1 OF SPAN  3

       H        B        T       DP               AREA       IX       AS       D       ASP       DP       A       K       J
      IN.      IN.      IN.      IN.              SQ.IN.    IN**4   SQ.IN.    IN.    SQ.IN.     IN.      IN.
     24.00    22.00    12.00    22.00    +BEND    528.0   25344.0    2.00    22.50     5.07     2.00     3.00    .000    .000
                                         -BEND    528.0   25344.0    5.07    22.00     2.00     1.60     1.00    .000    .000

***** INFLUENCE LINE (SIMPLE SPAN)                               ***** ALLOWABLE STRESS ***** MOMENT CAPACITY
                                                                       REINF.   CONC        CONC    REINF   REINF    CONC
      X-DIST (FT.)                         POS AREA =                  STEEL              + BEND  - BEND  + BEND  - BEND
      Y-ORDINATE                                                       PSI      PSI       FT-KIPS FT-KIPS FT-KIPS FT-KIPS
                                                           INVENTORY  20000.0   1600.0   131.8    314.0   131.8   314.0
***** ORDINATES OF AND AREAS UNDER INFLUENCE LINE (CONTINUOUS SPAN)  OPERATING  28000.0   2200.0   131.8    314.0   131.8   314.0
             SPAN 1   SPAN 2   SPAN 3   SPAN 4   SPAN 5   SPAN 6   POST VEH1      .0       .0      .0       .0      .0      .0
      T 0     .000     .000     .000     .000     .000     .000    POST VEH2      .0       .0      .0       .0      .0      .0
      E 1     .213    -.530     .857     .000     .000     .000    POST VEH3      .0       .0      .0       .0      .0      .0
      N 2     .414   -1.145    1.813     .000     .000     .000    POST SPEC      .0       .0      .0       .0      .0      .0
      T 3     .587   -1.793    2.954     .000     .000     .000
      H 4     .718   -2.368    3.972     .000     .000     .000    ***** TOTAL DL        ***** AVAIL.CAPAC.FOR LL+IMPACT
        5     .792   -2.831    5.156     .000     .000     .000         MOMENT EFFECT               TOP     TOP     BOT     BOT
      P 6     .795   -3.026    6.332     .000     .000     .000                                    +BEND   -BEND   +BEND   -BEN
      O 7     .727   -2.683    4.756     .000     .000     .000            FT-KIPS                 F-KPS   F-KPS   F-KPS   F-KP
      I 8     .578   -2.357    3.153     .000     .000     .000              19.9    INVENTORY    48.9   156.9    48.9   156.
      N 9     .333   -1.399    1.571     .000     .000     .000                      OPERATING    81.4   261.5    81.4   261.
      T 0     .000     .000     .000     .000     .000     .000  AREA                VEH. 1         .0      .0      .0
                                                                 TOTALS              VEH. 2         .0      .0      .0
   POS AREA   23.8       .0     89.0       .0       .0       .0  112.8               VEH. 3         .0      .0      .0
   NEG AREA     .0    106.8       .0       .0       .0       .0  106.8               SPECIAL        .0      .0      .0

***** LIVE LOAD AND RATING CALCULATIONS (IMPACT FACTOR =  .300 FOR +BEND AND =  .273 FOR -BEND)
                   ----------TRUCK LOAD---------------   -------LANE LOAD-------
     LIVE         LL+IMP    LL     LOC.NO.  DIR  AXLE   LL+IMP    LL    LOC.CONC  LOC.CONC         RATING  SAFE LOAD  RATING
     LOAD                          1 WHEEL       SPACE                    LOAD     LOAD 2          FACT.   CAPACITY   VALUE
                 FT-KIPS FT-KIPS    FT.           FT.   FT-KIPS FT-KIPS    FT.       FT.                      TONS
INV  HS20 +BEND    41.9    32.3   135.832   R     .0     33.0    25.4   121.833                    1.165      41.9   HS 23.3
          -BEND    32.5    25.5    61.248   L     .0     21.3    16.7    81.067      .000

OPER HS20 +BEND    41.9    32.3   135.832   R     .0     33.0    25.4   121.833                    1.942      69.9   HS 38.8
          -BEND    32.5    25.5    61.248   L     .0     21.3    16.7    81.067      .000

POST      +BEND      .0      .0      .000                                                          .000        .0
          -BEND      .0      .0      .000

POST      +BEND      .0      .0      .000                                                          .000        .0
          -BEND      .0      .0      .000

POST      +BEND      .0      .0      .000                                                          .000        .0
          -BEND      .0      .0      .000

POST SPEC +BEND      .0      .0      .000                                                          .000        .0
          -BEND      .0      .0      .000
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                                                DETAIL DATA AT MOMENT CHECK POINT FOR          BARS RELEASE 5.5
                                                REINFORCED CONCRETE FLEXURAL MEMBER
   DATE 08/18/97                                                                               D/P STRUCTURE I.D.  G65-005
                                                                                               MEMBER I.D.--B03
                                                                                               C.P. LOCATION                 1.40
***** SECTION PROPERTIES IN RANGE  2 OF SPAN  1

       H        B        T       BP               AREA      IX        AS       D       ASP      DP      A      K      J
      IN.      IN.      IN.      IN.              SQ.IN.    IN**4     SQ.IN.   IN.     SQ.IN.   IN.     IN.
     24.00    22.00     4.00     9.63     +BEND   280.6    15235.2    4.39    22.50     1.93    2.00    1.00   .000   .000
                                          -BEND   231.1    11093.8    1.93    22.00     4.39    1.50     .98   .000   .000

***** INFLUENCE LINE (SIMPLE SPAN)                                ***** ALLOWABLE STRESS  ***** MOMENT CAPACITY
                                                                            REINF.   CONC        CONC    REINF   REINF    CONC
    X-DIST (FT.)                               POS AREA =                   STEEL               + BEND  - BEND  + BEND  - BEND
    Y-ORDINATE                                                              PSI      PSI       FT-KIPS  FT-KIPS FT-KIPS FT-KIPS
                                                                  INVENTORY 20000.0   1600.0   271.0    120.6   271.0   120.6
***** ORDINATES OF AND AREAS UNDER INFLUENCE LINE (CONTINUOUS SPAN) OPERATING 28000.0   2200.0   271.0    120.6   271.0   120.6
               SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6  POST VEH1        .0       .0      .0       .0      .0      .0
      T 0        .000     .000     .000     .000     .000     .000   POST VEH2        .0       .0      .0       .0      .0      .0
      E 1       2.246   -1.003     .097     .000     .000     .000   POST VEH3        .0       .0      .0       .0      .0      .0
      N 2       4.519   -1.677     .163     .000     .000     .000   POST SPEC        .0       .0      .0       .0      .0      .0
      T 3       6.861   -2.011     .202     .000     .000     .000
      H 4       9.308   -2.071     .217     .000     .000     .000   ***** TOTAL DL          ***** AVAIL.CAPAC.FOR LL+IMPACT
        5       7.277   -1.890     .212     .000     .000     .000       MOMENT EFFECT                TOP     TOP     BOT     BOT
      P 6       5.421   -1.544     .190     .000     .000     .000                                   +BEND   -BEND   +BEND   -BEN
      O 7       3.744   -1.111     .154     .000     .000     .000         FT-KIPS                   F-KPS   F-KPS   F-KPS   F-KP
      I 8       2.265    -.668     .108     .000     .000     .000           47.8      INVENTORY      96.4    84.3    96.4    84.
      N 9       1.023    -.285     .056     .000     .000     .000                     OPERATING     160.7   140.5   160.7   140.
      T 0        .000     .000     .000     .000     .000     .000  AREA               VEH. 1          .0      .0      .0      .
                                                                   TOTALS              VEH. 2          .0      .0      .0      .
   POS AREA     197.0       .0      4.1       .0       .0       .0   201.0             VEH. 3          .0      .0      .0      .
   NEG AREA        .0     71.3       .0       .0       .0       .0    71.3             SPECIAL         .0      .0      .0      .

***** LIVE LOAD AND RATING CALCULATIONS (IMPACT FACTOR =  .292 FOR +BEND AND =  .273 FOR -BEND)
                  ---------TRUCK LOAD---------------   -------LANE LOAD-------
     LIVE         LL+IMP    LL     LOC.NO.  DIR  AXLE   LL+IMP    LL    LOC.CONC  LOC.CONC          RATING  SAFE LOAD  RATING
     LOAD                          1 WHEEL       SPACE                   LOAD     LOAD 2            FACT.   CAPACITY   VALUE
                 FT-KIPS FT-KIPS     FT.          FT.  FT-KIPS FT-KIPS    FT.      FT.                        TONS
INV  HS20 +BEND    75.9    58.7     4.467   L     .0     51.8    40.1   18.467                      1.271      45.7   HS 25.4
          -BEND    22.1    17.3    89.250   R     .0     14.4    11.3   69.433     .000

OPER HS20 +BEND    75.9    58.7     4.467   L     .0     51.8    40.1   18.467                      2.118      76.2   HS 42.4
          -BEND    22.1    17.3    89.250   R     .0     14.4    11.3   69.433     .000

POST      +BEND      .0      .0      .000                                                           .000        .0
          -BEND      .0      .0      .000

POST      +BEND      .0      .0      .000                                                           .000        .0
          -BEND      .0      .0      .000

POST      +BEND      .0      .0      .000                                                           .000        .0
          +BEND      .0      .0      .000

POST SPEC +BEND      .0      .0      .000                                                           .000        .0
          -BEND      .0      .0      .000
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                                     DETAIL DATA AT MOMENT CHECK POINT FOR                BARS RELEASE 5.5
                                   COMPOSITE STEEL AND CONCRETE FLEXURAL MEMBER
     DATE 08/18/97                                                                        D/P STRUCTURE I.D.  G65-005
                                                                                          MEMBER I.D.--S02
                                                                                          C.P. LOCATION              4.00

***** SECTION PROPERTIES IN COMPOSITE RANGE    2OF SPAN   3
                              ---NET AREA---                              -----------SECTION  MODULUS-----------
                   GROSS      +       -          IX        IX       C       TOP       TOP      BOTTOM     BOTTOM    HYBRID  SECTI
              R    AREA     BEND    BEND       + BEND    - BEND   (BOT)   + BEND    - BEND   + BEND     - BEND     +BEND   -BEN
             IN.   SQ.IN.   SQ.IN.  SQ.IN.     IN**4     IN**4    IN.     IN**3     IN**3    IN**3      IN**3  R= 1.0000  1.00
NON-COM      .00    .00      .00     .00          .0        .0     .00       .0        .0       .0          .0 FY= 36000   .360
COM (N=N)                                    34291.0               33.42   7097.5             1026.1
COM (N=3N)                                   24931.0               26.59   2137.5              937.7
                        (AS)C =    .0 SQ. IN. , (DS)C =   .0 SQ. IN.BRACA LENGTH =      .00 ,TEAR =   .00
*****  INFLUENCE LINE (SIMPLE SPAN)                             *****  ULTIMATE STRENGTH *****  MOMENT CAPACITY
                                                                                      TOP     TOP    BOTTOM  BOTTOM
                                                                       M1/M2   M1/M2   + BEND  - BEND  + BEND  - BEND
                                                                        TOP    BOTTOM  FT-KIPS FT-KIPS FT-KIPS FT-KIPS
                                                            INVENTORY    1.0      .0
*****  ORDINATES OF AND AREAS UNDER INFLUENCE LINE (CONTINUOUS SPAN)  OPERATING    .0
             SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6   POST VEH1    .0
      T 0     .000     .000     .000     .000     .000     .000     POST VEH2    .0
      E 1     .000     .000     .000     .000     .000     .000     POST VEH3    .0
      N 2     .000     .000     .000     .000     .000     .000     POST SPEC    .0
      T 3     .000     .000     .000     .000     .000     .000
      H 4     .000     .000     .000     .000     .000     .000     *****  DL MOMENT          *****  AVAIL.CAPAC.FOR LL+IMPACT
        5     .000     .000     .000     .000     .000     .000              EFFECT                  TOP     TOP     BOT     BOT
      P 6     .000     .000     .000     .000     .000     .000          DL        SDL               +BEND   -BEND   +BEND   -BEN
      O 7     .000     .000     .000     .000     .000     .000       FT-KIPS   FT-KIPS              F-KPS   F-KPS   F-KPS   F-KP
      I 8     .000     .000     .000     .000     .000     .000            .0        .0 INVENTORY  9827.3 -1130.1  1420.8 -1307.
      N 9     .000     .000     .000     .000     .000     .000                         OPERATING 16378.8 -1883.5  2367.9 -2179.
      T 0     .000     .000     .000     .600     .000     .000   AREA                  VEH. 1       .0      .0      .0
                                                                 TOTALS                 VEH. 2       .0      .0      .0
  POS AREA      .0       .0       .0       .0       .0       .0      .0                 VEH. 3       .0      .0      .0
  NEG AREA      .0       .0       .0       .0       .0       .0      .0                 SPECIAL      .0      .0      .0

*****  LIVE LOAD AND RATING CALCULATIONS (IMPACT FACTOR =  .260 FOR +BEND AND =  .260 FOR -BEND)
                   ----------TRUCK LOAD-------------------  --------LANE LOAD-------
   LIVE          LL+IMP    LL     LOC.NO.  DIR   AXLE    LL+IMP    LL    LOC.CONC  LOC.CONC         RATING  SAFE LOAD  RATING
   LOAD                            1 WHEEL        SPACE                    LOAD     LOAD 2          FACT.   CAPACITY   VALUE
                FT-KIPS FT-KIPS     FT.            FT.   FT-KIPS FT-KIPS    FT.       FT.                     TONS
INV  HS20 +BEND     .0      .0   264.508   L      .0       .0      .0     .000                      3.433     123.6   HS 68.7
          -BEND     .0      .0      .000   L      .0       .0      .0     .000      .000

OPER HS20 +BEND     .0      .0   264.508   L      .0       .0      .0     .000                      5.721     206.0   HS114.4
          -BEND     .0      .0      .000   L      .0       .0      .0     .000      .000

POST      +BEND     .0      .0      .000                                                            .000        .0
          -BEND     .0      .0      .000

POST      +BEND     .0      .0      .000                                                            .000        .0
          -BEND     .0      .0      .000

POST      +BEND     .0      .0      .000                                                            .000        .0
          -BEND     .0      .0      .000

POST SPEC +BEND     .0      .0      .000                                                            .000        .0
          -BEND     .0      .0      .000
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                                             DETAIL DATA AT MOMENT CHECK POINT FOR             BARS-PC RELEASE 5.5
                                  COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97                                                                             D/P STRUCTURE I.D. = G55-005
                                                                                             MEMBER I.D. --       S 4
                                                                                             C.P. LOCATION -      1.40

                                                                                                                  PAGE 1
***** SECTION PROPERTIES IN COMPOSITE RANGE  1 OF SPAN  1   ******

                                  -- STRUCTURAL STEEL PROPERTIES --
     H      Twab   H/Twab    D    D/Twab   - B' (IN) -    - B'/t -     Lb ( FT )    Ry ( IN )     - Lb / Ry    HYBRID RATIO, R
   (IN.)   (IN.)           (IN.)            TOP    BOT    TOP    BOT   TOP    BOT    TOP   BOT     TOP    BOT     +BEND   -BEND
   26.92    .49    54.94  25.40   51.84    4.76   4.76   6.26   6.26  CONT   15.00   2.89  2.89     .00  78.98  1.0000  1.0000

                                  -- COMPOSITE CONCRETE PROPERTIES --
   EFF.WIDTH   EFF.THICK.  VALUE   (AS)C     (DS)C  VALUE  VALUE    Atf       Abf       Aw
     (IN.)        (IN.)      N    (SQ.IN.)   (IN.)    a      Y    (SQ.IN.) (SQ.IN.) (SQ.IN.)
     93.0         5.6        8       .00       .00   3.15    .0     7.60     7.60     12.45

                                  -- SECTION PROPERTIES --          -------- SECTION MODULUS --------    ---- PLASTIC SECTION MODULUS ----
             GROSS    NET AREA        IX        IX       C      TOP      TOP      BOTT     BOTT     TOP      TOP      BOTT     BOTT
             AREA   +BEND  -BEND    +BEND     -BEND    (BOT)   +BEND    -BEND    +BEND    -BEND    +BEND   -BEND+    +BEND    -BEND
             SQ.IN. SQ.IN. SQ.IN.   IN.**4    IN.**4   IN.     IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3
NON-COM      27.65  27.65  27.65    3270.4    3270.4   13.46    243.0    243.0    243.0    243.0   277.85   277.85   277.85   277.8
COM(N=N)                          10472.2        .0   26.82 108097.6  1334.6    390.4    390.4
COM(N=3N)                          7733.5        .0   21.83   1520.6   602.5    354.2    354.2

                                  -- ULTIMATE STRENGTH --
    Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
     STEEL     CONC.     REBAR     TOP     BOT    TOP    BOT          BOT           TOP          WEB
                                  FLANGE  FLANGE FLANGE FLANGE       FLANGE        FLANGE
    36000.     4000.     40000.   10.83   10.83   11.60  11.60       36000.        36000.       36000.

***** SECTION QUALIFICATION  *****
          STIFFENED  UNSTIFFENED  COMPACT    BRACED      UNBRACED    REDUCTION   SYMMETRICAL UNSYMMETRICAL
         LONG  TRANV                       NON-COMPACT  NON-COMPACT    FACTOR
+BEND                   X          X                                   1.0000                     X
-BEND                   X                                  X           1.0000       X

***** SECTION CAPACITY  *****
          +BEND        ML =        .00 FT-KIPS,   MR =       .00 FT-KIPS
          -BEND        ML =        .00 FT-KIPS,   MR =     38.85 FT-KIPS,   M1/M2 =  1.0000       CB = 1.0
     --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---     -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --   -- SHEAR CAPACITY (KIPS) --

          TOP        TOP        BOTT       BOTT       MU         MAX. CAP.    MAX. CAP.     MU                      VU       VU
         +BEND      -BEND      +BEND      -BEND                   STEEL        CONC.                               LEFT     RIGHT
INV.     751.66     336.42     751.66     336.42     833.54       277.85      1350.74     1628.59                  259.87    259.87
OPER.   1252.76     560.70    1252.76     560.70     833.54       277.85      1350.74     1628.59                  259.87    259.87

***** MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                                  -- DEAD LOAD --
        M (DL)    M (SDL)      REDIS.    REDIS.      V (DL)      V (SDL)
                               M-(DL)---M-(SDL)
         83.23     61.18        83.23     61.18       -.21          .32
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                                DETAIL DATA AT MOMENT CHECK POINT FOR
                     COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
  DATE  8/18/97
                                                                                   D/P STRUCTURE I.D. = G65-005
                                                                                   MEMBER I.D. --       S 4
                                                                                   C.P. LOCATION --     1.40

                                                                                                        PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR =  .300 FOR +BEND AND =  .300 FOR -BEND)

                                             -- LIVE LOAD --
                  --------------TRUCK MOMENT-------------   --------------LANE MOMENT-------------  -----FIXED-----   -------MAX-------
      LIVE          REDIS   LL+IMP   LL     LOC.NO.  DIR   LL+IMP     LL     LOC.CONC  LOC.CONC.        SHEAR            SHEAR
      LOAD          LL+I                    1 WHEEL                          LOAD #1   LOAD #2    +V          -V     +V          -V
                  FT-KIPS FT-KIPS FT-KIPS    FT.           FT-KIPS  FT-KIPS    FT.       FT.     KIPS        KIPS   KIPS        KIPS

INV.    HS20 +BEND  353.20   353.2   271.7    1.200   L     247.4    190.3    15.200      .000   5.11        8.26
             -BEND   77.68    77.7    59.8   73.600   R      49.2     37.8    53.200      .000   5.11        5.11
                                                                                                                 22.44       22.4
OPER.   HS20 +BEND  353.20   353.2   271.7    1.200   L     247.4    190.3    15.200      .000   5.11        8.26
             -BEND   77.68    77.7    59.8   73.600   R      49.2     37.8    53.200      .000   5.11        5.11
                                                                                                                 22.44       22.4

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
            SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
     T 0      .000     .000     .000     .000     .000     .000
     E 1     2.093    -.741     .125    -.040     .000     .000
     N 2     4.195   -1.113     .328    -.058     .000     .000
     T 3     6.316   -1.455     .379    -.065     .000     .000
     H 4     8.467   -1.500     .390    -.066     .000     .000
       5     6.858   -1.465     .361    -.063     .000     .000
     P 6     5.292   -1.192     .302    -.055     .000     .000
     O 7     3.707    -.906     .226    -.044     .000     .000
     I 8     2.349    -.586     .143    -.031     .000     .000
     N 9     1.036    -.271     .064    -.016     .000     .000
     T 0      .000     .000     .000     .000     .000     .000

                                                                AREA
                                                               TOTALS
   POS AREA   153.6       .0      9.0       .0       .0       .0   162.5
   NEG AREA      .0     35.2       .0      1.7       .0       .0    36.9

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

     X-DIST (FT.)        .00        .00        .00  POS AREA =        .00
     Y-ORDINATE          .00        .00        .00
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                                     DETAIL DATA AT MOMENT CHECK POINT FOR
                            COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
  DATE  8/18/97                                                                          D/P STRUCTURE I.D. = G65-005
                                                                                         MEMBER I.D. --       S 4
                                                                                         C.P. LOCATION --     1.40

                                                                                                              PAGE 3


***** RATING FACTOR  *****
                         -- RATING FACTOR FOR MOMENT --
                    AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MOMENT
                TOP        TOP       BOTT       BOTT            TOP                BOTT               RATING     SAFE
               +BEND      -BEND     +BEND      -BEND     +BEND     -BEND    +BEND     -BEND         VALUE      LOAD
                                                                                                             CAP.(TONS)
INV.   HS20    665.0      423.1      665.0      423.1    1.8828    5.4463   1.8828    5.4463

OPER.  HS20   1108.3      705.1     1108.3      705.1    3.1380    9.0772   3.1380    9.0772

                       -- RATING FACTOR FOR SERVICEABILITY --
                   AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
                TOP        TOP       BOTT       BOTT            TOP                BOTT               RATING     SAFE
               +BEND      -BEND     +BEND      -BEND     +BEND     -BEND    +BEND     -BEND         VALUE      LOAD
                                                                                                             CAP.(TONS)
INV.   HS20 160019.0      502.1      546.9      502.1  453.0490   6.4641   1.5484    6.4641        HS 31.0     55.7

OPER.  HS20 266698.3      836.9      911.5      836.9  755.0816  10.7735   2.5807   10.7735        HS 51.6     92.9

                            -- RATING FACTOR FOR SHEAR --
                AVAILABLE CAPACITY (KIPS)                    RATING FACTOR - SHEAR                   RATING     SAFE
                  LEFT      RIGHT                               LEFT     RIGHT                       VALUE      LOAD

INV.   HS20      119.87    119.87                              5.3426    5.3426

OPER.  HS20      199.78    199.78                              8.9043    8.9043
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                                   DETAIL DATA AT MOMENT CHECK POINT FOR                    BARS-PC RELEASE 5.5
                         COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
     DATE  6/16/97                                                                          D/F STRUCTURE I.D. = 065-005
                                                                                            MEMBER I.D. --       S 4
                                                                                            C.P. LOCATION -      9.00

                                                                                                                 PAGE 1
*****  SECTION PROPERTIES IN COMPOSITE RANGE  1 OF SPAN  2  ******

                              -- STRUCTURAL STEEL PROPERTIES --
     H      Tweb   H/Tweb    D     D/Tweb   - B' (IN) -   - B'/t -    Lb ( FT )    Ry ( IN )    - Lb / Ry    HYBRID RATIO, R
   (IN.)   (IN.)           (IN.)            TOP    BOT   TOP   BOT   TOP    BOT    TOP   BOT    TOP   BOT    +BEND   -BEND
   26.92    .49    54.94  25.40   51.84    4.75  4.76   6.26  6.26  CONT   19.00  2.89  2.89    .00  78.98  1.0000  1.0000

                              -- COMPOSITE CONCRETE PROPERTIES --
   EFF.WIDTH   EFF.THICK.  VALUE   (AS)C    (DS)C  VALUE  VALUE   Atf     Abf      Aw
    (IN.)       (IN.)        N    (SQ.IN.)  (IN.)    a      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
    93.0        7.8          8      .00      .00   3.15    .0    7.60     7.60    12.45

                              -- SECTION PROPERTIES --         -------- SECTION MODULUS --------    ---- PLASTIC SECTION MODULUS ----
           GROSS     NET AREA       IX        IX      C      TOP      TOP      BOTT     BOTT      TOP      TOP      BOTT     BOTT
           AREA    +BEND  -BEND    +BEND     -BEND  (BOT)   +BEND    -BEND    +BEND    -BEND     +BEND    -BEND+   +BEND    -BEND
           SQ.IN.  SQ.IN. SQ.IN.   IN.**4    IN.**4   IN.   IN.**3   IN.**3   IN.**3   IN.**3    IN.**3   IN.**3   IN.**3   IN.**3
NON-CON    27.65   27.65  27.65    3270.4    3270.4 13.46   243.0    243.0    243.0    243.0     277.85   277.85   277.85   277.8
COM(N=N)                           3270.4        .0 13.46   243.0       .0    243.0    243.0
CON(N=3N)                          3270.4        .0 13.46   243.0       .0    243.0    243.0

                              -- ULTIMATE STRENGTH --
   Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)      -- YIELD STRESS, Fy (PSI) --
    STEEL     CONC.     REBAR     TOP     BOT     TOP    BOT         BOT          TOP          WEB
                                 FLANGE  FLANGE  FLANGE FLANGE      FLANGE       FLANGE
   36000.     4000.    60000.    10.83   10.83   11.60  11.60       36000.       36000.       36000.

*****  SECTION QUALIFICATION  *****
       STIFFENED   UNSTIFFENED  COMPACT    BRACED       UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
       LONG  TRANV                       NON-COMPACT  NON-COMPACT     FACTOR
+BEND                  X          X                                   1.0000                    X
-BEND                  X                                  X           1.0000        X

*****  SECTION CAPACITY  *****
       +BEND        ML =        .00 FT-KIPS,    MR =        .00 FT-KIPS
       -BEND        ML =      12.48 FT-KIPS,    MR =    -376.60 FT-KIPS,    M1/M2 =  -.0331        CB = 1.0
    --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---      -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --   -- SHEAR CAPACITY (KIPS) --

        TOP        TOP        BOTT       BOTT        MU         MAX. CAP.     MAX. CAP.      MU              VU        VU
       +BEND      -BEND      +BEND      -BEND                    STEEL         CONC.                        LEFT      RIGHT
INV.    751.66     336.42     751.66     336.42     833.54       277.85       1350.74      1628.59          259.87    259.87
OPER.  1252.76     560.70    1252.76     560.70     833.54       277.85       1350.74      1628.59          259.87    259.87

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                              -- DEAD LOAD --
     M (DL)     M (SDL)      REDIS.     REDIS.       V (DL)      V (SDL)
                             M (DL) --- M (SDL)
    -115.83     -58.01      -115.83     -58.01       15.22        9.25
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                                    DETAIL DATA AT MOMENT CHECK POINT FOR
                       COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97
                                                                                    D/F STRUCTURE I.D. = G65-005
                                                                                    MEMBER I.D. --       S 4
                                                                                    C.P. LOCATION --     2.00

                                                                                                         PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR =  .300 FOR +BEND AND =  .300 FOR -BEND)

                                          -- LIVE LOAD --
                  -------------TRUCK MOMENT------------  -------------LANE MOMENT------------  -----FIXED-----   ------MAX------
       LIVE        REDIS   LL+IMP   LL     LOC.NO.  DIR  LL+IMP     LL    LOC.CONC. LOC.CONC.       SHEAR             SHEAR
       LOAD        LL+I                    1 WHEEL                         LOAD #1   LOAD #2    +V          -V     +V        -V
                  FT-KIPS FT-KIPS FT-KIPS    FT.          FT-KIPS  FT-KIPS    FT.       FT.     KIPS        KIPS   KIPS      KIPS

INV.   HS20 +BEND   50.12    50.1    38.6  111.600   R     31.0     23.9    91.200      .000  40.03        5.58
            -BEND  202.96   203.0   156.1   31.601   L    188.2    144.7    53.200    22.800  40.03       40.03
                                                                                                                 53.44      53.4
OPER.  HS20 +BEND   50.12    50.1    38.6  111.600   R     31.0     23.9    91.200      .000  40.03        5.58
            -BEND  202.96   203.0   156.1   31.601   L    188.2    144.7    53.200    22.800  40.03       40.03
                                                                                                                 53.44      53.4

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
               SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
       T 0      .000     .000     .000     .000     .000     .000
       E 1     -.469   -1.852     .489    -.101     .000     .000
       N 2     -.913   -3.032     .796    -.145     .000     .000
       T 3    -1.310   -3.637     .949    -.162     .000     .000
       H 4    -1.634   -3.764     .975    -.165     .000     .000
         5    -1.862   -3.513     .901    -.156     .000     .000
       P 6    -1.969   -2.980     .756    -.137     .000     .000
       O 7    -1.932   -2.265     .566    -.110     .000     .000
       I 8    -1.726   -1.464     .358    -.077     .000     .000
       N 9    -1.206    -.677     .160    -.039     .000     .000
       T 0      .000     .000     .000     .000     .000     .000

                                                                AREA
                                                               TOTALS
    POS AREA      .0       .0     22.6       .0       .0       .0    22.6
    NEG AREA    49.5     88.1       .0      4.2       .0       .0   141.7

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

       X-DIST (FT.)        .00        .00        .00  POS AREA =        .00
       Y-ORDINATE          .00        .00        .00
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                              DETAIL DATA AT MOMENT CHECK POINT FOR
                   COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97
                                                                           D/P STRUCTURE I.D. = 065-005
                                                                           MEMBER I.D. --       S 4
                                                                           C.P. LOCATION --     2.00

                                                                                                PAGE 3


***** RATING FACTOR *****
                        -- RATING FACTOR FOR MOMENT --
                  AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MONENT
              TOP      TOP      BOTT      BOTT            TOP             BOTT               RATING    SAFE
             +BEND    -BEND    +BEND     -BEND      +BEND    -BEND    +BEND    -BEND        VALUE     LOAD
                                                                                                   CAP.(TONS)
INV.   HS20   855.0    232.1    855.0     232.1    17.0773   1.1436  17.0773   1.1436      HS 22.9    41.2

OPER.  HS20  1426.6    386.9   1426.6     386.9    28.4621   1.9061  28.4621   1.9061      HS 38.1    68.6

                     -- RATING FACTOR FOR SERVICABILITY --
                 AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
              TOP      TOP      BOTT      BOTT            TOP             BOTT               RATING    SAFE
             +BEND    -BEND    +BEND     -BEND      +BEND    -BEND    +BEND    -BEND        VALUE     LOAD
                                                                                                   CAP.(TONS)
INV.   HS20   519.8    311.2    519.8     311.2    10.3702   1.5332  10.3702   1.5332

OPER.  HS20   866.3    518.6    866.3     518.6    17.2837   2.5553  17.2837   2.5553

                         -- RATING FACTOR FOR SHEAR --
              AVAILABLE CAPACITY (KIPS)                  RATING FACTOR - SHEAR               RATING    SAFE
                LEFT      RIGHT                            LEFT     RIGHT                    VALUE     LOAD

INV.   HS20    105.26    105.26                           1.9697   1.9697

OPER.  HS20    175.43    175.43                           3.2828   3.2828
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                                      DETAIL DATA AT MOMENT CHECK POINT FOR                BARS-PC RELEASE 5.5
                             COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
  DATE  8/18/97                                                                            D/P STRUCTURE I.D. = G65-003
                                                                                           MEMBER I.D. --       S 4
                                                                                           C.P. LOCATION -      2.50

                                                                                                                PAGE 1
***** SECTION PROPERTIES IN COMPOSITE RANGE  1 OF SPAN  2   ******

                            -- STRUCTURAL STEEL PROPERTIES --
    H      Twab   H/Twab    D    D/Twab   - B' (IN) -    - B'/t -     Lb ( FT )     Ry ( IN )    - Lb / Ry    HYBRID RATIO, R
  (IN.)   (IN.)           (IN.)            TOP    BOT    TOP    BOT   TOP    BOT     TOP   BOT     TOP    BOT    +BEND   -BEND
  25.92    .49    54.94  25.40   51.84    4.76   4.76   6.26   6.26  CONT   19.00   2.89  2.89     .00  78.98  1.0000  1.0000

                            -- COMPOSITE CONCRETE PROPERTIES --
  EFF.WIDTH   EFF.THICK.  VALUE    (AS)C     (DS)C  VALUE  VALUE   Atf       Abf       Aw
    (IN.)       (IN.)       N    (SQ.IN.)   (IN.)    m      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
    93.0         7.8        8       .00       .00   3.15    .0    7.60      7.60     12.45

                            -- SECTION PROPERTIES --           -------- SECTION MODULUS ---------   ---- PLASTIC SECTION MODULUS ----
            GROSS    NET AREA        IX        IX       C       TOP      TOP      BOTT     BOTT      TOP      TOP      BOTT     BOTT
            AREA   +BEND  -BEND    +BEND     -BEND    (BOT)    +BEND    -BEND    +BEND    -BEND    +BEND    -BEND+   +BEND    -BEND
            SQ.IN. SQ.IN. SQ.IN.   IN.**4    IN.**4    IN.     IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3
NON-COM     27.65  27.65  27.65    3270.4    3270.4   13.46    243.0    243.0    243.0    243.0   277.85   277.85   277.85   277.8
COM(N=N)                           3270.4        .0   13.46    243.0   2544.9    243.0    243.0
COM(N=3N)                          3270.4        .0   13.46    243.0   1379.0    243.0    243.0

                            -- ULTIMATE STRENGTH --
   Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
    STEEL     CONC.     REBAR     TOP     BOT     TOP    BOT         BOT          TOP        WEB
                                FLANGE  FLANGE  FLANGE FLANGE      FLANGE       FLANGE
   36000.     4000.    40000.   10.83   10.83   11.60  11.60       36000.       36000.     36000.

***** SECTION QUALIFICATION  *****
        STIFFENED   UNSTIFFENED  COMPACT    BRACED       UNBRACED    REDUCTION  SYMMETRICAL UNSYMMETRICAL
      LONG  TRANV                         NON-COMPACT  NON-COMPACT    FACTOR
+BEND                    X          X                                 1.0000                   X
-BEND                    X          X                                 1.0000         X

***** SECTION CAPACITY  *****
        +BEND       ML =        .00 FT-KIPS,   MR =       .00 FT-KIPS
        -BEND       ML =        .00 FT-KIPS,   MR =       .00 FT-KIPS
     --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---     -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --   -- SHEAR CAPACITY (KIPS) --

        TOP       TOP       BOTT      BOTT       MU       MAX. CAP.    MAX. CAP.      MU                  VU       VU
       +BEND     -BEND     +BEND     -BEND                  STEEL        CONC.                           LEFT     RIGHT
INV.    751.66    384.71    751.66    336.42    833.54     277.85      1350.74     1628.59               259.87   259.87
OPER.  1252.76    641.19   1252.76    560.70    833.54     277.85      1350.74     1628.59               259.87   259.87

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                            -- DEAD LOAD --
     M (DL)    M (SDL)     REDIS.    REDIS.     V (DL)     V (SDL)
                           M-(DL)---M-(SDL)
      38.44     29.89       38.44     29.89       1.02        .00
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                                         DETAIL DATA AT MOMENT CHECK POINT FOR
                              COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
    DATE  8/18/97                                                                     D/F STRUCTURE I.D. = 065-005
                                                                                      MEMBER I.D. --        S 4
                                                                                      C.P. LOCATION --      2.50

                                                                                                            PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR =  .300 FOR +BEND AND =  .300 FOR -BEND)

                                              -- LIVE LOAD --
                  -------------TRUCK MOMENT------------   -------------LANE MOMENT------------   -----FIXED-----   ------MAX------
        LIVE          REDIS   LL+IMP   LL      LOC.NO.  DIR   LL+IMP      LL     LOC.CONC. LOC.CONC.      SHEAR                SHEAR
        LOAD           LL+I                    1-WHEEL                            LOAD #1   LOAD #2    +V          -V     +V         -V
                      FT-KIPS FT-KIPS FT-KIPS    FT.          FT-KIPS  FT-KIPS      FT.        FT.     KIPS        KIPS   KIPS       KIPS

INV.   HS20 +BEND  234.41   234.4   180.3   70.999   R     174.9     134.5    57.000       .000   5.58      16.97
            -BEND   55.85    55.8    43.0  111.600   R      45.9      35.3    91.200       .000   5.58       5.58
                                                                                                                  18.50      18.5
OPER.  HS20 +BEND  234.41   234.4   180.3   70.999   R     174.9     134.5    57.000       .000   5.58      16.97
            -BEND   55.85    55.8    43.0  111.600   R      45.9      35.3    91.200       .000   5.58       5.58
                                                                                                                  18.50      18.5

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
                SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
        T 0      .000     .000     .000     .000     .000     .000
        E 1     -.171     .715    -.544     .113     .000     .000
        N 2     -.333    1.706    -.887     .161     .000     .000
        T 3     -.477    2.969   -1.057     .181     .000     .000
        H 4     -.595    4.498   -1.086     .184     .000     .000
          5     -.679    6.289   -1.004     .174     .000     .000
        P 6     -.718    4.537    -.842     .153     .000     .000
        O 7     -.704    3.036    -.630     .122     .000     .000
        I 8     -.629    1.789    -.399     .085     .000     .000
        N 9     -.440     .773    -.179     .044     .000     .000
        T 0      .000     .000     .000     .000     .000     .000

                                                                     AREA
                                                                    TOTALS
     POS AREA      .0    100.0      .0      4.6      .0       .0     104.6
     NEG AREA    18.0       .0    25.2       .0      .0       .0      43.2

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

        X-DIST (FT.)        .00      .00      .00  POS AREA =       .00
        Y-ORDINATE          .00      .00      .00
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                                         DETAIL DATA AT MOMENT CHECK POINT FOR
                             COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97
                                                                                     D/P STRUCTURE I.D. = G65-005
                                                                                     MEMBER I.D. --      S 4
                                                                                     C.P. LOCATION --    2.50

                                                                                                         PAGE 3


***** RATING FACTOR  *****
                        -- RATING FACTOR FOR MOMENT --
                  AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR - MOMENT
             TOP      TOP      BOTT     BOTT          TOP             BOTT            RATING     SAFE
             +BEND    -BEND    +BEND    -BEND    +BEND   -BEND   +BEND   -BEND        VALUE      LOAD
                                                                                               CAP.(TONS)
INV.  HS20   710.7    425.7    710.7    425.7    3.0316  7.6228  3.0316  7.6228

OPER. HS20   1184.4   709.5    1184.4   709.5    5.0527  12.7047 5.0527  12.7047

                      -- RATING FACTOR FOR SERVICEABILITY --
                 AVAILABLE (LL+I) CAPACITY (FT-KIPS)  RATING FACTOR -SERVICEABILITY
             TOP      TOP      BOTT     BOTT          TOP             BOTT            RATING     SAFE
             +BEND    -BEND    +BEND    -BEND    +BEND   -BEND   +BEND   -BEND        VALUE      LOAD
                                                                                               CAP.(TONS)
INV.  HS20   374.5    516.1    374.5    516.1    1.5975  9.2416  1.5975  9.2416      HS 32.0     57.5

OPER. HS20   624.1    860.2    624.1    860.2    2.6625  15.4027 2.6625  15.4027     HS 53.3     95.9

                          -- RATING FACTOR FOR SHEAR --
             AVAILABLE CAPACITY (KIPS)                     RATING FACTOR - SHEAR                RATING     SAFE
               LEFT     RIGHT                                 LEFT    RIGHT                     VALUE      LOAD

INV.  HS20     119.33   119.33                                6.4500  6.4500

OPER. HS20     198.89   198.89                                10.7500 10.7500
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                                        DETAIL DATA AT MOMENT CHECK POINT FOR              BARS-PC RELEASE 5.5
                              COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
     DATE  8/18/97                                                                       D/P STRUCTURE I.D. = 065-005
                                                                                         MEMBER I.D. --       G 4
                                                                                         C.P. LOCATION -      3.00

                                                                                                              PAGE 1
*****  SECTION PROPERTIES IN COMPOSITE RANGE  1 OF SPAN  2  ******

                             -- STRUCTURAL STEEL PROPERTIES --
      H      Twab    H/Twab    D    D/Twab   - B' (IN) -   - B'/t -     Lb ( FT )     Ry ( IN )     - Lb / Ry    HYBRID RATIO, R
    (IN.)   (IN.)            (IN.)            TOP   BOT    TOP   BOT   TOP    BOT    TOP   BOT     TOP    BOT    +BEND   -BEND
    26.92    .49     54.94  25.40   51.84    4.76  4.76    6.26  6.26  CONT   19.00  2.89  2.89     .00  78.93  1.0000  1.0000

                             -- COMPOSITE CONCRETE PROPERTIES --
    EFF.WIDTH   EFF.THICK.  VALUE   (AS)C    (DS)C  VALUE  VALUE   Atf      Abf       AW
      (IN.)       (IN.)       N    (SQ.IN.)  (IN.)    a      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
     93.0         7.8         8       .00      .00   3.15    .0    7.60     7.60    12.45

                             -- SECTION PROPERTIES --        --------- SECTION MODULUS ---------   ---- PLASTIC SECTION MODULUS ----
           GROSS     NET AREA        IX        IX       C      TOP      TOP      BOTT      BOTT      TOP       TOP      BOTT      BOTT
           AREA    +BEND  -BEND    +BEND     -BEND    (BOT)   +BEND    -BEND    +BEND     -BEND     +BEND     -BEND+   +BEND     -BEND
           SQ.IN.  SQ.IN. SQ.IN.   IN.**4    IN.**4    IN.    IN.**3   IN.**3   IN.**3    IN.**3    IN.**3    IN.**3   IN.**3    IN.**3
NON-COM    27.65   27.65  27.65    3270.4    3270.4   13.46   243.0    243.0    243.0     243.0    277.85    277.85   277.85    277.8
COM(N=N)                           3270.4        .0   13.46   243.0       .0    243.0     243.0
COM(N=3N)                          3270.4        .0   13.46   243.0       .0    243.0     243.0

                             -- ULTIMATE STRENGTH --
     Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
      STEEL     CONC.     REBAR     TOP     BOT     TOP     BOT        BOT          TOP         WEB
                                   FLANGE  FLANGE  FLANGE FLANGE      FLANGE       FLANGE
     36000.    4000.     40000.    10.83   10.83   11.60   11.60      36000.       36000.      36000.

*****  SECTION QUALIFICATION  ******
        STIFFENED   UNSTIFFENED  COMPACT    BRACED       UNBRACED      REDUCTION   SYMMETRICAL UNSYMMETRICAL
        LONG  TRANV                        NON-COMPACT  NON-COMPACT     FACTOR
+BEND                    X          X                                   1.0000                     X
-BEND                    X                                 X            1.0000          X

*****  SECTION CAPACITY  *****
        +BEND        ML =        .00 FT-KIPS,   MR =       .00 FT-KIPS
        -BEND        ML =      12.48 FT-KIPS,   MR =   -335.65 FT-KIPS,   M1/M2 = -.0372        CB = 1.0
     --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---      -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --    -- SHEAR CAPACITY (KIPS) --

         TOP        TOP        BOTT       BOTT        MU         MAX. CAP.     MAX. CAP.      MU                   VU        VU
        +BEND      -BEND      +BEND      -BEND                    STEEL         CONC.                              LEFT      RIGHT
INV.    751.56     336.42     751.56     336.42     833.54       277.85       1350.74      1628.59               259.87    259.87
OPER.  1252.76     560.70    1252.76     560.70     833.54       277.85       1350.74      1628.59               259.87    259.87

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                            -- DEAD LOAD --
     M (DL)    M (SDL)     REDIS.    REDIS.     V (DL)     V (SDL)
                           M-(DL)---M-(SDL)
     -77.22    -58.02      -77.22    -58.02     13.19       9.25
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                              DETAIL DATA AT MOMENT CHECK POINT FOR
                     COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97
                                                                              D/P STRUCTURE I.D. = G65-005
                                                                              MEMBER I.D. --         S 4
                                                                              C.P. LOCATION --       3.00

                                                                                                   PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR =  .300 FOR +BEND AND =  .300 FOR -BEND)

                                          -- LIVE LOAD --
                     -------------TRUCK MOMENT------------   -------------LANE MOMENT-------------  -----FIXED-----   ------MAX------
        LIVE          REDIS   LL+IMP   LL     LOC.NO.  DIR  LL+IMP     LL     LOC.CONC. LOC.CONC.      SHEAR            SHEAR
        LOAD           LL+I                   1 WHEEL                          LOAD #1   LOAD #2   +V         -V    +V        -V
                     FT-KIPS FT-KIPS FT-KIPS    FT.         FT-KIPS  FT-KIPS     FT.       FT.    KIPS       KIPS  KIPS      KIPS

INV.   HS20 +BEND   29.35     29.3    22.6  149.600   R     26.1     20.0   129.200      .000   1.60       3.62
            -BEND  200.41    176.7   135.9   82.400   R    200.4    154.2    91.200    60.800   1.60       1.60
                                                                                                               52.35     52.3
OPER.  HS20 +BEND   29.35     29.3    22.6  149.600   R     26.1     20.0   129.200      .000   1.60       3.62
            -BEND  200.41    176.7   135.9   82.400   R    200.4    154.2    91.200    60.800   1.60       1.60
                                                                                                               52.35     52.3

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
                 SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
        T 0       .000    -.000     .000     .000     .000     .000
        E 1       .127    -.517   -1.578     .327     .000     .000
        N 2       .247   -1.155   -2.569     .468     .000     .000
        T 3       .355   -1.826   -3.062     .524     .000     .000
        H 4       .443   -2.440   -3.147     .534     .000     .000
          5       .504   -2.910   -2.910     .504     .000     .000
        P 6       .534   -3.147   -2.440     .443     .000     .000
        O 7       .524   -3.062   -1.826     .355     .000     .000
        I 8       .468   -2.569   -1.155     .247     .000     .000
        N 9       .327   -1.577    -.517     .127     .000     .000
        T 0       .000     .000     .000     .000     .000     .000

                                                                      AREA
                                                                     TOTALS
      POS AREA    13.4       .0       .0     13.4       .0       .0    26.8
      NEG AREA      .0     73.0     73.0       .0       .0       .0   145.9

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

        X-DIST (FT.)        .00        .00        .00  POS AREA =        .00
        Y-ORDINATE          .00        .00        .00
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                              DETAIL DATA AT MOMENT CHECK POINT FOR
                    COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/26/97                                                             D/P STRUCTURE I.D. = G65-005
                                                                             MEMBER I.D. --       G 4
                                                                             C.P. LOCATION --     3.00

                                                                                                  PAGE 3


*****  RATING FACTOR  *****
                     -- RATING FACTOR FOR MOMENT --
             AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MOMENT
                TOP       TOP      BOTT      BOTT          TOP               BOTT               RATING     SAFE
               +BEND     -BEND    +BEND     -BEND     +BEND    -BEND    +BEND    -BEND          VALUE      LOAD
                                                                                                         CAP.(TONS)
INV.   HS20    832.8     255.3    832.8     255.3    28.3780  1.2738  28.3780  1.2738          HS 25.5     45.9

OPER.  HS20   1388.0     425.5   1388.0     425.5    47.2967  2.1229  47.2967  2.1229          HS 42.5     76.4

                   -- RATING FACTOR FOR SERVICEABILITY --
             AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
               TOP       TOP      BOTT      BOTT          TOP               BOTT               RATING     SAFE
              +BEND     -BEND    +BEND     -BEND     +BEND    -BEND    +BEND    -BEND          VALUE      LOAD
                                                                                                         CAP.(TONS)
INV.   HS20    496.6     334.3    496.6     334.3    16.9226  1.6682  16.9226  1.6682

OPER.  HS20    827.7     557.2    827.7     557.2    28.2044  2.7804  28.2044  2.7804

                     -- RATING FACTOR FOR SHEAR --
             AVAILABLE CAPACITY (KIPS)                  RATING FACTOR - SHEAR               RATING     SAFE
               LEFT      RIGHT                          LEFT     RIGHT                      VALUE      LOAD

INV.   HS20    106.47    106.47                        2.0338   2.0338

OPER.  HS20    177.46    177.46                        3.3897   3.3897
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                                  DETAIL DATA AT MOMENT CHECK POINT FOR                BARS-PC RELEASE 5.5
                          COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97                                                                       D/P STRUCTURE I.D. = 065-005
                                                                                       MEMBER I.D. --      8 5
                                                                                       C.P. LOCATION -     1.40

                                                                                                           PAGE 1
*****  SECTION PROPERTIES IN COMPOSITE RANGE  1 OF SPAN  1    ******

                                 -- STRUCTURAL STEEL PROPERTIES --
      H      Twab   H/Twab    D     D/Twab    - B' (IN) -     - B'/t -     Lb ( FT )     Ry ( IN )     - Lb / Ry    HYBRID RATIO, R
    (IN.)   (IN.)           (IN.)             TOP   BOT     TOP    BOT   TOP     BOT    TOP   BOT     TOP    BOT    +BEND   -BEND
    26.92    .49    54.94  25.40   51.84    4.76  4.76     6.26   6.26  CONT    19.00   2.89  2.89     .00  78.98  1.0000  1.0000

                                 -- COMPOSITE CONCRETE PROPERTIES --
    EFF.WIDTH   EFF.THICK.  VALUE   (AS)C    (DS)C  VALUE  VALUE   Atf       Abf       Aw
      (IN.)       (IN.)       N    (SQ.IN.)  (IN.)    a      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
      93.0         5.6        8       .00      .00   3.15    .0    7.60      7.60     12.45

                                 -- SECTION PROPERTIES --         -------- SECTION MODULUS --------    ---- PLASTIC SECTION MODULUS ----
            GROSS     NET AREA        IX         IX       C      TOP      TOP      BOTT     BOTT     TOP      TOP      BOTT     BOTT
            AREA    +BEND  -BEND    +BEND      -BEND    (BOT)   +BEND    -BEND    +BEND    -BEND    +BEND    -BEND+   +BEND    -BEND
            SQ.IN.  SQ.IN. SQ.IN.   IN.**4     IN.**4    IN.    IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3
NON-COM     27.65   27.65  27.65    3270.4     3270.4   13.46    243.0    243.0    243.0    243.0   277.85   277.85   277.85   277.8
COM(N=N)                           10472.2         .0   26.82 108097.6   1334.6    390.4    390.4
COM(N=3N)                           7733.5         .0   21.83   1520.6    602.5    354.2    354.2

                                 -- ULTIMATE STRENGTH --
     Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
      STEEL     CONC.     REBAR    TOP      BOT     TOP    BOT         BOT           TOP          WEB
                                   FLANGE  FLANGE  FLANGE FLANGE      FLANGE        FLANGE
     36000.     4000.     40000.   10.83    10.83   11.60  11.60      36000.        36000.       36000.

*****  SECTION QUALIFICATION  *****
          STIFFENED   UNSTIFFENED  COMPACT    BRACED       UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
        LONG  TRANV                         NON-COMPACT  NON-COMPACT     FACTOR
+BEND                      X          X                                  1.0000                    X
-BEND                      X                                  X          1.0000         X

*****  SECTION CAPACITY  *****
          +BEND        ML =         .00 FT-KIPS,    MR =       .00 FT-KIPS
          -BEND        ML =         .00 FT-KIPS,    MR =     39.33 FT-KIPS,    M1/M2 =  1.0000       CB = 1.0
     --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---     -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --   -- SHEAR CAPACITY (KIPS) --

          TOP        TOP        BOTT       BOTT       MU        MAX. CAP.     MAX. CAP.      MU                  VU        VU
         +BEND      -BEND      +BEND      -BEND                   STEEL         CONC.                            LEFT      RIGHT
INV.     751.66     336.42     751.66     336.42     833.54      277.85       1350.74      1628.59              259.87    259.87
OPER.   1252.76     560.70    1252.76     560.70     833.54      277.85       1350.74      1628.59              259.87    259.87

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                                  -- DEAD LOAD --
       M (DL)     M (SDL)      REDIS.    REDIS.       V (DL)      V (SDL)
                               M-(DL)---M-(SDL)
        83.83      61.18        83.83     61.18        -.17          .32
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                                      DETAIL DATA AT MOMENT CHECK POINT FOR
                           COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97                                                                     D/F STRUCTURE I.D. = G55-005
                                                                                     MEMBER I.D. --        S 5
                                                                                     C.P. LOCATION --      1.40

                                                                                                         PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR =  .300 FOR +BEND AND =  .300 FOR -BEND)

                                               -- LIVE LOAD --
                  -------------TRUCK MOMENT------------   -------------LANE MOMENT-------------  -----FIXED-----   ------MAX------
      LIVE          REDIS   LL+IMP   LL    LOC.NO.  DIR   LL+IMP    LL    LOC.CONC. LOC.CONC.       SHEAR              SHEAR
      LOAD           LL+I                  1 WHEEL                         LOAD #1   LOAD #2    +V          -V    +V        -V
                  FT-KIPS FT-KIPS FT-KIPS    FT.          FT-KIPS FT-KIPS     FT.       FT.     KIPS        KIPS  KIPS      KIPS

INV.    HS20 +BEND  353.25   353.2   271.7    1.200   L    248.1    190.8   15.200      .000   5.12        8.26
             -BEND   77.89    77.9    59.9   73.600   R     49.9     38.4   53.200      .000   5.12        5.12
                                                                                                              22.44     22.4
OPER.   HS20 +BEND  353.25   353.2   271.7    1.200   L    248.1    190.8   15.200      .000   5.12        8.26
             -BEND   77.89    77.9    59.9   73.600   R     49.9     38.4   53.200      .000   5.12        5.12
                                                                                                              22.44     22.4

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
                SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
      T 0       .000      .000      .000      .000      .000      .000
      E 1      2.093     -.742      .193     -.053      .014     -.003
      N 2      4.195    -1.215      .325     -.087      .023     -.004
      T 3      6.317    -1.457      .390     -.104      .027     -.005
      H 4      8.457    -1.509      .404     -.108      .028     -.005
        5      6.856    -1.409      .378     -.102      .026     -.004
      P 6      5.293    -1.197      .321     -.086      .022     -.004
      O 7      3.789     -.911      .244     -.065      .016     -.003
      I 8      2.350     -.590      .158     -.042      .010     -.002
      N 9      1.038     -.273      .073     -.019      .005     -.001
      T 0       .000      .000      .000      .000      .000      .000

                                                                   AREA
                                                                  TOTALS
    POS AREA   153.5        .0       9.5        .0        .6        .0   163.6
    NEG AREA      .0      35.3        .0       2.5        .0        .1    38.0

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

      X-DIST (FT.)        .00        .00        .00  POS AREA =        .00
      Y-ORDINATE          .00        .00        .00
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                                           DETAIL DATA AT MOMENT CHECK POINT FOR
                               COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
    DATE  8/18/97
                                                                                          D/P STRUCTURE I.D. = 065-005
                                                                                          MEMBER I.D. --     B 5
                                                                                          C.F. LOCATION --   1.40

                                                                                                             PAGE 3

 *****  RATING FACTOR  *****
                          -- RATING FACTOR FOR MOMENT --
                  AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MOMENT
               TOP      TOP      BOTT     BOTT          TOP             BOTT            RATING     SAFE
              +BEND    -BEND    +BEND    -BEND     +BEND   -BEND   +BEND   -BEND        VALUE      LOAD
                                                                                                CAP.(TONS)
 INV.  HS20   664.7     423.4    664.7    423.4     1.8815  5.4363  1.8815  5.4363

 OPER. HS20   1107.8    705.7    1107.8   705.7     3.1359  9.0606  3.1359  9.0606

                       -- RATING FACTOR FOR SERVICEABILITY --
                 AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
               TOP      TOP      BOTT     BOTT          TOP             BOTT            RATING     SAFE
              +BEND    -BEND    +BEND    -BEND     +BEND   -BEND   +BEND   -BEND        VALUE      LOAD
                                                                                                CAP.(TONS)
 INV.  HS20 159860.5    502.5    546.3    502.5  452.5442  6.4514  1.5466  6.4514      HS 30.9     55.7

 OPER. HS20 266434.1    837.5    910.5    837.5  754.2404 10.7523  2.5776 10.7523      HS 51.6     92.8

                           -- RATING FACTOR FOR SHEAR --
              AVAILABLE CAPACITY (KIPS)              RATING FACTOR - SHEAR              RATING     SAFE
                LEFT     RIGHT                          LEFT    RIGHT                   VALUE      LOAD

 INV.  HS20     119.85   119.85                          5.3410   5.3410

 OPER. HS20     199.75   199.75                          8.9016   8.9016
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                                             DETAIL DATA AT MOMENT CHECK POINT FOR              BARS-PC RELEASE 5.5
                                  COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
    DATE  8/18/97                                                                                  D/F STRUCTURE I.D. = 065-005
                                                                                                   MEMBER I.D. --       8.5
                                                                                                   C.F. LOCATION -      2.00

                                                                                                                    PAGE 1
*****  SECTION PROPERTIES IN COMPOSITE RANGE  1 OF SPAN  2   ******

                              -- STRUCTURAL STEEL PROPERTIES --
     H      Tweb   H/Tweb    D    D/Tweb   - B' (IN) -    - B'/t -     Lb ( FT )     Ry ( IN )    - Lb / Ry    HYBRID RATIO, R
   (IN.)   (IN.)           (IN.)            TOP   BOT    TOP   BOT   TOP    BOT     TOP   BOT     TOP    BOT    +BEND   -BEND
   26.92    .49    54.94  25.40   51.84   4.75  4.75    6.26  6.26  CONT   15.00    2.89  2.89     .00  78.98  1.0000  1.0000

                              -- COMPOSITE CONCRETE PROPERTIES --
   EFF.WIDTH    EFF.THICK.  VALUE    (AS)C    (DS)C  VALUE  VALUE   Atf       Abf      Aw
    (IN.)        (IN.)        N     (SQ.IN.)  (IN.)    a      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
    93.0          7.8         8       .00      .00   3.15    .0    7.60     7.60     12.45

                              -- SECTION PROPERTIES --         --------- SECTION MODULUS ---------    ---- PLASTIC SECTION MODULUS ----
            GROSS    NET AREA        IX        IX       C       TOP      TOP      BOTT     BOTT      TOP      TOP      BOTT     BOTT
            AREA   +BEND  -BEND    +BEND     -BEND    (BOT)    +BEND    -BEND    +BEND    -BEND    +BEND    -BEND+   +BEND    -BEND
            SQ.IN.  SQ.IN. SQ.IN.  IN.**4    IN.**4    IN.     IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3
NON-COM     27.65   27.65  27.65   3270.4    3270.4  13.46     243.0    243.0    243.0    243.0   277.85   277.85   277.85   277.8
COM(N=N)                           3270.4        .0  13.46     243.0       .0    243.0    243.0
COM(N=3N)                          3270.4        .0  13.46     243.0       .0    243.0    243.0

                              -- ULTIMATE STRENGTH --
    Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
     STEEL     CONC.     REBAR     TOP     BOT     TOP    BOT          BOT          TOP          WEB
                                  FLANGE  FLANGE  FLANGE FLANGE       FLANGE       FLANGE
    36000.    4000.     40000.    10.83   10.83   11.60  11.60        36000.       36000.       36000.

*****  SECTION QUALIFICATION  *****
        STIFFENED   UNSTIFFENED  COMPACT    BRACED       UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
       LONG  TRANV                        NON-COMPACT  NON-COMPACT     FACTOR
+BEND                    X          X                                  1.0000                       X
-BEND                    X                                  X          1.0000        X

*****  SECTION CAPACITY  *****
        +BEND        ML =       .00 FT-KIPS,   MR =       .00 FT-KIPS
        -BEND        ML =      7.98 FT-KIPS,   MR =   -375.80 FT-KIPS,   M1/M2 =  -.0212       CB = 1.0
    --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---    -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --   -- SHEAR CAPACITY (KIPS) --

          TOP       TOP       BOTT      BOTT       MU         MAX. CAP.   MAX. CAP.     MD                  VU        VU
         +BEND     -BEND     +BEND     -BEND                  STEEL       CONC.                           LEFT      RIGHT
INV.     751.66    336.42    751.66    336.42    833.54      277.85      1350.74     1628.59              259.87    259.87
OPER.   1252.76    560.70   1252.76    560.70    833.54      277.85      1350.74     1628.59              259.87    259.87

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                              -- DEAD LOAD --
      M (DL)    M (SDL)      REDIS.    REDIS.      V (DL)     V (SDL)
                             M-(DL)----M-(SDL)
     -114.34    -58.01      -114.34    -58.01      15.03       9.75
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                                        DETAIL DATA AT MOMENT CHECK POINT FOR
                              COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
    DATE  8/18/97
                                                                                                D/P STRUCTURE I.D. = G65-005
                                                                                                MEMBER I.D. --        S 5
                                                                                                C.P. LOCATION --      2.00

                                                                                                                   PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR =  .300 FOR +BEND AND =  .300 FOR -BEND)

                                                 -- LIVE LOAD --
                        -------------TRUCK MOMENT-------------   -------------LANE MOMENT-------------  -----FIXED-----  ------MAX------
          LIVE          REDIS   LL+IMP   LL      LOC.NO.  DIR   LL+IMP     LL    LOC.CONC. LOC.CONC.        SHEAR             SHEAR
          LOAD          LL+I                     1 WHEEL                         LOAD #1   LOAD #2     +V          -V     +V          -V
                        FT-KIPS FT-KIPS FT-KIPS    FT.          FT-KIPS  FT-KIPS    FT.       FT.     KIPS        KIPS   KIPS        KIPS

INV.    HS20 +BEND    52.17     52.2    40.1  111.600    R      33.3     25.7    91.200      .000  40.08        5.80
             -BEND   203.44    203.4   156.5   31.601    L     190.0    146.1    53.200    22.800  40.08       40.08
                                                                                                                    53.48       53.4
OPER.   HS20 +BEND    52.17     52.2    40.1  111.600    R      33.3     25.7    91.200      .000  40.08        5.80
             -BEND   203.44    203.4   156.5   31.601    L     190.0    146.1    53.200    22.800  40.08       40.08

                                                                                                                    53.48       53.4

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
                SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
          T 0     .000     .000     .000     .000     .000     .000
          E 1    -.456   -1.854     .497    -.133     .035    -.007
          N 2    -.912   -3.036     .814    -.218     .057    -.010
          T 3   -1.308   -3.643     .976    -.261     .068    -.012
          H 4   -1.632   -3.773    1.011    -.270     .070    -.012
            5   -1.860   -3.524     .944    -.252     .065    -.011
          P 6   -1.967   -2.992     .802    -.214     .054    -.010
          O 7   -1.930   -2.276     .610    -.163     .041    -.008
          I 8   -1.725   -1.474     .395    -.105     .026    -.006
          N 9   -1.205    -.683     .183    -.049     .012    -.003
          T 0     .000     .000     .000     .000     .000     .000


                                                                  AREA
                                                                 TOTALS
      POS AREA      .0       .0     23.7       .0      1.6       .0    25.3
      NEG AREA    49.4     88.4       .0      6.3       .0       .3   144.4

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

        X-DIST (FT.)        .00       .00       .00  POS AREA =        .00
        Y-ORDINATE          .00       .00       .00
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                                      DETAIL DATA AT MOMENT CHECK POINT FOR
                              COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
      DATE  8/18/87                                                                    D/F STRUCTURE I.D. = 065-005
                                                                                       MEMBER I.D. --       B 5
                                                                                       C.P. LOCATION --     2.00

                                                                                                            PAGE 1


 *****  RATING FACTOR  *****
                         -- RATING FACTOR FOR MOMENT --
                  AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MOMENT
                TOP       TOP       BOTT      BOTT              TOP                BOTT             RATING     SAFE
               +BEND     -BEND     +BEND     -BEND      +BEND     -BEND     +BEND     -BEND       VALUE      LOAD
                                                                                                          CAP.(TONS)
 INV.   HS20    855.1     233.0     855.1     233.0    16.3916   1.1453   16.3916   1.1453       HS 22.9     41.2

 OPER.  HS20   1425.1     388.3    1425.1     388.3    27.3193   1.9089   27.3193   1.9089       HS 38.2     68.7

                        -- RATING FACTOR FOR SERVICEABILITY --
                 AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
                TOP       TOP       BOTT      BOTT              TOP                BOTT             RATING     SAFE
               +BEND     -BEND     +BEND     -BEND      +BEND     -BEND     +BEND     -BEND       VALUE      LOAD
                                                                                                          CAP.(TONS)
 INV.   HS20    518.9     312.1     518.9     312.1     9.9471   1.5339    9.9471   1.5339

 OPER.  HS20    864.8     520.1     864.8     520.1    16.5785   2.5566   16.5785   2.5566

                           -- RATING FACTOR FOR SHEAR --
               AVAILABLE CAPACITY (KIPS)                     RATING FACTOR - SHEAR                RATING     SAFE
                  LEFT      RIGHT                               LEFT      RIGHT                   VALUE      LOAD

 INV.   HS20     105.38    105.38                              1.9705    1.9705

 OPER.  HS20     175.63    175.63                              3.2842    3.2842
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                                        DETAIL DATA AT MOMENT CHECK POINT FOR                      BARS-PC RELEASE 5.5
                                COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
    DATE  8/18/97
                                                                                           D/P STRUCTURE I.D. = G65-005
                                                                                           MEMBER I.D. --       B 5
                                                                                           C.P. LOCATION -      2.50

                                                                                                                PAGE 1
 *****  SECTION PROPERTIES IN COMPOSITE RANGE  1 OF SPAN  2   ******

                            -- STRUCTURAL STEEL PROPERTIES --
      H      Tweb   H/Tweb    D    D/Tweb   - B' (IN) -   - B'/t -    Lb ( FT )    Ry ( IN )    - Lb / Ry    HYBRID RATIO, R
    (IN.)   (IN.)           (IN.)            TOP   BOT    TOP   BOT   TOP    BOT   TOP  BOT     TOP   BOT    +BEND   -BEND
    26.92    .49    54.94  25.40   51.84    4.76  4.76   6.26  6.26  CONT  19.00  2.89 2.89     .00  78.98  1.0000  1.0000

                            -- COMPOSITE CONCRETE PROPERTIES --
    EFF.WIDTH   EFF.THICK.  VALUE   (AS)C     (DS)C  VALUE  VALUE   Atf       Abf       Aw
      (IN.)       (IN.)       N    (SQ.IN.)  (IN.)     a      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
      93.0         7.8        8       .00      .00   3.15     .0   7.60      7.60     12.45

                            -- SECTION PROPERTIES --          -------- SECTION MODULUS --------    ---- PLASTIC SECTION MODULUS ----
             GROSS     NET AREA        IX       IX      C       TOP      TOP      BOTT     BOTT      TOP      TOP      BOTT     BOTT
             AREA    +BEND  -BEND    +BEND    -BEND   (BOT)   +BEND    -BEND    +BEND    -BEND    +BEND    -BEND+   +BEND    -BEND
             SQ.IN.  SQ.IN. SQ.IN.   IN.**4   IN.**4   IN.    IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3
  NON-COM    27.65   27.65  27.65    3270.4   3270.4  13.46    243.0    243.0    243.0    243.0   277.85   277.85   277.85   277.8
  COM(N=N)                           3270.4       .0  13.46    243.0   2544.9    243.0    243.0
  COM(N=3N)                          3270.4       .0  13.46    243.0   1179.0    243.0    243.0

                            -- ULTIMATE STRENGTH --
    Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
     STEEL      CONC.     REBAR     TOP     BOT    TOP    BOT         BOT        TOP        WEB
                                  FLANGE  FLANGE FLANGE FLANGE      FLANGE     FLANGE
    36000.     4000.     40000.   10.83   10.83   11.60  11.60      36000.     36000.     36000.

 *****  SECTION QUALIFICATION  *****
           STIFFENED    UNSTIFFENED  COMPACT    BRACED       UNBRACED    REDUCTION   SYMMETRICAL UNSYMMETRICAL
          LONG  TRANV                        NON-COMPACT  NON-COMPACT    FACTOR
 +BEND                      X          X                                 1.0000                      X
 -BEND                      X          X                                 1.0000          X

 *****  SECTION CAPACITY  *****
           +BEND        ML =        .00 FT-KIPS,   MR =       .00 FT-KIPS
           -BEND        ML =        .00 FT-KIPS,   MR =       .00 FT-KIPS
     --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---      -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --   -- SHEAR CAPACITY (KIPS) --

           TOP       TOP       BOTT      BOTT       MU         MAX. CAP.    MAX. CAP.     MU                     VU        VU
          +BEND     -BEND     +BEND     -BEND                   STEEL        CONC.                             LEFT      RIGHT
 INV.     751.66    384.71    751.66    336.42    833.54       277.85      1350.74      1628.59                259.87    259.87
 OPER.   1252.76    641.19   1252.76    560.70    833.54       277.85      1350.74      1628.59                259.87    259.87

 *****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                              -- DEAD LOAD --
      M (DL)    M (SDL)      REDIS.    REDIS.      V (DL)     V (SDL)
                             M-(DL)----M-(SDL)
      36.21      29.89       36.21      29.89        .82         .00
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                                          DETAIL DATA AT MOMENT CHECK POINT FOR
                               COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
     DATE  8/18/97                                                                      D/F STRUCTURE I.D. = 065-005
                                                                                        MEMBER I.D. --       # 5
                                                                                        C.P. LOCATION --     2.50

                                                                                                             PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR =  .390 FOR +BEND AND =  .300 FOR -BEND)

                                              -- LIVE LOAD --
                     --------------TRUCK MOMENT---------------  --------------LANE MOMENT-------------- -----FIXED-----  ------MAX------
         LIVE        REDIS   LL+IMP   LL     LOC.NO.  DIR   LL+IMP     LL     LOC.CONC. LOC.CONC.      SHEAR            SHEAR
         LOAD        LL+I                    1 WHEEL                          LOAD #1   LOAD #2     +V         -V     +V       -V
                     FT-KIPS FT-KIPS FT-KIPS   FT.          FT-KIPS  FT-KIPS    FT.       FT.      KIPS       KIPS   KIPS     KIPS

INV.   HS20 +BEND  234.85   234.9   180.7   70.999   R    177.0    136.2    57.000       .000   5.80      16.92
            -BEND   58.12    58.1    44.7  111.600   R     48.5     37.3    91.200       .000   5.80       5.80
                                                                                                                 18.57    18.5
OPER.  HS20 +BEND  234.85   234.9   180.7   70.999   R    177.0    136.2    57.000       .000   5.80      16.92
            -BEND   58.12    58.1    44.7  111.600   R     48.5     37.3    91.200       .000   5.80       5.80
                                                                                                                 18.57    18.5

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
                 SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
         T 0      .000     .000     .000     .000     .000     .000
         E 1     -.171     .717    -.554     .148    -.039     .008
         N 2     -.334    1.721    -.906     .243    -.064     .012
         T 3     -.479    2.977   -1.088     .291    -.076     .013
         H 4     -.597    4.508   -1.126     .301    -.078     .013
           5     -.681    6.301   -1.052     .291    -.072     .012
         P 6     -.720    4.550    -.893     .238    -.060     .011
         O 7     -.706    3.049    -.679     .181    -.045     .009
         I 8     -.631    1.794    -.440     .117    -.029     .006
         N 9     -.441     .780    -.204     .054    -.013     .003
         T 0      .000     .000     .000     .000     .000     .000

                                                                  AREA
                                                                 TOTALS
     POS AREA       .0    100.3       .0      7.0       .0       .3   107.6
     NEG AREA     18.1       .0     26.4       .0      1.8       .0    46.3

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

         X-DIST (FT.)        .00        .00        .00  POS AREA =        .00
         Y-ORDINATE          .00        .00        .00
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                                   DETAIL DATA AT MOMENT CHECK POINT FOR
                        COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
    DATE  8/18/97
                                                                                   D/P STRUCTURE I.D. = G65-005
                                                                                   MEMBER I.D. --        8 5
                                                                                   C.P. LOCATION --      2.50

                                                                                                   PAGE 3


*****  RATING FACTOR  *****
                        -- RATING FACTOR FOR MOMENT --
                  AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MOMENT
               TOP      TOP      BOTT     BOTT           TOP              BOTT               RATING    SAFE
              +BEND    -BEND    +BEND    -BEND     +BEND    -BEND    +BEND    -BEND          VALUE     LOAD
                                                                                                    CAP.(TONS)
INV.   HS20   712.0    424.4    712.0    424.4     3.0305   7.3013   3.0305   7.3013

OPER.  HS20  1186.7    707.3   1186.7    707.3     5.0508  12.1689   5.0508  12.1689

                      -- RATING FACTOR FOR SERVICEABILITY --
                 AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
               TOP      TOP      BOTT     BOTT           TOP              BOTT               RATING    SAFE
              +BEND    -BEND    +BEND    -BEND     +BEND    -BEND    +BEND    -BEND          VALUE     LOAD
                                                                                                    CAP.(TONS)
INV.   HS20   375.8    514.8    375.8    514.8     1.5996   8.8568   1.5996   8.8568       HS 32.0    57.6

OPER.  HS20   626.4    858.0    626.4    858.0     2.6660  14.7613   2.6660  14.7613       HS 53.3    96.0

                         -- RATING FACTOR FOR SHEAR --
               AVAILABLE CAPACITY (KIPS)                  RATING FACTOR - SHEAR              RATING    SAFE
                 LEFT      RIGHT                            LEFT     RIGHT                   VALUE     LOAD

INV.   HS20     119.45    119.45                           6.4341    6.4341

OPER.  HS20     199.09    199.09                          10.7235   10.7235
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                                    DETAIL DATA AT MOMENT CHECK POINT FOR              BARS-PC RELEASE 5.5
                          COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97                                                                   D/P STRUCTURE I.D. = 065-005
                                                                                   MEMBER I.D. --       S 5
                                                                                   C.P. LOCATION -      3.00

                                                                                                        PAGE 1
*****  SECTION PROPERTIES IN COMPOSITE RANGE  1 OF SPAN  3     ******

                              -- STRUCTURAL STEEL PROPERTIES --
     H      Twab   H/Twab    D    D/Twab   - B' (IN) -   - B'/t -     Lb ( FT )     Ry ( IN )    - Lb / Ry    HYBRID RATIO, R
   (IN.)   (IN.)           (IN.)            TOP   BOT    TOP   BOT   TOP    BOT    TOP   BOT     TOP    BOT    +BEND   -BEND
   26.92    .49    54.94  25.40   51.84   4.75  4.75    6.26  6.26  CONT   19.00   2.89  2.89     .00  78.98  1.0000  1.0000

                              -- COMPOSITE CONCRETE PROPERTIES --
   EFF.WIDTH   EFF.THICK.  VALUE   (AS)C    (DS)C  VALUE  VALUE   Atf     Abf      Aw
     (IN.)       (IN.)       N    (SQ.IN.)  (IN.)    a      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
     93.0         7.8        8       .00      .00   3.15    .0    7.60     7.60    12.45

                              -- SECTION PROPERTIES --          -------- SECTION MODULUS --------   ---- PLASTIC SECTION MODULUS ----
             GROSS     NET AREA        IX        IX       C       TOP       TOP      BOTT      BOTT      TOP       TOP      BOTT     BOTT
             AREA    +BEND  -BEND    +BEND     -BEND    (BOT)    +BEND     -BEND    +BEND     -BEND     +BEND     -BEND+    +BEND    -BEND
             SQ.IN.  SQ.IN. SQ.IN.   IN.**4    IN.**4    IN.     IN.**3    IN.**3   IN.**3    IN.**3    IN.**3    IN.**3   IN.**3   IN.**3
NON-COM      27.65   27.65  27.65    3270.4    3270.4   13.46     243.0     243.0    243.0     243.0   -277.85    277.85   277.85   277.8
COM(N+N)                             3270.4        .0   13.46     243.0        .0    243.0     243.0
COM(N*3N)                            3270.4        .0   13.46     243.0        .0    243.0     243.0

                              -- ULTIMATE STRENGTH --
    Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
     STEEL     CONC.     REBAR     TOP      BOT    TOP     BOT         BOT          TOP         WEB
                                  FLANGE  FLANGE  FLANGE FLANGE       FLANGE       FLANGE
    36000.     4000.     40000.    10.83    10.83   11.60   11.60      36000.       36000.      36000.

*****  SECTION QUALIFICATION  *****
         STIFFENED   UNSTIFFENED  COMPACT    BRACED       UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
         LONG  TRANV                       NON-COMPACT  NON-COMPACT     FACTOR
+BEND                    X          X                                   1.0000                    X
-BEND                    X                                 X            1.0000       X

*****  SECTION CAPACITY  *****
         +BEND        ML =        .00 FT-KIPS,   MR =        .00 FT-KIPS
         -BEND        ML =      15.95 FT-KIPS,   MR =    -347.83 FT-KIPS,   M1/M2 =  -.0459        CB = 1.0
     --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---     -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --    -- SHEAR CAPACITY (KIPS) --

          TOP        TOP        BOTT       BOTT        MU          MAX. CAP.    MAX. CAP.      MU                  VU         VU
         +BEND      -BEND      +BEND      -BEND                     STEEL        CONC.                             LEFT       RIGHT
INV.     751.66     336.42     751.66     336.42      833.54       277.85       1350.74      1628.59              259.87     259.87
OPER.   1252.76     560.70    1252.76     560.70      833.54       277.85       1350.74      1628.59              259.87     259.87

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                              -- DEAD LOAD --
      M (DL)    M (SDL)     REDIS.    REDIS.      V (DL)     V (SDL)
                            M-(DL)----M-(SDL)
      -83.16    -58.02      -83.16    -58.02      13.83        9.25
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                                    DETAIL DATA AT MOMENT CHECK POINT FOR
                            COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
    DATE  8/18/97
                                                                                D/P STRUCTURE I.D. = G65-005
                                                                                MEMBER I.D. --        8 5
                                                                                C.P. LOCATION --      3.00

                                                                                                      PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR =  .300 FOR +BEND AND =  .300 FOR -BEND)

                                          -- LIVE LOAD --
                    -------------TRUCK MOMENT------------   -------------LANE MOMENT------------  -----FIXED-----   ------MAX------
         LIVE       REDIS   LL+IMP   LL     LOC.NO.  DIR   LL+IMP     LL    LOC.CONC.  LOC.CONC.     SHEAR            SHEAR
         LOAD        LL+I                   1 WHEEL                         LOAD #1    LOAD #2    +V       -V      +V        -V
                   FT-KIPS FT-KIPS FT-KIPS    FT.          FT-KIPS  FT-KIPS    FT.        FT.     KIPS     KIPS    KIPS      KIPS

INV.    HS20 +BEND  45.01    45.0   34.6  149.600   R      36.8     28.3   129.200       .000   1.53     5.56
             -BEND 206.65   182.7  140.6   69.602   L     206.7    159.0    91.200     60.800   1.53     1.53
                                                                                                                52.89     52.8
OPER.   HS20 +BEND  45.01    45.0   34.6  149.600   R      36.8     28.3   129.200       .000   1.53     5.56
             -BEND 206.65   182.7  140.6   69.602   L     206.7    159.0    91.200     60.800   1.53     1.53
                                                                                                                52.89     52.8

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE   LINE (CONTINUOUS SPAN) *****
                SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
         T 0     .000     .000     .000     .000     .000     .000
         E 1     .125    -.511   -1.604     .429    -.113     .023
         N 2     .244   -1.141   -2.626     .703    -.184     .034
         T 3     .351   -1.804   -3.151     .843    -.220     .038
         H 4     .437   -2.410   -3.264     .872    -.226     .038
           5     .498   -2.874   -3.047     .814    -.209     .036
         P 6     .527   -3.108   -2.588     .691    -.175     .032
         O 7     .517   -3.025   -1.968     .525    -.131     .025
         I 8     .462   -2.538   -1.274     .339    -.083     .018
         N 9     .323   -1.558    -.590     .157    -.037     .009
         T 0     .000     .000     .000     .000     .000     .000

                                                                  AREA
                                                                 TOTALS
       POS AREA   13.2       .0       .0     20.4       .0      1.0     34.6
       NEG AREA     .0     72.1     76.4       .0      5.2       .0    153.8

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

         X-DIST (FT.)        .00        .00        .00  POS AREA =        .00
         Y-ORDINATE          .00  ___   .00        .00
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                                          DETAIL DATA AT MOMENT CHECK POINT FOR
                              COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97                                                                            D/P STRUCTURE I.D. = G65-005
                                                                                            MEMBER I.D. --       # 5
                                                                                            C.P. LOCATION --     1.08

                                                                                                                 PAGE 3


*****  RATING FACTOR  *****
                          -- RATING FACTOR FOR MOMENT --
                   AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MOMENT
                TOP       TOP       BOTT      BOTT               TOP                  BOTT                 RATING      SAFE
               +BEND     -BEND     +BEND     -BEND        +BEND     -BEND      +BEND     -BEND           VALUE       LOAD
                                                                                                                  CAP.(TONS)
INV.   HS20    836.4     251.7     836.4     251.7       18.5831   1.2181    18.5831   1.2181          HS 24.4      43.9

OPER.  HS20    1393.9    419.5     1393.9    419.5       30.9718   2.0301    30.9718   2.0301          HS 40.6      73.1

                       -- RATING FACTOR FOR SERVICEABILITY --
                  AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR -SERVICEABILITY
                TOP       TOP       BOTT      BOTT               TOP                  BOTT                 RATING      SAFE
               +BEND     -BEND     +BEND     -BEND        +BEND     -BEND      +BEND     -BEND           VALUE       LOAD
                                                                                                                  CAP.(TONS)
INV.   HS20    500.2     330.8     500.2     330.8       11.1136   1.6006    11.1136   1.6006

OPER.  HS20    833.6     551.3     833.6     551.3       18.5226   2.6677    18.5226   2.6677

                           -- RATING FACTOR FOR SHEAR --
               AVAILABLE CAPACITY (KIPS)                      RATING FACTOR - SHEAR                    RATING      SAFE
                 LEFT      RIGHT                                LEFT      RIGHT                        VALUE       LOAD

INV.   HS20     106.03    106.03                               2.0046    2.0046

OPER.  HS20     176.72    176.72                               3.3411    3.3411
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                                                   DETAIL DATA AT MOMENT CHECK POINT FOR                BARS-PC RELEASE 5.5
                                        COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
     DATE  8/18/97                                                                                   D/P STRUCTURE I.D. = G65-005
                                                                                                     MEMBER I.D. ==        S 5
                                                                                                     C.P. LOCATION -       3.50

                                                                                                                           PAGE 1
*****  SECTION PROPERTIES IN COMPOSITE RANGE  1 OF SPAN  3   ******

                                   -- STRUCTURAL STEEL PROPERTIES --
      H      Twab   H/Twab    D     D/Twab    - B' (IN) -    - B'/t -     Lb ( FT )     Ry ( IN )     - Lb / Ry     HYBRID RATIO, R
    (IN.)   (IN.)           (IN.)             TOP    BOT    TOP   BOT   TOP    BOT     TOP   BOT     TOP    BOT    +BEND   -BEND
    26.92    .49    54.94   25.40   51.84     4.76  4.76    6.26  6.26  CONT   19.00   2.89  2.89     .00  78.98  1.0000  1.0000

                                   -- COMPOSITE CONCRETE PROPERTIES --
  EFF.WIDTH   EFF.THICK.  VALUE    (AS)C    (DS)C  VALUE  VALUE   Atf      Abf       Aw
    (IN.)       (IN.)       N    (SQ.IN.)  (IN.)     a      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
    93.0         7.6        8       .00      .00   3.15    .0    7.60     7.60     12.45

                                   -- SECTION PROPERTIES --            -------- SECTION MODULUS --------    ---- PLASTIC SECTION MODULUS ----
            GROSS    NET AREA         IX         IX       C       TOP      TOP     BOTT      BOTT      TOP      TOP      BOTT      BOTT
            AREA   +BEND  -BEND     +BEND      -BEND    (BOT)    +BEND    -BEND    +BEND     -BEND    +BEND    -BEND+    +BEND     -BEND
           SQ.IN.  SQ.IN. SQ.IN.    IN.**4     IN.**4    IN.     IN.**3   IN.**3   IN.**3    IN.**3   IN.**3   IN.**3    IN.**3    IN.**3
  NON-COM  27.65   27.65  27.65     3270.4     3270.4   13.46     243.0    243.0    243.0     243.0   277.85   277.85    277.85    277.8
  COM(N=N)                          3270.4         .0   13.46     243.0   2725.5    243.0     243.0
  COM(N=3N)                         3270.4         .0   13.46     243.0   1284.2    243.0     243.0

                                   -- ULTIMATE STRENGTH --
     Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)      -- YIELD STRESS, Fy (PSI) --
      STEEL     CONC.     REBAR     TOP     BOT     TOP    BOT           BOT          TOP        WEB
                                   FLANGE  FLANGE  FLANGE FLANGE        FLANGE       FLANGE
     36000.     4000.     40000.   10.83   10.83   11.60  11.60         36000.       36000.     36000.

*****  SECTION QUALIFICATION  *****
         STIFFENED   UNSTIFFENED  COMPACT    BRACED       UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
        LONG  TRANV                        NON-COMPACT  NON-COMPACT     FACTOR
  +BEND                   X          X                                  1.0000                     X
  -BEND                   X          X                                  1.0000         X

*****  SECTION CAPACITY  *****
         +BEND       MU =        .00 FT-KIPS,   MR =        .00 FT-KIPS
         -BEND       MU =        .00 FT-KIPS,   MR =        .00 FT-KIPS
     --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---     -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --    -- SHEAR CAPACITY (KIPS) --

          TOP       TOP      BOTT      BOTT       MU         MAX. CAP.   MAX. CAP.     MU                     VU       VU
         +BEND     -BEND    +BEND     -BEND                   STEEL       CONC.                            LEFT     RIGHT
  INV.   751.66    384.71   751.66    336.42    833.54       277.85      1350.74     1628.59                259.87   259.87
  OPER. 1252.76    641.19  1252.76    560.70    833.54       277.85      1350.74     1628.59                259.87   259.87

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                               -- DEAD LOAD --
      M (DL)    M (SDL)     REDIS.    REDIS.      V (DL)      V (SDL)
                            M-(DL)---M-(SDL)
      46.61      29.89      46.61     29.89        -.27         .00
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                              DETAIL DATA AT MOMENT CHECK POINT FOR
                    COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97                                                              D/P STRUCTURE I.D. = 065-005
                                                                              MEMBER I.D. --       # 5
                                                                              C.P. LOCATION --     3.50

                                                                                                 PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR =  .300 FOR +BEND AND =  .300 FOR -BEND)

                                  -- LIVE LOAD --
               **************TRUCK MOMENT*************   *************LANE MOMENT************  *****FIXED*****   ******MAX******
     LIVE      REDIS   LL+IMP   LL      LOC.NO. DIR  LL+IMP    LL    LOC.CONC. LOC.CONC.      SHEAR               SHEAR
     LOAD      LL+I                     1 WHEEL                      LOAD #1   LOAD #2    +V         -V     +V        -V
               FT-KIPS FT-KIPS FT-KIPS   FT.         FT-KIPS FT-KIPS   FT.       FT.     KIPS       KIPS   KIPS      KIPS

INV.   HS20 +BEND  244.04   244.0   187.7  108.999  R    185.6    142.7    95.000     .000   5.56      17.78
            -BEND   60.54    60.5    46.6  149.600  R     54.8     42.2   129.200     .000   5.56       5.56
                                                                                                           17.98     17.9
OPER.  HS20 +BEND  244.04   244.0   187.7  108.999  R    185.6    142.7    95.000     .000   5.56      17.78
            -BEND   60.54    60.5    46.6  149.600  R     54.8     42.2   129.200     .000   5.56       5.56
                                                                                                           17.98     17.9

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
             SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
     T 0      .000     .000     .000     .000     .000     .000
     E 1      .046    -.187     .809    -.577     .152    -.032
     N 2      .039    -.418    1.861    -.945     .248    -.045
     T 3      .128    -.660    3.256   -1.134     .296    -.051
     H 4      .160    -.882    4.694   -1.173     .304    -.052
       5      .182   -1.052    6.474   -1.095     .281    -.049
     P 6      .193   -1.137    4.697    -.929     .236    -.043
     O 7      .180   -1.107    3.161    -.706     .176    -.034
     I 8      .163    -.929    1.866    -.456     .112    -.024
     N 9      .118    -.570     .813    -.211     .050    -.012
     T 0      .000     .000     .000     .000     .000     .000

                                                                    AREA
                                                                   TOTALS
   POS AREA    4.8       .0    104.6       .0      7.0       .0    116.5
   NEG AREA     .0     26.4       .0     27.5       .0      1.3     55.1

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

     X-DIST (FT.)        .00        .00        .00  POS AREA =        .00
     Y-ORDINATE          .00        .00        .00
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                                    DETAIL DATA AT MOMENT CHECK POINT FOR
                         COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
 DATE  8/18/97
                                                                                 D/P STRUCTURE I.D. = G65-005
                                                                                 MEMBER I.D. --       3 5
                                                                                 C.P. LOCATION --     3.50

                                                                                                    PAGE 3


***** RATING FACTOR  *****
                        -- RATING FACTOR FOR MOMENT --
                 AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MOMENT
               TOP      TOP       BOTT      BOTT            TOP               BOTT              RATING      SAFE
              +BEND    -BEND     +BEND     -BEND      +BEND    -BEND    +BEND    -BEND          VALUE       LOAD
                                                                                                         CAP.(TONS)
INV.   HS20   705.8    430.6     705.8     430.6      2.8920   7.1129   2.8920   7.1129

OPER.  HS20  1176.3    717.7    1176.3     717.7      4.8201  11.8547   4.8201  11.8547

                     -- RATING FACTOR FOR SERVICKABILITY --
                AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
               TOP      TOP       BOTT      BOTT            TOP               BOTT              RATING      SAFE
              +BEND    -BEND     +BEND     -BEND      +BEND    -BEND    +BEND    -BEND          VALUE       LOAD
                                                                                                         CAP.(TONS)
INV.   HS20   369.6    521.0     369.6     521.0      1.5145   8.6062   1.5145   8.6062        HS 30.3      54.5

OPER.  HS20   616.0    868.4     616.0     868.4      2.5241  14.3437   2.5241  14.3437        HS 50.5      90.9

                          -- RATING FACTOR FOR SHEAR --
               AVAILABLE CAPACITY (KIPS)                  RATING FACTOR - SHEAR                 RATING      SAFE
                 LEFT      RIGHT                            LEFT     RIGHT                      VALUE       LOAD

INV.   HS20     120.11    120.11                           6.6782   6.6782

OPER.  HS20     200.18    200.18                          11.1303  11.1303
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                                   DETAIL DATA AT MOMENT CHECK POINT FOR                  BARS-PC RELEASE 5.5
                          COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97                                                                        D/P STRUCTURE I.D. = 065-005
                                                                                        MEMBER I.D. --        S 5
                                                                                        C.P. LOCATION -       4.00

                                                                                                           PAGE 1
*****  SECTION PROPERTIES IN COMPOSITE RANGE  1 OF SPAN  3   ******

                        -- STRUCTURAL STEEL PROPERTIES --
      H      Tweb   H/Tweb   D     D/Tweb   - B' (IN) -    - B'/t -     Lb ( FT )    Ry ( IN )    - Lb / Ry    HYBRID RATIO, R
    (IN.)   (IN.)          (IN.)             TOP   BOT    TOP   BOT   TOP    BOT    TOP   BOT     TOP   BOT    +BEND   -BEND
    26.92    .49    54.94  25.40   51.84   4.76  4.76    6.26  6.26  CONT   19.00   2.89  2.89     .00  78.98  1.0000  1.0000

                        -- COMPOSITE CONCRETE PROPERTIES --
    EFF.WIDTH    EFF.THICK.   VALUE   (AS)C    (DS)C  VALUE  VALUE   Ab1      Ab2       Aw
     (IN.)        (IN.)        N    (SQ.IN.)  (IN.)    K      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
     93.0          7.5         8       .00      .00   3.15    .0    7.60     7.60     12.45

                        -- SECTION PROPERTIES --        --------- SECTION MODULUS ---------   ---- PLASTIC SECTION MODULUS ----
            GROSS    NET AREA        IX        IX      C      TOP      TOP      BOTT     BOTT      TOP      TOP      BOTT     BOTT
            AREA   +BEND  -BEND    +BEND     -BEND   (BOT)   +BEND    -BEND    +BEND    -BEND    +BEND    -BEND+   +BEND    -BEND
            SQ.IN. SQ.IN. SQ.IN.   IN.**4    IN.**4   IN.    IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3
NON-COM     27.65  27.65  27.65    3270.4    3270.4  13.46    243.0    243.0    243.0    243.0   277.85   277.85   277.85   277.8
CON(N=N)                           3270.4        .0  13.46    243.0   2725.5    243.0    243.0
CON(N=3N)                          3270.4        .0  13.46    243.0   1284.2    243.0    243.0

                        -- ULTIMATE STRENGTH --
    Fy (PSI) F'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
     STEEL     CONC.     REBAR     TOP     BOT     TOP    BOT        BOT          TOP        WEB
                                  FLANGE  FLANGE  FLANGE FLANGE     FLANGE       FLANGE
    36000.     4000.     40000.    10.83   10.83   11.60  11.60     36000.       36000.     36000.

*****  SECTION QUALIFICATION  *****
        STIFFENED   UNSTIFFENED  COMPACT    BRACED      UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
       LONG  TRANV                        NON-COMPACT  NON-COMPACT    FACTOR
+BEND                   X          X                                 1.0000                    X
-BEND                   X                                  X         1.0000        X

*****  SECTION CAPACITY  *****
        +BEND       ML =       .00 FT-KIPS,   MR =       .00 FT-KIPS
        -BEND       ML =     15.96 FT-KIPS,   MR =   -361.91 FT-KIPS,   M1/M2 =  -.0441       CB = 1.0
    --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---     -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --   -- SHEAR CAPACITY (KIPS) --

         TOP       TOP       BOTT      BOTT       MU        MAX. CAP.    MAX. CAP.      MU                    VU        VU
        +BEND     -BEND     +BEND     -BEND                  STEEL         CONC.                            LEFT      RIGHT
INV.    751.66    336.42    751.66    336.42    833.54       277.85       1350.74     1628.59               259.87    259.87
OPER.  1252.76    560.70   1252.76    560.70    833.54       277.85       1350.74     1628.59               259.87    259.87

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                        -- DEAD LOAD --
     M (DL)   M (SDL)     REDIS.    REDIS.      V (DL)     V (SDL)
                         M-(DL)----M-(SDL)
     -93.55    -59.02     -93.55    -58.02       14.48       9.25
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                              DETAIL DATA AT MOMENT CHECK POINT FOR
                    COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
    DATE  8/18/97
                                                                         D/F STRUCTURE I.D. = G65-005
                                                                         MEMBER I.D. --       S 5
                                                                         C.P. LOCATION --     4.00

                                                                                              PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR =  .300 FOR +BEND AND =  .300 FOR -BEND)

                                        -- LIVE LOAD --
                    --------------TRUCK MOMENT-------------  --------------LANE MOMENT-------------  -----FIXED-----   ------MAX------
       LIVE          REDIS   LL+IMP    LL     LOC.NO.  DIR   LL+IMP     LL     LOC.CONC. LOC.CONC.      SHEAR            SHEAR
       LOAD          LL+I                     1 WHEEL                          LOAD #1   LOAD #2    +V          -V    +V          -V
                    FT-KIPS FT-KIPS FT-KIPS    FT.           FT-KIPS  FT-KIPS    FT.       FT.      KIPS       KIPS   KIPS        KIPS

INV.    HS20 +BEND   42.87    42.9    33.0  187.600   R      38.6      29.7   167.200      .000    1.94       5.33
             -BEND  210.34   180.8   139.1  120.400   R     210.3     161.8   129.200    98.800    1.94       1.94
                                                                                                                  52.81       52.8
OPER.   HS20 +BEND   42.87    42.9    33.0  187.600   R      38.6      29.7   167.200      .000    1.94       5.33
             -BEND  210.34   180.8   139.1  120.400   R     210.3     161.8   129.200    98.800    1.94       1.94
                                                                                                                  52.81       52.8

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
                 SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
        T 0       .000     .000     .000     .000     .000     .000
        E 1      -.034     .137    -.579   -1.584     .418    -.087
        N 2      -.066     .306   -1.252   -2.593     .681    -.124
        T 3      -.094     .484   -1.937   -3.110     .811    -.139
        H 4      -.117     .646   -2.549   -3.219     .834    -.141
          5      -.134     .771   -3.004   -3.004     .771    -.134
        P 6      -.141     .834   -3.219   -2.549     .646    -.117
        O 7      -.139     .811   -3.110   -1.937     .484    -.094
        I 8      -.124     .681   -2.593   -1.252     .306    -.066
        N 9      -.087     .418   -1.584    -.579     .137    -.034
        T 0       .000     .000     .000     .000     .000     .000

                                                                     AREA
                                                                    TOTALS
      POS AREA      .0     19.3       .0       .0     19.3       .0    38.7
      NEG AREA     3.6       .0     75.3     75.3       .0      3.6   157.8

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

        X-DIST (FT.)          .00          .00          .00  POS AREA =          .00
        Y-ORDINATE            .00          .00          .00
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                                        DETAIL DATA AT MOMENT CHECK POINT FOR
                              COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE  8/18/97
                                                                                     D/F STRUCTURE I.D. = G65-005
                                                                                     MEMBER I.D. --       G 5
                                                                                     C.P. LOCATION --     4.00

                                                                                                          PAGE 3


*****  RATING FACTOR  *****
                       -- RATING FACTOR FOR MOMENT --
                  AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MOMENT
                TOP      TOP      BOTT     BOTT             TOP              BOTT              RATING     SAFE
               +BEND    -BEND    +BEND    -BEND      +BEND    -BEND    +BEND    -BEND        VALUE      LOAD
                                                                                                      CAP.(TONS)
INV.   HS20    842.6    245.5    842.5    245.5     19.6563   1.1571  19.6563   1.1571       HS 23.3     42.0

OPER.  HS20   1404.3    409.1   1404.3    409.1     32.7605   1.9451  32.7605   1.9451       HS 38.9     70.0

                     -- RATING FACTOR FOR SERVICABILITY --
                 AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
                TOP      TOP      BOTT     BOTT             TOP              BOTT              RATING     SAFE
               +BEND    -BEND    +BEND    -BEND      +BEND    -BEND    +BEND    -BEND        VALUE      LOAD
                                                                                                      CAP.(TONS)
INV.   HS20    506.4    324.5    506.4    324.5     11.8138   1.5429  11.8139   1.5429

OPER.  HS20    844.0    540.9    844.0    540.9     19.6898   2.5715  19.6898   2.5715

                         -- RATING FACTOR FOR SHEAR --
               AVAILABLE CAPACITY (KIPS)                RATING FACTOR - SHEAR                 RATING     SAFE
                  LEFT      RIGHT                            LEFT      RIGHT                  VALUE      LOAD

INV.   HS20     105.70    105.70                            2.0014    2.0014

OPER.  HS20     176.17    176.17                            3.3357    3.3357                   *
```

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                                          LIVE LOAD DATA AT MOMENT CHECK POINT FOR
                              COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER -   LOAD  FACTOR  RATING
   DATE  8/18/97                                                                              D/P STRUCTURE I.D. = G65-005
                                                                                              MEMBER I.D. --       S 1
                                                                                              C.P. LOCATION --     3.50

                                                                                                                  PAGE 1

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR = 0.215 FOR +BEND AND = 0.215 FOR -BEND)

                                             -- LIVE LOAD --
                    ------------TRUCK MOMENT------------  ------------LANE MOMENT------------  -----FIXED-----   -----SHEAR-----
         LIVE        REDIS   LL+IMP   LL     LOC.NO.  DIR  LL+IMP     LL    LOC.CONC. LOC.CONC.     SHEAR
         LOAD        LL+I                    1 WHEEL                        LOAD #1   LOAD #2   +V        -V     LEFT    RIGHT
                    FT-KIPS FT-KIPS FT-KIPS    FT.        FT-KIPS  FT-KIPS    FT.       FT.     KIPS      KIPS   KIPS    KIPS

INV.   HS20 +BEND    0.00   1247.2  1026.3  200.208   R   1056.2    869.1   186.208    0.000   -0.17    -26.85   32.61   32.61
            -BEND -358.49    298.8   245.9  296.735   R   -358.5   -295.0   272.008    0.000   -0.17     -0.17

OPER   HS20 +BEND    0.00   1247.2  1026.3  200.208   R   1056.2    869.1   186.208    0.000   -0.17    -26.85   32.61   32.61
            -BEND -358.49    298.8   245.9  296.735   R   -358.5   -295.0   272.008    0.000   -0.17     -0.17



SPEC 2 SPE2 +BEND    0.00   1763.3  1450.9  156.207                                             -9.69    -26.70  -32.51  -32.51
            -BEND -516.30    516.3   424.8  250.554                                             -9.69     -9.69
SPEC 3 SPE3 +BEND    0.00   1771.9  1458.0  144.208                                             -9.64    -30.33  -34.53  -34.53
            -BEND -513.49    513.5   422.5  250.558                                             -9.64     -9.64
SPEC 4 SPE4 +BEND    0.00   2089.2  1719.1  208.206                                            -10.54     -6.91  -43.98  -43.98
            -BEND -561.70    561.7   462.2  251.283                                            -10.54    -10.54
```

× 11/14 = 1641

MA = 2042'k

1-1-②

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                                            LIVE LOAD DATA AT MOMENT CHECK POINT FOR
                              COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER -   LOAD  FACTOR   RATING
     DATE  8/18/97                                                                             D/P STRUCTURE I.D. = G65-005
                                                                                               MEMBER I.D. --        S 1
                                                                                               C.P. LOCATION --      3.50

                                                                                                                     PAGE 2

***** RATING FACTOR  *****
                     -- RATING FACTOR FOR  --          -- RATING FACTOR FOR  --        -- RATING FACTOR FOR --
                             MOMENT                          SERVICEABILITY                      SHEAR                    RATING     SAFE
                        TOP             BOTT                TOP             BOTT           LEFT      RIGHT                VALUE      LOAD
                   +BEND    -BEND   +BEND   -BEND      +BEND   -BEND   +BEND   -BEND                                               CAP.(TONS)

INV.    HS20       4.170    3.790   0.982   5.073      7.348   4.363   1.327   5.948       4.816     4.816              HS 19.6       35.4

OPER    HS20       6.950    6.316   1.637   8.455     12.247   7.272   2.211   9.913       8.026     8.026              HS 32.7       58.9

SPEC 2 SPE2        6.200    4.386   1.158   5.871      8.663   5.049   1.564   6.883       8.053     8.053                           119.9

SPEC 3 SPE3        6.249    4.410   1.153   5.903      8.621   5.077   1.557   6.921       7.580     7.580                           146.9

SPEC 4 SPE4        5.300    4.031   0.977   5.398      7.311   4.641   1.320   6.327       5.952     5.952                            77.7
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159

155

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                                        LIVE LOAD DATA AT MOMENT CHECK POINT FOR
                             COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER -   LOAD  FACTOR   RATING
   DATE  8/18/97
                                                                               D/P STRUCTURE I.D. = G65-005
                                                                               MEMBER I.D. --       S 5
                                                                               C.P. LOCATION --     4.00

                                                                                                  PAGE 1

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR = 0.300 FOR +BEND AND = 0.300 FOR -BEND)

                                        -- LIVE LOAD --
                   *************TRUCK MOMENT************   *************LANE MOMENT************  -----FIXED-----    -----SHEAR-----
        LIVE       REDIS   LL+IMP   LL    LOC.NO.  DIR   LL+IMP     LL    LOC.CONC. LOC.CONC.       SHEAR
        LOAD        LL+I                  1 WHEEL                           LOAD #1   LOAD #2    +V          -V      LEFT     RIGHT
                   FT-KIPS FT-KIPS FT-KIPS   FT.         FT-KIPS  FT-KIPS    FT.        FT.     KIPS        KIPS     KIPS     KIPS

INV.    HS20 +BEND   42.87    42.9    33.0  187.600   R     38.6     29.7   167.200     0.000   1.94       -5.33    52.81    52.81
             -BEND -210.34   180.8   139.1  107.602   L   -210.3   -161.8   129.200    98.800   1.94        1.94

OPER    HS20 +BEND   42.87    42.9    33.0  187.600   R     38.6     29.7   167.200     0.000   1.94       -5.33    52.81    52.81
             -BEND -210.34   180.8   139.1  107.602   L   -210.3   -161.8   129.200    98.800   1.94        1.94



SPEC 2 SPE2 +BEND    52.11    52.1    40.1  153.399                                            52.50       -6.49   -64.81    64.81
             -BEND -233.90   233.9   179.9  136.401                                            52.50       52.50
PEC 3 SPE3 +BEND     43.78    43.8    33.7  276.400                                            48.80       -5.45   -64.65    64.66
             -BEND -347.72   347.7   267.5  140.599                                            48.80       48.80
SPEC 4 SPE4 +BEND    45.74    45.7    35.2  155.800                                            44.41       -5.69   -69.42    69.41
             -BEND -416.98   417.0   320.8   80.800                                            44.41       44.41
```

469.1k Avail

1-1 ②

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                                        LIVE LOAD DATA AT MOMENT CHECK POINT FOR
                             COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER -   LOAD  FACTOR   RATING
   DATE  8/18/97
                                                                               D/P STRUCTURE I.D. = G65-005
                                                                               MEMBER I.D. --       S 5
                                                                               C.P. LOCATION --     4.00

                                                                                                  PAGE 2

*****  RATING FACTOR  *****
                 -- RATING FACTOR FOR --          -- RATING FACTOR FOR --      -- RATING FACTOR FOR --
                          MOMENT                       SERVICEABILITY                  SHEAR             RATING     SAFE
                 TOP              BOTT              TOP              BOTT         LEFT      RIGHT        VALUE      LOAD
              +BEND    -BEND   +BEND   -BEND    +BEND   -BEND   +BEND   -BEND                                     CAP.(TONS)

INV.   HS20   19.656   1.167  19.656   1.071   11.814   1.543  11.814   1.543     2.001     2.001        HS 21.4     38.5

OPER   HS20   32.760   1.945  32.760   1.784   19.690   2.572  19.690   2.572     3.336     3.336        HS 35.7     64.2

SPEC 2 SPE2   26.947   1.749  26.947   1.605   16.196   2.312  16.196   2.312     2.718     2.718                  166.1

PEC 3 SPE3    32.076   1.177  32.076   1.079   19.279   1.556  19.279   1.556     2.724     2.724                  137.6

SPEC 4 SPE4   30.704   0.981  30.704   0.900   18.454   1.297  18.454   1.297     2.538     2.538                   71.6
```

207k

255k

159k

156k

P4-1-1-1

```
STRUCTURE I.D. = G65-005
```

error @ Pt 2.0 - Not Critical

Modified for new Jan letting (1998)

```
***********************************************************************************************************
*                                  STRUCTURE HEADER AND DESCRIPTION                                       *
***********************************************************************************************************

 100-- 2               EA/I/O/P = X              FILE REQUESTS AND OUTPUT DATA EXCEPTIONS
              TYPE =     SS   YEAR =  64  LEN = 1907.00 FT.       WIDTH =   52.00 FT.      14 SPANS SP.LOAD =
              INV.LL.TRK.=       OP.LL.TRK.=

***********************************************************************************************************
*                         STRUCTURE LOCATION AND PERMANENT IDENTIFICATION FACTORS                         *
***********************************************************************************************************

 200-- 5   BRIDGE=  9340    DIST./CO.= 5   27  CONST. ROUTE =  TH 35W    CONST. SECT.=          CONST. STA.=   0+   .
           MICROFILM REEL NO.   DESIGN PLANS=          COMPUTATIONS=           CORRESPONDENCE=
              ROUTE I.D.=            MARKED ROUTE =

***********************************************************************************************************
*                                              COMMENTS                                                   *
***********************************************************************************************************
```

300-- 6 1 .17 FT WC ARCH DECK TRUSS AND TRUSS FL BM'S NOT RATED,S01 IS 5 SPAN both Lines G-13,

400-- 6 2 SO. APPR. ~~G-13~~. S02 IS SPANS 9 TO 11/S03 IS VOIDED CONC. SPAN 12 TO 14,

500-- 6 3 ~~S02 IS G-13, S03 IS 35W~~ BR 9340A IS SAME AS S03, L.F.RATING

New Median J-rail & Solid exterior rail added in 1998.

S04 & S05 are Truss Stringer 4 & 6 span cont. reps.

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***********************************************************************************************************
*                     MEMBER SPECIFICATIONS AND REQUIRED ANALYSIS-GIRDER,STRINGER AND FLOOR BEAM          *
***********************************************************************************************************

          MEMBER SPANS  STIFF. SPAN 1     SPAN 2    SPAN 3   MATL    ALLOWABLE STRESS    LL DIST.  END  THRU  MAX  IMPACT  FACTOR
            ID       SYMM CODE (SPAN 4)  (SPAN 5)  (SPAN 6)  CODE       FY   FB FC* FC**  FACTOR  FL.BM DECK  INV   OP.  POST  SPEC

 600-- 8   S 1   5    X     50.917     81.667   107.250   CSC      0.00       0.00     1.485                  .00  .00  .00   .00
 700-- 8   S 1   0    X    107.250     69.583     0.000              0.00       0.00     0.000                  .00  .00  .00   .00
 800-- 8   S 2   3    X    137.833     94.000    67.417   CSC  36000.00       0.00     1.485                  .00  .00  .00   .00
 900-- 8   S 3   3          46.167     58.167    29.167   RC       0.00       0.00     0.271                  .00  .00  .00   .00

***********************************************************************************************************
*                           SUPERIMPOSED DEAD LOADS-GIRDERS,STRINGERS AND FLOOR BEAMS                     *
***********************************************************************************************************

           MEMBER SYMM. SPAN   DISTANCE FR. LOAD          LOAD            LENGTH
             ID          NO.    LEFT SUPP.  TYPE  P OR W(L)     W(R)
```

```
1000--10   S 1        1        0.000FT.   W     358.0      0.0        50.917FT.
1100--10   S 1        2        0.000FT.   W     358.0      0.0        81.667FT.
1200--10   S 1        3        0.000FT.   W     358.0      0.0       107.250FT.
1300--10   S 1        4        0.000FT.   W     358.0      0.0       107.250FT.
1400--10   S 1        5        0.000FT.   W     358.0      0.0        69.583FT.
1500--10   S 2        1        0.000FT.   W     358.0      0.0       137.833FT.
1600--10   S 2        2        0.000FT.   W     358.0      0.0        94.000FT.
1700--10   S 2        3        0.000FT.   W     358.0      0.0        67.417FT.
1800--10   S 3        1        0.000FT.   W      47.0      0.0        46.167FT.
1900--10   S 3        2        0.000FT.   W      47.0      0.0        58.167FT.
2000--10   S 3        3        0.000FT.   W      47.0      0.0        29.167FT.
```

ckd

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**************************************************************************************************************************
*                                          SECTION RANGE SPECIFICATIONS                                                 *
**************************************************************************************************************************

          MEMBER SYMM. SPAN  RANGE   RANGE    SECTION NO. SEC. VAR. HINGE   HINGE 1    HINGE 2        HYBRID GIRDER
            ID          NO.   NO.    LENGTH   LEFT RIGHT             CODE    DIST.      DIST.    CODE   FY    CODE    FY

 2200--11   S 1          1     1    40.917FT.   1    0                      0.000FT.   0.000FT.           0.             0.
 2100--11   S 1          1     2    10.000FT.   2    0                      0.000FT.   0.000FT.           0.             0.
 2400--11   S 1          2     1     8.000FT.   2    0                 X   70.000FT.   0.000FT.           0.             0.
 2300--11   S 1          2     2    12.000FT.   1    0                      0.000FT.   0.000FT.           0.             0.
 2700--11   S 1          2     3    40.000FT.   3    0                      0.000FT.   0.000FT.           0.             0.
 2600--11   S 1          2     4    10.000FT.   1    0                      0.000FT.   0.000FT.           0.             0.
 2500--11   S 1          2     5    11.667FT.   4    5      SB              0.000FT.   0.000FT.           0.             0.
 2800--11   S 1          3     1    10.000FT.   5    0                      0.000FT.   0.000FT.           0.             0.
 3000--11   S 1          3     2    86.250FT.   6    0                      0.000FT.   0.000FT.           0.             0.
 2900--11   S 1          3     3    11.000FT.   7    0                      0.000FT.   0.000FT.           0.             0.
 3200--11   S 1          4     1    11.000FT.   7    0                      0.000FT.   0.000FT.           0.             0.
 3100--11   S 1          4     2    86.250FT.   8    0                      0.000FT.   0.000FT.           0.             0.
 3300--11   S 1          4     3    10.000FT.   9    0                      0.000FT.   0.000FT.           0.             0.
 3400--11   S 1          5     1    14.000FT.   9    0                      0.000FT.   0.000FT.           0.             0.
 3500--11   S 1          5     2    55.583FT.  10    0                      0.000FT.   0.000FT.           0.             0.
 3600--11   S 2          1     1   112.833FT.   1    0                      0.000FT.   0.000FT.   A   45000.    W   50000.
 3700--11   S 2          1     2    25.000FT.   2    0                      0.000FT.   0.000FT.   A   45000.    W   50000.
 3800--11   S 2          2     1     8.000FT.   2    0                      0.000FT.   0.000FT.   A   45000.    W   50000.
 4000--11   S 2          2     2    16.000FT.   3    4      PB              0.000FT.   0.000FT.   A   45000.    W   50000.
 3900--11   S 2          2     3    52.000FT.   5    0                      0.000FT.   0.000FT.           0.             0.
 4100--11   S 2          2     4    18.000FT.   6    0                      0.000FT.   0.000FT.           0.             0.
 4300--11   S 2          3     1    13.000FT.   6    0                      0.000FT.   0.000FT.           0.             0.
 4200--11   S 2          3     2    54.417FT.   7    0                      0.000FT.   0.000FT.           0.             0.
 4500--11   S 3          1     1     5.000FT.   1    0                      0.000FT.   0.000FT.           0.             0.
 4400--11   S 3          1     2    21.000FT.   2    0                      0.000FT.   0.000FT.           0.             0.
 4700--11   S 3          1     3    14.167FT.   3    0                      0.000FT.   0.000FT.           0.             0.
 4600--11   S 3          1     4     6.000FT.   1    0                      0.000FT.   0.000FT.           0.             0.
 4900--11   S 3          2     1     6.000FT.   1    0                      0.000FT.   0.000FT.           0.             0.
 4800--11   S 3          2     2    12.167FT.   3    0                      0.000FT.   0.000FT.           0.             0.
 5200--11   S 3          2     3    22.000FT.   4    0                      0.000FT.   0.000FT.           0.             0.
 5100--11   S 3          2     4    11.000FT.   3    0                      0.000FT.   0.000FT.           0.             0.
 5000--11   S 3          2     5     7.000FT.   5    0                      0.000FT.   0.000FT.           0.             0.
 5300--11   S 3          3     1    29.167FT.   6    0                      0.000FT.   0.000FT.           0.             0.


**************************************************************************************************************************
*                    SECTION PROPERTIES (STEEL OR TIMBER) - GIRDERS STRINGERS, FLOOR BEAMS                              *
```

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************************************************************************************************************************

         MEMBER -- NON-DETAILED DESCRIPTION ---------------------- DETAILED DESCRIPTION ------------------
           ID   SEC.   A        I         S COMPACT SEC. SAME ADR                    H     I     A        IX       DY       DX

  5400--12   S 1   0   0.00    0.0    0.0     1   0   32.86  1  11.50P    0.7   32.5    0.0
  5500--12   S 1   0   0.00    0.0    0.0     1   0    0.00  2   0.55P   31.4   16.4    0.0
  5600--12   S 1   0   0.00    0.0    0.0     1   0    0.00  3  11.50P    0.7    0.4    0.0
  5700--12   S 1   0   0.00    0.0    0.0     2   0   34.18  1  11.50P    1.4   33.5    0.0
  5800--12   S 1   0   0.00    0.0    0.0     2   0    0.00  2   0.55P   31.4   17.1    0.0
  5900--12   S 1   0   0.00    0.0    0.0     2   0    0.00  3  11.50P    1.4    0.7    0.0
  6000--12   S 1   0   0.00    0.0    0.0     3   0   34.54  1  11.50P    1.6   33.8    0.0
  6100--12   S 1   0   0.00    0.0    0.0     3   0    0.00  2   0.55P   31.4   17.3    0.0
  6200--12   S 1   0   0.00    0.0    0.0     3   0    0.00  3  11.50P    1.6    0.8    0.0
  6300--12   S 1   0   0.00    0.0    0.0     4   0   34.76  1  14.00P    0.9   34.3    0.0
  6400--12   S 1   0   0.00    0.0    0.0     4   0    0.00  2   0.38P   33.0   17.4    0.0
  6500--12   S 1   0   0.00    0.0    0.0     4   0    0.00  3  14.00P    0.9    0.4    0.0
  6600--12   S 1   0   0.00    0.0    0.0     5   0   49.76  1  14.00P    0.9   49.3    0.0
  6700--12   S 1   0   0.00    0.0    0.0     5   0    0.00  2   0.38P   48.0   24.9    0.0
  6800--12   S 1   0   0.00    0.0    0.0     5   0    0.00  3  14.00P    0.9    0.4    0.0
  6900--12   S 1   0   0.00    0.0    0.0     6   0   50.13  1  12.00P    0.8   49.8    0.0
  7000--12   S 1   0   0.00    0.0    0.0     6   0    0.00  2   0.38P   48.0   25.4    0.0
  7100--12   S 1   0   0.00    0.0    0.0     6   0    0.00  3  14.00P    1.4    0.7    0.0
  7200--12   S 1   0   0.00    0.0    0.0     7   0   52.50  1  14.00P    2.3   51.4    0.0
  7300--12   S 1   0   0.00    0.0    0.0     7   0    0.00  2   0.38P   48.0   26.3    0.0
  7400--12   S 1   0   0.00    0.0    0.0     7   0    0.00  3  14.00P    2.3    1.1    0.0
  7500--12   S 1   0   0.00    0.0    0.0     8   0   49.63  1  12.00P    0.8   49.3    0.0
  7600--12   S 1   0   0.00    0.0    0.0     8   0    0.00  2   0.38P   48.0   24.9    0.0
  7700--12   S 1   0   0.00    0.0    0.0     8   0    0.00  3  14.00P    0.9    0.4    0.0
  7800--12   S 1   0   0.00    0.0    0.0     9   0   50.75  1  14.00P    1.4   50.1    0.0
  7900--12   S 1   0   0.00    0.0    0.0     9   0    0.00  2   0.38P   48.0   25.4    0.0
  8000--12   S 1   0   0.00    0.0    0.0     9   0    0.00  3  14.00P    1.4    0.7    0.0
  8100--12   S 1   0   0.00    0.0    0.0    10   0   49.50  1  12.00P    0.8   49.1    0.0
  8200--12   S 1   0   0.00    0.0    0.0    10   0    0.00  2   0.38P   48.0   24.8    0.0
  8300--12   S 1   0   0.00    0.0    0.0    10   0    0.00  3  14.00P    0.8    0.4    0.0
  8400--12   S 2   0   0.00    0.0    0.0     1   0   51.25  1  16.00P    1.3   50.6    0.0
  8500--12   S 2   0   0.00    0.0    0.0     1   0    0.00  2   0.63P   48.0   25.0    0.0
  8600--12   S 2   0   0.00    0.0    0.0     1   0    0.00  3  20.00P    2.0    1.0    0.0
  8700--12   S 2   0   0.00    0.0    0.0     2   0   52.00  1  20.00P    2.0   51.0    0.0
  8800--12   S 2   0   0.00    0.0    0.0     2   0    0.00  2   0.63P   48.0   26.0    0.0
  8900--12   S 2   0   0.00    0.0    0.0     2   0    0.00  3  20.00P    2.0    1.0    0.0
  9000--12   S 2   0   0.00    0.0    0.0     3   0   52.00  1  14.00P    2.0   51.0    0.0
  9100--12   S 2   0   0.00    0.0    0.0     3   0    0.00  2   0.63P   48.0   26.0    0.0
  9200--12   S 2   0   0.00    0.0    0.0     3   0    0.00  3  14.00P    2.0    1.0    0.0
  9300--12   S 2   0   0.00    0.0    0.0     4   0   40.00  1  14.00P    2.0   39.0    0.0
  9400--12   S 2   0   0.00    0.0    0.0     4   0    0.00  2   0.63P   36.0   20.0    0.0
  9500--12   S 2   0   0.00    0.0    0.0     4   0    0.00  3  14.00P    2.0    1.0    0.0
  9600--12   S 2   0   0.00    0.0    0.0     5   0   37.75  1  12.00P    0.8   37.4    0.0
  9700--12   S 2   0   0.00    0.0    0.0     5   0    0.00  2   0.63P   36.0   19.0    0.0
  9800--12   S 2   0   0.00    0.0    0.0     5   0    0.00  3  14.00P    1.0    0.5    0.0
  9900--12   S 2   0   0.00    0.0    0.0     6   0   38.75  1  14.00P    1.4   38.1    0.0
 10000--12   S 2   0   0.00    0.0    0.0     6   0    0.00  2   0.63P   36.0   19.4    0.0
 10100--12   S 2   0   0.00    0.0    0.0     6   0    0.00  3  14.00P    1.4    0.7    0.0
 10200--12   S 2   0   0.00    0.0    0.0     7   0   38.25  1  12.00P    1.0   37.8    0.0
 10300--12   S 2   0   0.00    0.0    0.0     7   0    0.00  2   0.63P   36.0   19.3    0.0
   400--12   S 2   0   0.00    0.0    0.0     7   0    0.00  3  14.00P    1.3    0.6    0.0


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*                        SECTION PROPERTIES (REINFORCED CONCRETE) - GIRDERS, STRINGERS, FLOOR BEAMS                          *
******************************************************************************************************************************

              MEMBER SECT. SAME   BFL   H         A         B         B*        T       I       AS        D     COMP
                ID    NO.   AS ADR                                                              R                  CODE

 10900--13    S 3     1     0          24.00     0.00     22.00     22.00     12.00   1       6.03      2.00
 11100--13    S 3     1     0           0.00     0.00     22.00      0.00     12.00   2       2.00     22.50   X
 10800--13    S 3     2     0          24.00    22.50     22.00      9.63      4.25   1       1.93      2.00   X
 11200--13    S 3     2     0           0.00     0.00     22.00      0.00      4.00   2       4.39     22.50
 10700--13    S 3     3     2  R       24.00    22.50     22.00     13.50      4.25   1       1.93      2.00   X
 10600--13    S 3     4     2  R        0.00     0.00      0.00      0.00      0.00   1       2.54      2.00   X
 10500--13    S 3     5     1  R        0.00     0.00      0.00      0.00      0.00   1       5.07      2.00
 11000--13    S 3     6     0          24.00     0.00     22.00     22.00     12.00   1       5.07      2.00   X
 11300--13    S 3     6     0           0.00     0.00     22.00      0.00     12.00   2       2.00     22.50


******************************************************************************************************************************
*                                  SECTION PROPERTIES (COMPOSITE) - GIRDERS, STRINGERS, FLOOR BEAMS                          *
******************************************************************************************************************************

              MEMBER  SPAN       RANGE   COMP N SECT     A     WIDTH    THICK   FILLET  FILLET  EFFECT.  EFFECT.  DIST TO
                ID SYMM  RANGE   LENGTH  CODE      SAME R               -NESS   WIDTH   THICK.   WIDTH    THICK.  TOP SECT.

 11500--14    S 1     1   1   40.000FT. C   0   1   0          98.00     6.25   18.00    1.00   93.00     7.75     4.20
 11400--14    S 1     1   2   10.917FT. N   0   1   0           0.00     0.00    0.00    0.00    0.00     0.00     0.00
 11700--14    S 1     2   1   14.000FT. N   0   1   0           0.00     0.00    0.00    0.00    0.00     0.00     0.00
 11600--14    S 1     2   2   56.000FT. C   0   1   0           0.00     0.00    0.00    0.00    0.00     0.00     0.00
 11800--14    S 1     2   3   11.667FT. N   0   1   0           0.00     0.00    0.00    0.00    0.00     0.00     0.00
 11900--14    S 1     3   1   10.000FT. N   0   1   0           0.00     0.00    0.00    0.00    0.00     0.00     0.00
 12100--14    S 1     3   2   68.250FT. C   0   1   0           0.00     0.00    0.00    0.00    0.00     0.00     0.00
 12000--14    S 1     3   3   29.000FT. N   0   1   0           0.00     0.00    0.00    0.00    0.00     0.00     0.00
 12400--14    S 1     4   1   33.000FT. N   0   1   0           0.00     0.00    0.00    0.00    0.00     0.00     0.00
 12300--14    S 1     4   2   53.250FT. C   0   1   0           0.00     0.00    0.00    0.00    0.00     0.00     0.00
 12200--14    S 1     4   3   21.000FT. N   0   1   0           0.00     0.00    0.00    0.00    0.00     0.00     0.00
 12500--14    S 1     5   1   14.000FT. N   0   1   0           0.00     0.00    0.00    0.00    0.00     0.00     0.00
 12600--14    S 1     5   2   55.583FT. C   0   1   0           0.00     0.00    0.00    0.00    0.00     0.00     0.00
 12700--14    S 2     1   1  112.833FT. C   0   1   0          98.00     6.25   18.00    1.00   93.00     7.75     4.20
 12800--14    S 2     1   2   25.000FT. N   0   1   0           0.00     0.00    0.00    0.00    0.00     0.00     0.00
 12900--14    S 2     2   1   44.000FT. N   0   1   0           0.00     0.00    0.00    0.00    0.00     0.00     0.00
 13100--14    S 2     2   2   32.000FT. C   0   1   0           0.00     0.00    0.00    0.00    0.00     0.00     0.00
 13000--14    S 2     2   3   18.000FT. N   0   1   0           0.00     0.00    0.00    0.00    0.00     0.00     0.00
 13300--14    S 2     3   1   13.000FT. N   0   1   0           0.00     0.00    0.00    0.00    0.00     0.00     0.00
 13200--14    S 2     3   2   54.417FT. C   0   1   0           0.00     0.00    0.00    0.00    0.00     0.00     0.00


******************************************************************************************************************************
*                                      BRACING LENGTH SPECIFICATIONS - LOAD FACTOR ANALYSIS                                  *
******************************************************************************************************************************

              MEMBER  SPAN RANGE    RANGE   SUPPORT COND. SPACES  SPACING    STIFF
                ID SYMM  T/B        LENGTH   LEFT RIGHT           DISTANCE  SPACING

 13400--16    S 1     1  T  1     50.917FT.C               0     0.000FT.    0.000IN.
 13500--16    S 1     1  B  1     50.917FT.SP    SP        3    16.972FT.  290.375IN.
 13600--16    S 1     2  T  1     81.667FT.C               0     0.000FT.    0.000IN.
 13700--16    S 1     2  B  1     72.000FT.SP              3    24.000FT.  288.000IN.
 13900--16    S 1     2  B  2      9.667FT.SP    SP        0     0.000FT.   38.666IN.
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```
13900--16   S 1    3  T  1    107.250FT.C                0    0.000FT.   0.000IN.
14000--16   S 1    3  B  1    107.250FT.SP     SP        5   21.450FT.  42.900IN.
  100--16   S 1    4  T  1    107.250FT.C                0    0.000FT.   0.000IN.
  200--16   S 1    4  B  1    107.250FT.SP     SP        5   21.450FT.  42.900IN.
14300--16   S 1    5  T  1     69.583FT.C                0    0.000FT.   0.000IN.
14400--16   S 1    5  B  1     69.583FT.SP     SP        3   23.194FT.  46.388IN.
14500--16   S 2    1  T  1    137.833FT.C                0    0.000FT.   0.000IN.
14600--16   S 2    1  B  1     96.000FT.SP               4   24.000FT.  48.000IN.
14700--16   S 2    1  B  2     21.833FT.SP               0    0.000FT.  43.667IN.
14800--16   S 2    1  B  3     20.000FT.SP     SP        0    0.000FT.  40.000IN.
14900--16   S 2    2  T  1     94.000FT.C                0    0.000FT.   0.000IN.
15000--16   S 2    2  B  1     94.000FT.SP     SP        4   23.500FT.  35.250IN.
15100--16   S 2    3  T  1     67.417FT.C                0    0.000FT.   0.000IN.
15200--16   S 2    3  B  1     67.417FT.SP     SP        3   22.472FT.  33.708IN.
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IFY151I VDIOS : 1020 RECORDS OF LENGTH 1200 FORMATTED ON FILE FT11F001.
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                         SUMMARY OF RATING CALCULATIONS------STRUCTURE MEMBER   S 1      BARS RELEASE 5.4
                                   INVENTORY AND/OR OPERATING ANALYSIS


   INPUT CODING --                                STRUCTURE   9340                          D/P STR. I.D.--  G65-005

     DATE 12/11/95
                              INVENTORY
                                                                OPERATING
                                                                                          ************************
     BY
                           LIVE LOAD   RATING
                                                            LIVE LOAD    RATING
                                                                                          *  SPECIAL ATTENTION    *
                                                                                          *      OF LEAD          *

                             HS20      HS  19.77
                                                              HS20      HS  32.95
                                                                                          *  ENGINEER REQUIRED    *

                                                                                          ************************
```

EXHIBIT NO: 7
Date: 4-21-08
JULIE A RIXE
COURT REPORTER

```
   STRUCTURE DESCRIPTION --                  LOCATION --                            MICROFILM REEL NUMBERS --
     IDENTIFICATION      9340                  DISTRICT        5                       DESIGN PLANS
     TYPE                   SS                 COUNTY          27                      COMPUTATIONS
     YEAR OF CONSTR.    1964                   CONSTR. RTE.    TH 35W                  CORRESPONDENCE
     LENGTH             1907.00 FEET           CONSTR. SEC.
     ROADWAY WIDTH        52.00 FEET           CONSTR. STA.       0+  .
     NUMBER OF SPANS      14                   KEY RTE.
                                               MARKED RTE.

                    ANALYST REMARKS --

                                   .17 FT WC  ARCH DECK TRUSS AND TRUSS FL BM'S NOT RATED S01 IS 5 SPAN
                                   SO. APPR. G-13. S02 IS SPANS 9 TO 11 S03 IS VOIDED CONC. SPAN 12 TO 14
                                   S02 IS G-13, S03 IS 35W  BR 9340A IS SAME AS S03. L.F.RATING



  INVENTORY RATING SUMMARY --
                                                                                OPERATING RATING SUMMARY --

   MEMBER ID.              S 1
                                                                                 MEMBER ID.          S 1

   SPAN                     4
                                                                                 SPAN                 4

   CRITICAL C.P. DIST.    53.6 FEET
                                                                                 CRITICAL C.P. DIST.    53.6 FEET

   LIVE LOAD DESIGNATION  HS20
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                                                               LIVE LOAD DESIGNATION  HS20

                    MOMENT
                                                                                 MOMENT

                  (FT. KIPS)
                                                                              (FT. KIPS)

MEMBER CAPACITY     1329.7
                                                               MEMBER CAPACITY      2216.2

DL EFFECT            489.6
                                                               DL EFFECT             489.6


CAPACITY FOR (LL+I)  962.4
                                                               CAPACITY FOR (LL+I)  1604.0

ACTUAL (LL+I)        973.6
                                                               ACTUAL (LL+I)         973.6


INVENTORY RATING   HS 19.77
                                                               OPERATING RATING   HS 32.95
```

```
                                   SUMMARY OF RATING CALCULATIONS------STRUCTURE MEMBER   S 2     BARS RELEASE 5.4
                                             INVENTORY AND/OR OPERATING ANALYSIS


   INPUT CODING --                                     STRUCTURE  9340                                D/P STR. I.D.--  G65-005

       DATE 12/11/95
                                        INVENTORY
                                                                           OPERATING
                                                                                                   *************************
       BY
                                    LIVE LOAD    RATING
                                                                      LIVE LOAD    RATING
                                                                                                   *  SPECIAL ATTENTION    *
                                                                                                   *      OF LEAD          *

                                      HS20      HS  27.32
                                                                        HS20      HS  45.53
                                                                                                   *  ENGINEER REQUIRED    *

                                                                                                   *************************




   STRUCTURE DESCRIPTION --                        LOCATION --                                     MICROFILM REEL NUMBERS --
       IDENTIFICATION     9340                         DISTRICT        5                                DESIGN PLANS
       TYPE                 SS                         COUNTY           27                              COMPUTATIONS
       YEAR OF CONSTR.   1964                          CONSTR. RTE.     TH 35W                          CORRESPONDENCE
       LENGTH            1907.00 FEET                  CONSTR. SEC.
       ROADWAY WIDTH       52.00 FEET                  CONSTR. STA.        0+  .
       NUMBER OF SPANS     14                          KEY RTE.
                                                       MARKED RTE.

                         ANALYST REMARKS --

                                           .17 FT WC  ARCH DECK TRUSS AND TRUSS FL BM'S NOT RATED S01 IS 5 SPAN
                                           SO. APPR. G-13. S02 IS SPANS 9 TO 11 S03 IS VOIDED CONC. SPAN 12 TO 14
                                           S02 IS G-13, S03 IS 35W  BR 9340A IS SAME AS S03. L.F.RATING




INVENTORY RATING SUMMARY --
                                                                                        OPERATING RATING SUMMARY --

  MEMBER ID.               S 2
                                                                                         MEMBER ID.                S 2

  SPAN                      3
                                                                                         SPAN                        3

  CRITICAL C.P. DIST.    40.4 FEET
                                                                                         CRITICAL C.P. DIST.    40.4 FEET

  LIVE LOAD DESIGNATION  HS20
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```
                     MOMENT

                  (FT. KIPS)

MEMBER CAPACITY        1408.0

DL EFFECT               470.3


CAPACITY FOR (LL+I)    1035.6

ACTUAL (LL+I)           758.2


INVENTORY RATING     HS 27.32
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```
LIVE LOAD DESIGNATION  HS20


                            MOMENT

                        (FT. KIPS)

MEMBER CAPACITY             2346.7

DL EFFECT                    470.3


CAPACITY FOR (LL+I)         1726.0

ACTUAL (LL+I)                758.2


OPERATING RATING          HS 45.53
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                              SUMMARY OF RATING CALCULATIONS------STRUCTURE MEMBER   S 3      BARS RELEASE 5.4
                                     INVENTORY AND/OR OPERATING ANALYSIS


  INPUT CODING --                          STRUCTURE   9340                           D/P STR. I.D.--  G65-005

     DATE 12/11/95
                                  INVENTORY
                                                              OPERATING
                                                                                      ************************
     BY
                               LIVE LOAD    RATING
                                                         LIVE LOAD    RATING
                                                                                      *  SPECIAL ATTENTION   *
                                                                                      *      OF LEAD         *

                                 HS20      HS  20.17
                                                           HS20      HS  33.61
                                                                                      *  ENGINEER REQUIRED   *

                                                                                      ************************




  STRUCTURE DESCRIPTION --                  LOCATION --                              MICROFILM REEL NUMBERS --
     IDENTIFICATION        9340                DISTRICT        5                       DESIGN PLANS
     TYPE                    SS                COUNTY          27                      COMPUTATIONS
     YEAR OF CONSTR.     1964                  CONSTR. RTE.     TH 35W                 CORRESPONDENCE
     LENGTH              1907.00 FEET          CONSTR. SEC.
     ROADWAY WIDTH         52.00 FEET          CONSTR. STA.        0+
     NUMBER OF SPANS       14                  KEY RTE.
                                               MARKED RTE.

                      ANALYST REMARKS --

                                        17 FT WC  ARCH DECK TRUSS AND TRUSS FL BM'S NOT RATED S01 IS 5 SPAN
                                        SO, APPR. G-13. S02 IS SPANS 9 TO 11 S03 IS VOIDED CONC. SPAN 12 TO 14
                                        S02 IS G-13, S03 IS 35W  BR 9340A IS SAME AS S03. L.F.RATING



 INVENTORY RATING SUMMARY --
                                                                             OPERATING RATING SUMMARY --

  MEMBER ID.              S 3
                                                                              MEMBER ID.              S 3

  SPAN                     3
                                                                              SPAN                     3

  CRITICAL C.P. DIST.     0.0 FEET
                                                                              CRITICAL C.P. DIST.     0.0 FEET

  LIVE LOAD DESIGNATION  HS20
```

LIVE LOAD DESIGNATION HS20

	MOMENT (FT. KIPS)
MEMBER CAPACITY	-314.0
DL EFFECT	-102.5
CAPACITY FOR (LL+I)	-83.4
ACTUAL (LL+I)	-82.7
INVENTORY RATING	HS 20.17

	MOMENT (FT. KIPS)
MEMBER CAPACITY	-314.0
DL EFFECT	-102.5
CAPACITY FOR (LL+I)	-139.0
ACTUAL (LL+I)	-82.7
OPERATING RATING	HS 33.61

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                                    DETAIL DATA AT MOMENT CHECK POINT FOR
                          COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE 12/11/95
                                                                                   D/P STRUCTURE I.D. = G65-005
                                                                                   MEMBER I.D. --       S 1
                                                                                   C.P. LOCATION --     1.00

                                                                                                        PAGE 3


***** RATING FACTOR *****
                         -- RATING FACTOR FOR MOMENT --
                   AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MOMENT
               TOP       TOP       BOTT      BOTT              TOP                   BOTT                RATING     SAFE
              +BEND     -BEND     +BEND     -BEND       +BEND      -BEND      +BEND      -BEND         VALUE      LOAD
                                                                                                                CAP.(TONS)
INV.   HS20  15678.6      0.0     742.6       0.0     999.0000 999.0000 999.0000 999.0000

OPER.  HS20  26130.9    973.1    1237.6    1037.1     999.0000 999.0000 999.0000 999.0000

                       -- RATING FACTOR FOR SERVICEABILITY --
                  AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
               TOP       TOP       BOTT      BOTT              TOP                   BOTT                RATING     SAFE
              +BEND     -BEND     +BEND     -BEND       +BEND      -BEND      +BEND      -BEND         VALUE      LOAD
                                                                                                                CAP.(TONS)
INV.   HS20  19363.0    604.4     917.1     604.4     999.0000 999.0000 999.0000 999.0000

OPER.  HS20  32271.7   1007.3    1528.5    1007.3     999.0000 999.0000 999.0000 999.0000

                          -- RATING FACTOR FOR SHEAR --
                AVAILABLE CAPACITY (KIPS)                   RATING FACTOR - SHEAR                  RATING     SAFE
                   LEFT      RIGHT                             LEFT      RIGHT                     VALUE      LOAD

INV.   HS20      154.82    154.82                             2.8502    2.8502                    HS 57.0    102.6

OPER.  HS20      258.04    258.04                             4.7503    4.7503                    HS 95.0    171.0
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                                   DETAIL DATA AT MOMENT CHECK POINT FOR               BARS RELEASE 5.4
                          COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
  DATE 12/11/95                                                                     D/P STRUCTURE I.D. = G65-005
                                                                                    MEMBER I.D. --       S 1
                                                                                    C.P. LOCATION -      1.40

                                                                                                      PAGE 1
*****  SECTION PROPERTIES IN RANGE  1 OF SPAN 1   ******

                          -- STRUCTURAL STEEL PROPERTIES --
    H     Tweb   H/Tweb   D    D/Tweb   - B' (IN) -   - B'/t -    Lb ( FT )   Ry ( IN )   - Lb / Ry   HYBRID RATIO, R
  (IN.)   (IN.)         (IN.)            TOP   BOT   TOP   BOT   TOP   BOT    TOP   BOT    TOP   BOT    +BEND   -BEND
  32.86   0.55   59.75 31.38   57.05   5.47 5.47   7.40  7.40  CONT   16.97  3.32  3.32   0.00 61.35  1.0000  1.0000

                          -- COMPOSITE CONCRETE PROPERTIES --
  EFF.WIDTH   EFF.THICK.  VALUE   (AS)C    (DS)C  VALUE  VALUE   Atf       Abf       Aw
   (IN.)        (IN.)       N    (SQ.IN.) (IN.)     a      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
   93.0          7.8        8      0.00     0.00   3.90   0.0    8.51      8.51     17.26

                          -- SECTION PROPERTIES --          -------- SECTION MODULUS --------   ---- PLASTIC SECTION MODULUS ----
          GROSS     NET AREA         IX         IX      C      TOP      TOP      BOTT     BOTT     TOP      TOP      BOTT     BOTT
          AREA    +BEND  -BEND     +BEND      -BEND   (BOT)   +BEND    -BEND    +BEND    -BEND    +BEND    -BEND+   +BEND    -BEND
          SQ.IN.  SQ.IN. SQ.IN.    IN.**4     IN.**4   IN.    IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3
NON-COM   34.28   34.28  34.28     5806.9     5806.9  16.43   353.4    353.4    353.4    353.4    408.74   408.74   408.74   408.74
COM(N=N)                          16825.9       0.0  31.37  11323.4  1878.9    536.3    489.9
COM(N=3N)                         12769.9       0.0  26.06   1878.9  1878.9    489.9    489.9

                         -- ULTIMATE STRENGTH --
    Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
     STEEL     CONC.     REBAR     TOP      BOT    TOP     BOT         BOT          TOP          WEB
                                  FLANGE  FLANGE  FLANGE FLANGE       FLANGE       FLANGE
    36000.     4000.     40000.    8.43     8.43   11.60   11.60      36000.       36000.       36000.

*****  SECTION QUALIFICATION  *****
       STIFFENED   UNSTIFFENED  COMPACT    BRACED       UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
       LONG  TRANV                       NON-COMPACT  NON-COMPACT     FACTOR
+BEND         X                              X                        0.0000         X
-BEND         X                                           X           0.8695         X

*****  SECTION CAPACITY  *****
       +BEND        ML =       0.00 FT-KIPS,   MR =      0.00 FT-KIPS,   M1/M2 =     0.0
       -BEND        ML =      43.96 FT-KIPS,   MR =   -234.73 FT-KIPS,   M1/M2 =     0.2
    --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---    -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --   -- SHEAR CAPACITY (KIPS) --

        TOP        TOP       BOTT       BOTT        MU         MAX. CAP.    MAX. CAP.      MU                    VU        VU
       +BEND      -BEND     +BEND      -BEND                    STEEL        CONC.                               LEFT      RIGHT
INV.  15678.55    489.37    742.57     489.37      0.00        408.74      10969.97     15678.55                360.37    360.37
OPER. 26130.92    815.61   1237.61     815.61      0.00        408.74      10969.97     26130.92                360.37    360.37

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                         -- DEAD LOAD --
    M (DL)    M (SDL)     REDIS.    REDIS.      V (DL)    V (SDL)
                          M-(DL)  --M-(SDL)
     94.85     60.90      94.85     60.90       -3.22      -0.66
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                              DETAIL DATA AT MOMENT CHECK POINT FOR
                    COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE 12/11/95
                                                                      D/P STRUCTURE I.D. = G65-005
                                                                      MEMBER I.D. --       S 1
                                                                      C.P. LOCATION --     1.40

                                                                                           PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR = 0.284 FOR +BEND AND = 0.242 FOR -BEND)

                                        -- LIVE LOAD --
                 -------------TRUCK MOMENT-------------  -------------LANE MOMENT------------  -----FIXED-----  ------MAX------
      LIVE        REDIS   LL+IMP   LL    LOC.NO.  DIR   LL+IMP    LL    LOC.CONC. LOC.CONC.      SHEAR             SHEAR
      LOAD         LL+I                  1 WHEEL                        LOAD #1   LOAD #2     +V        -V    +V        -V
                 FT-KIPS FT-KIPS FT-KIPS   FT.          FT-KIPS FT-KIPS   FT.       FT.      KIPS      KIPS  KIPS      KIPS

 INV.  HS20 +BEND   0.00   526.1   409.6    6.367   L    362.2   282.0   20.367    0.000    7.02      7.07
            -BEND 138.20   138.2   111.3   95.253   R    103.5    83.3   75.417    0.000    6.79      6.79
                                                                                                         25.10     25.10
 OPER. HS20 +BEND   0.00   526.1   409.6    6.367   L    362.2   282.0   20.367    0.000    7.02      7.07
            -BEND 138.20   138.2   111.3   95.253   R    103.5    83.3   75.417    0.000    6.79      6.79
                                                                                                         25.10     25.10

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
              SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
      T 0      0.000    0.000    0.000    0.000    0.000    0.000
      E 1      2.730   -1.553    0.117   -0.040    0.005    0.000
      N 2      5.476   -2.127    0.179   -0.068    0.007    0.000
      T 3      8.257   -2.205    0.213   -0.077    0.009    0.000
      H 4     11.090   -2.102    0.221   -0.073    0.009    0.000
        5      8.900   -1.854    0.210   -0.065    0.009    0.000
      P 6      6.796   -1.492    0.183   -0.053    0.008    0.000
      O 7      4.795   -1.048    0.145   -0.039    0.006    0.000
      I 8      2.920   -0.948    0.099   -0.024    0.004    0.000
      N 9      1.329   -0.163    0.048   -0.010    0.002    0.000
      T 0      0.000    0.000    0.000    0.000    0.000    0.000

                                                                  AREA
                                                                 TOTALS
    POS AREA   266.3      0.0     15.2      0.0      0.4      0.0   281.8
    NEG AREA     0.0    106.9      0.0      4.8      0.0      0.0   111.7

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

      X-DIST (FT.)      0.00      0.00      0.00  POS AREA =      0.00
      Y-ORDINATE        0.00      0.00      0.00
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                                               DETAIL DATA AT MOMENT CHECK POINT FOR
                                 COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE 12/11/95                                                                                  D/P STRUCTURE I.D. = G65-005
                                                                                                  MEMBER I.D. --       S 1
                                                                                                  C.P. LOCATION --     1.40

                                                                                                                       PAGE 3


*****  RATING FACTOR  *****
              -- RATING FACTOR FOR MOMENT --
                   AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR - MOMENT
               TOP       TOP       BOTT      BOTT               TOP               BOTT             RATING      SAFE
              +BEND     -BEND     +BEND     -BEND      +BEND    -BEND    +BEND    -BEND          VALUE       LOAD
                                                                                                         CAP.(TONS)
INV.   HS20  13635.0     582.8     616.2     582.8    25.9191   4.2173   1.1714   4.2173        HS 23.4      42.2

OPER.  HS20  22725.0     971.4    1027.0     971.4    43.1984   7.0288   1.9523   7.0288        HS 39.0      70.3

                        -- RATING FACTOR FOR SERVICEABILITY --
                  AVAILABLE (LL+I) CAPACITY (FT-KIPS)  RATING FACTOR -SERVICEABILITY
               TOP       TOP       BOTT      BOTT               TOP               BOTT             RATING      SAFE
              +BEND     -BEND     +BEND     -BEND      +BEND    -BEND    +BEND    -BEND          VALUE       LOAD
                                                                                                         CAP.(TONS)
INV.   HS20  17319.5     697.8     790.7     697.8    32.9229   5.0494   1.5031   5.0494

OPER.  HS20  28865.8    1163.0    1317.9    1163.0    54.8716   8.4157   2.5052   8.4157

                             -- RATING FACTOR FOR SHEAR --
               AVAILABLE CAPACITY (KIPS)                       RATING FACTOR - SHEAR             RATING      SAFE
                   LEFT      RIGHT                                LEFT     RIGHT                  VALUE       LOAD

INV.   HS20      168.65    168.65                               6.7190   6.7190

OPER.  HS20      281.08    281.08                              11.1983  11.1983
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                                          DETAIL DATA AT MOMENT CHECK POINT FOR              BARS RELEASE 5.4
                              COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
  DATE 12/11/95
                                                                                     D/P STRUCTURE I.D. = G65-005
                                                                                     MEMBER I.D. --        S 1
                                                                                     C.P. LOCATION -       2.00

                                                                                                          PAGE 1
*****  SECTION PROPERTIES IN RANGE  1 OF SPAN 2   ******

                          -- STRUCTURAL STEEL PROPERTIES --
    H     Tweb   H/Tweb   D    D/Tweb   - B' (IN) -    - B'/t -     Lb ( FT )    Ry ( IN )    - Lb / Ry   HYBRID RATIO, R
  (IN.)  (IN.)          (IN.)            TOP   BOT    TOP   BOT   TOP    BOT    TOP   BOT    TOP   BOT    +BEND   -BEND
  34.18  0.55    62.15  31.38   57.05   5.48  5.48    3.91  3.91  CONT   24.00  3.32  3.32   0.00  86.75  1.0000  1.0000

                        , -- COMPOSITE CONCRETE PROPERTIES --
   EFF.WIDTH  EFF.THICK.  VALUE   (AS)C    (DS)C  VALUE  VALUE   Atf      Abf       Aw
    (IN.)       (IN.)       N    (SQ.IN.)  (IN.)    a      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
    93.0         7.8        8      0.00     0.00   5.63   0.0   16.10    16.10     17.26

                         -- SECTION PROPERTIES --          -------- SECTION MODULUS --------   ---- PLASTIC SECTION MODULUS ----
          GROSS    NET AREA        IX         IX      C      TOP      TOP      BOTT     BOTT     TOP      TOP     BOTT     BOTT
          AREA   +BEND  -BEND    +BEND      -BEND   (BOT)   +BEND    -BEND    +BEND    -BEND    +BEND    -BEND+   +BEND    -BEND
          SQ.IN. SQ.IN. SQ.IN.   IN.**4     IN.**4   IN.    IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3
NON-COM   49.46  49.46  49.46   10071.4    10071.4  17.09   589.3    589.3    589.3    589.3    663.15   663.15   663.15   663.15
COM(N=N)                        10071.4        0.0  17.09   589.3    589.3    589.3    589.3
COM(N=3N)                       10071.4        0.0  17.09   589.3    589.3    589.3    589.3

                         -- ULTIMATE STRENGTH --
   Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)      -- YIELD STRESS, Fy (PSI) --
    STEEL     CONC.     REBAR     TOP     BOT    TOP    BOT          BOT          TOP          WEB
                                 FLANGE  FLANGE FLANGE FLANGE       FLANGE       FLANGE
   36000.     4000.     40000.    8.43    8.43   11.60  11.60       36000.       36000.       36000.

*****  SECTION QUALIFICATION  *****
        STIFFENED   UNSTIFFENED  COMPACT    BRACED      UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
       LONG  TRANV                       NON-COMPACT  NON-COMPACT    FACTOR
+BEND         X                               X                       0.0000         X
-BEND         X                                            X          0.7390         X

*****  SECTION CAPACITY  *****
         +BEND        ML =      0.00 FT-KIPS,   MR =      0.00 FT-KIPS,   M1/M2 =     0.0
         -BEND        ML =   -880.19 FT-KIPS,   MR =    196.75 FT-KIPS,   M1/M2 =     4.5
     --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---     -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --   -- SHEAR CAPACITY (KIPS) --

          TOP       TOP       BOTT       BOTT        MU        MAX. CAP.    MAX. CAP.      MU                   VU       VU
         +BEND     -BEND     +BEND      -BEND                   STEEL        CONC.                            LEFT     RIGHT
INV.     815.98    815.98    815.98     723.59       0.00       663.15        0.00        815.98              360.37   360.37
OPER.   1359.96   1359.96   1359.96    1205.98       0.00       663.15        0.00       1359.96              360.37   360.37

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                         -- DEAD LOAD --
     M (DL)    M (SDL)     REDIS.    REDIS.      V (DL)      V (SDL)
                          M-(DL)---M-(SDL)
    -366.48    -126.19    -366.48   -126.19      33.76       14.37
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                                     DETAIL DATA AT MOMENT CHECK POINT FOR
                          COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
  DATE 12/11/95                                                                   D/P STRUCTURE I.D. = G65-005
                                                                                  MEMBER I.D. --       S 1
                                                                                  C.P. LOCATION --     2.00

                                                                                                      PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR = 0.215 FOR +BEND AND = 0.261 FOR -BEND)

                                           -- LIVE LOAD --
                  --------------TRUCK MOMENT------------  -------------LANE MOMENT-------------  -----FIXED-----  ------MAX------
      LIVE        REDIS   LL+IMP   LL    LOC.NO.  DIR   LL+IMP     LL    LOC.CONC. LOC.CONC.       SHEAR              SHEAR
      LOAD         LL+I                  1 WHEEL                          LOAD #1   LOAD #2    +V         -V     +V         -V
                  FT-KIPS FT-KIPS FT-KIPS   FT.         FT-KIPS FT-KIPS    FT.       FT.      KIPS       KIPS  KIPS       KIPS

INV.   HS20 +BEND   0.00    34.6   28.4  192.759  R     31.8     26.1   175.483     0.000  16.65       0.49
            -BEND 387.52   350.9  278.2   95.253  R    387.5    307.2    75.417    30.550  17.28      17.28
                                                                                                            62.99      62.99
OPER.  HS20 +BEND   0.00    34.6   28.4  192.759  R     31.8     26.1   175.483     0.000  16.65       0.49
            -BEND 387.52   350.9  278.2   95.253  R    387.5    307.2    75.417    30.550  17.28      17.28
                                                                                                            62.99      62.99

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
              SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
       T 0     0.000    0.000    0.000    0.000    0.000    0.000
       E 1    -0.814   -3.883    0.292   -0.099    0.011    0.000
       N 2    -1.584   -5.317    0.448   -0.169    0.018    0.000
       T 3    -2.269   -5.512    0.531   -0.193    0.022    0.000
       H 4    -2.825   -5.256    0.553   -0.183    0.023    0.000
         5    -3.208   -4.636    0.525   -0.162    0.022    0.000
       P 6    -3.377   -3.730    0.458   -0.133    0.020    0.000
       O 7    -3.287   -2.620    0.363   -0.098    0.016    0.000
       I 8    -2.883   -1.370    0.248   -0.061    0.011    0.000
       N 9    -1.769   -0.408    0.119   -0.026    0.006    0.000
       T 0     0.000    0.000    0.000    0.000    0.000    0.000

                                                                AREA
                                                               TOTALS
   POS AREA     0.0      0.0     37.9      0.0      1.0      0.0    39.0
   NEG AREA   112.1    267.3      0.0     12.0      0.0      0.0   391.5

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

       X-DIST (FT.)      0.00       0.00       0.00  POS AREA =       0.00
       Y-ORDINATE        0.00       0.00       0.00
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DETAIL DATA AT MOMENT CHECK POINT FOR
COMPOSITE STEEL AND CONCRETE FLEXURAL MEMBER - LOAD FACTOR RATING

DATE 12/11/95

D/P STRUCTURE I.D. = G65-005
MEMBER I.D. -- S 1
C.P. LOCATION -- 2.00

***** RATING FACTOR *****

-- RATING FACTOR FOR MOMENT --

		AVAILABLE (LL+I) CAPACITY (FT-KIPS)				RATING FACTOR - MOMENT					
		TOP	TOP	BOTT	BOTT	TOP		BOTT		RATING	SAFE
		+BEND	-BEND	+BEND	-BEND	+BEND	-BEND	+BEND	-BEND	VALUE	LOAD CAP.(TONS)
INV.	HS20	1111.6	520.4	1111.6	~~428.0~~	32.1654	1.3428	32.1654	~~1.1044~~	~~HS 22.1~~	39.8
OPER.	HS20	1852.6	867.3	1852.6	~~713.3~~	53.6090	2.2381	53.6090	~~1.8407~~	~~HS 36.8~~	66.3

-- RATING FACTOR FOR SERVICEABILITY --

		AVAILABLE (LL+I) CAPACITY (FT-KIPS)				RATING FACTOR -SERVICEABILITY					
		TOP	TOP	BOTT	BOTT	TOP		BOTT		RATING	SAFE
		+BEND	-BEND	+BEND	-BEND	+BEND	-BEND	+BEND	-BEND	VALUE	LOAD CAP.(TONS)
INV.	HS20	1303.3	712.1	1303.3	712.1	37.7141	1.8377	37.7141	1.8377		
OPER.	HS20	2172.2	1186.9	2172.2	1186.9	62.8568	3.0628	62.8569	3.0628		

-- RATING FACTOR FOR SHEAR --

		AVAILABLE CAPACITY (KIPS)		RATING FACTOR - SHEAR		RATING	SAFE
		LEFT	RIGHT	LEFT	RIGHT	VALUE	LOAD
INV.	HS20	137.44	137.44	2.1818	2.1818		
OPER.	HS20	229.07	229.07	3.6364	3.6364		

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                                        DETAIL DATA AT MOMENT CHECK POINT FOR                BARS RELEASE 5.4
                              COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
  DATE 12/11/95                                                                         D/P STRUCTURE I.D. = G65-005
                                                                                        MEMBER I.D. --       S 1
                                                                                        C.P. LOCATION -      2.50

                                                                                                             PAGE 1
*****  SECTION PROPERTIES IN RANGE  2 OF SPAN 2   ******

                            -- STRUCTURAL STEEL PROPERTIES --
     H     Tweb   H/Tweb    D    D/Tweb   - B' (IN) -    - B'/t -     Lb ( FT )    Ry ( IN )     - Lb / Ry    HYBRID RATIO, R
   (IN.)   (IN.)          (IN.)            TOP    BOT    TOP    BOT   TOP    BOT    TOP   BOT     TOP    BOT    +BEND   -BEND
   34.54   0.55    62.80  31.38   57.05   5.48   5.48   3.47   3.47  CONT   24.00   3.32  3.32    0.00  86.75  1.0000  1.0000

                            -- COMPOSITE CONCRETE PROPERTIES --
    EFF.WIDTH   EFF.THICK.  VALUE   (AS)C    (DS)C  VALUE  VALUE   Atf       Abf        Aw
     (IN.)        (IN.)       N    (SQ.IN.)  (IN.)    a      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
     93.0          7.8        8      0.00     0.00   6.10   0.0   18.17     18.17     17.26

                            -- SECTION PROPERTIES --           --------- SECTION MODULUS ---------    ---- PLASTIC SECTION MODULUS ----
          GROSS     NET AREA         IX         IX       C      TOP       TOP      BOTT     BOTT     TOP      TOP      BOTT     BOTT
          AREA    +BEND  -BEND     +BEND      -BEND    (BOT)   +BEND     -BEND    +BEND    -BEND    +BEND    -BEND+   +BEND    -BEND
          SQ.IN.  SQ.IN. SQ.IN.    IN.**4     IN.**4   IN.     IN.**3    IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3
NON-COM   53.60   53.60  53.60    11293.4    11293.4  17.27    653.9     653.9    653.9    653.9    734.28   734.28   734.28   734.28
COM(N=N)                          27235.3        0.0  30.73   7151.1    2125.0    886.2    813.3
COM(N=3N)                         20315.9        0.0  24.98   2125.0    2125.0    813.3    813.3

                            -- ULTIMATE STRENGTH --
    Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
     STEEL     CONC.     REBAR     TOP     BOT     TOP    BOT         BOT          TOP         WEB
                                  FLANGE  FLANGE  FLANGE FLANGE      FLANGE       FLANGE
     36000.    4000.     40000.    8.43    8.43   11.60  11.60       36000.       36000.      36000.

*****  SECTION QUALIFICATION  *****
       STIFFENED   UNSTIFFENED  COMPACT    BRACED       UNBRACED    REDUCTION   SYMMETRICAL UNSYMMETRICAL
        LONG  TRANV                      NON-COMPACT  NON-COMPACT    FACTOR
+BEND         X                             X                        0.0000         X
-BEND         X                             X                        0.7390         X

*****  SECTION CAPACITY  *****
       +BEND        ML =       0.00 FT-KIPS,    MR =      0.00 FT-KIPS,    M1/M2 =      0.0
       -BEND        ML =     196.75 FT-KIPS,    MR =    405.01 FT-KIPS,    M1/M2 =      0.5
     --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---      -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --    -- SHEAR CAPACITY (KIPS) --

        TOP       TOP       BOTT      BOTT       MU        MAX. CAP.    MAX. CAP.     MU                     VU       VU
       +BEND     -BEND     +BEND     -BEND                  STEEL        CONC.                            LEFT     RIGHT
INV.  9901.52    905.44   1227.10    905.44     0.00       734.28      6497.16     9901.52                360.37   360.37
OPER. 16502.53   1509.07  2045.16   1509.07     0.00       734.28      6497.16    16502.53                360.37   360.37

*****  MONENT (FT-KIPS) AND SHEAR (KIPS)  *****
                            -- DEAD LOAD --
     M (DL)   M (SDL)      REDIS.   REDIS.      V (DL)     V (SDL)
                           M-(DL)   M-(SDL)
     338.90    162.31      338.90   162.31       0.39       -0.24
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                                            DETAIL DATA AT MOMENT CHECK POINT FOR
                               COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE 12/11/95                                                                          D/P STRUCTURE I.D. = G65-005
                                                                                          MEMBER I.D. --        S 1
                                                                                          C.P. LOCATION --      2.50

                                                                                                                PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR = 0.256 FOR +BEND AND = 0.256 FOR -BEND)

                                          -- LIVE LOAD --
                 -------------TRUCK MOMENT------------  -------------LANE MOMENT------------  -----FIXED----  ------MAX------
      LIVE       REDIS  LL+IMP    LL    LOC.NO.  DIR  LL+IMP     LL    LOC.CONC. LOC.CONC.       SHEAR           SHEAR
      LOAD        LL+I                  1 WHEEL                         LOAD #1   LOAD #2    +V        -V    +V        -V
                FT-KIPS FT-KIPS FT-KIPS   FT.         FT-KIPS FT-KIPS     FT.       FT.     KIPS      KIPS  KIPS      KIPS

 INV.   HS20 +BEND   0.00  773.2   615.4  105.750  R    560.9   446.4    91.750     0.000   2.83     22.63
             -BEND  82.49   82.5    65.7   11.459  L     55.3    44.0    30.550     0.000   2.83      2.83
                                                                                                          26.31     26.31
 OPER.  HS20 +BEND   0.00  773.2   615.4  105.750  R    560.9   446.4    91.750     0.000   2.83     22.63
             -BEND  82.49   82.5    65.7   11.459  L     55.3    44.0    30.550     0.000   2.83      2.83
                                                                                                          26.31     26.31

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE - LINE (CONTINUOUS SPAN) *****
            SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
      T 0    0.000    0.000    0.000    0.000    0.000    0.000
      E 1   -0.339    1.785    0.122   -0.041    0.005    0.000
      N 2   -0.660    4.590    0.187   -0.071    0.008    0.000
      T 3   -0.945    7.912    0.221   -0.080    0.009    0.000
      H 4   -1.177   11.421    0.230   -0.076    0.010    0.000
        5   -1.337   15.082    0.219   -0.068    0.009    0.000
      P 6   -1.407   10.696    0.191   -0.055    0.008    0.000
      O 7   -1.370    6.394    0.151   -0.041    0.007    0.000
      I 8   -1.201    2.151    0.103   -0.025    0.005    0.000
      N 9   -0.737   -0.170    0.050   -0.011    0.002    0.000
      T 0    0.000    0.000    0.000    0.000    0.000    0.000

                                                                 AREA
                                                                TOTALS
   POS AREA    0.0    489.6     15.8      0.0      0.4      0.0   505.8
   NEG AREA   46.7      0.7      0.0      5.0      0.0      0.0    52.5

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

     X-DIST (FT.)     0.00      0.00      0.00  POS AREA =      0.00
     Y-ORDINATE       0.00      0.00      0.00
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                              DETAIL DATA AT MOMENT CHECK POINT FOR
                  COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
  DATE 12/11/95                                                           D/P STRUCTURE I.D. = 665-005
                                                                          MEMBER I.D. --       S 1
                                                                          C.P. LOCATION --     2.50

                                                                                               PAGE 3


***** RATING FACTOR *****
                     -- RATING FACTOR FOR MOMENT --
               AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MOMENT
                TOP      TOP      BOTT     BOTT          TOP                BOTT            RATING     SAFE
               +BEND    -BEND    +BEND    -BEND     +BEND    -BEND    +BEND    -BEND      VALUE      LOAD
                                                                                                  CAP.(TONS)
INV.   HS20   7350.2   1206.2    845.4   1206.2    9.5056  14.6227   1.0933  14.6227     HS 21.9     39.4

OPER.  HS20  12250.3   2010.3   1409.0   2010.3   15.8426  24.3712   1.8222  24.3712     HS 36.4     65.6

                  -- RATING FACTOR FOR SERVICEABILITY --
               AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
                TOP      TOP      BOTT     BOTT          TOP                BOTT            RATING     SAFE
               +BEND    -BEND    +BEND    -BEND     +BEND    -BEND    +BEND    -BEND      VALUE      LOAD
                                                                                                  CAP.(TONS)
INV.   HS20   9677.0   1418.9   1133.8   1418.9   12.5148  17.2023   1.4662  17.2023

OPER.  HS20  16128.4   2364.9   1889.6   2364.9   20.8580  28.6705   2.4437  28.6705

                        -- RATING FACTOR FOR SHEAR --
             AVAILABLE CAPACITY (KIPS)                  RATING FACTOR - SHEAR              RATING     SAFE
                LEFT      RIGHT                            LEFT      RIGHT                  VALUE      LOAD

INV.   HS20    166.24    166.24                           6.3251    6.3251

OPER.  HS20    277.06    277.06                          10.5418   10.5418
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                                        DETAIL DATA AT MOMENT CHECK POINT FOR              BARS RELEASE 5.4
                              COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE 12/11/95
                                                                                      D/P STRUCTURE I.D. = 065-005
                                                                                      MEMBER I.D. --       S 1
                                                                                      C.P. LOCATION -      3.00

                                                                                                           PAGE 1
***** SECTION PROPERTIES IN RANGE  1 OF SPAN 3   ******

                           -- STRUCTURAL STEEL PROPERTIES --
      H      Tweb   H/Tweb    D    D/Tweb   - B' (IN) -     - B'/t -     Lb ( FT )     Ry ( IN )    - Lb / Ry     HYBRID RATIO, R
    (IN.)   (IN.)           (IN.)            TOP    BOT    TOP    BOT   TOP     BOT   TOP    BOT    TOP    BOT    +BEND    -BEND
    49.76   0.38   132.69  48.00  128.00    6.81   6.81   7.74   7.74  CONT   21.45   4.04   4.04   0.00  63.69  1.0000   1.0000

                           -- COMPOSITE CONCRETE PROPERTIES --
   EFF.WIDTH   EFF.THICK.  VALUE   (AS)C     (DS)C  VALUE  VALUE    Atf       Abf       Aw
     (IN.)       (IN.)       N    (SQ.IN.)  (IN.)    a       Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
     93.0         7.8        8      0.00     0.00   4.85    0.0    12.32     12.32     18.00

                           -- SECTION PROPERTIES --          -------- SECTION MODULUS --------    ---- PLASTIC SECTION MODULUS ----
          GROSS     NET AREA       IX        IX      C      TOP      TOP      BOTT     BOTT     TOP      TOP      BOTT     BOTT
          AREA   +BEND  -BEND    +BEND     -BEND   (BOT)   +BEND    -BEND    +BEND    -BEND    +BEND    -BEND+   +BEND    -BEND
          SQ.IN. SQ.IN. SQ.IN.   IN.**4    IN.**4   IN.    IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3
 NON-COM  42.64  42.64  42.64   18175.4   18175.4  24.88    730.5    730.5    730.5    730.5   818.20   818.20   818.20   818.20
 COM(N=N)                       18175.4       0.0  24.88    730.5    730.5    730.5    730.5
 COM(N=3N)                      18175.4       0.0  24.88    730.5    730.5    730.5    730.5

                           -- ULTIMATE STRENGTH --
    Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)      -- YIELD STRESS, Fy (PSI) --
     STEEL     CONC.     REBAR     TOP     BOT     TOP     BOT         BOT          TOP          WEB
                                 FLANGE  FLANGE  FLANGE  FLANGE      FLANGE       FLANGE
    36000.    4000.     40000.    8.43    8.43    11.60   11.60      36000.       36000.       36000.

*****  SECTION QUALIFICATION  *****
        STIFFENED   UNSTIFFENED  COMPACT    BRACED       UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
       LONG  TRANV                        NON-COMPACT  NON-COMPACT     FACTOR
 +BEND        X                               X                         0.0000        X
 -BEND        X                                             X           0.8653        X

*****  SECTION CAPACITY  *****
        +BEND        ML =      0.00 FT-KIPS,    MR =       0.00 FT-KIPS,   M1/M2 =     0.0
        -BEND        ML =  -1058.52 FT-KIPS,    MR =     -43.66 FT-KIPS,   M1/M2 =    24.2
   --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---     -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --    -- SHEAR CAPACITY (KIPS) --

          TOP      TOP      BOTT     BOTT       MU        MAX. CAP.   MAX. CAP.      MU                  VU        VU
         +BEND    -BEND    +BEND    -BEND                   STEEL       CONC.                           LEFT      RIGHT
 INV.   1011.49  1011.49  1011.49  1011.49     0.00       818.20        0.00      1011.49              353.26    353.26
 OPER.  1685.82  1685.82  1685.82  1685.82     0.00       818.20        0.00      1685.82              353.26    353.26

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                        -- DEAD LOAD --
     M (DL)    M (SDL)     REDIS.    REDIS.      V (DL)     V (SDL)
                          M-(DL)---M-(SDL)
    -328.99    -146.10    -328.99   -146.10      36.62       16.95
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                                    DETAIL DATA AT MOMENT CHECK POINT FOR
                         COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE 12/11/95                                                                    D/P STRUCTURE I.D. = G65-005
                                                                                    MEMBER I.D. --       S 1
                                                                                    C.P. LOCATION --     3.00

                                                                                                         PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR = 0.284 FOR +BEND AND = 0.228 FOR -BEND)

                                         -- LIVE LOAD --
                 -------------TRUCK MOMENT------------  -------------LANE MOMENT------------  -----FIXED-----  ------MAX------
       LIVE         REDIS   LL+IMP   LL      LOC.NO.  DIR   LL+IMP    LL     LOC.CONC. LOC.CONC.      SHEAR           SHEAR
       LOAD         LL+I                     1 WHEEL                         LOAD #1   LOAD #2    +V          -V    +V        -V
                   FT-KIPS FT-KIPS FT-KIPS    FT.           FT-KIPS FT-KIPS    FT.       FT.     KIPS        KIPS  KIPS      KIPS

INV.   HS20 +BEND    0.00    33.7    26.3    11.459    L      22.4    17.5    30.550     0.000   6.77        0.37
            -BEND  583.42   583.4   475.2    88.250    L     430.6   350.7   116.250   175.483   6.47        6.47
                                                                                                                  62.39     62.39
OPER.  HS20 +BEND    0.00    33.7    26.3    11.459    L      22.4    17.5    30.550     0.000   6.77        0.37
            -BEND  583.42   583.4   475.2    88.250    L     430.6   350.7   116.250   175.483   6.47        6.47
                                                                                                                  62.39     62.39

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
            SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
       T 0    0.000    0.000    0.000    0.000    0.000    0.000
       E 1    0.136   -0.714   -0.049    0.017   -0.002    0.000
       N 2    0.264   -1.836   -0.075    0.028   -0.003    0.000
       T 3    0.378   -3.165   -0.089    0.032   -0.004    0.000
       H 4    0.471   -4.568   -0.092    0.031   -0.004    0.000
         5    0.535   -6.033   -0.087    0.027   -0.004    0.000
       P 6    0.563   -7.545   -0.076    0.022   -0.003    0.000
       O 7    0.548   -9.091   -0.061    0.016   -0.003    0.000
       I 8    0.481  -10.661   -0.041    0.010   -0.002    0.000
       N 9    0.295   -8.099   -0.020    0.004   -0.001    0.000
       T 0    0.000    0.000    0.000    0.000    0.000    0.000

                                                                AREA
                                                               TOTALS
    POS AREA    18.7      0.0      0.0      2.0      0.0      0.0   20.7
    NEG AREA     0.0    422.3      6.3      0.0      0.2      0.0  428.8

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

       X-DIST (FT.)      0.00       0.00       0.00 POS AREA =       0.00
       Y-ORDINATE        0.00       0.00       0.00
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                         DETAIL DATA AT MOMENT CHECK POINT FOR
             COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE 12/11/95                                                          D/P STRUCTURE I.D. = G65-005
                                                                          MEMBER I.D. --        S 1
                                                                          C.P. LOCATION --      3.00

                                                                                                PAGE 3


***** RATING FACTOR *****
                       -- RATING FACTOR FOR MOMENT --
                 AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MOMENT
              TOP       TOP       BOTT      BOTT            TOP               BOTT              RATING     SAFE
             +BEND     -BEND     +BEND     -BEND     +BEND    -BEND    +BEND    -BEND         VALUE      LOAD
                                                                                                         CAP.(TONS)
INV.   HS20  1296.5    726.4     1296.5    726.4    38.4449   1.2451  38.4450   1.2451        HS 24.9    44.8

OPER.  HS20  2160.9    1210.7    2160.9    1210.7   64.0748   2.0752  64.0749   2.0752        HS 41.5    74.7

                     -- RATING FACTOR FOR SERVICEABILITY --
                AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
              TOP       TOP       BOTT      BOTT            TOP               BOTT              RATING     SAFE
             +BEND     -BEND     +BEND     -BEND     +BEND    -BEND    +BEND    -BEND         VALUE      LOAD
                                                                                                         CAP.(TONS)
INV.   HS20  1534.2    964.1     1534.2    964.1    45.4931   1.6525  45.4932   1.6525

  ER.  HS20  2557.1    1606.9    2557.1    1606.9   75.8219   2.7542  75.8220   2.7542

                        -- RATING FACTOR FOR SHEAR --
              AVAILABLE CAPACITY (KIPS)                 RATING FACTOR - SHEAR                  RATING     SAFE
                LEFT       RIGHT                         LEFT      RIGHT                       VALUE      LOAD

INV.   HS20    130.90     130.90                        2.0982    2.0982

OPER.  HS20    218.17     218.17                        3.4971    3.4971
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                                  DETAIL DATA AT MOMENT CHECK POINT FOR                 BARS RELEASE 5.4
                          COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE 12/11/95                                                                        D/P STRUCTURE I.D. = G65-005
                                                                                        MEMBER I.D. --        S 1
                                                                                        C.P. LOCATION -       3.50

                                                                                                              PAGE 1
 *****  SECTION PROPERTIES IN RANGE  2 OF SPAN 3   ******

                          -- STRUCTURAL STEEL PROPERTIES --
     H      Tweb   H/Tweb    D     D/Tweb    - B' (IN) -    - B'/t -     Lb ( FT )    Ry ( IN )     - Lb / Ry    HYBRID RATIO, R
   (IN.)   (IN.)           (IN.)              TOP    BOT    TOP   BOT    TOP    BOT    TOP   BOT     TOP    BOT    +BEND   -BEND
   50.13   0.38   133.67  48.00  128.00     5.81   6.81    7.75  4.95   CONT   21.45   3.46  4.04    0.00  63.69  1.0000  1.0000

                          -- COMPOSITE CONCRETE PROPERTIES --
   EFF.WIDTH    EFF.THICK.  VALUE   (AS)C    (DS)C  VALUE  VALUE   Atf       Abf       Aw
    (IN.)        (IN.)        N    (SQ.IN.)  (IN.)    a      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
    93.0          7.8         8      0.00     0.00   5.27   0.0    9.00     19.25    18.00

                          -- SECTION PROPERTIES --           -------- SECTION MODULUS --------   ---- PLASTIC SECTION MODULUS ----
          GROSS    NET AREA        IX         IX       C      TOP      TOP      BOTT     BOTT     TOP      TOP      BOTT     BOTT
          AREA   +BEND  -BEND    +BEND      -BEND   (BOT)   +BEND    -BEND    +BEND    -BEND    +BEND    -BEND+   +BEND    -BEND
          SQ.IN. SQ.IN. SQ.IN.   IN.**4     IN.**4   IN.    IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3
 NON-COM  46.25  46.25  46.25   19124.0    19124.0  19.84    631.5    631.5    963.8    963.8   865.39   865.39   865.39   865.39
 COM(N=N)                       55913.2        0.0  42.63   7458.1   2449.5   1311.7   1224.6
 COM(N=3N)                      40924.4        0.0  33.42   2449.5   2449.5   1224.6   1224.6

                          -- ULTIMATE STRENGTH --
      Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)      -- YIELD STRESS, Fy (PSI) --
       STEEL     CONC.     REBAR    TOP      BOT    TOP     BOT          BOT          TOP          WEB
                                   FLANGE  FLANGE  FLANGE FLANGE        FLANGE       FLANGE
      36000.    4000.     40000.    8.43     8.43   11.60   11.60       36000.       36000.       36000.

 *****  SECTION QUALIFICATION  *****
        STIFFENED   UNSTIFFENED  COMPACT    BRACED        UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
       LONG  TRANV                        NON-COMPACT   NON-COMPACT     FACTOR
 +BEND        X                              X                          0.0000                  X
 -BEND        X                                             X           0.8337                  X

 *****  SECTION CAPACITY  *****
        +BEND        ML =       0.00 FT-KIPS,   MR =       0.00 FT-KIPS,   M1/M2 =     0.0
        -BEND        ML =     377.09 FT-KIPS,   MR =     170.13 FT-KIPS,   M1/M2 =     2.2
     --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---     -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --    -- SHEAR CAPACITY (KIPS) --

          TOP        TOP        BOTT       BOTT        MU          MAX. CAP.    MAX. CAP.      MU                   VU        VU
         +BEND      -BEND      +BEND      -BEND                     STEEL        CONC.                             LEFT      RIGHT
 INV.   10326.60    874.42    1816.13    1334.46      0.00         963.78      6826.58     10326.60                353.26    353.26
 OPER.  17211.01   1457.36    3026.89    2224.11      0.00         963.78      6826.58     17211.01                353.26    353.26

 *****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                          -- DEAD LOAD --
       M (DL)   M (SDL)     REDIS.    REDIS.      V (DL)    V (SDL)
                            M-(DL)---M-(SDL)
       469.05    248.14     469.05    248.14      -6.94      -2.25
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                                   DETAIL DATA AT MOMENT CHECK POINT FOR
                      COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
  DATE 12/11/95                                                                      D/P STRUCTURE I.D. = 065-005
                                                                                     MEMBER I.D. --        S 1
                                                                                     C.P. LOCATION --      3.50

                                                                                                           PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR = 0.215 FOR +BEND AND = 0.215 FOR -BEND)

                                            -- LIVE LOAD --
                  -------------TRUCK MOMENT------------   -------------LANE MOMENT-----------  -----FIXED-----   ------MAX------
      LIVE          REDIS  LL+IMP   LL    LOC.NO.  DIR   LL+IMP    LL     LOC.CONC. LOC.CONC.      SHEAR            SHEAR
      LOAD          LL+I                  1 WHEEL                         LOAD #1   LOAD #2    +V       -V      +V       -V
                   FT-KIPS FT-KIPS FT-KIPS  FT.           FT-KIPS  FT-KIPS   FT.       FT.     KIPS     KIPS    KIPS     KIPS

INV.   HS20 +BEND    0.00  1246.2  1025.4  200.208  R    1055.5   868.5   186.208    0.000    0.18     26.87
            -BEND  358.62   299.1   246.1  296.732  R     358.6   295.1   272.008    0.000    0.18      0.18
                                                                                                            32.63    32.63
OPER.  HS20 +BEND    0.00  1246.2  1025.4  200.208  R    1055.5   868.5   186.208    0.000    0.18     26.87
            -BEND  358.62   299.1   246.1  296.732  R     358.6   295.1   272.008    0.000    0.18      0.18
                                                                                                            32.63    32.63

***** ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE   LINE (CONTINUOUS SPAN) *****
              SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
       T 0    0.000    0.000    0.000    0.000    0.000    0.000
       E 1    0.055   -0.289    4.347   -2.522    0.287    0.000
       N 2    0.107   -0.744    8.762   -4.303    0.465    0.000
       T 3    0.153   -1.282   13.275   -4.904    0.553    0.000
       H 4    0.191   -1.850   17.931   -4.666    0.582    0.000
         5    0.217   -2.444   22.776   -4.123    0.562    0.000
       P 6    0.228   -3.056   17.130   -3.369    0.499    0.000
       O 7    0.222   -3.682   11.763   -2.482    0.404    0.000
       I 8    0.195   -4.318    6.903   -1.541    0.283    0.000
       N 9    0.119   -3.280    3.097   -0.654    0.146    0.000
       T 0    0.000    0.000    0.000    0.000    0.000    0.000

                                                                  AREA
                                                                 TOTALS
    POS AREA    7.6      0.0   1136.7      0.0     26.3      0.0  1170.5
    NEG AREA    0.0    171.1      0.0    306.4      0.0      0.0   477.4

***** MOMENT INFLUENCE LINE (SIMPLE SPAN)

       X-DIST (FT.)     0.00       0.00       0.00  POS AREA =        0.00
       Y-ORDINATE       0.00       0.00       0.00
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                                                DETAIL DATA AT MOMENT CHECK POINT FOR
                                  COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
    DATE 12/11/95                                                                                  D/P STRUCTURE I.D. = G65-005
                                                                                                   MEMBER I.D. --       S 1
                                                                                                   C.P. LOCATION --     3.50

                                                                                                                        PAGE 3


*****  RATING FACTOR  *****
                           -- RATING FACTOR FOR MOMENT --
                   AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MOMENT
               TOP       TOP       BOTT      BOTT             TOP              BOTT              RATING      SAFE
              +BEND      -BEND      +BEND    -BEND      +BEND    -BEND   +BEND     -BEND         VALUE        LOAD
                                                                                                          CAP.(TONS)
INV.   HS20 111111.0     1304.7    1273.7    1764.8     4.1460  3.6382   1.0220    4.9210      HS 20.4       36.8

OPER.  HS20 111111.0     2174.5    2122.8    2941.3     6.9099  6.0637   1.7034    8.2017      HS 34.1       61.3

                         -- RATING FACTOR FOR SERVICEABILITY --
                  AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
               TOP       TOP       BOTT      BOTT             TOP              BOTT              RATING      SAFE
              +BEND      -BEND      +BEND    -BEND      +BEND    -BEND   +BEND     -BEND         VALUE        LOAD
                                                                                                          CAP.(TONS)
INV.   HS20   8976.5     1510.2    1700.5    2078.4     7.2030  4.2112   1.3645    5.7955

OPER.  HS20  14960.8     2517.0    2834.1    3464.0    12.0051  7.0187   2.2742    9.6592

                             -- RATING FACTOR FOR SHEAR --
               AVAILABLE CAPACITY (KIPS)                  RATING FACTOR - SHEAR                  RATING      SAFE
                 LEFT      RIGHT                             LEFT     RIGHT                      VALUE        LOAD

INV.   HS20     168.55    168.55                             4.8275   4.8275

OPER.  HS20     280.92    280.92                             8.0458   8.0458
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                              DETAIL DATA AT MOMENT CHECK POINT FOR              BARS RELEASE 5.4
                        COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
 DATE 12/11/95                                                                  D/P STRUCTURE I.D. = G65-005
                                                                                MEMBER I.D. --      S 1
                                                                                C.P. LOCATION -     4.00

                                                                                                    PAGE 1
*****  SECTION PROPERTIES IN RANGE  1 OF SPAN 4   ******

                               -- STRUCTURAL STEEL PROPERTIES --
     H     Tweb   H/Tweb    D    D/Tweb   - B' (IN) -   - B'/t -    Lb ( FT )   Ry ( IN )   - Lb / Ry    HYBRID RATIO, R
   (IN.)   (IN.)          (IN.)            TOP   BOT   TOP   BOT   TOP   BOT   TOP   BOT    TOP   BOT   +BEND   -BEND
   52.50   0.38   140.00  48.00  128.00   6.81  6.81   3.03  3.03  CONT  21.45  4.04  4.04   0.00  63.69  1.0000  1.0000

                               -- COMPOSITE CONCRETE PROPERTIES --
   EFF.WIDTH   EFF.THICK.  VALUE   (AS)C     (DS)C  VALUE  VALUE   Atf       Abf       Aw
    (IN.)        (IN.)       N    (SQ.IN.)  (IN.)    a      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
    93.0         7.8         8      0.00     0.00   0.00   0.5   31.50     31.50     18.00

                              -- SECTION PROPERTIES --          -------- SECTION MODULUS --------   ---- PLASTIC SECTION MODULUS ----
          GROSS    NET AREA         IX        IX      C      TOP      TOP      BOTT     BOTT     TOP      TOP      BOTT     BOTT
          AREA   +BEND  -BEND     +BEND     -BEND   (BOT)   +BEND    -BEND    +BEND    -BEND    +BEND    -BEND+   +BEND    -BEND
          SQ.IN. SQ.IN. SQ.IN.    IN.**4    IN.**4   IN.    IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3
NON-COM   81.00  81.00  81.00    43268.1   43268.1  26.25   1648.3   1648.3   1648.3   1648.3   1799.19  1799.19  1799.19  1799.19
COM(N=N)                         43268.1       0.0  26.25   1648.3   1648.3   1648.3   1648.3
COM(N=3N)                        43268.1       0.0  26.25   1648.3   1648.3   1648.3   1648.3

                              -- ULTIMATE STRENGTH --
   Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
    STEEL     CONC.     REBAR     TOP     BOT     TOP    BOT        BOT          TOP         WEB
                                 FLANGE  FLANGE  FLANGE FLANGE     FLANGE       FLANGE
   36000.     4000.     40000.    8.43    8.43   11.60  11.60      36000.       36000.      36000.

*****  SECTION QUALIFICATION  *****
        STIFFENED   UNSTIFFENED  COMPACT    BRACED       UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
       LONG  TRANV                        NON-COMPACT  NON-COMPACT     FACTOR
+BEND        X                                X                        0.0000        X
-BEND        X                                X                        0.8337        X

*****  SECTION CAPACITY   *****
        +BEND      ML =       0.00 FT-KIPS,    MR =       0.00 FT-KIPS,    M1/M2 =      0.0
        -BEND      ML =   -2479.12 FT-KIPS,    MR =    -684.98 FT-KIPS,    M1/M2 =      3.6
    --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---     -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --    -- SHEAR CAPACITY (KIPS) --

          TOP       TOP       BOTT      BOTT        MU        MAX. CAP.    MAX. CAP.     MU                    VU        VU
         +BEND     -BEND     +BEND     -BEND                   STEEL        CONC.                          LEFT      RIGHT
INV.    2282.27   2282.27   2282.27   2282.27      0.00       1799.19        0.00      2282.27               353.26    353.26
OPER.   3803.78   3803.78   3803.79   3803.79      0.00       1799.19        0.00      3803.79               353.26    353.26

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                              -- DEAD LOAD --
     M (DL)    M (SDL)      REDIS.   REDIS.      V (DL)      V (SDL)
                            M-(DL)---M-(SDL)
   -1084.71   -387.10     -1084.71  -387.10      48.44        20.58
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                                 DETAIL DATA AT MOMENT CHECK POINT FOR
                        COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE 12/11/95                                                                  D/P STRUCTURE I.D. = G65-005
                                                                                  MEMBER I.D. --        S 1
                                                                                  C.P. LOCATION --      4.00

                                                                                                        PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR = 0.242 FOR +BEND AND = 0.215 FOR -BEND)

                                         -- LIVE LOAD --
                ---------------TRUCK MOMENT-------------  ---------------LANE MOMENT------------  -----FIXED-----  ------MAX------
     LIVE        REDIS   LL+IMP   LL     LOC.NO.  DIR   LL+IMP     LL     LOC.CONC. LOC.CONC.       SHEAR            SHEAR
     LOAD         LL+I                   1 WHEEL                          LOAD #1   LOAD #2    +V          -V    +V          -V
                FT-KIPS FT-KIPS FT-KIPS    FT.          FT-KIPS  FT-KIPS     FT.       FT.     KIPS        KIPS  KIPS        KIPS

INV.   HS20 +BEND   0.00   112.1    90.2   88.250   L    113.2     91.1   116.250     0.000   1.45        0.28
            -BEND  1007.   600.2   493.9  296.735   R   1007.3    828.9   272.008   207.658   1.42        1.42
                                                                                                               60.67       60.67
OPER.  HS20 +BEND   0.00   112.1    90.2   88.250   L    113.2     91.1   116.250     0.000   1.45        0.28
            -BEND  1007.   600.2   493.9  296.735   R   1007.3    828.9   272.008   207.658   1.42        1.42
                                                                                                               60.67       60.67

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
              SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
       T 0     0.000    0.000    0.000    0.000    0.000    0.000
       E 1    -0.026    0.136   -1.983   -5.061    0.576    0.000
       N 2    -0.050    0.349   -3.851   -8.634    0.932    0.000
       T 3    -0.072    0.601   -5.536   -9.840    1.109    0.000
       H 4    -0.089    0.867   -6.945   -9.362    1.168    0.000
         5    -0.102    1.146   -7.985   -8.274    1.127    0.000
       P 6    -0.107    1.433   -8.564   -6.761    1.002    0.000
       O 7    -0.104    1.726   -8.588   -4.981    0.810    0.000
       I 8    -0.091    2.024   -7.604   -3.092    0.568    0.000
       N 9    -0.056    1.538   -4.512   -1.313    0.292    0.000
       T 0     0.000    0.000    0.000    0.000    0.000    0.000

                                                                    AREA
                                                                   TOTALS
    POS AREA     0.0      80.2       0.0       0.0      52.8      0.0   133.0
    NEG AREA     3.5       0.0     596.0     614.7       0.0      0.0  1214.3

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

       X-DIST (FT.)      0.00       0.00       0.00  POS AREA =      0.00
       Y-ORDINATE        0.00       0.00       0.00
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                                  DETAIL DATA AT MOMENT CHECK POINT FOR
                         COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
 DATE 12/11/95
                                                                                D/P STRUCTURE I.D. = G65-005
                                                                                MEMBER I.D. --       S 1
                                                                                C.P. LOCATION --     4.00
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***** RATING FACTOR *****
                        -- RATING FACTOR FOR MOMENT --
                  AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MONENT
               TOP      TOP      BOTT     BOTT          TOP                BOTT           RATING    SAFE
              +BEND    -BEND    +BEND    -BEND    +BEND    -BEND    +BEND    -BEND        VALUE     LOAD
                                                                                                 CAP.(TONS)
 INV.   HS20  3165.4   1399.2   3165.4   1399.2   27.9711   1.3890  27.9711   1.3890      HS 27.8    50.0

 OPER.  HS20  5275.6   2332.0   5275.6   2332.0   46.6186   2.3150  46.6186   2.3150      HS 46.3    83.3

                      -- RATING FACTOR FOR SERVICEABILITY --
                 AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
               TOP      TOP      BOTT     BOTT          TOP                BOTT           RATING    SAFE
              +BEND    -BEND    +BEND    -BEND    +BEND    -BEND    +BEND    -BEND        VALUE     LOAD
                                                                                                 CAP.(TONS)
 INV.   HS20  3701.7   1935.5   3701.7   1935.5   32.7105   1.9215  32.7106   1.9215

   ER.  HS20  6169.5   3225.9   6169.5   3225.9   54.5176   3.2024  54.5176   3.2024

                          -- RATING FACTOR FOR SHEAR --
               AVAILABLE CAPACITY (KIPS)                  RATING FACTOR - SHEAR           RATING    SAFE
                 LEFT      RIGHT                            LEFT     RIGHT                VALUE     LOAD

 INV.   HS20    121.63    121.63                           2.0047   2.0047

 OPER.  HS20    202.71    202.71                           3.3411   3.3411
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                                    DETAIL DATA AT MOMENT CHECK POINT FOR                BARS RELEASE 5.4
                           COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
  DATE 12/11/95                                                                          D/P STRUCTURE I.D. = G65-005
                                                                                          MEMBER I.D. --        S 1
                                                                                          C.P. LOCATION -       4.50

                                                                                                                PAGE 1
*****  SECTION PROPERTIES IN RANGE  2 OF SPAN 4   ******

                             -- STRUCTURAL STEEL PROPERTIES --
     H      Tweb   H/Tweb    D     D/Tweb   - B' (IN) -    - B'/t -      Lb ( FT )     Ry ( IN )     - Lb / Ry    HYBRID RATIO, R
   (IN.)   (IN.)           (IN.)              TOP    BOT    TOP    BOT   TOP     BOT    TOP   BOT     TOP     BOT    +BEND   -BEND
   49.63    0.38   132.33  48.00  128.00    5.81   6.81   7.75  7.79  CONT   21.45   3.46  4.04    0.00   63.69  1.0000  1.0000

                             -- COMPOSITE CONCRETE PROPERTIES --
   EFF.WIDTH   EFF.THICK.  VALUE   (AS)C    (DS)C  VALUE  VALUE   Atf      Abf       Aw
     (IN.)       (IN.)       N    (SQ.IN.)  (IN.)    a      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
     93.0         7.8        8      0.00     0.00   4.47   0.0    9.00    12.25     18.00

                             -- SECTION PROPERTIES --           --------- SECTION MODULUS ---------   ---- PLASTIC SECTION MODULUS ----
            GROSS    NET AREA         IX          IX       C      TOP      TOP      BOTT      BOTT      TOP      TOP      BOTT     BOTT
            AREA   +BEND  -BEND     +BEND       -BEND   (BOT)   +BEND    -BEND    +BEND     -BEND     +BEND    -BEND+   +BEND    -BEND
            SQ.IN. SQ.IN. SQ.IN.    IN.**4      IN.**4   IN.    IN.**3   IN.**3   IN.**3    IN.**3    IN.**3   IN.**3   IN.**3   IN.**3
NON-COM     39.25  39.25  39.25    15957.3     15957.3  22.84    595.7    595.7    698.7     698.7    729.67   729.67   729.67   729.67
COM(N=N)                           42661.1         0.0  44.42   8198.6   2429.3    960.4     894.6
COM(N=3N)                          32443.1         0.0  36.27   2429.3   2429.3    894.6     894.6

                             -- ULTIMATE STRENGTH --
      Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
       STEEL     CONC.     REBAR     TOP     BOT     TOP     BOT        BOT          TOP          WEB
                                    FLANGE  FLANGE  FLANGE FLANGE      FLANGE       FLANGE
      36000.     4000.     40000.    8.43    8.43   11.60   11.60      36000.       36000.      36000.

*****  SECTION QUALIFICATION  *****
        STIFFENED   UNSTIFFENED  COMPACT    BRACED       UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
        LONG  TRANV                       NON-COMPACT  NON-COMPACT     FACTOR
+BEND          X                              X                        0.0000                   X
-BEND          X                                            X          0.8337                   X

*****  SECTION CAPACITY  *****
        +BEND       ML =       0.00 FT-KIPS,   MR =       0.00 FT-KIPS,   M1/M2 =     0.0
        -BEND       ML =      99.52 FT-KIPS,   MR =     302.76 FT-KIPS,   M1/M2 =     0.3
    --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---      -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --    -- SHEAR CAPACITY (KIPS) --

          TOP        TOP       BOTT       BOTT        MU        MAX. CAP.    MAX. CAP.       MU                   VU        VU
         +BEND      -BEND     +BEND      -BEND                    STEEL        CONC.                             LEFT      RIGHT
INV.   11351.86    824.80   1329.74     967.50       0.00       729.67       7602.88     11351.86               353.26    353.26
OPER.  18919.77   1374.67   2216.24    1612.50       0.00       729.67       7602.88     18919.77               353.26    353.26

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                             -- DEAD LOAD --
      M (DL)    M (SDL)      REDIS.    REDIS.       V (DL)      V (SDL)
                             M-(DL)--+M-(SDL)
      287.76     201.85      287.76    201.85        4.16         1.38
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                              DETAIL DATA AT MOMENT CHECK POINT FOR
                   COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
DATE 12/11/95
                                                                              D/P STRUCTURE I.D. = G65-005
                                                                              MEMBER I.D. --        S 1
                                                                              C.P. LOCATION --      4.50

                                                                                                    PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR = 0.215 FOR +BEND AND = 0.215 FOR -BEND)

                                          ** LIVE LOAD **
                   -------------TRUCK MOMENT-------------  -------------LANE MOMENT------------  -----FIXED-----  ------MAX------
        LIVE       REDIS   LL+IMP  LL     LOC.NO.  DIR   LL+IMP    LL     LOC.CONC.  LOC.CONC.        SHEAR            SHEAR
        LOAD        LL*I                  1 WHEEL                         LOAD #1    LOAD #2     +V         -V     +V        -V
                  FT-KIPS FT-KIPS FT-KIPS   FT.          FT-KIPS  FT-KIPS    FT.        FT.      KIPS       KIPS   KIPS      KIPS

INV.  HS20 +BEND   0.00   973.6   801.1  279.458   L     799.8    658.2   293.458     0.000     1.42       6.97
           -BEND 216.22   190.1   156.4  179.658   L     216.2    177.9   207.658     0.000     1.42       1.42
                                                                                                                  27.17     27.17
OPER. HS20 +BEND   0.00   973.6   801.1  279.458   L     799.8    658.2   293.458     0.000     1.42       6.97
           -BEND 216.22   190.1   156.4  179.658   L     216.2    177.9   207.658     0.000     1.42       1.42
                                                                                                                  27.17     27.17

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE   LINE (CONTINUOUS SPAN) *****
            SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
      T 0    0.000    0.000    0.000    0.000    0.000    0.000
      E 1   -0.009    0.047   -0.694    1.991   -0.842    0.000
      N 2   -0.018    0.122   -1.348    4.615   -1.364    0.000
      T 3   -0.025    0.210   -1.937    8.419   -1.624    0.000
      H 4   -0.031    0.304   -2.430   13.237   -1.710    0.000
        5   -0.036    0.401   -2.794   18.539   -1.649    0.000
      P 6   -0.037    0.501   -2.996   13.597   -1.466    0.000
      O 7   -0.036    0.604   -3.005    9.144   -1.185    0.000
      I 8   -0.032    0.708   -2.660    5.191   -0.831    0.000
      N 9   -0.020    0.538   -1.579    1.985   -0.428    0.000
      T 0    0.000    0.000    0.000    0.000    0.000    0.000

                                                                 AREA
                                                                TOTALS
   POS AREA     0.0     28.1      0.0    822.8      0.0      0.0   850.8
   NEG AREA     1.2      0.0    208.5      0.0     77.2      0.0   287.0

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

      X-DIST (FT.)       0.00       0.00       0.00  POS AREA =        0.00
      Y-ORDINATE         0.00       0.00       0.00
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                                   DETAIL DATA AT MOMENT CHECK POINT FOR
                         COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE 12/11/95                                                                       D/P STRUCTURE I.D. = G65-005
                                                                                       MEMBER I.D. --       S 1
                                                                                       C.P. LOCATION --     4.50

                                                                                                            PAGE 3


***** RATING FACTOR *****
                      -- RATING FACTOR FOR MOMENT --
                AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR - MOMENT
               TOP       TOP       BOTT      BOTT             TOP              BOTT              RATING     SAFE
              +BEND     -BEND     +BEND     -BEND      +BEND    -BEND    +BEND    -BEND        VALUE      LOAD
                                                                                                       CAP.(TONS)
INV.   HS20  8566.8    1118.6     962.4    1261.3     8.7991   5.1733   0.9885   5.8333       HS 19.8     35.6

OPER.  HS20 14278.0    1864.3    1604.0    2102.1    14.6652   8.6222   1.6475   9.7221       HS 33.0     59.3

                    -- RATING FACTOR FOR SERVICEABILITY --
                AVAILABLE (LL+I) CAPACITY (FT-KIPS)  RATING FACTOR -SERVICEABILITY
               TOP       TOP       BOTT      BOTT             TOP              BOTT              RATING     SAFE
              +BEND     -BEND     +BEND     -BEND      +BEND    -BEND    +BEND    -BEND        VALUE      LOAD
                                                                                                       CAP.(TONS)
INV.   HS20 11234.5    1312.4    1274.9    1488.6    11.5391   6.0697   1.3095   6.8848

OPER.  HS20 18724.2    2187.3    2124.8    2481.0    19.2319  10.1162   2.1825  11.4746

                       -- RATING FACTOR FOR SHEAR --
              AVAILABLE CAPACITY (KIPS)                   RATING FACTOR - SHEAR              RATING     SAFE
                LEFT      RIGHT                             LEFT     RIGHT                   VALUE      LOAD

INV.   HS20    159.72    159.72                            5.8789   5.8789

OPER.  HS20    266.20    266.20                            9.7982   9.7982
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                                   DETAIL DATA AT MOMENT CHECK POINT FOR              BARS RELEASE 5.4
                        COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
 DATE 12/11/95
                                                                                  D/P STRUCTURE I.D. = G65-005
                                                                                  MEMBER I.D. -        S 1
                                                                                  C.P. LOCATION -      5.00

                                                                                                    PAGE 1
***** SECTION PROPERTIES IN RANGE  1 OF SPAN 5   ******

                         -- STRUCTURAL STEEL PROPERTIES --
    H     Tweb  H/Tweb   D    D/Tweb  - B' (IN) -   - B'/t -    Lb ( FT )   Ry ( IN )   - Lb / Ry    HYBRID RATIO, R
  (IN.)  (IN.)         (IN.)           TOP   BOT   TOP   BOT   TOP   BOT   TOP   BOT    TOP   BOT   +BEND   -BEND
  50.75  0.38  135.33  48.00  128.00  6.81  6.81  4.95  4.95  CONT  23.19  4.04  4.04   0.00  68.87  1.0000  1.0000

                         -- COMPOSITE CONCRETE PROPERTIES --
  EFF.WIDTH  EFF.THICK.  VALUE   (AS)C     (DS)C  VALUE  VALUE   Atf      Abf       AW
    (IN.)      (IN.)       N   (SQ.IN.)  (IN.)     a      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
    93.0        7.8        8     0.00     0.00   6.43   0.0   19.25    19.25     18.00

                         -- SECTION PROPERTIES --       --------- SECTION MODULUS ---------   ---- PLASTIC SECTION MODULUS ----
            GROSS    NET AREA      IX        IX      C     TOP      TOP     BOTT     BOTT      TOP      TOP      BOTT     BOTT
            AREA   +BEND  -BEND   +BEND     -BEND  (BOT)  +BEND    -BEND   +BEND    -BEND    +BEND    -BEND+   +BEND    -BEND
           SQ.IN. SQ.IN. SQ.IN.  IN.**4    IN.**4   IN.   IN.**3   IN.**3  IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3
NON-COM    56.50  56.50  56.50  26927.7   26927.7  25.37  1061.2   1061.2  1061.2   1061.2   1166.49  1166.49  1166.49  1166.49
COM(N=N)                        26927.7       0.0  25.37  1061.2   1061.2  1061.2   1061.2
COM(N=3N)                       26927.7       0.0  25.37  1061.2   1061.2  1061.2   1061.2

                         -- ULTIMATE STRENGTH --
    Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
     STEEL    CONC.      REBAR     TOP     BOT     TOP    BOT          BOT          TOP          WEB
                                  FLANGE  FLANGE  FLANGE FLANGE       FLANGE       FLANGE
    36000.    4000.     40000.    8.43    8.43    11.60  11.60        36000.       36000.       36000.

***** SECTION QUALIFICATION *****
        STIFFENED   UNSTIFFENED  COMPACT    BRACED       UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
       LONG  TRANV                        NON-COMPACT  NON-COMPACT     FACTOR
+BEND        X                               X                         0.0000        X
-BEND        X                                             X           0.8425        X

***** SECTION CAPACITY *****
        +BEND      ML =      0.00 FT-KIPS,   MR =     0.00 FT-KIPS,   M1/M2 =    0.0
        -BEND      ML =  -1592.56 FT-KIPS,   MR =  -340.12 FT-KIPS,   M1/M2 =    4.7
   --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---    -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --   -- SHEAR CAPACITY (KIPS) --

         TOP      TOP      BOTT     BOTT      MU       MAX. CAP.   MAX. CAP.     MU                 VU       VU
        +BEND    -BEND    +BEND    -BEND                 STEEL       CONC.                         LEFT     RIGHT
INV.   1469.34  1469.34  1469.34  1469.34    0.00      1166.49       0.00     1469.34              346.28   346.28
OPER.  2448.90  2448.90  2448.90  2448.90    0.00      1166.49       0.00     2448.90              346.28   346.28

***** MOMENT (FT-KIPS) AND SHEAR (KIPS) *****
                         -- DEAD LOAD --
    M (DL)    M (SDL)     REDIS.    REDIS.     V (DL)     V (SDL)
                          M-(DL)----M-(SDL)
   -627.83   -238.67    -627.83   -238.67     37.21       15.89
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                                   DETAIL DATA AT MOMENT CHECK POINT FOR
                          COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
DATE 12/11/95                                                                          D/P STRUCTURE I.D. = G65-005
                                                                                       MEMBER I.D. --        S 1
                                                                                       C.P. LOCATION --      5.00

                                                                                                             PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR = 0.215 FOR +BEND AND = 0.234 FOR -BEND)

                                         -- LIVE LOAD --
                     ---------------TRUCK MOMENT-------------  --------------LANE MOMENT------------  -----FIXED-----  ------MAX------
        LIVE         REDIS   LL+IMP   LL     LOC.NO.  DIR   LL+IMP     LL     LOC.CONC. LOC.CONC.      SHEAR              SHEAR
        LOAD          LL+I                   1 WHEEL                           LOAD #1   LOAD #2    +V         -V      +V        -V
                     FT-KIPS FT-KIPS FT-KIPS   FT.          FT-KIPS  FT-KIPS     FT.       FT.     KIPS       KIPS    KIPS      KIPS

INV.   HS20 +BEND     0.00   163.1   134.2  179.658   L     146.9    120.8   207.658     0.000   10.82       2.34
            -BEND   726.06   573.2   464.4  290.181   L     726.1    588.2   304.183   374.917   10.99      10.99
                                                                                                                  58.25     60.25
OPER.  HS20 +BEND     0.00   163.1   134.2  179.658   L     146.9    120.8   207.658     0.000   10.82       2.34
            -BEND   726.06   573.2   464.4  290.181   L     726.1    588.2   304.183   374.917   10.99      10.99
                                                                                                                  58.25     60.25

***** ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
              SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
        T 0    0.000    0.000    0.000    0.000    0.000    0.000
        E 1    0.008   -0.041    0.595   -1.682   -2.260    0.000
        N 2    0.015   -0.105    1.156   -3.587   -3.660    0.000
        T 3    0.022   -0.180    1.662   -5.497   -4.357    0.000
        H 4    0.027   -0.260    2.085   -7.065   -4.588    0.000
          5    0.030   -0.344    2.397   -8.272   -4.426    0.000
        P 6    0.032   -0.430    2.571   -8.946   -3.935    0.000
        O 7    0.031   -0.518    2.579   -8.907   -3.181    0.000
        I 8    0.027   -0.608    2.283   -7.975   -2.230    0.000
        N 9    0.017   -0.462    1.355   -5.443   -1.148    0.000
        T 0    0.000    0.000    0.000    0.000    0.000    0.000

                                                                      AREA
                                                                     TOTALS
   POS AREA      1.1      0.0    178.9      0.0      0.0      0.0     180.0
   NEG AREA      0.0     24.1      0.0    615.3    207.2      0.0     846.7

***** MOMENT INFLUENCE LINE (SIMPLE SPAN)

        X-DIST (FT.)      0.00       0.00       0.00  POS AREA =      0.00
        Y-ORDINATE        0.00       0.00       0.00
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                              DETAIL DATA AT MOMENT CHECK POINT FOR
                     COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE 12/11/95
                                                                              O/P STRUCTURE I.D. = G65-005
                                                                              MEMBER I.D. --       S 1
                                                                              C.P. LOCATION --     5.00

                                                                                                   PAGE 3


***** RATING FACTOR *****
                          -- RATING FACTOR FOR MOMENT --
                    AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MOMENT
                 TOP      TOP      BOTT     BOTT          TOP              BOTT              RATING     SAFE
                +BEND    -BEND    +BEND    -BEND     +BEND    -BEND    +BEND    -BEND        VALUE      LOAD
                                                                                                      CAP.(TONS)
INV.   HS20    1989.2    949.4   1989.2    949.4    12.1969   1.3077  12.1969   1.3077      HS 26.2     47.1

OPER.  HS20    3315.4   1582.4   3315.4   1582.4    20.3281   2.1794  20.3282   2.1794      HS 43.6     78.5

                        -- RATING FACTOR FOR SERVICEABILITY --
                   AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
                 TOP      TOP      BOTT     BOTT          TOP              BOTT              RATING     SAFE
                +BEND    -BEND    +BEND    -BEND     +BEND    -BEND    +BEND    -BEND        VALUE      LOAD
                                                                                                      CAP.(TONS)
INV.   HS20    2334.5   1294.7   2334.5   1294.7    14.3140   1.7832  14.3140   1.7832

OPER.  HS20    3890.9   2157.9   3890.9   2157.9    23.8567   2.9721  23.8568   2.9721

                           -- RATING FACTOR FOR SHEAR --
                AVAILABLE CAPACITY (KIPS)                      RATING FACTOR - SHEAR         RATING     SAFE
                   LEFT      RIGHT                              LEFT      RIGHT              VALUE      LOAD

INV.   HS20       127.96    127.96                              2.1239    2.1239

OPER.  HS20       213.27    213.27                              3.5398    3.5398
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                                   DETAIL DATA AT MOMENT CHECK POINT FOR                BARS RELEASE 5.4
                         COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
  DATE 12/11/95                                                                  D/P STRUCTURE I.D. = G65-005
                                                                                 MEMBER I.D. --        S 1
                                                                                 C.P. LOCATION -       5.60

                                                                                                     PAGE 1
*****  SECTION PROPERTIES IN RANGE  2 OF SPAN 5   ******

                      -- STRUCTURAL STEEL PROPERTIES --
     H     Tweb   H/Tweb    D    D/Tweb   - B' (IN) -    - B'/t -     Lb ( FT )    Ry ( IN )    - Lb / Ry    HYBRID RATIO, R
   (IN.)  (IN.)           (IN.)            TOP    BOT    TOP    BOT   TOP    BOT   TOP   BOT    TOP   BOT    +BEND   -BEND
   49.50  0.38  132.00  48.00  128.00    5.81  6.81    7.75  9.08  CONT   23.19  3.46  4.04   0.00 68.87  1.0000  1.0000

                      -- COMPOSITE CONCRETE PROPERTIES --
   EFF.WIDTH   EFF.THICK.  VALUE   (AS)C    (DS)C  VALUE  VALUE    Atf      Abf       AW
    (IN.)        (IN.)       N    (SQ.IN.)  (IN.)    a      Y    (SQ.IN.) (SQ.IN.) (SQ.IN.)
    93.0          7.8        8      0.00     0.00   4.27   0.0     9.00    10.50     18.00

                      -- SECTION PROPERTIES --         -------- SECTION MODULUS --------  ---- PLASTIC SECTION MODULUS ----
          GROSS    NET AREA        IX         IX       C      TOP      TOP      BOTT     BOTT     TOP      TOP      BOTT     BOTT
          AREA    +BEND  -BEND    +BEND      -BEND   (BOT)   +BEND    -BEND    +BEND    -BEND    +BEND    -BEND+   +BEND    -BEND
          SQ.IN.  SQ.IN. SQ.IN.   IN.**4     IN.**4   IN.    IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3
NON-COM   37.50   37.50  37.50   15007.0    15007.0  23.77    583.4    583.4    631.2    631.2   690.21   690.21   690.21   690.21
COM(N=N)                         39169.8        0.0  44.90   8524.4   2423.3    872.3    811.5
COM(N=3N)                        30091.0        0.0  37.08   2423.3   2423.3    811.5    811.5

                      -- ULTIMATE STRENGTH --
    Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
     STEEL     CONC.     REBAR     TOP      BOT    TOP     BOT         BOT          TOP         WEB
                                  FLANGE  FLANGE  FLANGE FLANGE       FLANGE       FLANGE
    36000.     4000.     40000.    8.43     8.43   11.60   11.60       36000.       36000.      36000.

*****  SECTION QUALIFICATION  *****
       STIFFENED   UNSTIFFENED  COMPACT     BRACED       UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
      LONG  TRANV                         NON-COMPACT  NON-COMPACT     FACTOR
+BEND        X                               X                         0.0000                  X
-BEND        X                                            X            0.8056                  X

*****  SECTION CAPACITY  *****
       +BEND        ML =      0.00 FT-KIPS,   MR =      0.00 FT-KIPS,   M1/M2 =     0.0
       -BEND        ML =   -340.12 FT-KIPS,   MR =    134.15 FT-KIPS,   M1/M2 =     2.5
    --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---    -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --   -- SHEAR CAPACITY (KIPS) --

        TOP        TOP       BOTT       BOTT        MU        MAX. CAP.    MAX. CAP.      MU                     VU        VU
       +BEND      -BEND      +BEND      -BEND                  STEEL        CONC.                               LEFT     RIGHT
INV.  11803.01    780.85    1207.77     844.90      0.00       690.21       7941.04    11803.01                346.28    346.28
OPER. 19671.69   1301.42    2012.95    1408.16      0.00       690.21       7941.04    19671.69                346.28    346.28

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                      -- DEAD LOAD --
     M (DL)   M (SDL)     REDIS.    REDIS.     V (DL)    V (SDL)
                          M-(DL)---M-(SDL)
     207.81    112.54     207.81    112.54      3.45       0.94
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                              DETAIL DATA AT MOMENT CHECK POINT FOR
                     COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE 12/11/95
                                                                           D/P STRUCTURE I.D. = G65-005
                                                                           MEMBER I.D. --      S 1
                                                                           C.P. LOCATION --    5.60

                                                                                              PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR = 0.257 FOR +BEND AND = 0.215 FOR -BEND)

                                       -- LIVE LOAD --
                -------------TRUCK MOMENT------------  --------------LANE MOMENT-------------  -----FIXED-----   ------MAX------
       LIVE      REDIS   LL+IMP   LL    LOC.NO.  DIR   LL+IMP    LL     LOC.CONC. LOC.CONC.      SHEAR            SHEAR
       LOAD      LL+I                   1 WHEEL                         LOAD #1   LOAD #2    +V         -V     +V        -V
                FT-KIPS FT-KIPS FT-KIPS   FT.         FT-KIPS  FT-KIPS    FT.       FT.     KIPS       KIPS   KIPS      KIPS

INV.   HS20 +BEND   0.00  783.8  623.6 402.833   R    594.5    473.0   388.833     0.000   8.39      24.45
            -BEND 225.74  225.7  185.7 290.181   L    207.8    171.0   304.183     0.000   8.11       8.11
                                                                                                           54.64     54.65
OPER.  HS20 +BEND   0.00  783.8  623.6 402.833   R    594.5    473.0   388.833     0.000   8.39      24.45
            -BEND 225.74  225.7  185.7 290.181   L    207.8    171.0   304.183     0.000   8.11       8.11
                                                                                                           54.64     54.65

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE   LINE (CONTINUOUS SPAN) *****
              SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
       T 0     0.000    0.000    0.000    0.000    0.000    0.000
       E 1     0.003   -0.016    0.238   -0.673    1.879    0.000
       N 2     0.006   -0.042    0.463   -1.435    4.102    0.000
       T 3     0.009   -0.072    0.665   -2.199    6.607    0.000
       H 4     0.011   -0.104    0.834   -2.826    9.298    0.000
         5     0.012   -0.138    0.959   -3.309   12.146    0.000
       P 6     0.013   -0.172    1.028   -3.578   15.126    0.000
       O 7     0.012   -0.207    1.031   -3.563   11.253    0.000
       I 8     0.011   -0.243    0.913   -3.190    7.458    0.000
       N 9     0.007   -0.185    0.542   -2.177    3.716    0.000
       T 0     0.000    0.000    0.000    0.000    0.000    0.000

                                                                 AREA
                                                                TOTALS
    POS AREA     0.4       0.0      71.6      0.0     498.1     0.0   570.1
    NEG AREA     0.0       9.6       0.0    246.1       0.0     0.0   255.8

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

       X-DIST (FT.)        0.00       0.00       0.00  POS AREA =        0.00
       Y-ORDINATE          0.00       0.00       0.00
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                                                 DETAIL DATA AT MOMENT CHECK POINT FOR
                                  COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE 12/11/95                                                                                    D/P STRUCTURE I.D. = G65-005
                                                                                                    MEMBER I.D. --      S 1
                                                                                                    C.P. LOCATION --    5.60

                                                                                                                        PAGE 3


*****  RATING FACTOR  *****
                            -- RATING FACTOR FOR MOMENT --
                   AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR - MOMENT
               TOP       TOP       BOTT      BOTT            TOP              BOTT               RATING      SAFE
              +BEND     -BEND     +BEND     -BEND     +BEND    -BEND    +BEND    -BEND         VALUE       LOAD
                                                                                                         CAP.(TONS)
INV.   HS20  9743.5     973.1     962.9    1037.1    12.4308  4.3106   1.2284   4.5943        HS 24.6      44.2

OPER.  HS20 16239.2    1621.8    1604.8    1728.5    20.7180  7.1844   2.0474   7.6572        HS 40.9      73.7

                         -- RATING FACTOR FOR SERVICEABILITY --
                  AVAILABLE (LL+I) CAPACITY (FT-KIPS)  RATING FACTOR -SERVICEABILITY
               TOP       TOP       BOTT      BOTT            TOP              BOTT               RATING      SAFE
              +BEND     -BEND     +BEND     -BEND     +BEND    -BEND    +BEND    -BEND         VALUE       LOAD
                                                                                                         CAP.(TONS)
INV.   HS20 12517.2    1189.8    1246.7    1271.6    15.9695  5.2706   1.5906   5.6330

OPER.  HS20 20862.0    1982.9    2077.9    2119.3    26.6159  8.7843   2.6509   9.3884

                                -- RATING FACTOR FOR SHEAR --
              AVAILABLE CAPACITY (KIPS)                      RATING FACTOR - SHEAR               RATING      SAFE
                  LEFT      RIGHT                                LEFT     RIGHT                  VALUE       LOAD

INV.   HS20      157.19    157.19                               2.9725   2.9725

OPER.  HS20      261.98    261.98                               4.9542   4.9542
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                                 DETAIL DATA AT MOMENT CHECK POINT FOR
                        COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
DATE 12/11/95
                                                                        D/P STRUCTURE I.D. = G65-005
                                                                        MEMBER I.D. --       S 2
                                                                        C.P. LOCATION --     1.00

                                                                                             PAGE 3


***** RATING FACTOR *****
                    -- RATING FACTOR FOR MOMENT --
               AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR - MOMENT
             TOP      TOP      BOTT     BOTT            TOP                BOTT            RATING    SAFE
            +BEND    -BEND    +BEND    -BEND     +BEND    -BEND     +BEND    -BEND        VALUE     LOAD
                                                                                                 CAP.(TONS)
INV.   HS20  12391.4   1621.8   4419.4   1728.5   999.0000 999.0000 999.0000 999.0000

OPER.  HS20  20652.4   1077.8   7365.6   1250.6   999.0000 999.0000 999.0000 999.0000

                 -- RATING FACTOR FOR SERVICEABILITY --
              AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
             TOP      TOP      BOTT     BOTT            TOP                BOTT            RATING    SAFE
            +BEND    -BEND    +BEND    -BEND     +BEND    -BEND     +BEND    -BEND        VALUE     LOAD
                                                                                                 CAP.(TONS)
INV.   HS20  15303.4   2708.0   5457.9   4239.6   999.0000 999.0000 999.0000 999.0000

OPER.  HS20  25505.7   4513.4   9096.6   7066.0   999.0000 999.0000 999.0000 999.0000

                      -- RATING FACTOR FOR SHEAR --
             AVAILABLE CAPACITY (KIPS)                   RATING FACTOR - SHEAR            RATING    SAFE
               LEFT     RIGHT                             LEFT     RIGHT                  VALUE     LOAD

INV.   HS20    355.97   355.97                            5.9865   5.9865                HS119.7   215.5

OPER.  HS20    593.29   593.29                            9.9775   9.9775                HS199.5   359.2
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                                   DETAIL DATA AT MOMENT CHECK POINT FOR                BARS RELEASE 5.4
                         COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
  DATE 12/11/95                                                                   D/P STRUCTURE I.D. = G65-005
                                                                                  MEMBER I.D. --        S 2
                                                                                  C.P. LOCATION -       1.40

                                                                                                     PAGE 1
*****  SECTION PROPERTIES IN RANGE  1 OF SPAN 1   ******

                         -- STRUCTURAL STEEL PROPERTIES --
      H     Tweb  H/Tweb    D    D/Tweb   - B' (IN) -   - B'/t -     Lb ( FT )   Ry ( IN )    - Lb / Ry    HYBRID RATIO, R
    (IN.)  (IN.)          (IN.)            TOP   BOT    TOP   BOT   TOP   BOT    TOP   BOT    TOP   BOT    +BEND   -BEND
    51.25  0.63   82.00  48.00   76.80   7.69  9.69   6.15  4.84  CONT  24.00   4.62  5.77   0.00 49.88  0.9971  0.9958

                         -- COMPOSITE CONCRETE PROPERTIES --
    EFF.WIDTH   EFF.THICK.  VALUE   (AS)C    (DS)C  VALUE  VALUE   Atf      Abf      Aw
     (IN.)       (IN.)        N    (SQ.IN.)  (IN.)    a      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
     93.0         7.8         8      0.00     0.00   0.00   1.2   20.00    40.00    30.00

                         -- SECTION PROPERTIES --            -------- SECTION MODULUS --------   ---- PLASTIC SECTION MODULUS ----
           GROSS    NET AREA        IX        IX      C      TOP      TOP      BOTT     BOTT     TOP      TOP      BOTT     BOTT
           AREA   +BEND  -BEND    +BEND     -BEND   (BOT)   +BEND    -BEND    +BEND    -BEND    +BEND    -BEND+   +BEND    -BEND
           SQ.IN. SQ.IN  SQ.IN.   IN.**4    IN.**4   IN.    IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3
NON-COM    90.00  90.00  90.00   39723.7   39723.7  20.03   1272.3   1272.3   1983.4   1983.4  1755.35  1755.35  1755.35  1755.35
CON(N=N)                         96667.0       0.0  37.75   7159.5   3046.9   2560.8   2358.1
CON(N=3N)                        68127.5       0.0  28.89   3046.9   3046.9   2358.1   2358.1

                         -- ULTIMATE STRENGTH --
      Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
       STEEL     CONC.     REBAR     TOP     BOT    TOP     BOT        BOT        TOP        WEB
                                   FLANGE  FLANGE  FLANGE FLANGE      FLANGE     FLANGE
      45000.     4000.    40000.    7.54    7.54   10.37  10.37       45000.     45000.     50000.

*****  SECTION QUALIFICATION  *****
       STIFFENED   UNSTIFFENED  COMPACT    BRACED       UNBRACED    REDUCTION   SYMMETRICAL UNSYMMETRICAL
       LONG  TRANV                      NON-COMPACT  NON-COMPACT     FACTOR
+BEND         X                             X                        0.0000                  X
-BEND         X                             X                        0.8056                  X

*****  SECTION CAPACITY  *****
        +BEND        ML =       0.00 FT-KIPS,   MR =       0.00 FT-KIPS,   M1/M2 =      0.0
        -BEND        ML =    1790.11 FT-KIPS,   MR =    1569.01 FT-KIPS,   M1/M2 =      1.1
     --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---      -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --    -- SHEAR CAPACITY (KIPS) --

          TOP       TOP       BOTT      BOTT        MU        MAX. CAP.     MAX. CAP.     MU                  VU        VU
         +BEND     -BEND     +BEND     -BEND                    STEEL         CONC.                          LEFT      RIGHT
INV.   12391.44   2192.72   4419.38   3432.86      0.00       1983.43       5887.21    12391.44              870.00    870.00
OPER.  20652.40   3654.54   7365.63   5721.43      0.00       1983.43       5887.21    20652.40              870.00    870.00

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                         -- DEAD LOAD --
      M (DL)   M (SDL)     REDIS.    REDIS.      V (DL)     V (SDL)
                           M-(DL)---M-(SDL)
     1558.97    620.14    1558.97    620.14       1.73        1.38
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                                        DETAIL DATA AT MOMENT CHECK POINT FOR
                             COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER -- LOAD FACTOR RATING
  DATE 12/11/95                                                                        D/P STRUCTURE I.D. = G65-005
                                                                                       MEMBER I.D. --      S 2
                                                                                       C.P. LOCATION --    1.40

                                                                                                           PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR = 0.190 FOR +BEND AND = 0.228 FOR -BEND)

                                                  -- LIVE LOAD --
                     -------------TRUCK MOMENT------------   -------------LANE MOMENT------------ -----FIXED-----  ------MAX------
          LIVE       REDIS   LL+IMP   LL     LOC.NO.  DIR   LL+IMP     LL     LOC.CONC. LOC.CONC.     SHEAR             SHEAR
          LOAD        LL+I                   1 WHEEL                           LOAD #1   LOAD #2    +V        -V     +V        -V
                     FT-KIPS FT-KIPS FT-KIPS   FT.          FT-KIPS  FT-KIPS     FT.       FT.     KIPS      KIPS   KIPS      KIPS

 INV.   HS20 +BEND     0.00  1716.4  1442.1   41.133   L    1636.9   1375.3    55.133     0.000   6.09      2.42
             -BEND   346.75   346.8   282.3  194.033   R     274.6    223.5   175.433     0.000   6.29      6.29
                                                                                                                 32.90     31.95
 OPER.  HS20 +BEND     0.00  1716.4  1442.1   41.133   L    1636.9   1375.3    55.133     0.000   6.09      2.42
             -BEND   346.75   346.8   282.3  194.033   R     274.6    223.5   175.433     0.000   6.29      6.29
                                                                                                                 32.90     31.95

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
              SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
         T 0    0.000    0.000    0.000    0.000    0.000    0.000
         E 1    7.513   -2.293    0.382    0.000    0.000    0.000
         N 2   15.070   -4.144    0.581    0.000    0.000    0.000
         T 3   22.713   -5.413    0.678    0.000    0.000    0.000
         H 4   30.486   -5.715    0.706    0.000    0.000    0.000
           5   24.649   -5.119    0.677    0.000    0.000    0.000
         P 6   19.028   -4.160    0.600    0.000    0.000    0.000
         O 7   13.667   -3.067    0.484    0.000    0.000    0.000
         I 8    8.608   -1.925    0.338    0.000    0.000    0.000
         N 9    3.969   -0.844    0.174    0.000    0.000    0.000
         T 0    0.000    0.000    0.000    0.000    0.000    0.000

                                                                 AREA
                                                                TOTALS
       POS AREA  2008.3      0.0     31.1      0.0      0.0      0.0  2039.4
       NEG AREA     0.0    307.2      0.0      0.0      0.0      0.0   307.2

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

         X-DIST (FT.)      0.00       0.00       0.00  POS AREA =       0.00
         Y-ORDINATE        0.00       0.00       0.00
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                                DETAIL DATA AT MOMENT CHECK POINT FOR
                       COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE 12/11/95
                                                                              D/P STRUCTURE I.D. = G65-005
                                                                              MEMBER I.D. --       S 2
                                                                              C.P. LOCATION --     1.40

                                                                                                   PAGE 3


***** RATING FACTOR *****
                        -- RATING FACTOR FOR MOMENT --
                  AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MOMENT
               TOP       TOP      BOTT      BOTT             TOP                BOTT           RATING     SAFE
              +BEND     -BEND    +BEND     -BEND      +BEND    -BEND    +BEND    -BEND         VALUE      LOAD
                                                                                                      CAP.(TONS)
INV.   HS20   6253.5    3500.2   2807.6    4740.3     3.6433  10.0942  1.6357  13.6707        HS 32.7     58.9

OPER.  HS20  10422.5    5833.6   4679.4    7900.5     6.0721  16.8237  2.7262  22.7845        HS 54.5     98.1

                     -- RATING FACTOR FOR SERVICEABILITY --
                  AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR -SERVICEABILITY
               TOP       TOP      BOTT      BOTT             TOP                BOTT           RATING     SAFE
              +BEND     -BEND    +BEND     -BEND      +BEND    -BEND    +BEND    -BEND         VALUE      LOAD
                                                                                                      CAP.(TONS)
INV.   HS20   9165.5    4015.5   3846.2    5547.0     5.3398  11.5803  2.2408  15.9972

OPER.  HS20  15275.8    6692.5   6410.3    9245.1     8.8997  19.3005  3.7346  26.6620

                          -- RATING FACTOR FOR SHEAR --
               AVAILABLE CAPACITY (KIPS)                   RATING FACTOR - SHEAR           RATING     SAFE
                 LEFT      RIGHT                             LEFT     RIGHT                VALUE      LOAD

INV.   HS20     399.67    399.67                           12.1469   12.1469

OPER.  HS20     666.12    666.12                           20.2449   20.2449
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                                                 DETAIL DATA AT MOMENT CHECK POINT FOR             BARS RELEASE 5.4
                                          COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE 12/11/95                                                                                   D/P STRUCTURE I.D. = G65-005
                                                                                                   MEMBER I.D. --        S 2
                                                                                                   C.P. LOCATION -       2.00

                                                                                                                         PAGE 1
*****  SECTION PROPERTIES IN RANGE  1 OF SPAN 2   ******

                                   -- STRUCTURAL STEEL PROPERTIES --
       H      Tweb   H/Tweb    D     D/Tweb   - B' (IN) -    - B'/t -     Lb ( FT )    Ry ( IN )    - Lb / Ry     HYBRID RATIO, R
     (IN.)   (IN.)           (IN.)             TOP    BOT    TOP    BOT   TOP    BOT   TOP   BOT     TOP    BOT    +BEND   -BEND
     52.00   0.63    83.20  48.00    76.80    9.69   9.69   4.84   4.84  CONT   23.50  5.77  5.77    0.00  48.84  0.9980  0.9980

                                   -- COMPOSITE CONCRETE PROPERTIES --
     EFF.WIDTH   EFF.THICK.  VALUE   (AS)C     (DS)C  VALUE  VALUE    Atf      Abf       Aw
       (IN.)       (IN.)       N    (SQ.IN.)  (IN.)     a      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
       93.0         7.8        8      0.00     0.00   0.00    1.5   40.00    40.00     30.00

                                   -- SECTION PROPERTIES --         ******** SECTION MODULUS ********    ---- PLASTIC SECTION MODULUS ----
              GROSS     NET AREA       IX        IX       C      TOP      TOP      BOTT     BOTT     TOP      TOP      BOTT     BOTT
              AREA    +BEND  -BEND   +BEND     -BEND    (BOT)   +BEND    -BEND    +BEND    -BEND    +BEND    -BEND+   +BEND    -BEND
              SQ.IN.  SQ.IN. SQ.IN.  IN.**4    IN.**4    IN.    IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3
NON-COM     110.00  110.00 110.00  55786.7   55786.7   26.00   2145.6   2145.6   2145.6   2145.6  2360.00  2360.00  2360.00  2360.00
COM(N=N)                           55786.7       0.0   26.00   2145.6   2145.6   2145.6   2145.6
COM(N=3N)                          55786.7       0.0   26.00   2145.6   2145.6   2145.6   2145.6

                                   -- ULTIMATE STRENGTH --
      Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
       STEEL     CONC.     REBAR      TOP     BOT     TOP    BOT        BOT          TOP          WEB
                                    FLANGE  FLANGE  FLANGE FLANGE     FLANGE       FLANGE
      45000.     4000.     40000.     7.54    7.54   10.37  10.37     45000.       45000.       50000.

*****  SECTION QUALIFICATION  *****
          STIFFENED   UNSTIFFENED  COMPACT    BRACED       UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
         LONG  TRANV                        NON-COMPACT  NON-COMPACT     FACTOR
+BEND          X                                X                        0.0000          X
-BEND          X                                X                        0.8056          X

*****  SECTION CAPACITY  *****
          +BEND        ML =       0.00 FT-KIPS,    MR =       0.00 FT-KIPS,    M1/M2 =      0.0
          -BEND        ML =   -3292.24 FT-KIPS,    MR =   -1081.84 FT-KIPS,    M1/M2 =      3.0
      --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---      -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --   -- SHEAR CAPACITY (KIPS) --

           TOP       TOP       BOTT      BOTT        MU        MAX. CAP.    MAX. CAP.     MU                     VU         VU
          +BEND     -BEND     +BEND     -BEND                   STEEL        CONC.                            LEFT       RIGHT
INV.     3713.61   3706.03   3706.03   3713.61      0.00       2360.00        0.00      3713.61                 870.00     870.00
OPER.    6189.34   6176.72   6176.72   6189.34      0.00       2360.00        0.00      6189.34                 870.00     870.00

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                                   -- DEAD LOAD --
      M (DL)    M (SDL)     REDIS.    REDIS.      V (DL)     V (SDL)
                            M-(DL)--  M-(SDL)
     -1611.38   -490.03   -1611.38   -490.03      55.43       20.53
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                                    DETAIL DATA AT MOMENT CHECK POINT FOR
                         COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
  DATE 12/11/95                                                                   D/P STRUCTURE I.D. = G65-005
                                                                                  MEMBER I.D. --      S 2
                                                                                  C.P. LOCATION --    2.00

                                                                                                      PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR = 0.260 FOR +BEND AND = 0.208 FOR -BEND)

                                          -- LIVE LOAD --
                 -------------TRUCK MOMENT------------   -------------LANE MOMENT------------  -----FIXED-----  ------MAX------
      LIVE            REDIS  LL+IMP   LL     LOC.NO.  DIR   LL+IMP     LL     LOC.CONC. LOC.CONC.      SHEAR              SHEAR
      LOAD             LL+I                  1 WHEEL                          LOAD #1   LOAD #2    +V         -V      +V       -V
                     FT-KIPS FT-KIPS FT-KIPS   FT.         FT-KIPS  FT-KIPS     FT.       FT.     KIPS       KIPS   KIPS     KIPS

INV.    HS20 +BEND    0.00   109.7    87.0 279.543   R      76.9     61.1  258.800     0.000   5.81       4.01
             -BEND   1191.   852.2   705.7 194.033   R    1190.8    986.2  175.433    82.700   5.57       5.57
                                                                                                              59.84    61.76
OPER.   HS20 +BEND    0.00   109.7    87.0 279.543   R      76.9     61.1  258.800     0.000   5.81       4.01
             -BEND   1191.   852.2   705.7 194.033   R    1190.8    986.2  175.433    82.700   5.57       5.57
                                                                                                              59.84    61.76

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
             SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
        T 0    0.000    0.000    0.000    0.000    0.000    0.000
        E 1   -1.892   -5.733    0.955    0.000    0.000    0.000
        N 2   -3.675  -10.359    1.453    0.000    0.000    0.000
        T 3   -5.242  -13.531    1.694    0.000    0.000    0.000
        H 4   -6.485  -14.288    1.766    0.000    0.000    0.000
          5   -7.294  -12.798    1.693    0.000    0.000    0.000
        P 6   -7.563  -10.401    1.499    0.000    0.000    0.000
        O 7   -7.183   -7.666    1.209    0.000    0.000    0.000
        I 8   -6.046   -4.813    0.846    0.000    0.000    0.000
        N 9   -3.860   -2.111    0.435    0.000    0.000    0.000
        T 0    0.000    0.000    0.000    0.000    0.000    0.000

                                                                     AREA
                                                                    TOTALS
    POS AREA      0.0      0.0     77.9      0.0      0.0      0.0     77.9
    NEG AREA    678.7    768.0      0.0      0.0      0.0      0.0   1446.7

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

        X-DIST (FT.)      0.00       0.00       0.00 POS AREA =      0.00
        Y-ORDINATE        0.00       0.00       0.00
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                                            DETAIL DATA AT MOMENT CHECK POINT FOR
                               COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE 12/11/95
                                                                                          D/P STRUCTURE I.D. = G65-005
                                                                                          MEMBER I.D. --       S 2
                                                                                          C.P. LOCATION --     2.00

                                                                                                             PAGE 3


*****  RATING FACTOR  *****
                         -- RATING FACTOR FOR MOMENT --
                  AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR - MOMENT
              TOP      TOP      BOTT     BOTT            TOP            BOTT              RATING     SAFE
             +BEND    -BEND    +BEND    -BEND     +BEND    -BEND   +BEND    -BEND         VALUE      LOAD
                                                                                                 CAP.(TONS)
INV.   HS20  4974.5   2445.2   4966.9   2452.8   45.3601  2.0533  45.2911  2.0597       HS 41.1     73.9

OPER.  HS20  8290.8   4075.3   8278.1   4087.9   75.6003  3.4222  75.4852  3.4328       HS 68.4    123.2

                      -- RATING FACTOR FOR SERVICEABILITY --
                 AVAILABLE (LL+I) CAPACITY (FT-KIPS)  RATING FACTOR -SERVICEABILITY
              TOP      TOP      BOTT     BOTT            TOP            BOTT              RATING     SAFE
             +BEND    -BEND    +BEND    -BEND     +BEND    -BEND   +BEND    -BEND         VALUE      LOAD
                                                                                                 CAP.(TONS)
INV.   HS20  5847.1   3316.1   5837.8   3325.5   53.3179  2.7847  53.2327  2.7926

OPER.  HS20  9745.3   5526.8   9729.7   5542.4   88.8633  4.6412  88.7211  4.6543

                           -- RATING FACTOR FOR SHEAR --
              AVAILABLE CAPACITY (KIPS)                    RATING FACTOR - SHEAR            RATING     SAFE
                LEFT     RIGHT                               LEFT     RIGHT                 VALUE      LOAD

INV.   HS20     355.96   355.96                              5.7640   5.7640

OPER.  HS20     593.26   593.26                              9.6066   9.6066
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                                   DETAIL DATA AT MOMENT CHECK POINT FOR                  BARS RELEASE 5.4
                          COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
  DATE 12/11/95                                                                    D/P STRUCTURE I.D. = G65-005
                                                                                   MEMBER I.D. --       S 2
                                                                                   C.P. LOCATION -      2.50

                                                                                                      PAGE 1
***** SECTION PROPERTIES IN RANGE  2 OF SPAN 2  ******

                          -- STRUCTURAL STEEL PROPERTIES --
     H     Tweb  H/Tweb    D    D/Tweb  - B' (IN) -   - B'/t -    Lb ( FT )    Ry ( IN )    - Lb / Ry    HYBRID RATIO, R
   (IN.)  (IN.)          (IN.)           TOP   BOT    TOP   BOT  TOP    BOT   TOP   BOT     TOP   BOT    +BEND   -BEND
   37.75   0.63   60.40  36.00   57.60   5.69  6.69   7.58  6.69 CONT   23.50  3.46  4.04    0.00 69.78  1.0000  1.0000

                          -- COMPOSITE CONCRETE PROPERTIES --
   EFF.WIDTH  EFF.THICK.  VALUE   (AS)C   (DS)C  VALUE  VALUE   Atf      Abf       AW
    (IN.)       (IN.)       N    (SQ.IN.) (IN.)    k      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
    93.0         7.8        8      0.00    0.00   5.18   0.0    9.00    14.00     22.50

                          -- SECTION PROPERTIES --          -------- SECTION MODULUS --------    ---- PLASTIC SECTION MODULUS ----
          GROSS    NET AREA      IX        IX      C      TOP      TOP     BOTT     BOTT     TOP     TOP      BOTT     BOTT
          AREA   +BEND  -BEND   +BEND     -BEND  (BOT)   +BEND    -BEND   +BEND    -BEND   +BEND   -BEND+   +BEND    -BEND
          SQ.IN.  SQ.IN. SQ.IN.  IN.**4    IN.**4  IN.    IN.**3   IN.**3  IN.**3   IN.**3  IN.**3   IN.**3  IN.**3   IN.**3
NON-COM   45.50   45.50  45.50  10069.2   10069.2 16.94    483.9    483.9   594.3    594.3  619.23  619.23  619.23   619.23
CON(N-N)                        29426.7       0.0 33.56   7020.4   1982.0   876.9    800.9
CON(N-3N)                       21533.2       0.0 26.89   1982.0   1982.0   800.9    800.9

                          -- ULTIMATE STRENGTH --
     Fy (PSI) f/c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)      -- YIELD STRESS, Fy (PSI) --
      STEEL    CONC.     REBAR    TOP     BOT     TOP    BOT          BOT          TOP         WEB
                                 FLANGE  FLANGE  FLANGE FLANGE       FLANGE       FLANGE
     36000.    4000.    40000.    8.43    8.43   11.60  11.60        36000.       36000.      36000.

*****  SECTION QUALIFICATION  *****
       STIFFENED   UNSTIFFENED  COMPACT    BRACED      UNBRACED    REDUCTION   SYMMETRICAL UNSYMMETRICAL
      LONG  TRANV                        NON-COMPACT  NON-COMPACT    FACTOR
+BEND        X                              X                        0.0000                     X
-BEND        X                              X                        0.8056                     X

*****  SECTION CAPACITY  *****
       +BEND       ML =      0.00 FT-KIPS,   MR =      0.00 FT-KIPS,   M1/M2 =     0.0
       -BEND       ML =      0.00 FT-KIPS,   MR =      0.00 FT-KIPS,   M1/M2 =     1.0
    --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---     -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --   -- SHEAR CAPACITY (KIPS) --

        TOP       TOP       BOTT      BOTT       MU        MAX. CAP.    MAX. CAP.      MU                    VU        VU
       +BEND     -BEND     +BEND     -BEND                   STEEL       CONC.                            LEFT     RIGHT
INV.   9720.51    670.04   1214.14    822.91      0.00       619.23      6536.45     9720.51               469.80    469.80
OPER. 16200.85   1116.73   2023.57   1371.51      0.00       619.23      6536.45    16200.85               469.80    469.80

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                          -- DEAD LOAD --
      M (DL)    M (SDL)    REDIS.    REDIS.     V (DL)    V (SDL)
                          M+(DL) --M-(SDL)
      39.13     79.57     -39.13     79.57      13.47      3.71
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                              DETAIL DATA AT MOMENT CHECK POINT FOR
                    COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
 DATE 12/11/95
                                                                              D/P STRUCTURE I.D. = G65-005
                                                                              MEMBER I.D. --       S 2
                                                                              C.P. LOCATION --     2.50

                                                                                                   PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR = 0.228 FOR +BEND AND = 0.190 FOR -BEND)

                                         -- LIVE LOAD --
                 -------------TRUCK MOMENT-----------  -------------LANE MOMENT---------------------FIXED-----  ------MAX------
       LIVE      REDIS   LL+IMP   LL      LOC.NO.  DIR  LL+IMP     LL     LOC.CONC. LOC.CONC.       SHEAR            SHEAR
       LOAD      LL+I                     1 WHEEL                         LOAD #1   LOAD #2    +V          -V    +V        -V
                 FT-KIPS FT-KIPS FT-KIPS    FT.         FT-KIPS  FT-KIPS    FT.       FT.      KIPS        KIPS  KIPS      KIPS

 INV.   HS20 +BEND    0.00   695.4   566.1  170.833  L    526.0    428.3  184.833     0.000   5.66        3.78
             -BEND  203.36   158.5   133.2   96.916  R    203.4    170.9   82.700     0.000   5.49        5.49
                                                                                                              30.11     30.11
 OPER.  HS20 +BEND    0.00   695.4   566.1  170.833  L    526.0    428.3  184.833     0.000   5.66        3.78
             -BEND  203.36   158.5   133.2   96.916  R    203.4    170.9   82.700     0.000   5.49        5.49
                                                                                                              30.11     30.11

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
                SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
        T 0    0.000    0.000    0.000    0.000    0.000    0.000
        E 1   -0.637    1.241   -0.686    0.000    0.000    0.000
        N 2   -1.238    2.903   -1.044    0.000    0.000    0.000
        T 3   -1.766    5.197   -1.217    0.000    0.000    0.000
        H 4   -2.185    8.743   -1.269    0.000    0.000    0.000
          5   -2.457   13.698   -1.216    0.000    0.000    0.000
        P 6   -2.548    9.976   -1.077    0.000    0.000    0.000
        O 7   -2.420    6.710   -0.869    0.000    0.000    0.000
        I 8   -2.037    3.881   -0.608    0.000    0.000    0.000
        N 9   -1.300    1.570   -0.313    0.000    0.000    0.000
        T 0    0.000    0.000    0.000    0.000    0.000    0.000

                                                                  AREA
                                                                 TOTALS
    POS AREA    0.0    506.8      0.0      0.0      0.0      0.0    506.8
    NEG AREA  228.6      0.0     55.9      0.0      0.0      0.0    284.6

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

        X-DIST (FT.)     0.00      0.00      0.00  POS AREA =      0.00
        Y-ORDINATE       0.00      0.00      0.00
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                                 DETAIL DATA AT MOMENT CHECK POINT FOR
                      COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE 12/11/95                                                                  D/P STRUCTURE I.D. = G65-005
                                                                                  MEMBER I.D. --       S 2
                                                                                  C.P. LOCATION --     2.50

                                                                                                       PAGE 3


***** RATING FACTOR *****
                    -- RATING FACTOR FOR MOMENT --
              AVAILABLE (LL+I) CAPACITY (FT-KIPS)   RATING FACTOR - MOMENT
            TOP      TOP      BOTT     BOTT             TOP              BOTT              RATING     SAFE
           +BEND    -BEND    +BEND    -BEND      +BEND    -BEND    +BEND    -BEND          VALUE      LOAD
                                                                                                   CAP.(TONS)
INV.  HS20  9892.0   694.3   1196.5    847.2    14.2249  3.4141   1.7206   4.1658         HS 34.4     61.9

OPER. HS20 16486.6  1157.2   1994.2   1412.0    23.7082  5.6902   2.8677   6.9430         HS 57.4    103.2

                    -- RATING FACTOR FOR SERVICEABILITY --
              AVAILABLE (LL+I) CAPACITY (FT-KIPS)  RATING FACTOR -SERVICEABILITY
            TOP      TOP      BOTT     BOTT             TOP              BOTT              RATING     SAFE
           +BEND    -BEND    +BEND    -BEND      +BEND    -BEND    +BEND    -BEND          VALUE      LOAD
                                                                                                   CAP.(TONS)
INV.  HS20 12176.3   851.8   1481.8   1040.6    17.5098  4.1884   2.1309   5.1167

OPER. HS20 20293.9  1419.6   2469.7   1734.3    29.1830  6.9806   3.5515   8.5279

                         -- RATING FACTOR FOR SHEAR --
            AVAILABLE CAPACITY (KIPS)                  RATING FACTOR - SHEAR               RATING     SAFE
              LEFT     RIGHT                             LEFT     RIGHT                    VALUE      LOAD

INV.  HS20   206.52   206.52                            6.8590   6.8598

OPER. HS20   344.21   344.21                           11.4330  11.4330
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                                  DETAIL DATA AT MOMENT CHECK POINT FOR              BARS RELEASE 5.4
                         COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE 12/11/95                                                                      D/P STRUCTURE I.D. = G65-005
                                                                                      MEMBER I.D. --       S 2
                                                                                      C.P. LOCATION -      3.00

                                                                                                           PAGE 1
*****  SECTION PROPERTIES IN RANGE  1 OF SPAN 3   ******


                         -- STRUCTURAL STEEL PROPERTIES --
     H     Tweb   H/Tweb    D    D/Tweb   - B' (IN) -    - B'/t -     Lb ( FT )    Ry ( IN )    - Lb / Ry    HYBRID RATIO, R
   (IN.)  (IN.)           (IN.)            TOP   BOT    TOP   BOT   TOP    BOT    TOP   BOT     TOP   BOT    +BEND   -BEND
   38.75   0.63   62.00  36.00  57.60     6.69  6.69   4.86  4.86  CONT   23.50  4.04  4.04    0.00  69.78  1.0000  1.0000

                         -- COMPOSITE CONCRETE PROPERTIES --
   EFF.WIDTH   EFF.THICK.  VALUE   (AS)C     (DS)C  VALUE  VALUE   Atf       Abf       Aw
     (IN.)       (IN.)       N    (SQ.IN.)  (IN.)     a      Y   (SQ.IN.) (SQ.IN.) (SQ.IN.)
     93.0         7.8        8      0.00     0.00   6.94    0.0   19.25     19.25     22.50

                         -- SECTION PROPERTIES --           -------- SECTION MODULUS --------    ---- PLASTIC SECTION MODULUS ----
            GROSS    NET AREA        IX        IX       C      TOP      TOP      BOTT     BOTT      TOP      TOP      BOTT     BOTT
            AREA   +BEND  -BEND    +BEND     -BEND   (BOT)   +BEND    -BEND    +BEND    -BEND    +BEND    -BEND+   +BEND    -BEND
           SQ.IN.  SQ.IN. SQ.IN.  IN.**4    IN.**4    IN.    IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3   IN.**3
NON-COM    61.00   61.00  61.00   15881.8   15881.8  19.37    819.7    819.7    819.7    819.7   921.99   921.99   921.99   921.99
COM(N=N)                          15881.8       0.0  19.37    819.7    819.7    819.7    819.7
COM(N=3N)                         15881.8       0.0  19.37    819.7    819.7    819.7    819.7

                         -- ULTIMATE STRENGTH --
   Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)     -- YIELD STRESS, Fy (PSI) --
    STEEL     CONC.     REBAR     TOP     BOT     TOP     BOT        BOT          TOP          WEB
                                FLANGE  FLANGE  FLANGE  FLANGE     FLANGE       FLANGE
   36000.     4000.    40000.    8.43    8.43    11.60   11.60     36000.       36000.       36000.

*****  SECTION QUALIFICATION  *****
         STIFFENED   UNSTIFFENED  COMPACT    BRACED       UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
        LONG  TRANV                        NON-COMPACT  NON-COMPACT     FACTOR
+BEND         X                                X                        0.0000          X
-BEND         X                                              X          0.8323          X

*****  SECTION CAPACITY  *****
         +BEND        ML =      0.00 FT-KIPS,    MR =      0.00 FT-KIPS,    M1/M2 =      0.0
         -BEND        ML =  -1011.93 FT-KIPS,    MR =     -7.22 FT-KIPS,    M1/M2 =    140.2
     --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---      -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --    -- SHEAR CAPACITY (KIPS) --

          TOP        TOP        BOTT       BOTT         MU        MAX. CAP.    MAX. CAP.      MU                 VU          VU
         +BEND      -BEND      +BEND      -BEND                    STEEL        CONC.                           LEFT        RIGHT
INV.    1134.98    1134.98    1134.98    1133.52       0.00       921.99        0.00       1134.98            469.80      469.80
OPER.   1891.63    1891.63    1891.63    1889.20       0.00       921.99        0.00       1891.63            469.80      469.80

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                         -- DEAD LOAD --
      M (DL)   M (SDL)      REDIS.    REDIS.      V (DL)     V (SDL)
                            M-(DL)---M-(SDL)
     -309.55   -141.65     -309.55   -141.65      33.02       14.17
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                                          DETAIL DATA AT MOMENT CHECK POINT FOR
                              COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE 12/11/95                                                                           D/P STRUCTURE I.D. = G65-005
                                                                                           MEMBER I.D. --       5 2
                                                                                           C.P. LOCATION --     3.00

                                                                                                               PAGE 2

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR = 0.190 FOR +BEND AND = 0.243 FOR -BEND)

                                      -- LIVE LOAD --
                  -------------TRUCK MOMENT-----------  -------------LANE MOMENT------------ -----FIXED----- ------MAX------
     LIVE          REDIS  LL+IMP   LL    LOC.NO. DIR  LL+IMP    LL    LOC.CONC. LOC.CONC.      SHEAR              SHEAR
     LOAD          LL+I                  1 WHEEL                      LOAD #1   LOAD #2    +V          -V     +V         -V
                  FT-KIPS FT-KIPS FT-KIPS   FT.       FT-KIPS FT-KIPS    FT.       FT.     KIPS       KIPS   KIPS       KIPS

INV.   HS20 +BEND   0.00  153.5   129.0   96.916  R    165.9   139.4   82.700     0.000   9.80      65.92
            -BEND 560.72  461.0   370.8  175.635  L    560.7   451.1  194.233   258.800  10.23      10.23
                                                                                                         58.59      60.09
OPER.  HS20 +BEND   0.00  153.5   129.0   96.916  R    165.9   139.4   82.700     0.000   9.80      65.92
            -BEND 560.72  461.0   370.8  175.635  L    560.7   451.1  194.233   258.800  10.23      10.23
                                                                                                         58.59      60.09

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
              SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
       T 0    0.000    0.000    0.000    0.000    0.000    0.000
       E 1    0.617   -1.186   -2.328    0.000    0.000    0.000
       N 2    1.199   -2.635   -3.540    0.000    0.000    0.000
       T 3    1.710   -4.274   -4.128    0.000    0.000    0.000
       H 4    2.116   -5.827   -4.303    0.000    0.000    0.000
         5    2.380   -6.805   -4.125    0.000    0.000    0.000
       P 6    2.468   -7.246   -3.653    0.000    0.000    0.000
       O 7    2.343   -7.116   -2.946    0.000    0.000    0.000
       I 8    1.972   -6.224   -2.062    0.000    0.000    0.000
       N 9    1.259   -4.150   -1.060    0.000    0.000    0.000
       T 0    0.000    0.000    0.000    0.000    0.000    0.000

                                                                   AREA
                                                                  TOTALS
     POS AREA  221.4      0.0      0.0      0.0      0.0      0.0  221.4
     NEG AREA    0.0    427.3    189.8      0.0      0.0      0.0  617.1

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

       X-DIST (FT.)      0.00       0.00       0.00 POS AREA =      0.00
       Y-ORDINATE        0.00       0.00       0.00
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                                               DETAIL DATA AT MOMENT CHECK POINT FOR
                                  COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
    DATE 12/11/95
                                                                                                  D/P STRUCTURE I.D. = G65-005
                                                                                                  MEMBER I.D. --       S 2
                                                                                                  C.P. LOCATION --     3.00

                                                                                                                     PAGE 3


*****  RATING FACTOR  *****
                           -- RATING FACTOR FOR MOMENT --
                   AVAILABLE (LL+I) CAPACITY (FT-KIPS)    RATING FACTOR - MOMENT
               TOP        TOP       BOTT      BOTT              TOP              BOTT              RATING      SAFE
              +BEND      -BEND     +BEND     -BEND      +BEND    -BEND    +BEND    -BEND           VALUE       LOAD
                                                                                                          CAP.(TONS)
INV.   HS20   1405.7     864.3     1405.7    862.8      8.4716   1.5413   8.4716   1.5387         HS 30.8      55.4

OPER.  HS20   2342.8     1440.4    2342.8    1438.0     14.1194  2.5689  14.1194   2.5645         HS 51.3      92.3

                           -- RATING FACTOR FOR SERVICEABILITY --
                  AVAILABLE (LL+I) CAPACITY (FT-KIPS)  RATING FACTOR -SERVICEABILITY
               TOP        TOP       BOTT      BOTT              TOP              BOTT              RATING      SAFE
              +BEND      -BEND     +BEND     -BEND      +BEND    -BEND    +BEND    -BEND           VALUE       LOAD
                                                                                                          CAP.(TONS)
INV.   HS20   1672.4     1131.0    1672.4    1131.0     10.0790  2.0170  10.0791   2.0170

OPER.  HS20   2787.4     1885.0    2787.4    1885.0     16.7984  3.3617  16.7984   3.3617

                            -- RATING FACTOR FOR SHEAR --
              AVAILABLE CAPACITY (KIPS)                      RATING FACTOR - SHEAR                 RATING      SAFE
                LEFT       RIGHT                               LEFT      RIGHT                     VALUE       LOAD

INV.   HS20     188.52     188.52                              3.1370    3.1370

OPER.  HS20     314.19     314.19                              5.2284    5.2284
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                              DETAIL DATA AT MOMENT CHECK POINT FOR                 BARS RELEASE 5.4
                      COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
  DATE 12/11/95                                                                D/P STRUCTURE I.D. = C65-005
                                                                               MEMBER I.D. --        S 2
                                                                               C.P. LOCATION -       3.60

                                                                                                    PAGE 1
*****  SECTION PROPERTIES IN RANGE  2 OF SPAN 3  ******

                           -- STRUCTURAL STEEL PROPERTIES --
     H     Tweb   H/Tweb    D    D/Tweb   - B' (IN) -    - B'/t -     Lb ( FT )    Ry ( IN )     - Lb / Ry    HYBRID RATIO, R
   (IN.)  (IN.)           (IN.)            TOP   BOT    TOP    BOT   TOP    BOT    TOP   BOT     TOP   BOT     +BEND   -BEND
   38.25   0.63    61.20  36.00   57.60   5.69  6.69   5.69   5.35  CONT   22.47   3.46  4.04    0.00  66.73  1.0000  1.0000

                           -- COMPOSITE CONCRETE PROPERTIES --
   EFF.WIDTH   EFF.THICK.  VALUE    (AS)C     (DS)C  VALUE  VALUE   Atf       Abf       Aw
     (IN.)        (IN.)      N     (SQ.IN.)  (IN.)    a      Y    (SQ.IN.) (SQ.IN.) (SQ.IN.)
     93.0          7.8       8       0.00      0.00  5.92   0.0   12.00     17.50     22.50

                           -- SECTION PROPERTIES --          -------- SECTION MODULUS --------    ---- PLASTIC SECTION MODULUS ----
           GROSS     NET AREA         IX         IX      C      TOP       TOP      BOTT     BOTT      TOP       TOP       BOTT      BOTT
           AREA    +BEND  -BEND     +BEND      -BEND   (BOT)   +BEND     -BEND    +BEND    -BEND     +BEND     -BEND     +BEND     -BEND
           SQ.IN.  SQ.IN. SQ.IN.    IN.**4     IN.**4   IN.    IN.**3    IN.**3   IN.**3   IN.**3    IN.**3    IN.**3    IN.**3    IN.**3
NON-COM    52.00   52.00  52.00     12403.1    12403.1  17.25   590.7     590.7    719.0    719.0    741.94    741.94    741.94    741.94
COM(N=N)                            33789.5        0.0  33.23  6728.8    2092.9   1016.9    930.7
COM(N=3N)                           24641.5        0.0  26.48  2092.9    2092.9    930.7    930.7

                           -- ULTIMATE STRENGTH --
   Fy (PSI) f'c (PSI)  Fy (PSI)  2055/(SQRT Fy)  2200/(SQRT Fy)      -- YIELD STRESS, Fy (PSI) --
    STEEL     CONC.      REBAR     TOP     BOT    TOP    BOT         BOT          TOP         WEB
                                 FLANGE  FLANGE  FLANGE FLANGE      FLANGE       FLANGE
    36000.    4000.      40000.    8.43    8.43   11.60  11.60       36000.       36000.      36000.

*****  SECTION QUALIFICATION  *****
        STIFFENED   UNSTIFFENED  COMPACT    BRACED       UNBRACED     REDUCTION   SYMMETRICAL UNSYMMETRICAL
       LONG  TRANV                        NON-COMPACT  NON-COMPACT     FACTOR
+BEND         X                               X                        0.0000                  X
-BEND         X                                             X          0.8106                  X

*****  SECTION CAPACITY  *****
        +BEND        ML =      0.00 FT-KIPS,   MR =      0.00 FT-KIPS,  M1/M2 =      0.0
        -BEND        ML =     -7.22 FT-KIPS,   MR =    294.29 FT-KIPS,  M1/M2 =      0.0
     --- NON-COMPOSITE MOMENT CAPACITY (FT-KIPS) ---      -- COMPOSITE MOMENT CAPACITY (FT-KIPS) --    -- SHEAR CAPACITY (KIPS) --

        TOP        TOP       BOTT       BOTT        MU         MAX. CAP.    MAX. CAP.      MU                      VU        VU
       +BEND      -BEND     +BEND      -BEND                    STEEL        CONC.                                 LEFT      RIGHT
INV.    9316.75    795.55    1408.00     968.38       0.00       741.94      6138.11      9316.75                  469.80    469.80
OPER.  15527.91   1325.92    2346.66    1613.97       0.00       741.94      6138.11     15527.91                  469.80    469.80

*****  MOMENT (FT-KIPS) AND SHEAR (KIPS)  *****
                          -- DEAD LOAD --
      M (DL)   M (SDL)     REDIS.    REDIS.      V (DL)     V (SDL)
                           M-(DL)---M-(SDL)
      331.75    138.59     331.75    138.59      -1.06       -0.31
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                                  DETAIL DATA AT MOMENT CHECK POINT FOR
                       COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
   DATE 12/11/95
                                                                           D/P STRUCTURE I.D. = G65-005
                                                                           MEMBER I.D. --       S 2
                                                                           C.P. LOCATION --     3.60

***** LIVE LOAD CALCULATIONS (IMPACT FACTOR = 0.260 FOR +BEND AND = 0.228 FOR -BEND)

                                     -- LIVE LOAD --
                 -------------TRUCK MOMENT------------  -------------LANE MOMENT------------  -----FIXED-----  ------MAX------
        LIVE     REDIS   LL+IMP   LL    LOC.NO.  DIR  LL+IMP    LL    LOC.CONC. LOC.CONC.       SHEAR            SHEAR
        LOAD      LL+I                  1 WHEEL                       LOAD #1   LOAD #2     +V        -V     +V         -V
                 FT-KIPS FT-KIPS FT-KIPS   FT.        FT-KIPS  FT-KIPS   FT.       FT.      KIPS      KIPS   KIPS       KIPS

 INV.   HS20 +BEND   0.00  758.2  601.8  286.283  R    582.0    462.0  272.283    0.000   6.93     24.52
             -BEND 182.19  182.2  148.3  175.635  L    148.5    120.9  194.233    0.000   6.76      6.76
                                                                                                         28.05      28.05
 OPER.  HS20 +BEND   0.00  758.2  601.8  286.283  R    582.0    462.0  272.283    0.000   6.93     24.52
             -BEND 182.19  182.2  148.3  175.635  L    148.5    120.9  194.233    0.000   6.76      6.76
                                                                                                         28.05      28.05

*****  ORDINATES OF AND AREAS UNDER MOMENT INFLUENCE  LINE (CONTINUOUS SPAN) *****
             SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6
        T 0   0.000    0.000    0.000    0.000    0.000    0.000
        E 1   0.247   -0.474    1.765    0.000    0.000    0.000
        N 2   0.480   -1.054    3.977    0.000    0.000    0.000
        T 3   0.684   -1.710    6.439    0.000    0.000    0.000
        H 4   0.846   -2.331    9.065    0.000    0.000    0.000
          5   0.952   -2.722   11.833    0.000    0.000    0.000
        P 6   0.987   -2.899   14.719    0.000    0.000    0.000
        O 7   0.937   -2.846   10.957    0.000    0.000    0.000
        I 8   0.789   -2.490    7.265    0.000    0.000    0.000
        N 9   0.504   -1.660    3.621    0.000    0.000    0.000
        T 0   0.000    0.000    0.000    0.000    0.000    0.000

                                                                AREA
                                                               TOTALS
      POS AREA    88.6      0.0    469.5      0.0      0.0      0.0  558.1
      NEG AREA     0.0    170.9      0.0      0.0      0.0      0.0  170.9

*****  MOMENT INFLUENCE LINE (SIMPLE SPAN)

        X-DIST (FT.)       0.00       0.00       0.00  POS AREA =        0.00
        Y-ORDINATE         0.00       0.00       0.00
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                                              DETAIL DATA AT MOMENT CHECK POINT FOR
                                COMPOSITE STEEL AND CONCRETE  FLEXURAL MEMBER - LOAD FACTOR RATING
  DATE 12/11/95                                                                                D/P STRUCTURE I.D. = G65-005
                                                                                               MEMBER I.D. --      S 2
                                                                                               C.P. LOCATION --    3.60

                                                                                                                   PAGE 3


***** RATING FACTOR *****
                          -- RATING FACTOR FOR MOMENT --
                  AVAILABLE (LL+I) CAPACITY (FT-KIPS)  - RATING FACTOR - MOMENT
              TOP        TOP       BOTT      BOTT             TOP              BOTT              RATING      SAFE
             +BEND      -BEND     +BEND     -BEND      +BEND    -BEND    +BEND    -BEND          VALUE       LOAD
                                                                                                          CAP.(TONS)
INV.  HS20 111111.0     1077.8    1035.6    1250.6     6.8202   5.9155   1.3659   6.8640        HS 27.3      49.2

OPER. HS20 111111.0     1796.3    1726.0    2084.3    11.3669   9.8591   2.2765  11.4401        HS 45.5      82.0

                       -- RATING FACTOR FOR SERVICEABILITY --
                 AVAILABLE (LL+I) CAPACITY (FT-KIPS)  RATING FACTOR -SERVICEABILITY
              TOP        TOP       BOTT      BOTT             TOP              BOTT              RATING      SAFE
             +BEND      -BEND     +BEND     -BEND      +BEND    -BEND    +BEND    -BEND          VALUE       LOAD
                                                                                                          CAP.(TONS)
INV.  HS20   8971.2     1292.2    1366.5    1511.6    11.8322   7.0926   1.8023   8.2969

OPER. HS20  14952.1     2153.7    2277.5    2519.4    19.7204  11.8210   3.0038  13.8282

                            -- RATING FACTOR FOR SHEAR --
              AVAILABLE CAPACITY (KIPS)                        RATING FACTOR - SHEAR             RATING      SAFE
                 LEFT       RIGHT                                 LEFT     RIGHT                 VALUE       LOAD

INV.  HS20     217.65     217.65                                7.6997    7.6997

OPER. HS20     362.76     362.76                               12.8329   12.8329
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                                          DETAIL DATA AT MOMENT CHECK POINT FOR          BARS RELEASE 5.4
                                          REINFORCED CONCRETE FLEXURAL MEMBER
   DATE 12/11/95
                                                                                         D/P STRUCTURE I.D.  G65-005
                                                                                         MEMBER I.D.--S03
                                                                                         C.P. LOCATION        1.4
*****  SECTION PROPERTIES IN RANGE  2 OF SPAN  1

         H       B       T      BP               AREA      IX      AS      D      ASP      DP      A      K      J
        IN.     IN.     IN.     IN.             SQ.IN.   IN**4   SQ.IN.   IN.   SQ.IN.    IN.     IN.
       24.00   22.00    4.00    9.63     +BEND   280.6   15235.2   4.39   22.50    1.93    2.00   1.00  0.000  0.000
                                         -BEND   231.1   11093.8   1.93   22.00    4.39    1.50   0.98  0.000  0.000

*****  INFLUENCE LINE (SIMPLE SPAN)                               *****  ALLOWABLE STRESS  *****  MONENT CAPACITY
                                                                          REINF.  CONC      CONC   REINF   REINF    CONC
   X-DIST (FT.)                              POS AREA =                  STEEL            + BEND  - BEND  + BEND  - BEND
   Y-ORDINATE                                                             PSI     PSI     FT-KIPS FT-KIPS FT-KIPS FT-KIPS
                                                                INVENTORY  20000.0  1600.0  271.0   120.6   271.0   120.6
*****  ORDINATES OF AND AREAS UNDER INFLUENCE LINE (CONTINUOUS SPAN)  OPERATING  28000.0  2200.0  271.0   120.6   271.0   120.6
               SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6   POST VEH1      0.0     0.0    0.0     0.0     0.0     0.0
       T 0      0.000    0.000    0.000    0.000    0.000    0.000    POST VEH2      0.0     0.0    0.0     0.0     0.0     0.0
       E 1      2.246   -1.003    0.097    0.000    0.000    0.000    POST VEH3      0.0     0.0    0.0     0.0     0.0     0.0
       N 2      4.519   -1.677    0.163    0.000    0.000    0.000    POST SPEC      0.0     0.0    0.0     0.0     0.0     0.0
       T 3      6.861   -2.011    0.202    0.000    0.000    0.000
       H 4      9.308   -2.071    0.217    0.000    0.000    0.000    *****  TOTAL DL       *****  AVAIL.CAPAC.FOR LL+IMPACT
         5      7.277   -1.890    0.212    0.000    0.000    0.000        MOMENT EFFECT               TOP     TOP     BOT     BOT
       P 6      5.421   -1.544    0.190    0.000    0.000    0.000                                   +BEND   -BEND   +BEND   -BEND
       O 7      3.744   -1.111    0.154    0.000    0.000    0.000          FT-KIPS                  F-KPS   F-KPS   F-KPS   F-KPS
       I 8      2.265   -0.668    0.108    0.000    0.000    0.000           47.8      INVENTORY      96.4    84.3    96.4    84.3
       N 9      1.023   -0.285    0.056    0.000    0.000    0.000                     OPERATING     160.7   140.5   160.7   140.5
       T 0      0.000    0.000    0.000    0.000    0.000    0.000   AREA              VEH. 1          0.0     0.0     0.0     0.0
                                                                     TOTALS            VEH. 2          0.0     0.0     0.0     0.0
    POS AREA   197.0      0.0      4.1      0.0      0.0      0.0    201.0             VEH. 3          0.0     0.0     0.0     0.0
    NEG AREA     0.0     71.3      0.0      0.0      0.0      0.0     71.3             SPECIAL         0.0     0.0     0.0     0.0

*****  LIVE LOAD AND RATING CALCULATIONS (IMPACT FACTOR = 0.292 FOR +BEND AND = 0.273 FOR -BEND)
                  ---------TRUCK LOAD---------------   -------LANE LOAD-------
    LIVE          LL+IMP    LL    LOC.NO.  DIR  AXLE    LL+IMP    LL    LOC.CONC  LOC.CONC         RATING  SAFE LOAD  RATING
    LOAD                          1 WHEEL       SPACE                     LOAD      LOAD 2            FACT.   CAPACITY   VALUE
                 FT-KIPS FT-KIPS    FT.          FT.   FT-KIPS FT-KIPS    FT.        FT.                        TONS
 INV  HS20 +BEND   75.9    58.7    4.467    L    0.0     51.8    40.1    18.467                       1.271      45.7   HS 25.4
           -BEND   22.1    17.3   89.250    R    0.0     14.4    11.3    69.433      0.000

 OPER HS20 +BEND   75.9    58.7    4.467    L    0.0     51.8    40.1    18.467                       2.118      76.2   HS 42.4
           -BEND   22.1    17.3   89.250    R    0.0     14.4    11.3    69.433      0.000

 POST VEH1 +BEND    0.0     0.0    0.000                                                              0.000       0.0
           -BEND    0.0     0.0    0.000

 POST VEH2 +BEND    0.0     0.0    0.000                                                              0.000       0.0
           -BEND    0.0     0.0    0.000

 POST VEH3 +BEND    0.0     0.0    0.000                                                              0.000       0.0
           -BEND    0.0     0.0    0.000

   ST SPEC +BEND    0.0     0.0    0.000                                                              0.000       0.0
           -BEND    0.0     0.0    0.000
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                                    DETAIL DATA AT MOMENT CHECK POINT FOR            BARS RELEASE 5.4
                                    REINFORCED CONCRETE FLEXURAL MEMBER
   DATE 12/11/95                                                                     D/P STRUCTURE I.D.  G65-005
                                                                                     MEMBER I.D.--S03
                                                                                     C.P. LOCATION        2.0
***** SECTION PROPERTIES IN RANGE  1 OF SPAN  2

       H       B       T       BP                AREA      IX      AS      D      ASP      DP      A     K      J
      IN.     IN.     IN.     IN.               SQ.IN.    IN**4  SQ.IN.   IN.   SQ.IN.    IN.     IN.
     24.00   22.00   12.00   22.00     +BEND    528.0   25344.0   2.00   22.50    6.03    2.00   1.00  0.000  0.000
                                       -BEND    528.0   25344.0   6.03   22.00    2.00    1.50   1.00  0.000  0.000

***** INFLUENCE LINE (SIMPLE SPAN)                                      *****  ALLOWABLE STRESS  *****  MOMENT CAPACITY
                                                                                REINF.   CONC        CONC   REINF   REINF    CONC
     X-DIST (FT.)                                 POS AREA =                    STEEL               + BEND  - BEND  + BEND  - BEND
     Y-ORDINATE                                                                  PSI      PSI     FT-KIPS  FT-KIPS FT-KIPS FT-KIPS
                                                                     INVENTORY  20000.0   1600.0   131.8   368.8   131.8   368.8
***** ORDINATES OF AND AREAS UNDER INFLUENCE LINE (CONTINUOUS SPAN)  OPERATING  28000.0   2200.0   131.8   368.8   131.8   368.8
            SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6     POST VEH1      0.0      0.0     0.0     0.0     0.0     0.0
     T 0     0.000    0.000    0.000    0.000    0.000    0.000      POST VEH2      0.0      0.0     0.0     0.0     0.0     0.0
     E 1    -1.310   -2.508    0.241    0.000    0.000    0.000      POST VEH3      0.0      0.0     0.0     0.0     0.0     0.0
     N 2    -2.553   -4.192    0.407    0.000    0.000    0.000      POST SPEC      0.0      0.0     0.0     0.0     0.0     0.0
     T 3    -3.623   -5.028    0.504    0.000    0.000    0.000
     H 4    -4.431   -5.178    0.542    0.000    0.000    0.000      ***** TOTAL DL            ***** AVAIL.CAPAC.FOR LL+IMPACT
       5    -4.890   -4.725    0.530    0.000    0.000    0.000          MOMENT EFFECT                TOP     TOP     BOT     BOT
     P 6    -4.915   -3.860    0.474    0.000    0.000    0.000                                      +BEND   -BEND   +BEND   -BEND
     O 7    -4.491   -2.778    0.386    0.000    0.000    0.000              FT-KIPS                 F-KPS   F-KPS   F-KPS   F-KPS
     I 8    -3.571   -1.671    0.271    0.000    0.000    0.000              -123.3     INVENTORY    134.8    96.3   134.8    96.3
     N 9    -2.058   -0.712    0.140    0.000    0.090    0.000                         OPERATING    224.6   160.4   224.6   160.4
     T 0     0.000    0.000    0.000    0.000    0.000    0.000  AREA                   VEH. 1         0.0     0.0     0.0     0.0
                                                               TOTALS                   VEH. 2         0.0     0.0     0.0     0.0
  POS AREA     0.0      0.0     10.2      0.0      0.0      0.0    10.2                 VEH. 3         0.0     0.0     0.0     0.0
  NEG AREA   147.0    178.3      0.0      0.0      0.0      0.0   325.3                 SPECIAL        0.0     0.0     0.0     0.0

***** LIVE LOAD AND RATING CALCULATIONS (IMPACT FACTOR = 0.300 FOR +BEND AND = 0.282 FOR -BEND)
                  ---------TRUCK LOAD-----------------  ---------LANE LOAD-------
     LIVE         LL+IMP    LL    LOC.NO.  DIR   AXLE   LL+IMP    LL    LOC.CONG  LOC.CONG          RATING  SAFE LOAD  RATING
     LOAD                         1 WHEEL        SPACE                    LOAD     LOAD 2            FACT.   CAPACITY   VALUE
                 FT-KIPS FT-KIPS    FT.           FT.   FT-KIPS FT-KIPS    FT.       FT.                        TONS
INV  HS20 +BEND     4.6     3.5  138.749   R     0.0      2.9     2.2  116.000
          -BEND    55.6    43.3   89.250   R     0.0     68.1    53.1   69.433    27.700            1.414      50.9   HS 28.3

OPER HS20 +BEND     4.6     3.5  138.749   R     0.0      2.9     2.2  116.000
          -BEND    55.6    43.3   89.250   R     0.0     68.1    53.1   69.433    27.700            2.357      84.8   HS 47.1

POST VEH1 +BEND     0.0     0.0    0.000                                                            0.000       0.0
          -BEND     0.0     0.0    0.000

POST VEH2 +BEND     0.0     0.0    0.000                                                            0.000       0.0
          -BEND     0.0     0.0    0.000

POST VEH3 +BEND     0.0     0.0    0.000                                                            0.000       0.0
          -BEND     0.0     0.0    0.000

POST SPEC +BEND     0.0     0.0    0.000                                                            0.000       0.0
          -BEND     0.0     0.0    0.000
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                                                     DETAIL DATA AT MOMENT CHECK POINT FOR              BARS RELEASE 5.4
                                                     REINFORCED CONCRETE FLEXURAL MEMBER
     DATE 12/11/95
                                                                                                        D/P STRUCTURE I.D.  665-005
                                                                                                        MEMBER I.D.--S03
                                                                                                        C.P. LOCATION        2.5
***** SECTION PROPERTIES IN RANGE  3 OF SPAN  2

           H       B       T      BP             AREA     IX       AS      D     ASP      DP     A      K      J
          IN.     IN.     IN.     IN.           SQ.IN.   IN**4   SQ.IN.   IN.   SQ.IN.   IN.    IN.
         24.00   22.00   4.00    9.63   +BEND   280.6   15235.2   4.39   22.50   2.54    2.00   1.00  0.000  0.000
                                        -BEND   231.1   11093.8   2.54   22.00   4.39    1.50   0.98  0.000  0.000

***** INFLUENCE LINE (SIMPLE SPAN)                                     ***** ALLOWABLE STRESS  ***** MOMENT CAPACITY
                                                                               REINF.  CONC       CONC   REINF   REINF    CONC
       X-DIST (FT.)                               POS AREA =                  STEEL             + BEND  - BEND  + BEND  - BEND
       Y-ORDINATE                                                              PSI     PSI     FT-KIPS FT-KIPS FT-KIPS FT-KIPS
                                                                     INVENTORY 20000.0  1600.0  271.0   155.8   271.0   155.8
***** ORDINATES OF AND AREAS UNDER INFLUENCE LINE (CONTINUOUS SPAN)  OPERATING 28000.0  2200.0  271.0   155.8   271.0   155.8
               SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6  POST VEH1     0.0     0.0    0.0     0.0     0.0     0.0
      T 0       0.000    0.000    0.000    0.000    0.000    0.000   POST VEH2     0.0     0.0    0.0     0.0     0.0     0.0
      E 1      -0.390    0.992   -0.266    0.000    0.000    0.000   POST VEH3     0.0     0.0    0.0     0.0     0.0     0.0
      N 2      -0.760    2.289   -0.448    0.000    0.000    0.000   POST SPEC     0.0     0.0    0.0     0.0     0.0     0.0
      T 3      -1.078    3.969   -0.555    0.000    0.000    0.000
      H 4      -1.318    6.059   -0.597    0.000    0.000    0.000   ***** TOTAL DL          ***** AVAIL.CAPAC.FOR LL+IMPACT
        5      -1.455    8.641   -0.583    0.000    0.000    0.000        MOMENT EFFECT                TOP     TOP     BOT     BOT
      P 6      -1.462    5.920   -0.522    0.000    0.000    0.000                                     +BEND   -BEND   +BEND   -BEND
      O 7      -1.336    3.732   -0.424    0.000    0.000    0.000           FT-KIPS                   F-KPS   F-KPS   F-KPS   F-KPS
      I 8      -1.063    2.023   -0.298    0.000    0.000    0.000            50.3       INVENTORY     94.9   102.1    94.9   102.1
      N 9      -0.612    0.803   -0.154    0.000    0.000    0.000                       OPERATING    158.2   170.2   158.2   170.2
      T 0       0.000    0.000    0.000    0.000    0.000    0.000   AREA                VEH. 1         0.0     0.0     0.0     0.0
                                                                     TOTALS              VEH. 2         0.0     0.0     0.0     0.0
    POS AREA     0.0    200.3      0.0      0.0      0.0      0.0    200.3               VEH. 3         0.0     0.0     0.0     0.0
    NEG AREA    43.7      0.0     11.2      0.0      0.0      0.0     55.0               SPECIAL        0.0     0.0     0.0     0.0

***** LIVE LOAD AND RATING CALCULATIONS (IMPACT FACTOR = 0.273 FOR +BEND AND = 0.292 FOR -BEND)
                 ----------TRUCK LOAD----------------   -------LANE LOAD-------
      LIVE       LL+IMP    LL    LOC.NO.  DIR   AXLE   LL+IMP    LL    LOC.CONC  LOC.CONC          RATING  SAFE LOAD  RATING
      LOAD                       1 WHEEL        SPACE                   LOAD     LOAD 2            FACT.   CAPACITY   VALUE
                 FT-KIPS FT-KIPS   FT.           FT.   FT-KIPS FT-KIPS   FT.       FT.                       TONS
INV  HS20 +BEND    70.0    55.0  89.249    R     0.0     49.3    38.8   75.250                     1.356     48.8    HS 27.1
          -BEND    15.4    11.9   4.466    L     0.0     10.8     8.4   27.700     0.000

OPER HS20 +BEND    70.0    55.0  89.249    R     0.0     49.3    38.8   75.250                     2.259     81.3    HS 45.2
          -BEND    15.4    11.9   4.466    L     0.0     10.8     8.4   27.700     0.000

POST VEH1 +BEND     0.0     0.0   0.000                                                            0.000      0.0
          -BEND     0.0     0.0   0.000

POST VEH2 +BEND     0.0     0.0   0.000                                                            0.000      0.0
          -BEND     0.0     0.0   0.000

POST VEH3 +BEND     0.0     0.0   0.000                                                            0.000      0.0
          -BEND     0.0     0.0   0.000

POST SPEC +BEND     0.0     0.0   0.000                                                            0.000      0.0
          -BEND     0.0     0.0   0.000
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                                        DETAIL DATA AT MOMENT CHECK POINT FOR          BARS RELEASE 5.4
                                        REINFORCED CONCRETE FLEXURAL MEMBER
  DATE 12/11/95                                                                        D/P STRUCTURE I.D.  G65-005
                                                                                       MEMBER I.D.--S03
                                                                                       C.P. LOCATION       3.0
***** SECTION PROPERTIES IN RANGE  1 OF SPAN  3

       H       B       T       BP              AREA      IX       AS      D      ASP      DP      A     K      J
      IN.     IN.     IN.     IN.            SQ.IN.    IN**4   SQ.IN.    IN.   SQ.IN.    IN.     IN.
     24.00   22.00   12.00   22.00   +BEND   528.0   25344.0   2.00   22.50    5.07     2.00    1.00  0.000  0.000
                                     -BEND   528.0   25344.0   5.07   22.00    2.00     1.50    1.00  0.000  0.000

***** INFLUENCE LINE (SIMPLE SPAN)                              ***** ALLOWABLE STRESS  ***** MOMENT CAPACITY
                                                                          REINF.  CONC      CONC    REINF   REINF    CONC
    X-DIST (FT.)                          POS AREA =                      STEEL            + BEND  - BEND  + BEND  - BEND
    Y-ORDINATE                                                            PSI     PSI     FT-KIPS FT-KIPS FT-KIPS FT-KIPS
                                                              INVENTORY 20000.0  1600.0   131.8   314.0   131.8   314.0
***** ORDINATES OF AND AREAS UNDER INFLUENCE LINE (CONTINUOUS SPAN) OPERATING 28000.0  2200.0   131.8   314.0   131.8   314.0
            SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6  POST VEH1     0.0     0.0     0.0     0.0     0.0     0.0
      T 0    0.000    0.000    0.000    0.000    0.000    0.000   POST VEH2     0.0     0.0     0.0     0.0     0.0     0.0
      E 1    0.530   -1.324   -0.773    0.000    0.000    0.000   POST VEH3     0.0     0.0     0.0     0.0     0.0     0.0
      N 2    1.034   -2.864   -1.302    0.000    0.000    0.000   POST SPEC     0.0     0.0     0.0     0.0     0.0     0.0
      T 3    1.467   -4.483   -1.614    0.000    0.000    0.000
      H 4    1.794   -5.970   -1.736    0.000    0.000    0.000   ***** TOTAL DL       ***** AVAIL.CAPAC.FOR LL+IMPACT
        5    1.980   -7.077   -1.695    0.000    0.000    0.000       MOMENT EFFECT              TOP     TOP     BOT     BOT
      P 6    1.990   -7.566   -1.519    0.000    0.000    0.000                                 +BEND   -BEND   +BEND   -BEND
      O 7    1.818   -7.207   -1.234    0.000    0.000    0.000         FT-KIPS                 F-KPS   F-KPS   F-KPS   F-KPS
      I 8    1.446   -5.916   -0.868    0.000    0.000    0.000         -102.5      INVENTORY   122.3    83.4   122.3    83.4
      N 9    0.833   -3.498   -0.448    0.000    0.000    0.000                     OPERATING   203.9   139.0   203.9   139.0
      T 0    0.000    0.000    0.000    0.000    0.000    0.000  AREA               VEH. 1        0.0     0.0     0.0     0.0
                                                               TOTALS               VEH. 2        0.0     0.0     0.0     0.0
   POS AREA   59.5      0.0      0.0      0.0      0.0      0.0   59.5              VEH. 3        0.0     0.0     0.0     0.0
   NEG AREA    0.0    267.0     32.6      0.0      0.0      0.0  299.7              SPECIAL       0.0     0.0     0.0     0.0

***** LIVE LOAD AND RATING CALCULATIONS (IMPACT FACTOR = 0.292 FOR +BEND AND = 0.296 FOR -BEND)
                 ---------TRUCK LOAD-----------------    -------LANE LOAD-------
    LIVE         LL+IMP    LL     LOC.NO.  DIR   AXLE   LL+IMP    LL    LOC.CONC  LOC.CONC        RATING  SAFE LOAD  RATING
    LOAD                          1 WHEEL        SPACE                    LOAD     LOAD 2          FACT.   CAPACITY   VALUE
                 FT-KIPS FT-KIPS    FT.           FT.   FT-KIPS FT-KIPS    FT.       FT.                     TONS
INV  HS20 +BEND    20.9    16.2    4.466    L    0.0     13.0    10.1   27.700
          -BEND    82.7    63.8   61.248    L    0.0     63.4    48.9   81.067   116.000          1.008      36.3    HS 20.2

OPER HS20 +BEND    20.9    16.2    4.466    L    0.0     13.0    10.1   27.700
          -BEND    82.7    63.8   61.248    L    0.0     63.4    48.9   81.067   116.000          1.681      60.5    HS 33.6

POST VEH1 +BEND     0.0     0.0    0.000                                                           0.000       0.0
          -BEND     0.0     0.0    0.000

POST VEH2 +BEND     0.0     0.0    0.000                                                           0.000       0.0
          -BEND     0.0     0.0    0.000

POST VEH3 +BEND     0.0     0.0    0.000                                                           0.000       0.0
          -BEND     0.0     0.0    0.000

POST SPEC +BEND     0.0     0.0    0.000                                                           0.000       0.0
          -BEND     0.0     0.0    0.000
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                                              DETAIL DATA AT MOMENT CHECK POINT FOR           BARS RELEASE 5.4
                                              REINFORCED CONCRETE FLEXURAL MEMBER
 DATE 12/11/95
                                                                                              D/P STRUCTURE I.D.  G65-005
                                                                                              MEMBER I.D.--S03
                                                                                              C.P. LOCATION         3.6
***** SECTION PROPERTIES IN RANGE  1 OF SPAN  3

       H        B        T        BP              AREA     IX       AS      D      ASP      DP      A      K      J
      IN.      IN.      IN.      IN.             SQ.IN.   IN**4   SQ.IN.   IN.    SQ.IN.   IN.     IN.
    24.00    22.00    12.00    22.00    +BEND   528.0   25344.0   2.00   22.50    5.07    2.00   1.00  0.000  0.000
                                        -BEND   528.0   25344.0   5.07   22.00    2.00    1.50   1.00  0.000  0.000

***** INFLUENCE LINE (SIMPLE SPAN)                                  ***** ALLOWABLE STRESS ***** MOMENT CAPACITY
                                                                          REINF.  CONC      CONC    REINF   REINF    CONC
     X-DIST (FT.)                              POS AREA =                 STEEL            + BEND  - BEND  + BEND  - BEND
     Y-ORDINATE                                                           PSI      PSI    FT-KIPS FT-KIPS FT-KIPS FT-KIPS
                                                                INVENTORY 20000.0  1600.0  131.8   314.0   131.8   314.0
***** ORDINATES OF AND AREAS UNDER INFLUENCE LINE (CONTINUOUS SPAN) OPERATING 28000.0  2200.0  131.8   314.0   131.8   314.0
            SPAN  1  SPAN  2  SPAN  3  SPAN  4  SPAN  5  SPAN  6   POST VEH1      0.0     0.0     0.0     0.0     0.0     0.0
     T 0    0.000    0.000    0.000    0.000    0.000    0.000    POST VEH2      0.0     0.0     0.0     0.0     0.0     0.0
     E 1    0.212   -0.530    0.857    0.000    0.000    0.000    POST VEH3      0.0     0.0     0.0     0.0     0.0     0.0
     N 2    0.414   -1.146    1.813    0.000    0.000    0.000    POST SPEC      0.0     0.0     0.0     0.0     0.0     0.0
     T 3    0.587   -1.793    2.854    0.000    0.000    0.000
     H 4    0.718   -2.388    3.972    0.000    0.000    0.000    ***** TOTAL DL          ***** AVAIL.CAPAC.FOR LL+IMPACT
       5    0.792   -2.831    5.155    0.000    0.000    0.000          MOMENT EFFECT              TOP     TOP     BOT     BOT
     P 6    0.796   -3.026    6.392    0.000    0.000    0.000                                    +BEND   -BEND   +BEND   -BEND
     O 7    0.727   -2.883    4.756    0.000    0.000    0.000              FT-KIPS               F-KPS   F-KPS   F-KPS   F-KPS
     I 8    0.578   -2.366    3.153    0.000    0.000    0.000               19.9     INVENTORY    48.9   156.9    48.9   156.9
     N 9    0.333   -1.399    1.571    0.000    0.000    0.000                        OPERATING    81.4   261.5    81.4   261.5
     T 0    0.000    0.000    0.000    0.000    0.000    0.000   AREA                 VEH. 1        0.0     0.0     0.0     0.0
                                                                 TOTALS               VEH. 2        0.0     0.0     0.0     0.0
  POS AREA   23.8      0.0     89.0      0.0      0.0      0.0   112.8                VEH. 3        0.0     0.0     0.0     0.0
  NEG AREA    0.0    106.8      0.0      0.0      0.0      0.0   106.8                SPECIAL       0.0     0.0     0.0     0.0

***** LIVE LOAD AND RATING CALCULATIONS (IMPACT FACTOR = 0.300 FOR +BEND AND = 0.273 FOR -BEND)
                ---------TRUCK LOAD---------------   -------LANE LOAD-------
    LIVE       LL+IMP   LL     LOC.NO.  DIR  AXLE   LL+IMP   LL    LOC.CONC  LOC.CONC          RATING  SAFE LOAD  RATING
    LOAD                       1 WHEEL       SPACE                   LOAD     LOAD 2            FACT.   CAPACITY   VALUE
              FT-KIPS FT-KIPS    FT.          FT.  FT-KIPS FT-KIPS   FT.       FT.                        TONS
INV  HS20 +BEND  41.9   32.3  135.832   R    0.0    33.0    25.4  121.833                      1.165     41.9    HS 23.3
          -BEND  32.5   25.5   61.248   L    0.0    21.3    16.7   81.067    0.000

OPER HS20 +BEND  41.9   32.3  135.832   R    0.0    33.0    25.4  121.833                      1.942     69.9    HS 38.8
          -BEND  32.5   25.5   61.248   L    0.0    21.3    16.7   81.067    0.000

POST VEH1 +BEND   0.0    0.0    0.000                                                          0.000      0.0
          -BEND   0.0    0.0    0.000

POST VEH2 +BEND   0.0    0.0    0.000                                                          0.000      0.0
          -BEND   0.0    0.0    0.000

POST VEH3 +BEND   0.0    0.0    0.000                                                          0.000      0.0
          -BEND   0.0    0.0    0.000

POST SPEC +BEND   0.0    0.0    0.000                                                          0.000      0.0
          -BEND   0.0    0.0    0.000
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                                                    SUMMARY OF SHEAR ANALYSIS

  DATE 12/11/95                                                                                    D/P STRUCTURE I.D.  G65-005

                                          ---INVENTORY---  ---OPERATING---  --VEH. 1 --  --VEH. 2 --  --VEH. 3 --  --SPECIAL--
MEMB.      SPAN DIS FRM L  DL    SDL    LL+I T  LL+I T  LL+I T  LL+I T  LL+I  LL+I  LL+I  LL+I  LL+I  LL+I  LL+I  LL+I
 ID  MATL  NO. LT SPRT R SHEAR SHEAR  MAX.V L MIN.V L  MAX.V L MIN.V L  MAX.V MIN.V MAX.V MIN.V MAX.V MIN.V MAX.V MIN.V
                  FT.     KIPS  KIPS   KIPS    KIPS     KIPS    KIPS    KIPS  KIPS  KIPS  KIPS  KIPS  KIPS  KIPS  KIPS

 S03  CSC   1    0.000 L  12.5   6.6   54.3 T   7.0 T   54.3 T   7.0 T
            1   20.367 L   3.2   0.7   25.1 T  18.5 T   25.1 T  18.5 T
            2    0.000 L  33.8  14.4   63.0 T   0.5 L   63.0 T   0.5 L
            2   40.833 L   0.4   0.2   23.3 T  26.3 T   23.3 T  26.3 T
            3    0.000 L  36.6  17.0   62.4 T   6.0 L   62.4 T   6.0 L
            3   53.625 L   6.9   2.2   23.0 T  32.6 T   23.0 T  32.6 T
            4    0.000 L  48.4  20.6   60.7 T   3.2 T   60.7 T   3.2 T
            4   53.625 L   4.2   1.4   27.2 T  27.1 T   27.2 T  27.1 T
            5    0.000 L  37.2  15.9   60.3 T   2.5 L   60.3 T   2.5 L
            5   41.750 L   3.4   0.9   21.2 T  54.7 T   21.2 T  54.7 T
            5   69.583 L  18.4   9.0    8.7 L  56.8 T    8.7 L  56.8 T

 S02  CSC   1    0.000 L  54.8  21.1   59.5 L   6.1 T   59.5 L   6.1 T
            1   55.133 L   1.7   1.4   32.9 T  25.5 T   32.9 T  25.5 T
            2    0.000 L  55.4  20.5   61.8 T   3.9 T   61.8 T   3.9 T
            2   47.000 L  13.5   3.7   30.1 T  22.2 T   30.1 T  22.2 T
            3    0.000 L  33.0  14.2   60.1 T   2.9 L   60.1 T   2.9 L
            3   40.450 L   1.1   0.3   20.9 T  28.1 T   20.9 T  28.1 T
            3   67.417 L  23.5  10.0    6.9 T  56.7 T    6.9 T  56.7 T

 S03  RC    1    0.000 L   6.2   0.8    9.5 T   1.2 T    9.5 T   1.2 T
            1   18.467 L   0.7   0.1    4.0 T   3.5 T    4.0 T   3.5 T
            2    0.000 L  11.6   1.4   10.6 T   0.3 T   10.6 T   0.3 T
            2   29.083 L   0.3   0.1    3.6 T   4.4 T    3.6 T   4.4 T
            3    0.000 L  11.3   1.1    9.2 T   0.7 T    9.2 T   0.7 T
            3   17.500 L   1.5   0.3    3.4 L   3.9 T    3.4 L   3.9 T
            3   29.167 L   4.9   0.3    2.8 T   8.3 T    2.8 T   8.3 T
```

From: Lowell Johnson
To: Paul Kivisto
Date: Thursday, 17 October, 2002 08:00:02 AM
Subject: Br 4654, Stillwater

EXHIBIT NO: 8
Date: 4-21-08
JULIE A RIXE
COURT REPORTER

I have rerated this bridge using the measurements from the HNTB inspectors.
The member that was bent the most was U4 - L4 of the north side of span 7. This member is in tension under Dead load. It can be in either tension or compression under live load. Before this damage the controlling rating of the member was tension, inventory HS38, operating HS53.
With the damage, the rating of the member is inventory HS24, operating HS29, with compression controlling.
The bridge is already posted at the legal limit. This rating will not change that posting.
The member will not have to be repaired immediately. However we have investigated the repair and have prepared some sketches for doing it.

Lowell Johnson, PE
Bridge Rating Engineer
MnDOT Office of Bridges and Structures
3485 Hadley Avenue N
Oakedale, Minnesota, 55128-3307
Tel: 651 747 2118
FAX: 651 747 2114

CC: Gary Peterson; Todd Niemann

EXHIBIT NO: 9
Date: 4-21-08
JULIE A RIXE
COURT REPORTER

From: Lowell Johnson
To: Gary Peterson; Mark Taylor; Paul Kivisto; Paul Rowekamp; Pete Wilson; Steve Kordosky
Date: Tuesday, 16 August, 2005 10:40:23 AM
Subject: Bridge 4654, Stillwater

Yesterday we were called to the bridge site to inspect corrosion on truss stringers. I was accompanied by bridge inspectors Pete Wilson, Bill Nelson, and Ken Rand.

I am recommending corrective action to repair section loss in the webs of the fascia stringers under the curb adjacent to the sidewalk. Section losses in the range of 75 to 85 % were found.

All stringers with holes in the area of the web above their connection to the floor beam need repair. Another way to state the repair criteria is: measure the area along a horizontal section 6 inch long, above the flange fillet, at the end of the stringer. The required area here needs to be at least 0.40 square inches. In new condition this area would be 6 x .275 = 1.65 sq in.

There are two possible ways to make this repair.

First, several of the stringers along this line have had repairs in the past. This consists of bent plates (or angles) about 7 x 4 x 3/8 inch on each side of the web. This detail may be copied.

Second, some of the stringers already removed may be in good condition and can possibly be substituted for these fascia stringers. They should be inspected to ensure they do not have corrosion in the bearing areas. Turning them upside down from their original position may be a possibility.

It may also be possible to remove the corroded fascia stringers, turn them upside down, drill new holes and reinstall them.

Please contact me if you have any questions.

Lowell Johnson, PE
Bridge Rating Engineer
MnDOT Bridge Office
3485 Hadley Avenue N
Oakdale, Minnesota, 55128-3307
Tel: 651 747 2118
FAX: 651 747 2114

Minnesota Department of Transportation

Memo

Office of Bridges and Structures
Mail Stop 610
3485 Hadley Avenue North
Oakdale MN 55128-3307

Office Tel: 651/747-2100
Fax: 651/747-2108

May 4, 2001

EXHIBIT NO: 2
Date: 3-27-08
JULIE A RIXE
COURT REPORTER

To: Gary Workman
Metro Division, Operations

From: Dan Dorgan
State Bridge Engineer

Subject: Metro Region Fracture Critical Bridge Repair Recommendations

The Bridge Office recently received copies of the 2000 Fracture Critical Bridge Inspection Reports from the Metro Division Bridge Inspection Group. We commend your Office for reports well done. The reports indicate some potential work which the Metro Division suggests doing in 2001. The following list includes our recommendations to those areas indicated in the reports:

Br. # 4654 – Stillwater Lift Bridge, TH 36 over the St. Croix River

- The report details the severe corrosion on many of the truss members, stringers, and floor beams. We are in the process of writing the Bridge Improvement Recommendations for spot painting in 2002, which will include painting the entire underside of the bridge, and the portions of the trusses within 10' of the bridge deck surface.
- Many stringer locations had severe section loss, but the Bridge Crew repaired these locations in 2000. We will include a detail for repair of other stringer ends in the painting contract.
- Severe section loss is indicated at one truss vertical member and at one floor beam location. These areas will be included for repair in the painting contract.
- All of the roller nest bearings are frozen and do not move. We will recommend replacing the bearings with elastomeric pads as part of the painting contract.

Br. #5514 – Arcade St. Bridge, TH 61 over the UPRR

- The report indicates that underpinning should be completed in span 2. We concur that underpinning be completed if danger of punchout is imminent. The bridge is still programmed for an August 2001 letting.

Br. #5895 – Hastings Bridge, TH 61 over the Mississippi River

- The Bridge Office recommends continued scour monitoring at pier #7 and pier #8.
- The old inspection/maintenance scaffolding is in the Bridge Improvement Program for replacement in 2003.
- We concur that the long term plans for this bridge need to be discussed. This Office has recommended that the bridge be programmed for replacement within the next 10 to 15 years.

Br. #5993 - Wakota Bridge, TH 494 over the Mississippi River

- The report details many rivets that have severe section loss. We concur that these rivets should be replaced with bolts.

Br. #6347 – Osceola Bridge, TH 243 over the St. Croix River

- There is a small crack in the tack weld at the south truss beam connection. We concur it is sufficient to continue monitoring the crack at this time.

Br. # 6566 – Taylor's Falls Bridge – TH 8 over the St. Croix River

- We concur that the pin ends should be painted.
- The crack indication in pin #3 should continue to be monitored. If there is any indication of a larger crack the pin should be replaced.

Br. #9340 – I-35W over the Mississippi River near downtown Minneapolis

- We concur that long range plans for this bridge need to be defined. The Bridge Office has recommended that this bridge be programmed for replacement within 10 to 15 years.

Br. #9600N and Br #9600S – Cedar Avenue Bridge, TH 77 over the Minnesota River

- The report details extensive corrosion at the floorbeam/tie girder connections. We will be writing Bridge Painting Recommendations shortly for this bridge for a 2002 spot painting contract.
- There is standing water in the interior of the tie girders. A detail for drilling weep holes in the tie girder is attached to this memo.

Br. #9800 – Lafayette Bridge, TH 52 over the Mississippi River

- We concur that long range plans for this bridge need to be defined. The Bridge Office has recommended that this bridge be programmed for replacement or major rehabilitation within 5 to 10 years.
- Several hinges are not functioning and we recommend that the Bridge Crew attempt to lubricate the pins. If a repair detail is desired please contact this Office.
- One small crack was found in the approach span at a diaphragm stiffener. We concur that these locations should be monitored in the future to ensure more significant cracks do not develop.
- Per review of the 2000 underwater inspection report most of the Pier 9 footing and up to 5' of the Pier 9 seal is exposed by a scour hole. A scour hole up to 5' deep was found along the Pier 10 footing. We concur with the underwater report recommendations that the pier continue to be monitored for additional footing and seal exposure.

Br. #62090 – Smith Avenue High Bridge, TH 149 over the Mississippi River

- There are small cracks in 4 stringer/floorbeam connections. We concur that it is sufficient to continue monitoring the cracks at this time.

Br. #86001 – TH 101 NB over the Mississippi River at Elk River

- Although the report indicated several cracks at the floorbeam connections, we do not recommend any repair work be done at this time since the bridge will be replaced in 2001. If the project is delayed we will recommend that the cracks be drilled out and the floorbeam angle brackets be removed.

If you have any questions on these recommendations or feel you need additional repair details please contact this Office.

cc: Gary Peterson
Kevin Western
Paul Kivisto
Terry Moravec
Val Svensson
Jack Pirkl
Mark Pribula

Minnesota Department of Transportation

Memo

Office of Bridges and Structures
Mail Stop 610
3485 Hadley Avenue North
Oakdale MN 55128-3307

Office Tel: 651/747-2100
Fax: 651/747-2108

May 4, 2001

To: Gary Workman
Metro Division, Operations

From: Dan Dorgan D L Dorgan
State Bridge Engineer

Subject: Br. #9600 Repair of Water Leakage Inside the Box Tie Girder

The 2000 Fracture Critical Inspection Report indicates that there has been standing water inside the tie girders on Br. #9600, TH 77 over the Minnesota River. This water has leaked through the cable connections into the interior of the box and has caused extensive corrosion.

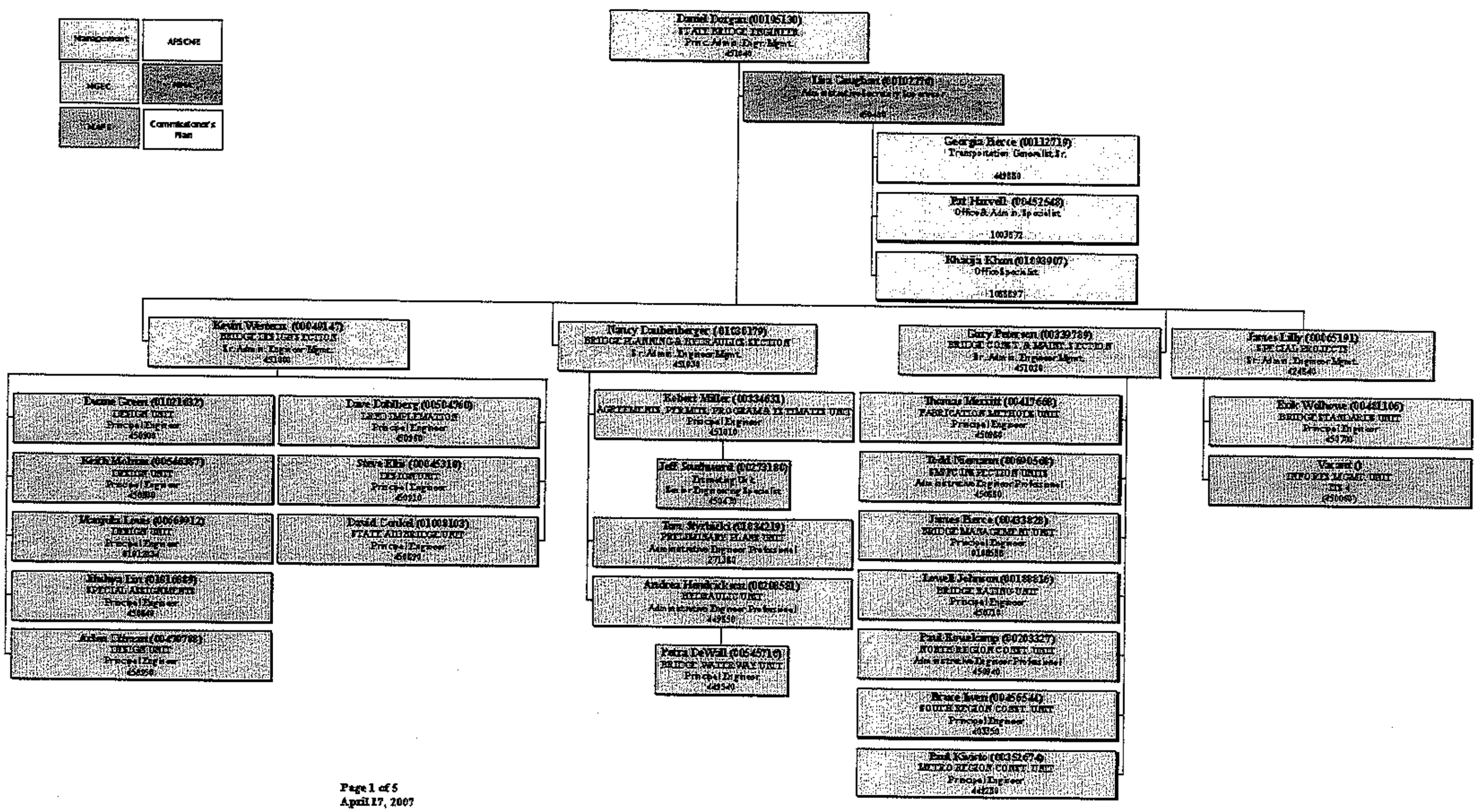
To minimize the amount of water in the boxes we recommend that a 1" diameter hole be drilled in the bottom flange of the box section to allow water to drain out of the box. The holes should be positioned in the center of the bottom flange at the low points in the box where water has accumulated in the past. The edges of the holes shall be slightly radiused to reduce the likelihood that cracks could initiate from corrosion in the top or bottom of the flange plate. If there are any bolts in the area of the low point of the box, one bolt can be removed in lieu of drilling which also will allow the water to drain out.

During each annual bridge safety inspection the holes shall be inspected carefully to ensure no cracks have begun. Please contact this Office if you have any questions on this procedure, or if you need any assistance with ultrasonic testing.

cc: Gary Peterson
Kevin Western
Paul Kivisto
Terry Moravec
Val Svensson
Jack Pirkl
Mark Pribula
Bruce Anderson

EXHIBIT NO: 3
Date: 3-27-08
JULIE A RIXE
COURT REPORTER

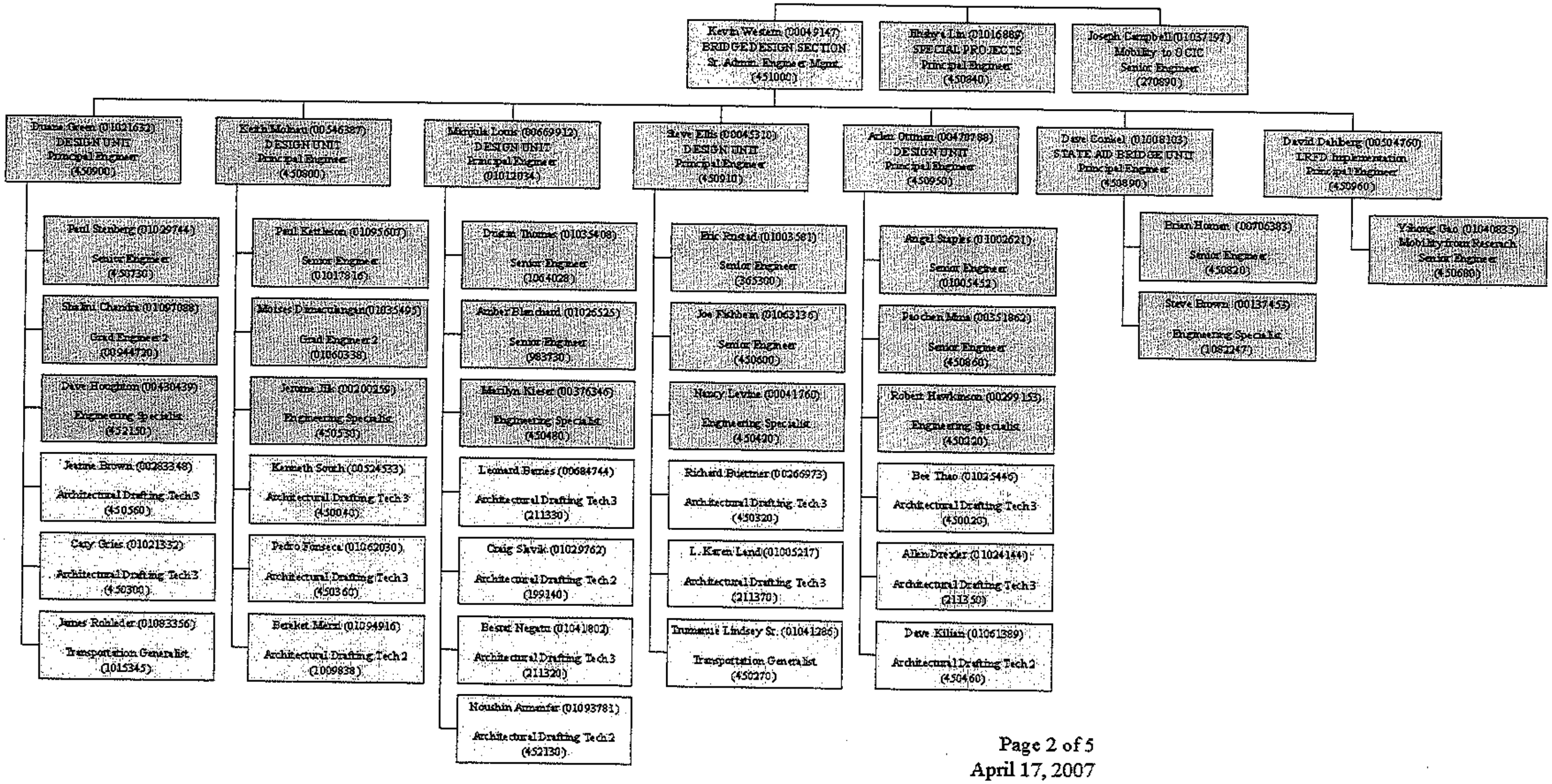
BRIDGE OFFICE



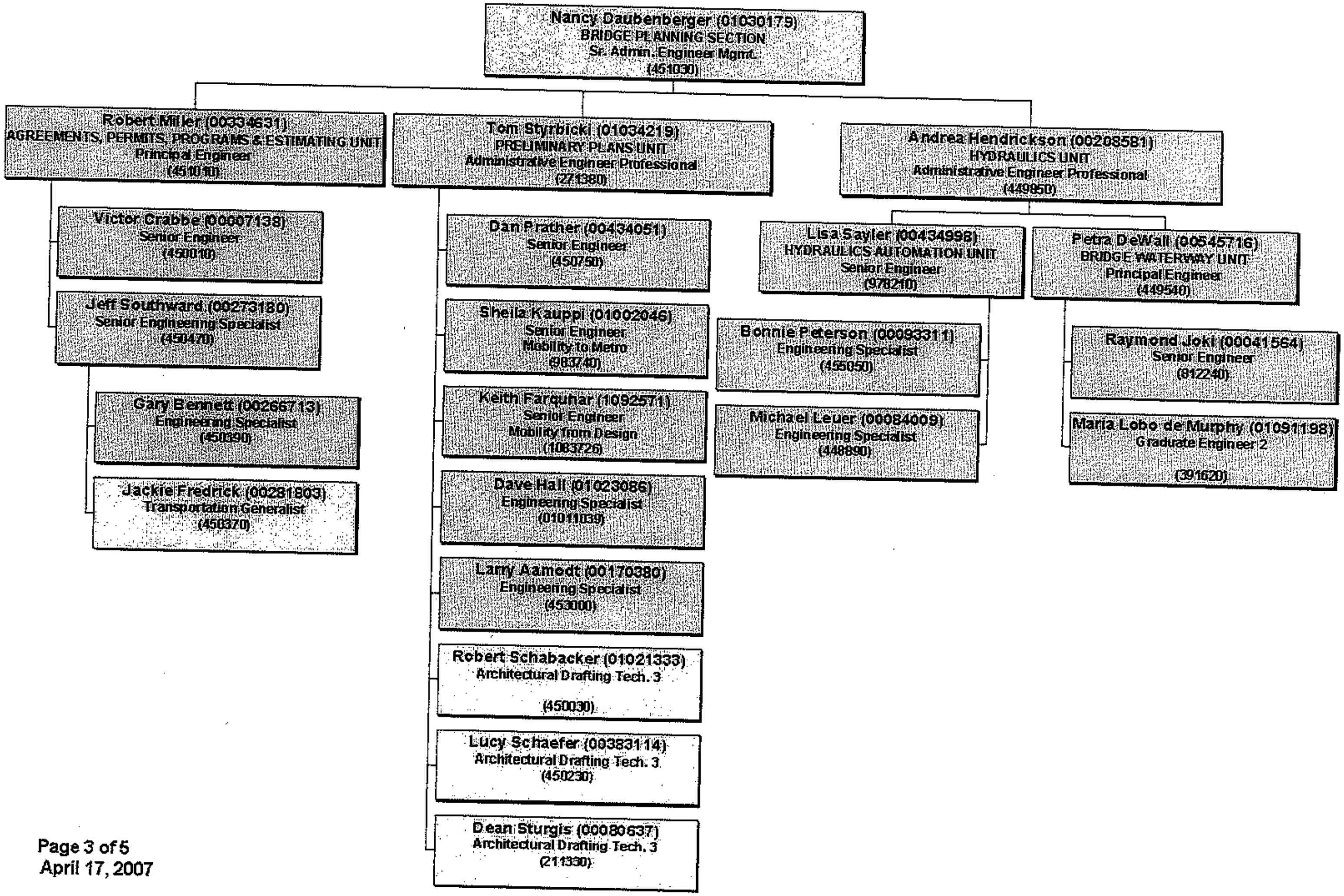
Page 1 of 5
April 17, 2007

BRIDGE OFFICE

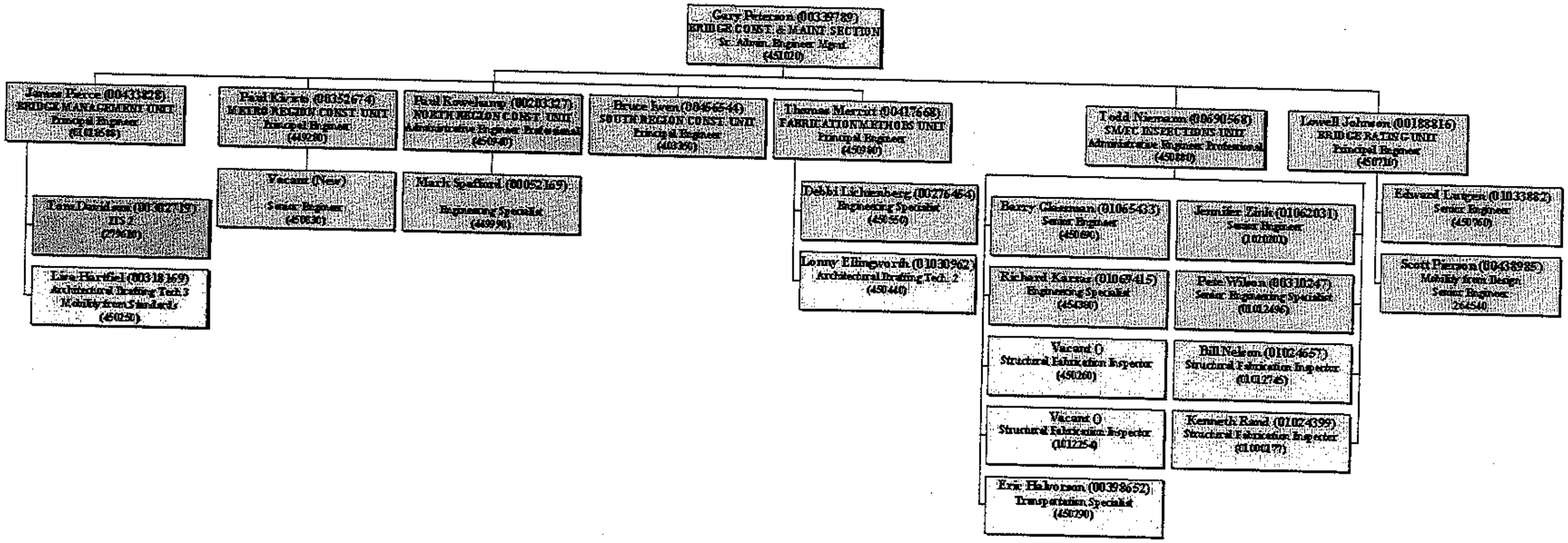
Bridge Design Section



BRIDGE OFFICE
Bridge Planning & Hydraulics Section

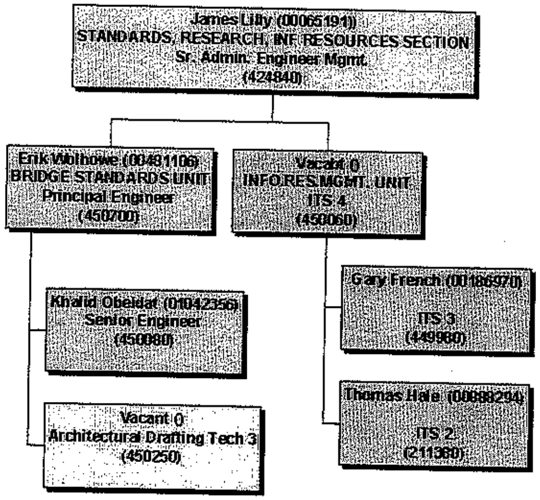


BRIDGE OFFICE
Bridge Construction & Maintenance Section



BRIDGE OFFICE

Bridge Standards, Research, Information Resources Section



Minnesota Department of Transportation

Memo

Office of Bridges and Structures
Mail Stop 610
Waters Edge
1500 W. Co. Rd. B2

Office Tel: 582-1100
Fax: 582-1110

EXHIBIT NO: 4
Date: 3-27-08
JULIE A BIXE
COURT REPORTER

Date: October 23, 1998

To: Gary Workman
Metro Division Office of Operations

From: for Donald J. Flemming Gary Peterson
State Bridge Engineer

Subject: BR 9340 - Cracks in Approach Span Girders, North End of Bridge Near Pier 9

Bridge number 9340 carries TH 35W over the Mississippi River in Minneapolis. The bridge consists of a steel deck truss main span and continuous steel girder approach spans and was constructed in 1967. During the 1998 bridge safety inspection of the north approach spans in October, 1998, Metro bridge inspectors noticed 12 crack locations in the 48" deep approach span girders at the top of the stiffener/diaphragm connection near Pier #9 at the north end of the bridge. One major crack has already been repaired by the Metro Bridge Maintenance Crew. 11 other cracks are at the web toe of the web to top flange weld in the base metal. These locations are in a negative moment region and thus are in tension. See the attached plan sheet for a detailed location of the cracks.

After review in this office, it is recommended that Metro Bridge Maintenance drill out the ends of the cracks with a 1 1/2" or 2" core drill. The core samples should be submitted to Todd Niemann for analysis of the steel. During drilling it is recommended that ultrasonic testing be completed such that we can be certain the end of the crack has been arrested. If the ends of the cracks can not be drilled out, we will recommend additional procedures or repairs to undertake. Additional recommendations to loosen or modify the diaphragm connections at these problem areas will be discussed at a November 5 meeting.

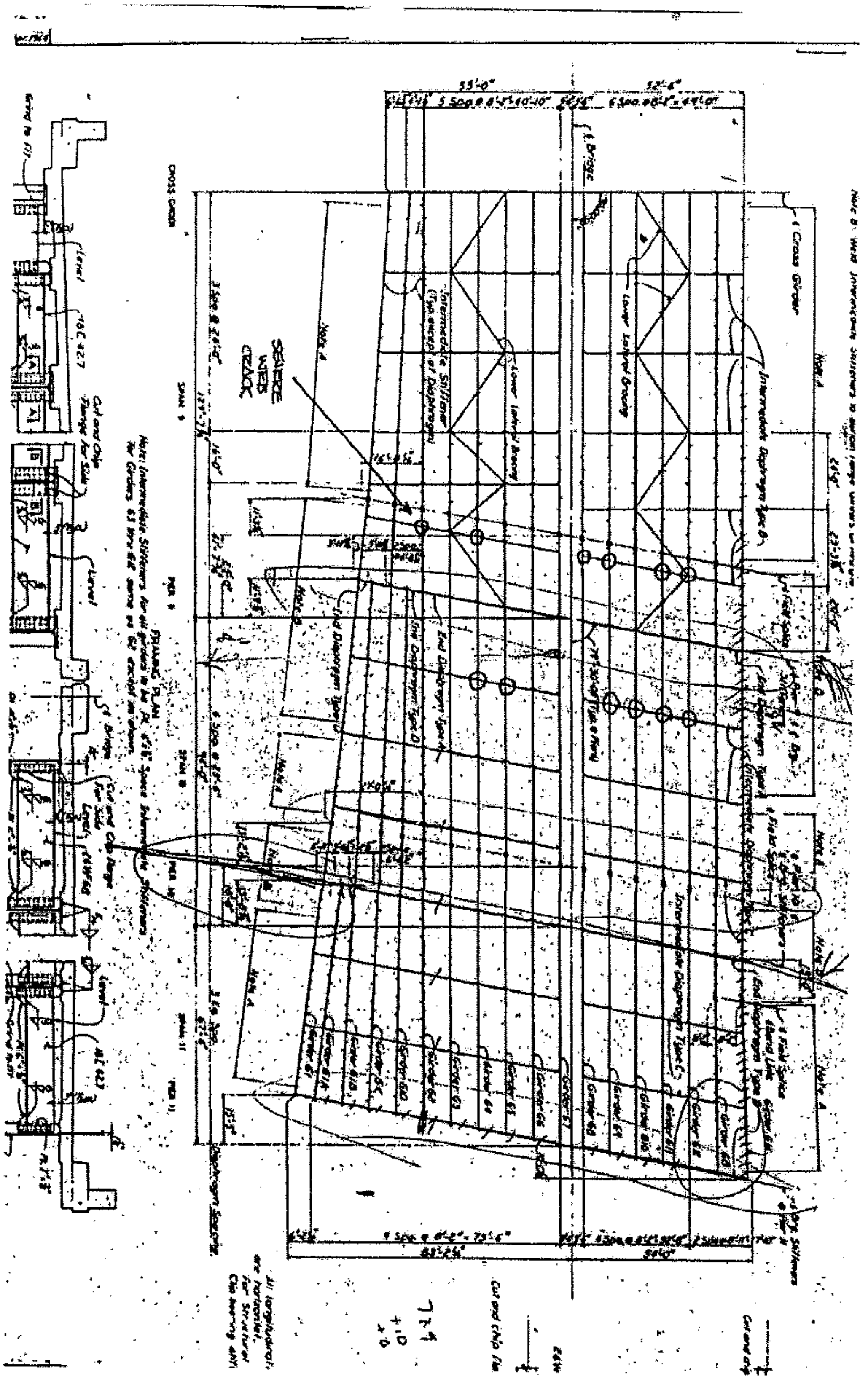
Since 33 cracks have been found this year in the approach span girders, we are concerned that these locations have potential for further cracking. We recommend that you perform close in-depth inspections of these areas on a six month interval, and keep a detailed weld/crack inspection log for these areas. As suggested by Mark Pribula in an October 14, 1998 memo to Jack Pirkl, it will be prudent to perform a detailed inspection of Br. #27855, I-94 over TH 55, to determine if similar problems exist on another continuous steel structure with high traffic volumes.

I feel that we need to discuss the short and long range plan for Br. #9340. Our office has scheduled a meeting with Metro Division personnel on November 5 from 9:00 to 11:00 in Conference Room D to discuss topics such as the upcoming contract to paint the girders in 1999, redecking the bridge within 10 years, other long term improvements, and any additional repair strategies. Please contact me if you have any comments or concerns with the long range plan for this bridge.

cc:
D. J. Flemming
G. D. Peterson
R. Noreen
E. Evans
J. Pirkl
R. Schultz
J. R. Allen
P. Kivisto
T. Moravec
T. Niemann
M. Pribula
D. Hoff

File Br 9340

p:\wp\memos\9340_crk4.wpd


SEVERE WEB CRACK
FRAMING PLAN
Note: Intermediate Stiffeners for all girders to be PL 6"x⅜". Space Intermediate Stiffeners for Girders 63 thru 6E same as 62 except as shown.
Note B: Weld Intermediate Stiffeners to bottom flange
Note A
℄ Cross Girder
Intermediate Diaphragm Type B
Intermediate Diaphragm Type C
End Diaphragm Type A
End Diaphragm Type B
End Diaphragm Type D
Intermediate Stiffener (Typ. except at Diaphragm)
Lower Lateral Bracing
℄ Bridge
℄ Field Splice
Girder 61
Girder 61A
Girder 61B
Girder 6C
Girder 6D
Girder 62
Girder 63
Girder 64
Girder 65
Girder 66
Girder 67
Girder 68
Girder 69
Girder 6B
Girder 6E
Girder 6H
CROSS GIRDER
SPAN 9
PIER 9
SPAN 10
PIER 10
SPAN 11
PIER 11
Diaphragm Spacing
3 Spa. @ 24'-0"
16'-0"
6 Spa. @ 23'-6"
3 Eq. Spa.
33'-0"
32'-6"
Level
18C 42.7
Cut and Chip Flange for Side
Grind to Fit
26WF68
All longitudinals are horizontal. For Structural Clip bearing stiffeners
Cut and chip
E&W
7+9
+10
+0

Minnesota Department of Transportation

Office of Bridges and Structures
Mail Stop 610
Waters Edge
1500 W. Co. Rd. B2

Office Tel: 582-1149
Fax: 582-1110

EXHIBIT NO: 5
Date: 3-27-08
JULIE A RIXE
COURT REPORTER

Date: November 23, 1998

Subject: Meeting Minutes
Bridge # 9340
November 5, 1998
Waters Edge Conference Room D

Attendees: PK Paul Kivisto, Arlen Ottman, David Reinsch, Terry Moravec, Roger Schultz, Mark Pribula, Tom O'Keefe, John Allen, Don Flemming, Russ Noreen, Todd Niemann, Robert Dexter, Gary Peterson

Description of bridge: Steel deck truss main river span, continuous steel girder approach spans with riveted connections, concrete slab span at north end. Bridge 9340 carries I-35W over the Mississippi River near downtown Minneapolis. The ADT on the bridge is 120,000, HCADT is 6,250 (1992 data).

Long range plan: Bridge 9340 is included in the 2011 to 2020 time frame along with expansion of I-35W from Washington Avenue to TH 36. The entire corridor would be widened in that time frame. No funding for bridge replacement has been allocated at this time.

Description of problem: 33 cracks have been found in 1998 in the webs of the approach span girders on both the north and south approaches. The cracks are located in the top of the girder web at the stiffener/ diaphragm connection nearest piers 3, 4, and 9. These regions are negative moment regions and the top flange is in tension. The top of the stiffener is not welded to the top flange of the girder. The cracks typically start at the bottom of the top flange to web weld, and progress slightly downwards into the web. Most of the cracks are less than 1" long. One crack was 12" on one side of the stiffener and 42" on the other side of the stiffener.

Recent fixes: The ends of all of the cracks that could be accessed have been drilled out. Only a few cracks that had not propagated far enough to be drilled were left. A splice plate was added to strengthen the girder at the large crack near pier 9. All work was done by Metro Bridge Maintenance Crews.

Truss condition: There have been little or no problems other than a few cracks noted over the past 10 years in the transition floor beams at the end of the truss. There are a lot of very poor details throughout, including plug welded web cover plates, welds at bulk head tabs on the inside of the tension truss members, and bad welds. There are some corrosion problems, especially under the median area. Concern was expressed over the fact that there are many welds on the inside of the tension chord members that can not be inspected.

Steel material: Based on the plans, there are at least 4 different types of steel in the bridge. It was decided we need to identify the location the various types of steel, especially in stress reversal areas and in areas of large live load stresses.

Action: Arlen Ottman: Identify stress reversal areas. Identify areas of large live load tension stresses. Determine the type of steel in the above areas. Determine areas that contain bad details. Catalogue the above areas in one package.

Action Plan: Discussion on what would be done if major cracks are found in the truss members. We need to develop an action plan containing items such as traffic flow, truck traffic detours and widening potential. Rehab details and replacement scheme with possible time frames should be developed.
Action: Paul Kivisto, Arlen Ottman, Jack Pirkl, Tom O'Keefe: Develop action plan in case of major cracks in truss.

Fixes for approach span cracks: The ends of the cracks have already been drilled out. We need to measure the stresses in a few uncracked girders to determine levels of web stress. We will then loosen some diaphragms and test what the stress levels are when out-of-plane bending forces are removed. If the stresses are lowered significantly we will loosen the diaphragms and relocate them to the bottom of the girders at the diaphragms nearest to piers 3, 4, 9, and 10. (As of 11/19/98 all of the diaphragms will be lowered regardless of findings).
Action: Gary Peterson: Develop contract with University of Minnesota to install strain gauges and record stresses based on known truck weights. Dave Reinsch: Write supplemental agreement with PCI to lower diaphragms in test area and work with U of M in strain gauge testing. Possibly supplement contract with PCI to lower or loosen all diaphragms at piers 3, 4, 9, and 10 (This could also be done as part of 1999 paint contract).

1999 Paint contract: A contract is ready to do partial painting on the middle 30' of the truss span and on the center girders nearest the median and the inside face of the next interior girder on the approach spans. The special provisions are completed, and it is set for a December letting. Discussion on whether or not painting should continue in light of problems in approach spans. Consensus was that retrofits outlined above may take care of problems, such that steel would last for a long time. It was decided to keep the partial paint contract in 1999. The project will be moved to a January letting. Still to be decided is whether lowering the diaphragms should be done under the paint contract or as a supplement to PCI contract.
Action: Paul Kivisto, David Reinsch, Arlen Ottman: Determine best way to include diaphragm work. Include in paint contract if necessary. Paint project will be in January, 1999 letting.

Deck condition: The deck is showing some problems, but is expected to last until 2010 - 2015. At that time deck replacement would be necessary. Other work would be dependent on the extent of problems found up to that time. Replacement of the truss would probably be recommended due to non-redundant nature of the existing system.

Future work: Scope of work in the next 10 to 20 years depends on deck condition and extent of problems with cracks or corrosion on approach girders and on the truss. It was recommended that Metro move the reconstruction project to their 10 year program and begin planning work including layouts, number of traffic lanes both during construction and on the new bridge, and projected traffic volumes. Metro needs to determine whether funding is available.
Action: Tom O'Keefe, Ray Cekalla: Develop rough plan for bridge replacement. This could be part of the action plan above.

cc:
Attendees
Dave Ekern
Gary Workman
Jack Pirkl
Ray Cekalla

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EXHIBIT NO. 6
Date: 3-27-08
JULIE A RIXE
COURT REPORTER

From: Sharon Hunt
To: Bridge Conf Rm 1st Floor; Dorgan, Daniel; Kivisto, Paul; Peterson, Gary; Western, Kevin
Date: 11/28/01
Time: 1:00PM - 2:30PM
Subject: Discussion of Possible Additional Fatigue Investigation Work on Br 9340
Place: Bridge Conf Rm 1st Floor

Meeting with Rich Johnson from HNTB and Bob Dexter fromr the U of M. + Steve Olson.

CC: Zerwas, Lisa

Discussed with Group.
Decided to meet with Metro to discuss their longterm plan for 35W to see if what type of investment is req'd in the inplace bridge.

Study would be:

Stage 1
- model bridge
- Temp modeling via survey targets
- Identify critical members and response with members removed.

Stage 2
- Develop retrofit details for critical members
or . . . . scheme for entire such as additional arches.

EXHIBIT NO: 7
Date: 3-27-08
JULIE A RIXE
COURT REPORTER

From: Ray Cekalla
To: Bob Miller; Daniel Dorgan; Paul Kivisto; Paul Rowekamp
Date: 11/25/02 11:25AM
Subject: Fwd: RESCHEDULED SP 2783-draft I-35W at Mississippi bridge replacement

Dan, what are your thoughts on hiring a consultant for this - should the bridge work be part of metro's contract with bridge involved in the selection or should the bridge work be a separate contract with Bridge?

Minnesota Department of Transportation

File
Bridge 9340

Memo

Office of Bridges and Structures
Mail Stop 610
3485 Hadley Avenue North
Oakdale MN 55128-3307

Office Tel: 651/747-2130
Fax: 651/747-2207

Lisa –
copy for me
and give
original to
Paul K.
Dan

December 3, 2002

EXHIBIT NO: 8
Date: 3-27-08
JULIE A RIXE
COURT REPORTER

To: Dan Dorgan
Gary Peterson
Kevin Western
Bob Miller
Ray Cekalla

From: Paul Kivisto PK
Metro Region Bridge Engineer

Subject: Draft RFI for Consultant Study on Br. #9340, TH 35W/Mississippi River

We recently met to discuss the scope of a consultant study to identify critical members in the deck truss-arch on Br. #9340. Attached is a draft of an RFI that will go out to consultants. Please add any comments you have and return to me by December 13th. Bob and I will then work on getting the RFI finalized.

I plan to distribute this to a few people in Metro today to see if they have any items to add.

AGE PROFILE BY AREA OF STRUCTURES
TRUNK HIGHWAYS ONLY
STRUCTURES 10 FT AND OVER
As of 2003

EXHIBIT NO: 3
Date: 3-28-08
JULIE A RIXE
COURT REPORTER

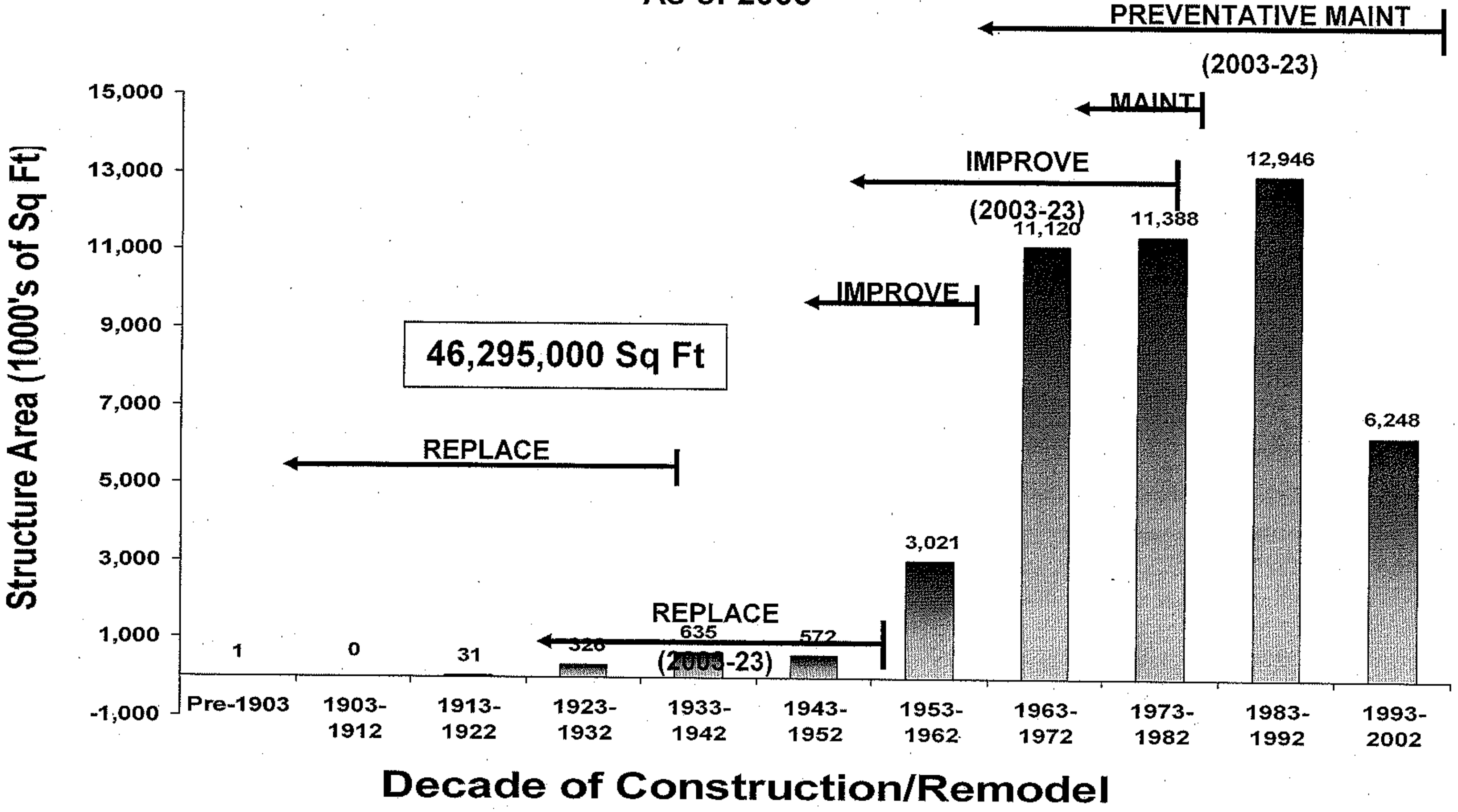


EXHIBIT NO: 4
Date: 3-28-08
JULIE A RIXE
COURT REPORTER

JAMES A LILLY, P.E.

4354 Upton Avenue North
Minneapolis, MN 55412-1010

Home: (612) 588-3103
Office: (651) 366-4508
e-mail: jim.lilly@dot.state.mn.us

EXPERIENCE – BY CATEGORY:

The following list was extracted from my "Work History"

Aviation/Aeronautics:
- Military aviator
- Civilian flight instructor

Bridges:
- Steel fabrication and erection
- Precast and Prestressed concrete structures
- Inspection and repair
- Specifications

Computer Systems:
- System Development
- System Training

Construction:
- Private highway contractor
- Local government
- MnDOT Bridge

Design:
- Local government: streets, water and sewers, bike paths and sewage treatment
- Structural design

Equipment & Fleet Management:
- MnDOT

Facilities & Buildings:
- MnDOT

Maintenance:
- MnDOT Highways
- MnDOT Bridge
- MnDOT Buildings

Materials:
- MnDOT
- Private Industry

Management & Supervision:
- MnDOT
- Private Industry

Pavements:
- Local Government
- National (FPP)
- MnDOT

Research:
- Private Industry
- MnDOT Maintenance
- National
- University

ACCOMPLISHMENTS:

2003 – Present: Coordinate development of MnDOT preventive bridge maintenance program which include research of new products and development of best practices.

1998 – 2003: Led the effort to implement anti-icing program statewide. Directed the development of standard anti-icing practices. Initiated the concept of using a "Winter Index" to normalize district winter maintenance performance for statewide comparisons. Skills demonstrated: vision, trans department coordination and leadership.

Led successful effort with University of Minnesota Duluth to benchmark private and public *Fleet Management* organizations and methods. This included development of outcome based performance measures giving the department the ability to apply modern fleet management practices. Skills demonstrated: vision, inter-agency coordination and leadership.

Led effort to develop reporting of performance measures of the department's *roadside sign and highway marking replacement program*. Developed procedure for reporting and monitoring *highway edge drain* *dewatering system maintenance program.* The "output" focused measures help assure safe operation of roadways and proper performance of edge drain dewatering systems to assure full life of pavements. Potential annual cost savings are in the millions of dollars in increase pavement life. Skills demonstrated: personal initiative, perseverance and vision.

Improved working relationships between staff of the *Operations Management System (OMS)* and IRM personnel in such a way that the needs of both sides have been met. Successfully negotiated and executed a contract to replace the *RouteBuilder Permitting and Routing System.* – Skills demonstrated: conflict resolution, negotiations, computer system design, project leadership and planning.

1996 – 1998: Served as chairman of the *AASHTOWare* task force to transfer SHRP software programs and systems to AASHTO. This task force is responsible to oversee the upgrading and the appropriate adoption of these programs and systems by member states. Skills demonstrated: team leadership, computer system development and project management.

Served as co-chair and facilitator of *Tristate Superpave Asphalt Binder Technical Working Group (TWG).* This TWG coordinated the implementation of performance graded asphalt binders for 1997 and the Tristate Asphalt Producer Certification plan for 1998. On the national level, this represents a "first" for multistate & multi supplier cooperation on Superpave specifications and testing. Skills demonstrated: negotiations, consensus building, conflict resolution, public speaking, writing, planning and team leadership.

Established a rational method of determining needed *staffing levels* for all eight of the state's laboratories. This included establishing *statewide performance measures* for turn around times. Skills demonstrated: analytical thinking and innovation.

1992 – 1996: Led *Pathbuilding Project* – Chaired the Financial Task Force that developed and promoted the application of activity based costing to the department. This effort evaluated previous business planning by the Maintenance Business Team and determined additional business needs and planning techniques for the entire department. The work of this task force has been the backbone of the department's efforts to apply modern business practices, including: performance measures, activity based costing and management, and business planning. This group also pioneered the first attempt to apply pavement preservation to the department's highways. Skills demonstrated: Financial management and costing, vision, communications, persuasion and team leadership, public speaking, application of Activity Based Costing to Maintenance Operations.

Implemented *direct computer data entry,* first in Chemistry Labs, then in Soils and Cement Labs and finally in the Aggregate Laboratories. The outcome has been reduced data entry and calculation times, improved testing times and greater report accuracy, due to reduced transcription errors. Skills demonstrated: analytical thinking, application of computer system and organizing production systems.

Established *Quality Improvement* Programs in both the Materials Lab and Structural Metals Unit. These efforts have included instituting *performance measures, team building*, realistic *customer focus, implementation of automation*, and an office steering committee, as well as the use of "quality" tools to improve service. Skills demonstrated: systems thinking, team formation, applying automation and customer relations.

Led efforts to make materials testing and inspection more effective, including *supplier certification*, eliminating ineffective testing and improving working relationships with suppliers. These efforts have resulted in 20% reduction in labor and improvements in delivery time. Skills demonstrated: production management, customer relations and negotiations.

1989 – 1991: Served on committee overseeing revisions to *AASHTO/AWS Bridge Welding Code, D1.5.*

Established *North Central States Consortium on Bridge Fabrication*, which brought together eleven states and many industry representatives to standardize and improve design, inspection and fabrication practices. Skills demonstrated: leadership ability, negotiation skills, conflict resolutions, planning, national and regional perspectives, innovation and meeting facilitation and coordination.

Established Bridge Office and Materials and Research Laboratory's *New Employee Orientation Program* for new employees to improve employee retention and productivity. Skills demonstrated: ability to organize, team leadership, public speaking, writing and technical analysis.

Pre 1988: Authored three technical articles including: "Learning About Materials: Optimizing Profits", 1981. Established *Materials Testing and Water Testing Laboratories* for Johnson Filtration Systems, Inc. Hold *two patents* for oil and gas well screens. Skill demonstrated: technical writing.

Designed and managed a very wide variety of city construction projects which involved interaction with the Grand Forks City Council. Skills demonstrated: Civil engineering design, estimating, inspection, contractor negotiations and city council relations.

Involved in national and international construction projects (highways, landfills and pipelines in Oklahoma, Missouri, Wyoming, Alaska, Viet Nam and Netherlands). Skills demonstrated: cultural and racial flexibility, construction project leadership, construction engineering, surveying and estimating.

WORK HISTORY:

Minnesota Department of Transportation: St. Paul, Minnesota, 1988 - Current

BRIDGE STDS, RESEARCH AND INFO MANAGER, Bridge Office – 2007 to Present

Manage Standards and Research Unit and Information Technology Unit as well as all duties I had as Special Bridge Projects Manager.

SPECIAL BRIDGE PROJECTS MANAGER, Bridge Office – 2003 to 2007

Develop and manage special projects including annual office budget, new quality assurance program, overhead sign inspection program, and Historic Bridge Management Program in cooperation with the Minnesota State Historic Society.

STATE FACILITIES AND EQUIPMENT ENGINEER, Office of Maintenance - 2002 to 2003

Managed Facilities Management Section and Equipment Section. The twelve member Facilities Management Section is responsible for developing the replacement program and designs of the more than 1000 buildings owned by MnDOT. In addition the section directs the management and maintenance of these buildings. The 19-member Equipment Section is responsible for developing and monitoring fleet and equipment management policies, purchasing and disposing of equipment, fabrication of snow plows, operating the central inventory and repairing and maintaining the Central Office Fleet.

ASSIS. MAINTENANCE ENGINEER, Office of Maintenance, 1998 to 2002

Special emphasis is on *managing Maintenance Operations, Fleet Management, Buildings and Facilities, Training, Business and Computer Systems,* *Research and Emergency Operations.* The focus of all of these activities is to assist the Program Delivery Group, which consists of the outstate districts and the Metro Division, in performing and improving their abilities to maintain and operate the trunk highway system. Total staff managed is 47.

MATERIALS ENGINEER, Materials and Research Laboratory, 1991 - 1998

Managed 37 member laboratory, inspection and certification section. The section is responsible to assure the quality of all products used in MN/DOT construction projects. My primary efforts are invested in overseeing implementation of Superpave Performance Graded asphalt cements; revision of laboratory testing to improve effectiveness; establishing a *laboratory information management system* to speed data entry, analysis and report writing; and facilitating Prestressed and Precast *Concrete Plant certification* and personnel issues involved with these changes.

STRUCTURAL METALS ENGINEER, Office of Bridges and Structures '88 – '91

Supervised nine member staff, which oversaw fabrication of welded structures (e.g. bridges and overhead signs). Founder and first chair of the Consortium of North Central States on Bridge Fabrication. Developed and presented training seminars on Welding Inspection and New Employee Orientation.

C & M Consulting: Minneapolis, Minnesota, 1987 - 88

CONSULTANT.

Failure analyses and corrosion studies for various customers in manufacturing and agriculture.

Johnson Filtration Systems: New Brighton, Minnesota, 1978 - 87

SUPERVISOR OF MATERIALS RESEARCH, R & D, 1983 - 87

Welding, *Corrosion and Material Testing*, Failure and New Product Analyses, SEM and EDAX, Water Testing and Treatment Design - four member staff max.

PROJECT ENGINEER, New Product Development, 1979 - 83

Hydraulic, Metallurgical and Welding Studies, Industrial and Oil & Gas Well Product Development.

DESIGN ENGINEER, Engineering Department, 1978 - 79

Structural Design of Mining Screens.

Brown Minneapolis Tank: Eagan, Minnesota, 1977 – 78

DESIGN ENGINEER, Field erected steel tank layouts and Foundation design.

City of Grand Forks, N.D., 1976 - 77

PROJECT ENGINEER

Designed and supervised the construction of all types of municipal projects (streets, bicycle trails, sewers, water mains, lift stations and sewage treatment).

University of North Dakota, Grand Forks, North Dakota, 1974 - 76

GRADUATE TEACHING ASSISTANT, Civil Engineering Department.
Surveying Lab instructor, Structural Analyses and Fluid Mechanics.
FLIGHT INSTRUCTOR, Aviation Department

U.S. Air Force: Grand Forks AFB, North Dakota, 1969 - 74

CAPTAIN/PILOT of KC-135 Aircraft (served in Thailand, Spain and England)
Hold Commercial, Instrument, Multi-engine and Instructor ratings.

Morrison Knudsen Company, Inc.: Boise, Idaho (sites included contiguous United States, Alaska, Europe and South East Asia), summers, 1960 - 67

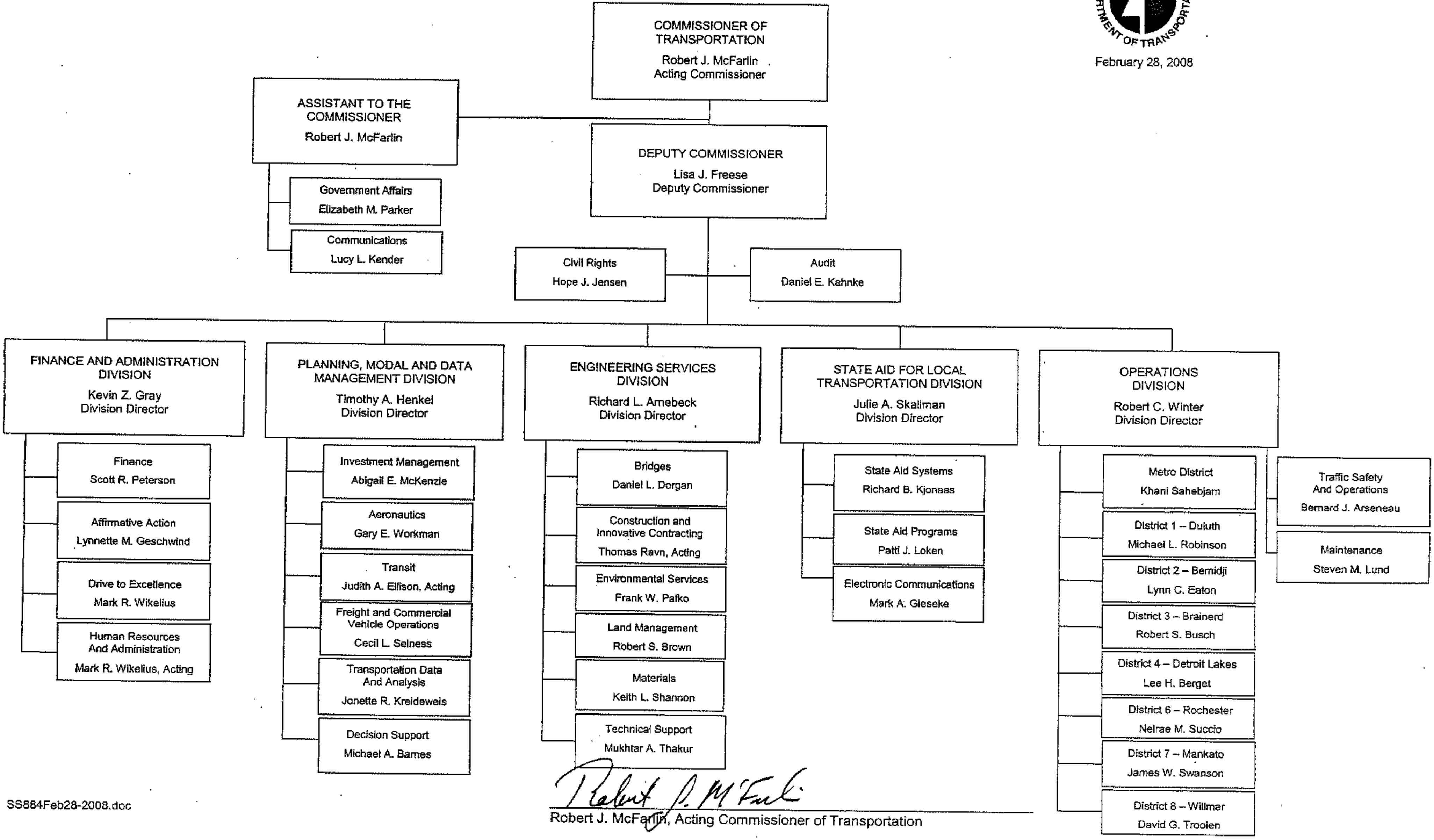
HEAVY CONSTRUCTION (highways, pipelines, airports and landfills):
PROJECT ENGINEER, SURVEYOR, GENERAL FOREMAN, and
EXCAVATION FOREMAN

EDUCATION:

Master of *Metallurgy and Materials Science* - University of Minnesota, 1986.
M.S. - *Structural Engineering* - University of North Dakota, 1977.
B.S. - *Civil Engineering* - University of Wyoming, 1969.
Highway and Transportation Management Institute - Indiana University, 1993
NHI Highway Materials Engineering Short Course - Arizona State Univ., 1992

STATE C NNESOTA
Department of Transportation Organization

February 28, 2008



- COMMISSIONER OF TRANSPORTATION
Robert J. McFarlin
Acting Commissioner
  - ASSISTANT TO THE COMMISSIONER
Robert J. McFarlin
    - Government Affairs
Elizabeth M. Parker
    - Communications
Lucy L. Kender
  - DEPUTY COMMISSIONER
Lisa J. Freese
Deputy Commissioner
    - Civil Rights
Hope J. Jensen
    - Audit
Daniel E. Kahnke
    - FINANCE AND ADMINISTRATION DIVISION
Kevin Z. Gray
Division Director
      - Finance
Scott R. Peterson
      - Affirmative Action
Lynnette M. Geschwind
      - Drive to Excellence
Mark R. Wikelius
      - Human Resources And Administration
Mark R. Wikelius, Acting
    - PLANNING, MODAL AND DATA MANAGEMENT DIVISION
Timothy A. Henkel
Division Director
      - Investment Management
Abigail E. McKenzie
      - Aeronautics
Gary E. Workman
      - Transit
Judith A. Ellison, Acting
      - Freight and Commercial Vehicle Operations
Cecil L. Selness
      - Transportation Data And Analysis
Jonette R. Kreideweis
      - Decision Support
Michael A. Barnes
    - ENGINEERING SERVICES DIVISION
Richard L. Arnebeck
Division Director
      - Bridges
Daniel L. Dorgan
      - Construction and Innovative Contracting
Thomas Ravn, Acting
      - Environmental Services
Frank W. Pafko
      - Land Management
Robert S. Brown
      - Materials
Keith L. Shannon
      - Technical Support
Mukhtar A. Thakur
    - STATE AID FOR LOCAL TRANSPORTATION DIVISION
Julie A. Skallman
Division Director
      - State Aid Systems
Richard B. Kjonaas
      - State Aid Programs
Patti J. Loken
      - Electronic Communications
Mark A. Gieseke
    - OPERATIONS DIVISION
Robert C. Winter
Division Director
      - Metro District
Khani Sahebjam
      - District 1 – Duluth
Michael L. Robinson
      - District 2 – Bemidji
Lynn C. Eaton
      - District 3 – Brainerd
Robert S. Busch
      - District 4 – Detroit Lakes
Lee H. Berget
      - District 6 – Rochester
Nelrae M. Succio
      - District 7 – Mankato
James W. Swanson
      - District 8 – Willmar
David G. Trooien
      - Traffic Safety And Operations
Bernard J. Arseneau
      - Maintenance
Steven M. Lund

Robert J. McFarlin

Robert J. McFarlin, Acting Commissioner of Transportation

EXHIBIT
2

STATE OF MINNESOTA
Department of Transportation
Organization

August 1, 2006

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  Lt. Governor/Commissioner
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    Robert J. McFarlin
    - Communications – Lucy L. Kender
    - Government Affairs – Elizabeth M. Parker
  - **DEPUTY COMMISSIONER**
    Douglas H. Differt
    Deputy Commissioner/Chief Engineer
    - **AUDIT** – Daniel E. Kahnke
    - **FINANCE AND ADMINISTRATION DIVISION**
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      Division Director
      - Affirmative Action Officer – Lynnette M. Geschwind
      - Civil Rights and Administrative Services – Michael A. Garza
      - Drive to Excellence – Mark R. Wikelius
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      - Human Resources – Nancy C. Moore
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      Division Director
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      - Environmental Services – Frank W. Pafko
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      - Materials – Keith L. Shannon
      - Technical Support – Mukhtar A. Thakur
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      Division Director
      - Electronic Communications – Andrew W. Terry
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      - Homeland Security – Sonia K. Morphew
      - Maintenance – Steven M. Lund
      - Transportation Data and Analysis – Jonette R. Kreideweis
      - Traffic, Security and Operations – Bernard J. Arseneau
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      Julie A. Skallman
      Division Director
      - State Aid Systems – Richard B. Kjonaas
      - State Aid Programs – Patti J. Simmons
    - **DISTRICT OPERATIONS DIVISION**
      Robert C. Winter
      Division Director
      - Metro District – Khani Sahebjam
      - District 1 - Duluth – Michael L. Robinson
      - District 2 - Bemidji – Lynn C. Eaton
      - District 3 - Brainerd – Robert S. Busch
      - District 4 - Detroit Lakes – Lee H. Berget
      - District 6 - Rochester – Nelrae M. Succio
      - District 7 - Mankato – James W. Swanson
      - District 8 - Willmar – David G. Trooien

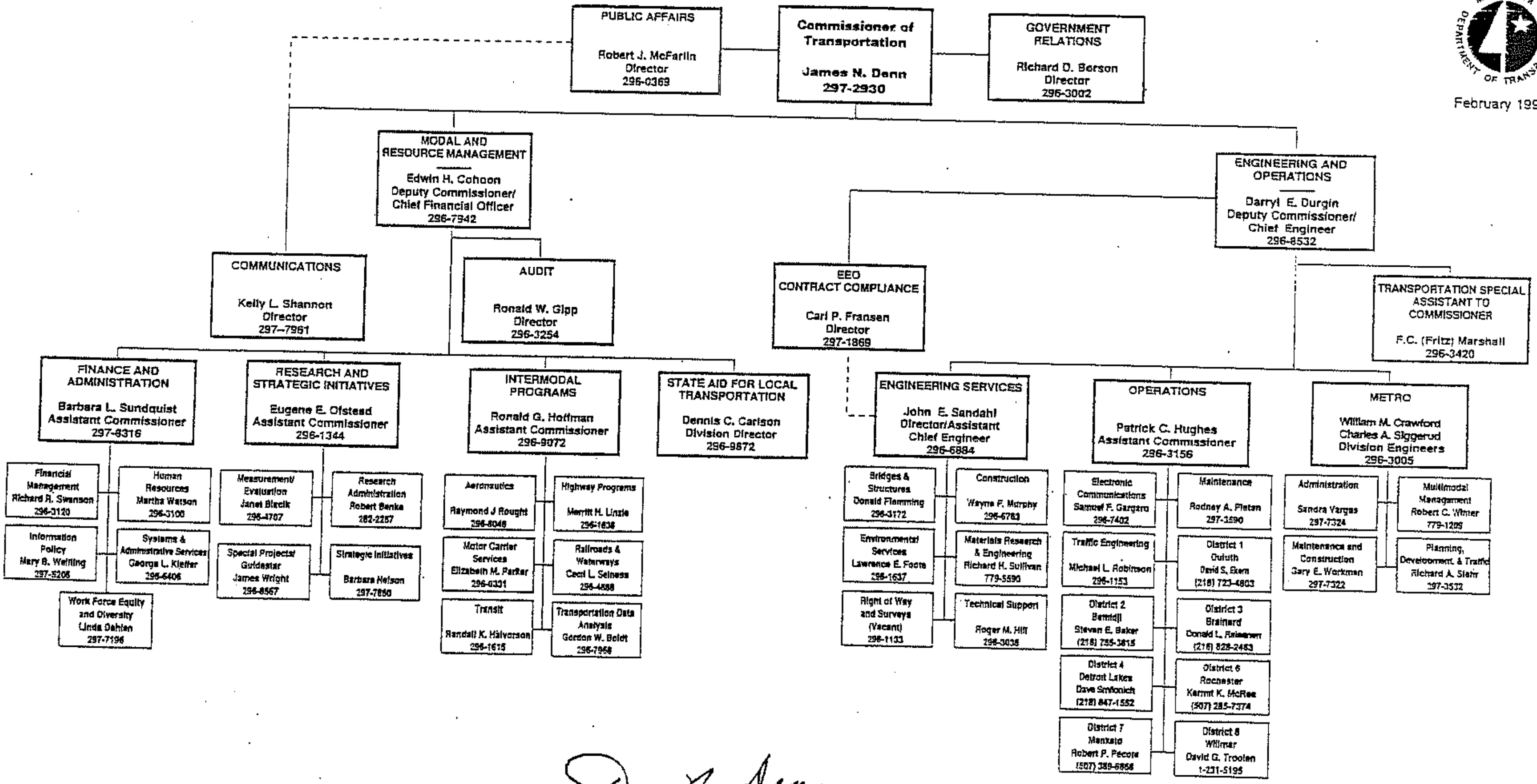
Carol Molnau

Carol Molnau, Lt. Governor/Commissioner of Transportation

EXHIBIT
3

STATE OF MINNESOTA
Department of Transportation
Organization

February 1993



James N. Denn

James N. Denn, Commissioner

EXHIBIT
4

EXHIBIT NO: 4
Date: 4-27-08
JULIE A RIXE
COURT REPORTER

Ed Zhou/HuntValley/URSCorp
12/13/2006 02:34 PM

To Don Flemming/Minneapolis/URSCorp@URSCorp
cc Brett McElwain/HuntValley/URSCorp@URSCORP, David Long/Minneapolis/URSCorp@URSCORP
bcc
Subject Recommended Actions for Br. 9340

Don,

Hope everything went well with your procedure on Monday.

As we discussed, attached please find a list of all the fracture critical members on the main truss identified by our analysis. Including the corresponding chord members on the opposing side of the zero-force vertical, there are a total of 52 fracture critical members on the main trusses, or 13 members on each quadrant. As I mentioned to you in a previous email, my fracture mechanics analysis indicated that the size of an existing crack needs to be about 1/4 of web plate thickness in order to propagate under the live load induced stresses.

Based on all the results we have obtained, I strongly believe that doing a 2-million-dollar plating retrofit is not necessary. The most rational solution is to perform a thorough NDE procedure to detect and then remove any measurable cracks or flaws at the clearly known fatigue sensitive details. After that, we should have the peace of mind just as good as doing the plating.

Please review the attached files. MaTech's EFS appears to be the most advanced NDE procedure at this time and their quote is under $200,000 for doing a complete examination of all the welds for all the 52 members. They are coming to the FHWA's lab for another demonstration near the end of January and I will be there to observe.

Let me know for any questions and concerns.

Ed

Member Retrofit Recommendations.doc TTCI final report V5.3.pdf

EXHIBIT

3

Minnesota Department of Transportation
Office Of Bridges and Structures

FACSIMILE TRANSMITTAL

TO : **Randy Hochstein**

COMPANY : **Maxim Technologies**

TELECOPIER : **659 - 7348**

FROM :
Gary D. Peterson
Bridge Design Engineer
Office Of Bridges and Structures
Minnesota Department of Transportation
Waters Edge Building
Roseville, Minnesota 55113

Return Phone : (612) 582-1101
FAX : (612) 582-1110

Date : **1 December 1997**
Time :
No. Pages : 6

Subject: Bridge 9340 - TH 35W over Mississippi
Installation of Strain Gauges to measure stress in Floorbeam Connections

Instructions: As we discussed today Todd Niemann will initiate a contract with you next week to install and read strain gauges at one floorbeam location on Bridge 9340. The floorbeam is located at the end of the truss cantilever at the north end of the bridge. There is access near the floorbeam from a road below the bridge. A Mn/DOT snooper or other lift equipment will be used to access the floorbeam from the road.

We believe the stringer framing into the floorbeam directly over the bearing may be causing out of plain bending forces in the floor beam web. The out of plane bending is thought to result from high push-pull forces caused by a partially frozen rocker bearing, and/or from the live load rotation of the stringer to floorbeam connection. (See attached plan detail)

EXHIBIT
4

Minnesota Department of Transportation
Office Of Bridges and Structures

FACSIMILE TRANSMITTAL

TO : **Randy Hochstein**
Project Manager

COMPANY : **Maxim Technologies**

TELECOPIER : **612 659 7348**

FROM : Bob Miller
Bridge Agreements Engineer
Office Of Bridges and Structures
Minnesota Department of Transportation
Waters Edge Building
Roseville, Minnesota 55113

Return Phone : (612) 582-1104
FAX : (612) 582-1110

Date : **Dec 17, 1997**
Time :
No. Pages : 1

Subject: Bridge 9340 - TH 35W over Mississippi
Installation of Strain Gauges to measure stress in floorbeam connection

Instructions: Yesterday you informed us that you have not received a notice to start work on the subject project. The general scope of the work is described in the information transmitted to you December 1, 1997 and as quoted by Maxim in their letter dated December 4, 1997. Because, cracking in the area of the floorbeam stringer connection may threaten public safety, you are authorized to begin work immediately. Contract documents are in the process of being prepared.

To determine the size of these forces we propose to install strain gauges at the locations shown on the attached drawings and to read strains as a loaded Mn/DOT dump truck drives over the stringer and floorbeam.

Please prepare an estimate of your firms cost to install and read the strain gauges. From our discussion, I understand that all strain gauges may not be able to be read at one time so that two truck runs may be necessary. After all strain gauges have been read the strain gauges will be removed.

At this time I hope we can have your contract in place and Mn/DOT lift equipment and crews scheduled to perform the testing during the week beginning December 15th. Please call Todd (582-1157) on Monday if possible to discuss your estimate. If you have any questions before then, please call me.

cc: Todd Niemann
John Allen
Arlen Ottman

EXHIBIT NO: 2
Date: 3-26-08
JULIE A RIXE
COURT REPORTER

GPM INTERVIEW ON MARCH 26, 2008

MnDOT Employment History

Anniversary date: Sept. 1959
Bridge utilities coordinator
Reviewed consultant's preliminary plans
1960 to July 1967: Member of a design squad – designs for new bridges & review of final bridge plans by consultants
July 1967 to Nov. 1970: Supervisor of the design squad after promotion of the previous supervisor.
Nov. 1970 to June 1975: Bridge Estimates Engineer
June 1975 to Aug. 1987: State Aid Bridge Engineer
Aug. 1987 to present: Bridge Design Unit Leader

Note: All design involvement was under the current (for the time) edition of the AASHO or AASHTO bridge design specifications.

Education, degrees, etc.

BS in Civil Engineering May 1959 South Dakota State University

Professional registration (licensure)

Jan. 1965 No. 7578

Training courses taken

Updates on design codes
Seminars on design codes and practices
Other training courses to obtain prof. dev. hours
Homeland Security training course

Meetings conducted as part of position

Section meetings with supervisor (Kevin Western)
Unit meetings with design unit personnel
Kick-off meetings with consultants and/or preliminary unit at start of project
Interim meetings with consultants
Interim meetings with project engineers

Task forces, committees

Consultant Plan Review Committee
Consultant Pre-qualification Committee
Task force on specifications for concrete anchorages
NCHRP panel for Performance Testing of Modular Bridge Joint Systems, Report 467, issued 2002
Developed special provisions "boiler plates" as necessary

Professional organizations

ASCE – Life member
MGEC

9340 Involvement

Nov. 1, 1996 – Assigned to develop plans and special provisions for median replacement, railing reconstruction and repair of other portions of the bridge.
Mar. 2, 1998 - Assigned to develop plans and special provisions for painting the bridge and installation of bird screens. Additional work included developing plans for lower designated diaphragms within the approach spans as a means of crack control.
1998 – Developed plans for repair of a crack in the web of a plate girder in the north approach spans.
2005 – Assigned to develop plans for deck and expansion joint repair as part of a larger package of bridge repair plans. Framed special provisions for reconstruction of the anti-icing system. Package let on April 27, 2007.
Nov. 21, 2006 – Assigned to review consultant-prepared plans for retrofitting designated truss members. (To date, I have not seen any plans for this work or knew specifically what it involved.)

Minnesota Department of Transportation

Memo

Bridge Inspection, Maintenance Operations
Metro Division
1500 W. County Road B2
Roseville, MN 55113

Office Tel: 582-1418
Fax: 582-1008

EXHIBIT NO: 5
Date: 3-26-08
JULIE A RIXE
COURT REPORTER

Date: October 14, 1998

To: Jack Pirkl
Maintenance Operations Engineer

From: Mark Pribula
Bridge Inspection Engineer

Subject: Cracked Welds in Approach Spans & Diaphragms at Pier # 9
Br. # 9340 I-35W over Mississippi River

During the 1998 annual inspection of Bridge # 9340, bridge inspectors noticed cracks on the south multi-girder approach spans at the top of the stiffener / diaphragm connection near piers' # 2, # 3, # 4, and # 5. The cracks are in the negative moment region of the spans.

Metro Bridge Inspection felt that because cracks were found on the south multi-girder approach spans near piers' # 2, # 3, # 4, and # 5. We should inspect Pier # 9 on the north multi-girder approach span. During this inspection, bridge inspectors noticed eight cracks at the top flange / web weld, seven cracks at the top of stiffener weld, and two cracks at the web toe of stiffener welds.

The cracked welds in approach spans & diaphragms at Pier 9, locations are as follows:

Crack Type	Girder #	Pier # 9		Span
		N. Side	S. Side	
Beam Web @ Top of Stiffener Weld, Crack Diagonal Downwards, 12" (S) 42"(N)	G-2		X	9
Top Flange / Web Weld	G-4 (Westside)		X	9
Top Flange / Web Weld, (Sm. Horz.)	G-8 (Eastside)		X	9
Top of Stiffener Weld	G-9 (Eastside)		X	9
Top of Stiffener Weld	G-11 (Eastside)		X	9
Top of Stiffener Weld	G-12 (Eastside)		X	9

Crack Type	Girder #	Pier # 9		Span
		N. Side	S. Side	
Top Flange / Web Weld, (4"Lg Turning Down)	G-4 (Both sides)	X		10
Top Flange / Web Weld (W & E) & Top of Stiffener Weld (East)	G-5 (See Note)	X		10
Web Toe of Stiffener Weld, (West) Top Flange / Web Weld (East) & Top of Stiffener Weld (East)	G-9 (See Note)	X		10
Web Toe of Stiffener Weld, (West) Top Flange / Web Weld (East)	G-10 (See Note)	X		10
Top Flange / Web Weld, (W & E) & Top of Stiffener Weld (East)	G-11 (See Note)	X		10
Top Flange / Web Weld, (West & E) & Top of Stiffener Weld (East)	G-12 (See Note)	X		10

Metro Bridge Inspection is requesting that, The Office of Bridges and Structures consider a review of bridges with this similar type of girder / stiffener / diaphragm connection. One possible review candidate is Br # 27855, I-94 over Hiawatha (TH 55).

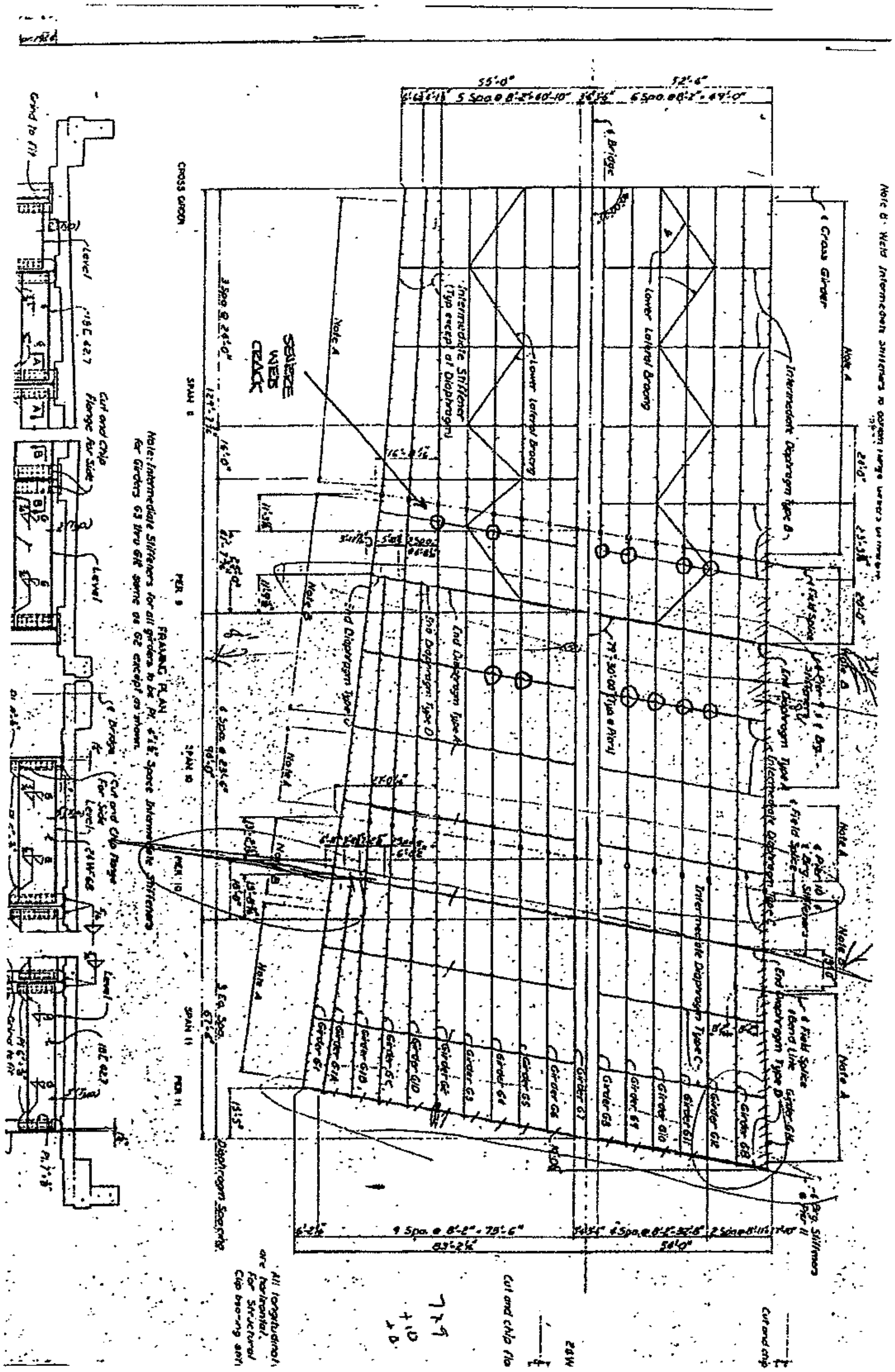
Mn/DOT constructed bridge #27855 in 1967, with seven continuous spans. The bridge was widened & re-decked in 1992. Stiffener details for the 34" & 62" welded beams, showed a "tight fit" on the tension flange. The framing plans show several areas where the diaphragms are orientated square to the beams and could be in the negative moment region. Beam lines at two locations, possibly more, terminate at header beams in near negative moment areas. We should inspect this area for stiffener / diaphragm connection weld cracks. While the beams added in 1992 presumably have bolted stiffener connections in negative moment regions, we should inspect the connections to the original fascia beams.

As a complete inspection of Br #27855 would be costly due to the lane closures required. We should first inspect those areas that we can reach without lane closures (the "gore" area toward the west end). If any fatigue cracks are found - a complete inspection would be prudent.

Metro Bridge Inspection is additionally requesting that, The Office of Bridges and Structures prepare recommendations for the repair of all negative moment girder / stiffener / diaphragm connections. Metro Bridge Inspection will also inspect the south stiffener / diaphragm connections of Pier # 10.

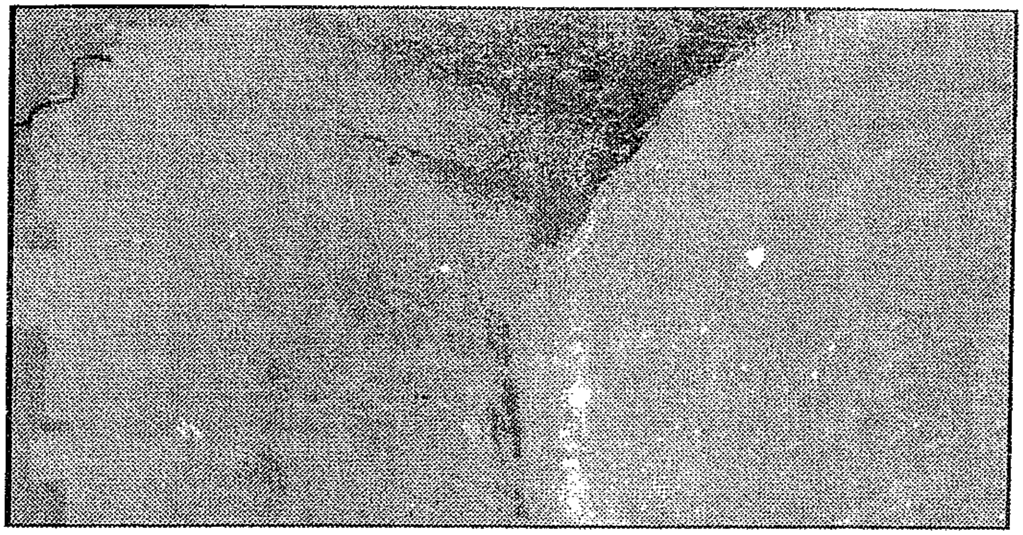
Attachments

cc: Terry Zoller, Metro Maintenance
Brad Johnson, Metro Bridge Maintenance
Paul Kivisto, Office of Bridges and Structures
Lowell Johnson, Office of Bridges and Structures
Terry Moravec, Office of Bridges and Structures
Donavan Hoff, Metro Bridge Maintenance
Gary Peterson, Office of Bridges and Structures
Arlen Ottman, Office of Bridges and Structures
Todd Niemann, Office of Bridges and Structures



North Approach Spans, Weld Cracks Circled

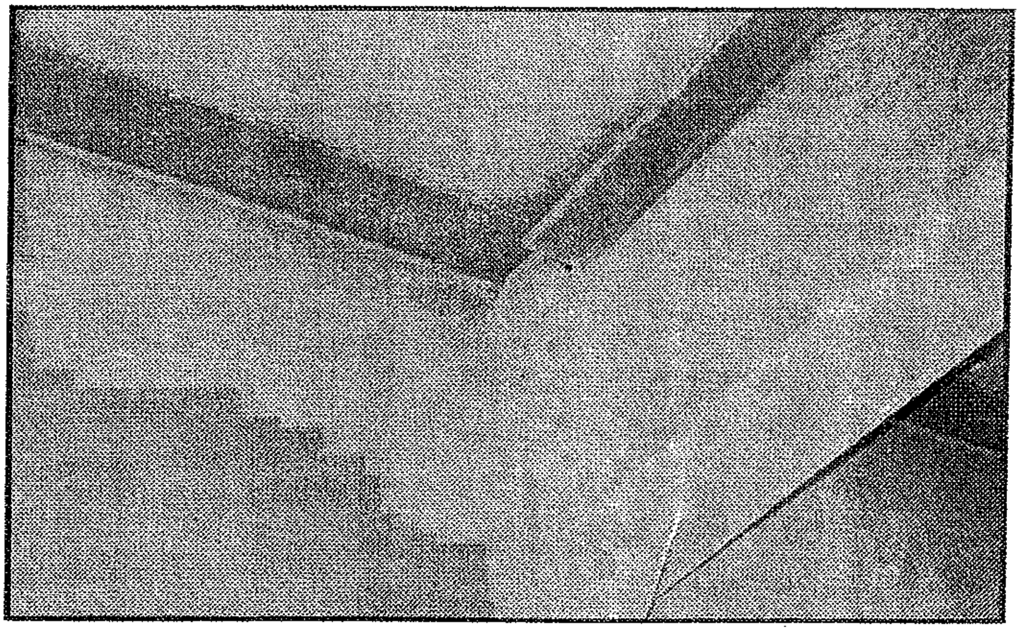
Bridge # 9340



Br #9340

I-35W Over Mississippi River

Typical Weld Cracks on Top Web/Flange Weld
And Top Vertical Stiffener/Web Girder



Br #9340

Girder/Diaphram Connection

Add to "35W River Br." File

9340

EXHIBIT NO: 6
Date: 3-26-08
JULIE A RIXE
COURT REPORTER

From: Paul Kivisto
To: Arlen Ottman, David Reinsch, Don Flemming, DONO...
Date: Thu, Nov 5, 1998
Time: 9:00 AM - 11:00 AM
Subject: Br 9340, TH 35W over Mississippi, Short and Long Range Plan
Place: Waters Edge Conf Room D

Discuss short and long range plan for Br 9340. Agenda includes:
1) Description of problem
2) Recent fixes
3) Additional fixes such as loosening diaphragms and/or moving diaphragms to bottom of beam at problem areas to minimize out of plane bending and shorten unbraced lengths. Discuss whether it is preferred to make a rigid or pinned connection.
4) Extent of 1999 paint contract, cost of approach span painting
5) Future strain gauge monitoring
6) 10 to 15 year plan - Condition of deck, expected condition of approaches and truss, rehab or replace

CC: Gary Workman

EXHIBIT NO: 8
Date: 3-26-08
JULIE A RIXE
COURT REPORTER

8/13/06 – DLD

Comments on Executive Summary – Bridge 9340 Study

Strength Evaluation Page 5: The second paragraph notes that no interaction ratios greater than 1.0 were found using the unfactored load and the ultimate capacity. Assuming some were close to 1.0, does this mean no traditional safety factor remains and there is no residual capacity beyond the design live loads?

Fatigue Evaluation Page 9: Various members are described in the text and tables, such as U0)-U1 Upper Chord, etc. Within the Executive Summary, if would be beneficial to have a truss diagram. At times, only the Executive Summary would be reprinted for others to read. It should stand alone without needed the full report to clarify.

Fatigue Evaluation Page 10: The last paragraph states failure of five of the eight critical members would "cause instability of the structural system". For others in Mn/DOT that are not knowledgeable in structures this phrase may not be understood. If the conclusion is the instability would likely lead to collapse of the bridge, that should be stated clearly.

Retrofit Concepts Page 11: The first paragraph begins with; "Another retrofit strategy…" and discusses replacing the existing deck with a continuous deck. Some may conclude this is an alternate to the steel plating strategy. Suggest the sentence begin with: "In addition to the steel plating concept, replacing the existing deck…..etc."

Retrofit Concepts Page 12: The paragraph at the top of the page ends with the sentence; "The amount of longitudinal deck reinforcement above Piers 6 and 7 shall be carefully determined in the final design of deck replacements." What specifically is the writer thinking when this caution is given to a future designer. Please elaborate on the aspects you believe the designer must consider.

Conceptual Plan for Deck Replacement Page 13: The last sentence of the first paragraph notes if the unbalanced half deck procedure is considered, a detailed analysis should be performed during final design. This decision is critical to our future project planning. One of the outcomes expected from the study was an assessment of the redecking options and traffic maintenance. We need this key question answered at this time, how many lanes can be maintained and what should be the staging, either half at a time, middle rebuilt first, or outside redecked first? This same issue appears is Recommendation 4. Without this answer, the staging for the entire project and roadway is stalled. So it cannot wait for final design.

Recommendations Page 13: Within the recommendations, the summary of the fatigue life should be reiterated. In short, it appears the likelihood of a fatigue failure is low. However, due to the lack of access in the box members, crack initiation or growth cannot be monitored. Therefore, if a crack occurs, it could easily go undetected and result in a sudden failure. For those reasons, a retrofit is recommended.

Additionally, we should discuss the timing of the retrofit, urgency, and agree upon language for the Executive Summary. A natural question will be when these retrofits are needed and can they coincide with other work.

Recommendation 2 states an internal inspection should be conducted of critical members. Is it even possible to get an inspector within arms length of the internal diaphragms? If only camera access is possible this leaves no opportunity to clean away rust scale and perform the necessary NDT.

(Bridge 9340 Study Comments DLD 8-2006.doc)

Section 1 Executive summary 8/7/06 GDP

Page 1 first paragraph. - is anything known about toughness of the steel used. Some discussion of unknown toughness may bear on rate of crack growth and time to react to initial crack discovery.

Strength Evaluation
Page 3 2nd paragraph. What was the allowable stress for steel tension or compression members compared to yield. Is the last sentence true that with a design ration of 1.004 any bending moments would likely cause localized overstress in relation to operating or inventory bridge rating criteria. Clarification give us some feeling for remaining safety factors for occasional over legal loads.

Do we address what the operating rating of this bridge is based on the analysis? Based on what we know, we may want some discussion about permitting trucks somewhere between inventory and operating rating.

Page 4 center paragraph, 1st sentence: #) LRFD factored load and ultimate capacity???

In the following discussion, clarify that ultimate capacity is the yield capacity of the member.
The paragraph states the force interaction ratio for unfactored loads never exceeded 1.0.
What would be an acceptable interaction ration at an operating rating? How often is that interaction ratio exceeded?

Fatigue evaluation
Page 6 paragraph 1, first sentence: "determined to have theoretically infinite fatigue life"???

Retrofit concepts:
Page 10 last paragraph: For the plate retrofit option, was a computer model generated to determine if force effects are concentrated at the ends of the plate members? It seems the moment deformations might be magnified in the unplated axial member located between the last bolt in the gusset plate connection and the first bolt in stiffened axial member??

I may be mistaken but I thought the contract asked for some analysis of contingency repairs. There should be some discussion of using the retrofit concepts as contingency repairs, or others should be discussed in more detail. Perhaps they are in subsequent sections.

One concept discussed by the District is to purchase plates and bolts for one or two member repairs during the overlay contract to be installed as a repair should a short un repairable crack be discovered during inspections. Would one size plate work for any repair, assuming it would be cut to length in the future. Would it be possible to pre drill the plates in a pattern that would work for all without significantly reducing the strength of the plate if only the required bolts holes were filled?
Is it feasible to make emergency repairs a tension member under traffic, or from above the member, or would that repair need to be made from below. Is the repair feasible from below assuming the cracks may occur during winter months when barges may not be used?

Its likely that retrofit of main members may be postponed for 15-20 years once an overlay is placed next year. Indepth weld inspections would continue to made every 5 years on the critical members indicated in this report and a visual arms length inspection of the critical members would be made every year.

Section 1- Introduction

Page 1 last sentence: Category E not B

Section 2 Bridge Inspection and Data Collection

Page 6 first paragraph, first sentence: Do we really want a recommendation that specifically requires the tab welds to be inspected on a yearly basis. What is the basis for the recommendation.

An initial inspection schedule has been discussed that will open the access holes on identified critical members to do an up close inspection of tab welds every 5 years, and an arms length visual inspection of the exterior surface yearly, and a routine snooper visual inspection of all other tension members on a yearly basis.

Is the recommendation relevant to the scope of work of the study? Should it be deleted? If relevant, would it be sufficient to recommend that Mn/DOT establish an arms length visual inspection schedule for critical members to provide early detection of crack formation at tab welds.

Page 7 - Section 2.3.1. Is the reported crack in a critical, highly stressed, or fatigue prone member? Metro: Are the cracks being monitored on each inspection,? Are there plans to repair the cracks?

Page 8 - Section 2.3.3 . Is the reported crack in a critical, highly stressed, or fatigue prone member? Metro: Are the cracks being monitored on each inspection,? Are there plans to repair the cracks?

Page 9 - Section 2.3.6: was the transfer floor beam at the junction of the truss and approach span determined to be a critical member: Has retofit or freeing of these bearings been discussed or recommended in other sections. No recommendation concerning freeing these bearings is listed in the executive summary.

Page 23 last paragraph. - Good data. Does the fatigue analysis section discuss the significance of over 17 million fatigue cycles on the bridge. Does the number of cycles indicate that if flaws were present they should have caused cracking by now, and the absence of crack history or findings indicate a low probability of future cracking based on calculated fatigue stresses. Ie do we have some confidence that the absence of major flaws then increases the probability of infinite fatigue life?

Section 3 Computer Modeling of Truss Span

No comments

Section 4 Strength Evaluation of Truss Members

Page 2 Explain the that eq 4.1 is used for gross section calculations and 4.2 is used for net? Or what ever the difference is.

Page 4 bottom of page: is "this has been ..." a note that is meant to be deleted?

Page 19 bottom of page: is it LRFD factored load and ultimate capacity?

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Introduction

Bridge 9340, I-35W over the Mississippi River, is a three-span continuous deck truss for the main crossing. Built in 1967, the steel superstructure contains a number of fatigue susceptible details in the main truss members and floor truss members. Most pronounced are the welded attachments at the diaphragms inside the box section of the main truss tension chords, which are Category D fatigue details according to current AASHTO fatigue provisions. The bridge was designed in accordance with the 1961 AASHO *Standard Specifications for Highway Bridges*, which was based on a completely different fatigue design method that was revamped in the 1974 interim edition. The poor fatigue details on the truss spans, particularly those inside the main truss tension chords that are difficult to inspect, have raised concerns on the consequence of a possible main truss member failure triggered by a fatigue crack.

URS Corporation was retained by Minnesota Department of Transportation (Mn/DOT) to evaluate the integrity of the truss-arch superstructure in light of fatigue and fracture characteristics. The results from this study will be utilized by Mn/DOT as a reference for the development of future renovation work to be performed on the bridge. The primary objectives of the project include: (1) identify critical superstructure members that are most susceptible to cracking, (2) evaluate structural consequences if one of the critical members should sever, in terms of load redistribution and load carrying capacities of remaining members, (3) develop contingency repairs to selected fracture critical members, and (4) establish measures for improving structural redundancy and minimizing tensile stresses in the trusses, and develop a preferred deck replacement staging plan.

Computer Modeling

A 3-D finite element model was developed that includes all the structural components of the truss spans: deck, stringers, floor beams, floor trusses, main trusses, as well as all bracing members. All the piers and the adjacent approach span at each end were also included in the model. All steel components were modeled with space frame members through their center of gravity lines. Link members of proper stiffness properties were used at the joints to address the eccentricities due to the actual dimensions of members and connections. The reinforced concrete deck, with the existing transverse and longitudinal expansion joints, was modeled with shell elements at its mid-thickness and connected to supporting stringers with rigid shear link members for the composite action. Based on field inspection and measurements, the main truss expansion bearings have been found not to behave as intended and the actual force-displacement relationship of the bearings is rather erratic. In the computer modeling, two extreme bearing conditions were investigated for their impact: (1) the "as-designed" condition based on the original contract plans; and (2) the fully "locked" condition. Additionally, the stringers also have expansion shoes at certain locations on the supporting floor trusses. Both the "as-designed" and "locked" conditions were considered for these expansion shoes in the computer modeling.

The model was compared with previous strain gage test results of the bridge by University of Minnesota for truss member stresses under known loading conditions. Adjustments were made to the model for various support and connection stiffness properties to achieve a reasonable agreement with the test results. Based on the model-test comparison and a calibration process, the following conditions of the computer model were determined to yield the best prediction of truss member axial forces: (1) all main truss expansion bearings were completely fixed at the piers for the live load, different from the "as-designed" condition; (2) the substructure was included for the stiffness of all piers and their foundations; (3) all stringer expansion bearings were completely fixed at the floor truss and end floor beam locations, also different from the "as-designed" condition; (4) the link members at the stringer-to-floor truss and floor truss-to-main truss connections had a longitudinal stiffness that reflects the low out-of-plane web stiffness of the floor truss top chord and the actual connection properties; and (5) the link members at the deck-to-stringer and stringer-to-floor truss connections had a transverse stiffness that reflects the low out-of-plane web stiffness of the stringer and the actual connection properties.

Strength Evaluation of Truss Members

The strength of the truss members were evaluated using the 3-D computer model in terms of the force interaction ratio, defined as the sum of the ratios of force to section capacity for axial force and bending moments in two principal directions, considering the axial force and bending moments. This is different from the traditional design of truss bridges when only the axial force is considered.

Truss members of Bridge 9340 were originally designed using the axial force only with member capacities determined from the 1961 AASHO *Standard Specifications for Highway Bridges*. A "design ratio", defined for comparison purposes as the ratio of the calculated axial force under design load to the allowable axial capacity of the member, was used to measure the axial force design margin, similar to the force interaction ratio concept for combined force effects. Based on the information in the original contract plans, the design ratio was found to range between 0.730 and 1.004 for all the main truss members. This indicates that some of the members were sized very tightly in terms of the axial capacity and any bending moments would likely cause a localized overstress in relation to the design criteria.

Does this indicate underdesigned?

Since truss members of Bridge 9340 were connected as frame members in reality, they are subject to axial force as well as in-plane and out-of-plane bending moments. To measure the combined force effects, the force interaction ratio was calculated for all truss members based on member force results of 3-D analysis as well as section capacities determined per the 1985 AASHTO *Guide Specifications for Strength Design of Truss Bridges (Load Factor Design)* and the 2004 AASHTO *LRFD Bridge Design Specifications*, respectively. The calculation of the force interaction ratios included the loads due to camber, non-composite dead load, composite dead load, and live load.

Question if the members were fabricated to achieve cambered [illegible] is this assumption correct.

The cambering of the main trusses and floor trusses was included in the computer model as a uniform axial member distortion load to account for the built-in forces this process would induce. The calculated vertical deflections of the trusses due to camber were compared with the camber diagram in the original contract drawings and excellent agreement was observed. Ideally, the truss member bending moments due to the total dead loads would cancel out those due to the camber and the truss members would be subject to axial forces only under the dead load. The 3-D analysis indicated that after applying the camber and all the dead loads, including those at the truss ends that support the approach spans, significant bending moments may still remain in some truss members although the bending moments due to camber do counteract with those from dead loads in most members.

The force interaction ratio under the total load (camber, dead load and maximum live load) was calculated for three cases: 1) unfactored load and ultimate capacity; 2) LFD factored load and ultimate capacity; and 3) LRFD factored load and capacity. For all truss members, the LRFD loading was found to produce highest magnitudes of the force interaction ratio. For the "as-designed" truss bearing condition, the maximum values of the interaction ratio are: upper chords 1.452 (U1'-U0'), lower chords 1.120 (L8-L9), diagonals 1.773 (U0-L1), and verticals 1.321 (U1'-L1'). The maximum values of the force interaction ratio for the "locked" bearing condition (for live load) are: upper chords 1.504 (U1'-U0'), lower chords 1.264 (L8-L9), diagonals 1.827 (U0-L1), and verticals 1.310 (U1-L1). One distinct feature of the LRFD loading is the inclusion of both truck and lane loads as compared with the LFD loading that uses the higher of truck or lane load. The analysis indicated that using the unfactored loads and the ultimate capacities, no truss member has a force interaction ratio exceeding 1.0.

Further investigation was made for truss members with force interaction ratios greater than 1.0 using the LFD and LRFD criteria. It was found that for all the cases considered, the axial component of the force interaction ratio is either less than 1.0 or slightly above 1.0 (1.039 maximum). This indicates that if the truss were evaluated based on the design assumption that the members take axial load only, the members would be acceptable. A comparison between the force interaction ratios of the same members under the LRFD and the LFD criteria indicates that the LRFD produces higher interaction ratios for all but two of the sections, or 98% of the members. This indicates the impact of the heavier LRFD loading. In diagonal member L1'-U0' the force interaction ratio per the LRFD was found to be almost 30% greater than that per the LFD. For the two sections where the LFD produces a higher interaction ratio, the value was only about 5% greater than the LRFD interaction ratio (U1-L1) and the magnitude was low. The highest force interaction ratio occurred in member U0-L1, the diagonal supporting the truss cantilever at the end of the truss spans. Using the LRFD criteria the total force interaction ratio was calculated to be 1.858 with 1.038 from axial, 0.819 from in-plane bending, and essentially zero from out-of-plane bending. A large portion of this axial load and in-plane bending can be directly attributed to the approach span loads that are applied at the upper joint U0. For the same member (U0-L1) using the LFD criteria the total interaction ratio was 1.464 with 0.871 from axial, 0.590 from in-plane bending, and essentially zero from out-of-plane bending.

A force interaction ratio greater than or equal to 1.0 for the existing structure does not necessarily indicate a member "failure", but rather a localized overstress beyond the elastic limit under the factored design load and section capacities. Besides, the occurrence of a local yielding in a structural system there typically is a load redistribution, and thus a reduction of loading forces at the overstressed section, based on the change of member/connection stiffness properties. It is important to note that no interaction ratios greater than 1.0 were observed in the analysis using the unfactored load and the ultimate capacity. This indicates that the actual design load should not cause overstress in any truss members. No signs of overstress have been reported in the service history of the bridge for more than 40 years. Although some members exhibited large interaction ratios using the LRFD criteria, this is mainly because the LRFD loading can be significantly greater than the original design load for some members. Another difference between the current analysis and the original design is the assumption that the truss member end connections are rigid rather than "pinned". This assumption of rigid connections, although tending to maximize bending moments in the truss members, should better represent the actual truss joint condition.

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In summary, a close examination of the force interaction ratios indicates that bending effects are not negligible in truss members when the members are assembled with moment connections. Such bending effects become significant when there are special sources for concentrated forces, such as the truss span ends that serve as supports to the approach spans. Additionally, the LRFD loading was also found to produce more severe load effects than the traditional ASD and LFD design load, due to the use of combined truck and lane load as well as a greater vehicle impact. The 3-D analysis showed force interaction ratios greater than 1.0 in some member sections using the LRFD and LFD criteria. However, a force interaction ratio exceeding 1.0 does not necessarily indicate a section failure but rather a localized overstress under the factored load which should result in a consequent load reduction at the overstressed section due to a load redistribution.

Fatigue Evaluation of Truss Members

Using the 3-D computer model and the fatigue truck for live load stress analysis, the truss members were determined to have infinite fatigue life in accordance with the AASHTO *Guide Manual for Condition Evaluation and Load and Resistance Factor Rating (LRFR) of Highway Bridges* (LRFR Manual) and the *Guide Specifications for Fatigue Evaluation of Existing Steel Bridges* (Fatigue Guide Specifications). The University of Minnesota also concluded that fatigue cracking is not expected in the deck truss of this bridge based on field strain measurements and load tests in 2001. Therefore, it can be concluded that the probability for fatigue crack development at the concerned Category D details is very remote.

However, the fatigue concern should not be completely discounted for the following reasons: (1) the access to the fatigue susceptible details inside the truss sections is very limited for crack inspection at the weld toes and therefore a timely discovery is unlikely to happen should a crack occur for some unusual causes; (2) the length of the welded tabs at the box section diaphragms was specified 3.5" in length in the original contract plans, which is very close to the lower limit of 4" for the Category E detail. Should a fabrication error or the workmanship modify the detail to the extent that it has the fatigue resistance of a Category E detail, the infinite fatigue life requirement would not be satisfied per the AASHTO Fatigue Guide Specifications; (3) the traffic on the bridge is heavy compared with the average highway bridge and therefore the use of a single fatigue truck may be underestimating the repetitive load effects on the structure.

Structural Redundancy Analysis

For the investigation of structural redundancy and retrofit need, eight critical main truss members were selected from one half of each truss. The eight members actually represent thirty-two main truss members due to the nearly double symmetry of the trusses. Using the 3-D computer model calibrated with field testing results, the selection of the eight truss members was based on the following criteria: (1) subject to tension under combined dead load and live load; (2) containing the fatigue susceptible welded details at the interior diaphragm; and (3) among members subject to the highest magnitude of fatigue load stress range. The eight truss members selected based on these criteria are: L3-U4, L1-L2, U0-U1, U4-U5, U3-U4, L4-L5, L12-L13, and L13-L14. They cover all truss member types except the vertical, because the verticals are either compression members or do not have the fatigue susceptible detail.

The redundancy analysis was to evaluate the structural consequence for the sudden failure of each of the eight critical truss members, using the calibrated computer model. Based on the conventional planar analysis method used in truss bridge design, most tension truss members would be classified as fracture critical due to the statically determinant nature of trusses. The primary objective of the redundancy analysis was to assess the three-dimensional bridge structural system's ability to redistribute the load upon failure of a main truss member, considering the participation of all structural components. The force effects of load redistribution after a sudden member failure were to be calculated and compared with load carrying capacities of the remaining members.

After a literature review on structural redundancy evaluation, an analysis procedure was established to evaluate the force effects for the sudden failure of a main truss member and compare them with the load carrying capacities of the remaining members. Four live load cases were used for the redundancy analysis, which intend to represent realistically possible loading conditions on the bridge: (1) dead load only without live load; (2) eight lanes of slow moving HS-20 truck load (without multiple presence factor or vehicle impact); (3) eight lanes of standstill HS-20 truck and lane load (without multiple presence factor or vehicle impact); and (4) the LRFD design load (seven lanes of HS-20 truck and lane load pushed to one side with a multiple presence factor of 0.65 and a dynamic load allowance of 33%).

For each live load case, the remaining bridge system (members and connections) were checked for their structural capacities against the consequent forces resulting from the sudden member failure. The member and connection capacities were checked using the force interaction ratio, including the effects of axial force and in-plane and out-of-plane bending moments for section capacities at the ultimate state. According to AASHTO specifications for connection design, the connections were designed with capacities between 75% and 100% of those of the main members, depending on the magnitude of design forces. The force interaction ratios were calculated both without and with a dynamic impact factor of 1.854 applied to magnify the static results to account for the dynamic effects caused by a sudden member failure. The calculated force interaction ratio presents a measurement of the load effects in terms of the ultimate capacities, or the probability of a section failure, at either the member or the connection.

Results of the redundancy analysis include the following items: (1) number of consequent main truss member failures; (2) number of consequent floor truss member failures; (3) impact on the floor truss members that "failed" in the intact structural condition; (4) consequent impact on reactions at the expansion bearings; and (5) consequent maximum bridge deflections. Table 1 and Table 2 present results of the redundancy analysis for all eight members under each of the four live load cases, based on member capacities and connection capacities, respectively.

Table 1. Consequent Main Truss Member Failures due to a Critical Member Failure (Based on Member Capacities)

Need Truss Diagram to understand

So Exec Summary can standalone

Number of Consequent Member Failures - Member Capacities					
Critical Member	Dynamic Impact	Load Case 1	Load Case 2	Load Case 3	Load Case 4
L3-U4 (Diagonal)	w/o Dynamic Impact	0	0	0	0
	w/ Dynamic Impact	0	0	0	0
L1-L2 (Lower Chord)	w/o Dynamic Impact	0	0	0	0
	w/ Dynamic Impact	0	0	1	0
U0-U1 (Upper Chord)	w/o Dynamic Impact	2	2	2	2
	w/ Dynamic Impact	3	4	6	4
U4-U5 (Upper Chord)	w/o Dynamic Impact	0	0	0	0
	w/ Dynamic Impact	0	0	0	0
U4'-U3' (Upper Chord)	w/o Dynamic Impact	0	0	0	0
	w/ Dynamic Impact	0	0	0	0
L4-L5 (Lower Chord)	w/o Dynamic Impact	0	0	0	0
	w/ Dynamic Impact	0	0	0	0
L12-L13 (Lower Chord)	w/o Dynamic Impact	0	2	4	3
	w/ Dynamic Impact	2	3	7	5
L13-L14 (Lower Chord)	w/o Dynamic Impact	0	4	7	6
	w/ Dynamic Impact	6	7	10	7

Table 2. Consequent Main Truss Member Failures due to a Critical Member Failure (Based on Connection Capacities)

Number of Consequent Member Failures - Connection Capacities					
Critical Member	Dynamic Impact	Load Case 1	Load Case 2	Load Case 3	Load Case 4
L3-U4 (Diagonal)	w/o Dynamic Impact	0	0	0	0
	w/ Dynamic Impact	0	0	0	0
L1-L2 (Lower Chord)	w/o Dynamic Impact	0	0	0	0
	w/ Dynamic Impact	0	0	2	1
U0-U1 (Upper Chord)	w/o Dynamic Impact	2	2	3	2
	w/ Dynamic Impact	4	5	6	5
U4-U5 (Upper Chord)	w/o Dynamic Impact	0	0	0	0
	w/ Dynamic Impact	0	0	1	0
U4'-U3' (Upper Chord)	w/o Dynamic Impact	0	0	0	0
	w/ Dynamic Impact	0	0	0	0
L4-L5 (Lower Chord)	w/o Dynamic Impact	0	0	0	0
	w/ Dynamic Impact	0	0	0	0
L12-L13 (Lower Chord)	w/o Dynamic Impact	1	2	5	3
	w/ Dynamic Impact	3	5	9	6
L13-L14 (Lower Chord)	w/o Dynamic Impact	0	4	9	6
	w/ Dynamic Impact	6	7	11	7

The tables summarize the number of additional main truss members that would fail as a result of the failure of the critical member both without and with the application of the dynamic impact factor. As shown in the tables, five of the eight critical members are fracture critical, i.e., their failure would result in the failure of at least one other main truss member and thus cause instability of the structural system. and possible collapse. The five fracture critical main truss members are: Lower Chord L1-L2, Upper Chord U0-U1, Upper Chord U4-U5, Lower Chord L12-L13, and Lower Chord L13-L14. These five members actually represent twenty main truss members due to the nearly double symmetry of the trusses. Accounting for the connection capacities yields more total consequent main truss member failures, but Upper Chord U4-U5 is the only additional facture critical member that would not be considered as such if the connection capacities were neglected.

Collapse??
?
FR so, say so. We need to use report to obtain action.

Retrofit Concepts for Improving Structural Safety and Performance

For strengthening the eight critical truss members on one half of each truss, several retrofit alternatives have been investigated, including the use of Carbon Fiber Reinforced Polymer (CFRP) strips or sheets, pre-tensioned steel strands or CFRP bars, and high performance steel plating. The general objective of the retrofit is to replace the strength of a member in an event that the member should completely fail due to a fracture initiated from the concerned fatigue susceptible detail. The added benefit is that the retrofit would also reduce the live load stresses and thus retard or minimize the development of fatigue cracks in the repaired members.

The steel plating concept was considered most suitable for this application and is recommended. The retrofit involves installing steel plates on the exterior surfaces of both webs of the truss member, with high strength anchor bolts properly located beyond the fatigue susceptible details. The retrofit steel plates, and the bolted connections at both ends, were designed to take over all the member forces and replace the lost capacity in the case of a member fracture. To minimize the plate weight for field erection and installation, high performance steel of 100 ksi yield strength was used with two steel plates on each side of the truss member with each plate width equal to approximately one half of the member web depth. Preliminary plans have been developed for the thirty-two truss members on the bridge.

an additional

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Another retrofit strategy is to alter the structural system by replacing the existing deck with a new deck that is continuous throughout the main truss spans and composite with the truss system. This structural alteration aims to reduce live load stresses in most members and improve structural redundancy. Combined with the steel plating member retrofit for selected critical members, the structural performance and redundancy of the redecked bridge is further improved.

Analyses results from the computer model indicate that replacing the existing deck with a continuous deck of the same thickness throughout the truss spans significantly reduces stresses in most truss members under both dead and live loads. The largest stress reductions typically occur in the members near the existing deck joint locations. Some truss members near the span contra-flexural areas experience minor stress increases due to a continuous deck under both the dead and live loads, but the consequence is not detrimental since those member forces are of low magnitudes. Under live load, further stress reduction can be achieved by using a thicker structural deck and by stiffening the connections between the floor truss and the main truss. The further stress reduction due to each of these two measures, however, is insignificant to the upper chords and nearly negligible to the lower chords and diagonals. Therefore, further enhancement of the deck-truss composite action by stiffening the connections between the main truss and floor truss top chord does not seem to be worthwhile.

The casting procedure of the new deck is critical to achieving the maximum benefit of stress reduction in truss members. Since the weight of wet concrete is carried by the steel system alone and any dead load applied after the deck concrete cures is carried more efficiently by the composite deck-truss system, the design and construction of the new deck should aim to minimize the thickness of the initial pour. For example, casting a continuous new deck with a 7" structural thickness plus a subsequently applied 2" overlay is more advantageous than a monolithically poured deck of 9" thickness. In addition, the use of light-weight concrete for the new deck should also be evaluated in the final design of deck replacement.

The impact of a continuous deck on the improvement of structural redundancy was also investigated using the 3-D computer model. The analyses indicated that replacing the existing deck with a continuous deck of the same thickness improves the structural redundancy by reducing the number of consequent member failures after the failure of truss lower chord L13-L14, and the failure of truss upper chord U7-U8, respectively. However, the continuous deck would likely not eliminate the consequent failures of main truss members and thus would likely not change the fracture-critical nature of either member. The amount of longitudinal deck reinforcement above Piers 6 and 7 shall be carefully determined in the final design of deck replacement.

← what is meant here
elaborate

While the condition of the expansion bearings was assumed locked under live load, both "as-designed" and "locked" conditions were considered in the redecking dead load analysis for their uncertain and erratic nature. The analysis results indicated that the effect of bearing condition is complicated and can be significant on truss member forces. In the final design of deck replacement, both bearing conditions should be taken into consideration and the governing situation to be used in the design.

Conceptual Plan for Deck Replacement

A conceptual plan for deck replacement was studied to maintain a minimum of four lanes open to traffic during construction and to minimize traffic interruptions during necessary transportation and placement of construction materials and equipment. Based on the layout of existing bridge ramps, it is easier to replace the half deck width on the east side and then the other half on the west side, or vice versa, resulting in unbalanced loading about the bridge centerline during the deck replacement construction. It is also possible, although more difficult, to maintain traffic for the outer lanes and then the inner lanes, or vice versa, during the deck replacement to keep balanced dead loading to the trusses.

Since truss bridges have generally been designed with symmetrical dead load between the two trusses, the suitability of the structure, particularly the floor trusses, to the transversely unbalanced half-deck loading condition was investigated. Using the LRFD design load on the 3-D computer model, the analysis indicated that member forces in the main trusses and the floor trusses are no higher in the half-deck condition than the full-deck condition. Therefore, the removal of half of the deck does not create a worse loading condition than what the existing structure is currently experiencing. However, it is likely that the original design of the floor trusses (members and connections) and other lateral bracing members did not consider the 3-D behavior of the truss system under transversely unbalanced half-deck loading. If the unbalanced half-deck procedure is to be considered, a more complete detailed analysis should be performed in the final design to evaluate the impact on all transverse members and their connections between the two main trusses.

Key question left unanswered

Based on the total available space between the existing side curbs of the bridge, it was determined possible to allow the maintenance of four traffic lanes in each of the two half-deck construction stages while having the median area serving as a path for transporting concrete. Using the 3-D computer model, a map of deck longitudinal axial stress contours was provided over the entire truss bridge, which can be used as a basis to determine the sequence of deck concrete pouring for placing concrete in the compression areas first and tension areas last. The exact sequence will depend on the volume capacity for each pour as well as traffic maintenance details.

What is urgency? Sequencing, can you wait for deck replacement.

Restate fatigue life while probability of failure low, should retrofit due to no inspection.

Recommendations

Based on results of our study, the following recommendations are made:

(1) Five main truss members in one half of each truss, representing twenty members in the bridge, have been identified as fracture critical and should be retrofitted with the steel plating scheme developed, using high performance steel and high strength bolts. The retrofit, although not changing the fracture critical nature of the truss member, adds internal redundancy to the member and eliminates the possibility of a member fracture due to the fatigue of susceptible welded details at the internal diaphragms.

(2) Before the retrofit takes place, the fatigue susceptible details at the internal diaphragms inside the identified fracture critical truss tension chords should be inspected with the access hole cover plates removed during the normal inspections. The toe of the

Is this possible

Camera access, if NOT

If not possible [illegible]

longitudinal fillet weld between the tab and the truss chord web is a primary location for the development of a fatigue crack.

(3) A deck replacement with a new deck that is continuous throughout the main truss spans, and composite with the truss system, can significantly reduce live load stresses in most truss members and improve the redundancy of the truss system. To minimize dead load stresses, the replacement deck should be placed in two stages, with a structural deck of minimum required thickness, plus an overlay. Alternatively, the use of light-weight concrete for the new deck can also reduce dead load effects and should be evaluated in the final design of the deck replacement.

Need to answer this.

Major question

(4) A preliminary analysis using the LRFD design load indicated that member forces in the main trusses and the floor trusses are no higher in a transversely unbalanced half-deck condition than the full-deck condition. However, since truss bridges have generally been designed with symmetrical dead load between the two trusses, it is more desirable to keep this symmetrical loading condition during deck replacement as much as possible. If the unbalanced half-deck procedure is to be considered, a more complete detailed analysis should be performed in the final design to evaluate the impact on all transverse members and their connections between the two main trusses.

(5) Based on a map of the deck longitudinal axial stress contours provided, the sequence of deck concrete pouring can be determined for placing concrete in the compression areas first and tension areas last.

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Proposed tasks to evaluate and increase the redundancy of

Mn/DOT Bridge No. 9340

Interstate 35W over the Mississippi River

Minneapolis, Minnesota

Prepared
By

HNTB Corporation

May 2000

Peterson EXHIBIT 5
DATE 4/2/08
COLLEEN M. SICHKO
COURT REPORTER

BACKGROUND

The redundancy of the deck truss portion of the Interstate 35W bridge over the Mississippi River is a continuing concern to the Minnesota Department of Transportation. The bridge is a primary link in the transportation network for the Minneapolis-St.Paul metropolitan area. If for some reason, the strength of the deck truss should be compromised and the bridge closed, the impact to the area's transportation network would be significant. Based on data in the 1997 National Bridge Inventory the average daily traffic volume on the bridge is 124,000.

Bridge No. 9340 was designed in 1965 in accordance with the 1961 AASHO Specifications. It was constructed in 1967, the same year the Silver Bridge collapsed. The collapse of the Silver Bridge over the Ohio River near Point Pleasant, WV initiated the national bridge inspection program, the development of fracture control plans, and material specifications requiring minimum Charpy values.

Due to concerns regarding the redundancy of the bridge, Mn/DOT recently contracted with the University of Minnesota Department of Civil Engineering to conduct fieldwork and analysis for a "Fatigue Evaluation of the Deck Truss of Bridge No. 9340". Selected primary truss and floor truss members were instrumented with strain gages and data was collected when trucks of known weight passed over the bridge and when the bridge was subjected to "open" traffic. Among the findings in the University's Interim Report dated January 2000 are the following:

1) Observed strain ranges in the primary trusses and the floor trusses are significantly below those estimated with 2-dimensional analysis models

2) The response of the primary trusses lies between analysis results generated with pinned-roller support conditions and pinned-pinned support conditions

3) The floor truss upper chord picks up approximately 25% of the load estimated by analysis. The floor truss diagonals pick up approximately

100% of the load estimated by analysis. The floor truss lower chords pick up approximately 50% of the load estimated by analysis.

Based on the University's findings it is apparent that "conventional" 2-dimensional design analysis methods can not pick up all of the load transfer mechanisms present in the bridge. In order to increase the ability to identify critical elements we would propose to assemble and calibrate a sophisticated structural model with frame and plate elements.

OVERALL STRATEGY

1. Place permanent survey targets on the bridge at key locations on both the upstream and downstream sides of the bridge. Data from the targets will permit the global movements of the bridge to be captured. This will serve two purposes: 1) it will initially provide data to calibrate a three-dimensional structural model of the bridge, 2) once a baseline of movements has been captured, abnormal movements may indicate distress in the bridge prior to it becoming visible to the naked eye.

   The position of the targets would be obtained by surveying the targets at discrete points in time. The targets can be measured to a precision of 0.01' and from a distance of up to 800 to 1200 feet. We would propose that the targets be installed at key positions on the bridge (ends of the bridge, either side of deck joints, and at substructure locations). Information from these points would allow us to determine which joints are moving (and how much) and which bearings are moving (and how much)

2. Assemble a 3-dimensional structural model that accurately depicts the global movements of the bridge and also replicates the localized behavior of the bridge observed by the University.

Yes

3. Locate the most fatigue sensitive members of the primary trusses

Yes

Yes 4. Identify the susceptibility of the bridge if one of the fatigue sensitive members should fail.

Future 5. Prepare rehabilitation contract documents for a project to rehab fatigue sensitive/critical members

DETAILED TASK LIST

Meet with Mn/DOT

Phase 1 Tasks – Obtain Global Movement Data

1. Purchase one of the targets
2. Contact the Corp of Engineers and the City of Minneapolis about entering their property to survey the bridge.
3. Go to the bridge and test the limits of reading the target. Determine how much "out-of-alignment" the targets can accommodate before they can't be read and "fixtures" need to be mounted below the targets so they are oriented towards the survey gun. Test shooting the target from upstream on the Corp of Engineers facilities and from downstream on the 10th Avenue bridge.
4. Order targets and fixtures
5. Install targets and fixtures
6. Record ambient temperature and obtain MSP temperature for 12 hours prior to survey (initial survey in June?)
7. Collect and reduce additional survey and temperature data. July data collected at 7 am and 5 pm on a hot sunny day. September data collected at 7 am. November data is collected at 7 am. January data is collected at 8 am and 4 pm on a cold sunny day.
8. Prepare document summarizing the movements of different positions of the bridge.

Phase 2 Tasks – Assemble and Calibrate Structural Model

No 1. Continue surveying the bridge on a bimonthly basis.

2. Prepare a three-dimensional STAAD model built with frame and plate elements.
3. Calibrate the boundary conditions for the model to replicate the movements obtained from the surveys. (load model with different temperature loadings)
4. Calibrate the plate elements such that the member strains in the primary and floor trusses match those observed by the University.
5. Verify that the boundary conditions for the global movements are still accurately modeled.
6. Load the model with HS25 trucks at hot, normal, and cold ambient temperatures. List the most fatigue sensitive elements at each of the three ambient temperatures.
7. Prepare a document summarizing the modeling and analysis of the bridge

Phase 3 Tasks – Fracture Analysis – Develop Conceptual Repair Schemes

1. Using the three-dimensional model as a tool investigate the capacity of the bridge with fractures in any one of the 10 most fatigue sensitive members.
2. For each of the fatigue sensitive members whose failure results in failure of the bridge develop 3 conceptual repair schemes.
3. Meet with Mn/DOT, discuss fractured member analysis and conceptual repair schemes.

Phase 4 Tasks – Contract Documents for Rehabilitation

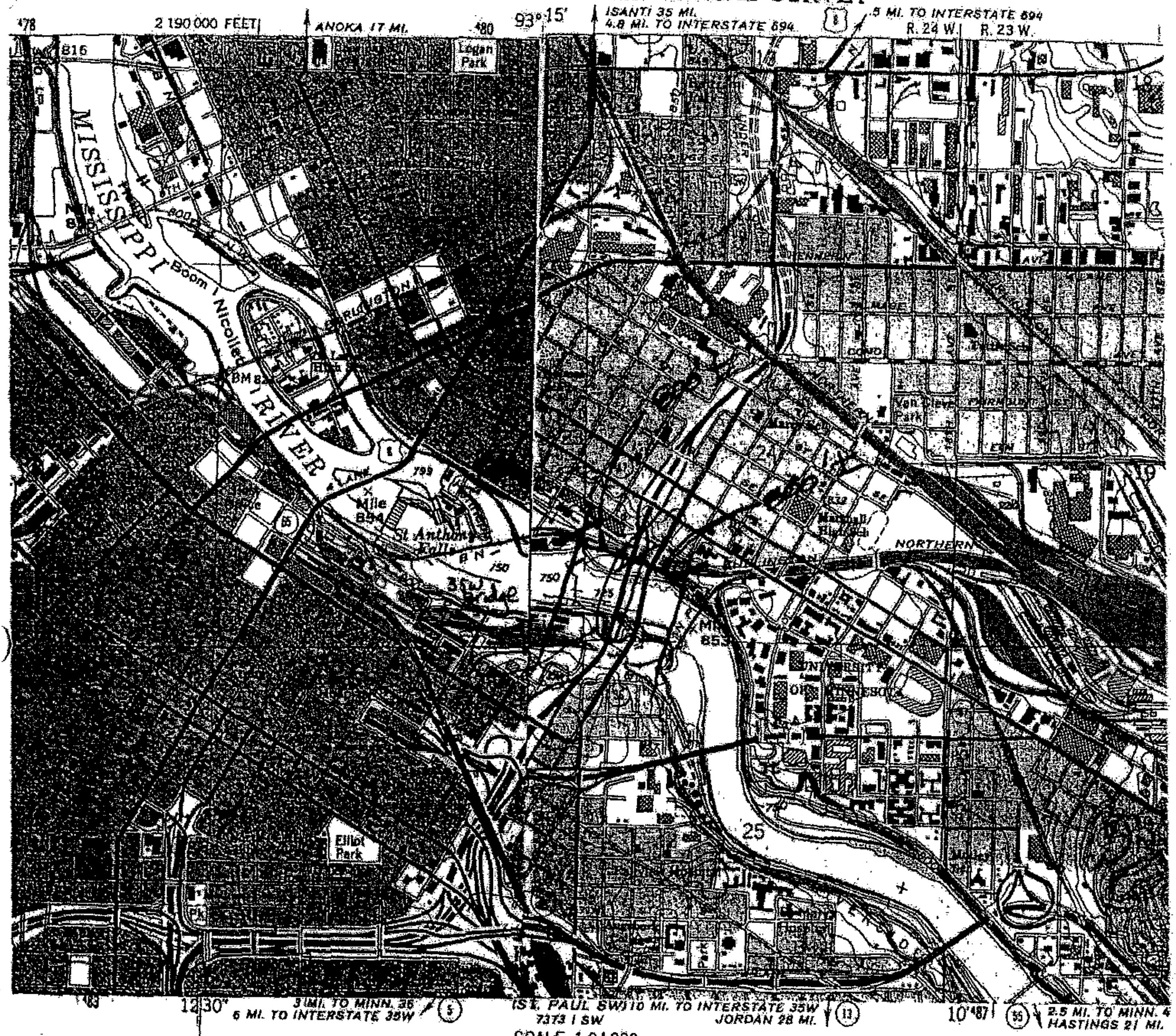
1. As directed by Mn/DOT, prepare contract documents for the rehabilitation of the most fatigue sensitive members

The following pages contain topographic information, permanent survey marker information, and recommended survey target locations.

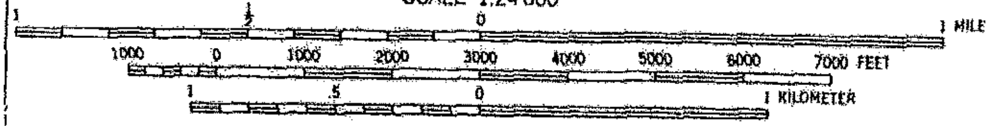
TOPO MAP OF THE AREA NEAR BRIDGE NO. 9340

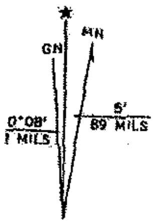
MINNEAPOLIS SOUTH QUADRANGLE
MINNESOTA-HENNEPIN CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



SCALE 1:24 000





ND 1972 MAGNETIC NORTH
ON AT CENTER OF SHEET

CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL

QUADRANGLE LOC

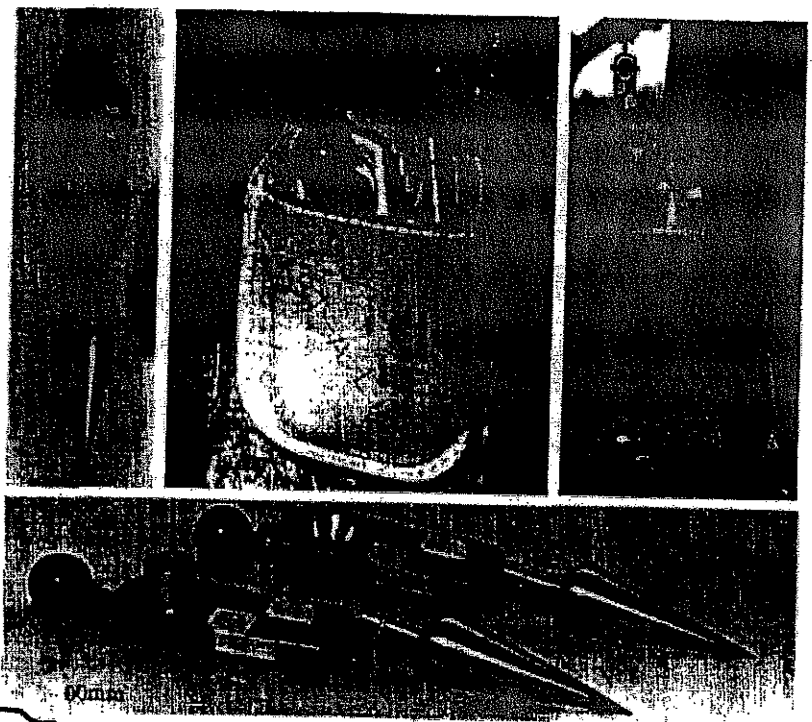
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D. C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

Revisions shown in pu
taken 1972. This inf

CATALOG CUTS OF PERMANENT SURVEY MARKERS

PERMANENT SURVEY TARGETS

Dist-A-Line™ - Line of Sight and Distance Measuring System



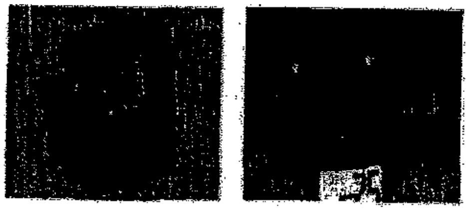
The Dist-A-Line™ was designed by a surveyor to allow the instrument man to get line and distance in one operation. This is accomplished by having the prism, Gammon reel™ and plumb bob string all hang over the point in perfect vertical alignment with the optical center of the prism. There is no level bubble to check or get knocked out of adjustment. The Prism tilts for inclined shots and has a range of approx. +-2000 feet depending on the EDM. Working height is any length of the Gammon reel™ string, which can be replaced quickly when worn. The unit is 3/4" x2"x 5 1/4" and weighs 10 oz. It comes with Prism, Gammon reel™, 18 oz. plumb bob and a custom heavy duty leather carrying case.

Item No. 288 - Dist-A-Line™ w/Leather Case
(-30. mm Offset) ....$324.95 Ea.

Item No. 289 - Dist-A-Line™ w/Leather Case
(-34. mm Offset)(For Wild EDMs) ....$324.95 Ea.

Item No. 290 - Dist-A-Line™ w/Leather Case
(00. mm Offset)..$324.95 Ea.

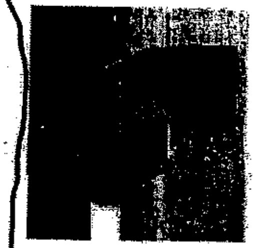
Tilting & New Stationary Reflectors

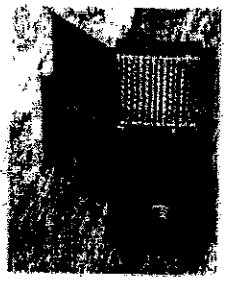


This two inch square reflector has a range of + - 1000 ft. It's constructed of a high quality plastic reflector with an all aluminum housing. Adjustable for both 0mm and 30mm offset. Fits all standard 5/8 x 11 threads. The NEW stationary reflector utilizes the same 2" square reflector as above but has a right angle aluminum backing plate. Can be placed on any surface to be measured for a 'O' offset. *Tested range with a topcon GTS -4 is 1048 under good conditions.

Item No. TR Tilting Reflector ....$49.95 Ea.
Item No. SR New Stationary Reflector ....$29.95 Ea.

Corner Reflector



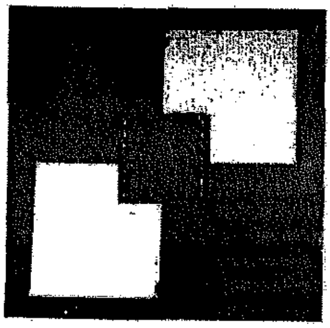


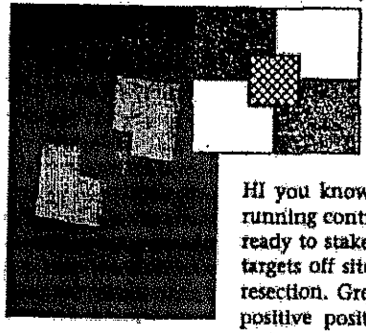
Now you can get accurate measurements to most outside corners with this SELF-STANDING corner reflector. The unit fits any 5/8x11-prism pole or candy cane and has a range of 1000ft. Shoot either side of the reflector for quick and precise measurements. Great for mortgage inspections and building locations, and the one-man survey. Prism measures a 0 offset to any corner and a -30 offset when used with a prism pole

Item No. CR Corner Reflector ....$74.95 Ea.

OR

PERM-A-SITE™

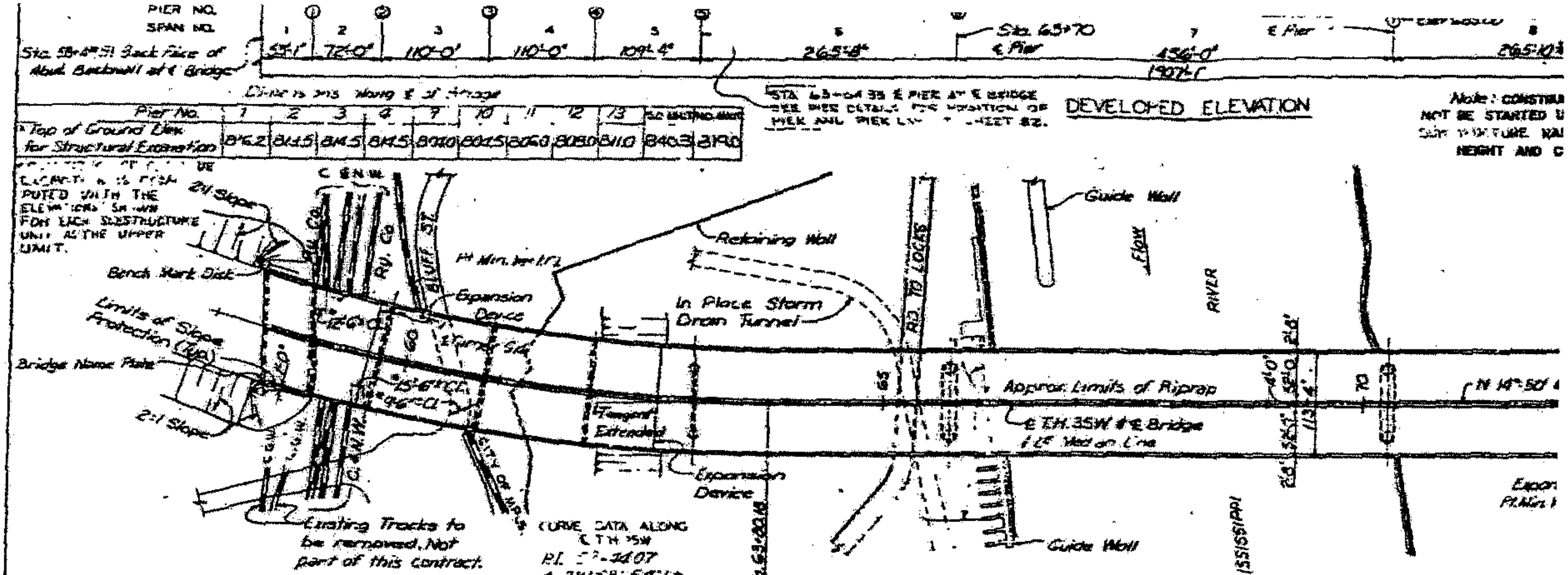




How can PERM-A-SITE™ help you save time, money & effort? After mounting the PERM-A-SITE™ to a tree, telephone pole, building or any stationary object and setting out to it, you now have a permanent back site with X, Y, Z. This means, even if your occupation point has been disturbed or you have a bad instrument HI you know about it, fast. So instead of running around giving back sites or running control back to the job site, you can be planning the days work or getting ready to stake out, saving you time, money & effort. The low cost PERM-A-SITE™ targets off site, you can easily reestablish you're on site control with a 3 position resection. Great for monitoring, with two targets set at 90 degrees =/- you get a positive position and two elevation checks, with one person! Weather proof construction, Adhesive backed, and reusable. 6"x6". Patent Pending.

Item No. 301ps - PERM-A-SITE (0mm offset only) . . . . $24.95 Ea.   Item No. 302ps - PERM-A-SITE (-30mm offset only) ....$28.95 Ea.

TRUSS ELEVATION WITH POTENTIAL PERMANENT SURVEY MARKER LOCATIONS



DEVELOPED ELEVATION

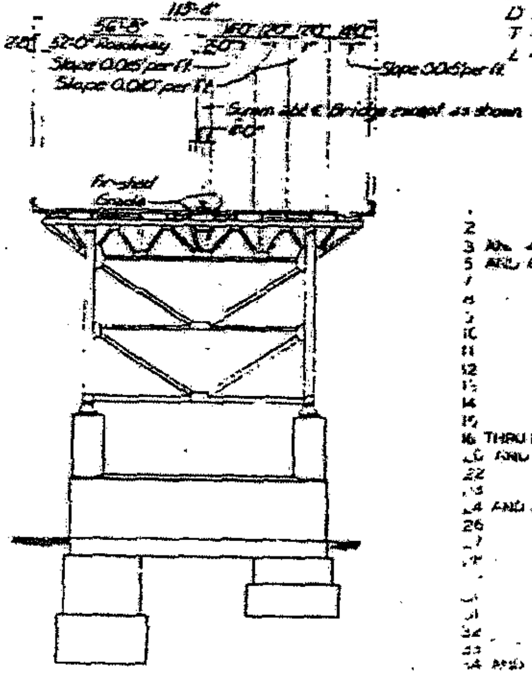
Pier No.	1	2	3	4	7	10	11	12	13		
* Top of Ground Elev. for Structural Excavation	816.2	814.5	814.5	814.5	801.0	801.5	806.0	808.0	811.0	840.3	819.0

* ... ELEVATION ... PUTED WITH THE ELEVATIONS SHOWN FOR EACH SUBSTRUCTURE UNIT AS THE UPPER LIMIT.

CURVE DATA ALONG ℄ T.H. 35W
P.I. 57+34.07
Δ 25°59'54" Lt.
D 3°15'00"
T 455.63
L 871.7?

PLAN

Note: Triangulation field measurement as shown on Survey Sheets.



SECTION NEAR PIER 7

INDEX OF DRAWINGS

TITLE SHEET
1 GENERAL PLAN AND ELEVATION
2 GENERAL NOTES AND QUANTITIES
3 AND 4 DECK DETAILS AT PIERS AND ABUTMENTS
5 AND 6 SOUTH ABUTMENT
7 PIER 1
8 PIERS 2 & 3
9 PIER 4
10 BAR LIST AND QUANTITIES PIER 1 THRU 4
11 PIER 9
12 PIER 10
13 PIER 11
14 NORTH ABUTMENT
15 BAR LIST AND QUANTITIES PIERS 9 THRU 11 AND NORTH ABUTMENT
16 THRU 19 SOUTH APPROACH SPANS STRUCTURAL STEEL DETAIL
20 AND 21 DECK TRUSS SPANS ... SHEET
22 DECK TRUSS SPANS FRAMING PLAN AND FLOOR TRUSS LAYOUT
23 DECK TRUSS SPANS STRINGER DETAILS
24 AND 25 DECK TRUSS SPANS FLOOR TRUSS DETAILS
26 DECK TRUSS SPANS END FLOORBEAM - SOUTH END
27 DECK TRUSS SPANS END FLOORBEAM - NORTH END
28 DECK TRUSS SPANS TRUSS DETAILS - L0 TO L2
[illegible] DECK TRUSS SPANS TRUSS DETAILS ... TO ...
[illegible] DECK TRUSS SPANS TRUSS DETAILS - L7 TO L10
31 DECK TRUSS SPANS TRUSS DETAILS - L11 TO L14
32 DECK TRUSS SPANS PORTALS U1 AND U8
33 DECK TRUSS SPANS SWAY FRAMES
34 AND 35 DECK TRUSS SPANS INSPECTION WALKWAY DETAILS
36 THRU 38 DECK TRUSS SPANS BEARING ASSEMBLIES
[illegible] THRU 4? NORTH APPROACH ... [illegible]
[illegible] THRU 47 NORTH APPROACH ... [illegible]
48 AND 49 NORTH APPROACH ... [illegible]
50 ROADWAY EXPANSION DEVICE NEAR PIER 2
51 ROADWAY EXPANSION DEVICE NEAR PIER ?
52 ROADWAY EXPANSION DEVICE NEAR PIER ?
53 ROADWAY EXPANSION DEVICE CASTINGS
54 ROADWAY EXPANSION DEVICE AT PIER 11
55 ... APPROACH ... DETAILS
56 - ?? DECK TRUSS SPANS SLAB DETAILS
58 NORTH APPROACH GIRDER SPANS SLAB DETAILS
59 SLAB DETAILS
6? CONCRETE ... [illegible]
AND ... DETAILS
61 ... STEEL RAIL AND RAILING
62 HANDRAIL AND GUARDRAIL DETAILS
63 BAR LIST AND QUANTITIES SPANS 1 THRU 11
64 AND 65 DRAINAGE DETAILS
66 AND 67 PROFILE DATA
68 ELECTRICAL PLAN & ELEMENTARY DIAGRAM
69 ELECTRICAL SECTIONS AND DETAILS
70 NAVIGATION LIGHTING AND UNDERPASS LIGH
71 THRU 81 DETAILS
82 SUBSTRUCTURE LAYOUT
83 ... BRIDGE SURVEY
... BRIDGE SURVEY CONTRACTED PROFILE
... THRU ... BRIDGE SURVEY PLAN AND PROFILE
... THRU ... UTILITY LAYOUT

CONTRACT B

CONTRACT B CONSISTS OF CONS
AND NORTH ABUTMENT, PIERS ...
AND 13, AND SUPERSTRUCTURE.

Drawn by: H.P. Maconey Oct. 1963
Checked by: ... Sept. 196?
2083
63569

... B.D. REVIEW RRT
53 063
MINN. PROJ. NO. ... 35W-3?(?)12

PLEASE REVIEW

& DISCUSS WITH

BOB. 11/2/00 9-10'30

Set up a mtg with Bob, Gary, Kevin & I to Decide on Action —

Dan

Peterson EXHIBIT 6
DATE 4/12/08
COLLEEN M. SICHKO
COURT REPORTER

HNTB
The HNTB Companies
3400 W. 66th Street, Suite 250, Minneapolis, Minnesota 55435, 612 920-4666

LETTER OF TRANSMITTAL

Job No.
Date 9/5/00

TO: Bob Miller
MN/DOT - OAKDALE

RE: 35 W over Mississippi

WE ARE FORWARDING TO YOU:

☐ Estimates
☐ Plans
☐ Shop drawings
☐ Copy of letter

☒ Proposals
☐ Prints
☐ Samples
☐ Change order

☐ Reports
☐ Under separate cover via:
☐ Specifications

NO. OF COPIES	DRAWING NO.	LAST DATED	CODE	DESCRIPTION
1		3/99		CONCEPTUAL STRUCTURAL SCHEMES (11 x 17)
1		5/00		Proposed Tasks Document (8½ x 11)

THESE ARE TRANSMITTED

☐ For approval
☐ For your use
☒ As requested
☐ For review and comment

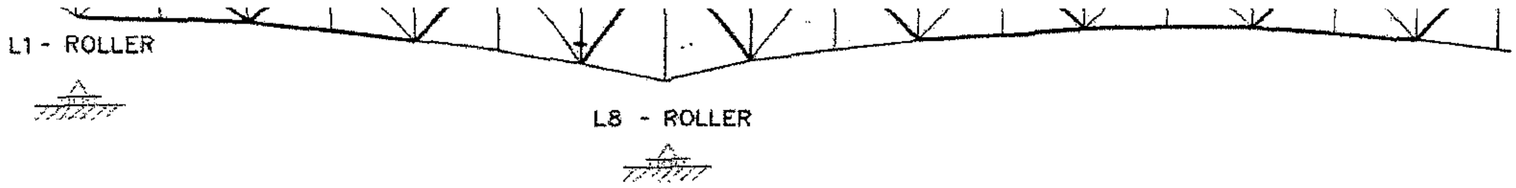
☐ Resubmit ___ copies for review
☐ Submit ___ copies for distribution
☐ Return ___ corrected prints

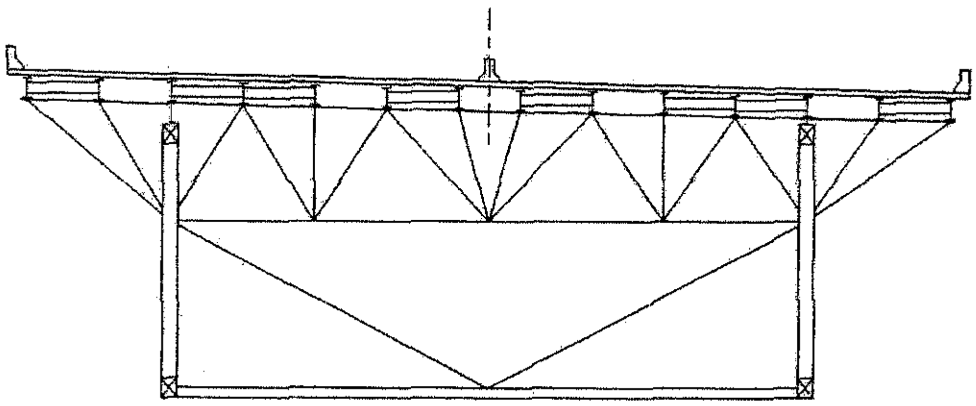
☐ No exceptions taken (NE)
☐ Make corrections noted (MCN)
☐ Amend and resubmit (AR)

PLEASE NOTE: Bob:
Don was only interested in the failure analysis portion of the tasks listed in the 5/00 material. (Parts of Phase 2 and Phase 3)

COPY TO: RICH JOHNSON - HNTB

By STEVE OLSON





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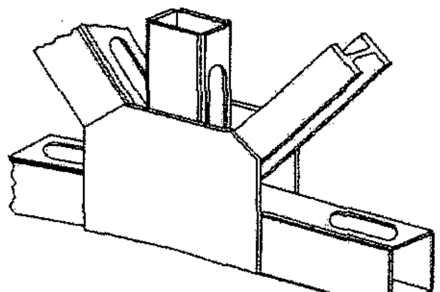

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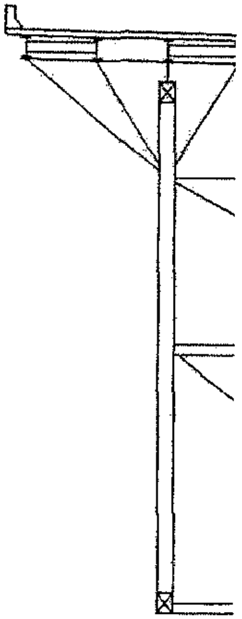

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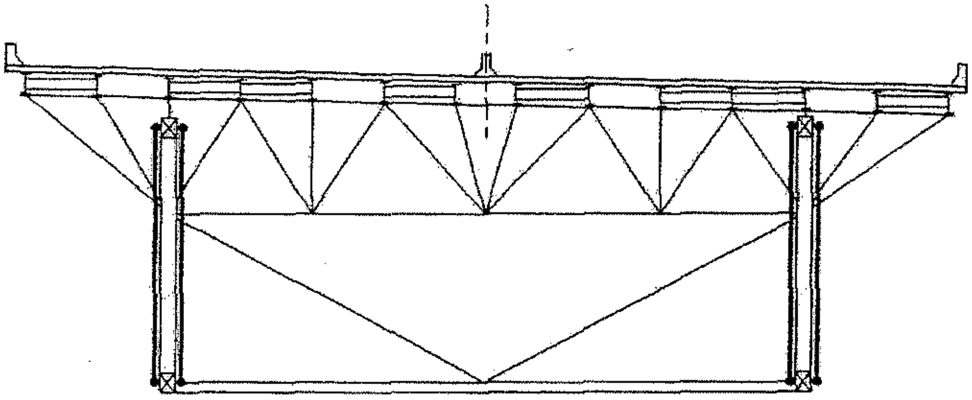

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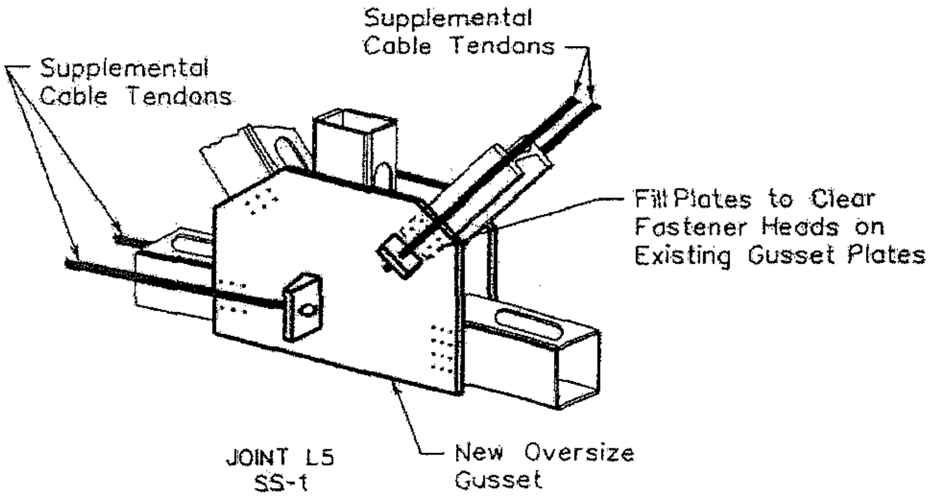

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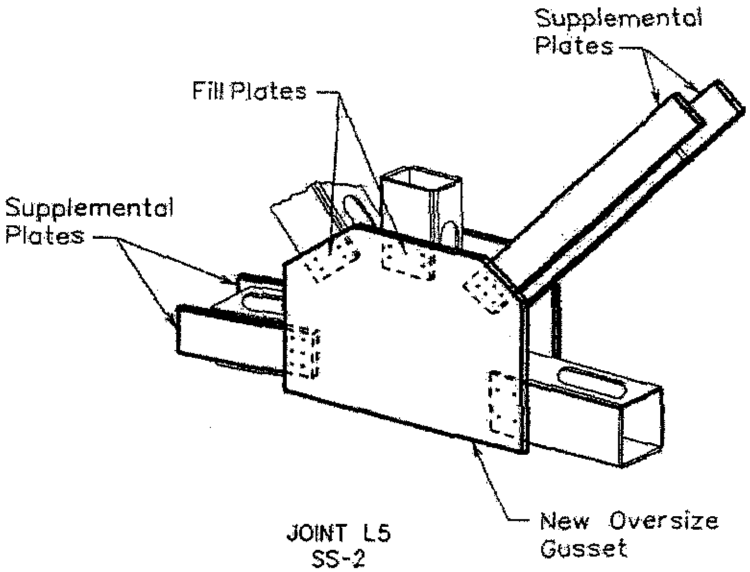

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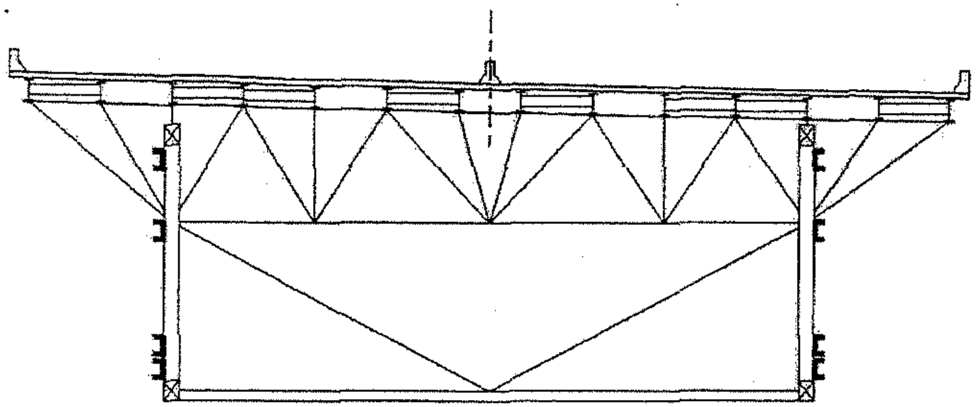
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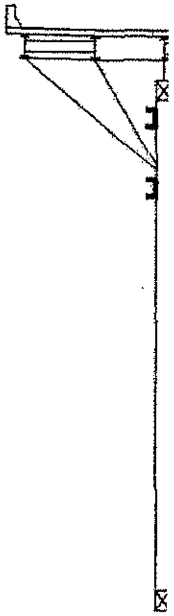

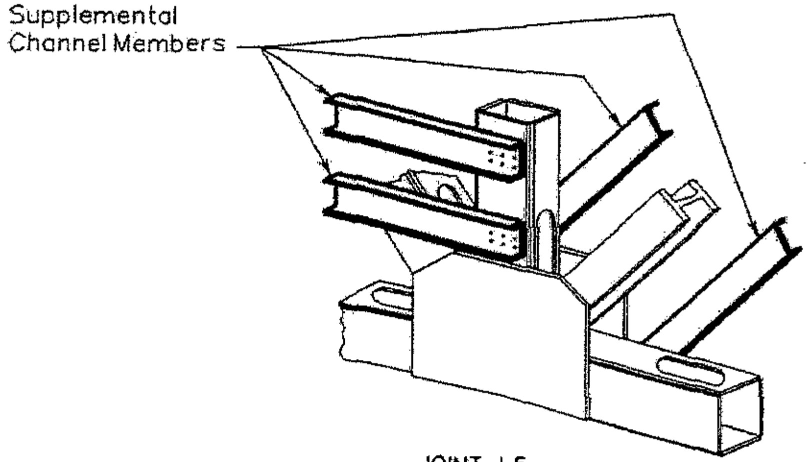

JOINT L5

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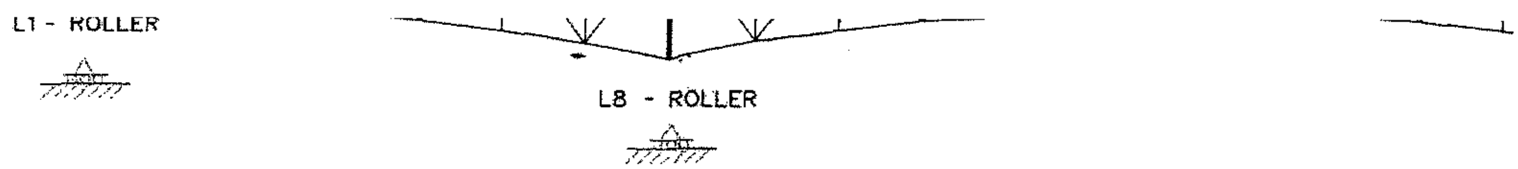

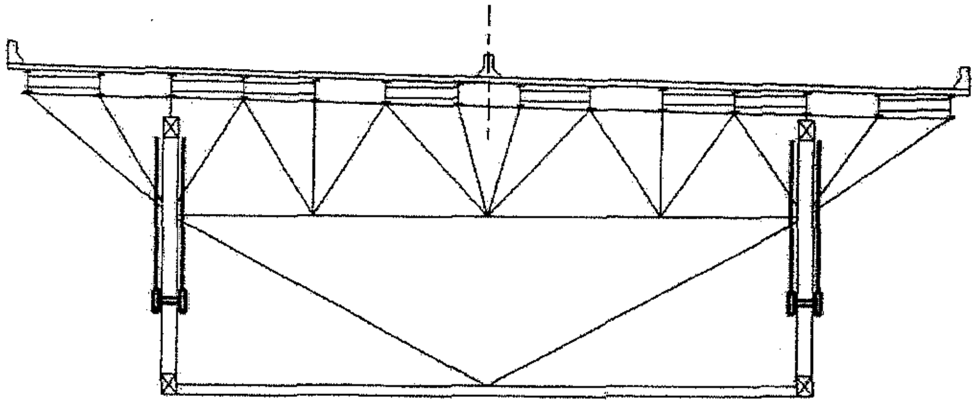

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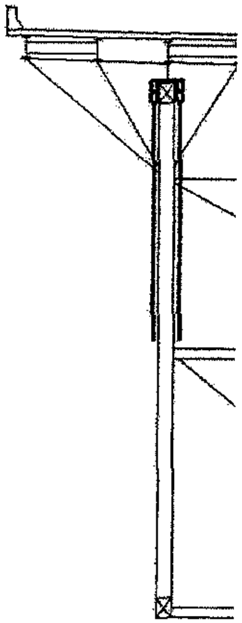

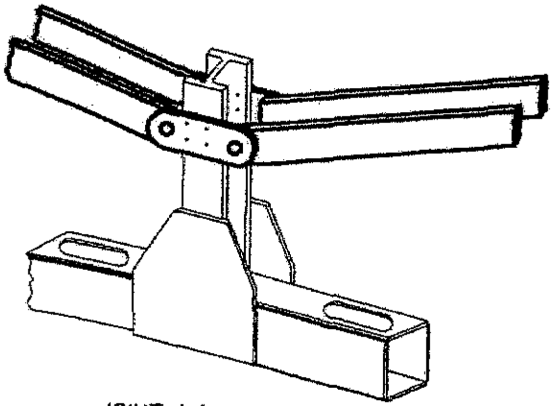

JOINT L4

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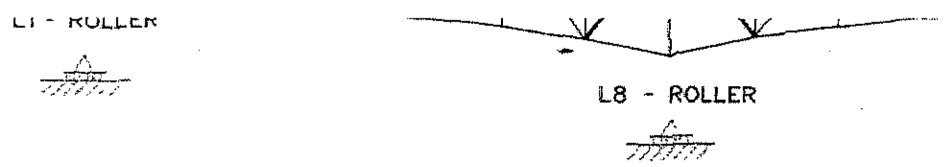

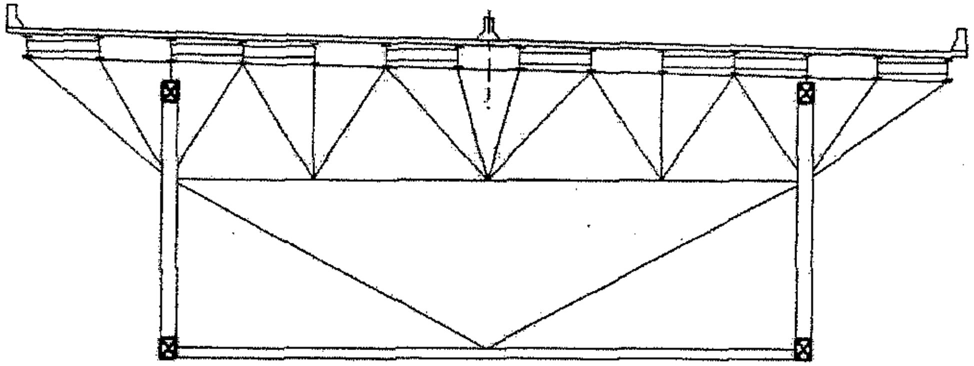

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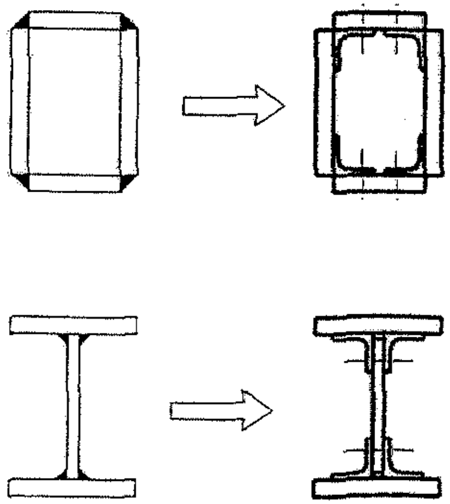

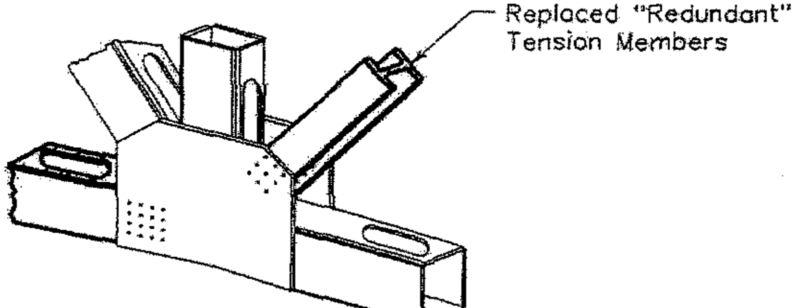

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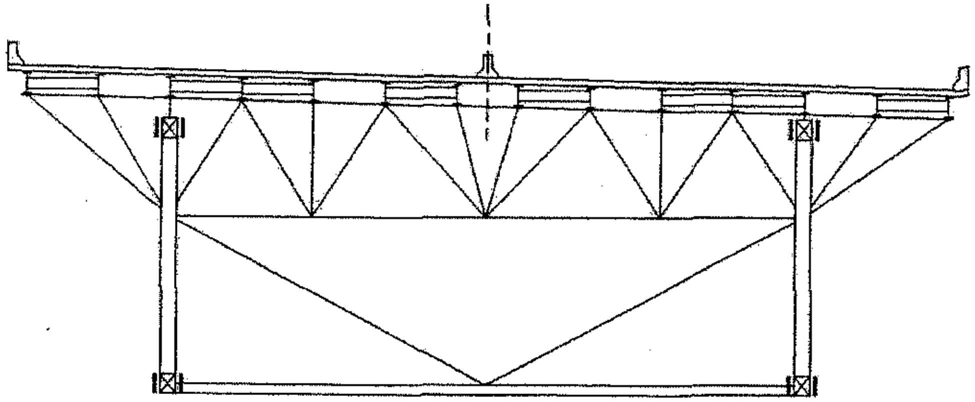

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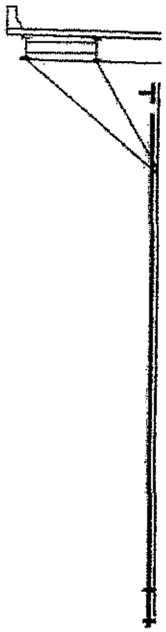

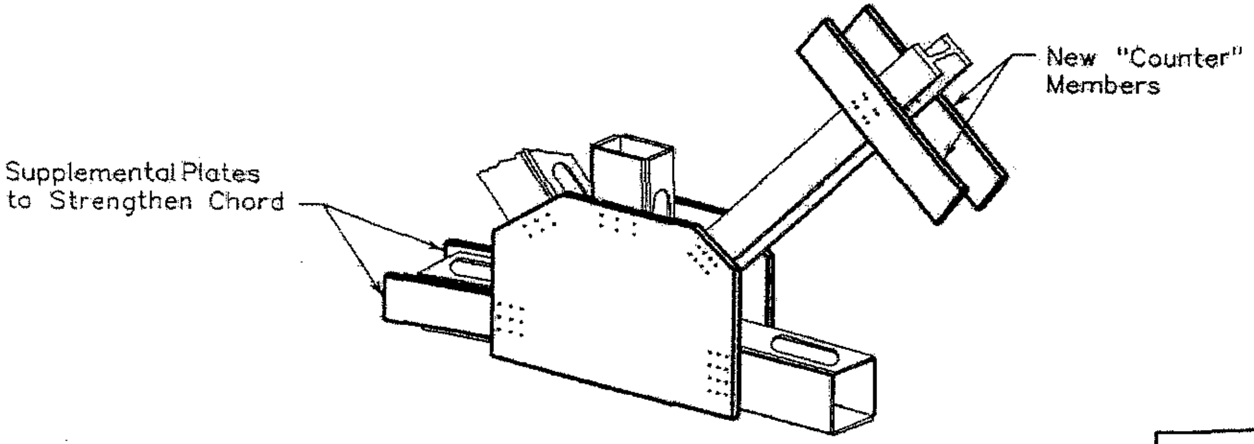

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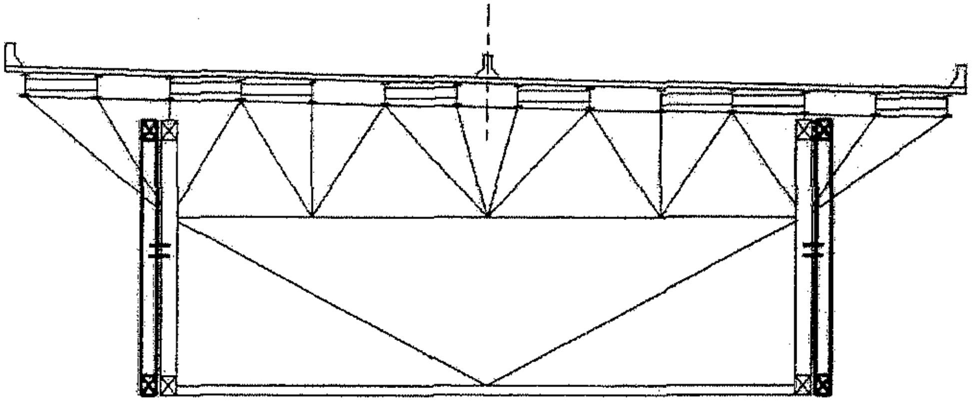

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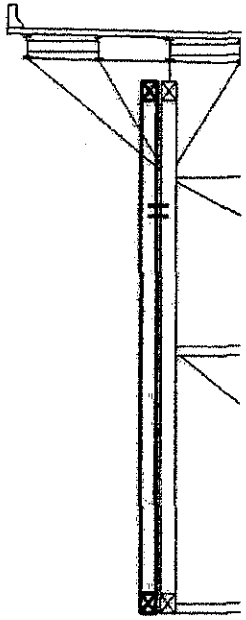

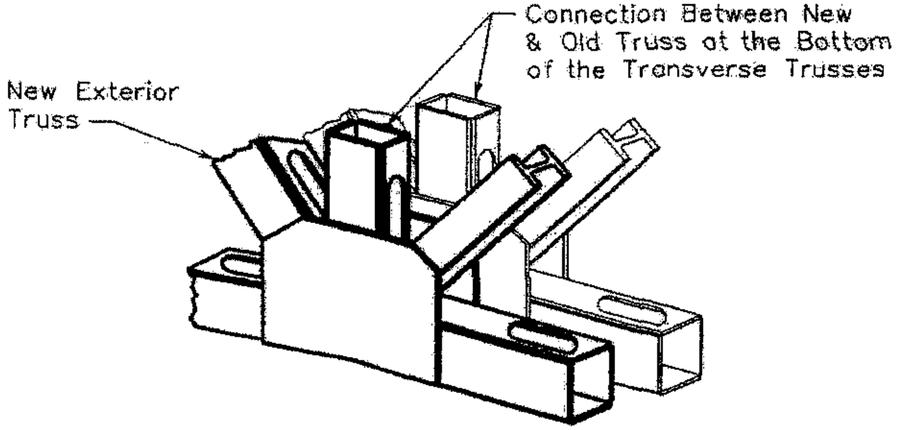

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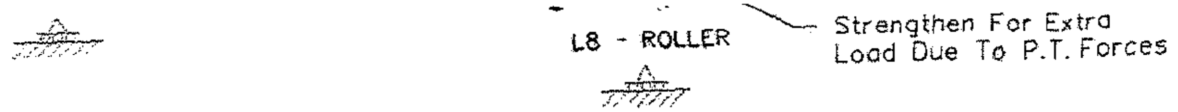

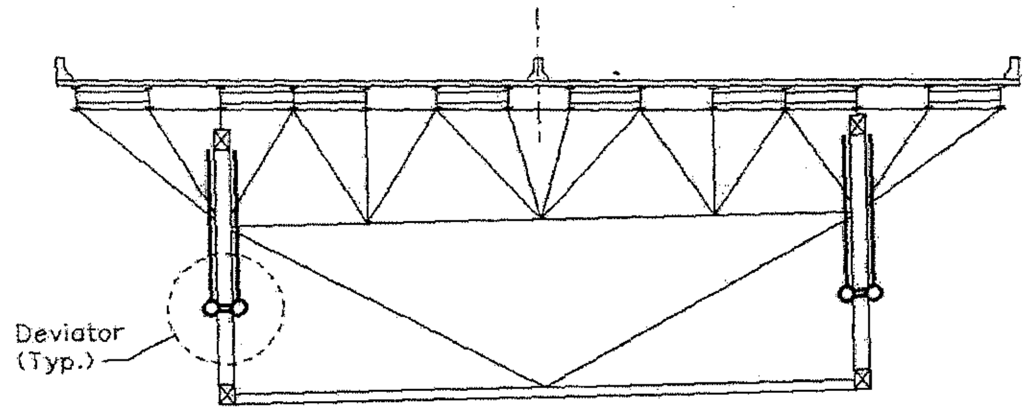

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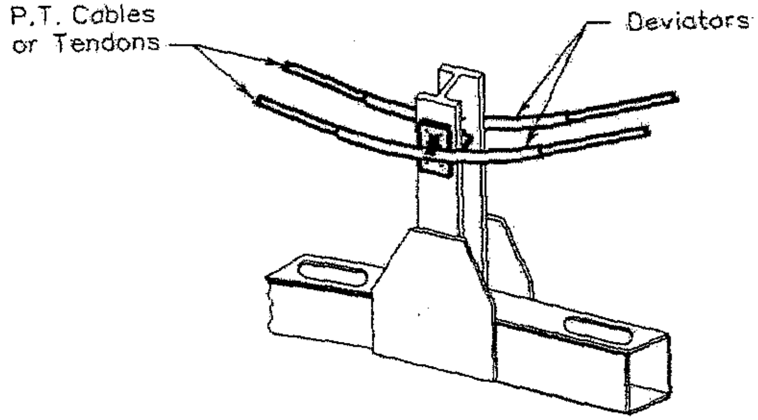

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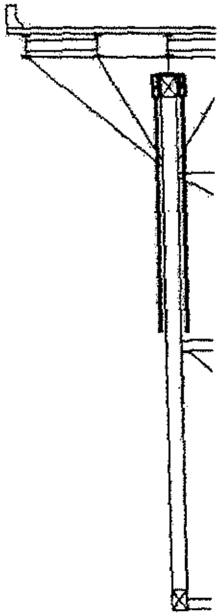

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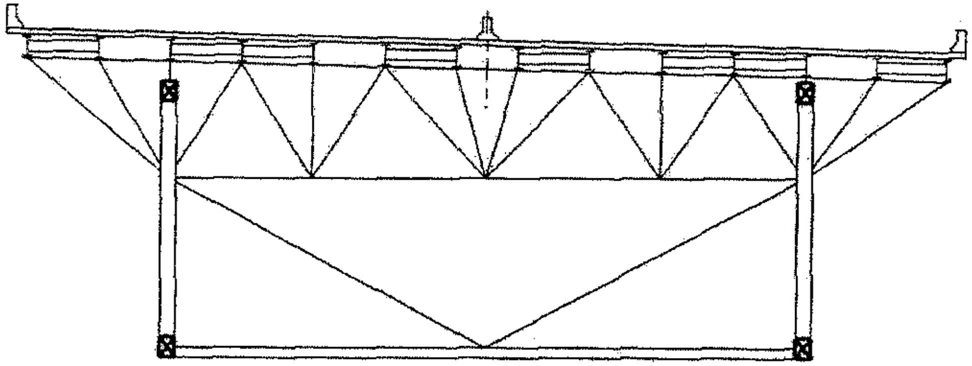
L8 - ROLLER



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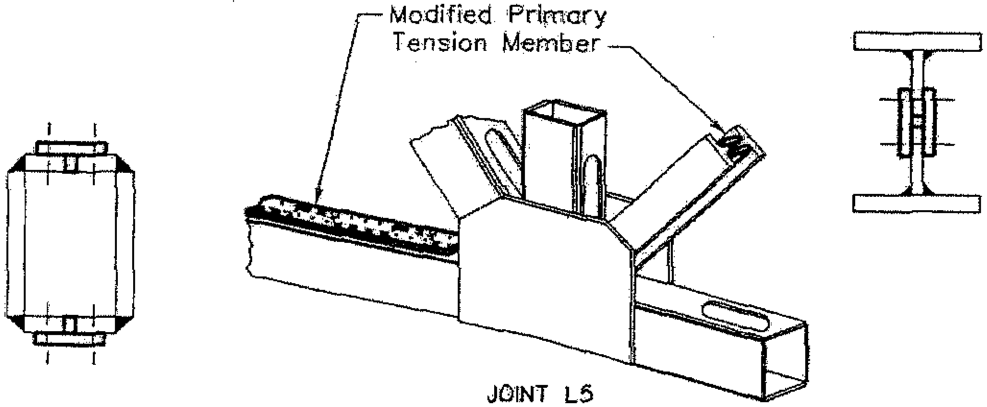
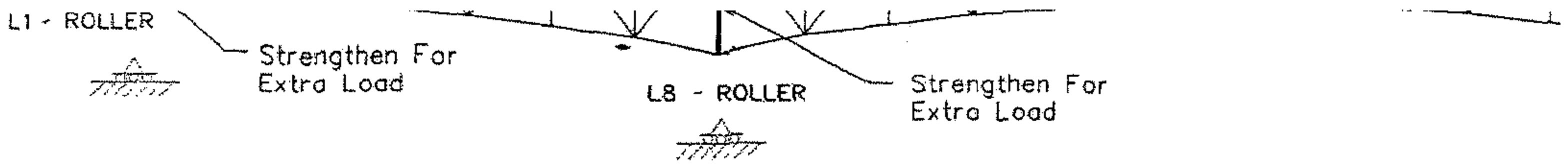
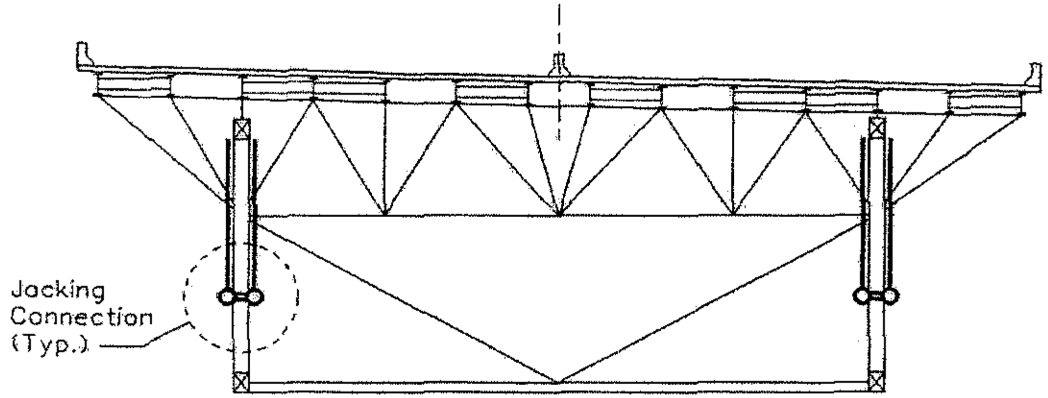


JOINT L5

For I Members, Split Web; For Box Members, Split Top and Bottom Plates Prior to Adding Supplemental Plates





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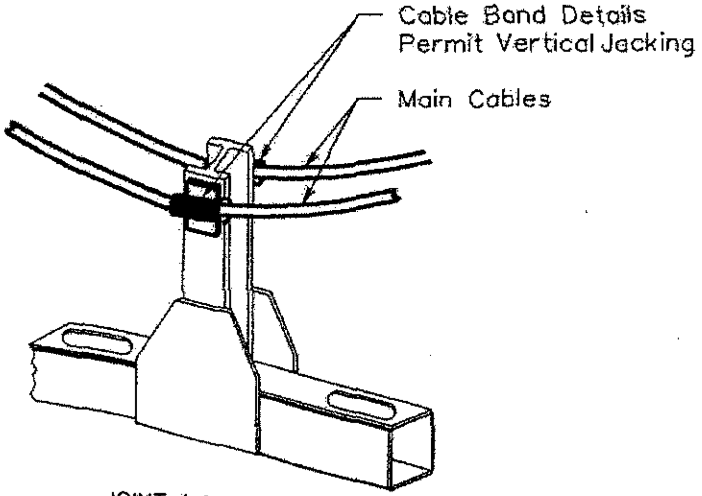

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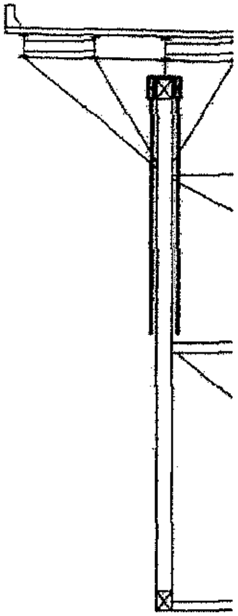

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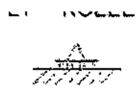

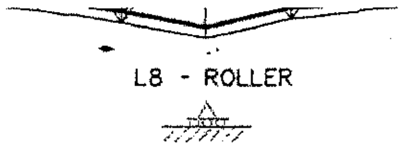

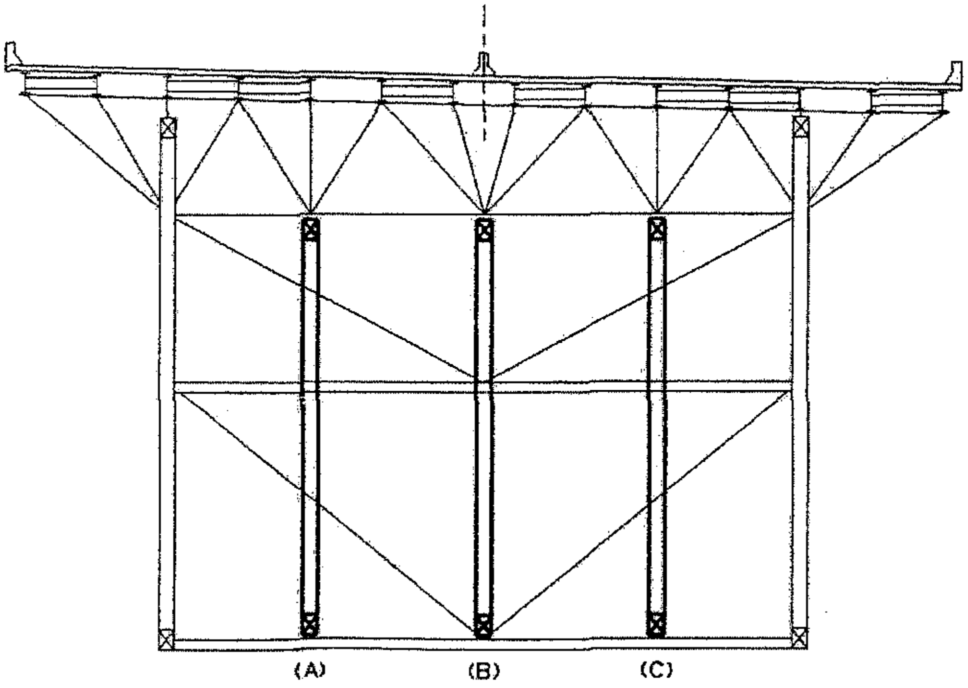

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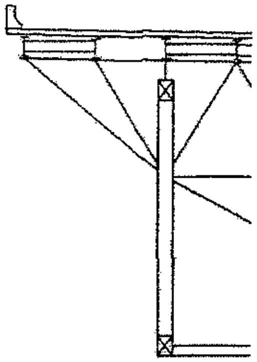

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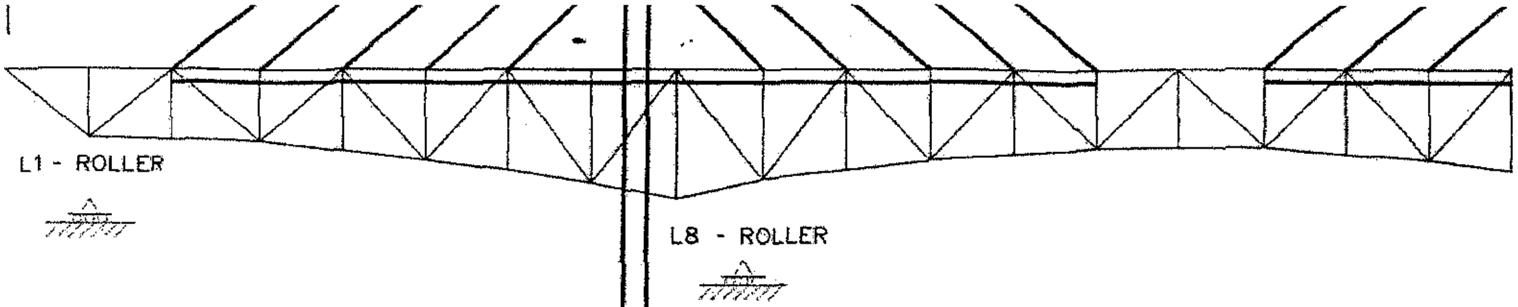

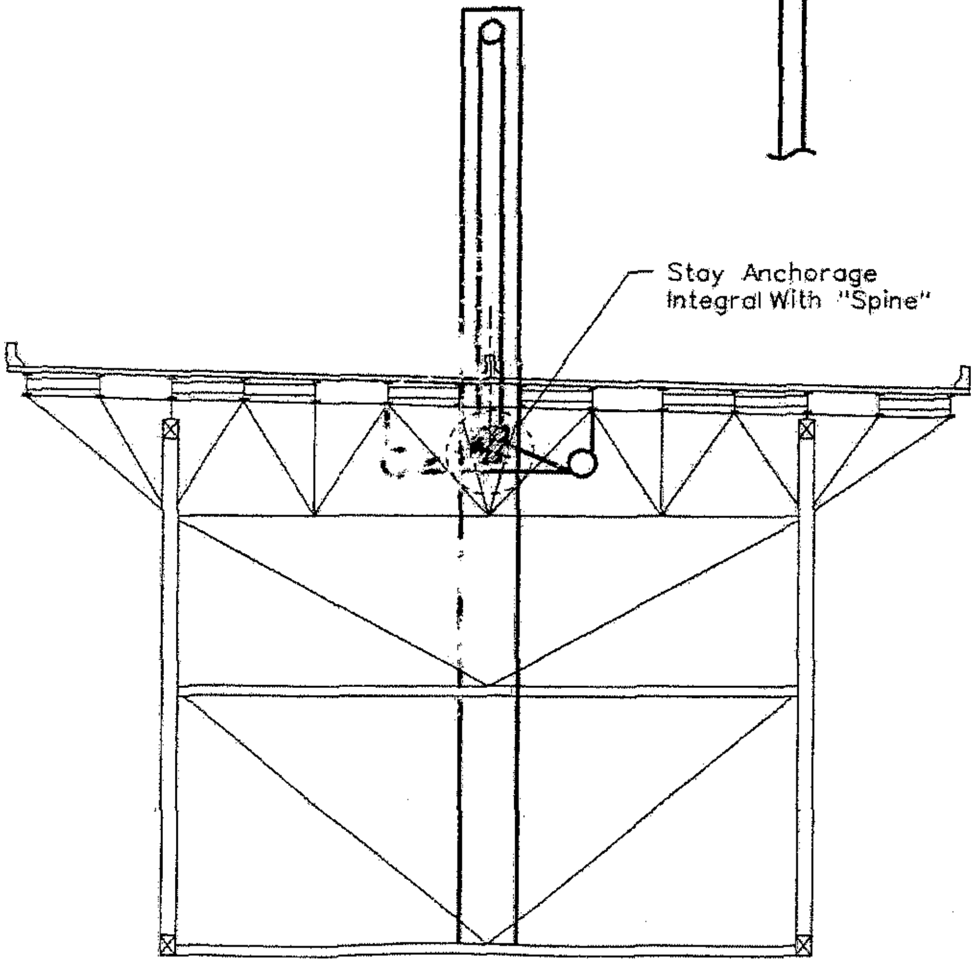

SECTION AT L7

1. Construct Tower
2. Construct Horizontal Spine
3. Erect Stay Cables
4. Transfer Fraction of Deck & Live Load to Stay System
5. Remove ½ of Deck & Stringers
6. Construct New ½ Deck
7. Complete Remaining Deck
8. Remove Original Trusses

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Bridge 9340 Outstanding Issues

Comments on "Fatigue Evaluation of the Deck Truss of Bridge 9340 – Final Report"

The maximum stress ranges measured for the actual vehicular traffic over a 4-month period don't appear to exceed the stresses developed during the controlled load tests.
Good, then the model was probably calibrated near the maximum load so we are more confident in extending results to somewhat heavier loads.

In no case did measured loads approach the CAFL (page 52).
Good, but regardless of what Dexter says about loads which occasionally exceed the CAFL don't decrease fatigue life, if we really don't know the load history of the bridge and the size of the Permit trucks that have gone across the bridge, and the damage they have done, I really don't feel comfortable saying there is infinite life left in the bridge. That the measured stresses over the 4-month period were so significantly (70%CAFL) below the CAFL tends to reduce my concerns somewhat.

In the most highly stressed bridge members, the actual stress ranges due to the test load to produce maximum stresses in the truss were lower than the CAFL (page 71).
Good, but they were near the CAFL and we really don't know the extent they have already been damaged. This report bases its assumptions on the statistically anticipated behavior a single fatigue detail. However, where we have hundreds of similar details, even this report suggests that the "system reliability" may be substantially lower than for a single detail (page 10).

Overall, the report tends to conclude that as far as fatigue is concerned we probably shouldn't be overly concerned. It tends to predict that if we do see the beginnings of fatigue problems we will probably notice them first at the clips on three members on the main truss, which should be inspected at two-year intervals, or on fin attachments to the floor trusses, which could be inspected at 6-month intervals because they are conveniently located.

I'm ok with continuing to monitor this bridge, since we really haven't had any indication of serious fatigue problems. I tend to think that we should think ahead to the day that we start finding problems and what our response might be.

Comments on the HNTB Proposal:

HNTB suggest a major study to further refine Dexter's analysis model, then identify the members that if they completely failed would cause the bridge to collapse. After which they would then suggest redundant *retrofits to eight of those members.*

I'm not convinced HNTB's proposal for $125,000 (and subsequent retrofit project costs) gives any greater assurance that problems won't develop than Dexter's report currently assures us. Dexter doesn't appear to hint in his report that further study is needed. Moreover, even if we were to retrofit the most vulnerable members, there's no guarantee that cracks won't develop in the members to be left non-redundant.

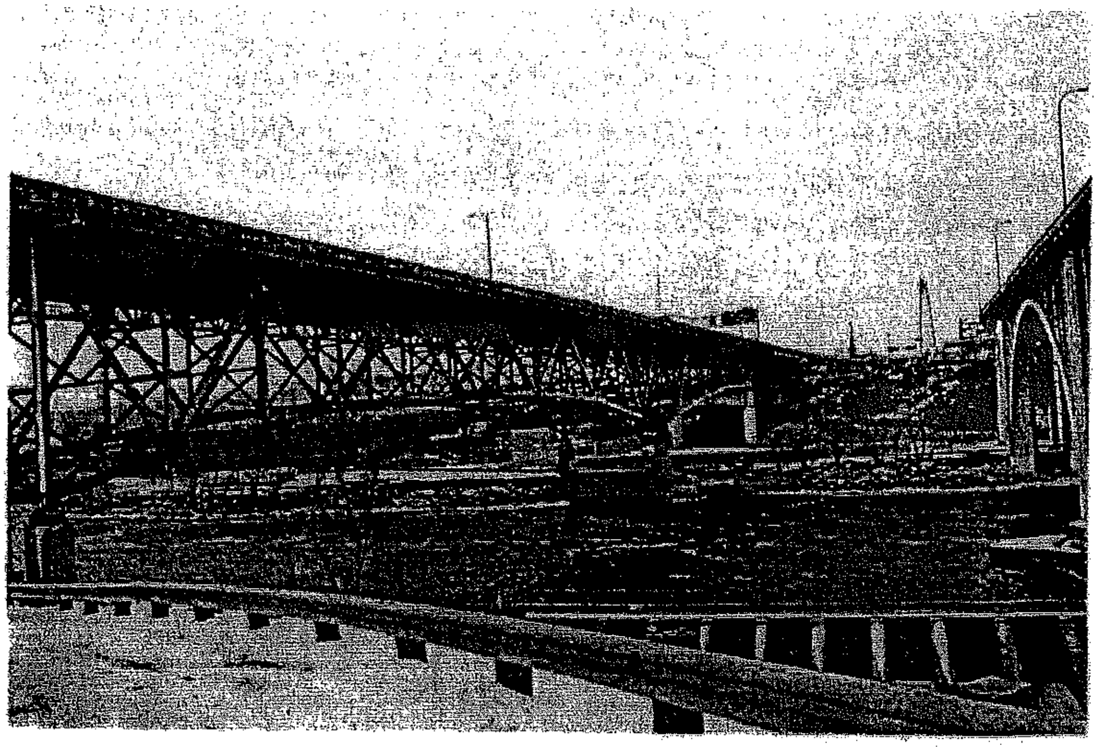
It might be more worthwhile if we ask HNTB to develop an "action plan" and retrofit details to repair various crack types in case they develop in the future.

What's Next?
What course of action does the Bridge Office think is the best course to follow?
Meet with Metro to discuss Dexter report, HNTB proposal, and other options.
Respond to HNTB.

Peterson EXHIBIT 7
DATE 4/2/08
COLLEEN M. SICHKO
COURT REPORTER

PROPOSAL FOR
STRUCTURAL EVALUATION OF BRIDGE NO. 9340
[I-35W OVER THE MISSISSIPPI RIVER]

HNTB OCTOBER 2001



Peterson

Peterson EXHIBIT 8

DATE 4/2/08

COLLEEN M. SICHKO
COURT REPORTER

ATTACHMENT A

PROPOSAL FOR REVIEW OF STRUCTURAL REDUNDANCY
MN/DOT BRIDGE NO. 9340 – I-35W OVER MISSISSIPPI RIVER

October 9, 2001

Mn/DOT has requested a proposal from the HNTB Corporation to evaluate the fatigue of various fracture critical members for Br. No. 9340 over the Mississippi River. This document represents HNTB's understanding of the terms and conditions that Mn/DOT and HNTB mutually concur to regarding the provided services under the pending Agreement. The document is organized as follows:

I. PROJECT BACKGROUND

Bridge No. 9340 (I-35W over the Mississippi River) is a primary link in the transportation network of the Twin Cities metropolitan area. The objective of this project is to identify the main truss members susceptible to fracture and evaluate the structural consequences should one of the members fail. Through this type of evaluation of Bridge 9340, Mn/DOT will be allowed to focus and refine inspection and rehabilitation efforts on those members expected to be critical - with respect to bridge stability.

We reviewed the fracture critical inspection report prepared by Pete Wilson for this bridge. His inspection was conducted between 7/28/97 and 8/4/97. The inspection report describes several bridge components that are not functioning as intended and could impact a realistic analysis of the bridge. These items include:

1) Frozen SE rocker in a cross beam
2) Span #2 joint closed beyond tolerable limits
3) Pinned connections of the sway bracing are "working"
4) Troughs under the finger joints tend to fill up with debris
5) The roller nest bearing at Pier #6 shows no sign of movement

In addition, we have reviewed a vehicular live load fatigue study prepared in 2000 by Robert Dexter. His report contains field test procedures, test results, stress analysis, fatigue life expectancy, as well as inspection recommendations.

II. QUALIFICATIONS

Dr. Steven Olson of HNTB's Minneapolis office will serve as project manager for this project. Dr. Olson has worked on a number of truss bridges or bridges with stiffening trusses (Hell Canyon – Custer, SD; East Street – Parkersburg, WV; U.S. Grant – Portsmouth, OH; Market Street – Steubenville, OH; Steel Bridge – Portland, OR; Kwang An Grand – Pusan, South Korea). While working for a previous firm, Dr. Olson developed software that performs second-order analyses of suspension bridges. This geometrically non-linear analysis is similar to that which will be required to evaluate the global stability of Bridge No. 9340 when members are assumed to fail.

Professor Robert Dexter from the University of Minnesota and Professor Stan Rolfe from the University of Kansas will serve as subconsultants to HNTB for this project. Both are nationally recognized experts on fatigue and fracture. Professor Dexter brings an intimate working knowledge of the bridge as a result of his past experimental studies on the bridge; his services will contribute significantly to the vehicular live load impact on the primary bridge members. Professor Rolfe will add considerable assistance in the development of failure criterion for the members.

Carl Osberg of HNTB will serve as a design engineer for this project. In pursuing his M.S. degree under Dr. Robert Dexter at the University of Minnesota, he conducted fatigue-related analyses of modular bridge joint systems. In addition, Carl has served as a design engineer for numerous structural projects and has considerable experience in non-destructive testing.

The structural assessment of Br. No. 9340 requires sophisticated tools and experience. In addition to a talented staff of professionals in the Minneapolis office, HNTB has the resources of a national firm with more than 2,600 employees. Of specific interest to this project is our group of programmers in the Kansas City office. We have experienced bridge engineers available to develop customized applications, which can streamline and automate the analysis of bridge structures. As a member of the Kansas City programming group, Don Kruse has noteworthy experience in the development of inelastic structural analysis software. HNTB's software is capable of solving models with non-linear material properties and non-linear geometric considerations, both of which will be required for this project. Some of the software that will be utilized throughout this project includes – STAA Pro 2001, Microstation, T187, PCACOL, BDGS, and Microsoft Office.

Resumes for Dr. Olson, Dr. Dexter, Dr. Rolfe, Don Kruse, and Carl Osberg are given in Attachment B as further demonstration of their credentials.

III. SCOPE OF SERVICES

HNTB will evaluate the potential consequences and effect on the structural stability of Br. No. 9340 related to failure of selected main truss members. This evaluation will be completed through investigating previous bridge studies and using survey measurements, numerical analysis and structural modeling of the bridge as described herein. Our project approach is presented with six major work tasks.

1) **Collect bridge traffic data.**

   Mn/DOT will provide traffic history information to aid us in this process. Average Daily Traffic (ADT) numbers, Average Daily Truck Traffic (ADTT) percentages, and permit vehicles records, if available, for the bridge will be assembled to estimate the expended fatigue life of primary truss members.

2) **Assemble and calibrate three-dimensional space frame model of the bridge.**

   Did Dexter do this?

   a. We intend to construct a three-dimensional space frame model of the bridge. The space frame model will permit us to examine bending effects, in an effort to highlight regions where peak stresses would be anticipated. The three-dimensional model also permits us to examine the impact of lateral bracing, sway bracing, and other elements that may not have been considered in the original design of the bridge in the 1960s.

   why? stress is not cyclical.

   b. We intend to attach survey targets to the bridge and observe the thermal displacements of the bridge over a period of time no less than six months. This would permit the movements of the bridge to be collected for a range of temperatures.

   Needed for failure condition

   c. Using the movements collected with the surveys, the local behavior of certain members (collected in Professor Dexter's studies), as well as, addition information noted in past studies and inspections we intend to calibrate the structural model of the bridge. The movement or lack of movement at joints and bearings may have a significant effect on the forces introduced into primary truss members. By adjusting the boundary conditions of the model to approximate the observed behavior, the calibrated model will be used to produce a refined estimate of the remaining fatigue life of the primary truss members. Moreover, the calibrated model will allow evaluation of the bridge stability with various members removed. A number of model adjustments are possible. They include adding spring elements to the supports to represent less than perfect roller conditions, placing compression only elements in joints that tend to fill with debris, etc.

3) **Select the live load vehicles to be considered in the remaining analysis.**

   We will review selected recent literature pertaining to the observed weights of trucks on interstate highways. After reviewing the literature and the live loads specified in various AASHTO documents, we will prepare a document that lists five potential live load configurations that potentially could be applied to the model. Pros and cons for each of the load types will be identified in the document.

After submitting the document to you, we will meet with you to discuss the merits of the different live load configurations and to select three to be carried forward in the evaluation of the bridge. We anticipate that one live load configuration will be used for fatigue evaluation, a second live load will be used for tensile strength evaluation, and the third will be at Mn/DOT's discretion.

4) **Capacity criteria for individual truss members.**

Based on information contained in the construction drawings and material records available for the bridge, tension capacities, compression capacities, and fatigue thresholds of primary truss members will be calculated. The calculated capacities will be used to identify critical members and to evaluate whether or not a member is functioning after removal of another member in the bridge.

5) **Identify Critical Members.**

OK

Using the calibrated three-dimensional model and the selected live loads to be applied to the bridge, eight critical members will be identified. The reason eight critical members have been chosen is two-fold. First, the feasibility of rehabilitation of more than eight members is an expensive and complex process. Secondly, the scope of this project needs to contain set limits on the amount of work to be completed. Four of the eight members will be identified based on fatigue considerations. They will be the members that experience the largest live load stress ranges. The remaining four members will be tension members whose tension capacity is most closely reached when subjected to dead plus live load. We anticipate a second meeting with Mn/DOT at the conclusion of this task to discuss the specific members identified as critical and the survey data/report.

6) **Analysis with members removed.**

OK

After the eight critical members have been identified and Mn/DOT has concurred with the selection of the members, a sequential analysis will be performed using the calibrated three-dimensional model. A total of eight analyses will be performed. For each analysis one of the eight critical members will be removed from the computer model. With only dead load applied to the model, the structure will be evaluated to determine if redistribution of dead load generates member forces that exceed the capacity of the remaining members. If additional members fail the analysis will be stopped. On the other hand, if there is additional capacity in the bridge, live load intensities will be increased until a second member fails. A summary document will be prepared which describes the impact of removing each of the eight critical members.

IV. DELIVERABLE PRODUCTS

HNTB will provide to Mn/DOT the following deliverables/products as instruments of service associated with the scope of services described herein:

- Report of Findings - Observed Thermal Movements of the Bridge – 2 black and white copies
- Live Load Configurations for Consideration for the Structural Evaluation of Bridge No. 9340 – 2 black and white copies
- Identification of Eight Critical Primary Truss Members – 2 black and white copies
- Report of Findings – Structural Evaluation of Bridge No. 9340 – 2 black and white copies
- Bound and indexed structural assessment calculations – one copy.

V. SERVICES EXCLUDED FROM WORK SCOPE

- **Verification of Structural Members**: HNTB will not be responsible for comparison of the actual structural members to those depicted on the construction drawings. HNTB will use the members as described within the construction drawings.
- **Bridge Inspection and Condition Survey**: HNTB will not be responsible for inspection of the bridge as a whole or in part, or for inspection of individual structural members and elements of the bridge. No attempt will be made to determine the location, or extent of corrosion, misalignment, or condition of structural members or their connections. HNTB will not be responsible for destructive, or non-destructive testing of the bridge elements or the bridge materials.
- **Dimension Survey:** HNTB will not be responsible for determination of the overall geometry of the structure as it relates to settlement, differential settlement, or out-of-plumb conditions of the substructure units.
- **Deck/Substructure/Foundation Evaluation:** HNTB will not be responsible for assessment of the bridge deck, substructure units or foundation elements of the bridge. HNTB will base its analysis and computer models on construction drawings with the assumption that the bridge deck, substructure units and foundations were constructed as shown on the construction drawings; no significant scour has occurred; and, the substructure and foundations are performing as intended by the designer.
- **Load Rating:** HNTB will not be responsible for determination of the bridge's load rating.
- **Remedial Measures:** HNTB will not responsible for evaluating the options available to address deficiencies determined during the course of the structural stability assessment described herein.
- **Cost Estimates:** HNTB will not be responsible for estimating the initial cost of repairs or other remedial measures as occasioned by the findings of the services described herein.

VI. SERVICES TO BE PROVIDED BY MN/DOT

HNTB and Mn/DOT mutually agree that Mn/DOT will provide services or products associated with the project as described with Section VI.

1. Participate in project meetings.
2. Review and comment on HNTB submittals in a timely manner.
3. Grant HNTB the right to access Mn/DOT facilities (Br. No. 9340) and adjacent property as needed to survey the movement of the bridge.
4. Provide two sets of 8 ½ x 11 photocopies of all construction documentation, such as: pile driving records, material records, shop drawings, and construction observation reports.
5. Provide two copies of all maintenance reports for the existing bridge.
6. Provide two sets of 11x17 construction drawings for the existing bridge.
7. Provide use of a snooper truck to gain access to the bridge for purposes of placement of survey targets if climbing methods cannot be used to place survey targets.

VII. SCHEDULE

Our anticipated work schedule is shown in the Gantt Chart of Attachment D. HNTB will commence work within 30 calendar days of notice-to-proceed and provide services in accordance with the following schedule:

- Capture Global Behavior of the Bridge within 175 business days of notice to proceed.
- Develop 3-D computer model with frame members within 40 business days of notice to proceed.
- Calibrate the 3-D computer model within 190 business days of notice to proceed.
- Select live loads to be used within 100 business days of notice to proceed.
- Develop failure criteria within 140 business days of notice to proceed.
- Identify selected critical members within 200 business days of notice to proceed.
- Perform failure analysis within 235 business days of notice to proceed.
- Deliver final report of findings within 260 business days of notice to proceed.

VIII. COMPENSATION

Our estimated cost for this project is $126,135. We propose a lump sum agreement for our services. A detailed breakdown of our estimated costs is provided in the spreadsheet table of Attachment C.

IX. QUALITY ASSURANCE / QUALITY CONTROL

Checks for quality are incorporated into the fabric of HNTB's standard work practices. Structured checking procedures are in place for personnel in all classifications, from CAD technicians to project managers. In addition, project managers are required to hold monthly progress meetings, which internally address questions about his or her project's progress, budget, schedule, and client satisfaction.

How will quality be defined for the evaluation of Bridge No. 9340? We perceive the quality parameters require a structural evaluation that:

- Is technically sound. To ensure that this quality measure is met, we've added nationally recognized experts to our team to guide and review our efforts.
- Uses state-of-the-art analytical tools. Our T187 program has the ability to model and analyze non-linear material and geometric behavior. In addition, our programmers in Kansas City can tailor the program for specific projects.
- Is presented in documents that are easy to read, understand, and follow. Our document figures will be completed in Microstation, so they are compatible with Mn/DOT practices.
- Is thoroughly checked by experienced engineers. Because of its sensitive nature, work products for this project will be checked by bridge engineers with more than 10 years of experience.
- Is within budget and on time. The schedule and compensation attachments are realistic and well defined.

If desired, additional information can be provided to Mn/DOT describing HNTB's standard QA/QC plans and policies, which are used for each HNTB project.

Peterson EXHIBIT 9
DATE 4/2/08
COLLEEN M. SICHKO
COURT REPORTER

11/8/01

* 1) What is need for thermal movement work?

2) Will retrofit details be developed for any critical locations?

* 3) Do we need load tests? – No

Outcome: Need retrofit/response details for an emergency situation.

* If cracks develop how do we retrofit?

* What do we do with results?

What is our decision tree after the study?

Rich, Steve Olson, Dexter

meet with

Gary, Kevin, Paul K

* Gary Identify members that ~~are fracture~~ critical & most susceptible to fatigue cracking & fracture critical and develop retrofit details

From: Sharon Hunt
To: Bridge Conf Rm 1st Floor; Dorgan, Daniel; Kivisto, Paul; Peterson, Gary; Western, Kevin
Date: 11/28/01
Time: 1:00PM - 2:30PM
Subject: Discussion of Possible Additional Fatigue Investigation Work on Br 9340
Place: Bridge Conf Rm 1st Floor

Meeting with Rich Johnson from HNTB and Bob Dexter fromr the U of M. + Steve Olson.

CC: Zerwas, Lisa

Discussed with Group.

Decided to meet with Metro to discuss their longterm plan for 35W to see If what type of investment is req'd in the replace bridge.

Study would be:

Stage 1
- model bridge
- Temp modeling via survey targets
- Identify critical members and response with members removed.

Stage 2
- Develop retrofit details for critical members
or . . . scheme for entire arch as additional arches.

Peterson EXHIBIT 10
DATE 4/2/08
COLLEEN M. SICHK
COURT REPORTER

From Rich Johnson

Discussion Points
I-35W over Mississippi River Bridge

November 28, 2001

I. Prof. Dexter's Work – August 2000

- Measured stress range is less than calculated stress range.
- Fatigue cracking is not anticipated during the remaining life of the bridge.
- If problems develop, they will likely develop in the floor trusses first.
- Failure of a floor truss will likely not result in a catastrophic event.

II. HNTB Proposal – October 2001

- Develop and calibrate structural model of bridge.
- Identify those members with the highest potential for fatigue problems.
- Analyze failure mechanism(s).
- Intended to provide background for additional discussions.

III. Future Consideration

- Does Mn/DOT wish to buy insurance (remedial measures)?
- Is it feasible/desirable to make the bridge redundant?
- Is it feasible/desirable to plan for bridge replacement?
  - Allow for Longitudinally staged construction.
  - Re-use of members for next generation bridge.
- Determine alternative remedial measures.
- If remedial work is warranted, consider:
  - Short-range fix, < 5 years
  - Mid-range fix, 5 to 15 years
  - Long-range fix, > 15 years (ideally applicable to bridge replacement)

IV. November, 2001 Mn/DOT Questions

- Why measure for thermal movement?
- Are retrofit details included in our present scope?
- Are additional load tests needed?
- On a big picture scale - what are we doing, and why are we doing it?

V. Liability Issues

- Is there an inordinate amount of risk associated with this work?

Peterson EXHIBIT 11
DATE 4/2/08
COLLEEN M. SICHKO
COURT REPORTER

ArchiveManager

From: Jackie Fredrick **Sent:** Mon, 03 Dec 2001 07:44:45 GMT

To: Conf Rm Waters Edge 148; Thomas OKeefe; Daniel Dorgan; John Griffith; Jack Pirkl; Gary Peterson; Paul Kivisto; Mark Pribula;

CC:

Subject: Br. 9340 35W/Mississippi River in downtown Mpls.

Start Date: 12/14/2001 1:00 PM
End Date: 12/14/2001 2:30 PM
Place: Conf Rm Waters Edge 148
Duration: 1 hour 30 minutes

Discuss future plans for the bridge and corridor to assess the value of investing in further study of Bridge 9340 fatigue issues. HNTB with Dr. Dexter from U of M have discussed a proposal to develop a fatigue "action plan" to identify likely areas for fracture and develop possible retrofit details for immediate use in the event of discovery of fatigue cracks.

Dorgan EXHIBIT 8
DATE 4/22/08
COLLEEN M. SICHKO
COURT REPORTER

12/14/01

Meeting at
WatersEdge

Br 9340 35W/Miss

Met with: Tom OKeefe, John Griffith, Jack Pirkl,
Mark Pribula, Paul Kivisto, Gary Peterson

Discussed Dexter report plus HNTB proposal for added ~~[illegible]~~ study.

- ~~9340~~ 35W Corridor is in Metro TSP for "after 2016" for expansion.
  Current 3 lanes + aux lane ⇒ want to add a lane
  Expansion would include 3rd street interchange at Industry Sq area which Minneapolis wants to redo.
- 9340 replacement would likely be 2016-2020 as part of expansion.
- discussed difficulty maintaining traffic unless we 1st build on each side of 9340.
- Overlay of 9340 will be needed about 2010.

Based on above, and doubtfulness expansion will occur on schedule, decided to proceed with study HNTB/Dexter proposed.

Peterson EXHIBIT 12
DATE 4/2/08
COLLEEN M. SICHKO
COURT REPORTER

File
Bridge 9340

From: Gary Peterson
To: Daniel Dorgan
Date: 11/7/2006 5:19:11 PM
Subject: Fwd: Fw: RFP for a monitoring system

Dan, I did review this briefly and discussed with Kevin.
① First URS needs to address if the bolted fix is less risky than doing nothing. We still have some questions about if drilling all those holes in the truss box members and terminating the plates at the gusset won't somehow make things worse. If they respond that plating will do no harm and they continue to recommend within the report we should do the plating now, I tend to think we should do the plating and have them prepare plans and specs. It settles things and gives us the greatest security.

② If we go to the monitoring plan, we do not follow their recommendation, and we take on a lot of responsibility and cost for monitoring the bridge for the next 15 - 20 years.

③ If they no longer feel that the bolted repairs should be done, and may add risk to the bridge, then I would agree a monitoring system may be the next best belt and suspenders, recognizing their analysis shows the chance of failure is remote, but the consequence could be high.

\>>> <Don_Flemming@urscorp.com> 11/7/2006 12:01 PM >>>

Dan,as we discussed today, Ed and I have been discussing the feasibility of placing a monitoring system on Bridge 9340 to detect any crack on the critical members that may occur. The idea would be to possibly place a monitoring system in lieu of adding the plates. Ed advised that he feels a level of confidence in some of the acoustic systems.

As we discussed we need to modify the RFP approach as shown in Ed's e-mail to be a less formal approach where we just contact selected vendors and get two or three of the most promising systems identified with a system definition and cost.

Please advised with any further concerns and we will wait to here back from you before making any contacts with vendors. We would be happy to advise as to which vendors we would contact prior to any contacts being made if you would prefer that approach.

Thank you for your assistance.

Don

11/14/06
Discussed with DJF Don & Ed by phone. Still confident in plating retrofit. Therefore, decided they do not need to pursue monitoring. Δ and Gary want the certainty of a reinforced member rather than relying on monitoring.
DJD.

----- Forwarded by Don Flemming/Minneapolis/URSCorp on 11/07/2006 11:35 AM

Dorgan EXHIBIT 10
DATE 4/22/08
COLLEEN M. SICHKO
COURT REPORTER

ArchiveManager

From: Gary Peterson **Sent:** Wed, 10 Jan 2007 15:43:07 GMT

To: Gary Peterson; Kevin Western; Bridge Conf Rm 1st Floor; Todd Niemann;

CC: Paul Kivisto; Daniel Dorgan;

Subject: Bridge 9340 plating contract scope of work

Fw: Retrofit Recommendations (0Kb)

Start Date: 1/11/2007 9:00 AM
End Date: 1/11/2007 9:30 AM
Place: Bridge Conf Rm 1st Floor
Duration: 30 minutes

The Agenda will be first to go over Todds comments (see below) and second to make a recommendation on how the scope of work should be developed for the URS design SA, and subsequent use of NDT to limit proposed additional planting. I've scheduled it for 1/2 hr, but if we run over we can extend 1/2 hour according to your schedules.

As we've discussed, Don has stated in a letter (attached) that some additional areas of plating may need to be added to the recommendations of the URS report. The areas originally recommended were typically the highest fatigue areas (none really meet the fatigue susceptible category), but overall stress in the members was low. Fatigue is the mechanism that would cause existing cracks to grow.

They recently added the more highly stressed members that had very low fatigue stresses which are far below the stress levels needed to support crack growth. Without a mechanism for crack growth, he suggests its possible to eliminate these from the plating contract if a thorough NDT inspection determines flaws that could generate cracks are not present.

He suggests that a similar inspection on the more fatigue prone members (again, none really meet the fatigue susceptible category) might eliminate the need to plate those members.

Don needs to know from us if he should include the cost to design and detail these additional High stress, minor fatigue members in his RFP for this project.

I would initially recommend he does ad them as an extra that we can eliminate, and that we assist metro to do thorough NDT inspections of those newly identified members this spring.

odd Niemann 12/27/06 3:44 PM >>>
Gary,

I have read this report and am available to discuss at your convenience.

I have several comments/questions based on this report (I realize I just have the exectutive summary and it is not intended to be overly detailed).

#1 - Have the details been determined to be a certain Catagory (D or E). This report is not clear.
#2 - The reports discusses the protential for brittle fracture for which the basis is plate size. This is a gross generallity that is inappropriate for a technical report of this importance.
#3 - The material properties of the steel with determine ductile vs brittle behavior. No mention is made.
#4 - The statement: "the dimensions fo preexisting cracks need to be quite large in order to propagate under the traffic load and grow to critical size to induce a brittle fracture of the truss chord web plate." Again, assuming brittle fracture is inappropriate and the preexisting crack size is not identified.
#5 - Assuming the previous statement is true, a "quite large preexisting crack" is very detectable by current inspection frequencies and techniques. NDT could be added to provide reassurance that cracks are not initiating and propagating.
#6 - NDT is highly capable of finding small defects in plate. We currently scan the underside of flanges plate to look for defects in cover plates welded to the topside of top flanges. This would be very similar technique to scan the outside face of a web plate looking for detects associated with internal connections.
#7 - The report later identifies that the dimensions of preexisting surface cracks need to be at least 1/4 of the web plate in order to grow and subsequently cause member fracture. Is this just the depth of the defect. What about the width? Is it 1/4 depth for entire width of the plate. A defect of this size (1/4 fo web plate) would seem to be highly detectable with visual observation. NDT can be used to further substantiate this condition does not exist with high degree of reliabilitly.
#8 - If accessable, UIT could also be employeed as a technique to improve the fatique catagory and completely rule out the probabilty of crack initation or propagation at these stress levels.

These are just my initial thoughts for your consideration/deliberation. As I have not been involved with this study or any of the past analysis of this structure I am not completely familiar with it. I have also never been under this bridge or involved with an inspection. What I know is mostly a combination of pieces from past office discussions, etc. No need to respond back to this list. We can get together and discuss if I can be of further assistance with this project.

Dorgan EXHIBIT 11
DATE 4/22/08
COLLEEN M. SICHKO
COURT REPORTER

>>> Gary Peterson 12/21/2006 4:48 PM >>>
Todd, read the report. Is it feasable to do UT on these 52 members with confidence that we detect existing flaws. I think we are looking primarily at the tab plate diaphragm connection detail within the box.

>>> "DFlemming" <dflemming@iphouse.com> 12/19/2006 11:19 AM >>>
Gary attached is the recommendation from Ed Zhou regarding the number of members to plate. As you can see from Ed's discussion it all depends on how conservative we want to be with the plating in regard to how many members we plate. I had mentioned in our meeting on December 4th that I thought it would be 40 members and Ed's most conservative number is 52. This difference is mainly my not including the corresponding chord member on the opposing side of a zero force member.

I would be happy to discuss at any time and my goal is that URS and Mn/DOT would reach consensus on the appropriate repair.

Don
----- Original Message -----
From: <Ed_Zhou@URSCorp.com>
To: "DFlemming" <dflemming@ipHouse.com>
Cc: <Don_Flemming@URSCorp.com>; <Brett_McElwain@URSCorp.com>; <David_Long@URSCorp.com>
Sent: Monday, December 18, 2006 10:47 AM
Subject: Retrofit Recommendations

> Don,
>
> Per our discussions last week, here is the revised retrofit
> recommendations
> where we provide three options for them to pick from.
>
> Ed
>
> (See attached file: Member Retrofit Recommendations.doc)
>
>
> This e-mail and any attachments are confidential. If you receive this
> message in error or are not the intended recipient, you should not retain,
> distribute, disclose or use any of this information and you should destroy
> the e-mail and any attachments or copies.
>
>
>
>

From: Gary Peterson
To: Bridge Conf Rm 1st Floor; Daniel Dorgan; Kevin Western; Todd Niemann
Date: 1/17/2007
Time: 8:30:00 AM - 9:30:00 AM
Subject: 9340 plating scope
Place: Bridge Conf Rm 1st Floor

Dorgan EXHIBIT 12
DATE 4/22/08
COLLEEN M. SICHKO
COURT REPORTER

Don has confirmed he will be here for an 8:30 Am meeting.

I will be unable to attend. The plan is to have Don come here and to call Ed on conference

Ed - recently did a more detailed review of fatigue, using fracture mechanics. Expect they are Category D however some could be "E" due to mfg weld defect or other defects, undercut.

Plating - as long as holes clean after drilling, should not introduce defect.

Defect needs to be 1/4 to 1/3 plate thickness, before crack would propagate under these low stresses.

3 diaphragms each member, 8 tabs per diaphragm only 6 are welded. also look at tack welds.

Decisions:

Do NDE (Evaluation) of South Span where access over parking lot ASAP in 2007. If confident of visual +

(over)

ultrasonic testing, proceed with main & north span.
If not confident, go with plating repair.

URS - extend contract for time,
plus Ed Zhu support during NDE,
plus plating work (to be deleted
if not used).

GARY'S EDIT FROM PETE'S DRAFT

Minnesota Department of Transportation
In-Depth Fracture Critical Bridge Inspection

Quality Assurance of Inspections Performed by Mn/DOT Districts

This outlines the process Mn/DOT's Office of Bridges and Structures (OBS) will use to assure that the quality of in-depth fracture critical bridge inspections performed by Mn/DOT Districts meets minimum standards.

Fracture Critical Inspection Teams in District 6 (Rochester) perform "in-depth" fracture critical bridge inspections on all bridges (district and local jurisdiction) within their district. Similar teams in Metro Division perform "in-depth" fracture critical bridge inspections on all Metro District bridges. OBS performs all other fracture critical inspections for District and Local Agency bridges.

Fracture Critical Definition: Technical Memorandum XXXX dated XXXX provided guidelines for In-Depth Inspection of Fracture Critical Bridges. A fracture critical bridge has at least one fracture critical tension member or member component, whose failure would be expected to result in collapse of the bridge. Districts work with the OBS to identify the fracture critical bridges or components of bridges.

Inspection Frequency & Scheduling: The OBS determines the frequency of inspections (typically 4 or 5 year intervals), and tracks when inspections are due and when they are completed. At the beginning of each inspection cycle, the OBS will notify Fractured Critical Inspection Teams which bridges are due for Fracture Critical inspections. Metro and District 6 are responsible for the inspection scheduling and planning.

Qualifications of Inspectors: The Office of Bridges & Structures is responsible for reviewing the inspector's qualifications. The lead inspector must be certified (by Mn/DOT) as a Level 2 bridge inspector, or must be a registered engineer. Completion of the FHWA training class "Inspection of Fracture Critical Bridge Members" is required.

Bridge Office Participation in Inspections: The Office of Bridges & Structures will annually assess the quality of inspections by participating in one or more inspections conducted by Metro and by District 6. Metro and District 6 Fracture Critical inspection teams shall notify OBS of their inspection schedule and the dates which they request OBS assistance to inspect major structures, or on bridges with significant deterioration.

Inspection Reports: Within 6 months of each FC inspection the Fracture Critical Inspection Team shall submit a detailed written report of the inspection to the OBS. The format of the report shall be similar to reports developed by the OBS. The OBS Bridge Inspections Engineer and Area Construction Engineer shall review the report. Within 30 days of its receipt, the OBS Bridge Inspections Engineer forward written comments as necessary to the Fracture Critical Inspection Team regarding the quality of the inspection

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report or its conclusions. The OBS Bridge Inspections Engineer and Area Construction Engineer shall date and initial the file copy of the report upon conclusion of their reviews.

"Critical" Findings: A critical finding for the purposes of Fracture Critical Inspections shall be defined as any condition that in the judgment of the Fracture Critical Inspection Team may, if not corrected in a timely manner, cause the failure of all or part of the bridge. Critical findings shall be reported immediately to the Metro or District Inspections Engineer and to the OBS Bridge Inspections Engineer or Regional Bridge Construction Engineer. The OBS will confer with appropriate Metro or District 6 staff to develop short and long term strategies to address the critical finding.

Pete's
ORIGINAL
DRAFT

Minnesota Department of Transportation
"In-Depth" Fracture Critical Bridge Inspection Program
Quality Assurance of Inspections Performed by Mn/DOT Districts

Definition: This policy outlines Mn/DOT's policy regarding "in-depth" fracture critical bridge inspections performed by Mn/DOT Districts (as opposed to those performed by the Office of Bridges & Structures).

Currently, District 6 (Rochester) performs "in-depth" fracture critical bridge inspections on all bridges (district and local jurisdiction) within their district, and the Metro Division performs "in-depth" fracture critical bridge inspections on all Metro District bridges.

Fracture Critical Definition: The Office of Bridges & Structures defines which bridges are designated as "fracture critical" (refer to technical memorandum).

Inspection Frequency & Scheduling: The Office of Bridges & Structures determines the frequency of inspections (typically 4 or 5 year intervals), and keeps a lo~~n~~g on when inspections are completed. The District is responsible for the inspection scheduling and planning, but must submit the schedule to the Bridge Office.

Qualifications of Inspectors: The Office of Bridges & Structures is responsible for reviewing the inspector's qualifications. As with routine annual inspections, the lead inspector must be certified (by Mn/DOT) as a Level 2 bridge inspector (or a registered engineer). Completion of the FHWA training class "Inspection of Fracture Critical Bridge Members" is encouraged.

Bridge Office Participation in Inspections: The Office of Bridges & Structures will participate in some inspections (as determined by the Bridge Office). This will typically be on major structures, or on bridges with significant deterioration. The Bridge Office will provide inspection (or NDT) assistance whenever requested by the Districts.

Inspection Reports: The District performing the inspections shall submit a detailed written report of the inspection (independent of the PONTIS report) to the Office of Bridges & Structures.

"Critical" Findings: Any "critical" findings observed during the inspection will be reported immediately to the Bridge Office.

Bridge Office Review of Inspection Reports: The Office of Bridges & Structures will review all "in-depth" fracture critical inspection reports.

Todd —

See my Email.

Get Comments back ASAP.

thanks

Minnesota Department of Transportation
Program Support Division
Technical Memorandum No. 02-XX-B-XX
July 30, 2002

To: Distribution 57, 612, 618, 650

From: Douglas J. Weiszhaar
Assistant Commissioner, Chief Engineer

Subject: Guidelines for In-Depth Inspection of Fracture Critical Bridges and Underwater Inspections

Expiration

This Technical Memorandum supersedes Technical Memorandum No. 96-03-B-01 and will expire September 1, 2006 unless superseded prior to that date.

Purpose

The In-Depth Fracture Critical and Underwater Bridge Inspection Program is a joint effort of the Office of Bridges and Structures (OBS), the District Offices, and local government agencies. The purpose of this program is to ensure the safety of fracture critical bridges in accordance with Minnesota Statutes 165 and Minnesota Rule 8810, as well as complying with federal regulations and guidelines which require appropriate inspection of bridge members which are fracture critical (23 CRF 650.303).

Definition

A Fracture Critical (FC) Bridge has at least one fracture critical member or member component. Fracture critical members or member components (FCM's) are steel tension members or steel tension components of members whose failure would be expected to result in collapse of the bridge (Ref: AASHTO Manual for Maintenance Inspection of Bridges – 1994). An FCM lacks redundancy if; it fails and there is no other member supporting a major part of the bridge. Bridges, which require underwater inspection, have members that cannot be visually evaluated during periods of low flow or examined by feel for condition, integrity and safe load capacity due to excessive water depth of turbidity.

General Guidelines for In-Depth Fracture Critical Inspection

Inspection under these guidelines will apply to all bridges that have members determined to be fracture critical. There are currently about 500 bridges designated as FC carrying public highway traffic in Minnesota. The frequency of in-depth inspection of each FCM will be based upon the criticality and condition of the member. The maximum interval between in-depth inspections will be five (5) years.

-MORE-

State Trunk Highway bridges will be scheduled on a four (4) year plan and Local System bridges will be scheduled on a five (5) year plan.

The Office of Bridges and Structures will, for all FC bridges, monitor the In-Depth Inspection Program, maintain information files on the bridges, and assure the quality of 3rd party or district inspections in accordance with the attached Quality Assurance Plan. The OBS will maintain a list of the following for those bridges which contain FCM's and those which contain unique or special features requiring additional attention during inspection to ensure the safety of such bridges (e.g. pin and hanger details and steel pier caps).

- Location and description of such members for each bridge.
- In-depth Inspection frequency.
- Inspection procedure(s).
- Date of the last inspection.
- Description of inspection findings.
- Description of any follow-up action resulting from the most recent inspection.

In-depth FC inspections are the responsibility of the Office of Bridges and Structures. The OBS will delegate these inspections, if requested by the District. Currently, the OBS will conduct these inspections in Districts 1, 2, 3, 4, 7, and 8. Districts 6 and Metro will conduct these inspections in their District. Scheduling priority for inspections will be given to large and complex bridges. For inspections conducted by the District, the OBS will offer planning assistance as well as on-site inspection assistance. Traffic control and access equipment (snooper, man-lift, etc.) remain the District's responsibility regardless of participation by the OBS.

The OBS will provide a wide range of services to the Districts in support of in-depth FC inspections, including: identification of FCM's, training, on-site inspections, and non-destructive testing (NDT). Training provided to the Districts will include inspection procedures for FCM's, procedures for basic NDT methods, and identification of FC bridges, FCM's and critical details.

-MORE-

Inspector Qualifications

In-depth FC inspections shall be conducted under the direct supervision of individuals which have been certified as, either, Mn/DOT Level II or E Bridge Inspectors. Only qualified American Society for Non-Destructive Testing (ASNT) Level II or III technician shall conduct NDT services, by Ultrasonic methods.

Inspection Procedures and Reporting

In-depth inspections shall be conducted using under-bridge inspection units (snoopers), man-lifts, boats, ladders or any means necessary to visually inspect all FC members from a distance not to exceed 600 mm **(24 inches)**.

Field inspections should be conducted in a systematic and organized manner that will be efficient and minimize the possibility of any bridge item being overlooked. All inspections shall be conducted following appropriate Mn/DOT safety guidelines for both the employee and the public. Critical findings shall be reported immediately to the OBS Bridge Inspection Engineer and/or Bridge Construction and Maintenance Engineer. Detailed and narrative reports including sketches and photographs shall be provided to the OBS upon completion of the inspection. Reports shall include such items as: identification of FCM's, description of areas visually inspected, description of areas NDT inspected, amount of corrosion and associated field measurements of loss of section, description of fatigue prone areas, length and extent of cracking present, and extent of external damage due to impact or external factors.

Guidelines for Underwater Inspection

National Bridge Inspection Standards require inspection of all bridges as needed to determine the condition of the underwater portion of the substructures with certainty. Minnesota defines a bridge as needing underwater inspection when: "the water depth is such that the underwater portions of a substructure cannot routinely be inspected using waders." Underwater inspections shall be both visual and a tactile inspection of the entire underwater portion of the substructure. Inspections shall include checking all concrete for erosion, wear, abrasion, scaling, spalling, exposure, and deterioration, and for any exposed reinforcing steel and all cracking. All exposed structural steel and piling shall be checked for misalignment and loss of section. All timber shall be sounded and checked for presence of bores, decay, and weathering. Channel bottom shall also be inspected for presence, size, and condition of riprap. The Office of Bridges and Structures will, for all Trunk Highway bridges, monitor and conduct the Underwater inspection program and maintain information files on the bridges.

-MORE-

Questions
Any questions regarding the content of this Technical Memorandum should be directed to Todd L. Niemann, Structural Metals and Bridge Inspection Engineer, Office of Bridges and Structures, MS 610, (651) 747 – 2132.

Any questions regarding the publication of this Technical Memorandum should be directed to Mohammad Dehdashti, Design Standards Engineer at (651) 296-4859 or Jennifer Abernathy, Design Services Administrative Assistant at (651) 296-2381.

Attachment:
Quality Assurance Plan-Mn/DOT Fracture Critical Bridge Inspection Program

-END-

STATE OF MINNESOTA

SF-00008-05

OFFICE INFORMATION MEMO

DATE 5/9

TIME

TO BOB

LOCATION

FROM SCOTT PIERSON

LOCATION

PHONE NO ( )

MESSAGE TAKEN BY

☐ Called
☐ Urgent

☐ Please call
☐ Will call again

☐ Was here to see you
☐ Returned your call

ACTION

☐ As we discussed
☐ As you requested
☐ Review and see me
☐ Review and return

☒ For your information
☐ For your approval
☐ For signature
☐ Notify staff

☐ Per voice mail
☐ Take appropriate action
☐ Prepare reply for my sig.
☐ Reply and send me copy
☐ File ☐ Dispose

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☐ One side only
☐ Head to head
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☐ Collate
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TYPING

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Date needed

☐ Rough draft
☐ Single space
☐ Double space
☐ Rush

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REMARKS/MESSAGES

☐ Over

Peterson

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COURT REPORTER

URS

April 18, 2005

Mr. Scott Pierson
Mn Department of Transportation
3485 Hadley Avenue North, MS 610
Oakdale, MN 55128

RE: Bridge No. 9340 Progress Meeting

Dear Scott,

Attached are the minutes from the fourth progress meeting for the fatigue study for Bridge No. 9340. Also two CD's are attached containing the power point presentation made at the fourth progress meeting.

If you have any concerns, questions regarding the meeting minutes, please advise.

Sincerely,

Donald J. Flemming

Donald J. Flemming
URS Project Manager

DJF/da

Enclosures

Thresher Square • 700 Third Street South • Suite 600 • Minneapolis, MN 55415 • Phone: (612) 370-0700 • Fax: (612) 370-1378

URS

Meeting Minutes

Thresher Square
700 Third Street South
Minneapolis, MN 55415
Phone: (612) 370-0700
Fax: (612) 370-1378

Meeting: **Evaluation of Bridge 9340 – Progress Meeting 4**

Meeting Attendees: **MnDOT** – Dan Dorgan, Gary Peterson, Nancy Daubenberger, Paul Kivisto, Scott Pierson
URS – Ed Zhou, Don Flemming, Brett McElwain, David Long

From: David D. Long

Meeting Date: March 31, 2005
Location: MnDOT Oakdale
Time: 9:00-12:00 PM

Minute Issue Date: April 18, 2005
Revised Issue Date:

Discussion Items:

1. The Power Point presentation was viewed and topics were discussed with questions answered as they occurred. This presentation will serve as the fourth project progress report.
2. The five live load cases for the redundancy analysis that had been decided in a series of emails were briefly discussed. Ed Zhou mentioned that they were included in the presentation.
3. Ed Zhou presented an answer to the question that was raised in the last progress meeting regarding the localized effect and the overall number of floor trusses involved as the consequence of the failure of main truss members. It was discovered that some of the floor truss members are overstressed as a result of dead load alone. The overstress is a result of the out-of-plane bending of the floor truss top chord. The non-symmetric connection of the stringers with a fixed bearing at one side and an expansion bearing at the other side of the deck joints causes the member to rotate and deflect toward the fixed side of the deck joint, where the stringers are rigidly connected to the floor truss top chord. It was his opinion that the original design of the bridge probably did not take this effect into account.
4. There was a discussion regarding the dynamic impact factor of 1.854, due to the sudden failure of a truss member. It was determined that the actual failure

may be somewhere between sudden and slow. Previous input from Robert Dexter indicated that if a crack propagated until it reached approximately 2" in length, that a brittle fracture would most likely occur in 24 hours. Presenting the data with a dynamic impact factor at both 1.0 and 1.854 was determined to adequately cover the range of expected failures.

5. The question was asked about how compressive failures of the bottom chord would be affected by composite action of the slab. Ed Zhou will be studying this condition.
6. Retrofitted members should take the full DL and LL in case of complete member failure.
7. URS was directed to use a 3'-0" seal/stitch bolt spacing for the retrofit plates. This spacing is in excess of the requirements of AASHTO 10.24.6. MnDOT may choose to decrease the bolt spacing in the future.
8. Gary Peterson raised the question about failures that may occur at locations other than at the interior diaphragm, specifically at tack weld locations. URS will contact Mark Pribula. and review the photograph records to determine if tack welds exist at the member to gusset plate locations.
9. Post-tensioning by use of FRP straps was discussed. It was determined that this option was not feasible due to the number of straps required.
10. Post-tensioning by the use of Dywidag bars was also discussed. It may prove that it is not feasible to use Dywidag bars due to the high number required. URS will look further into the use of post-tensioning bars instead of the plates. URS will also develop conceptual plans for the anchorage requirements of a PT bar.
11. URS was directed to use 100 ksi steel in the development of the plate retrofit plans. We can contact Todd Nieman or Tom Merritt to determine the availability of plates with this yield strength.
12. URS will consider bolting and plating requirements for both the design load and the actual member load and prepare a comparison of the two methods.
13. The deck pouring sequence was discussed. MnDOT's preference is to consider a full 9" depth deck to save on construction time. The possible advantage of using a precast concrete deck was discussed. MnDOT's preference is to use CIP concrete and avoid the use of "experimental" deck systems on a bridge with such a high ADT. URS will also review the advantages of utilizing a composite slab on the truss system. MnDOT may consider the use of a stay-in-place form for the slab on this bridge
14. URS will also study the possibility of using a non-symmetric deck pouring sequence to determine if this is feasible.
15. Stay-in-Place forms were used for the median reconstruction. MnDOT indicated that the form was continuos between the beams, but there was a joint in the deck and barrier.
16. The next progress meeting was discussed. It was agreed to meet in approximately 3 months. URS will prepare a draft report for MnDOT's review and comment prior to the meeting.

URS - Action Items:

1. Determine the magnitude of the expected lateral member displacement of the "failed" floor truss top chord members.
2. Review photographs and contact Mark Pribula, about the potential for fabrication tack welds at the truss member to gusset plate connection.
3. Revise plate retrofit calculations to use 100 ksi steel. Contact Todd Nieman or Tom Merritt about the availability of 100 ksi plate steel.
4. Determine plating and bolting requirements for both the design load and the actual member load and compare the results in a table.
5. Review the advantages of using a composite deck.
6. Review both symmetric and non-symmetric deck pouring sequences.
7. Develop conceptual requirement of using PT bar instead of plates and determine possible anchorage requirements.
8. Study the impact on the structural system of making both the deck and stringers continuous.

MnDOT – Action Items:

1. None noted

Next Meeting: To Be Determined: Tentatively scheduled for end of June 2005. Scott Pierson, Ed Zhou and Don Flemming to coordinate the exact meeting time.

David Long prepared these meeting minutes. If there are any corrections to these minutes, please contact David at 612.373.6394 or email at david_long@urscorp.com.

Minnesota Department of Transportation

Metropolitan District – Waters Edge
Jerome Adams, P.E.
Design
1500 West County Road B2
Roseville, MN 55113

Office: 651-582-1320
Fax: 651-634-2162
E-mail: jerome.adams@dot.state.mn.us

MEETING MINUTES

April 3, 2006
10 AM to 11 AM
Mn/DOT Waters Edge, Conference Room 148
Subject: Bridge preservation recommendations for Bridge Number 9340 I35W over the Mississippi River.

1.0 Attendees:

Paul Kivisto – Bridge Office - Chair	Jerome Adams – Metro Design – Minutes Recorder
Tom O'Keefe – Metro Area Manager	John Griffith – Metro Area Engineer
Gary Peterson – Bridge Office	Mark Pribula – Metro Bridge Maintenance
Jack Pirkl – Metro Bridge Maintenance	Roger Schultz – Metro Bridge Maintenance
Dale Dombroske – Metro Maintenance	Geoff Prelgo – Metro Design
James Martin – Metro Design	

2.0 Introduction

Paul Kivisto presented his Preliminary Bridge Preservation Recommendations for the bridge plan tied to SP 2783-107. There are several Mn/DOT State Projects (SP) that need to be considered to establish a context for these recommendations.

2.1 Br. 9340 Fatigue Study by URS

- 2.1.1 Project Manager: Scott Pierson
- 2.1.2 Completion Date: Summer 2006
- 2.1.3 Scope: To identify the most fracture critical steel elements and propose methods to strengthen those elements.

2.2 SP 2783-107

- 2.2.1 Project Manager: Geoff Prelgo
- 2.2.2 Letting: Jan. 26, 2007
- 2.2.3 Plan turn-In: Oct. 19, 2006
- 2.2.4 Scope: Pavement rehabilitation of I35W both north of Br. 9340 including deck rehabilitation of Br. 9340 with seven other bridge deck repairs south of the Mississippi River and two bridge other bridge deck repairs north of the Mississippi River.

2.3 SP 8825-204 Minneapolis Freeway Study

- 2.3.1 Project Manager: Jerome Adams
- 2.3.2 Completion Date: March 31, 2007

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2.3.3 Scope: This study is the first step in generating possible alternatives and solutions that will address the safety and congestion problems in this complicated road system. This study precedes the Highway Project Development Process (HPDP). The limits of the study are on I94 from TH 55 to Huron Blvd., I35W from Lake St. to Hennepin Avenue, and TH 55 from 26th Street to I35W.

2.4 SP 2783-102

2.4.1 Project Manager: Jerome Adams

2.4.2 Letting: None

2.4.3 Scope: Proposed project to replace Br. 9340. Project is currently on hold until Mn/DOT Metro creates an investment strategy for this bridge. This strategy will rely on data obtained from the URS Structural Assessment, results of SP 8825-204 Minneapolis Freeway Study, and recommendations from the Mn/DOT Bridge Office.

3.0 Proposed rehabilitation/reconstruction options for Br. 9340

3.1 Deck Patching

Mn/DOT Maintenance patches the concrete deck as the need arises. Currently repair costs are about $15,000 per year. However, these costs are based on repairs that can occur overnight. These patches are not as durable a repair as a repair done by a Contractor. Mn/DOT Maintenance has to do the work overnight and then put traffic on the patch in the morning. A Contract repair would set up traffic control that would last many days for the concrete patch to cure and strengthen.

For now the patches that Mn/DOT Maintenance has been constructing are sufficient and can be done in one night. However, in some areas of the bridge, such as the northbound lanes at the north end of the bridge by the University Avenue exit, the same patch is reconstructed again and again. Each time the patch gets a little bigger. At some point the patch will go through the entire deck, and the hole will need to be underpinned. This will require several days for the work to be completed and the concrete to cure. This will greatly increase the repair cost.

3.2 Deck Overlay

2 inch concrete scarify with 2 inch low slump concrete overlay. This will extend the lifespan of bridge about 10 to 15 years. Estimated cost is $3.5 million.

3.3 Redeck and strengthen

Replace the entire deck, and strengthen the most critical steel members of the bridge. This will extend the lifespan of the bridge about 40 years. Estimated cost is $13 to $15 million including traffic control costs.

3.4 Replacement

Remove and replace entire bridge. Minimum design life is 70 years. Estimated cost is more than $75 million. This cost is based on removing and replacing the existing bridge and reconstructing I-35W from Washington Avenue to 4th Street including the reconstruction of the Washington Ave., University Ave., and 4th St. bridges. The roadway will have the same number of lanes and same configuration as it does today in this scenario.

This cost estimate should be considered highly volatile, because a geometric layout has not been selected.

4.0 Investment Strategies for Br. 9340

Using the rehabilitation/reconstruction options above there are three basic Investment Strategies for Br. 9340.

4.1 Deck overlay scenario

4.1.1 2007 perform deck overlay on SP 2783-107 $3.5 million

4.1.2 2017-2022 perform deck replacement and steel strengthening $15 million

4.1.3 2057-2062 replace Br. 9340 $75 million

4.1.4 Pros:

4.1.4.1 Immediate action is taken to rehabilitate the deck. Metro Maintenance will not have to patch the deck as often, which occurs randomly throughout the year and causes construction traffic delays and costs money.

4.1.4.2 Delays bridge replacement the most, so it is 51 to 56 years away.

4.1.4.3 This allows time to acquire the funds needed for the deck replacement and the bridge replacement.

4.1.4.4 Annual bridge inspections have not found any cracks in the steel structure yet. The steel is in good condition right now.

4.1.5 Cons:

        - 4.1.5.1 In the next 51 to 56 years bridge construction will cause 3 separate major disruptions to traffic.
        - 4.1.5.2 It will be 51 to 56 years before existing safety and congestion problems are fixed, which can only be corrected with new bridge geometry.
        - 4.1.5.3 It will take 10 to 15 years before the steel is strengthened.
        - 4.1.5.4 The bridge will continue to be inspected annually. This inspection will be a detailed bridge inspection in reality if not by name. This means extra time and cost to perform the inspection instead of using the 4 year rotation for detailed bridge inspections.
        - 4.1.5.5 In the next 10 to 15 years, if the bridge inspector finds a crack forming on a steel member, then the bridge will be closed to all traffic immediately until that member can be strengthened. A central metropolitan freeway will be closed for an extended period of time. This could take weeks or months.
        - 4.1.5.6 In the next 10 to 15 years if a crack begins to form on a steel member it may be impossible to strengthen that steel member. As a result the bridge will be permanently closed until it is replaced. The high cost of the project will result in delaying many other projects to maintain our budget. This process could take 3 years, one year for design, and two years for construction. A central metropolitan freeway will be closed for 3 years.

- 4.2 Deck replacement scenario
    - 4.2.1 2006 to 2012 Mn/DOT Maintenance will need to patch the deck multiple times each year for $15,000 per year for 6 years, which is $90,000 total.
    - 4.2.2 SP 2783-107 will still rehabilitate the concrete mainline from the Mississippi River to Stinson Blvd. in 2007. The deck of Br. 9340 will not be rehabilitated on this project, but the public will still encounter a major disruption to traffic due to the mainline construction.
    - 4.2.3 2012 perform deck replacement and steel strengthening $15 million
    - 4.2.4 2052 replace Br. 9340 $75 million
    - 4.2.5 Pros:
        - 4.2.5.1 Deck replacement and steel strengthening occurs 5 to 10 years sooner than the deck overly scenario.
        - 4.2.5.2 Delays bridge replacement the 2nd most to 46 years away.
        - 4.2.5.3 This allows time to acquire the funds needed for the bridge replacement.
        - 4.2.5.4 Annual bridge inspections have not found any cracks in the steel structure yet. The steel is in good condition right now.
    - 4.2.6 Cons:

4.2.6.1 In the next 46 years construction will still cause 3 separate major disruptions to traffic. Two will be due to construction on Br. 9340 and one will be due to mainline construction on I-35W from SP 2783-107.

4.2.6.2 It will be 46 years before existing safety and congestion problems are fixed, which can only be corrected with new bridge geometry.

4.2.6.3 Mn/DOT maintenance will need to repair deck periodically throughout the year and for the next 6 years as it continues to deteriorate.

4.2.6.4 It will take 6 years before the steel is strengthened.

4.2.6.5 The bridge will continue to be inspected annually. This inspection will be a detailed bridge inspection in reality if not by name. This means extra time and cost to perform the inspection instead of using the 4 year rotation for detailed bridge inspections.

4.2.6.6 In the next 6 years if the bridge inspector finds a crack forming on a steel member the bridge will be closed to all traffic immediately until that member can be strengthened. A central metropolitan freeway will be closed for an extended period of time. This could take weeks or months.

4.2.6.7 In the next 6 years if a crack begins to form on a steel member it may be impossible to strengthen that steel member. As a result the bridge will be permanently closed until it is replaced. The high cost of the project will result in delaying many other projects to maintain our budget. This process could take 3 years, one year for design, and two years for construction. A central metropolitan freeway will be closed for 3 years.

4.3 Bridge replacement only scenario:

4.3.1 Right now this project does not have a letting date. Mn/DOT has not committed to spending $75 million or more dollars to this project in the next 20 years.

4.3.2 Pros:

4.3.2.1 New bridges will correct all structural, safety, and congestion problems with one project.

4.3.2.2 Bridge inspections can revert to the regular 4 year rotation for detailed bridge inspections, which requires less effort and cost for inspecting this bridge.

4.3.2.3 A major disruption to traffic due to bridge construction will occur once in 70 years.

4.3.3 Cons:

4.3.3.1 Mn/DOT has not committed to funding this project in the next 20 years.

4.3.3.2 Project must be done in the next 6 years, or a deck overlay or redecking project will need to be completed to keep the bridge serviceable, which becomes one of the other scenarios listed above.

4.3.3.3 Project is cost prohibitive.

5.0 Ground penetrating radar survey

The actual integrity of the deck is in question. A ground penetrating radar survey will ascertai the integrity of the deck. This new survey can be compared to a survey taken in 1999. This comparison will determine the rate at which the deck is deteriorating.

This information will help determine whether the deck is in good enough condition to last a few more years with patching and localized overlays only. Or if a deck overlay is a viable option, which will result in the predicted 10-15 years of service life. Or if the deck overlay is not a viable option and the deck needs to be replaced right away.

This survey needs to be completed this summer, so that we know the type of work that will be done to Br. 9340 on SP 2783-107. This project Lets Jan. 2007, and has a plan turn-in of Oct. 19, 2006.

5.1 The consultant contract should cost about $40,000.

5.2 Tom O'Keefe will request $40,000 from Metro Consultant Services for the radar survey contract next week, April 10-14, 2006. Tom will contact Roger Schultz with the outcome of the request.

5.3 Roger Schultz will be the Project Manager for this contract and will work with Metro Consultant Services to initiate and execute the contract.

5.4 The consultant report should be complete by Aug. 15, 2006. Contract schedule would be:

5.4.1 Start contract approval process: No later than May 19, 2006 (8 weeks)

5.4.2 Notice to Proceed: No later than July 14, 2006

5.4.3 Completion: No later than Aug, 15, 2006

5.4.4 Bridge Office revises Preliminary Bridge Preservation Recommendations: Aug. 22, 2006

5.4.5 This group meets again to discuss investment strategy for Br. 9340 considering the new information, and decides on the type of bridge work to be done with SP 2783-107: Aug. 23, 2006.

5.4.6 SP 2783-107 Plan turn-in: Oct. 19, 2006

6.0 Bridge chaining

If we cannot execute the ground penetrating radar survey there is an opportunity to do a chain survey of the bridge deck. A bridge painting project is occurring on bridges adjacent to Br. 9340 in June 2006. This project will temporarily close one direction of I35W. This would be a good opportunity for Mn/DOT Maintenance to chain Br. 9340 to identify unsound deck. However, chaining is considered a last resort and the information from chaining is very inferior to the ground penetrating radar survey.

7.0 Development of bridge plans for SP 2783-107

The Bridge Office will continue to develop the bridge plans for SP 2783-107 assuming that a 2 inch deck scarify and low slump concrete overlay will occur for the entire deck. By proceeding with this design now it will insure the plans are ready for the Oct. 19, 2006 plan turn-in. If the bridge preservations recommendations should change prior to plan turn-in it will be easier to cancel or modify the overlay plan that will have been developed.

Minnesota Department of Transportation

Metropolitan District – Waters Edge
Jerome Adams, P.E.
Design
1500 West County Road B2
Roseville, MN 55113

Office: 651-582-1320
Fax: 651-634-2162
E-mail: jerome.adams@dot.state.mn.us

Minutes

Nov. 1, 2006
1:00 PM to 2:00 PM
Waters Edge Conf. Rm. 206
Subject: Br. 9340 TH 35W over the Mississippi River investment strategy
Attendees:

Jerome Adams, Meeting chair/recorder	Dale Dombroske – Metro Maintenance
Paul Kivisto – Oakdale Bridge	Gary Peterson – Oakdale Bridge
Geoff Prelgo – Metro Design	Mark Pribula – Metro Bridge Maintenance
Roger Schultz – Metro Bridge Maintenance	Tom O'Keefe - Metro Area Manager
John Griffith - Metro Area Engineer	Phillip Erickson – Metro Bridge

1.0 Central Bridge Fund

Paul Kivisto will determine if any funding is available to replace bridge 9340 in the Central Bridge Fund for sometime in the 20teens. He will send an email to the people listed above.

2.0 Steel reinforcement presentation

Gary Peterson presented the costs of reinforcing the steel structure of bridge 9340. The costs will be $1 to $1.5 million. Gary restated that not performing the reinforcing work is not acceptable. The consequences of a structural failure are too great. The steel reinforcement will add an extra level of security to the bridge.

3.0 Funding

Roger Schultz has allocated $1.5 million dollars for Fiscal Year 2008 from the Bridge Improvement Fund, which he manages.

4.0 Decision

It was decided by all present to move forward with programming a steel reinforcement project for Fiscal Year 2008.

5.0 STIP update

Roger Schultz and Marv Lunceford will work together to update the STIP regarding this project.

6.0 Programming

Jerome Adams will program this project. The letting will be January 2008. Activities will include bridge plans, environmental documents, permits (water resources), traffic control and Right of Way.

7.0 Construction issues

Peterson EXHIBIT 116
DATE 4/2/08
COLLEEN M. SICHKO
COURT REPORTER

7.1 Make sure to coordinate with the Army Corps. of Engineers regarding dredging of the river

7.2 Coordinate with the Coast Guard.

7.3 Set up weight restriction on the bridge during construction.

EXHIBIT NO: 2
Date: 4-25-08
JULIE A RIXE
COURT REPORTER

08/02/2007
Crew Number: 7627
Inspector: METRO

Mn/DOT BRIDGE INSPECTION REPORT

RIDGE 9340 **I 35W OVER RR, MISS R, 2ND ST & RD** **INSP. DATE: 06-15-2006**

County: HENNEPIN
City: MINNEAPOLIS
Township:
Section: 25 Township: 029N Range: 24W
Span Type: CSTL BEAM SPAN
NBI Deck: 5 Super: 4 Sub: 6 Chan: 7 Culv: N

Location: 1.0 MI NE OF JCT TH 94
Route: ISTH 35W Ref. Pt.: 018+00.538
Control Section: 2783 Maint. Area: METRO
Local Agency Bridge Nbr:

Length: 1,907.0 ft
Deck Width: 113.3 ft (Varies)
Rdwy. Area / Pct. Unsnd: 201,511 sq ft 6 %
Paint Area / Pct. Unsnd: 490,200 sq ft 15 %

Open, Posted, Closed: OPEN

Appraisal Ratings - Approach: 8 Waterway: 9
MN Scour Code: L-STBL;LOW RISK Def. Stat: S.D. Suff. Rate: 50.0

Required Bridge Signs - Load Posting: NOT REQUIRED Traffic: NOT REQUIRED
Horizontal: NOT REQUIRED Vertical: NOT APPLICABLE

STRUCTURE UNIT: 0

ELEM NBR	ELEMENT NAME	ENV	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4	QTY CS 5
22	LS O/L (CONC DECK)	2	06-15-2006	201,853 SF	0	0	201,853	0	0
			06-10-2005	201,853 SF	0	0	201,853	0	0
	Notes: 3 lanes + on/off ramp each direction (2 FT shoulders). [1978] Low slump overlay (extensive full depth repairs). [1993] Spalls & patched areas along finger jonts. [1998] Median copings replaced (stay-in-place steel forms), exterior copings patched with "gunnite". [1998] Partial chaining of NBL found 1,665 SF of delamination & 47 SF of spall. [1999] Ground penetrating radar survey (FWHA) found deck to be 6% unsound. [2001] Mill and Patch repair of deck by contract.								
48	LS O/L (CONC SLAB)	2	06-15-2006	17,233 SF	0	17,233	0	0	0
			06-10-2005	17,233 SF	0	17,233	0	0	0
	Notes: Spans 12 - 14 have a 2 FT deep CIP concrete voided slab (continuous).								
300	STRIP SEAL JOINT	2	06-15-2006	946 LF	852	0	94	N/A	N/A
			06-10-2005	946 LF	852	0	94	N/A	N/A
	Notes: [1978] Type H strip seal at abutments, pier 11, and stringer expansion joints (7 total). [1998] Strip gland replaced at pier 11, north abutment. South abutment joint (SBL) repaired with new product (hot pour with steel mesh). Steel extrusion was too corroded to install new gland. [1995] Pier 11 joint has numerous leaks (SBL & NBL), glands in the stringer joints have pulled out in scattered locations.								
301	POURED DECK JOINT	2	06-15-2006	1,017 LF	1,000	0	17	N/A	N/A
			06-10-2005	1,017 LF	1,000	0	17	N/A	N/A
	Notes: Deck has 1,017 LF of transverse poured joints. [1997] All have leaching below (with some deck spalling).								
303	ASSEMBLY DECK JOINT	2	06-15-2006	326 LF	191	110	25	N/A	N/A
			06-10-2005	326 LF	191	110	25	N/A	N/A
	Notes: Open finger joints at truss ends and span 2 hinge. [1998] Rubber "skirts" installed below truss end finger joints. The face exposed to the open finger joints have extensive section loss (surface pitting & holes in stiffeners).								
412	APPR RELIEF JOINT	2	06-15-2006	226 LF	0	226	0	N/A	N/A
			06-10-2005	226 LF	0	226	0	N/A	N/A
	Notes: Relief joint at approaches. 52 LF SBL 4" wide; 52 LF NBL 3 1/2" wide; south approach. 26 LF SBL ramp 2" wide; 48 LF SBL 1" wide; 48 LF NBL 1" wide; north approach. Relief joints need re-sealing.								
321	CONC APPROACH SLAB	2	06-15-2006	4 EA	0	4	0	0	N/A
			06-10-2005	4 EA	0	4	0	0	N/A
	Notes: [1991] All 4 approach panels have transverse cracks.								
331	CONCRETE RAILING	2	06-15-2006	7,831 LF	7,000	831	0	0	N/A
			06-10-2005	7,831 LF	7,000	831	0	0	N/A
	Notes: [1998] 4018 LF Railings re-constructed. 3813 LF Split median J-rail installed (with removeable pre-cast caps). Exterior railings (originally code 12) were retrofit (32" high concrete face added, horizontal steel railings removed). Vertical cracks.								
107	PAINTED STEEL GIRDER	2	06-15-2006	10,596 LF	0	9,000	1,400	196	0
			06-10-2005	10,596 LF	0	9,000	1,400	110	86
	Notes: [1968] Bridge painted with lead base system. Approach spans have welded beams (depth transitions from 48" to 33"), with riveted connections. Spans 1 & 2 have 33" deep rolled beams with welded cover plates (square ends). [1995] Beams have salt film, minor chalking throughout, fascia beams have section loss: pitting, flaking & surface rust along the bottom flange. [1999] Beams along median (and at hinge) re-painted. Spot painting contract: truss ends, hinge joints, and area below median painted with zinc system. Paint system is 15% unsound.								

Mn/DOT BRIDGE INSPECTION REPORT

RIDGE 9340 **I 35W OVER RR, MISS R, 2ND ST & RD** **INSP. DATE: 06-15-2006**

STRUCTURE UNIT: 0

ELEM NBR	ELEMENT NAME	ENV	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4	QTY CS 5
113	PAINT STEEL STRINGER	2	06-15-2006	14,896 LF	0	14,000	700	196	0
			06-10-2005	14,896 LF	0	14,700	0	150	46
	Notes: 27" deep rolled stringers (truss spans). [1995] Stringers have section loss: pitting, flaking & surface rust corrosion at expansion joints. [1999] Median stringers re-painted. [91/2000] Stringer/floorbeam connections are "working". Several bolts are loose or missing.								
131	PAINT STL DECK TRUSS	2	06-15-2006	2,127 LF	0	1,000	880	247	0
			06-10-2005	2,127 LF	0	0	1,880	215	32
	Notes: Main truss members have numerous poor weld details (some cracked tack welds). [1995] Interiors of truss members have section loss: pitting, flaking & surface rust, severe pigeon debris, at the floorbeam & sway frame brace connections (with pack rust & surface pitting). [1999] Pigeons screens placed on truss member openings.								
152	PAINT STL FLOORBEAM	2	06-15-2006	3,348 LF	0	2,000	725	623	0
			06-10-2005	3,348 LF	0	2,000	725	600	23
	Notes: [1986] Crossbeam web stiffeners cracked at SE rocker hinge (rocker bearing had frozen). Cracks were welded/drilled out, and bracing was added (attached to approach span beams). [1992/98] Several cracks found in crossbeam & end floorbeam at the NE rocker hinge. Some cracks were drilled out, and bracing was added (attached to approach span beams). [1998/99] End floorbeams & "crossbeams re-painted. Floorbeam trusses have numerous poor weld details, section loss: pitting, flaking & surface rust, some have holes, (plug welds & tack welds in tension zones). [1994] Floorbeam trusses have salt film, chalking throughout. [1999] Median portions of floorbeam trusses (and sway braces) re-painted.								
373	STEEL HINGE	2	06-15-2006	18 EA	0	4	0	14	0
			06-10-2005	18 EA	0	4	0	0	14
	Notes: [1986] SE crossbeam rocker hinge pin replaced. Section loss at hinges, (open finger joint) steel has moderate pitting, flaking & surface rust. [1999] Crossbeam rocker hinge bearings re-painted (all show evidence of recent movement). [1995] Span 2: all hinge bearings are locked in full expansion (beam ends contacting). [1999] Span 2 hinge bearings re-painted.								
380	SECONDARY ELEMENTS	2	06-15-2006	1 EA	0	0	1	0	N/A
			06-10-2005	1 EA	0	0	1	0	N/A
	Notes: [1995] Pinned braces between floorbeam truss & stringers are working.								
311	EXPANSION BEARING	2	06-15-2006	125 EA	75	44	6	N/A	N/A
			06-10-2005	125 EA	75	44	6	N/A	N/A
	Notes: [94/2000] Some abutment bearings are rusty (joints leaking). [1996] South abutment bearings are in full contraction. [1994] Main truss roller bearings have section loss: pitting, flaking & surface rust, moderate corrosion.								
313	FIXED BEARING	2	06-15-2006	35 EA	35	0	0	N/A	N/A
			06-10-2005	35 EA	35	0	0	N/A	N/A
	Notes:								
205	CONCRETE COLUMN	2	06-15-2006	52 EA	49	3	0	0	N/A
			06-10-2005	52 EA	49	3	0	0	N/A
	Notes: [1969] Pier 9: east column damaged by train derailment (minor scrapes & spalls). [1993] Pier 7: west column has a vertical crack. [2000] Pier 11: west column has a minor spall. [1996] Pier 1 has tipped slightly northward. Likely related to hinge failure in span 2 (south abutment bearings are in full contraction).								
210	CONCRETE PIER WALL	2	06-15-2006	168 LF	168	0	0	0	N/A
			06-10-2005	168 LF	168	0	0	0	N/A
	Notes:								
215	CONCRETE ABUTMENT	2	06-15-2006	255 LF	230	25	0	0	N/A
			06-10-2005	255 LF	230	25	0	0	N/A
	Notes: [1991] Both abutments have minor cracking & staining.								
234	CONCRETE CAP	2	06-15-2006	819 LF	669	150	0	0	N/A
			06-10-2005	819 LF	669	150	0	0	N/A
	Notes: [1998] Pier 11: cap has extensive "gunnite" repairs.								

Mn/DOT BRIDGE INSPECTION REPORT

BRIDGE 9340 **I 35W OVER RR, MISS R, 2ND ST & RD** **INSP. DATE: 06-15-2006**

STRUCTURE UNIT: 0

ELEM NBR	ELEMENT NAME	ENV	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4	QTY CS 5
356	FATIGUE CRACKING	2	06-15-2006	1 EA	0	1	0	N/A	N/A
			06-10-2005	1 EA	0	1	0	N/A	N/A
	Notes: [98/2000] Numerous fatigue cracks found in approach spans. Cracks were located at negative moment diaphragm connections where the stiffener was not welded to the top flange. In span 9, the 3rd beam from the east had a 4 FT long crack in the web (it was reinforced with bolted plates). Most existing cracks were drilled out, and the diaphragm connections were lowered to reduce stress levels. [2004] Crack found in cope north approach crossbeam at beam G1C bottom flange 2 1/2" east side, 2" west side.								
357	PACK RUST	2	06-15-2006	1 EA	0	0	1	0	N/A
			06-10-2005	1 EA	0	0	1	0	N/A
	Notes: [1995] Truss members have flaking & surface rust corrosion at the floorbeam & sway brace connections (with pack rust & some section loss, surface pitting).								
358	CONC DECK CRACKING	2	06-15-2006	1 EA	0	1	0	0	N/A
			06-10-2005	1 EA	0	1	0	0	N/A
	Notes: [1993] Overlay has 3,000 LF of transverse cracks. [1998] Cracks sealed.								
359	CONC DECK UNDERSIDE	2	06-15-2006	1 EA	0	0	1	0	0
			06-10-2005	1 EA	0	0	1	0	0
	Notes: [1997/98] Underside of deck has a moderate amount of transverse leaching cracks, with some areas of leaching map cracks & spalling (particularly in the north approach spans). [1998] Removal of median copings damaged deck in adjacent bays (some areas have been patched).								
360	SETTLEMENT	2	06-15-2006	1 EA	1	0	0	N/A	N/A
			06-10-2005	1 EA	1	0	0	N/A	N/A
	Notes:								
361	SCOUR	2	06-15-2006	1 EA	1	0	0	N/A	N/A
			06-10-2005	1 EA	1	0	0	N/A	N/A
	Notes: [2004] Underwater Inspection by "Ayres Associates" found no evidence of scour or changes to structure condition.								
363	SECTION LOSS	2	06-15-2006	1 EA	0	1	0	0	N/A
			06-10-2005	1 EA	0	1	0	0	N/A
	Notes: Section loss: pitting, flaking & surface rust on steel.								
964	CRITICAL FINDING	2	06-15-2006	1 EA	1	0	N/A	N/A	N/A
			06-10-2005	1 EA	1	0	N/A	N/A	N/A
	Notes:								
966	FRACTURE CRITICAL	2	06-15-2006	1 EA	1	0	0	N/A	N/A
			06-10-2005	1 EA	1	0	0	N/A	N/A
	Notes: See in-depth report for location of F/C members.								
981	SIGNING	2	06-15-2006	1 EA	1	0	0	0	0
			06-10-2005	1 EA	1	0	0	0	0
	Notes: OH sign bridge mounted on exterior railings at north end of truss, sign post mounted on west rail at south end of truss.								
982	GUARDRAIL	2	06-15-2006	1 EA	1	0	0	N/A	N/A
			06-10-2005	1 EA	1	0	0	N/A	N/A
	Notes: Plate beam guardrail SE & SW corners, north & south median I 35W. [1998] Approach guardrail repaired (impact attenuator at NB off ramp).								
984	DRAINAGE	2	06-15-2006	1 EA	0	0	1	N/A	N/A
			06-10-2005	1 EA	0	0	1	N/A	N/A
	Notes: Pier 6: horizontal drain trough has inadequate slope (usually clogged). [1998/99] Drain troughs below truss end finger joints removed & replaced with rubber "skirts". [2000] "Skirts" above crossbeam rockers are clogged.								

08/02/2007
Crew Number: 7627
Inspector: METRO

Mn/DOT BRIDGE INSPECTION REPORT

BRIDGE 9340 **I 35W OVER RR, MISS R, 2ND ST & RD** **INSP. DATE: 06-15-2006**

STRUCTURE UNIT: 0

ELEM NBR	ELEMENT NAME	ENV	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4	QTY CS 5
985	SLOPES	2	06-15-2006	1 EA	1	0	0	N/A	N/A
			06-10-2005	1 EA	1	0	0	N/A	N/A
	Notes: [1994] North abutment slope paving has 20 LF of horizontal cracks.								
986	CURB & SIDEWALK	2	06-15-2006	1 EA	0	1	0	N/A	N/A
			06-10-2005	1 EA	0	1	0	N/A	N/A
	Notes: [1993] Curb below exterior railings have spalling & delamination.								
988	MISCELLANEOUS	2	06-15-2006	1 EA	0	1	0	N/A	N/A
			06-10-2005	1 EA	0	1	0	N/A	N/A
	Notes: Rail mounted deck lighting, under deck lighting, and river navigation lights. [1994] Light post on west rail ("W5/3 L") has a 6" vertical split (plow damage). [1999] Automated de-icing system installed on deck (control room constructed on NW approach corner).								

General Notes: *Bridge #9340, Year 2006
Bridge constructed in 1967.

See "Fracture Critical" report for additional information.

Inspectors: K Fuhrman, V Desens.

Inspector's Signature

Reviewer's Signature / Date

EXHIBIT NO: 2
Date: 4-15-08
JULIE A RIXE
COURT REPORTER

From: <Don_Flemming@urscorp.com>
To: <scott.pierson@dot.state.mn.us>
Date: Wed, Aug 4, 2004 2:09 PM
Subject: Minutes from Br. 9340 Meeting

Scott, attached are the minutes from the July 20th meeting on Bridge 9340. If you have comments or want revisions please advise. I am also sending a hard copy.

Thanks for your assistance in this matter.

Don

(See attached file: Br. 9340 Minutes)

URS

Meeting Minutes

Thresher Square
700 Third Street South
Minneapolis, MN 55415
Phone: (612) 370-0700
Fax: (612) 370-1378

Meeting: **Evaluation of Bridge 9340 – Progress Meeting 1**

Meeting Attendees: **MnDOT** – Dan Dorgan, Scott Pierson, Paul Kivisto, Kevin Western, Gary Peterson, Bob Miller, Victor Crabbe
URS – Ed Zhou, Don Flemming, David Long

From: David D. Long

Meeting Date: July 20, 2004
Location: MnDOT Oakdale
Time: 8:30-11:00 AM

Minute Issue Date: August 4, 2004
Revised Issue Date:

Discussion Items:

1. The Power Point presentation was viewed and topics were discussed with questions answered as they occurred. This presentation will serve as the first project progress report.
2. Critical fatigue susceptible details are welded bars inside tension chords of the main truss and welded stiffeners on the tension members of the floor truss.
3. Movements of the bearings were discussed. The intent was to try to calibrate the model with the measurement results. The movements measured up to date, however, are inconsistent and variable. It does show that the bearings are moving with changes in temperature, but not linearly.
4. Discussions were made on the failure criteria for redundancy analysis. Should the failure criteria be based on initial yielding, the ultimate state after strain hardening, or should deflection (non-elastic) redistribution of loading and forces be allowed. MnDOT suggested limiting the study within the linear-elastic range as defined in the original project scope. Ed Zhou will study the subject and develop a failure criteria recommendation for MnDOT review.
5. Failure for the compression members will be defined as when the member buckles. The effects of the non-linear post-buckling strength will also be studied.
6. URS's development for re-decking strategies will include deck replacement and construction sequence as well as strategies to strengthen the structural system and make it more redundant.
7. With the unintended global composite action of the structure, the "stack up"

method of the original design ignored the strength benefits of the structure acting as one complete structure.

8. The 494 & 694 weigh-in-motion data could be used to estimate the volume and characteristics of the traffic on bridge 9340. Traffic projections could also be estimated by using this weigh-in-motion data in conjunction with the observed traffic data at the Bridge 9340 site.

URS - Action Items:

1. Add the rotational stiffness of the foundation at pier 6 to the model.
2. Convert presentation data to English units in all tables. (Convert the U of MN data)
3. Model the stiffness of the floor beam/stringer web in the model vs. the rigid link as modeled.
4. Verify the camber shown on the construction documents with the shop drawings
5. Send 2 copies of the Power Point presentation to Scott Pierson at MnDOT.
6. Obtain the traffic count data at the Bridge 9340 site.
7. If the sequence of the deck pour becomes an important part of the analysis, obtain the construction diaries to review the actual pour sequence.
8. Complete a study of possible failure criteria's and develop a recommendation for failure criteria. Consider an upper and lower bound on the failure limits. The decision should be made when more data on the actual member forces is available.
9. Obtain the 494 & 694 weigh-in-motion traffic data.

MnDOT – Action Items:

1. Scott Pierson will check with Jim Paddock about the availability of the Mill Certifications for bridge 9340, including the force-deformation curves of the test coupons.
2. Dan Dorgan was going to contact Jonette Kreideweis to let her now that URS will be contacting their office to obtain the 494 & 694 weigh in motion data.

Next Meeting: To be established: Mid September, 2004 at MnDOT Oakdale

David Long prepared these meeting minutes. If there are any corrections to these minutes, please contact David at 612.373.6394 or email at david_long@urscorp.com.

URS

Meeting Minutes

EXHIBIT NO: 3
Date: 4-15-08
JULIE A RIXE
COURT REPORTER

Thresher Square
700 Third Street South
Minneapolis, MN 55415
Phone: (612) 370-0700
Fax: (612) 370-1378

Meeting: **Evaluation of Bridge 9340 – Progress Meeting 2**

Meeting Attendees: **MnDOT** – Dan Dorgan, Scott Pierson, Paul Kivisto, Kevin Western, Bob Miller
URS – Ed Zhou, Don Flemming, David Long

From: David D. Long

Meeting Date: November 15, 2004
Location: MnDOT Oakdale
Time: 9:00-1:00 PM

Minute Issue Date: November 17, 2004
Revised Issue Date:

Discussion Items:

1. The Power Point presentation was viewed and topics were discussed with questions answered as they occurred. This presentation will serve as the second project progress report.
2. URS needs to obtain the weigh-in-motion data in order to calibrate the traffic count data obtained by MnDOT.
3. The mill certification data for the bridge was discussed. There is a large amount of data that is not easily related to the shop drawings. URS will review where this data may be critical to the analysis.
4. Discrepancies in the camber data between the shop drawings and the contract plans were discussed. The shop drawing data was incomplete and had a few locations with major differences from the contract plans. URS used the contract plans to set the camber of the truss. MnDOT would like URS to investigate the discrepancies and determine if revisions to the model are required.
5. Member forces were not affected greatly by approach span construction sequence. The model is based on the approach spans being poured with the truss non-composite.
6. MnDOT questioned the use of Category D or E fatigue details. The length of the welded attachment is 3 ½" which is very close to the cut off between the two categories. It was determined at this time that Category D should be

considered.

7. There was much discussion regarding the appropriate number of fatigue trucks to be used for identifying fatigue-critical members. MnDOT prefers to use multiple fatigue trucks on bridges when using a "system" analysis. MnDOT directed URS to use 3 side-by-side fatigue trucks along the centerline of the exterior lanes vs. the single AASHTO fatigue truck used in the analysis to date. For such fatigue loading, MnDOT directed URS to use no reduction factor for multiple presence and a dynamic impact of 15%.
8. Discussions were also made in regard to the loading for redundancy analysis. Eight tension members will be selected from the fatigue analysis and structural analysis will be performed for the consequences of the failure of one of the eight members at a time. MnDOT directed URS to consider two load cases for the redundancy analysis; 8 HS-20 trucks with a 1.0 reduction factor and 8 HS-20 trucks + lane loads with a 0.65 reduction factor. The second load case will be analyzed for one member first and results will be presented to MnDOT at the next progress meeting before being applied to the remainder of the eight selected members. MnDOT will compare these results to determine the appropriate loading and reduction factors.
9. MnDOT directed URS to leave in the 0.85 factor in the calculation of compressive member capacity per AASHTO LFD method to account for fabrication and erection imperfections.
10. MnDOT questioned the use of the 1.854 dynamic impact factor to consider the effect of a brittle failure of one of the truss members. Further review into the use of this factor will need to be determined.
11. Review the LRFD Specification to determine if there is a more recent specification than the 1985 AASHTO Guide Specifications for LFD of Truss Bridges.

URS - Action Items:

1. Send 2 copies of the Power Point presentation to Scott Pierson at MnDOT.
2. Obtain the 494 & 694 weigh-in-motion traffic data. Don Flemming will contact Jonette Kreideweis.
3. Review the "letter" file for Bridge 9340 construction to determine if additional information is available to clarify camber discrepancies between the contract plans and the shop drawings. Tabulate members with length discrepancies between the shop drawings and contract plans.
4. Revise slide for "Model Test Comparison" to show the load application in the same direction as the bridge elevation is drawn. Revise slide for "DL Analysis" to remove the term IWS. The original deck was poured monolithically.
5. Identify 8 critical members as determined by fatigue and be prepared to discuss retrofits to the truss members.

MnDOT – Action Items:

1. No action items noted

Next Meeting: Tentatively scheduled for January 6, 2005 9:00 AM at MnDOT Oakdale. Scott Pierson to confirm the meeting.

David Long prepared these meeting minutes. If there are any corrections to these minutes, please contact David at 612.373.6394 or email at david_long@urscorp.com.

URS

Meeting Minutes

EXHIBIT NO: 4
Date: 4-15-08
JULIE A RIXE
COURT REPORTER

Thresher Square
700 Third Street South
Minneapolis, MN 55415
Phone: (612) 370-0700
Fax: (612) 370-1378

Meeting: **Evaluation of Bridge 9340 – Progress Meeting 3**

Meeting Attendees: **MnDOT** – Dan Dorgan, Gary Peterson, Kevin Western, Paul Kivisto, Scott Pierson, Bob Miller, Victor Crabbe
URS – Ed Zhou, Don Flemming, David Long

From: David D. Long

Meeting Date: January 6, 2005
Location: MnDOT Oakdale
Time: 9:00-12:00 PM

Minute Issue Date: January 10, 2005
Revised Issue Date:

Discussion Items:

1. The Power Point presentation was viewed and topics were discussed with questions answered as they occurred. This presentation will serve as the third project progress report.
2. Don Flemming reviewed the status of the WIM data. Vehicles with 5 or more axles (weights greater than or equal to the fatigue truck) account for approximately 1% of the daily traffic at Bridge 9340. This is currently about 700 fatigue truck or higher weight vehicles per day. It was determined that additional effort to refine this data is probably not required. MnDOT would probably choose to use a higher percentage anyway based on the I694 and I494 WIM data. Subsequent review of the WIM data after the meeting shows that the I 694 and I 494 weight data is substantially the same as the statewide data that was initially used.
3. The shop drawing discrepancy as noted in the last meeting was determined to be attributable to the difference between the contract documents with level geometry and shop drawings with corrections to profile grade.
4. The dynamic impact factor of 1.854, due to the sudden failure of a truss member, was calculated based on a 5% damping. Live load impact due to the vehicular dynamics was not applied to the load case involving the eight side-by-side HS-20 trucks for member failure analysis.
5. Member capacities and combined stress ratios were calculated based on the

latest update of the AASHTO Guide Specification for Strength Design of Truss Bridges (Load Factor Design) 1986 Interim.

6. A question was raised as to localized effect and the overall number of floor trusses involved as the consequence of the failure of main truss members. URS will review the extent of the floor truss failures to insure that this data is presented clearly.
7. Dan Dorgan noted that we could combine the composite deck and PT system on the lower chord and consider that as an alternate for truss retrofit.
8. There was a lot of discussion regarding the use of the PT system as an alternate to plating for retrofitting the tension bottom chords of the main truss. Issues and concerns discussed include:
    - Elongation and tensioning of the PT rod.
    - Without tensioning there may be too much elongation in the PT system after member fracture.
    - Anchoring of the PT system onto the gusset plate.
    - Interference of a continuous PT system on the inside web of the box.
    - Panel to panel anchorage of the PT system vs. a continuous system across multiple panel points.
    - Anchorage of a PT system utilizing the perforation holes.
9. There was also discussion of the use of FRP to reinforce the existing diagonals.
    - There is uncertainty about the applicability of using this system to strengthen steel members.
    - The fibers and epoxy may be too brittle.
    - The FRP would take tension but may not stop a crack or fracture.
10. After the above discussions, it was determined that URS should concentrate our efforts at looking into the steel plating option of retrofit.
11. Consider placing the new plates one half of the box depth at a time, to minimize weight.
12. There was a discussion about placing the new steel plates onto the gussets by replacing rivets with bolts a couple at a time. Kevin Western pointed out that it would be very difficult to fabricate a new plate that would match the existing rivet holes at each end.
13. Stitch connecting of the plate along the length of the member is probably preferable to leaving a gap between the existing web and new side plates. This would attempt to seal the plates and to eliminate potential vibration induced slapping of the plates.
14. Investigate the use of A490 bolts, increasing surface friction, and the use of high strength steel (Fy 100ksi) to minimize the weight of the plate and the number of bolts required.
15. The new side plates should be capable of replacing the entire capacity of the member in case of complete fracture.
16. URS will also study the effect of the steel plate strengthening in regard to the change in stiffness and the impact this may have near the gusset plate connections.
17. Strengthening options will also be studied for the diagonal L3-U4 considering the location of the access holes and the limited web plate end areas for plating.
18. MnDOT's current plan is to overlay the bridge in 2007 and to re-deck around

the year 2020. They want to have repair plans available for the critical members in case problems are discovered during inspections and also have the report to gauge how critical problems discovered may actually be.

URS - Action Items:

1. Send 2 copies of the Power Point presentation to Scott Pierson at MnDOT.
2. Ed Zhou will further investigate how multiple floor beam failures occur as a result of a main truss member failure.
3. Check if the diagonal L3-U4 has perforation holes that would allow access for adding bolted side plates.
4. Ed Zhou to review the members to determine if plating of the member will cause a stress problem at the location between the end of the new plate and the gusset plate connection.
5. Investigate retrofit of the critical members by the use of bolted side plates.
6. Include the WIM and bridge 9340 traffic data and the findings in the final report.
7. Future power points should be printed with 2 slides per page.
8. Develop re-decking concepts with regard to traffic staging and sequencing of the pours.

MnDOT – Action Items:

1. Scott Pierson will attempt to locate the missing shop drawings as noted in the presentation for members (L13 – L13'). There may be microfilm available for this location.

Next Meeting: Tentatively scheduled for April 5, 2005 9:00 AM at MnDOT Oakdale. Scott Pierson to confirm the meeting.

David Long prepared these meeting minutes. If there are any corrections to these minutes, please contact David at 612.373.6394 or email at david_long@urscorp.com.

EXHIBIT NO: 5
Date: 4-15-08
JULIE A RIXE
COURT REPORTER

Ed Zhou/HuntValley/URSCorp
02/07/2005 06:16 PM

To Don Flemming/Minneapolis/URSCorp@URSCorp
cc David Long/Minneapolis/URSCorp@URSCORP
bcc
Subject Re: Request for Information

Don,

I was in Philadelphia when you called last week and out for lunch today when you called again. I have gone through their memo and think it is ok. We are to provide the basis for the selection of different alternatives for member retrofit as well as deck replacement and construction sequence. I think it would be worthwhile though if you can talk to a contract for some input on transporting construction materials and equipment. Let me know for further discussions.

Ed

Don Flemming

Don Flemming
02/07/2005 12:00 PM

To: Ed Zhou/HuntValley/URSCorp@URSCorp
cc: David Long/Minneapolis/URSCorp@URSCorp
Subject: Request for Information

Ed, the answers to the questions on the deck were included in the memo from Mn/DOT on 1/27/05 and I inadvertently did not apparently send this to you.
Please review the deck information and give me your feedback.

Don
----- Forwarded by Don Flemming/Minneapolis/URSCorp on 02/07/2005 10:59 AM -----

"Scott Pierson " <Scott.Pierson@dot.state.mn.us>
01/27/2005 07:29 AM

To: <Don_Flemming@urscorp.com>
cc:
Subject: Request for Information

Don, I have attached a memo in response to your request for information that was revised in an e-mail dated 1/24/05. I hope this answers your questions, and if not or if you have any further questions, please feel free to call or e-mail me.

Scott A. Pierson, P.E.
Senior Engineer
Office of Bridges and Structures
3485 Hadley Ave. No.
Oakdale, Minnesota 55128

Phone: 651/747-2192
Fax: 651/747-2115
E-mail: scott.pierson@dot.state.mn.us

Minnesota Department of Transportation

Memo

Bridge Office
Mail Stop 610
3485 Hadley Avenue North
Oakdale, MN 55128-3307

Phone No: 651-747-2192
Fax No: 651-747-2115

AUTODATE

To: Donald Flemming, URS

From: Scott Pierson

Subject: Request for Information Verification with Mn/DOT(revised 1/24/05)

After reviewing notes from the three progress meetings it was decided, in response to your question 1 (see page 2 & 3 of this memo for complete request submitted in attachment to an e-mail dated 1/24/05):

Question 1.) Concur with URS that Load cases 1,2 3,&4 shall be used with load case 3 modified as follows;
Modify load case 3 to include a multi-presence factor of 0.65

In response to question 2 (deck replacement study):

Question 2a.) It is expected that 2 lanes in each direction will be required to remain open.

Question 2b.) For the arch spans pour negative areas last. For continuous approach spans pour 3 spans of positive areas between inflection points before first negative areas is poured. The preferred volume and the maximum will be the same if the design allows and experience has shown that approximately 25,000 square feet of 9" deck can be done in a long day and supplied at an approximate rate of 120 cubic yards per hour.

Question 2c.) The deck placement should be studied with many options thus allowing the District to choose the staging. The option of closing one entire side to traffic and the option of restricting traffic to the interior and redecking exterior portions or vice versa shall both be required. This is not to preclude disclosure of any checkerboard pattern remove and replace scheme that structurally may be required so as not to overly load one of the two trusses either under unbalanced live load or construction loads. Any additional constructability issues regarding staged construction should be discussed with this office.

Any questions please feel free to call or e-mail Scott Pierson.

Cc:
Daniel Dorgan
Gary Peterson
Kevin Western
Paul Kivisto
Bob Miller
Victor Crabbe

BRIdge 9340 INFORMATION VERIFICATION WITH MNDOT
To proceed on our redundancy analysis and deck replacement study, we would like to verify the following information with MnDOT.

1. **Live Load for Member Failure Analysis:** As of last progress meeting on January 6, we have determined the eight truss members for studying the consequence of their individual failures. For the live load to be used for such member failure analysis, we have used eight HS-20 trucks side-by-side without dynamic impact and without multiple presence reduction. We talked about studying another live load case to include lane load plus the truck load per the LRFD, eight lanes side-by-side, with a 0.65 multiple presence reduction. One issue with lane load is the longitudinal distribution, whether throughout the full bridge length or only placed segmentally for maximizing the force effect in the member under investigation. The latter case is for design. Our understanding for using the eight lane side-by-side case is to consider the "parking lot" condition, which should fill the entire length of the bridge. NCHRP 406 recommends the use of only two HS-20 trucks side-by-side placed for maximum effects and to determine the multiplier of that load till failure. With all this said, we have listed the optional load cases shown below. We need to finalize what is to be used in the very near future. (please note that the dynamic impact mentioned below is the vehicular impact, not the 1.854 factor due to the sudden loss of a member, which will be considered in all cases):

   Case 1. No live load at all. This is for the dead load only case to find out if the structure would stand with all lanes closed to traffic.
   Case 2. Eight HS-20 trucks side-by-side, placed longitudinally for maximum member force effect, without dynamic impact and without multiple presence reduction. This is for eight lanes of traffic moving at slow speed, with each entire lane of traffic represented by a single HS-20 truck.
   Case 3. Eight HS-20 lane loads, without trucks or concentrated forces, placed over the full length of the bridge, without dynamic impact and no multiple presence reduction. Each lane should also have concentrated forces placed at the worst locations for heavy vehicles, without multiple presence reduction. The concentrated forces may be HS-20 trucks, or those in the Standard Specifications for lane load. This is the "parking lot" condition in rush hours.
   Case 4. Two HS-20 trucks side-by-side, placed longitudinally for maximum member force effect, with dynamic impact. This is in agreement with NCHRP 406, which states that the two-truck loading is the most probable bridge load based on loading statistics.
   Case 5. Seven side-by-side HS-20 trucks plus lane load lopsided to the truss under investigation, both placed longitudinally for maximum member force effect, with dynamic impact for the trucks only and with a 0.65 multiple presence reduction. This is the worst loading case for the design condition and is probably too conservative for redundancy (member failure) analysis. However, considering the fact that the southbound roadway on the bridge actually carries four lanes of traffic and the northbound has primarily three lanes, the seven-lane lopsided loading may indeed be a realistic loading for the west truss. This "design load" case may make better sense if we modify the land load to be continuous throughout the bridge length instead of segmentally for maximum effects.
   Our recommendation is to study all five cases and compare their results. Anyway, these options are for discussion and to finalize the loads for the analysis.

2. **Deck Replacement Study:** We need to confirm the following information for studying the redecking schemes and sequencing:

   (a) What is the number of lanes we need to remain open during the construction? We have assumed two lanes in each direction would be acceptable?

   (b) What is the preferred volume and maximum volume, respectively, of concrete for each deck pour?

   (c) In order to minimize torsion in the global structural system, the loading should be kept symmetrical about the bridge centerline during the construction. One scheme is to leave the two inner lanes open to traffic in each direction and to work on the outer portion above each truss. By the time work would be done on the inner portion of the deck, the outer lanes of new deck and floor system would already be made composite with the main trusses. The problem with this method is transporting materials and equipment in and out of the construction area between the outer lanes. Can we deal with this alternative considering the construction constraints at this particular job site?

URS

Meeting Minutes

EXHIBIT NO: 68
Date: 4-15-08
JULIE A RIXE
COURT REPORTER

Thresher Square
700 Third Street South
Minneapolis, MN 55415
Phone: (612) 370-0700
Fax: (612) 370-1378

Meeting: **Evaluation of Bridge 9340 – Progress Meeting 4**

Meeting Attendees: **MnDOT** – Dan Dorgan, Gary Peterson, Nancy Daubenberger, Paul Kivisto, Scott Pierson
URS – Ed Zhou, Don Flemming, Brett McElwain, David Long

From: David D. Long

Meeting Date: March 31, 2005
Location: MnDOT Oakdale
Time: 9:00-12:00 PM

Minute Issue Date: April 4, 2005
Revised Issue Date:

Discussion Items:

1. The Power Point presentation was viewed and topics were discussed with questions answered as they occurred. This presentation will serve as the fourth project progress report.
2. The five load cases for the redundancy analysis that had been decided in a series of emails was briefly discussed. Ed Zhou mentioned that they were included in the presentation.
3. Ed Zhou presented an answer to the question that was raised in the last progress meeting regarding the localized effect and the overall number of floor trusses involved as the consequence of the failure of main truss members. It was discovered that some of the floor truss members are overstressed as a result of dead load alone. The overstress is a result of the out of plane bending of the floor truss top chord. The non-symmetric connection of the stringers at the deck joints causes the member to rotate and deflect toward the fixed side of the deck. It was his opinion that the original "stack-up" design probably did not take this effect into account.
4. There was a discussion regarding the dynamic impact factor of 1.854, due to the sudden failure of a truss member. It was determined that the actual failure would be somewhere between sudden and slow. Previous input from Robert Dexter indicated that the crack would propagate slowly until it reached

approximately 2" in length and then have a brittle fracture. Presenting the data with a dynamic impact factor at both 1.0 and 1.854 was determined to adequately cover the range of expected failures.

5. The question was asked about how compressive failures of the bottom chord would be affected by composite action of the slab. Ed Zhou will be studying this condition.
6. Retrofitted members should take the full DL and LL in case of complete member failure.
7. URS should use 3' seal/stitch bolt spacing for the retrofit plates. This spacing is in excess of the requirements of AASHTO 10.24.6. MnDOT may choose to decrease the bolt spacing in the future.
8. Gary Peterson raised the question about failures that may occur at locations other than at the interior diaphragm, specifically at tack weld locations. URS will contact Mark P. and review the photograph records to determine if tack welds exist at the member to gusset plate locations.
9. Post-tensioning by use of FRP straps was discussed. It was determined that this option was not feasible due to the number of straps required.
10. Post-tensioning by the use of Dywidag bars was also discussed. It may prove to not be feasible to use bars either due to the number required. URS will look further into the use of post-tensioning bars instead of the plates. URS will also develop conceptual plans for the anchorage requirements of a PT bar.
11. URS was directed to use 100 ksi steel in the development of the plate retrofit plans. We can contact Todd Nieman or Tom Merritt to determine the availability of plates with this yield strength.
12. URS will consider bolting and plating requirements for both the design load and the actual member load and prepare a comparison of the two methods.
13. The deck pouring sequence was discussed. MnDOT's preference is to consider a full 9" depth deck to save on construction time. The possible advantage of using a precast concrete deck was discussed. MnDOT's preference is to use CIP concrete and avoid the use of "experimental" deck systems on a bridge with such a high ADT. URS will also review the advantages of utilizing a composite slab on the truss system. MnDOT may consider the use of a stay-in-place form for the slab on this bridge
14. URS will also study the possibility of using a non-symmetric deck pouring sequence to determine if this is feasible.
15. Stay-in-Place forms were used for the median reconstruction. MnDOT indicated that the form was continuos between the beams, but there was a joint in the deck and barrier.
16. The next progress meeting was discussed. It was agreed to meet in approximately 3 months. URS will prepare a draft report for MnDOT's review and comment prior to the meeting.

URS - Action Items:

1. Determine the magnitude of the expected lateral member displacement of the "failed" floor truss top chord members.
2. Review photographs and contact Mark P. about the potential for fabrication

tack welds at the truss member to gusset plate connection.

3. Revise plate retrofit calculations to use 100 ksi steel. Contact Todd Nieman or Tom Merritt about the availability of 100 ksi plate steel.
4. Determine plating and bolting requirements for both the design load and the actual member load and compare the results.
5. Review the advantages of using a composite deck.
6. Review both symmetric and non-symmetric deck pouring sequences.
7. Develop conceptual requirement of using PT bar instead of plates and determine possible anchorage requirements.
8. Study the impact on the structural system of making both the deck and stringers continuous.

MnDOT – Action Items:

1. None noted

Next Meeting: To Be Determined: Tentatively scheduled for end of June 2005. Scott Pierson, Ed Zhou and Don Flemming to coordinate the exact meeting time.

David Long prepared these meeting minutes. If there are any corrections to these minutes, please contact David at 612.373.6394 or email at david_long@urscorp.com.

URS

EXHIBIT NO: 2
Date: 4-15-08
JULIE A RIXE
COURT REPORTER

March 24, 2006

Mr. Gary Peterson, PE
Bridge Office
3485 Hadley Avenue North
Oakdale, MN 55128-3307

RE: Bridge 9340

Dear Mr. Peterson:

Our preliminary recommendations for Bridge 9340 are as described below:

We have used a 3-D computer model, calibrated with field testing results, to identify fracture critical truss members and to study retrofit schemes for improving bridge safety and performance. The bridge safety and performance can be improved if the identified fracture critical members are retrofitted. The bridge redundancy can be also improved if the bridge deck is replaced with a fully continuous deck. The member retrofit and a continuous deck will increase structural redundancy of the bridge system and reduce live load-induced tension stresses in truss members that contain fatigue susceptible details. Our analysis results and recommendations are summarized as follows:

Retrofit of Fracture Critical Truss Members

Eight critical main truss members were selected from one half of each truss for the investigation of structural redundancy and retrofit need. The eight members actually represent thirty-two main truss members due to the nearly double symmetry of the trusses.

The selection of the eight truss members was based on the following criteria:

- Subject to tension under combined dead load and live load
- Containing the fatigue susceptible welded details at the interior diaphragm
- Subject to the highest magnitude of fatigue load stress range

The eight truss members selected based on these criteria are: L3-U4, L1-L2, U0-U1, U4-U5, U3-U4, L4-L5, L12-L13, and L13-L14. A redundancy analysis was performed to evaluate the structural consequence for the sudden failure of each of the eight members. Depending on the load case being considered, it was found that each of the eight members can be fracture critical, i.e., whose failure would result in the failure of at least one other main truss member or connection and thus cause instability of the structural system.

We recommend up to thirty-two main truss members represented by the eight fracture critical members be retrofitted with the steel plating scheme we have developed. The retrofit adds internal redundancy to the member and eliminates the possibility of a member fracture due to the fatigue of the poor welded details at the internal diaphragms. The retrofit also reduces live load stresses at the welded details.

Bridge Retrofit with a Complete Deck Replacement

The existing reinforced concrete bridge deck has a total of seven transverse expansion joints in the truss spans: one at each end of the truss cantilevers, one at the center of each of the three spans, and one at each pier of the center span. Additionally, there is a longitudinal deck joint along the bridge centerline, under the median barriers.

By making the entire bridge deck continuous throughout, our computer analyses have revealed that live load stress ranges decrease approximately 20% in truss members that contain the fatigue susceptible welded detail at the internal diaphragm. Additionally, we have also found that a continuous deck improves the structural redundancy of the bridge.

In summary, the steel plating retrofit of the identified fracture critical members, and/or a continuous deck will improve the safety and performance of the deck truss system.

We are in the process of completing our study and the final report. Please feel free to contact us for any further questions or concerns.

Sincerely,

URS

Donald J. Flemming

Donald J. Flemming, PE
Project Manager

cc: Ed Zhou / Hunt Valley

EXHIBIT NO: 2
Date: 4-15-08
JULIE A RIXE
COURT REPORTER

Preliminary Meeting Minutes: **S.P. 2783-107 Staging of 35W Rehab Project, Traffic Detours and Timing Issues.**

Date: **August 16, 2006** Time: **9:30 AM to 12:00 Noon**
Location: **Metro WE Conference Room 148**

Present: **Rick Post, Geoff Prelgo, Design; Jeff Morey, Mike Engh, Traffic; Dale Nelson, Materials; John Griffith, Area Engineer; Paul Kivisto, Bridge; Eric Embacher, Construction.**

Reason: **Meeting to discuss Various Staging Options, Traffic Impacts, Closures and Detours for Bridge, Pavement and Guardrail Repairs on the 35W Rehab project.**

1. Project has a turn in date of November 15th, 2006 with a projected letting in March of 2007.
2. Jeff & Mike (Traffic) outlined the proposed ramp closings and detours for the various bridges south of the river. Bridges 27880 & 27880A would be split into two separate ramp closures maintaining traffic on one exit, Bridge 27903 would fall inside the Bridge 27880 ramp closure. Bridges 27902, 27879A, 27874 each will have a full ramp closures in place. Bridges 27873, 27879, 9340, 27888, 27887 & 27893 will be repaired under traffic in two parts..
3. Mainline bridge repairs on 27879 & 9340 should be staged together using extended lane closures to minimize traffic confusion.
4. Jeff & Mike (Traffic) proposed using a two lane/one lane plan for staging. Stage I work would commence on the inside two lanes throughout the project with various ramp closings south of the river for bridge repair. Single lane traffic would travel in the right lane with shoulders reserved for emergency use only. Stage II would switch traffic to the repaired center and left lanes while the right lane, shoulder and ramp repairs continued. A Stage III would take care of any remaining surface planning and permanent roadway striping. If barrier wall is requested by construction an additional Stage would be added before the project to rebuild the shoulders to support traffic. Little or no traffic would travel on the shoulders if no barrier is used, the use of barrier would require the shoulders for traffic eliminating the any emergency lane for traffic incidents. Traffic expressed concerns with maintaining traffic in two lanes throughout the project as follows:
    a. Current left & right shoulder and drainage structures will not support traffic without major rebuilding.
    b. Grade and pitch of left shoulder uneven and variable for driving surface.
    c. Left shoulder width varies between 7'-9' with pinch points under bridges.
    d. Use of shoulder as a driving lane eliminates emergency stopping area.
    e. Shoulders would have to be rebuilt before main project start.
    f. Additional cost for traffic control and additional staging.
    g. Would require narrow lanes.

   h. Concern over speed limits and two trucks side by side through construction zone.
   i. Traffic would be to close to the barrier, tangent guardrail end treatments, bridge piers and curbs.
   j. Plan would require an Incident Response Plan to address emergencies.

5. Eric Embacher (Construction) will make the decision for using temporary traffic barrier after reviewing project plans and proposed quantities, he will report back in one week.
6. Traffic proposed that the Contractor be required to work a six day week with double shifts during the double lane closure stage of the project, work could revert back to a single shift when 2 lanes are reopened to traffic. Eric stated that this could be accomplished by requiring a shorter time limit for the Contractor to complete the project and /or by requiring the Contractor to rent lanes.
7. Traffic will contact the City of Minneapolis with proposed project details pending a final staging plan; this information will be copied to John Griffith and Geoff Prelgo on discussion.
8. Dale Nelson (Materials) will provide pavement information to Eric about the limits of Continuous Reinforced Pavement on the project.
9. Rick (Design) will provide Eric with preliminary plan sheets for review.

Meeting was adjourned until a final decision for time and traffic is conveyed by construction to all concerned.

Meeting Minutes: S.P. 2783-107 **Staging of 35W Rehab Project, Construction Issues, Clarification of Job Scope and Guard Rail**

EXHIBIT NO: 3
Date: 4-15-08
JULIE A RIXE
COURT REPORTER

Date: **August 24, 2006** Time: **12:00 PM to 2:00 PM**
Location: **35W Project Site, Mn/Dot Car**

Present: **Rick Post, Geoff Prelgo, Design; Eric Embacher, Construction.**

Reason: **Meeting to discuss Various Staging Options, Traffic Impacts, Pavement and Guardrail Repairs on the 35W Rehab project.**

1. Eric discussed his concern about full depth repairs spanning across one lane where two pavement lanes are tied together. The possibility exists where the opening of one lane would relieve the expansion pressure enough to cause the other lane to blow up. There appears to be a change in which two lanes are tied together throughout the project flipping back and forth. In the first stage closing of the left two lanes, the left lane is free; the center lane appears to be tied to the right lane. With traffic carried in the right lane, a full depth repair to the closed center lane could result in a pavement blow up shutting down the only lane open to traffic.

2. Full depth repairs should be completed full lane width at one time.

3. One possibility discussed during the meeting was closing down of I35W in one direction on the weekends to work on full depth concrete repairs. After it was closed it would have to be chained, bad areas removed, then concrete would need to be replaced so that the road could be opened up on Monday morning. If we did this we would have one lane of traffic with the first stage of the project, however we would be able to open up two lanes for the second stage. If we cannot shutdown I35W for a few weekends, we will have one lane open for traffic for both the first and second stages. **Traffic** will recommend if it is feasible to shut down I35W for a few weekend closures. **Construction** or **Design** will coordinate with the Concrete Office to determine if a mix can be designed that would cure fast enough to allow traffic on Monday morning. **Ron Mulvaney from the Concrete office stated that a 12 hour cure time is possible. They can probably come up with something shorter. However there is a trade-off in strength.**

4. If weekend closures are not a possibility, a contingency plan may be needed to address pavement blow. If needed **Design** will coordinate with Brian Kary on Incident Management Plan.

5. Check if we need a chain of custody paper trail for the removal of dirty soils located under the guardrail. **Design** will check on this and the option of addressing the removal as minor site grading as a lump sum.

6. Many loop detectors are located within the roadway and ramps, they need to be identified and included in the plan. **Design** will coordinate this.

7. A concern of Dale Nelson was relayed to Eric about the proposed milling of 2" on the frontage roads. Dale is concerned about the remaining 1" of bituminous being able to support construction traffic during paving operations. Dale made the decision to change the milling to 1 ½" with a 1 ½" bit overlay.

8. Water is seeping out of the right of way SB 35W across from the identified site on the NB lanes. **Materials** will investigate a potential problem in this area.

9. Buckled concrete filler panels should be repaired in two locations atop the current concrete barrier wall in the median. **Design** will add this into the plan.

10. The inside bituminous shoulder will be removed and replaced full depth in the area of new median concrete barrier. This will eliminate compaction problems and reflective cracking. Inside median drains will be reinforced to support traffic.

11. Current guardrail installations NB & SB 35W protecting the bridge piers at 4th & University Avenue should be addressed with concrete barrier wall and new end treatment transitions to bring up to standard. **Design** will add this into the plan.

12. Routing traffic onto the shoulder areas would result in pinch points at bridge locations in the median due to narrowing.

13. **Construction** will handle the placement of field office and material storage while the project is being built.

EXHIBIT NO: 7
Date: 3-28-08
JULIE A [illegible]
COURT REPORTER

08/02/2007
Crew Number: 7627
Inspector: DISTRICT9

Mn/DOT BRIDGE INSPECTION REPORT

BRIDGE 9340 **I 35W OVER RR, MISS R, 2ND ST & RD** **INSP. DATE: 09-26-2001**

County: HENNEPIN
City: MINNEAPOLIS
Township:
Section: 25 Township: 029N Range: 24W
Span Type: CSTL BEAM SPAN
NBI Deck: 5 Super: 4 Sub: 6 Chan: 8 Culv: N

Location: 1.0 MI NE OF JCT TH 94
Route: ISTH 35W Ref. Pt.: 018+00.538
Control Section: 2783 Maint. Area: METRO
Local Agency Bridge Nbr:

Length: 1,907.0 ft
Deck Width: 113.3 ft (Varies)
Rdwy. Area / Pct. Unsnd: 201,511 sq ft
Paint Area / Pct. Unsnd: 490,200 sq ft 15 %

Open, Posted, Closed: OPEN
Appraisal Ratings - Approach: 8 Waterway: 8
MN Scour Code: L-STBL;LOW RISK
Def. Stat: S.D.
Suff. Rate:
Required Bridge Signs - Load Posting: NOT REQUIRED
Traffic: NOT REQUIRED
Horizontal: NOT REQUIRED
Vertical: NOT APPLICABLE

STRUCTURE UNIT: 0

ELEM NBR	ELEMENT NAME	ENV	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4	QTY CS 5
22	LS O/L (CONC DECK)	2	09-26-2001	1 SF	0	0	1	0	0
			04-03-2000	219,086 SF	0	0	219,089	0	0
	Notes: 3 lanes + on/off ramp each direction (2 ft. shoulders). [1978] Low slump overlay (extensive full-depth repairs). [1993] Minor spalls & patched areas along finger jonts. [1998] Median copings replaced (stay-in-place steel forms), exterior copings patched with "gunnite". [1998] Partial chaining of NBL found 1,665 SF of delamination & 47 SF of spall. [1999] Ground penetrating radar survey (FWHA) found deck to be 6% unsound.								
48	LS O/L (CONC SLAB)	2	09-26-2001	1 SF	0	1	0	0	0
			04-03-2000	219,086 SF	0	219,089	0	0	0
	Notes: Spans 12-14 have a 2 ft. deep CIP concrete voided slab (continuous).								
300	STRIP SEAL JOINT	2	09-26-2001	946 LF	906	40	0	N/A	N/A
			04-03-2000	946 LF	746	50	150	N/A	N/A
	Notes: [1978] Type H strip seal @ abutments, Pier 11, and stringer expansion joints (7 joints total). [1998] South Abutment joint (SBL) repaired with new product (hot pour with steel mesh). Steel extrusion was too corroded to install new gland. [1995/2000] Pier 11 joint has numerous leaks (SBL & NBL), glands in the stringer joints have pulled out in scattered locations.								
301	POURED DECK JOINT	2	09-26-2001	1,017 LF	1,017	0	0	N/A	N/A
			04-03-2000	1,017 LF	0	356	661	N/A	N/A
	Notes: Deck has 1,017 LF of transverse poured joints. [1997] All have leaching below (with some deck spalling).								
303	ASSEMBLY DECK JOINT	2	09-26-2001	326 LF	216	110	0	N/A	N/A
			04-03-2000	326 LF	0	326	0	N/A	N/A
	Notes: Open finger joints at truss ends and Span 2 hinge. [1998] Rubber "skirts" installed below truss end finger joints.								
321	CONC APPROACH SLAB	2	09-26-2001	4 EA	0	4	0	0	N/A
			04-03-2000	4 EA	0	4	0	0	N/A
	Notes: [1991] All 4 approach panels have transverse cracks (relief joints need re-sealing).								
331	CONCRETE RAILING	2	09-26-2001	7,628 LF	7,628	0	0	0	N/A
			04-03-2000	7,628 LF	7,628	0	0	0	N/A
	Notes: [1998] Railings re-constructed. Split median J-rail installed (with removeable pre-cast caps). Exterior railings (originally Code 12) were retrofit (32" high concrete face added, horizontal steel railings removed).								
107	PAINTED STEEL GIRDER	2	09-26-2001	10,596 LF	0	9,086	1,400	110	0
			04-03-2000	10,596 LF	1,272	7,947	1,377	0	0
	Notes: [1968] Bridge painted with Lead base system. [98/2000] Numerous fatigue cracks found in approach spans. Cracks were located at negative moment diaphragm connections where the stiffener was not welded to the top flange. In Span 9, the 3rd beam from the east had a 4 ft. long crack in the web (it was reinforced with bolted plates). Most existing cracks were drilled out, and the diaphragm connections were lowered to reduce stress levels. Approach spans have welded beams (depth transitions from 48" to 33"), with riveted connections. Spans 1 & 2 have 33" deep rolled beams with welded cover plates (square ends). [1995] Beams have minor chalking throughout, fascia beams have flaking rust along the bottom flange. [1999] Beams along median (and at hinge) re-painted. Beam ends at hinge have moderate surface pitting. Spot painting contract: truss ends, hinge joints, and area below median painted with zinc system. Paint system is 15% unsound.								

STRUCTURE UNIT: 0

ELEM NBR	ELEMENT NAME	ENV	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4	QTY CS 5
113	PAINT STEEL STRINGER	2	09-26-2001	14,896 LF	0	14,746	0	150	0
			04-03-2000	14,896 LF	1,788	12,960	0	149	0
	Notes: 27" deep rolled stringers (truss spans). [1995] Stringers have corrosion at expansion joints. [1999] Median stringers re-painted. [1991/2000] Stringer/Floorbeam connections are "working". Several bolts are loose or missing.								
131	PAINT STL DECK TRUSS	1	09-26-2001	2,127 LF	0	0	1,912	215	0
	Notes: 20/156/157/161) Main truss members have numerous poor weld details (some cracked tack welds). [1995] Interiors of truss members have severe pigeon debris. [1999] Pigeon screens placed on truss member openings. [1995] Truss members have corrosion at the floorbeam & sway brace connections (with pack rust & some surface pitting).								
152	PAINT STL FLOORBEAM	2	09-26-2001	3,348 LF	0	2,623	725	0	0
			04-03-2000	3,348 LF	0	2,645	703	0	0
	Notes: 33/156/161) [1986] Crossbeam web stiffeners cracked at SE rocker hinge (rocker bearing had frozen). Cracks were welded/drilled out, and bracing was added (attached to approach span beams). [1992/98] Several cracks found in crossbeam & end floorbeam at the NE rocker hinge. Some cracks were drilled out, and bracing was added (attached to approach span beams). [1998/99] End floorbeams & "crossbeams re-painted. The face exposed to the open finger joints have extensive section loss (surface pitting & holes in stiffeners). 33/50/161) Floorbeam trusses have numerous poor weld details (plug welds & tack welds in tension zones). [1994] Floorbeam trusses have chalking throughout. [1999] Median portions of floorbeam trusses (and sway braces) re-painted. Some areas had severe section loss (holes).								
373	STEEL HINGE	2	09-26-2001	18 EA	0	4	0	0	14
			04-03-2000	18 EA	0	4	0	0	14
	Notes: [1986] SE crossbeam rocker hinge pin replaced. [1999] Crossbeam rocker hinge bearings re-painted (all show evidence of recent movement). [1995] Span 2: all hinge bearings are locked in full expansion (beam ends contacting). [1999] Span 2 hinge bearings re-painted.								
380	SECONDARY ELEMENTS	2	09-26-2001	1 EA	0	0	1	0	N/A
			04-03-2000	1 EA	0	0	1	0	N/A
	Notes: [1995] Pinned braces between floorbeam truss & stringers are working.								
311	EXPANSION BEARING	2	09-26-2001	125 EA	81	44	0	N/A	N/A
			04-03-2000	125 EA	81	44	0	N/A	N/A
	Notes: [1994/2000] Some abutmenet bearings are rusty (joints leaking). [1996] South Abutment bearings are in full contraction. [1994] Main truss roller bearings have moderate corrosion.								
313	FIXED BEARING	2	09-26-2001	35 EA	35	0	0	N/A	N/A
			04-03-2000	35 EA	35	0	0	N/A	N/A
	Notes: < none >								
205	CONCRETE COLUMN	2	09-26-2001	52 EA	49	3	0	0	N/A
			04-03-2000	52 EA	49	3	0	0	N/A
	Notes: [1969] Pier 9: East column damaged by train derailment (minor scrapes & spalls). [1993] Pier 7: west column has a vertical crack. [2000] Pier 11: west column has a minor spall. 58/160) [1996] Pier 1 has tipped slightly northward. Likely related to hinge failure in Span 2 (South Abutment bearings are in full contraction).								
210	CONCRETE PIER WALL	2	09-26-2001	168 LF	168	0	0	0	N/A
			04-03-2000	168 LF	168	0	0	0	N/A
	Notes: < none >								
215	CONCRETE ABUTMENT	2	09-26-2001	255 LF	255	0	0	0	N/A
			04-03-2000	255 LF	230	26	0	0	N/A
	Notes: [1991] Both Abutments have minor cracking & staining.								
234	CONCRETE CAP	2	09-26-2001	819 LF	669	150	0	0	N/A
			04-03-2000	819 LF	680	139	0	0	N/A
	Notes: [1998] Pier 11: Cap has extensive "gunnite" repairs.								

Mn/DOT BRIDGE INSPECTION REPORT

BRIDGE 9340 **I 35W OVER RR, MISS R, 2ND ST & RD** **INSP. DATE: 09-26-2001**

STRUCTURE UNIT: 0

ELEM NBR	ELEMENT NAME	ENV	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4	QTY CS 5
356	FATIGUE CRACKING	2	09-26-2001	1 EA	0	1	0	N/A	N/A
			04-03-2000	1 EA	0	1	0	N/A	N/A
	Notes: [1998/2000] Numerous fatigue cracks found in approach spans. Cracks were located at negative moment diaphragm connections where the stiffener was not welded to the top flange. In Span 9, the 3rd beam from the east had a 4 ft. long crack in the web (it was reinforced with bolted plates). Most existing cracks were drilled out, and the diaphragm connections were lowered to reduce stress levels.								
357	PACK RUST	2	09-26-2001	1 EA	0	1	0	0	N/A
			04-03-2000	1 EA	0	1	0	0	N/A
	Notes: [1995] Truss members have corrosion at the floorbeam & sway brace connections (with pack rust & some surface pitting).								
358	CONC DECK CRACKING	2	09-26-2001	1 EA	0	1	0	0	N/A
			04-03-2000	1 EA	0	1	0	0	N/A
	Notes: [1993] Overlay has 3,000 LF of transverse cracks. [1998] Cracks sealed.								
359	CONC DECK UNDERSIDE	2	09-26-2001	1 EA	0	0	1	0	0
			04-03-2000	1 EA	0	0	1	0	0
	Notes: [1997/98] Underside of deck has a moderate amount of transverse leaching cracks, with some areas of leaching map cracks & spalling (particularly in the north approach spans). [1998] Removal of median copings damaged deck in adjacent bays (some areas have been patched).								
360	SETTLEMENT	2	09-26-2001	1 EA	1	0	0	N/A	N/A
			04-03-2000	1 EA	1	0	0	N/A	N/A
	Notes: < none >								
363	SECTION LOSS	2	09-26-2001	1 EA	0	1	0	0	N/A
			04-03-2000	1 EA	0	1	0	0	N/A
	Notes: < none >								
981	SIGNING	2	09-26-2001	1 EA	1	0	0	0	0
			04-03-2000	1 EA	1	0	0	0	0
	Notes: OH Sign bridge mounted on exterior railings at north end of truss, sign post mounted on west rail at south end of truss.								
982	GUARDRAIL	2	09-26-2001	1 EA	1	0	0	N/A	N/A
			04-03-2000	1 EA	1	0	0	N/A	N/A
	Notes: [1998] Approach guardrail repaired (new impact attenuator at NB off ramp).								
984	DRAINAGE	2	09-26-2001	1 EA	0	0	1	N/A	N/A
			04-03-2000	1 EA	0	0	1	N/A	N/A
	Notes: Pier 6: Horizontal drain trough has inadequate slope (usually clogged). [1998/99] Drain troughs below truss end finger joints removed & replaced with rubber "skirts". [2000] "Skirts" above crossbeam rockers are clogged.								
985	SLOPES	2	09-26-2001	1 EA	1	0	0	N/A	N/A
			04-03-2000	1 EA	1	0	0	N/A	N/A
	Notes: [1994] North Abutment slope paving has 20 LF of horizontal cracks.								
986	CURB & SIDEWALK	2	09-26-2001	1 EA	0	1	0	N/A	N/A
			04-03-2000	1 EA	0	1	0	N/A	N/A
	Notes: [1993] Curb below exterior railings have spalling & delamination.								
988	MISCELLANEOUS	2	09-26-2001	1 EA	0	1	0	N/A	N/A
			04-03-2000	1 EA	0	1	0	N/A	N/A
	Notes: Rail mounted deck lighting, under deck lighting, and river navigation lights. [1994] Light post on west rail ("W5/3 L") has a 6" vertical split (plow damage). [1999] Automated de-icing system installed on deck (control room constructed on NW approch corner).								

Mn/DOT BRIDGE INSPECTION REPORT

BRIDGE 9340 **I 35W OVER RR, MISS R, 2ND ST & RD** **INSP. DATE: 09-26-2001**

STRUCTURE UNIT: 0

ELEM NBR	ELEMENT NAME	ENV	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4	QTY CS 5

General Notes: *Bridge #9340, Year 2001 Bridge Constructed in 1967. See "Fracture Critical" Report for additional information.

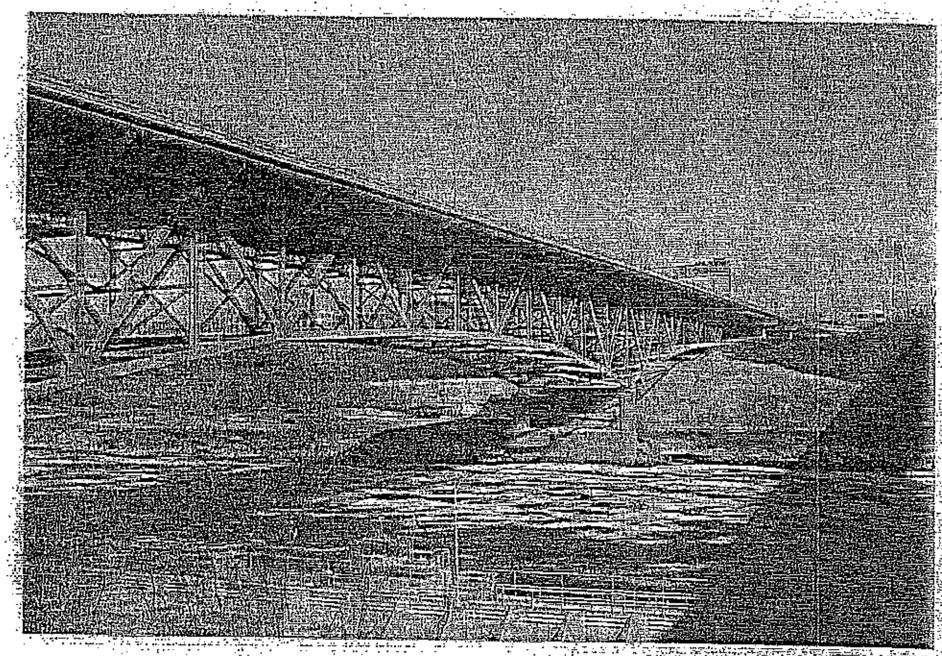
Inspector's Signature

Reviewer's Signature / Date

EXHIBIT NO. 2
Date [illegible]

Response of Interest for:

Fatigue Evaluation
Bridge 9340
35W Over Mississippi River



Prepared for:

Mn/DOT

Prepared by:

URS

Thresher Square
700 Third Street South
Minneapolis, MN 55414-1199

March 28, 2003

URS

March 28, 2003

Mr. Robert J. Miller
Bridge Agreements Engineer
Minnesota Department of Transportation
Offices of Bridges and Structures
3485 Hadley Ave. North
Oakdale, MN 55128-3307

RE: Request for Interest (RFI)
Fatigue Evaluation for Bridge 9340: TH 35W over Mississippi River

Dear Mr. Miller:

We are pleased to respond to this Request for Interest in preparing a scope of work for the TH 35 W Bridge Fatigue Evaluation Project. URS has an exceptionally well qualified team that is experienced on similar projects, understands the history of the bridge, and is able to deliver a quality engineering study to the Minnesota Department of Transportation.

This response of interest has been prepared to specifically address the following items as requested in your RFI:

- Project Objectives
- Project Approach/Work Plan
- Project Staff
- Project Deliverables/Timeline
- Relevant Projects

The TH 35W bridge presents a unique opportunity for URS and the Department to evaluate the fatigue and fracture characteristics of this structure and develop necessary retrofit and repair measures to best serve the public. As an older steel bridge with non-redundant main spans, fatigue problems and bridge deck deterioration, it requires experienced engineering judgement to evaluate fracture critical bridge members and to develop retrofit and repair measures. Our URS team will provide Mn/DOT with the experience and expertise needed to complete this project in a professional, timely, and cost-effective manner that exceeds expectations.

Thank you for the opportunity to respond to this RFI and we look forward to working with you on this project.

Sincerely,
URS Corporation

Donald J. Flemming

Donald J. Flemming, PE
Project Manager

Thresher Square
700 Third Street South
Minneapolis, MN 55415-1199
612.370.0700 Tel
612.370.1378 Fax

PROJECT OBJECTIVES

The following is our understanding of the primary project objectives for a fatigue/fracture evaluation of the deck truss-arch spans of Bridge 9340, as outlined in the Mn/DOT RFI:

1. Identify critical superstructure members that are most susceptible to fatigue/fracture failures. Evaluate their fatigue strengths, or remaining fatigue lives, under the cyclic stresses due to service loads.
2. Evaluate structural consequences for the loss of any one of the critical members (redundancy analyses)
3. Determine the necessity for repairs and establish most suitable repair methods and details as needed
4. Develop preferred schemes of deck replacement to minimize member stresses

PROJECT APPROACH/WORK PLAN

Data Collection: URS will begin the project with assembling all necessary information and materials from the Mn/DOT Records Center and Bridge Office files. The information to be collected will include, but not limited to, bridge plans, piling reports, shop drawings, material records, traffic history, inspection reports, as well as the study reports and strain measurement records of the University of Minnesota.

Cooperation with the University of Minnesota: URS will use the results of field strain measurements of the University of Minnesota in calibrating the computer model and in determining the stress range histogram in certain truss members. If we determine the needs for additional processing of existing data or additional field instrumentation as the project develops, we will discuss different options with Mn/DOT regarding whether URS or the University would provide any additional work. We will willingly cooperate with the University in all aspects of the project as directed by Mn/DOT.

Development of a 3-D Computer Model: URS has extensive experience in 3-D finite element analyses of complex bridge structures, including trusses and arches. We will develop a 3-D space frame model of the bridge including all structural steel members and the concrete deck. All truss/bracing members will be rigidly connected at the joints to resemble the reality and to be able to evaluate the effects of secondary bending. Bridge piers will also be included in the model for the effects of their stiffness to bridge responses under live and temperature loads. The composite actions between various superstructure elements, e.g. the deck, stringers, floorbeams and trusses, will be properly simulated. Connections at the end expansion joints to the approach spans will also be considered in the model. Support conditions of the superstructure at expansion bearings will have the capabilities of being adjusted for simulating an ideal expansion bearing (a roller), a frozen expansion bearing (a pin or a rigid connection), or a partial expansion bearing (a linear or nonlinear spring) based on field-determined stiffness.

Condition Assessment of Bridge Bearings, Joints and Piers through Field Measurements: URS will perform necessary measurements to assess the actual performances of all bridge bearings and the expansion joints to the approach spans for evaluating their impact to truss member forces. We will measure bridge movements at the bearings/joints, as well as the movement of the piers, with temperature changes and/or under the live load. These measurements will provide basis for setting proper support/restraint conditions of the computer model under thermal and live loads. Although frozen expansion bearings bring a benefit of reducing live load forces in certain truss members due to the frame/arch effect, adverse tensile forces are induced in truss members during temperature drops. This may potentially raise the risk of fracture in combination with lowered material toughness in cold temperatures. URS engineers are highly experienced in measuring structural strains and displacements using various instruments. We will discuss different options and finalize an effective instrumentation plan with Mn/DOT. Measurements of bearing movement and rotation and pier top movement with temperature changes, daily and/or seasonally, can be made with commercially available high-precision laser survey equipment with carefully selected/installed stationary targets as references. Bearing/pier rotation may also be directly measured with an inclinometer. Relative movements between the bridge superstructure and the top of piers as well as at end expansion joints can be measured with displacement transducers. Our experience indicates that the restraint/stiffness of old expansion bearings may be highly non-linear and highly variable. Conditions of expansion bearings can also be assessed in a short test by using strain gages under the live load. Readings of average axial strain from truss members framed into the joint at a bearing can be used to determine whether equilibrium of force is maintained in the longitudinal direction. Any unbalance of the longitudinal force components at the joint represents the restraint from the bearing.

Calibration of the Computer Model: Using the bridge bearing/joint/pier measurements and available strain measurement results from the University of Minnesota, URS engineers will calibrate and adjust our computer model for boundary conditions, including the stiffness of expansion bearings, piers and expansion joints to the approach spans. After the calibration, the model should be able to generate member forces and support movements in reasonable agreement with the measurement results.

Strength Evaluation/Ratings of Superstructure Members: After the calibration, we will use the computer model to perform structural analysis for dead, live and thermal loads. Critical loading combinations will be determined in accordance with the AASHTO load groups. The live load will be based on up to five vehicles identified by Mn/DOT.

Strength ratings for the five vehicles will be performed per AASHTO Manual for Condition Evaluation of Bridges, 2nd Edition, 2000, with interim revisions through 2003. For the effects of temperature and live loads, two extreme support conditions will be considered for expansion bearings (i.e., rollers and rigid connections) and the strength rating of each member will be governed by the condition that results in a higher force.

Identification and Tabulation of Tension Members with Fatigue Details and Loading Stresses: URS will first identify tension truss members that are potentially subject to fatigue/fracture failures. Truss members that remain in compression throughout their service life can be omitted for fatigue/fracture evaluation. A review of available information has indicated that most truss members of Bridge 9340 are welded built-up box sections while some diagonals and verticals are welded H-sections. The connections are both riveted and bolted. The truss members have numerous poor welded details, including intermittent fillet welds, welded longitudinal stiffeners and welded attachments at diaphragms inside tension members. These details are classified as Categories D and E per current AASHTO fatigue provisions. Steel corrosion and pack rusting have also been noted in recent inspections. Upon completion of data collection and review, URS will tabulate all identified tension truss members with descriptions of existing fatigue susceptible details, their AASHTO fatigue categories, and loading stresses (axial stresses due to dead load, live load, temperature load if any, respectively, and their combinations). The most critical fatigue/fracture members will be identified with the consideration of both the live load stress range for fatigue and the total tensile stress for fracture.

Identification of Fracture Critical Members and Design of Contingency Repairs: URS is highly experienced in redundancy analysis of steel truss bridges, for both new designs and existing structure evaluation. We will use the calibrated computer model to identify fracture critical members in the superstructure. Under the dead and live loads, each tension truss member will be removed from the model and a stiffness analysis will be made. Under the influence of load redistribution, all remaining members will be checked for possible tension or compression failure. If one or more member(s) is overstressed to failure, the failed member(s) will be removed from the model in addition to the member initially removed. After a stiffness analysis in this condition, if any additional member failure is possible or the structure is statically unstable, then the initially removed member is identified as a fracture critical member. This procedure will be repeated for all tension members. The effect of temperature changes and dysfunctional bearings will also be considered in the analysis, with attention paid to the impact of a sudden release of partially frozen expansion bearings. The criteria for member failure will include the member sections as well as connections/joints. We will consider all possible failure modes, including compression failures due to buckling/yielding and tension failures due to fatigue/fracture/yielding. URS will identify at least eight fracture critical members that contain critical fatigue susceptible details and design contingency repairs for each member to be utilized by Mn/DOT if/when cracking is discovered. The repair schemes will improve the structural redundancy by adding load-carrying elements to the member (e.g. plates, tendons, etc.) and/or by altering global load paths in the superstructure (e.g. making various superstructure elements into composite systems, etc.).

Assessment of Remaining Fatigue Life: Based on the cyclic stresses determined from the computer model and the University of Minnesota's field strain measurements, URS will evaluate the fatigue strength and remaining fatigue life of all identified tension members. The effects of secondary bending in truss members and section loss due to corrosion will also be considered depending on the type of fatigue detail and its location with respect to the member. For each fatigue detail on the bridge, we will select the most suitable fatigue strength, or the S-N curve with a constant amplitude fatigue limit, based on the most recent research results. We will also determine the most suitable yet safe method for calculating the effective stress range from the measured stress range histogram as well as the correlation between the histogram and the traffic count. We will then perform the fatigue evaluation and present the results in terms of the remaining life for each tension member, with a quantified factor of safety based on the actual fatigue strength (S-N curve) of the detail. Additionally, we will assess the fatigue strength, or remaining fatigue life, in accordance with the AASHTO specifications. In our opinion, the following three AASHTO specifications are most applicable to this project: (1) *Guide Specifications for Fatigue Evaluation of Existing Steel Bridges*, 1990, with interim revisions through 1995; (2) *LRFD Bridge Design Specifications*, 2nd Edition, 1998, with interim revisions through 2003; and (3) *Manual for Condition Evaluation and Load Resistance Factor Rating of Highway Bridges* (LRFR), to be issued in spring 2003. The Fatigue Guide Specifications and the LRFR Manual have provisions for using field strain measurements as an alternative method for determining live load stress ranges. URS will summarize our findings of the fatigue evaluation following the requirements of each of these AASHTO specifications as well as the probability of fatigue cracking based on the actual S-N curve.

Development of Redecking Schemes for Minimizing Member Stresses: URS has extensive experience designing bridge deck replacement projects that satisfy various needs, such as reducing critical member stresses and maintaining traffic capacity during construction. We will develop at least four staging and sequencing alternatives for deck removal and replacement over the truss spans. Our schemes will satisfy the traffic needs as specified by Mn/DOT. Key issues include: (1) the potential for significant unsymmetrical loadings to the truss spans; (2) the extent of slab removal prior to placement of the new deck; (3) weight difference between the current deck and the new deck; and (4) the position and weight of temporary traffic barriers and loadings from construction equipment.

We will develop conceptual replacement decks based on cast-in-place and precast, post-tensioned construction methods and we will evaluate use of lightweight concrete to reduce the deck's weight and increase the truss's live load capacity. Composite construction, replacement or modification of stringers, and elimination of intermediate deck joints will be assessed for potential improvement of critical member redundancy and for stiffening the global behavior of the truss spans. A new deck incorporating stiffening girders detailed to furnish composite behavior with the truss could prove to be an effective method for substantially lowering maximum stresses and stress ranges by altering the truss structure's basic response to loading. This approach could also form reliable alternative load paths for many critical truss members. We will utilize the 3-D computer model to determine the stresses and ranges of stress imposed on the structure during each redecking alternative. The alternatives will then be further refined to keep truss member stresses during construction within acceptable levels. Advantages and disadvantages and comparative estimated costs for each deck replacement alternative will also be assessed.

Final Report: URS will prepare a final report for submission to Mn/DOT. The report will summarize our procedure, results and findings of all the project tasks described above. In the report we will present our recommendations on the necessity and methods of repairs to address bridge bearings, fatigue susceptible details, and fracture critical members. We will also recommend preferred schemes of deck replacement for minimizing member stresses.

PROJECT TEAM/MANAGEMENT

Project Key Staff: The URS project key staff members are identified as follows:

- Donald J. Flemming, PE – Project Manager
- Y. Edward Zhou, PhD, PE – Project Engineer
- David D. Long, PE – Assistant Project Engineer
- Thomas D. Jenkins, PE – Quality Assurance and Quality Control Officer

These key staff members will be available throughout the project and their resumes are attached. Mr. Flemming has over 40 years of bridge engineering/management experience and is highly familiar with the requirements, policies and procedures of Mn/DOT. He will be responsible for managing the URS project team and coordinating with the Mn/DOT. Dr. Zhou specializes and has extensive experience in fatigue evaluation of steel bridges. He will lead the engineering efforts in structural analyses, field measurements and fatigue/fracture evaluation and will be the primary writer of the final report. He has performed fatigue/fracture evaluation and retrofit design of several steel truss bridges which are very similar to Bridge 9340. Dr. Zhou was just elected as chairman of the ASCE committee on fatigue and fracture and also teaches graduate course "Fatigue and Fracture in Steel Bridges" at Johns Hopkins University as an adjunct professor. Mr. Long is experienced in structural analysis, design and inspection of various bridge types and will assist Dr. Zhou in executing the project tasks. Mr. Jenkins is the chief bridge engineer and has extensive experience in bridge design, evaluation and rehabilitation of all structural types. He has been the lead designer of several bridge projects that won national awards for excellence and innovation in design and/or deck replacement. Being one of the largest engineering consultants, URS is able to provide highly qualified engineers for completing all tasks in time under the directions of the key staff.

Communication/Coordination with Mn/DOT: Mr. Flemming, the URS Project Manager, will serve as the primary liaison between Mn/DOT and the URS project team. Mr. Flemming, assisted by Dr. Zhou as needed, will maintain proper and necessary communications with Mr. Paul Kivisto, the Project Manager of Mn/DOT Office of Bridges and Structures. Mr. Flemming will report project progress to Mr. Kivisto on a regular basis. URS will also inform Mn/DOT for any new findings or unexpected issues as the project develops in a timely manner.

Quality Assurance/Quality Control (QA/QC): URS is committed to providing quality and timely service to Mn/DOT. To ensure that this commitment is achieved, we have established a QA/QC program. The Project Manager and the Project Engineer will develop a detailed work plan for each assignment, including a detailed scope of work and schedule. This work plan will be distributed to all staff working on the assignment. Detailed checking will be performed for all analysis, design, and contract documents. The final documents/report will go through a thorough independent technical review by Mr. Jenkins, the URS QA/QC officer, before submittal to Mn/DOT.

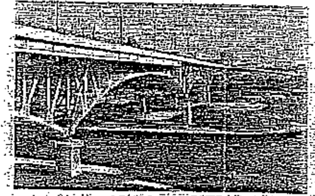
PROJECT DELIVERABLES AND TIMELINE

It is assumed that an agreement will be executed and work will start in May 2003. URS will deliver three copies of the final report and one copy of the structural assessment calculations to Mn/DOT within 16 months of contract execution. We will attend all interim project status meetings and submit all interim reports as required by Mn/DOT.

RECENT RELEVANT PROJECTS

Three recent URS projects relevant to the fatigue/fracture evaluation of Mn/DOT Bridge 9340 are shown below:

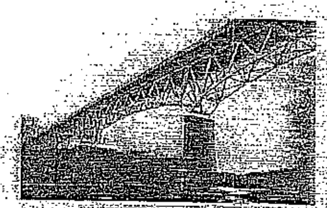
Cleveland Central Viaduct (I-90 over Cuyahoga River), Cleveland, Ohio



Client/Year: Ohio Department of Transportation/2001
Bridge Type: Deck Trusses with Welded Steel Girder Approaches
URS Scope: Strength Ratings, Fatigue Evaluation and Repair Recommendations

Constructed in 1959, the 8-lane, riveted steel structure consists of nine-span continuous cantilevered deck trusses flanked by continuous span girder approaches. URS performed in-depth structural analyses using several space frame computer models to identify critical members for strength and fatigue. All members were tabulated for AASHTO strength ratings and tension members identified for fatigue assessment after critical fatigue details were identified. An analytical fatigue evaluation using the fatigue truck following the procedure in *AASHTO Guide Specifications for Fatigue Evaluation of Existing Steel Bridges* indicated insufficient fatigue strength for the continuing service. Consequently, URS performed field measurements of strains in identified fatigue-critical members under controlled test vehicle and normal traffic. Secondary stresses in truss members due to joint fixity and laterally framed members, as well as stress increases at corroded sections were also evaluated in the test program. Based on the stress range histograms measured over a two-week period, URS determined the effective stress ranges for the critical members. In accordance with applicable provisions in the AASHTO Fatigue Guide Specifications, URS determined the remaining fatigue life of the structure and made recommendations for repairs.

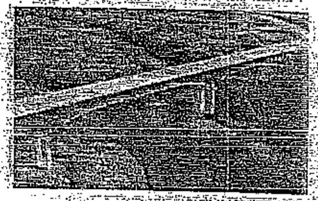
US Route 522 over Potomac River, Hancock, Maryland



Client/Year: Maryland State Highway Administration/2002
Bridge Type: Wichert Deck Trusses and Wichert Girders
URS Scope: Fatigue Evaluation and Retrofit Design

The 2,577-ft long steel structure consists of continuous Wichert truss spans and continuous Wichert girder spans. Constructed in 1939, the steel superstructure is made of riveted built-up members, riveted and bolted connections, as well as some welds. The structure has a history of fatigue problems with cracks in the gusset plate around the top pin of rhomboids, stringer-to-floorbeam connections, and most recently, in the web of floorbeams between the stringer connection plate and the bottom flange. URS conducted an emergency field inspection after long fatigue cracks were found in a steel floorbeam and directed on-site hole-drilling for crack arrest. Subsequently, URS performed in-depth structural analyses with a space frame computer model to assess stress variations in the critical fatigue details due to live load. It was concluded that the fatigue problems were primarily caused by the unintended composite action between the floor system and the main trusses/girders in combination with the low stiffness of many connections. The general retrofit scheme was to strengthen the connection for longitudinal shear between the floor system and the main trusses/girders and to strengthen the connections between the stringers and the floorbeams. URS developed contract drawings and part of the retrofit construction was completed in 2002.

Route 33 over Lehigh River, Easton, Pennsylvania



Client/Year: Pennsylvania Department of Transportation/2002
Bridge Type: Steel Deck Trusses
URS Scope: Preliminary and Final Designs with Redundancy Analysis

URS performed preliminary and final designs of the four-span continuous steel deck truss bridge with a main span of 594 ft. Structural redundancy was given special consideration for this two-truss system. A 3-D space frame model was developed to determine structural consequences when each tension member was removed individually under the dead and live loads. Member design forces under these circumstances were determined and critical members for maintaining structural integrity under redistributed loads were identified. The design maximized structural redundancy by taking some special measures. The top chord was made composite with the deck to obtain the redundancy. The deck reinforcement was increased and mechanically spliced to provide required tension capacity. The stringers and floorbeams were made composite to the deck to increase the integrity of the floor system. Internal redundancy was provided for fracture critical bottom chord members by adding steel plates on each side of the welded H-section. The elements were designed for extreme event loading assuming any one of the three elements failed. These special considerations significantly increased the redundancy of the structure.

Donald J. Flemming, PE
Senior Bridge Engineer

Experience

Donald Flemming is a Senior Bridge Engineer in URS' Minneapolis office. His responsibilities include coordination of bridge engineering projects for Central Region One. He has 42 years' transportation and bridge engineering experience including 14 years as State Bridge Engineer for the Minnesota Department of Transportation (Mn/DOT).

Bridge Design and Rehabilitation

Major bridge projects which Mr. Flemming has been involved with include:

- I 35w Bridge over the Mississippi River repairs and rehabilitation, Minneapolis, MN
- High Bridge over the Mississippi River, St. Paul, MN
- Lake Street Bridge over the Mississippi River between St. Paul and Minneapolis, MN
- I-94 Dartmouth Avenue Bridge over the Mississippi River between St. Paul and Minneapolis, MN
- Blatnik Bridge rehabilitation over the Duluth harbor, Duluth, MN
- I-90 Dresbach Bridge over the Mississippi River, Dresbach, MN
- North Star Bridge over the Minnesota River, Mankato, MN
- Mendota Bridge rehabilitation over the Minnesota River in Mendota, MN
- Bong Bridge over the Duluth harbor, Duluth, MN

Education

Bachelor of Science in Civil Engineering, University of Minnesota, 1961

Professional Registrations/ Affiliations

Registered Professional Engineer – Minnesota and North Dakota

American Society of Civil Engineers

National Society of Professional Engineer

Minnesota Surveyors and Engineers Society

TRB Steel Bridge Committee

TRB Steel Fabrication Committee

TRB General Structures Committee

TRB Concrete Committee

Work History

URS Corporation, Director of Bridge Engineering (2001 to Present)

Mn/DOT: State Bridge Engineer (1986 to 2000)

Various Bridge Engineering Positions (1961 to 1986)

Y. Edward Zhou, PhD, PE
Structural Engineer

Experience Summary

Dr. Zhou has 17 years, including 9 years with URS, he has extensive experience in bridge evaluation through combined finite element analysis and field strain/displacement measurement. He has exceptional expertise in fatigue/fracture analysis of steel bridges. His experience also includes analysis, design, inspection, evaluation and repairs of all types of bridges.

Key Projects

Cleveland Central Viaduct (I-90 over Cuyahoga River), Ohio. Performed space frame structural analysis for strength ratings and fatigue/fracture evaluation of the 50-year old 9-span continuous riveted steel deck truss bridge. Conducted field strain measurements in critical members for stress range histograms under normal traffic. Determined remaining fatigue life of the structure and made repair recommendations.

US Route 522 Bridge over Potomac River, Hancock, Maryland. Conducted emergency inspection after long fatigue cracks were found and directed on-site hole-drilling for crack arrest. Performed fatigue evaluation of the 60-year old steel bridge consisting of continuous Wichert deck truss and Wichert girder spans. Performed space frame structural analysis and designed retrofit for correcting various fatigue problems.

Millard E. Tydings Memorial Bridge (I-95 over Susquehanna River), Maryland. Performed fatigue investigation for various cracks observed in the welded steel floor system of the 11-span cantilevered deck truss bridge built in early 1960's. Designed repairs, bearing replacement at expansion joints above hangers, temporary support system and jacking for fatigue retrofit.

Great Bridge, Chesapeake, Virginia. Performed 3-D finite element analysis of the highly skewed 250-ft span steel truss double-leaf rolling lift bridge with unsymmetrical live load bents. The model included all truss members, portal frame members, lateral braces, segmental girders, and a floor system made of floorbeams, stringers and orthotropical concrete-filled steel grid deck. It produced design forces for all members/connections under dead load at various open positions and live load at the closed position.

Education

BS / 1982 / Civil Engineering / Northern Jiaotong University, China
MS / 1990 / Civil Engineering / Lehigh University
PhD / 1994 / Structural Engineering / Lehigh University

Professional Registrations/ Affiliations

1995 / Professional Engineer / Maryland, No. 21330
1995 / Professional Engineer / Delaware, No. 10086
1999 / Professional Engineer / Virginia, No. 0402 033413
Chairman-Elect of ASCE Committee on Fatigue and Fracture
Member of ASCE Committee on Monitoring Structural Performance
Adjunct Professor of Johns Hopkins University

David D. Long, PE
Senior Structural Engineer

Experience

Mr. Long is a Senior Structural Engineer in URS' Minneapolis office. He is experienced in bridge design, inspection and evaluation studies.

Bridge Design and Studies

Mr. Long has experience in preliminary and final design for a variety of bridge projects including highway, railroad and pedestrian bridges. He has experience in bridge studies, evaluations, inspections, rehabilitation, bridge ratings and has used various modeling techniques including three dimensional space frame modeling. He has experience in the following bridge types: curved and straight welded steel plate girders, pin and hanger welded steel plate girders, rolled steel beam, thru-girder steel railroad bridges, timber trestle railroad bridge, concrete flat slab, and prestressed concrete girder. He has experience with complex bridge layouts requiring high degrees of curvature, sharply skewed substructures and/or kinked girder geometry. Some of these projects include:

- Penn Avenue Bridge No. 27V45. Penn Avenue C.S.A.H. 32 over I-494 (Four Span Single Point Diamond Bridge) in Richfield. Highly complex steel framed bridge with high degrees of curvature and a sharply skewed Superstructure.
- Annual bridge inspections for the Cities of Coon Rapids and Arden Hills.
- Anoka County bridge inspection and repair (involved inspection of two existing prestressed concrete beam bridges and preparation of repair plans and special provisions) in Coon Rapids, MN
- Dartmouth Bridge (bridge inspection, superstructure replacement and widening of a 1000' steel plate girder bridge, I94 over Mississippi River) in Minneapolis, MN
- I-535 Blatnik Bridge (bridge inspection, rehabilitation and widening of an 8000' bridge) conecting Duluth, Mn to Superior, WI.

Education

Bachelor of Science in Civil Engineering, University of Minnesota, 1990

Professional Registrations/ Affiliations

Professional Engineer in the State of Minnesota (24384/1996)
Minnesota Concrete Council (MCC)
American Concrete Institute (ACI)

Work History

URS Corporation Senior Structural Engineer (1998 to Present)
RCM Associates Inc., Structural Project Engineer (1995 to 1998)
Parsons Brinkerhoff Quade & Douglas, Inc., Structural Engineer (1990 to 1995)
Bladholm Bros. Prestress, Structural Engineer (1990 to 1990)

Thomas D. Jenkins, PE
Chief Bridge Engineer

Experience Summary

Mr. Jenkins has 30 years experience, all with URS. He currently serves as Vice President and Chief Bridge Engineer responsible for structural design and direction of bridge projects. His expertise is in bridge analysis and design in structural steel, reinforced concrete, and prestressed concrete, including long-span steel truss bridges. He has extensive experience in evaluation of and retrofit design for existing structures exhibiting distress.

Key Projects

Cleveland Central Viaduct Bridge (I-90 over Cuyahoga River), Ohio. Load rating analysis, fatigue evaluation, strain gauge testing, and rehabilitation and widening studies for a nine-span continuous steel cantilever deck truss (2,720 feet long).

US Route 522 Bridge over Potomac River, Hancock, Maryland. Fatigue evaluation of steel bridge consisting of continuous Wichert deck truss and Wichert girder spans including space frame structural analysis and preparation of retrofit plans for correcting fatigue-related cracking.

Lehigh River Bridge, Easton, Pennsylvania. Preliminary and final design development for this 1,800-foot-long, four-span composite steel truss with a main river span length of 594 feet. Design included a complete structure three-dimensional analysis used for identification of non-redundant tension members which were then detailed to provide redundant elements.

Fracture Critical Bridges, Statewide, Michigan. Development of an inspection guide for the Michigan Department of Transportation's fracture critical bridges. Included evaluation of all welded and fatigue-sensitive details on the bridges.

Fracture Review for Hoan-Like Details, Maryland. Performed detail review and provided retrofit recommendations for steel girder fracture critical bridges potentially having tri-axial constraint at bracing connections similar to conditions responsible for brittle fracture of the Hoan Bridge.

I-95 over James River, Richmond, Virginia. Superstructure rehabilitation and replacement for two parallel 4,185-foot-long bridges over James River. Pre-constructed composite units were used for nighttime superstructure replacement. Precast filled grid deck panels were used for nighttime deck replacement.

Education

BS / 1972 / Civil Engineering / University of Virginia
ME / 1974 / Civil Engineering / University of Virginia

Professional Registrations/ Affiliations

1978 / Professional Engineer / Maryland, No. 11219
1979 / Structural Engineer / Illinois, No. 4261
1991 / Civil Engineer / California, No. C47439
1996 / Professional Engineer / Michigan, No. 41762

3
Date 9-29-07

URS

Facsimile

Date: May 21, 2003
Page 1 of: 5

To: Don Flemming/David Long
From: Ed Zhou (ed_zhou@urscorp.com) (Tel. 301-670-5461)
Firm: URS/Minneapolis
cc:
Facsimile: (612) 370-1378
Subject: Inspection Check List for Bridge 9340

Message: Don/David,

Please review the attached inspection check list and sketches for bearing movement measurement. Call for questions, comments, or suggestions.

Ed

URS Corporation
200 Orchard Ridge Drive,
Suite 101
Gaithersburg, MD 20878
Tel: 301.258.9780
Fax: 301.869.8728
www.urscorp.com

Inspection Check List for Bridge No. 9340, 35W/Mississipi River
June 9 to 13, 2003

1. Truss Members and Welded Attachments
   (a) typical compositions of the main truss, floor truss and bracing members (e.g., welded box, rolled section, riveted built-up section, etc.)
   (b) physical/corrosion condition of truss members, especially the top chords under expansion joints (pack welds between plates, section loss, etc.)
   (c) physical/corrosion condition of truss member ends between gusset plates
   (d) typical types of welded attachments, especially at the ends of welds.
   (e) welded attachments located inside box sections (if visible?) ←
   (f) VT for Corrosion Loss –

2. Truss Joints/Connections
   (a) typical truss joints/gusset plates
   (b) physical/corrosion conditions, especially under expansion joints
   (c) typical connections between floor truss members and main truss members
   (d) typical connections between stringer and floor truss members
   (e) typical connections between lateral bracing members and main truss members

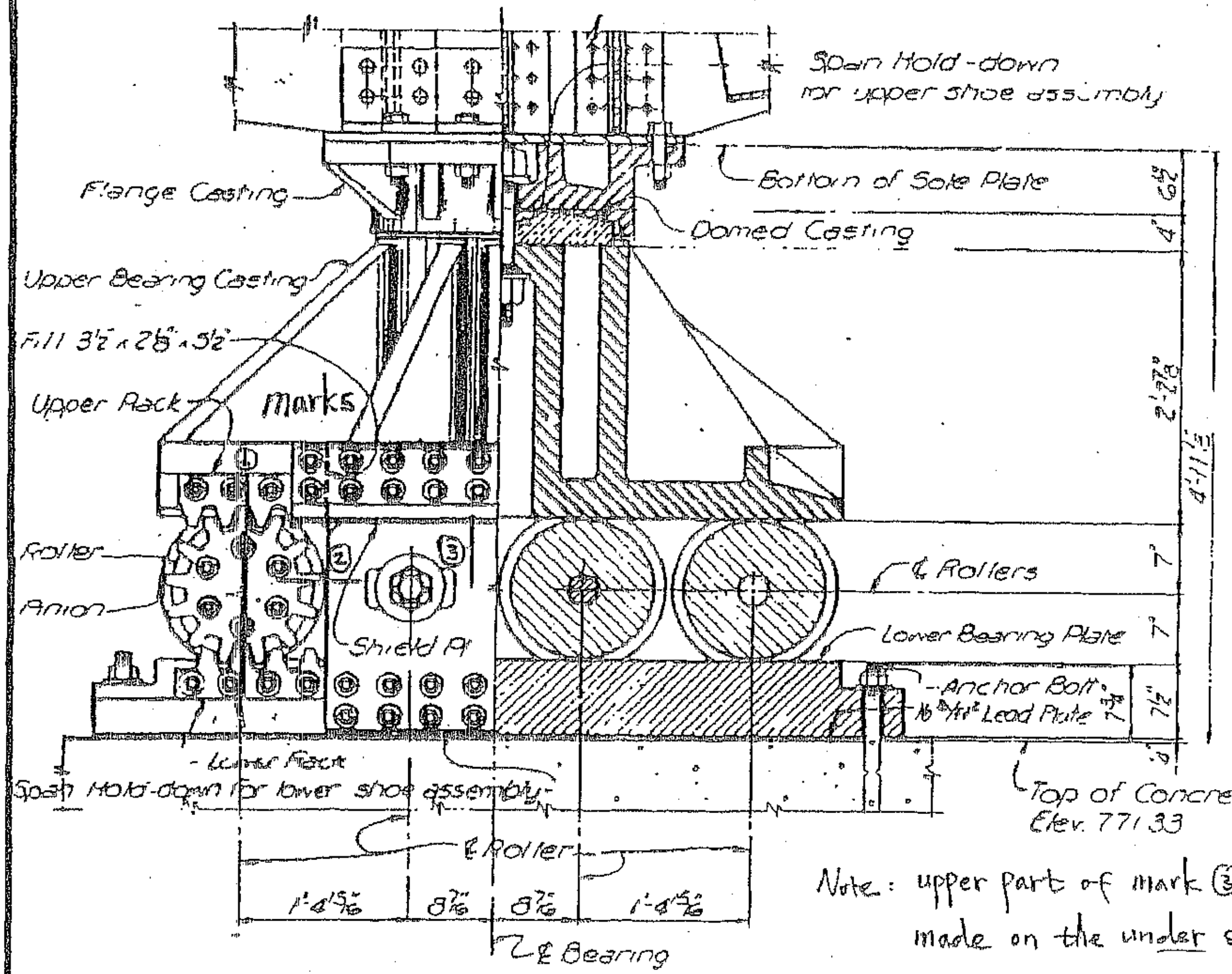
3. Expansion Bearings (expansion at Piers 5, 6 & 8, fixed at Pier 7)
   (a) conditions of bearings and top of pier cap at each pier
   (b) any visible signs of bearing movement?
   (c) make horizontal marks between rollers for measuring relative roller rotations ← Make Level Marks – one –
   (d) make vertical marks between shield plates for longitudinal movement
   (e) make vertical marks between roller and lower bearing plate for longitudinal movement

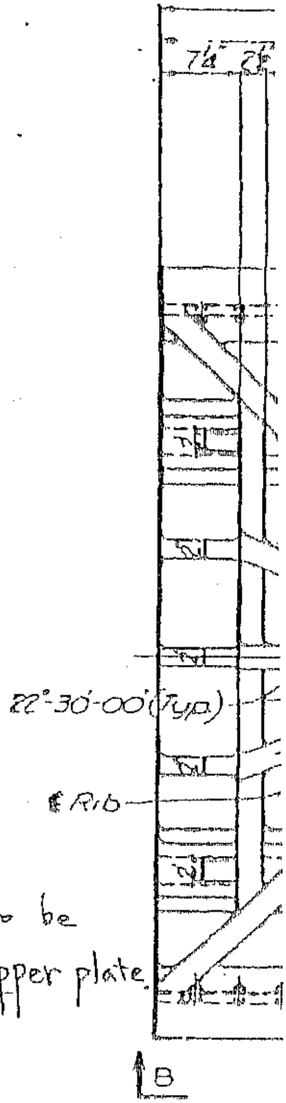
4. Expansion Joints between Truss and Approach Spans
   (a) conditions of truss members and joints under the joint
   (b) conditions of end floorbeams and connections between the floorbeam and trusses
   (c) conditions of connections between end floorbeam and stringers
   (d) conditions of rocker bearings
   (e) any visible signs of movement?
   (f) make marks between the rocker casting and the support casting

5. Deck Expansion Joints
   (a) condition of all deck expansion joints viewed from above
   (b) make marks on the expansion joints for measuring the movement if possible ← Drill or punch
   (c) Record Temp –

Important Notes:

- Take a lot of pictures with a clear photo log for the location and direction of viewing (e.g. "member U8-U9 of E truss, N end, looking E", "E bearing at Pier 6, looking W"). Put all photos and the log in a CD
- Use a scriber and a metal straight edge for making marks on bearings. They will be used for continuous monitoring for at least a year. Make sure the marks are made straight across the moving and permanent parts so any bridge movements will be detected. No marked are necessary on the fixed bearing at Pier 7.



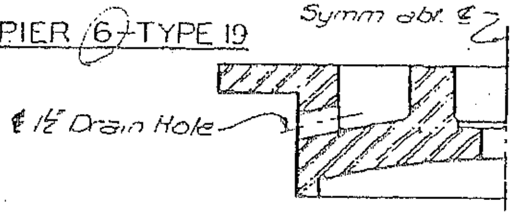


Note: upper part of mark ③ needs to be made on the under side of upper plate.

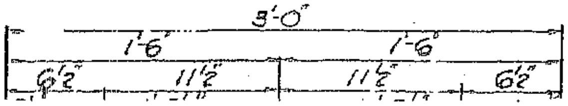
SECTIONAL ELEVATION

EXPANSION BEARING ASSEMBLY FOR PIER (6) TYPE 19

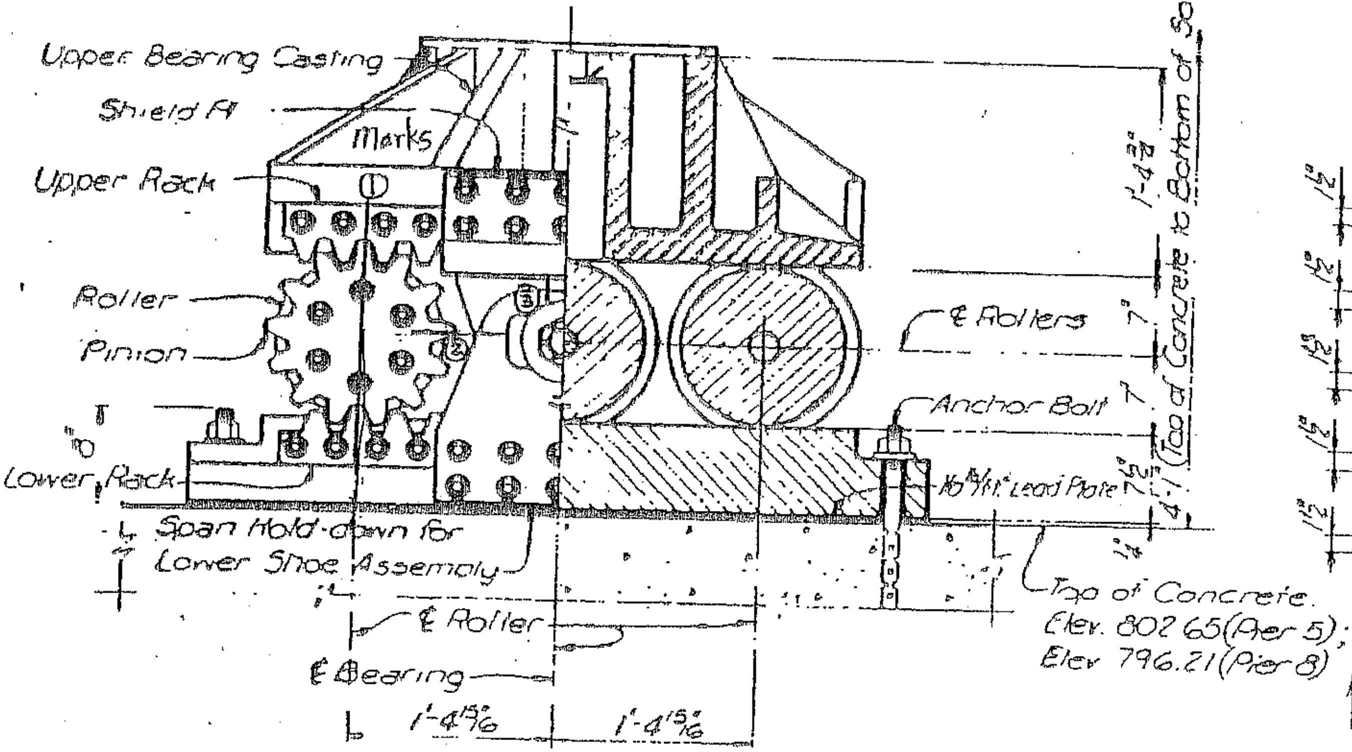
(2 Assemblies required)



HALF SECTION G-G



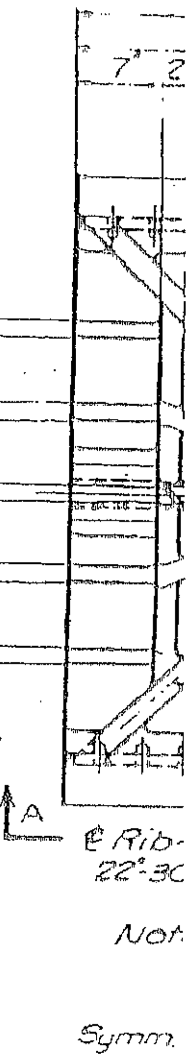
Note Flange Casting, Domed Casting, and Span Hold-down for Upper Bearing Assembly are the same as Expansion Bearings for Pier 6.

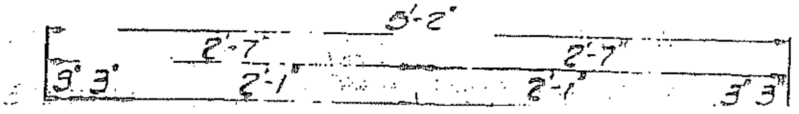


SECTIONAL ELEVATION

EXPANSION BEARING ASSEMBLY FOR PIERS 5 AND 8—TYPE 17

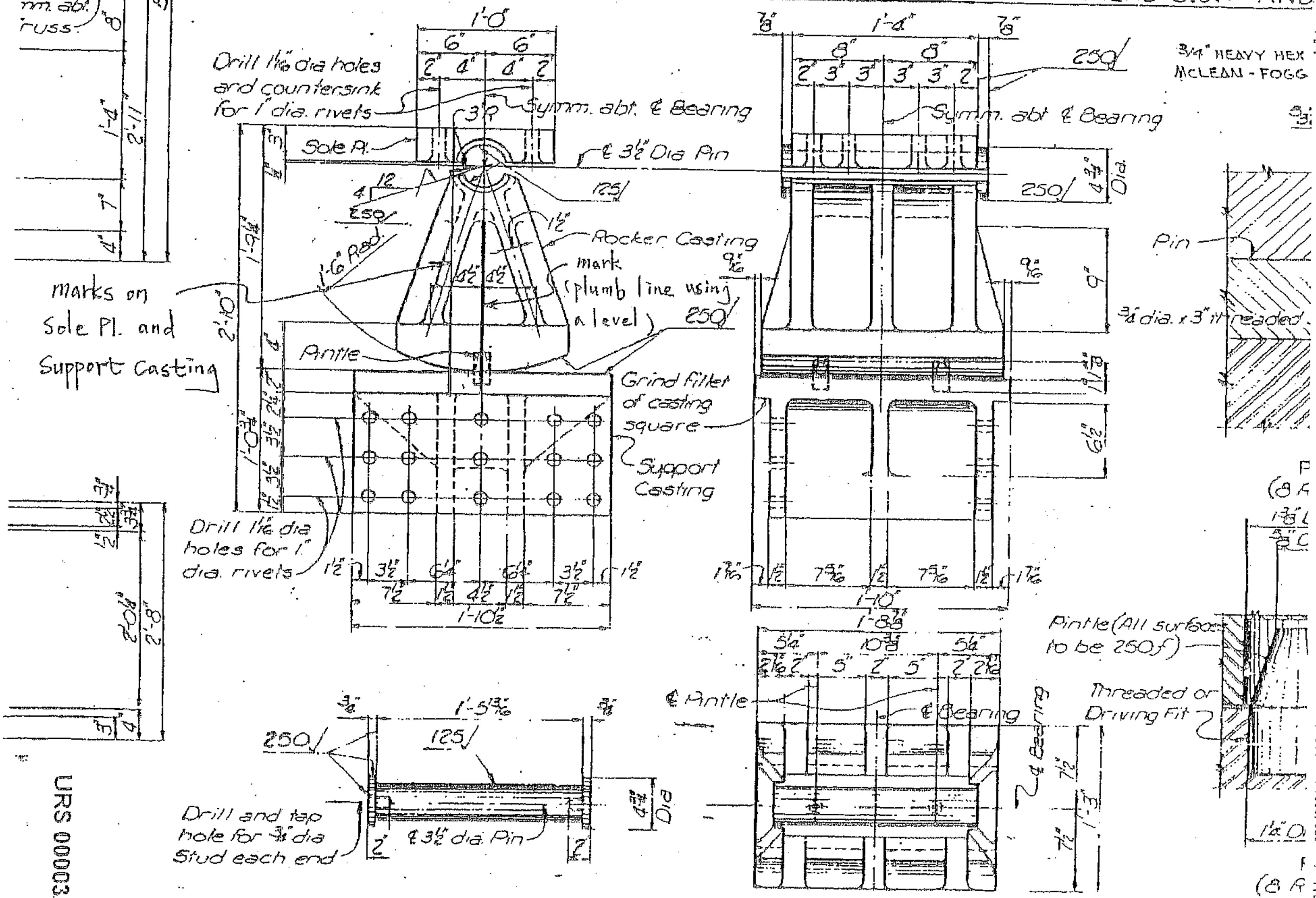
(4 Assemblies required)





MORTAR FILL AND COVER WITH JT SEALER 3/4" TO 1" THICK, TYP.

SPAN HOLD-DOW.. DETAILS FOR BEARINGS AT PIERS 5.6.7 AND



EXPANSION BEARINGS AT PANELS U0 AND U0' — TYPE 20

(4 Required)

Exhibit 5
Date: 9-29-08

Ed Zhou
11/17/2004 09:12 AM

To: David Long/Minneapolis/URSCorp@URSCORP
cc: Don Flemming/Minneapolis/URSCorp@URSCORP
Subject: Re: Final Minutes

I had some new comments on items 8 and 11. This minutes is very important since they are directing us to do something that is kind of out of ordinary or standard. We need to get their approval for the minutes so it serves as a document.

Don, I just learned that Robert Dexter passed away last night due to some kind of acute form of leukemia. I am very sad about that.

Ed

2004-11-15-MM_zhou 2.do

David Long

David Long
11/17/2004 07:48 AM

To: Don Flemming/Minneapolis/URSCorp@URSCorp, Ed Zhou/HuntValley/URSCorp@URSCORP
cc:
Subject: Final Minutes

Ed and Don

Attached are the minute with both of your comments included. If there are no further revisions, they are ready for Don to distribute.

2004-11-15-MM.doc

David D. Long P.E.
Sr. Structural Engineer
URS Corporation
700 Third Street South
Minneapolis MN 55415-1199
Email: david_long@urscorp.com
Phone: 612-373-6394
Fax: 612-373-6522

Exhibit No. 7
Date 4-29-08
[illegible]

Ed Zhou/HuntValley/URSCorp
12/18/2006 11:47 AM

To "DFlemming" <dflemming@ipHouse.com>
cc Don Flemming/Minneapolis/URSCorp@URSCorp, Brett McElwain/HuntValley/URSCorp@URSCORP, David Long/Minneapolis/URSCorp@URSCORP
bcc
Subject Retrofit Recommendations

Don,

Per our discussions last week, here is the revised retrofit recommendations where we provide three options for them to pick from.

Ed

Member Retrofit Recommendations.doc

EXHIBIT 8
Date 4-29-08

URS

Brett McElwain/HuntValley/URSCorp
02/01/2007 11:20 AM

To Ed Zhou/HuntValley/URSCorp@URSCORP
cc
bcc
Subject MnDOT Bridge 9340 Retrofit Design

Ed,

As a follow-up to our discussion today, this is a list of the issues we need to keep in mind for estimating the retrofit design:

1. David already designed the 8 critical members and the corresponding 8 symmetric members (total of 32 when considering the symmetry about the longitudinal centerline). It is my understanding that he has taken into account the asymmetry due to the geometry at the ends of the bridge. However, the additional members that are listed in the final recommendations as being fracture critical will need to be designed (upper chords near piers, etc.). We would need to have the appropriate shop drawings scanned and emailed to David, and I would need to pull forces out of the results and put them in a spreadsheet similar to what was done before. I think 2-3 days is a reasonable estimate. We had discussed 1-2 days, but 3 is probably a more comfortable amount because I will need to immerse myself in the data again.

2. The values I sent to David are not based on the models with the revised rigid link properties for the composite models. As we discussed, the values with the revised rigid link properties are probably not that different and would probably not have a significant affect on the results. However, if you do want to pull these values out it would probably be 1-2 days.

3. The values I sent to David for the live loads are based on the "Main Truss bearings locked, Stringer bearings as-designed" condition. It may be beneficial to also consider the live loads with "Main Truss bearings as-designed, Stringer bearings as-designed" to give us a range of values. From reviewing the numbers I sent to David, the live load can equal or exceed the dead load in some of the members. This may take another 2-3 days.

If I did all three items at one time, I would estimate about 5 days to do everything. The values would be coming out of the same spreadsheets. I estimated the durations above assuming only that task would be done. This is probably on the conservative side, but it has been awhile since I have pulled the numbers for David out of the spreadsheets and I do not recall exactly what all is involved.

Hope this helps. If you need anything else, please let me know.

Brett

9

6-29-08

Don Flemming/Minneapolis/URSCorp
07/19/2007 05:35 PM

To Ed Zhou/HuntValley/URSCorp@URSCORP
cc Mark Maves/Minneapolis/URSCorp@URSCORP
bcc
Subject Fw: 9340

Ed, apparently the Mn/DOT inspection team went ahead without us. I saw them at the bridge and asked if we were not going to get involved? I would like you to be involved if possible, if you could make a meeting on August 20th.

Please advise. I will be out of the Office on Friday and in possibly only late in the afternoon on Monday.

Don Flemming, PE
Vice President
URS
700 Third Street South
Minneapolis, MN 55415
Ph: 612-373-6320
Fx: 612-370-1378

----- Forwarded by Don Flemming/Minneapolis/URSCorp on 07/19/2007 05:31 PM -----

"Todd Niemann" <Todd.Niemann@dot.state.mn.us>
07/19/2007 03:20 PM

To <Don_Flemming@urscorp.com>
cc "Gary Peterson" <Gary.Peterson@dot.state.mn.us>
Subject 9340

Don,

Are you available to meet on Monday, August 20 at 9:30am to review findings of the special inspection conducted on 9340. If you would like to include Ed at this meeting please let me know. If this date does not work for you, could you please provide some alternate date during that week of Aug 20th.

Bridge Office and Metro Inspection conducted a special inspection this summer 9340. Inspection concentrated on critical members identified by URS fatigue and fracture risk study of the structure. The internal box diaphragms and there attachments were the features of principle interest. We will present our inspection results and answer questions in effort to determine if inspection can safely and adequately identify potential critical defects.

NOTICE: NEW PHONE NUMBER

Todd L. Niemann, P.E.

Structural Metals and Bridge Inspection Engineer
AASHTO/AWS D1.5 Bridge Welding Code Chairman
Minnesota Department of Transportation
(651) 366 - 4567 work
(612) 741 - 1413 cellular

----- Message from "Todd Niemann" <Todd.Niemann@dot.state.mn.us> on Thu, 19 Jul 2007 15:12:26 -0500 -----

To: <Bridge Conf Rm 1st Floor.GWBRGPO1.GWBRGDOM@dot.state.mn.us>, "Daniel Dorgan" <Dan.Dorgan@dot.state.mn.us>, "Bill Nelson" <Nels1Bil.GWBRGPO1.GWBRGDOM@dot.state.mn.us>, "Todd Niemann" <Niem1Tod.GWBRGPO1.GWBRGDOM@dot.state.mn.us>, "Gary Peterson" <Pete1Gar.GWBRGPO1.GWBRGDOM@dot.state.mn.us>, "Mark Pribula" <Prib1Mar.GWMETPO1.GWMETDOM@dot.state.mn.us>, "Ken Rand" <Rand1Ken.GWBRGPO1.GWBRGDOM@dot.state.mn.us>, "Kevin Western" <West1Kev.GWBRGPO1.GWBRGDOM@dot.state.mn.us>, "Pete Wilson" <Wils1Pet.GWBRGPO1.GWBRGDOM@dot.state.mn.us>, "Jennifer Zink" <Zink1Jen.GWBRGPO1.GWBRGDOM@dot.state.mn.us>

Subject: 9340

Item Type: Appointment
Start Date: Monday, 20 Aug 2007, 09:30:00am (Central Daylight Time)
Duration: 1 Hour, 30 Mins
Place: Bridge Conf Rm 1st Floor

Review findings of special inspection on 9340. Bridge Office and Metro Inspection conducted a special inspection this summer 9340. Inspection concentrated on critical members identified by URS fatigue and fracture risk study of the structure. The internal box diaphragms and there attachments were the features of principle interest. We will present our inspection results and answer questions in effort to determine if inspection can safely and adequately identify potential critical defects.

10
9-29-08

URS

Job MnDOT
Description Evaluation of I-35W Bridge
Notes from Meeting
Project No. 31809166.01262
Computed by BAM
Checked by
Page ____ of ____
Sheet ____ of ____
Date 9/6/05
Date ____

Reference

Notes (CJL, YEZ, BAM)

- Gusset Plate Buckling - If this occurs, it is not catastrophic
- Bridge Designed Using Allowable Stress
  - We use most current code (Truss Specs)
  - Write up a paragraph about specs
    Factor of safety, for DL, Truss connections, etc.

EXHIBIT NO. 11
Date: 4-24-08

URS

Brett McElwain/HuntValley/URSCorp
06/23/2006 08:16 AM

To Ed Zhou/HuntValley/URSCorp@URSCORP
cc
bcc
Subject Fw: Br. 9340 TH 35W over the Mississippi River investmen strategy

Ed,

I hope your flight to China went well and you are enjoying your vacation so far.

Don and I spoke and exchanged emails on Thursday (6/22) about the Executive Summary. He had a few requests for additions and noted a few typos. Attached is the latest version of the file. I have not heard back from him so I do not know if he is completely satisfied with this version, but I don't anticipate too many more changes. I have also forwarded you what I believe is the complete email correspondence detailing what we changed.

The major item that Don was concerned about was recommendation 4. He is very concerned about stating that a unsymmetrical deck replacement is okay even if our numbers indicate this. I think Don is worried because we have found the truss members are already subjected to bending that was not accounted for in the design which he believes will be worsened by an unsymmetric loading. He is afraid that if the unsymmetrical deck replacement is done, and something goes wrong, someone else could analyze the structure and show that there was bending present. I also think that he is concerned because the symmetrical deck replacement is typically what is done and he is hesitant to recommend something that is out of the ordinary even if it is what MnDOT was hoping for. So, Don asked me to modify the recommendation to make it a little less definitive and to indicate that the symmetrical deck replacement would still be preferable. Don stated that although the site constraints will cause some problems with staging it is not impossible and there was another similar situation in Minneapolis where they were able to do a symmetrical deck replacement.

Could you please review the modified Executive Summary and let me know what you think, especially for recommendation 4? Don would really like your input on that issue and was wondering if you had any reservations about recommending the unsymmetrical deck replacement.

Thanks,
Brett

Executive Summary.doc

****
Brett A. McElwain, P.E.
Senior Structural Engineer
URS Corporation - Maryland
4 North Park Drive, Suite 300
Hunt Valley, MD 21030
Tel: 410-891-9242 (direct)
410-785-7220 (office)
Fax: 410-229-0585 (direct)
410-785-6818 (office)
Email: brett_mcelwain@urscorp.com
****

----- Forwarded by Brett McElwain/HuntValley/URSCorp on 06/23/2006 07:29 AM -----

Brett McElwain/HuntValley/URSCorp
06/22/2006 03:07 PM

To Don Flemming/Minneapolis/URSCorp
cc Mark Maves/Minneapolis/URSCorp@URSCORP
Subject Re: Fw: Br. 9340 TH 35W over the Mississippi River investmen strategy

Don,

Attached is the revised Executive Summary. In addition to the corrections that we discussed I made a slight revision to the first full paragraph on Page 7 by adding a sentence addressing the dynamic impact factor. I don't believe that this had been discussed but should be in order to understand the two tables. I also shifted text around to keep the tables on one page.

Please let me know what you think about how I reworded recommendation 4. I tried to make it a little less definitive and also indicated that a symmetrical redecking is preferable but difficult due to site constraints.

Thanks,
Brett

[attachment "Executive Summary.doc" deleted by Brett McElwain/HuntValley/URSCorp]

****
Brett A. McElwain, P.E.
Senior Structural Engineer
URS Corporation - Maryland
4 North Park Drive, Suite 300
Hunt Valley, MD 21030
Tel: 410-891-9242 (direct)
410-785-7220 (office)
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Email: brett_mcelwain@urscorp.com
****

Don Flemming/Minneapolis/URSCorp

Don Flemming/Minneapolis/URSCorp
06/22/2006 01:03 PM

To Brett McElwain/HuntValley/URSCorp@URSCORP
cc Mark Maves/Minneapolis/URSCorp@URSCORP

Subject Re: Fw: Br. 9340 TH 35W over the Mississippi River investmen strategy

Brett, I have reviewed the executive summary and I just have one more change. On page 12 in paragraph 3 in the second sentence change the shall to should.

In addition to this change please make the changes in adding verbage to state that the numbers shown in tables 1 and 2 are the numbers of additional failures caused by failure of this particular member.

Also I would prefer that we add language stating that even though the analysis indicates that the bridge deck replacement could be staged by removing and replacing one side at a time it would be preferable to keep the dead and live loading as symetrical as possible. This would , however,
require reconstruction of the deck in the center portion of the bridge with traffic being maintained on the outside portions of the deck.

I appreciate all of your work on this difficult project.

Don

Brett McElwain/HuntValley/URSCorp

URS
Brett McElwain/HuntValley/URSCorp
06/22/2006 10:54 AM

To Don Flemming/Minneapolis/URSCorp@URSCorp
cc
Subject Re: Fw: Br. 9340 TH 35W over the Mississippi River investmen strategy

Don,

I have made all the corrections that you requested. Please email me or call if you have any more comments. Once you have completed your review and I have addressed all your comments I will send the file again.

Thanks,
Brett

****

Brett A. McElwain, P.E.
Senior Structural Engineer
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****

Don Flemming/Minneapolis/URSCorp

Don Flemming/Minneapolis/URS Corp
06/22/2006 11:31 AM

To Brett McElwain/HuntValley/URSCorp@URSCORP
cc
Subject Re: Fw: Br. 9340 TH 35W over the Mississippi River investmen strategy

Brett, I found another typo on page 4 the first word in the second sentence in the bottom paragraph should be It and not If. Also I would like to see a sentence in that paragraph that states that it appears that the original design took into accout axial loads only if that is the case from your observation.

In addition in the bottom paragraph of page 5 I would like to change the word eliminated in the first sentence to discounted.

Brett McElwain/HuntValley/URSCorp

Brett McElwain/HuntValley/URSCorp
06/22/2006 09:30 AM

To Ed Zhou/HuntValley/URSCorp@URSCORP
cc Don Flemming/Minneapolis/URSCorp@URSCORP, Mark Maves/Minneapolis/URSCorp@URSCORP
Subject Re: Fw: Br. 9340 TH 35W over the Mississippi River investmen strategy

Don,

I have made a few minor changes to the Executive Summary. The revised file is attached. In case you have already started reviewing the file the changes I made are:

Page 5:

First line on page - removed "and U0".

Second line on page - Changed "0.871 from in-plane bending" to "0.590 from in-plane bending".

Page 7:

Last paragraph on page, fourth line - Capitalized "Chord" in "Upper Chord U0-U1".

Sorry about this. I missed these minor items in the rush to complete this prior to Ed's departure.

Thanks,
Brett

[attachment "Executive Summary.doc" deleted by Brett McElwain/HuntValley/URSCorp]

****
Brett A. McElwain, P.E.
Senior Structural Engineer
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Hunt Valley, MD 21030
Tel: 410-891-9242 (direct)
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Fax: 410-229-0585 (direct)
410-785-6818 (office)
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****

Ed Zhou/HuntValley/URSCorp

Ed Zhou/HuntValley/URSCorp
06/22/2006 08:18 AM

To Don Flemming/Minneapolis/URSCorp@URSCorp
cc Mark Maves/Minneapolis/URSCorp@URSCORP, Brett McElwain/HuntValley/URSCorp@URSCORP
Subject Re: Fw: Br. 9340 TH 35W over the Mississippi River investmen strategy

Don,

Attached please find a 12-page executive summary that includes detailed descriptions on our study, findings and recommendations.

Brett is finishing up a few more things to finalize Sections 4, 6, 7 and 8. I have already addressed your comments to Sections 2, 7, and 8. Once all the chapters of the report are finished, Brett will load them onto the ftp site and inform you, hopefully before the beginning of July.

I'm leaving for a trip to China in an hour and will return to the office on July 26. During the this time, I will still check emails and communicate as necessary.

Ed

-----Don Flemming/Minneapolis/URSCorp wrote: -----

To: Ed Zhou
From: Don Flemming/Minneapolis/URSCorp
Date: 06/19/2006 12:23PM
cc: Mark Maves/Minneapolis/URSCorp@URSCORP
Subject: Fw: Br. 9340 TH 35W over the Mississippi River investment strategy

Ed, we need to get the report done as soon as possible. I feel that I personally and URS in general will loose a lot of credibliity if we do not respond with a report some time before the July 24 th time frame as Gary Peterson discussed in his e-mail. They need recommended repair concepts as soon as we can get them to the DOT well ahead of the Junly 24th date.

Please advise on the latest status on how we meet the DOT's needs and the completion of the report as soon as posible.

Thanks

Don

----- Forwarded by Don Flemming/Minneapolis/URSCorp on 06/19/2006 11:17 AM -----

"Gary Peterson"
<Gary.Peterson@dot.state.mn.us>
06/16/2006 09:58 AM

To <Don_Flemming@URSCorp.com>

cc "Daniel Dorgan" <Dan.Dorgan@dot.state.mn.us>, "Scott Pierson" <Scott.Pierson@dot.state.mn.us>

Subject Fwd: Br. 9340 TH 35W over the Mississippi River investment strategy

Don, FYI. See the following. We will have a meeting to discuss these issues on July 24th. As I mentioned in my previous note we need the recommended repair concepts (task 9) to begin discussions with Metro on how we respond once a crack is discovered in the bridge, assuming a contract to add redundancy is delayed 15 years.

>>> Jerome Adams 6/16/2006 7:23 AM >>>
We will meet again to discuss the investment strategy for this bridge. There are two items we need to focus on as we plan the future of this bridge. These items are the concrete deck and the steel structure.

CONCRETE DECK:
The entire deck has been chain dragged for unsound concrete. The Ground Penetrating Radar Survey (GPR) was not completed due to funding. The results of the deck chaining indicate 5% to 7% of the deck

are unsound. Based on this information Paul Kivisto's preliminary recommendation is to do a concrete scarify and low slump concrete overlay of the entire bridge deck on SP 2783-107 in 2007. This work will enable the deck to last another 15 years or to about 2022.

STEEL STRUCTURE:
The URS Fatigue Study should be complete by the time we have this meeting. The Bridge Office will have reviewed the report. Based on the results of the report we will need to discuss whether the steel needs reinforcement and when. We will also need to discuss and enact a strategy for dealing with the possibility that a crack may be found in the steel structure between now and 2022. If that occurs how do we handle it. Is it likely it can be fixed? How much money will it cost? Should we budget for this fix every year even if we never use it? What is the likelihood that we may have to close the bridge unexpectedly, and for a very long time?

Lastly, even if we are able to keep the bridge functioning in 2022 we should discuss whether we think the bridge should be redecked and reinforced, or flat out replaced after 2022. If we have a good idea we should begin budgeting for the outcome.

Free Field 1: MNDOT
Free Field 2: Busy
Private Flag: 1

Jerome Adams, P.E.
Senior Engineer
MNDOT
Metro Design
1500 West County Rd. B2
Roseville, MN 55113
Office: 651-582-1320 Fax: 651-634-2162
E-mail: jerome.adams@dot.state.mn.us

[attachment "Executive Summary.doc" deleted by Brett McElwain/HuntValley/URSCorp]

EXHIBIT NO. 12
Date: 4-30-08
JULIE A RIXE
COURT REPORTER

David Long/Minneapolis/URSCorp
05/17/2005 02:04 PM

To Ed Zhou/HuntValley/URSCorp@URSCORP, Don Flemming/Minneapolis/URSCorp@URSCorp
cc Brett McElwain/HuntValley/URSCorp@URSCORP
bcc
Subject Bridge 9340

Ed and Don

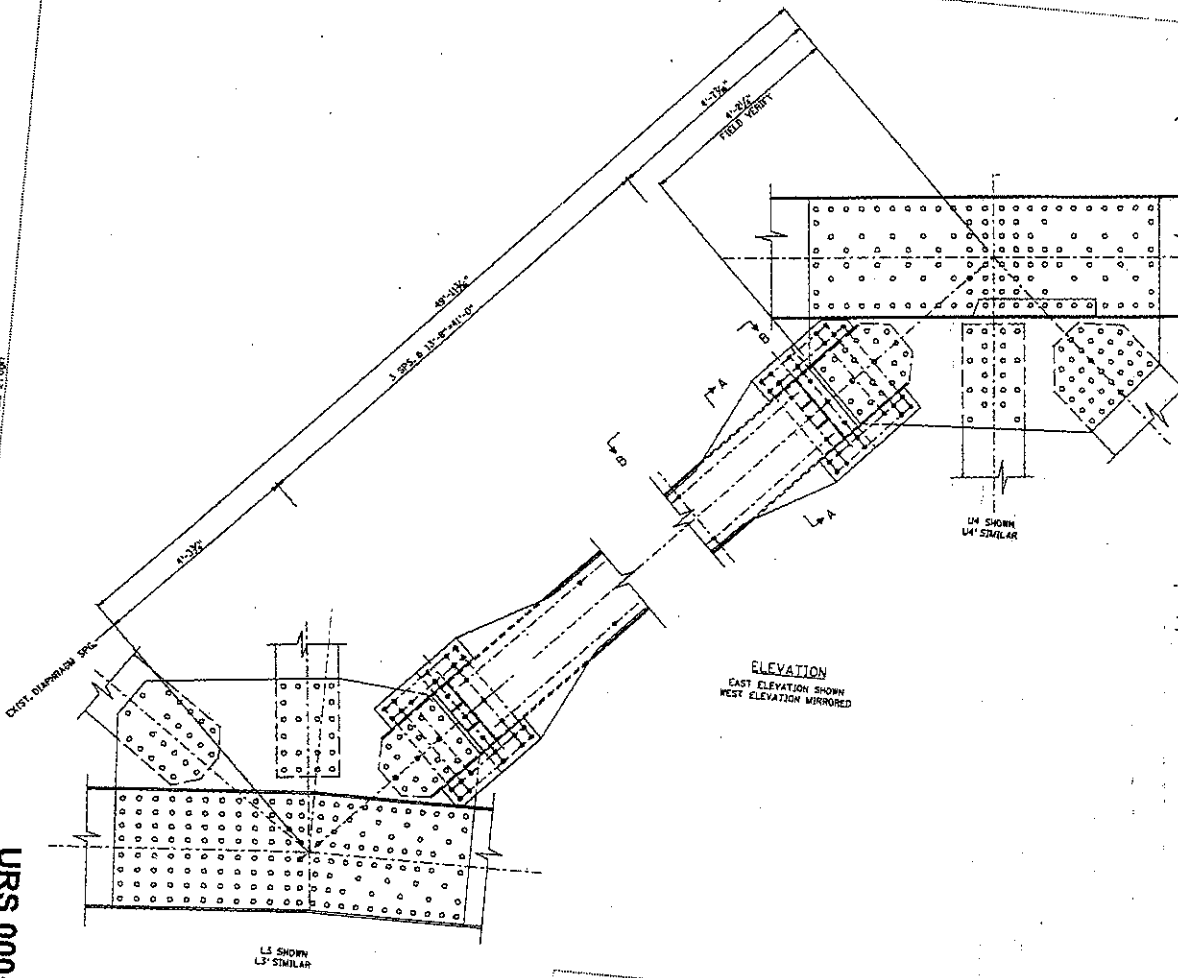
Please look at the attached PDF of member L3-U4. I sketched one concept of a solution on how to develop the end forces beyond the diaphragm. Do you think this is a reasonable solution at this location? The 5 bolts connected to the existing 1/2" gusset plate would be in double shear with a new 1/2" x 6 1/2" plate on each side of the gusset. There are 3 bolts connected to the existing truss member between the existing diaphragm and the gusset plate.

L3-U4-Modified-2.pdf

Ed, do you have the summary of the axial, shear and moments for the other load combinations? I am hoping for the maximum tension and compression along with the corresponding shears and moments similar to what Brett provided for the first two load combinations. I could then plug the maximum forces into the solution for plate sizes and bolting requirements.

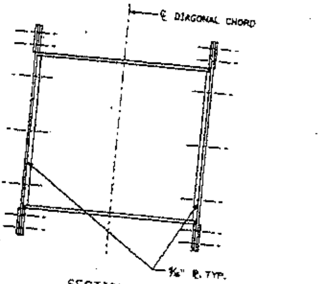
Thanks

David D. Long P.E.
Sr. Structural Engineer
URS Corporation
700 Third Street South
Minneapolis MN 55415-1199
Email: david_long@urscorp.com
Phone: 612-373-6394
Fax: 612-373-6522



ELEVATION

EAST ELEVATION SHOWN
WEST ELEVATION MIRRORED



SECTION A-A

URS

SIGNATURE:
PRINTED NAME:
DATE:
REG. NO.

TITLE:
DIAGONAL CHORD
L3 - U4, L3' - U4'

NOTE:
SEE SHEET XX FOR GENERAL NOTES.

DES: | DRN:
CHK: | CHK:
APPROVED:

SHEET NO. XX OF XX SHEETS

Ed
Zhou/HuntValley/URSCorp
05/17/2005 04:07 PM

To David Long/Minneapolis/URSCorp@URSCORP
cc Don Flemming/Minneapolis/URSCorp@URSCorp, Brett McElwain/HuntValley/URSCorp@URSCORP
bcc
Subject Re: Bridge 9340

It is a good concept to expand the end connection areas. I just wanted to point out that when you check the strength of the bolted connection the assumed failure line is at the end of the welded bars that is the closest to the gusset plate. At the connection to L3, for example, the line of bolts that run across the welded 3.5x3.5 bars do not contribute to the connection strength for the retrofit.

Brett will get you the forces you requested.

Ed

-----David Long/Minneapolis/URSCorp wrote: -----

To: Ed Zhou/HuntValley/URSCorp@URSCORP, Don Flemming/Minneapolis/URSCorp@URSCorp
From: David Long/Minneapolis/URSCorp
Date: 05/17/2005 02:04PM
cc: Brett McElwain/HuntValley/URSCorp@URSCORP
Subject: Bridge 9340

Ed and Don

Please look at the attached PDF of member L3-U4. I sketched one concept of a solution on how to develop the end forces beyond the diaphragm. Do you think this is a reasonable solution at this location? The 5 bolts connected to the existing 1/2" gusset plate would be in double shear with a new 1/2" x 6 1/2" plate on each side of the gusset. There are 3 bolts connected to the existing truss member between the existing diaphragm and the gusset plate.

Ed, do you have the summary of the axial, shear and moments for the other load combinations? I am hoping for the maximum tension and compression along with the corresponding shears and moments similar to what Brett provided for the first two load combinations. I could then plug the maximum forces into the solution for plate sizes and bolting requirements.

Thanks

David D. Long P.E.
Sr. Structural Engineer
URS Corporation
700 Third Street South
Minneapolis MN 55415-1199
Email: david_long@urscorp.com
Phone: 612-373-6394
Fax: 612-373-6522

[attachment "L3-U4-Modified-2.pdf" removed by Ed Zhou/HuntValley/URSCorp]

49340"
①

EXHIBIT NO: 13
Date: 4-30-08
JULIE A RIXE
COURT REPORTER

November 30, 1998

HDR

DEC 01 1998

Mr. Donald J. Fleming, P.E.
State Bridge Engineer
Minnesota Department of Transportation
Office of Bridges and Structures
Mail Stop 610
Waters Edge Building
1500 West County Road B-2
Roseville, MN 55113

BRIDGE ENGINEER	DJF		
DESIGN ENG.	✓	✓	
PLANNING ENG.			
CONST/MAINT ENG.	✓	✓	
HYDRAULICS			
OFFICE MANAGER			

Return

Dear Mr. Fleming:

Thank-you for meeting with Chuck Gonderinger and me on November 10, 1998. I enjoyed talking to you about your program and the status of various upcoming projects. HDR strongly desires to provide further services to you and to continue our good working relationship.

I especially enjoyed the discussion we had with you and your staff about the non-redundancy and fatigue issues associated with the 3-span continuous truss bridge, Bridge No. 9340. The stress sheets that we looked at showed some rather large live load stress ranges in several chord and diagonal members, and we talked about the potential of strengthening these members to provide additional redundancy. I mentioned that HDR had investigated a similar 3-span truss bridge crossing the Allegheny River in Pennsylvania for fracture critical and fatigue status, and I recalled that the stress ranges on that bridge were not as high as what you were finding on your bridge. I said that I would dig out our report on the Allegheny River bridge and see just what the situation was.

I have enclosed a copy of a portion of our report on the Allegheny River bridge that discussed the fatigue investigation for your review. Also included is a General Plan sheet and Fatigue Summary sheet, which shows critical fatigue details and calculated stress ranges. The Allegheny River bridge is similar to Bridge No. 9340 in that they are both 3-span continuous, deck type, Warren Truss bridges. The Allegheny River bridge has a main span of 540 feet. The end span proportions are different with a more balanced 0.77 ratio for the Allegheny River bridge vs. 0.58 for Bridge No. 9340. The Allegheny River bridge has welded, sealed box members for all chord and diagonal members.

The report deals with truck traffic; associated stress cycles for lane loading, truck loading, and single-lane truck loading; and allowable stress ranges for the various fatigue categories that were found on the bridge. The issue of redundant vs. non-redundant load path was also discussed. Generally, the calculated stress ranges were within acceptable limits.

HDR Engineering, Inc.
Employee-owned

Suite 205
5700 Cleveland Street
Virginia Beach, Virginia
23462-1752

Telephone
757 671-1500
Fax
757 671-1482

An interesting parallel for your bridge is the discussion of whether certain tension members can be considered non-fracture critical. Our past detailed fracture-critical investigations on continuous trusses showed that certain chord members in end-span, load reversal regions were non-fracture critical because fracture in these members would result in the development of a hinge and would not lead to failure. With this reasoning, it is possible that a more detailed analysis would show that chord members U2-U4, U4-U6, L1-L3, and L3-L5 are not fracture critical. These are the chord members of highest concern.

In Bridge 9340, diagonal members U2-L3 and L3-U4 were subject to reversal, and had very large potential stress ranges based upon the design stress sheet values. These members would still be considered fracture critical and should be investigated for the allowable stress ranges corresponding to the existing fatigue stress categories. It should be noted however, that the appropriate live load (lane vs. truck) corresponding to the various number of cycles to be considered would have to be used to compute the live load stress. I would assume that the design stress sheet values are based on lane loading. Truck loads should also be considered, which would be considered at higher numbers of cycles, and have lower allowable stress ranges. The actual stress ranges for truck loads will also be quite lower, however.

I hope this information will be useful in your analysis of Bridge No. 9340. Please contact me if you have any questions. We would be happy to further discuss this bridge with you or assist in your investigation if you would desire.

Sincerely,

HDR Engineering, Inc.

Edward H Power

Edward H. Power, P.E.
Senior Vice President
National Bridge Director

Enclosure

cc: Charles Gonderinger w/enclosure

IV. FATIGUE ANALYSIS

A. Introduction

As described in Section II, the main truss spans are of welded design with shop riveted and field bolted end connections. The approach spans are welded, non-composite, multiple plate girder design with field bolted girder splices and cross frame connections.

The following describes the material used in main members:

Location	ASTM Designation
Approach Span Girders	A441
Truss Members	A36 & A441
Truss Gussets	A440
Truss Floorbeams	A441
Truss Stringers	A36

The original design was completed around 1964 and followed the 1961 AASHO Standard Specifications for Highway Bridges. Since that time, the state-of-the-art concerning fatigue and fatigue prone details in welded steel highway bridges has advanced significantly. Current fatigue design philosophy for these types of structures utilizes the allowable stress range concept accompanied by a categorization of various details according to their susceptibility to fatigue damage. As part of the scope of this work, a thorough review of the original design drawings and steel detail shop drawings was made to determine if any existing welded or mechanically connected details would be considered fatigue prone according to current standards and to determine if the actual range of stress at any such detail would exceed the current allowable range of stress. The allowables considered are tabulated in the current Standard Specifications for Highway Bridges adopted by the American Association of State Highway and Transportation Officials, Twelfth Edition, 1977, including Interim Specifications through 1982.

B. Traffic and Stress Cycles

The following data, provided by the Pennsylvania Dept. of Transportation shows the actual average daily traffic (ADT) and the percent truck traffic at the bridge from 1971 through 1982. These figures represent the total traffic across the bridge and it is assumed for this study that one direction traffic is equal to half the total.

TRAFFIC DATA

ALLEGHENY RIVER BRIDGE (L.R.1009)
INTERSTATE 80 BETWEEN EXITS 5 & 6

Year	Total ADT	Truck %	Total ADTT	One Direction ADTT
1971	11,200	31%	3470	1735
1972	12,300	31%	3810	1905
1973	10,900	31%	3380	1690
1974	13,200	31%	4090	2045
1975	12,200	31%	3780	1890
1976	11,200	31%	3470	1735
1977	13,100	38%	4980	2490
1978	15,000	39%	5850	2925
1979	13,900	38%	5280	2640
1980	12,900	40%	5160	2580
1981	14,800	34%	5030	2515
1982	12,900	34%	4390	2195

Currently, structures are designed for a specified number of static load cycles corresponding to the roadway classification and the anticipated average daily truck traffic (ADTT) for one direction. The following table from AASHTO shows the various numbers of design stress cycles currently used.

TABLE 1.7.2B—Stress Cycles

Main (Longitudinal) Load Carrying Members

Type of Road	Case	ADTT*	Truck Loading	Lane Loading†
Freeways, Expressways, Major Highways and Streets	I	2500 or more	2,000,000**	500,000
	II	less than 2500	500,000	100,000
Other Highways and Streets not included in Case I or II	III		100,000	100,000

Transverse Members and Details Subjected to Wheel Loads

Type of Road	Case	ADTT*	Truck Loading
Freeways, Expressways, Major Highways and Streets	I	2500 or more	over 2,000,000
	II	less than 2500	2,000,000
Other Highways and Streets	III	...	500,000

*Average Daily Truck Traffic (one direction).

†Longitudinal members should also be checked for truck loading.

**Members shall also be investigated for "over 2 million" stress cycles produced by placing a single truck on the bridge distributed to the girders as designated in Article 1.3.1(B) for one traffic lane loading.

At the Allegheny River Bridge, the assumed ADTT for one direction has been around the 2500 mark since 1977. It was therefore conservatively assumed that Case I criteria would apply.

Following is a summary of loadings used to calculate maximum stress ranges and corresponding numbers of cycles used to determine maximum allowable stress ranges:

1. Approach span girders, and truss members.
   - a) Lane Load (multiple lanes loaded) @ 500,000 cycles
   - b) Truck Load (multiple lanes loaded) @ 2,000,000 cycles
   - c) Truck Load (single lane loaded) @ over 2,000,000 cycles
2. Truss Span Floorbeams.

   Truck Load (multiple lanes loaded) @ over 2,000,000 cycles

C. Allowable Stress Ranges

AASHTO standard Specifications list the following allowable stress ranges corresponding to the number of design cycles and the fatigue category for the specific detail under investigation.

TABLE 1.7.2A1
REDUNDANT LOAD PATH STRUCTURES (1)

Category See Table 1.7.2A2	Allowable Range of Stress, F_{sr} (ksi) (MPa)			
	For 100,000 Cycles	For 500,000 Cycles	For 2,000,000 Cycles	For over 2,000,000 Cycles
A	60 (413.69)	36 (248.21)	24 (165.47)	24 (165.47)
B	45 (310.26)	27.5 (189.60)	18 (124.10)	16 (110.31)
C	32 (220.63)	19 (131.00)	13 (89.63)	10 (68.95) 12* (82.74)*
D	27 (186.16)	16 (110.31)	10 (68.95)	7 (48.26)
E	21 (144.79)	12.5 (86.18)	8 (55.15)	5 (34.47)
E'	16 (110.31)	9.4 (64.810)	5.8 (39.990)	2.6 (17.926)
F	15 (103.42)	12 (82.74)	9 (62.05)	8 (55.15)

*For transverse stiffener welds on girder webs or flanges.

NON REDUNDANT LOAD PATH STRUCTURES (2)

Category See Table 1.7.2A2	Allowable Range of Stress F_{sr} (ksi) (MPa)			
	For 100,000 Cycles	For 500,000 Cycles	For 2,000,000 Cycles	For over 2,000,000 Cycles
A	36 (248.21)	24 (165.47)	24 (165.47)	24 (165.47)
B	27.5 (189.60)	18 (124.10)	16 (110.31)	16 (110.31)
C	19 (131.00)	13 (89.63)	10, (68.95) 12*(82.74)	9, (62.05) 11*(75.84)
D	16 (110.31)	10 (68.95)	7 (48.26)	5 (34.47)
E**	12.5 (86.18)	8 (55.16)	5 (34.47)	2.5 (17.24)
F	12 (82.74)	9 (62.05)	8 (55.15)	7 (48.26)

*For transverse stiffener welds on girder webs or flanges.

**Partial length welded cover plates shall not be used on flanges more than 0.8 inches (20mm) thick for non-redundant load path structures.

(1) Structure types with multi-load paths where a single fracture in a member cannot lead to the collapse. For example, a simply supported single span multi-beam bridge or a multi-element eye bar truss member has redundant load paths.

(2) Structure types with a single load path where a single fracture can lead to a catastrophic collapse. For example, flange and web plates in one or two girder bridges, main one-element truss members, hanger plates, caps at single or two column bents have non-redundant load paths.

Allowable stress ranges are tabulated separately for Redundant Load Path Structures and Non-Redundant Load Path Structures. A member is considered redundant if its fracture will not lead to catastrophic collapse of the entire structure. Conversely, it is assumed that fracture of a non-redundant member could lead to total structure failure. Allowable stress ranges are therefore more conservative for non-redundant members.

For this analysis, longitudinal girders in the approach spans and truss span stringers are considered redundant load path members. Main truss members are considered redundant or non-redundant depending on their locations. This is discussed in more detail in sections following. Truss floorbeams are considered redundant members.

D. Fatigue Results - Approach Spans

Plate II shows the approach span framing with typical girder details and corresponding fatigue stress categories. Actual stress ranges are compared to allowable stress ranges for the three indicated loading cases.

The most critical fatigue detail is the welded connection of bottom lateral bracing gusset plates to the webs of girders 2 and 9. A Category E Fatigue Stress Detail exists at the termination of longitudinal fillet welds connecting the lateral plates to the girder webs. At these locations, the actual stress range for single truck load is about 2% over the maximum allowable stress range for over 2,000,000 cycles of load. Actual stress ranges for other load cases and for other details are all less than the maximum allowable stress ranges. It is therefore concluded that welded details in the approach spans are in close agreement with current fatigue stress range criteria.

E. Fatigue Results - Truss Members

A truss elevation, typical details and tabulations of stress ranges are given in Plate III for the main truss members. Tension members, reversal members and assumed redundant members are all indicated on the truss elevation. Details 1 and 2 show typical top and bottom chord joints and indicate various fatigue detail categories. Table 1 summarizes the actual axial load stress ranges for all tension and reversal members using the basic member sections away from joints. Table 2 compares actual stress ranges with allowables for certain critical members and details.

As previously discussed, allowable stress ranges vary depending on whether members are considered redundant or non-redundant. Simply described, failure of a redundant member will not lead to collapse of the entire structure whereas failure of a non-redundant member will. To determine redundancy, a separate and complete truss analysis must be made for each tension member. The member is assumed failed and if other members are found to fail when analysed for dead load and partial live load, thereby leading to the truss collapse, the given member is classified as fracture critical or non-redundant. Such an exhaustive analysis is beyond the scope of this investigation. However, previous truss design experience has shown that top and bottom chord members near the points of dead load contraflexure are generally redundant. Fracture in one of these members normally results in the development of a hinge and does not lead to failure. In this investigation, therefore, top and bottom chord members in these reversal areas are assumed redundant in determining allowable stress ranges. It is also conservatively assumed that the trusses act independently.

The most critical fatigue details in the truss members occur near the joints. Truss members on one side of the panel points are shop riveted to gusset plates while opposite members are field bolted. Base metal across the net section of a riveted splice is fatigue Category D as opposed to Category B at the gross section of a high-strength bolted slip resistant splice. On the inside corners of each box member, there is a 3/8" fillet weld extending from the end of the member, at the panel point, to the end diaphragm. See Plate III, Section A-A. The termination of this longitudinal fillet weld at the diaphragm is a fatigue stress Category E. Member section properties at the joints vary from the basic design sections because of increased plate thicknesses in the splice regions and the effects of man-holes and fastener holes.

Table 2 compares actual stress ranges with allowables for four chord members with the highest stress ranges figured on the basic sections as determined in Table 1. Stress ranges are compared for the two worst fatigue conditions: the riveted splice (Category D) and the longitudinal weld termination at the end diaphragm (Category E). Members U9-U10 and L8-L9 are assumed redundant, Members U11-U12 and L6-L7 are assumed non-redundant. In all cases, actual stress ranges are less than the allowables for the assumed conditions of redundancy. Hence, it is concluded that existing details and stress ranges compare favorably with current fatigue criteria.

F. Fatigue Results - Truss Floor System

Plate IV shows the truss floor system framing plan with typical details for floorbeams and stringers.

1. Floorbeams

Floorbeams are supported by the truss top chords at panel points and cantilever about 10' beyond the truss centerlines. Thus, negative moment is developed in the floorbeams over the trusses and positive moment is developed in the floorbeams between trusses.

The critical floorbeam fatigue detail is the welded transverse stiffener connection to the floorbeam web. Here, a fatigue stress Category C exists at the connecting fillet weld termination, near the flange, in a tension zone.

Transverse floorbeams are generally more critical than longitudinal members for fatigue because they are subjected to greater numbers of stress cycles. AASHTO Specifications require that such members on major highway bridges carrying one direction average daily truck traffic greater than 2500 be designed for an allowable stress range corresponding to over 2,000,000 cycles of truck loading. Where the ADTT is less than 2500, the number of design cycles can be 2,000,000.

The Floorbeam Fatigue Summary Table on Plate IV compares the actual stress ranges for multiple-lane truck load with allowables based on 2,000,000 cycles and over 2,000,000 cycles. At stiffener location 1, which applies to the three center stiffeners as shown in Section A-A, the design stress range exceeds the allowable for over 2,000,000 cycles by about 9.5% but is very close (within 1%) to the allowable for 2,000,000 cycles.

The maximum LL+I floorbeam stress at location No. 1 is figured for truck load with the two center lanes (passing lanes) loaded simultaneously and with maximum axle loads placed directly over the floorbeams. Since this 2-lane design truck loading has rather infrequent occurrance, it is more reasonable to assume that the greatest number of actual stress cycles occur from single truck passage. The stress range for single lane truck load is about half of that shown for multiple-lanes and would be well within the allowable for over 2,000,000 cycles. It is felt that the calculated stress range for the infrequent multiple-lanes loaded case is satisfactory when compared to the allowable for 2,000,000 cycles.

Considering that the actual stress range is generally much less than the design stress range and since the actual one-direction ADTT is just around the 2500 mark, below which Case II would apply and only 2,000,000 truck load cycles need be considered, it does not appear that the stress range at the three center stiffeners is sufficiently high to cause any reduction in the normal expected fatigue life.

Stress ranges at stiffener locations 2 and 3 for multiple-lane truck load are all within the allowables for over 2,000,000 cycles.

2. Stringers

Truss span stringers are rolled wide flange shapes and are connected at mid-span, between floorbeams, by channel diaphragms. The diaphragm connection plates welded to the stringer webs have a Category C fatigue detail at the bottom fillet weld termination. See Plate IV, Section D-D.

The Stringer Fatigue Summary Table compares design stress ranges with allowables for multiple-lane truck load at 2,000,000 cycles and single-lane truck load at over 2,000,000 cycles. In each case the design stress range is less than the allowables.

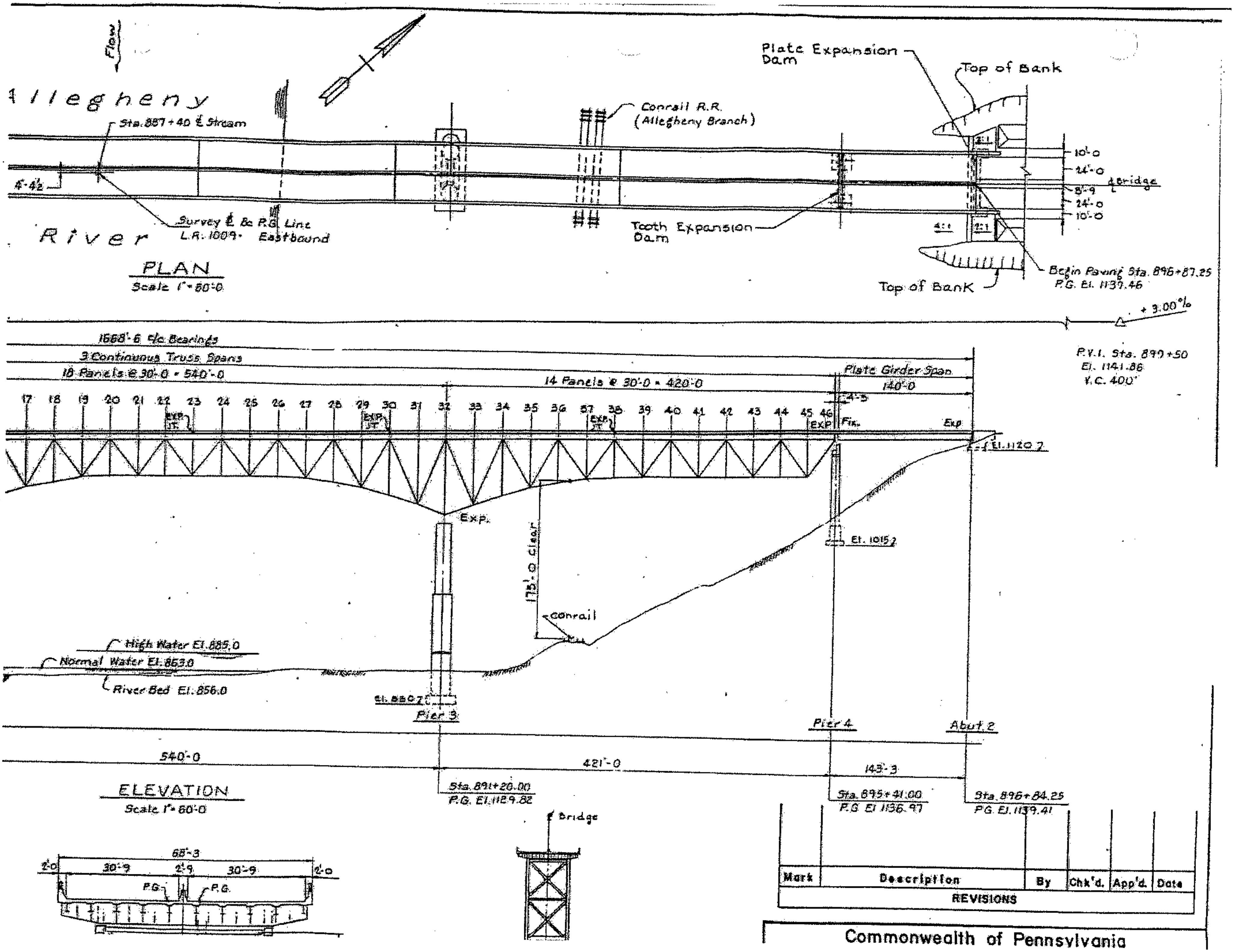
G. Fatigue Analysis Summary

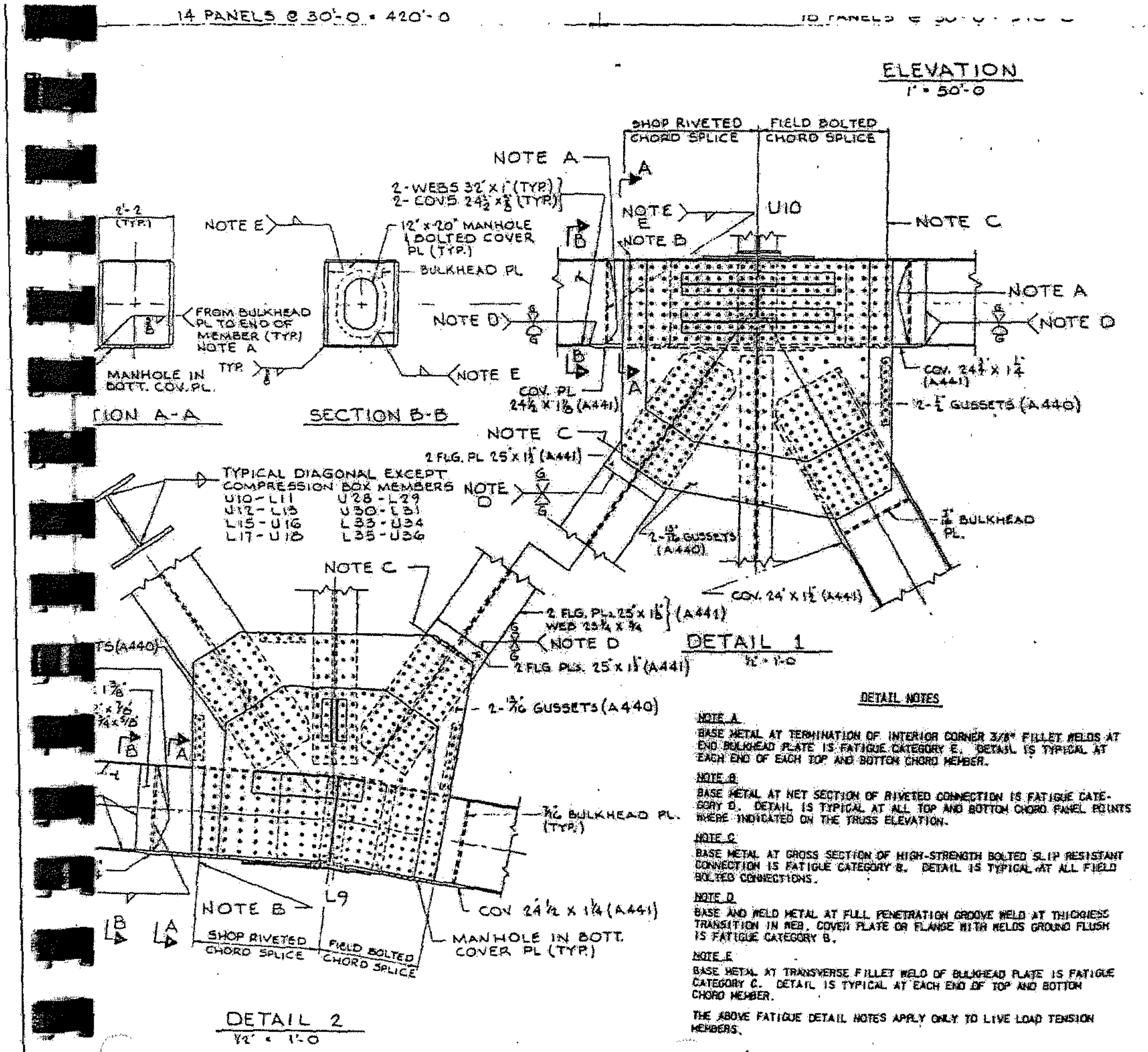
All main members of this 17 year old structure, including approach span girders, truss tension members, truss floorbeams and truss stringers were investigated for fatigue based on current AASHTO design criteria. For each member, design stress ranges were computed for Standard HS20-44 lane load and/or truck load. Allowable stress ranges were determined as a function of the detail fatigue category, the assumed redundancy or non-redundancy, the loading type, the general roadway case and the one direction average daily truck traffic (ADTT). Summaries of member details and stresses are shown in Plates II, III & IV.

Computed stress ranges at all critical details on approach girders, truss members and truss stringers are either less than the current allowables or exceed the allowables by not more than 2%.

At the center three stiffeners on all truss span floorbeams, the stress range at the bottom fillet weld termination for multiple lane truck load exceeds the Category C allowable for over 2,000,000 cycles by about 9.5% but is comparable to the allowable for 2,000,000 cycles. The single lane truck load stress range, however, is less than the allowable for over 2,000,000 cycles. It is believed that the multiple lane truck design load is an infrequent loading condition and as such, its stress range meeting the allowable for 2,000,000 cycles should be adequate. It is considered more significant that the highly frequent single lane truck load stress range is within the allowable for over 2,000,000 cycles.

It is concluded from the investigation described herein that this bridge, designed under 1961 specifications, has adequate fatigue resistance in accordance with current AASHTO stress range criteria and should experience no reduction in normal expected fatigue life.


Flow
Allegheny
River
Sta. 887+40 ℄ Stream
4'-4½
Survey ℄ & P.G. Line
L.R. 1009 - Eastbound
Conrail R.R.
(Allegheny Branch)
Tooth Expansion Dam
Plate Expansion Dam
Top of Bank
Top of Bank
10'-0
24'-0
8'-9
24'-0
10'-0
℄ Bridge
2:1
2:1
4:1
Begin Paving Sta. 896+87.25
P.G. El. 1139.46
PLAN
Scale 1" = 60'-0
+ 3.00%
P.V.I. Sta. 890+50
El. 1141.86
V.C. 400'
1668'-6 c/c Bearings
3 Continuous Truss Spans
18 Panels @ 30'-0 = 540'-0
14 Panels @ 30'-0 = 420'-0
Plate Girder Span
140'-0
4'-5
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46
EXP. JT.
EXP. JT.
EXP. JT.
EXP
Fix.
Exp
Exp.
El. 1120.7
El. 1015.2
175'-0 Clear
Conrail
High Water El. 885.0
Normal Water El. 863.0
River Bed El. 856.0
El. 850.7
Pier 3
Pier 4
Abut. 2
540'-0
421'-0
143'-3
Sta. 891+20.00
P.G. El. 1129.82
Sta. 895+41.00
P.G. El. 1136.97
Sta. 896+84.25
P.G. El. 1139.41
ELEVATION
Scale 1" = 60'-0
68'-3
2'-0
30'-9
2'-9
30'-9
2'-0
P.G.
P.G.
℄ Bridge
Mark
Description
By
Chk'd.
App'd.
Date
REVISIONS
Commonwealth of Pennsylvania



DETAIL NOTES

NOTE A

BASE METAL AT TERMINATION OF INTERIOR CORNER 3/8" FILLET WELDS AT END BULKHEAD PLATE IS FATIGUE CATEGORY E. DETAIL IS TYPICAL AT EACH END OF EACH TOP AND BOTTOM CHORD MEMBER.

NOTE B

BASE METAL AT NET SECTION OF RIVETED CONNECTION IS FATIGUE CATEGORY D. DETAIL IS TYPICAL AT ALL TOP AND BOTTOM CHORD PANEL POINTS WHERE INDICATED ON THE TRUSS ELEVATION.

NOTE C

BASE METAL AT GROSS SECTION OF HIGH-STRENGTH BOLTED SLIP RESISTANT CONNECTION IS FATIGUE CATEGORY B. DETAIL IS TYPICAL AT ALL FIELD BOLTED CONNECTIONS.

NOTE D

BASE AND WELD METAL AT FULL PENETRATION GROOVE WELD AT THICKNESS TRANSITION IN WEB, COVER PLATE OR FLANGE WITH WELDS GROUND FLUSH IS FATIGUE CATEGORY B.

NOTE E

BASE METAL AT TRANSVERSE FILLET WELD OF BULKHEAD PLATE IS FATIGUE CATEGORY C. DETAIL IS TYPICAL AT EACH END OF TOP AND BOTTOM CHORD MEMBER.

THE ABOVE FATIGUE DETAIL NOTES APPLY ONLY TO LIVE LOAD TENSION MEMBERS.

TABLE 1 - SUMMARY OF MEMBER

	MEMBER	fSR - AXIAL ST	
		MULTIPLE LANES LANE LOAD	MULTIF TRUC
TOP CHORD	*U8-U9R	10.98	4
	*U9-U10R	10.98	4
	U10-U11	8.85	3
	U11-U12	8.85	3
	U12-U13	5.34	1
	U13-U14	5.34	1
	U14-U15	5.17	1
	U15-U16	5.17	1
	U16-U17	6.62	2
	U17-U18	6.62	2
	*U18-U19	7.49	3
	*U19-U20	7.49	3
BOTTOM CHORD	U0-L1	5.31	2
	L1-L2	5.92	2
	L2-L3	5.92	2
	L3-L4	7.97	3
	L4-L5	7.97	3
	L5-L6	9.88	3
	L6-L7	9.88	3
	*L7-L8	12.71	4
	*L8-L9	12.71	4
	*L19-L20R	8.85	3
	*L20-L21R	8.85	3
	L21-L22	9.81	3
	L22-L23	9.81	3
DIAGONALS	U2-L3	7.92	3
	*U4-L5R	7.13	3
	L5-U6	8.65	4
	L7-U8	5.56	2
	L9-U10	4.33	2
	L11-U12	5.59	2
	L13-U14	5.63	2
	U14-L15	5.56	2
	U16-L17	6.05	2
	U18-L19	5.98	2
	U20-L21	6.97	2
	U22-L23R	8.05	3

TABLE 1 NO

* - MEMBER ASSUMED TO

R - MEMBER SUBJECT TO

GENERAL NO

1. LIVE LOAD FOR FATIGUE ANALYSIS: H
2. FOR ANALYSIS, TRUSS IS ASSUMED SYM (PANEL PT. 23).
3. ALL TENSION MEMBERS ASSUMED TO BE UNLESS NOTED.
4. STRESS RANGES fSR LISTED IN TABLE CROSS SECTION, REMOVED FROM JOINTS
5. STRESS RANGES fSR LISTED IN TABLE CROSS SECTION AT THE FATIGUE DETAI

EXHIBIT NO: 14
Date: 4-30-08
JULIE A RIXE
COURT REPORTER

Don Flemming/Minneapolis/URSCorp
09/01/2006 05:41 PM

To Mark Maves/Minneapolis/URSCorp@URSCORP
cc David Long/Minneapolis/URSCorp@URSCORP
bcc
Subject Fw: Response to MnDOT comments

FYI, I am concerned that Ed, is trying a little too hard to not advise Mn/DOT that the 9340 Bridge is okay even though it is clearly overstressed by today's design criteria when considering bending and secondary stresses of the members based on a 3 D analysis. I am trying to work with Ed on this issue so that we bring a reasonable recommendation.

I feel that the bottom line is that the fatigue analysis does not result in alarming results but from a strength standpoint the original design does not meet today's design specifications by a very significant degree.

In addition, from a fatigue standpoint if a significant crack develops in any of the 10 most critical members collapse could be imminent in a short amount of time,even though the analysis says a crack is unlikely. We experienced such a crack on the TH 36 bridge over Cleveland when the fatigue analysis showed infinite fatigue life and we had poor workmanship in a detail.

Don

----- Forwarded by Don Flemming/Minneapolis/URSCorp on 09/01/2006 11:15 AM -----

Don Flemming/Minneapolis/URSCorp
09/01/2006 11:14 AM

To Ed Zhou/HuntValley/URSCorp
cc David Long/Minneapolis/URSCorp@URSCORP
Subject Re: Response to MnDOT comments

Ed, in the discussion on page 5 when you list the equations I think it would be a good idea to indicate the reference as to which specification these equations are from and also note or emphasize that the terms in these equations are additive to determine the interaction ratio. Also, is there any specification that currently allows the idea that you are suggesting in showing the plastic condition in these equations?

Ed Zhou/HuntValley/URSCorp

Ed Zhou/HuntValley/URSCorp
09/01/2006 10:46 AM

To Don Flemming/Minneapolis/URSCorp@URSCorp
cc Brett McElwain/HuntValley/URSCorp@URSCORP
Subject

Response to MnDOT comments

Don

Here is a work-in-progress file that I will send you an updated version on Tuesday.

Ed

Response to MnDOT Comments.doc

EXHIBIT NO: 16
Date: 4-30-08
JULIE A RIXE
COURT REPORTER

Ed Zhou/HuntValley/URSCorp
02/27/2006 06:33 PM

To Brett McElwain/HuntValley/URSCorp@URSCORP
cc
bcc
Subject Fw: Bridge 9340 Preliminary Recommendations

----- Forwarded by Ed Zhou/HuntValley/URSCorp on 02/27/2006 01:32 PM -----

Don Flemming/Minneapolis/URSCorp
02/27/2006 01:00 PM

To Ed Zhou
cc Mark Maves/Minneapolis/URSCorp@URSCORP, David Long/Minneapolis/URSCorp@URSCORP
Subject Bridge 9340 Preliminary Recommendations

Ed, Gary Peterson of Mn/DOT called on Friday and I talked to Gary today about the BR. 9340 project. The District is planning work for the bridge and Gary is concerned that they are planning for deck and joint repairs without considering recommendations for a more permanent repair. I told Gary that personally I would defer the proposed deck work and plan for a deck replacement and strengthening project.

Gary would like our preliminary recommendations in the form of a letter next week if possible . I told Gary that we would try to get him a letter next week.

Don