1-2017

Steel Pin and Hanger Assembly Replacement Options

Daniel Linzell
University of Nebraska-Lincoln, dlinzell@unl.edu

Chandana C. Balakrishna
University of Nebraska-Lincoln

Nebraska Transportation Center

MID-AMERICA TRANSPORTATION CENTER

NDOR
Nebraska Department of Roads

Report M042

Final Report
26-1121-4031-001

Steel Pin and Hanger Assembly Replacement Options

Daniel G. Linzell, Ph.D., P.E., F.ASCE.
Voelte-Keegan Professor and Chair
Department of Civil Engineering
University of Nebraska-Lincoln

Chandana C. Balakrishna
Graduate Research Assistant
Department of Civil Engineering
University of Nebraska-Lincoln

2017

Nebraska Transportation Center
262 Prem S. Paul Research Center at Whittier School
2200 Vine Street
Lincoln, NE 68583-0851
(402) 472-0141

"This report was funded in part through grant[s] from the Federal Highway Administration [and Federal Transit Administration], U.S. Department of Transportation. The views and opinions of the authors [or agency] expressed herein do not necessarily state or reflect those of the U.S. Department of Transportation."

Steel Pin and Hanger Assembly Replacement Options

Daniel G. Linzell, Ph.D., P.E., F.ASCE.
Voelte-Keegan Professor and Chair
Department of Civil Engineering
University of Nebraska-Lincoln

Chandana C. Balakrishna
Graduate Research Assistant
Department of Civil Engineering
University of Nebraska-Lincoln

A Research Report Sponsored by

Mid-America Transportation Center

University of Nebraska-Lincoln

Nebraska Department of Roads

January 2017

1. Report No. M042	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Steel Pin and Hanger Assembly Replacement Options		5. Report Date January 2017
		6. Performing Organization Code
7. Author(s) Daniel G. Linzell and Chandana C. Balakrishna		8. Performing Organization Report No. 26-1121-4031-001
9. Performing Organization Name and Address Mid-America Transportation Center 2200 Vine St. PO Box 830851 Lincoln, NE 68583-0851		10. Work Unit No. (TRAIS)
		11. Contract or Grant No.
12. Sponsoring Agency Name and Address Nebraska Department of Roads 1500 Hwy. 2 Lincoln, NE 68502		13. Type of Report and Period Covered July 2015- January 2017
		14. Sponsoring Agency Code
15. Supplementary Notes		

16. Abstract

A number of steel beam bridges exist in the United States that contain pin and hanger assemblies. Pin and hanger assemblies are fracture critical members whose failure would result in collapse of the bridge or render it unable to perform its expected functions. As these bridges continue to age, many assemblies have deteriorated to a point where retrofit or replacement has to be considered and performed to maintain intended safety and performance. States have taken various approaches to address the pin and hanger assembly retrofit and replacement options. However, there is no single report that summarizes these approaches. This report documents steel pin and hanger assembly retrofit and replacement options via a literature review and synthesis that explores options that have been studied and implemented in the United States. In conjunction with the literature review, a survey was developed in conjunction with the Bureau of Sociological Research (BOSR) at the University of Nebraska-Lincoln to assist with identifying implemented strategies and evaluate best practices. Information was solicited from 50 states and was used in conjunction with the literature review to develop flowcharts that would assist NDOR personnel with assessing various options and their consequences when pin and hanger assembly retrofit or replacement options are being considered for bridges in the state.

17. Key Words Pin and Hanger; Steel; Bridge; Retrofit; Replacement		18. Distribution Statement	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 193	22. Price

Table of Contents

List of Tables

List of Figures

Abstract

A number of steel beam bridges exist in the United States that contain pin and hanger assemblies. Pin and hanger assemblies are fracture critical members whose failure would result in collapse of the bridge or render it unable to perform its expected functions. As these bridges continue to age, many assemblies have deteriorated to a point where retrofit or replacement has to be considered and performed to maintain intended safety and performance. States have taken various approaches to address the pin and hanger assembly retrofit and replacement options. However, there is no single report that summarizes these approaches. This report documents steel pin and hanger assembly retrofit and replacement options via a literature review and synthesis that explores options that have been studied and implemented in the United States. In conjunction with the literature review, a survey was developed in conjunction with the Bureau of Sociological Research (BOSR) at the University of Nebraska-Lincoln to assist with identifying implemented strategies and evaluate best practices. Information was solicited from 50 states and was used in conjunction with the literature review to develop flowcharts that would assist NDOR personnel with assessing various options and their consequences when pin and hanger assembly retrofit or replacement options are being considered for bridges in the state.

Chapter 1 Introduction

1.1 Background

Pin and hanger assemblies are structural components that have been used in many steel bridge systems around the United States (Mosavi et al. 2011). These assemblies are often used in steel girder systems and were traditionally implemented to reduce analysis, design, and construction complexity. The primary function of the pin and hanger assemblies is to mimic the rotational freedom provided by an idealized hinge in a continuous structural system, thereby reducing levels of indeterminacy and facilitating construction. The additional rotational degrees of freedom provided by the assemblies also help accommodate thermal movements of the bridge superstructure (Graybeal et al. 2000). As bridges continue to age, water, deicing chemicals, and debris that fall through the deck joint above the pin and hangers can accumulate on these assemblies and accelerate their degradation, possibly adversely affecting their performance and leading to a need for retrofit or replacement (Graybeal et al. 2000).

Pin and hanger assemblies are considered fracture critical members (FCMs), meaning they are non-redundant and their failure could cause partial or complete collapse. Non-redundant systems have traditionally contributed to major steel bridge collapses. The collapse of the Mianus River Bridge in Connecticut in 1983 is an example of a pin and hanger bridge that suffered a catastrophic failure (Connor et al. 2005).

The *American Association of State Highway and Transportation Officials, Load and Resistance Factor Design Specifications* (AASHTO LRFD) defines *redundancy* as “the quality of a bridge that enables it to perform its design function in a damaged state,” and *redundant member*

as “a member whose failure does not cause failure of the bridge” (AASHTO LRFD, 2014). Different ways to enhance bridge redundancy include:

- Increasing the number of main supporting elements between points of structural support;
- Providing load redistribution mechanisms or providing continuity for main elements over interior supports elements; or
- Properly detailing structural elements using built-up cross sections, which provide division of elements to restrict increasing fracture propagation across the entire cross section.

States have taken various approaches to address the pin and hanger assembly retrofit and replacement, but there is no single report summarizing these approaches. This report documents a literature review that explores steel pin and hanger assembly replacement and retrofit options that have been studied and implemented in the United States. In addition to the literature review, a survey was developed in conjunction with the Bureau of Sociological Research at the University of Nebraska-Lincoln (BOSR) to assist with determining implemented strategies and evaluate best practices. In this survey, information was solicited from 50 states on current engineering practices related to addressing the steel pin and hanger assembly replacement options. Of these 50 solicitations, 38 (76%) were returned. Literature review and survey information was used to design an organized decision-making tool in the form of flowcharts that would assist NDOR personnel with assessing various options and their consequences when the pin and hanger assembly replacement and retrofit are being considered.

1.2 Objectives and Scope

The objectives of this project were to review and summarize research related to pin and hanger assembly behavior, repair and replacement while also determining and summarizing retrofit and replacement options being used by states in the U.S. The ultimate goal was the development of decision-making tools that would assist NDOR when considering pin and hanger assembly repair or replacement options in the future. These objectives were accomplished via the following steps:

1. Review relevant literature related to the pin and hanger assembly replacement options that have been studied and implemented in the United States;
2. Review relevant literature related to the design of steel web and flange splices one of the possible replacement options;
3. Survey U.S. State Departments of Transportation (DOTs) to investigate current practices for addressing pin and hanger assembly retrofit and replacement;
4. Synthesize and summarize information from Steps 1-3 to provide an initial summary of retrofit and replacement options;
5. Develop and present flowcharts that would assist engineers with assessing various options and their consequences when the pin and hanger assembly retrofit and replacements are being considered in the future.

Chapter 2 Literature Review

2.1 Introduction

A major element of this study consisted of an in-depth literature review. The purpose of this review was to collect and summarize information related to pin and hanger assembly retrofit and replacement options. The literature review also provides information successfully implemented options in different parts of the United States and served as a resource for other portions of this study.

In this chapter, Section *2.2 Literature*, summarizes the review of literature related to pin and hanger assembly retrofit and replacement options. Section *2.3 State and Federal DOT Provisions*, describes available state DOT design provisions and protocols for various retrofit and replacement options.

2.2 Literature

In 1983, the I-95 Mianus River Bridge in Greenwich, Connecticut collapsed (Figure 2.1). The collapse was determined to occur when one of the pin and hanger assemblies fractured. This assembly was subjected to excessive corrosion due to water leaking through the deck joints and from drainage modifications (NTSB, 1984).

Figure 2.1 Mianus River Bridge collapse (Connor et al. 2005).

As a result of the Mianus River Bridge collapse, the Pennsylvania Department of Transportation (PennDOT) instructed its districts to identify and establish the current condition of pin and hanger assemblies on all bridges in Pennsylvania (Britt, 1990). A subsequent condition inspection of twin structures carrying I-80 over the Susquehanna River at Mifflinville, Pennsylvania discovered multiple fractured lower pin retainer bolts in its pin and hanger assemblies (Christie & Kulicki, 1991). Further investigation determined that the major cause of the fractures was significant build-up of corrosion on the pin and hangers. PennDOT had identified additional problems in similar bridges, such as pin cracking on the Wysox Bridge in the northeastern part of the state. As a result of this discovery and in an attempt to ensure future safety of similar bridges in the state, Modjeski and Masters (M&M) developed and proposed cost-effective methods to provide a higher level of redundancy for these bridges. M&M proposed the following pin and hanger assembly retrofit and replacement options:

- Providing continuity by removing the pin and hanger assembly and splicing the flange and web at that location;
- Providing a secondary system under the floor beams at the pin and hanger assembly; or
- Providing a secondary system under girders at the pin and hanger assembly.

PennDOT engineers, after several major studies (Christie & Kulicki, 1991), decided that providing continuity was the most advantageous solution from both aesthetic and safety points of view. However, preliminary study shows that this approach would only be economical when re-decking was programmed. Continuity would be established by designing splices into the girders following provisions established in the *AASHTO Standard Specifications for Highway Bridges*.

In 1989, the Loma Prieta earthquake in California demonstrated that bridges designed following pre-1983 AASHTO seismic criteria were sensitive to strong earthquakes (Shirole & Malik, 1993). As a result of these findings it was determined that a considerable retrofitting program was needed to address this issue. The program included improving the strength of the existing bridges whenever practical to improve their seismic resistance and global efficiency. Pin and hanger assemblies were deemed to be seismically sensitive components and global structural efficiency would be improved via their removal, which would provide continuity and enhance the redundancy of the structure.

In response to work in California, the New York State Department of Transportation (NYSDOT) initiated part of study on seismically sensitive bridges in New York to evaluate their resiliency and to provide a cost data for various seismic retrofits (Shirole & Malik, 1993). The project included a case study of five-span, continuous, steel, multi-girder bridge having pin and hanger assemblies that produced drop-in spans. The study recommended removal of the pin and hanger assembly replacing it with top flange, bottom flange and web splices following *AASHTO*

Standard Specifications for Highway Bridges guidelines. It was also recommended that cumulative dead and live load stresses be checked in the vicinity of the replaced pin and hanger assembly locations.

Another possible retrofit option, termed a "link slab", has also been discussed in the research (Caner & Zia, 1998). In this method, expansion joints are removed at the pin and hangers, the deck is debonded from the girders for a minimum of 5 % of the span length on each side of the splice, and the joint is replaced with link slab, which renders the deck continuous while maintaining some level of rotational freedom for the girders beneath the link slab. Reducing the number of expansion joints via the placement of link slabs (Caner & Zia, 1998) would minimize or eliminate corrosion damage due to water leaking through the deck joints. Further discussion of this retrofit option can be found in *Section 4.2.2*.

A national effort to identify and synthesize inspections and repairs appropriate for FCMs was conducted in association with the National Cooperative Highway Research Program (NCHRP). The subsequent report provided a comprehensive investigation of bridges with fracture critical details and focused on inspection and maintenance of FCMs. One of the outcomes was identifying and briefly discussing prevailing pin and hanger assembly retrofit and replacement options in the U.S. The final report summarized two common techniques for the replacement and retrofit of pin and hanger assemblies (Connor et al. 2005):

- Complete removal of the pin and hanger assembly. In this method, the pin and hanger assembly is completely removed and replaced with a new section of the girder having bolted splices. The girders are made continuous for live load and a proportion of dead load given that these splices would be placed after the large part of the deck has been cast.

Continuity would be established by designing splices into the girders following *AASHTO LRFD Bridge Design Specifications*; and

- Placement of a catcher beam system. These systems are added below the location of the pin and hanger assembly to catch the suspended girder when the existing pin and hanger assembly fails.

In 2010, PennDOT further investigated pin and hanger assembly rehabilitation via a preservation program associated with the I-579 Crosstown Boulevard Bridge in Pittsburgh (Sirianni & Tricini, 2010). The program included complete replacement of pin and hanger assemblies with new stainless pins and high strength hangers. By replacing the existing assemblies with new, more durable components, the assemblies would be strengthened and maintenance requirements for the fracture critical bridges could be reduced.

In 2014, the Manitoba Infrastructure and Transportation Department conducted a detailed structural survey of the Pinawa Bridge, a bridge that contained pin and hanger assemblies. The study identified that steel girders near the existing pin and hanger assemblies had severe corrosion and deterioration due to deck expansion joint leakage (Banthia et al. 2014), which, subsequently,caused corrosion at the pin and hanger assembly that could possibly lead to catastrophic failure of the assembly. A number of possible failure mechanisms were identified, including:

- Reduction of pin cross section that could lead to crack initiation;
- Locking of the pin, which could produce considerable amount of torsional stresses on a reduced cross-section, stresses that, when combined with direct shear stresses, could provide an area for development and increases of cracks which leads to pin failure (Banthia et al. 2014); and

- Corrosion and packrust formation of hanger plates that could cause the pin to move out of the assembly and result in failure of the structure at the location of the assembly.

The study did not directly observe any cracks or loss in pin cross-sectional area or prevention of rotation. Despite these observations, it was recommended to replace all pin and hanger assemblies with bolted splices following guidelines provided in the *AASHTO Standard Specifications for Highway Bridges* and *Manual for Bridge Evaluation*.

2.3 State and Federal DOT Provisions

The Nebraska Department of Roads (NDOR) has implemented certain retrofit and replacement options for the pin and hanger assemblies on specific bridges. These options included implementing;

- Catcher beam systems;
- Bolted splices; and
- Replacement with new pin and hanger assembly.

Design drawings for the implemented assembly options are found in Appendix D1.

NDOR was interested in identifying other State and Federal agencies who have implemented retrofit and replacement options and developed design specifications and supporting documents. Identified DOTs and their implemented options and documentation are summarized below.

The 2002 edition of the Montana Department of Transportation's "Montana Structural Manual" provides rehabilitation alternatives for pin and hanger assemblies (MDT, 2002). It was stated that pin and hangers are sensitive to corrosion because of leaking deck joints and subsequent

accumulation of debris on the assembly. This could result in the pin misplacements due to unseating of hangers and frozen pins and in initiation of fatigue cracks in the hangers. They recommended the following pin and hanger rehabilitation techniques (MDT, 2002):

- Unlocking the frozen pin and hanger assembly. Provide alternative support beam system to the suspended girder and remove the pin and hanger assembly. The elements of the assembly could be replaced or cleaned of corrosion before re-assembling the elements;
- Complete elimination of pin and hanger assembly. In this method, pin and hanger assemblies should be completely replaced with bolted splices. This approach requires a structural analysis of the continuous girder to show that revised load paths do not exceed the resistance of the superstructure. Continuity would be established by designing splices into girders following appropriate *AASHTO Standard Specifications for Highway Bridges*; and
- Providing a catcher beam system. In a catcher beam system, a supplemental support beam system is provided to catch the suspended girder ends if the pin and hanger assembly fails. Similar structural system could also be provided temporarily when frozen pin and hanger assemblies are slated to be unlocked.

PennDOT further investigated pin and hanger assembly rehabilitation in 2010 and recommended installation of a catcher beam system when pin and hanger assembly failure is a concern so that bridge integrity and safety is maintained (PennDOT, 2010). They stated that the catcher beam system should be designed to be active only if the pin and hanger fails and must accommodate anticipated thermal movements. The gap between the girder and the catcher beam system must be kept as small as possible to limit impact loading if failure occurs. They

recommended use of auxiliary neoprene bearings on the catcher beam system to reduce any impact effects (PennDOT, 2010).

In 2011, the Illinois Department of Transportation published a report that recommended that steel girders with pin and hanger assemblies be examined for assembly elimination and to make the superstructure system continuous whenever feasible and economical (IDOT, 2011). Continuity would be established by designing splices into the girders following the *AASHTO Standard Specifications for Highway Bridges*.

In 2012, the Federal Highway Administration stated that pin and hanger assembly failure is caused by formation of corrosion between the hanger and the girder web due to deck expansion joint leakage. As steel corrodes, it can occupy up to 10 times its original volume and cause unwanted forces in a limited space (FHWA-BIRM , 2012), which results in packrust and possible failure of the assembly. Additional pin and hanger assembly defects that were identified in the report were corrosion, fatigue cracking and coating failures. Various retrofit and replacement options were discussed as summarized below:

- Catcher beam system. The catcher beam system is added to the structure to carry a load if the pin and hanger assembly fails. The gap between the girder and the catcher beam should be kept as small as possible to reduce impact. Auxiliary neoprene bearings on the catcher beam system could be provided to reduce impact effects should failure occur;
- Removal and replacement of pin and hanger assembly with bolted splices. This approach requires a structural analysis to determine if other members can support continuous girders instead of cantilevered and drop-in spans. Analyses should investigate both positive and negative moment regions in the superstructure; and

- Replacing the pin and hanger assembly with a structural grade stainless steel pin and hanger, which results in reduction in corrosion mitigation.

In 2014, the Minnesota Department of Transportation published a study on a rehabilitation of the Kennedy Bridge over the Red River. This study focused on rehabilitation alternatives and showed that its pin and hanger assemblies had sufficient load carrying capacity. However, failure of multiple hangers could result in failure of the structure (MnDOT, 2014). Part of this study focused on increasing reliability of a bridge containing a pin and hanger assembly. It was reported that pin and hanger assembly retrofit and replacement options can include removing existing pins and hangers, re-machining pin holes to accommodate new pins as required to remove corrosion and pitting and the installation of new, higher strength pins and reinforced hangers. It was stated that each girder must be temporary supported while work is occurring and that temporary supports must be able to accommodate hanger fit up.

2.4 Summary

This chapter has documented the results of a literature search that focused on current practices implemented in the United States and research related to retrofit and replacement of pin and hanger assemblies. A summary of finding from the literature review are provided below.

Retrofit options:

Bolted Splices -

Provide continuity by removing the existing pin and hanger assembly and splicing the flange and web at that location following appropriate AASHTO Specifications (*AASHTO Standard Specifications for Highway Bridges, and AASHTO LRFD Bridge Design Specifications*) and/or relevant state specifications. Providing continuity was the most advantageous solution from both

aesthetic and safety points of view but would be economical only when re-decking was programmed.

Rehabilitation options:

Link Slab -

Providing a link slab is a rehabilitation option that would remove expansion joints by linking two adjacent girder sections together using a continuous slab design. This approach would render the deck continuous while maintaining some level of rotational freedom for the girders.

Catcher Beam System -

A secondary catcher beam system could be added below the location of the pin and hanger assembly. This system should provided to carry live loads if the existing pin and hanger fails. The use of auxiliary neoprene bearings on the catcher beam system was recommended to use, reduce any impact effects should failure occur.

Removal and replacement option:

New Pin and Hanger Assembly -

In this option existing pins and hangers are removed and replaced with new, higher strength pins and reinforced hangers. It was recommended to use stainless steel pins and hangers according to *AASHTO LRFD Bridge Design Specifications* (Article 6.4.7), this could results in reduction in corrosion failure. While work is under construction each girder must be temporary supported and that temporary supports must be modifiable to accommodate hanger fit up.

Chapter 3 U.S. State Departments of Transportation Survey

3.1 Survey Objectives

In December 2015 a survey was sent to 50 State Departments of Transportation (DOTs). The objective of the survey was to assemble additional information on variety of topics related to pin and hanger retrofit and replacement options. These topics included: a) types of steel bridges that contain pin and hanger assemblies; b) pin and hanger assemblies that need retrofitted and/or replacements; and c) designs, procedures, or criteria for retrofit and/or replacements. Of the 50 surveys, 38 were received as of March 2016. Results from these surveys were examined to: a) document current practices and level of success concerning pin and hanger assembly retrofit and replacement options; b) identify practical application of retrofit and replacement options documented in the literature; and c) identify new or innovative retrofit and replacement options that have not yet been recorded in the literature.

The survey was divided into three sections. Section 1 (General) collected general information related to types of steel bridges that contain pin and hanger assemblies. Section 2 (Options) intended to identify various options, criteria and procedures related to retrofit and replacement of pin and hanger assemblies in each of the states. In addition, data related to retrofit and replacement options that have been implemented and programmed for future was requested. Section 3 (Future Contact) requested that additional information related to pin and hanger assemblies be provided, information that included: to share the respective state DOTs that have developed their own criteria and procedures for retrofits and /or replacements. A copy of the survey is included in Appendix A and responses are provided in Appendix B.

3.2 Survey History and Timeline

The questionnaire was designed by BOSR with technical input being provided by UNL Civil Engineering personnel assigned to the project and NDOR. Prior to the initial mailing, NDOR notified and encouraged State Bridge Engineers to complete the survey. The initial mailing occurred in mid-December 2015. Non-responders were mailed survey packets a second time in early January 2016. Completed surveys were collected by BOSR through early March with findings summarized and provided to UNL Civil personnel.

3.3 Findings of the Survey

Surveys that were completed and returned were initially examined by BOSR, who performed data analysis, processing and filtering. BOSR's used Statistical Package for the Social Sciences (SPSS) software for processing and documenting the dataset. BOSR personnel assigned to the project, in turn, analyzed each survey question in detail and prepared a report. As stated earlier, of the 50 State Bridge Engineers who were sent the survey, 38 were completed and returned (Figure 3.1), a 76% response rate based on the American Association for Public Opinion Research's (AAPOR) standard definition for Response Rate 2 (RR2), which counts partial interviews as respondents (AAPOR, 2015). The following sections summarize survey responses to each question.

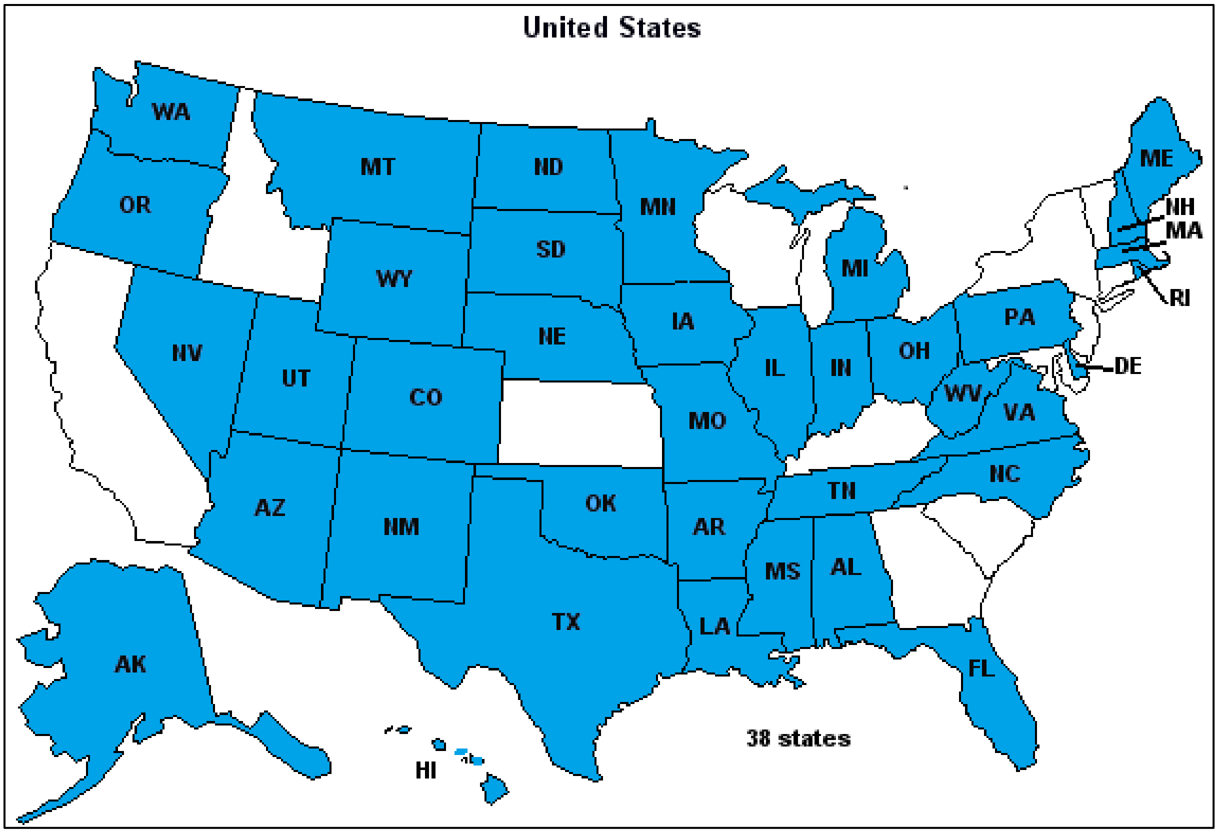


Figure 3.1 Geographic representation of states that responded to the survey.

3.3.1 Question 1

Do you have steel bridges that contain pin and hanger assemblies?

Figure 3.2 and Figure 3.3 show that, of the 38 states who answered the question, 35 have steel bridges that contain pin and hanger assemblies and 3 states have steel bridges without pin and hanger assemblies.

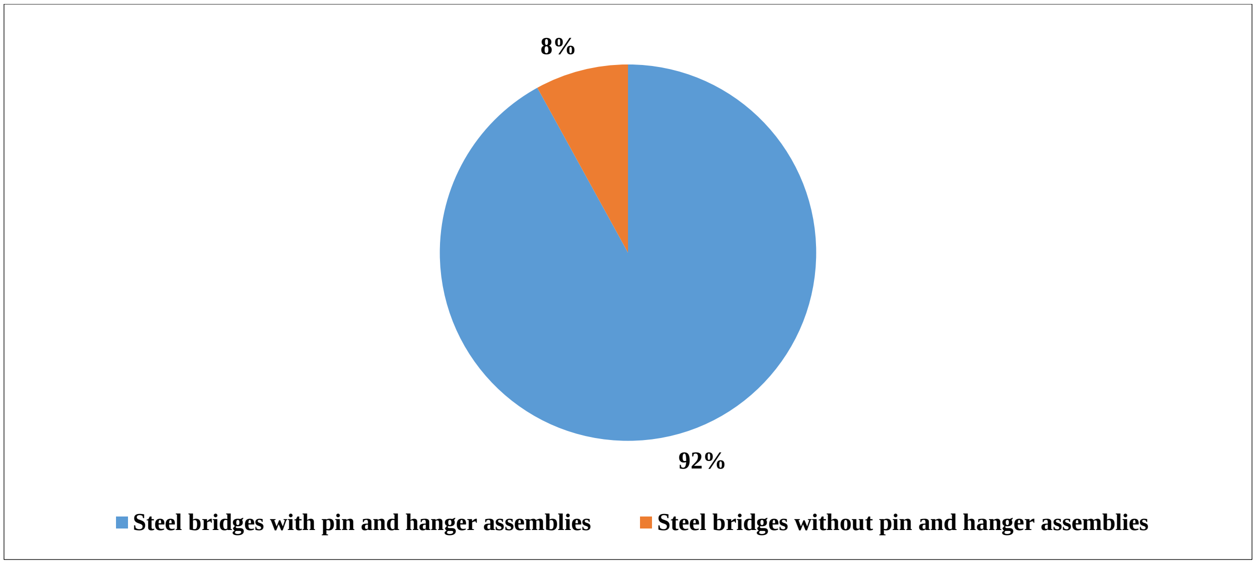


Figure 3.2 Visual representation of responses to question 1.

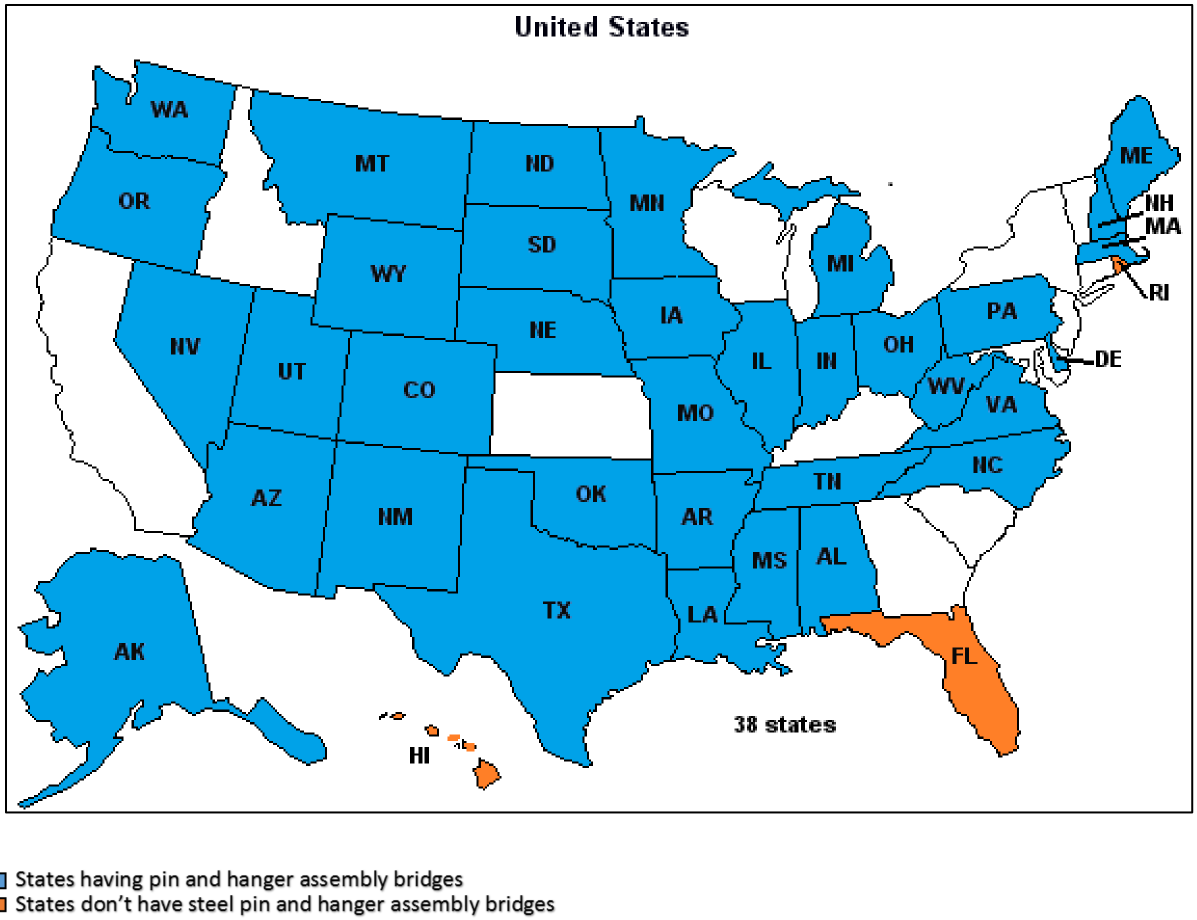


Figure 3.3 Geographic representation of state responses to question 1.

Question 1 (a)

If yes, please provide the number of steel bridge types for each category that have pin and hanger assemblies.

Figure 3.4 reports on the superstructure types that contain pin and hanger assemblies in their states. Eighteen states (67%) reported having two or three girder bridges with pin and hanger assemblies, 25 (86%) have at least one bridge with four or more girders having a pin and hanger assemblies, and 19 states (68%) contain at least one truss bridge with a pin and hanger assembly (Figure 3.4). Additional bridges reported as having pin and hanger assemblies included tied

through arches, suspension bridges, and pinned arches. Additional details are found in Table 3.1, Table 3.2 and Appendix B.

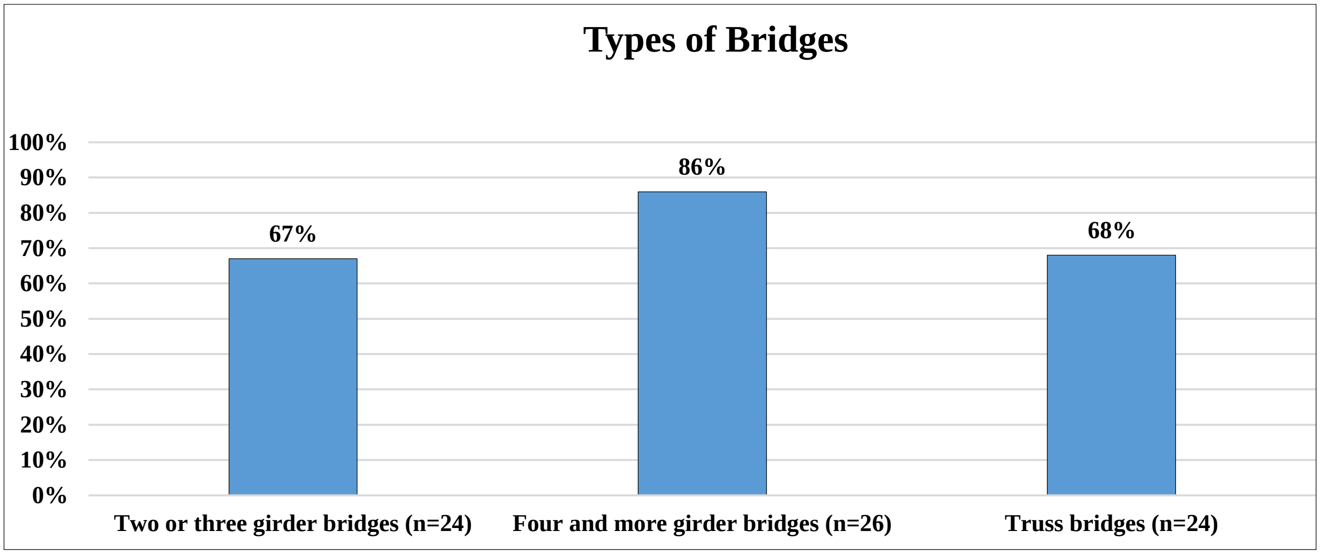


Figure 3.4 Visual representation of state response to question 1(a).

Table 3.1 Types of bridges which has pin and hanger assembly.

Types of bridges (number of pin and hanger assemblies)			
DOTs	**Two or three girder bridges**	**Four or more girder bridges**	**Truss bridges**
Alabama DOT	1	5	2
Alaska DOT & PF	0	6	2
Arizona DOT	12	157	84
Arkansas State Highway and Transportation Department			6
Delaware DOT	0	3	1
Illinois DOT	1	92	14
Indiana NDOT	0	0	0
Iowa DOT	0	2	0
Maine DOT	0	6	3
Massachusetts DOT	1	11	1
Minnesota DOT	4	29	7
Mississippi DOT		24	2
Missouri DOT	26	750	10
Montana DT	4	150	0
New Hampshire DOT		74	
New Mexico DOT	0	17	0
North Carolina DOT	1	1	0
North Dakota DOT	0	14	1
Ohio DOT	9	13	
Oklahoma DOT	0	2	0
Oregon DOT	5	73	12
Pennsylvania DOT	45	15	12
South Dakota DOT	0	0	
Tennesseem DOT	2	0	2
Utah DOT	2	33	0
Virginia DOT	1	18	3
Washington State DOT	51	306	488
West Virginia DOT	6	26	5
Wyoming DOT	12	90	4

*Acronym definitions in Appendix C.

Table 3.2 Other types of steel bridges with pin and hanger assemblies.

Other, Specify		
DOTs	**Other types of bridges**	**Number of P & H assemblies**
Alaska Department of Transportation and Public Facilities	Box girders	
Arkansas State Highway and Transportation Department	Arch deck	2
Colorado DOT	Tie down	
Illinois DOT	Truss with eye bars & pins	1
Iowa DOT	Secondary highway steel girders Secondary highway truss	
Michigan DOT	All girder bridges	1099
Minnesota DOT	Arch Suspension	1 1
Ohio DOT	Riveted steel arches	2
Oregon DOT	RGDG	9
Utah DOT	Pinned arches Suspension arches	7 1
Washington State DOT	Concrete box (2) Steel box(3)	132 90
West Virginia DOT	Tied thru arch Suspension Bridge	1 1

*Acronym definitions in Appendix C.

3.3.2 Question 2

Does your agency view the pin and hanger assemblies as components that need to be retrofitted and/or replaced?

Figure 3.5 and Figure 3.6 shows state agencies were nearly evenly split between viewing pin and hanger assemblies as components that need to be retrofit and/or replaced and feeling that these assemblies do not need retrofitted and/or replaced. A complete list of reasons for non-action can be found in Appendix B.

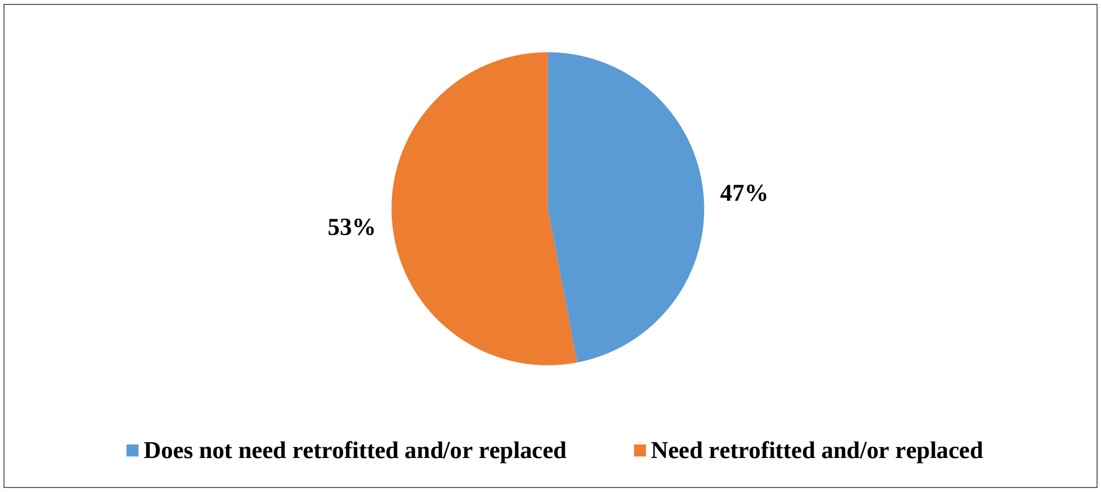


Figure 3.5 Visual representation of state response to question 2

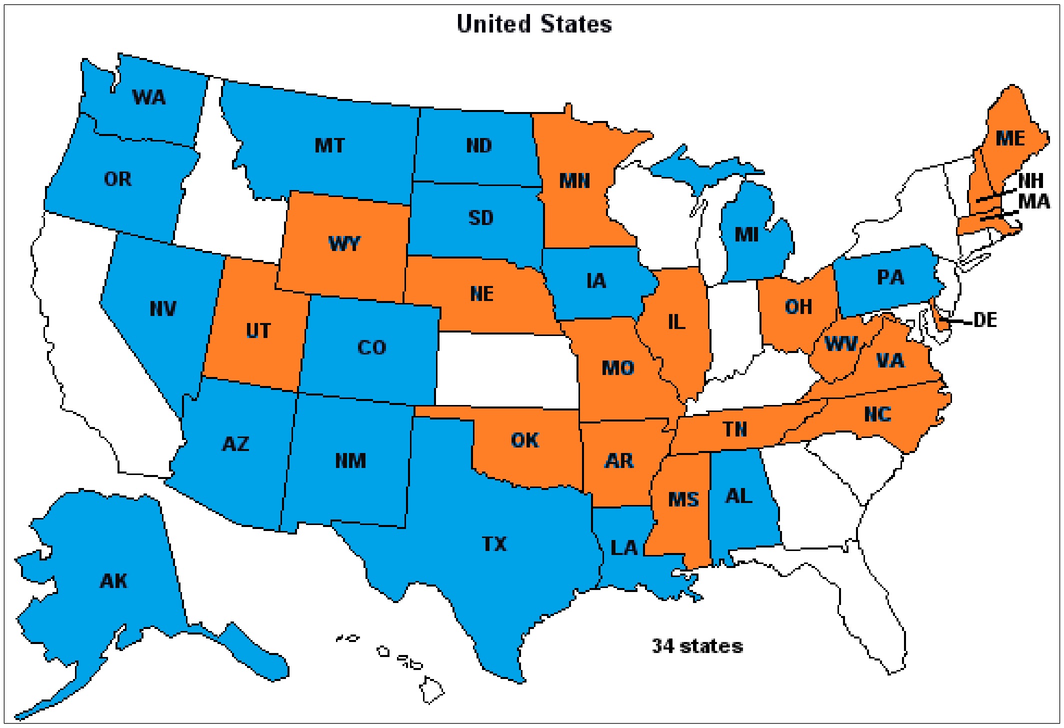


Figure 3.6 Geographical representation of states responded to question 2

Does not need retrofitted and/or replaced
Need retrofitted and/or replaced

Question 2(a)

If yes, please provide the number of retrofit and/or replacement options that you have implemented or programmed for each category below. If you have implemented or scheduled retrofit and/or replacement options other than those listed below, please describe and provide the number for each option in the additional table rows.

Figure 3.7 shows that, for those that view retrofitting and/or replacement as necessary, most states have implemented a secondary system, such as a catcher beam (79%). Few responses indicated that replacements had taken place using new pin and hanger assemblies (43%) or bolted splices (33%). Despite fewer states implementing replacement using new pin and hanger

assemblies or bolted splices, nearly one-quarter of states who responded to the question have new pin and hanger replacement projects planned for the future (21%), while 8% have replacements with bolted splice repairs planned. Details are found in Table 3.3.

Other retrofit and/or replacement options implemented or planned by survey respondents included: (a) replacing the bridge or entire superstructure with concrete girders; (b) supporting the assembly using an "under-running bearing beam," which is akin to a catcher beam; and replacing the assembly with a "ship lap joint". Complete detail on these retrofit and replacement options can be found in Table 3.4 and Appendix B.

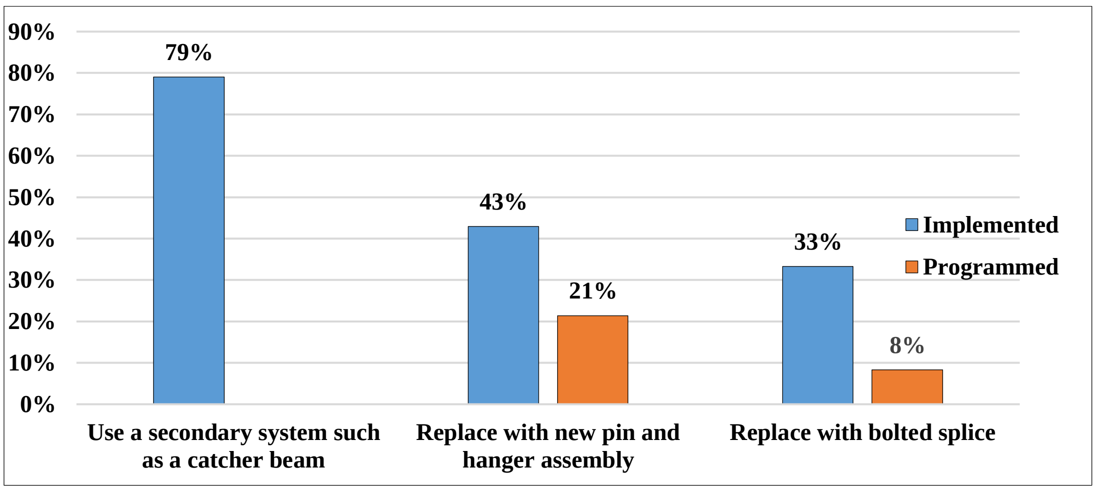


Figure 3.7 Visual representation of state response to question 2 (a)

Table 3.3 Implemented and programmed retrofit and/or replacement options.

Retrofit/replacement options						
DOTs	**Catcher beam system**		**Replace with P & H assembly**		**Replace with bolted splice**	
	Number implemented	Number programmed	Number implemented	Number programmed	Number implemented	Number programmed
Arkansas State Highway and Transportation Department	1					
Delaware DOT	1					
Illinois DOT	0	0	92	92	0	0
Indiana DOT	1	0	0	0	0	0
Maine DOT	4	0	0	0	1	0
Massachusetts DOT	2	0	0	0	0	0
Minnesota DOT	1	0	5	0	2	0
Mississippi DOT			1	1		
Missouri DOT	20	0	30	4	0	0
New Hampshire DOT			0		8	
North Carolina DOT	1	0	0	0	0	0
Oklahoma DOT	1	0	0	0	0	0
Tennessee DOT	1	0	0	0		
Utah DOT	0		5		2	3
West Virginia DOT	3	0	0	0	0	0
Wyoming DOT	0	0	1	0	0	0

*Acronym definitions in Appendix C

Table 3.4 Other implemented and programmed retrofit and/or replacement options.

Other, Specify			
DOTs	**Other options**	**Number implemented**	**Number programmed**
Maine DOT	Superstructure replace	1	1
Massachusetts DOT	Ship lap joint. Replace P & H assembly with under running beam	0 1	1 0
Mississippi DOT	Replace bridge	1	3
Nebraska Department of Roads	Replace bridge or superstructure		50/102
North Carolina DOT	Replace with concrete girder	0	1
Virginia DOT	Replace bridge		
Wyoming YDOT	Suspension hanger/seismic	1	0

*Acronym definitions in Appendix C.

3.3.3 Question 3

For the retrofits and /or replacements you indicated above as implemented or programmed, did you follow any of the designs, procedures, or criteria below?

The survey indicated that multiple designs, procedures, and/or criteria are used to complete pin and hanger assembly retrofit or replacement. Nearly all state bridge engineers who answered the inventory question reported using *AASHTO Standard Specifications for Highway Bridges* criteria and procedures, while some states use *AASHTO LRFD Bridge Design Specifications* criteria and procedures as shown in Figure 3.8 Figure 3.9. Five states reported using their own developed criteria and procedures.

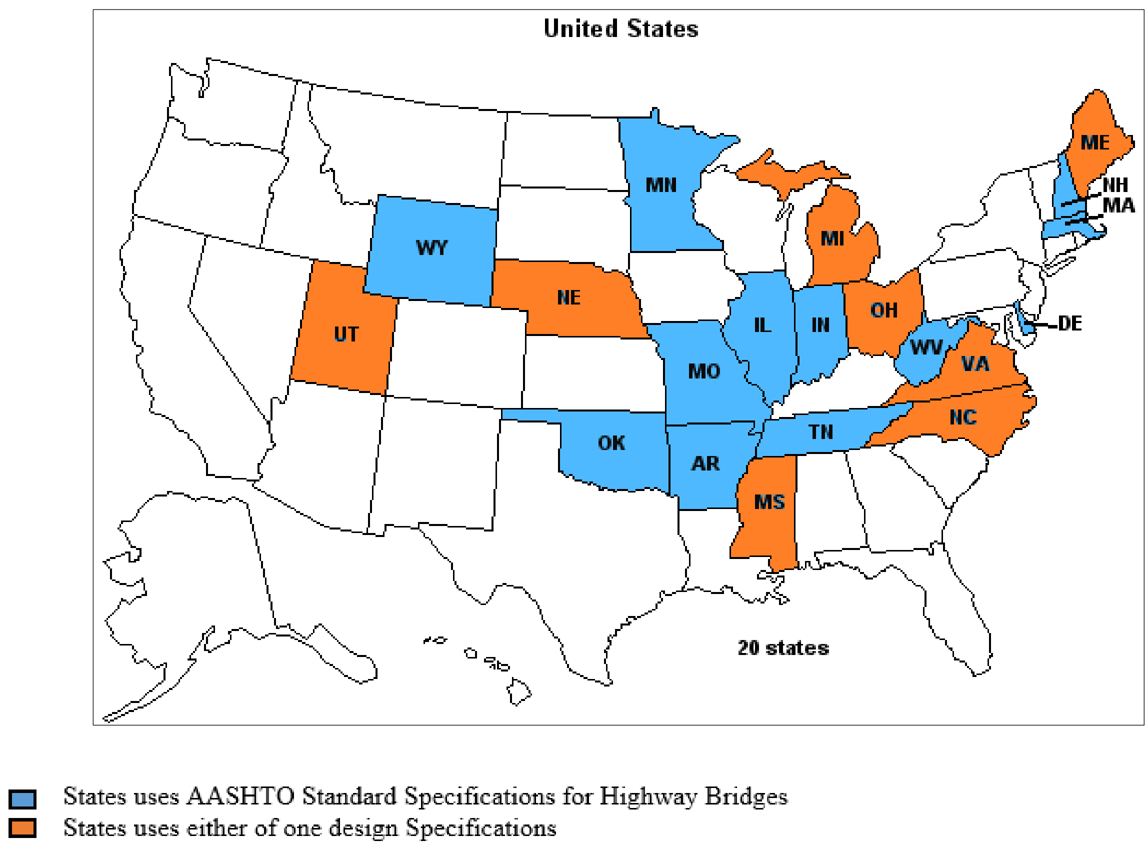


Figure 3.8 Geographical representation of federal design Specification usage.

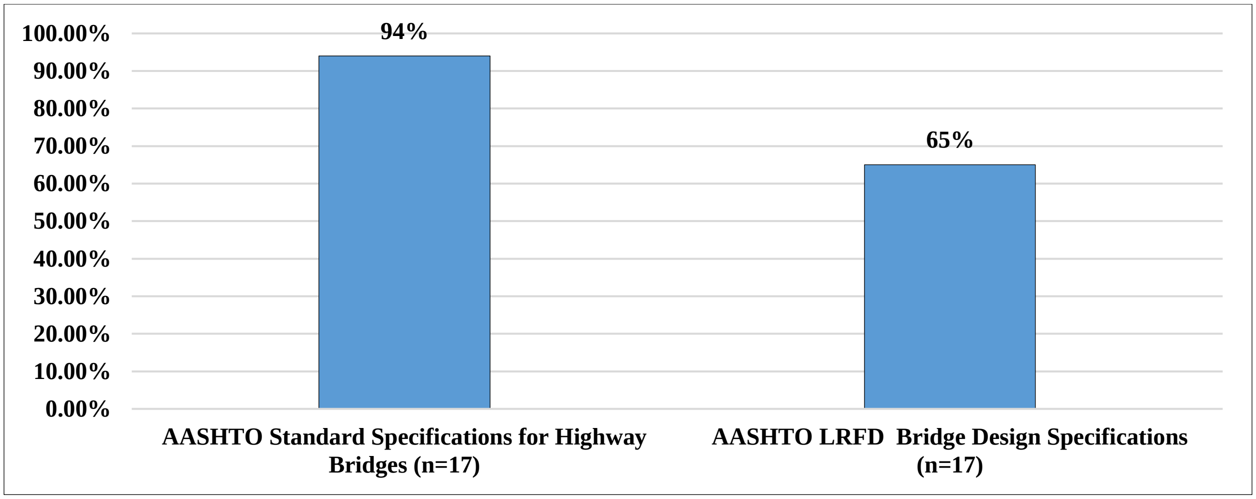


Figure 3.9 Visual representation of state responses to question 3.

3.3.4 Question 4

Have you developed your own criteria and procedures for retrofits and/or replacements?

One-quarter of states in the (24%) reported developing their own criteria and procedures for retrofits and /or replacements (Figure 3.10 and Figure 3.11). More states use their own procedures in conjunction with the *AASHTO Standard Specifications for Highway Bridges*. Additional details are found in Table 3.5, Table 3.6 and Appendix B.

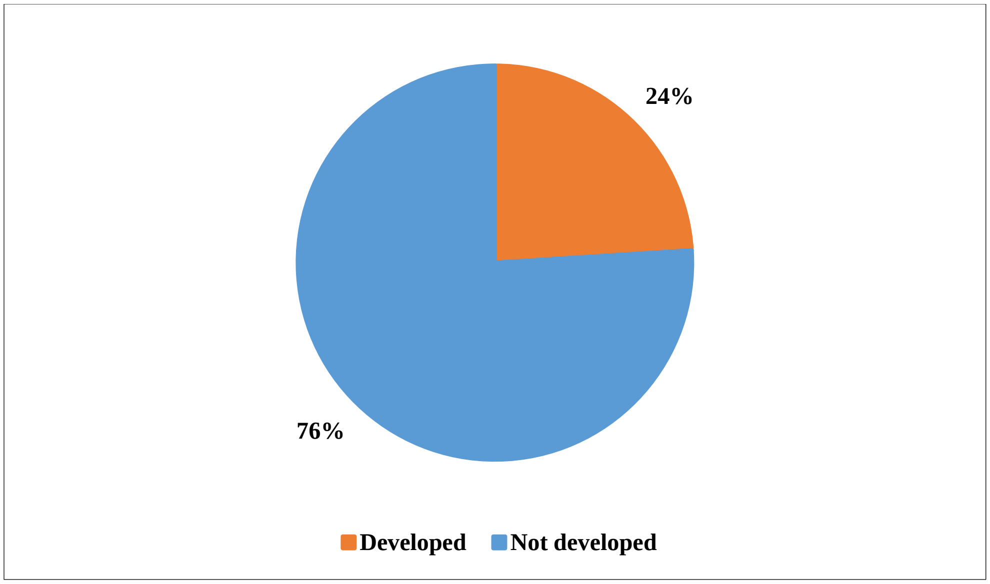


Figure 3.10 Visual representation of states response to question 4.

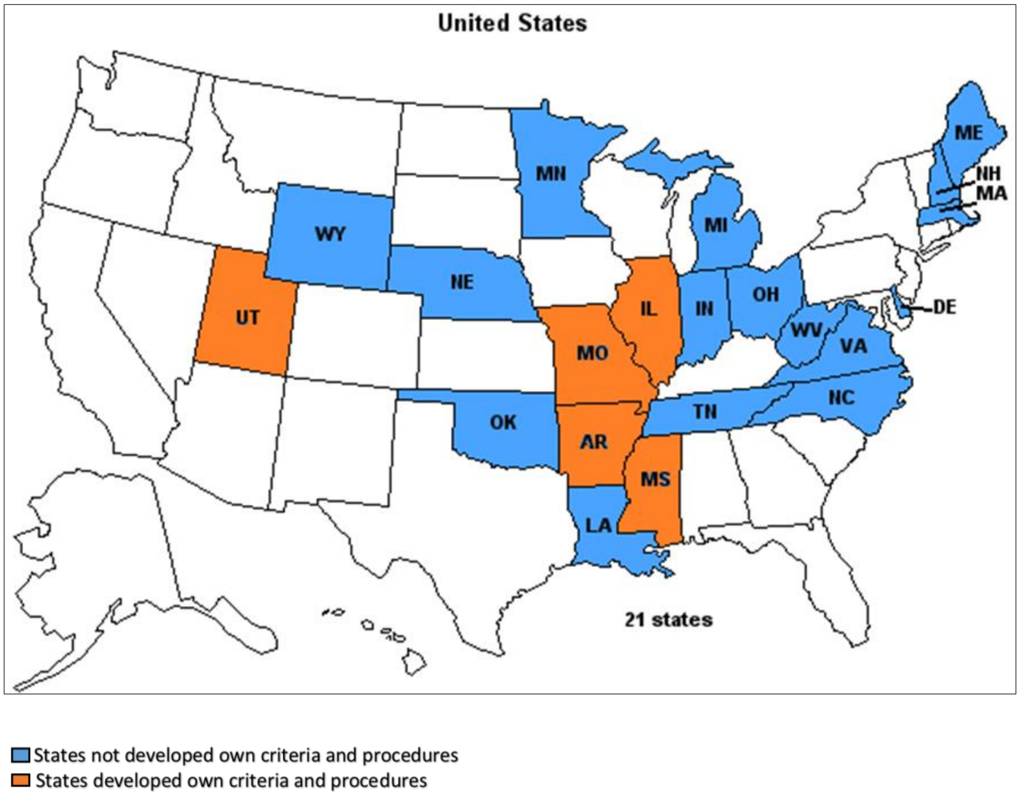


Figure 3.11 Geographical representation of states that have developed own criteria and procedures.

Table 3.5 Design Specifications.

Design Specfications	Total number of States
AASHTO LRFD criteria and procedures	11
AASHTO Standard Specfication criteria and procedures	16
Developed own criteria and procedures	5

Table 3.6 Developed own criteria & procedures.

Developed own criteria & procedures for retrofits/replacements	
DOTs	**Comments**
Arkansas State Highway and Transportation Department	Internally developed.
Illinois DOT	It is part of our structural services manual. Bureau of Bridges and Structures.
Mississippi DOT	Our bridge replacement program prioritizes bridges with pins & hanger high enough to systematically replacethe bridge with another (usually concrete) bridges.
Missouri DOT	No set criteria. Details are case-by-case.
Utah DOT	Is not documented.

*Acronym definitions in Appendix C.

3.3.5 Question 5

Does your agency view the pin and hanger assemblies as components that need no further action at this time?

Of the 32 state bridge engineers who answered the question, half reported that their agency views pin and hanger assemblies as not needing further action at this time as shown in Figure 3.12 and Figure 3.13. Reasons for non-action included: a) bridges being in good condition and functioning properly; b) routine inspections and adequate maintenance; and c) a lack of concern about these assemblies. A complete list of reasons for non-action can be found in Table 3.7 and Appendix B.

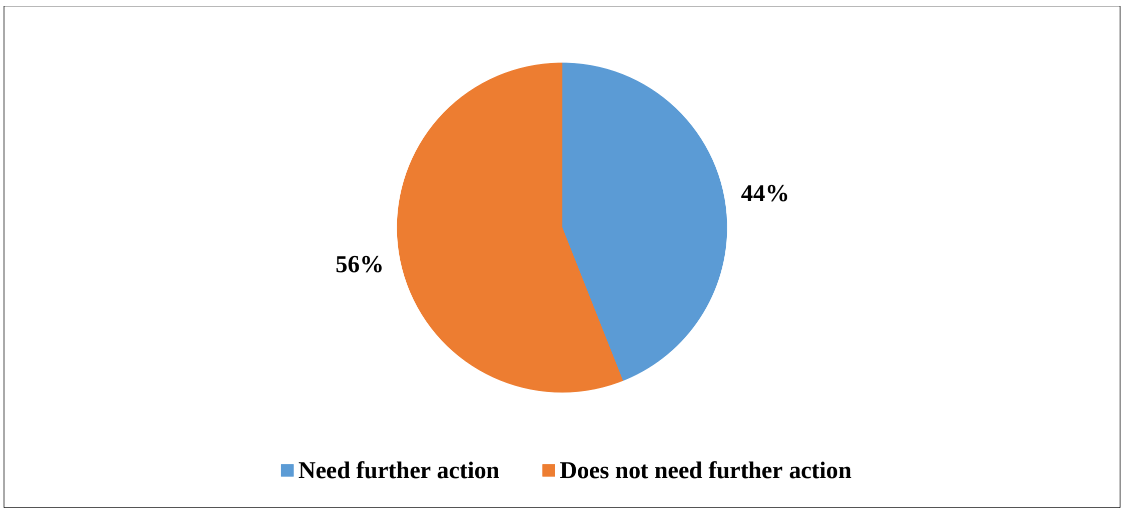


Figure 3.12 Visual representation of states response to question 5.

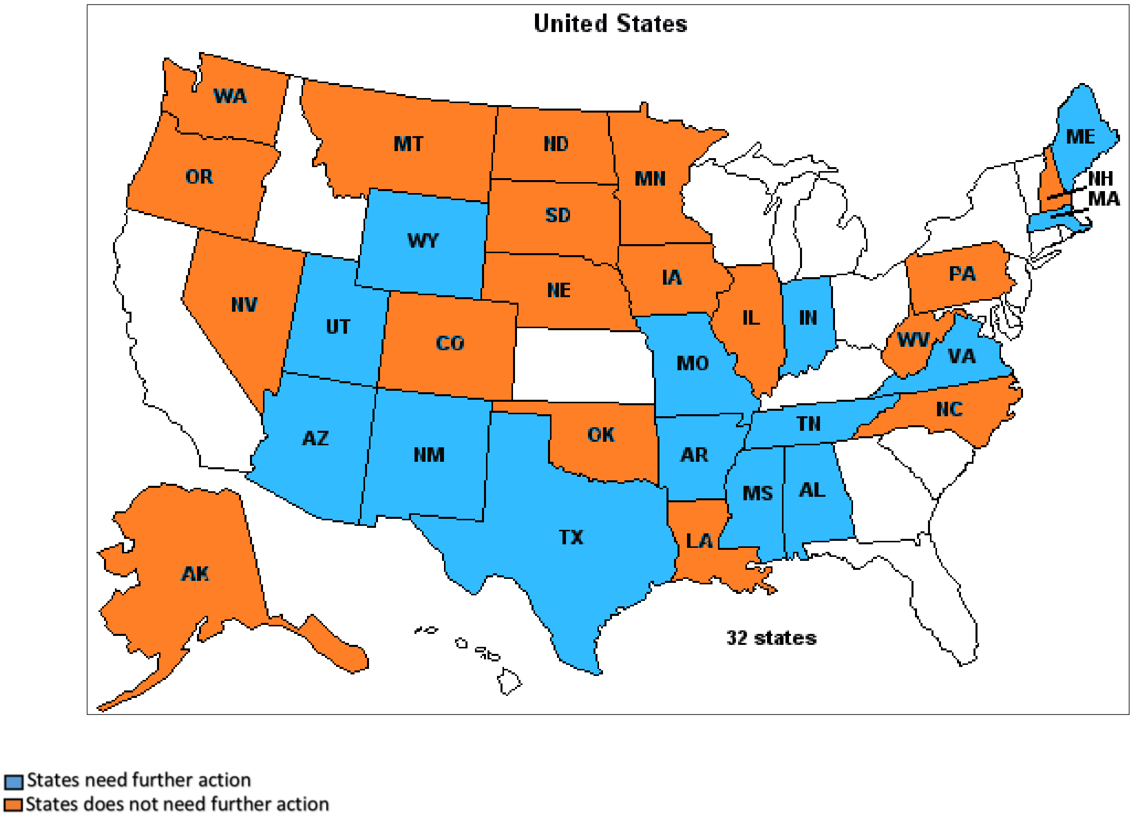


Figure 3.13 Geographical representation of states need or not need for further action.

Table 3.7 Reasons for pin and hanger assembly non-action.

Agency view P & H assemblies that need no further action at this time	
DOTs	**Comments**
Alaska DOT & PF	Pin & hangers are functioning properly. No pack rust present.
Colorado DOT	No section loss due to corrosion & no crack on hanger.
Delaware DOT	We are not as concerned with pin & hanger assemblies for multi-beam bridges. Pin & hanger assemblies on truss bridges are treated as a fracture critical member and are scrutinized more.
Iowa DOT	Proper inspection should identify deficiencies in time to address them without impacts to public safety.
Louisiana DOT	Bridges are in good condition.
Montana DT	Pins and hangers are usually inspected every 2 years and UT inspected every 4 years. With our relatively dry climate and large temperature swings the p & h assemblies usually stay moving as designed with little rust impact.
Minnesota DOT	We will include repairs or improvements to pin and hanger elements as conditions warrant. We have not developed projects solely on pin and hanger detail unless condition justifies.
North Carolina DOT	Inspection reports indicate the condition of the pin and hang is “good”.
Nebraska Department of Transportation	All bridges are inspected by certified inspectors at least every 2 years and all bridges that this agency manages directly have redundant secondary systems should failure occur.
Nevada DOT	We haven't identified problems with the hangers, aside from minor corrosion.
Ohio DOT	We retrofit when they are deteriorated.
Oklahoma DOT	We used ultrasonic inspection on our pins. No problems were found.
Oregon DOT	We inspect & monitor p & h's and only r & r or provide supplemental support when their condition indicates a need.
Pennsylvania DOT	We have retrofitted the inventory of 2 girder and truss bridges with suspended assemblies.
South Dakota DOT	These assemblies are part of annual NBIS inspections and the pins get a periodic NDT inspection as well.
Virginia DOT	We evaluate each one individually.
Washington State DOT	Routine inspections and painting when needed.
West Virginia DOT	We monitor during routine inspections and provide action as needed

*Acronym definitions in Appendix C.

3.3.6 Question 6

If you developed your own criteria and procedures for retrofit and/or replacements, would you be willing to share those with us?

Of the 30 state bridge engineers who answered the question, 10 states were willing to share their criteria and procedures electronically.

3.3.7 Question 7

Would you like to receive results of this study?

Of the 38 states bridge engineers who answered the question, 33 states would like to receive the results from this study.

3.4 Follow-Up Contact

States that indicated they would provide additional information in response to question 6, based on the response to question 6, follow up for the fourteen states (Figure 3.14). The plans, drawings and photos are found in Appendix D1. Additional details of the retrofit and/ or replacement options are discussed in Chapter 4. Summary of contact information found in Table 3.8.

Table 3.8 Summary of follow-up contacts

DOTs	Contacted for the information
Arkansas State Highway and Transportation Department	Not responded
Colorado DOT	Not responded
Georgia DOT	Not responded
Illinois DOT	Provided repair drawings found in Appendix D1
Indiana DOT	Not responded
MassDOT	Provided information on ship lap joints with plan and pictures found in Appendix D1
Michigan DOT	Provided pin and hanger assembly drawings found in Appendix D1
North Dakota DOT	Not responded
New Hampshire DOT	Not responded
Oklahoma DOT	Provided catcher beam system drawing found in Appendix D1
Pennsylvania DOT	Provided catcher beam system drawing found in Appendix D1
South Carolina DOT	Not responded
Texas DOT	Not reponded
Utah DOT	Not responded

*Acronym definitions in Appendix C.

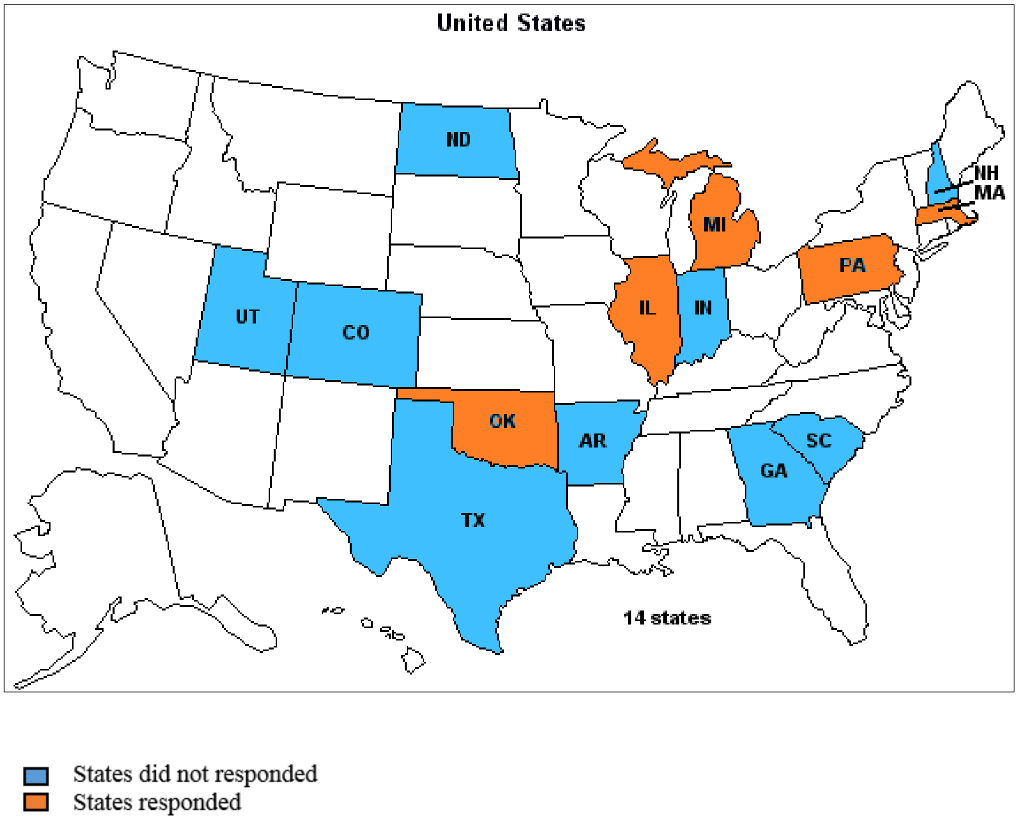


Figure 3.14 Geographical representation of states contacted for additional details.

3.5 Summary

The State DOT survey produced the following information:

- States who responded were roughly split between seeing such retrofits and replacements as necessary and unnecessary;
- Pin and hanger assemblies are most commonly found bridges having four and more girders (86%);
- Implementing a secondary system, such as a catcher beam (79%), is a more widely used retrofit and/or replacement option than replacing with either a new pin or hanger assembly

(43%) or with bolted splices (33%), although at the time of the inventory study no future secondary system retrofits were programmed;

- Nearly all of the states utilize *AASHTO Standard Specifications for Highway Bridges* (94%),while fewer states use the *AASHTO LRFD Bridge Design Specifications* (65%),and some states developed their own criteria and procedures; and
- Additional retrofit and/or replacement options that were revealed by the survey included replacing with a “ship lap joint,” providing an “under-running bearing beam,” and, as expected, replacing the entire bridge or superstructure.

Chapter 4 Flowcharts Summarizing Retrofit and/or Replacement Options

4.1 Introduction

The objectives of this chapter are to provide flowcharts that describe steps associated with completing feasible options associated with addressing pin and hanger assembly retrofit and/or replacement. Approaches for which flowcharts are provided are categorized as retrofit, rehabilitation, or removal and replacement options as shown in Figure 4.1. The intention is that these flowcharts will provide an organized decision-making tool that would assist NDOR personnel with assessing options and their consequences when pin and hanger assembly retrofit and/or replacement are being considered. As appropriate, each cell in the flowcharts refers to corresponding articles in appropriate state and federal design specifications. These include the *AASHTO Standard Specifications for Highway Bridges*, the *AASHTO LRFD Bridge Design Specifications* and NDOR’s *Bridge Office Policies and Procedures (BOPP) manual*.

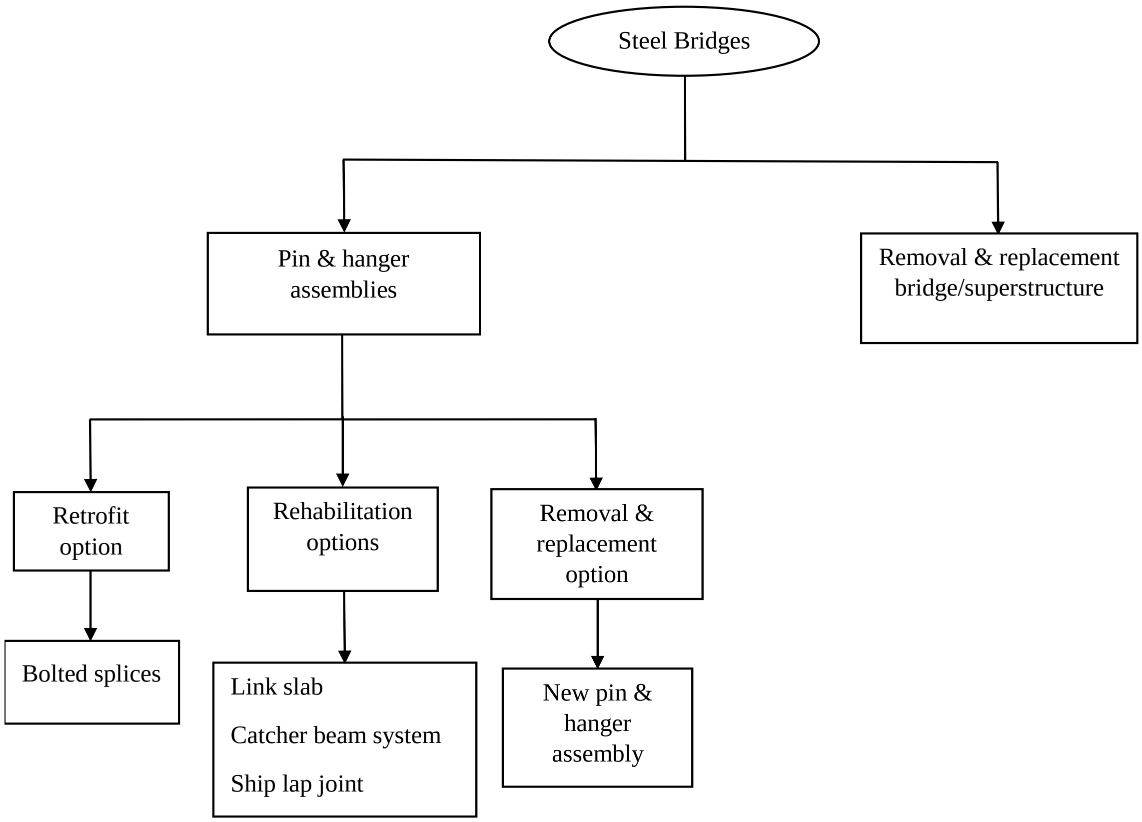


Figure 4.1 Flowchart demonstrates decision – making process.

4.2 Retrofit and/or Replacement Options Process Summaries

This section summaries retrofit, rehabilitation and, removal and replacement options based on the literature review and survey of DOTs and provided along with pros and cons of each respective options. Each section organized into brief summary followed with pros, cons and flowcharts with description.

4.2.1 Replace with Bolted Splices

This section summarizes the option that involves removing pin and hanger assemblies and replacing them with bolted splices. Items that are discussed and presented in the corresponding flowchart incorporate relevant information from the literature search, DOT survey and appropriate federal and state specifications.

When a major retrofit of a bridge structure is programmed, pin and hanger assemblies should be examined for elimination. The pin and hanger assembly would be replaced with continuity web and flange splices and existing deck expansion joints at the hinges would be removed and replaced to make these locations continuous. By making the drop-in section spans locations to continuity support the demand of the girder changes, so demand should be recalculated. While the pin and hanger assembly is being replaced with bolted splices, the girders should be temporarily supported from below or above the deck.

The state DOT survey produced a comment related to replacing pin and hanger assemblies with bolted splices. For drop-in section spans, the method implemented to eliminate the assemblies completely and replace with bolted splices involved installation of counterweights at the ends of the span. A flow-chart detailing general steps involved in the process is located in Figure 4.2.

Pros:

- Pin and hanger assembly is removed and continuity is provided through splices, possibly eliminating non-redundancy and making the structure more efficient; and
- Expansion joints eliminated to reduce and mitigate superstructure corrosion.

Cons:

- Changing the structural system from containing a drop-in span to being completely continuous necessitates a re-evaluation of superstructure behavior and capacity; and
- Higher construction cost.

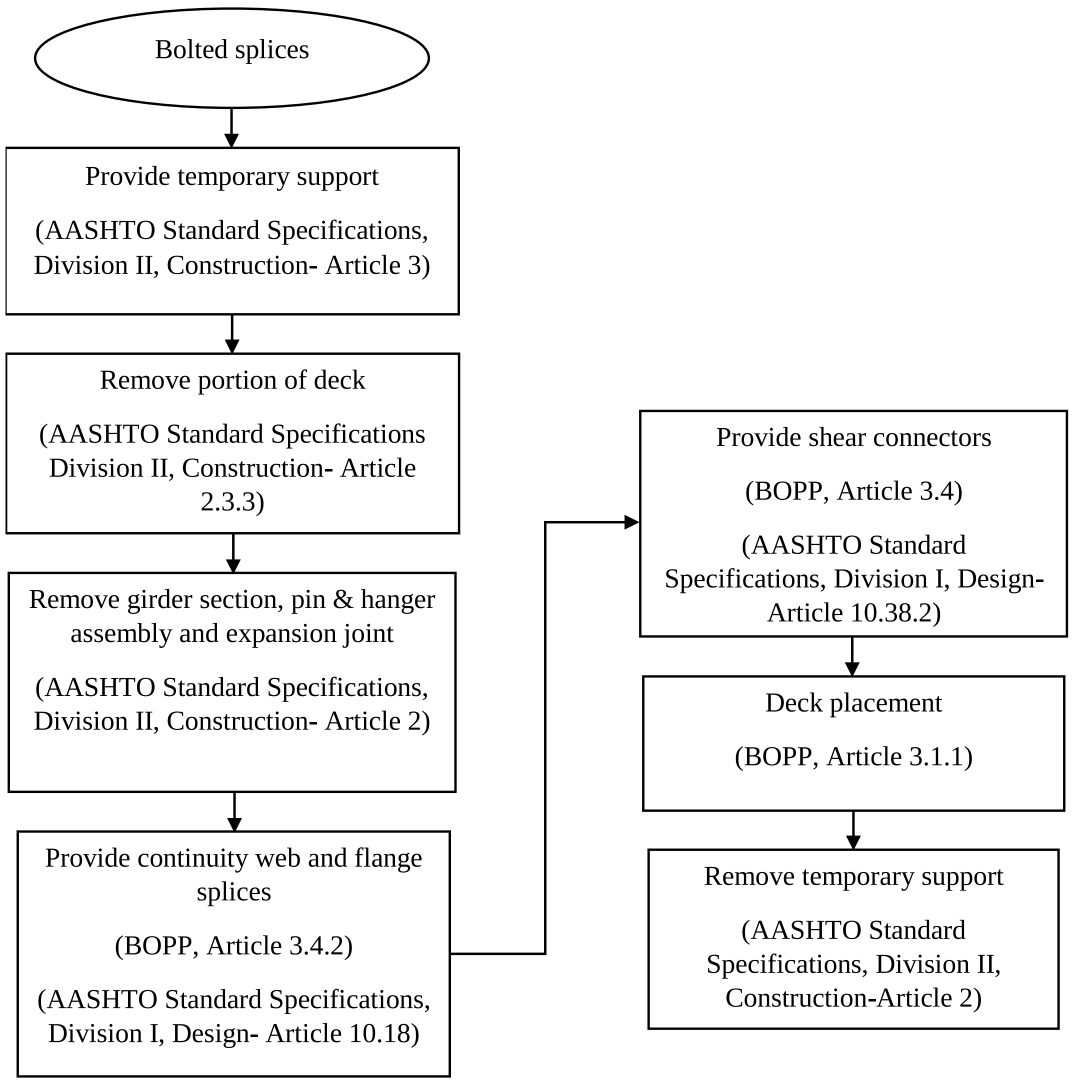


Figure 4.2 Bolted splice design process.

As shown in Figure 4.2, when considering replacing the assemblies with bolted splices, the process starts with following steps. While replacing the pin and hanger assemblies with bolted splices, the girder should be supported by temporary support beam and this support should be provided according to Standard Specifications, Division II-Construction (Article 3). The portion of the deck along the expansion joints are removed as per the design dimensions of the splices according to Standard Specifications, Division II-Construction (Article 2.3.3). The portion of the girder section near the pin and hanger location, pin and hanger assembly, and the expansion joints are removed according to Standard Specifications, Division II-Construction (Article 2). The drop-in span is completely converted into continuity support which is provided through bolted splices connection according to Standard Specifications, Division I-Design (Article 10.18) and BOPP Specifications (Article 3.4.2). Here demand of the girder changes, so demand should be recalculated. Provide shear connectors along the newly constructed girder, shear connectors are designed to provide a composite action between the slab and the girders according to Standard Specifications, Division I-Design (Article 10.38.2) and BOPP Specifications (Article 3.4). Place the deck according to BOPP Specifications (Article 3.1.1). Finally, after construction temporary support should be removed according to Standard Specifications, Division II-Construction (Article 2).

4.2.2 Link Slab

This section summarizes the option that involves removing expansion joints and replacing them with link slab. Items that are discussed and presented in the corresponding flowchart incorporate relevant information from the literature search.

The deck expansion joint is one of the significant component in the functioning of bridge structures (Chang & Lee, 2002). Deck expansion joints accompany the pin and hanger assemblies. The elimination or reduction of expansion joints reduces costs. One identified option that would help eliminate deck joints is via providing "link slabs" at joint locations. Figure 4.3 referred from (Caner & Zia, 1998). A flow-chart detailing general steps involved in the process is located in Figure 4.4.

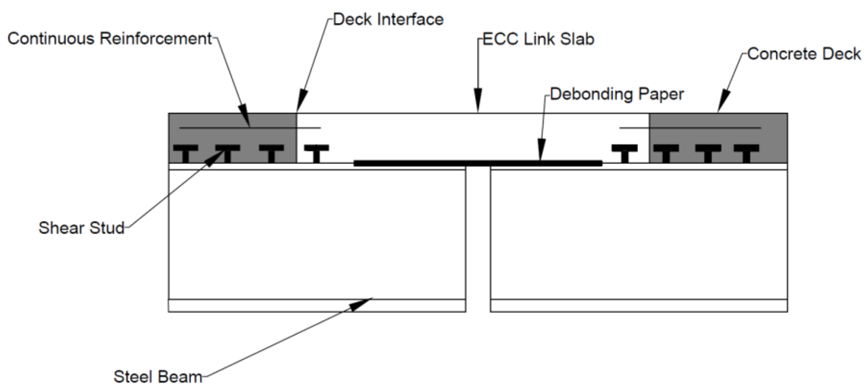


Figure 4.3 Link slab detail.

Pros:

- Reduced construction and maintenance of bridge via reduction of joints, moisture intrusion and subsequent corrosion control.

Cons:

- Continuity achieved by providing link slab influences shrinkage, creep and thermal stress which causes structural damages; and
- Continuous slab has high stresses developed due to repeated load will lead to fracture and cracking of the structures along the slab.

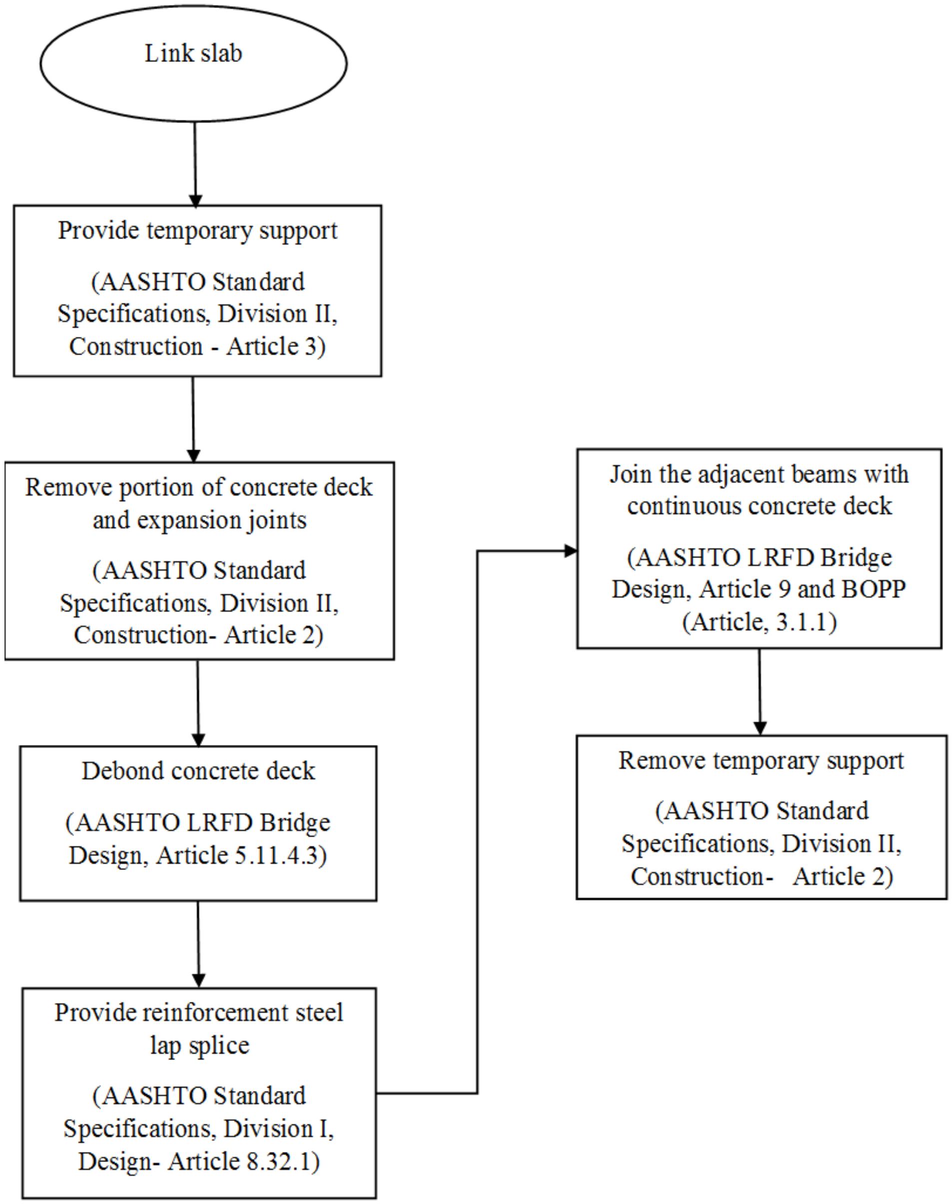


Figure 4.4 Link slab design process.

As shown in Figure 4.4, when considering rehabilitation with link slab, the process starts with following steps according to (Caner & Zia, 1998). While replacing the pin and hanger assembly with a link slab, the girder should be supported by temporary support beam and this support should be provided according to Standard Specifications, Division II-Construction (Article

3). Expansion joints and a portion of the concrete deck along the expansion joints are removed according to Standard Specifications, Division II-Construction (Article 2). Debond the concrete deck on each side of the beam at least 5% of the span length according to AASHTO LRFD Specifications, (Article 5.11.4.3) along the debonded region, the shear connectors are removed to prevent composite action. Further, the top flange of the girder is provided with debonding mechanism in the form of standard roofing tar paper which acts as a water proofing material. Provide reinforcement steel lap splice for continuity of deck reinforcement according to Standard Specifications, Division I-Design (Article 8.32.1). Join the adjacent beams with a continuous concrete deck according to AASHTO LRFD Specifications (Article 9) and BOPP Specifications (3.1.1). Finally, after construction temporary support should be removed according to Standard Specifications, Division II -Construction (Article 2).

4.2.3 Catcher Beam System

This section summarizes the option that involves rehabilitation of pin and hanger assemblies with catcher beam system. Items that are discussed and presented in the corresponding flowchart incorporate relevant information from the literature search, DOT survey and appropriate federal and state specifications. A Secondary catcher beam system is provided to carry live loads across the expansion joint when the existing pin and hanger fails at the location of the pin and hanger assembly. The retrofit should be detailed to resist applied live load and the gap between the girder and the catcher beam must be kept as small as possible to the limit impact loading. To reduce impact, the use of auxiliary neoprene bearings on the catcher beam is also recommended (PennDOT, 2010). A flow-chart detailing general steps involved in the process is located in Figure 4.7.

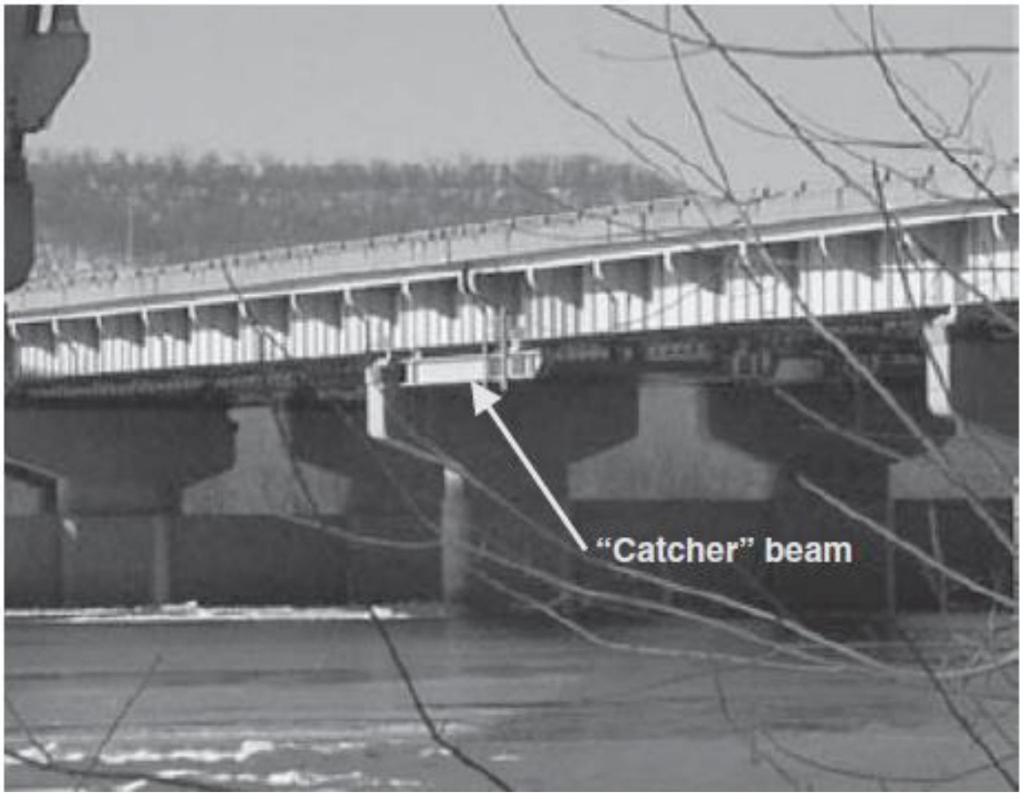


Figure 4.5 Catcher beam system. (Connor et al. 2005)

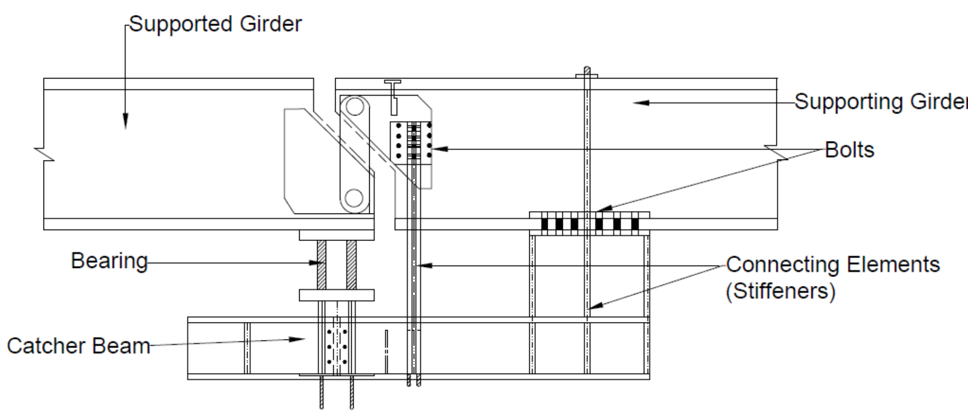


Figure 4.6 Catcher beam system representative detail.

Pros:

- When pin and hanger assembly fails to carry the live load then catcher beam system should be installed to carry the live load, which is an immediate option to replace and control the sudden bridge collapse.

Cons:

- This is a temporary system, which works for very less number of years due to fatigue related problems in catcher beam system, and replacement needs to be considered.

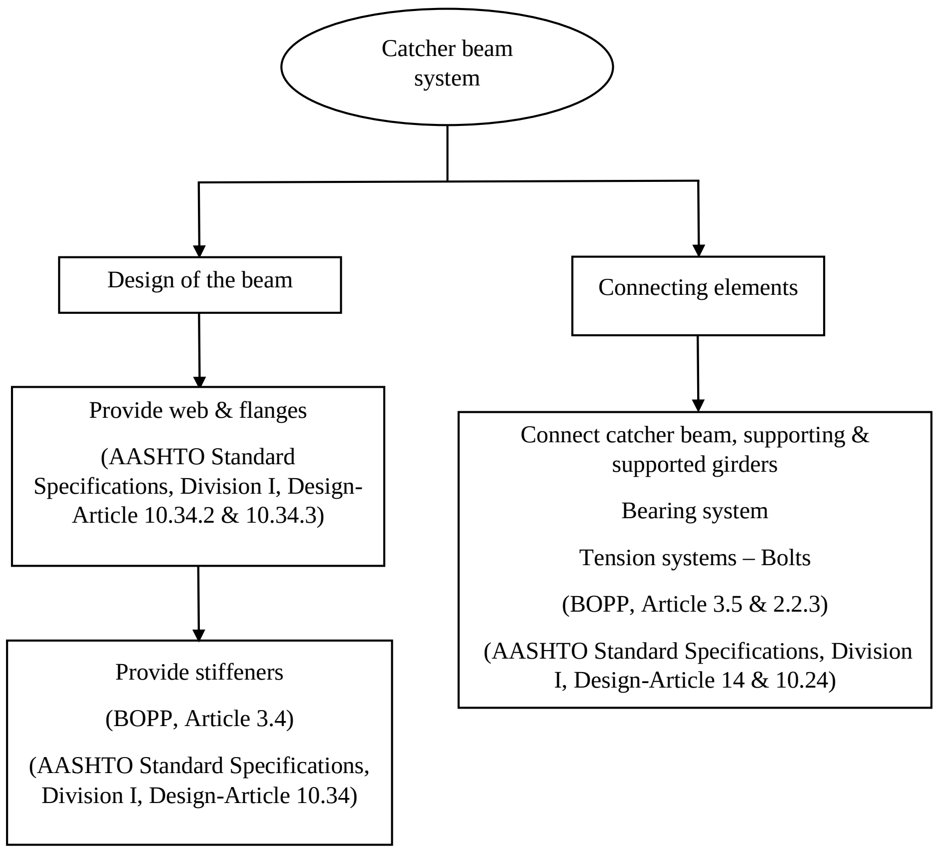


Figure 4.7 Catcher beam design process.

As shown in Figure 4.7, when considering retrofit of pin and hanger assemblies with catcher beam, the design process is explained below. Catcher beam system design consists of two components: design of the beam and connecting elements.

- Design of beam: The web and flanges of the beam is designed according to Standard Specifications, Division I-Design (Article 10.34.2 & 10.34.3). Stiffeners are designed according to Standard Specifications, Division I-Design (Article 10.34) and BOPP Specifications (Article 3.4).
- Connecting elements: For connecting the catcher beam and the supported girder, bearing systems are used and this bearing system is designed according to Standard Specifications, Division I-Design (Article 14). For connecting the catcher beam and the supporting girder, bearing systems and tension systems like bolts are designed according to Standard Specifications, Division I-Design (Article 14 & 10.24) and BOPP Specifications (Article 3.5 & 2.2.3).

4.2.4 Replace with Ship Lap Joint.

This section summarizes the option that involves rehabilitation of pin and hanger assemblies with ship lap joint. Items that are discussed and presented in the corresponding flowchart incorporate relevant information from the DOT survey and state specifications.

The Massachusetts DOT has utilized a different type of pin and hanger replacement option they refer to as a "ship lap joint." In this option, which performs in similar fashion to the original pin and hanger assembly, bearings are used to carry loads at the joint location, with girder sections being modified to act as short "cantilevers" that transfer loads across the joint in shear and bending. This detail is depicted for a specific project, the I-91 viaduct in Springfield, Massachusetts, in

Figure 4.8, Figure 4.9 and in Appendix D1. A flow-chart detailing general steps involved in the process is located in Figure 4.10.

Figure 4.8 Ship lap joint at bearing at joint locations (Mass DOT, 2014).

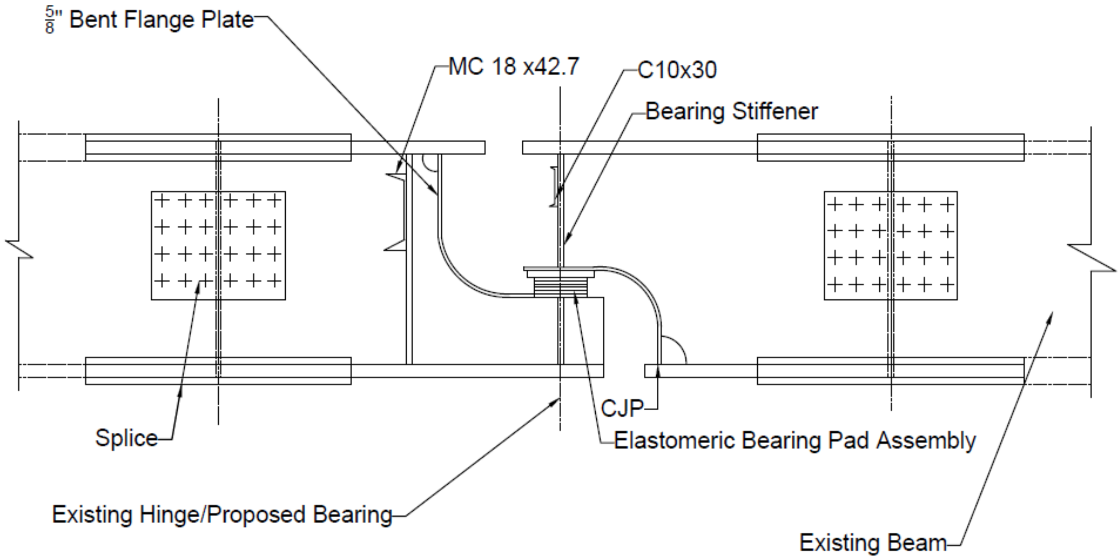


Figure 4.9 Ship lap joint detail (Mass DOT, 2014).

Pros:

- In the ship lap joint, support beam is carried by bearings, which improves rotational degree of freedom.

Cons:

- Still need to maintain joint which results in accumulation of debris and moisture and causes corrosion;
- Design and retrofit required for ship lap joint appears tedious compared to pin and hanger assemblies; and
- Fabrication and construction cost are more compare to pin and hanger assemblies.

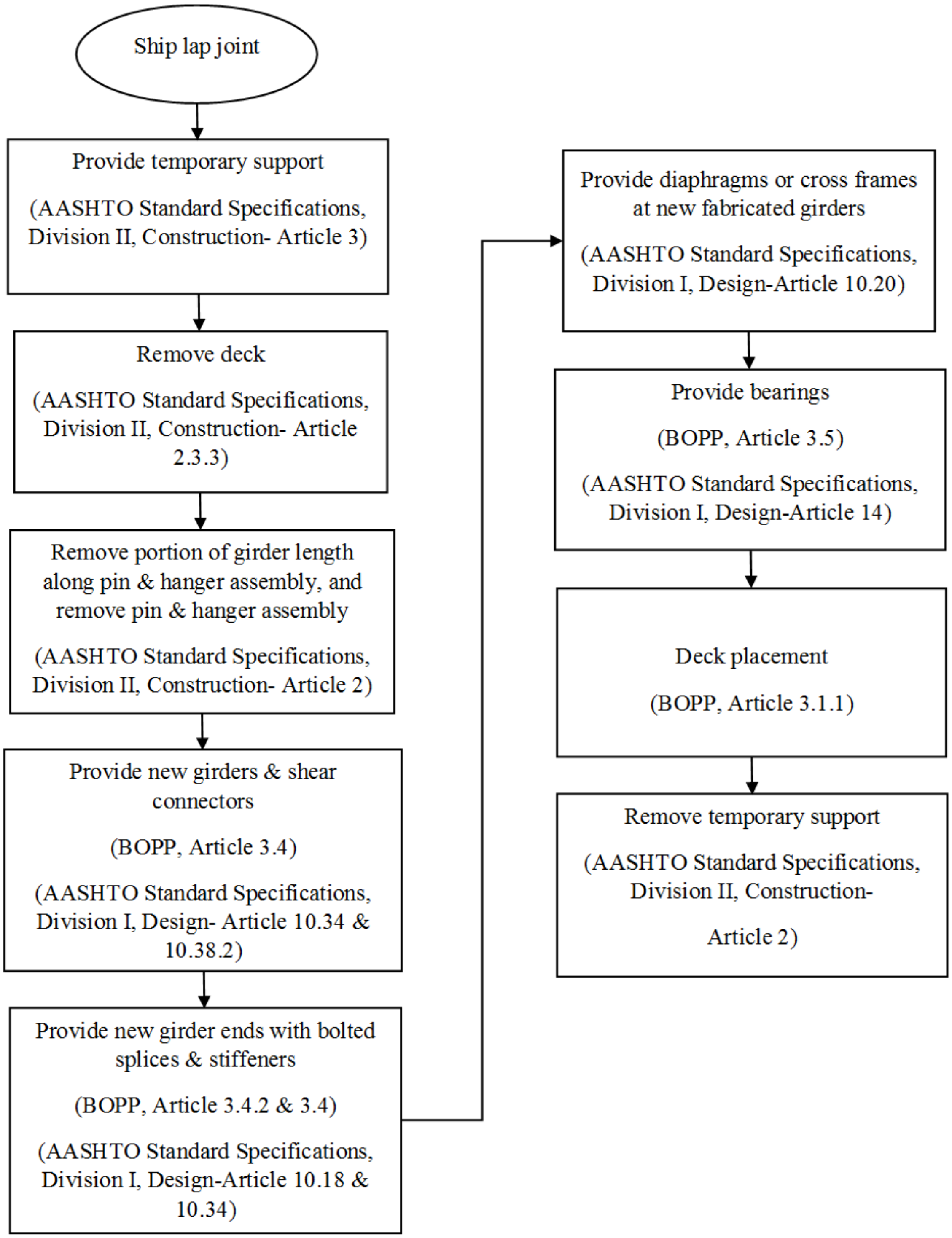


Figure 4.10 Ship lap joint design process.

As shown in Figure 4.10, when considering replacing the assemblies with ship lap joint, the process starts with following steps. While replacing the pin and hanger assemblies with a ship lap joint, the girder should be supported by a temporary support beam and this support should be provided according to Standard Specifications, Division II-Construction (Article 3). Then remove the deck according to Standard Specifications, Division II-Construction (Article 2.3.3).The portion of the girder length and the pin and hanger assembly are removed according to Standard Specifications, Division II-Construction (Article 2).Then provide new girders and shear connectors according to Standard Specifications, Division I-Design Standard Specifications (Article 10.34 & 10.38.2) and BOPP Specifications (Article 3.4).Then provide the new girder ends with bolted splices connection and stiffeners according to Standard Specifications, Division I-Design (Article 10.18 & 10.34) and BOPP Specifications (Article 3.4.2 & 3.4). Provide diaphragms or cross frames at new fabricated girders according to Standard Specifications, Division I-Design (Article 10.20). The support beam is carried by bearings which carries the loads at the joint locations and bearing systems are designed according to Standard Specifications, Division I-Design (Article 14) and BOPP Specifications (Article 3.5) which improves rotational degree of freedom. Further, place the deck according to BOPP Specifications (Article 3.1.1). Finally, after construction, temporary support beam should be removed according to Standard Specifications, Division II-Construction (Article 2).

4.2.5 Replace with Pin and Hanger Assembly.

This section summarizes the option that involves removing pin and hanger assemblies and replacing them with new similar pin and hanger assembly. Items that are discussed and presented in the corresponding flowchart incorporate relevant information from the literature search, DOT survey and appropriate federal and state specifications.

When pin and hanger assembly is found to be frozen, they should be considered for examination and should be replaced with new pin and hanger assembly. The hanger plates and pins should be designed according to *AASHTO Standard Specifications for Highway Bridges*. While replacing the new pin and hanger assembly, the suspended span should be temporarily supported from below or above the deck. FHWA recommended to use new stainless steel pins and hangers according to *AASHTO LRFD Bridge Design Specifications* (Article 6.4.7), which reduces corrosion damage. Higher strength pins and larger hanger cross sections are also recommended to use so that by replacing existing assemblies with new, more durable components the assembly would be strengthened and maintenance requirements could be reduced. (Sirianni & Tricini, 2010).

From the DOTs survey, the approach of replacing new pins and hangers is programmed in more states than any other approaches. A flow-chart detailing general steps involved in the process is located in Figure 4.11.

Pros:

- Replacement with similar design can be cost efficient and cause minimal disruption to traffic; and
- By using stainless pins and hangers, corrosion could be controlled.

Cons:

- Still provides non-redundant system; and
- Pin and hanger assembly needs regular ultrasonic inspection every two years. So there is a higher inspection and maintenance cost.

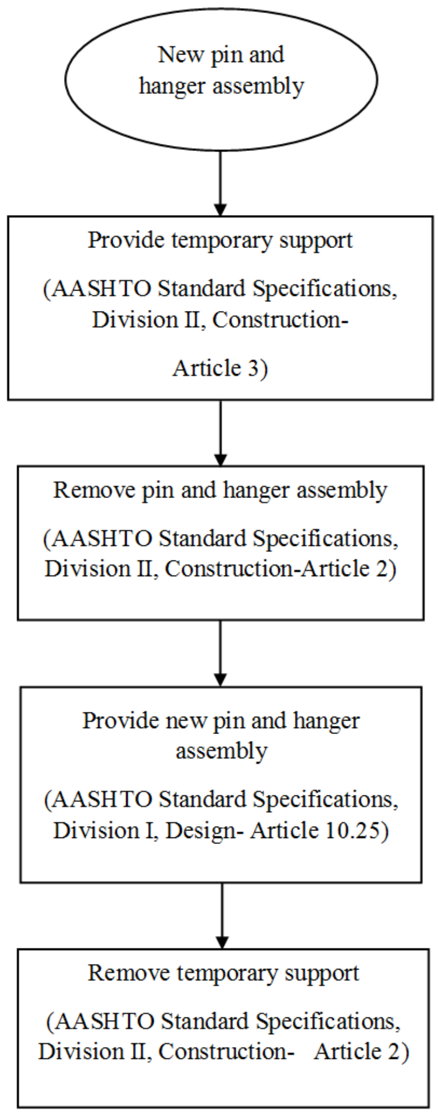


Figure 4.11 New pin and hanger assembly design process.

As shown in Figure 4.11, when considering replacing the assemblies with new assemblies, the process starts with following steps. When replacing the pin and hanger assemblies with new similar design section, the girder should be temporary supported and this support should be provided according to Standard Specifications, Division II-Construction (Article 3). Removal of the pin and hanger assembly is carried out according to Standard Specifications, Division II-Construction (Article 2). Then provide a new pin and new hanger according to Standard Specifications, Division I-Design (Article 10.25). Providing stainless steel pins and hangers are recommended to use and these are designed according to AASHTO LRFD Specifications (Article 6.4.7), which reduces corrosion damage. Finally, after construction, temporary support beam should be removed according to Standard Specifications, Division II- Construction (Article 2).

4.3 Summary

This chapter summarized and provided flowcharts that describes steps associated with completing feasible options associated with addressing pin and hanger assembly retrofit and/or replacement. The intention was that the described flowcharts will provide an organized decision-making tool that would assist NDOR personnel with assessing options and their consequences when pin and hanger assembly retrofit and/or replacement are being considered. The respective flowcharts in this chapter are designed based on the relevant information from the literature search, DOT survey and appropriate federal and state Specifications. These included the *AASHTO Standard Specifications for Highway Bridges*, the *AASHTO LRFD Bridge Design Specifications* and NDOR's *Bridge Office Policies and Procedures (BOPP) manual*.

Chapter 5 Recommendations for Future Research

- In the present study, research work was related to the synthesis part of finding the different types of pin and hanger assembly retrofit and replacement options.
- The future research should focus on the analysis part of the different types of pin and hanger assembly retrofit and replacement options.
- The analysis part includes finding the behavior of the various retrofit and /or replacement option of steel pin and hanger assembly, and its effects on the behavior of the bridge with different retrofit and/or replacement options.
- The research mainly focuses on retrofit and replacement options and their effect on bridges due to distortion induced fatigue cracking at the connections between the girders, one of the severe problem of steel bridges. Fatigue analysis should be carried out by modelling and analyzing using finite element analysis.
- The development of a finite element models and analysis are planned for the bridges located in the Nebraska State.

References

AASHTO Standard Specifications for Highway Bridges, 16th edition. (1996). American Association of State Highway and Transportation Officials ,Washington D.C.

AASHTO Bridge Construction Specifications, 3th edition. (2010). American Association of State Highway and Transportation Officials,Washington D.C.

AASHTO LRFD Bridge Design Specifications, 7th edition. (2014). American Association of State Highway and Transportation Officials,Washington D.C.

American Association for Public Opinion Research. (2015). "Standard Definitions", Final Dispositions of Case Codes and Outcomes Rate for Surveys.

Banthia, V., Hengen, T., & Phillips, B. (2014). "Rehabilitation Works for Pinawa Bridge Over Winnipeg River,". *In Transportation 2014: Past, Present, Future-2014 Conference and Exhibition of Transportation of Canada//Transport 2014.*

Bridge Condtion Report Procedures and Practices. (2011). Bureau of Bridges and Structures Division of Highways, Illinois Department of Transportation.

Bridge Inspector's Reference Manual (BIRM). (2012). Volume 1, Federal Highway Administration, Publication No. FHWA NHI 12- 049.

Bridge Office Policies and Procedures (BOPP). (2014). Nebraska Department of Roads, Bridge Division.

Bridge Safety Inspection Manual 2nd Edition. (2010). Publication 238 Part IE:Evaluation Specifications, Pennsylvania Department of Transportation.

Britt, M. F. (1990). "The Pennsylvania Department of Transportation's Auxiliary Support System Retrofit for Bridges with Nonredundant Pin and Hanger Details". *In Second Workshop on Bridge Engineering Research in Progress, Proceedings*.

AASHTO Standard Specifications for Highway Bridges, 16th edition. (1996). American Association of State Highway and Transportation Officials ,Washington D.C.

AASHTO Bridge Construction Specifications, 3th edition. (2010). American Association of State Highway and Transportation Officials,Washington D.C.

AASHTO LRFD Bridge Design Specifications, 6th edition. (2012). American Association of State Highway and Transportation Officials,Washington D.C.

American Association for Public Opinion Research. (2015). "Standard Definitions", Final Dispositions of Case Codes and Outcomes Rate for Surveys.

Banthia, V., Hengen, T., & Phillips, B. (2014). "Rehabilitation Works for Pinawa Bridge Over Winnipeg River,". *In Transportation 2014: Past, Present, Future-2014 Conference and Exhibition of Transportation of Canada//Transport 2014.*

Bridge Condtion Report Procedures and Practices. (2011). Bureau of Bridges and Structures Division of Highways, Illinois Department of Transportation.

Bridge Inspector's Reference Manual (BIRM). (2012). Volume 1, Federal Highway Administration, Publication No. FHWA NHI 12- 049.

Bridge Office Policies and Procedures (BOPP). (2014). Nebraska Department of Roads, Bridge Division.

Bridge Safety Inspection Manual 2nd Edition. (2010). Publication 238 Part IE:Evaluation Specifications, Pennsylvania Department of Transportation.

Britt, M. F. (1990). "The Pennsylvania Department of Transportation's Auxiliary Support System Retrofit for Bridges with Nonredundant Pin and Hanger Details". *In Second Workshop on Bridge Engineering Research in Progress, Proceedings*.

Caner, A., & Zia, P. (1998). "Behavior and Design of Link Slabs for Jointless Bridge Decks". *PCI Journal*, 43(1998):68-81.

Chang, L. M., & Lee, Y. J. (2002). "Evaluation of Performance of Bridge Deck Expansion Joints". *Journal of Performance of Constructed Facilities*, 16(1),3-9.

Christie, S., & Kulicki, J. M. (1991). "New Support for Pin-Hanger Bridges,". *Civil Engineering-ASCE*, 61(2).

Connor, R. J., Dexter, R., & Mahmoud, H. (2005). *"Inspection and Management of Bridges with Fracture-Critical Details".* (No.Project 20-5(Topic 53-08)).

Graybeal, B., Walther, R., & Washer, G. (2000). "Ultrasonic Inspection of Bridge Hanger Pins". *Transporatation Research Record:Journal of the Transportation Research Board*, (1697),19-23 .

Kennedy Bridge Planning Study. (2014). Technical Memorandum, Bridge Rehabilitaion Alternatives, Minnesota Department of Transportation.

Montana Structures manual- Part II. (2002). Chapter 22, Bridge Rehabilitation , Reference number:SS-10 Pin and Hanger Rehabilitation,Montana Department of Transportation.

Mosavi, A. A., Sedarat, H., Emami-Naeini, & Lynch, J. (2011). "Finite Element Driven Damage Detection of a Skewed Highway Bridge with Pin and Hanger Assemblies".

National Transportation Safety Board (NTSB). (1984). "Highway Accident Report - Collapse of a Suspended Span of Interstate Route 95 Highway Bridge Over the Mianus River,Greenwich,Connecticut,June 28,1983," Report No. NTSB/HAR-84/03, NTSB, Washington D.C.

New York State Route 5 Buffalo Skyway management Study Report. (2008). City of Buffalo, Erie County, New York Department of Transportation.

Shirole, A. M., & Malik, A. H. (1993). "Seismic Retrofitting of Bridges in New York State,". *In Symposium on Practical Solutions for Bridge Strengthening and Rehabilitation*.

Sirianni, C. M., & Tricini, J. (2010). "I- 579 Crosstown Boulevard Bridge Preservation Project". *American Society of Highway Engineers*.

Structural Services Manual. (2015). Bureau of Bridges and Structures Division of Highways, Illinois Department of Transportation.,Springfiled Illinois.

Appendix A

Survey

Steel Pin and Hanger Assembly Replacement Options

Inventory Survey

A number of steel beam bridges exist in the United States that contain steel pin and hanger assemblies. These assemblies were used to facilitate construction and to reduce the level of indeterminacy along a given beam line when the bridges were originally built. As the bridges continue to age, these assemblies have collected debris and moisture and, in certain instances, have deteriorated to a point where their retrofit or removal has been completed or is being considered. We are facilitating this survey on behalf of the Nebraska Department of Roads (NDOR) to explore how other agencies address pin and hanger assemblies that are aging and becoming deteriorated. Results from the survey can be provided to you upon request.

Section 1. General

1. Do you have steel bridges that contain pin and hanger assemblies?

- ○ Yes
- ○ No → Go to Question 7 on page 3

1a. If yes, please provide the number of steel bridge types for each category below <u>that have pin and hanger assemblies</u>. If you do not have a pin and hanger assembly for the steel bridge type, please write in '0'.

Type of bridge	Number of pin and hanger assemblies
a. Two or three girder bridges	
b. Four and more girder bridges	
c. Truss bridges	
d. Other, specify:	
e. Other, specify:	

1

Section 2. Options

2. **Does your agency view the pin and hanger assemblies as components that need retrofitted and/or replaced?**

   ○ Yes

   ○ No → **Go to question 5 on page 3**

   2a. If yes, please provide the number of retrofit and/or replacement options that you have implemented or programmed for each category below. If you have implemented or scheduled retrofit and/or replacement options other than those listed below, please describe and provide the number for each option in the additional table rows. If you have not implemented or programmed the retrofit and/or replacement option listed, please write in '0'.

Retrofit option	Number implemented	Number programmed
a. Use a secondary system such as a "catcher beam"		
b. Replace with new pin and hanger assembly		
c. Replace with bolted splice		
d. Other, specify:		
e. Other, specify:		

3. **For the retrofits and/or replacements you indicated above as implemented or programmed, did you follow any of the designs, procedures, or criteria below?**

	Yes	No
a. AASHTO LRFD criteria and procedures	○	○
b. AASHTO standard specification criteria and procedures	○	○

4. **Have you developed your own criteria and procedures for retrofits and/or replacements?**

   ○ Yes

   ○ No → **Go to question 5 on page 3**

   4a. If yes, please provide references.

2

5. Does your agency view the pin and hanger assemblies as components that need no further action at this time?
   - ○ Yes
   - ○ No → Go to Question 6

   5a. If yes, please briefly explain why no action was taken.

Section 3. Future Contact

6. If you developed your own criteria and procedures for retrofits and replacements, would you be willing to share those with us?
   - ○ Yes
   - ○ No → Go to Question 10
   - ○ Not applicable

   6a. If yes, which format would you prefer to share those in?
   - ○ Electronically
   - ○ Hard copy

7. Would you like to receive the results of this study?
   - ○ Yes
   - ○ No

8. If you answered yes to Question 6 or 7, please provide your information below for us to contact you to either request your criteria and procedures, or to provide you the results of this study.

   Name

   First *Last*

   Email

   @

9. **Please use the space below to provide any additional comments.**

Thank you!

That completes our questions. We greatly appreciate the time you have taken to complete this inventory survey. For your convenience, please use the postage-paid return envelope included in your survey packet to return your questionnaire to the Bureau of Sociological Research.

Questions or requests from this survey can be directed to:

Bureau of Sociological Research
University of Nebraska-Lincoln
PO Box 886102
Lincoln, NE 68588-6102
Phone: 1-800-480-4549 (toll free)
E-mail: bosr@unl.edu

Appendix B

Response to Survey of DOTs

Question 1

Other types of steel bridges that have pin and hanger assemblies other than listed are:

- Arizona DOT: Arch Bridge (85).
- Arkansas State Highway and Transportation Department: Arch deck (2).
- Alaska Department of Transportation and Public Facilities: Box girders (1).
- Colorado DOT: Tie down.
- Illinois DOT: Truss with eye bars & pins (1).
- Iowa DOT: Secondary highway steel girders, secondary highway truss.
- Michigan DOT: All girder bridges (1099).
- Minnesota DOT: Arch (1), Suspension (1).
- Ohio DOT: Riveted steel arch (2).
- Oregon DOT: RGDG (9).
- Utah DOT: Pinned arches (7), Suspension arch (1).
- Washington State DOT: Concrete box -2 (132).
- West Virginia DOT: Tied thru arch (1), Suspension bridge (1).

Question 2

- Maine DOT: Superstructure replace (number implemented-1, number programmed -1).
- Massachusetts DOT**:** Ship lap joint (number programmed -1), replace p & h assembly with under running bearing beam (number implemented-1).
- Michigan DOT**:** Replace bridge (number implemented-1, number programmed -3).

- North Carolina DOT**:** Replace w/ concrete girder (number programmed -1).
- Nebraska Department of Roads: replace bridge or superstructure- (of the 102 pin and hanger bridges on the state system 50 are scheduled for replacement of either the entire bridge or the entire superstructure).
- Virginia DOT: replace Bridge.
- Wyoming DOT: suspension hanger/seismic (number implemented-1).

Question 4

- Arkansas State Highway and Transportation Department**:** Internally developed.
- Illinois DOT: It is part of our structural services manual. Bureau of bridges and structures IDOT.
- Michigan MDOT**:** Our bridge replacement program prioritizes bridges with pins & hanger high enough to systematically replace the bridge with another (usually concrete) bridge.
- Missouri DOT**:** No set criteria. Details are case-by-case.
- Utah DOT**:** Is not documented.

Question 5

- Alaska Department of Transportation and Public Facilities: Pin & hangers are functioning properly. No pack rust present.
- Colorado DOT: No section loss due to corrosion & no crack on hanger.
- Delaware DOT: We are not as concerned with pin & hanger assemblies for multi-beam bridges. Pin & hanger assemblies on truss bridges are treated as a fracture critical member and are scrutinized more.

- Iowa DOT: Proper inspection should identify deficiencies in time to address them without impacts to public safety.
- Louisiana Department of Transportation and Development: Bridges are in good condition.
- Montana DOT: Pins and hangers are usually inspected every 2 years and UT inspected every 4 years. With our relatively dry climate and large temperature swings the p & h assemblies usually stay moving as designed with little rust impact.
- Minnesota DOT: We will include repairs or improvements to pin and hanger elements as conditions warrant. We have not developed projects solely on pin and hanger detail unless condition justifies.
- North Carolina DOT: Inspection reports indicate the condition of the pin and hanger is “good”.
- Nebraska Department of Roads: All bridges are inspected by certified inspectors at least every 2 years and all bridges that this agency manages directly have redundant secondary systems should failure occur.
- Nevada DOT: We haven't identified problems with the hangers, aside from minor corrosion.
- New Hampshire DOT: Framing plan varies from 10 to 7 girder lines, condition is satisfactory.
- Ohio DOT: We retrofit when they are deteriorated.
- Oklahoma DOT: We used ultrasonic inspection on our pins. No problems were found.
- Oregon DOT: We inspect & monitor p & h's and only r & r or provide supplemental support when their condition indicates a need.

- Pennsylvania DOT: We have retrofitted the inventory of 2 girder and truss bridges with suspended assemblies.
- South Dakota DOT: These assemblies are part of annual NBIS inspections and the pins get a periodic NDT inspection as well.
- Virginia DOT: We evaluate each one individually.
- Washington State DOT: Routine inspections and painting when needed.
- West Virginia DOT: We monitor during routine inspections and provide action as needed

Question 6

- 10 states willing to share their own criteria and procedures for retrofit and or/replacements are:

States willing to share their own criteria and procedures for retorfit and or/replacements			
Name	**Email**	**DOT**	**Preference for sharing**
Michael Hill	mike.hill@ahtd.ar.go	Arkansas State Highway and Transportation Department	Electronically
Behrooz Far	behrooz.far@state.co.us	Colorado Department of Transportation	Electronically
Victor Veliz	victor.veliz@illinois.gov	Illinois Department of Transportation	Electronically
Anne Rearick	arearick@indot.in.gov	Indiana Department of Transportation	Electronically
Dave Powelson	dpowelson@dot.state.nh.us	New Hampshire Department of Transportation	Electronically
Tim Schwaglor	tschwaglor@nd.gov	North Dakota Department of Transportation	Electronically
Walter Peters	wpeters@odot.org	Oklahoma Department of Transportation	Electronically
Tom Macioce	tmacioce@pa.gov	Pennsylvania Department of Transportation	Electronically
Graham Bettis	graham.bettis@txdot.gov	Texas Department of Transportation	Electronically
Joshua Sletten	jsletten@utah.gov	Utah Department of Transportation	Electronically

Additional Comments

- Arkansas State Highway and Transportation Department: We usually have 1 or 2 bridges a year that have pin/hanger issues. Our fix is normally to replace pin and hanger. Sometimes we keep the hanger and just flip it around. When we have wear we will bore and replace with bigger pins.
- Illinois DOT: As a result of a fractured pin is one of our structures in the mid 1990's the Illinois Department of Transportation developed an aggressive program for the replacement of pins and link assemblies. Between 1995 and 1997 over 90 structures on our primary system were retrofitted. Over 2000 pins and corresponding links or plate assemblies were replaced throughout the state. In general the retrofit replaced the old style “shoulder” pin (with no bushings) with a constant diameter solid pin made of a stronger material (Nitronic 60) using Teflon bushings. The intent was to provide a better pin assembly as well as one that was easier to inspect in the future.
- Iowa DOT: We have replaced bushings in pin & hanger assemblies due to corrosion/wear.
- Massachusetts DOT :For the replacement of the p & h assembly with the under running bearing beam, the detail looks just like a catcher beam except that the suspended span sits on a bearing on that beam and the p & h assembly was removed in its entirely.
- Michigan DOT: MDOT does not automatically view pin & hangers as needing replacement. We replace them on a case-by case basis based on condition and load capacity. Although pin & hangers are not utilized on new bridges, we do not have any focused efforts to remove them from our inventory.

- Mississippi DOT: We have replace pins & links on our large scale MS River crossing bridges in Watchez, MS. It is the only bridge we intend to remain in service with these details. The replacements were very large scale. These are long span truss bridges.
- Montana DOT: Our pin and hanger assemblies tend to work well. We have replaced pins over the years due to wear and also a few assemblies when they were ruined by impacts to girders from overweight loads.
- Minnesota DOT: MnDOT stopped building bridges w/ pin and hanger details in 1960's. We have not rehabilitated that many as the bridge width is typically too narrow therefore we have done mostly bridge replacements for those vintage. It has been over 10 years since last pin and hanger rehab and that one was caused by no cotter pin on pin and there was a condition concern the hanger may come off of pin. Call w/ questions.
- Missouri DOT: We only replace or repair them after they deteriorate. We don't have a program to do so.
- New Mexico DOT: Performs ultrasonic testing on all pins every 60 months. We have found and replaced compromised/broken pins.
- Ohio DOT: Number of retrofits performed - you did not give a time frame for this work. This makes it difficult to answer. This type of work has gone on for many years. We do not track this work so there is no way to answer that question beyond the memory of current group.
- Utah DOT: Please contact me for additional details on the bridge retrofit projects we have completed or programmed. I would like a copy of the results.
- Wyoming DOT: The pin & hanger we replaced was due to damage from gunshot.

Appendix C

List of Abbreviations

Alabama Department of Transportation (ALDOT)

Alaska Department of Transportation and Public Facilities (Alaska DOT & PF)

American Association for Public Opinion Research (AAPOR)

American Association of State Highway and Transportation Officials, Load and Resistance Factor Design (AASHTO LRFD)

Arizona Department of Transportation (ADOT)

Arkansas State Highway and Transportation Department (AHTD)

Average Daily Truck Traffic (ADTT)

Bridge Office Policies and Procedures (BOPP)

Bureau of Sociological Research (BOSR)

Colorado Department of Transportation (CDOT)

Delaware Department of Transportation (DelDOT)

Federal Highway Administration (FHWA)

Florida Department of Transportation (FDOT)

Fracture Critical Members (FCMs)

Georgia Department of Transportation (GDOT)

Hawaii Department of Transportation (Hawaii DOT)

Illinois Department of Transportation (IDOT)

Indiana Department of Transportation (INDOT)

Iowa Department of Transportation (IOWADOT)

Louisiana Department of Transportation and Development (LADOTD)

Maine Department of Transportation (Maine DOT)

Massachusetts Department of Transportation (Mass DOT)

Michigan Department of Transportation (MDOT)

Minnesota Department of Transportation (MnDOT)

Mississippi Department of Transportation (Mississippi DOT)

Missouri Department of Transportation (MoDOT)

Montana Department of Transportation (MDT)

National Bridge Inspection Standards (NBIS)

National Cooperative Highway Research Program (NCHRP)

National Transportation Safety Board (NTSB)

Nebraska Department of Roads (NDOR)

Nevada Department of Transportation (NDOT)

New Hampshire Department of Transportation (NHDOT)

New Mexico Department of Transportation (NMDOT)

New York State Department of Transportation (NYSDOT)

Non-destructive Testing (NDT)

North Carolina Department of Transportation (NCDOT)

North Dakota Department of Transportation (NDDOT)

Ohio Department of Transportation (ODOT)

Oklahoma Department of Transportation (OklahomaDOT)

Oregon Department of Transportation (OregonDOT)

Pennsylvania Department of Transportation (PennDOT)

Rhode Island Department of Transportation (RIDOT)

South Dakota Department of Transportation (SDDOT)

South Carolina Department of Transportation (SCDOT)

Tennessee Department of Transportation (TDOT)

Texas Department of Transportation (TxDOT)

Transportation Research Board (TRB)

Utah Department of Transportation (UDOT)

Virginia Department of Transportation, Central Office (VDOT)

Washington State Department of Transportation (WSDOT)

West Virginia Department of Transportation (WVDOT)

Wyoming Department of Transportation (WYDOT)

Appendix D

Table A.1 Summary

Summary of various retrofit and replacement options are briefly presented in the Table A1.

Table A 1: Summary of DOT Options

Retrofit/replacement options	Pros	Cons	States that uses retrofit/replacement options	States that have drawings
Bolted splices	Eliminates non-redundant system, make structure more efficient. Reduces and mitigate superstructure corrosion.	Need to re-evaluate superstructure behavior and capacity. Higher construction cost.	MaineDOT, MnDOT, NHDOT, UDOT.	
Link slab	Reduction of joints controls corrosion and moisture intrusion.	Structural damages-(thermal stress, shrinkage & creep). Higher stress lead to fracture & cracking along the slab.		
Catcher beam system	Immediate option, controls sudden failure of bridge.	Temporary system. Fatigue related problem replacement need to be considered.	AHTD, DelDOT, INDOT, MaineDOT, MassDOT, MnDOT, MoDOT, NCDOT, Oklahoma DOT, TDOT, WVDOT.	OklahomaDOT, PennDOT
Ship lap joint	Support beam carried by bearings, improves rotational degree of freedom.	Need to maintain joints. Higher maintenance and initial construction cost. Design, retrofit required are tedious compare to pin and hanger assembly.	MassDOT.	MassDOT
New pin and hanger assembly	Similar design can be cost-effective and minimal traffic disruption.	Regular ultrasonic inspection. Still provides non-redundant system.	IDOT, MnDOT, Mississippi DOT, MoDOt, UDOT, WYDOT.	IDOT, MichiganDOT

Appendix D1

Nebraska Department of Roads Design Plans

1. S07507234 – Bridge built in 1957, repaired and overlaid in 1982-1983 and re-decked in 2010. The re-deck plan eliminated the deck expansion joints and provided with bolted splices.
2. S02611926 – Bridge built in 1939, widened, re-decked and overlaid with asphalt in 1975, repaired and deck overlaid with concrete in 2009. The 2009 plan replaced some existing pins with new pins. Girder supported using temporary system during pin replacement
3. S01118443 – Pin and hanger assembly bridge, built in 1945, and overlaid in 1983.
4. S05703867 – Pin and hanger assembly bridge, built in 1934, and widened in 1962.
5. S07301232 - Pin and hanger assembly bridge, built in 1933, widened and re-decked in 1973.

TITLECTE2.DGN

(R1) 8 August 2008
(R2) 28 Janurary 2009

PROJECT NUMBER	SHEET NO.
75-2(1064)	16

C.N. 22342

STRUCTURE NUMBER S075 07234

- PLATTSMOUTH NORTH BRIDGES -

- NOTES -

The existing structure was built under project 475(2)-1, dated 1957. Plans are available from the Bridge Division upon request.

The concrete bridge deck is designed by the empirical design method in accordance with AASHTO LRFD fourth edition.

The contractor may substitute any one of the alternate designs shown on the plans for the original design. All quantities are based on the original design and no additions or deductions will be allowed for the use of an alternate design.

All structural steel for stiffeners and all splice material shall conform to the requirements of ASTM A709/A709M, Grade 50W weathering steel.

Nuts, bolts and washers used in the assembly of weathering steel shall be Type 3.

All fasteners shall be 7/8"φ high strength bolts, ASTM A325.

Field tack welding of form hangers or miscellaneous hardware to any part of the steel girder, shall be prohibited.

The girders for this bridge are not designed to resist any torsional or lateral forces due to temporary construction loads. The contractor must provide any temporary bracing necessary to support the girder web and flanges against all torsional forces resulting from construction loads.

Concrete for slab, approach slabs and rails shall be class "47BD", with a minimum 28-day strength of 4000 Psi.

All reinforcing steel shall be epoxy coated and conform to the requirements of ASTM A615/A615M, Grade 60 steel.

The minimum clearance, measured from the face of the concrete to the surface of any reinforcing bar, shall be 3", except where otherwise noted.

All dimensions shown are in horizontal plane only. No allowance have been made for vertical curve or roadway cross slope.

Girder shims that will be provided to the contractor account for dead load deflection due to the weight of the slab and rail only. The contractor is responsible for making the necessary adjustments for the particular forming system used to achieve the slab grades and elevations shown on the plans.

Required Construction as follows:

New Slab, Turndown and Rails.
New Approach Slabs and Grade Beams
New Bearings at Abutments
(R1) ~~Concrete Repair at Abutments if necessary~~
Add stiffeners (3x3x 3/8 angle where shown
Splice Top and Bottom Flanges at Pin and Hanger Systems

- QUANTITIES -

- 6 -

PREPARATION OF BRIDGE AT STA. 859+67.50			1	EACH
ABUTMENT NO. 1 EXCAVATION			1	LUMP SUM
ABUTMENT NO. 2 EXCAVATION			1	LUMP SUM
CLASS 47BD-4000 CONCRETE FOR BRIDGES			216.1	CU. YD.
SLAB	175.4	CU. YD.		
HAUNCH	1.3	CU. YD.		
CONCRETE RAILS	39.4	CU. YD.		
STRUCTURAL STEEL FOR SUPERSTRUCTURE			4110	LBS.
EPOXY COATED REINFORCING STEEL			47115	LBS.
SLAB	38520	LBS.		
CONCRETE RAILS	8595	LBS.		
EXPANSION BEARING, TFE TYPE			10	EACH
BEARING DEVICE REPLACEMENT			10	EACH
GRANULAR BACKFILL			85	CU. YD.
SUBSURFACE DRAINAGE MATTING			79	SQ. YDS.
BROKEN CONCRETE RIPRAP			500	TONS
CONCRETE FOR PAVEMENT APPROACHES CLASS 47BD-4000			216.5	CU. YD.
SLAB	152.3	CU. YD.		
CONCRETE RAILS	22.2	CU. YD.		
GRADE BEAM	42.0	CU. YD.		
EPOXY COATED REINFORCING STEEL FOR PAVEMENT APPROACHES			36775	LBS.
SLAB	26435	LBS.		
CONCRETE RAILS	5805	LBS.		
GRADE BEAM	4535	LBS.		
PRECOMPRESSED POLYURETHANE FOAM JOINT, TYPE B			95.5	LIN. FT.
(R2) 1½" CONDUIT IN BRIDGE			261	LIN. FT.

- INDEX -

PROFESSIONAL CIVIL ENGINEER CLAUDE R. OIE E-3939 STATE OF NEBRASKA

BRIDGE ENGINEER

COUNTY CASS
HWY. NO. US-75
REF. POST. 72+34
STA. 859+67.50

LOCATION PLATTSMOUTH NORTH BRIDGES
SKEW 42°30'
ROADWAY 32'-0"
DESIGN LIVE LOAD H-20

175'-0" 3-SPAN
ROLLED BEAM GIRDER BRIDGE
WIDEN & REDECK
GENERAL NOTES, QUANTITIES & INDEX

DESIGNED BY BN | DETAILED BY TJH | CHECKED BY VLK | DATE JULY 2008

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

NDOR Nebraska Department of Roads

PROFESSIONAL STRUCTURAL ENGINEER DANIEL J. SHARP E-5375 STATE OF NEBRASKA

11-21-09

SPECIAL PLAN NO. 1 / 1 / 14

(R1) 8 August 2008
(Added Sheet)

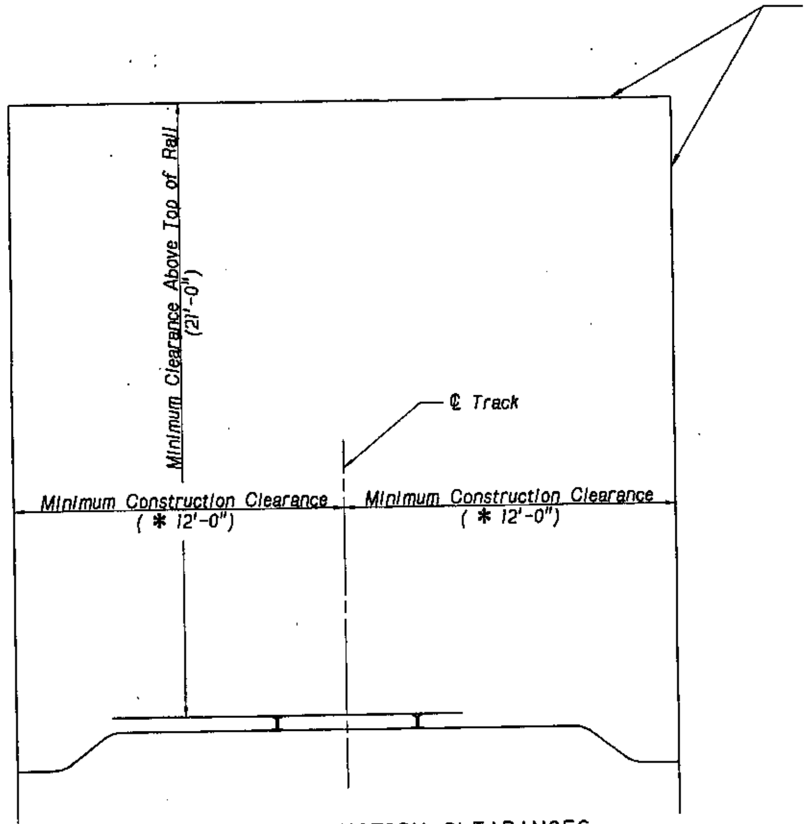
PROJECT NUMBER	SHEET NO.
75-2(1064)	16A

C.N. 22342

STRUCTURE NUMBER S075 07234

No Construction Activities or other Obstructions may be placed within these Limits.

* Add 1.5 Inches per Degree of Track Curvature to the Horizontal Clearance Distance.



MINIMUM CONSTRUCTION CLEARANCES

(Normal to Railroad)

RAILROAD NOTES

THE PROPOSED GRADE SEPARATION PROJECT SHALL NOT INCREASE THE QUANTITY AND/OR CHARACTERISTICS OF THE FLOW IN THE RAILROAD'S DITCHES AND/OR DRAINAGE STRUCTURES.

THE ELEVATION OF THE EXISTING TOP-OF-RAIL PROFILE SHALL BE VERIFIED BEFORE BEGINNING CONSTRUCTION. ALL DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE RAILROAD PRIOR TO CONSTRUCTION.

THE CONTRACTOR MUST SUBMIT A PROPOSED METHOD OF EROSION AND SEDIMENT CONTROL AND HAVE THE METHOD APPROVED BY THE RAILROAD.

ALL SHORING SYSTEMS THAT IMPACT THE RAILROAD'S OPERATIONS AND/OR SUPPORTS THE RAILROAD'S EMBANKMENT SHALL BE DESIGNED AND CONSTRUCTED PER CURRENT RAILROAD GUIDELINES FOR TEMPORARY SHORING.

ALL DEMOLITIONS WITHIN THE RAILROAD'S RIGHT-OF-WAY AND/OR DEMOLITION THAT MAY IMPACT THE RAILROAD'S TRACKS OR OPERATIONS SHALL BE IN COMPLIANCE WITH THE RAILROAD'S DEMOLITION GUIDELINES.

ERECTION OVER THE RAILROAD'S RIGHT-OF-WAY SHALL BE DESIGNED TO CAUSE NO INTERRUPTION TO THE RAILROADS OPERATION, ENABLING THE TRACK(S) TO REMAIN OPEN TO TRAFFIC PER THE RAILROAD'S REQUIREMENTS.

RAILROAD REQUIREMENTS DO NOT ALLOW WORK WITHIN 50 FEET OF TRACK CENTERLINE WHEN A TRAIN PASSES THE WORK SITE AND ALL PERSONNEL MUST CLEAR THE AREA WITH IN 25 FEET OF THE TRACK CENTERLINE AND SECURE ALL EQUIPMENT.

FALSE-WORK CLEARANCES SHALL COMPLY WITH MINIMUM CONSTRUCTION CLEARANCES.

ALL PERMANENT CLEARANCES SHALL BE VERIFIED BEFORE PROJECT CLOSING.

FOR RAILROAD COORDINATION PLEASE REFER TO THE RAILROAD MINIMUM REQUIREMENTS AS PART OF SPECIAL PROVISIONS.

PROFESSIONAL CIVIL ENGINEER — CLAUDE R. OIE — E-3939 — STATE OF NEBRASKA

BRIDGE ENGINEER

175'-0" 3-SPAN ROLLED BEAM GIRDER BRIDGE WIDEN & REDECK
RAILROAD NOTES

COUNTY CASS
HWY. NO. US-75
REF. POST. 72+34
STA. 859+67.50

LOCATION PLATTSMOUTH NORTH BRIDGES
SKEW 42°30'
ROADWAY 32'-0"
DESIGN LIVE LOAD H-20

DESIGNED BY BN | DETAILED BY TJH | CHECKED BY VLK | DATE JULY 2008

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

NDOR Nebraska Department of Roads

PROFESSIONAL STRUCTURAL ENGINEER — DANIEL J. SHARP — E-5375 — STATE OF NEBRASKA

8-8-08

SPECIAL PLAN NO.	
1	1A / 14

(R1) 8 August 2008
(R2) 28 Janurary 2009

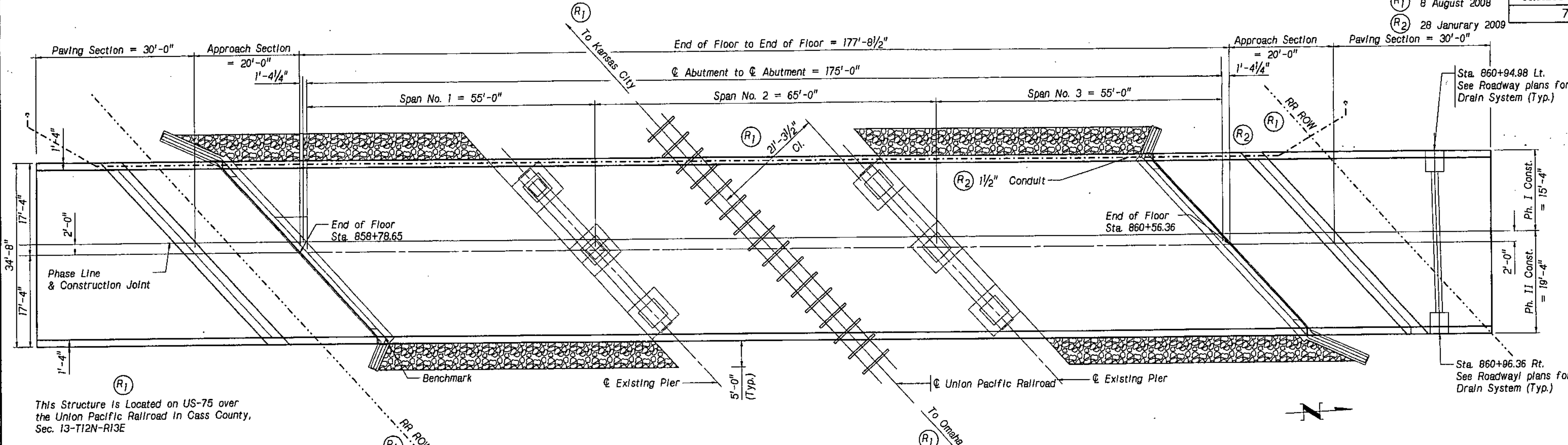
PROJECT NUMBER	SHEET NO.
75-2(1064)	17

C.N. 22342

STRUCTURE NUMBER S075 07234

PROFESSIONAL CIVIL ENGINEER CLAUDE R. OIE E-3939 STATE OF NEBRASKA

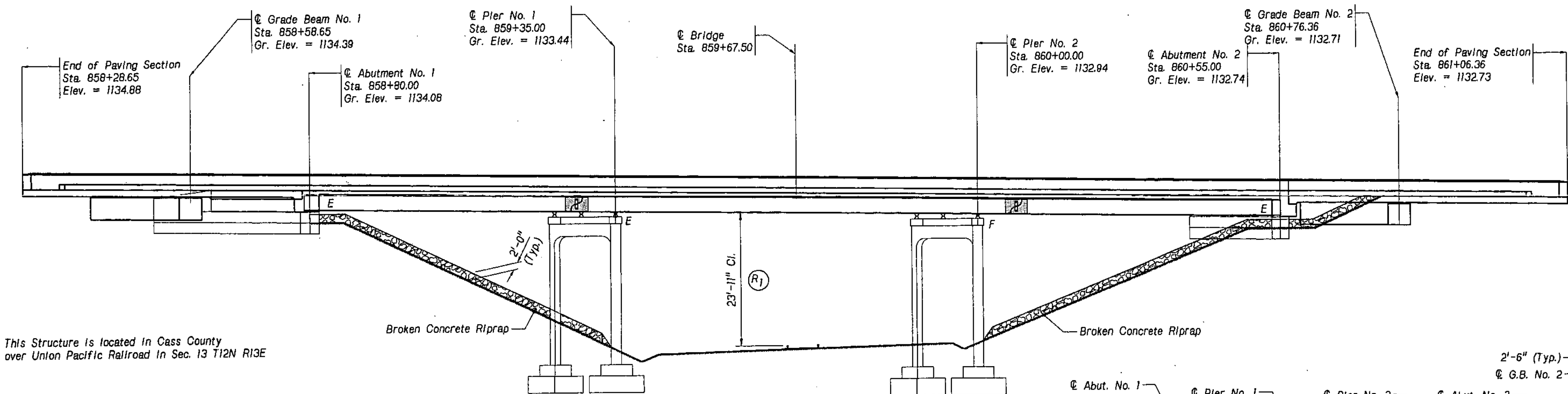
BRIDGE ENGINEER



(R1)
This Structure Is Located on US-75 over the Union Pacific Railroad In Cass County, Sec. 13-T12N-R13E

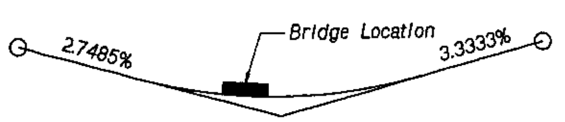
This Structure Is Located at Union Pacific Milepost 461.30 Falls City Sub.
(R1)

GENERAL PLAN
Not to Scale



This Structure Is located In Cass County over Union Pacific Railroad In Sec. 13 T12N R13E

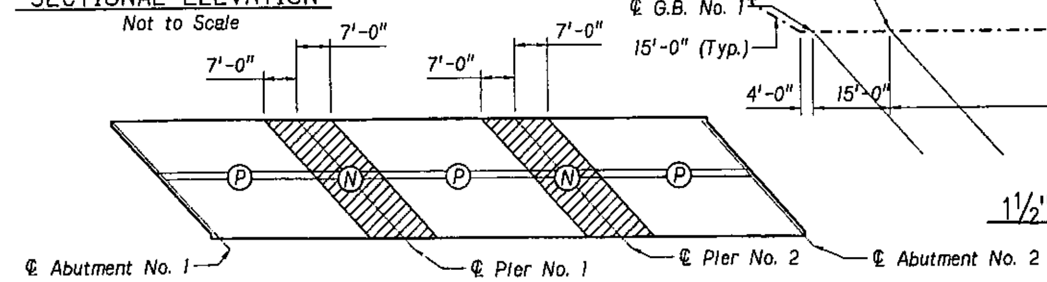
SECTIONAL ELEVATION
Not to Scale



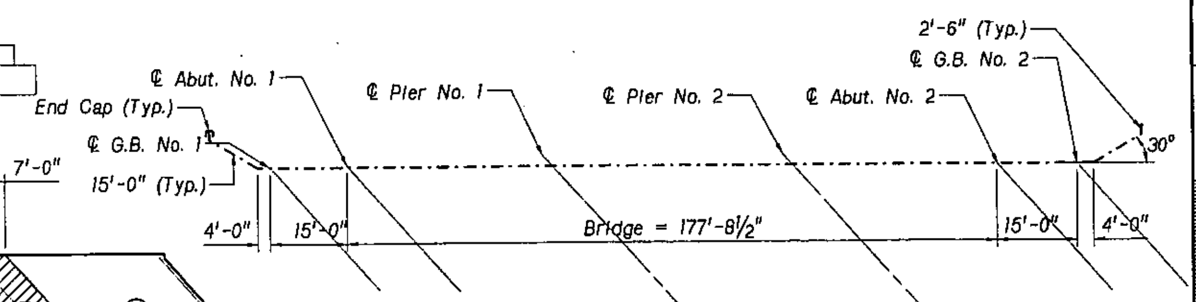
Sta. 861+25
Elev. 25.81
VC. = 900'

POURING SEQUENCE:

The entire slab shall be poured starting at one end and proceeding to the other end, stopping at the completion of any "P" section.
(P)=Positive moment section
(N)=Negative moment section



POURING DIAGRAM



1½" CONDUIT IN BRIDGE LINE DIAGRAM
(R2) WEST RAIL ONLY

175'-0" 3-SPAN ROLLED BEAM GIRDER BRIDGE WIDEN & REDECK
GENERAL PLAN AND ELEVATION

LOCATION PLATTSMOUTH NORTH BRIDGES
SKEW 42° 30'
ROADWAY 32'-0"
DESIGN LIVE LOAD H-20

COUNTY CASS
HWY. NO. US-75
REF. POST. 72+34
STA. 859+67.50

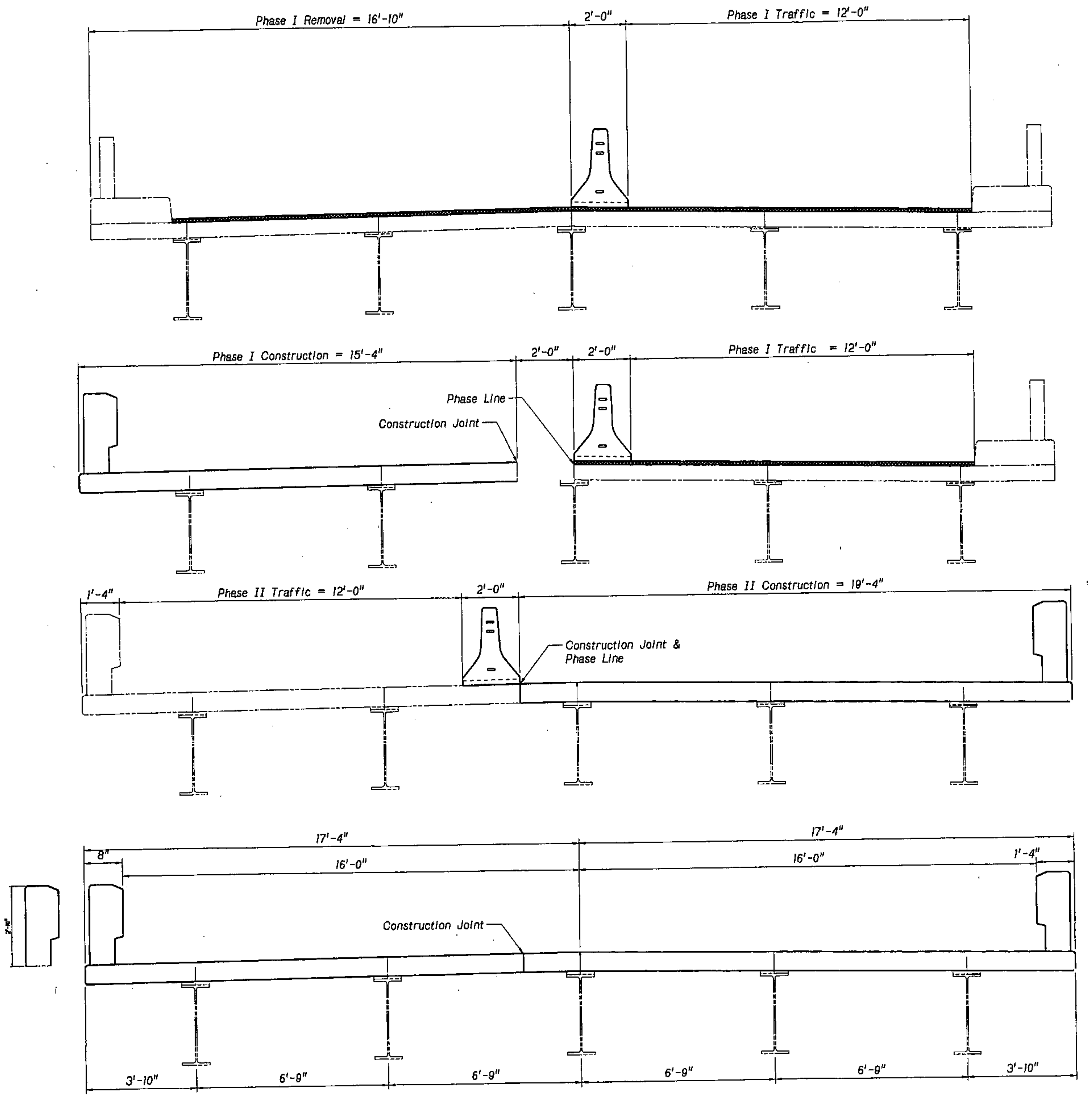
DESIGNED BY BN | DETAILED BY TJH | CHECKED BY VLK | DATE JULY 2008

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

NDOR Nebraska Department of Roads

PROFESSIONAL STRUCTURAL ENGINEER DANIEL J. SHARP E-5375 STATE OF NEBRASKA
1-21-09

SPECIAL PLAN NO.	
1	2/14



PHASING PLAN

Notes:

Concrete Protection Barriors will be anchored to the slab as per Special Plan 3C. The barriers will be placed next to the break line and construction line, as shown. Due to low traffic speed the 1'-0" min. ledge is not required.

PROJECT NUMBER	SHEET NO.
75-2(1064)	1B

C.N. 22342

STRUCTURE NUMBER S075 07234

PROFESSIONAL CIVIL ENGINEER CLAUDE R. OIE E-3939 STATE OF NEBRASKA

BRIDGE ENGINEER

175'-0" 3-SPAN ROLLED BEAM GIRDER BRIDGE WIDEN & REDECK PHASING PLAN

LOCATION PLATTSMOUTH NORTH BRIDGES
SKEW 42°30'
ROADWAY 32'-0"
DESIGN LIVE LOAD H-20

COUNTY CASS
HWY. NO. US-75
REF. POST 72+34
STA. 859+67.50

DESIGNED BY BN
DETAILED BY TJH
CHECKED BY VLK
DATE JULY 2008

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

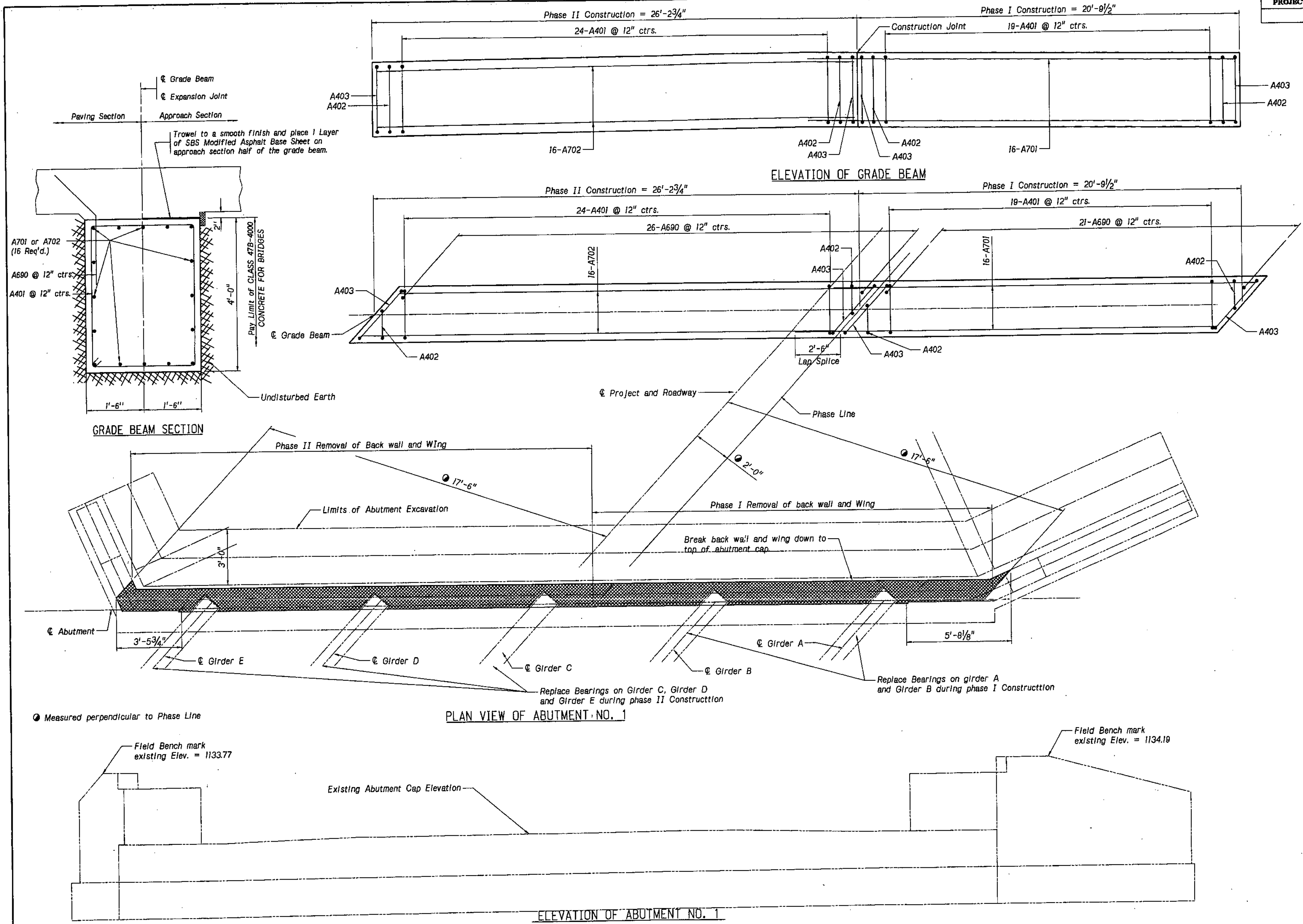
NDOR Nebraska Department of Roads

PROFESSIONAL STRUCTURAL ENGINEER DANIEL J. SHARP E-5375 STATE OF NEBRASKA

6-27-08

SPECIAL PLAN NO. 1

3/14



PROJECT NUMBER 75-2(1064) SHEET NO. 19

C.N. 22342

STRUCTURE NUMBER S075 07234

PROFESSIONAL CIVIL ENGINEER CLAUDE R. OIE E-3939 STATE OF NEBRASKA

BRIDGE ENGINEER

LOCATION PLATTSMOUTH NORTH BRIDGES 175'-0" 3-SPAN ROLLED BEAM GIRDER BRIDGE
BRIDGES WIDEN & REDECK
ABUTMENT NO. 1 LAYOUT AND GRADE BEAM

COUNTY CASS
HWY. NO. US-75
REF. POST. 72+34
STA. 859+67.50
SKEW 42° 30'
ROADWAY 32'-0"
DESIGN LIVE LOAD H-20
DESIGNED BY BN
DETAILED BY TJH
CHECKED BY VLK
DATE JULY 2008

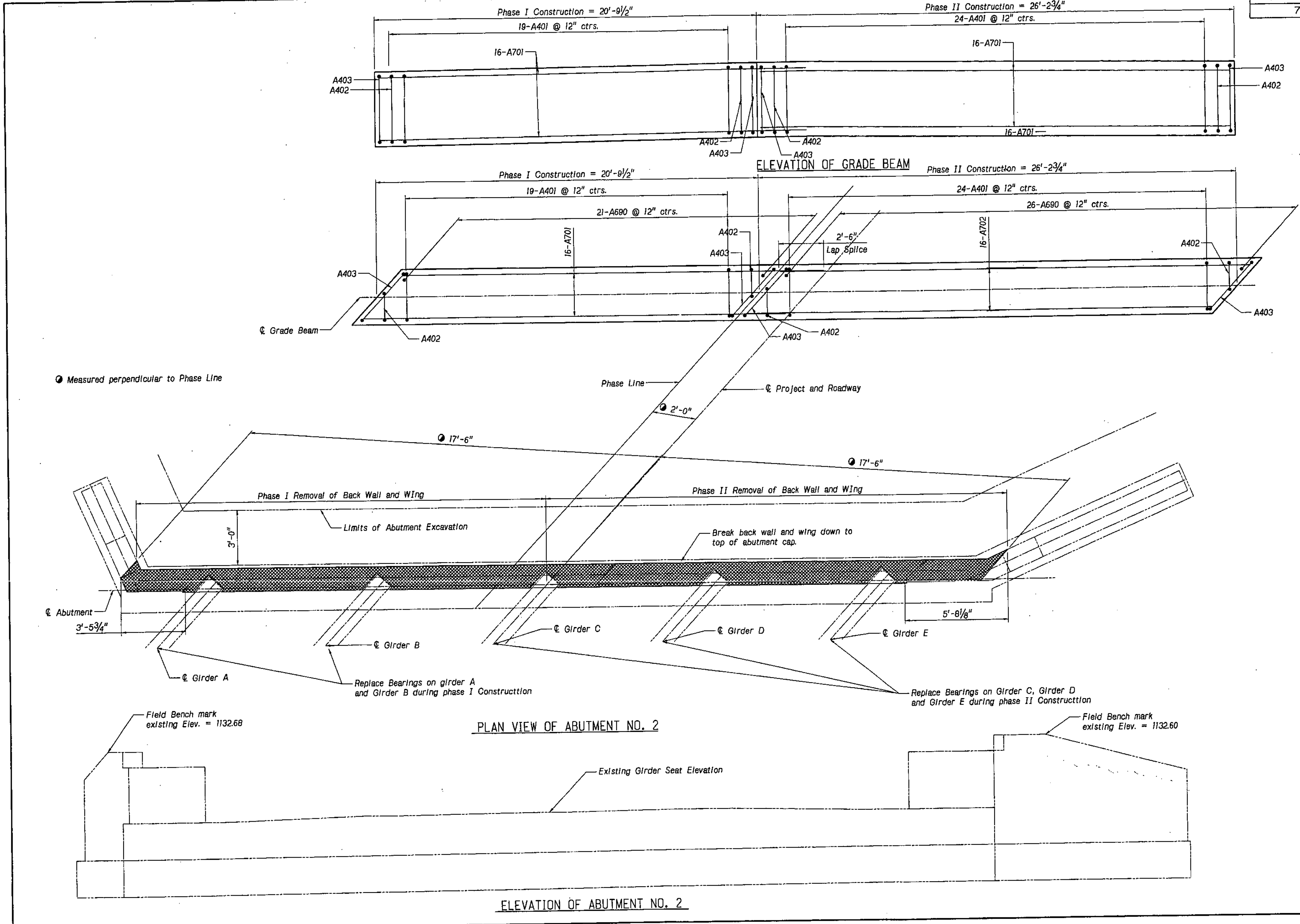
STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

NDOR Nebraska Department of Roads

PROFESSIONAL STRUCTURAL ENGINEER DANIEL J. SHARP E-5375 STATE OF NEBRASKA

6-26-08

SPECIAL PLAN NO. 1 4/14



PROJECT NUMBER	SHEET NO.
75-2(1064)	20

C.N. 22342

STRUCTURE NUMBER S075 07234

CLAUDE R. OIE E-3939 PROFESSIONAL CIVIL ENGINEER STATE OF NEBRASKA

BRIDGE ENGINEER

175'-0" 3-SPAN ROLLED BEAM GIRDER BRIDGE WIDEN & REDECK

ABUTMENT NO. 2 LAYOUT AND GRADE BEAM

LOCATION PLATTSMOUTH NORTH BRIDGES

SKEW 42° 30'

ROADWAY 32'-0"

DESIGN LIVE LOAD H-20

COUNTY CASS

HWY. NO. US-75

REF. POST. 72+34

STA. 859+67.50

DESIGNED BY BN | DETAILED BY TJH | CHECKED BY VLK | DATE JULY 2009

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

NDOR Nebraska Department of Roads

DANIEL J. SHARP E-5375 PROFESSIONAL STRUCTURAL ENGINEER STATE OF NEBRASKA

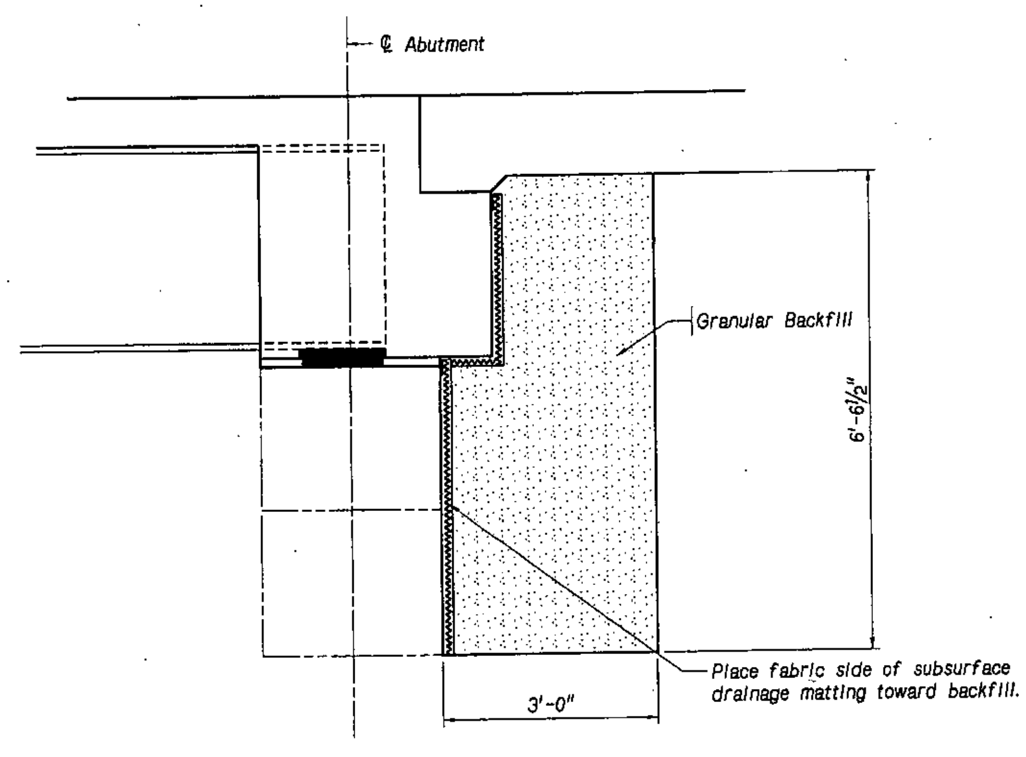
6-26-09

SPECIAL PLAN NO. 1 | 5/14

B I L L   O F   B A R S

	MARK	NUMBER OF BARS PHASE 1	NUMBER OF BARS PHASE 2	LENGTH	TYPE	"A"	"B"	"C"	"D"	"E"	"F"		PIN	HOOK	WEIGHT LBS
GRADE BEAM NO. 1	A701	16		22'-11"	STR.										749
	A702		16	25'-9"	STR.										842
	A690	21	26	3'-5"	105	2'-0"	1'-5"	1'-0"							241
	A401	19	24	12'-9"	107	3'-6"	2'-6"						2"	4½"	366
	A402	2	2	10'-7"	107	3'-6"	1'-5"						2"	4½"	28
	A403	2	2	14'-7"	107	3'-6"	3'-5"						2"	4½"	39
													SUBTOTAL =		2266 LBS.
GRADE BEAM NO. 2	A701	16		22'-11"	STR.										749
	A702		16	25'-9"	STR.										842
	A690	21	26	3'-5"	105	2'-0"	1'-5"	1'-0"							241
	A401	19	24	12'-9"	107	3'-6"	2'-6"						2"	4½"	366
	A402	2	2	10'-7"	107	3'-6"	1'-5"						2"	4½"	28
	A403	2	2	14'-7"	107	3'-6"	3'-5"						2"	4½"	39
													SUBTOTAL =		2266 LBS.
													TOTAL =		4533 LBS.

NOTE: FOR BENDING DIAGRAMS, HOOK LENGTHS & PIN DIAMETERS SEE SHEET 14 OF 14.



DRAINAGE DETAIL AND GRANULAR BACKFILL

PROJECT NUMBER 75-2(1064) SHEET NO. 21
C.N. 22342
STRUCTURE NUMBER S075 07234

CLAUDE R. OIE E-3939 PROFESSIONAL CIVIL ENGINEER STATE OF NEBRASKA

BRIDGE ENGINEER

COUNTY CASS
HWY. NO. US-75
REF. POST. 72+34
STA. 859+67.50

LOCATION PLATTSMOUTH NORTH BRIDGES
SKEW 42° 30'
ROADWAY 32'-0"
DESIGN LIVE LOAD H-20

175'-0" 3-SPAN ROLLED BEAM GIRDER BRIDGE WIDEN & REDECK
GRADE BEAM BILL OF BARS

DESIGNED BY BN | DETAILED BY TJH | CHECKED BY VLK | DATE JULY 2008

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

NDOR Nebraska Department of Roads

DANIEL J. SHARP E-5375 PROFESSIONAL STRUCTURAL ENGINEER STATE OF NEBRASKA
6-26-08

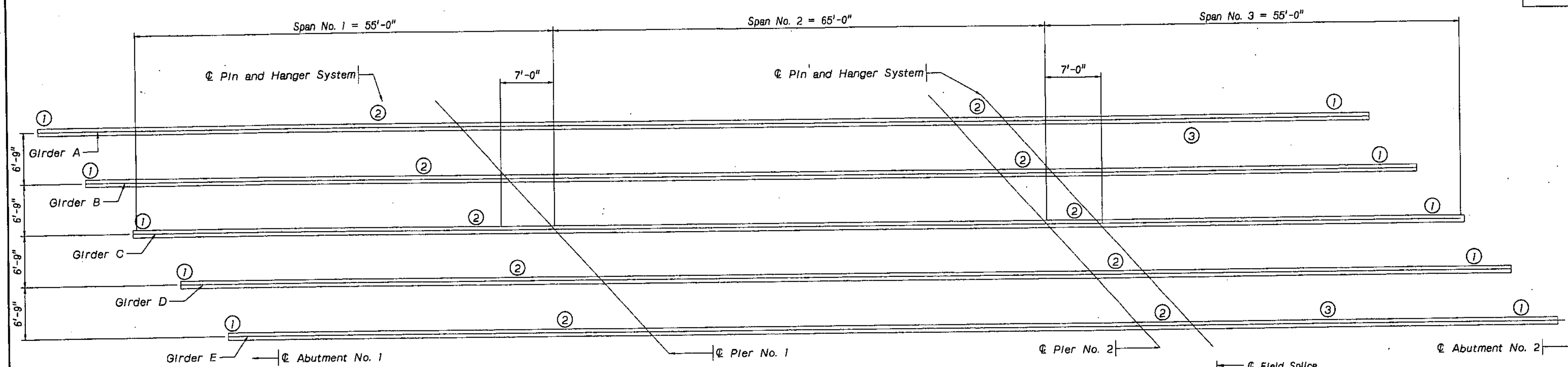
SPECIAL PLAN NO. 1 | 6/14

Sheet F

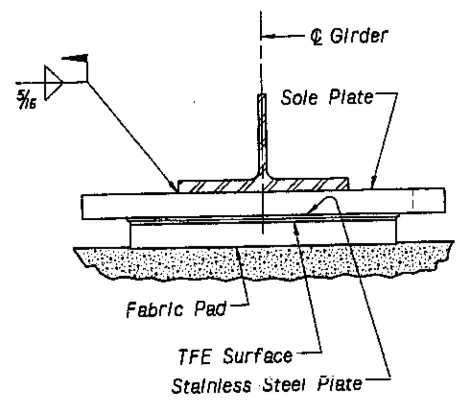
PROJECT NUMBER	SHEET NO.
75-2(1064)	22

C.N. 22342

STRUCTURE NUMBER S075 07234

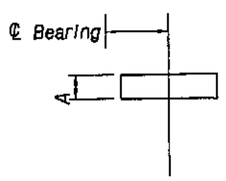


1. Replace Bearings at Abutments.
2. Place a Field Splice (Top and Bottom Flange) at Pin and Hanger Systems.
3. Place 2-L 3x3x3/8 spaced at 3'-6" ctrs. at maximum deterlation of web.

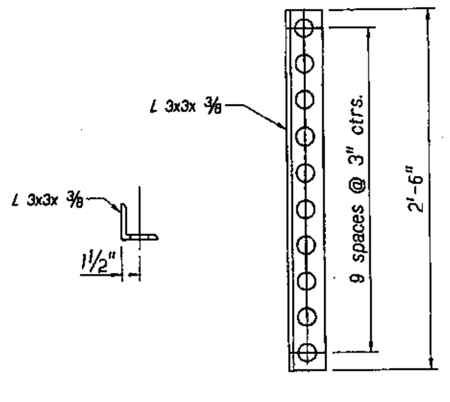


SECTION AT EXPANSION BEARING (TFE TYPE)

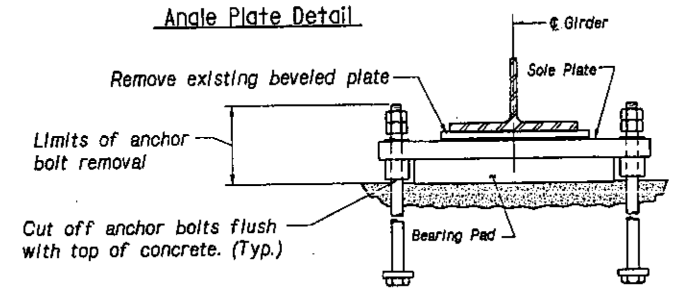
Beveled plates are to be removed before new sole plates can be attached to existing Girders.



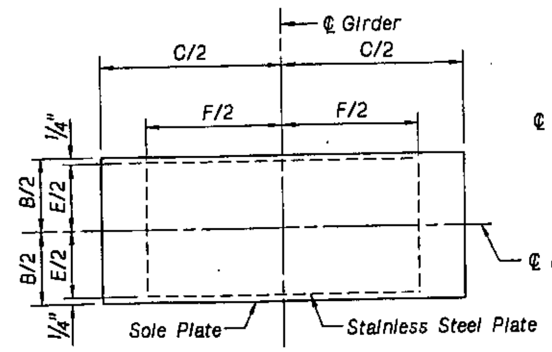
Bearing Detail



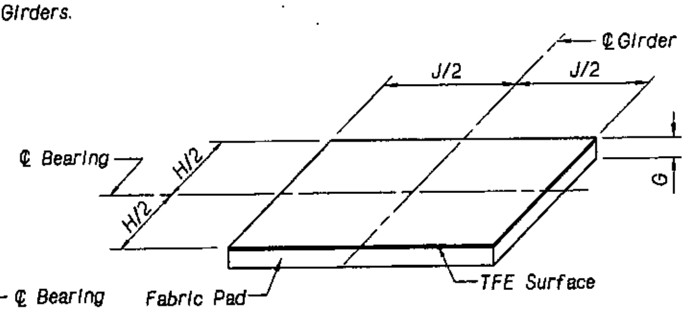
Angle Plate Detail



EXISTING BERAINGS AT ABUTMENTS



SOLE PLATE

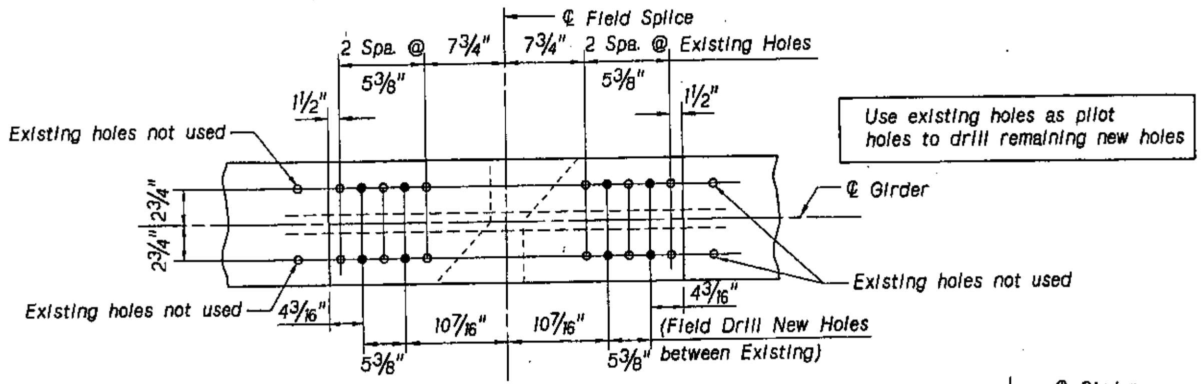


FABRIC PAD

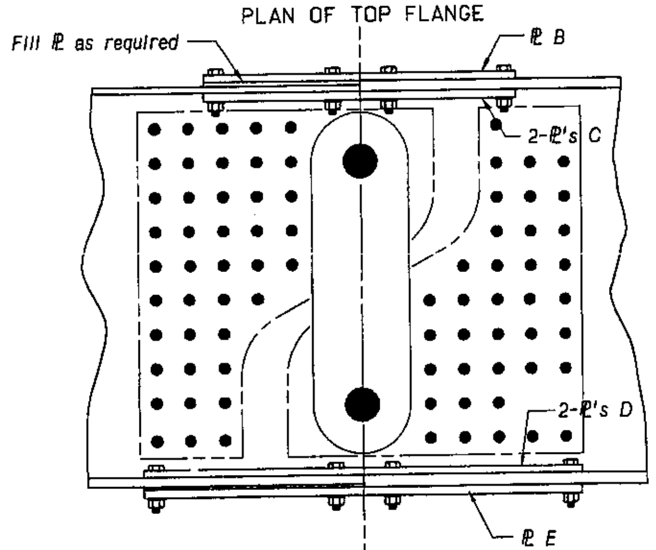
DIMENSIONS FOR BEARING DEVICES									
LOCATION	SOLE PLATE				STAINLESS STEEL		FABRIC PAD		
	A	B	C	D	E	F	G	H	J
Abutment No. 1	1½	12	14	---	11	12	1⅜	7	10
Abutment No. 2	1½	12	14	---	11	12	1⅜	7	10

FIELD SPLICE DATA			
PIN AND HANGER SYSTEM NO. 1 AND NO. 2			
	Thickness	Width	Length
Plate A	---	---	---
Plate B	1"	11"	3'-4"
Plate C	1"	4"	3'-4"
Plate D	1"	4"	2'-11"
Plate E	1"	11"	2'-11"

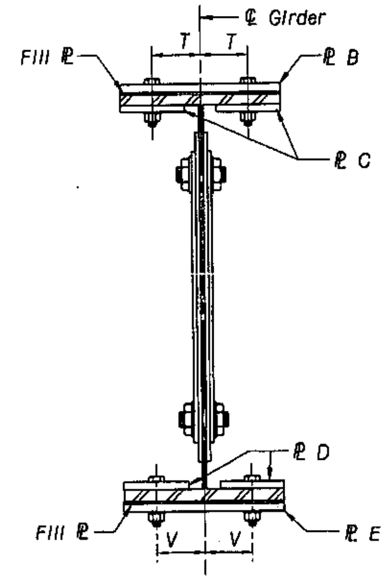
* match existing



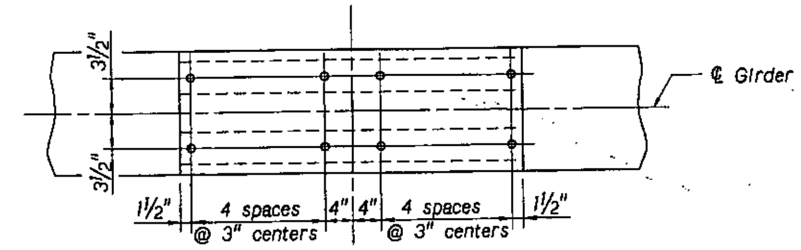
PLAN OF TOP FLANGE



ELEVATION



SECTION



PLAN OF BOTTOM FLANGE

FIELD SPLICE DETAILS

PROFESSIONAL CIVIL ENGINEER CLAUDE R. OIE E-3939 STATE OF NEBRASKA

BRIDGE ENGINEER

175'-0" 3-SPAN ROLLED BEAM GIRDER BRIDGE WIDEN & REDECK GIRDER LAYOUT, FIELD SPLICE AND BEARING DETAILS

LOCATION PLATTSMOUTH NORTH BRIDGES
SKEW 42°30'
ROADWAY 32'-0"
DESIGN LIVE LOAD H-20

COUNTY CASS
HWY. NO. US-75
REF. POST. 72+34
STA. 859+67.50

DESIGNED BY BN | DETAILED BY TJH | CHECKED BY VLK | DATE JULY 2008

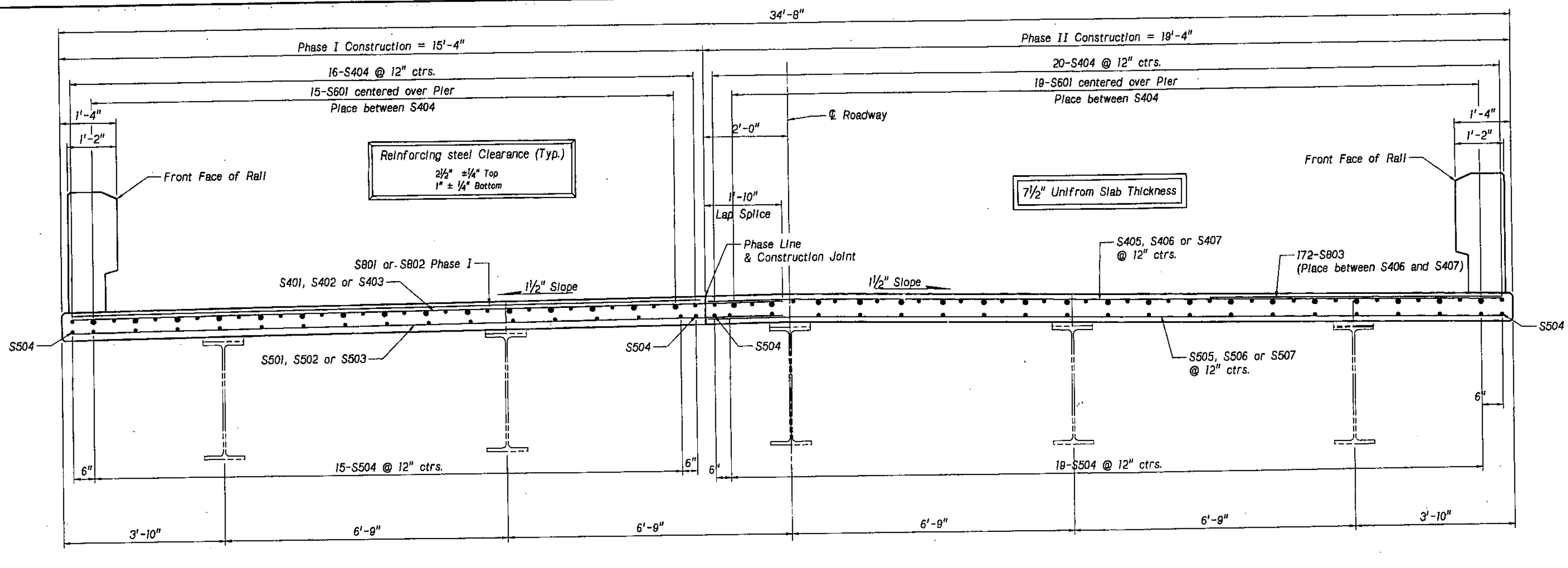
STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

NDOR Nebraska Department of Roads

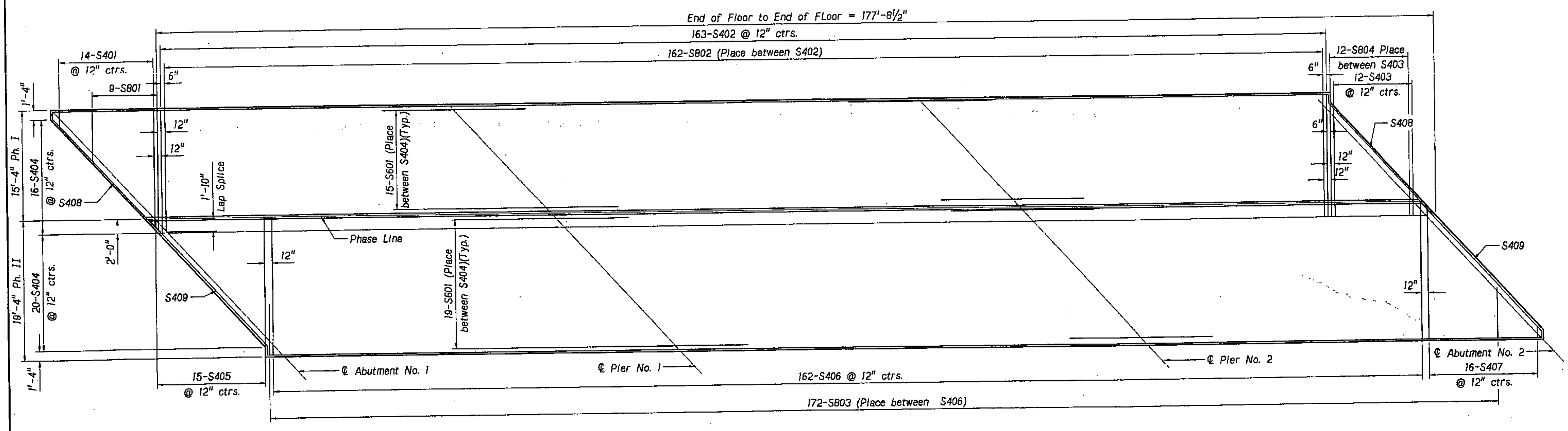
PROFESSIONAL STRUCTURAL ENGINEER DANIEL J. SHARP E-5375 STATE OF NEBRASKA

6-26-08

SPECIAL PLAN NO. 1 — 7/14



CROSS SECTION OF ROADWAY



PLAN VIEW OF SLAB
SHOWING TOP BARS ONLY

PROJECT NUMBER	SHEET NO.
75-2(1064)	23

C.N. 22342
STRUCTURE NUMBER S075 07234

PROFESSIONAL CIVIL ENGINEER CLAUDE R. OIE E-3939 STATE OF NEBRASKA
BRIDGE ENGINEER

175'-0" 3-SPAN ROLLED BEAM GIRDER BRIDGE WIDEN & REDECK
CROSS SECTION OF ROADWAY AND PLAN VIEW OF SLAB

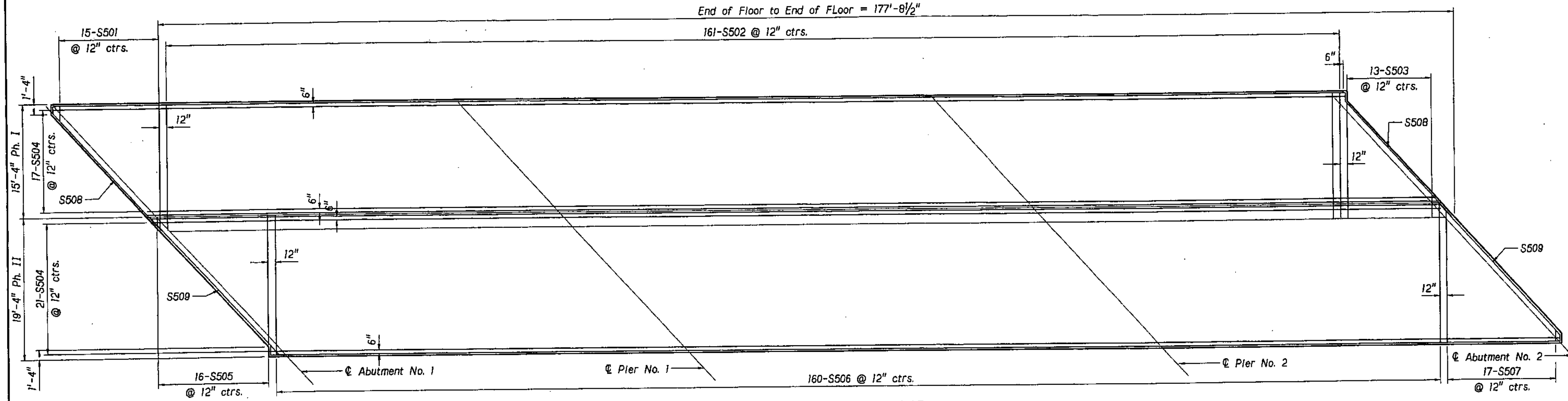
LOCATION PLATTSMOUTH NORTH BRIDGES
COUNTY CASS
SKEW 42° 30'
HWY. NO. US-75
ROADWAY 32'-0"
REF. POST. 72+34
DESIGN LIVE LOAD H-20
STA. 859+67.50
DESIGNED BY BN | DETAILED BY TJH | CHECKED BY VLK | DATE JULY 2008

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

NDOR Nebraska Department of Roads

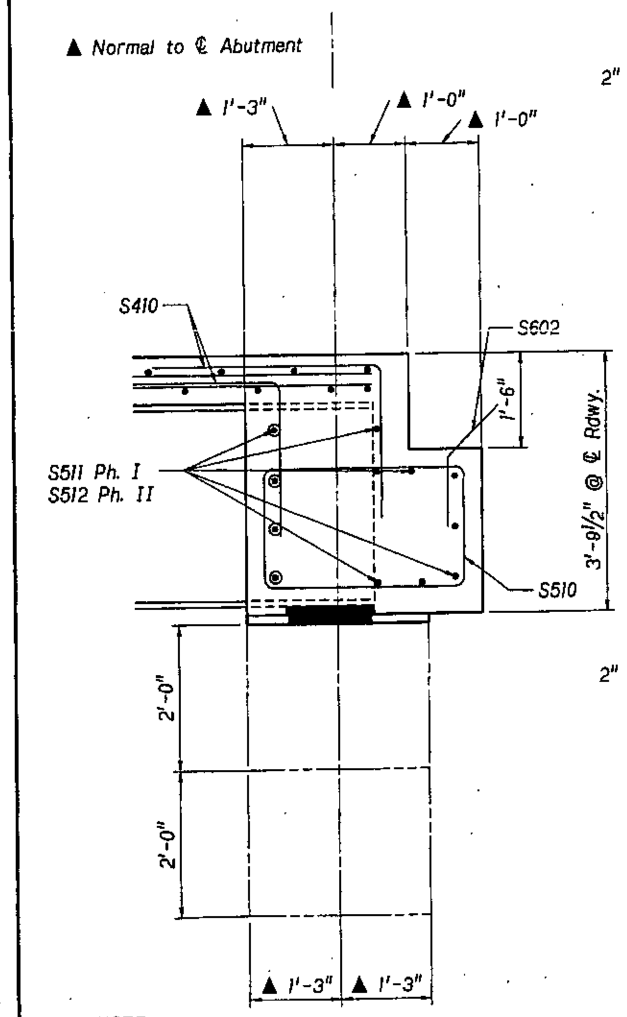
PROFESSIONAL STRUCTURAL ENGINEER DANIEL J. SHARP E-5375 STATE OF NEBRASKA
6-26-08

SPECIAL PLAN NO.	8/14
1	

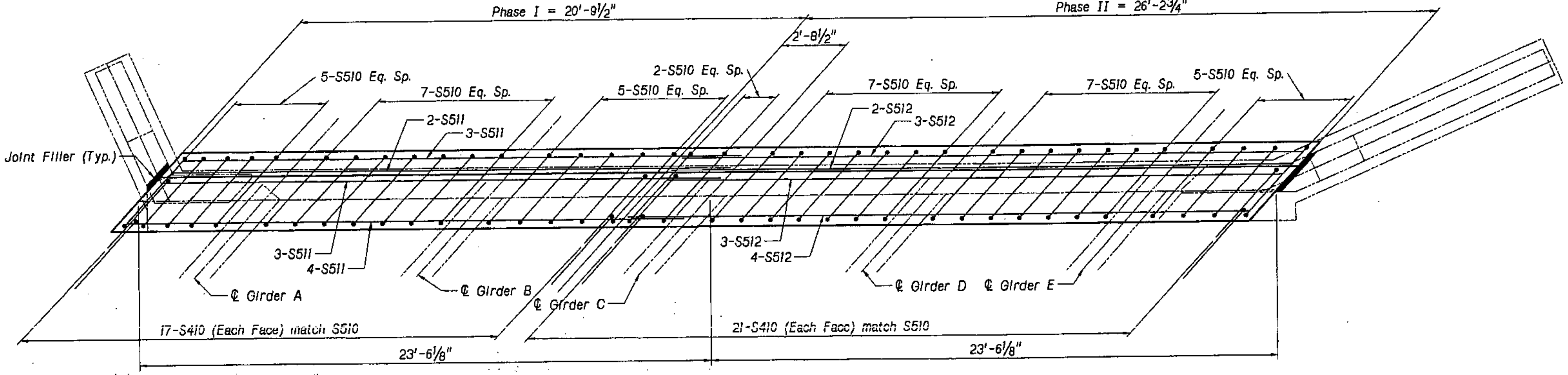


PLAN VIEW OF SLAB

BOTTOM BARS SHOWN

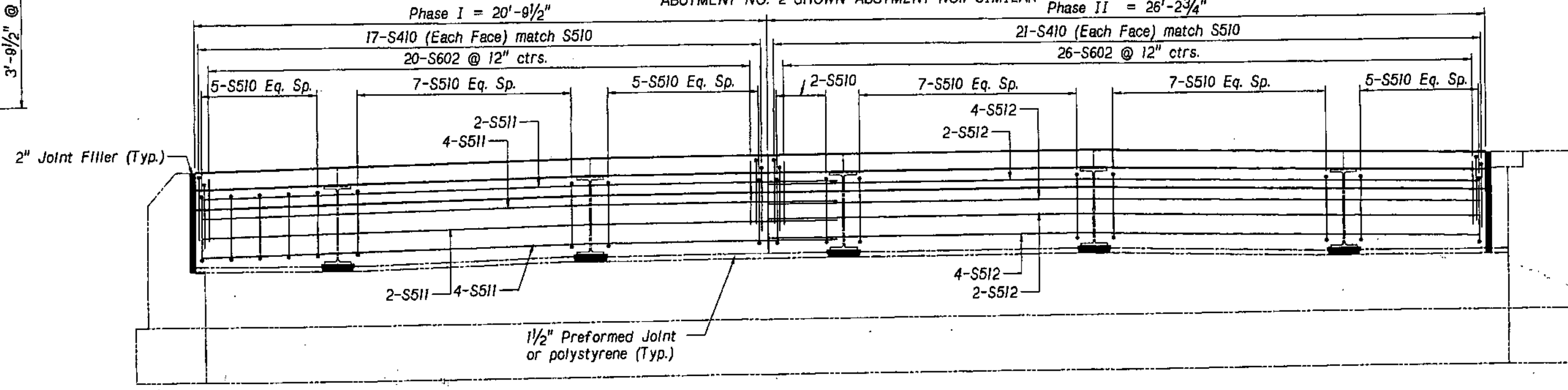


NOTE:
Cut 1" ϕ hole in web to allow for placing of S511 or S512.



PLAN VIEW OF TURNDOWN

ABUTMENT NO. 2 SHOWN ABUTMENT NO.1 SIMILAR



ELEVATION OF TURNDOWN

ABUTMENT NO. 2 SHOWN ABUTMENT NO.1 SIMILAR

PROJECT NUMBER 75-2(1064) SHEET NO. 24
C.N. 22342
STRUCTURE NUMBER S075 07234

PROFESSIONAL CIVIL ENGINEER CLAUDE R. OIE E-3939 STATE OF NEBRASKA

BRIDGE ENGINEER

175'-0" 3-SPAN ROLLED BEAM GIRDER BRIDGE
WIDEN & REDECK
PLAN VIEW OF SLAB AND TURNDOWN

LOCATION PLATTSMOUTH NORTH BRIDGES
SKEW 42°30'
ROADWAY 32'-0"
DESIGN LIVE LOAD H-20
DATE JULY 2008
CHECKED BY VLK
DETAILED BY TJH
DESIGNED BY BN
COUNTY CASS
HWY. NO. US-75
REF. POST. 72+34
STA. 859+67.50

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

NDOR Nebraska Department of Roads

PROFESSIONAL STRUCTURAL ENGINEER DANIEL J. SHARP E-5375 STATE OF NEBRASKA

6-26-08

SPECIAL PLAN NO. 1

9/14

N:\bridge\ebasesheets\bilbar2.dgn

BILL OF BARS

	MARK	NUMBER OF BARS PHASE 1	NUMBER OF BARS PHASE 2	LENGTH	TYPE	"A"	"B"	"C"	"D"	"E"	"F"		PIN	HOOK	WEIGHT LBS
SLAB	S801	9		Avg. 9'-9"	STR.										234
	S802	162		14'-10"	STR.										6416
	S803		172	6'-6"	STR.										2985
	S804	12		Avg. 9'-5"	STR.										302
	S601	30	38	28'-0"	STR.										2860
	S602	40	52	3'-0"	105	1'-6"	1'-6"	10"							415
	S501	15		Avg. 9'-4"	STR.										146
	S502	161		16'-11"	STR.										2841
	S503	13		Avg. 9'-11"	STR.										134
	S504	17	21	187'-3"	STR.				Includes 4 - 2'-6" Lap Splice						7421
	S505		16	Avg. 9'-5"	STR.										157
	S506		160	19'-1"	STR.										3185
	S507		17	Avg. 9'-8"	STR.										171
	S508	2		22'-11"	STR.										48
	S509		2	25'-11"	STR.										54
	S510	34	42	10'-9"	107	1'-6"	3'-5"						5½	2½	852
	S511	24		22'-11"	STR.										574
	S512		24	25'-9"	STR.										645
	S401	14		Avg. 9'-2"	STR.										86
	S402	163		16'-11"	STR.										1842
	S403	12		Avg. 8'-11"	STR.										71
	S404	16	20	185'-3"	STR.				Includes 4 - 2'-0" Lap Splice						4455
	S405		15	Avg. 9'-5"	STR.										94
	S406		162	19'-1"	STR.										2065
	S407		16	Avg. 9'-8"	STR.										103
	S408	2		22'-11"	STR.										31
	S409		2	25'-11"	STR.										35
	S410	68	82	3'-0"	104	1'-6"	1'-6"								301
														SUBTOTAL =	38522 LBS.
RAIL ON BRIDGE	S591	178	178	5'-8"	104	2'-10"	2'-10"						3¾"		2104
	S592	178	178	6'-0"	104	3'-0"	3'-0"						3¾"		2228
	S593	10	10	187'-3"	STR				Includes 4 - 2'-6" Lap Splice						3906
	S391	89	89	5'-4"	107	1'-6"	0'-10"						1½"	4"	357
														SUBTOTAL =	8595 LBS.
														TOTAL =	47117 LBS.

BAR SETS

MARK	MAX. LENGTH	MIN. LENGTH	NO. OF SETS	BARS PER SET	MARK	MAX. LENGTH	MIN. LENGTH	NO. OF SETS	BARS PER SET
S801	14'-8"	4'-10"	1	9					
S804	15'-5"	3'-5"	1	12					
S501	16'-8"	2'-0"	1	15					
S503	16'-11"	2'-11"	1	13					
S505	17'-7"	1'-3"	1	16					
S507	17'-10"	1'-6"	1	17					
S401	16'-3"	2'-1"	1	14					
S403	14'-11"	2'-11"	1	12					
S405	17'-7"	1'-3"	1	15					
S407	17'-10"	1'-6"	1	16					

NOTE: FOR BENDING DIAGRAMS, HOOK LENGTHS & PIN DIAMETERS SEE SHEET 14 OF 14.

PROJECT NUMBER 75-2(1064) SHEET NO. 25
C.N. 22342
STRUCTURE NUMBER S075 07234

PROFESSIONAL CIVIL ENGINEER CLAUDE R. OIE E-3939 STATE OF NEBRASKA
BRIDGE ENGINEER

175'-0" 3-SPAN ROLLED BEAM GIRDER BRIDGE
WIDEN & REDECK
SLAB BILL OF BARS

LOCATION PLATTSMOUTH NORTH BRIDGES
SKEW 42°30'
ROADWAY 32'-0"
DESIGN LIVE LOAD H-20

COUNTY CASS
HWY. NO. US-75
REF. POST. 72+34
STA. 859+67.50

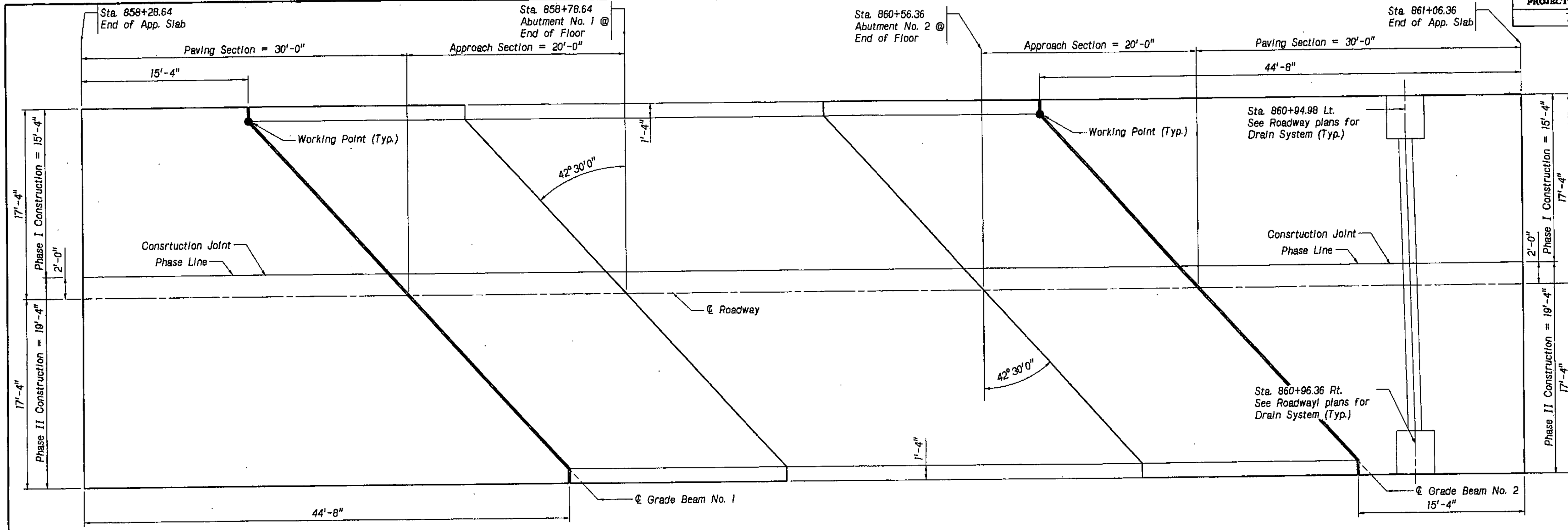
DESIGNED BY BN | DETAILED BY TJH | CHECKED BY VLK | DATE JULY 2008

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

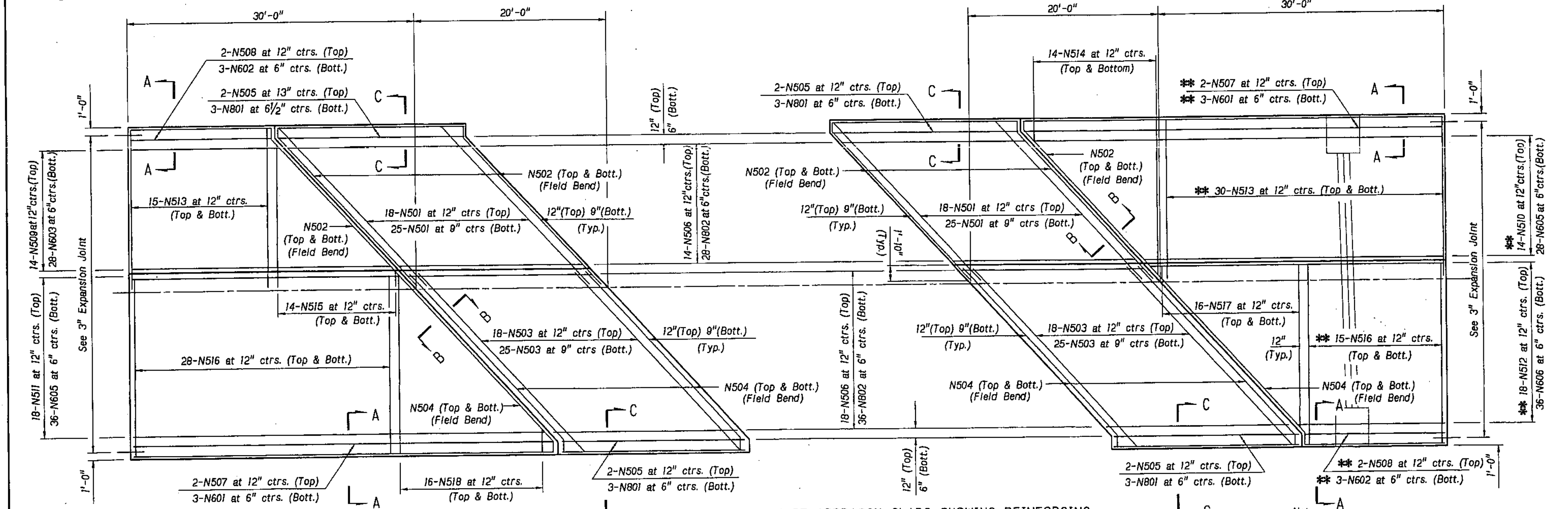
NDOR Nebraska Department of Roads

PROFESSIONAL STRUCTURAL ENGINEER DANIEL J. SHARP E-5376 STATE OF NEBRASKA
6-26-08

SPECIAL PLAN NO. 1
10/14



GENERAL PLAN OF APPROACH SLABS SHOWING DIMENSIONS



GENERAL PLAN OF APPRAOCH SLABS SHOWING REINFORCING

Note:
For Sections see Sheet 12 of 14.
** Field cut to keep 1" clearance around drainage box out

PROJECT NUMBER	SHEET NO.
75-2(1064)	26

C.N. 22342

STRUCTURE NUMBER S075 07234

CLAUDE R. OIE E-3939 — PROFESSIONAL CIVIL ENGINEER — STATE OF NEBRASKA

BRIDGE ENGINEER

175'-0" 3-SPAN ROLLED BEAM GIRDER BRIDGE WIDEN & REDECK
APPROACH SLAB PLAN VIEW

LOCATION PLATTSMOUTH NORTH BRIDGES
SKEW 42°30'
ROADWAY 32'-0"
DESIGN LIVE LOAD H-20
DETAILED BY TJH
CHECKED BY VLK
DATE JULY 2008

COUNTY CASS
HWY. NO. US-75
REF. POST 72+34
STA. 859+67.50
DESIGNED BY BN

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

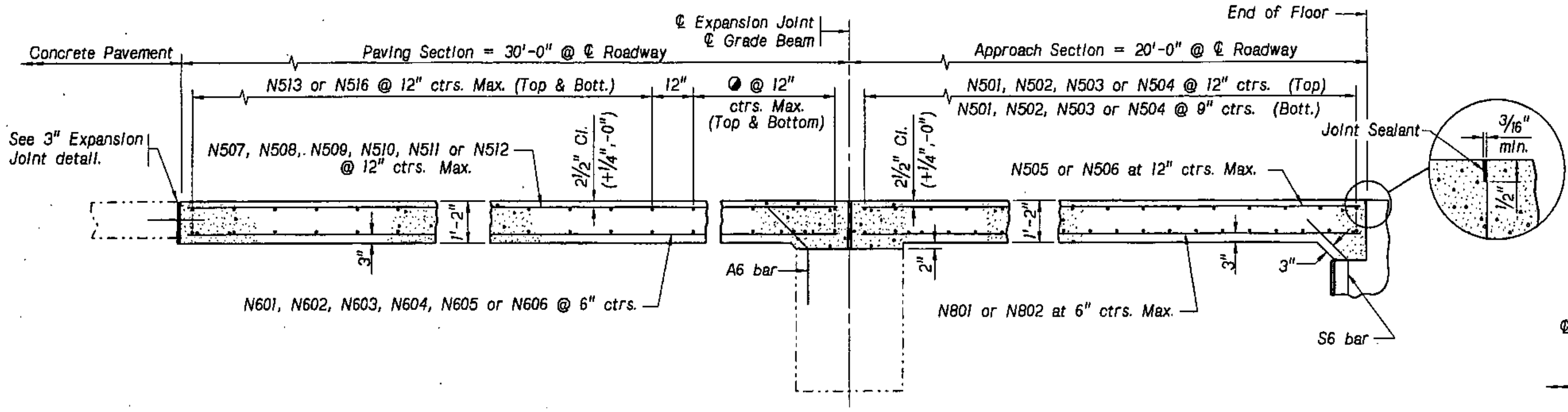
NDOR Nebraska Department of Roads

DANIEL J. SHARP E-5375 — PROFESSIONAL STRUCTURAL ENGINEER — STATE OF NEBRASKA
6-27-08

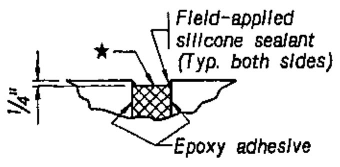
SPECIAL PLAN NO. 1

11 / 14

◑ N514, N515, N517 or N518

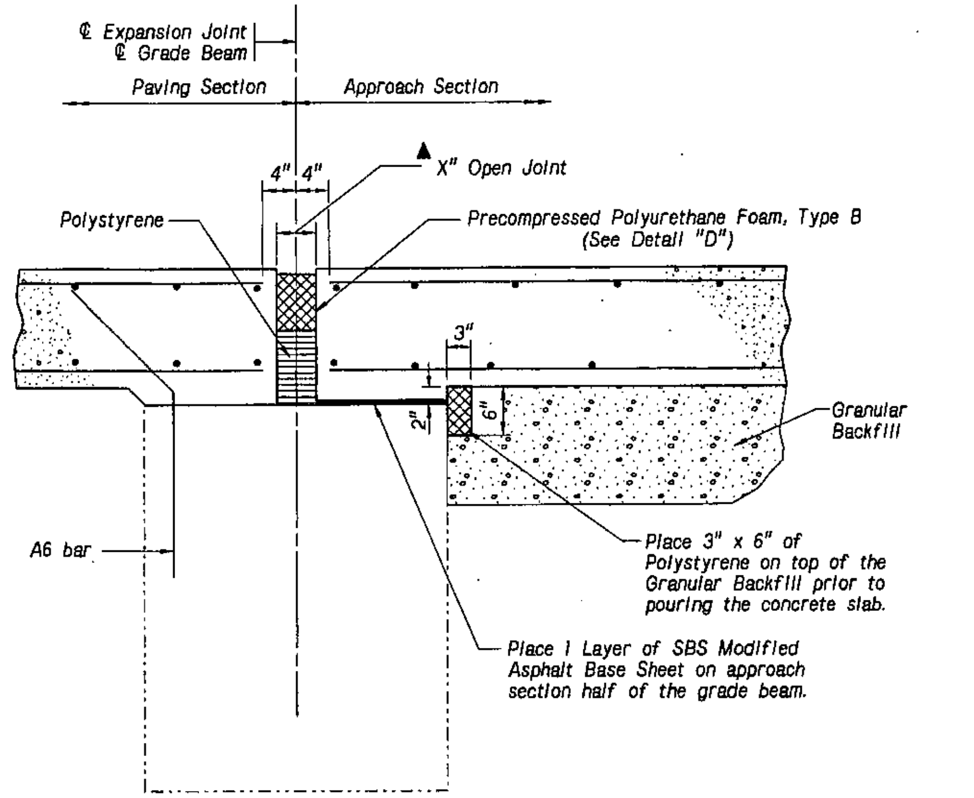


LONGITUDINAL SECTION

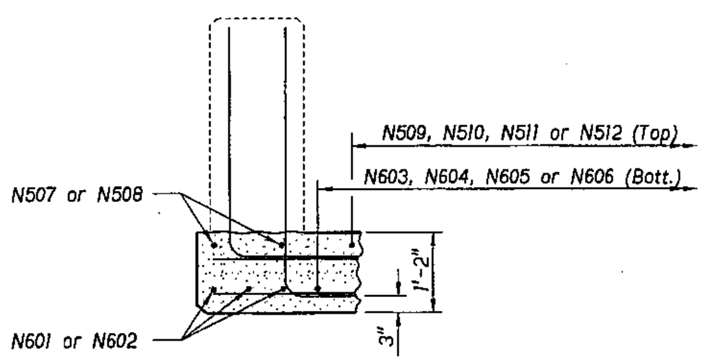


DETAIL "D"

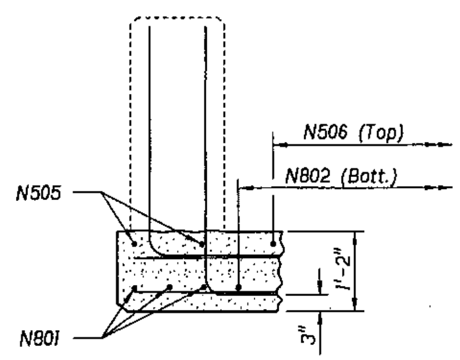
★ Factory applied & cured silicone facing



SECTION B-B

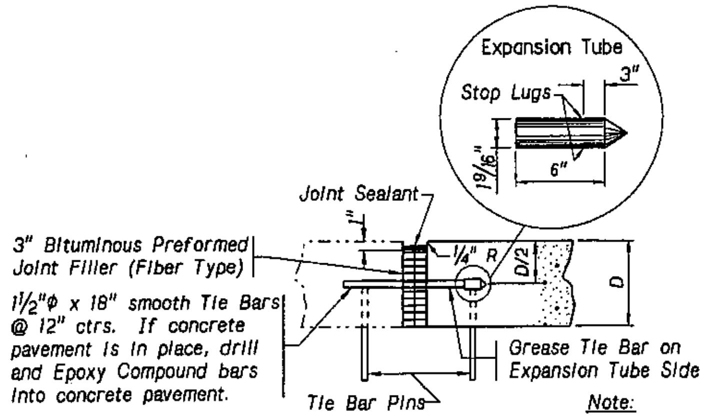


SECTION A-A



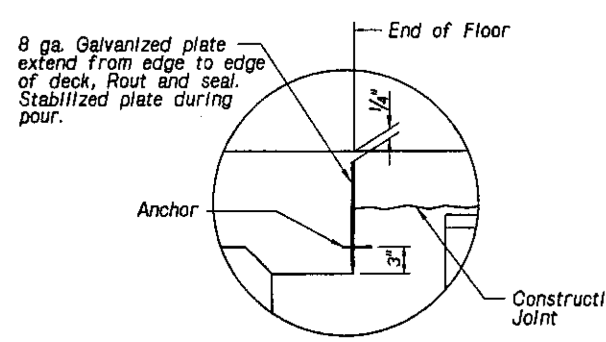
SECTION C-C

▲ Measured at 50°F. Gap width shall be decreased ⅛" for every Y°F. increase in temperature above 50°F. Gap width shall be increased ⅛" for every Y°F. decrease in temperature below 50°F.
Y° = 11.4°F @ Grade Beam No. 1
Y° = 21.2°F @ Grade Beam No. 2



3" EXPANSION JOINT

Note:
Use D/2 of Roadway Pavement if less than D/2 of Paving Section.



ALTERNATE JOINT DETAIL AT END OF FLOOR

To be used if approach slab is poured continuous with bridge deck.

APPROACH SLAB NOTES:

Concrete Rail Width = 1'-2". See sheet 13 of 14 for placement of rail reinforcement.

See Standard Specifications for tining and finishing of approach slabs.

SBS MODIFIED ASPHALT base sheets and all other miscellaneous items shall be considered subsidiary to the pay item, CONCRETE FOR PAVEMENT APPROACHES CLASS 47BD-4000.

SBS MODIFIED ASPHALT base sheets shall be modified bitumen roofing material, with a minimum thickness of 0.090 inch and a minimum weight of 60 lbs. per 100 sq. feet.

The expansion gap between approach section and paving section shall be cleaned of all foreign matter before the installation of the expansion device or the filler material.

✱ Working points are located at the intersection of the edge of clear roadway and ℄ Grade Beam.
★ Dimensions measured at edge of clear roadway.

PROJECT NUMBER	SHEET NO.
75-2(1064)	27

C.N. 22342

STRUCTURE NUMBER S075 07234

PROFESSIONAL CIVIL ENGINEER CLAUDE R. OIE E-3939 STATE OF NEBRASKA

BRIDGE ENGINEER

LOCATION PLATTSMOUTH NORTH BRIDGES
SKEW 42° 30'
ROADWAY 32'-0"
DESIGN LIVE LOAD H-20

175'-0" 3-SPAN ROLLED BEAM GIRDER BRIDGE WIDEN & REDECK
APPROACH SLAB DETAILS

COUNTY CASS
HWY. NO. US-75
REF. POST. 72+34
STA. 859+67.50

DESIGNED BY BN | DETAILED BY TJH | CHECKED BY VLK | DATE JULY 2008

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

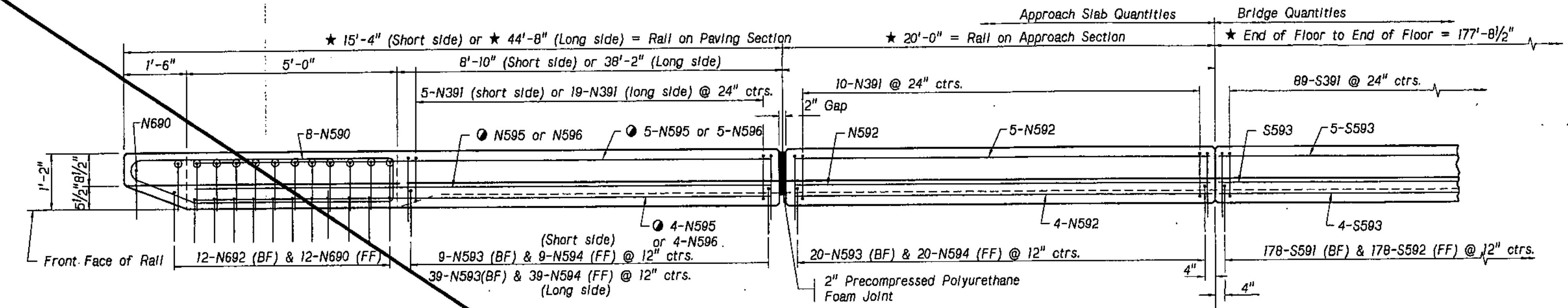
NDOR Nebraska Department of Roads

PROFESSIONAL STRUCTURAL ENGINEER DANIEL J. SHARP E-5375 STATE OF NEBRASKA
6-26-08

SPECIAL PLAN NO. 1

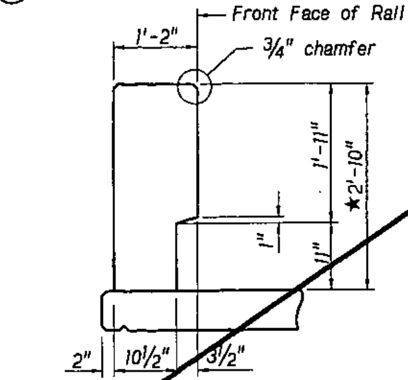
12/14

(R2) Deleted Sheet 28 January 2009

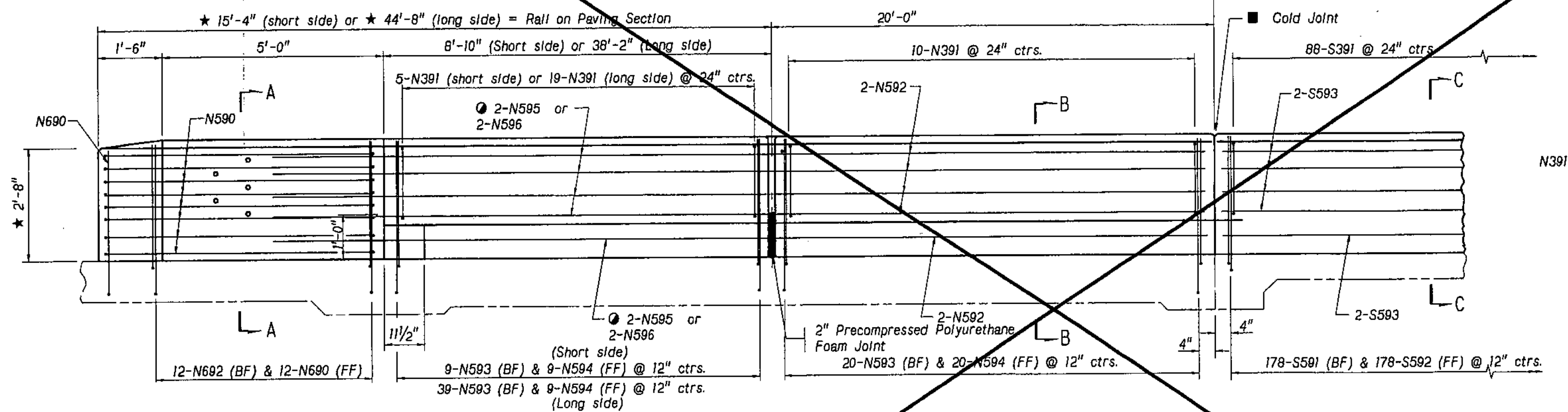


PARTIAL PLAN OF OUTSIDE CONCRETE RAILS

Not to Scale

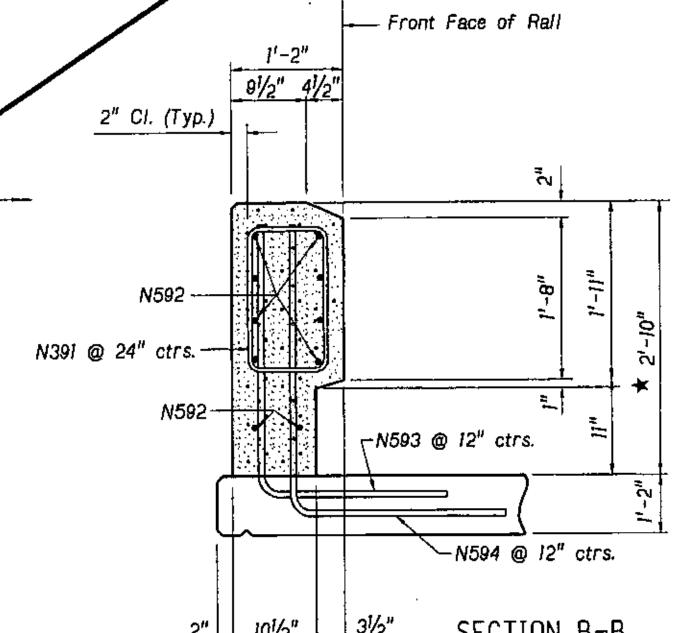


ALTERNATE CHAMFER DETAIL



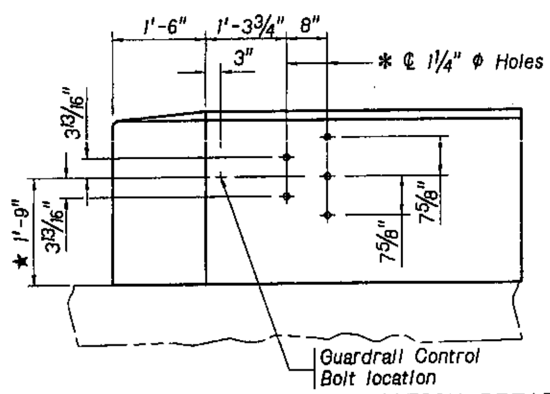
PARTIAL ELEVATION OF OUTSIDE CONCRETE RAILS

Not to Scale



SECTION B-B

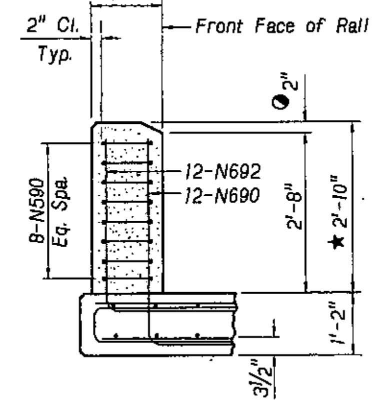
ON APPROACH SECTION



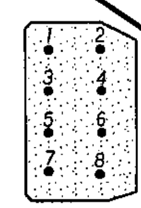
THRIE BEAM TERMINAL CONNECTION DETAIL

✱ As an alternate method, the contractor shall furnish and cast into the concrete an approved welded assembly consisting of threaded inserts, held accurately to the template of the holes shown. Inserts are to be complete with galvanized plate washers and galvanized ⅞" x 2" cap screws. The insert assembly shall be a standard product of a reputable manufacturer of such items and be capable of resisting a shear load of 80,000 lbs.

Slope from 2" to 0" the last 1'-6" length of rail.

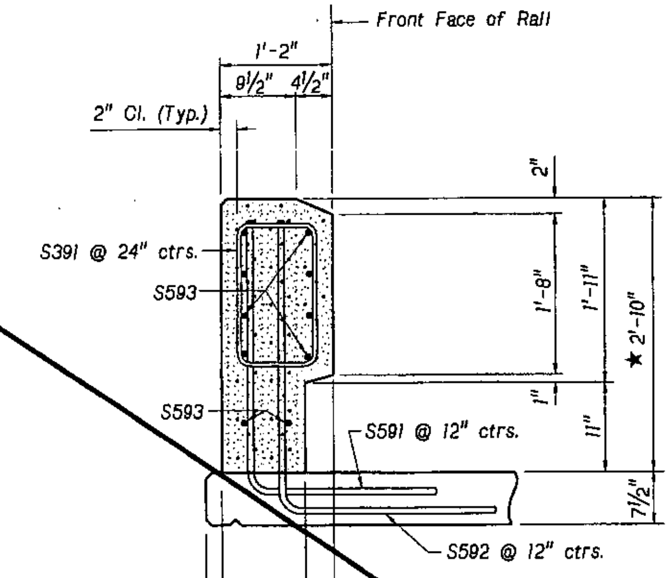


SECTION A-A



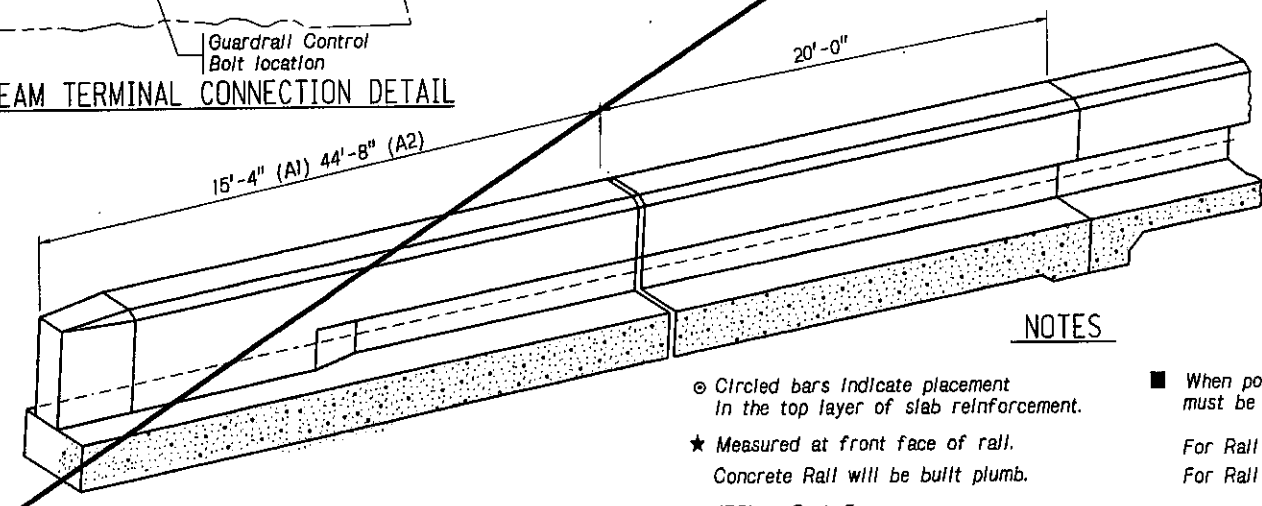
RAIL SECTION

See Lap Detail



SECTION C-C

ON BRIDGE



CONCRETE BARRIER

NOTES

⊙ Circled bars indicate placement in the top layer of slab reinforcement.

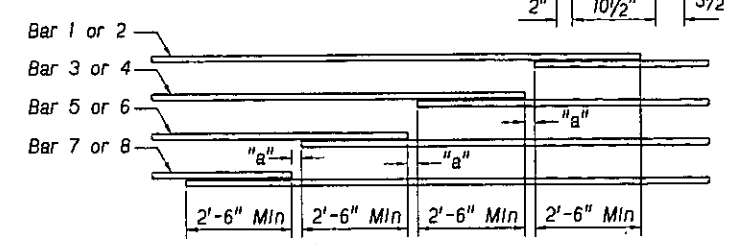
★ Measured at front face of rail.

Concrete Rail will be built plumb.

(EF) = Each Face
(FF) = Front Face
(BF) = Back Face

■ When pouring concrete rails, a mandatory chamfered cold joint must be formed at the end of floor.

For Rail Bill of Bars on Approach Slab see sheet 10 of 14.
For Rail Bill of Bars on Bridge Deck see sheet 14 of 14.



"a" ≥ Zero

LAP DETAIL

PROJECT NUMBER 75-2(1064) SHEET NO. 28

C.N. 22342

STRUCTURE NUMBER S075 07234

PROFESSIONAL CIVIL ENGINEER CLAUDE R. OIE E-3939 STATE OF NEBRASKA

BRIDGE ENGINEER

175'-0" 3-SPAN ROLLED BEAM GIRDER BRIDGE WIDEN & REDECK

NU CLOSED CONCRETE RAIL (TL4)

LOCATION PLATTSMOUTH NORTH BRIDGES

COUNTY CASS | SKEW 42°30'
HWY. NO. US-75 | ROADWAY 32'-0"
REF. POST 72+34 | DESIGN LIVE LOAD H-20
STA. 859+67.50

DESIGNED BY BN | DETAILED BY TJH | CHECKED BY VLK | DATE JULY 2008

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

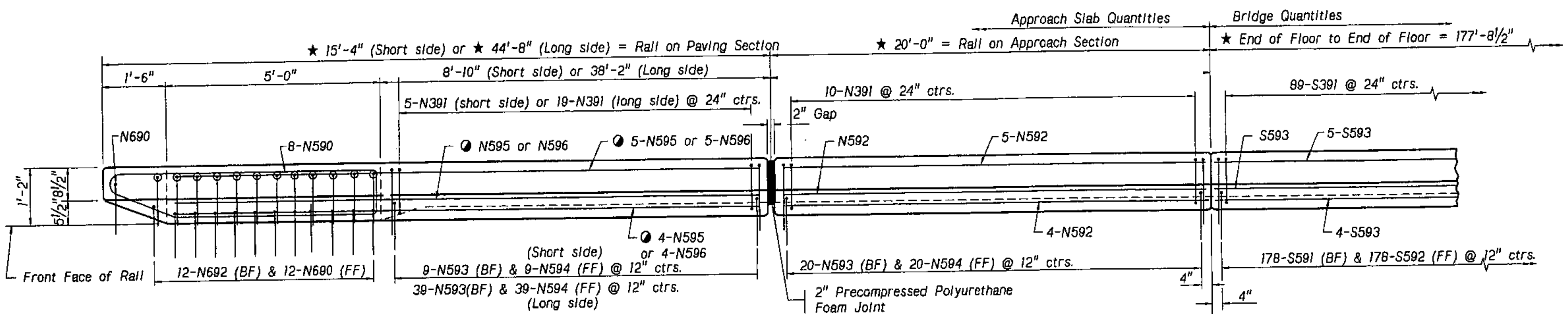
NDOR Nebraska Department of Roads

PROFESSIONAL STRUCTURAL ENGINEER DANIEL J. SHARP E-5375 STATE OF NEBRASKA

SPECIAL PLAN NO. 1

13/14

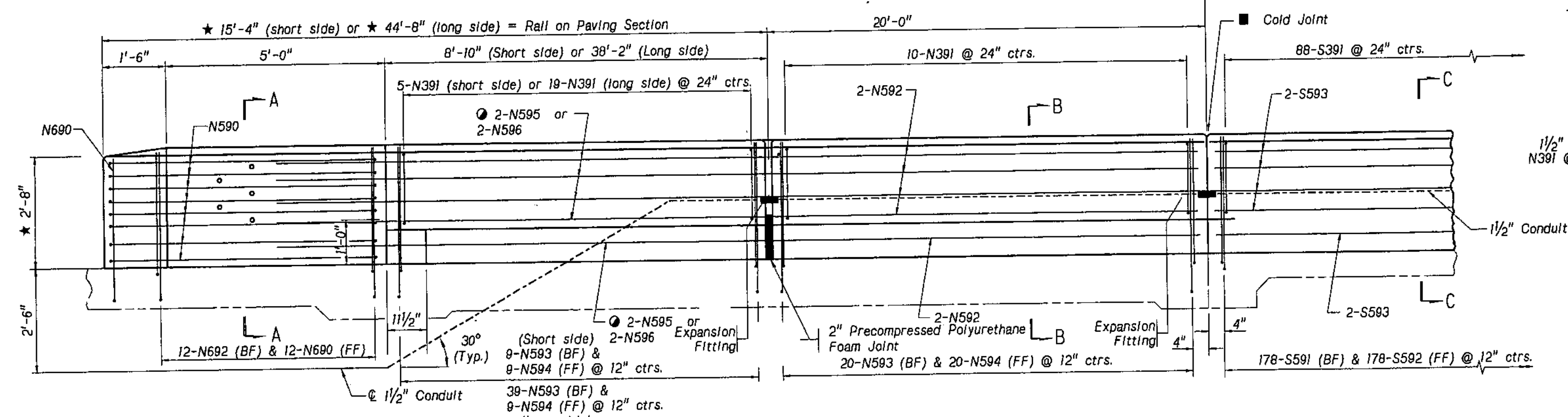
Ⓡ2 Added Sheet 28 Janurary 2009



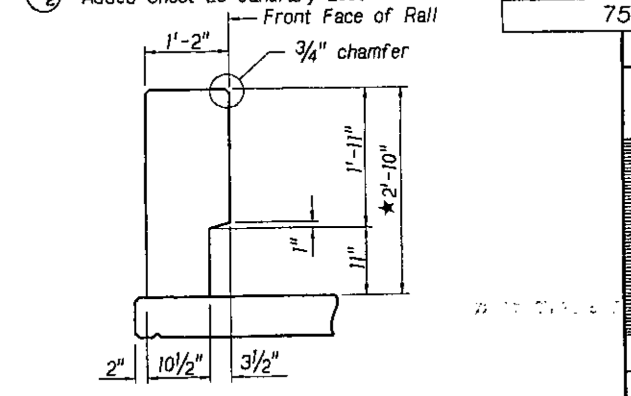
N595 at short side
N596 at long side

PARTIAL PLAN OF OUTSIDE CONCRETE RAILS
Not to Scale

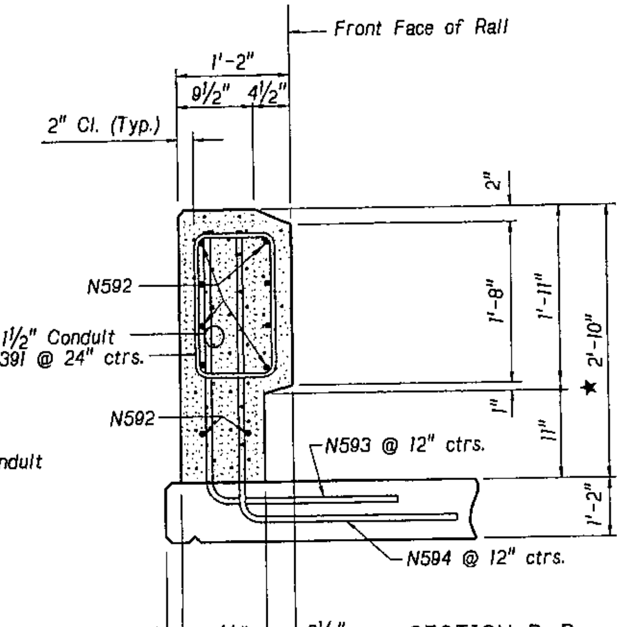
End of Floor @ Gutter Line



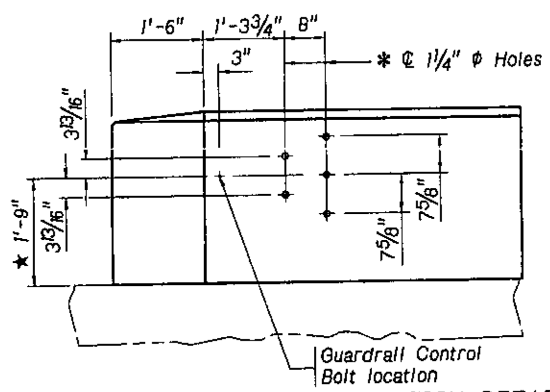
PARTIAL ELEVATION OF OUTSIDE CONCRETE RAILS
Not to Scale



ALTERNATE CHAMFER DETAIL



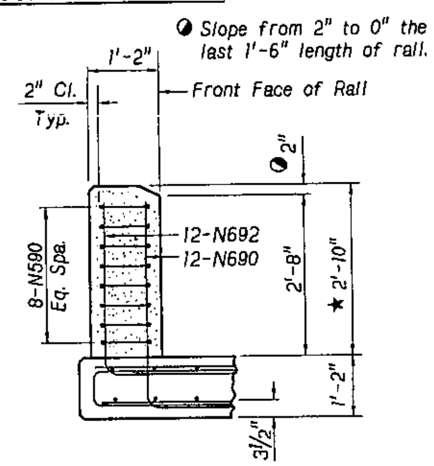
SECTION B-B
ON APPROACH SECTION



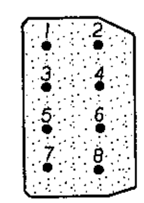
THRIE BEAM TERMINAL CONNECTION DETAIL

*As an alternate method, the contractor shall furnish and cast into the concrete an approved welded assembly consisting of threaded inserts, held accurately to the template of the holes shown. Inserts are to be complete with galvanized plate washers and galvanized ⅞" x 2" cap screws. The insert assembly shall be a standard product of a reputable manufacturer of such items and be capable of resisting a shear load of 80,000 lbs.

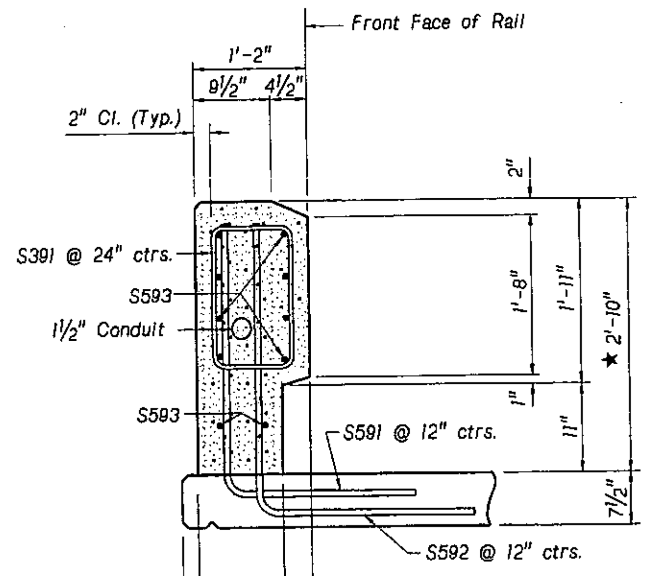
Slope from 2" to 0" the last 1'-6" length of rail.



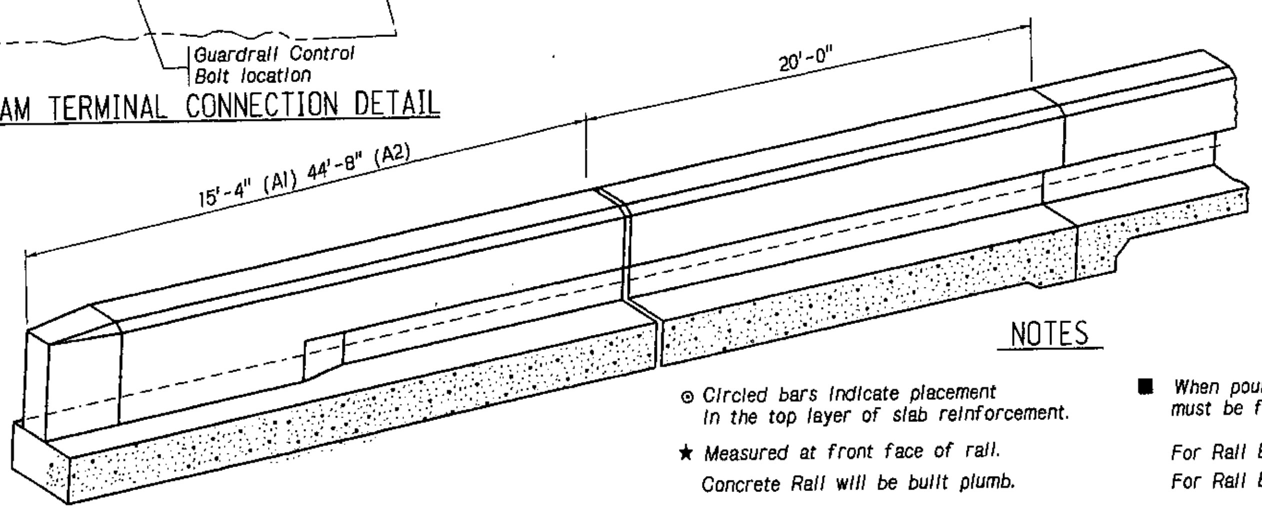
SECTION A-A



RAIL SECTION
See Lap Detail



SECTION C-C
ON BRIDGE



CONCRETE BARRIER

NOTES

⊙ Circled bars indicate placement in the top layer of slab reinforcement.

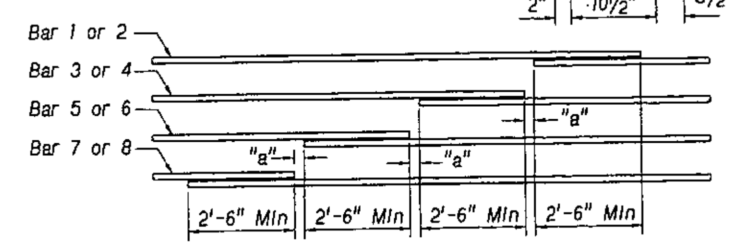
★ Measured at front face of rail.

Concrete Rail will be built plumb.

(EF) = Each Face
(FF) = Front Face
(BF) = Back Face

■ When pouring concrete rails, a mandatory chamfered cold joint must be formed at the end of floor.

For Rail Bill of Bars on Approach Slab see sheet 10 of 14.
For Rail Bill of Bars on Bridge Deck see sheet 14 of 14.



"a" ≥ Zero

LAP DETAIL

PROJECT NUMBER	SHEET NO.
75-2(1064)	28A

C.N. 22342

STRUCTURE NUMBER S075 07234

PROFESSIONAL CIVIL ENGINEER CLAUDE R. OIE E-3939 STATE OF NEBRASKA

BRIDGE ENGINEER

175'-0" 3-SPAN ROLLED BEAM GIRDER BRIDGE WIDEN & REDECK NU CLOSED CONCRETE RAIL (TL4)

LOCATION PLATTSMOUTH NORTH BRIDGES
COUNTY CASS
HWY. NO. US-75
SKEW 42° 30'
REF. POST. 72+34
ROADWAY 32'-0"
STA. 859+67.50
DESIGN LIVE LOAD H-20
DESIGNED BY BN DETAILED BY TJH CHECKED BY VLK DATE JULY 2008

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

NDOR Nebraska Department of Roads

PROFESSIONAL STRUCTURAL ENGINEER DANIEL J. SHARP E-5375 STATE OF NEBRASKA

1-21-09

SPECIAL PLAN NO.	13A/14
1	

PROJECT NUMBER	SHEET NO.
75-2(1064)	29

C.N. 22342

STRUCTURE NUMBER S075 07234

BILL OF BARS

	MARK	NUMBER OF BARS PHASE 1	NUMBER OF BARS PHASE 2	LENGTH	TYPE	"A"	"B"	"C"	"D"	"E"	"F"		PIN	HOOK	WEIGHT LBS
Approach Slab No. 1	N801	3	3	19'-5"	Str.										311
	N802	28	36	19'-3"	Str.										3289
	N601	3		44'-0"	Str.										198
	N602		3	14'-9"	Str.										66
	N603	28		Avg. 21'-2"	Str.										890
	N604		36	Avg. 35'-7"	Str.										1924
	N501	43		22'-11"	Str.										1028
	N502	6		22'-6"	Str.										141
	N503		43	25'-8"	Str.										1151
	N504		6	25'-3"	Str.										158
	N505	2	2	19'-5"	Str.										81
	N506	14	18	19'-3"	Str.										642
	N507	2		44'-0"	Str.										92
	N508		2	14'-9"	Str.										31
	N509	14		Avg. 21'-5"	Str.										313
	N511		18	Avg. 35'-9"	Str.										671
	N513	30		16'-11"	Str.										529
	N515	28		Avg. 9'-1"	Str.										265
	N516		56	18'-11"	Str.										1105
	N518		32	Avg. 10'-4"	Str.										345
													SUBTOTAL =	13232	LBS.
Rail on Approach Slab No. 1	N690	13	13	6'-6"	104	3'-3"	3'-3"						4½"		254
	N692	12	12	5'-10"	104	2'-11"	2'-11"						4½"		210
	N590	8	8	14'-4"	130	4'-8"	10"	6'-1"	5"	1'-6"	1'-5"		2½"	5½"	239
	N592	10	10	19'-5"	STR.										405
	N593	29	59	5'-10"	104	2'-11"	2'-11"						2½"	5½"	535
	N594	29	59	6'-10"	104	3'-5"	3'-5"						2½"	5½"	627
	N595	10		11'-4"	STR.										118
	N596		10	40'-8"	STR.										424
	N391	15	29	5'-4"	107	1'-6"	10"						1½"	4"	88
													SUBTOTAL =	2902	LBS.
Approach Slab No. 2	N801	3	3	19'-5"	Str.										311
	N802	28	36	19'-3"	Str.										3289
	N601	3		44'-0"	Str.										198
	N602		3	14'-9"	Str.										66
	N605	28		Avg. 37'-5"	Str.										1574
	N606		36	Avg. 23'-0"	Str.										1244
	N501	43		22'-11"	Str.										1028
	N502	6		22'-6"	Str.										141
	N503		43	25'-8"	Str.										1151
	N504		6	25'-3"	Str.										158
	N505	2	2	19'-5"	Str.										81
	N506	14	18	19'-3"	Str.										642
	N507		2	44'-0"	Str.										92
	N508	2		14'-9"	Str.										31
	N510	14		Avg. 36'-8"	Str.										535
	N512		18	Avg. 22'-11"	Str.										430
	N513	60		16'-11"	Str.										1059
	N514	28		Avg. 9'-3"	Str.										270
	N516		30	18'-11"	Str.										592
	N517		32	Avg. 9'-3"	Str.										309
													SUBTOTAL =	13201	LBS.
Rail on Approach Slab No. 2	N690	13	13	6'-6"	104	3'-3"	3'-3"						4½"		254
	N692	12	12	5'-10"	104	2'-11"	2'-11"						4½"		210
	N590	8	8	14'-4"	130	4'-8"	10"	6'-1"	5"	1'-6"	1'-5"		2½"	5½"	239
	N592	10	10	19'-5"	STR.										405
	N593	59	29	5'-10"	104	2'-11"	2'-11"						2½"	5½"	535
	N594	59	29	6'-10"	104	3'-5"	3'-5"						2½"	5½"	627
	N595		10	11'-4"	STR.										118
	N596	10	.	40'-8"	STR.										424
	N391	29	15	5'-4"	107	1'-6"	10"						1½"	4"	88
													SUBTOTAL =	2902	LBS.
													TOTAL =	32237	LBS.

BAR MARK

A413 — A 4 13

- bar number: 01 thru 49, general reinforcing; 70 thru 79, light pole reinforcing; 90 thru 99, curb or rail reinforcing
- bar size
- type of bridge element - A=Abutment (P=Pier, B=Bent, S=Slab, N=Approach Slab)

BAR SETS - PHASE I

MARK	MAX. LENGTH	MIN. LENGTH	NO. OF SETS	BARS PER SET
N603	27'-4"	15'-0"	1	28
N605	43'-7"	31'-3"	1	28
N509	27'-4"	15'-6"	1	14
N510	42'-2"	31'-2"	1	14
N514	16'-4"	2'-2"	2	14
N515	16'-11"	1'-3"	2	14

BAR SETS - PHASE II

MARK	MAX. LENGTH	MIN. LENGTH	NO. OF SETS	BARS PER SET
N604	43'-7"	27'-7"	1	36
N606	31'-0"	15'-0"	1	36
N511	44'-0"	27'-6"	1	18
N512	31'-1"	14'-9"	1	18
N517	17'-5"	1'-1"	2	16
N518	18'-6"	2'-2"	2	16

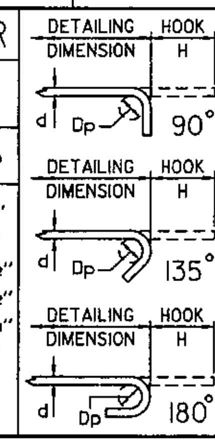
STANDARD HOOK LENGTH

PRIMARY STRESS BARS: BAR SIZE	HOOK H 90°	HOOK H 180°	STIRRUPS AND TIES: BAR SIZE	HOOK H 90°	HOOK H 135°
4	8"	6"	3	4"	4"
5	10"	7"	4	4 ½"	4 ½"
6	12"	8"	5	6"	5 ½"
7	15"	10"	6	12"	8"
8	17"	11"	7	14"	9"
9	19"	15"	8	16"	10 ½"
10	23"	17"			
11	24"	19"			

d = BAR SIZE
Dp = PIN DIAMETER

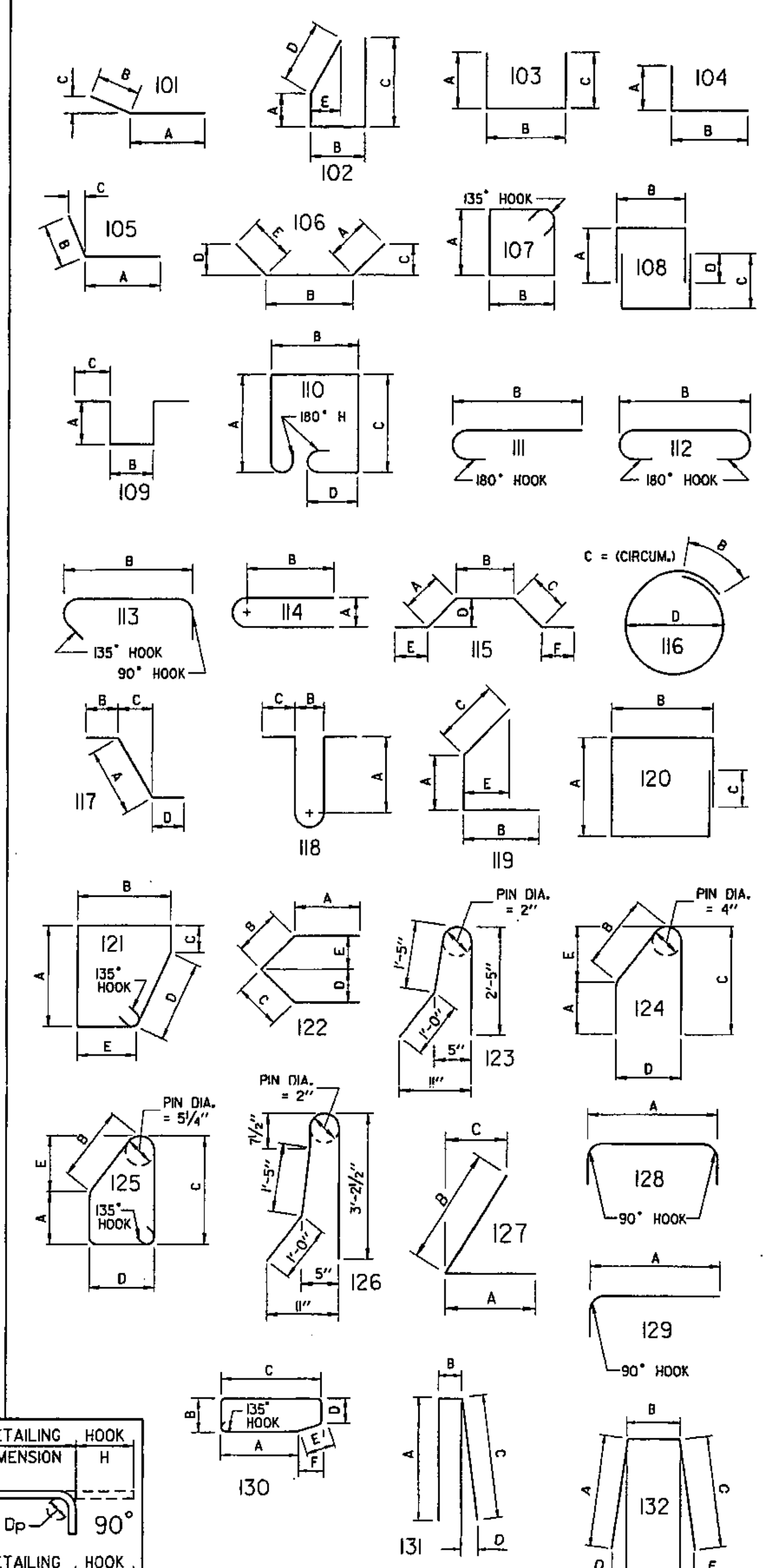
PIN DIAMETER

PRIMARY STRESS: BAR SIZE	Dp	STIRRUP & TIES: BAR SIZE	Dp
4	3"	3	1 ½"
5	3 ¾"	4	2"
6	4 ½"	5	2 ½"
7	5 ¼"	6	4 ½"
8	6"	7	5 ¼"
9	9½"	8	6"
10	11"		
11	12"		



BENDING DIAGRAMS

ALL DIMENSIONS ARE OUT TO OUT & NOT TO SCALE
ALL REINFORCING STEEL SHALL BE EPOXY COATED



CLAUDE R. OIE E-3939 PROFESSIONAL CIVIL ENGINEER STATE OF NEBRASKA

BRIDGE ENGINEER

175'-0" 3-SPAN ROLLED BEAM GIRDER BRIDGE
WIDEN & REDECK
APPROACH SLAB BILL OF BARS

LOCATION PLATTSMOUTH NORTH BRIDGES
COUNTY CASS
HWY. NO. US-75
SKEW 42°30'
REF. POST 72+34
ROADWAY 32'-0"
STA. 859+67.50
DESIGN LIVE LOAD H-20
DESIGNED BY BN
DETAILED BY TJH
CHECKED BY VLK
DATE JULY 2008

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

NDOR Nebraska Department of Roads

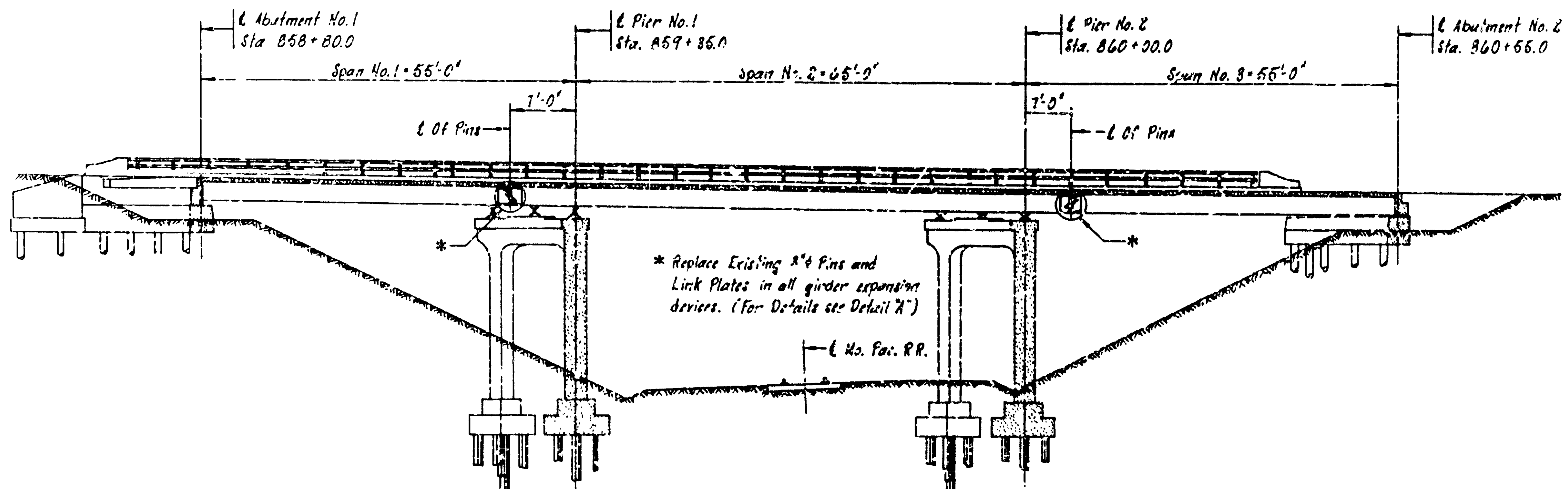
DANIEL J. SHARP E-5375 PROFESSIONAL STRUCTURAL ENGINEER STATE OF NEBRASKA
6-26-08

SPECIAL PLAN NO. 1 — 14/14

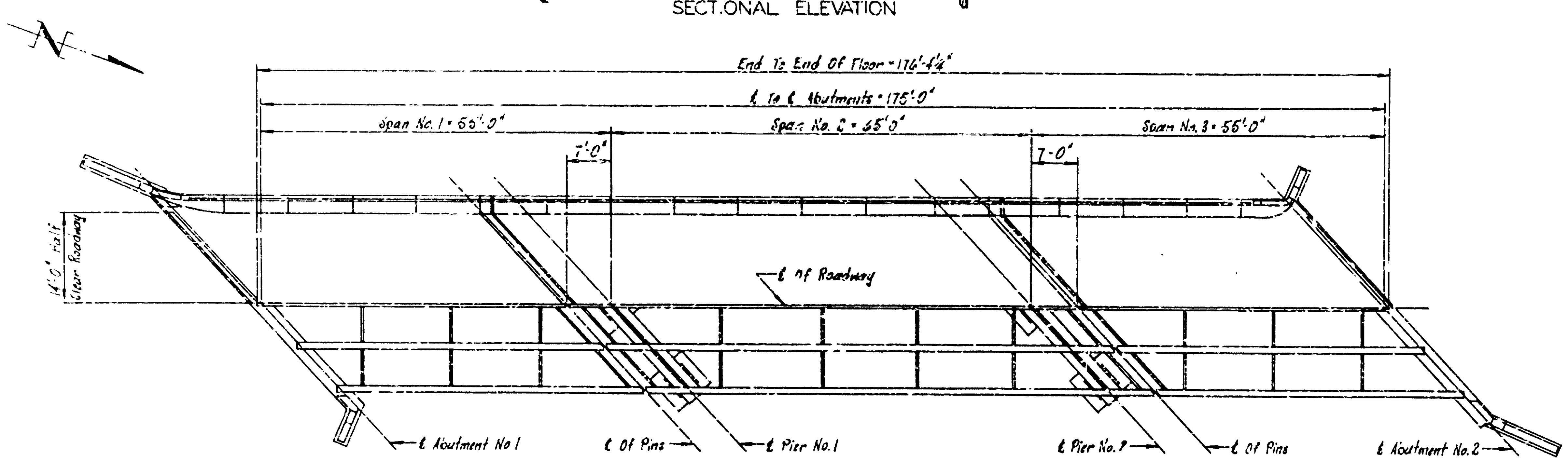
Sheet H

STATE	PROJECT NUMBER	SHEET NO.
NEBR.		

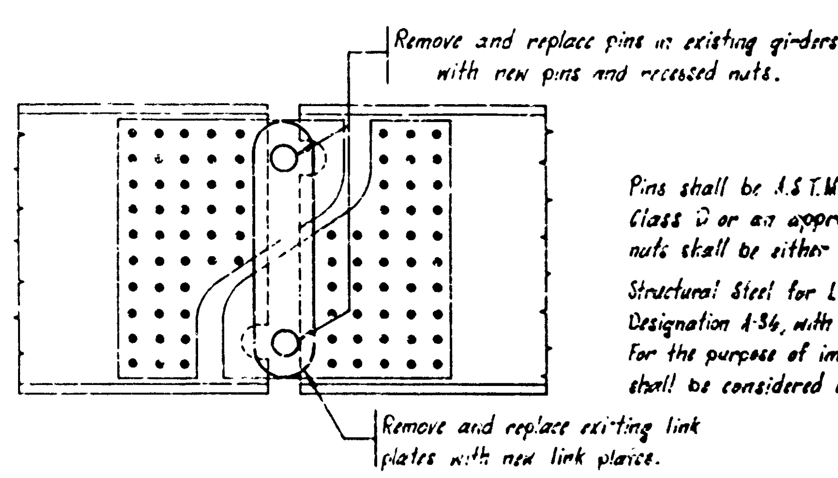
REVISIONS



SECTIONAL ELEVATION



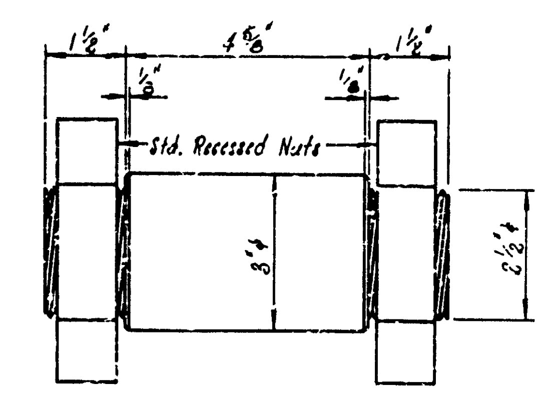
GENERAL PLAN



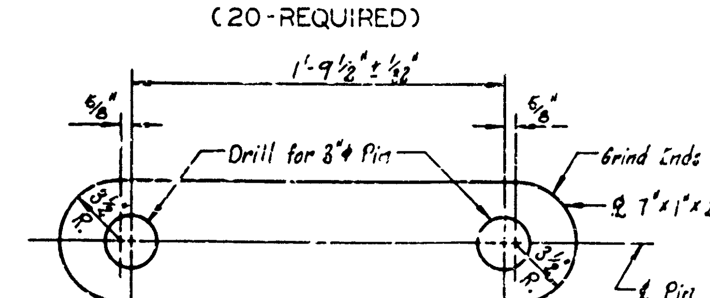
DETAIL "A"

Pins shall be A.S.T.M. A-108 or A.S.T.M. A-668 Class D or an approved equal. Recessed nuts shall be either pressed or cast steel.

Structural Steel for Link Plates shall be A.S.T.M. Designation A-36, with a working stress of 20,000 p.s.i.. For the purpose of impact test, all Link Plates shall be considered main tension members.



PIN REPLACEMENT
(20-REQUIRED)



LINK PLATE
(20-REQUIRED)

NOTES

Dead Load Reaction at each girder end equals 18,000 Lbs..
A.D.T. on structure is 4840.
Repair all damages caused in accordance with the Standard Specifications.

QUANTITIES

PIN REPLACEMENT 20 EACH

NEBRASKA DEPARTMENT OF ROADS
BRIDGE DIVISION

STATE ROAD PLATTSMOUTH NORTH SKEW
HWY. NO. US-73 DESIGN
REF. POST 84.49 ROADWAY
COUNTY CASS STA. 859 + 67

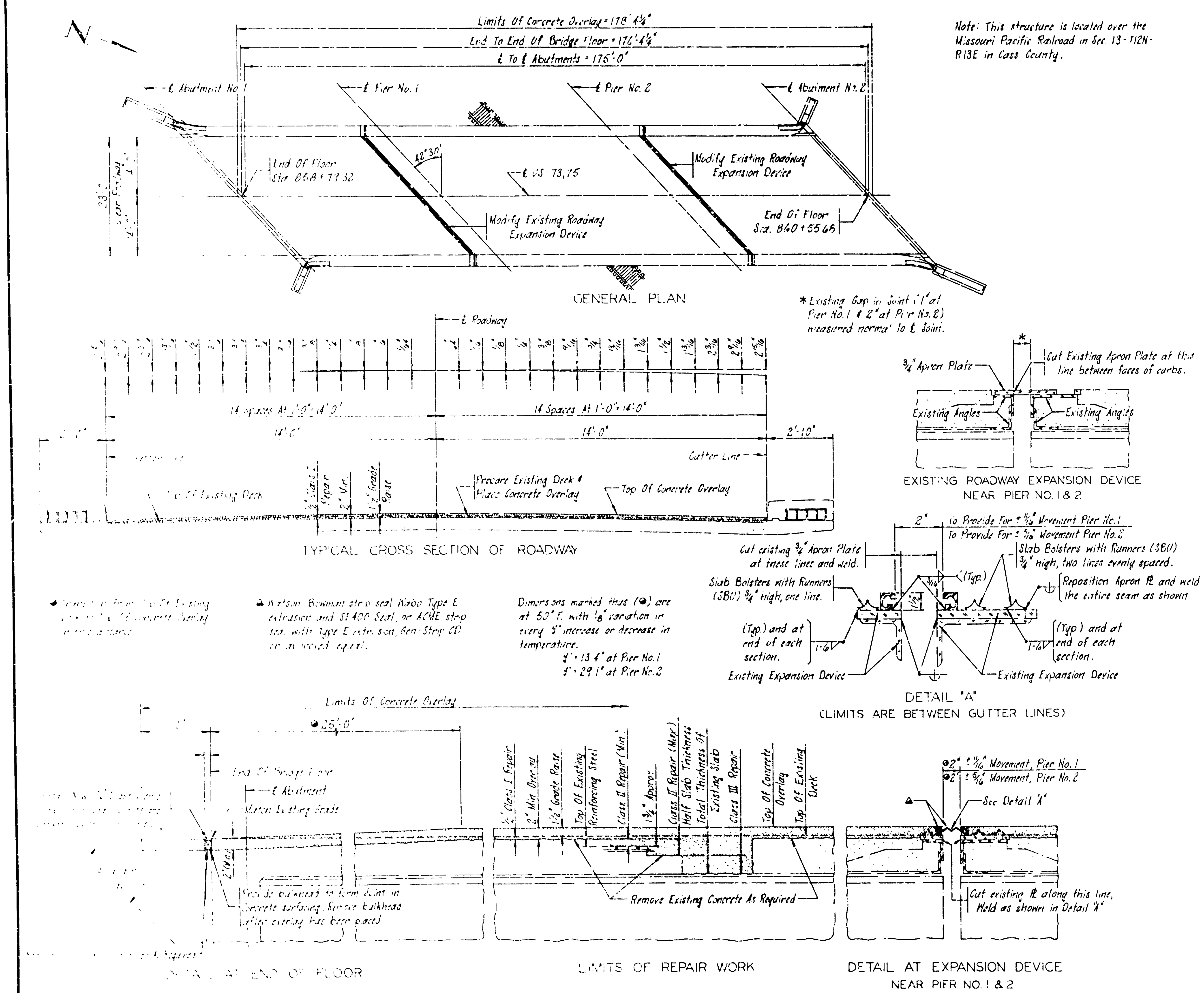
PIN REPLACEMENT

DESIGNED BY OOB	BRIDGE ENGINEER	
DETAILED BY DWL	PROJECT NUMBER	SPECIAL PLAN NO.
CHECKED BY GWS	~~73(84.45)~~ 75(72.34)	
DATE AUG., 1983		

CERTIFICATE OF AUTHENTICITY

STATE	PROJECT NUMBER	SHEET NO.
NEBR.		

REVISIONS



NOTES

Before ordering any materials, the contractor shall make a detailed field inspection of the existing structure verifying all dimensions and reporting to the Engineer any discrepancies between his measurements and those shown on these plans.

Concrete overlay shall be 2" min. High Density Low Slump Concrete.

Slab Bolsters shall be Type (SBU), class "A" as specified in C.R.S.I. manual of Standard Practice.

The furnishing and placing of Elastomeric Compression Seals & Slab Bolsters, shall not be paid for directly, but shall be considered subsidiary to other items for which payment is made.

- QUANTITIES -

CLASS I REPAIR	[illegible]	SQ YDS
CLASS II REPAIR	[illegible]	SQ YDS
CLASS III REPAIR		SQ YDS
HIGH DENSITY, LOW SLUMP CONCRETE	[illegible]	CU YDS
PLACING, FINISHING & CURING CONCRETE OVERLAY	[illegible]	SQ YDS
STRIP SEAL	[illegible]	LIN FT

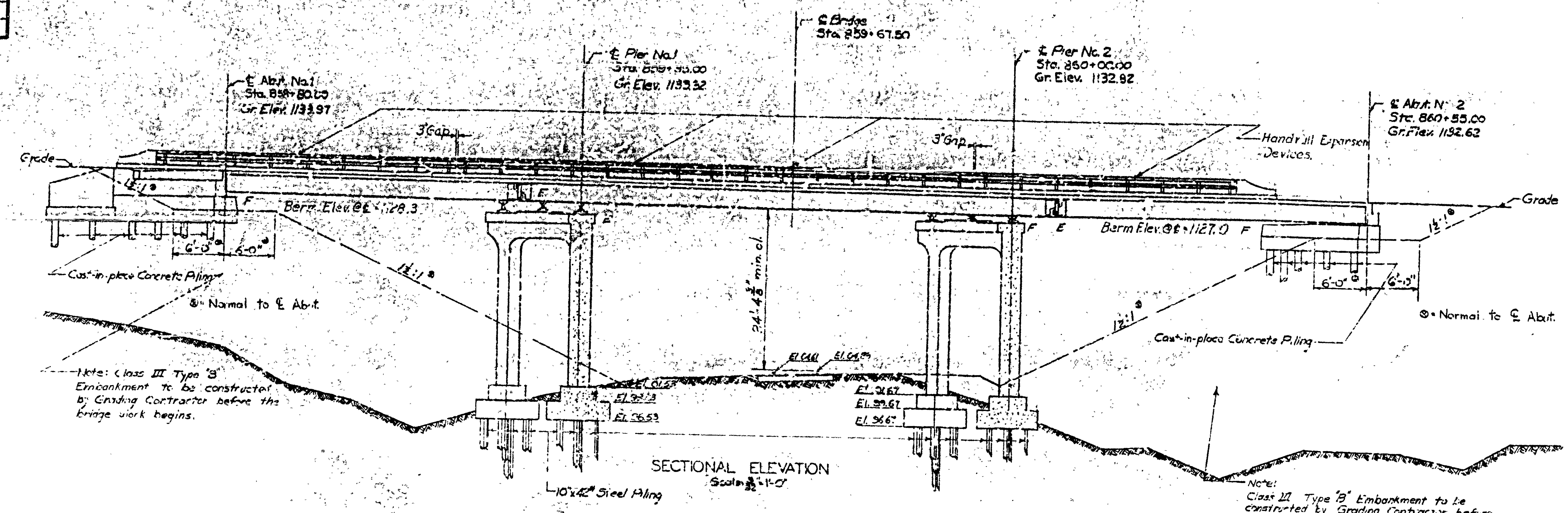
NEBRASKA DEPARTMENT OF ROADS
BRIDGE DIVISION

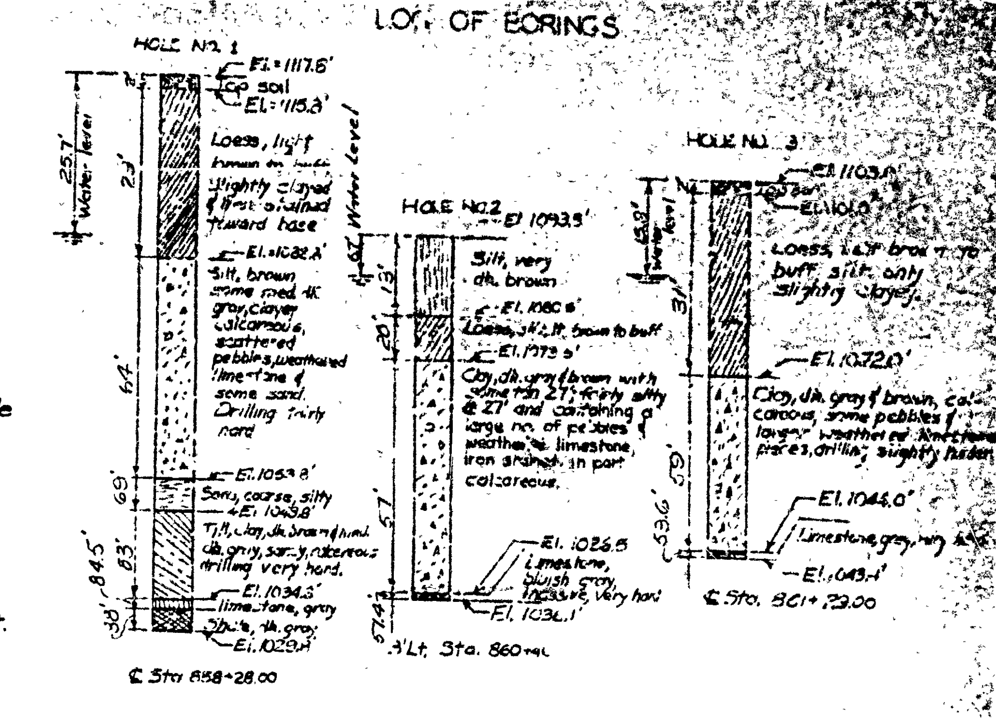
STATE ROAD PLATTSMOUTH NORTH **SKEW** [illegible]
HWY. NO. US-73 **DESIGN**
REF. POST 84.49 **ROADWAY** [illegible]
COUNTY CASS **STA.** [illegible]

BRIDGE DECK RESURFACING

DESIGNED BY OOB	BRIDGE ENGINEER	
DETAILED BY DWL	PROJECT NUMBER ~~73(84.49)~~	SPECIAL PLAN NO.
CHECKED BY GWS		
DATE DEC. 1982		

REVISIONS		
DESCRIPTION	BY	DATE





DESIGN PILE BEARING

ABUTMENTS & WINGS 24 Tons/Pile
PIERS 36 Tons/Pile

MIN. PENETRATION BELOW C.O. ELEV.

ABUT. NO. 1 64'
PIER NO. 1 60'
PIER NO. 2 60'
ABUT. NO. 2 66'

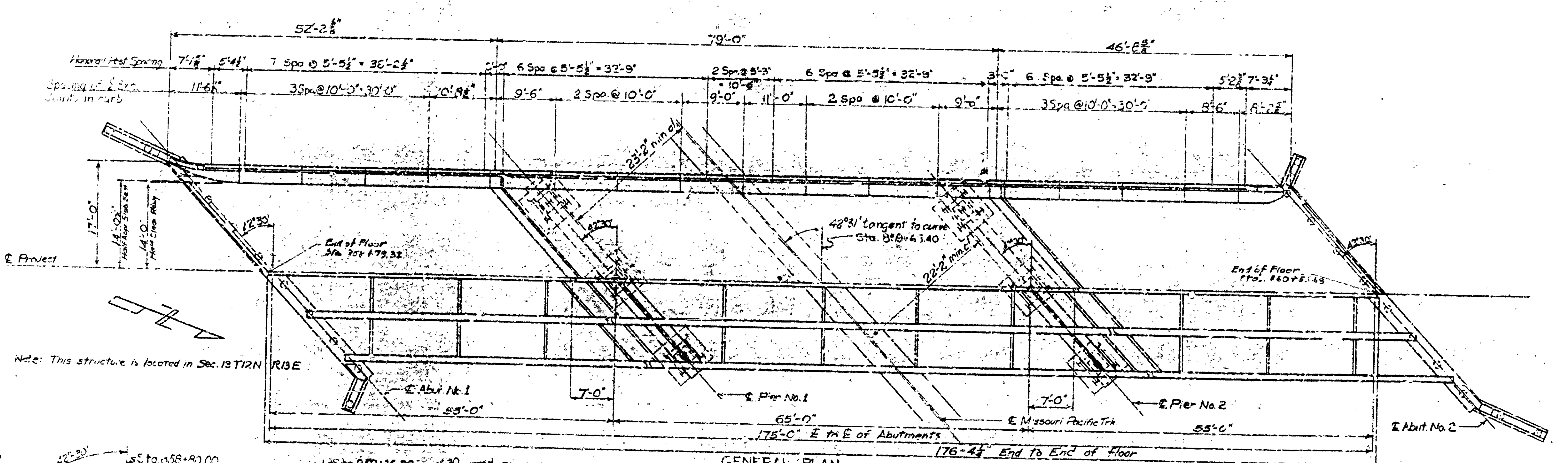
PILE ORDER LENGTHS

ABUT. NO. 1 65'
PIER NO. 1 64'
PIER NO. 2 64'
ABUT. NO. 2 68'

SECTIONAL ELEVATION
Scale: 1/8" = 1'-0"

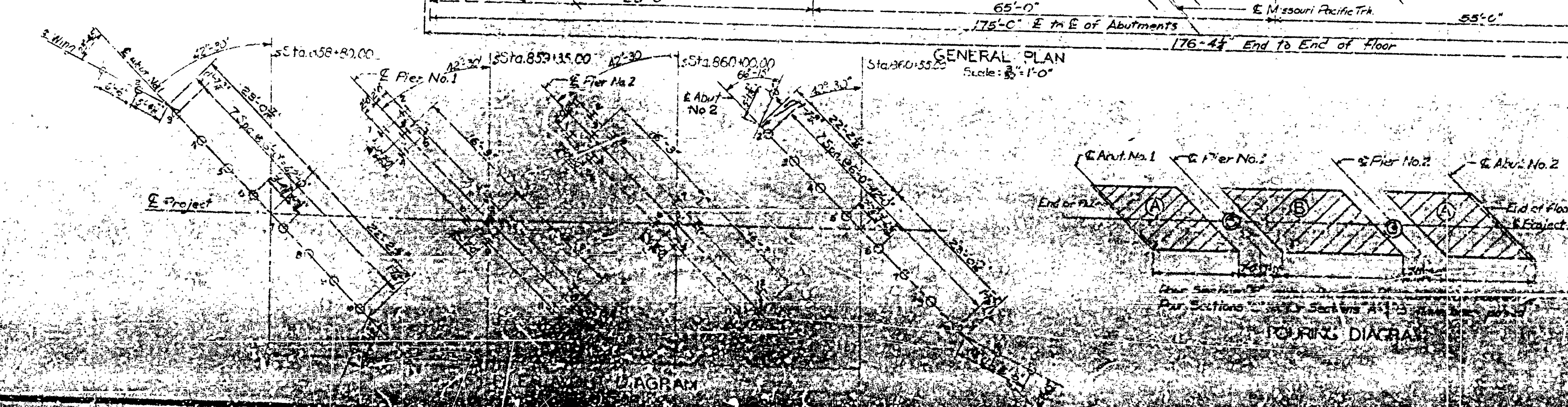
PILE CUT OFF ELEV. TABLE

	PILE	CUT OFF ELEVATION
ABUTMENT NO. 1	1	1126.80
	2	1126.80
	3	1126.80
	4	1126.75
	5	1126.73
	6	1126.67
	7	1126.61
	8	1126.55
	9	1126.50
	10	1126.47
	11	1126.47
ABUTMENT NO. 2	1	1125.31
	2	1125.31
	3	1125.31
	4	1125.30
	5	1125.29
	6	1125.29
	7	1125.28
	8	1125.27
	9	1125.27
	10	1125.27
	11	1125.27



Note: This structure is located in Sec. 13 T12N R13E

GENERAL PLAN
Scale: 1/8" = 1'-0"



POURING DIAGRAM

NOTES

All concrete shall be Class "47A-5", "47B" or "47 C-S."
All reinforcing steel shall be deformed bars and that used for bent bars shall satisfy the bend test requirements for Structural Grade Steel in accordance with the Specifications.
All lightweight concrete filler block shall conform to the strength requirements of Grade "A" block as specified in A.S.T.M. "Hollow Load Bearing Concrete Masonry Units," Designation C 90, and shall have a minimum face shell thickness of 3/4 inch.
Concrete in the floor slab shall be poured in accordance with the pouring diagram.
Concrete shims shall be varied to compensate for dead load deflection and the vertical curve.
All welding shall be done by the "Arc Process" in accordance with the Specifications of The American Welding Society.
The borings as logged on these plans represent the character of the subsoil at the location indicated. No guarantee is made that the subsoil conditions vary uniformly between or outside the given locations.
The contractor may substitute one of the alternate designs for the original design. Quantities are based on the original design. No addition or deduction will be allowed for the use of an alternate design.

QUANTITIES

EXCAVATION FOR BRIDGES		325 Cu. Yds.
Abutments	55 Cu. Yds.	
Piers	270 Cu. Yds.	
CLASS "47A-5", "47B" OR "47C-S" CONCRETE		301.1 Cu. Yds.
Floor and Curbs	150.6 Cu. Yds.	
Abutments	49.0 Cu. Yds.	
Piers	101.5 Cu. Yds.	
REINFORCING STEEL		44,825 Lbs.
Floor and Curbs	29,985 Lbs.	
Abutments	4,480 Lbs.	
Piers	10,360 Lbs.	
STEEL SUPERSTRUCTURE		1 EACH
Girders and Pls	132,850 Lbs.	
Separators and Bracing	17,435 Lbs.	
Fixed & Expansion Hanger Devices	6,745 Lbs.	
Roadway Expansion Devices	7,755 Lbs.	
Rockers, Rollers, Bearing Pls & Anchors	8,395 Lbs.	
	TOT'L 173,180 Lbs.	
CAST-IN-PLACE CONCRETE PILING		1474 Lin. Ft.
10" x 42 LB. STEEL PILING		1332 Lin. Ft.
STRUCTURAL STEEL FOR HANDRAIL		8625 Lbs.

QUANTITIES FOR HANDRAIL	
559.46 Lin. Ft. 4 x 3½ x ⅜ Rail L	Total Weight 8625
64 Post Assemblies	
16 Exp. Device Assemblies	
Capacity Plate Assemblies	

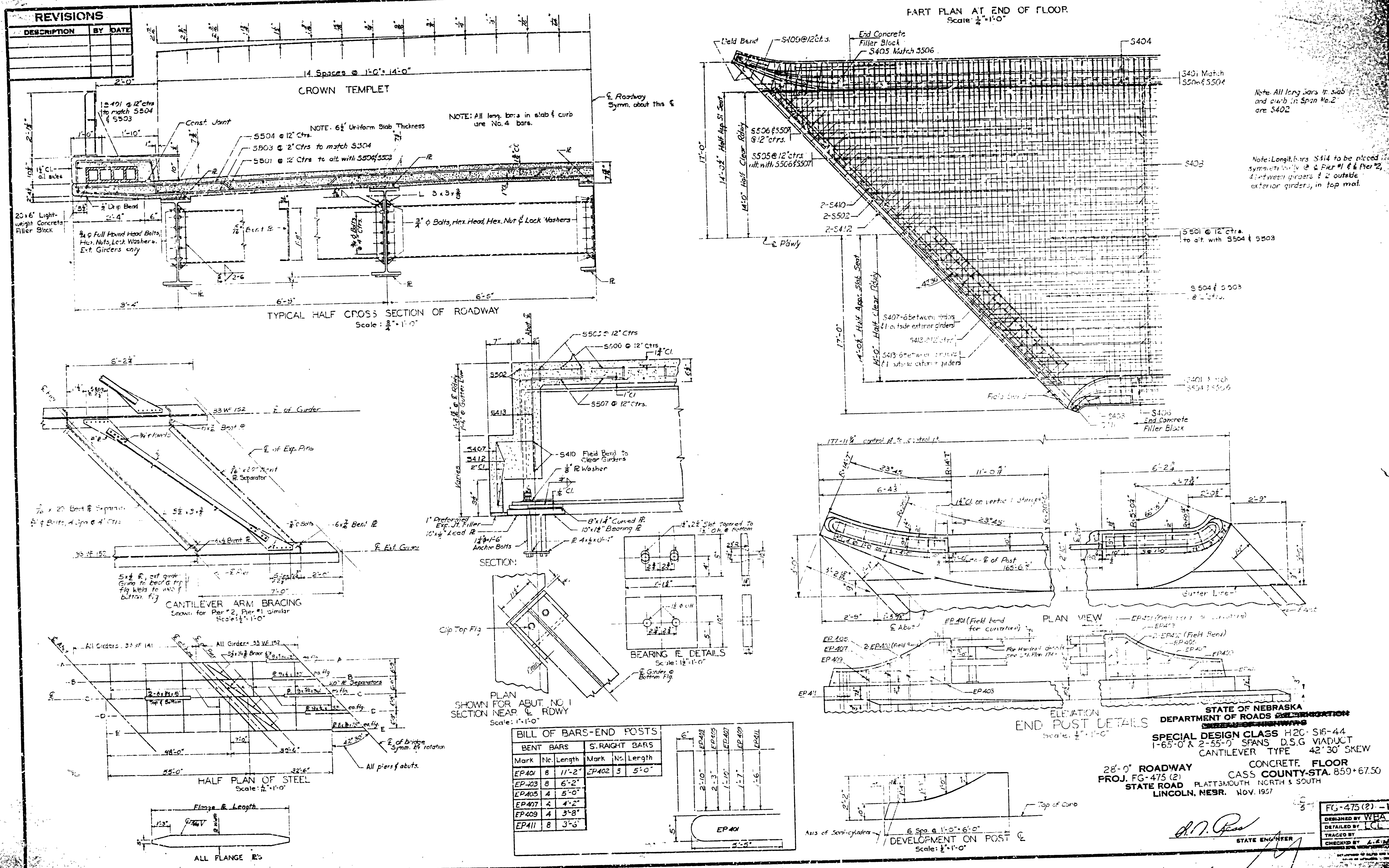
AS BUILT

MICRO DEC 8 1965

STATE OF NEBRASKA
DEPARTMENT OF ROADS ~~AND IRRIGATION~~
~~BUREAU OF HIGHWAYS~~
SPECIAL DESIGN CLASS H20-S16-44
1-65'-0" & 2-55'-0" SPANS D.S.G. VIADUCT
CANTILEVER TYPE 42° 30' SKEW
28 FT. ROADWAY CONCRETE FLOOR
PROJ. FG-475(2) CASS COUNTY-STA. 859 + 67.50
STATE ROAD PLATTSMOUTH NORTH & SOUTH
LINCOLN, NEBR. NOV. 1957

For details of Handrail, except as shown, see Std. Plan No. 174
For details of Capacity Plate, see Std. Plan No. 1747
For details of Expansion Hanger Devices, see Std. Plan No. 1688
For details of Rockers & Rollers, see Std. Plan No. 1597 B

FG-475(2)



BILL OF BARS-END POSTS					
BENT BARS			STRAIGHT BARS		
Mark	No.	Length	Mark	No.	Length
EP401	8	11'-2"	EP402	3	5'-0"
EP403	8	6'-2"			
EP405	4	5'-0"			
EP407	4	4'-2"			
EP409	4	3'-8"			
EP411	8	3'-6"			

STATE OF NEBRASKA
DEPARTMENT OF ROADS ~~& IRRIGATION~~
~~BUREAU OF HIGHWAYS~~

SPECIAL DESIGN CLASS H20-S16-44
1-65'-0" & 2-55'-0" SPANS D.S.G VIADUCT
CANTILEVER TYPE 42° 30' SKEW

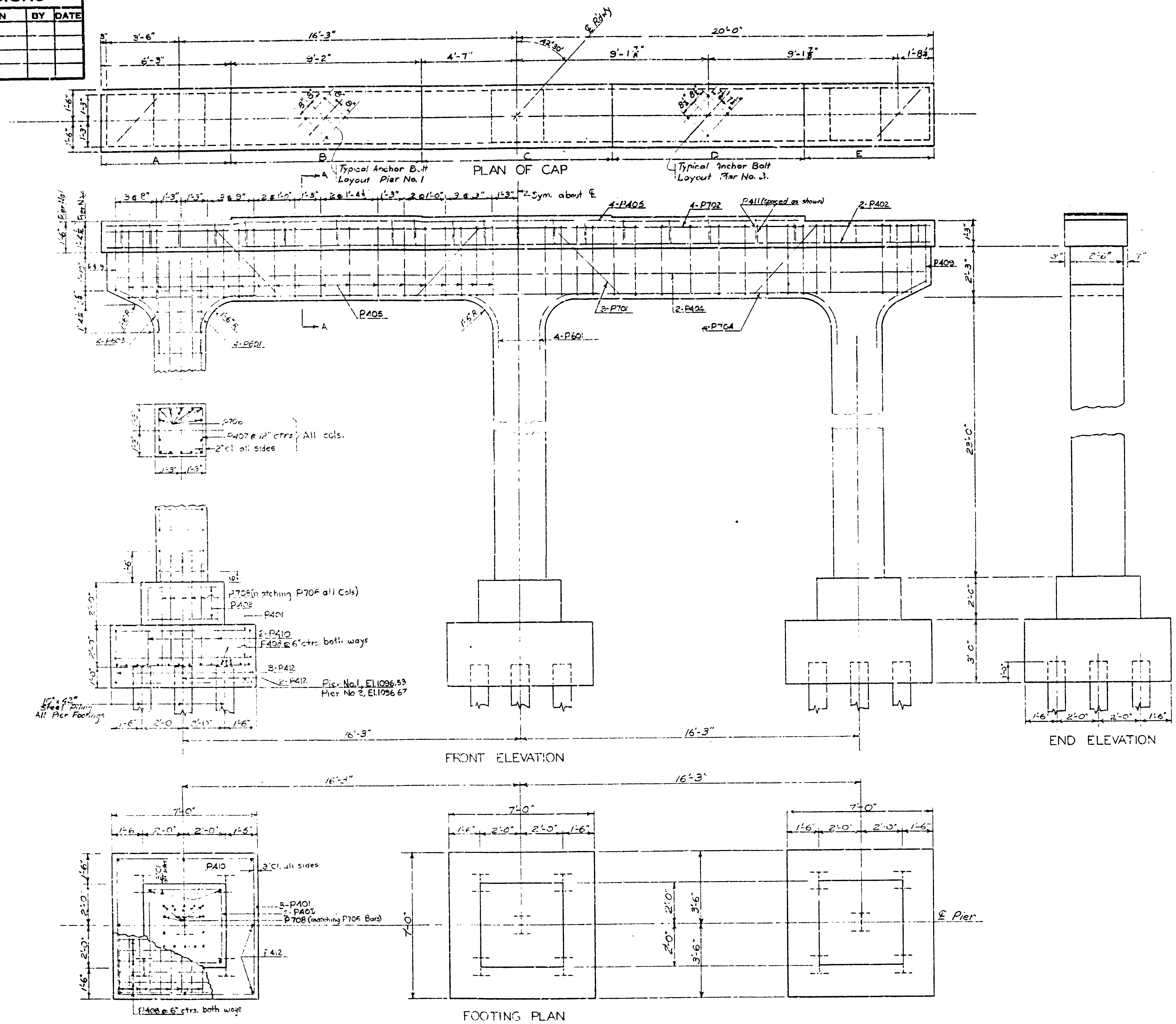
28'-0" ROADWAY
CONCRETE FLOOR
PROJ. FG-475 (2)
CASS COUNTY-STA. 859+67.50
STATE ROAD PLATTSMOUTH NORTH & SOUTH
LINCOLN, NEBR. NOV. 1957

STATE ENGINEER

FG-475 (2) -1

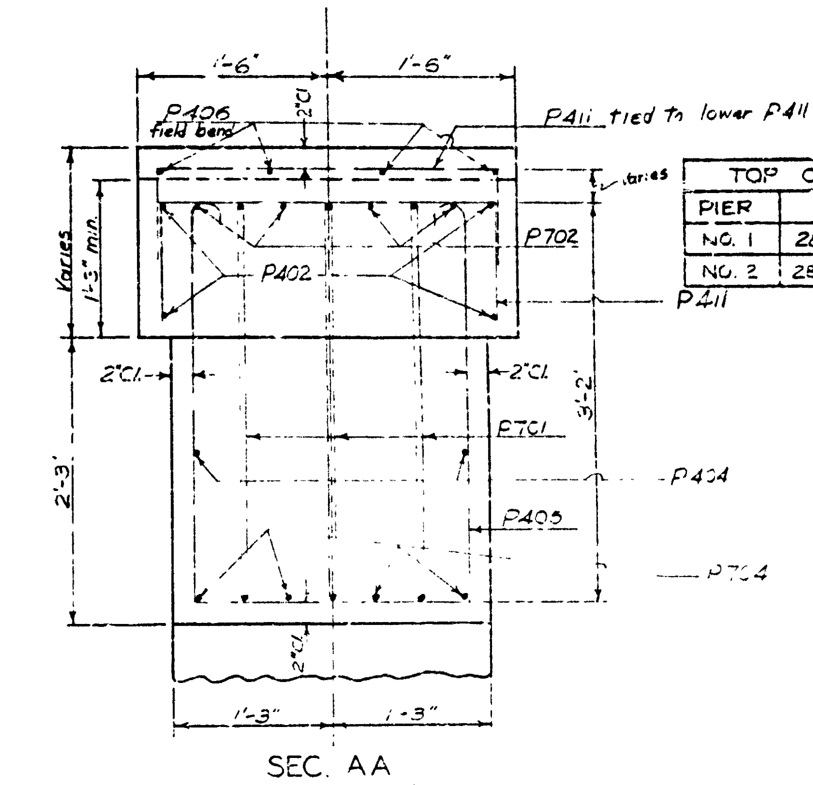
DESIGNED BY WBA
DETAILED BY LCL
TRACED BY
CHECKED BY

REVISIONS		
DESCRIPTION	BY	DATE



PIER DETAILS

SCALE: $\frac{3}{8}$" = 1'-0"



SEC. AA
Scale: 1" = 1'-0"

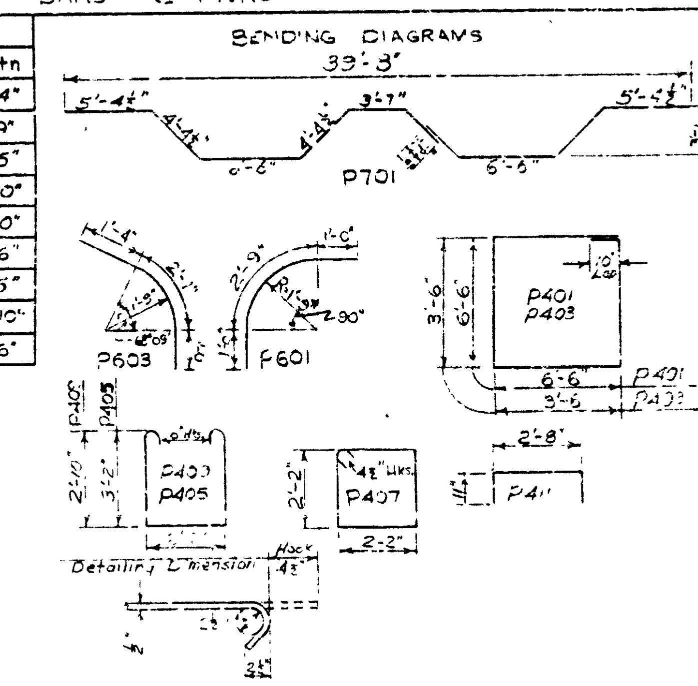
TOP OF PIER ELEVATIONS					
PIER	A	B	C	D	E
NO. 1	28.28	28.38	28.32	28.26	28.03
NO. 2	28.31	28.44	28.40	28.37	28.17

ROLLERS & ROCKERS		STD. PLAN 1627 B	
PIER	TYPE OF DEVICE	DIMENSION "A"	DIMENSION "B"
NO. 1	ROLLER TYPE 1	1'-0"	1'-8"
NO. 2	ROCKER TYPE 1	1'-0"	1'-8"

BILL of BARS 2 PIERS

STRAIGHT BARS			BENT BARS		
Mark	No	Length	Mark	No.	Length
P702	8	39'-8"	P701	6	46'-4"
P704	8	38'-0"	P601	32	4'-9"
P706	84	25'-0"	P603	16	4'-5"
P708	84	5'-6"	P401	18	28'-10"
P402	8	39'-8"	P403	12	14'-10"
P404	4	39'-2"	P405	72	9'-6"
P406	8	39'-5"	P407	144	9'-5"
P408	168	6'-6"	P409	4	8'-10"
P410	24	3'-9"	P411	64	4'-6"
P412	48	2'-6"			

BENDING DIAGRAMS



HOOK DETAILS

STATE OF NEBRASKA
DEPARTMENT OF ROADS ~~AND IRRIGATION~~
~~BUREAU OF HIGHWAYS~~

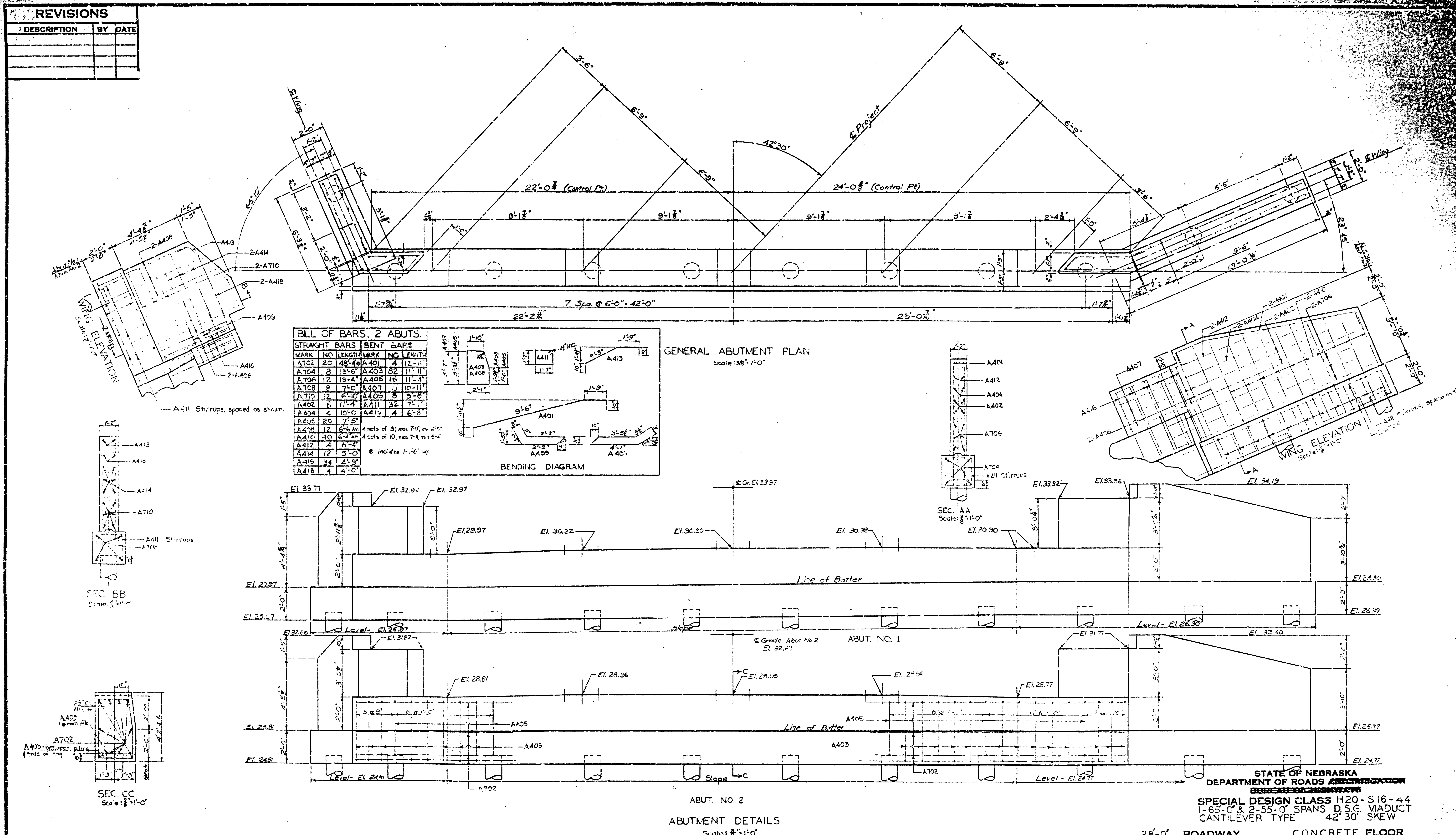
SPECIAL DESIGN CLASS H20-S16-44
1-65-0 & 2-55-0 SPANS D.S.G. VIADUCT
CANTILEVER TYPE

28'-0" **ROADWAY** CONCRETE **FLOOR**
PROJ. FG-475(2) CASS **COUNTY-STA.** 859+67.50
STATE ROAD PLATTSMOUTH NORTH & SOUTH
LINCOLN, NEBR. Nov. 1957

3/5

STATE ENGINEER

FG-475 (2) -1	
DESIGNED BY	WBA
DETAILED BY	I.C.L.
TRACED BY	
CHECKED BY	L.C.N.



BILL OF BARS, 2 ABUTS.

STRAIGHT BARS			BENT BARS		
MARK	NO.	LENGTH	MARK	NO.	LENGTH
A702	20	48'-4" ⊗	A401	4	12'-11"
A704	8	13'-6"	A403	82	11'-11"
A706	12	13'-4"	A405	15	11'-4"
A708	8	7'-0"	A407	[illegible]	10'-11"
A710	12	6'-10"	A409	8	9'-8"
A402	8	11'-4"	A411	32	7'-1"
A404	4	10'-0"	A413	4	6'-8"
A406	20	7'-5"			
A408	12	6'-6" Av.	4 sets of 3; max 7'-0", min 6'-0"		
A410	40	6'-4" Av.	4 sets of 10; max 7'-4", min 5'-4"		
A412	4	6'-4"			
A414	12	5'-0"			
A415	34	4'-9"			
A418	4	4'-0"			

⊗ includes 1'-6" lap

STATE OF NEBRASKA
DEPARTMENT OF ROADS

SPECIAL DESIGN CLASS H20-S16-44
1-65'-0" & 2-55'-0" SPANS D.S.G. VIADUCT
CANTILEVER TYPE 42° 30' SKEW

28'-0" ROADWAY CONCRETE FLOOR
PROJ. FG-475 (2) CASS COUNTY-STA. 859+67.50
STATE ROAD PLATTSMOUTH NORTH & SOUTH
LINCOLN, NEBR NOV. 1957

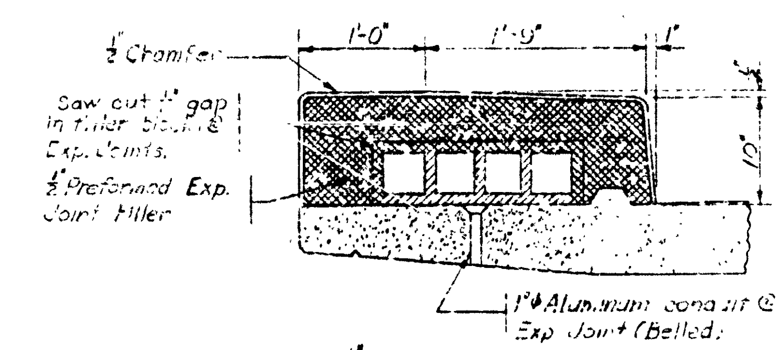
4/5

STATE ENGINEER

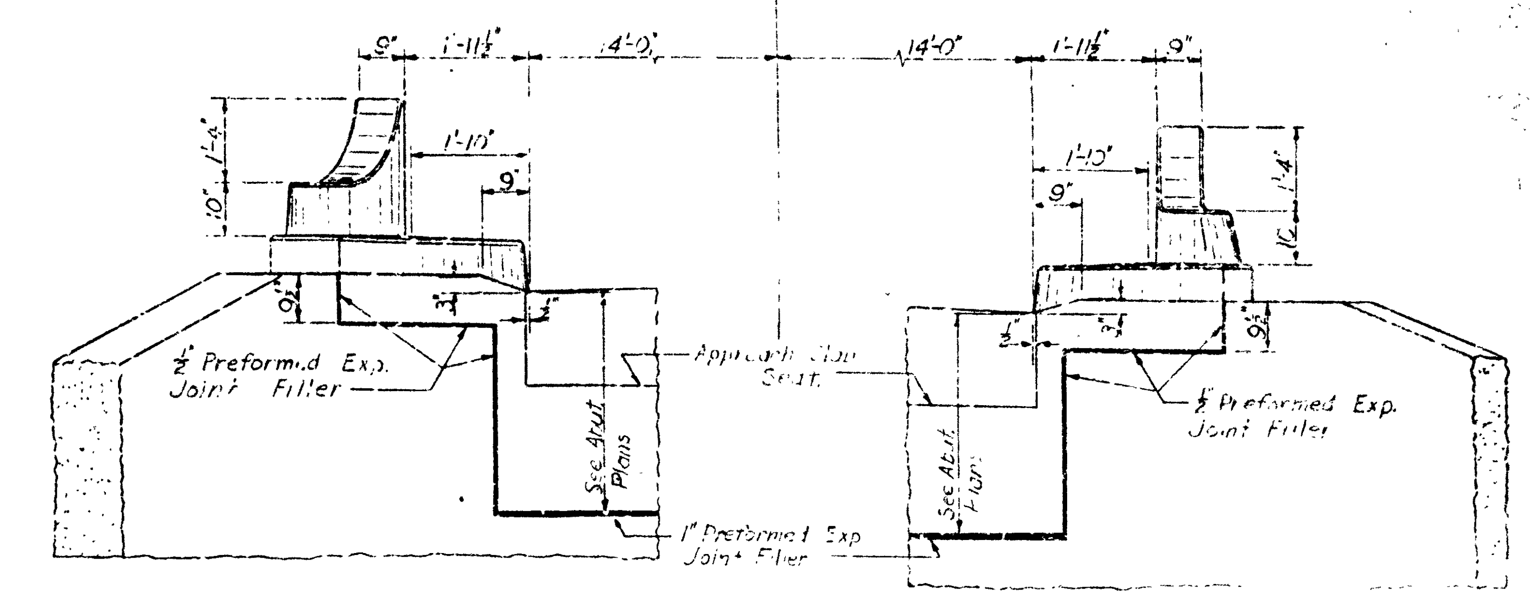
FG-475(2)-1

DESIGNED BY WBA
DETAILED BY
TRACED BY
CHECKED BY

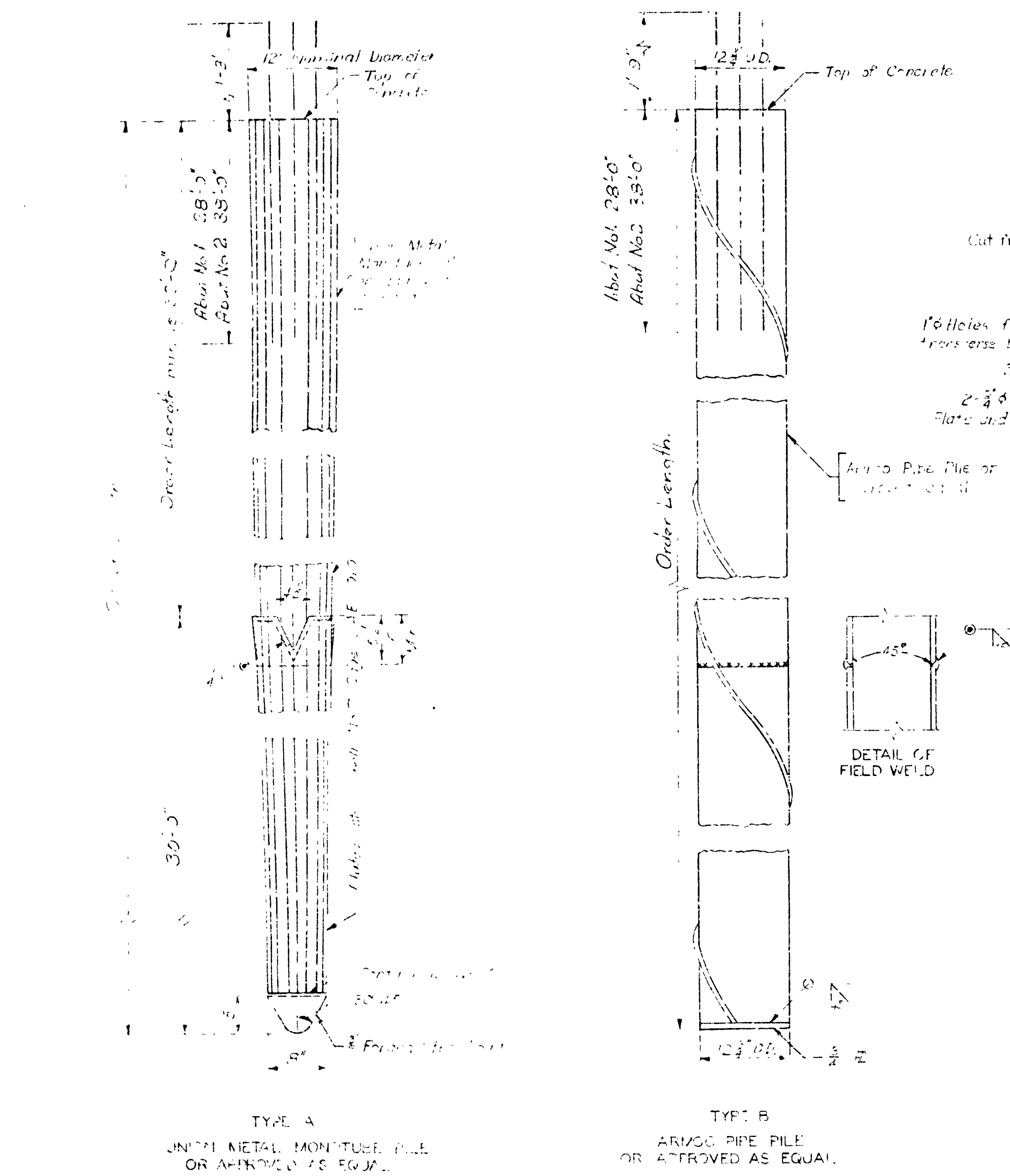
REVISIONS		
DESCRIPTION	BY	DATE



½" EXP JOINT IN CURB
Scale: 1"=1'-0"



PART END ELEVATION OF FLOOR
Scale: ½"=1'-0"

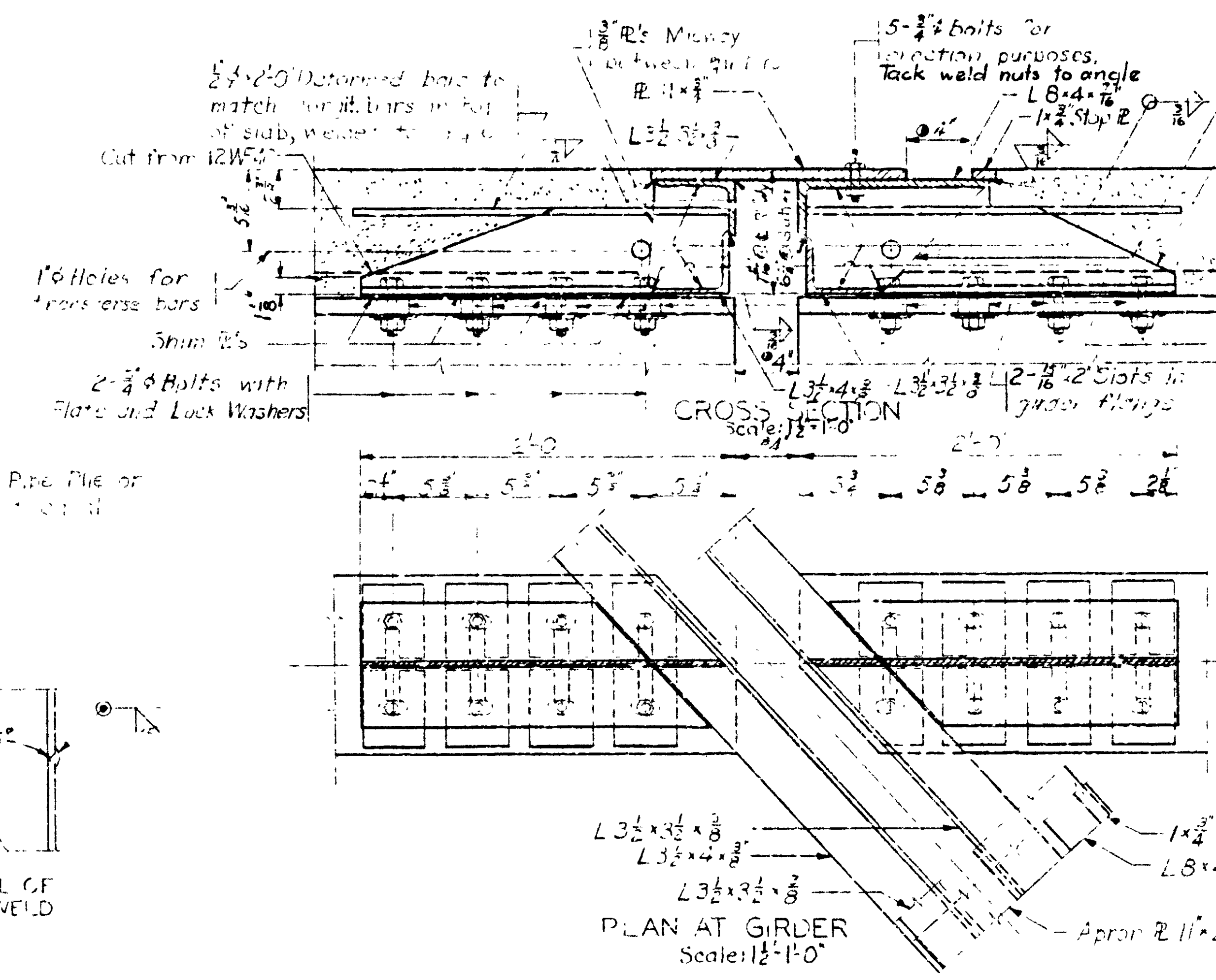


TYPE A
UNION METAL MONOTUBE PILE OR APPROVED AS EQUAL

TYPE B
ARMCO PIPE PILE OR APPROVED AS EQUAL

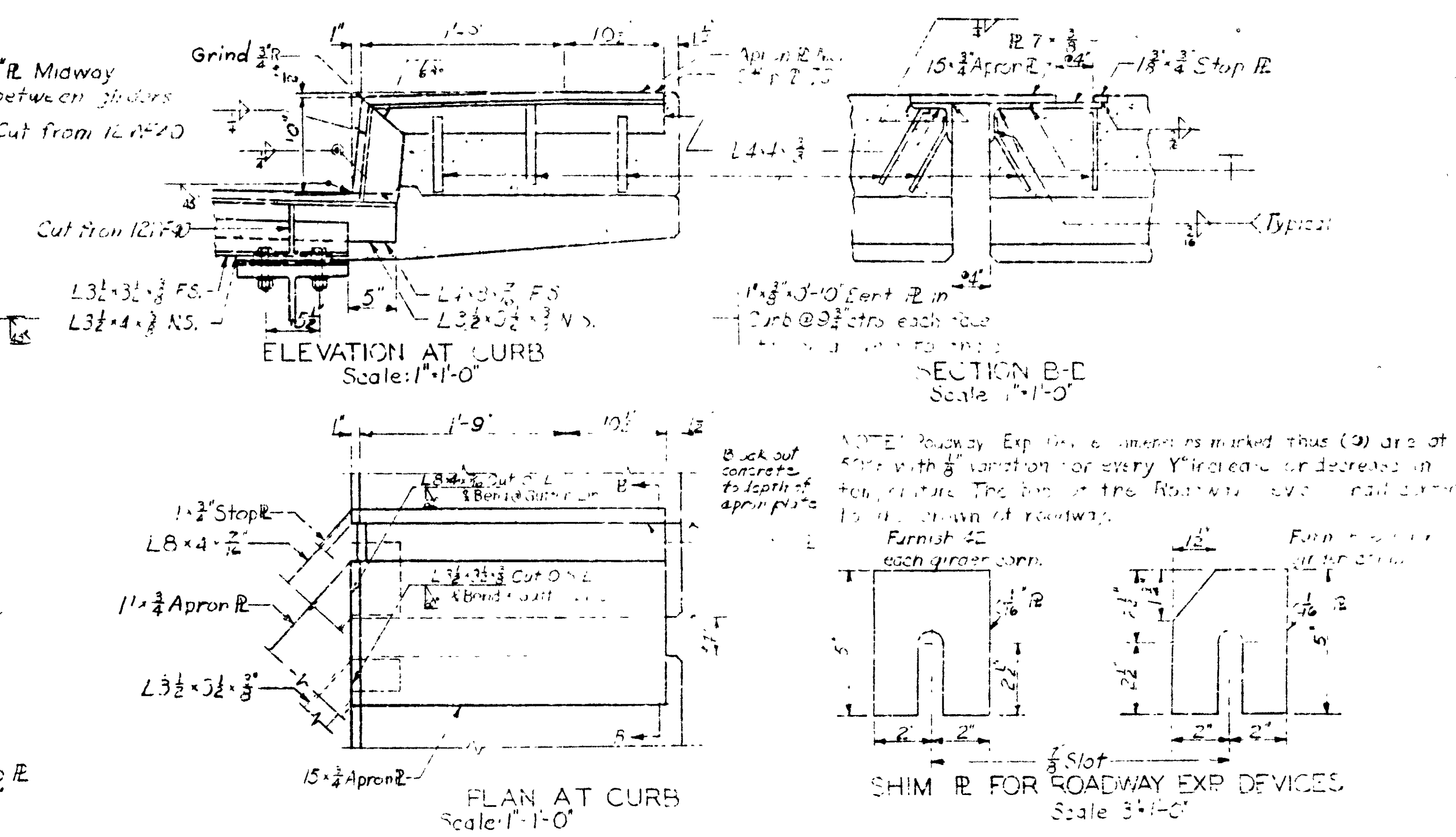
CAST IN PLACE CONCRETE PILING
Scale: 1"=1'-0"

NOTE:
Pipe for steel pipe piles shall conform to the Requirements of A.S.T.M. Serial Designation A 252 - 55 for "Welded and Seamless Steel Pipe Piles Grade 2". Nominal shell thickness shall be 0.18 inches.



CROSS SECTION

PLAN AT GIRDER
Scale: 1½"=1'-0"



ELEVATION AT CURB
Scale: 1"=1'-0"

SECTION B-B
Scale 1"=1'-0"

PLAN AT CURB
Scale: 1"=1'-0"

SHIM ℄ FOR ROADWAY EXP DEVICES
Scale 3"=1'-0"

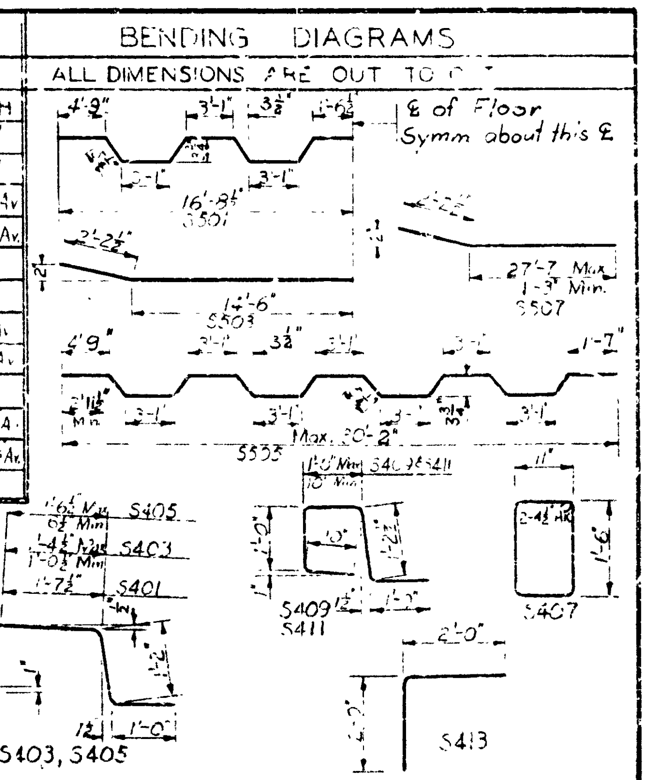
ROADWAY EXPANSION DEVICE

BILL OF BARS FLOOR & CURB

STRAIGHT			BENT		
MARK	NO.	LENGTH	MARK	NO	LENGTH
S502	12	*46'-0"	S501	96	34'-7"
S504	99	33'-5"	S503	90	33'-5"
S506	150	16'-7½" Av	S505	156	17'-2¼" Av
			S507	150	16'-7½" Av
S402	71	**79'-0"			
[illegible]	12	53'-0"	S401	324	6'-5"
[illegible]	12	**49'-6"	S403	4	[illegible]
[illegible]	118	**48'-1"	S405	12	5'-10" Av
S410	4	39'-10"	S407	52	5'-7"
S412	4	38'-10"	S409	8	4'-11½" Av
S414	40	7'-0"	S411	4	4'-11½" Av
* Incl. 1-1'-1" Lap **Incl 1-10" Lap			S413	130	4'-0"

BAR SETS			
MARK	MAX.	MIN	SETS
S506	29'-9½"	3'-5½"	6 of 25
S505	3?'-5"	2'-11½"	6 of 26
S507	29'-3½"	3'-5½"	6 of 25
S403	6'-3"	5'-11"	2 of 2
S405	6'-5"	5'-5"	2 of 6
S409	5'-0½"	4'-10½"	2 of 4
S411	5'-0½"	4'-10½"	2 of 2

BENDING DIAGRAMS
ALL DIMENSIONS ARE OUT TO OUT



S401, S403, S405

STATE OF NEBRASKA
DEPARTMENT OF ROADS ~~[illegible]~~
~~[illegible]~~
SPECIAL DESIGN CLASS H20-S16-44
1-55-0 & 2-55-0 SPAN D.S.G. VIADUCT
CANTILEVER TYPE
28'-0" ROADWAY CONCRETE FLOOR
PROJ. FG-475(2) CASS COUNTY-STA. 859+67.50
STATE ROAD PLATTSMOUTH NORTH & SOUTH
LINCOLN, NEBR. Nov. 1957

5/5

STATE ENGINEER

FG-475(2)-1
DESIGNED BY W.B.A.
DETAILED BY D.J.S.
TRACED BY
CHECKED BY L.C.A.

s026 11926design model general plan view

(R1) 01 April 2010

PROJECT NUMBER	SHEET NO.
26-2(1023)	9

C.N. 61440

STRUCTURE NUMBER S026 11926

- LEWELLEN SOUTHEAST -

- NOTES -

The existing structure was built under project 249-C(3)-1, dated 1939, and was widened under project 26(119.26) & 26 (119.54), dated 1973. Plans are available from the Bridge Division upon request.

The contractor may substitute any one of the alternate designs shown on the plans for the original design. All quantities are based on the original design and no additions or deductions will be allowed for the use of an alternate design.

All sructural steel for Superstructure shall conform to the requirements of ASTM A709/A709M, Grade 36.

(R1) ~~Field tack welding of form hangers or miscellaneous hardware to any part of the steel girder, shall be prohibited.~~ (R1)

Concrete for slab, approach slabs and rails shall be class "47BD", with a minimum 28-day strength of 4000 Psi.

All other cast-in-place concrete shall be Class "47B" concrete with a 28-day strength of 3,000 psi.

All reinforcing steel shall be epoxy coated and conform to the requirements of ASTM A615/A615M, Grade 60 steel.

The minimum clearance, measured from the face of the concrete to the surface of any reinforcing bar, shall be 3", except where otherwise noted.

All existing concrete coming in contact with the new work shall be thoroughly cleaned and roughened before placing new concrete.

All reinforcing steel encountered in breaking back existing concrete shall be thoroughly cleaned, straightened and extended into the new work a minimum of 24 in.

All dimensions shown are in horizontal plane only. No allowances have been made for vertical curve or roadway cross slope.

The girders for this bridge are not designed to resist any torsional or lateral forces due to temporary construction loads. The Contractor must provide any temporary bracing necessary to support the girder web and flanges against all torsional or lateral forces resulting from construction loads.

Before ordering any materials, the contractor shall make a detailed field inspection of the project site, verifying all dimensions and reporting to the Engineer any discrepancies between his measurements and those shown on the plans.

All materials removed shall become the property of the contractor and shall be removed from the project site.

All preparations, materials, equipment, tools, labor and incidentals necessary to complete the work that are not paid for directly, shall be considered as subsidary to items for which payment is made.

All concrete surfaces to be in contact with the new work shall be thoroughly cleaned before placing any new concrete.

Contractor will determine the locations of all Class II Repair, with the approval of the Engineer.

The contractor shall place a 1" deep saw cut at the limits of pavement removal to facilitate a clean, smooth line when breaking back existing concrete.

When breaking existing concrete, the use of a maximum 15 lb. hammer applied at a 45° angle is required.

- QUANTITIES -
- GROUP 6 -

Item	Sub-quantity	Quantity
ABUTMENT NO. 1 EXCAVATION		LUMP SUM
ABUTMENT NO. 2 EXCAVATION		LUMP SUM
PREPARATION OF BRIDGE AT STA. 694+45.86		1 EACH
ABUTMENT REPAIR		~~30 SQ. FT.~~
CLASS 47BD-4000 CONCRETE FOR BRIDGES		128.5 CU. YDS.
SLAB	43.0 CU. YDS.	
HAUNCH	.70 CU. YDS.	
CONCRETE RAIL	84.8 CU. YDS.	
CLASS 47B-3000 CONCRETE FOR BRIDGE		52.2 CU. YDS.
ABUTMENTS	52.2 CU. YDS.	
EPOXY COATED REINFORCING STEEL		36,510 LBS.
SLAB	6,350 LBS.	
CONCRETE RAILS	16,795 LBS.	
ABUTMENTS	13,365 LBS.	
CONCRETE FOR PAVEMENT APPROACHES CLASS 47BD-4000		~~193.1 CU. YDS.~~ 194.0 CU. YDS.
SLAB	~~181.9 CU. YDS.~~ 182.8 CU. YDS.	
CONCRETE RAILS	11.2 CU. YDS.	
EPOXY COATED REINFORCING STEEL FOR PAVEMENT APPROACHES		34,530 LBS.
SLAB	30,235 LBS.	
CONCRETE RAILS	4,295 LBS.	
GRANULAR BACKFILL		190.0 CU. YDS.
STRUCTURAL STEEL FOR SUPERSTRUCTURE		2,360 LBS.
PRECOMPRESSED POLYURETHANE FOAM JOINT, TYPE B		341.3 LIN. FT.
CLASS 4, COLD MILLLING		1,999 SQ. YDS.
CLASS I REPAIR		1915 SQ. YDS.
CLASS II REPAIR		~~383 SQ. YDS.~~ 28.986 SQ. YDS.
CLASS III REPAIR		~~5 SQ. YDS.~~ 0.600 SQ. YDS.
PLACING, FINISHING, AND CURING CONCRETE OVERLAY - SF		2,028 SQ. YDS.
CONCRETE FOR OVERLAY - SF		~~143.3 CU. YDS.~~ 185.432 CU. YDS.
PIN REPLACEMENT		1 EACH

- INDEX -

CLASS II AND III REPAIR LOCATION AND SIZE LOCATED IN FALCON PROJECT\61440\DISTRICT\AS BUILT\BRIDGE\ A26-2(1023) lewellen se patch.dgn

ELEVATION NORTHWEST ALUMINUM CAP IN BRIDGE RAIL 3305.044
ELEVATION SOUTHEAST ALUMINUM CAP IN BRIDGE RAIL 3305.049

AS BUILT
JUL 14 2011

The location of all aerial and underground utility facilities may not be indicated in these plans. Underground utilities, whether indicated or not will be located and flagged at the request of the contractor.

No excavation will be permitted in the area of underground utility facilities until all such facilities have been located and idetified to the satisfaction of all parties. The excavtion must be accomplished with extreme care in order to avoid any possibilty of damage to the utility facility.

PROFESSIONAL CIVIL ENGINEER MARK J. TRAYNOWICZ E-8119 STATE OF NEBRASKA

BRIDGE ENGINEER

450'-0" MULTIPLE SPAN DECK STEEL GIRDER BRIDGE (REHAB)
NOTES, QUANTITIES, & INDEX

COUNTY GARDEN LOCATION LEWELLEN SOUTHEAST
HWY. NO. US 26 SKEW 0°
REF. POST. 119.26 ROADWAY 40'-0"
STA. 694+45.86 DESIGN LIVE LOAD
DESIGNED BY TJH DETAILED BY TJH CHECKED BY SDM DATE JUNE 2009

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

NDOR Nebraska Department of Roads

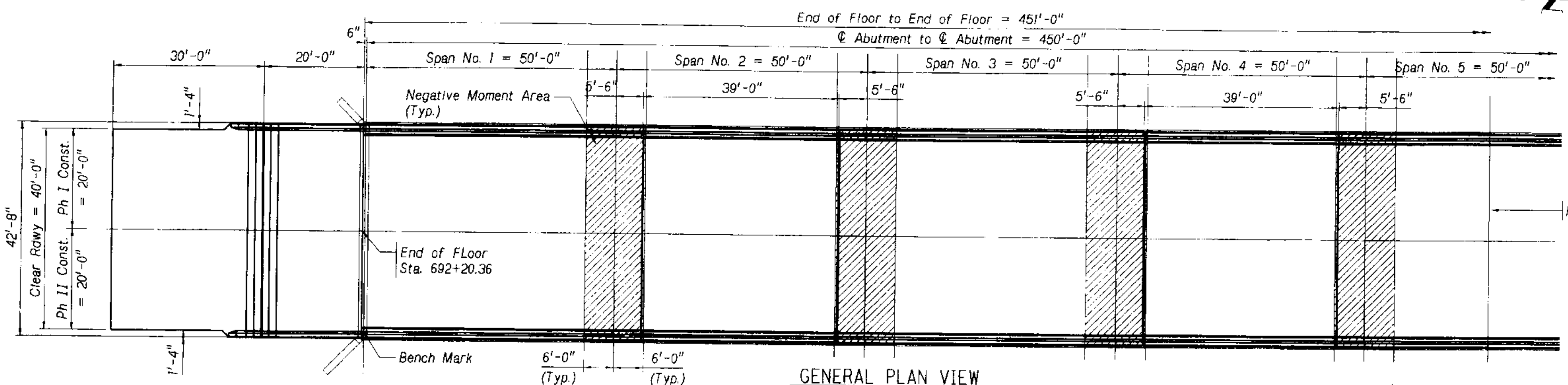
SPECIAL PLAN NO. 1 — 1/15

PROJECT NUMBER	SHEET NO.
26-2(1023)	10

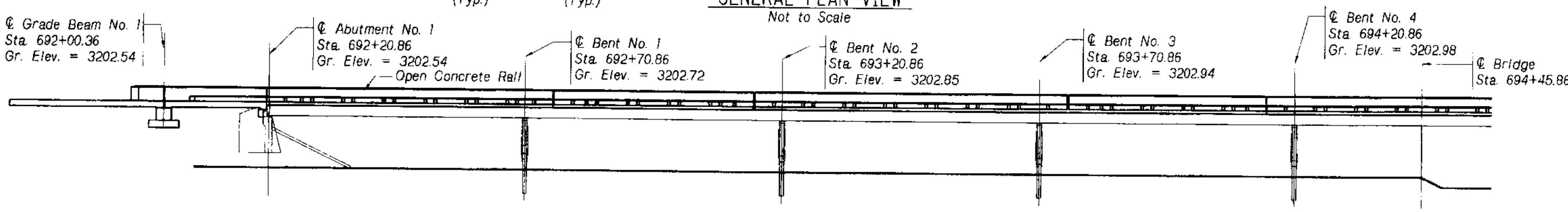
C.N. 61440

STRUCTURE NUMBER S026 11926

s026 11926design model general plan view



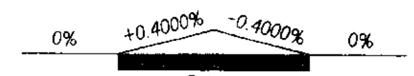
GENERAL PLAN VIEW
Not to Scale



GENERAL ELEVATION VIEW
Not to Scale

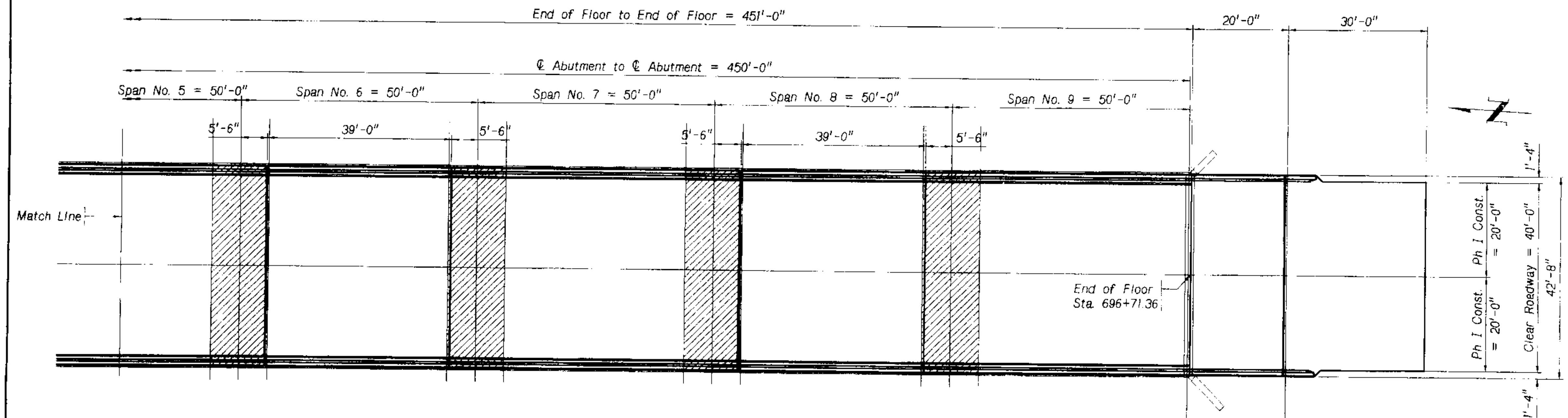
This structure is located on US 26 in Sec. 34 T15N R42W over the North Platte River in Garden county

Grades shown are at ℄ of Roadway Project manager should contact the Bridge Division and verify elevations before overlay.



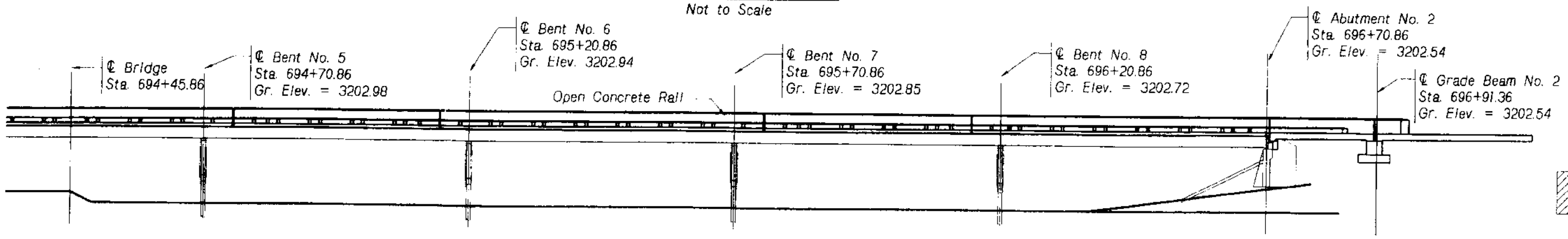
BRIDGE HYDRAULIC INFORMATION

STREAM: NORTH PLATTE RIVER
D.A. = 28600 SQ. MI.
Q100 = 15000 CFS (DESIGN FLOOD)
H.W. ELEV. = 3295.23 (D. S. SIDE)
W.W.A. BELOW H. W. = 3000 SQ. FT.
Q (OHW) = 1500 CFS
ORDINARY HIGH WATER ELEV. = 3292.70 FT.
Q100 GENERAL SCOUR = 4 FT.
Q100 LOCAL SCOUR = 1 FT.
Q500 SCOUR ELEV. = 3284 FT.



TRAFFIC DATA		
YEAR	2009	2029
ADT	1445	1805
DHV	220	275
HEAVY TRUCKS	20 %	20 %

GENERAL PLAN VIEW
Not to Scale



GENERAL ELEVATION VIEW
Not to Scale

The hatched area is the negative moment area where tack welding is prohibited over the Pier which is equal to 12'-0". Tack welding is permitted on the top flange in positive areas only.

(1) Welding to rebar will be prohibited. Anchoring to or bolting through existing slab will require approval from the bridge Division.

PROFESSIONAL CIVIL ENGINEER MARK J. TRAYNOWICZ E-8119 STATE OF NEBRASKA

BRIDGE ENGINEER

450'-0" MULTIPLE SPAN DECK STEEL GIRDER BRIDGE (REHAB)
GENERAL PLAN AND ELEVATION

LOCATION LEWELLEN SOUTHEAST
SKEW 0°
ROADWAY 40'-0"
DESIGN LIVE LOAD

COUNTY GARDEN
HWY. NO. US 26
REF. POST. 119.26
STA. 694+45.86

DESIGNED BY TJH
DETAILED BY TJH
CHECKED BY SDM
DATE JUNE 2009

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

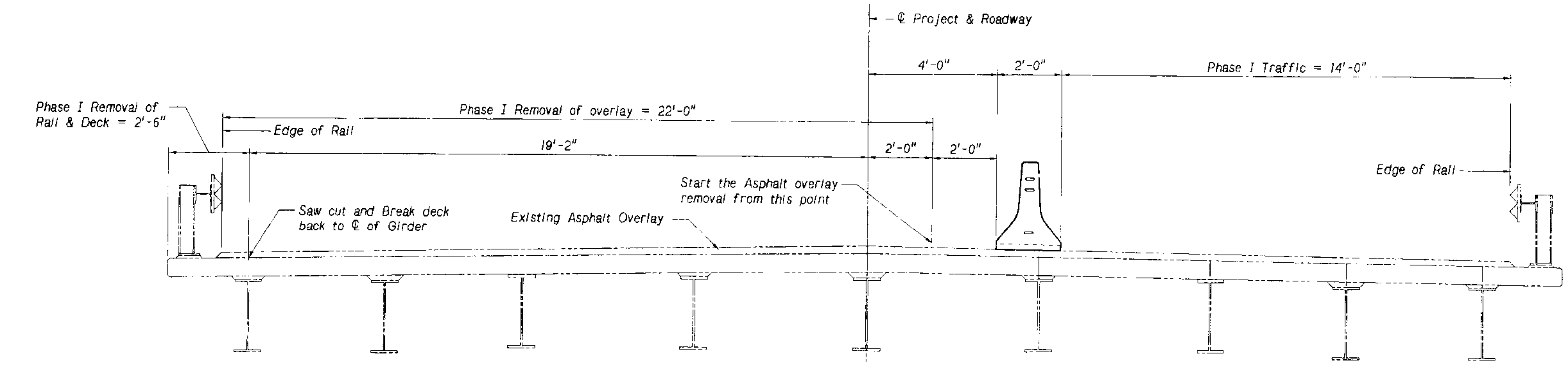
NDOR Nebraska Department of Roads

PROFESSIONAL STRUCTURAL ENGINEER DANIEL J. SHARP E-5375 STATE OF NEBRASKA
12-1-09

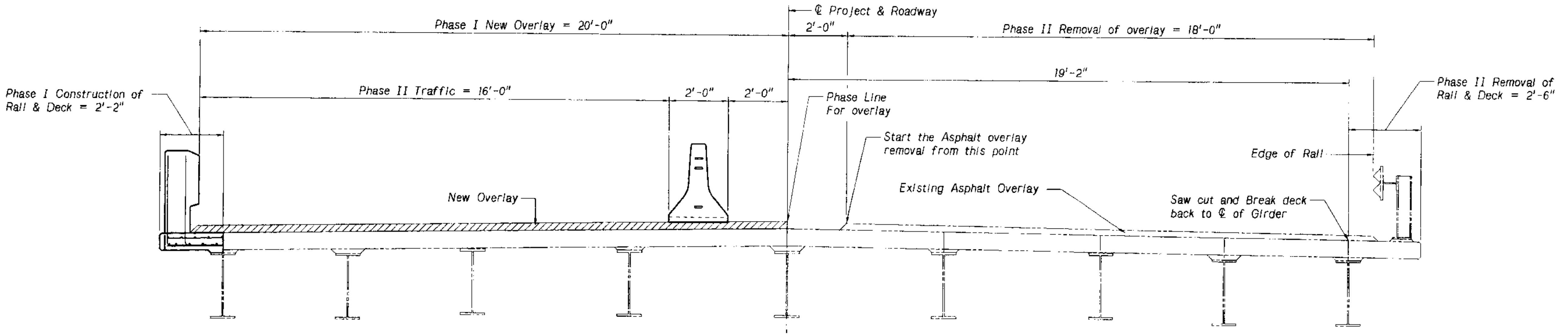
SPECIAL PLAN NO.	
1	2/15

C.N. 61440

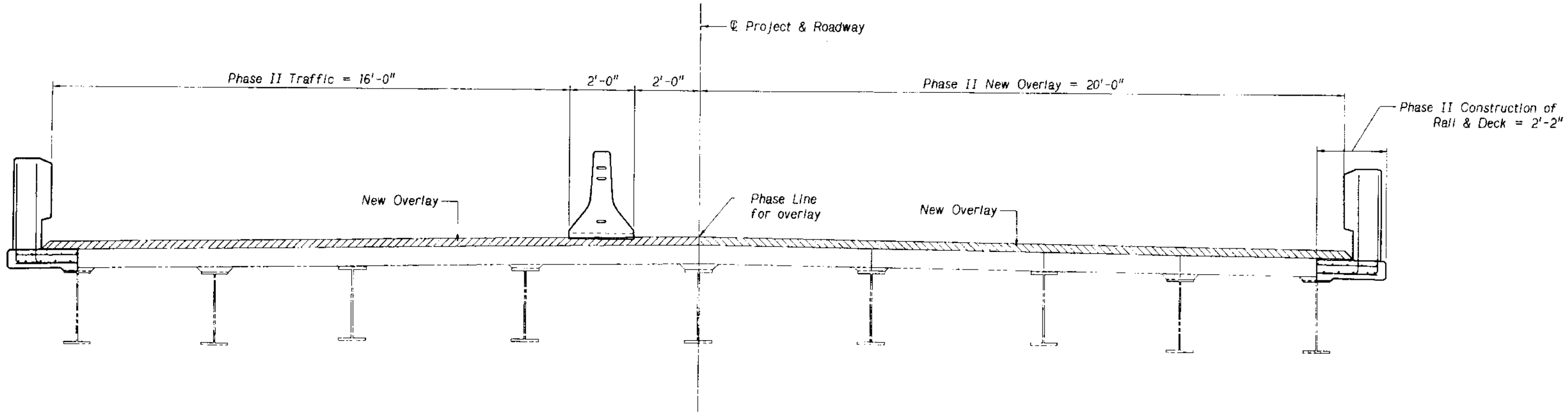
STRUCTURE NUMBER S026 11926



PHASE I TRAFFIC & REMOVAL



PHASE I CONSTRUCTION & PHASE II TRAFFIC & REMOVAL



PHASE II CONSTRUCTION & TRAFFIC

s026 11926design model phasing views

PROFESSIONAL CIVIL ENGINEER MARK J. TRAYNOWICZ E-8119 STATE OF NEBRASKA

BRIDGE ENGINEER

450'-0" MULTIPLE SPAN DECK STEEL GIRDER BRIDGE (REHAB)

CONSTRUCTION PHASING PLAN

COUNTY GARDEN | LOCATION LEWELLEN SOUTHEAST
HWY. NO. US 26 | SKEW 0°
REF. POST. 119.26 | ROADWAY 40'-0"
STA. 694+45.86 | DESIGN LIVE LOAD

DESIGNED BY TJH | DETAILED BY TJH | CHECKED BY SDM | DATE JUNE 2009

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

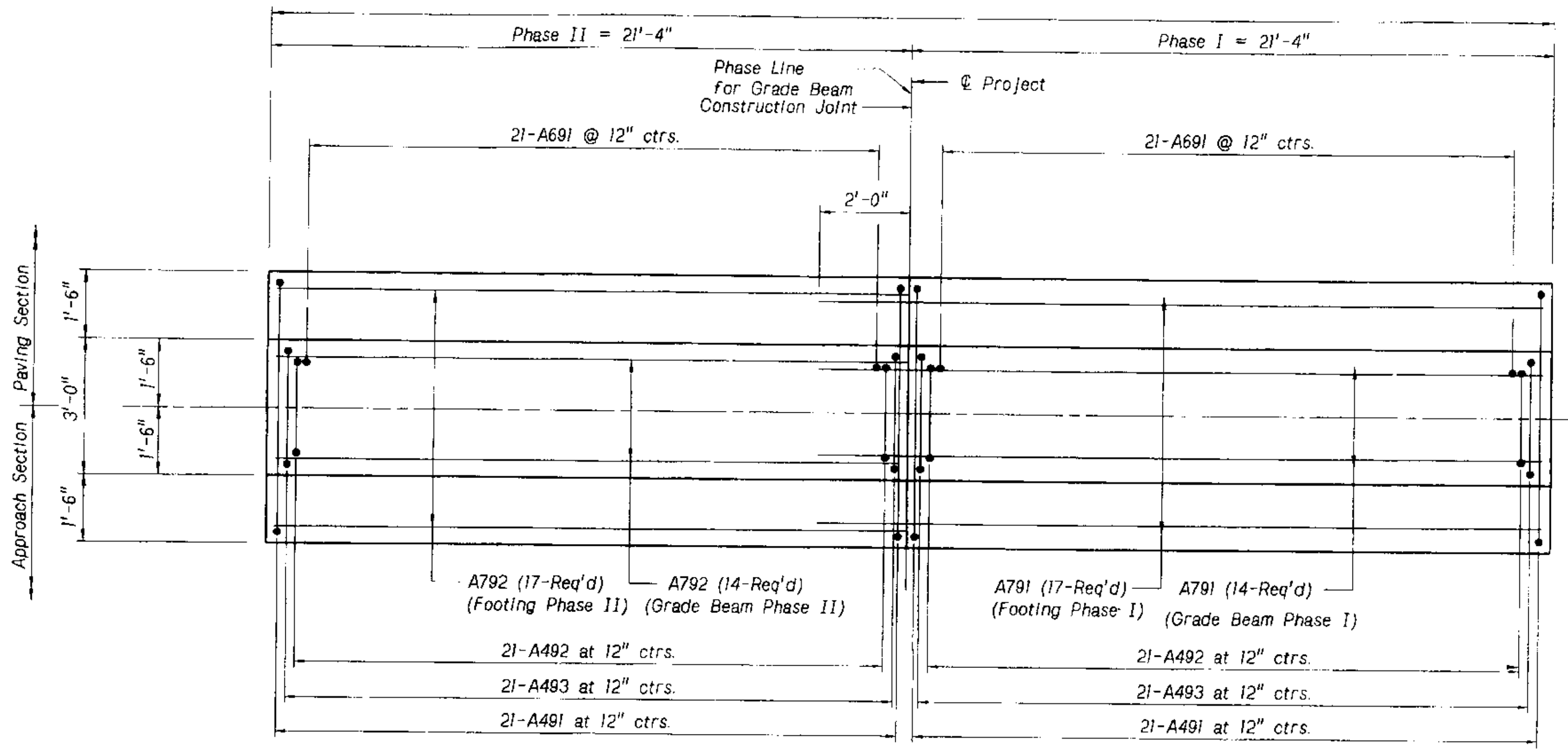
NDOR Nebraska Department of Roads

PROFESSIONAL STRUCTURAL ENGINEER DANIEL J. SHARP E-5375 STATE OF NEBRASKA

12-4-10

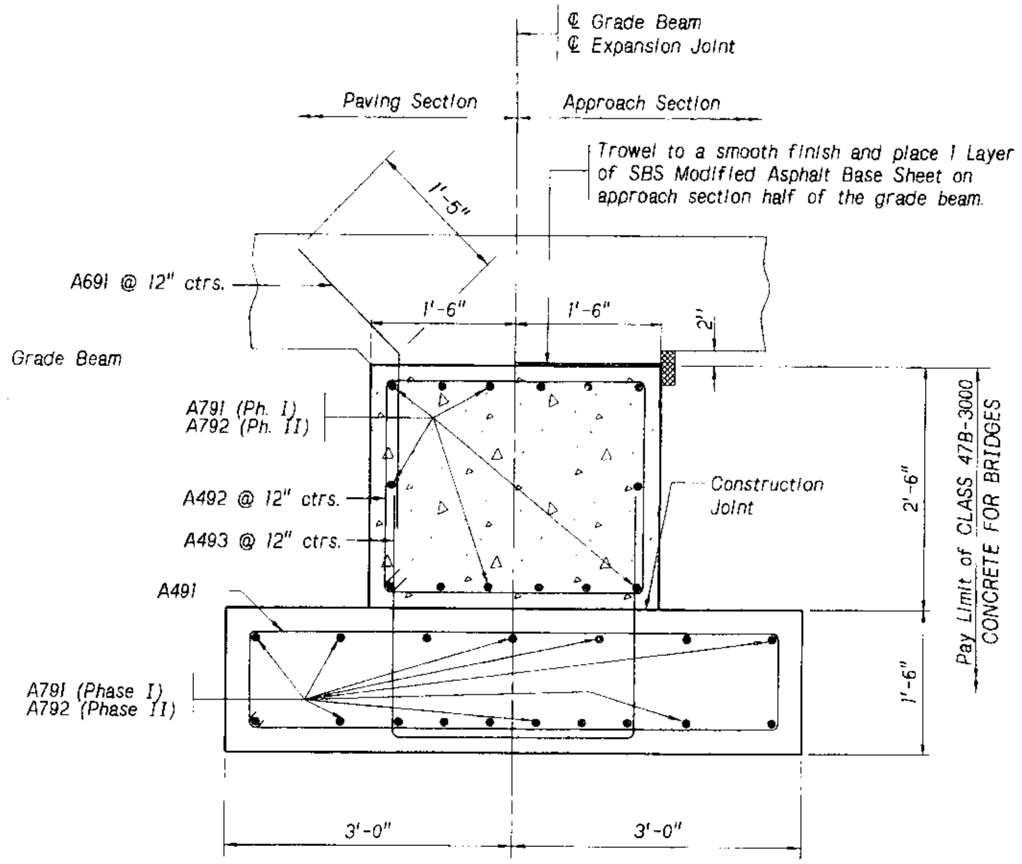
SPECIAL PLAN NO. 1 | 3/15

N:\brdge\ebasesheets\bilbar3.dgn



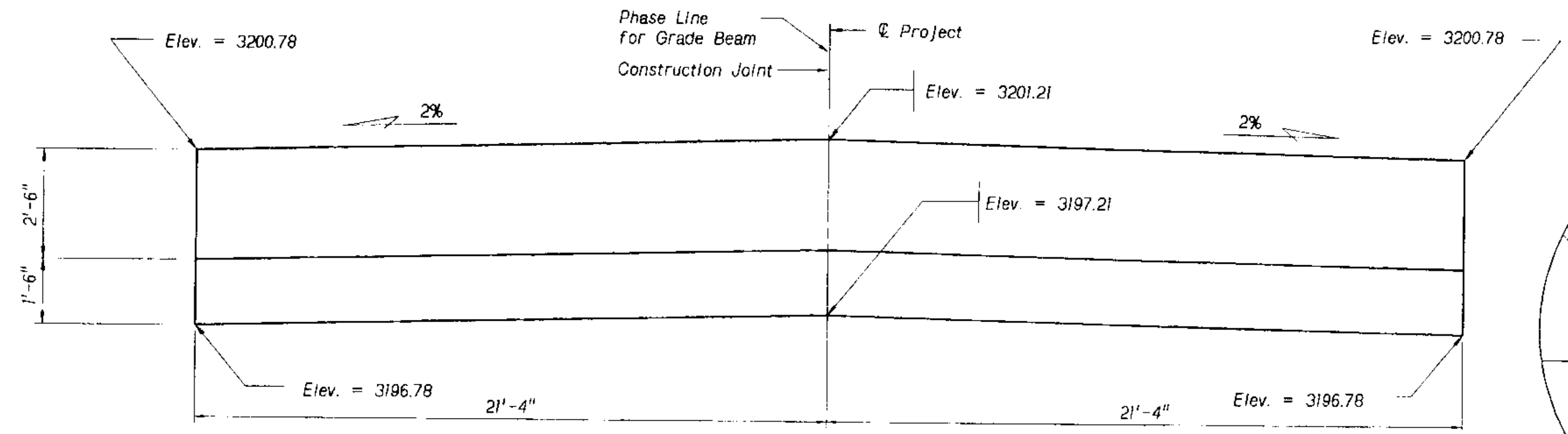
PLAN OF GRADE BEAMS

Grade Beam No. 1 shown, Grade Beam No. 2 Similar but Opposite
Not to Scale



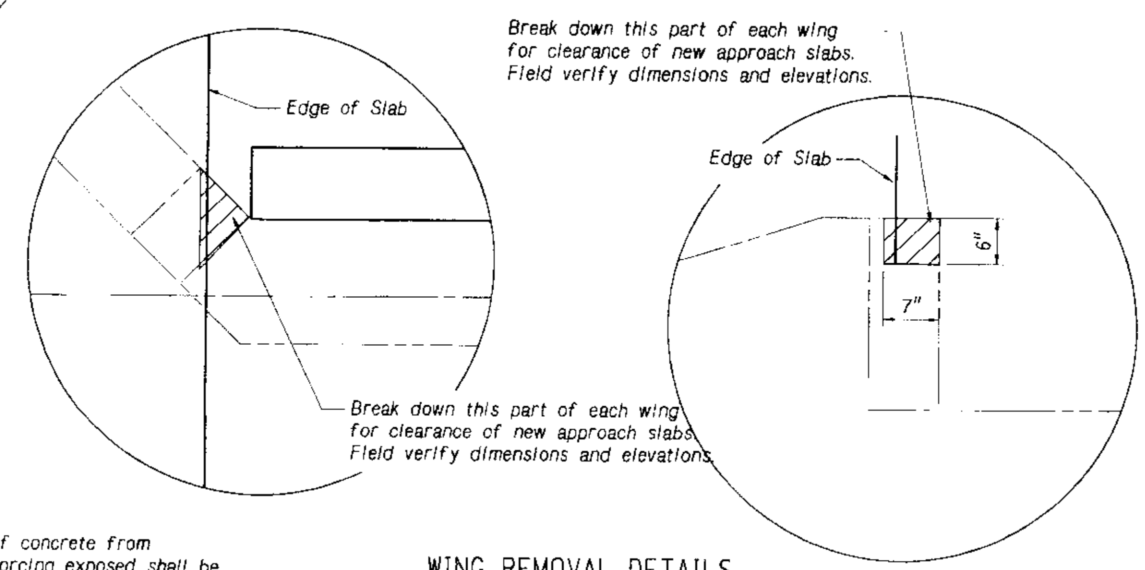
SECTION THRU GRADE BEAM

Not to Scale



ELEVATION OF GRADE BEAMS

Grade Beam No. 1 shown, Grade Beam No. 2 Similar but Opposite
Not to Scale



After removal of concrete from wings any reinforcing exposed shall be cleaned and a new epoxy coating shall be added.

WING REMOVAL DETAILS

NOTE: FOR PIN DIAMETERS, HOOK LENGTHS & BENDING DIAGRAMS SEE SHEET 15 OF 15.

BILL OF BARS — GRADE BEAM AND FOOTING # 1

MARK	NUMBER OF BARS PHASE 1	NUMBER OF BARS PHASE 2	LENGTH	TYPE	"A"	"B"	"C"	"D"	"E"	"F"	PIN	HOOK	WEIGHT — LBS PHASE I	WEIGHT — LBS PHASE II
A791	31	31	23'-1"	STR.									1463	1463
A792	31	31	21'-1"	STR.									1336	1336
A691	21	21	3'-5"	105	2'-0"	1'-5"	1'-0"				4½"		108	108
A491	21	21	13'-9"	107	1'-0"	5'-6"					2"	4½"	193	193
A492	21	21	9'-9"	107	2'-0"	2'-6"					2"	4½"	137	137
A493	21	21	7'-6"	103	2'-6"	2'-6"	2'-6"				2"		105	105
												SUBTOTAL =	3341	3341
												TOTAL =	6682	LBS.

BILL OF BARS — GRADE BEAM AND FOOTING # 2

MARK	NUMBER OF BARS PHASE 1	NUMBER OF BARS PHASE 2	LENGTH	TYPE	"A"	"B"	"C"	"D"	"E"	"F"	PIN	HOOK	WEIGHT — LBS PHASE I	WEIGHT — LBS PHASE II
A791	31	31	23'-1"	STR.									1463	1463
A792	31	31	21'-1"	STR.									1336	1336
A691	21	21	3'-5"	105	2'-0"	1'-5"	1'-0"				4½"		108	108
A491	21	21	13'-9"	107	1'-0"	5'-6"					2"	4½"	193	193
A492	21	21	9'-9"	107	2'-0"	2'-6"					2"	4½"	137	137
A493	21	21	7'-6"	103	2'-6"	2'-6"	2'-6"				2"		105	105
												SUBTOTAL =	3341	3341
												TOTAL =	6682	LBS

PROJECT NUMBER 26-2(1023) SHEET NO. 12
C.N. 61440
STRUCTURE NUMBER S026 11926

PROFESSIONAL CIVIL ENGINEER MARK J. TRAYNOWICZ E-8119 STATE OF NEBRASKA

BRIDGE ENGINEER

COUNTY GARDEN
HWY. NO. US 26
REF. POST. 119.26
STA. 694+45.86
LOCATION LEWELLEN SOUTHEAST
SKEW 0°
ROADWAY 40'-0"
DESIGN LIVE LOAD

450'-0" MULTIPLE SPAN
DECK STEEL GIRDER BRIDGE (REHAB)
GRADE BEAM PLAN & ELEVATION VIEW

DESIGNED BY TJH | DETAILED BY TJH | CHECKED BY SDM | DATE JUNE 2009

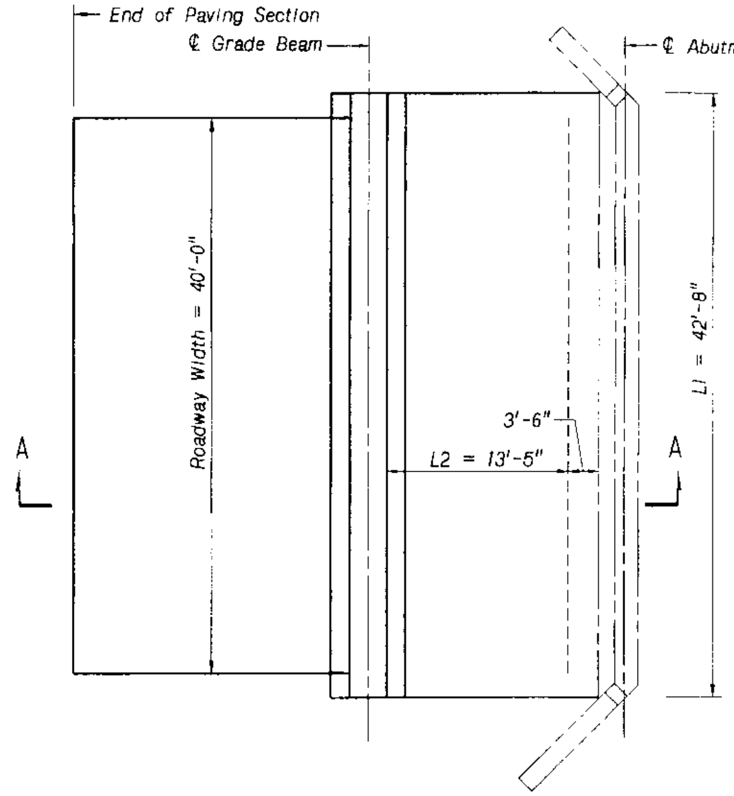
STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

NDOR Nebraska Department of Roads

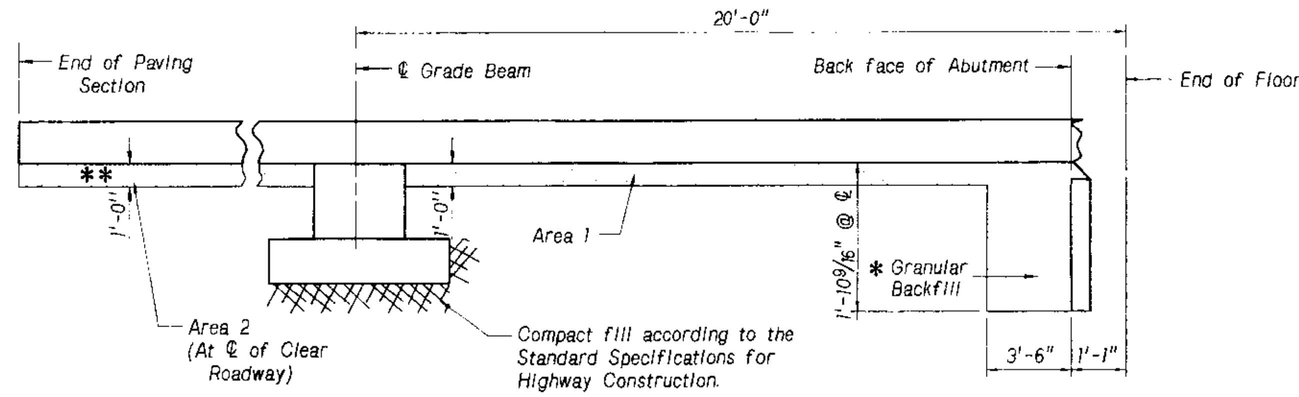
PROFESSIONAL STRUCTURAL ENGINEER DANIEL J. SHARP E-5375 STATE OF NEBRASKA
12-11-09

SPECIAL PLAN NO. 1
4/15

s026 11926design model grade beam



PLAN OF GRANULAR BACKFILL



The pay limit quantity for Granular Backfill, per Abutment, has been established using the following equation:

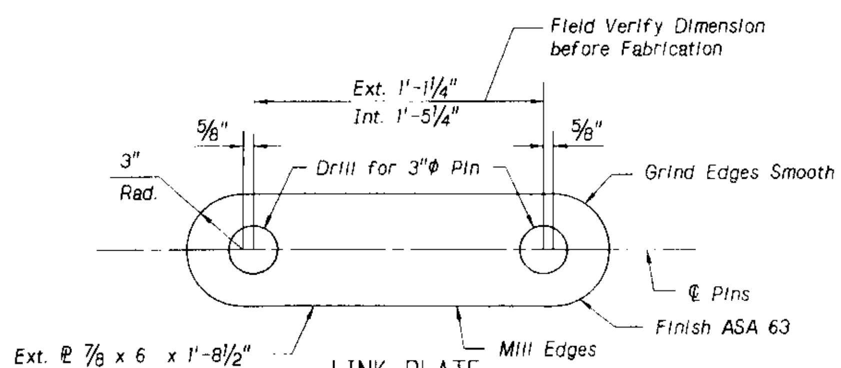
$$\text{Quantity } (yd^3) = \frac{\text{Area x } [L1 + (2 \times L2)]}{27} + \frac{\text{Area 2 x (Roadway Width)}}{27}$$

* The Granular Backfill in this area shall be placed in 8 inch layers and compacted by a single pass of a walk-behind, lightweight (approx. 100 lbs.) mechanical tamper, roller, or vibratory compactor. There is no density requirement. Heavy compaction equipment shall not be used in this area. Flooding the granular backfill with water is not allowed.

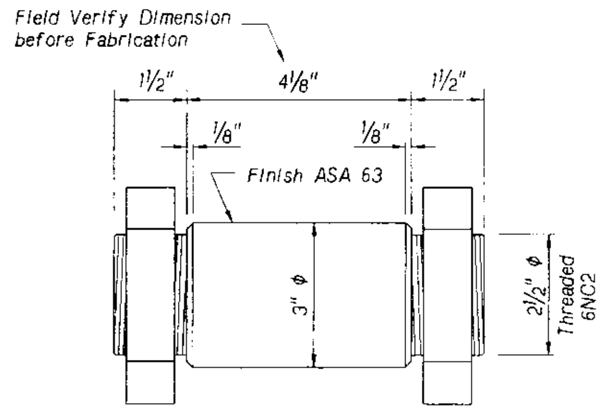
** The Backfill in this area shall be compacted in accordance with the Standard Specifications.

SECTION A-A

GENERAL PLAN
Not to Scale



LINK PLATE
(1-Required)



PIN REPLACEMENT
(1-Required)

Notes: Pin shall be ASTM A-108 or ASTM A688 Class D or Approved Equal. Recessed nut shall be either pressed or cast steel.
Structural steel for Link Plates shall be ASTM A36. For the purpose of impact test, all Link Plates shall be considered main tention members.

- NOTES -

"PIN REPLACEMENT". This work shall consist of supporting the suspended girders at the expansion joint, removing the existing link plates and pins, and installing the new link plates and pins.

Prior to beginning any field work, a step-by-step procedure for supporting the girders and replacing the link plates and pins shall be submitted by the Contractor for the Engineer's approval. A possible method of supporting the girders is shown in the plans. The Contractor is not required to use this method of support; it is only shown as a possible method. The furnishing and installing of jacks, temporary scaffolding, blocks or other material shall be a part of this item. Any damage to the structure due to negligence by the Contractor shall be repaired by the Contractor at no expense to the State. Approval of any procedure submitted by the Contractor shall not release him of any responsibility.

The item "Pin Replacement" shall be measured for payment as a single unit for each set of link plates and pins replaced and accepted by the Engineer.

Payment for this work, measured as provided herein, shall be made at the contract unit price per each (EA) for the item "Pin Replacement". This price shall be full compensation for all labor, equipment, tools, materials and any incidentals necessary to complete the work.

PROJECT NUMBER 26-2(1023) SHEET NO. 13
C.N. 61440
STRUCTURE NUMBER S026 11926
PROFESSIONAL CIVIL ENGINEER MARK J. TRAYNOWICZ E-8119 STATE OF NEBRASKA
BRIDGE ENGINEER

COUNTY GARDEN LOCATION LEWELLEN SOUTHEAST
HWY. NO. US 26 SKEW 0°
REF. POST. 119.26 ROADWAY 40'-0"
STA. 694+45.86 DESIGN LIVE LOAD

450'-0" MULTIPLE SPAN DECK STEEL GIRDER BRIDGE (REHAB)
GRANULAR BACKFILL & PIN REPLACEMENT

DESIGNED BY TJH DETAILED BY TJH CHECKED BY SDM DATE JUNE 2009

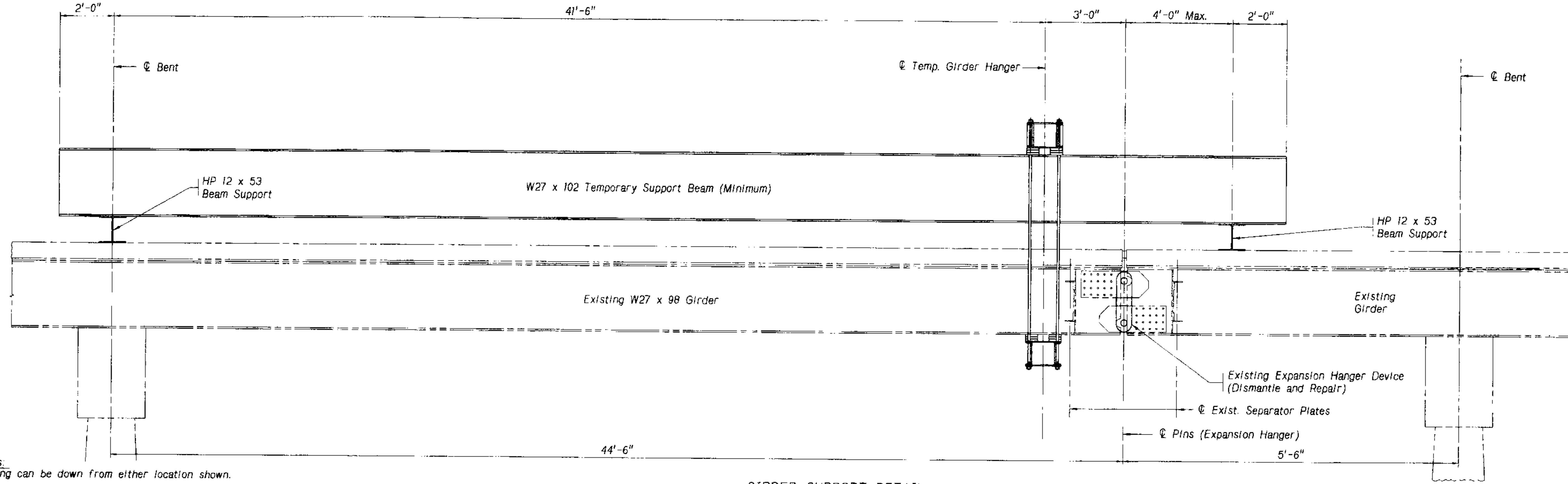
STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

NDOR Nebraska Department of Roads

PROFESSIONAL STRUCTURAL ENGINEER DANIEL J. SHARP E-5375 STATE OF NEBRASKA
12-11-09

SPECIAL PLAN NO. 1 5/15

N:\brdge\ebasesheets\bilbar3.dgn



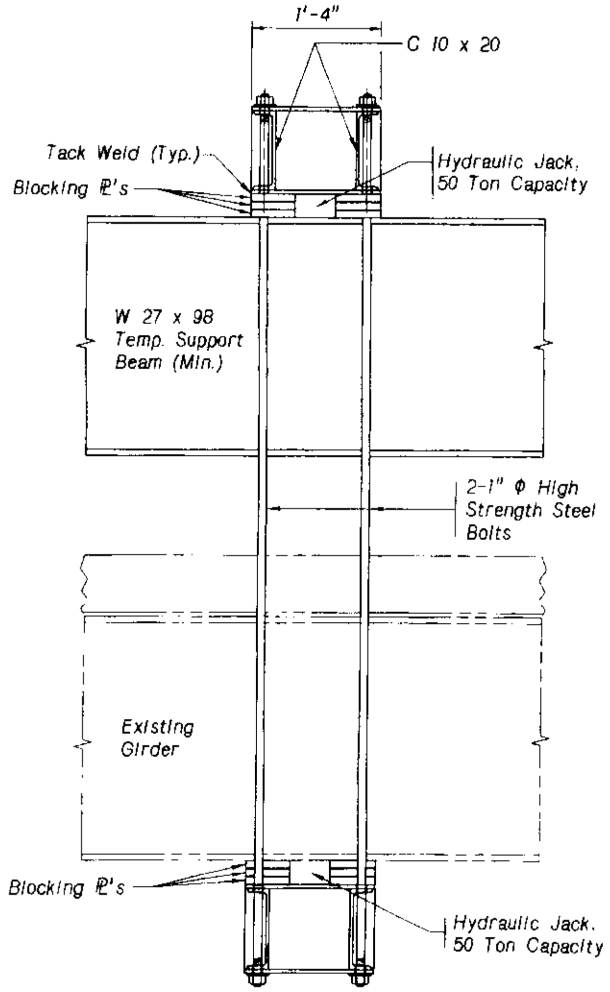
Notes:
Jacking can be down from either location shown.

Bearing area for the temporary beam support shall be built up and leveled by constructing a leveling pad on the concrete deck, using portland cement mortar. Remove when work is completed.

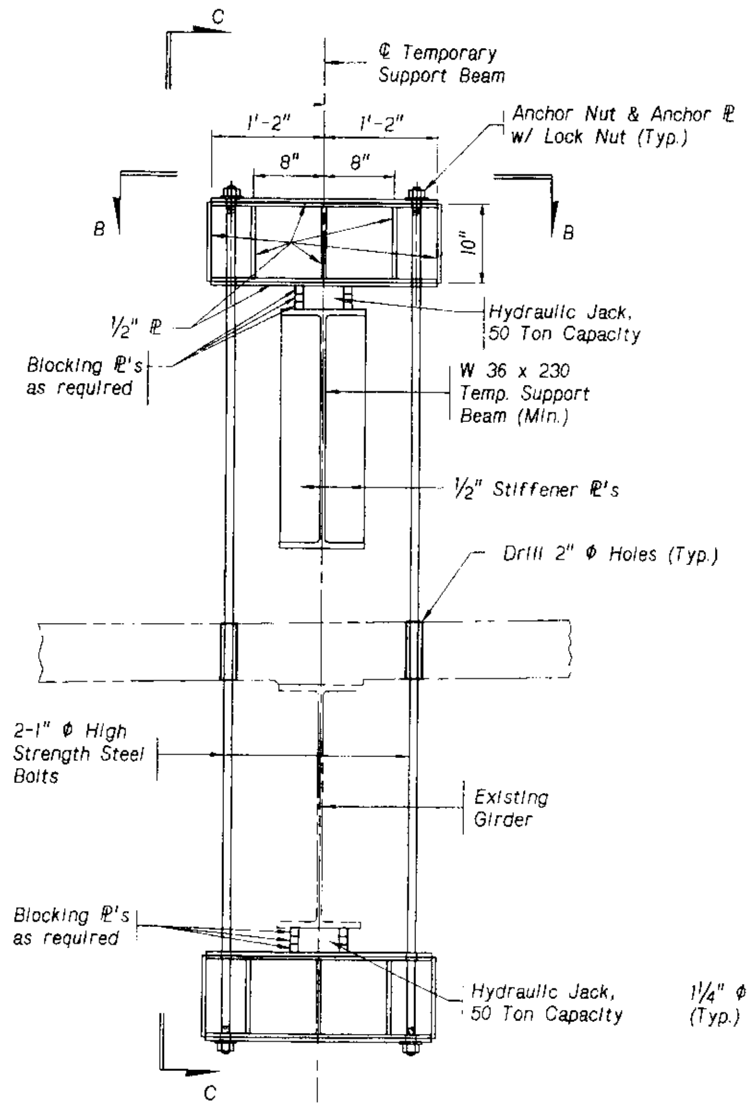
No cleaning or painting is required for this steel material.

GIRDER SUPPORT DETAIL
Not to Scale

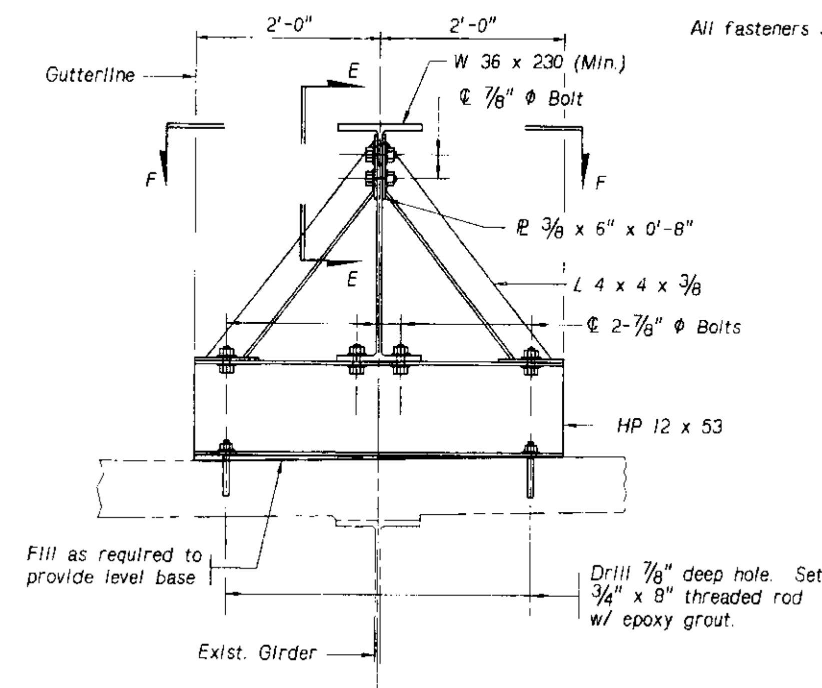
Note:
All fasteners shall be ⅞" ϕ bolts, A.S.T.M. A-325.



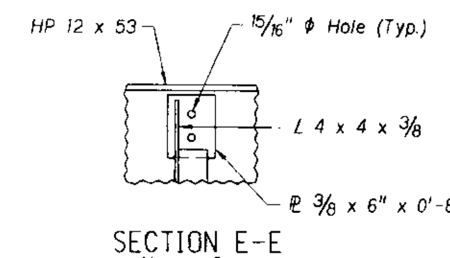
SECTION C-C
Not to Scale



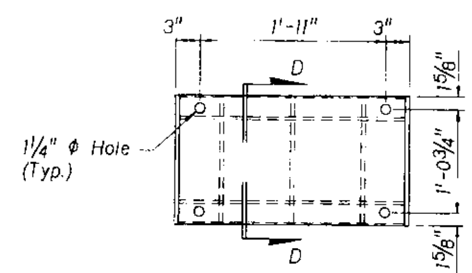
GIRDER HANGER DETAIL
Not to Scale



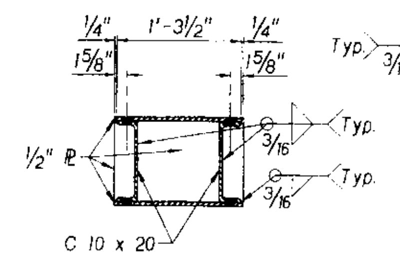
BEAM SUPPORT DETAIL
Not to Scale



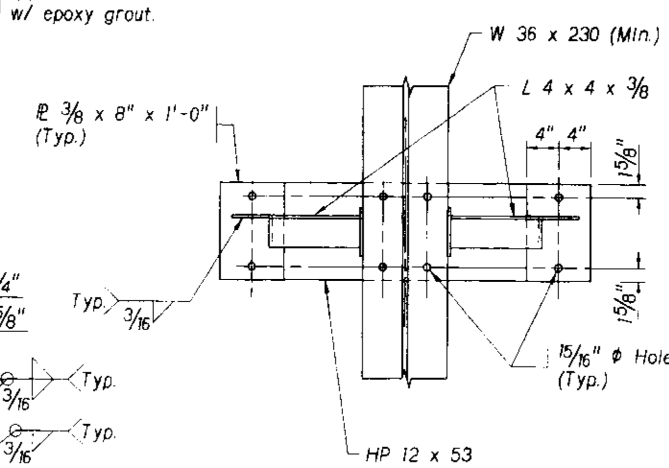
SECTION E-E
Not to Scale



SECTION B-B
Not to Scale



SECTION D-D
Not to Scale



SECTION F-F
Not to Scale

PROJECT NUMBER 26-2(1023) SHEET NO. 14
C.N. 61440
STRUCTURE NUMBER S026 11926

PROFESSIONAL CIVIL ENGINEER MARK J. TRAYNOWICZ E-8119 STATE OF NEBRASKA

BRIDGE ENGINEER

LOCATION LEWELLEN SOUTHEAST
SKEW 0°
ROADWAY 40'-0"
DESIGN LIVE LOAD

450'-0" MULTIPLE SPAN DECK STEEL GIRDER BRIDGE (REHAB)
GRANULAR BACKFILL & PIN REPLACEMENT

COUNTY GARDEN
HWY. NO. US 26
REF. POST. 119.26
STA. 694+45.86

DESIGNED BY DEPT. DETAILED BY TJH CHECKED BY SDM DATE JUNE 2009

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

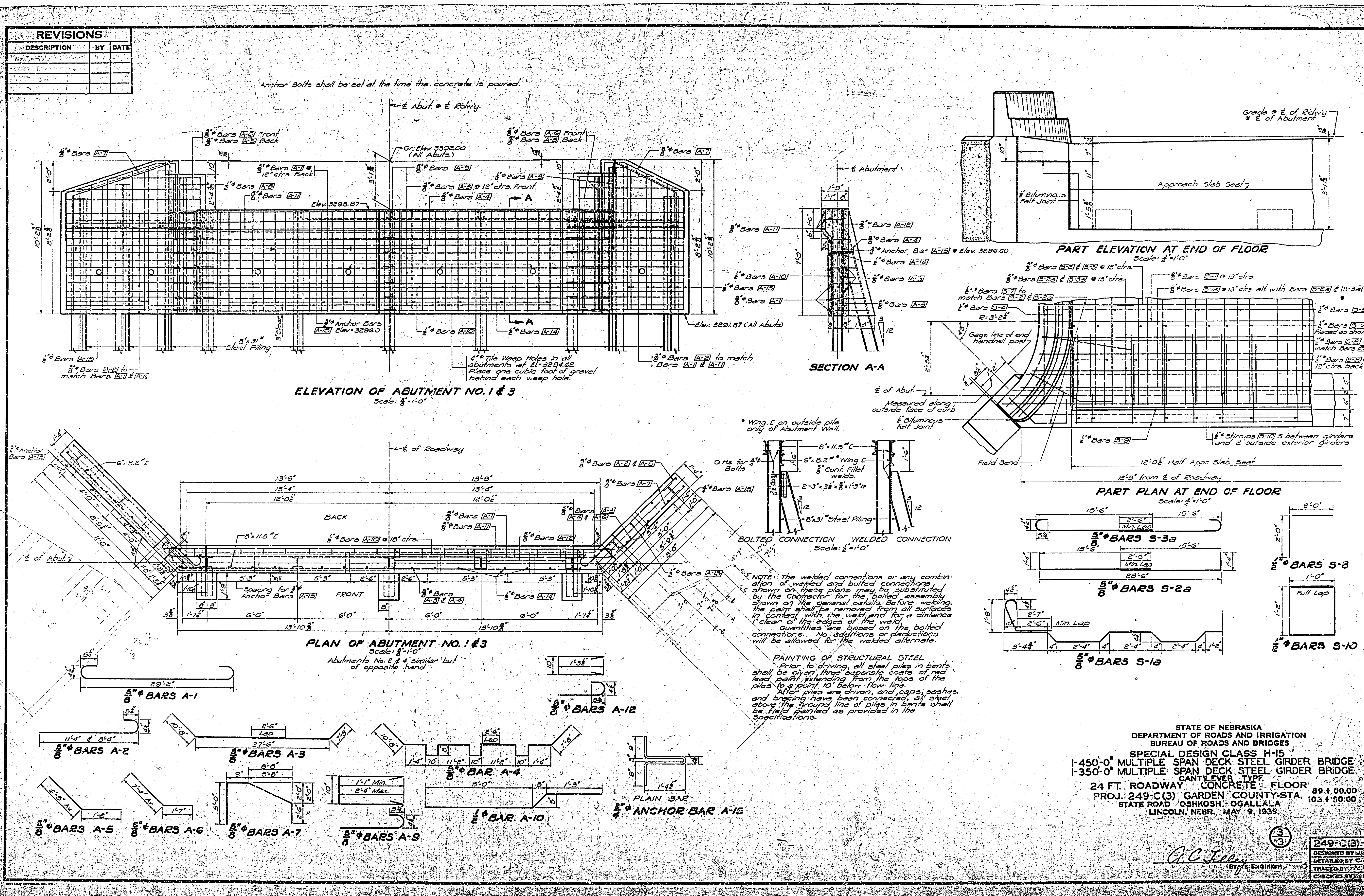
NDOR Nebraska Department of Roads

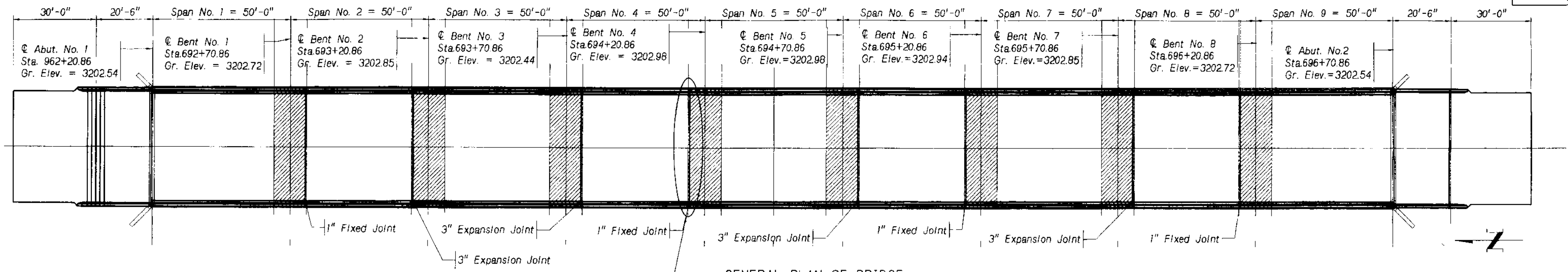
PROFESSIONAL STRUCTURAL ENGINEER DANIEL J. SHARP E-5375 STATE OF NEBRASKA

2-4-10

SPECIAL PLAN NO. 1

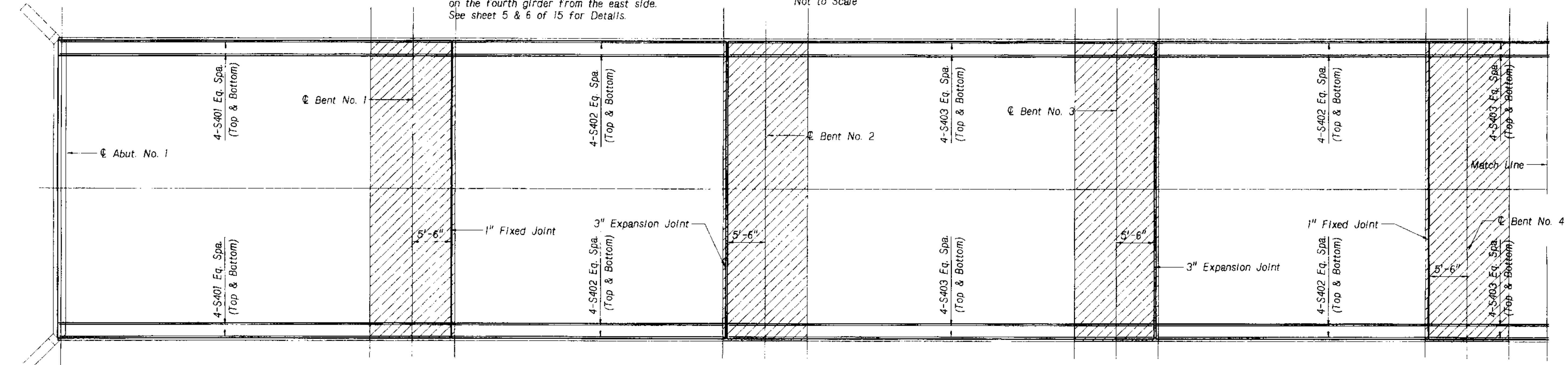
6/15


REVISIONS
DESCRIPTION
BY
DATE
Anchor Bolts shall be set at the time the concrete is poured.
ELEVATION OF ABUTMENT NO. 1 & 3
Scale: 1/8"=1'-0"
SECTION A-A
PART ELEVATION AT END OF FLOOR
Scale: 3/4"=1'-0"
Approach Slab Seat
PART PLAN AT END OF FLOOR
Scale: 3/4"=1'-0"
12'-0 1/2" Half Appr. Slab Seat
13'-9" from ℄ of Roadway
PLAN OF ABUTMENT NO. 1 & 3
Scale: 1/8"=1'-0"
Abutments No. 2 & 4 similar but of opposite hand
4" Tile Weep Holes in all abutments at El. 3294.62. Place one cubic foot of gravel behind each weep hole.
Elev. 3291.87 (All Abuts)
BOLTED CONNECTION
WELDED CONNECTION
Scale: 1/2"=1'-0"
NOTE: The welded connections or any combination of welded and bolted connections shown on these plans may be substituted by the Contractor for the bolted assembly shown on the general details. Before welding, the paint shall be removed from all surfaces in contact with the weld and for a distance 1" clear of the edges of the weld.
Quantities are based on the bolted connections. No additions or deductions will be allowed for the welded alternate.
PAINTING OF STRUCTURAL STEEL
Prior to driving, all steel piles in bents shall be given three separate coats of red lead paint extending from the tops of the piles to a point 10' below flow line.
After piles are driven, and caps, sashes, and bracing have been connected, all steel above the ground line of piles in bents shall be field painted as provided in the Specifications.
5/8" BARS S-3a
5/8" BARS S-2a
5/8" BARS S-1a
BARS S-8
BARS S-10
5/8" BARS A-1
5/8" BARS A-2
5/8" BARS A-3
BAR A-4
5/8" BARS A-5
5/8" BARS A-6
5/8" BARS A-7
5/8" BARS A-9
1/2" BAR A-10
BARS A-12
PLAIN BAR
ANCHOR BAR A-15
STATE OF NEBRASKA
DEPARTMENT OF ROADS AND IRRIGATION
BUREAU OF ROADS AND BRIDGES
SPECIAL DESIGN CLASS H-15
1-450'-0" MULTIPLE SPAN DECK STEEL GIRDER BRIDGE
1-350'-0" MULTIPLE SPAN DECK STEEL GIRDER BRIDGE
CANTILEVER TYPE
24 FT. ROADWAY CONCRETE FLOOR
PROJ. 249-C(3) GARDEN COUNTY-STA. 89+00.00 / 103+50.00
STATE ROAD OSHKOSH - OGALLALA
LINCOLN, NEBR. MAY 9, 1939.
3/3
249-C(3)
STATE ENGINEER



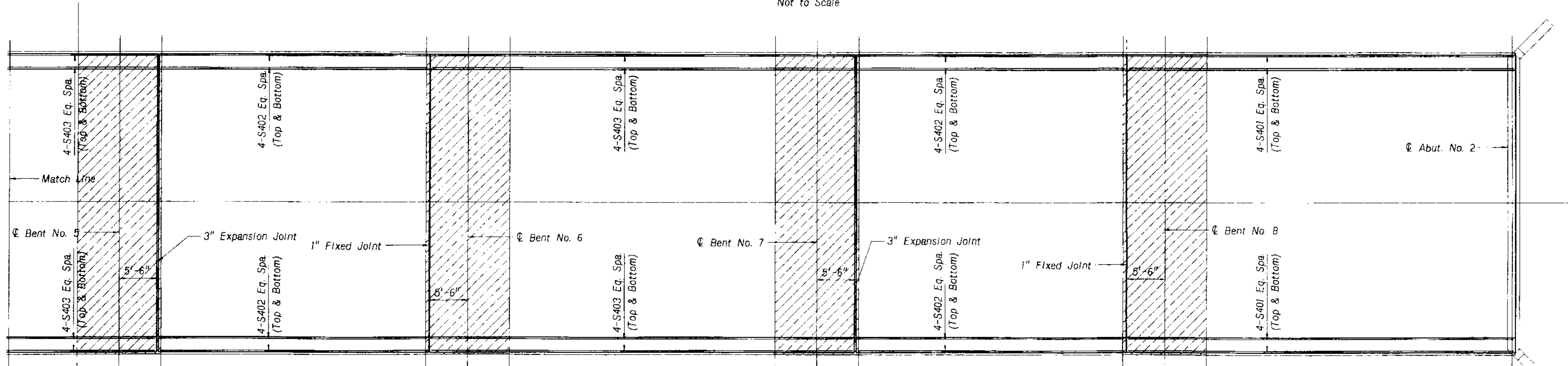
GENERAL PLAN OF BRIDGE

Not to Scale



SLAB REINFORCEMENT

Not to Scale



SLAB REINFORCEMENT

Not to Scale

PROJECT NUMBER	SHEET NO.
26-2(1023)	15

C.N. 61440

STRUCTURE NUMBER S026 11926

PROFESSIONAL CIVIL ENGINEER MARK J. TRAYNOWICZ E-8119 STATE OF NEBRASKA

BRIDGE ENGINEER

450'-0" MULTIPLE SPAN DECK STEEL GIRDER BRIDGE (REHAB)

SLAB REINFORCMENT

LOCATION LEWELLEN SOUTHEAST
SKEW 0°
ROADWAY 40'-0"
DESIGN LIVE LOAD

COUNTY GARDEN
HWY. NO. US 26
REF. POST. 119.26
STA. 694+45.86

DESIGNED BY TJH DETAILED BY TJH CHECKED BY SDM DATE JUNE 2009

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

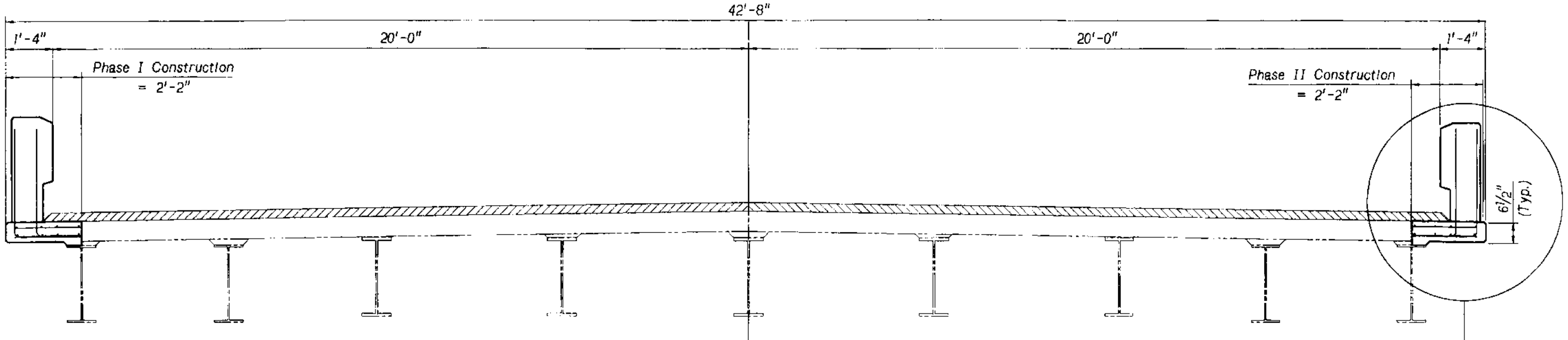
NDOR Nebraska Department of Roads

PROFESSIONAL STRUCTURAL ENGINEER DANIEL J. SHARP E-6375 STATE OF NEBRASKA

12-1-09

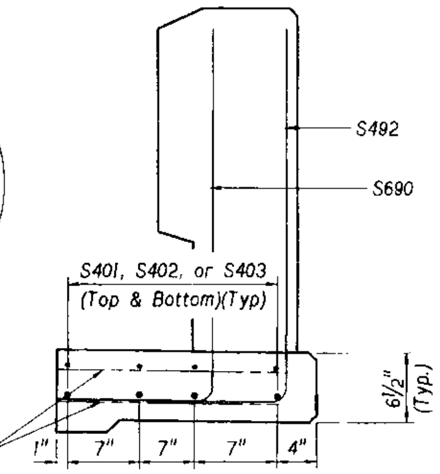
SPECIAL PLAN NO. 1 7/15

Ⓡ1 Added Sheet 01 April 2010



CROSS SECTION OF ROADWAY

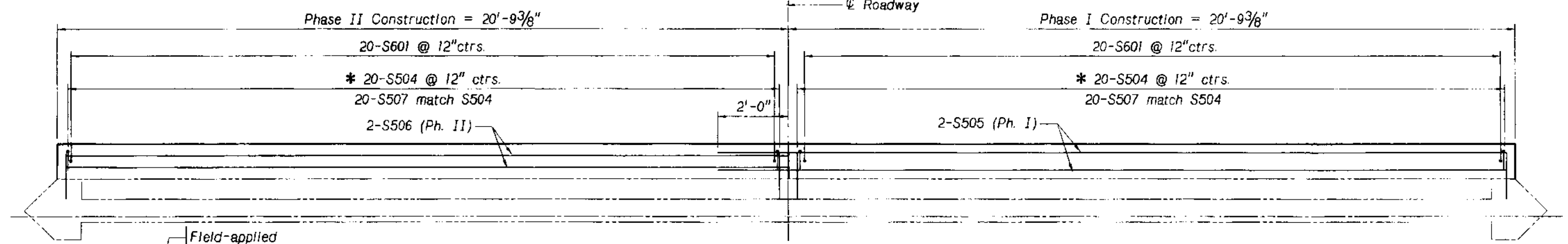
Scale 1/2" = 1'-0"



DETAIL "A"

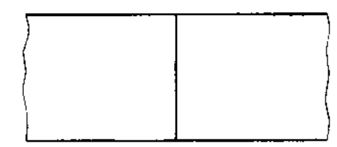
Not to Scale

✱ Existing reinforcement in deck needs to be cut back to maintain a 3" clearance in new deck.

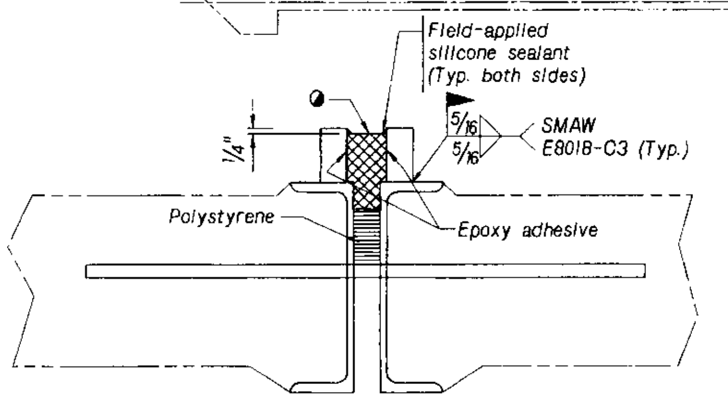


PLAN VIEW OF TURNDOWN

Scale: 1/2" = 1'-0"

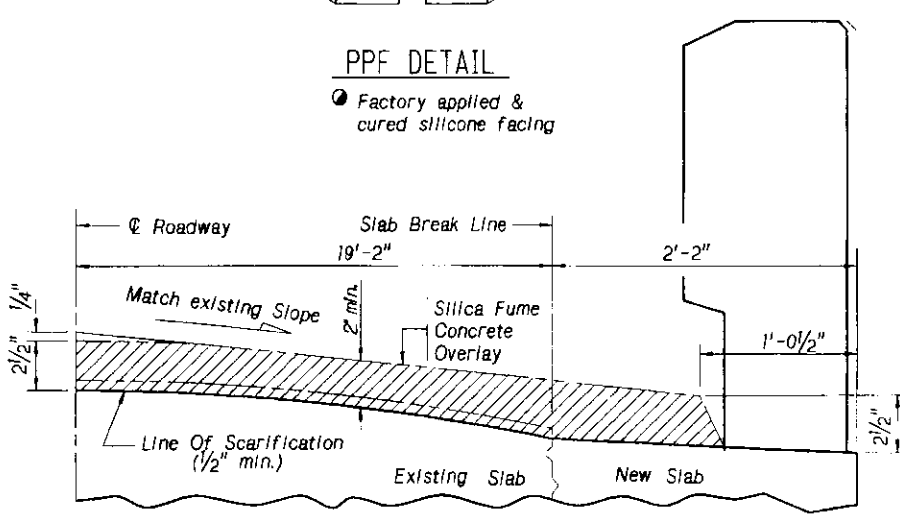


SLAB CONSTRUCTION JOINT

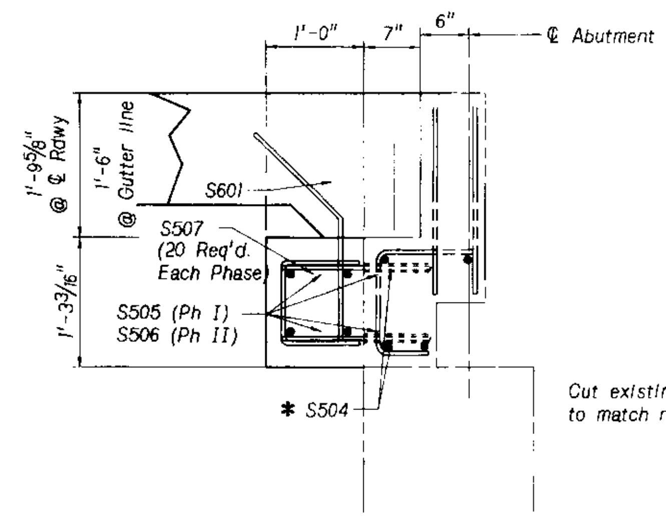


PPF DETAIL

◑ Factory applied & cured silicone facing

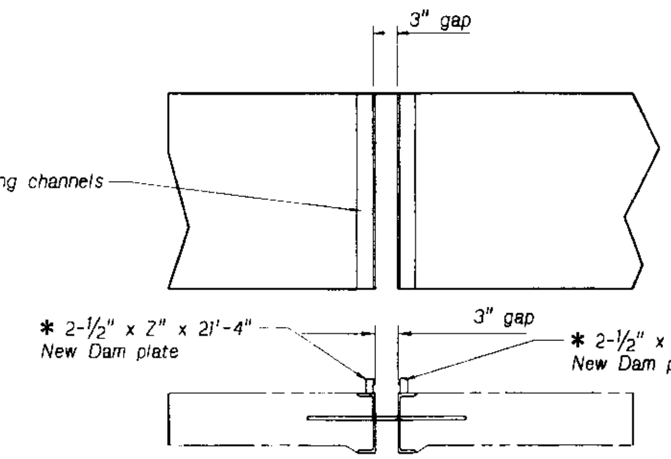


OVERLAY DETAIL

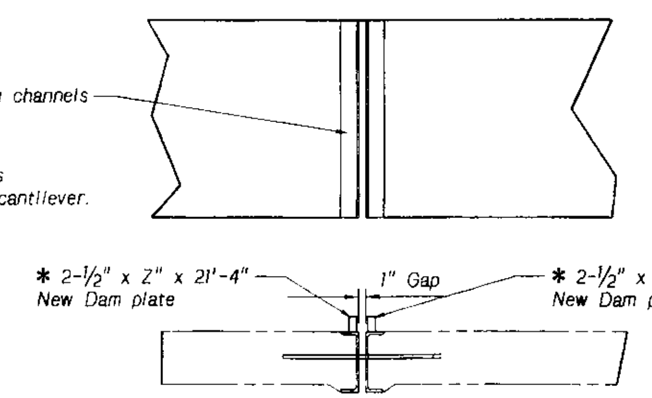


✱ Field drill 1" Φ hole 8" into existing turndown to place S504 bars and fill with approved epoxy.

SECTION OF TURNDOWN



3" EXPANSION JOINT DETAIL

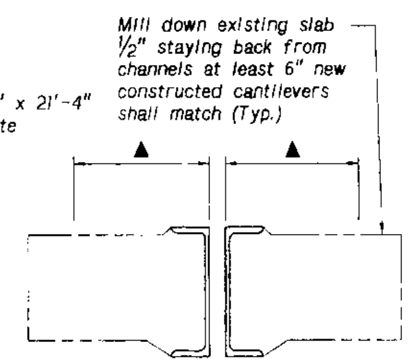


1" FIXED JOINT DETAIL

NOTES

▲ Class I repair shall be as close as possible to the existing channels without damaging them.

✱ Remove existing dam plates and replace with new. The removal of existing dam plates shall be considered Subsidiary to class 4 Cold milling.



A-A

DAM PLATES DIMENSION		
SPAN	JOINT	Z
2	1	1¾"
2	2	1¾"
4	1	1¾"
4	2	1¾"
6	1	2"
6	2	2¼"
8	1	2¼"
8	2	2¾"

PROJECT NUMBER 26-2(1023) SHEET NO. 16A

C.N. 61440

STRUCTURE NUMBER S026 11926

PROFESSIONAL CIVIL ENGINEER MARK J. TRAYNOWICZ E-8119 STATE OF NEBRASKA

BRIDGE ENGINEER

450'-0" MULTIPLE SPAN DECK STEEL GIRDER BRIDGE (REHAB)

CROSS SECTION OF ROADWAY AND JOINT DETAIL

LOCATION LEWELLEN SOUTHEAST
SKEW 0°
ROADWAY 40'-0"
DESIGN LIVE LOAD

COUNTY GARDEN
HWY. NO. US 26
REF. POST. 119.26
STA. 694+45.86

DESIGNED BY TJH DETAILED BY TJH CHECKED BY SDM DATE JUNE 2009

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

NDOR Nebraska Department of Roads

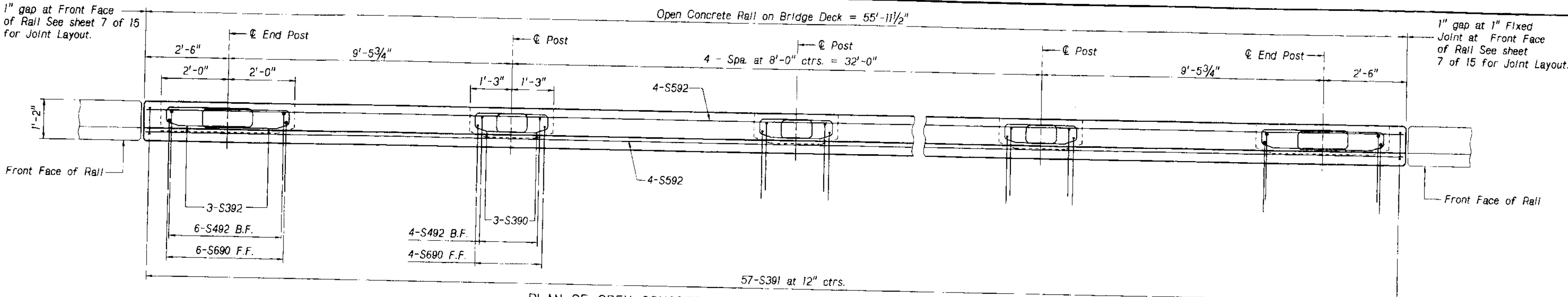
PROFESSIONAL STRUCTURAL ENGINEER DANIEL J. SHARP E-5375 STATE OF NEBRASKA

1-20-10

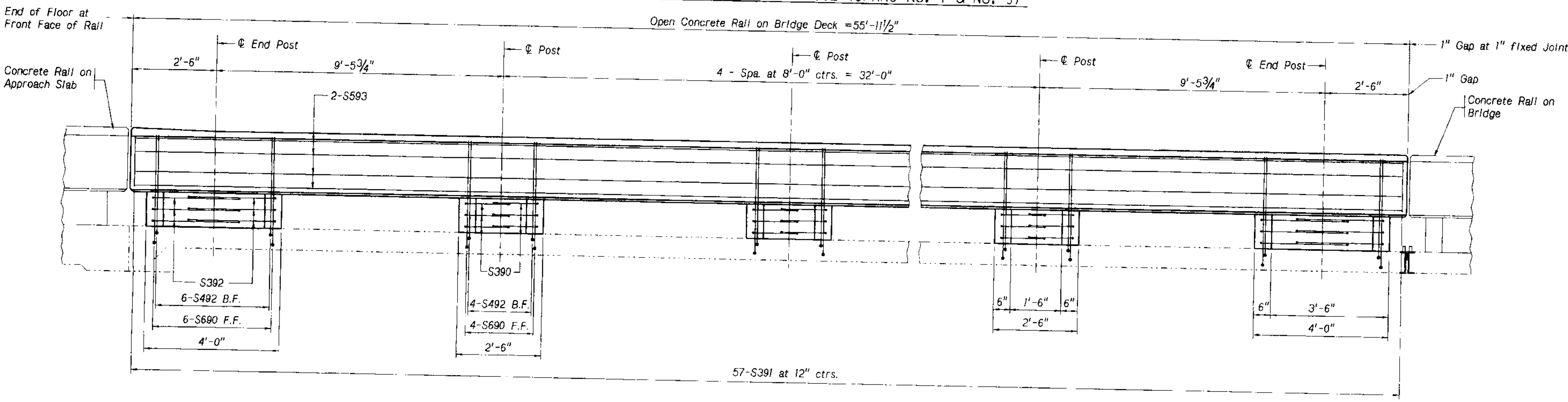
SPECIAL PLAN NO. 8A

1 / 15

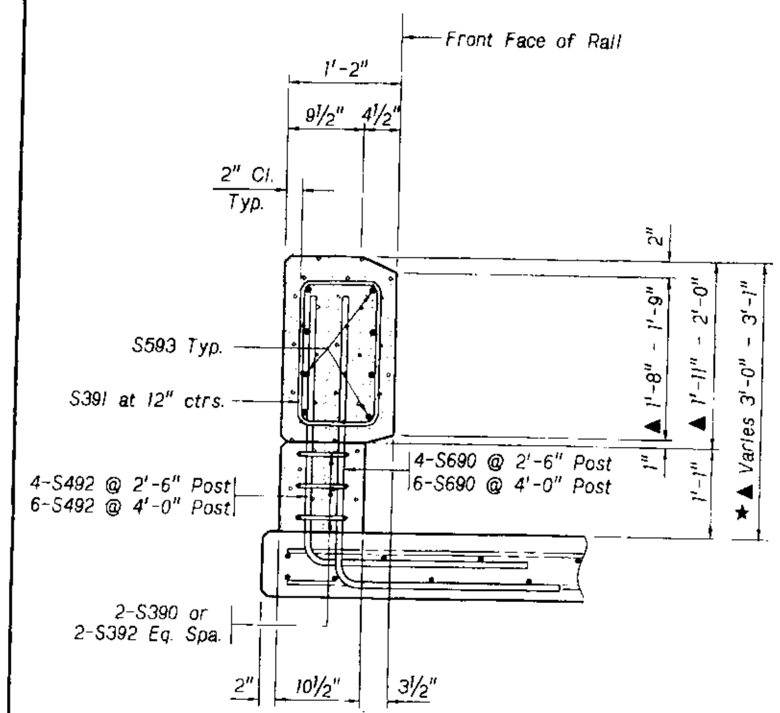
NURAIL6.DGN



PLAN OF OPEN CONCRETE RAIL ON BRIDGE (SPANS NO. 1 & NO. 9)



ELEVATION OF OPEN CONCRETE RAIL ON BRIDGE (SPANS NO. 1 & NO. 9)



TYPICAL SECTION OF RAIL

NOTES:

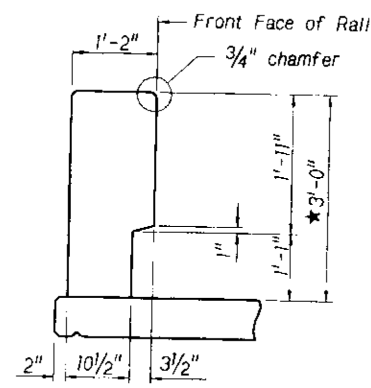
Posts must be plumb.

▲ Transition near Abutment No. 2 Only

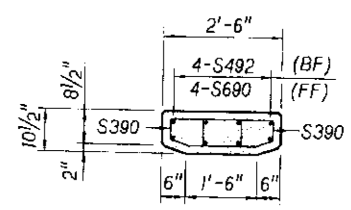
★ Measured at front face of rail.

For Bill of Bars see sheet 12 of 15.

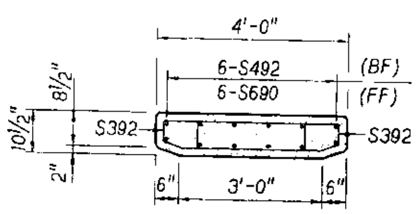
(EF) = Each Face
(FF) = Front Face
(BF) = Back Face



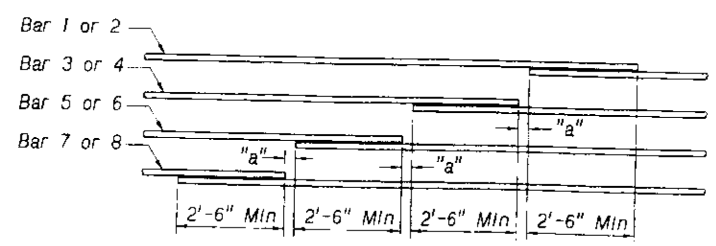
ALTERNATE CHAMFER DETAIL



PLAN OF 2'-6" POST

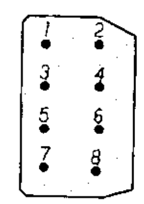


PLAN OF 4'-0" POST



"a" ≥ Zero

LAP DETAIL



RAIL SECTION

See Lap Detail

PROJECT NUMBER	SHEET NO.
26-2(1023)	17

C.N. 61440

STRUCTURE NUMBER S026 11926

PROFESSIONAL CIVIL ENGINEER MARK J. TRAYNOWICZ E-8119 STATE OF NEBRASKA

BRIDGE ENGINEER

450'-0" MULTIPLE SPAN DECK STEEL GIRDER BRIDGE (REHAB)

56'-0" NU OPEN CONCRETE RAIL ON BRIDGE (TL4)

COUNTY GARDEN
HWY. NO. US 26
REF. POST 119.26
STA. 694+45.86
DESIGNED BY TJH

LOCATION LEWELLEN SOUTHEAST
SKEW 0°
ROADWAY 40'-0"
DESIGN LIVE LOAD
DETAILED BY TJH

CHECKED BY SDM

DATE JUNE 2009

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

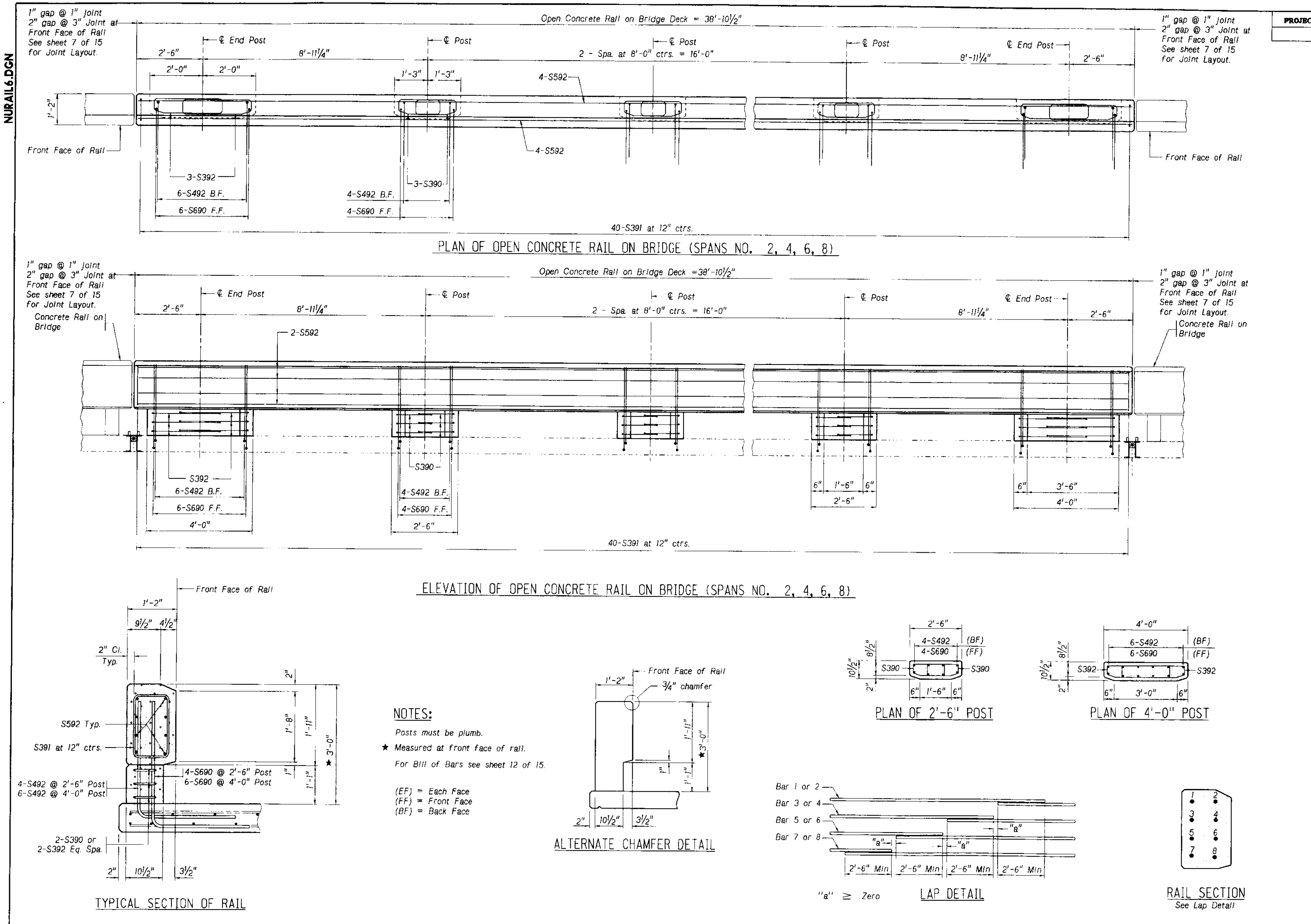
NDOR Nebraska Department of Roads

PROFESSIONAL STRUCTURAL ENGINEER DANIEL J. SHARP E-5375 STATE OF NEBRASKA

2-4-10

SPECIAL PLAN NO. 1

9/15



PROJECT NUMBER	SHEET NO.
26-2(1023)	18

C.N. 61440

STRUCTURE NUMBER S026 11926

PROFESSIONAL CIVIL ENGINEER MARK J. TRAYNOWICZ E-8119 STATE OF NEBRASKA

BRIDGE ENGINEER

LOCATION LEWELLEN SOUTHEAST
450'-0" MULTIPLE SPAN DECK STEEL GIRDER BRIDGE (REHAB)
39'-0" NU OPEN CONCRETE RAIL ON BRIDGE (TL4)

COUNTY GARDEN
HWY. NO. US 26
REF. POST. 119.26
STA. 694+45.86
SKEW 0°
ROADWAY 40'-0"
DESIGN LIVE LOAD
DESIGNED BY TJH
DETAILED BY TJH
CHECKED BY SDM
DATE JUNE 2009

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

NDOR Nebraska Department of Roads

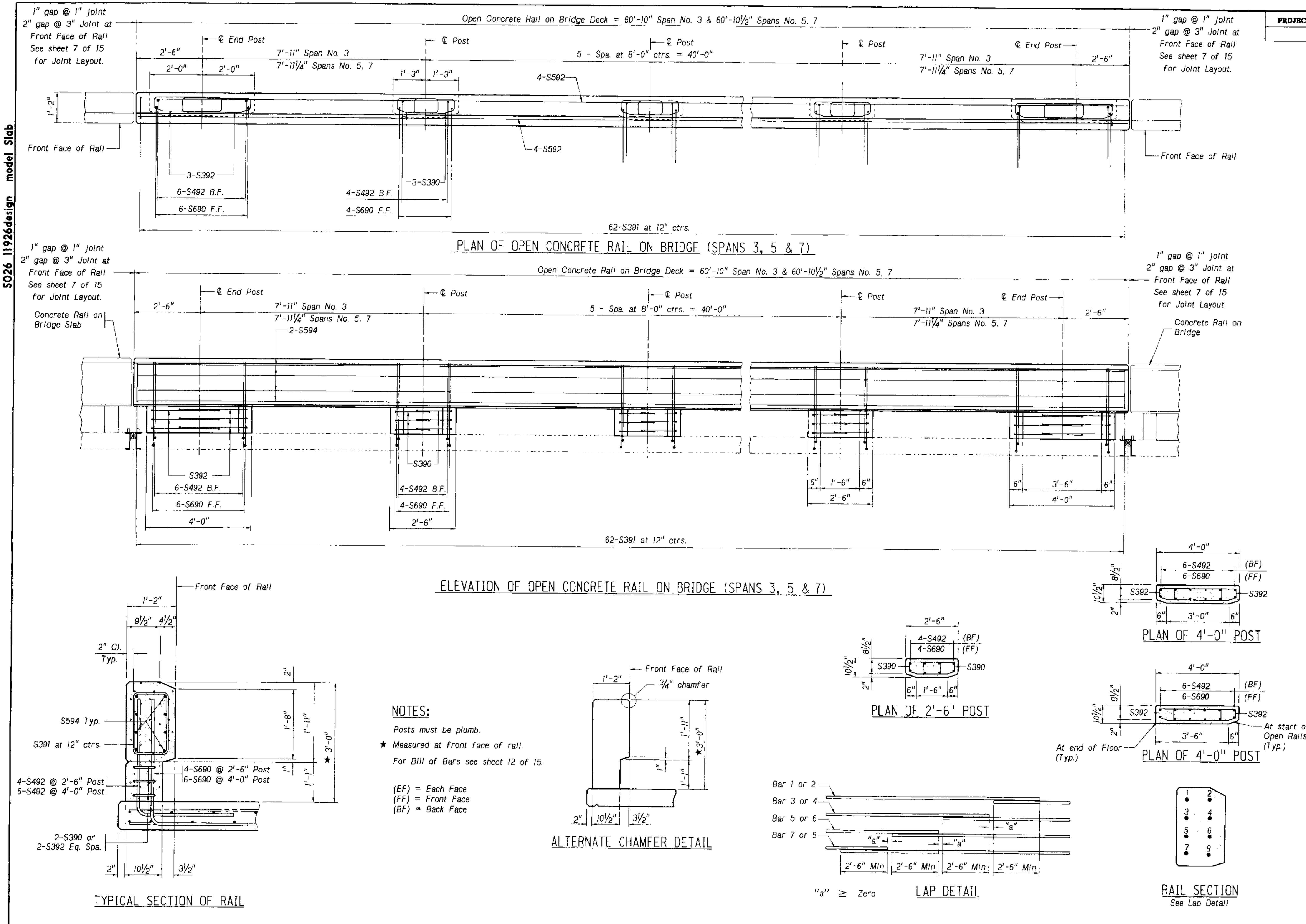
PROFESSIONAL STRUCTURAL ENGINEER DANIEL J. SHARP E-5375 STATE OF NEBRASKA

2-4-10

SPECIAL PLAN NO. 1

10/15

S026 11926design model Slab



NOTES:

Posts must be plumb.

★ Measured at front face of rail.

For Bill of Bars see sheet 12 of 15.

(EF) = Each Face
(FF) = Front Face
(BF) = Back Face

PROJECT NUMBER	SHEET NO.
26-2(1023)	19

C.N. 61440

STRUCTURE NUMBER S026 11926

PROFESSIONAL CIVIL ENGINEER MARK J. TRAYNOWICZ E-8119 STATE OF NEBRASKA

BRIDGE ENGINEER

450'-0" MULTIPLE SPAN DECK STEEL GIRDER BRIDGE (REHAB)
61'-0" NU OPEN CONCRETE RAIL ON BRIDGE (TL4)

COUNTY GARDEN — LOCATION LEWELLEN SOUTHEAST
HWY. NO. US 26 — SKEW 0°
REF. POST 119.26 — ROADWAY 40'-0"
STA. 694+45.86 — DESIGN LIVE LOAD
DESIGNED BY TJH — DETAILED BY TJH — CHECKED BY SDM — DATE JUNE 2009

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

NDOR Nebraska Department of Roads

PROFESSIONAL STRUCTURAL ENGINEER DANIEL J. SHARP E-5375 STATE OF NEBRASKA

12-4-10

SPECIAL PLAN NO. 1

11/15

N:\brdge\ebasesheets\bilbar3.dgn

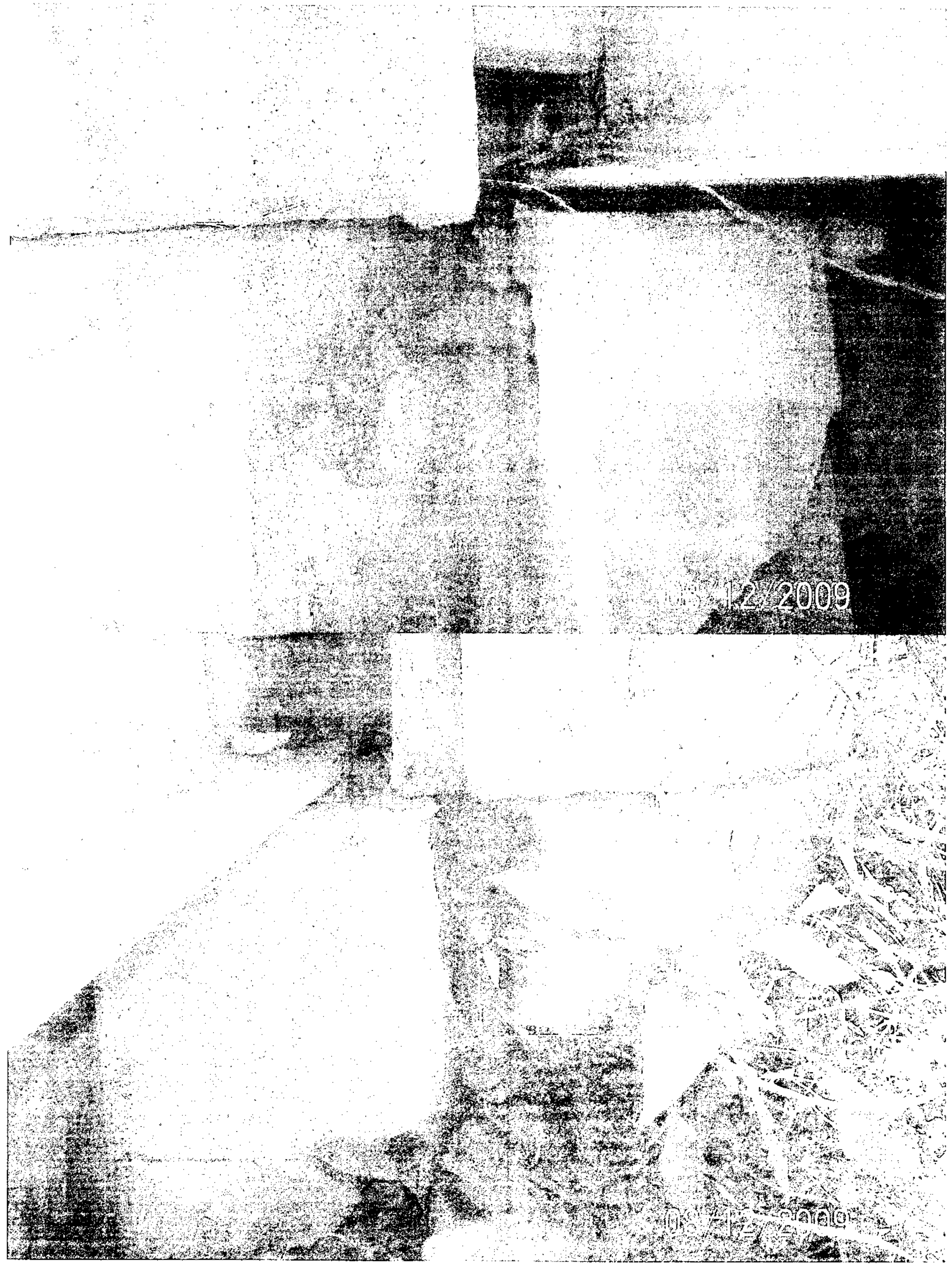
B I L L O F B A R S

	MARK	NUMBER OF BARS PHASE I	NUMBER OF BARS PHASE 2	LENGTH	TYPE	"A"	"B"	"C"	"D"	"E"	"F"		PIN	HOOK	WEIGHT — LBS PHASE I	WEIGHT — LBS PHASE II
SLAB	S601	40	40	3'-0"	105	1'-6"	1'-6"	1'-1"					4½"		180	180
SLAB	S504	80	80	1'-5"	STR.										118	118
SLAB	S505	8	8	22'-6"	STR.										188	188
SLAB	S506	8	8	20'-6"	STR.								6"		171	171
SLAB	S507	40	40	2'-2"	103	9"	8"	9"							90	90
SLAB	S401	16	16	57'-4"	STR.		Includes 1 - 2'-0" Lap Splice.								613	613
SLAB	S402	32	32	38'-3"	STR.										818	818
SLAB	S403	24	24	62'-3"			Includes 1 - 2'-0" Lap Splice.								998	998
													SUBTOTAL =		3176	3176
56'-0" Open Rail on Bridge	S690	64	64	5'-1"	104	1'-11"	3'-2"						4½"		489	489
56'-0" Open Rail on Bridge	S593	16	16	58'-2"	STR.		Include 1 - 2'-6" Lap Splice.								971	971
56'-0" Open Rail on Bridge	S492	64	64	5'-0"	104	1'-11"	3'-1"						3"		214	214
56'-0" Open Rail on Bridge	S390	60	60	4'-8"	130	1'-1½"	6½"	1'-6"	5"	5"	4½"		1½"	4"	105	105
56'-0" Open Rail on Bridge	S391	114	114	5'-2"	107	1'-5"	10"						1½"	4"	221	221
56'-0" Open Rail on Bridge	S392	24	24	7'-8"	130	1'-7½"	6½"	3'-0"	5"	5"	4½"		1½"	4"	69	69
													SUBTOTAL =		2069	2069
39'-0" Open Rail on Bridge	S690	96	96	5'-1"	104	1'-11"	3'-2"						4½"		733	733
39'-0" Open Rail on Bridge	S592	32	32	38'-6"	STR.		Include 1 - 2'-6" Lap Splice.								1285	1285
39'-0" Open Rail on Bridge	S492	96	96	5'-0"	104	1'-11"	3'-1"						3"		321	321
39'-0" Open Rail on Bridge	S390	72	72	4'-8"	130	1'-1½"	6½"	1'-6"	5"	5"	4½"		1½"	4"	126	126
39'-0" Open Rail on Bridge	S391	160	160	5'-2"	107	1'-5"	10"						1½"	4"	311	311
39'-0" Open Rail on Bridge	S392	48	48	7'-8"	130	1'-7½"	6½"	3'-0"	5"	5"	4½"		1½"	4"	138	138
													SUBTOTAL =		2914	2914
61'-0" Open Rail on Bridge	S690	108	108	5'-1"	104	1'-11"	3'-2"						4½"		825	825
61'-0" Open Rail on Bridge	S594	24	24	62'-11"	STR.		Include 1 - 2'-6" Lap Splice.								1575	1575
61'-0" Open Rail on Bridge	S492	108	108	5'-0"	104	1'-11"	3'-1"						3"		361	361
61'-0" Open Rail on Bridge	S390	108	108	4'-8"	130	1'-1½"	6½"	1'-6"	5"	5"	4½"		1½"	4"	190	190
61'-0" Open Rail on Bridge	S391	186	186	5'-2"	107	1'-5"	10"						1½"	4"	361	361
61'-0" Open Rail on Bridge	S392	36	36	7'-8"	130	1'-7½"	6½"	3'-0"	5"	5"	4½"		1½"	4"	104	104
													SUBTOTAL =		3415	3415
													TOTAL =		23148 LBS.	

NOTE: FOR PIN DIAMETERS, HOOK LENGTHS & BENDING DIAGRAMS SEE SHEET 15 OF 15.

Example shown for Abutment repair. (See pictures)
Pictures were taken at the North Abutment

All damaged concrete at abutments should be removed to sound concrete and then patch in with new concrete. Pay Item for this repair is listed under "Abutment Repair".
Contact Bridge Division with any questions.



PROJECT NUMBER	SHEET NO.
26-2(1023)	20

C.N. 61440

STRUCTURE NUMBER S026 11926

PROFESSIONAL CIVIL ENGINEER — MARK J. TRAYNOWICZ E-8119 — STATE OF NEBRASKA

BRIDGE ENGINEER

COUNTY GARDEN
HWY. NO. US 26
REF. POST. 119.26
STA. 694+45.86

LOCATION LEWELLEN SOUTHEAST
SKEW 0°
ROADWAY 40'-0"
DESIGN LIVE LOAD

450'-0" MULTIPLE SPAN DECK STEEL GIRDER BRIDGE (REHAB)
SLAB AND RAIL BILL OF BARS

DESIGNED BY TJH | DETAILED BY TJH | CHECKED BY SDM | DATE JUNE 2009

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

NDOR Nebraska Department of Roads

PROFESSIONAL STRUCTURAL ENGINEER — DANIEL J. SHARP E-5375 — STATE OF NEBRASKA

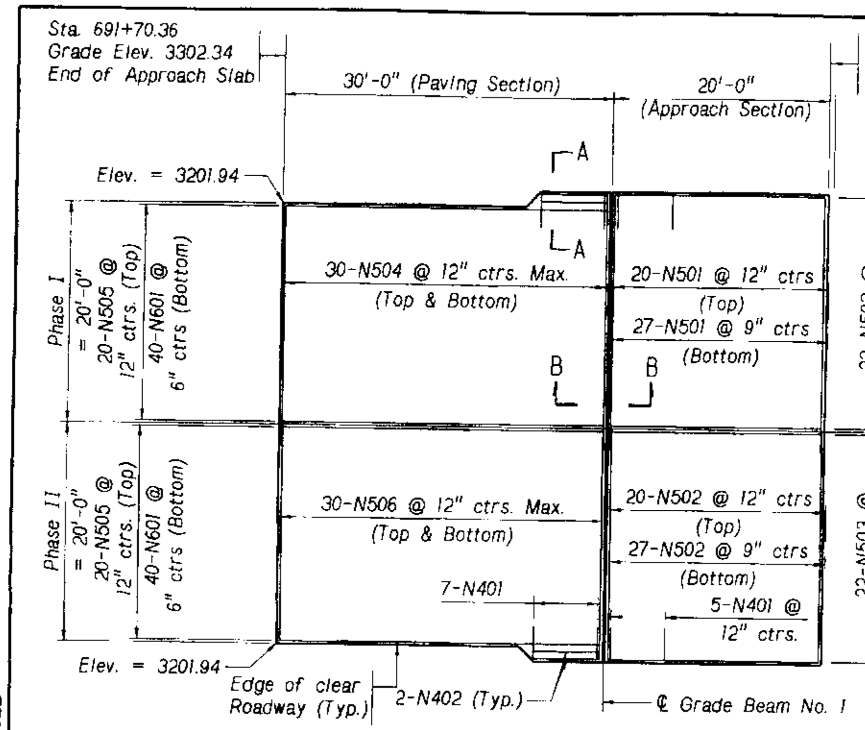
12-4-10

SPECIAL PLAN NO. 1 | 12 / 15

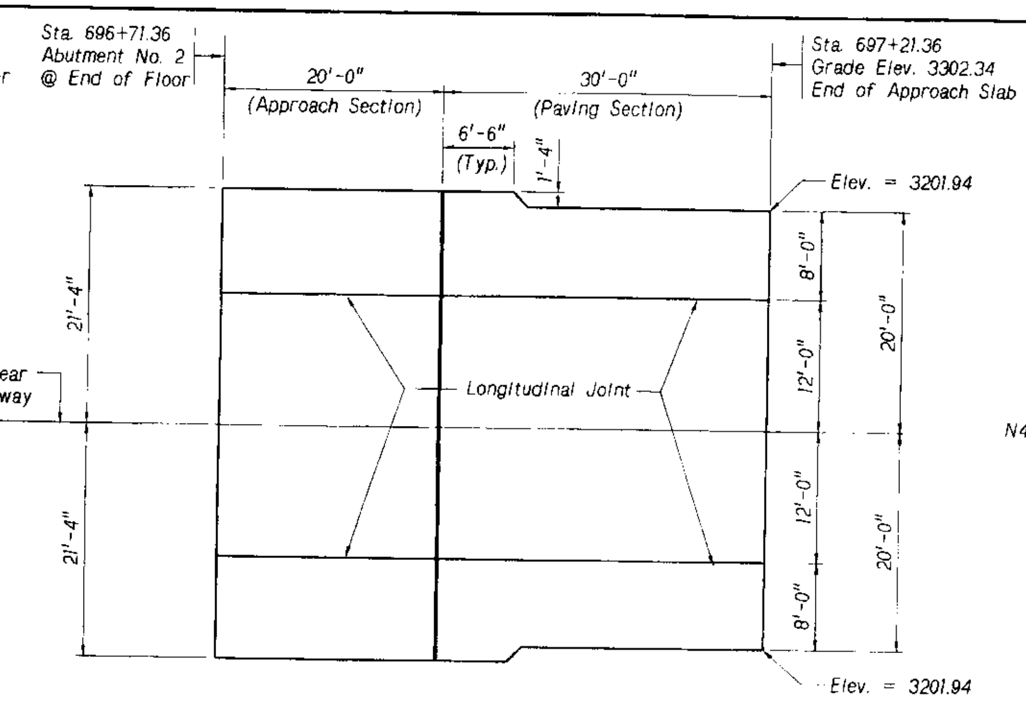
S026 11926design model approach Slab

PROJECT NUMBER 26-2(1023) SHEET NO. 21
C.N. 61440
STRUCTURE NUMBER S026 11926

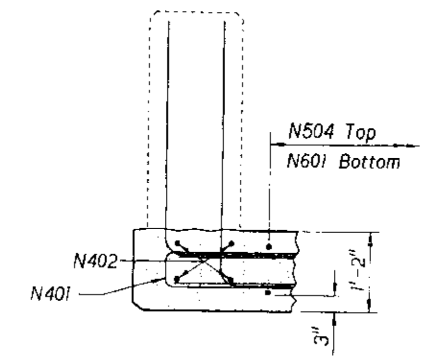
GENERAL PLAN OF APPROACH SLABS



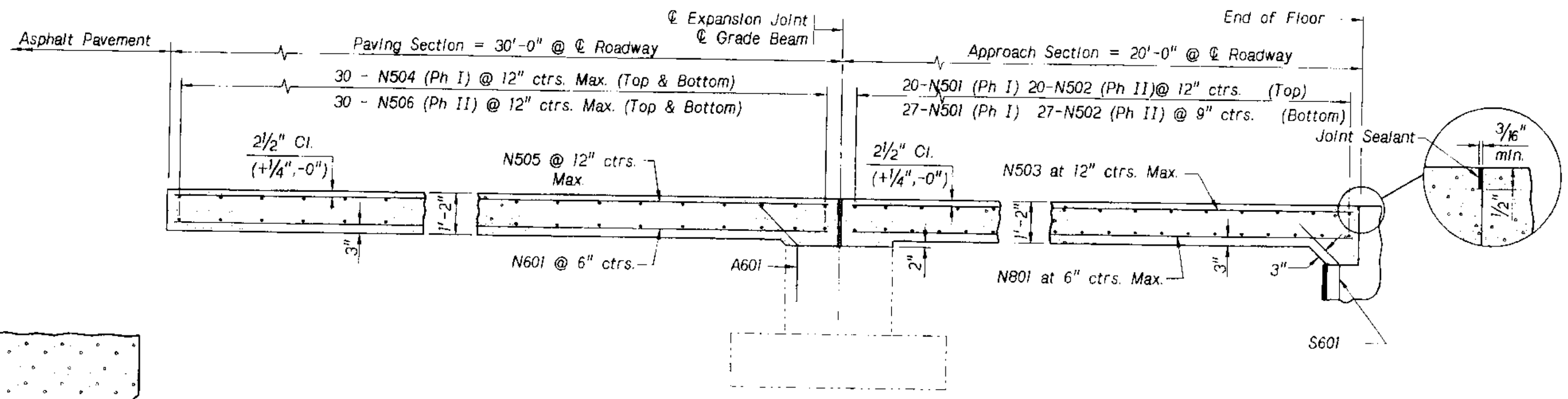
APPROACH SLAB NO. 1
SHOWING REINFORCING



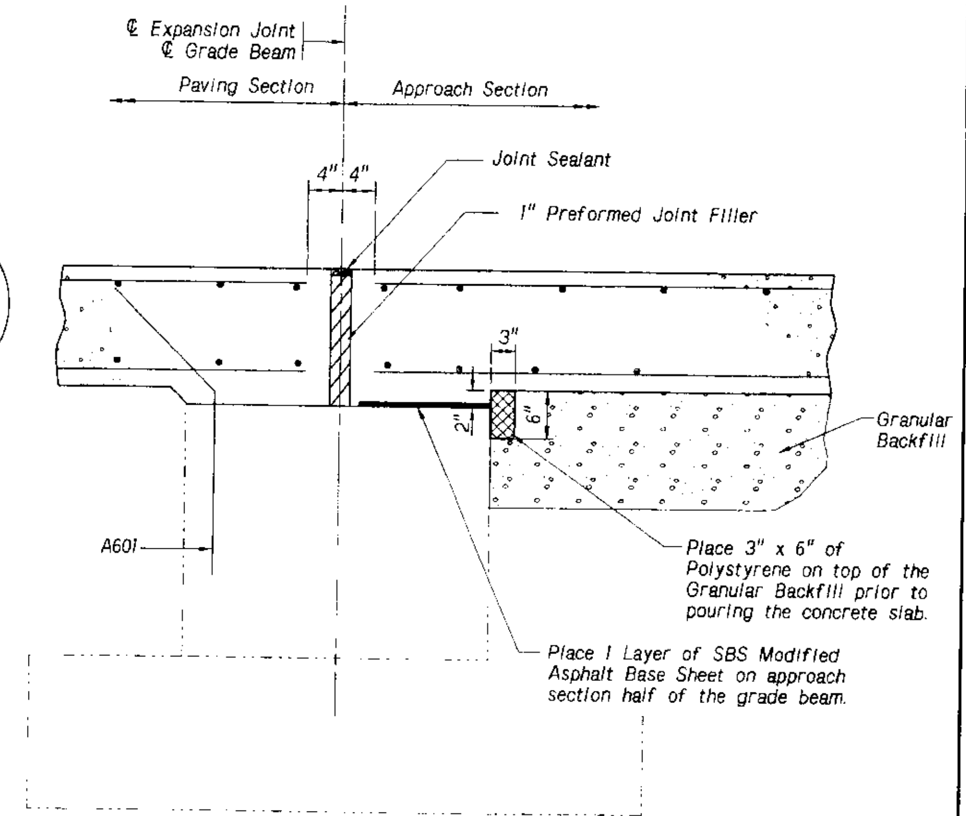
APPROACH SLAB NO. 2
SHOWING DIMENSIONS



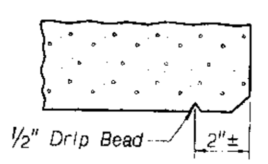
SECTION A-A
Typical



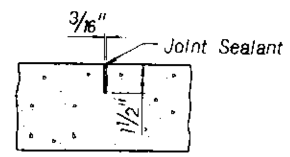
LONGITUDINAL SECTION



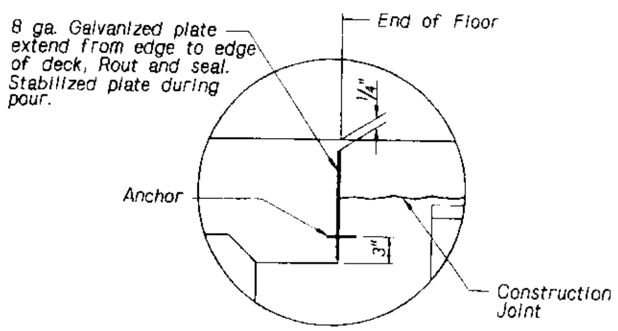
SECTION B-B



DRIP BEAD DETAIL



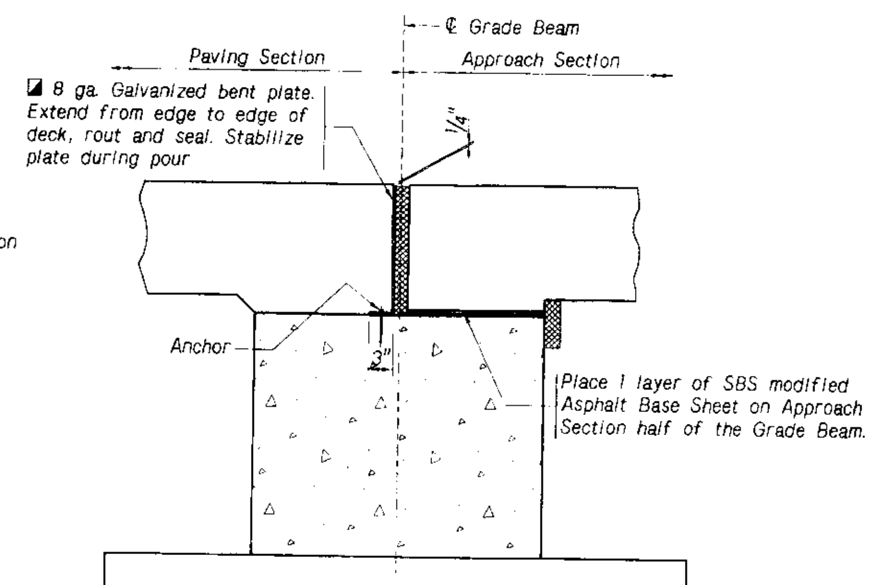
LONGITUDINAL JOINT



ALTERNATE JOINT DETAIL
AT END OF FLOOR

To be used if approach slab is poured continuous with bridge deck.

■ To be used if Approach Slab and Paving Section is poured continuous.



OPTIONAL GRADE BEAM JOINT DETAIL

APPROACH SLAB NOTES:

Concrete Rail Width = 1'-2". See sheet 13 of 14 for placement of rail reinforcement.

See Standard Specifications for tining and finishing of approach slabs.

SBS MODIFIED ASPHALT base sheets and all other miscellaneous items shall be considered subsidiary to the pay item, CONCRETE FOR PAVEMENT APPROACHES CLASS 47BD-4000.

SBS MODIFIED ASPHALT base sheets shall be modified bitumen roofing material, with a minimum thickness of 0.090 inch and a minimum weight of 60 lbs. per 100 sq. feet.

LONGITUDINAL JOINTS shall be 1½" deep and placed in the paving and approach slabs in accordance with section 603.03 paragraph 8 of the Standard Specifications. Contractor shall exercise care not to damage reinforcing steel placed in the top layer of the slabs.

The expansion gap between approach section and paving section shall be cleaned of all foreign matter before the installation of the expansion device or the filler material.

1" Preformed Joint Filler shall be be considered subsidiary to the pay item, CONCRETE FOR PAVEMENT APPPROACHES CLASS 47BD-4000.

PROFESSIONAL CIVIL ENGINEER MARK J. TRAYNOWICZ E-8119 STATE OF NEBRASKA
BRIDGE ENGINEER

450'-0" MULTIPLE SPAN
DECK STEEL GIRDER BRIDGE (REHAB)
APPROACH SLABS

COUNTY GARDEN
HWY. NO. US 26
REF. POST. 119.26
STA. 694+45.86
LOCATION LEWELLEN SOUTHEAST
SKEW 0°
ROADWAY 40'-0"
DESIGN LIVE LOAD
DESIGNED BY TJH
DETAILED BY TJH
CHECKED BY SDM
DATE JUNE 2009

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

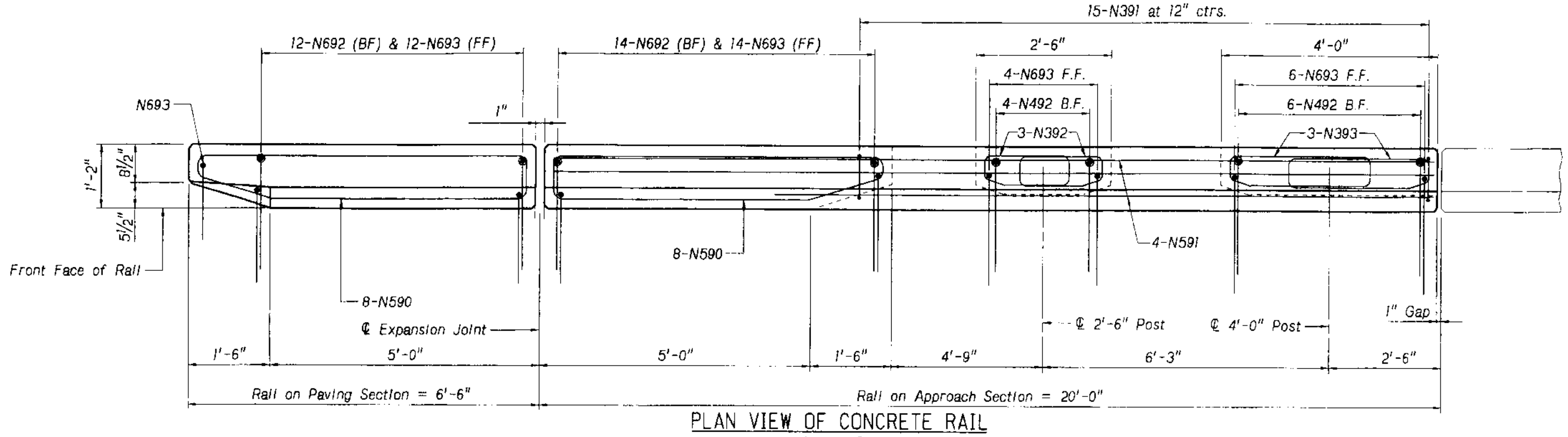
NDOR Nebraska Department of Roads

PROFESSIONAL STRUCTURAL ENGINEER DANIEL J. SHARP E-5375 STATE OF NEBRASKA
12-11-09

SPECIAL PLAN NO. 1
13/15

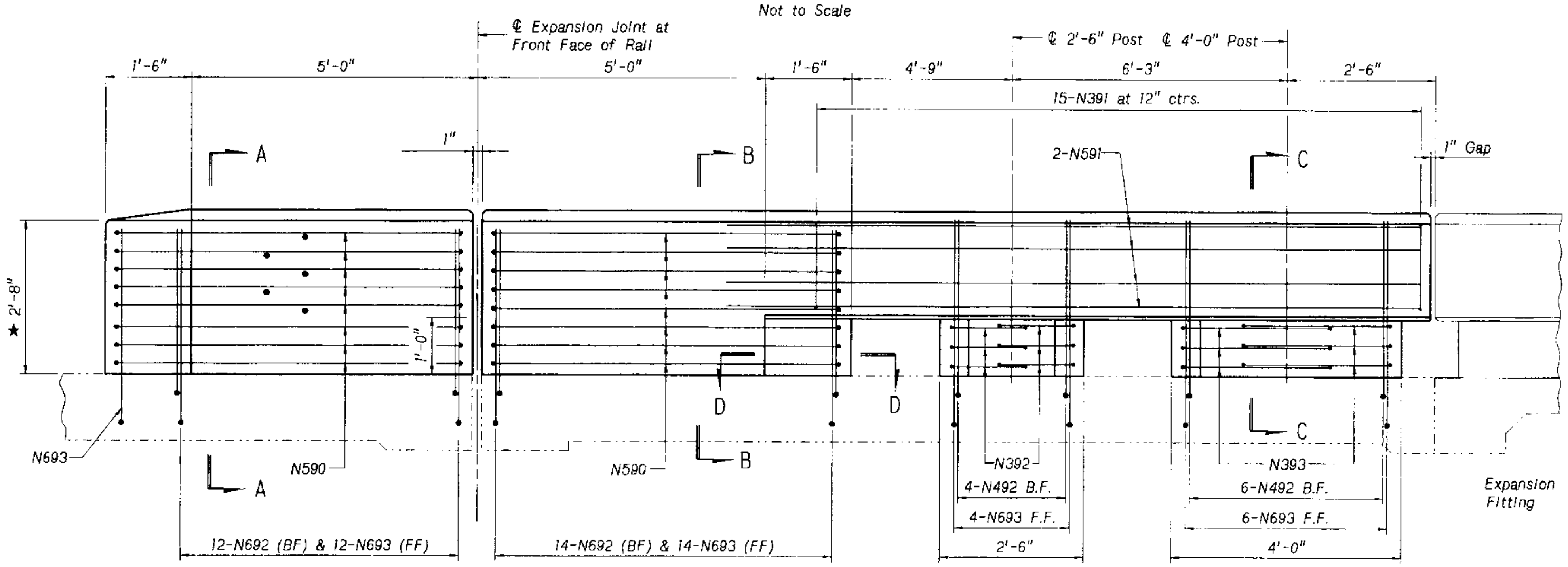
NURAIL8.DGN

S026 11926design model approach Slab



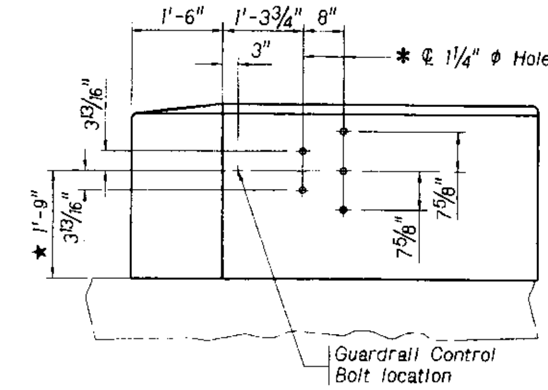
PLAN VIEW OF CONCRETE RAIL

Not to Scale



ELEVATION OF CONCRETE RAIL

Not to Scale



THRIE BEAM TERMINAL CONNECTION DETAIL

★As an alternate method, the contractor shall furnish and cast into the concrete an approved welded assembly consisting of threaded inserts, held accurately to the template of the holes shown. Inserts are to be complete with galvanized plate washers and galvanized ⅞" x 2" cap screws. The insert assembly shall be a standard product of a reputable manufacturer of such items and be capable of resisting a shear load of 80,000 lbs.

NOTES

⊚ Circled bars indicate placement in the top layer of slab reinforcement. Concrete Rail will be built plumb.

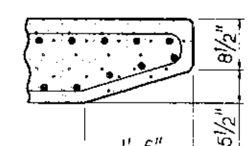
★ Measured at front face of rail.

For Bill of Bars see sheet 14 of 14.

Steel forms are required when using the 4½" rail chamfer.

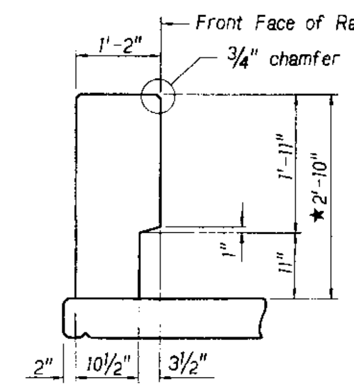
(FF) = Front Face

(BF) = Back Face

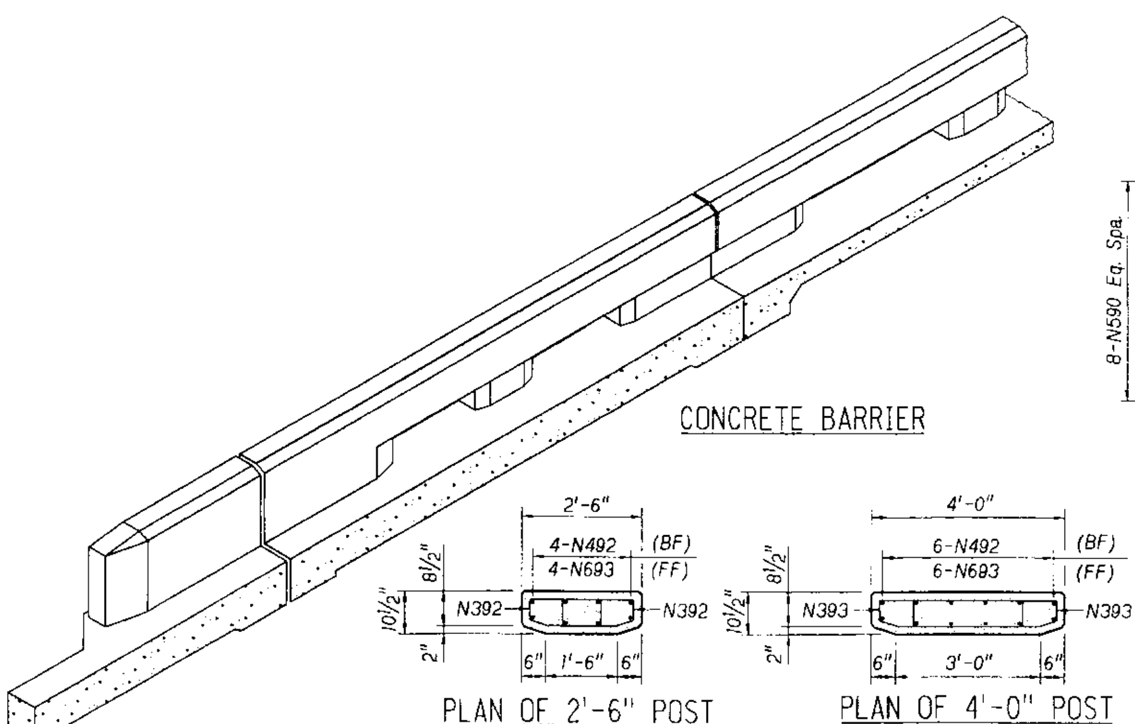


SECTION D-D

Not to Scale



ALTERNATE CHAMFER DETAIL

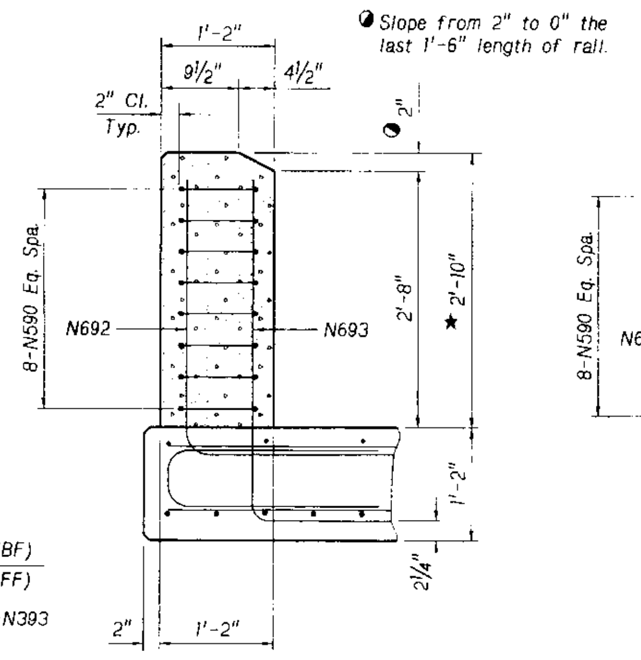


CONCRETE BARRIER

PLAN OF 2'-6" POST

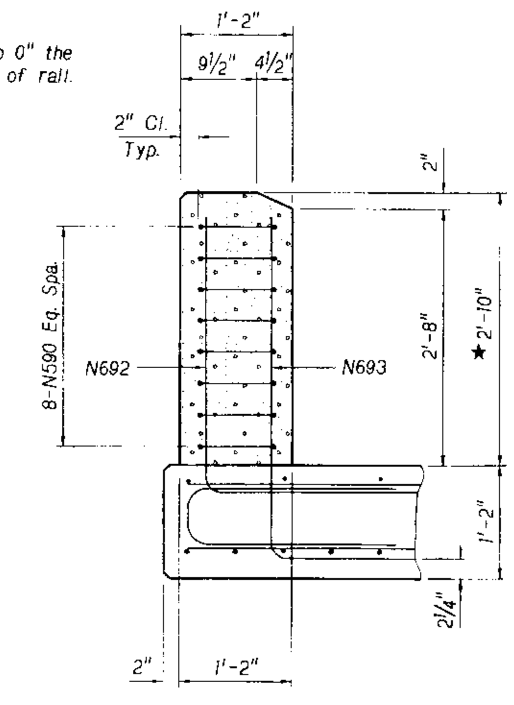
PLAN OF 4'-0" POST

◑ Slope from 2" to 0" the last 1'-6" length of rail.



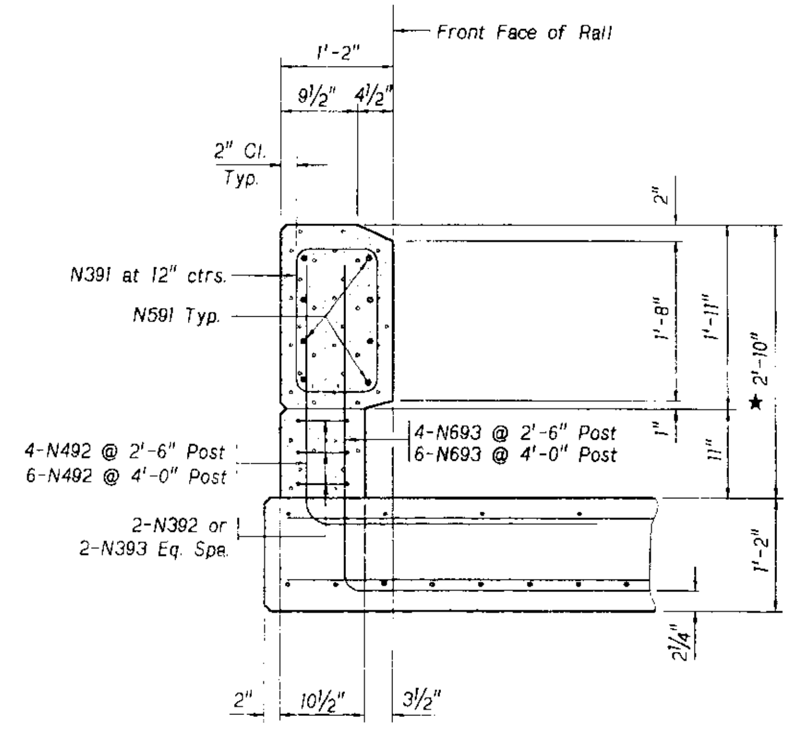
SECTION A-A

Not to Scale



SECTION B-B

Not to Scale



SECTION C-C

Not to Scale

PROJECT NUMBER	SHEET NO.
26-2(1023)	22

C.N. 61440

STRUCTURE NUMBER S026 11926

PROFESSIONAL CIVIL ENGINEER MARK J. TRAYNOWICZ E-9119 STATE OF NEBRASKA

BRIDGE ENGINEER

450'-0" MULTIPLE SPAN DECK STEEL GIRDER BRIDGE (REHAB)

NU OPEN CONCRETE RAIL

LOCATION LEWELLEN SOUTHEAST
SKEW 0°
ROADWAY 40'-0"
DESIGN LIVE LOAD

COUNTY GARDEN
HWY. NO. US 26
REF. POST 119.26
STA. 694+45.86

DESIGNED BY TJH
DETAILED BY TJH
CHECKED BY SDM
DATE JUNE 2009

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

NDOR Nebraska Department of Roads

PROFESSIONAL STRUCTURAL ENGINEER DANIEL J. SHARP E-5375 STATE OF NEBRASKA

2-4-10

SPECIAL PLAN NO. 1

14/15

BILL OF BARS

Section	MARK	NUMBER OF BARS PHASE I	PHASE 2	LENGTH	TYPE	"A"	"B"	"C"	"D"	"E"	"F"		PIN	HOOK	WEIGHT — LBS PHASE I	PHASE II
APPROACH SLAB NO. 1	N801	44	44	19'-5"	STR.										2281	2281
	N601	40	40	29'-5"	STR.										1767	1767
	N501	47		23'-1"	STR.										1132	
	N502		47	21'-1"	STR.											1034
	N503	22	22	19'-5"	STR.										446	446
	N504	60		21'-9"	STR.										1361	
	N505	20	20	29'-5"	STR.										614	614
	N506		60	19'-9"	STR.											1236
	N401	12	12	6'-8"	103	3'-0"	8"	3'-0"					4½"		53	53
	N402	4	4	6'-2"	STR.										16	16
													SUBTOTAL =		7670	7447
RAIL ON APPROACH SLAB NO. 1	N692	26	26	5'-10"	104	2'-11"	2'-11"						4½"		228	228
	N693	37	37	6'-10"	104	3'-5"	3'-5"						4½"		380	380
	N590	16	16	14'-5"	130	4'-8"	0'-10"	6'-1"	0'-5"	1'-6"	1'-5"		2½"	5½"	241	241
	N591	8	8	15'-6"	STR.										129	129
	N492	10	10	5'-10"	104	2'-11"	2'-11"						3"		39	39
	N391	15	15	5'-2"	107	1'-5"	0'-10"						1½"	4"	29	29
	N392	6	6	4'-8"	130	1'-1½"	0'-6½"	1'-6"	0'-5"	0'-5"	0'-4½"		1½"	4"	11	11
	N393	6	6	7'-8"	130	2'-7½"	0'-6½"	3'-0"	0'-5"	0'-5"	0'-4½"		1½"	4"	17	17
													SUBTOTAL =		1074	1074
APPROACH SLAB NO. 2	N801	44	44	19'-5"	STR.										2281	2281
	N601	40	40	29'-5"	STR.										1767	1767
	N501	47		23'-1"	STR.										1132	
	N502		47	21'-1"	STR.											1034
	N503	22	22	19'-5"	STR.										446	446
	N504	60		21'-9"	STR.										1361	
	N505	20	20	29'-5"	STR.										614	614
	N506		60	19'-9"	STR.											1236
	N401	12	12	6'-8"	103	3'-0"	8"	3'-0"					4½"		53	53
	N402	4	4	6'-2"	STR.										16	16
													SUBTOTAL =		7670	7447
RAIL ON APPROACH SLAB NO. 2	N692	26	26	5'-10"	104	2'-11"	2'-11"						4½"		228	228
	N693	37	37	6'-10"	104	3'-5"	3'-5"						4½"		380	380
	N590	16	16	14'-5"	130	4'-8"	0'-10"	6'-1"	0'-5"	1'-6"	1'-5"		2½"	5½"	241	241
	N591	8	8	15'-6"	STR.										129	129
	N492	10	10	5'-10"	104	2'-11"	2'-11"						3"		39	39
	N391	15	15	5'-2"	107	1'-5"	0'-10"						1½"	4"	29	29
	N392	6	6	4'-8"	130	1'-1½"	0'-6½"	1'-6"	0'-5"	0'-5"	0'-4½"		1½"	4"	11	11
	N393	6	6	7'-8"	130	2'-7½"	0'-6½"	3'-0"	0'-5"	0'-5"	0'-4½"		1½"	4"	17	17
													SUBTOTAL =		1074	1074

TOTAL = 34530 LBS.

S026 11926design model approach Slab

BAR MARK

A413 A 4 13

- bar number.
  - 01 thru 49, general reinforcing
  - 70 thru 79, light pole reinforcing
  - 90 thru 99, curb or rail reinforcing
- bar size
- type of bridge element - A=Abutment (P=Pier, B=Bent, S=Slab, N=Approach Slab)

BAR SETS

MARK	MAX. LENGTH	MIN. LENGTH	NO. OF SETS	BARS PER SET

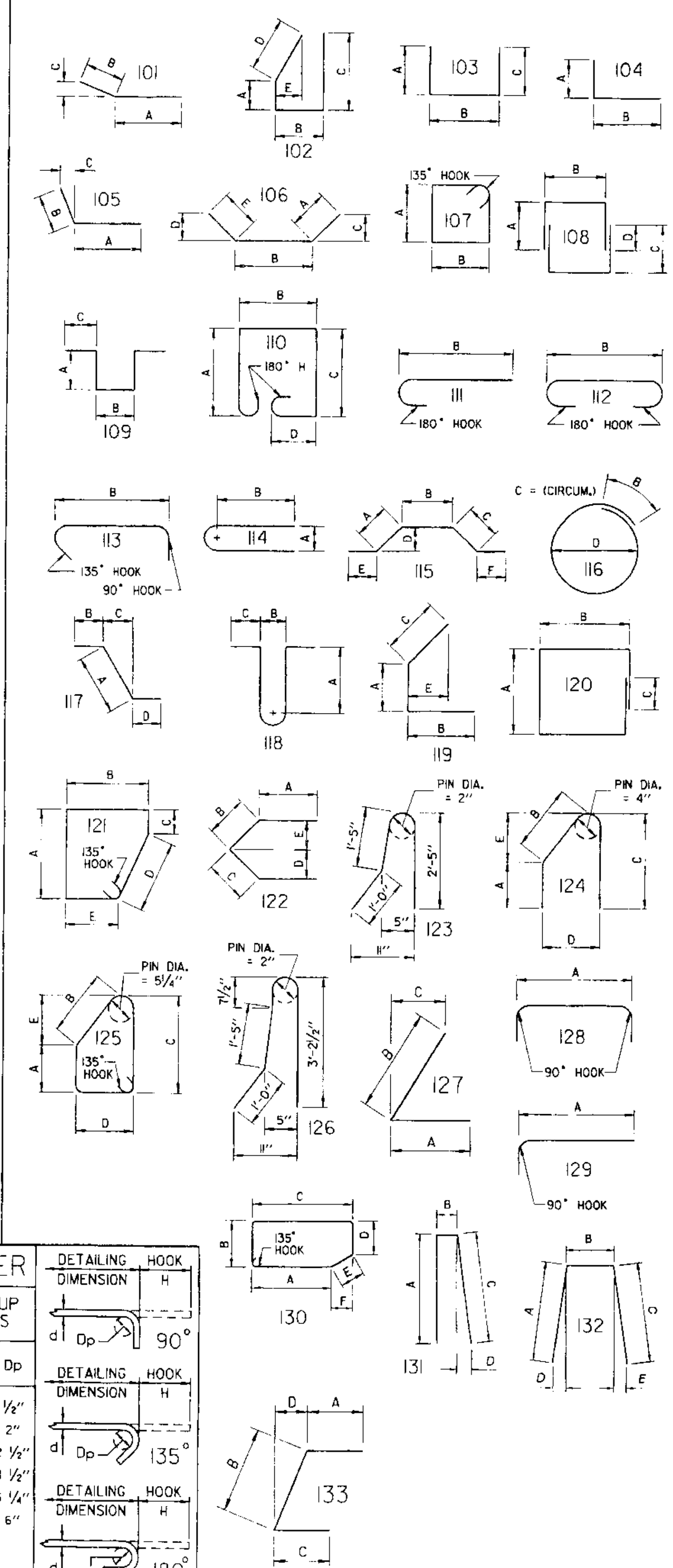
BAR SETS

MARK	MAX. LENGTH	MIN. LENGTH	NO. OF SETS	BARS PER SET

BENDING DIAGRAMS

ALL DIMENSIONS ARE OUT TO OUT & NOT TO SCALE

ALL REINFORCING STEEL SHALL BE EPOXY COATED



STANDARD HOOK LENGTH

PRIMARY STRESS BARS BAR SIZE	HOOK H 90°	HOOK H 180°	STIRRUPS AND TIES BAR SIZE	HOOK H 90°	HOOK H 135°
4	8"	6"	3	4"	4"
5	10"	7"	4	4 ½"	4 ½"
6	12"	8"	5	6"	5 ½"
7	15"	10"	6	12"	8"
8	17"	11"	7	14"	9"
9	19"	15"	8	16"	10 ½"
10	23"	17"			
11	24"	19"			

d = BAR SIZE
Dp = PIN DIAMETER

PIN DIAMETER

PRIMARY STRESS BAR SIZE	Dp	STIRRUP & TIES BAR SIZE	Dp
4	3"	3	1 ½"
5	3 ¾"	4	2"
6	4 ½"	5	2 ½"
7	5 ¼"	6	4 ½"
8	6"	7	5 ¼"
9	9½"	8	6"
10	11"		
11	12"		

DETAILING DIMENSION — HOOK H — 90°

DETAILING DIMENSION — HOOK H — 135°

DETAILING DIMENSION — HOOK H — 180°

PROJECT NUMBER 26-2(1023) SHEET NO. 23

C.N. 61440

STRUCTURE NUMBER S026 11926

PROFESSIONAL CIVIL ENGINEER MARK J. TRAYNOWICZ E-8119 STATE OF NEBRASKA

BRIDGE ENGINEER

450'-0" MULTIPLE SPAN DECK STEEL GIRDER BRIDGE (REHAB)

APPROACH SLAB BILL OF BARS

COUNTY GARDEN
HWY. NO. US 26
REF. POST. 119.26
STA. 694+45.86

LOCATION LEWELLEN SOUTHEAST
SKEW 0°
ROADWAY 40'-0"
DESIGN LIVE LOAD

DATE JUNE 2009
CHECKED BY SDM
DETAILED BY TJH
DESIGNED BY TJH

STATE OF NEBRASKA - DEPARTMENT OF ROADS - BRIDGE DIVISION

NDOR Nebraska Department of Roads

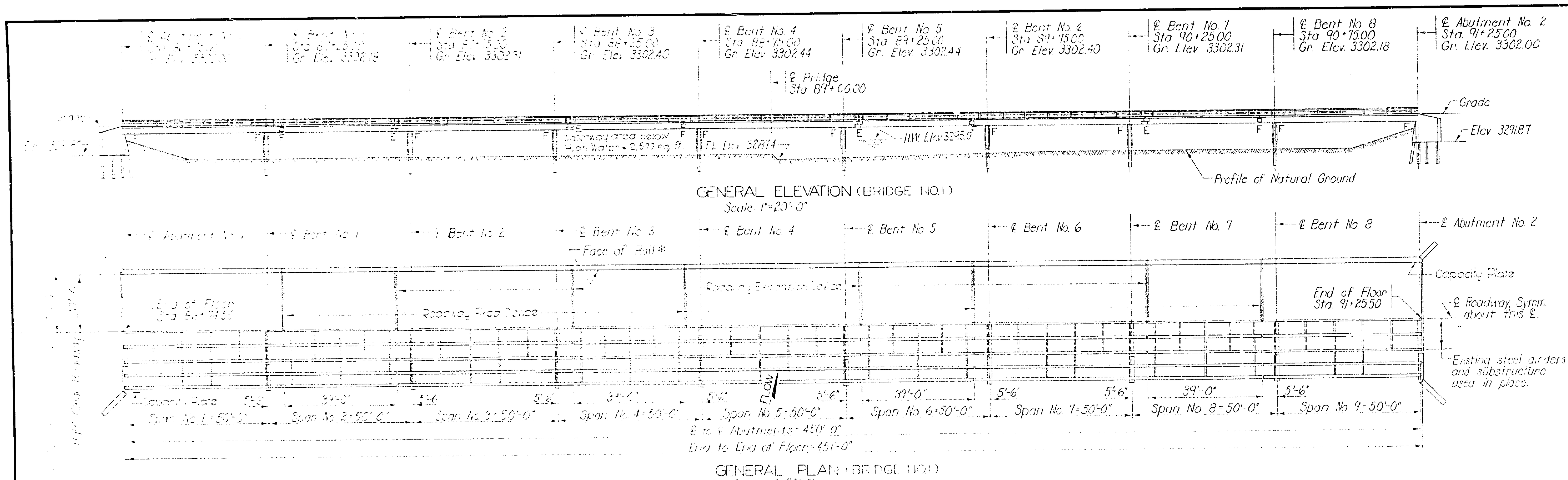
PROFESSIONAL STRUCTURAL ENGINEER DANIEL J. SHARP E-5375 STATE OF NEBRASKA

2-4-10

SPECIAL PLAN NO. 1

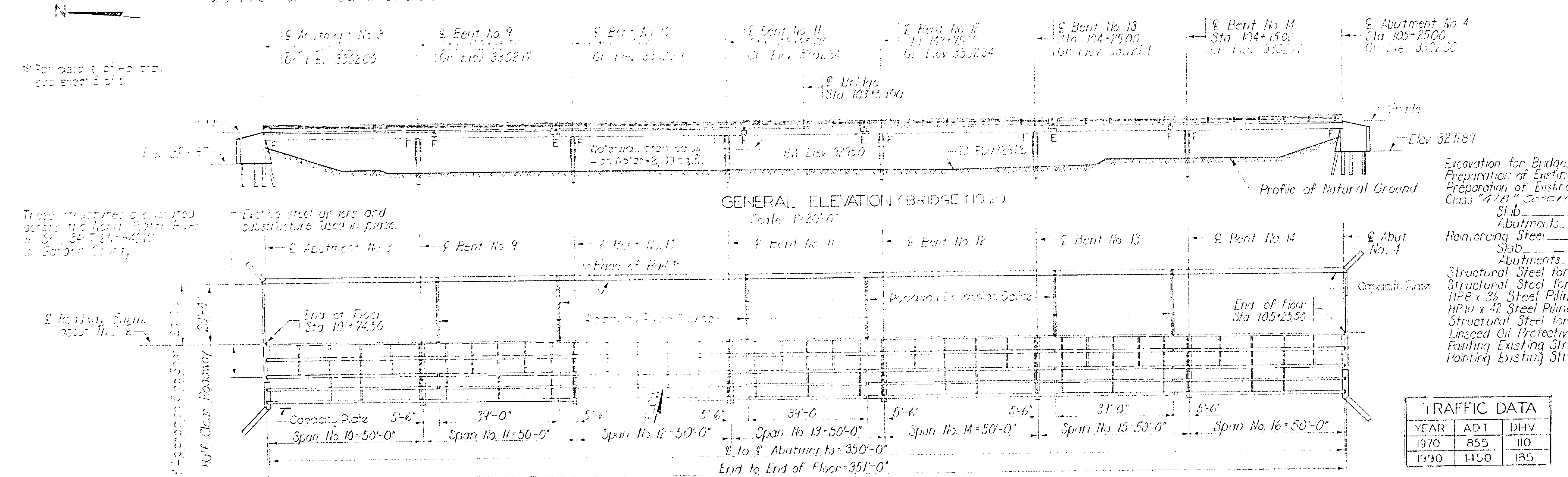
15/15

FED. ROAD REG. NO.	STATE NEBR.	FED. AID PROJECT NO.	SHEET NO.
7		26 (119.26), 26 (119.54)	4



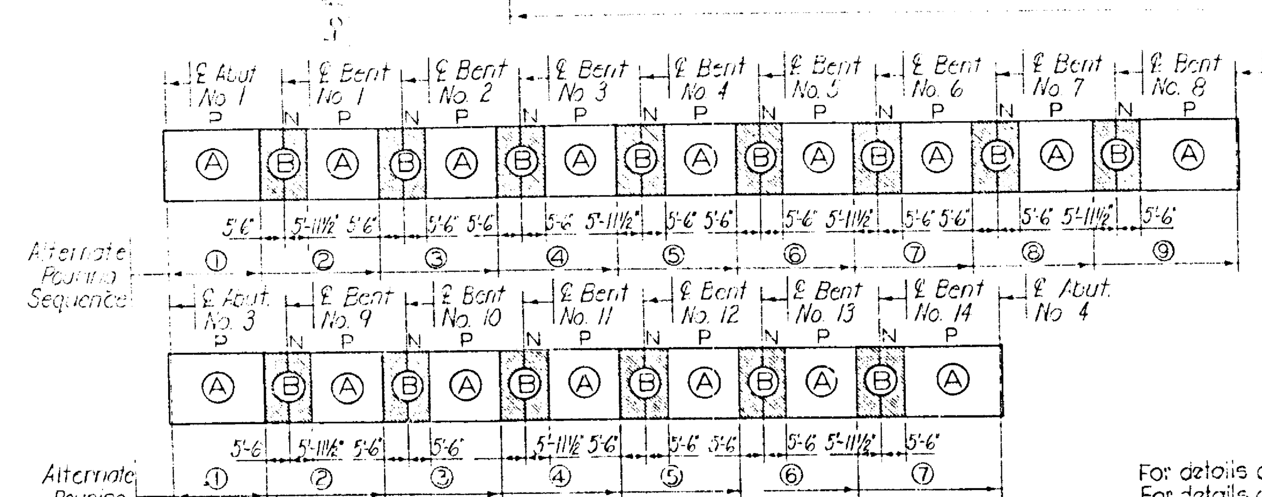
GENERAL ELEVATION (BRIDGE NO.1)
Scale: 1"=20'-0"

GENERAL PLAN (BRIDGE NO.1)
Scale: 1"=20'-0"



GENERAL ELEVATION (BRIDGE NO.2)
Scale: 1"=20'-0"

GENERAL PLAN (BRIDGE NO.2)
Scale: 1"=20'-0"



POURING DIAGRAMS
Not to scale

P = Positive Moment Section
N = Negative Moment Section

ORIGINAL POURING SEQUENCE

Section "B" shall be poured after adjacent "A" sections have been poured. Section "B" may be poured continuous with either section "A", providing the other adjacent section "A" has been poured.

ALTERNATE POURING SEQUENCE

Pour slab in numerical order as shown. Slab may be placed in 1 to 9 pours or 1 to 7 pours.

For details of Surface finish for concrete, see Standard Plan No. 1562-C.
For details of Capacity Plate, except as shown, see Standard Plan No. 1747-R1.
For details of Guardrail Element, see Standard Plan No. 420-F-R11.

NOTES

Before ordering any material the contractor shall make a detailed field inspection of the existing structures and report any discrepancies between his measurements and those shown on this set of plans to the Engineer.

This structure is designed in accordance with the 10th edition of the A.A.S.H.O. "Standard Specifications for Highway Bridges".

All concrete shall be Class "47B" with a working stress of 1,200 psi.

All exposed edges of concrete shall be chamfered.

All existing concrete coming in contact with new concrete shall be roughened and cleaned prior to placing the new concrete.

The minimum clearance measured from the face of the concrete to the surface of any reinforcing bar shall be 2 inches, except as shown.

All reinforcing steel shall conform to the requirements of A.S.T.M. Designation A615 or A617, Grade 40, except that Grade 60 may be substituted for Grade 40.

The working stress for reinforcing steel is 20,000 psi.

All reinforcing steel encountered in breaking back the existing structure shall be cleaned, straightened and extended a minimum of 2 feet into the new concrete.

The item "Preparation of existing structures at Sta. 89+00.0 and Sta. 103+50.0" shall be in accordance with the Special Provisions.

The furnishing and placing of Capacity Plates, drain tiles and Elastomeric Compression Seals shall not be paid for directly, but shall be considered subsidiary to other items for which payment is made.

Bridge Deck shall be finished with a mechanical bridge finisher.

AS BUILT

QUANTITIES

	TOTAL	STA. 89+00.00	STA. 103+50.00	
Excavation for Bridges	120	60	60	Cu. Yds.
Preparation of Existing Structures at Sta. 89+00.00	1	1		Each
Preparation of Existing Structures at Sta. 103+50.00	1		1	Each
Class "47B" Concrete	846.2	471.5	374.7	Cu. Yds.
Slab	790.8	443.8	347.0	Cu. Yds.
Abutments	55.4	27.7	27.7	Cu. Yds.
Reinforcing Steel	173,075	96,995	76,080	Pounds
Slab	168,745	94,830	73,915	Pounds
Abutments	4,330	2,165	2,165	Pounds
Structural Steel for Superstructure	372,185	208,825	163,360	Pounds
Structural Steel for Substructure	35,920	20,480	15,440	Pounds
HP8 x 36 Steel Piling *As Built	*1760 ~~1520~~	*880 ~~760~~	*880 ~~760~~	Lin. Ft.
HP10 x 42 Steel Piling	2,800	1,600	1,200	Lin. Ft.
Structural Steel for Bridge Rail	75,625	42,560	33,065	Pounds
Linseed Oil Protective Coating	3,860	2,170	1,690	Sq. Yds.
Painting Existing Structure at Sta. 89+00.00	1	1		Each
Painting Existing Structure at Sta. 103+50.00	1		1	Each

EXISTING STRUCTURES PROJ. 249-C(3)-1 DATE: MAY 1939

TRAFFIC DATA		
YEAR	ADT	DHV
1970	855	110
1990	1450	185

REVISIONS		
DATE	DESCRIPTION	BY

STRUCTURAL STEEL FOR BRIDGE RAIL

BRIDGE NO. 1	898.0 Lin. Ft. of Beam W6×20	TOTAL WEIGHT 42,560 LBS.
	904.0 Lin. Ft. of Standard Guard Rail (10 Gage)	
	158 Splice Plates 6"×½"×1'-0½"	
	158 ⅝" φ End Welded Studs	
	116 Rail Post Assemblies	
	8 Rail Expansion Joint Assemblies	
BRIDGE NO. 2	698.5 Lin. Ft. of Beam W6×20	TOTAL WEIGHT 33,065 LBS.
	702.0 Lin. Ft. of Standard Guard Rail (10 Gage)	
	124 Splice Plates 6"×½"×1'-0½"	
	124 ⅝" φ End Welded Studs	
	90 Rail Post Assemblies	
	6 Rail Expansion Joint Assemblies	

STATE OF NEBRASKA
DEPARTMENT OF ROADS -- BRIDGE DIVISION

MULTIPLE SPANS DECK STEEL GIRDER
BRIDGE WIDENING-CANTILEVER TYPE

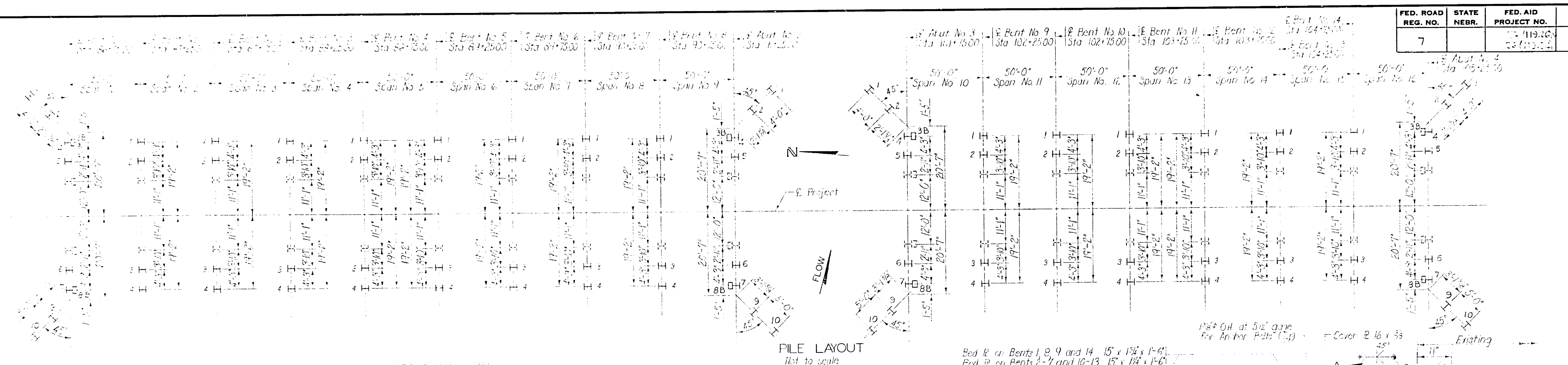
STATE ROAD OSHKOSH-OGALLALA — 0° **SKEW**
HWY. NO. US 26 — H20-44 **DESIGN**
REF. POST 119.26 AND 119.54 — 40 FT. **ROADWAY**
COUNTY GARDEN — **STA.** 89+00.00, 103+50.00

DESIGNED BY C.M.	BRIDGE ENGINEER	PLAN NUMBER 26-119.26 AND 119.54
DETAILED BY V.W.S.		SHEET NUMBER 1
CHECKED BY C.S.	DIRECTOR -- STATE ENGINEER	NUMBER SHEETS 5
DATE APRIL, 1973		

UC

STATE OF NEBRASKA 1000 4-71 DEPARTMENT OF ROADS

FED. ROAD REG. NO.	STATE	FED. AID PROJECT NO.	SHEET NO.
7	NEBR.	[illegible]	5



PILE LAYOUT
Not to scale

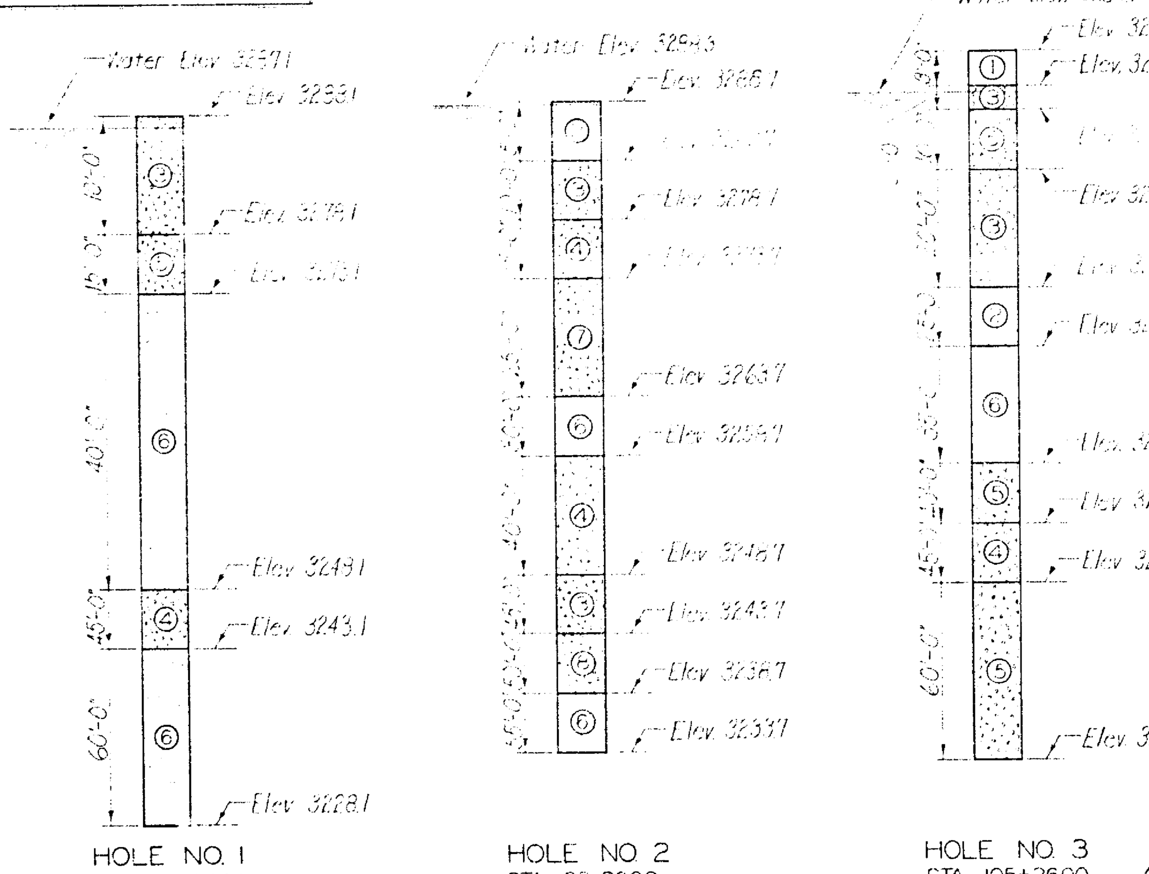
PILE DRIVING DATA FROM-1940 PROJECT NO 249-C(3)-1				
LOCATION	PILE TYPE	AVERAGE LENGTH IN PLACE (FEET)	** AVERAGE BEARING (TONS)	AVERAGE FALL OF HAMMER (FEET)
ABUTMENT NO. 1	HP 8 x 31	50.7	19.05	15
BENT NO 1	HP 10 x 42	45.5	31.10	13
BENT NO 2	HP 10 x 42	45.5	23.40	15
BENT NO 3	HP 10 x 42	45.5	29.05	15
BENT NO 4	HP 10 x 42	45.5	28.20	15
BENT NO 5	HP 10 x 42	45.5	30.10	15
BENT NO 6	HP 10 x 42	45.5	30.10	15
BENT NO 7	HP 10 x 42	45.5	26.55	15
BENT NO 8	HP 10 x 42	45.5	26.55	15
ABUTMENT NO 2	HP 8 x 31	50.4	19.05	12
ABUTMENT NO 3	HP 8 x 31	52.6	19.05	15
BENT NO 9	HP 10 x 42	45.0	31.10	15
BENT NO 10	HP 10 x 42	45.0	33.40	15
BENT NO 11	HP 10 x 42	45.0	33.40	15
BENT NO 12	HP 10 x 42	45.0	28.20	15
BENT NO 13	HP 10 x 42	45.0	28.20	15
BENT NO 14	HP 10 x 42	45.0	33.40	15
ABUTMENT NO 4	HP 8 x 31	50.1	19.89	15

1940 Piling driven with gravity hammer. Weight = 3100 Lbs
** Indicates bearing capacity calculated using current formula.

DESIGN PILE BEARING	
ABUTMENTS	20 TONS/PILE
WINGS	10 TONS/PILE
BENTS	25 TONS/PILE

PILE DATA					
LOCATION	PILE NO	PILE CUT-OFF ELEVATION	MINIMUM PENET BELOW CO	ORDER LENGTH	PILE TYPE
ABUTMENT NO 1	1,2,4-7,9 & 10	* 3298.93	32	35	HP 8 x 36
	3B AND 8B	* 3297.43	47	50	
BENT NO 1	1 - 4	* 3298.95	47	50	HP 10 x 42
BENT NO 2	1 - 4	* 3299.10	47	50	HP 10 x 42
BENT NO 3	1 - 4	* 3299.19	47	50	HP 10 x 42
BENT NO 4	1 - 4	* 3299.23	47	50	HP 10 x 42
BENT NO 5	1 - 4	* 3299.23	47	50	HP 10 x 42
BENT NO 6	1 - 4	* 3299.19	47	50	HP 10 x 42
BENT NO 7	1 - 4	* 3299.10	47	50	HP 10 x 42
BENT NO 8	1 - 4	* 3298.95	47	50	HP 10 x 42
ABUTMENT NO 2	1,2,4-7,9 & 10	* 3298.93	32	35	HP 8 x 36
	3B AND 8B	* 3297.43	47	50	
ABUTMENT NO 3	1,2,4-7,9 & 10	* 3298.93	32	35	HP 8 x 36
	3B AND 8B	* 3297.43	47	50	
BENT NO 9	1 - 4	* 3298.94	47	50	HP 10 x 42
BENT NO 10	1 - 4	* 3299.08	47	50	HP 10 x 42
BENT NO 11	1 - 4	* 3299.13	47	50	HP 10 x 42
BENT NO 12	1 - 4	* 3299.13	47	50	HP 10 x 42
BENT NO 13	1 - 4	* 3299.08	47	50	HP 10 x 42
BENT NO 14	1 - 4	* 3298.94	47	50	HP 10 x 42
ABUTMENT NO 4	1,2,4-7,9 & 10	* 3298.93	32	35	HP 8 x 36
	3B AND 8B	* 3297.43	47	50	

* These elevations are to match the existing cut-off elevations of the appropriate bent and .08' higher than existing cut-off elevations of the appropriate abutment.



HOLE NO. 1
STA. 77+56.00

HOLE NO. 2
STA. 93+26.00

HOLE NO. 3
STA. 105+26.00

LOG OF BORINGS

The borings as logged on these plans represent the character of the subsoil at the locations indicated. No guarantee is made that the subsoil conditions vary uniformly between or outside the given locations.

CLASSIFICATION OF MATERIALS

1. Fine Sand
2. Coarse Sand
3. Coarse Sand to Fine Sand Gravel
4. Fine Sand to Fine Sand Gravel
5. Coarse Sand to Coarse Sand Gravel
6. Fine to Coarse Sand
7. Sand to Coarse Sand Gravel
8. Fine Sand to Coarse Sand Gravel

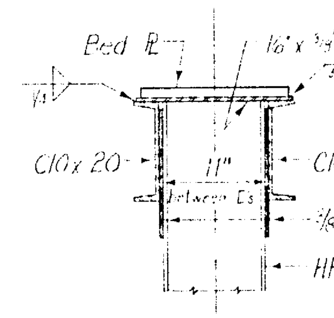
As Built Pile Data

Total Length	Pile Splices	Lowest Bearing	Hi-est. Br-ing	Location
*340	*4	22.4	31.1	Abut.
100		22.4	31.1	No. 1
200		29.5	30.7	Bent No. 1
200		29.5	31.2	Bent No. 2
200		29.5	29.5	Bent No. 3
200		29.5	32.7	Bent No. 4

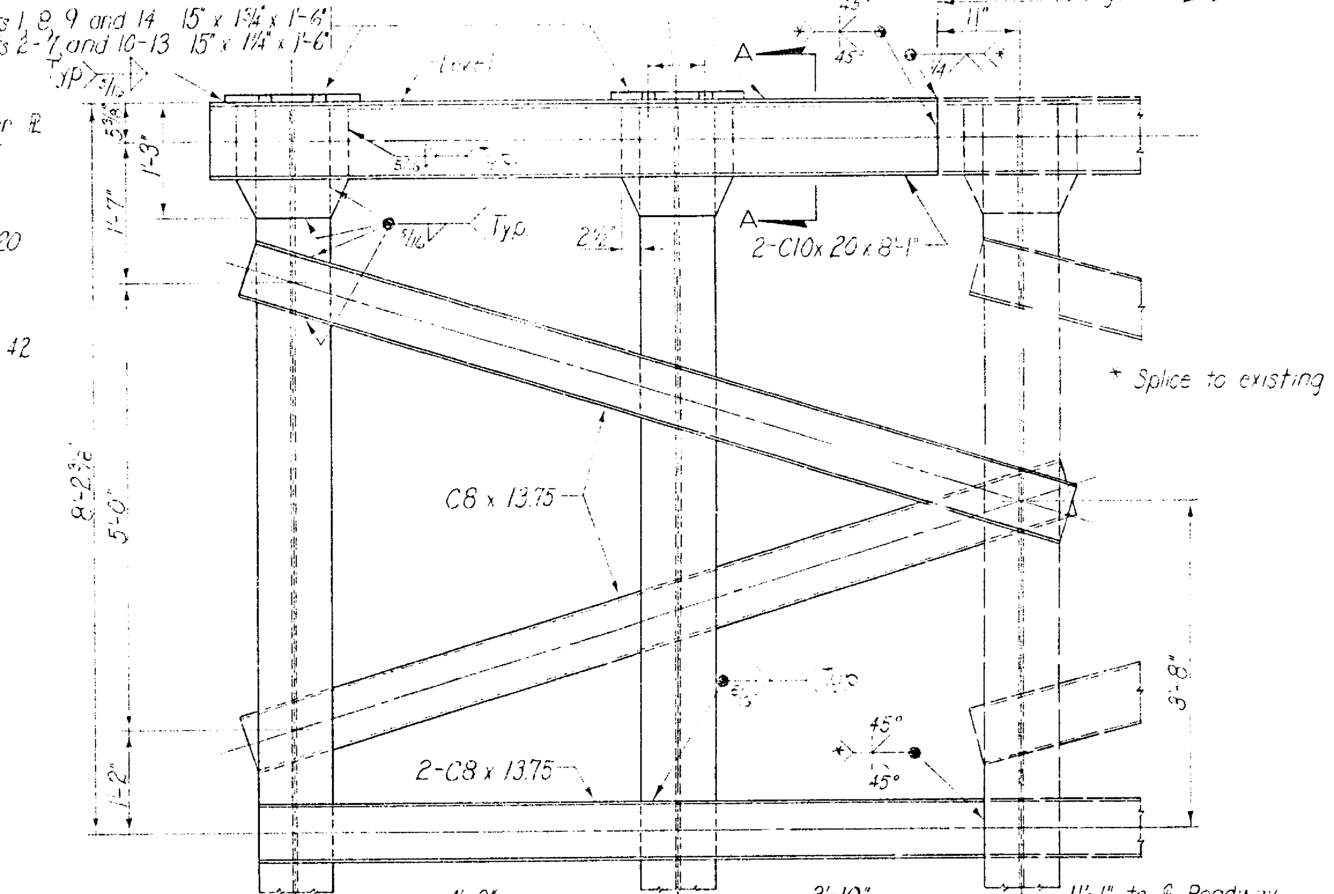
1940 As Built Pile Data (Cont'd.)

200		29.5	30.7	Bent No. 5
200		29.5	34.8	Bent No. 6
200		29.5	32.7	Bent No. 7
200		29.5	39.8	Bent No. 8
*340	*4	13.7	34.5	Abut.
100		13.7	34.5	No. 2
*340	*4	12.1	27.0	Abut.
100		12.1	27.0	No. 3
200		29.5	29.5	Bent No. 9
200		28.6	30.7	Bent No. 10
200		29.5	29.5	Bent No. 11
200		29.5	32.7	Bent No. 12
200		29.5	32.7	Bent No. 13
200		29.5	30.7	Bent No. 14
*340	*4	14.7	25.4	Abut.
100		14.7	25.4	No. 4
Total Lgth.	Pile Splcs.	Lowest Bearing	Hi-est. Br-ing	Location

* Pile Splices of 15' Added on to Pile No's. 4, 5, 6 & 7.

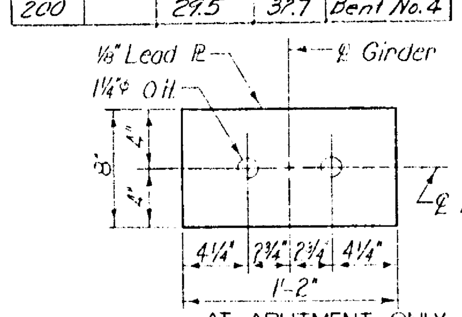


SECTION A-A
Scale: 1"=1'-0"

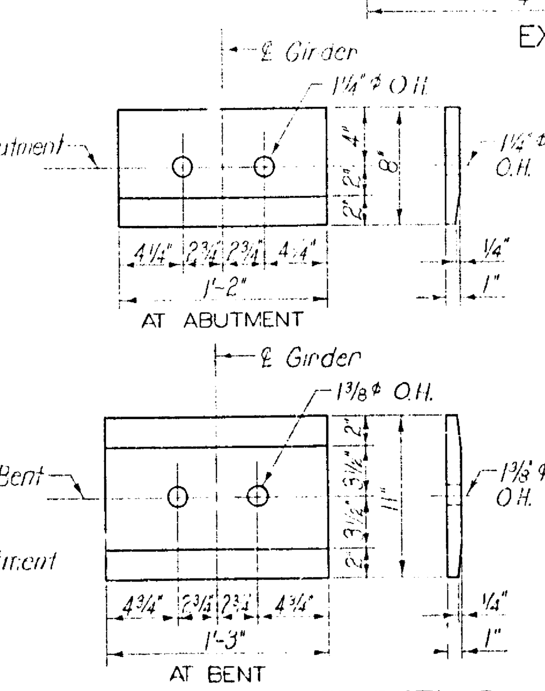


EXTENSION BENT ELEVATION
Scale: 3/4"=1'-0"

AS BUILT



AT ABUTMENT ONLY
LEAD PLATE DETAIL
Scale: 1½"=1'-0"



AT ABUTMENT

AT BENT
BEARING PLATE DETAILS
Scale: 1½"=1'-0"

REVISIONS		
DATE	DESCRIPTION	BY

STATE OF NEBRASKA
DEPARTMENT OF ROADS -- BRIDGE DIVISION
MULTIPLE SPANS DECK STEEL GIRDER
BRIDGE WIDENING-CANTILEVER TYPE

STATE ROAD OSHKOSH-OGALLALA
HWY. NO. US 26
REF. POST 119.26 AND 119.54
COUNTY GARDEN

0° SKEW
H20-44 DESIGN
40 FT. ROADWAY
STA. 89+00.00 103+50.00

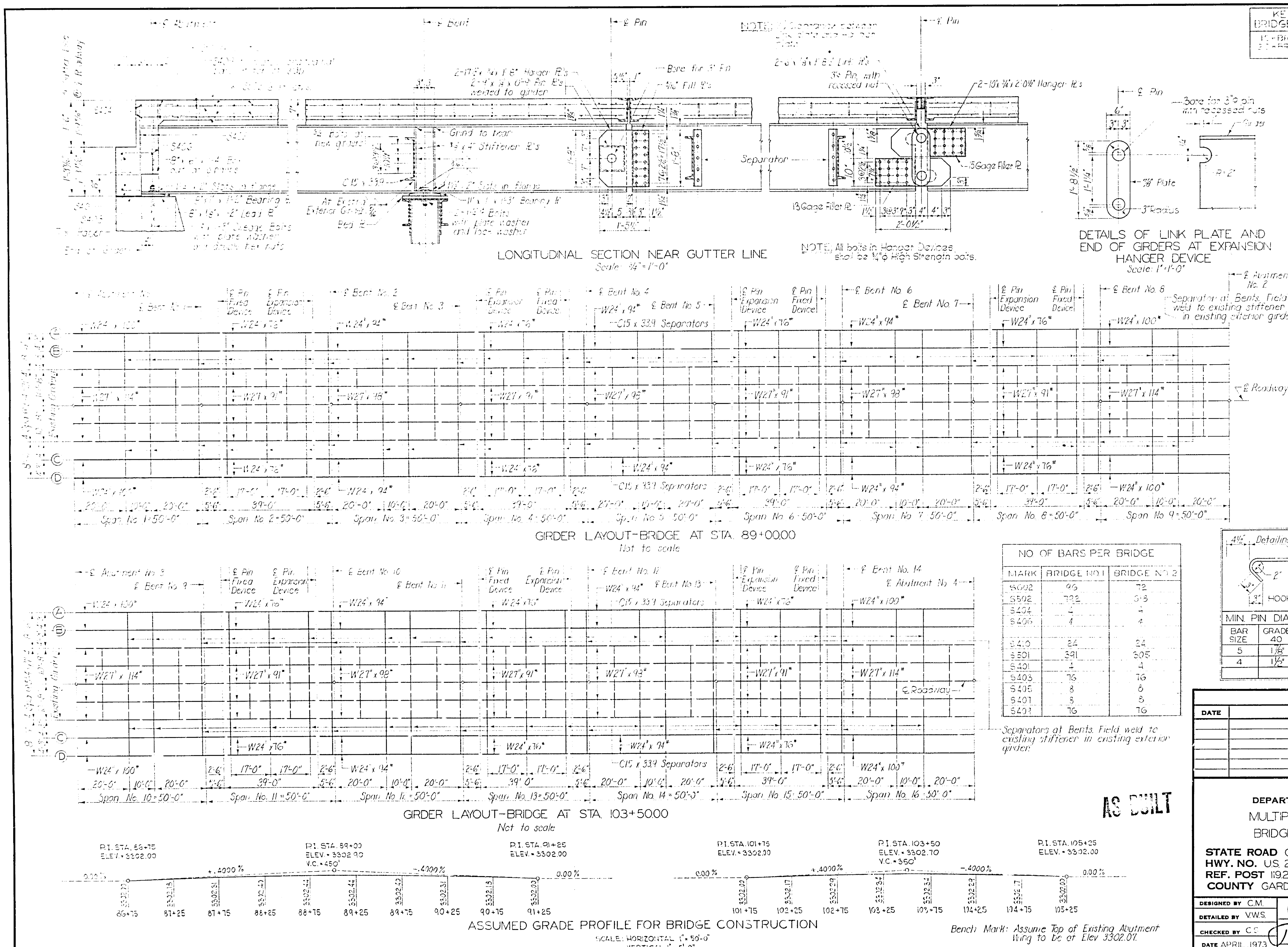
DESIGNED BY C.M.
DETAILED BY V.W.S.
CHECKED BY C.S.
DATE APRIL, 1973

BRIDGE ENGINEER
DIRECTOR -- STATE ENGINEER

PLAN NUMBER 26-119.26 AND 119.54
SHEET NUMBER 2
NUMBER SHEETS 5

4C

FED. ROAD REG. NO.	STATE NEBR.	FED. AID PROJECT NO.	SHEET NO.
7		26 (119.26) 26 (119.54)	6

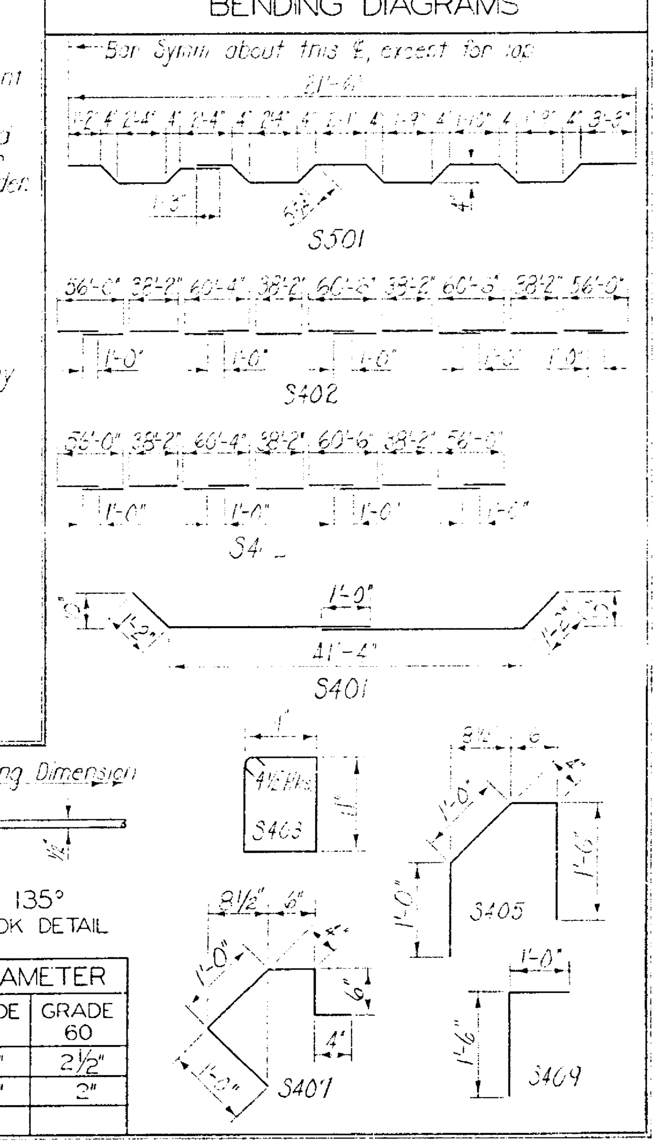


BILL OF BARS-SLAB

STRAIGHT			BENT		
MARK	NO	LENGTH	MARK	NO	LENGTH
S602	168	44'-6" ▲	S501	696	46'-4" ◐
S502	[illegible]	44'-3" ◐	S401	8	44'-8" ✱✱
			S403	152	4'-5"
S402	107	45'-0" ◪	S405	16	4'-0"
S402	107	35'-4" ✱	S407	16	3'-4"
S404	8	4'-5" ✱✱	S409	152	2'-6"
S406	8	4'-0"			
S410	48	2'-5"			

▲ Includes 1-1'-6" Lap
◐ Includes 1-1'-3" Lap
◪ Includes 3-1'-0" Laps
✱ Includes 4-1'-0" Laps
✱✱ Includes 1-1'-0" Lap

BENDING DIAGRAMS



NO OF BARS PER BRIDGE

MARK	BRIDGE NO 1	BRIDGE NO 2
S602	96	72
S502	792	618
S404	4	4
S406	4	4
S410	24	24
S501	391	305
S401	4	4
S403	76	76
S405	8	8
S407	8	8
S409	76	76

MIN. PIN DIAMETER

BAR SIZE	GRADE 40	GRADE 60
5	1 7/8"	2 1/2"
4	1 1/2"	2"

REVISIONS

DATE	DESCRIPTION	BY

AS BUILT

STATE OF NEBRASKA
DEPARTMENT OF ROADS -- BRIDGE DIVISION

MULTIPLE SPANS DECK STEEL GIRDER
BRIDGE WIDENING-CANTILEVER TYPE

STATE ROAD OSHKOSH-OGALLALA — 0° **SKEW**
HWY. NO. U.S. 26 — H 20-44 **DESIGN**
REF. POST 119.26 AND 119.54 — 40 FT. **ROADWAY**
COUNTY GARDEN — **STA.** 89+00.00 103+50.00

DESIGNED BY C.M.
DETAILED BY V.W.S.
CHECKED BY C.S.
DATE APRIL, 1973

Charles D. Smith
BRIDGE ENGINEER

Thomas D. Doyle
DIRECTOR -- STATE ENGINEER

PLAN NUMBER 26-119.26 AND 119.54
SHEET NUMBER 3
NUMBER SHEETS 5

VC

STATE OF NEBRASKA 1000 4-71 DEPARTMENT OF ROADS

DEPARTMENT OF ROADS

REPRODUCTION SECTION

CERTIFICATE OF AUTHENTICITY

This is to certify that the microphotographs appearing on this film are true and accurate reproductions of the original records produced in the regular course of business.

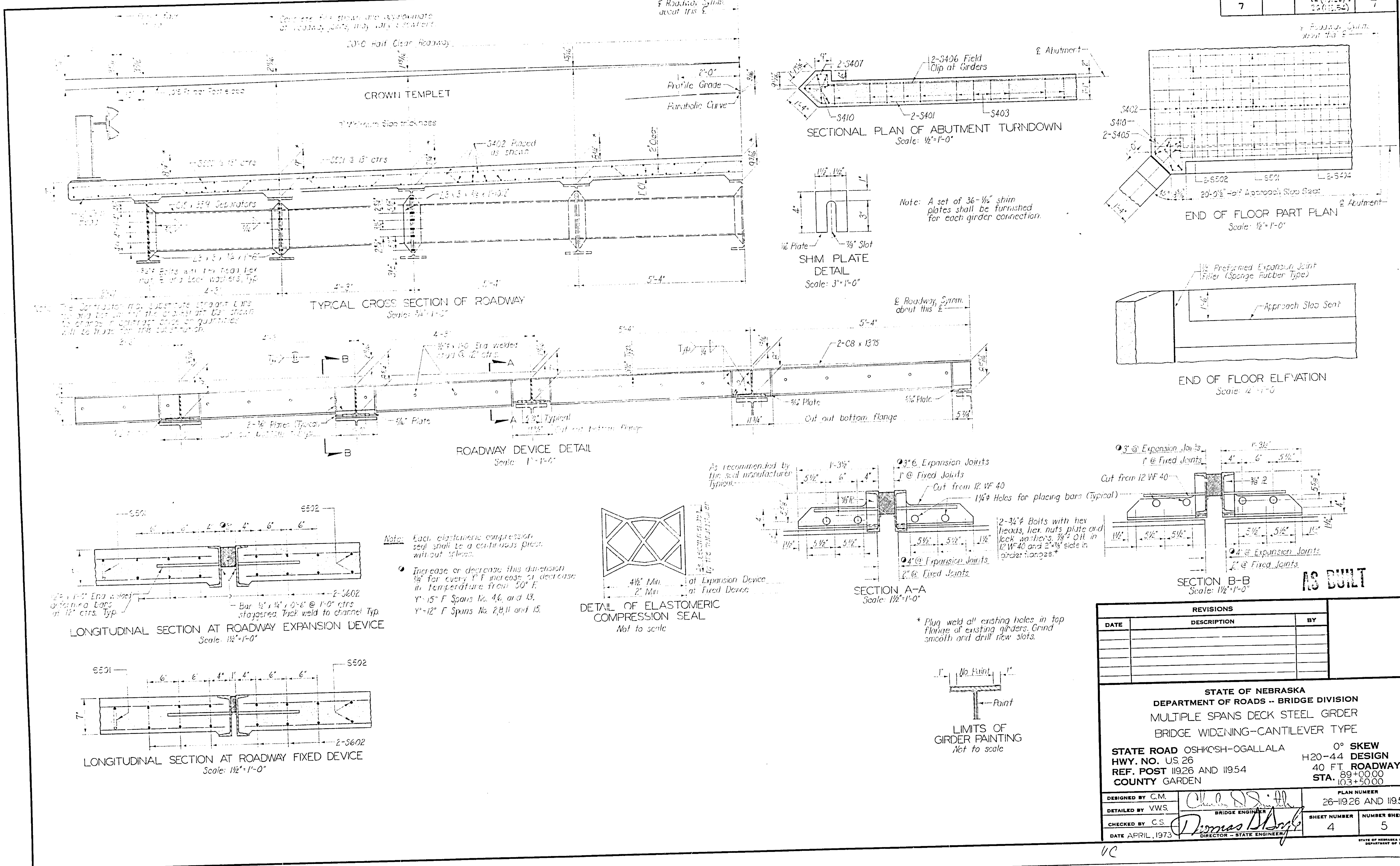
It is further certified that records on this film are microfilmed in conformity with the Rules and Regulations of the State Records Administrator and the Statutes governing them, and that the microphotographic processes accurately reproduce the records and that the film forms a durable medium for reproducing the original, if necessary.

Date 9-10-76

Mike Danning
Microfilm Operator

Allen R. Evers
Reproduction Supervisor

FED. ROAD REG. NO.	STATE NEBR.	FED. AID PROJECT NO.	SHEET NO.
7		22(15,23) & 23(11,54)	7



REVISIONS		
DATE	DESCRIPTION	BY

STATE OF NEBRASKA
DEPARTMENT OF ROADS -- BRIDGE DIVISION
MULTIPLE SPANS DECK STEEL GIRDER
BRIDGE WIDENING–CANTILEVER TYPE

STATE ROAD OSHKOSH–OGALLALA
HWY. NO. U.S. 26
REF. POST 119.26 AND 119.54
COUNTY GARDEN

0° SKEW
H20–44 DESIGN
40 FT. ROADWAY
STA. 89+00.00 / 103+50.00

DESIGNED BY C.M.
DETAILED BY V.W.S.
CHECKED BY C.S.
DATE APRIL, 1973

BRIDGE ENGINEER
DIRECTOR – STATE ENGINEER

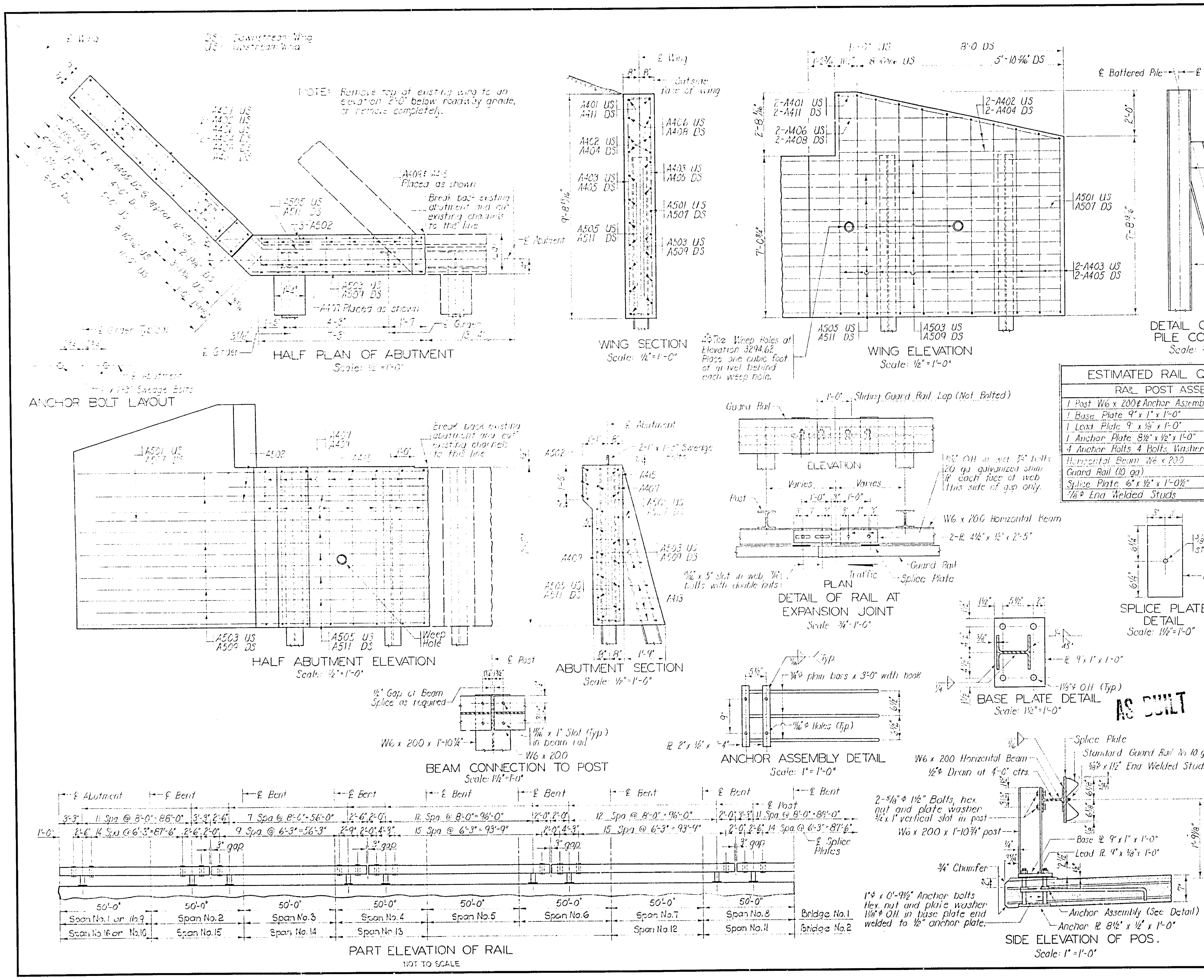
PLAN NUMBER 26–119.26 AND 119.54

SHEET NUMBER 4 — NUMBER SHEETS 5

STATE OF NEBRASKA 1006 4-71 DEPARTMENT OF ROADS

VC

FED. ROAD REG. NO.	STATE NEBR.	FED. AID PROJECT NO.	SHEET NO.
7		[illegible]	[illegible]



ESTIMATED RAIL QUANTITIES	
RAIL POST ASSEMBLY	
1 Post W6 x 20.0 & Anchor Assembly	Total Wt 125.0 Lbs.
1 Base Plate 9" x 1" x 1'-0"	
1 Lead Plate 9" x ⅛" x 1'-0"	
1 Anchor Plate 8½" x ½" x 1'-0"	
4 Anchor Bolts, 4 Bolts, Washers	
Horizontal Beam W6 x 20.0	20.0 Lbs/Lin Ft
Guard Rail (10 ga)	8.9 Lbs/Lin Ft
Splice Plate 6" x ½" x 1'-0½"	10.7 Lbs/ea.
⅝"Φ End Welded Studs	0.1 Lbs/ea.

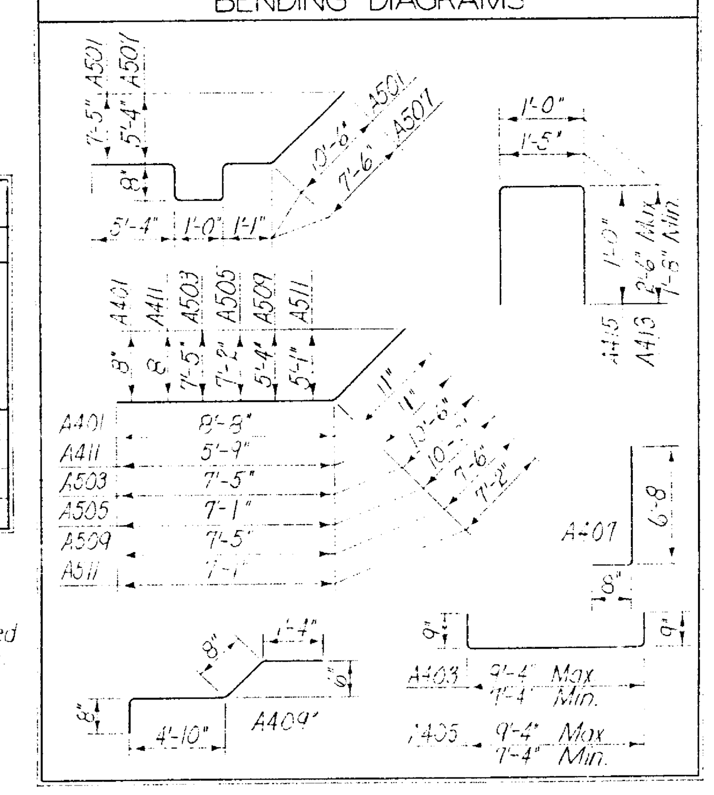
BILL OF BARS-ABUTMENTS

STRAIGHT MARK	NO	LENGTH	BENT MARK	NO	LENGTH
A502	24	3'-8"	A501	4	[illegible]
			A503	24	17'-11"
A402	16	9'-6"	A505	28	17'-3"
A404	16	6'-6"	A507	4	16'-3"
A406	8	5'-1"	A509	24	14'-11"
A408	8	3'-7"	A511	28	14'-3"
			A401	8	9'-7"
			A403	88	9'-10" Av.
			A405	64	9'-10" Av.
			A407	64	7'-4"
			A409	64	7'-6"
			A411	8	6'-6"
			A413	40	5'-2" Av.
			A415	64	3'-5"

BAR SETS

MARK	MAX	MIN	SETS
A403	10'-10"	8'-10"	8 of 11
A405	10'-10"	8'-10"	8 of 8
A413	6'-0"	4'-4"	8 of 5

BENDING DIAGRAMS



NOTES

This Handrail is designed in accordance with the 10th Edition of the A.A.S.H.O Standard Specifications for Highway Bridges.

Posts and Rail shall meet the requirements of A.S.T.M. A36 steel.

Anchor Bolts shall conform to A.S.T.M. A307 requirements. The nuts, washers and top four inches of bolt shall be galvanized in accordance with A.S.T.M. designation A123.

Post and Beam and hardware shall be galvanized in accordance with A.S.T.M. designation A153.

REVISIONS		
DATE	DESCRIPTION	BY

STATE OF NEBRASKA
DEPARTMENT OF ROADS -- BRIDGE DIVISION

MULTIPLE SPANS DECK STEEL GIRDER
BRIDGE WIDENING-CANTILEVER TYPE

STATE ROAD OSHKOSH-OGALLALA — 0° **SKEW**
HWY. NO. US 26 — H20-44 **DESIGN**
REF. POST 119.26 AND 119.54 — 40 FT **ROADWAY**
COUNTY GARDEN — **STA.** 89+0000 103+5000

DESIGNED BY C.M.	BRIDGE ENGINEER	PLAN NUMBER 26-119.26 AND 119.54
DETAILED BY V.W.S.		
CHECKED BY C.S.	DIRECTOR -- STATE ENGINEER	SHEET NUMBER 5 / NUMBER SHEETS 5
DATE APRIL, 1973		

VC

STATE OF NEBRASKA 1000 4-71 DEPARTMENT OF ROADS

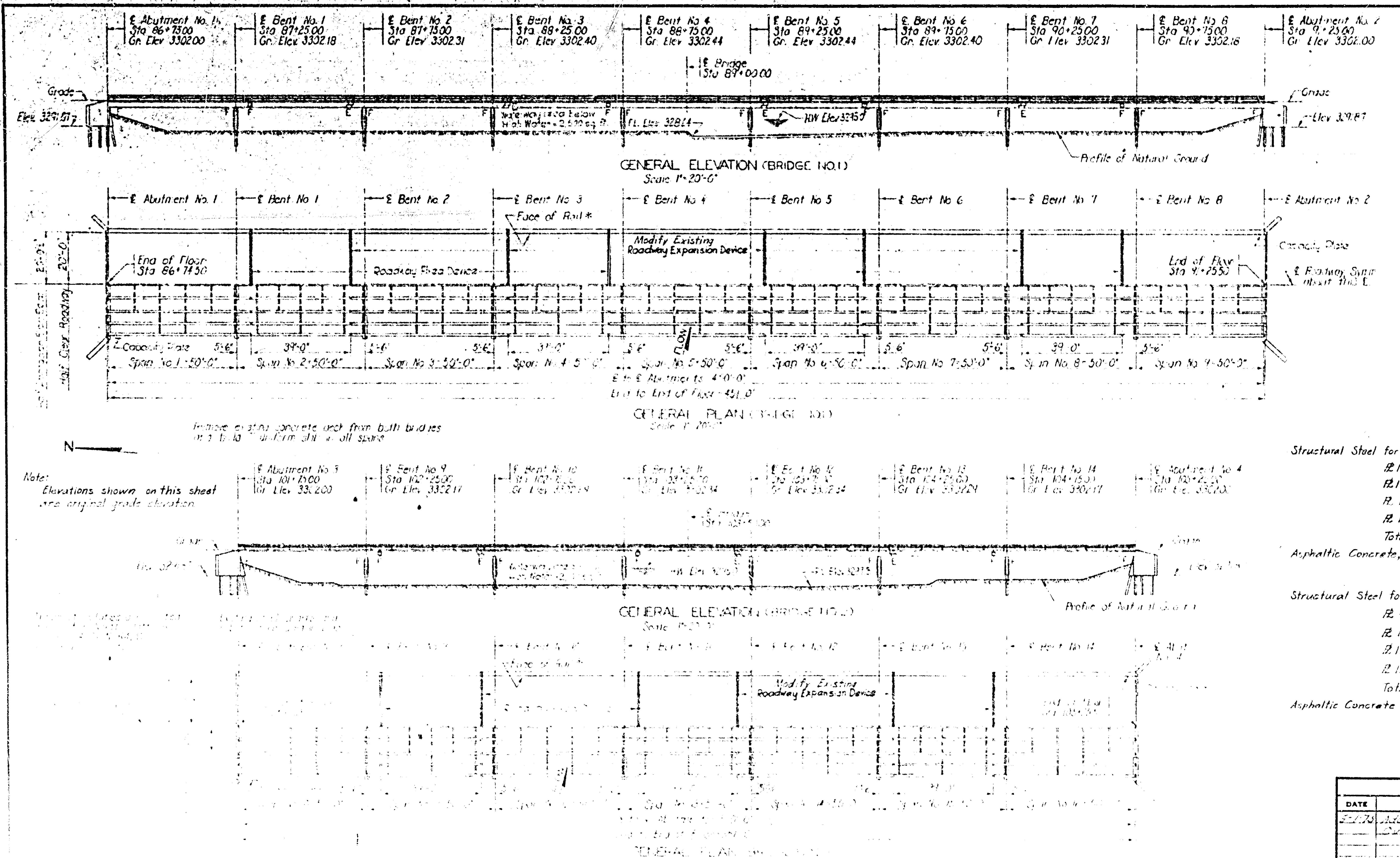
DEPARTMENT OF ROADS
OFFICE SERVICES SECTION

CERTIFICATE OF AUTHENTICITY

Microfilm Operator

Office Services Manager

FED. ROAD REG. NO.	STATE NEBR.	FED. AID PROJECT NO.	SHEET NO.
			11



Ⓡ Added 5-1-75

NOTES

Asphaltic Concrete wedge on approach slabs are full width of the bridge and 30 Ft from the end of the bridge floor.

QUANTITIES

BRIDGE NO. 1

Structural Steel for Dam Plates

PL 1"x 3/4"	816	Lbs.	320	Lin. Ft.
PL 1¼"x 3/4"	255	Lbs.	80	Lin. Ft.
PL 1½"x 3/4"	612	Lbs.	160	Lin. Ft.
PL 1¾"x 3/4"	356	Lbs.	80	Lin. Ft.
Total	2,040	Lbs.	640	Lin. Ft.

Asphaltic Concrete, Type "C" 168 Tons

BRIDGE NO. 2

Structural Steel for Dam Plate

PL ¾"x 3/4"	152	Lbs.	80	Lin. Ft.
PL 1"x 3/4"	408	Lbs.	160	Lin. Ft.
PL 1¼"x 3/4"	255	Lbs.	80	Lin. Ft.
PL 1½"x 3/4"	612	Lbs.	160	Lin. Ft.
Total	1,428	Lbs.	480	Lin. Ft.

Asphaltic Concrete Type "C" 151 Tons

REVISIONS		
DATE	DESCRIPTION	BY
5-1-75	Added Asphaltic Concrete Overlay	MHS

STATE OF NEBRASKA
DEPARTMENT OF ROADS -- BRIDGE DIVISION

ASPHALTIC CONCRETE OVERLAY

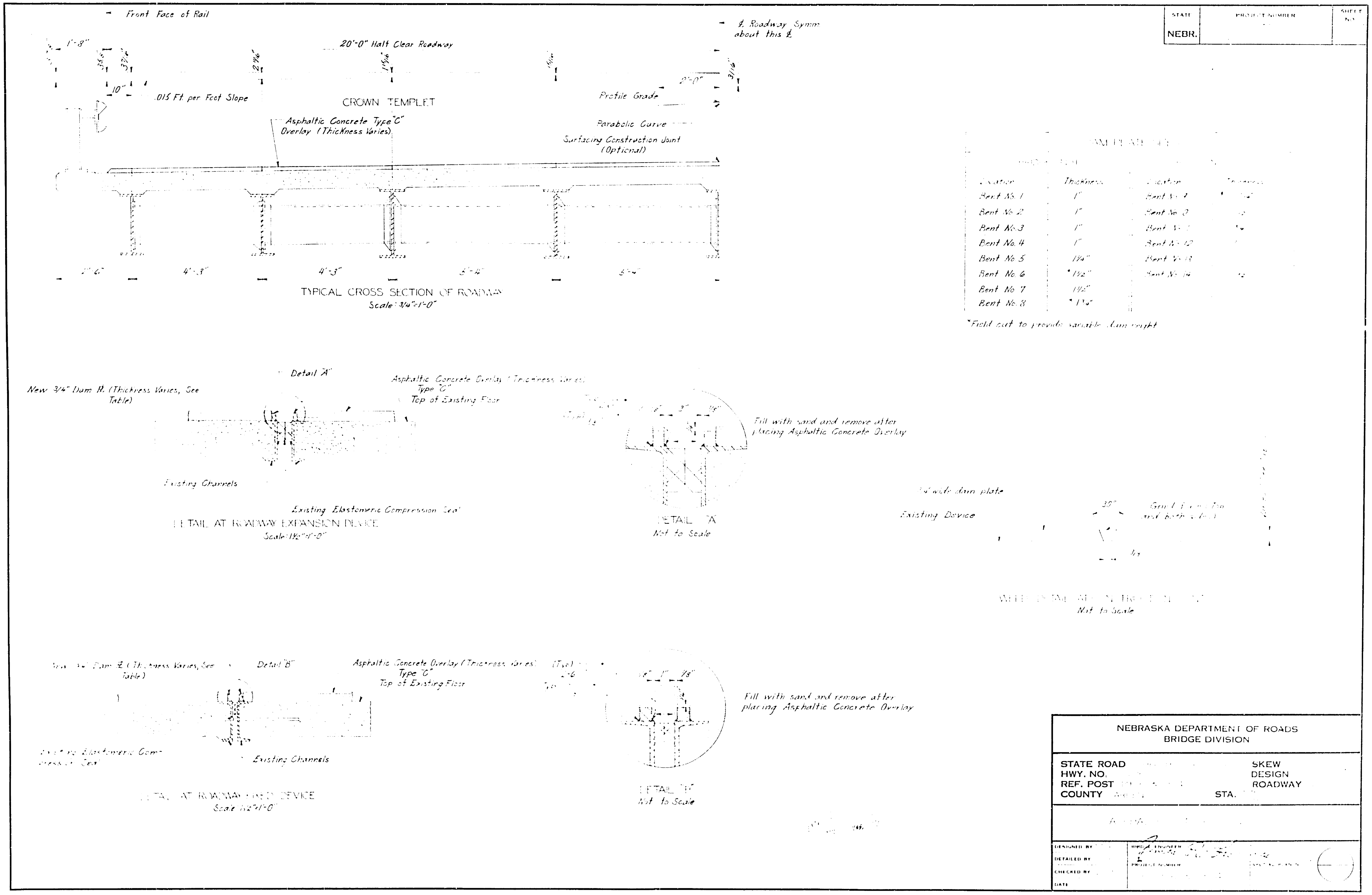
STATE ROAD
HWY. NO.
REF. POST
COUNTY

SKEW
DESIGN
ROADWAY
STA.

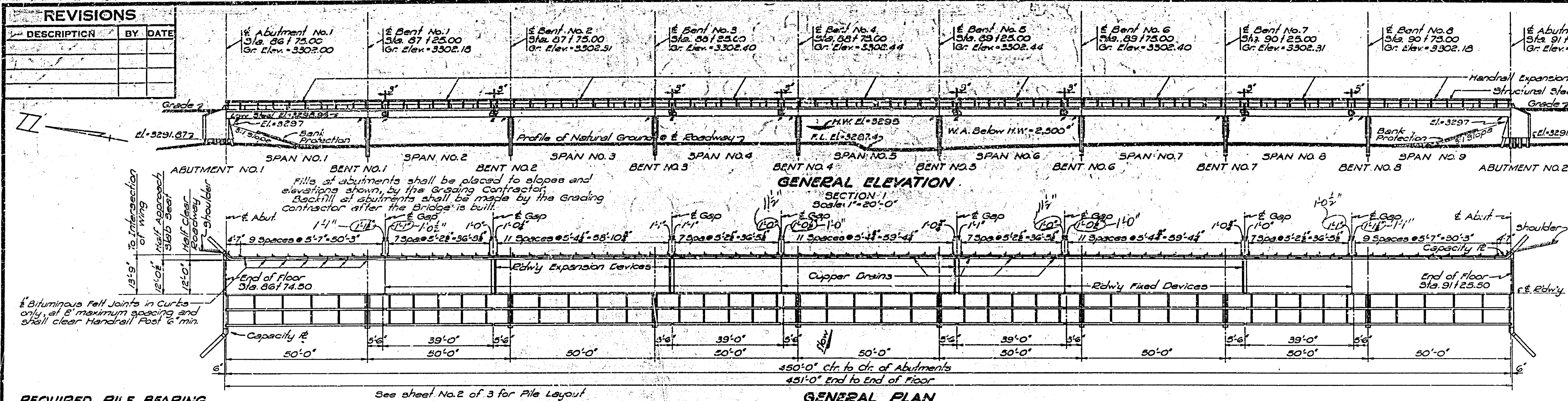
DESIGNED BY
DETAILED BY
CHECKED BY
DATE

BRIDGE ENGINEER

PLAN NUMBER
SHEET NUMBER
NUMBER SHEETS


Front Face of Rail
℄ Roadway Symm about this ℄
20'-0" Half Clear Roadway
1'-8"
10"
.015 Ft per Foot Slope
CROWN TEMPLET
Profile Grade
2'-0"
Asphaltic Concrete Type "C" Overlay (Thickness Varies)
Parabolic Curve
Surfacing Construction Joint (Optional)
TYPICAL CROSS SECTION OF ROADWAY
Scale 3/4"=1'-0"
STATE
NEBR.
Location
Thickness
Bent No. 1 1"
Bent No. 2 1"
Bent No. 3 1"
Bent No. 4 1"
Bent No. 5 1¼"
Bent No. 6 *1½"
Bent No. 7 1½"
Bent No. 8 *1¾"
*Field cut to provide variable dam height
Detail "A"
New 3/4" Dam Pl. (Thickness Varies, See Table)
Asphaltic Concrete Overlay (Thickness Varies) Type "C"
Top of Existing Floor
Fill with sand and remove after placing Asphaltic Concrete Overlay
Existing Channels
Existing Elastomeric Compression Seal
DETAIL AT ROADWAY EXPANSION DEVICE
Scale 1½"=1'-0"
DETAIL "A"
Not to Scale
Existing Device
Not to Scale
Detail "B"
Type "C"
Top of Existing Floor
Fill with sand and remove after placing Asphaltic Concrete Overlay
Existing Channels
DETAIL "B"
Not to Scale
NEBRASKA DEPARTMENT OF ROADS
BRIDGE DIVISION
STATE ROAD
HWY. NO.
REF. POST
COUNTY
SKEW
DESIGN
ROADWAY
STA.
DESIGNED BY
DETAILED BY
CHECKED BY
DATE

REVISIONS		
DESCRIPTION	BY	DATE



REQUIRED PILE BEARING

Abutments No. 1, 2, 3 & 4
- Piles No. 1, 2, 11, 12 & 13 — 10 Tons per pile
- Piles No. 3 to 10B inc. — 15 Tons per pile

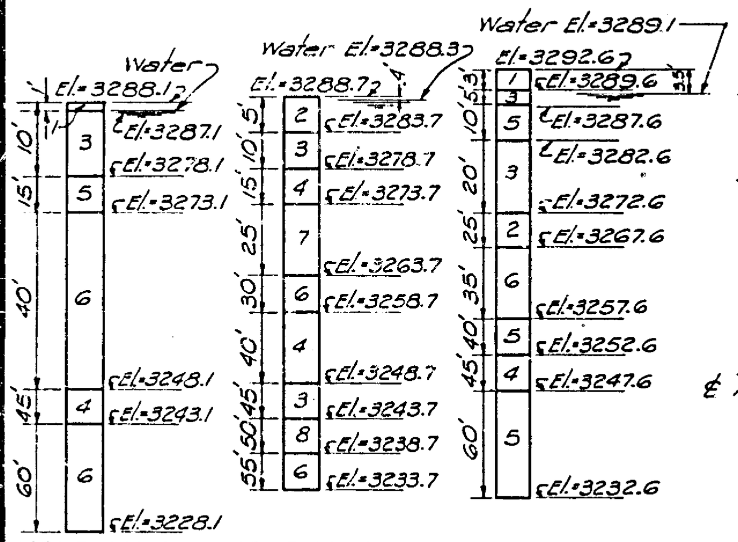
Bents No. 1, 8, 9 & 14
- All Piles — 19 Tons per pile

Bents No. 2 to 7 inc. & 10 to 13 inc.
- All Piles — 18 Tons per pile

MINIMUM PENETRATION BELOW CUTOFF

Abutments No. 1, 2, 3 & 4
- Piles (Wings) No. 1, 2, 11, 12 & 13 — 35 Feet
- Piles (Wall) No. 3 to 10-B inc. — 35 Feet

Bents No. 1, 8, 9 & 14 — 45 Feet
Bents No. 2 to 7 inc. & 10 to 13 inc. — 45 Feet



LOG OF TEST BORINGS

CLASSIFICATION OF MATERIALS
1 = Fine Sand
2 = Coarse Sand
3 = Coarse Sand to Fine Sand Gravel
4 = Fine Sand to Fine Sand Gravel
5 = Coarse Sand to Coarse Sand Gravel
6 = Fine to Coarse Sand
7 = Sand to Coarse Sand Gravel
8 = Fine Sand to Coarse Sand Gravel

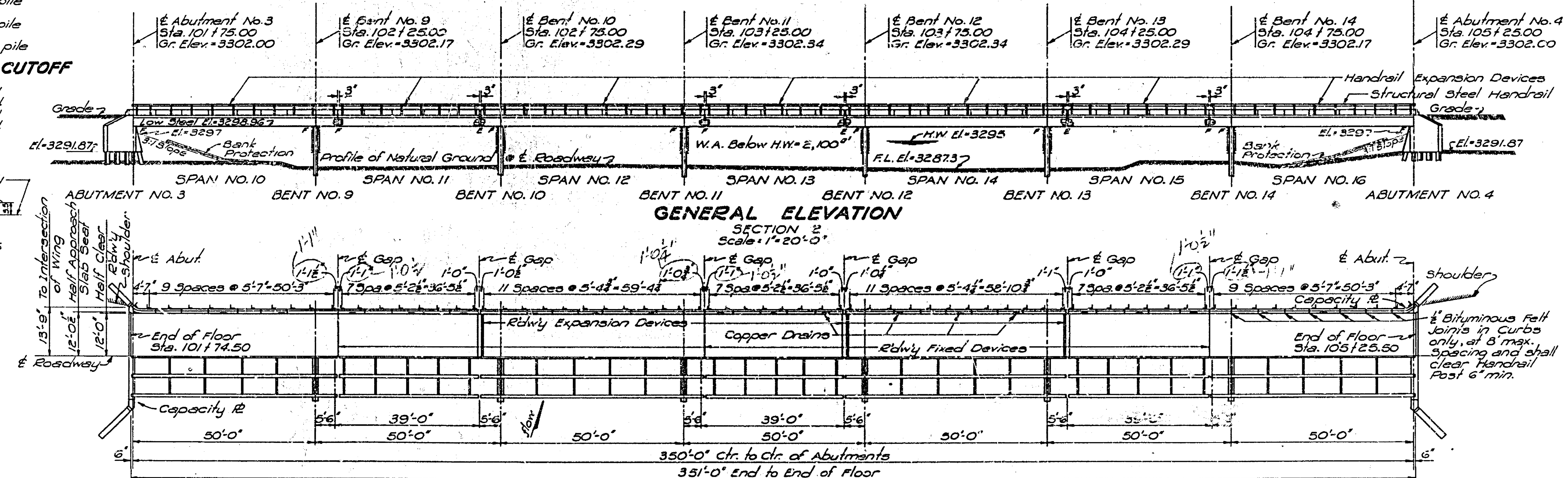
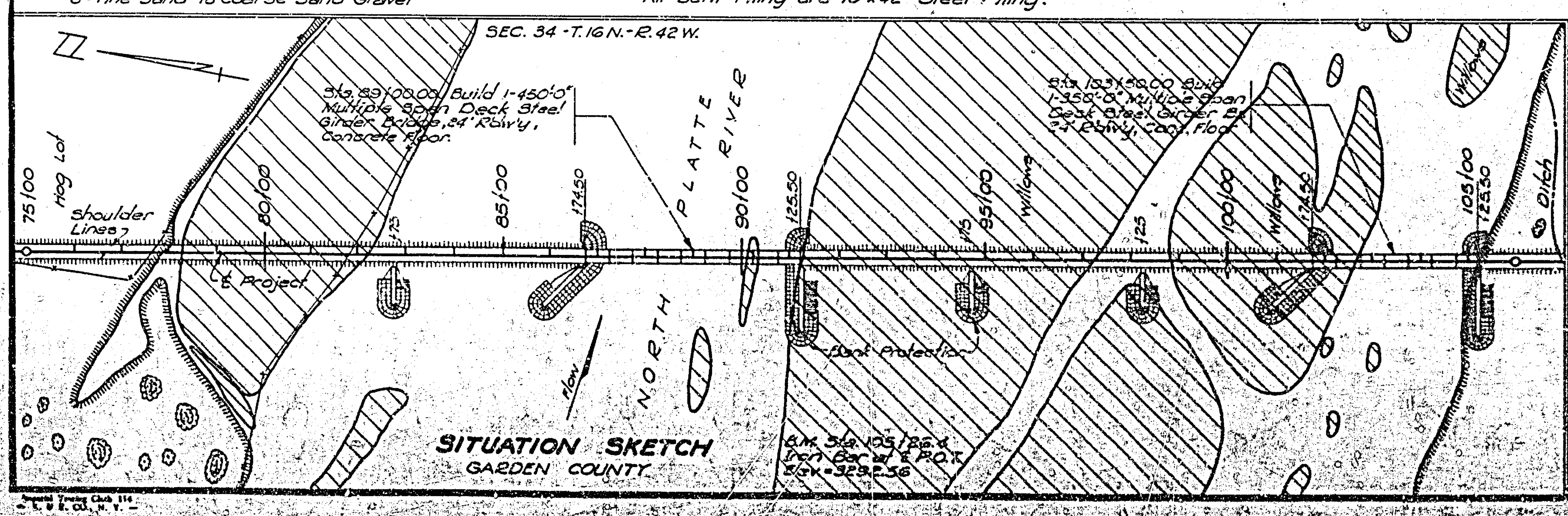
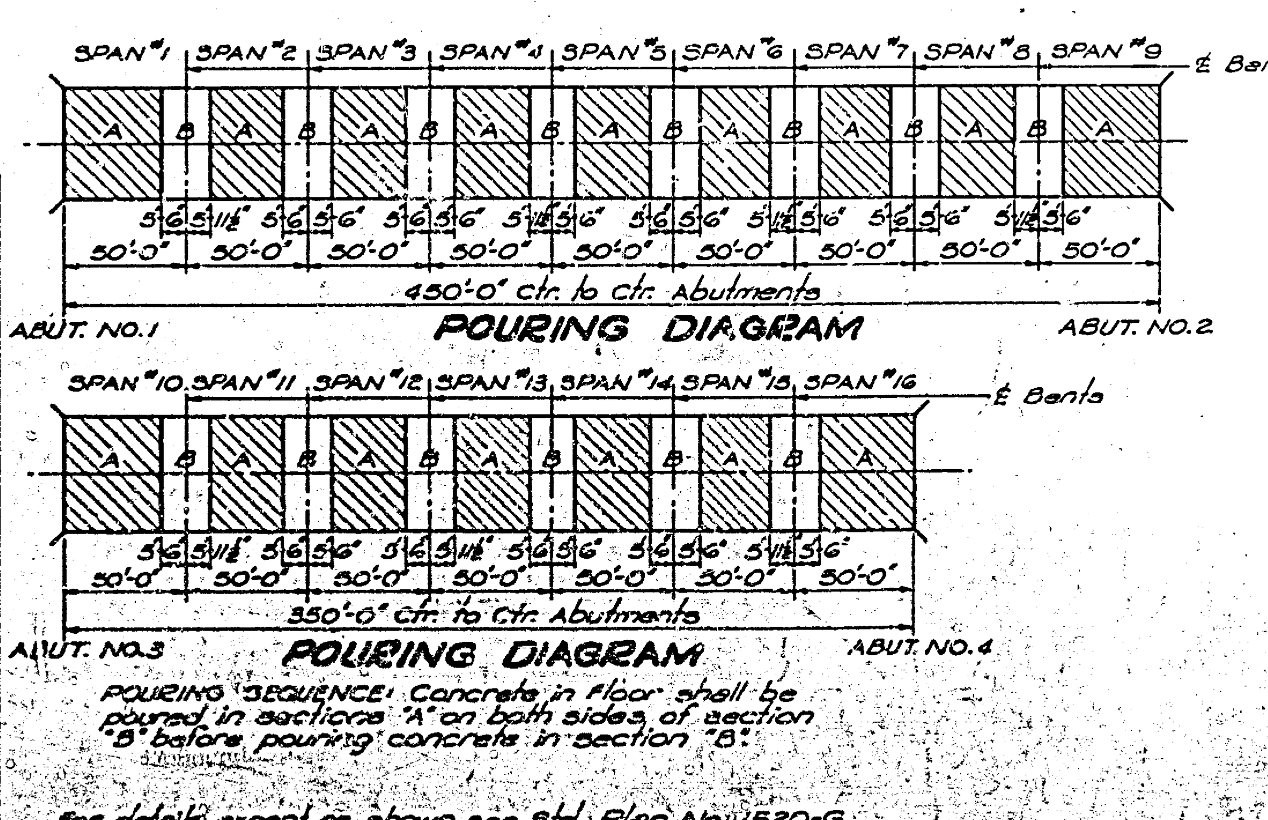


TABLE OF BEAM SIZES	
Spans 1, 9, 10 & 16	27¼"x114# WF
Spans 3, 5, 7, 12 & 14	27"x98# WF
Spans 2, 4, 6, 8, 11, 13 & 15	26⅞"x91# WF

All Separators are 15"x33.9# C.
All Abutment Piling are 8"x31# Steel Piling.
All Bent Piling are 10"x42# Steel Piling.





POURING SEQUENCE: Concrete in Floor shall be poured in sections "A" on both sides of section "B" before pouring concrete in section "B".

For details except as shown see Std. Plan No. 1520-G.
For details of Capacity Plates see Std. Plan No. 1509-D, Type 4.
For details of Concrete Surface Finish see Std. Plan No. 1562.

NOTES

REINFORCED CONCRETE:
Concrete in Floor and Curbs shall be Class "AA", "CC" or "HH".
Concrete in Abutments shall be Class "A", "C" or "H".
Concrete in Curbs shall be poured in accordance with the Specifications.
Concrete in Floor shall be poured in accordance with the Specifications and the Pouring Diagram.
The galvanized iron strip at the bituminous felt joint in the floor shall be either continuous or have soldered lock joints.

REINFORCING STEEL:
All reinforcing steel shall be deformed bars.
Contractor shall submit bar lists and details for all reinforcing steel before starting fabrication. Payment for reinforcing steel shall be based upon approved shop lists.

STEEL STRUCTURE:
All field connections shall be bolted. Except as noted, all bolts and rivets shall be ¾"Φ and all open holes shall be 13/16"Φ.
All bolts shall be unfinished bolts.

HANDRAIL:
Handrail shall be set to transit line and grade.
Handrail Posts shall be set plumb.

BORING NOTE:
The borings as logged on these plans represent the character of the subsoil at the locations indicated. No guarantee is made that the subsoil conditions vary uniformly between or outside the given locations.

QUANTITIES

ITEM		SECTION 1		SECTION 2
EXCAVATION FOR BRIDGES		80 Cu.Yds.		80
CLASS "AA", "CC" OR "HH" CONCRETE		314.0 Cu.Yds.		245.3
CLASS "A", "C" OR "H" CONCRETE		40.0 Cu.Yds.		40.0
REINFORCING STEEL		62,405 Lbs.		49,330
Floor and Curbs	59,480 Lbs.		46,405 Lbs.	
Abutments	2,925 Lbs.		2,925 Lbs.	
STEEL SUPERSTRUCTURE		1 Each		1
Girders & Separators	264,980 Lbs.		208,025 Lbs.	
Fixed & Exp. Hanger Devices	14,970 Lbs.		11,240 Lbs.	
R'dw'y Fixed & Exp. Devices	13,645 Lbs.		10,235 Lbs.	
Bearing Pls, Anchor Bolts, etc.	2,560 Lbs.		2,025 Lbs.	
Total:	296,155 Lbs.		231,525 Lbs.	
STRUCTURAL STEEL FOR SUBSTRUCTURE		32,315 Lbs.		24,710
8"x31# STEEL PILING (Estimated)		1,300 Lin.Ft.		1,300
10"x42# STEEL PILING (Estimated)		3,840 Lin.Ft.		2,880
STRUCTURAL STEEL FOR HANDRAIL		16,620 Lbs.		12,940
COPPER DRAINS		50 Each		38

DESIGN NOTE: Loadings and Stresses are in accordance with the Specifications of the A.A. of S.H.O.

STATE OF NEBRASKA
DEPARTMENT OF ROADS AND IRRIGATION
BUREAU OF ROADS AND BRIDGES
SPECIAL DESIGN CLASS H-15
1-450'-0" MULTIPLE SPAN DECK STEEL GIRDER BRIDGE
1-350'-0" MULTIPLE SPAN DECK STEEL GIRDER BRIDGE
CANTILEVER TYPE
24 FT. ROADWAY CONCRETE FLOOR
PROJ. 249-C (3) GARDEN COUNTY-STA. 89+00 / 103+25
STATE ROAD OSHKOSH-OGALLALA
LINCOLN, NEBR. MAY 9, 1939.

1/3

A. C. Tilley
STATE ENGINEER

249-C(3)
DESIGNED BY
DETAILED BY
TRACED BY
CHECKED BY

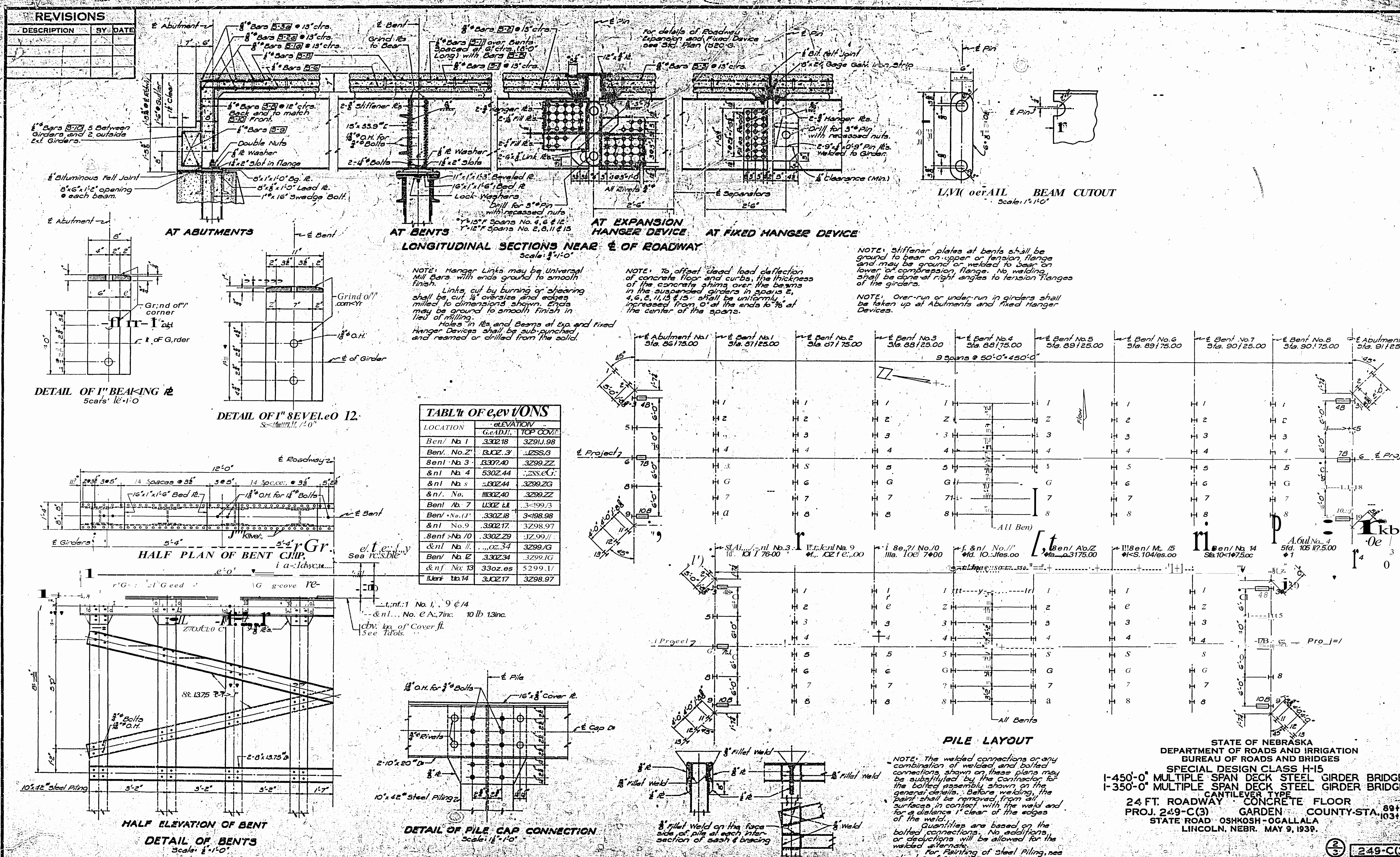


TABLE OF ELEVATIONS

LOCATION	ELEVATION: GRADE	ELEVATION: TOP CONC.
Bent No. 1	3302.18	3291.98
Bent No. 2	3302.31	[illegible]
Bent No. 3	3302.40	3299.22
Bent No. 4	3302.44	[illegible]
Bent No. 5	3302.44	3299.26
Bent No. 6	3302.40	3299.22
Bent No. 7	[illegible]	3299.13
Bent No. 8	3302.18	3298.98
Bent No. 9	3302.17	3298.97
Bent No. 10	3302.29	3299.11
Bent No. 11	[illegible]	3299.16
Bent No. 12	3302.34	3299.16
Bent No. 13	[illegible]	[illegible]
Bent No. 14	3302.17	3298.97

STATE OF NEBRASKA
DEPARTMENT OF ROADS AND IRRIGATION
BUREAU OF ROADS AND BRIDGES
SPECIAL DESIGN CLASS H-15
1-450'-0" MULTIPLE SPAN DECK STEEL GIRDER BRIDGE
1-350'-0" MULTIPLE SPAN DECK STEEL GIRDER BRIDGE
CANTILEVER TYPE
24 FT. ROADWAY · CONCRETE FLOOR
PROJ. 249-C(3) GARDEN COUNTY-STA. 89+0 103+5
STATE ROAD OSHKOSH-OGALLALA
LINCOLN, NEBR. MAY 9, 1939.

2/3

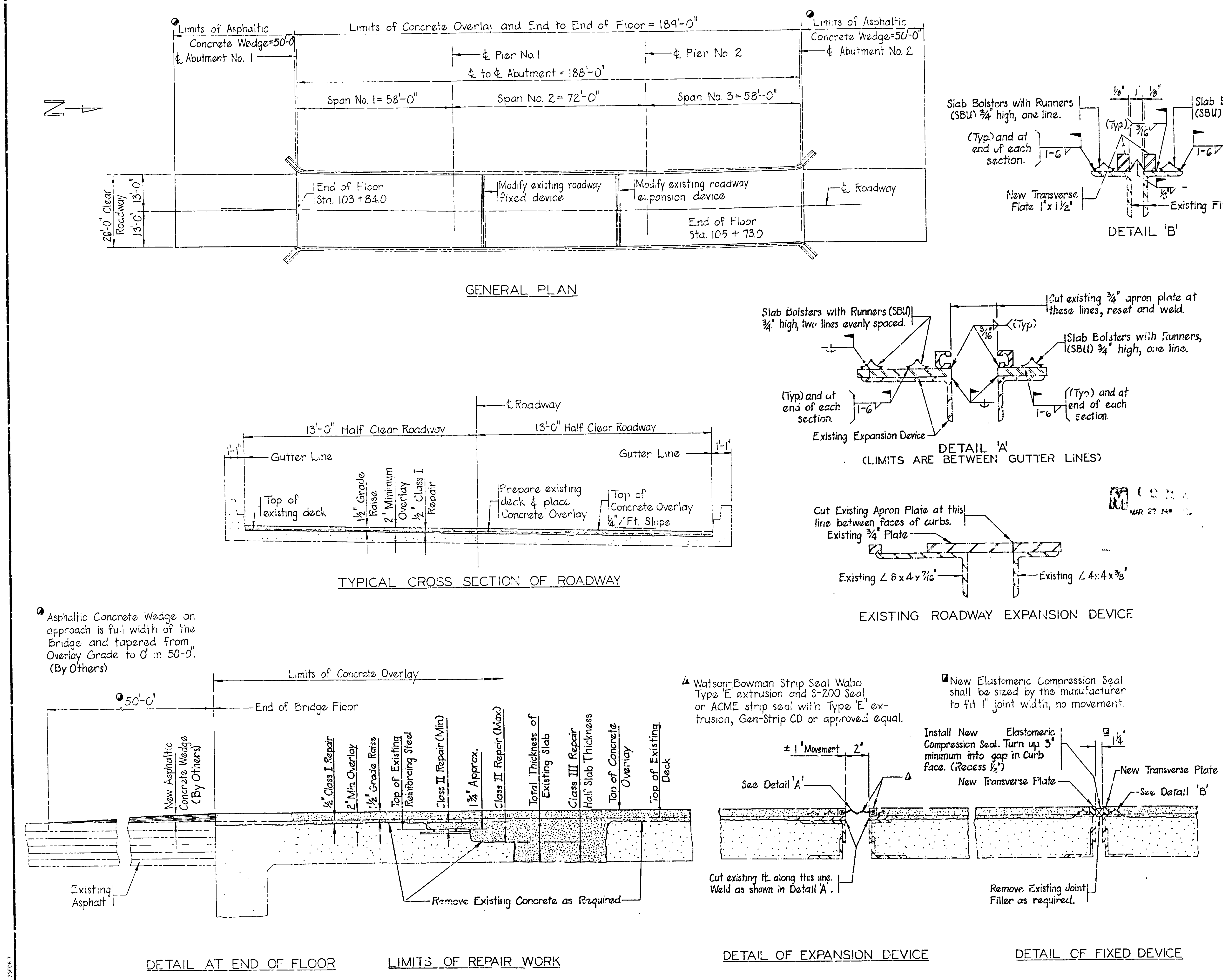
249-C(3)

STATE ENGINEER

DESIGNED BY
DETAILED BY
TRACED BY
CHECKED BY

STATE	PROJECT NUMBER	SHEET NO.
NEBR.	11 (184.43)	2

REVISIONS



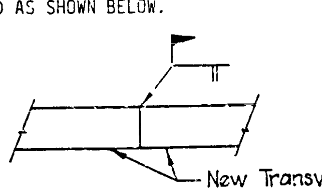
- N O T E S -

BEFORE ORDERING ANY MATERIALS, THE CONTRACTOR SHALL MAKE A DETAILED FIELD INSPECTION OF THE EXISTING STRUCTURE VERIFYING ALL DIMENSIONS AND REPORTING TO THE ENGINEER ANY DISCREPANCIES BETWEEN HIS MEASUREMENTS AND THOSE SHOWN ON THESE PLANS.

CONCRETE OVERLAY SHALL BE 2" MINIMUM HIGH-DENSITY, LOW-SLUMP CONCRETE.

ALL STEEL SHALL BE MILD STEEL AND SHALL BE UNPAINTED.

THE NEW TRANSVERSE PLATES USED TO MODIFY THE EXISTING ROADWAY DEVICES SHALL END AT THE CURB LINES. THESE PLATES ARE NOT REQUIRED TO RUN FULL CURB-TO-CURB LENGTH, BUT MAY BE PLACED IN SHORTER LENGTHS WITH JOINTS WELDED AS SHOWN BELOW.



SLAB BOLSTERS SHALL BE TYPE (SBU), CLASS "A" AS SPECIFIED IN C.R.S.I. MANUAL OF STANDARD PRACTICES.

THE FURNISHING AND PLACING OF ELASTOMERIC COMPRESSION SEAL AND SLAB BOLSTERS SHALL NOT BE PAID FOR DIRECTLY, BUT SHALL BE CONSIDERED SUBSIDIARY TO OTHER ITEMS FOR WHICH PAYMENT IS MADE.

- Q U A N T I T I E S -

CLASS I REPAIR	546	SQ YDS
CLASS II REPAIR	154.9 ~~257~~	SQ YDS
CLASS III REPAIR	19.3 ~~10~~	SQ YDS
HIGH-DENSITY, LOW-SLUMP CONCRETE	47.48 ~~48.2~~	CU YDS
PLACING, FINISHING & CURING CONCRETE OVERLAY	546	SQ YDS
STRIP SEAL	26	LIN FT
STRUCTURAL STEEL FOR SUPERSTRUCTURE	265	LBS

NEBRASKA DEPARTMENT OF ROADS
BRIDGE DIVISION

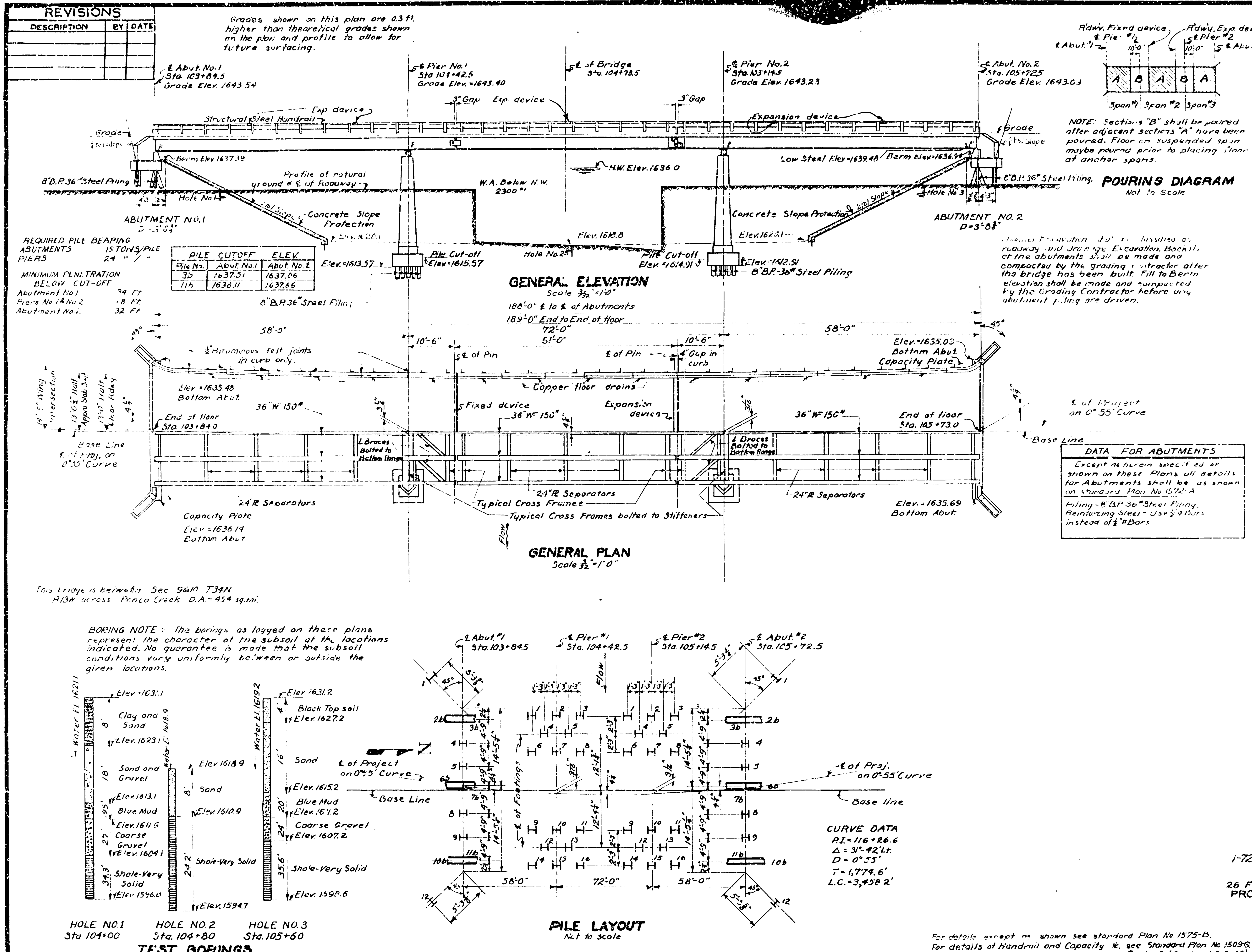
STATE ROAD BUTTE-NORTH
HWY. NO. N-11
REF. POST 184.43
COUNTY BOYD

SKEW 0°
DESIGN
ROADWAY 26'-0"
STA. 104 + 78.5

BRIDGE DECK RESURFACING

DESIGNED BY DEPT.
DETAILED BY DEPT.
CHECKED BY GWS
DATE JUNE, 1985

BRIDGE ENGINEER Daniel R. Holmes
PROJECT NUMBER 11 (184.43)
SPECIAL PLAN NO.



NOTES

REINFORCED CONCRETE:-

All Concrete shall be class "A", "C", or "H".

All reinforcing steel shall be deformed bars.

Concrete in the floor and curbs shall be poured in accordance with the Specifications and shall conform to the Horizontal Curve.

The floor shall be poured in accordance with the pouring diagram and to allow for dead load deflection.

STEEL SUPERSTRUCTURE:-

All shop rivets shall be 3/4".

All field connections shall be bolted with 3/4"⌀ bolts.

All welding shall be done by the "Arc Process" and in accordance with the specifications of the "A.A. of S.H.O."

HANDRAIL:-

Handrail shall be set to transit line and grade and shall conform to the horizontal curve.

Handrail posts shall be set to parallel the back face of the Curb and plumb in side elevation.

All structural steel work shall be painted 3 coats of paint in accordance with the Specifications. The first or shop coat shall be red lead paint, the second coat shall be gray lead base paint, and the third coat shall be white lead base paint type A.

PROTECTION WORK -

Anchor bars for concrete slope protection shall be placed in the Abutments at the time that the concrete [illegible] details of [illegible] slope protection [illegible]

STEEL SHIMS

[illegible] contractor shall provide steel shims [illegible] these plans) in amounts sufficient to adjust for dead load deflections.

The floor shall be poured to conform to the superelevation section shown on these plans. The curb at all points between tangents to curved ends, shall be poured to set perpendicular to a line drawn between gutter lines. The curb on the curved portions at the end of the floor shall be warped to meet the wing in a vertical plane.

QUANTITIES

Excavation for Bridges		150 Cu. Yds.
Abutments	40 Cu. Yds.	
Piers	110 Cu. Yds.	
Class "A", "C", or "H" Concrete		208.4 Cu. Yds.
Floor & Curbs	48.9 Cu. Yds.	
Abutments	31.0 Cu. Yds.	
Piers	55.5 Cu. Yds.	
Reinforcing Steel		38,860 Pounds
[illegible]	27,000 Pounds	
Abutments	3,080 Pounds	
Piers	8,780 Pounds	
Steel Superstructure		1 Each
Girders, Separators & Braces	160,485 Pounds	
Brg. Pl., Anchors, Rollers, etc.	6,690 Pounds	
Rdwy. Fixed & Exp. Devices	3,525 Pounds	
Fixed & Exp. Hanger Devices	6,820 Pounds	
Total	177,520 Pounds	
Structural Steel for Substructure		1,165 Pounds
8"×36" Steel Piling (Estimated)		1,366 Lin. ft.
Structural Steel for Handrail		7,035 Pounds
Copper Drains		14 Each

For details except as shown see Standard Plan No. 1575-B.
For details of Handrail and Capacity Pl. see Standard Plan No. 1509G.
For details of Rollers see Standard Plan #1521-C. (Revised 2-9-49).
For details of Abut's. except as shown see Standard Plan #1572-A.
For details of Concrete surface finish see Standard Plan #1569-B.

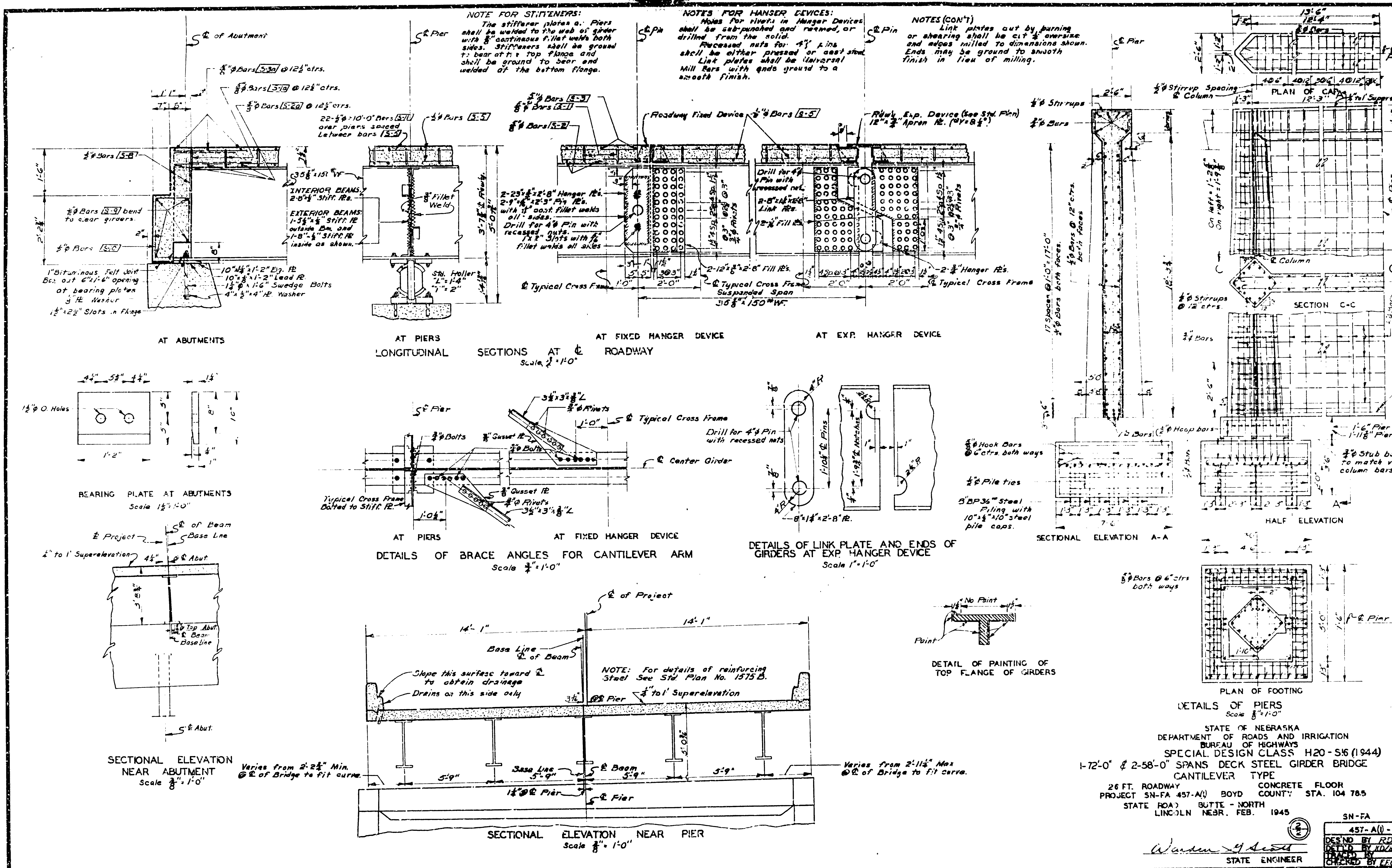
STATE OF NEBRASKA
DEPARTMENT OF ROADS AND IRRIGATION
BUREAU OF HIGHWAYS
SPECIAL DESIGN CLASS H20-S16(1944)
1-72'-0" & 2-58'-0" SPANS DECK STEEL GIRDER BRIDGE
CANTILEVER TYPE
26 FT. ROADWAY CONCRETE FLOOR
PROJ. SN-FA 457-A(1) BOYD COUNTY-STA. 104+78.5
STATE ROAD BUTTE-NORTH
LINCOLN, NEBR. FEB. 1945

1/2

STATE ENGINEER

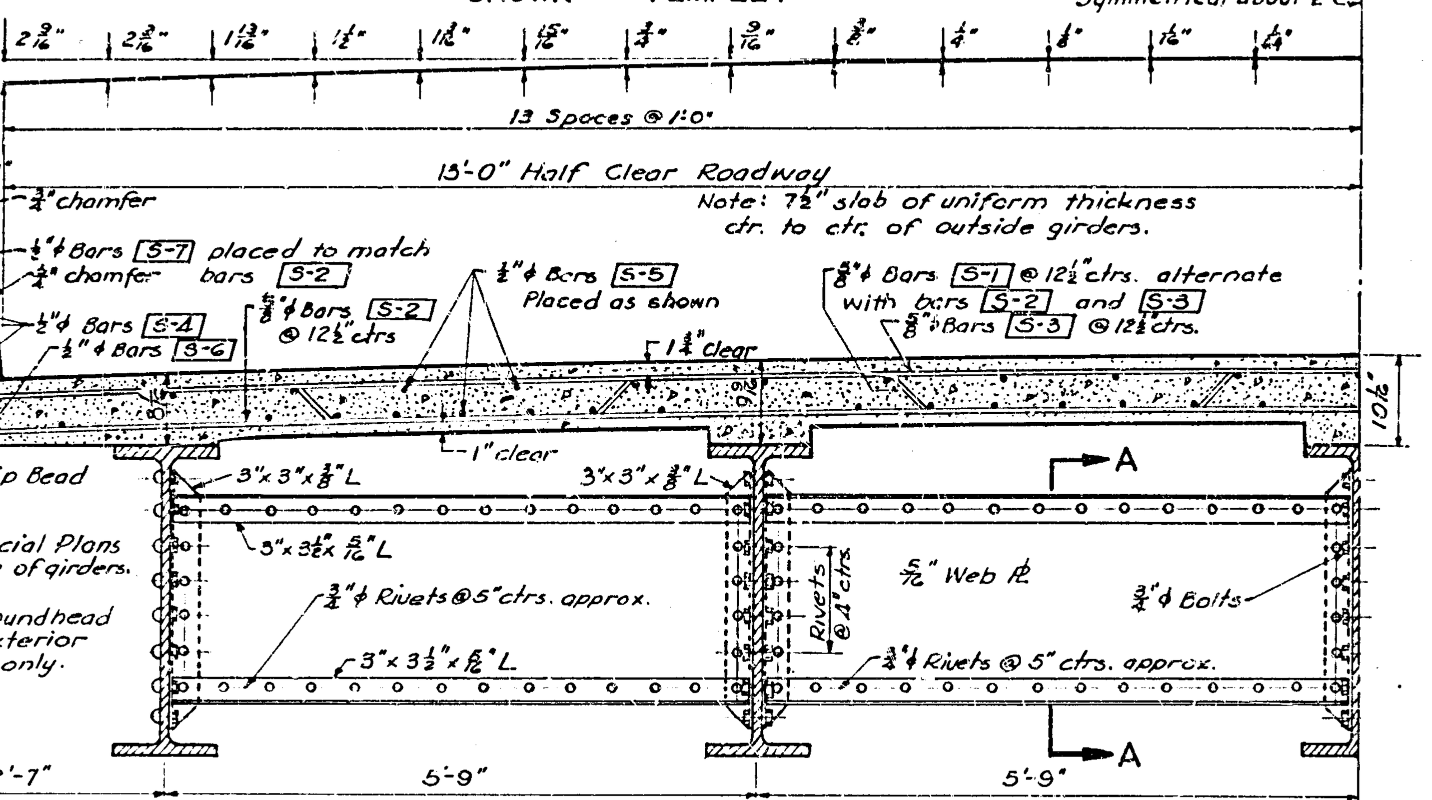
SN-FA 457-A(1)-1
DESIGNED BY R.D.L.
DETAILED BY M.H./C.E.
TRACED BY
CHECKED BY E.F.G.

Traced from Original Aug. 1948. By: C.F.G.
Checked by: C.R.D. GHG DEK.



Traced from Original Sept. 7, 1948 By: J.D.
Checked By: L.J.W. D.W.W. R.R.D.

REVISIONS		
DESCRIPTION	BY	DATE



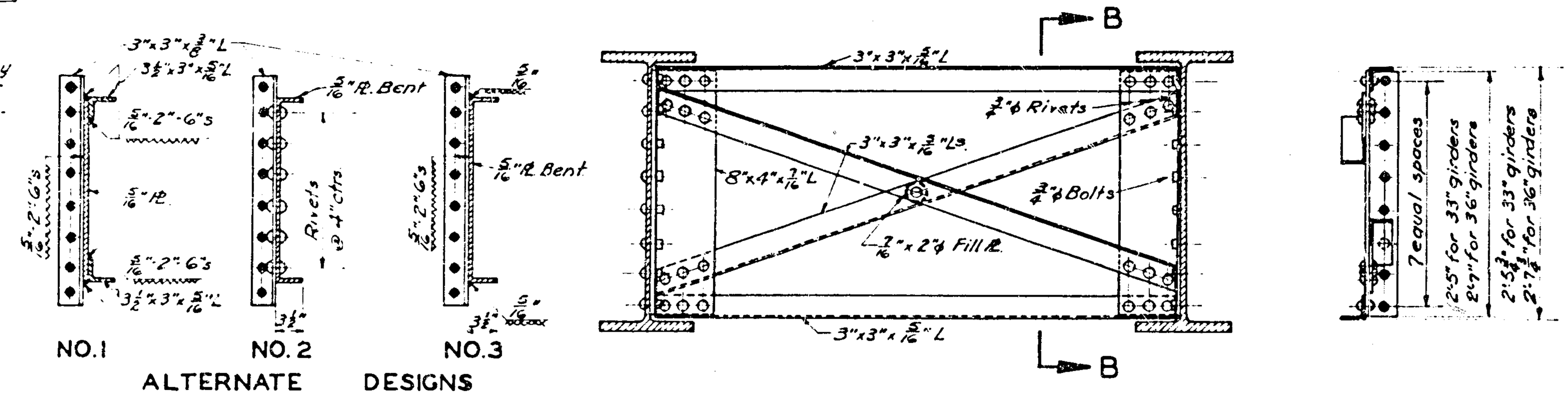
TYPICAL DETAIL OF PLATE SEPARATOR

ORIGINAL DESIGN

TYPICAL CROSS SECTION OF ROADWAY

SPAN LENGTH	NO. OF SEP
18'0" to 24'0" inc	2
25'0" to 35'0" inc	2
36'0" to 55'0" inc	3
56'0" to 75'0" inc	4
NOM DEPTH OF GIRDER	TYPE OF SEP
18"	8"x11.5# ⊏
21" to 24" inc	12"x20.7# ⊏
26" to 28" inc	15"x33.9# ⊏
30"	18" ℞
33"	20" ℞
36"	24" ℞

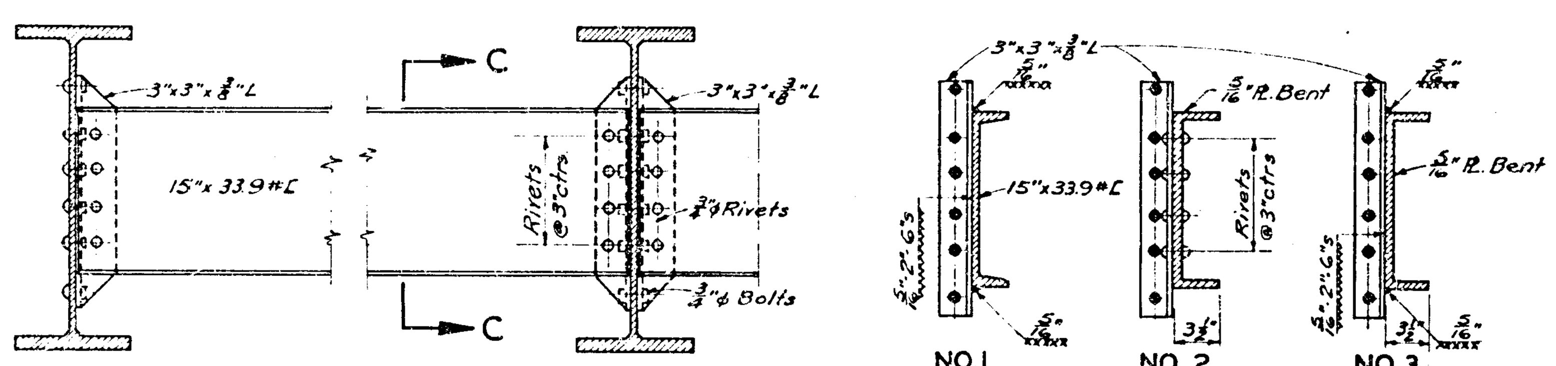
NOTE:
Cross frames may be used in place of 20" ℞ or 24" ℞ separators for 33" or 36" girders



NO.1 NO.2 NO.3

ALTERNATE DESIGNS

SECTION TAKEN AT A-A TYPICAL DETAIL OF CROSS FRAME SECTION B-B

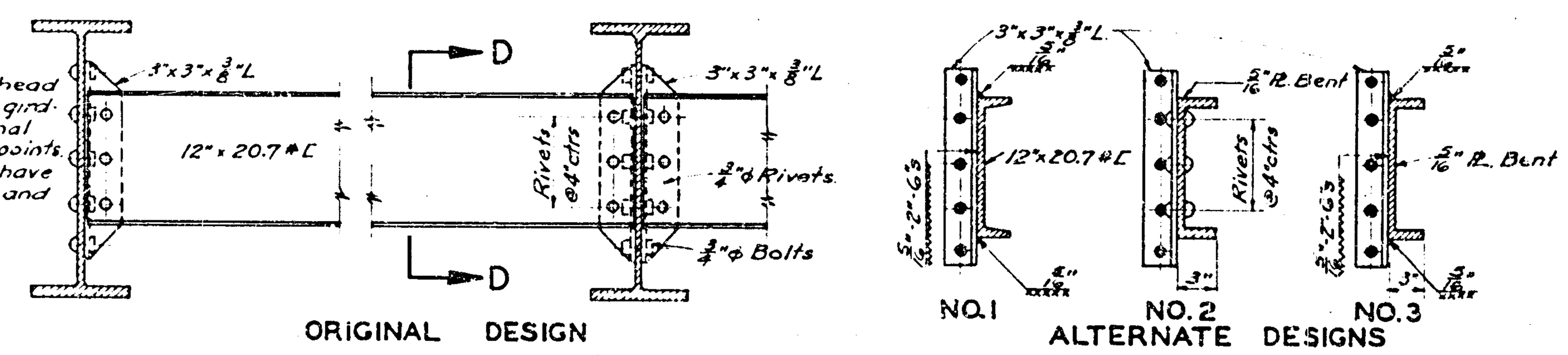


ORIGINAL DESIGN

TYPICAL DETAIL OF 15"x 33.9# ⊏ SEPARATOR

NO.1 NO.2 NO.3 ALTERNATE DESIGNS

SECTION TAKEN AT C-C

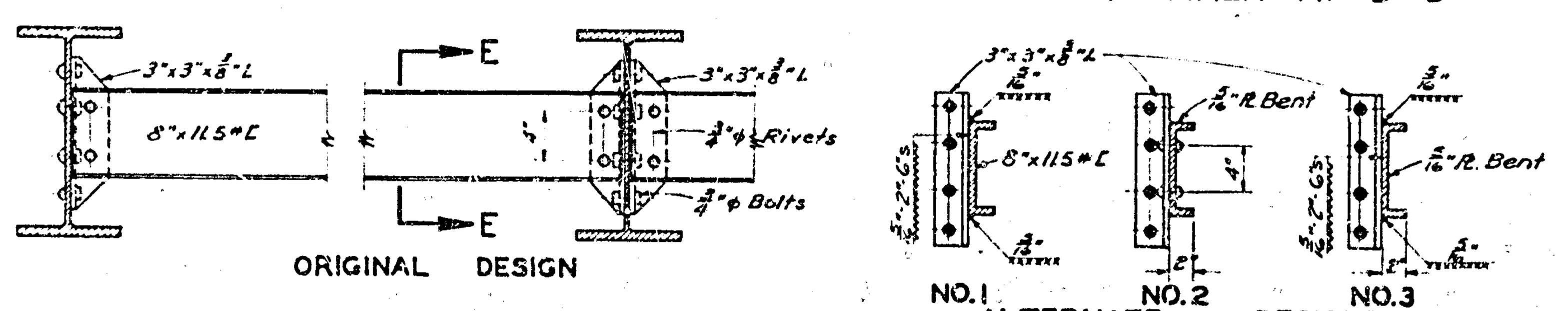


ORIGINAL DESIGN

TYPICAL DETAIL OF 12"x 20.7# ⊏ SEPARATOR

NO.1 NO.2 NO.3 ALTERNATE DESIGNS

SECTION TAKEN AT D-D



ORIGINAL DESIGN

TYPICAL DETAIL OF 8"x 11.5# ⊏ SEPARATOR

NO.1 NO.2 NO.3 ALTERNATE DESIGNS

SECTION TAKEN AT E-E

—NOTES—

FOR EXPANSION & FIXED DEVICES

Dimensions marked thus ⓐ are at 50°F. with ⅛" variation for every Y°F. increase or decrease in temperature. For values of A, B, and Y°F. see the Special Plans. Dimension B shall be clear distance.

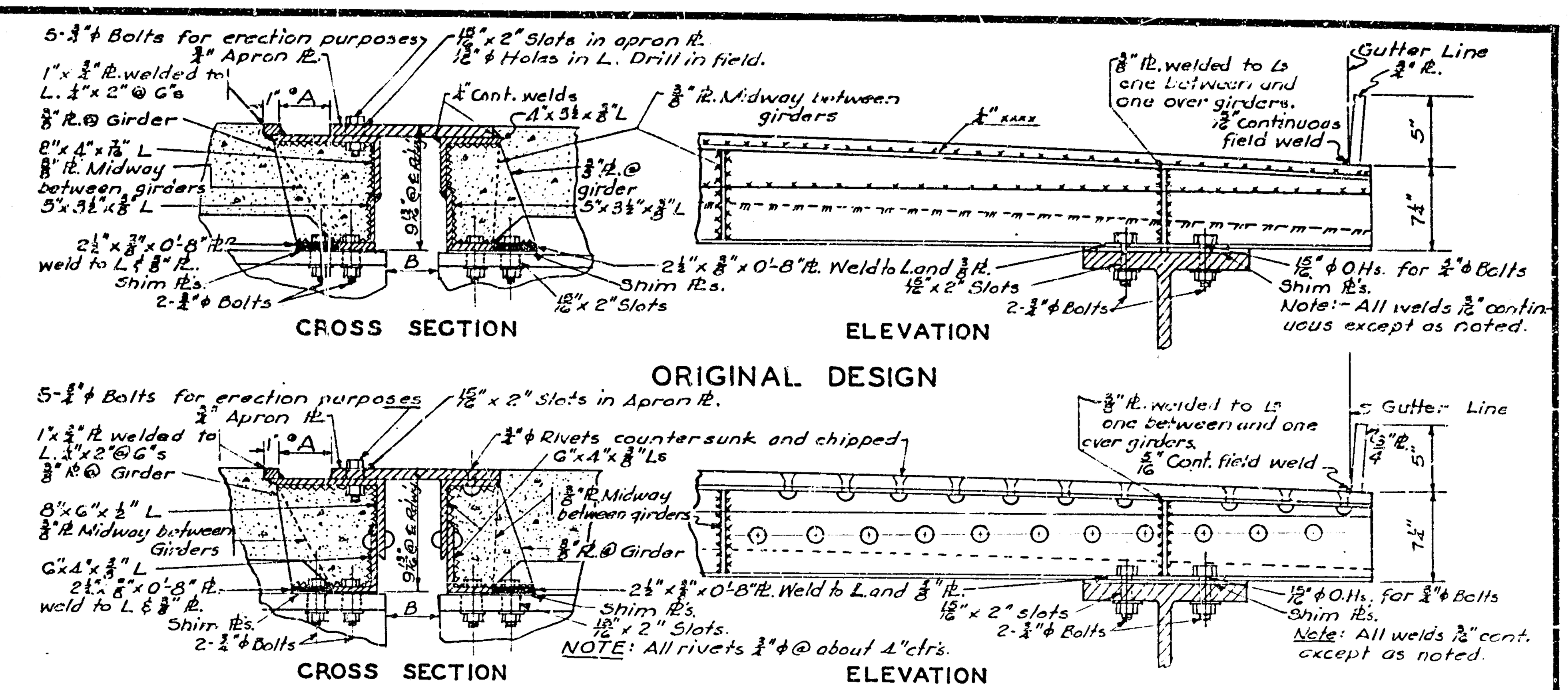
The top of the devices shall conform to the crown of the roadway.

A set of 12-1/16" shim plates shall be furnished for each girder connection.

FOR ALTERNATE DESIGNS

The Contractor may substitute any one of the alternate designs for the original designs.

Quantities are based on the original designs. No deductions or additions will be allowed for use of the alternate designs.

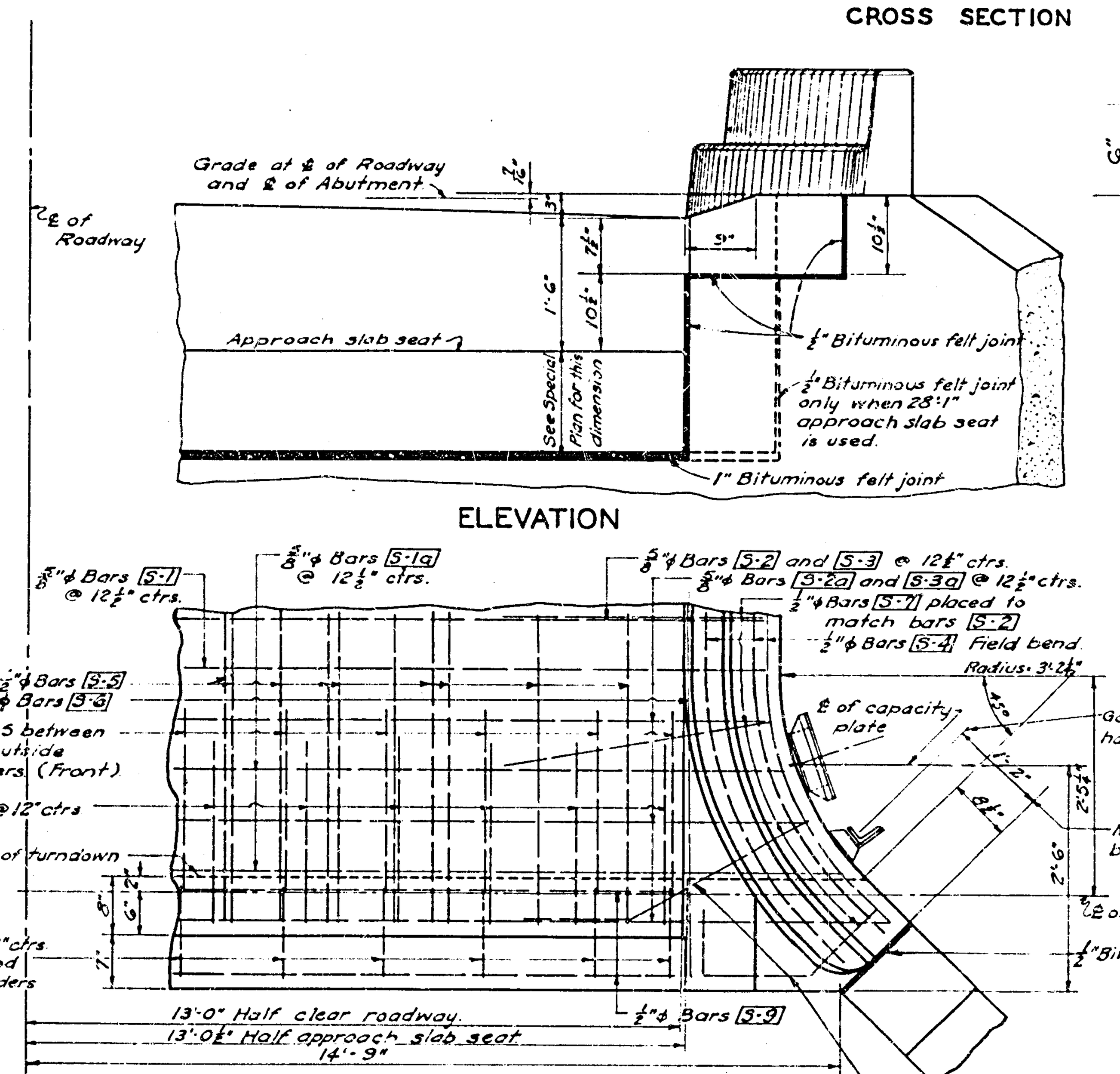


CROSS SECTION ELEVATION

ORIGINAL DESIGN

CROSS SECTION ELEVATION

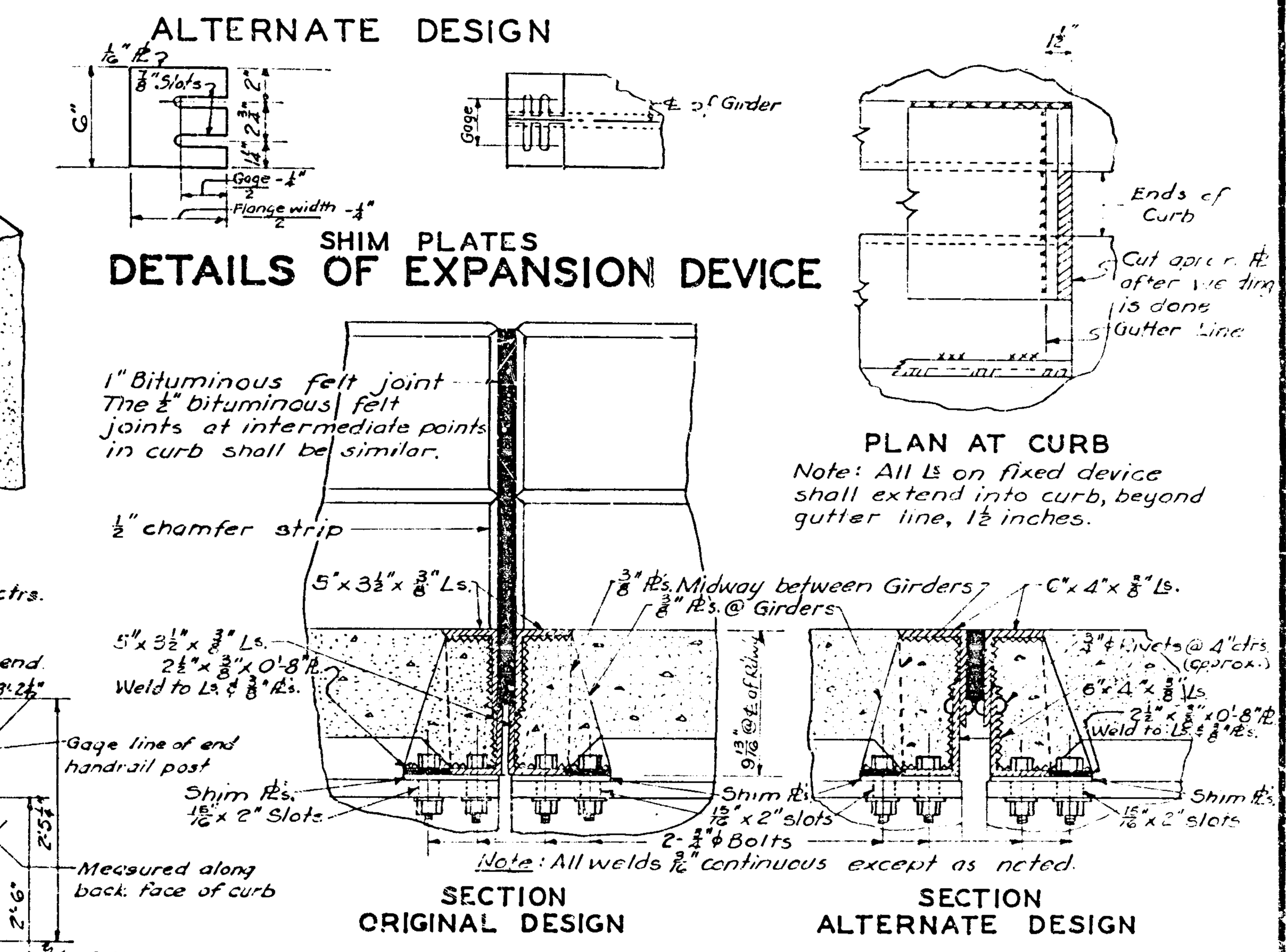
ALTERNATE DESIGN



ELEVATION

PLAN

DETAILS AT END OF FLOOR



SHIM PLATES

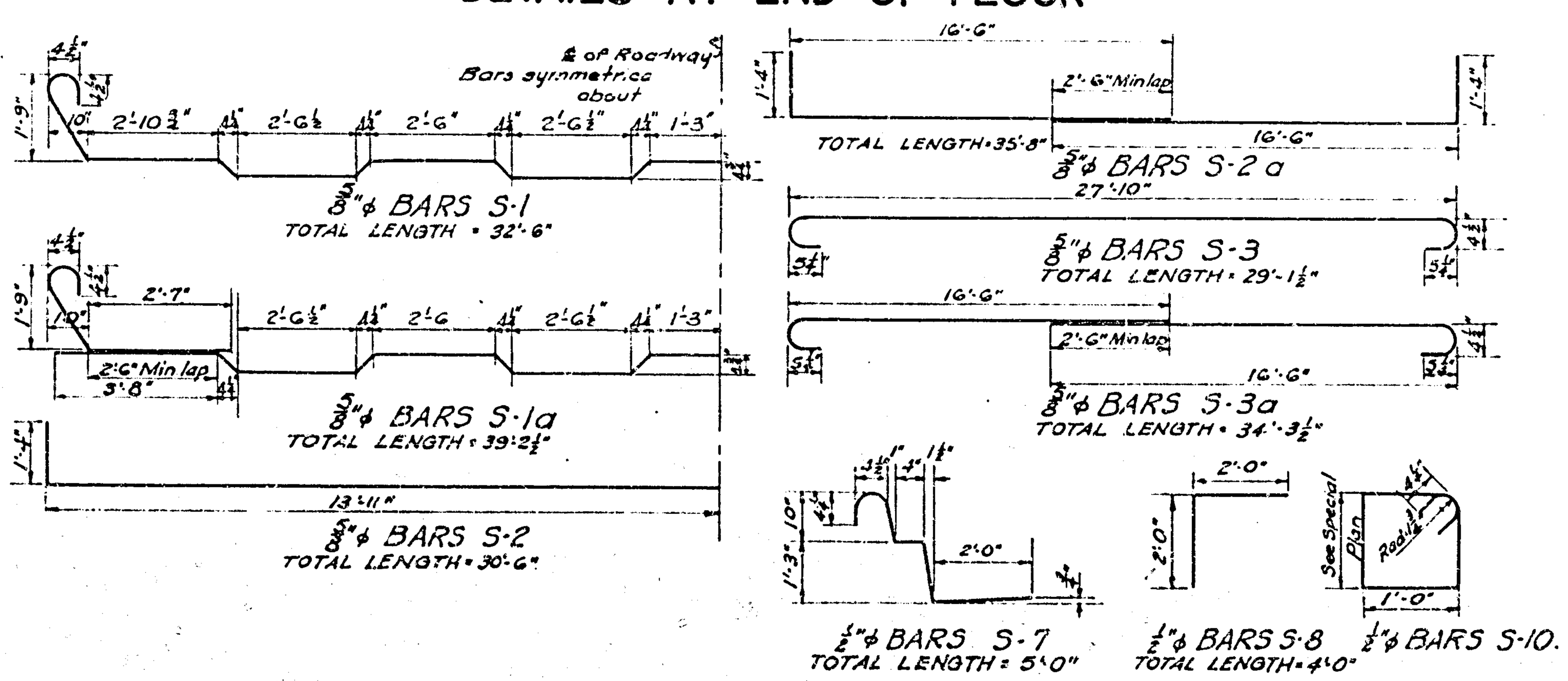
DETAILS OF EXPANSION DEVICE

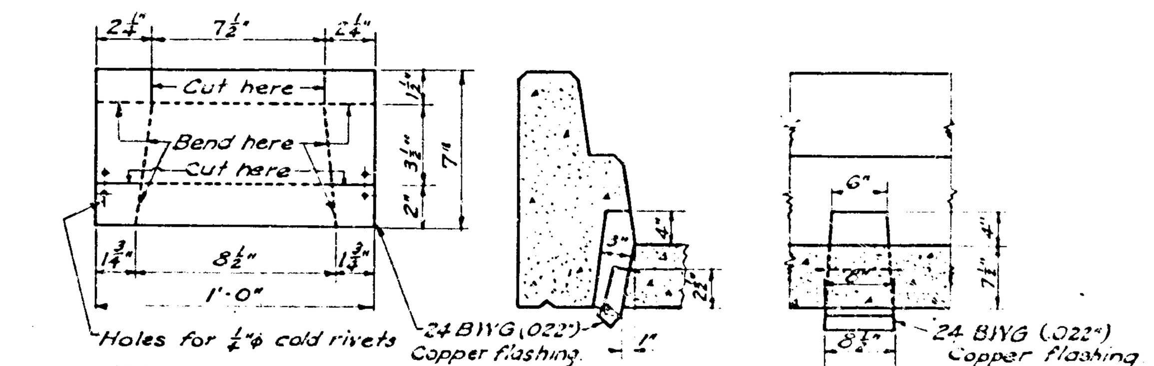
PLAN AT CURB

SECTION ORIGINAL DESIGN

SECTION ALTERNATE DESIGN

DETAILS OF FIXED DEVICE





NOTE: Any re-bars interfering with floor drains shall be bent to clear. For location of drains see Special Plans.

DETAILS OF COPPER DRAIN

STATE OF NEBRASKA
DEPARTMENT OF ROADS AND IRRIGATION
BUREAU OF HIGHWAYS
STANDARD DESIGN CLASS H20-S16

DETAILS FOR DECK STEEL GIRDER SPANS

26 FT. ROADWAY CONCRETE FLOOR
PROJ. [redacted] COUNTY-STA. [redacted]
STATE ROAD [redacted]
LINCOLN, NEBR. JUNE 1944.

Wardner G. Scott
STATE ENGINEER

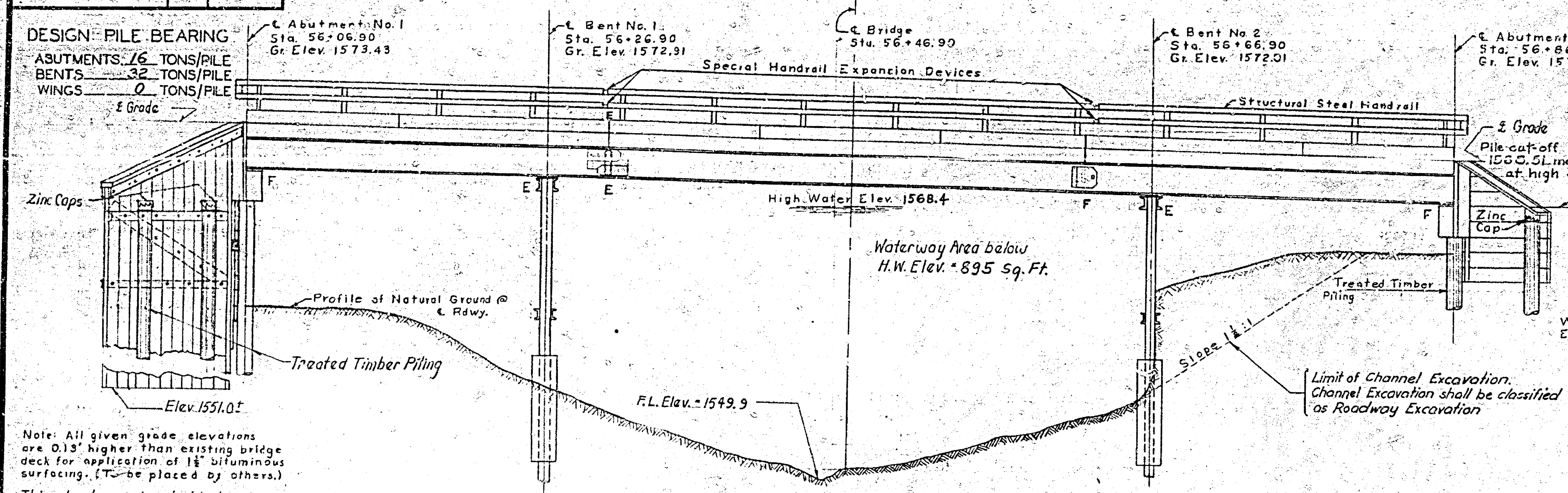
1575-B
DESIGNED BY Dept.
DETAILED BY PET
TRACED BY PET
CHECKED BY E.F.G.

REVISIONS

DESCRIPTION	BY	DATE
Quantities	I.D.	Feb. 11, 1963

DESIGN PILE BEARING

ABUTMENTS 16 TONS/PILE
BENTS 32 TONS/PILE
WINGS 0 TONS/PILE



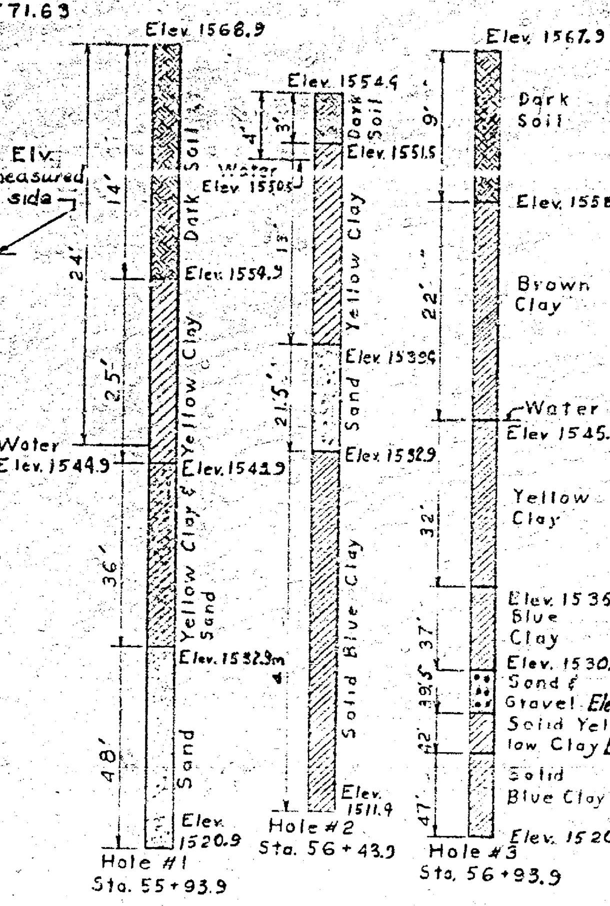
Note: All given grade elevations are 0.13' higher than existing bridge deck for application of 1½" bituminous surfacing. (To be placed by others.)

This structure is located between Sections 3 & 4, T26N-R2E Wayne County

N

GENERAL ELEVATION
SCALE ⅛" = 1'-0"

HANDRAIL QUANTITIES	
330.5 Lin. Ft. of Rail ∠ 4 × 3½ × 5/16	Total Weight 4,180 Lbs.
28 Handrail Post Assemblies	
8 Special Expansion Device Assemblies	
4 End Handrail Plates	
2 Capacity Plates Assemblies	



LOG OF BORINGS
(Taken from 1936 Plans)

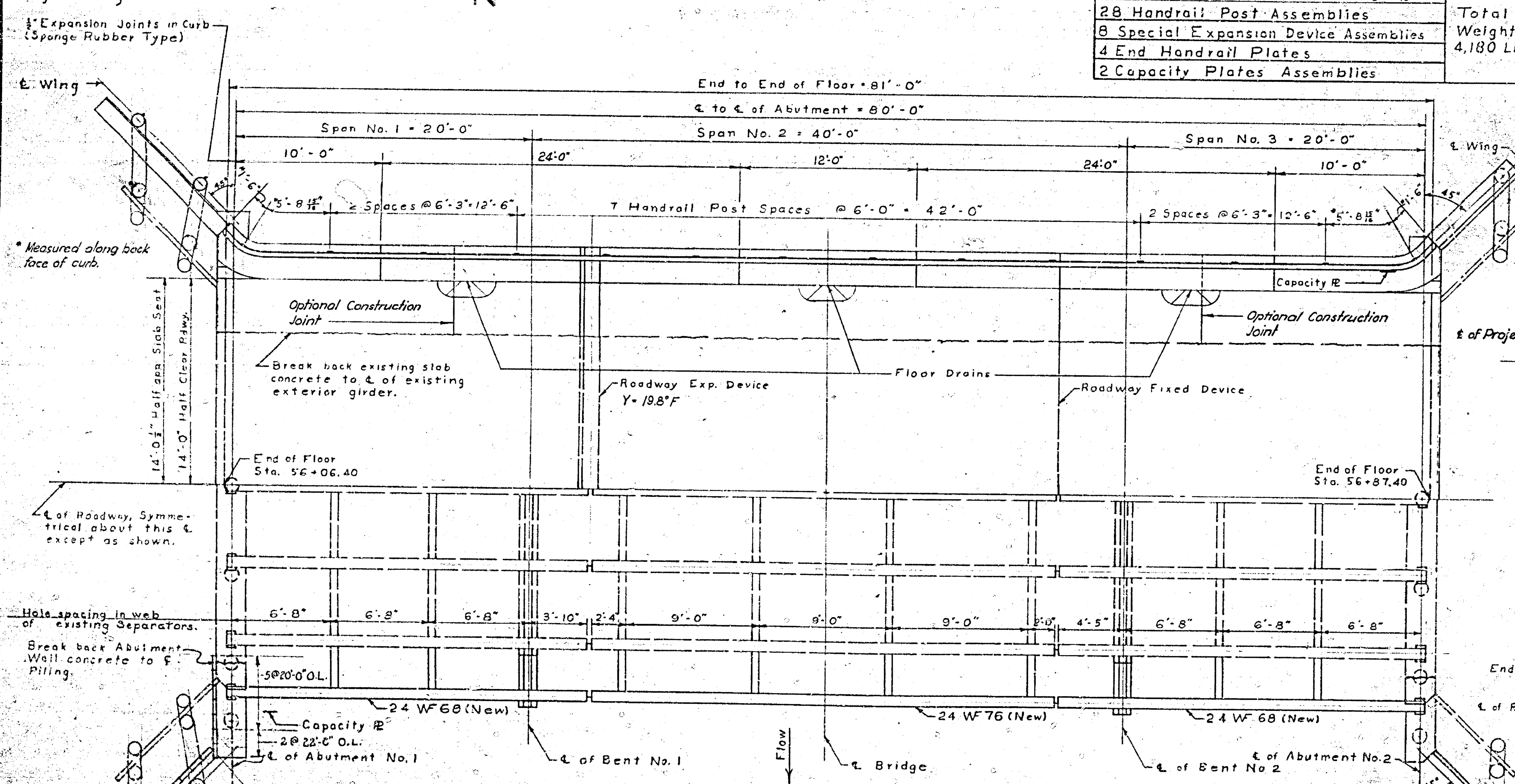
NOTES

All concrete shall be Class "47A-S", "47B" or "47C-S".
All exposed edges of concrete shall be chamfered.
All reinforcing steel shall be deformed bars, and that used for bent bars shall satisfy the bent test requirements for Structural Grade Steel in accordance with the Specifications.
The working stress for Reinforcing Steel shall be 20,000 p.s.i.
The working stress for Concrete shall be 1,200 p.s.i.
The borings as logged on this plan represent the character of the subsoil at the locations indicated. No guarantee is made that the subsoil conditions vary uniformly between or outside the given locations.
Before ordering any material, the Contractor shall make a detailed feild inspection of this bridge, checking all dimensions and reporting all discrepancies between this plan and his field measurements to the Engineer.
All reinforcing steel encountered in breaking back the existing concrete in slab and abutments shall be thoroughly cleaned, straightened and extended in the new work a minimum of 2 feet.
The item "Preparation of Existing Structure at Sta. 56+46.90" shall be in accordance with the Special Provisions.
All existing concrete coming in contact with the new work shall be thoroughly cleaned and roughened prior to placing new concrete.
Floor drains, ½" Expansion Joint Filler in Curbs, Wire mesh for Bents and the wood strips at Roadway Devices shall not be paid for directly, but shall be considered as subsidiary to items for which payment is made.
Handrail Posts shall be set to transit line and grade, and Posts shall be set plumb.
Shim thickness shall vary to compensate for dead load deflection and vertical curve.
The unit price bid per M. ft. B.M. of Treated Bridge Timber shall include furnishing and placing of all hardware and galvanized Steel cable.
The minimum breaking load for galvanized steel cable shall be 7000 Lbs.
All reinforcing bars shall be intermediate or hard grade steel.
Structural steel shall conform to the requirements of A.S.T.M. Design A-7.
Working Stress for structural steel is 18,000 p.s.i.

FED. ROAD REG. NO.	STATE	FED. AID PROJECT NO.	SHEET NO.
	NEBR.	S 416(8)	63

QUANTITIES

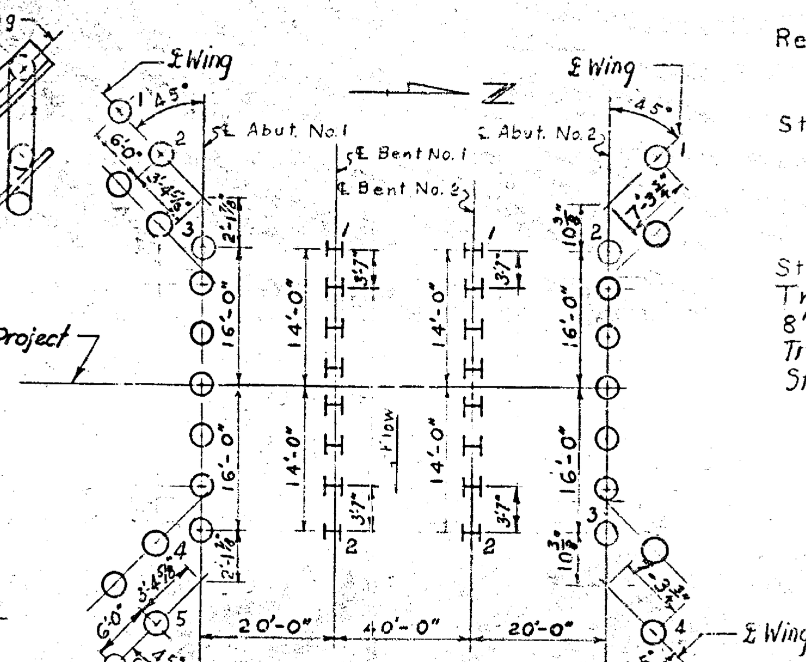
Excavation for Bridges — 50 Cu. Yds.
Abutments — 35 Cu. Yds.
Bents — 15 Cu. Yds.
Preparation of Existing Structure at Sta. 56+46.90 — 1 Each
Treated Bridge Timber — 1.279 — 1.289 M. ft. B.M.
Class "47A-S", "47B" or "47C-S" Concrete — 42.5 Cu. Yds.
Floor and Curbs — 36.6 Cu. Yds.
Abutments — 3.6 Cu. Yds.
Bents — 2.3 Cu. Yds.
Reinforcing Steel — 5,800 Lbs.
Floor and Curbs — 5,000 Lbs.
Abutments — 800 Lbs.
Structural Steel for Superstructure — 15,885 Lbs.
Girders and Separators — 13,070 Lbs.
Roadway Expansion and Fixed Devices — 905 Lbs.
Expansion and Fixed Pin Connections — 1,240 Lbs.
Bent and Abutment Bearing Devices — 670 Lbs.
Structural Steel for Substructure — 1,875 Lbs.
Treated Timber Piling — 340 Lin. ft.
8" × 36# Steel Piling — 290 Lin. ft.
Treated Timber Sheet Piling (4" thick) — 748 Sq. ft.
Structural Steel for Handrail — 4,180 Lbs.



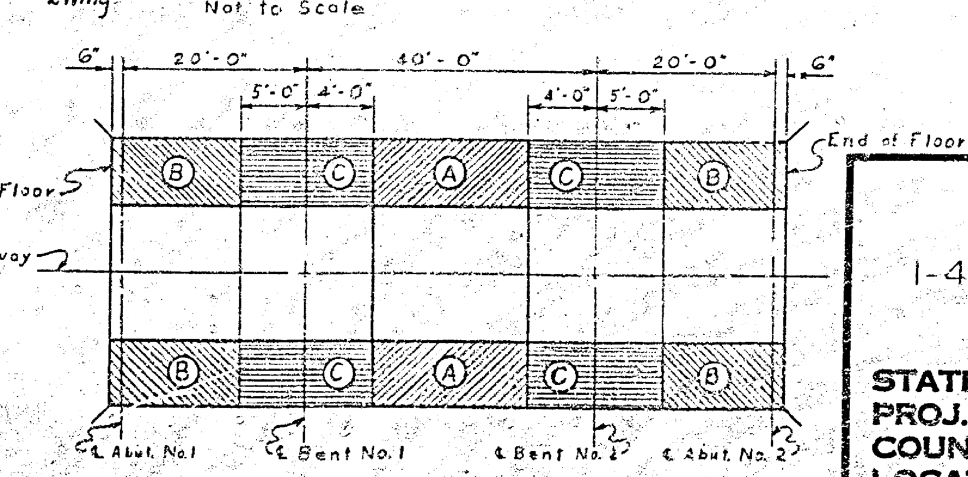
GENERAL PLAN
SCALE ⅛" = 1'-0"

PILE DATA				
Location	Pile No.	Cut Off Elev.	Min. Penet. Below C.O. Elev.	Order Length
Abut. No. 1	1 & 6	1568.42	27	30
	2 & 5	1566.42	27	30
	3 & 4	1568.92	37	40
Bent No. 1	1 & 2	1569.88	58	60
Bent No. 2	1 & 2	1568.98	58	60
Abut. No. 2	1 & 4	1568.51	27	30
	2 & 3	1567.12	37	40

For details of Handrail, except as shown, See Std. Plan 1749-A.
For details of Capacity Plates, except as shown, See Std. Plan 1747.
For details of Pile Splices, see Std. Plan 1592-A.



PILE LAYOUT
Not to Scale



POURING DIAGRAM
Not to Scale

Pouring Sequence: Area "A" shall be poured before Areas "B" and "C".
Area "B" shall be poured before adjacent Area "C".
Area "C" may be poured continuous with Area "B".

PILE DRIVING DATA* - 1936		
Location	Average Bearing	Avg. Length in place
Abut. No. 1	12.9 tons/pile	28.4 Ft.
Bent No. 1	13.9 tons/pile	46.6 Ft.
Bent No. 2	14.18 tons/pile	44.1 Ft.
Abut. No. 2	13.0 tons/pile	28.5 Ft.

* Piling driven with 1,985 pound gravity hammer.

STATE OF NEBRASKA
DEPARTMENT OF ROADS

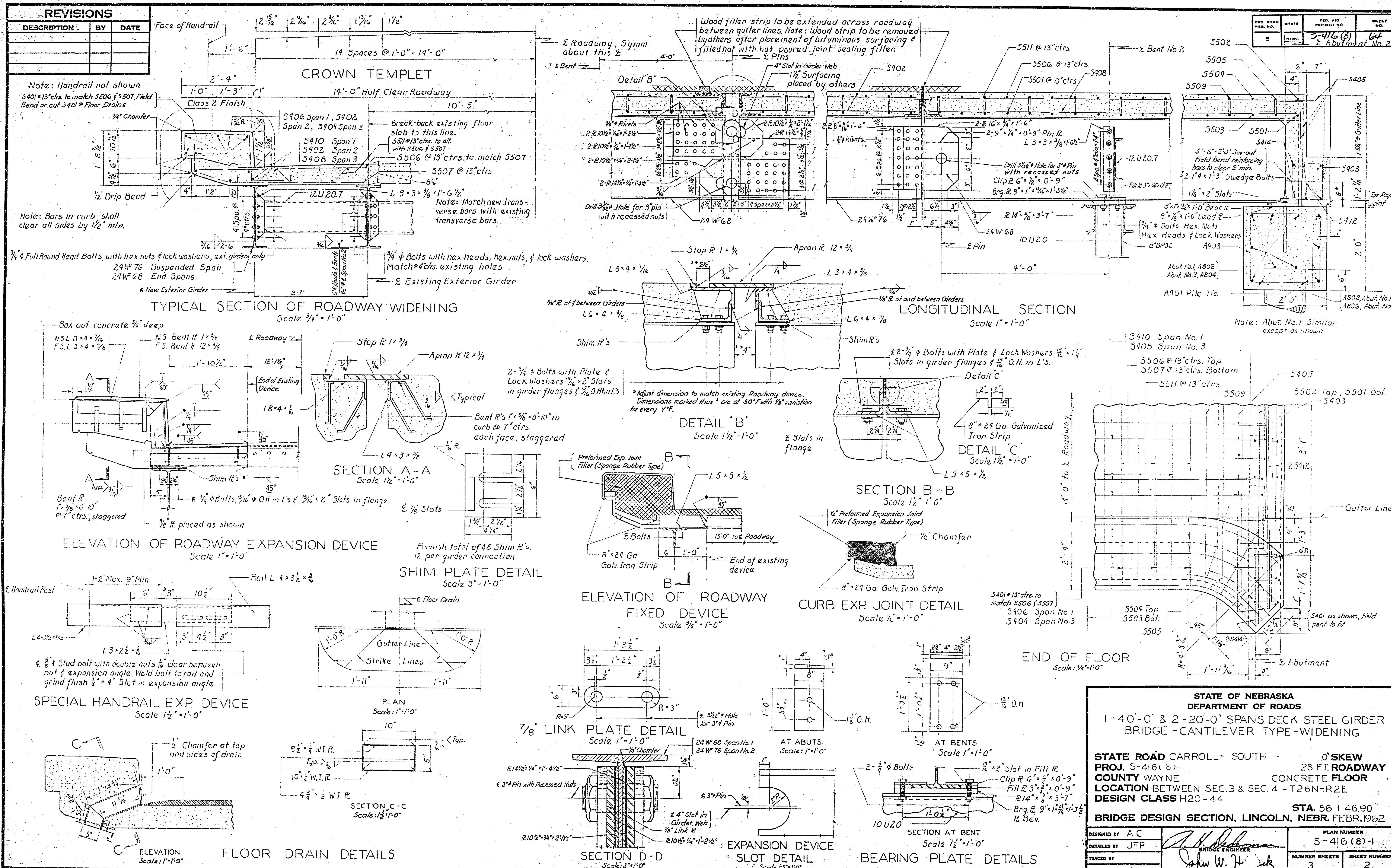
1-40'-0" & 2-20'-0" SPANS DECK STEEL GIRDER BRIDGE-CANTILEVER TYPE-WIDENING

STATE ROAD CARROLL - SOUTH — 0° SKEW
PROJ. S-416(8) — 28 FT. ROADWAY
COUNTY WAYNE — CONCRETE FLOOR
LOCATION BETWEEN SEC. 3 & SEC. 4 - T26N - R2E
DESIGN CLASS H20-44
STA. 56+46.90
BRIDGE DESIGN SECTION, LINCOLN, NEBR. FEBR. 1962

DESIGNED BY A.C.
DETAILED BY R.R.E.
TRACED BY
CHECKED BY I.D.

BRIDGE ENGINEER
John W. Hossack
STATE ENGINEER

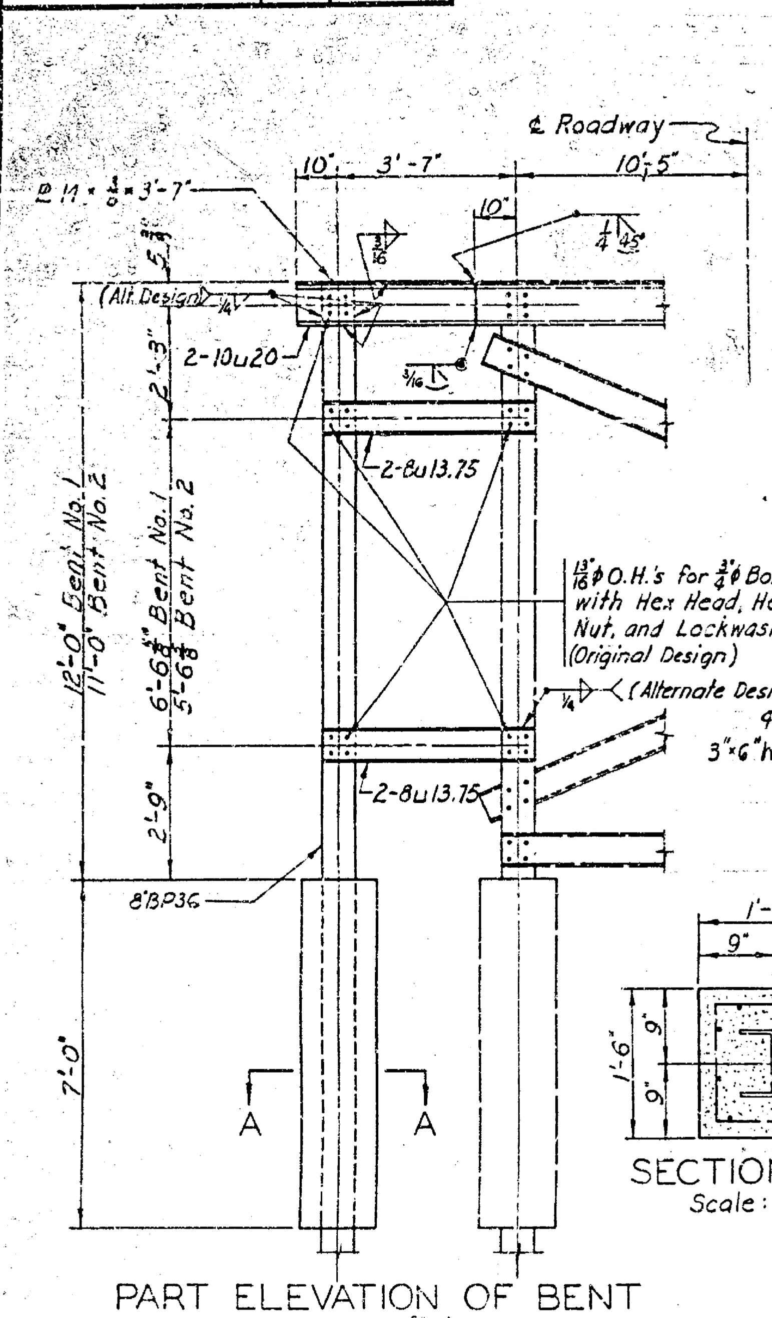
PLAN NUMBER S-416(8)-1
NUMBER SHEETS 3
SHEET NUMBER 1


REVISIONS
DESCRIPTION
BY
DATE
CROWN TEMPLET
14'-0" Half Clear Roadway
TYPICAL SECTION OF ROADWAY WIDENING
Scale 3/4" = 1'-0"
LONGITUDINAL SECTION
Scale 1" = 1'-0"
DETAIL "B"
Scale 1 1/2" = 1'-0"
SECTION A-A
Scale 1 1/2" = 1'-0"
SECTION B-B
Scale 1 1/2" = 1'-0"
DETAIL "C"
Scale 1 1/2" = 1'-0"
ELEVATION OF ROADWAY EXPANSION DEVICE
Scale 1" = 1'-0"
SHIM PLATE DETAIL
Scale 3" = 1'-0"
Furnish total of 48 Shim R's.
12 per girder connection.
ELEVATION OF ROADWAY FIXED DEVICE
Scale 3/4" = 1'-0"
CURB EXP. JOINT DETAIL
Scale 1/2" = 1'-0"
END OF FLOOR
Scale 3/4" = 1'-0"
SPECIAL HANDRAIL EXP. DEVICE
Scale 1 1/2" = 1'-0"
7/8" LINK PLATE DETAIL
Scale 1" = 1'-0"
AT ABUTS.
AT BENTS
Scale 1" = 1'-0"
FLOOR DRAIN DETAILS
SECTION D-D
Scale: 3" = 1'-0"
EXPANSION DEVICE SLOT DETAIL
Scale: 3" = 1'-0"
BEARING PLATE DETAILS
SECTION AT BENT
Scale 1 1/2" = 1'-0"
Note: Handrail not shown
Note: Bars in curb shall clear all sides by 1/2" min.
Note: Abut. No. 1 Similar except as shown
STATE OF NEBRASKA
DEPARTMENT OF ROADS
1-40'-0" & 2-20'-0" SPANS DECK STEEL GIRDER
BRIDGE - CANTILEVER TYPE - WIDENING
STATE ROAD CARROLL - SOUTH
0° SKEW
PROJ. S-416(8)
28 FT. ROADWAY
COUNTY WAYNE
CONCRETE FLOOR
LOCATION BETWEEN SEC. 3 & SEC. 4 - T26N-R2E
DESIGN CLASS H20-44
STA. 56 + 46.90
BRIDGE DESIGN SECTION, LINCOLN, NEBR. FEBR. 1962
DESIGNED BY A C
DETAILED BY JFP
TRACED BY
CHECKED BY I.D.
BRIDGE ENGINEER
STATE ENGINEER
PLAN NUMBER S-416(8)-1
NUMBER SHEETS 3
SHEET NUMBER 2
S-416(8)
64

FED. ROAD DIV. NO.	STATE	FED. AID PROJECT NO.	SHEET
5	NEBR.	S-416(8)	65

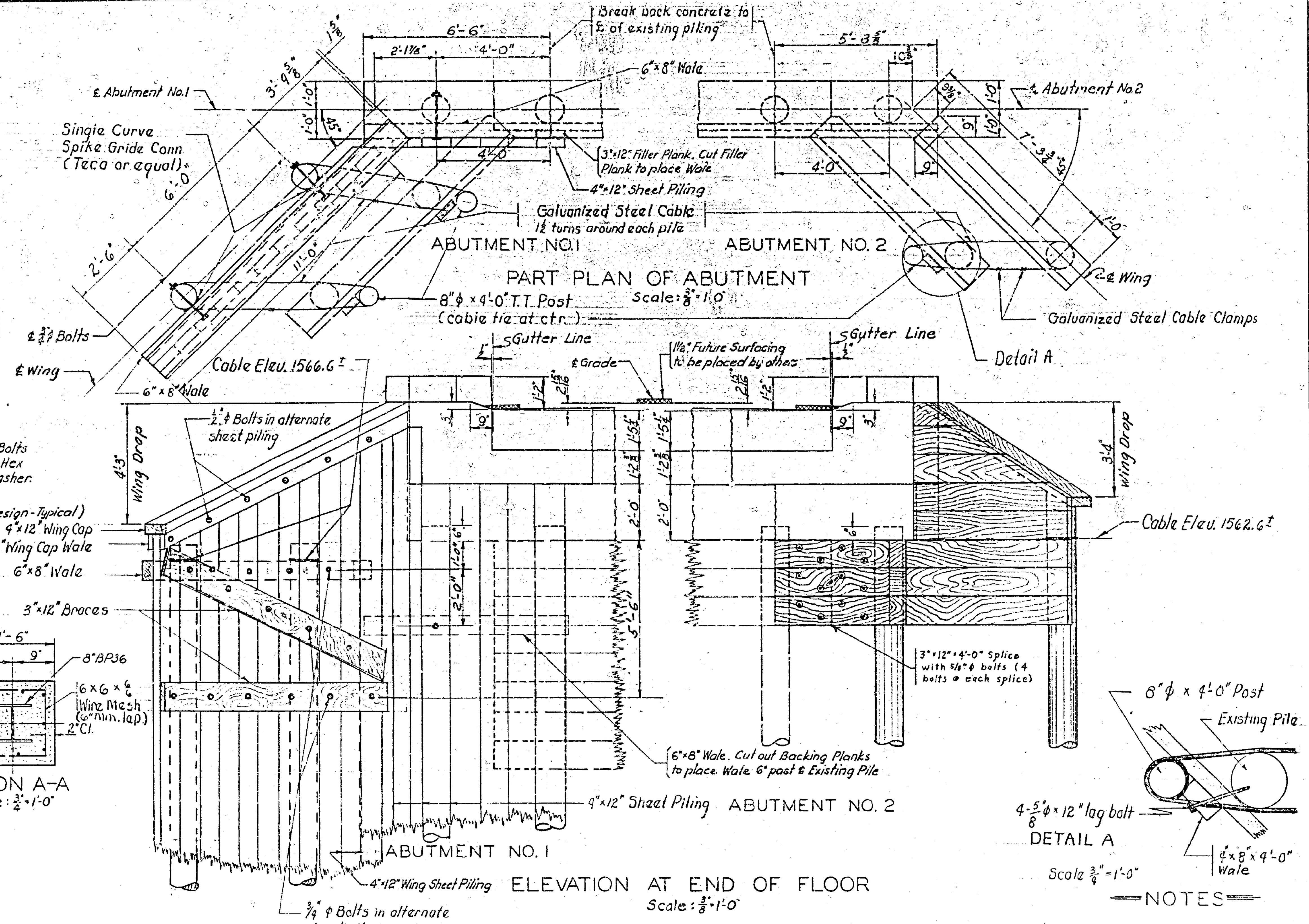
REVISIONS

DESCRIPTION	BY	DATE
Quantities	I.D.	Feb. 11, 1963



PART ELEVATION OF BENT
Scale: $\frac{3}{8}$"=1'-0"

SECTION A-A
Scale: $\frac{3}{4}$"=1'-0"

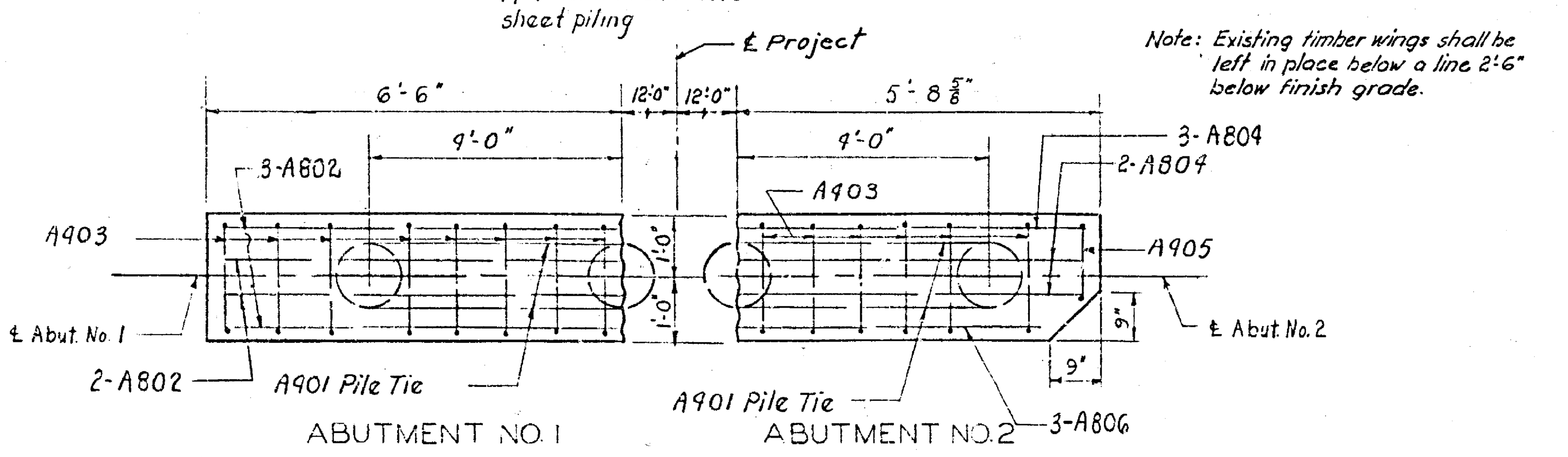


PART PLAN OF ABUTMENT
Scale: $\frac{3}{8}$"=1'-0"

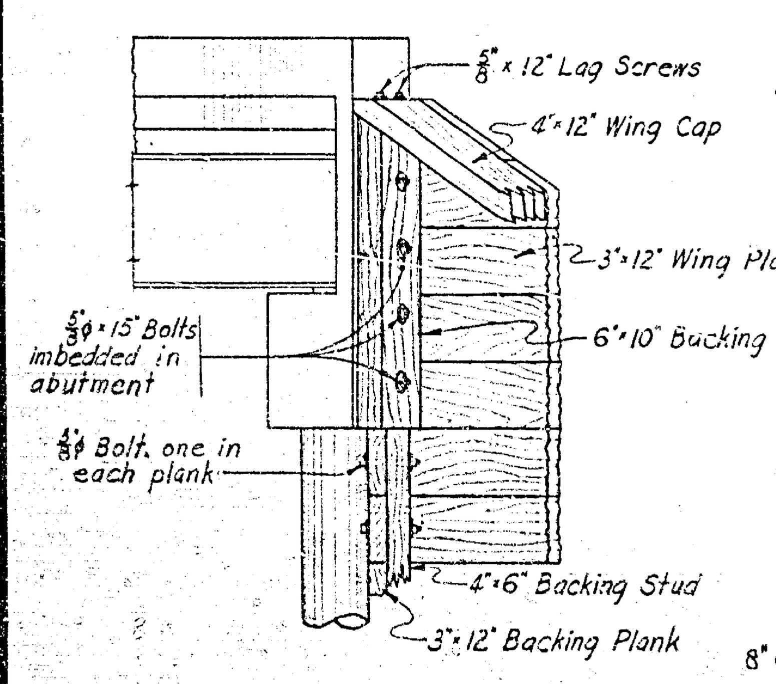
ELEVATION AT END OF FLOOR
Scale: $\frac{3}{8}$"=1'-0"

DETAIL A
Scale $\frac{3}{4}$"=1'-0"

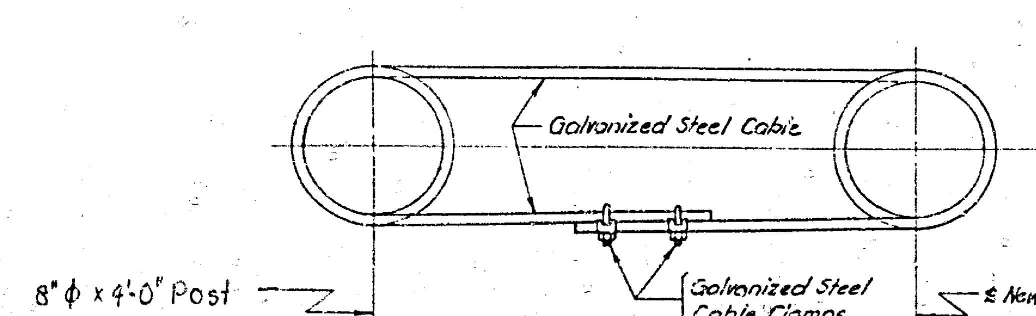
Note: Existing timber wings shall be left in place below a line 2'-6" below finish grade.



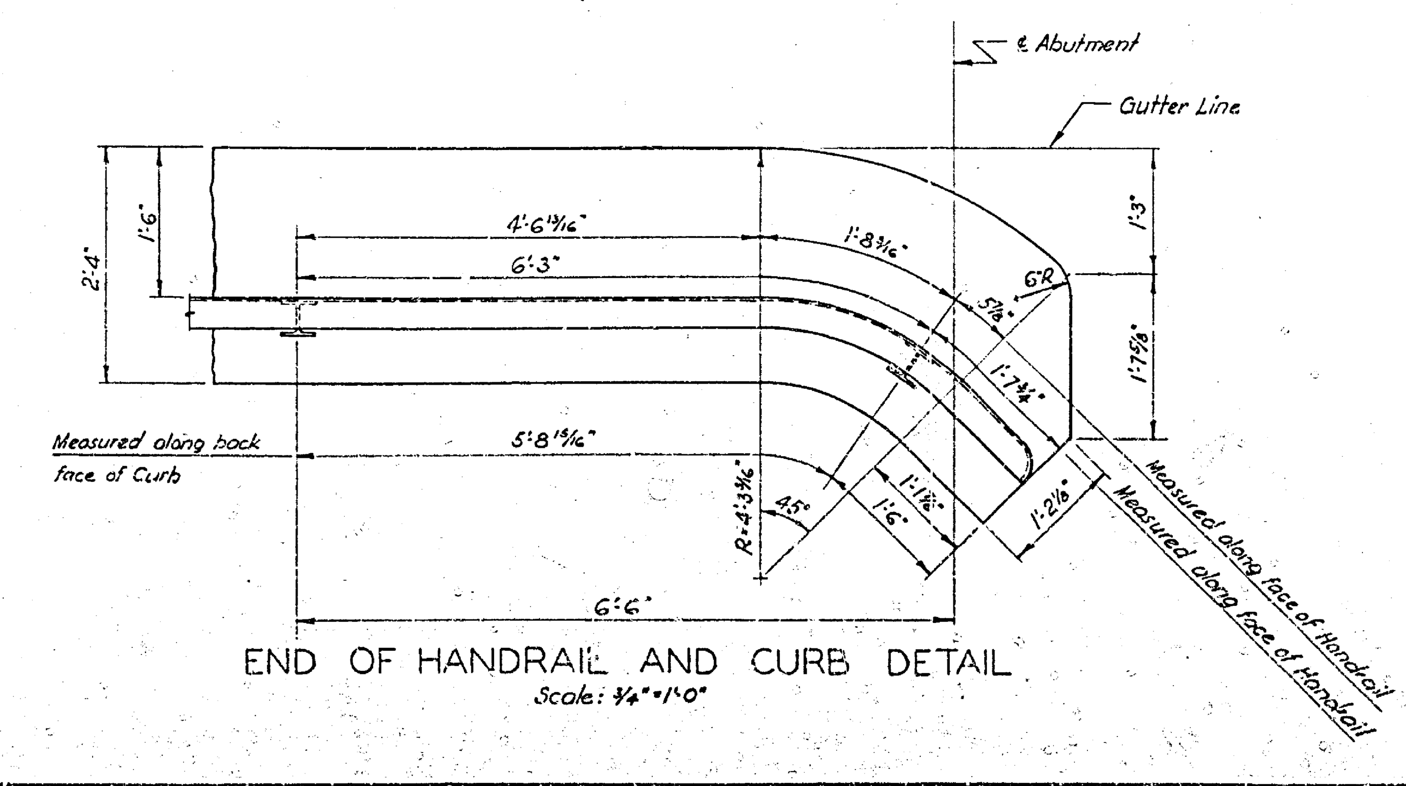
PART PLAN OF ABUTMENT
Scale $\frac{1}{2}$"=1'-0"



DETAIL OF WING CONNECTION AT ABUTMENT NO. 2
Scale: $\frac{3}{8}$"=1'-0"



GALVANIZED STEEL CABLE DETAIL
Not to Scale



END OF HANDRAIL AND CURB DETAIL
Scale: 3/4"=1'-0"

NOTES

All Timber shall be full sawn, rough treated Bridge Timber, conforming to the Specifications.

All Bolts shall be 3/4" ϕ unless otherwise noted.

All Washers shall be standard cast iron O. G. washers unless otherwise specified.

Use 60d Spikes to nail Sheet Piling to abutment wales and 3"×12" Filler Plank.

Nail Wing Cap to Wing Wales with 60d spikes @ 12" ctrs.

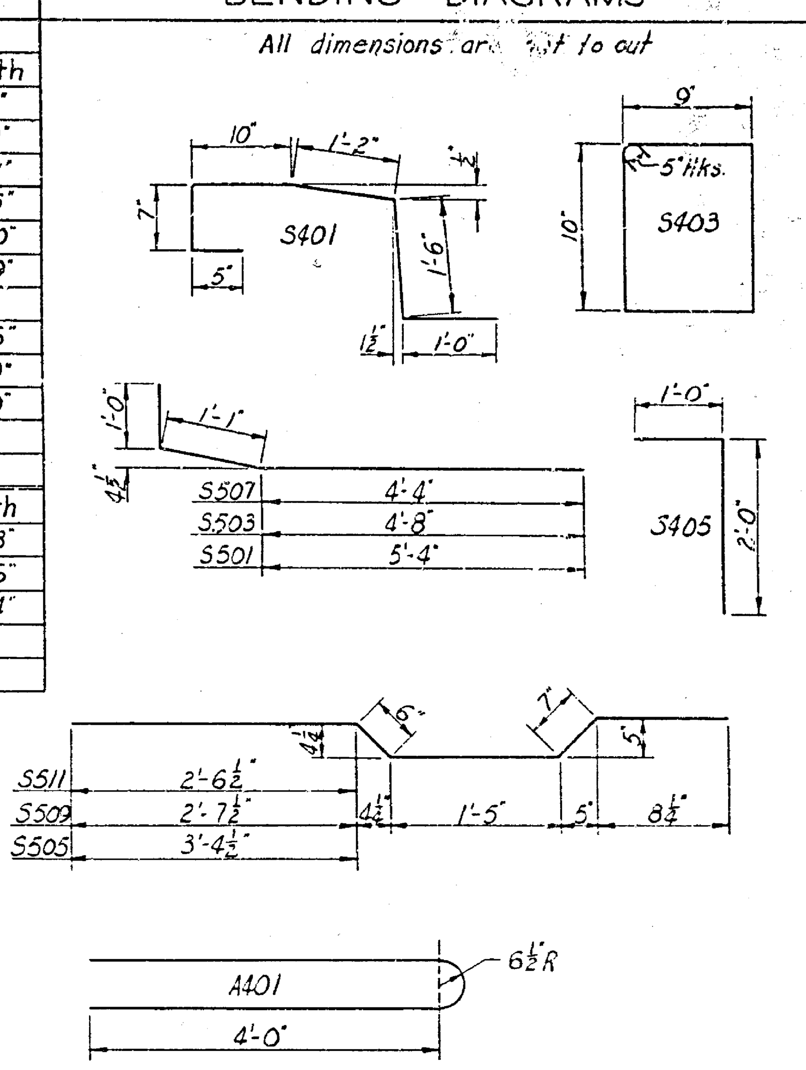
Use 60d spikes for nailing Wing Planks to Wing Cap, Wing Planks to Backing Studs, Wing Planks to Piles and Backing Planks to Piles.

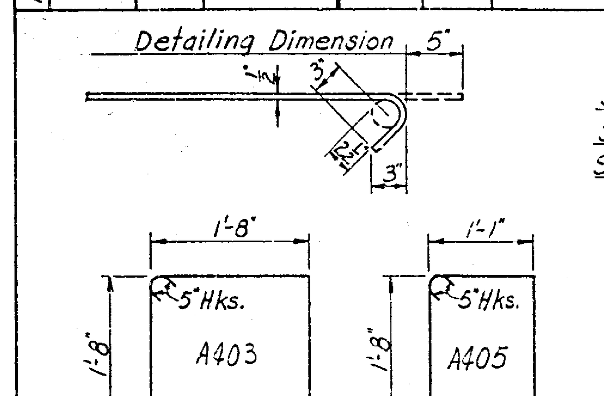
BILL OF BARS

	STRAIGHT			BENT		
	Mark	No.	Length	Mark	No.	Length
SLAB & CURBS	S502	4	6'-11"	S501	4	7'-5"
	S504	4	5'-9"	S503	4	6'-9"
	S506	144	5'-5"	S505	4	6'-7"
				S507	144	6'-5"
	S402	26	31'-0"	S509	4	5'-10"
	S404	10	25'-6"	S511	140	5'-9"
	S406	10	25'-0"			
	S408	16	24'-7"	S401	160	5'-6"
	S410	16	23'-11"	S403	20	4'-0"
	S412	16	6'-5"	S405	52	3'-0"
	S414	8	2'-4"			
ABUTMENT	Mark	No.	Length	Mark	No.	Length
	A802	20	6'-3"	A401	4	9'-8"
	A804	14	5'-6	A403	28	7'-6"
	A806	6	4'-9	A405	2	6'-4"

BENDING DIAGRAMS

All dimensions are out to out





TEST BAR NOTE: Ship one No. 8 × 4'-8" bar. The Engineer will cut a 3'-0" piece from a representative No. 8 bar and match with the 4'-8" piece respectively. The 3'-0" piece is for testing purposes.

TREATED BRIDGE TIMBER

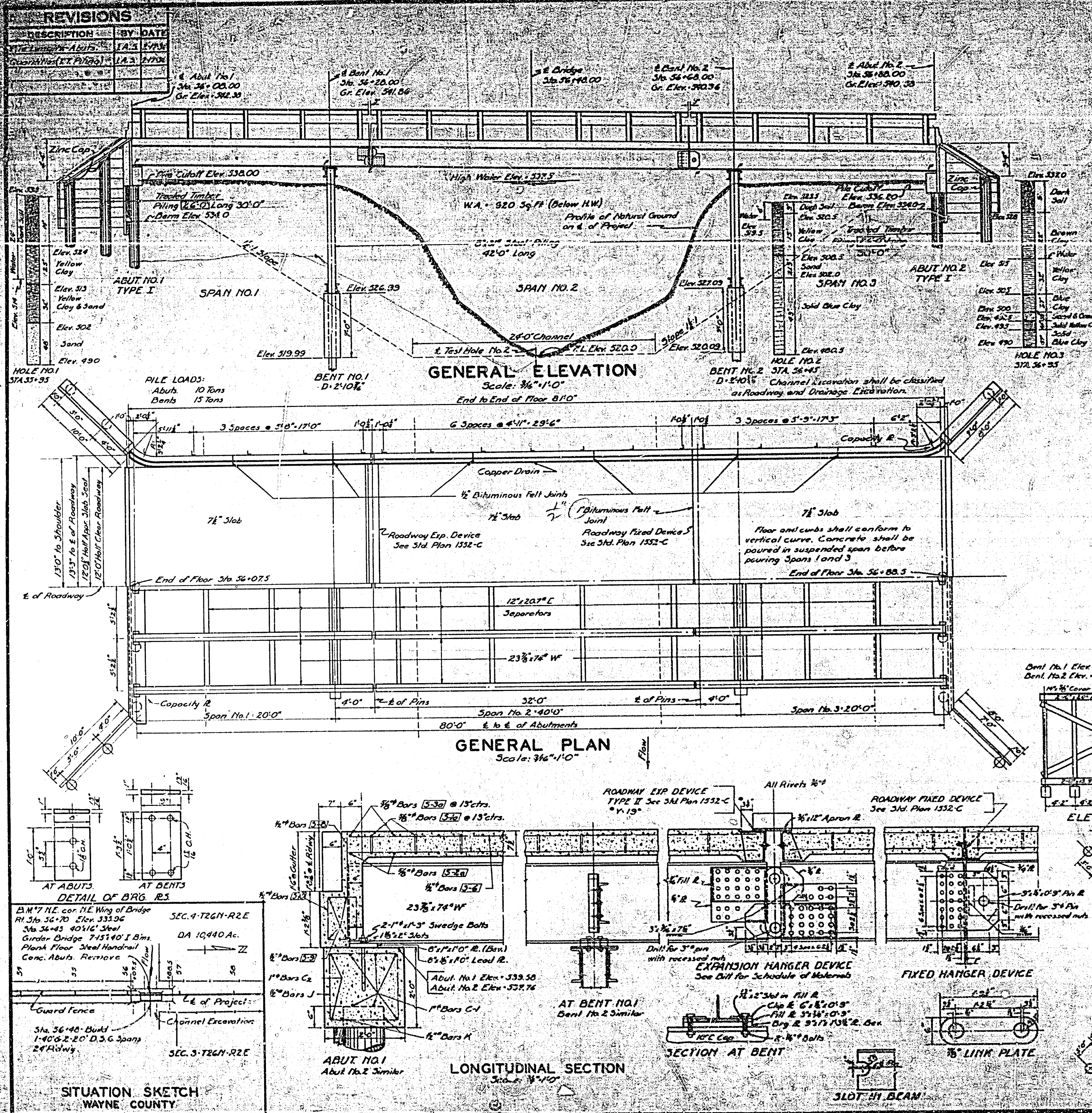
	MEMBER	NO.	SIZE	LENGTH	GROUP
ABUTMENT NO. 1	Filler Plank	2	3"×12"	8'-0"	II
	Brace	4	3"×12"	12'-0"	II
	Wing Cap	2	4"×12"	13'-0"	II
	Wing Cap Wale	4	3"×6"	13'-0"	II
	Abutment Wale	2	6"×8"	7'-0"	B
	Wing Wale	2	6"×8"	11'-0"	B
	Post	4	8" ϕ	4'-0"	B
	Wale	4	4"×8"	9'-0"	B
ABUTMENT NO. 2	Backing Plank	6	3"×12"	8'-0"	II
	" "	4	3"×12"	7'-8"	II
	" "	2	3"×12"	6'-8"	II
	" "	2	3"×12"	4'-6"	II
	" "	2	3"×12"	2'-4"	II
	Backing Plank Splice	6	3"×12"	4'-0"	II
	Backing Plank Extension	6	3"×12"	3'-9"	II
	Wing Cap	2	4"×12"	8'-6"	II
	Post	2	8" ϕ	4'-0"	B
	Wale	2	4"×8"	9'-0"	B
	* Refers to Art. 251.04 of the Specifications				
	Backing Stud	2	6"×10"	5'-0"	II

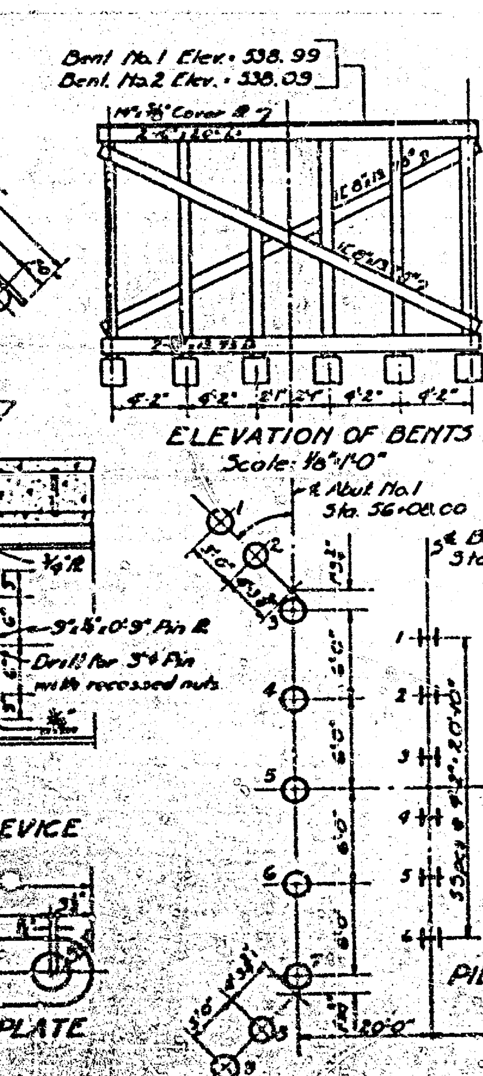
STATE OF NEBRASKA
DEPARTMENT OF ROADS

1-40'-0" & 2-20'-0" SPANS DECK STEEL GIRDER BRIDGE-CANTILEVER TYPE-WIDENING

STATE ROAD CARROLL - SOUTH — 0° **SKEW**
PROJ. S-416(8) — 28 FT. **ROADWAY**
COUNTY WAYNE — CONCRETE **FLOOR**
LOCATION BETWEEN SEC. 3 & SEC. 4 - T26N - R2E
DESIGN CLASS H20-44
STA. 56 + 46.90
BRIDGE DESIGN SECTION, LINCOLN, NEBR. FEBR. 1962

DESIGNED BY A.C.	A. H. Edgerman — BRIDGE ENGINEER	PLAN NUMBER S-416(8)-1	
DETAILED BY D.J.S.			
TRACED BY	John W. Hossack — STATE ENGINEER	NUMBER SHEETS 3	SHEET NUMBER 3
CHECKED BY I.D.			





BARS, PLS, ANCHORS, ETC.
10-8"x1"x1'-0" Pls. (Beveled)
10-3"x1"x1'-3½" Pls.
20-6"x⅜"x0'-9" Clip Pls.
20-3"x⅜"x0'-3" Fill Pls.
20-1"ϕ Swedge Bolts x1'3"
40-¾"ϕ Bolts
TOTAL WEIGHT 1090#
ONE EXPANSION HANGER DEVICE
4-10⅝"x⅝"x2'4⅝" Pls.
4-14⅝"x⅝"x1'4⅝" Pls.
4-10⅝"x⅝"x1'-2⅝" Pls.
2-6"x⅝"x1'9⅝" Link Pls.
2-3"ϕ Pins with Recessed Nuts
¾"ϕ Rivets
TOTAL WEIGHT 433#
ONE FIXED HANGER DEVICE
2-16"x⅝"x1'6" Pls.
2-8"x⅝"x1'-6" Pls.
2-9"x⅝"x0'-9" Pin Pls.
1-3"ϕ Pin with Recessed Nuts
¾"ϕ Rivets
TOTAL WEIGHT 185#
ROADWAY FIXED DEVICE
2-Bulb Ls 5"x4½"x⅜"x26'-0"
¾"ϕ Bolts
TOTAL WEIGHT 1015#
ROADWAY EXPANSION DEVICE
2-Ls 6"x6"x⅜"x24'-3"
1-L 5"x3½"x⅜"x24'-3"
1-L 8"x6"x⅞"x24'-3"
1 Pl. 12"x⅜" x24'-3"
2 Pls. 12"x⅜"x0'-5"
1-⅜"x1"x24'-3" Bar
⅜" Stiffener Pls. Shim Pls.
¾"ϕ Bolts ¾"ϕ Rivets.
TOTAL WEIGHT 2575#
STRUCTURAL STEEL HANDRAIL
34 Handrail Post Assemblies
160.33'- 5"x3"x⅜" Rail L
2 Capacity Pl. Assemblies
TOTAL WEIGHT 3060#

STRUCTURAL STEEL IN BENTS
4 Ls 10"x20.8"x22'-6"
4 Ls 8"x13.75"x21'-6"
2 Ls 8"x13.75"x24'-0"
2 Ls 8"x13.75"x23'-6"
2-16"x⅜"x22'-6" Cover Pl.
¾"ϕ Bolts ¾"ϕ Rivets
TOTAL WEIGHT 5375#

BILL OF BARS FOR ABUTS.

MARK	SIZE	NO.	LT.	LOCATION
C-1	1"ϕ	12	29'-8"	Long Cap
C-2	1"ϕ	4	28'-3"	" "
K	½"ϕ	4	27'-9"	Pile Ties
J	½"ϕ	64	8'-0"	Stirrups

For detail see Std. Plan #1547-B
Ship 1 extra Bar C-2 for testing.

BILL OF BARS FOR SLAB

MARK	SIZE	NO.	LT.	LOCATION
S-1	⅝"ϕ	70	30'-6"	° Slab Tran
S-1a	"	4	39'-4"	* " "
S-2	"	72	28'-6"	° " "
S-2a	"	4	34'-10"	* " "
S-3	"	72	25'-10"	° " "
S-3a	"	4	32'-2"	* " "
S-4	½"ϕ	4	23'-11⅞"	Curb Span #1
S-4	"	4	31'-1"	" " #2
S-4	"	4	24'-6⅞"	" " #3
S-5	"	4	24'-0"	Slab Span #1
S-5	"	4	31'-0"	" " #2
S-5	"	4	24'-6"	" " #3
S-6	"	16	23'-11"	" " #1
S-6	"	16	31'-0"	" " #2
S-6	"	16	24'-7"	" " #3
S-7	"	152	5'-0"	° Curb
S-8	"	48	4'-0"	* Turndown
S-9	"	8	26'-6"	"
S-10	"	48	4'-4"	* "

For details of bars marked thus * see Std. Plan 1544-E
For Bars marked thus ° see Std. Plan 1552-C
Bars not detailed are straight.

BILL OF LUMBER

MEMBER	NO.	SIZE	LT.	MEMBER	NO.	SIZE	LT.
Backing Plank	8	3"x12"	28'-0"	Wing Cap	2	8"x12"	10'-7"
Wing Plank	10	"	10'-0"	"	2	"	8'-9"
" "	6	"	8'-0"	Backing Studs	4	6"x10"	4'-9"
" "	2	"	*9'-0"	" "	2	4"x6"	3'-0"
" "	4	"	*6'-11"	" "	2	"	5'-0"
" "	4	"	*4'-9"	Wing Plank	2	3"x12"	7'-8"
" "	4	"	*2'-8"				

* These lengths are the longest dimension in place.
Pay quantities are based on the economical cutting of 12" plank.

NOTES

REINFORCED CONCRETE

All exposed edges of concrete shall be chamfered.

Concrete in floor and curbs shall be Class "AA".

Concrete in bents and abutment caps shall be Class "A".

Pouring of concrete in floor and curbs shall be in accordance with the Specifications. A construction joint shall be used at the base of the curbs.

Curbs shall have a bituminous felt joint extending from the top of the slab to the top of the curbs at the locations shown on the plans

Place one layer of tar paper between concrete and all bridge timber

The galvanized iron strip at the bituminous felt joint shall be either continuous or have soldered lock joints.

The unit price bid per cubic yard of Class "AA" concrete shall include the furnishing and placing of all bituminous felt material, tar paper and galvanized iron strip.

All reinforcing steel shall be deformed bars.

HANDRAIL

Handrail shall be set to transit line and grade.

Handrail posts shall be set plumb.

The unit price bid per pound of structural steel for handrail shall include the furnishing and placing of Capacity Plates.

STRUCTURAL STEEL

Buttonhead bolts shall be used where called for on the plans All other bolts shall be unfinished bolts.

Lock washers shall be used under all nuts unless otherwise specified.

All rivets and bolts shall be ¾"ϕ unless noted. All open holes shall be 13/16"ϕ unless noted. All field connections shall be bolted.

Girders and steel piling shall conform to the "Standard Specifications for Structural Steel for Bridges" A.S.T.M. serial designation A7-34.

TREATED BRIDGE TIMBER

All timber shall be full sawn, rough treated bridge timber conforming to the Special Provisions.

Plate, cast or malleable iron washers shall be used between all bolt heads, nuts, lagscrew heads and the timber.

All hardware in the treated timber construction shall be included in the unit price bid per M. ft. B.M. of Treated Bridge Timber.

WELDING

All welding shall be done by the arc process and in accordance with the Specifications of the A. A. of S.H.O.

PAINTING

Steel piling and all structural steel in substructure shall be painted as called for on Standard Plan 1544-E.

TIMBER PILING

All timber piling shall be treated timber piling conforming to the Specifications.

After cutoff the top of all piling shall be brush treated with three coats of hot creosote.

After brush treatment, the tops of wing piling shall be capped with rolled Zinc plates, American Zinc Gage No. 9, of one piece bent down 3" below tops of piling and fastened with large headed galvanized iron nails.

The unit price bid per lineal foot of treated bridge piling shall include the brush treatment and the furnishing and placing of zinc caps.

REMOVAL NOTE

The unit price bid for the Removal of Old Structure shall include the dismantling of superstructure, the breaking down of old concrete abutments, pulling or cutting off old piling and the moving and storing of all salvaged material within 300' of the original site as directed by the Engineer.

All salvaged material material shall become the property of the State.

QUANTITIES

Excavation for Bridges	80	Cu. Yds.
Treated Bridge Timber	1.642	M. ft. B.M.
Class "AA" Concrete	61.7	Cu. Yds.
Class "A" Concrete	15.0	Cu. Yds.
Reinforcing Steel	10,950	Lbs.
Steel Superstructure	1	Each
Girders & Separators	35080 Lbs	
Roadway Fixed & Exp. Devices	3590 "	
Fixed & Exp. Hanger Devices	3100 "	
Brg. Pls., Anchors, etc.	1090 "	
TOTAL	42,860 "	
Structural Steel for Substructure	5375	Lbs.
Treated Timber Piling	480	Lin. Ft.
8"x31" Steel Piling	304	Lin. Ft.
Structural Steel for Handrail	3060	Lbs.
Copper Drains	2	Each
Galvanized Iron Strip	26.0	Lin. Ft.
Lead Pls. 8"x⅛"x1'-0"	10	Each

Design Note: Stresses and loadings are in accordance with the Specifications of the A.A. of S.H.O.

For Details of Abut. except as shown see Std. Plan No. 1547-B.
For Details except as shown see Std. Plan No. 1552-C.
For Details of Bents see Std. Plan No. 1544-E.
For Concrete Surface Finish see Std. Plan No. 1562.
For Details of Capacity Pls. see Std. Plan No. 1509-B Type IV.
Traced from the original by: J.A.S. 2-11-36.
Tracing checked by: J.G.P. 2-11-36.

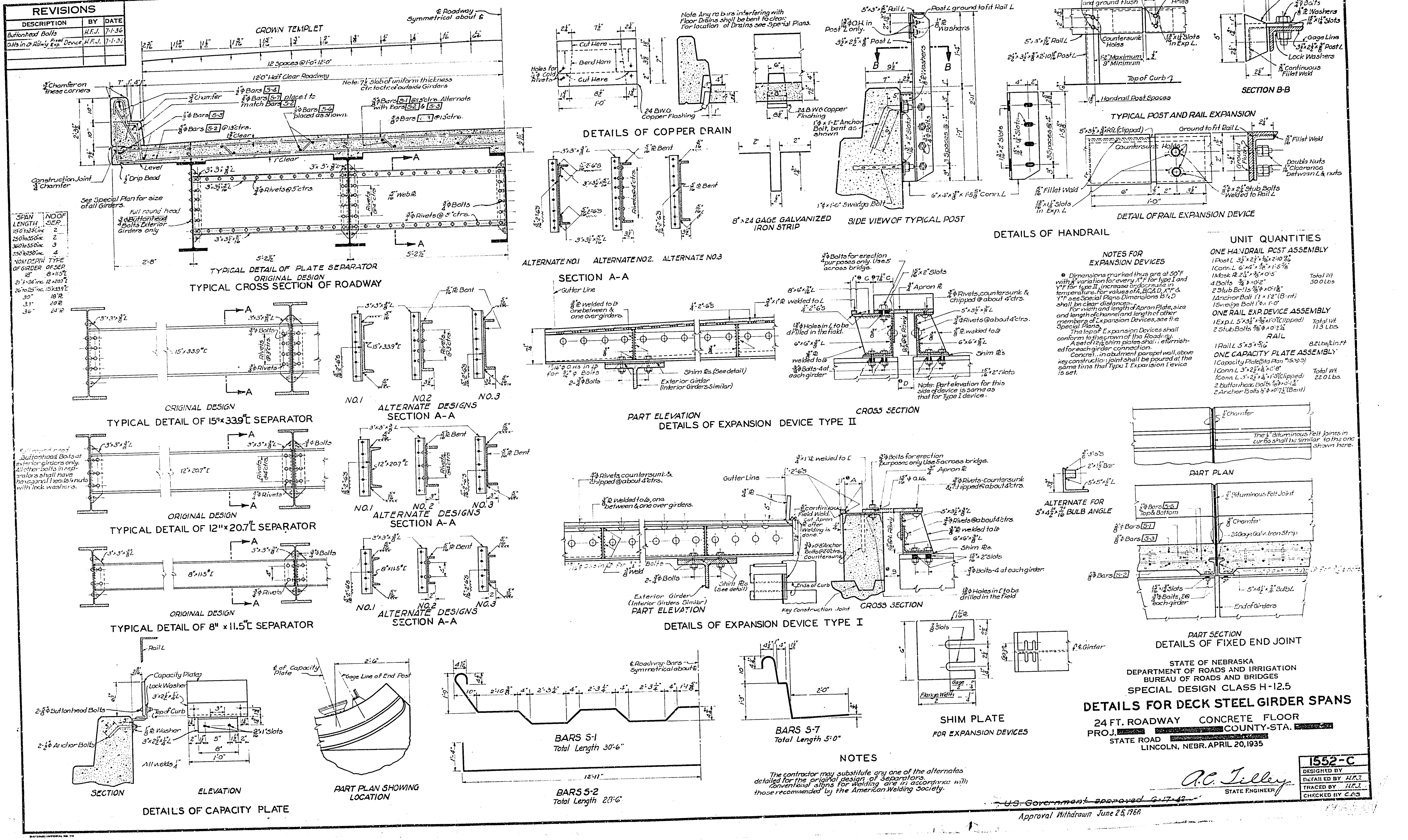
STATE OF NEBRASKA
DEPARTMENT OF ROADS AND IRRIGATION
BUREAU OF ROADS AND BRIDGES
SPECIAL DESIGN CLASS H-12.5

1-40' & 2-20' DECK STEEL GIRDER SPANS

CANTILEVER TYPE
24 FT. ROADWAY CONCRETE FLOOR
PROJ. 416 WAYNE COUNTY-STA. 56+48.00
STATE ROAD WINSIDE - BELDEN
LINCOLN, NEBR. JAN. 23, 1936

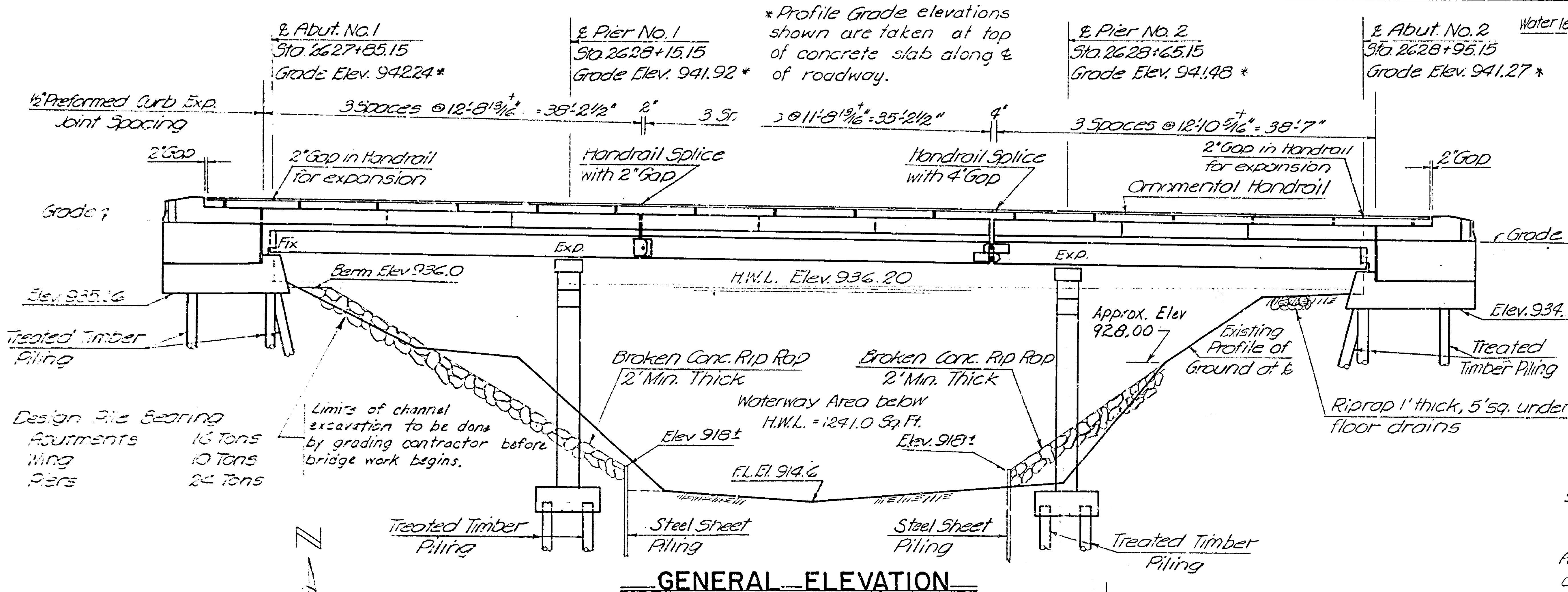
A. C. Tilley
STATE ENGINEER

W.P.S.O.
416-1
DESIGNED BY C.V.K.
DETAILED BY C.V.K.
TRACED BY
CHECKED BY



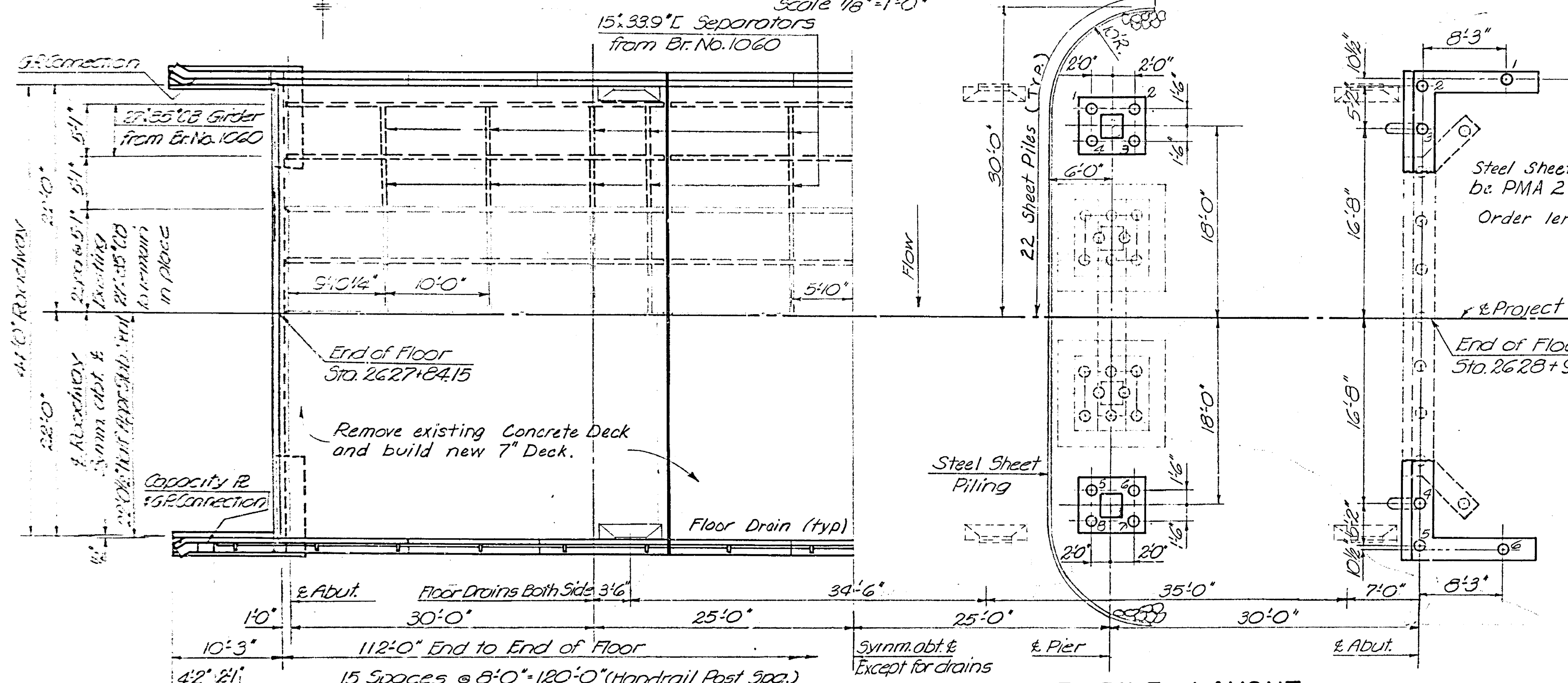
REVISIONS
DESCRIPTION | BY | DATE
Buttonhead Bolts | H.F.J. | 7-1-36
CROWN TEMPLET
TYPICAL DETAIL OF PLATE SEPARATOR
ORIGINAL DESIGN
TYPICAL CROSS SECTION OF ROADWAY
DETAILS OF COPPER DRAIN
8"x24 GAGE GALVANIZED IRON STRIP
SIDE VIEW OF TYPICAL POST
DETAILS OF HANDRAIL
TYPICAL POST AND RAIL EXPANSION
DETAIL OF RAIL EXPANSION DEVICE
SECTION B-B
ALTERNATE NO.1
ALTERNATE NO.2
ALTERNATE NO.3
SECTION A-A
TYPICAL DETAIL OF 15"x33.9# [SEPARATOR
ALTERNATE DESIGNS
SECTION A-A
PART ELEVATION
DETAILS OF EXPANSION DEVICE TYPE II
CROSS SECTION
NOTES FOR EXPANSION DEVICES
UNIT QUANTITIES
ONE HANDRAIL POST ASSEMBLY
ONE RAIL EXP. DEVICE ASSEMBLY
RAIL
ONE CAPACITY PLATE ASSEMBLY
TYPICAL DETAIL OF 12"x20.7# [SEPARATOR
TYPICAL DETAIL OF 8" x 11.5# [SEPARATOR
PART ELEVATION
DETAILS OF EXPANSION DEVICE TYPE I
ALTERNATE FOR 5"x4½"x7/16" BULB ANGLE
PART PLAN
PART SECTION
DETAILS OF FIXED END JOINT
DETAILS OF CAPACITY PLATE
SECTION
ELEVATION
PART PLAN SHOWING LOCATION
BARS S-1
Total Length 30'-6"
BARS S-2
Total Length 28'-6"
BARS S-7
Total Length 5'-0"
SHIM PLATE
FOR EXPANSION DEVICES
NOTES
The contractor may substitute any one of the alternates detailed for the original design of Separators. Conventional signs for welding are in accordance with those recommended by the American Welding Society.
STATE OF NEBRASKA
DEPARTMENT OF ROADS AND IRRIGATION
BUREAU OF ROADS AND BRIDGES
SPECIAL DESIGN CLASS H-12.5
DETAILS FOR DECK STEEL GIRDER SPANS
24 FT. ROADWAY CONCRETE FLOOR
PROJ. [redacted] COUNTY-STA. [redacted]
STATE ROAD [redacted]
LINCOLN, NEBR. APRIL 20, 1935
1552-C
A.C. Tilley
STATE ENGINEER
DESIGNED BY
DETAILED BY H.F.J.
TRACED BY H.F.J.
CHECKED BY C.E.S.
U.S. Government approved 6-17-42
Approval Withdrawn June 25, 1966

FED. ROAD REG. NO.	STATE	FED. AID PROJECT NO.	SHEET NO.
7	NEBR.	RF-2(21)	100



GENERAL ELEVATION

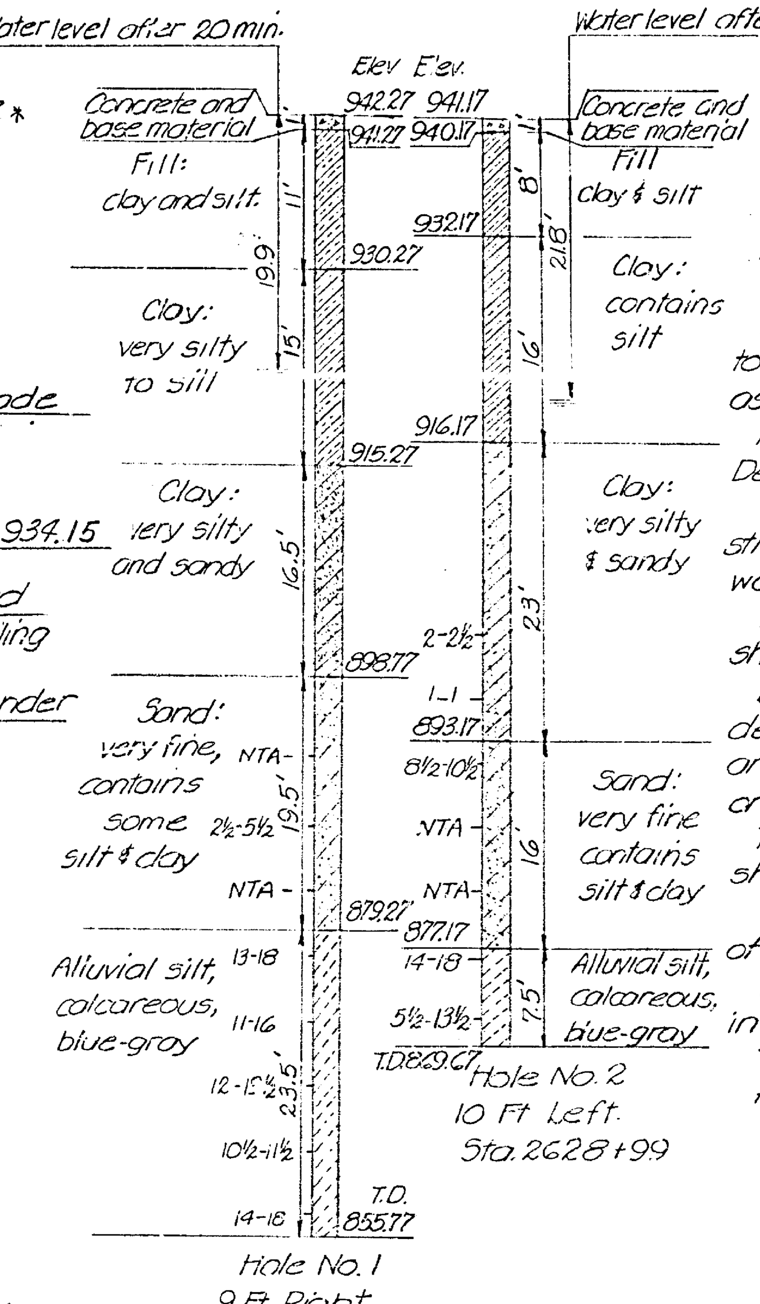
Scale 1/8" = 1'-0"



HALF GENERAL PLAN

HALF PILE LAYOUT

Scale 1/8" = 1'-0"



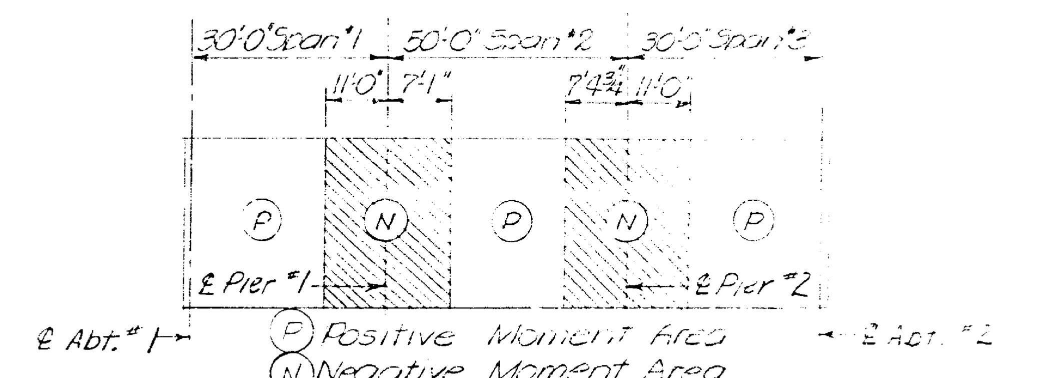
LOG OF BORINGS

Scale 3/32" = 1', Date: 1933

Figures beside the column of borings indicate the number of blows required to drive a standard penetrometer of 2" O.D. second and third six inches, using a 140 pound weight falling 30 inches, in accordance with A.S.T.M. D1586-64T procedures.

NOTES

Concrete for Bridge Slab and Curbs shall be Class "47BD" or "47CSD".
All other concrete shall be Class "47A-S", "47B" or "47C-S".
The working stress for Concrete is 1200 psi.
The minimum covering measured from the face of the concrete to the surface of any reinforcing bar shall be 2 inches except as otherwise noted.
All reinforcing steel shall comform to the requirements of A.S.T.M. Designation A615 Grade 40; or A.S.T.M. Designation A617 Grade 40.
All reinforcing steel encountered in breaking back the existing structure shall be cleaned, straightened and extended into new work to provide sufficient lap.
All existing concrete coming in contact with the new concrete shall be roughened and cleaned prior to placing new concrete.
Before ordering any material the Contractor shall make a detailed field inspection of the existing structure and report any discrepancies between his measurements and those shown on the plans to the Engineer.
The item preparation of Existing Structure at Sta. 2628+40.15 shall be in accordance with the Special Provisions.
This structure is designed in accordance with the 11th edition of the AASHO Standard Specifications for Highway Bridges.
Use broken concrete from curbs, floor and abutments for riprap in front of each abutment at shown.
The Bridge Deck shall be finished with a Mechanical Bridge Finisher.
All exposed edges of Concrete shall be Chamfered.



(P) Positive Moment Area
(N) Negative Moment Area

POURING SEQUENCE: Section "N" shall be poured after adjacent "P" sections are poured. Section "N" may be poured continuous with either "P" section provided the other "P" section has been poured.
ALTERNATE POURING SEQUENCE: The entire slab shall be poured starting at the abutment and proceeding to the other abutment or stopping at the completion of any "P" section.

Traffic Data	1971	1991
ADT	2040	3570
DHV	275	460

This Structure is located across Mackelroy Creek in Richardson Co.
Section 17-T2N-R16E
D.A. = 11 Sq. Mi.
Q50 = 5,000 cfs

QUANTITIES

Preparation of Existing Structure		1 Each
Excavation for Bridges		*119.59 ~~109~~ Cu. Yds
Abutments	38 Cu. Yds	
Piers	*81.59 ~~71~~ Cu. Yds.	
Class "47 BD", or "47 CSD" Concrete		147.7 Cu. Yds.
Class "47A-S", "47B" or "47C-S" Concrete		74.0 Cu. Yds.
Abutments	34.4 Cu. Yds.	
Piers	39.6 Cu. Yds.	
Reinforcing Steel		38,415 Lbs.
Slab and Curbs	30,325 Lbs.	
Abutments	2,460 Lbs.	
Piers	5,630 Lbs	
Structural Steel for Superstructure		10,000 Lbs.
Erecting Steel Superstructure at Sta. 2628+40.15		1 Each
Broken Concrete Rip Rap		*305.46 ~~360~~ Tons
Treated Timber Piling		1100 Lin. Ft.
Steel Sheet Piling		1727 Sq. Ft.
Ornamental Handrail		240 Lin. Ft.
Floor Drains		6 Each
* 47-B Crushed Rock for Footings		*11.78 Cu. Yds.

Calculated on basis of 1965 Standard Specifications.

EXISTING PILE DATA

All Piling driven with a 3000 lbs. Vulcan #2 Hammer
Based on $P = \frac{3.5E}{S+0.1} \times \frac{W}{W+M}$

Location	Average length in Place Feet	Average Penetration of Pile for last 5 blows (Inches/Blow)	Average Calculated Bearing Power Tons / Pile
Abut. No.1	45.5	0.231	22.7
Pier No.1	23.2	0.211	27.5
Pier No.2	24.5	0.223	26.4
Abut. No.2	45.3	0.273	20.1

For details of Ornamental Handrail, see Standard Plan 1755-C or 1758.
For details of Capacity Plate, see Standard Plan 1747-R3
For details of Pile Splice, see Standard Plan 1542-A
For details of Concrete Surface Finish, see Standard Plan 1562-C

PILE DATA

Location	Pile No.	Pile cut off Elevation	Min. Penetration below cut off Feet	Order Length Feet
Abut. No.1	1 & 6	936.~~56~~63*	32	35
	2,3,4,5	937.~~15~~14*	47	50
Pier No.1	1 to 8	914.32	32	35
Pier No.2	1 to 8	913.88	32	35
Abut. No.2	1 & 6	935.~~65~~62*	32	35
	2,3,4,5	936.~~75~~12*	47	50

Existing Bridge No. 1061

DATE	DESCRIPTION	BY

REVISIONS

BURGWIN, MARTIN & ASSOCIATES, P.A.
CONSULTING ENGINEERS

REF. POST 12+32 STATE OF NEBRASKA HWY. NO. US-73
DEPARTMENT OF ROADS

30'-0", 50'-0", 30'-0" DECK STEEL GIRDER SPANS BRIDGE WIDENING

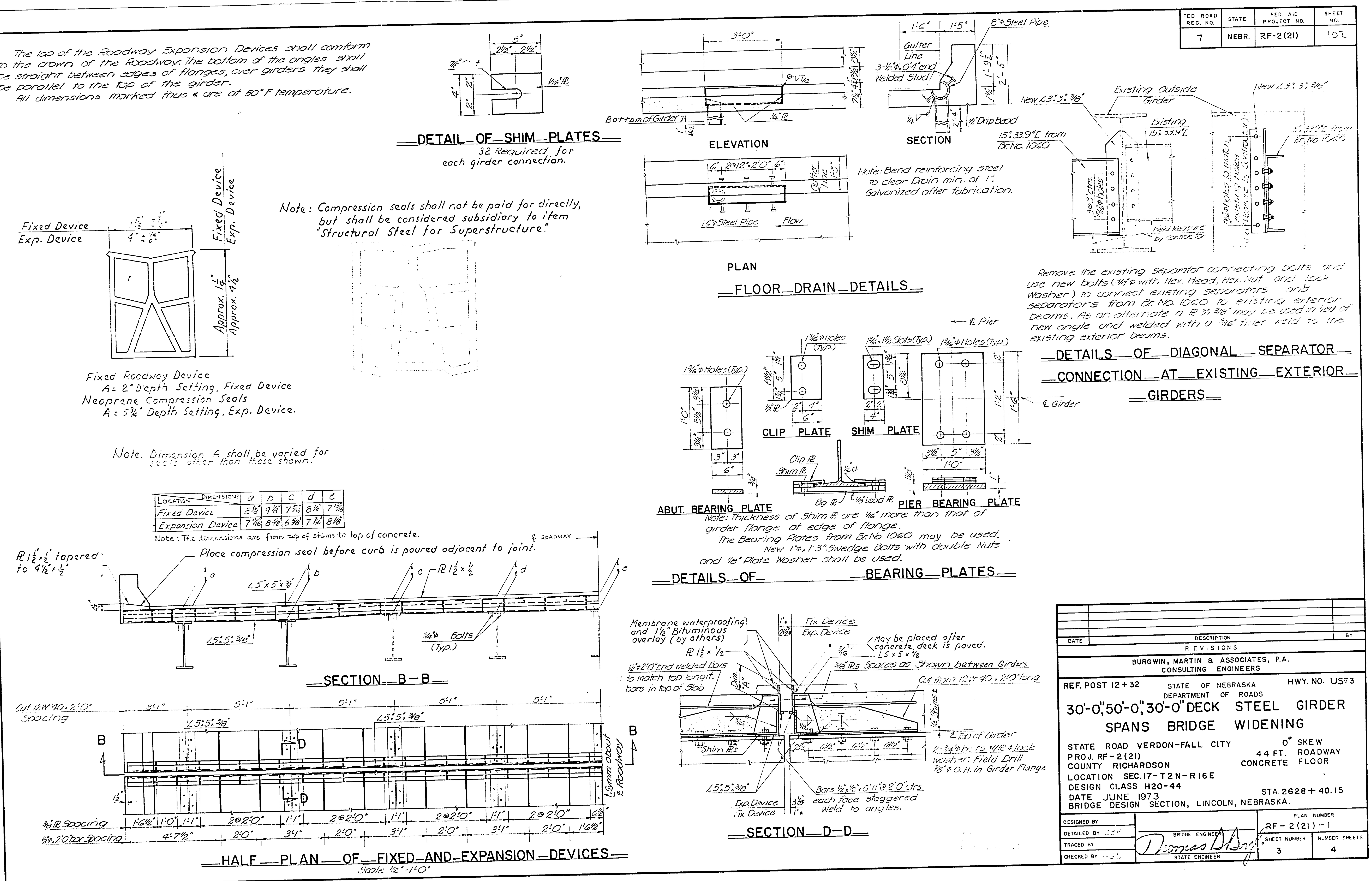
STATE ROAD VERDON-FALL CITY — 0° SKEW
PROJ. RF-2(21) — 44 FT. ROADWAY
COUNTY RICHARDSON — CONCRETE FLOOR
LOCATION SEC. 17-T2N-R16E
DESIGN CLASS H20-44
DATE JUNE 1973 — STA. 2628+40.15
BRIDGE DESIGN SECTION, LINCOLN, NEBRASKA.

DESIGNED BY CBP
DETAILED BY CBP
TRACED BY
CHECKED BY JGF
BRIDGE ENGINEER
STATE ENGINEER
PLAN NUMBER RF-2(21)-1
SHEET NUMBER 1

ILLEGIBLE

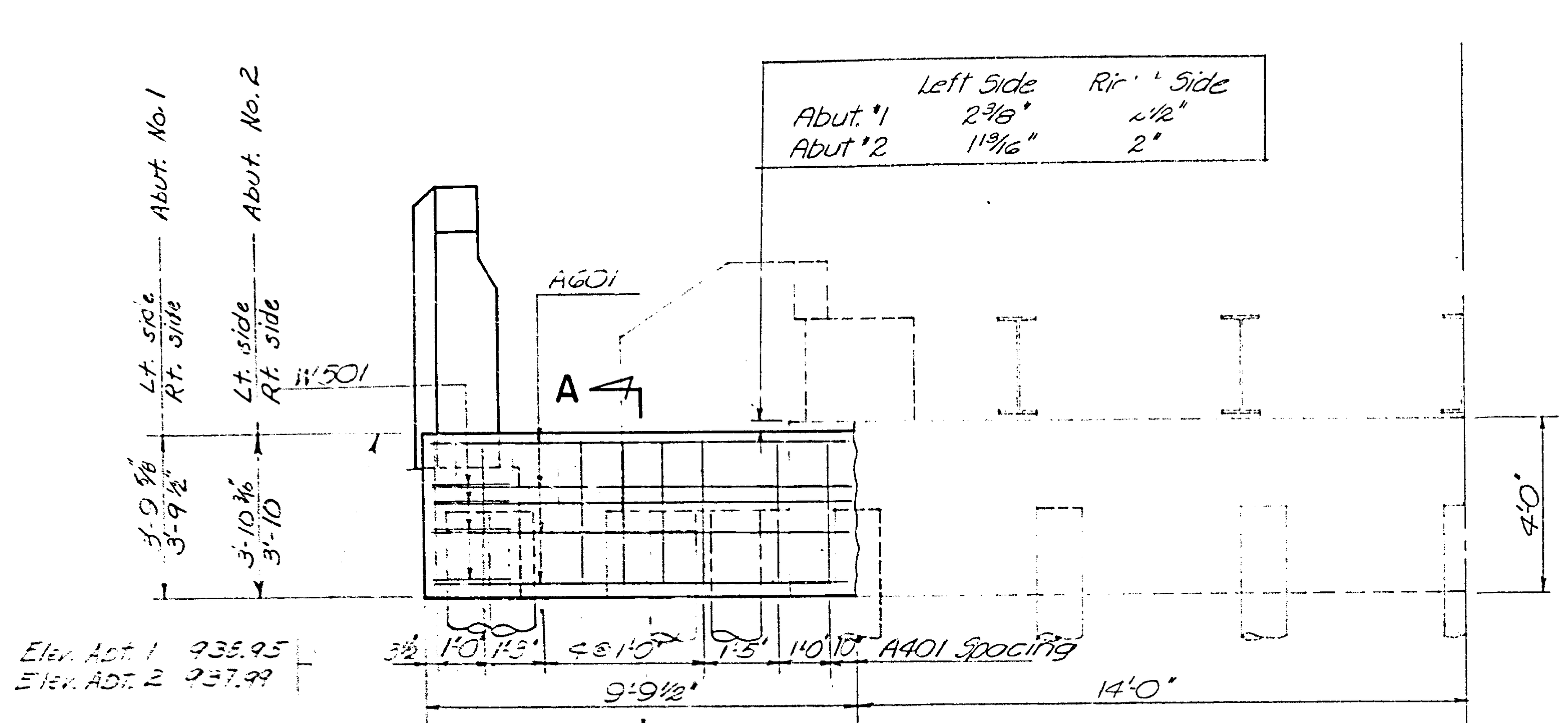

FED. ROAD REG. NO. 7
STATE NEBR.
FED AID PROJECT NO RF-2(21)
HALF ELEVATION AT END OF FLOOR
Scale 1/2" = 1'-0"
22'-0" Half Roadway
Membrane waterproofing and 1 1/2" Bituminous overlay (by others)
Girder Seats Elev. Abut. 1 = 938.95 (Both Sides) Abut. 2 = 937.99 (Both Sides)
CROWN TEMPLET
Slope .015'/Ft.
2'-0" Parabolic Crown
Gutter Line
Note: Handrail not Shown
SECTION B-B
1/2" PREFORMED EXPANSION JOINT FILLER IN CURB
1/2" Preformed Exp. Joint Filler (Sponge Rubber Type)
1/2" Chamfer
HALF CROSS SECTION
Not to scale
15" 33.9# [Salv.
New 3" 3" 3/8" L
2 Spaces @ 5'-1" = 10'-2" Existing Girders
Symm. about ℄
Note: The Contractor may substitute #5 straight bars top and bottom, for the crankshafts bars shown for Slab reinforcing. No change will be made in contract price or quantities for this substitution.
SIDE ELEVATION OF PIER
Scale 3/8" = 1'-0"
HALF ELEVATION OF PIER
Scale 3/8" = 1'-0"
SECTION A-A
Pier 1 El. 938.61 (Both Side) Pier 2 El. 938.17 (Both Side)
Pier 1 Lt & Rt. Elev. 913.32 Pier 2 Lt & Rt. Elev. 912.88
112'-0" End to End of Floor
69 Spaces @ 6 1/2" = 37'-4 1/2"
63 Spaces @ 6 1/2" = 34'-1 1/2"
69 Spaces @ 6 1/2" = 37'-4 1/2"
℄ CB27" 85#
Reset Gap to 3 1/2" on existing Girders
30'-0"
50'-0"
30'-0" to ℄ Abut. 2
TYPICAL PART LONGITUDINAL SECTION
Scale 1/2" = 1'-0"
Note: All dimensions marked thus * are at 50° F temperature.
PLAN OF FOOTING
REVISIONS
DATE DESCRIPTION BY
BURGWIN, MARTIN & ASSOCIATES, P.A.
CONSULTING ENGINEERS
REF. POST 12+32
STATE OF NEBRASKA DEPARTMENT OF ROADS
HWY. NO. US-73
30'-0", 50'-0", 30'-0" DECK STEEL GIRDER SPANS BRIDGE WIDENING
STATE ROAD VERDON-FALL CITY
0° SKEW
PROJ. RF-2(21)
44 FT. ROADWAY
COUNTY RICHARDSON
CONCRETE FLOOR
LOCATION SEC. 17-T2N-R16E
DESIGN CLASS H20-44
DATE JUNE 1973
STA. 2628+40.15
BRIDGE DESIGN SECTION, LINCOLN, NEBRASKA.
DESIGNED BY
DETAILED BY
TRACED BY
CHECKED BY
BRIDGE ENGINEER
STATE ENGINEER
PLAN NUMBER RF-2(21)-1
SHEET NUMBER 2
NUMBER SHEETS 4

ILLEGIBLE


FED. ROAD REG. NO. 7 | STATE NEBR. | FED. AID PROJECT NO. RF-2(21) | SHEET NO. 102
The top of the Roadway Expansion Devices shall conform to the crown of the Roadway. The bottom of the angles shall be straight between edges of flanges, over girders they shall be parallel to the top of the girder.
All dimensions marked thus * are at 50°F temperature.
DETAIL OF SHIM PLATES
32 Required for each girder connection.
ELEVATION
SECTION
PLAN
FLOOR DRAIN DETAILS
8"φ Steel Pipe
Gutter Line
3-½"φ, 0'-4" end Welded Stud
Bottom of Girder
½" Drip Bead
Note: Bend reinforcing steel to clear Drain min. of 1". Galvanized after fabrication.
Flow
Note: Compression seals shall not be paid for directly, but shall be considered subsidiary to item "Structural Steel for Superstructure."
Fixed Device
Exp. Device
Approx. 1¼"
Approx. 4½"
Fixed Roadway Device
A = 2" Depth Setting, Fixed Device
Neoprene Compression Seals
A = 5¾" Depth Setting, Exp. Device.
Note. Dimension A shall be varied for seals other than those shown.
New L3"x3"x⅜"
Existing Outside Girder
Existing 15"33.9"[
15"33.9"[from Br. No. 1060
Field Measure by Contractor
Remove the existing separator connecting bolts and use new bolts (¾"φ with Hex. Head, Hex. Nut and lock washer) to connect existing separators and separators from Br. No. 1060 to existing exterior beams. As an alternate a PL 3"x⅜" may be used in lieu of new angle and welded with a 3/16" fillet weld to the existing exterior beams.
DETAILS OF DIAGONAL SEPARATOR CONNECTION AT EXISTING EXTERIOR GIRDERS
ABUT. BEARING PLATE
CLIP PLATE
SHIM PLATE
PIER BEARING PLATE
℄ Pier
℄ Girder
Note: Thickness of Shim PL are 1/16" more than that of girder flange at edge of flange.
The Bearing Plates from Br. No. 1060 may be used.
New 1"φ, 1'-3" Swedge Bolts with double Nuts and ⅛" Plate Washer shall be used.
DETAILS OF BEARING PLATES
Location / Dimension: a, b, c, d, e
Fixed Device: 8⅛", 9⅛", 7⅞", 8¼", 7¾"
Expansion Device: 7 7/16", 8⅜", 6⅝", 7⅜", 8⅛"
Note: The dimensions are from top of shims to top of concrete.
℄ ROADWAY
PL 1½"x½" tapered to 4½"x½"
Place compression seal before curb is poured adjacent to joint.
L5"x5"x⅜"
¾"φ Bolts (Typ.)
SECTION B-B
Membrane waterproofing and 1½" Bituminous overlay (by others)
Fix Device
Exp. Device
May be placed after concrete deck is paved.
⅜" PL Spaces as Shown between Girders
Cut from 12WF40 x 2'-0" long
Top of Girder
2-¾"φ bolts w/ E & lock washer, Field Drill 13/16"φ O.H. in Girder Flange.
Shim PLs
Bars ½"x½"x0'-11" @ 2'-0" ctrs. each face staggered weld to angles.
SECTION D-D
Cut 12WF40 x 2'-0" Spacing
HALF PLAN OF FIXED AND EXPANSION DEVICES
Scale ½" = 1'-0"
REVISIONS
BURGWIN, MARTIN & ASSOCIATES, P.A. CONSULTING ENGINEERS
REF. POST 12+32
STATE OF NEBRASKA DEPARTMENT OF ROADS
HWY. NO. US73
30'-0", 50'-0", 30'-0" DECK STEEL GIRDER SPANS BRIDGE WIDENING
STATE ROAD VERDON-FALL CITY
PROJ. RF-2(21)
COUNTY RICHARDSON
LOCATION SEC. 17-T2N-R16E
DESIGN CLASS H20-44
DATE JUNE 1973
0° SKEW
44 FT. ROADWAY
CONCRETE FLOOR
STA. 2628+40.15
BRIDGE DESIGN SECTION, LINCOLN, NEBRASKA.
PLAN NUMBER RF-2(21)-1
BRIDGE ENGINEER
STATE ENGINEER
SHEET NUMBER 3
NUMBER SHEETS 4

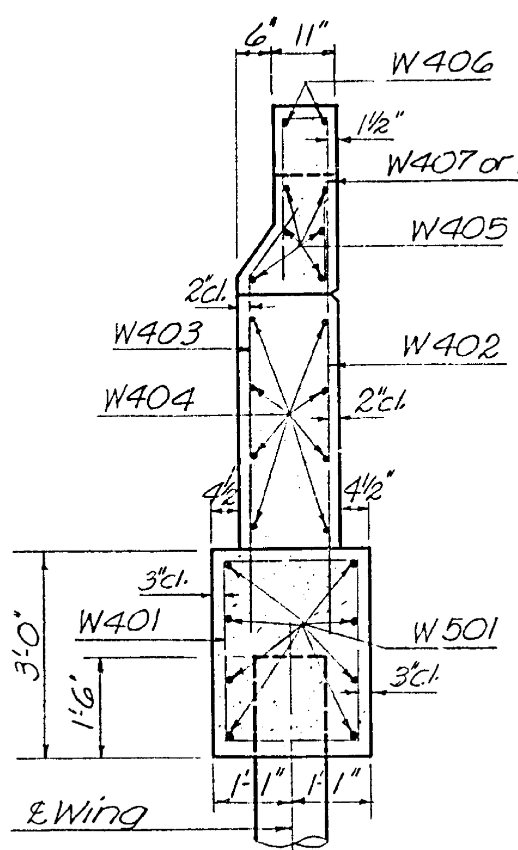
ILLEGIBLE

FED. ROAD REG. NO.	STATE	FED. AID PROJECT NO.	SHEET NO.
7	NEBR.	RF-2(21)	103

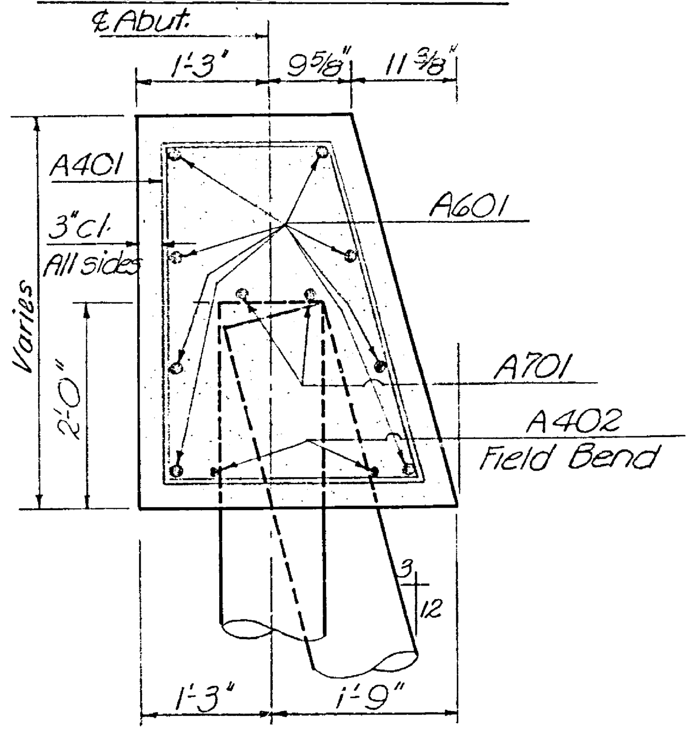


HALF ELEVATION OF ABUTMENT

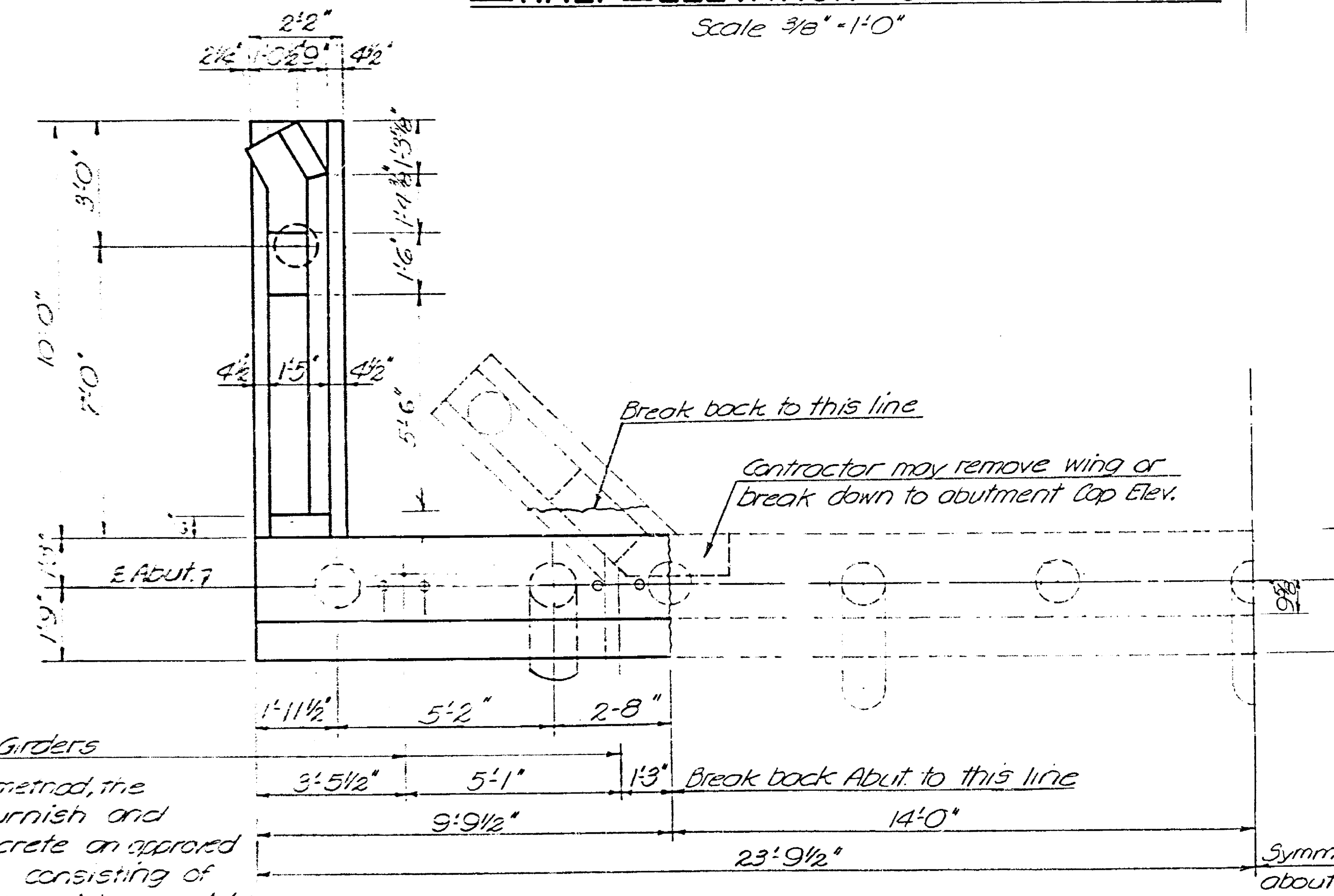
Scale 3/8" = 1'-0"



SECTION B-B



SECTION A-A

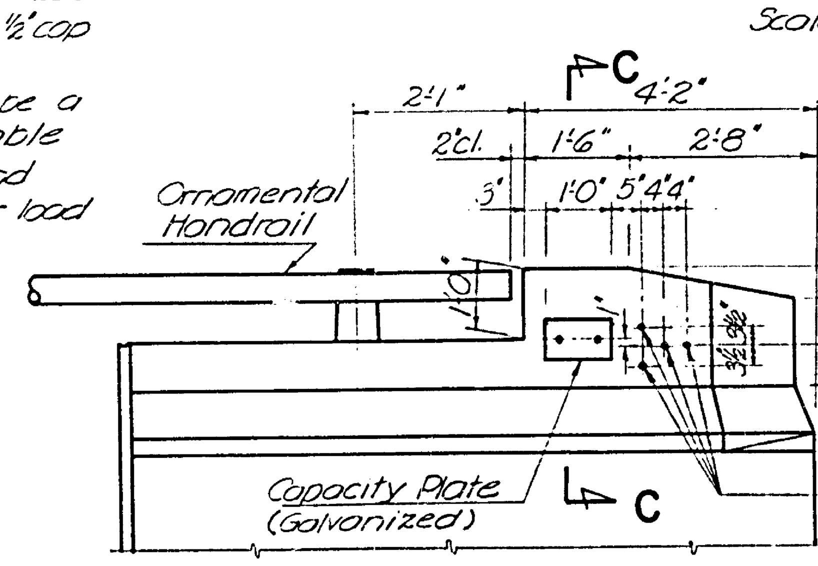


HALF PLAN OF ABUTMENT

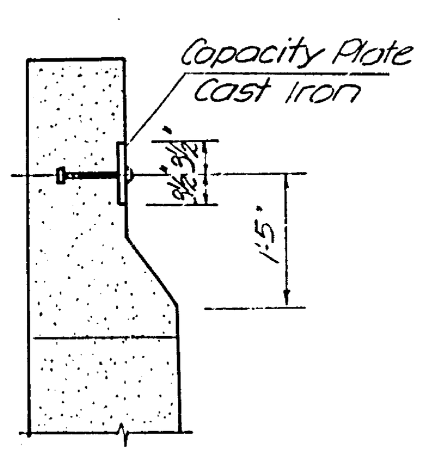
Scale 3/8" = 1'-0"

* As an alternate method, the Contractor may furnish and cast into the concrete an approved welded assembly consisting of 4 threaded inserts held accurately to the template of the holes shown; inserts to be complete with galvanized 12 washers and galvanized 7/8" x 1/2 cap screws.

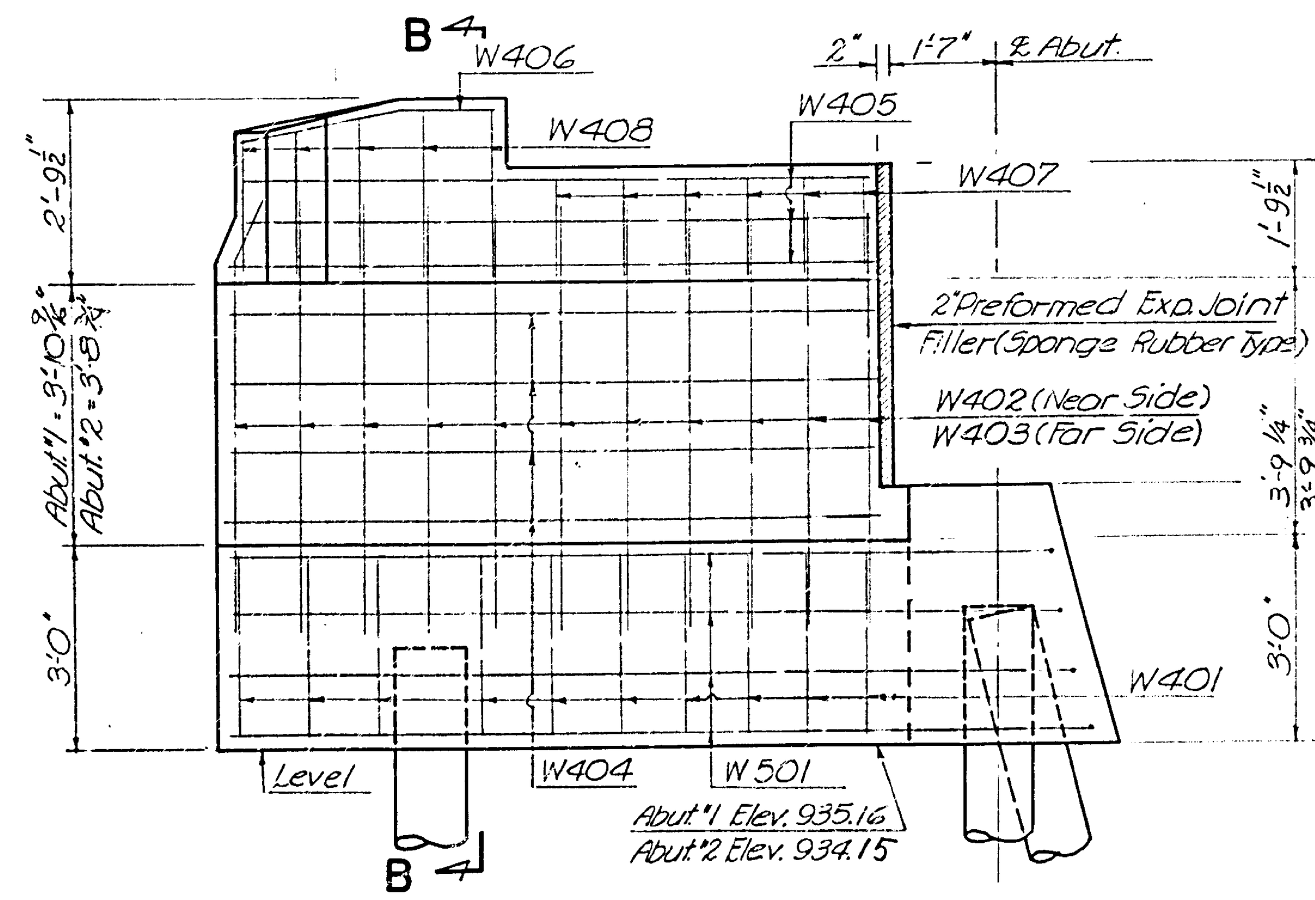
The insert assembly shall be a standard product of a reputable manufacturer of such items and capable of resisting a shear load of 80,000 lbs.



BUTTRESS DETAIL



SECTION C-C



SIDE ELEVATION OF WING

Scale 1/2" = 1'-0"

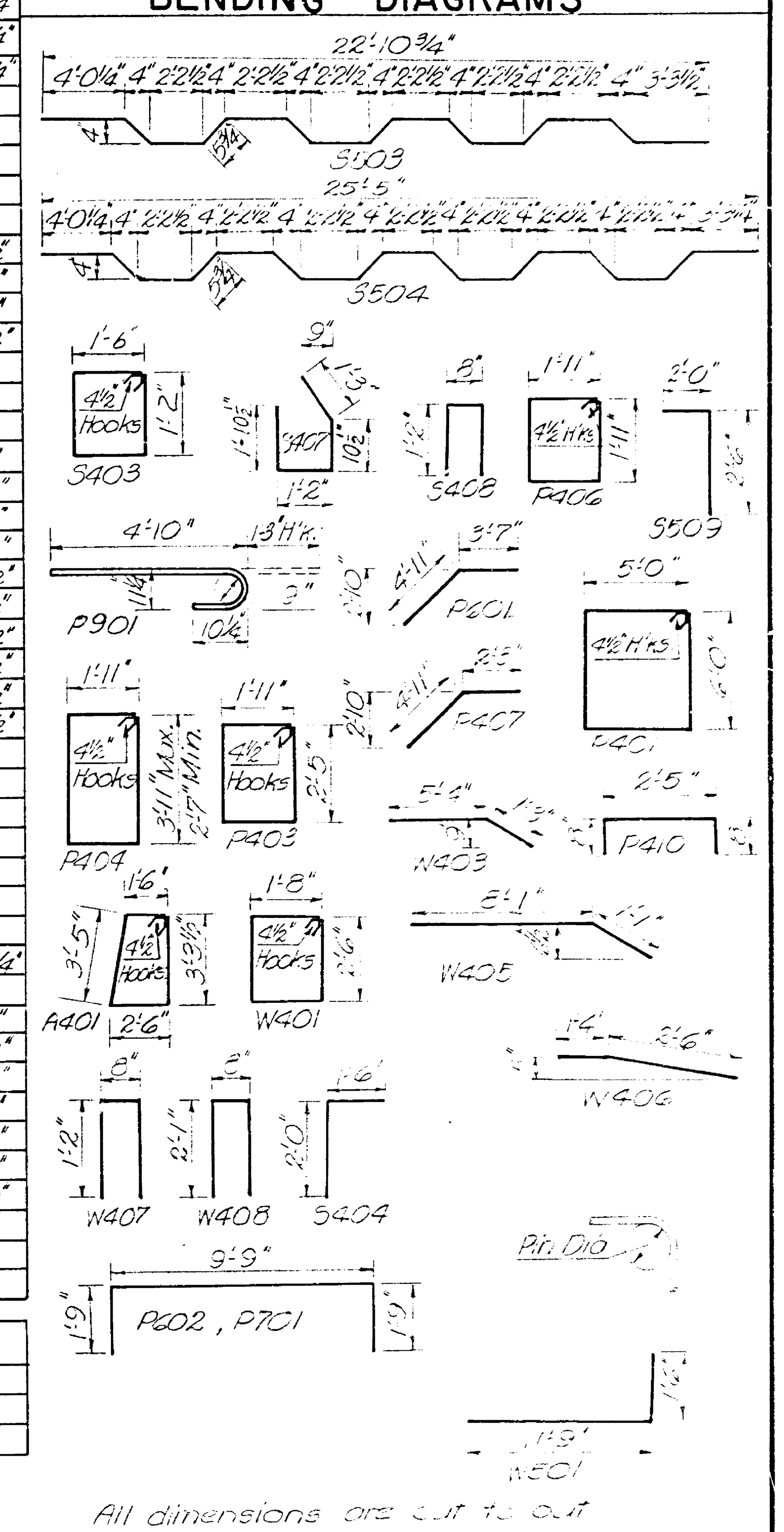
BILL OF BARS

	STRAIGHT			BENT			
	Mark	No.	Length	Mark	No.	Length	Pin Dia.
Slab and Curbs	S501	102	22'-9"	S503	102	23'-6"	3¾"
	S502	102	25'-3"	S504	102	26'-1"	3¾"
	S505	102	22'-6"	S509	96	4'-4½"	3¾"
	S506	102	25'-0"				
	S507	198	37'-9"				
	S508	99	34'-9"				
	S401	12	23'-9"	S403	96	5'-10"	1½"
	S402	20	23'-9"	S407	204	5'-0"	1½"
				S408	204	2'-10"	1½"
	S405	24	38'-4"	S404	96	3'-5"	1½"
	S406	12	35'-2"				
Piers	P902	32	21'-9"	P901	32	6'-1"	8"
				P701	8	13'-0"	7"
				P601	16	8'-6"	6"
	P603	24	3'-0"	P602	8	13'-0"	6"
	P501	44	6'-0"	P401	12	22'-6"	1½"
	P502	52	5'-0"	P406	84	8'-2"	1½"
	P402	8	18'-4"	P407	16	7'-2"	1½"
	P405	32	2'-0"	P404	24	10'-10" Ave.	1½"
	P408	16	10'-0"	P403	16	9'-2"	1½"
	P409	8	6'-0"	P410	44	3'-7"	1½"
Abutments	A701	8	9'-6"				
	A601	32	9'-6"				
				W501	32	13'-2"	3¾"
	A402	8	9'-6"	A401	36	11'-3"	1½"
	W402	44	6'-5"	W401	40	8'-10"	1½"
	W404	32	9'-3"	W403	44	6'-7"	1½"
				W405	24	9'-2"	1½"
				W406	8	3'-10"	1½"
				W407	24	2'-10"	1½"
				W408	20	4'-8"	1½"

BAR SETS

Mark	Max.	Min.	Sets
P404	12'-2"	9'-6"	4 of 3

BENDING DIAGRAMS



All dimensions are out to out

DATE	DESCRIPTION	BY
	REVISIONS	

BURGWIN, MARTIN & ASSOCIATES, P.A.
CONSULTING ENGINEERS

REF. POST 12+32 STATE OF NEBRASKA HWY. NO. US-73
DEPARTMENT OF ROADS

30'-0", 50'-0", 30'-0" DECK STEEL GIRDER SPANS BRIDGE WIDENING

STATE ROAD VERDON-FALL CITY 0° SKEW
PROJ. RF-2(21) 44 FT. ROAD WAY
COUNTY RICHARDSON CONCRETE FLOOR
LOCATION SEC. 17-T2N-R16E
DESIGN CLASS H20-44
DATE JUNE 1973 STA. 2628 + 40.15
BRIDGE DESIGN SECTION, LINCOLN, NEBRASKA.

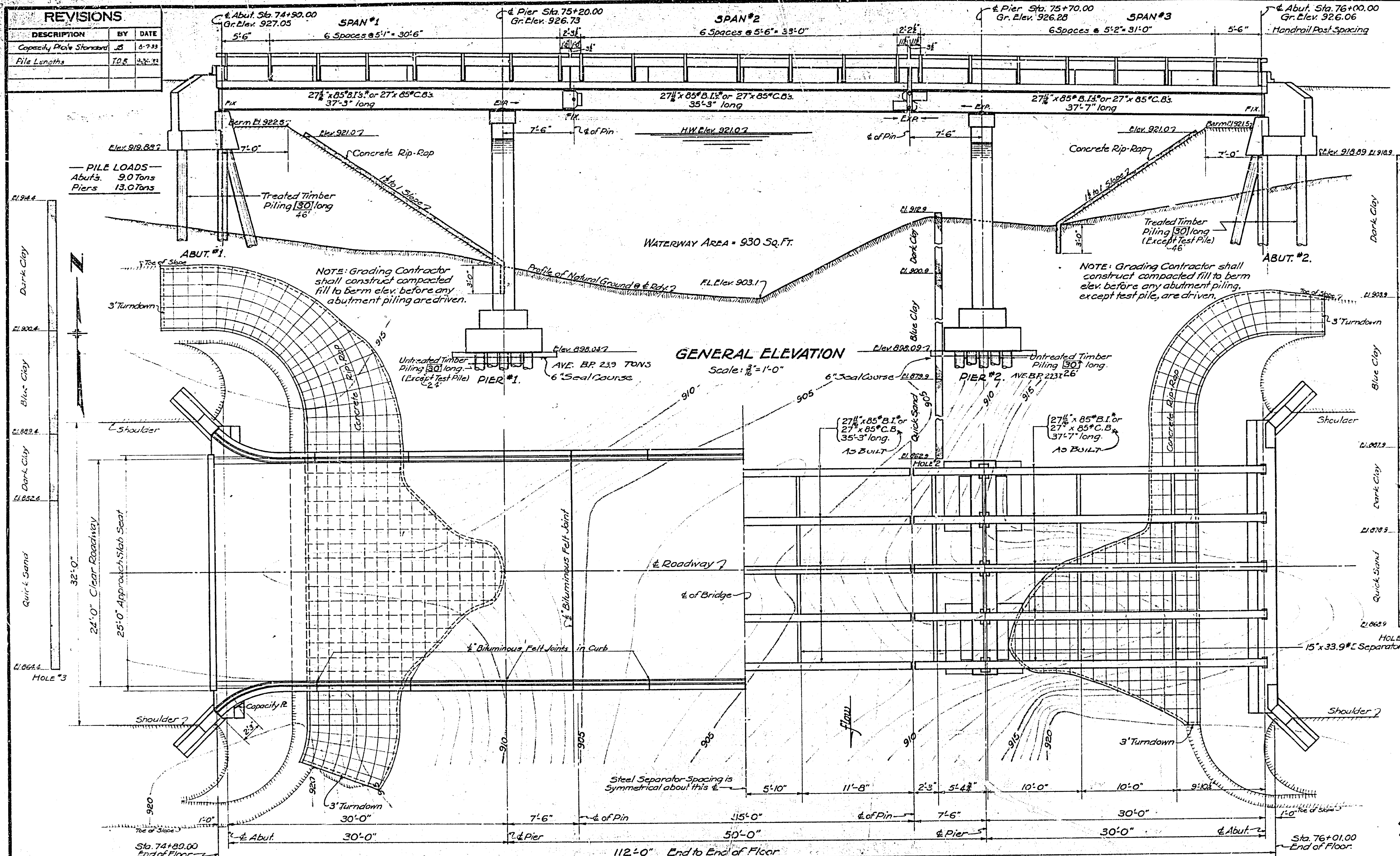
DESIGNED BY
DETAILED BY
TRACED BY
CHECKED BY

BRIDGE ENGINEER
STATE ENGINEER

PLAN NUMBER RF-2(21)-1

SHEET NUMBER	NUMBER SHEETS
4	4

ILLEGIBLE



— NOTES —

REINFORCED CONCRETE —

All exposed edges of concrete shall be chamfered.

Concrete in floor and curbs shall be Class "AA".

Concrete in abutments and piers shall be Class "A".

All reinforcing steel shall be deformed bars.

Curbs shall have a bituminous felt joint from top of slab to top of curb at the locations indicated on plan.

Before placing any concrete in floor the anchor bolts at abutments shall be grouted and nuts drawn tight.

The galvanized iron strip at the bituminous felt joint near Pier #1 shall be either continuous or have a soldered lock joint.

The unit price bid per cubic yard of Class "AA" Concrete shall include the furnishing and placing of all bituminous felt material and galvanized iron strip.

HANDRAIL —

Handrail shall be set to transit line and grade.

Handrail posts shall be set plumb.

The unit price bid per pound of Structural Steel For Handrail shall include the furnishing and placing of the Capacity Plates.

STEEL SUPERSTRUCTURE —

Details, dimensions and quantities are given for the beam sections marked thus (*). The Contractor may use the alternate sections indicated, in which case he shall revise the details and dimensions that change. No additional charges or deductions will be allowed for these substitutions.

The Contractor shall notify the Engineer of his intent to use the alternate sections.

Button head bolts shall be used where called for on plans. All other bolts shall be unfinished bolts.

Lock washers shall be used under all nuts unless otherwise noted.

All rivets and bolts shall be 3/4" ϕ except as noted.

All open holes shall be 13/16" ϕ except as noted.

All field connections shall be bolted.

At Piers #1 & #2 place 16 B.W.G. Copper expansion plates as shown. Before placing, all sliding surfaces shall be thoroughly coated with high grade graphite grease.

Lead plates 1/8" thick shall be placed between all bearing plates and concrete.

The unit price bid for the Steel Superstructure shall include the furnishing and placing of all lead plates, copper plates and graphite grease.

PILING —

Two test piles, 45 ft. long shall be driven at the locations indicated in the Pile Layout. Method of driving, measurement and payment shall be in accordance with the Special Provisions.

Piling shall be driven with a No. 2 Vulcan steam hammer or its equivalent.

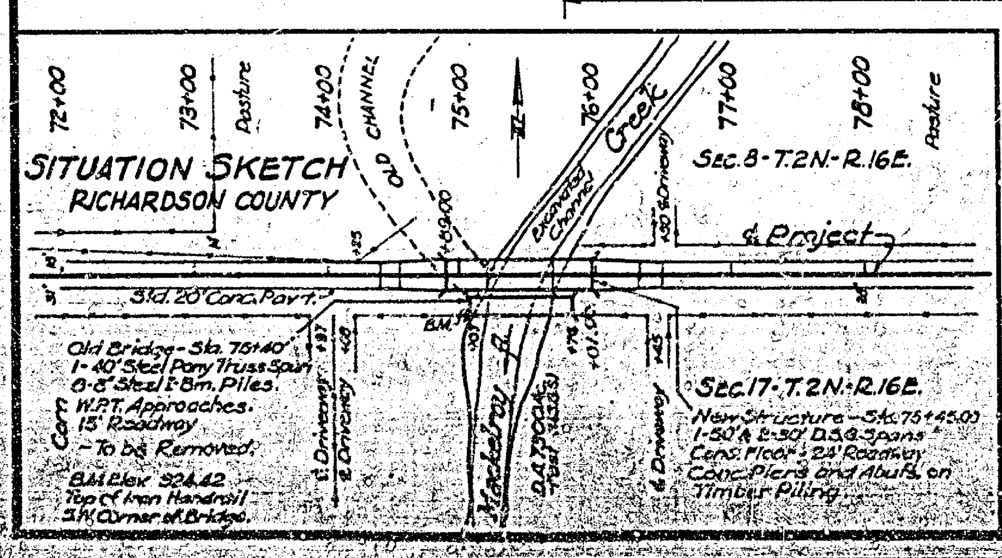
Untreated Timber Piling
Length In Place
Cut Offs

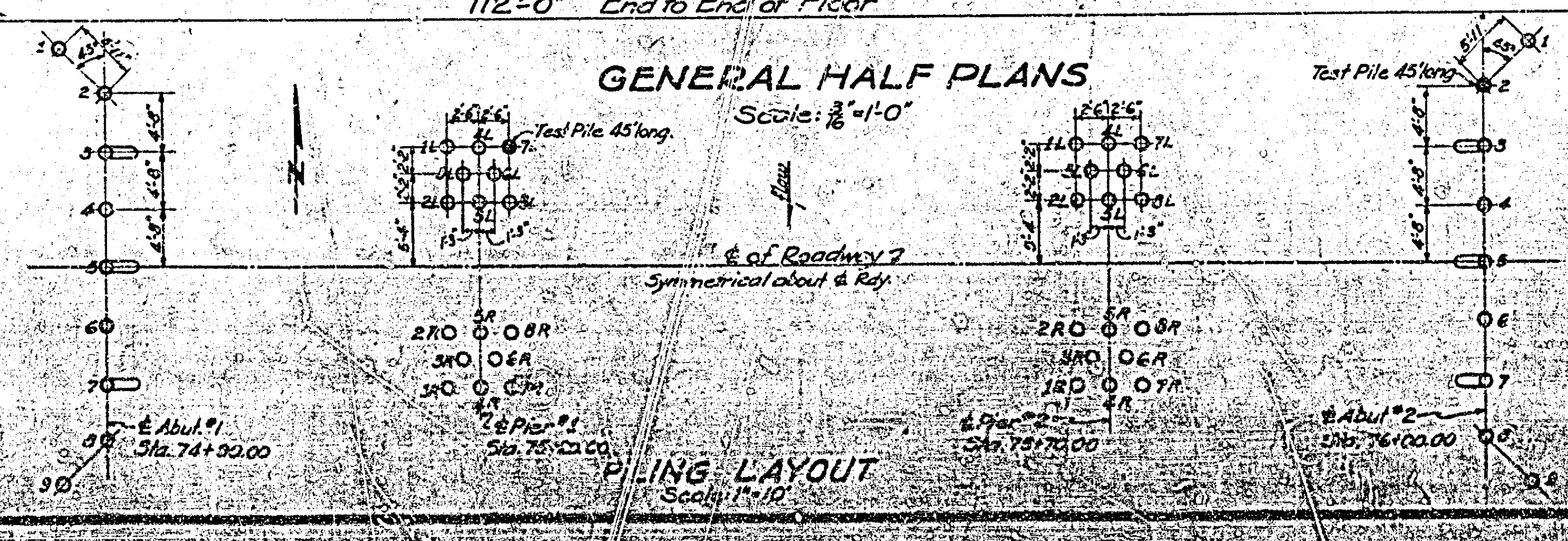
Treated Timber Piling
Length In Place — 774.2 Lin. Ft.
Cut Offs — 7.6
782.0 Lin. Ft.

Concrete Seal Course

— QUANTITIES —

EXCAVATION FOR BRIDGES As Built		30C CU. YDS.
CLASS "AA" CONCRETE - Floor & Curbs		83.4 CU. YDS.
CLASS "A" CONCRETE		89.7 CU. YDS.
2 Abutments	31.3 Cu. Yds.	
2 Piers	58.4 Cu. Yds.	
REINFORCING STEEL		24,555 LBS.
Floor & Curbs	14,060 Lbs.	
2 Abutments	3,155 Lbs.	
2 Piers	7,340 Lbs.	
STEEL SUPERSTRUCTURE		62,985 LBS.
Girders & Separators	54,875 Lbs.	
Rdy. Exp. & Fixed Devices	3,380 Lbs.	
Exp. & Fixed Pin Conn. for Girders	3,440 Lbs.	
Beveled Bg. Pl's, Clips, Anchors, etc.	1,290 Lbs.	
UNTREATED TIMBER PILINGS - 31 @ 30	See Table	776 930 LIN. FT.
TREATED TIMBER PILING - 17 @ 30 46'		782 510 LIN. FT.
STRUCTURAL STEEL FOR HANDRAIL	See Table	4180 Lbs.
TEST PILING - 45' Untreated Timber Piling		1 Each
45' Treated Timber Piling		1 Each
CONCRETE RIP-RAP		230 SQ. YDS.





REMOVAL OF OLD STRUCTURE

The Old Structure shall be taken apart and removed by the Contractor for his unit price bid for 'Removal of Old Structure'; which shall include the dismantling of the old superstructure, the removing of steel and timber caps from abutments and piers and the steel bracing from piers, the cutting off or pulling of steel and timber piling, and the moving and storing of all material within 500 feet of the site as directed by the Engineer. All salvaged material shall become the property of the State.

FOR DETAILS OF SUPERSTRUCTURE SEE STD. PLAN 1520-C
FOR DETAILS OF CAPACITY PLATE SEE STD. PLAN 1539-A 1509-B
FOR DETAILS OF CONCRETE RIP-RAP SEE STD. PLAN 1555

STATE OF NEBRASKA
DEPARTMENT OF ROADS AND IRRIGATION
BUREAU OF ROADS AND BRIDGES
SPECIAL DESIGN CLASS H-15

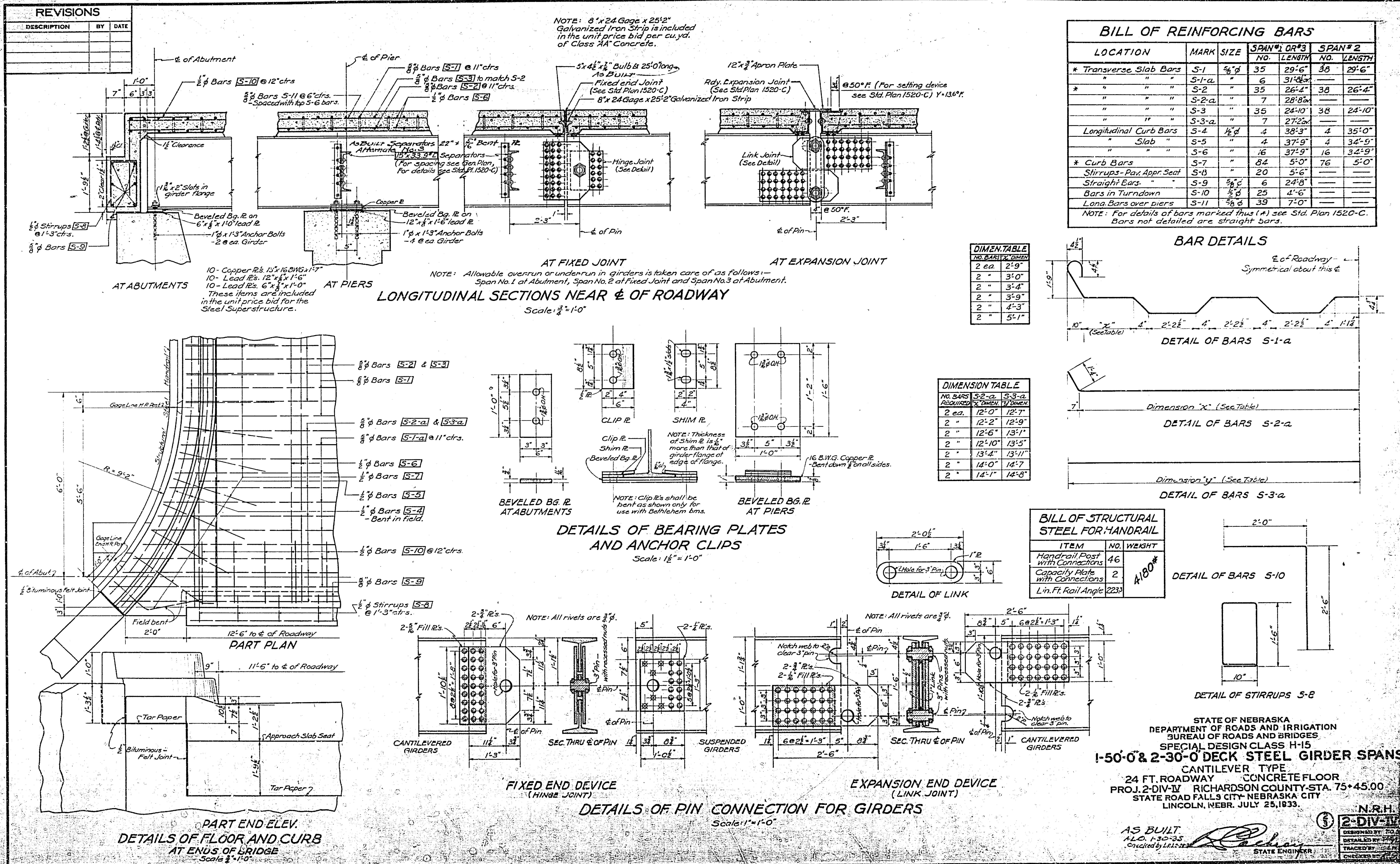
1-50'-0" & 2-30'-0" DECK STEEL GIRDER SPANS

CANTILEVER TYPE
24 FT ROADWAY — CONCRETE FLOOR
PROJ. 2-DIV-IV RICHARDSON COUNTY-STA. 75+45.00
STATE ROAD FALLS CITY - NEBRASKA CITY
LINCOLN, NEBR. JULY 25, 1933.

AS BUILT
A.L.O. 1-30-35
Checked

N.R.H.
2-DIV-IV

STATE ENGINEER



BILL OF REINFORCING BARS

LOCATION	MARK	SIZE	SPAN #1 OR #3 NO.	SPAN #1 OR #3 LENGTH	SPAN #2 NO.	SPAN #2 LENGTH
* Transverse Slab Bars	S-1	⅝"ϕ	35	29'-6"	38	29'-6"
" " "	S-1-a	"	6	31'-8" av.	—	—
* " " "	S-2	"	35	26'-4"	38	26'-4"
" " "	S-2-a	"	7	28'-8" av.	—	—
" " "	S-3	"	35	24'-10"	38	24'-10"
" " "	S-3-a	"	7	27'-2" av.	—	—
Longitudinal Curb Bars	S-4	½"ϕ	4	38'-3"	4	35'-0"
" Slab "	S-5	"	4	37'-9"	4	34'-9"
" " "	S-6	"	16	37'-9"	16	34'-9"
* Curb Bars	S-7	"	84	5'-0"	76	5'-0"
Stirrups - Pav. Appr. Seat	S-8	"	20	5'-6"	—	—
Straight Bars - " "	S-9	⅝"ϕ	6	24'-8"	—	—
Bars in Turndown	S-10	½"ϕ	25	4'-6"	—	—
Long. Bars over piers	S-11	⅝"ϕ	39	7'-0"	—	—

NOTE: For details of bars marked thus (*) see Std. Plan 1520-C. Bars not detailed are straight bars.

DIMEN. TABLE

NO. BARS	"X" DIMEN
2 ea.	2'-9"
2 "	3'-0"
2 "	3'-4"
2 "	3'-9"
2 "	4'-3"
2 "	5'-1"

DIMENSION TABLE

NO. BARS REQUIRED	S-2-a "X" DIMEN.	S-3-a "Y" DIMEN.
2 ea.	12'-0"	12'-7"
2 "	12'-2"	12'-9"
2 "	12'-6"	13'-1"
2 "	12'-10"	13'-5"
2 "	13'-4"	13'-11"
2 "	14'-0"	14'-7
2 "	14'-1"	14'-8"

BILL OF STRUCTURAL STEEL FOR HANDRAIL

ITEM	NO.	WEIGHT
Handrail Post with Connections	46	4180#
Capacity Plate with Connections	2	
Lin. Ft. Rail Angle	223.3	

STATE OF NEBRASKA
DEPARTMENT OF ROADS AND IRRIGATION
BUREAU OF ROADS AND BRIDGES
SPECIAL DESIGN CLASS H-15

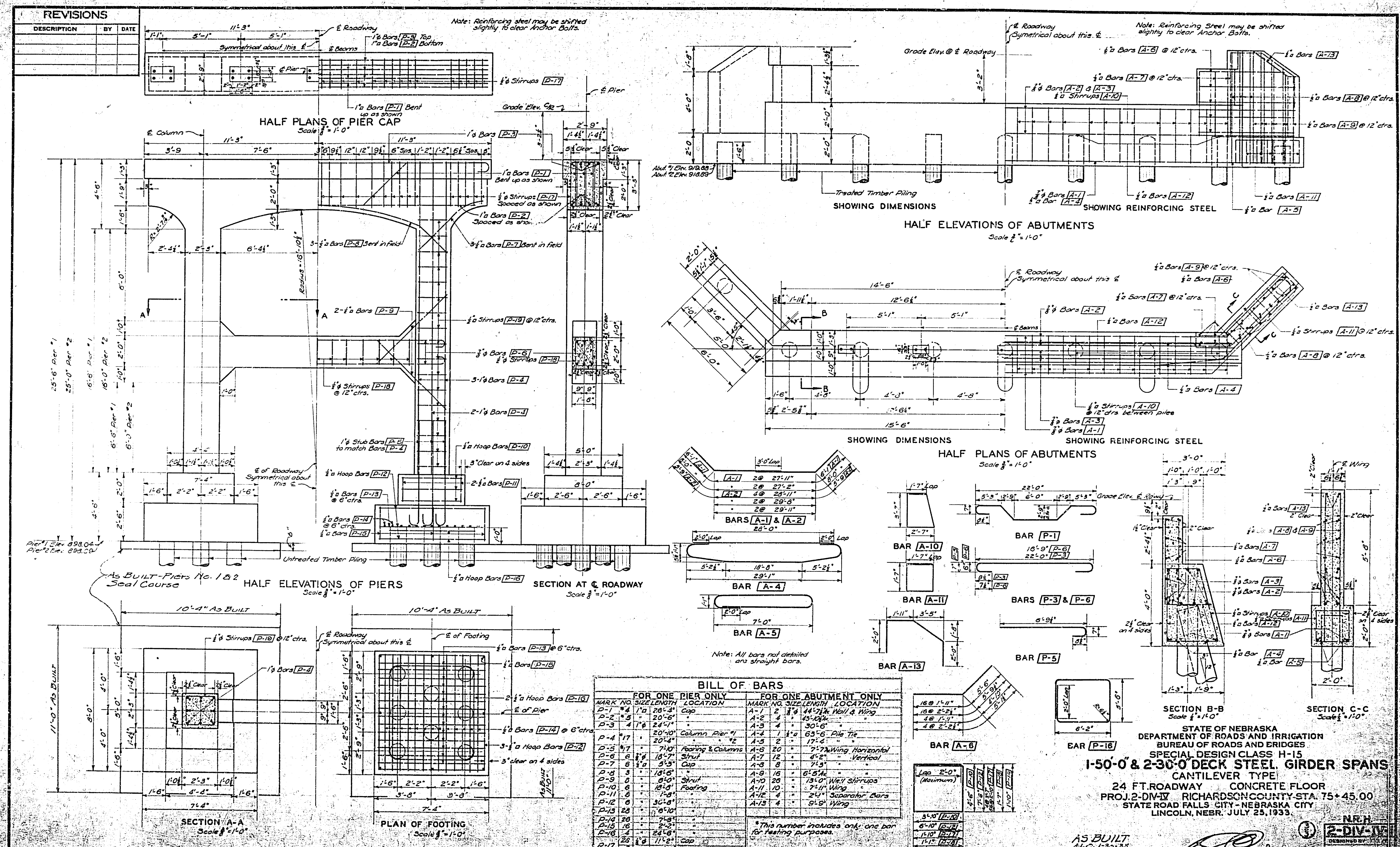
1-50'-0" & 2-30'-0" DECK STEEL GIRDER SPANS

CANTILEVER TYPE
24 FT. ROADWAY — CONCRETE FLOOR
PROJ. 2-DIV-IV RICHARDSON COUNTY-STA. 75+45.00
STATE ROAD FALLS CITY-NEBRASKA CITY
LINCOLN, NEBR. JULY 25, 1933.

N.R.H.
2-DIV-IV

AS BUILT
A.L.O. 1-30-35
Checked by L.R.L.

STATE ENGINEER



BILL OF BARS

FOR ONE PIER ONLY					FOR ONE ABUTMENT ONLY				
MARK	NO.	SIZE	LENGTH	LOCATION	MARK	NO.	SIZE	LENGTH	LOCATION
P-1	*4	1"□	28'-4"	Cap	A-1	2	7/8"ϕ	44'-7 1/2" Av.	Wall & Wing
P-2	*5	"	20'-6"	"	A-2	4	"	45'-10 1/2" Av.	" "
P-3	4	1"ϕ	24'-1"	"	A-3	4	"	30'-6"	"
P-4	*17	"	20'-10"	Column Pier #1	A-4	1	1/2"□	63'-6	Pile Tie
			20'-4"	" " #2	A-5	2	"	17'-4	" "
P-5	*17	"	7'-10"	Footing & Columns	A-6	20	"	7'-7 1/2"	Wing Horizontal
P-6	6	7/8"ϕ	18'-7"	Strut	A-7	12	"	4'-2"	" Vertical
P-7	8	1/2"□	5'-3"	Cap	A-8	8	"	7'-3"	" "
P-8	3	"	18'-6"	"	A-9	16	"	6'-5" Av.	" "
P-9	8	"	6'-0"	Strut	A-10	26	"	13'-0"	Wall Stirrups
P-10	6	"	18'-8"	Footing	A-11	10	"	7'-11"	Wing
P-11	8	"	1'-8"	"	A-12	4	"	2'-1"	Separator Bars
P-12	6	"	30'-8"	"	A-13	4	"	9'-9"	Wing
P-13	28	"	6'-10"	"					
P-14	28	"	7'-8"	"					
P-15	16	"	2'-2"	"					
P-16	4	"	24'-6"	"					
P-17	28	1/4"ϕ	11'-2"	Cap					
	2	"	10'-8"	"					
P-18	13	"	8'-5"	Strut					
P-19	34	"	9'-2"	Columns					

*This number includes only one bar for testing purposes.

STATE OF NEBRASKA
DEPARTMENT OF ROADS AND IRRIGATION
BUREAU OF ROADS AND BRIDGES
SPECIAL DESIGN CLASS H-15

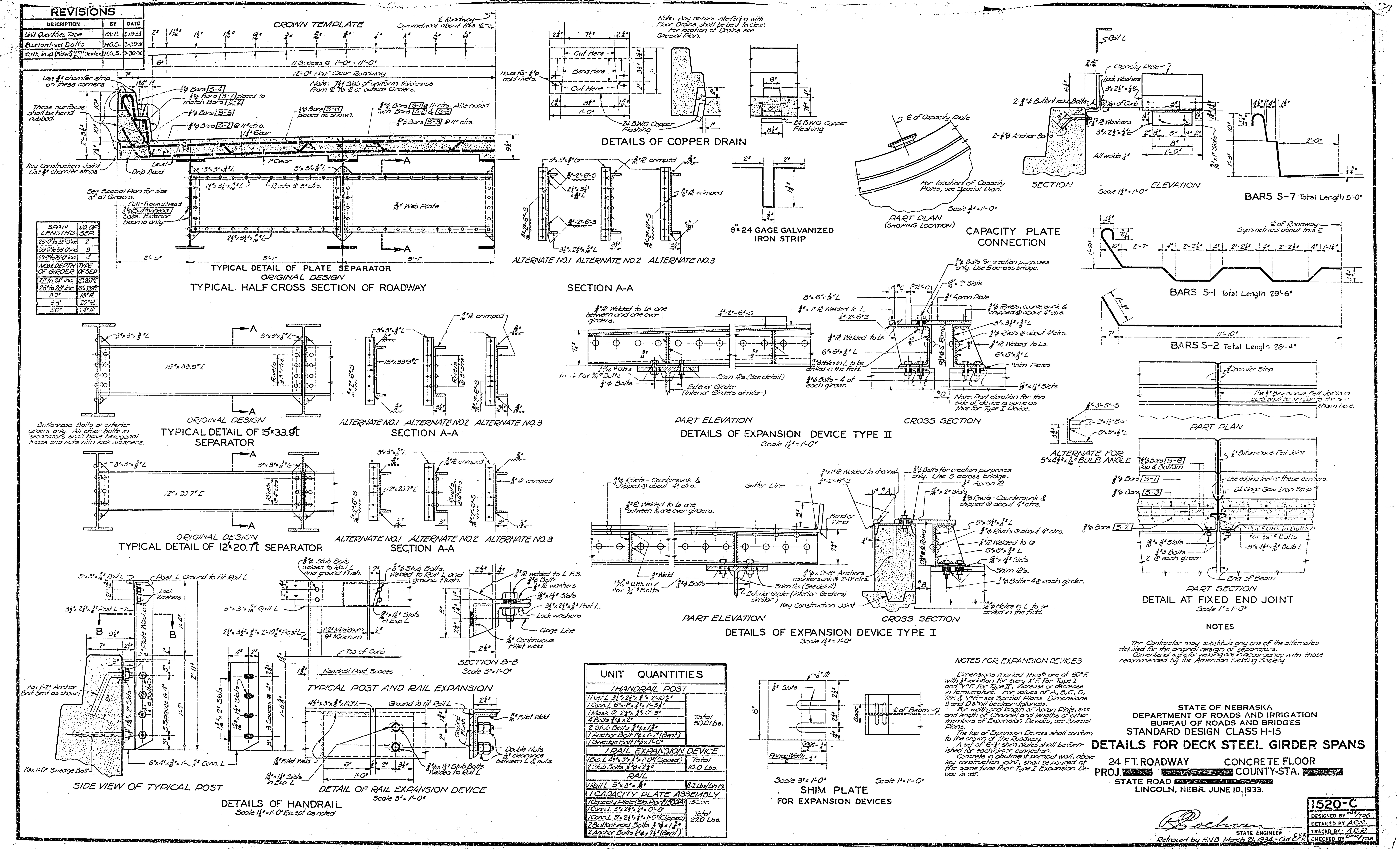
1-50'-0" & 2-30'-0" DECK STEEL GIRDER SPANS

CANTILEVER TYPE
24 FT. ROADWAY CONCRETE FLOOR
PROJ. 2-DIV-IV RICHARDSON COUNTY-STA. 75+45.00
STATE ROAD FALLS CITY - NEBRASKA CITY
LINCOLN, NEBR. JULY 25, 1933.

AS BUILT
A.L.C. 1-25-35
Checked by L.B.I. 2-27-35

STATE ENGINEER

N.R.H.
2-DIV-IV
DESIGNED BY
DETAILED BY
TRACED BY
CHECKED BY



REVISIONS

DESCRIPTION	BY	DATE
Unit Quantities Table	F.N.B.	3-19-34
Buttonhed Bolts	H.G.S.	3-30-36
O.H.S. in Δ (Rdwy Fixed/Exp. Device)	H.G.S.	3-30-36

SPAN LENGTHS	NO. OF SEP.
25'-0" to 35'-0" inc.	2
36'-0" to 55'-0" inc.	3
55'-0" to 75'-0" inc.	4

NOM. DEPTH OF GIRDER	TYPE OF SEP.
21" to 24" inc.	12"x20.7# [
26" to 28" inc.	15"x33.9# [
30"	18" PL
33"	20" PL
36"	24" PL

UNIT QUANTITIES

Item	Total
1 HANDRAIL POST	
1 Post L 3½"x2½"x⅜"x2'-10⅝"	Total 50.0 Lbs.
1 Conn. L 6"x4"x⅜"x1'-5⅜"	
1 Mask PL 2¼"x⅜"x0'-5"	
4 Bolts ¾"φ x 2"	
2 Stub Bolts ⅝"φ x 1¾"	
1 Anchor Bolt 1"φ x 1'-2" (Bent)	
1 Swedge Bolt 1"φ x 1'-0"	
1 RAIL EXPANSION DEVICE	
1 Exp. L 4½"x3"x⅜"x1'-0" (Clipped)	Total 10.0 Lbs.
2 Stub Bolts ⅝"φ x 2¼"	
RAIL	
1 Rail L 5"x3"x5/16"	8.2 Lbs/Lin. Ft.
1 CAPACITY PLATE ASSEMBLY	
1 Capacity Plate (Std. Plan #1500A)	1509B
1 Conn. L 3"x2½"x¼"x0'-8"	Total 22.0 Lbs.
1 Conn. L 3"x2½"x¼"x1'-0" (Clipped)	
2 Buttonhead Bolts ½"φ x 1⅜"	
2 Anchor Bolts ½"φ x 7½" (Bent)	

NOTES FOR EXPANSION DEVICES

Dimensions marked thus* are at 50°F. with ⅛" variation for every X°F. for Type I and Y°F. for Type II, increase or decrease in temperature. For values of A, B, C, D, X°F. & Y°F. – see Special Plans. Dimensions B and D shall be clear distances.

For width and length of Apron Plate, size and length of Channel and lengths of other members of Expansion Devices, see Special Plans.

The top of Expansion Devices shall conform to the crown of the Roadway.

A set of 6-⅛" shim plates shall be furnished for each girder connection.

Concrete in abutment parapet wall, above key construction joint, shall be poured at the same time that Type I Expansion Device is set.

NOTES

The Contractor may substitute any one of the alternates detailed for the original design of separators.

Conventional signs for welding are in accordance with those recommended by the American Welding Society.

STATE OF NEBRASKA
DEPARTMENT OF ROADS AND IRRIGATION
BUREAU OF ROADS AND BRIDGES
STANDARD DESIGN CLASS H-15

DETAILS FOR DECK STEEL GIRDER SPANS

24 FT. ROADWAY CONCRETE FLOOR
PROJ. [redacted] COUNTY-STA. [redacted]
STATE ROAD [redacted]
LINCOLN, NEBR. JUNE 10, 1933.

STATE ENGINEER
Retraced by F.N.B March 21, 1934.- Ckd C.F.K.

1520-C
DESIGNED BY H.G.S./T.O.
DETAILED BY A.R.R.
TRACED BY A.R.R.
CHECKED BY D.F.M./T.O.

Illinois Department of Transportation

Standard drawings - pin and hanger assembly replacement.

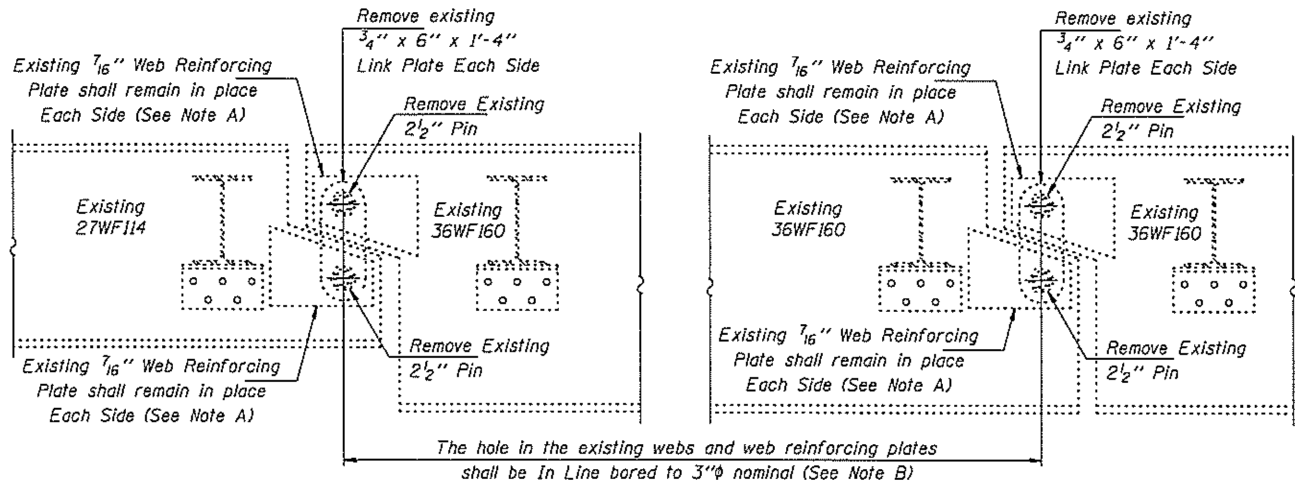
UNIT

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

" D-2 BRIDGE PIN REPLACE 1997-1

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
FAI 80	*	BUREAU	26	22
FED. ROAD DIST. NO. 7		ILLINOIS	FED. AID PROJECT-	

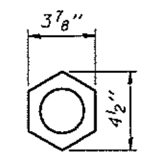
SHEET NO. 1
5 SHEETS



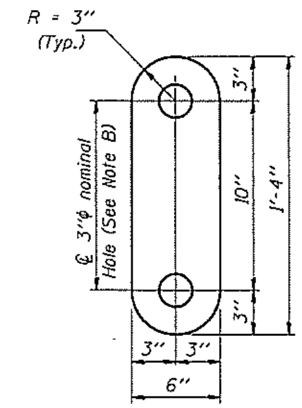
ELEVATION AT EXISTING PIN ASSEMBLY FOR INTERIOR BEAMS

ELEVATION AT EXISTING PIN ASSEMBLY FOR EXTERIOR BEAMS

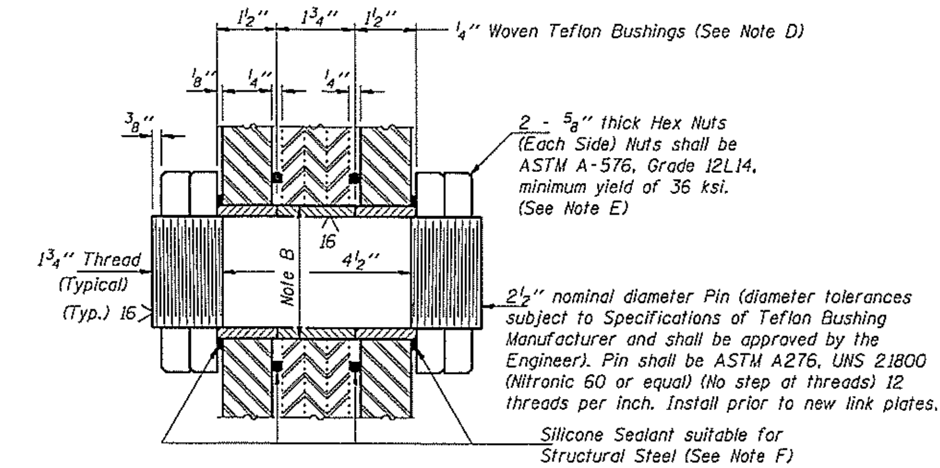
Any Pins that can be easily removed without damage to the pin shall be salvaged and the Bridge Engineer shall be contacted for disposition. Cost of salvage is included in "Pin and Link Plate Replacement".



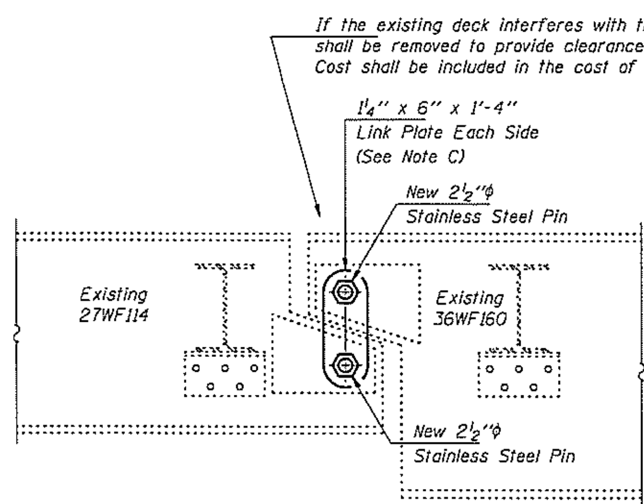
NUT DETAIL
(80 Required)

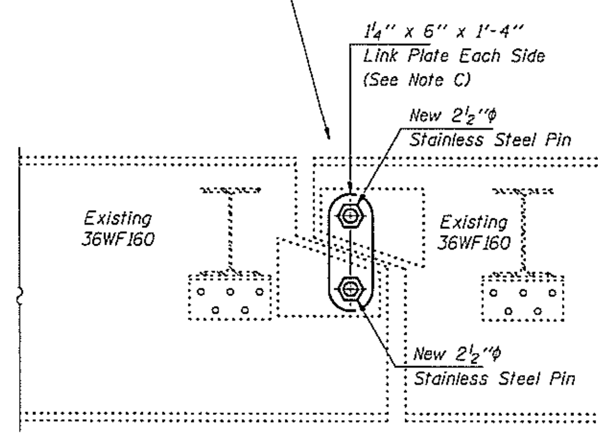


LINK PLATE DETAIL
(20 Required)



SECTION THRU PIN
(20 Required)





ELEVATION AT NEW PIN ASSEMBLY FOR INTERIOR BEAMS

ELEVATION AT NEW PIN ASSEMBLY FOR EXTERIOR BEAMS

Note A:
Existing welds shall be inspected for cracks using liquid dye penetrant or magnetic particle testing. Any cracks that are found shall be identified and reported to the Bureau of Bridges and Structures for further disposition. Clean and paint before installing new link plates.

Note B:
Bore diameter for bushing in link plate, existing webs and web reinforcement plates shall correspond to bushing manufacturer's allowable tolerances for proper functioning. Hole diameter may be adjusted to allow use of stock bushings.

Note C:
Inside face of new link plates shall receive first field coat in shop. The primer shall pass the M.E.K. Rub Test before the first field coat is applied.

Note D:
Actual bushing thickness per manufacturer's specifications. $^{1}/_{4}$" is approximate. Bushings shall be a self lubricating filament wound epoxy matrix backed Duralon Bearing, metal backed Fiber Glide Bearing or equivalent. No primer or grease shall be allowed on bushings. Bushings shall be suitable for dynamic loads of 20,000 psi.

Note E:
Tighten inside nuts to bring all bushings into firm contact, then back off $^{1}/_{4}$ turn and tighten outer nuts.

Note F:
Apply $^{3}/_{8}$" bead to face of the web reinforcing plates approximately $^{1}/_{2}$" from bushing immediately before installing new link plates. Place sealant around nuts after installation. Sealant shall be suitable for prolonged exterior exposure without losing flexibility or adhesion to painted steel surfaces. Proposed products shall be subject to Department's acceptance based on documented testing or other evidence.

GENERAL NOTES

All new structural steel shall conform to AASHTO Classification M-270 Gr. 36, unless otherwise noted.

The Contractor shall provide support and/or shoring systems for the beam in the area of existing pin and link plate replacement. See Special Provision "Temporary Support System."

The inorganic zinc rich primer/acrylic/acrylic paint system shall be used for shop and field painting of new structural steel except where otherwise noted. The color of the acrylic finish coat shall be Interstate Green, Munsell No. 7.5G 4/8. See Special Provisions "Cleaning and Painting New Metal Structures". Cost shall be included in the cost of "Pin and Link Plate Replacement".

Existing Structural steel shall be cleaned and painted as required by the Special Provision "Cleaning and Painting Adjacent Areas of Existing Steel Structures". Cost shall be included in the cost of "Pin and Link Plate Replacement."

All existing steel surfaces behind link plates shall be cleaned and primed before installation of new link plates. Cost shall be included in the cost of "Pin and Link Plate Replacement."

Plan dimensions and details relative to existing structure have been taken from existing plans and are subject to nominal construction variations. It shall be the Contractor's responsibility to verify such dimensions and details in the field, except the pin diameters, and make necessary approved adjustments prior to construction or ordering of materials. Such variations shall not be cause for additional compensation for a change in the scope of the work, however, the Contractor will be paid for the quantity actually furnished at the unit price bid for the work.

The Pins and Link Plates shall conform to the minimum Charpy V-Notch Toughness of 25 ft.-lbs. at 40° F.

The pins, link plates, bushings, nuts and silicone sealant are the items included in "Pin and Link Plate Replacement".

TOTAL BILL OF MATERIAL

ITEM	UNIT	QUANTITY
Temporary Support System	Each	10
Pin and Link Plate Replacement	Each	10
Silicone Joint Sealer	Foot	75

MAXIMUM REACTIONS AT PIN

R$^{D}_{L}$	(K)	22.3
R$^{L}_{L}$	(K)	30.3
Imp.	(K)	9.1
R (Total)	(K)	61.7

DESIGNED	KPS
CHECKED	NJS
DRAWN	Paul Summer
CHECKED	KPS NJS

APRIL 29, 1997
EXAMINED Todd E. Ahrens
ENGINEER OF STRUCTURAL SERVICES
PASSED
ENGINEER OF BRIDGES AND STRUCTURES

PIN REPLACEMENT
FAS 309 SEC. 06-7HB-1
BUREAU COUNTY
STA. 1738+38
STR. No. 006-0133

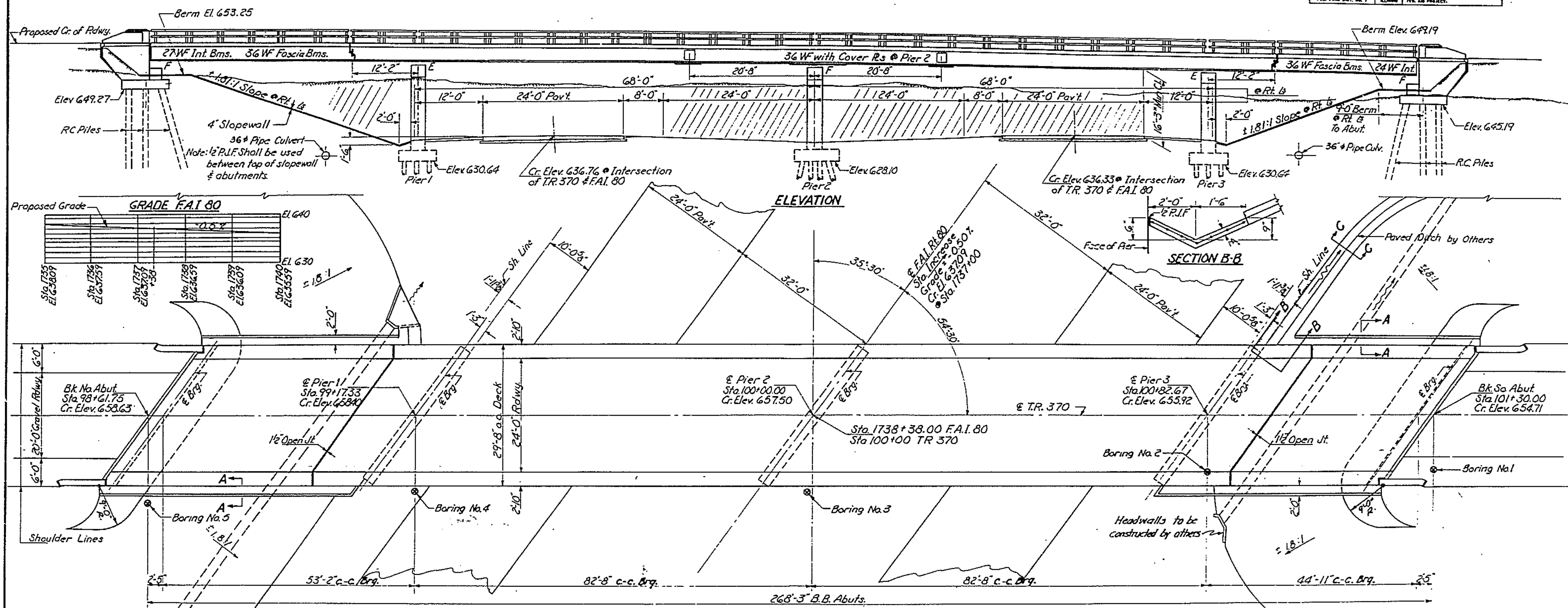
006 - 0133

B.M. #92 3/4" Iron pipe opposite Sta. 1741+00 and 272.5' So. of centerline Elev. 646.63
No Existing Structure.

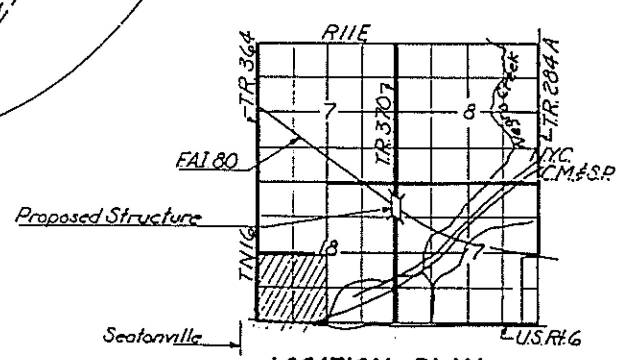
STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS

COUNTY	TOTAL SHEETS	SHEET NO.
BUREAU	26	24

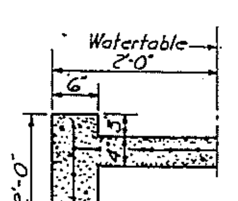
SHEET NO. 3
5 SHEETS



PLAN



LOCATION PLAN



SEC. A-A

GENERAL NOTES

Class X Concrete shall be used throughout except in handrail end posts.
Handrail Concrete shall be used in handrail end posts.
The concrete floor slab shall be finished in accordance with Article 51.19 of the Standard Specifications.
Slope wall shall be reinforced with welded wire fabric 6"x6" mesh, #4 wires, weighing 58# per 100 sq. ft.

Expansion guards shall be fabricated and erected in accordance with Article 51.13(d) of the Standard Specifications.
Expansion guards are included in quantity of Structural Steel.
All the outside vertical faces of the vertical legs of angles in the expansion guards shall be given two shop coats of red lead paint.
Rivets 3/4" φ, open holes 13/16" φ, unless noted.
All rollers, rockers, bearing plates, lead plates, pintles, and anchor bolts shall be fabricated and set in accordance with Article 51.15 of the Standard Specifications and are included in quantity of Structural Steel.
Anchor bolts shall be set before riveting diaphragms over supports.
Except as otherwise provided, all structural steel shall receive one shop coat of red lead paint and two field coats of aluminum paint. See Articles 56.1 to 56.5 inclusive of the Standard Specifications.
Pins, Pin Plates and Links are included in quantity of Structural Steel.
The Contractor shall drive 1 test pile at N. Abut. and 1 test pile in the vicinity of Pier 2 as directed by the Engineer before ordering remainder of piles.
Test Pile at N. Abut. shall be driven in a permanent location.

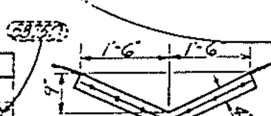
DESIGN STRESSES

fc = 1400 psi. Super
vc = 75 psi. Footings
fs = 20,000 psi. Reinf.
fs = 18,000 psi. Struct.
n = 10

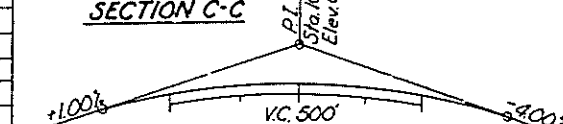
LOADING H 15-S12-44

TOTAL BILL OF MATERIAL

Item	Unit	Super	Sub	Total
Class X Concrete	Cu. Yds.	214.3	269.3	483.6
Reinforcement Bars	Lbs.	~~[illegible]~~ (39150)	19,600	~~[illegible]~~ (58750)
Structural Steel	Lbs.	241640		241640
Handrail Concrete	Cu. Yds.	2.9		2.9
Metal Handrail	Lin. Ft.	530		530
Class A Excavation For Struct.	Cu. Yds.		280	280
Concrete Piles	Lin. Ft.		925	925
Creosoted Piles	Lin. Ft.		845	845
Test Piles (Concrete)	Each		1	1
Test Piles (Timber)	Each		1	1
Slopewall (4)	Sq. Yds.		380	380
Name Plates	Each		2	2
Metal Shoes	Each			53
Pipe Culverts 36"	Lin. Ft.		178	178



SECTION C-C



V.C. DATA T.R. 370

DESIGNED Wm. C. Keene	EXAMINED	JAN 31 1961	
CHECKED Emery J. Stiche	PASSED		
DRAWN J. L. Armstrong	APPROVED		
CHECKED E.S.			

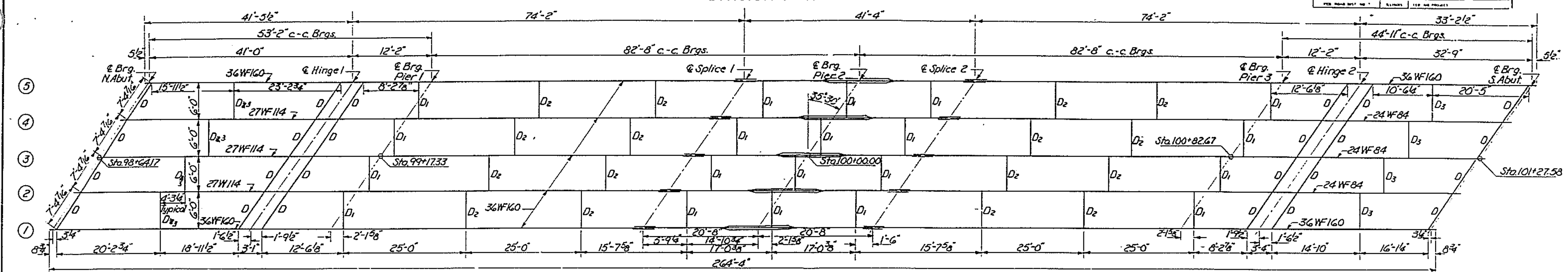
T.R. 370 OVER F.A.I. RT. 80
GENERAL PLAN
PROJ. I-80-2(2)67
F.A.I. RT. 80 SEC. 6-7HB-1
BUREAU COUNTY
STA. 1738+38

Revised 4/3/61 Quantity of Reinf. Bars increased.

STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS

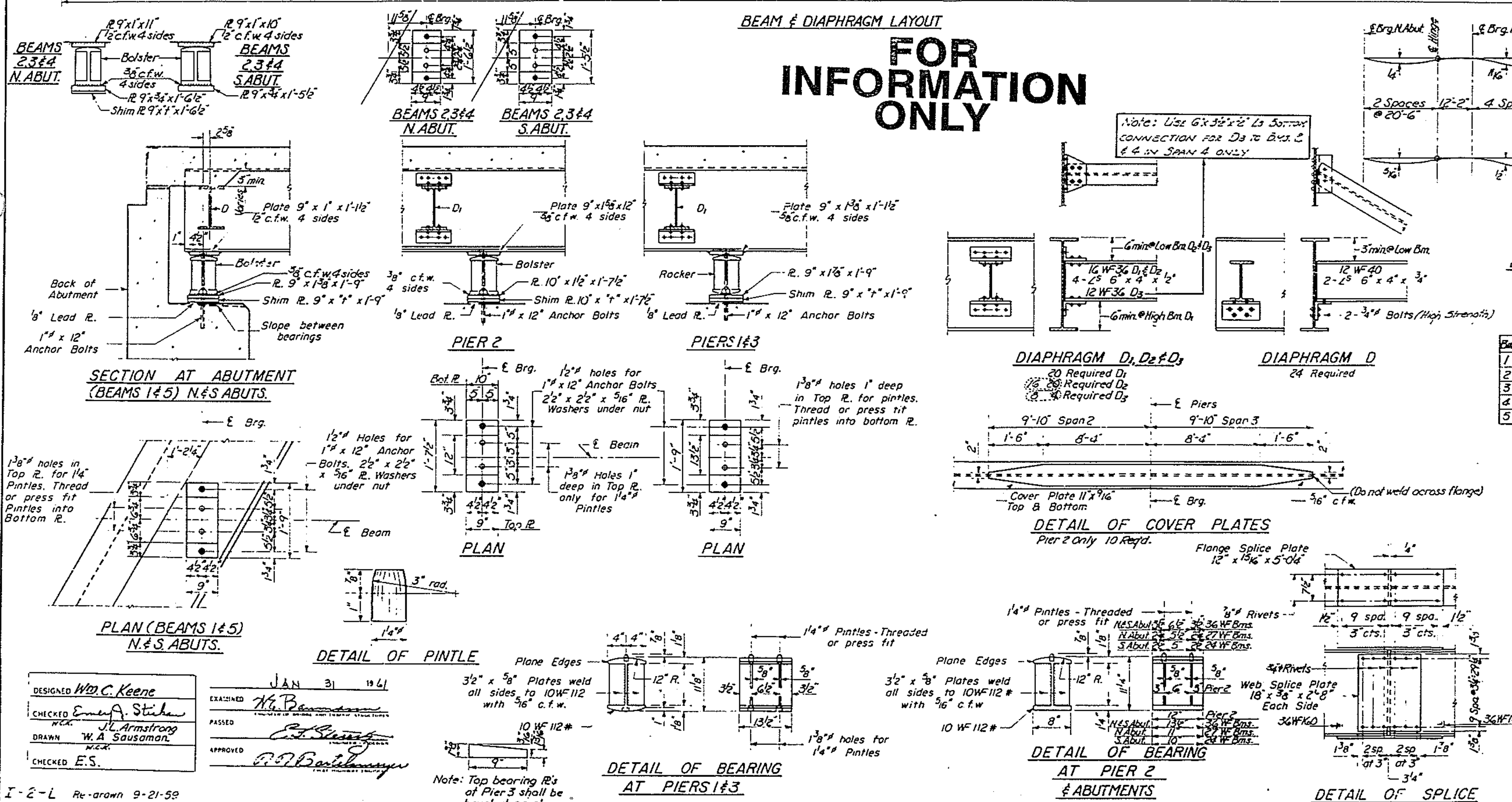
		BUREAU	26	25

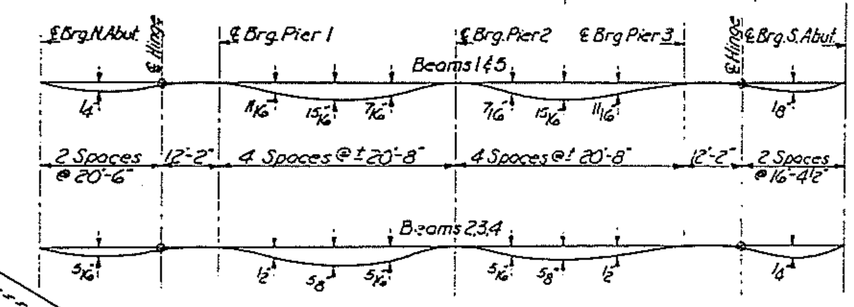
SHEET NO 4
5 SHEETS



BEAM & DIAPHRAGM LAYOUT

FOR INFORMATION ONLY





DEAD LOAD DEFLECTION DIAGRAM

Weight of Slab only.

ELEVATION TOP OF BEAMS

Bm.	℄ Brg. N.Abut.	℄ Hinge 1	℄ Pier 1	℄ Splice 1	℄ Pier 2	℄ Splice 2	℄ Pier 3	℄ Hinge 2	℄ Brg. S.Abut.
1	657.94	657.83	657.72	657.17	656.87	656.58	655.38	655.15	654.32
2	658.02	657.59	657.79	657.20	656.90	656.60	655.37	655.13	654.29
3	658.04	657.90	657.78	657.17	656.86	656.55	655.30	655.05	654.20
4	658.00	657.85	657.73	657.09	656.77	656.45	655.17	654.92	654.05
5	657.91	657.73	657.60	656.95	656.62	656.29	654.99	654.73	653.94

Note: Elevations top of beams do not include dead load deflections.

BILL OF MATERIAL

Item	Unit	Quantity
Structural Steel	Lbs.	241,640

TABLE OF "t" DIMENSIONS

Bm.	N.Abut.	Pier 1	Pier 2	Pier 3	S.Abut.
1	3/8"	0	1/8"	1/8"	0
2	1/4	5/8"	3/8"	0	0
3	1/2"	5/8"	0	0	0
4	0	0	0	1/8"	0
5	0	0	0	0	0

DESIGNED Wm. C. Keene
CHECKED Emery A. Stieha
J. L. Armstrong
DRAWN W. A. Sausaman
CHECKED E.S.

JAN 31 1941
EXAMINED
PASSED
APPROVED

STRUCTURAL STEEL DETAILS
TR.370 OVER F.A.I. 80
F.A.I. RT. 80 SEC. 6-7HB-1
BUREAU COUNTY
STA. 1738+38

I-2-L Re-drawn 9-21-59

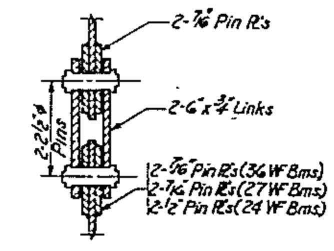
ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		BUREAU	26	26

SHEET NO. 5
5 SHEETS

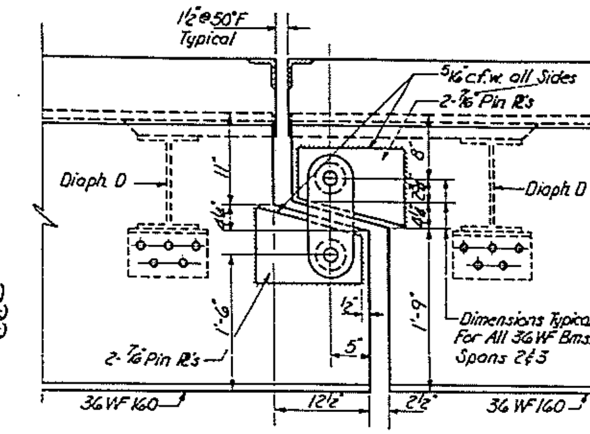
STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS

TOP OF SLAB ELEVATIONS

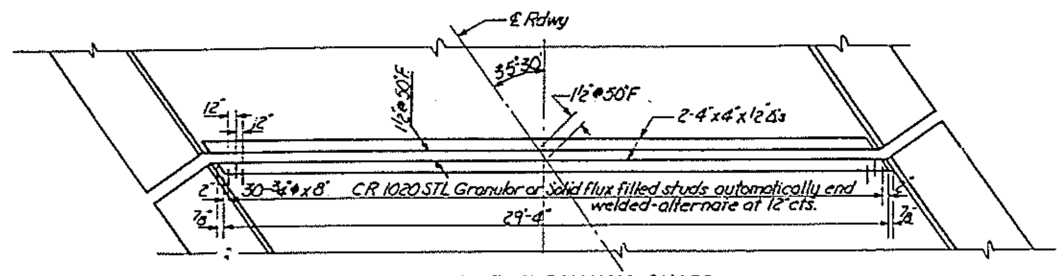
Beam	Bk.N.Abut. Sta. 98+53.??	℄ Brg. N.Abut.	Sta. 98+63.86	Sta. 98+76.11	Sta. 98+86.36	℄ Hinge 1	℄ Brg. Pier 1	Sta. 99+19.11	Sta. 99+29.44	Sta. 99+39.77	Sta. 99+50.11	Sta. 99+60.44	℄ Splice 1	Sta. 99+81.11	℄ Brg. Pier 2	Sta. 100+01.77	℄ Splice 2	Sta. 100+22.44	Sta. 100+32.77	Sta. 100+43.11	Sta. 100+53.44	Sta. 100+63.77	℄ Brg. Pier 3	℄ Hinge 2	Sta. 100+97.19	Sta. 101+08.11	℄ Brg. S.Abut.	Bk.S.Abut.
1	658.52	658.52	658.50	658.48	658.45	658.41	658.34	658.28	658.20	658.11	658.02	657.91	657.79	657.66	657.52	657.37	657.20	657.03	656.85	656.65	656.45	656.23	656.01	655.73	655.46	655.19	654.90	654.83
	Sta. 98+57.47	℄ Brg. N.Abut.	Sta. 98+70.14	Sta. 98+80.39	Sta. 98+90.64	℄ Hinge 1	℄ Brg. Pier 1	Sta. 99+23.39	Sta. 99+33.72	Sta. 99+44.05	Sta. 99+54.39	Sta. 99+64.72	℄ Splice 1	Sta. 99+85.39	℄ Brg. Pier 2	Sta. 100+06.05	℄ Splice 2	Sta. 100+26.72	Sta. 100+37.05	Sta. 100+47.39	Sta. 100+57.72	Sta. 100+68.05	℄ Brg. Pier 3	℄ Hinge 2	Sta. 101+01.47	Sta. 101+12.39	℄ Brg. S.Abut.	Bk.S.Abut.
2	658.60	658.60	658.58	658.56	658.52	658.47	658.40	658.33	658.25	658.16	658.06	657.94	657.82	657.69	657.54	657.38	657.22	657.04	656.85	656.65	656.44	656.22	655.99	655.71	655.44	655.16	654.87	654.80
	Sta. 98+61.75	℄ Brg. N.Abut.	Sta. 98+74.42	Sta. 98+84.67	Sta. 98+94.92	℄ Hinge 1	℄ Brg. Pier 1	Sta. 99+27.67	Sta. 99+38.00	Sta. 99+48.33	Sta. 99+58.67	Sta. 99+69.00	℄ Splice 1	Sta. 99+89.67	℄ Brg. Pier 2	Sta. 100+10.33	℄ Splice 2	Sta. 100+31.00	Sta. 100+41.33	Sta. 100+51.67	Sta. 100+62.00	Sta. 100+72.33	℄ Brg. Pier 3	℄ Hinge 2	Sta. 101+05.75	Sta. 101+16.67	℄ Brg. S.Abut.	Bk.S.Abut.
3	658.62	658.62	658.60	658.57	658.53	658.48	658.40	658.33	658.24	658.15	658.04	657.92	657.79	657.66	657.51	657.35	657.17	656.99	656.80	656.60	656.38	656.16	655.92	655.63	655.36	655.07	654.78	654.71
	Sta. 98+66.03	℄ Brg. N.Abut.	Sta. 98+78.70	Sta. 98+88.95	Sta. 98+99.20	℄ Hinge 1	℄ Brg. Pier 1	Sta. 99+31.95	Sta. 99+42.28	Sta. 99+52.61	Sta. 99+62.95	Sta. 99+73.28	℄ Splice 1	Sta. 99+93.95	℄ Brg. Pier 2	Sta. 100+14.61	℄ Splice 2	Sta. 100+35.28	Sta. 100+45.61	Sta. 100+55.95	Sta. 100+66.28	Sta. 100+76.61	℄ Brg. Pier 3	℄ Hinge 2	Sta. 101+10.03	Sta. 101+20.95	℄ Brg. S.Abut.	Bk.S.Abut.
4	658.59	658.58	658.56	658.53	658.48	658.43	658.35	658.27	658.18	658.08	657.96	657.84	657.71	657.57	657.41	657.25	657.07	656.89	656.69	656.48	656.26	656.03	655.79	655.50	655.22	654.93	654.63	654.56
	Sta. 98+70.31	℄ Brg. N.Abut.	Sta. 98+82.98	Sta. 98+93.23	Sta. 99+03.48	℄ Hinge 1	℄ Brg. Pier 1	Sta. 99+36.23	Sta. 99+46.56	Sta. 99+56.89	Sta. 99+67.23	Sta. 99+77.56	℄ Splice 1	Sta. 99+98.23	℄ Brg. Pier 2	Sta. 100+18.89	℄ Splice 2	Sta. 100+39.56	Sta. 100+49.89	Sta. 100+60.23	Sta. 100+70.56	Sta. 100+80.89	℄ Brg. Pier 3	℄ Hinge 2	Sta. 101+14.31	Sta. 101+25.23	℄ Brg. S.Abut.	Bk.S.Abut.
5	658.50	658.49	658.46	658.42	658.37	658.31	658.23	658.15	658.05	657.95	657.83	657.70	657.57	657.42	657.26	657.09	656.91	656.72	656.52	656.31	656.08	655.85	655.61	655.31	655.02	654.73	654.42	654.35



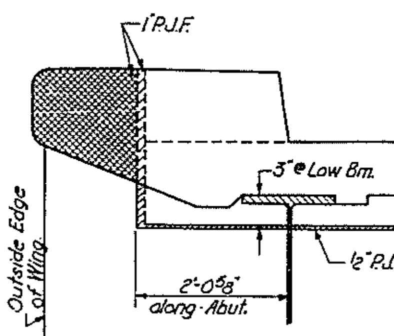
SECTION THRU CONNECTION



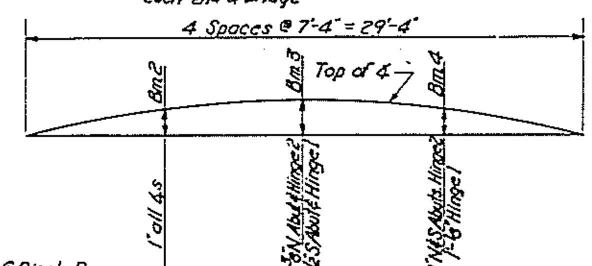
PIN CONNECTION 36 WF TO 36 WF (FASCIA BMS.)



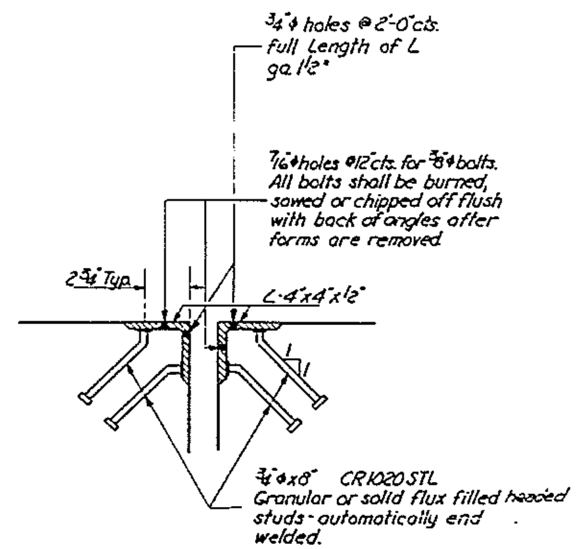
PLAN OF EXPANSION GUARD
Angles required both sides exp. joints ℄ each end of bridge



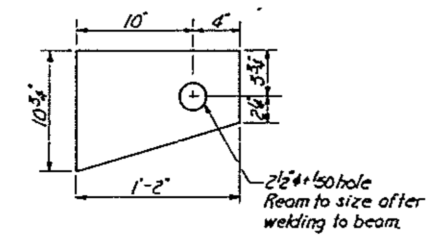
ABUT. CORNER DETAIL



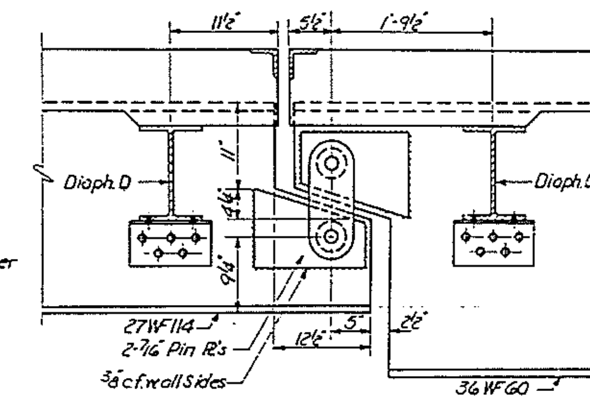
PROFILE OF EXPANSION GUARD
1/4"ϕ N. & S. Abuts.
2 ∠s ℄ Hinges



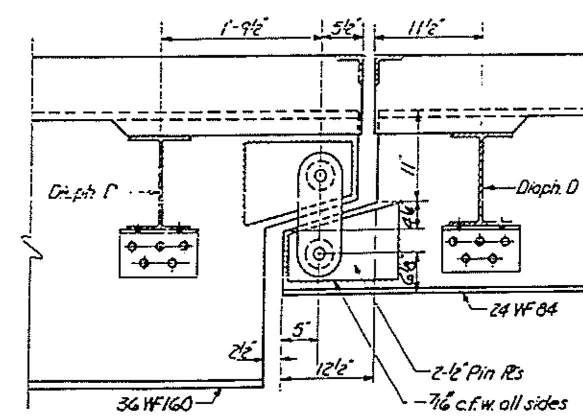
WELDED STUD DETAIL



PIN PLATE
28-7/16" Thick for 36 WF 160 Bms.
6-7/16" Thick for 27 WF 114 Bms
6-1/2" Thick for 24 WF 84 Bms.

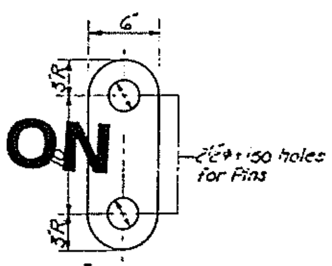


PIN CONNECTION 27 WF TO 36 WF (SPAN 1)

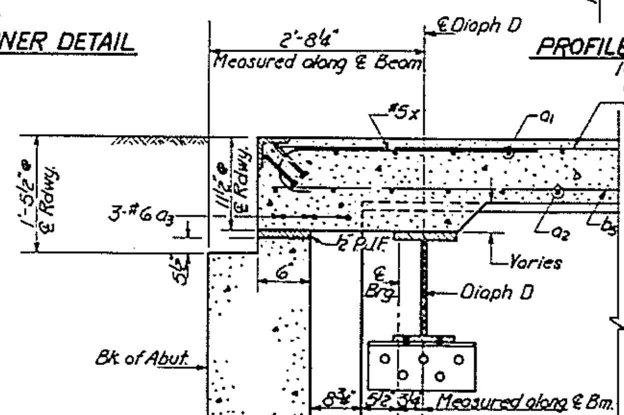


PIN CONNECTION 24 WF TO 36 WF (SPAN 4)

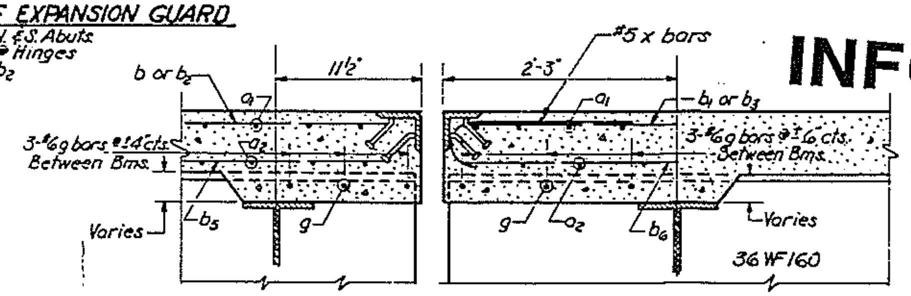
FOR INFORMATION ONLY



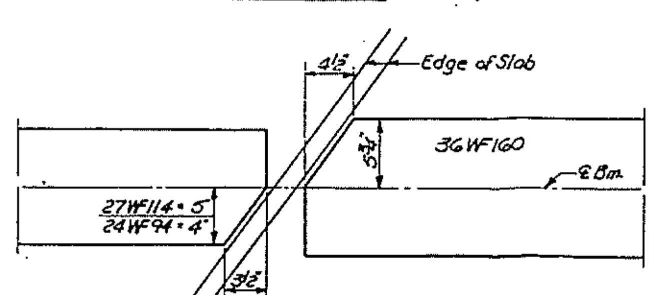
3/4" LINK
20 Req'd.



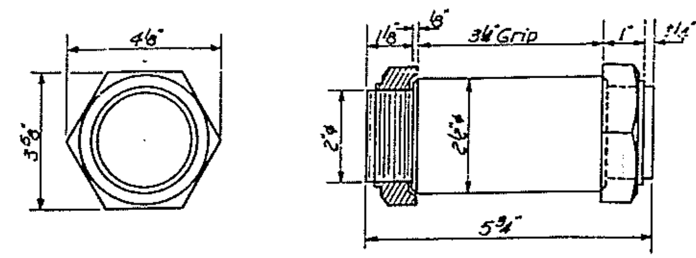
EDGE BEAM REINFORCEMENT AT END OF BRIDGE



EDGE BEAM REINFORCEMENT AT HINGES



PLAN OF BEAMS @ EXPANSION JOINT
Cut Top Flange Only



PIN DETAIL
20 Req'd.

DESIGNED Wm. C. Keene	EXAMINED W. E. Baumann, Engineer of Bridge and Traffic Structures
CHECKED Emery J. Stich	PASSED E. T. Shively
DRAWN J.L. Armstrong	APPROVED W. W. Bartelmay
CHECKED E.S.	

JAN 31 1961

SPECIAL DETAILS
T.R. 370 OVER F.A.I. RT. 80
F.A.I. RT. 80 SEC. 6-7HB-1
BUREAU COUNTY
STA. 1738+38

Revised 6/20/61 - S.E.C. Welding studs ... Removed 2" dimension ... identification of studs.

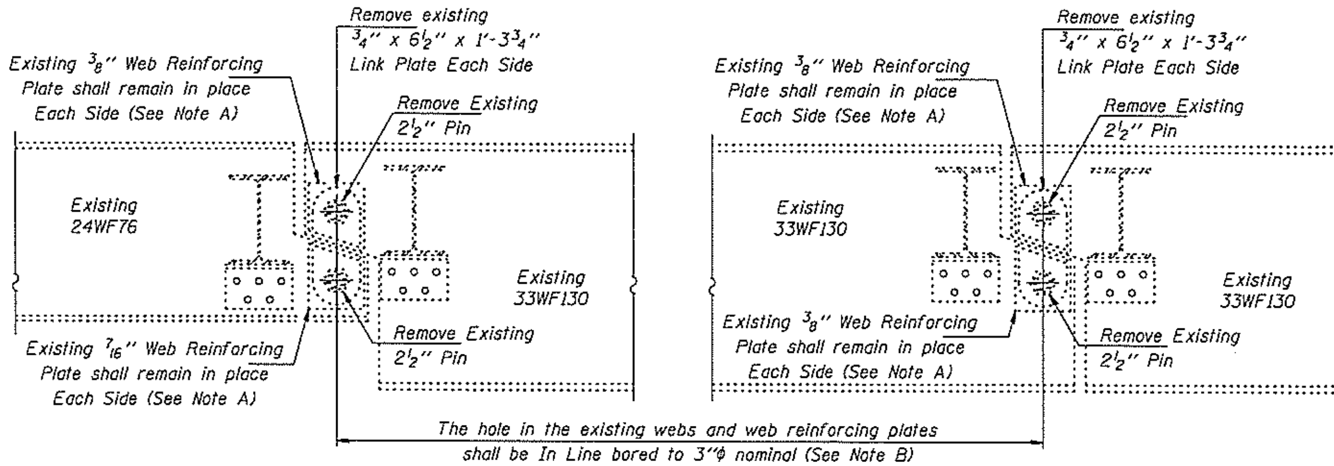
UNIT

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

* D-2 BRIDGE PIN REPLACE 1997-1

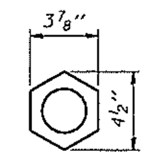
ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
FAI 80	*	BUREAU	26	14
FED. ROAD DIST. NO. 7		ILLINOIS	FED. AID PROJECT-	

SHEET NO. 1
4 SHEETS

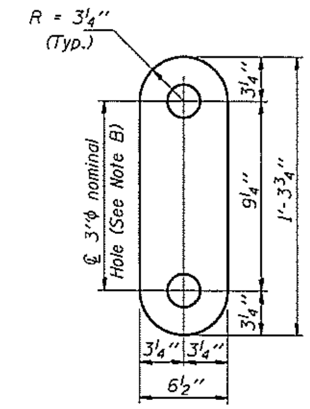


ELEVATION AT EXISTING PIN ASSEMBLY FOR INTERIOR BEAMS

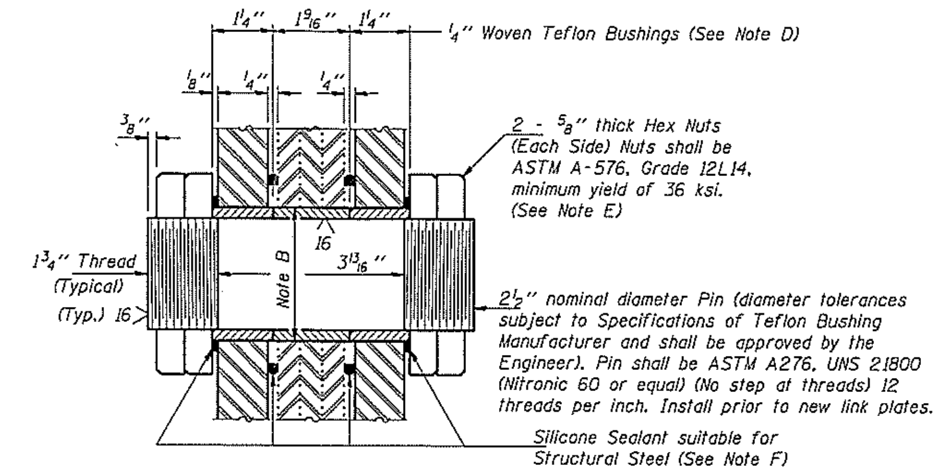
ELEVATION AT EXISTING PIN ASSEMBLY FOR EXTERIOR BEAMS



NUT DETAIL
(80 Required)

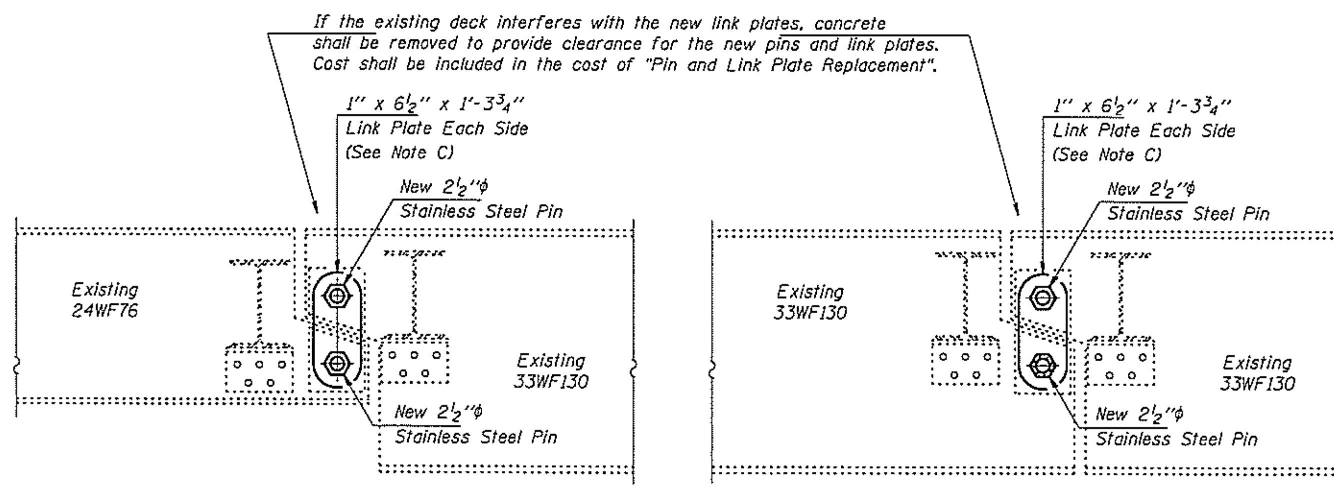


LINK PLATE DETAIL
(20 Required)



SECTION THRU PIN
(20 Required)

Any Pins that can be easily removed without damage to the pin shall be salvaged and the Bridge Engineer shall be contacted for disposition. Cost of salvage is included in "Pin and Link Plate Replacement".



ELEVATION AT NEW PIN ASSEMBLY FOR INTERIOR BEAMS

ELEVATION AT NEW PIN ASSEMBLY FOR EXTERIOR BEAMS

Note A:
Existing welds shall be inspected for cracks using liquid dye penetrant or magnetic particle testing. Any cracks that are found shall be identified and reported to the Bureau of Bridges and Structures for further disposition. Clean and paint before installing new link plates.

Note B:
Bore diameter for bushing in link plate, existing webs and web reinforcement plates shall correspond to bushing manufacturer's allowable tolerances for proper functioning. Hole diameter may be adjusted to allow use of stock bushings.

Note C:
Inside face of new link plates shall receive first field coat in shop. The primer shall pass the M.E.K. Rub Test before the first field coat is applied.

Note D:
Actual bushing thickness per manufacturer's specifications, 1/4" is approximate. Bushings shall be a self lubricating filament wound epoxy matrix backed Duralon Bearing, metal backed Fiber Glide Bearing or equivalent. No primer or grease shall be allowed on bushings. Bushings shall be suitable for dynamic loads of 20,000 psi.

Note E:
Tighten inside nuts to bring all bushings into firm contact, then back off 1/4 turn and tighten outer nuts.

Note F:
Apply 3/8" bead to face of the web reinforcing plates approximately 1/2" from bushing immediately before installing new link plates. Place sealant around nuts after installation. Sealant shall be suitable for prolonged exterior exposure without losing flexibility or adhesion to painted steel surfaces. Proposed products shall be subject to Department's acceptance based on documented testing or other evidence.

GENERAL NOTES

All new structural steel shall conform to AASHTO Classification M-270 Gr. 36, unless otherwise noted.

The Contractor shall provide support and/or shoring systems for the beam in the area of existing pin and link plate replacement. See Special Provision "Temporary Support System."

The inorganic zinc rich primer/acrylic/acrylic paint system shall be used for shop and field painting of new structural steel except where otherwise noted. The color of the acrylic finish coat shall be Interstate Green, Munsell No. 7.5G 4/8. See Special Provisions "Cleaning and Painting New Metal Structures". Cost shall be included in the cost of "Pin and Link Plate Replacement".

Existing Structural steel shall be cleaned and painted as required by the Special Provision "Cleaning and Painting Adjacent Areas of Existing Steel Structures". Cost shall be included in the cost of "Pin and Link Plate Replacement."

All existing steel surfaces behind link plates shall be cleaned and primed before installation of new link plates. Cost shall be included in the cost of "Pin and Link Plate Replacement."

Plan dimensions and details relative to existing structure have been taken from existing plans and are subject to nominal construction variations. It shall be the Contractor's responsibility to verify such dimensions and details in the field, except the pin diameters, and make necessary approved adjustments prior to construction or ordering of materials. Such variations shall not be cause for additional compensation for a change in the scope of the work, however, the Contractor will be paid for the quantity actually furnished at the unit price bid for the work.

The Pins and Link Plates shall conform to the minimum Charpy V-Notch Toughness of 25 ft.-lbs. at 40° F.

The pins, link plates, bushings, nuts and silicone sealant are the items included in "Pin and Link Plate Replacement".

TOTAL BILL OF MATERIAL

ITEM	UNIT	QUANTITY
Temporary Support System	Each	10
Pin and Link Plate Replacement	Each	10
Silicone Joint Sealer	Foot	64

MAXIMUM REACTIONS AT PIN

R D.L.	(K)	14.3
R L.L.	(K)	25.6
Imp.	(K)	7.7
R (Total)	(K)	47.6

DESIGNED	KPS
CHECKED	NJS
DRAWN	Paul Summer
CHECKED	KPS NJS

APRIL 29, 1997
EXAMINED Todd E. Ahrens
ENGINEER OF STRUCTURAL SERVICES
PASSED
ENGINEER OF BRIDGES AND STRUCTURES

PIN REPLACEMENT
TR ROUTE 148 SEC. 06-3HB
BUREAU COUNTY
STA. 640+74.80
STR. No. 006-0123

006 - 0123

STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS

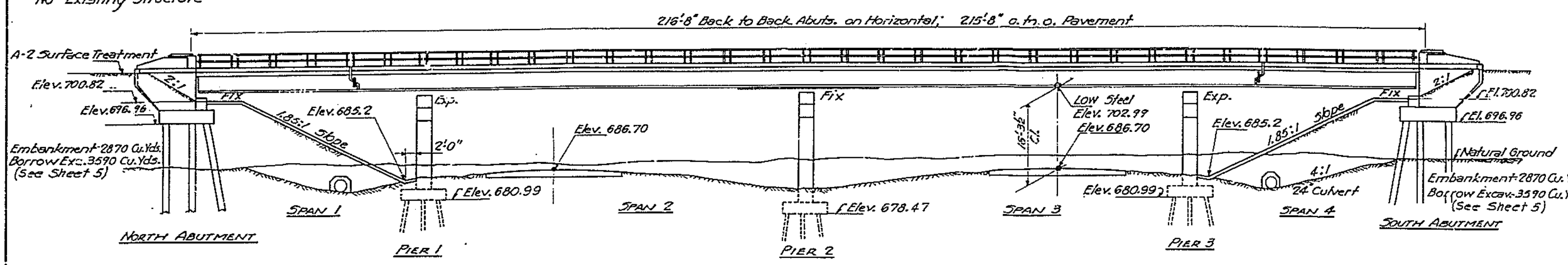
		County	Total Sheets	Sheet No.
		Bureau	26	16

F.A. I-80-1(40)48

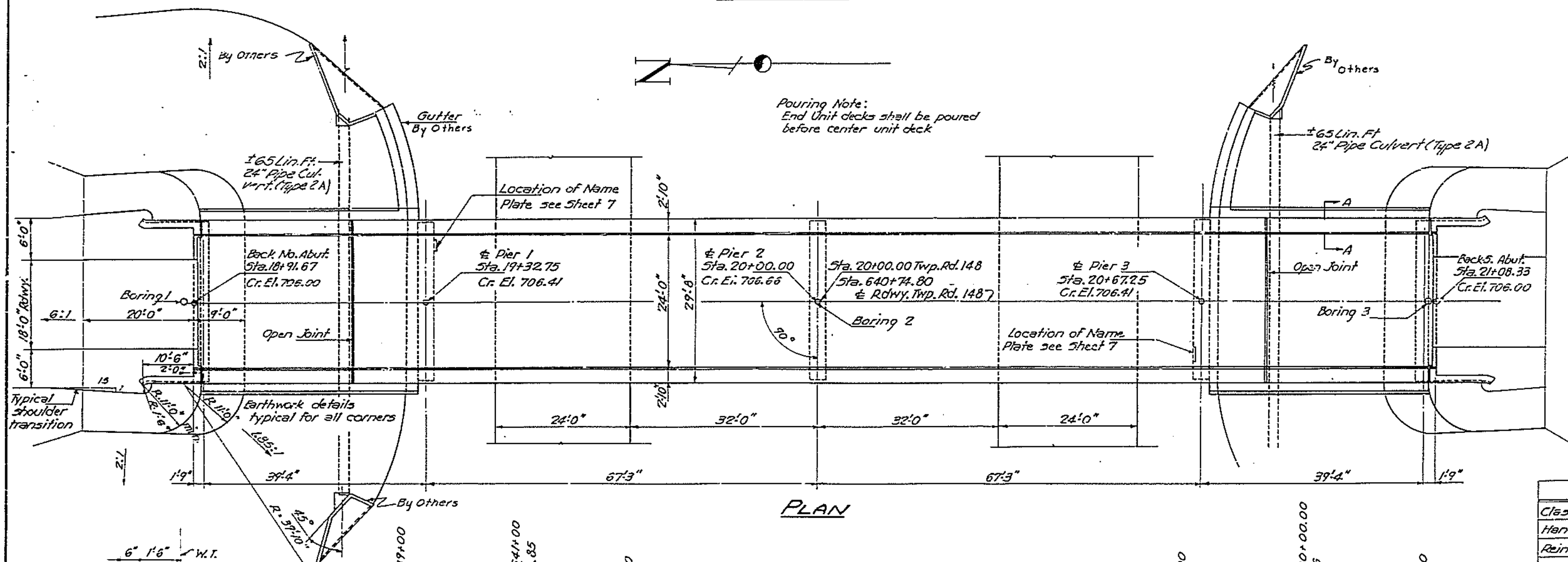
SHEET NO. 3
4 SHEETS

B.M.: Spike and Washer in side of Telephone Pole 60' Rt. Sta. 23+66 Elev. 687.27

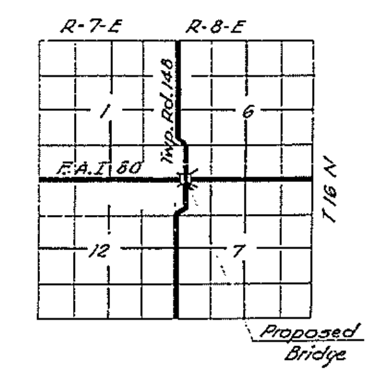
No Existing Structure



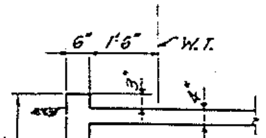
ELEVATION



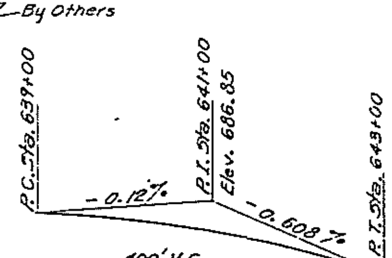
PLAN



LOCATION SKETCH



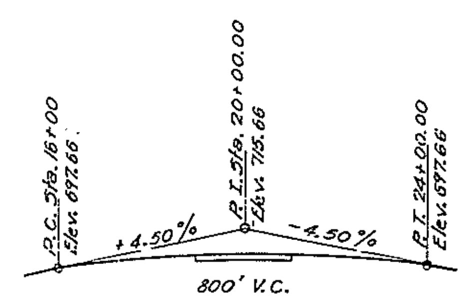
SECTION A-A



PROFILE F.A.I. RT. 80

STATION 640+74.80
BUILT 196 BY
STATE OF ILLINOIS
F.A.I. RT. 80-SEC. 06-3-HB
F.A. PROJECT I-80-1(40)
LOADING H15-S12

LETTERING FOR NAME PLATE
See Standard 2113



GRADE PROFILE - TWP. RD. 148

GENERAL NOTES

Class X Concrete shall be used throughout except in End Posts. Handrail Concrete shall be used in the End Posts.

The concrete floor slab shall be finished in accordance with Art. 51.19 of the Standard Specifications.

Slope Wall shall be reinforced with welded wire fabric 6"x6" mesh #4 wires, weighing 58#/100 sq. ft.

Rivets ¾", Open Holes 13/16" unless noted.

All rockers, bolsters, bearing plates, lead plates, pintles and anchor bolts shall be fabricated and set in accordance with Art. 51.15 of the Standard Specifications.

Anchor bolts shall be set before riveting diaphragms over supports.

Expansion guards shall be fabricated and erected in accordance with Art. 51.13(d) of the Standard Specifications. and are included in quantity of Structural Steel.

Except as otherwise provided all Structural Steel and Handrail shall receive one shop coat of red lead paint and two field coats of aluminum paint. See Articles 56.1 to 56.5 inclusive of the Standard Specifications.

The Contractor shall drive two test piles: one Concrete test pile in the South Abutment and one timber test pile near Pier 1.

Holes shall be precored for piles under Abutments. See Art. 60.9 (c) of the Standard Specifications.

All paint shall be furnished and applied by the Contractor.

TOTAL BILL OF MATERIAL

ITEM		SUPER.	SUBSTR.	TOTAL
Class-X-Concrete	Cu. Yds.	182.0	200.4	382.4
Handrail Concrete	Cu. Yds.	2.9		2.9
Reinforcement Bars	Lbs.	32,900	16,960	49,860
Structural Steel	Lbs.	166810		166810
Metal Handrail	Lin. Ft.	429		429
Concrete Piles	Lin. Ft.		442	442
Creosoted Piles	Lin. Ft.		1122	1122
Test Piles (Concrete)	Each		1	1
Test Piles (Timber)	Each		1	1
Name Plates	Each		2	2
Class-A-Excavation for Struct.	Cu. Yds.		270	270
Protective Coat	Sq. Yds.	758		758
Slope Wall (4")	Sq. Yds.			227
Pipe Culverts Type 2A-24"	Lin. Ft.			130

DESIGNED	J.B.H.Jr.
CHECKED	C.H. Hagedorn
DRAWN	J.B.K. M. Miller
CHECKED	C.H.H.

MAY 27 1960

EXAMINED V. M. Romine
PASSED
APPROVED R. L. Bartelsmeyer

FOR INFORMATION ONLY

DESIGN STRESSES
fc - - - - 1400#/□" Super and Sub.
V - - - - 75#/□" Footing
fs - - - - 20000#/□" Reinf.
fs - - - - 18000#/□" Struct.
n - - - - 10

Loading H15-S12-44

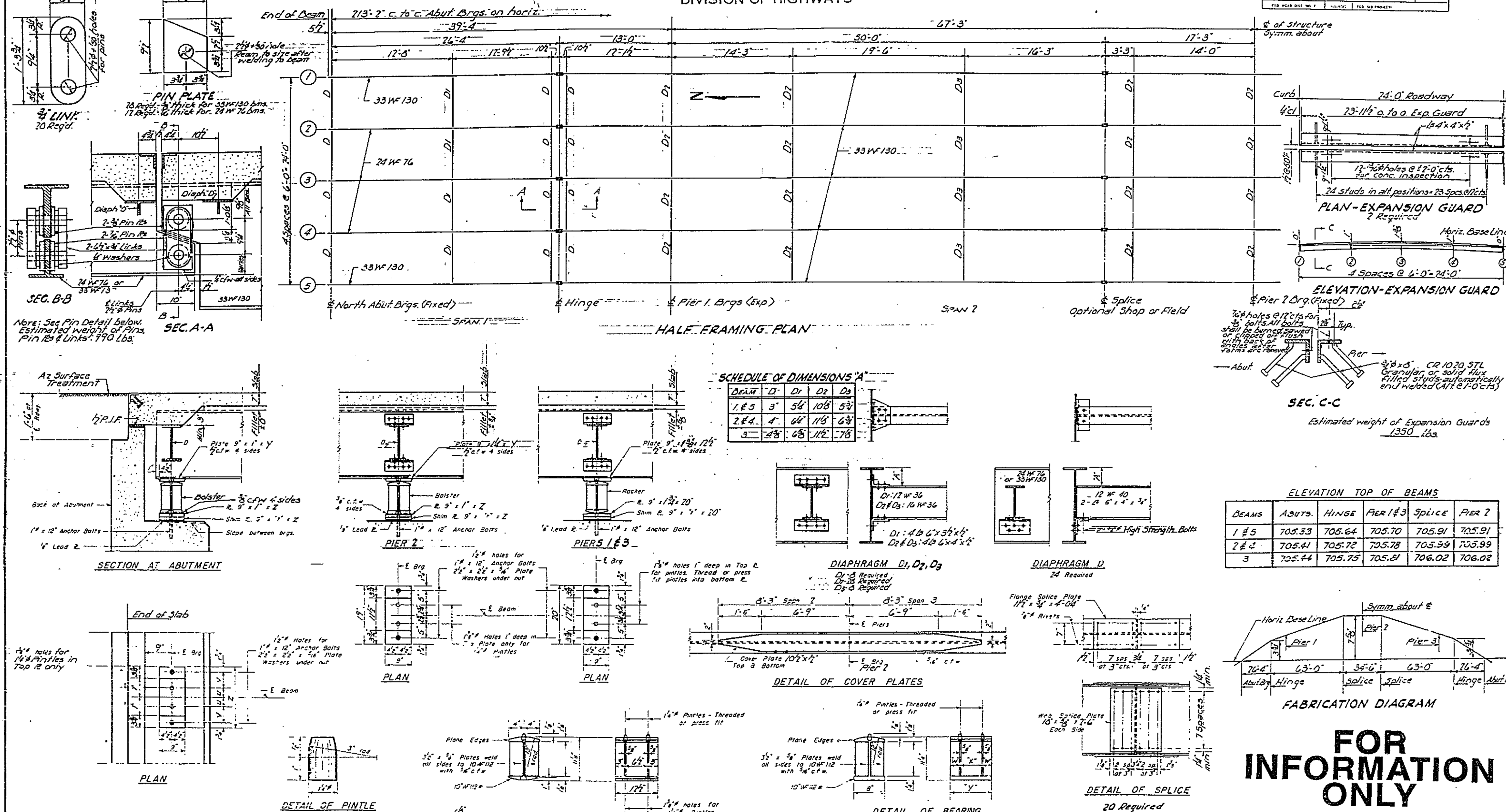
GENERAL PLAN & ELEVATION
F.A.I. RT. 80-SEC. 06-3-HB
F.A. PROJECT I-80-1(40)48
BUREAU COUNTY
STATION 640+74.80

Revised 4/23/62 In total bill of mtl. quantity of reinf. bars super. from 34,980 to 32,900 (Super) & from 48,340 to 49,860 (Total) RAZ.

STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS

COUNTY	TOTAL SHEETS	SHEET NO.
Bureau	26	17

SHEET NO. 4
4 SHEETS



SCHEDULE OF DIMENSIONS "A"

BEAM	"D"	D1	D2	D3
1 & 5	3"	5¼"	10⅛"	5¾"
2 & 4	4"	6¼"	11⅛"	6¾"
3	4⅜"	6⅝"	11½"	7⅛"

ELEVATION TOP OF BEAMS

BEAMS	ABUTS.	HINGE	PIER 1 & 3	SPLICE	PIER 2
1 & 5	705.33	705.64	705.70	705.91	705.91
2 & 4	705.41	705.72	705.78	705.99	705.99
3	705.44	705.75	705.81	706.02	706.02

SCHEDULE OF BOLSTER DIMENSIONS

Brg.	Beam	t	U	V	W	X	Y	Z	No. Req'd
Abut.	1 & 5	6¼"	3¼"	5"	3"	6½"	12½"	20"	4
	2-3-4	5"	2½"	4½"	2½"	5"	10"	17½"	6
Pier 2	All	5¾"	2¾"	5"	3"	5½"	11½"	19"	5

TABLE OF "t" DIMENSIONS

BEAM	ALL BEARINGS
1-2-4-5	0"
3	⅜"

FOR INFORMATION ONLY

DESIGNED J. B. Nile
CHECKED P. H. Hogeveen
DRAWN J. Sandoval / W. A. Sausman
CHECKED P. H. H.

MAY 27 1960
EXAMINED V. M. Romine
PASSED
APPROVED

STRUCTURAL STEEL
F.A.I. RT. 80 SEC. 06-3-HB
BUREAU COUNTY
STA. 640+74.80

I-2 SPAN 4 5-10-51

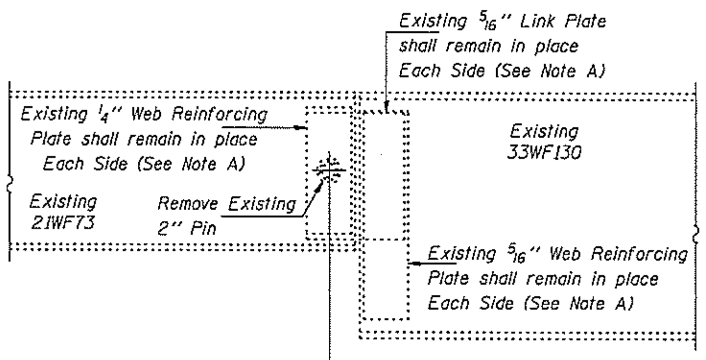
UNIT

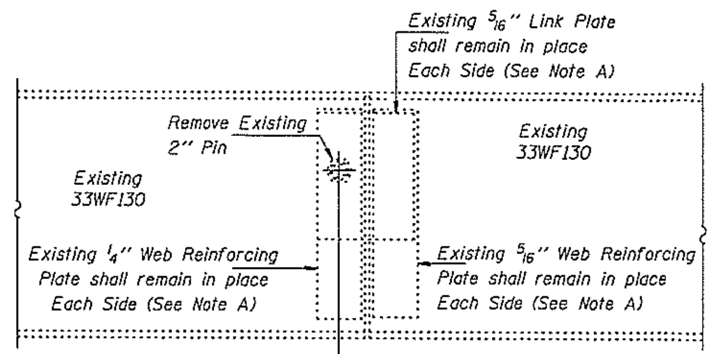
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

" D-2 BRIDGE PIN REPLACE 1997-1

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
FAI 80	*	BUREAU	26	10
FED. ROAD DIST. NO. 7		ILLINOIS	FED. AID PROJECT-	

SHEET NO. 1
4 SHEETS



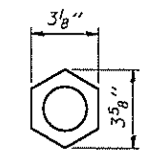


The hole in the existing webs, web reinforcing plates and pin plates shall be In Line bored to 2 1/2"ϕ nominal (See Note B)

ELEVATION AT EXISTING PIN ASSEMBLY FOR INTERIOR BEAMS

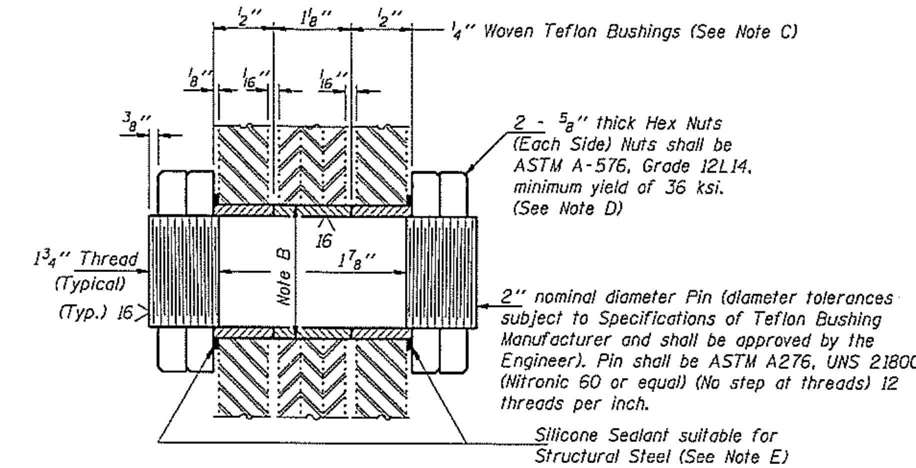
ELEVATION AT EXISTING PIN ASSEMBLY FOR EXTERIOR BEAMS

Any Pins that can be easily removed without damage to the pin shall be salvaged and the Bridge Engineer shall be contacted for disposition. Cost of salvage is included in "Pin Replacement".



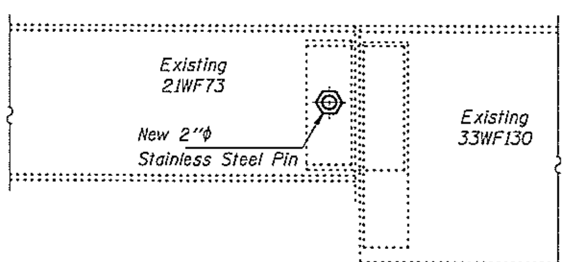
NUT DETAIL

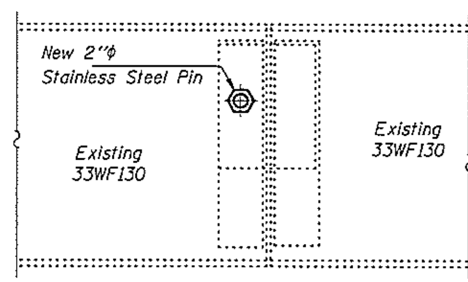
(40 Required)



SECTION THRU PIN

(10 Required)





ELEVATION AT NEW PIN ASSEMBLY FOR INTERIOR BEAMS

ELEVATION AT NEW PIN ASSEMBLY FOR EXTERIOR BEAMS

Note A:
Existing welds shall be inspected for cracks using liquid dye penetrant or magnetic particle testing. Any cracks that are found shall be identified and reported to the Bureau of Bridges and Structures for further disposition. Clean and paint before installing new pins.

Note B:
Bore diameter for bushing in existing link plates, webs and web reinforcement plates shall correspond to bushing manufacturer's allowable tolerances for proper functioning. Hole diameter may be adjusted to allow use of stock bushings.

Note C:
Actual bushing thickness per manufacturer's specifications. 1/4" is approximate. Bushings shall be a self lubricating filament wound epoxy matrix backed Duralon Bearing, metal backed Fiber Glide Bearing or equivalent. No primer or grease shall be allowed on bushings. Bushings shall be suitable for dynamic loads of 20,000 psi.

Note D:
Tighten inside nuts to bring all bushings into firm contact, then back off 1/4 turn and tighten outer nuts.

Note E:
Place sealant around nuts after installation. Sealant shall be suitable for prolonged exterior exposure without losing flexibility or adhesion to painted steel surfaces. Proposed products shall be subject to Department's acceptance based on documented testing or other evidence.

GENERAL NOTES

All new structural steel shall conform to AASHTO Classification M-270 Gr. 36. unless otherwise noted.

The Contractor shall provide support and/or shoring systems for the beam in the area of existing pin replacement. See Special Provision "Temporary Support System."

The inorganic zinc rich primer/acrylic/acrylic paint system shall be used for shop and field painting of new structural steel except where otherwise noted. The color of the acrylic finish coat shall be Interstate Green, Munsell No. 7.5G 4/8. See Special Provisions "Cleaning and Painting New Metal Structures". Cost shall be included in the cost of "Pin Replacement".

Existing Structural steel shall be cleaned and painted as required by the Special Provision "Cleaning and Painting Adjacent Areas of Existing Steel Structures". Cost shall be included in the cost of "Pin Replacement."

Plan dimensions and details relative to existing structure have been taken from existing plans and are subject to nominal construction variations. It shall be the Contractor's responsibility to verify such dimensions and details in the field, except the pin diameters, and make necessary approved adjustments prior to construction or ordering of materials. Such variations shall not be cause for additional compensation for a change in the scope of the work, however, the Contractor will be paid for the quantity actually furnished at the unit price bid for the work.

The Pins shall conform to the minimum Charpy V-Notch Toughness of 25 ft.-lbs. at 40° F.

The pins, bushings, nuts and silicone sealant are the items included in "Pin Replacement".

TOTAL BILL OF MATERIAL

ITEM	UNIT	QUANTITY
Temporary Support System	Each	10
Pin Replacement	Each	10
Silicone Joint Sealer	Foot	68

MAXIMUM REACTIONS AT PIN

R℄	(K)	16.0
RL	(K)	21.7
Imp.	(K)	6.5
R (Total)	(K)	44.1

DESIGNED	KPS
CHECKED	NJS
DRAWN	Paul Summer
CHECKED	KPS NJS

APRIL 29, 1997

EXAMINED [signature]
ENGINEER OF STRUCTURAL SERVICES

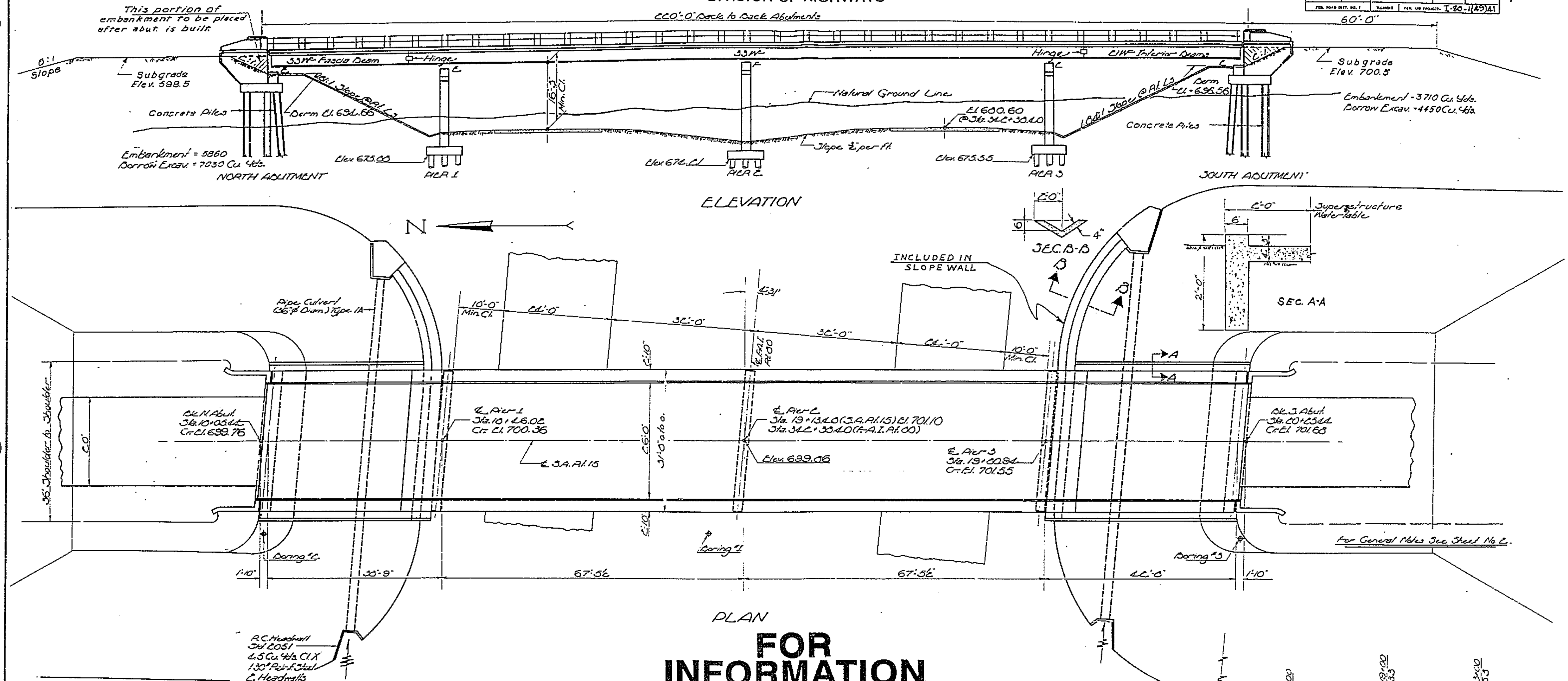
PASSED
ENGINEER OF BRIDGES AND STRUCTURES

PIN REPLACEMENT
FAS 1248 SEC. 06-2HB
BUREAU COUNTY
STA. 342+38.40
STR. No. 006-0117

006 - 0117

STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS

Bureau	26	12	SHEET NO. 3	4 SHEETS
F.A. PROJ. I-80-1(49)41				



FOR INFORMATION ONLY

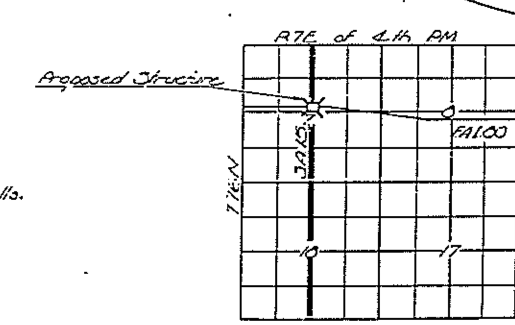
STATION 342+38.40
BUILT 196 BY
STATE OF ILLINOIS
F.A.I. RT. 80 ~ SEC. 06-2-HB
F.A. PROJ. I-80-1(49)
LOADING H15-S12

NAME PLATE
See Std. 2113

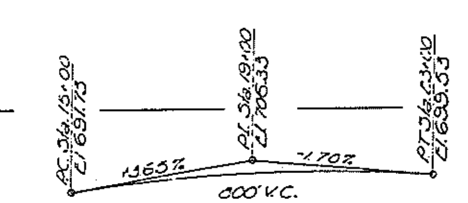
TOTAL BILL OF MATERIALS

ITEM	UNIT	SUPER	SUB	TOTAL
Class X Concrete	Cu. Yds.	197.9	195.8	393.7
Class X Concrete (Headwalls)	Cu. Yds.			9.0
Reinforcement Bars †	Lbs.	31810	13880 †	45690
Structural Steel	Lbs.	161890		161890
Metal Handrail	Lin. Ft.	436		436
Concrete Piles	Lin. Ft.		335	335
Test Piles (Concrete)	Each		One	One
Creosoted Piles	Lin. Ft.		636	636
Test Piles (Creosoted)	Each		One	One
Name Plates	Each			2
Slope Wall	Sq. Yds.		360	360
Class A Excavation for Structures	Cu. Yds.		314	314
Borrow Excavation	Cu. Yds.		11480	11480
Pipe Culvert, 36" Ø, Type IA	Lin. Ft.		160	160
Protective Coat	Sq. Yds.	830		830

† Includes 260 lbs. for 2 Headwalls.



LOCATION DIAGRAM



PROFILE GRADE C.H. RT. 15

DESIGNED — D. Atwell
CHECKED — J. G. Cites
DRAWN — W. L. Jacobs
CHECKED
EXAMINED
PASSED — ENGINEER OF BRIDGE AND TRAFFIC STRUCTURES
ENGINEER OF DESIGN
APPROVED — CHIEF HIGHWAY ENGINEER

DESIGN STRESSES
f'c = 1400 p.s.i. Super & Sub.
fs = 20,000 p.s.i. Reinf.
fs = 20,000 p.s.i. Struct.
v = 75 p.s.i. Ftg.
n = 10
LOADING H15-S12-44

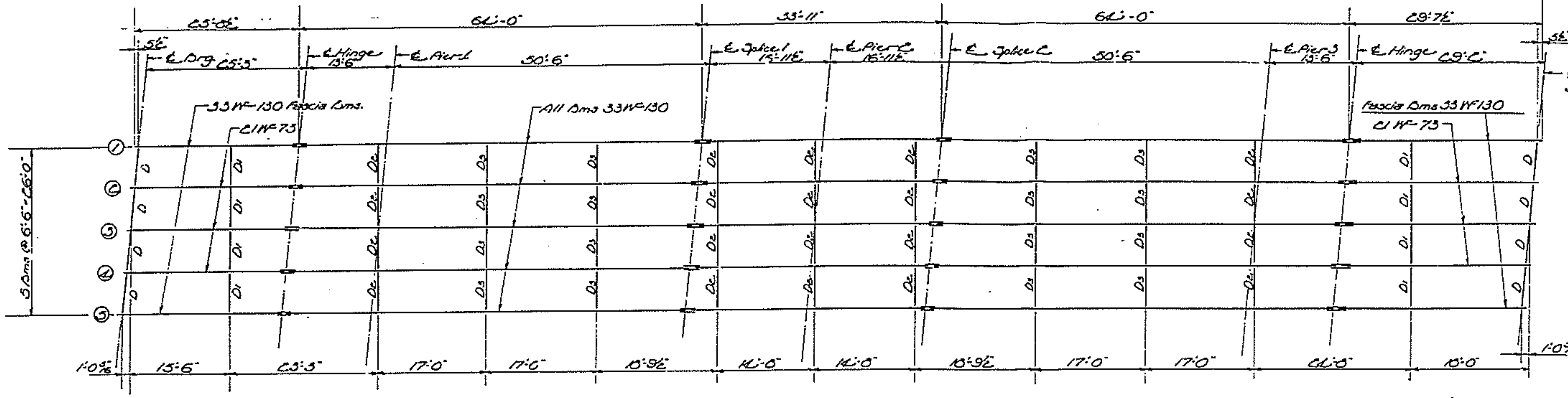
GENERAL PLAN & ELEVATION
F.A.I. RT. 80 ~ SEC. 06-2-HB
PROJ. I-80-1(49)41
BUREAU COUNTY
STA. 342+38.40

1-29-63 W.L.P. Rev. 20' Bridge Conn. to 60' & increase Emb. from 2560 to 5860 & from 710 to 3710; Bor. Exc. from 3070 to 7030 & from 890 to 4450 & Total from 3910 to 11,480. Rev. Sec. A-A With Toe Wall. Pipe Cul. from Type I to Type IA. Added Protective Coat to Bill of Material. Removed Handrail Conc. & put Quantity of 2.3 Cu. Yds. in Cl. X Conc. Design Stresses fs from 18000 to 20 000. Slope Quan. from 335 to 360. Changed Str. St. from 161,160 to 161,890. Changed Reinf. Bars From 27 940 to 31,810 & From 43,720 to 45,690
Add Ftg. Item of 9.0 Cu. Yds. Cl. X Conc. Hdwl. Reduced Cl. X Conc. by 9.0 Cu. Yds.
2-14-63 Revised Sect. B-B. Added notation TRM "INCLUDED IN SLOPE WALL"

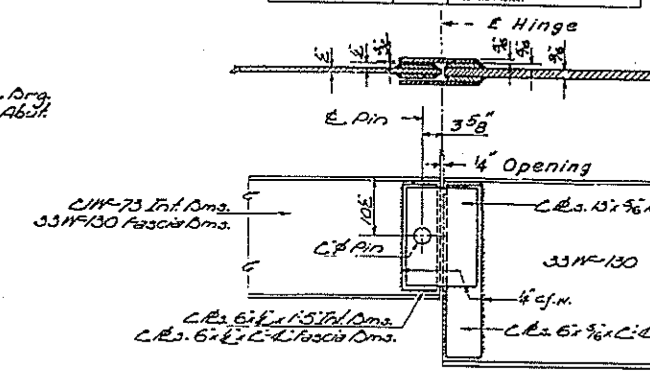
STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.	
		Bureau	26	13	

SHEET NO. 4
4 SHEETS

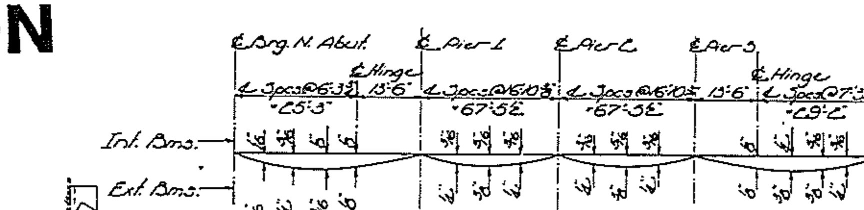


LAYOUT OF STRUCTURAL STEEL

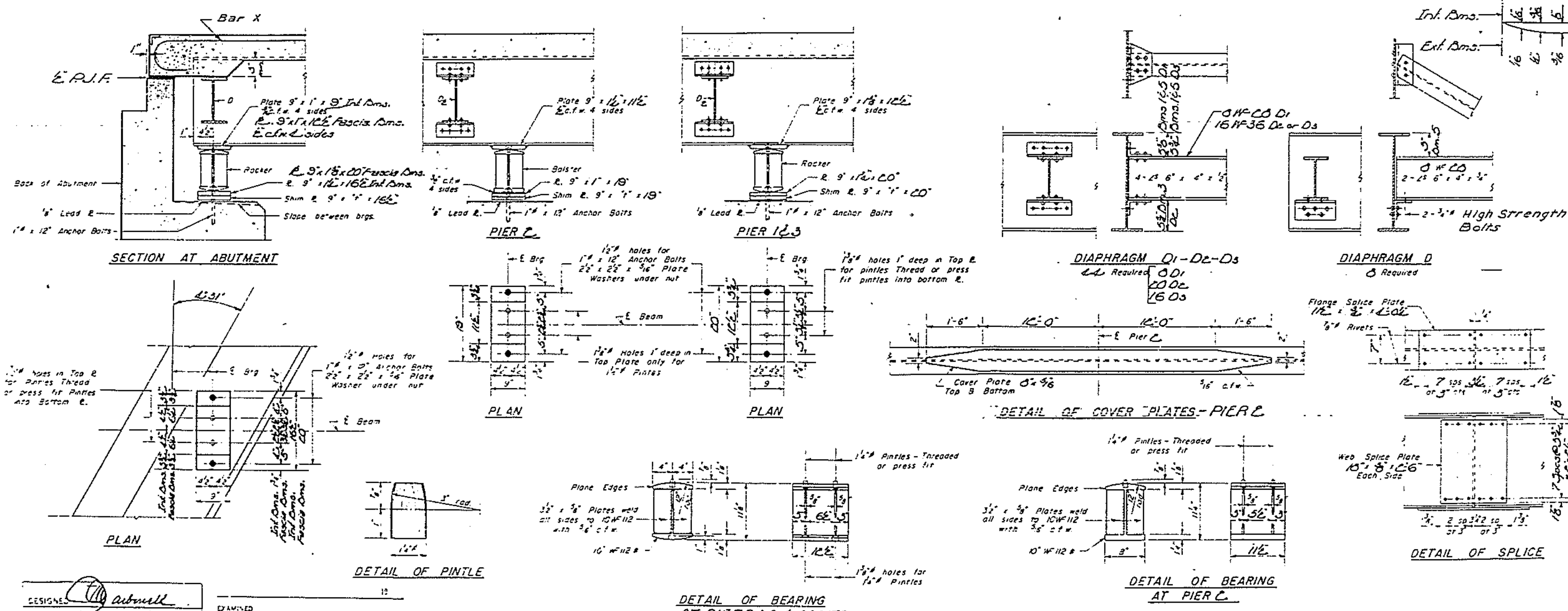


DETAILS OF HINGE

FOR INFORMATION ONLY



DEAD LOAD DEFLECTION DIAGRAM



SECTION AT ABUTMENT

PIER 2

PIER 1 & 3

DIAPHRAGM D1 - D2 - D3

DIAPHRAGM D

PLAN

PLAN

PLAN

DETAIL OF PINTLE

DETAIL OF COVER PLATES - PIER 2

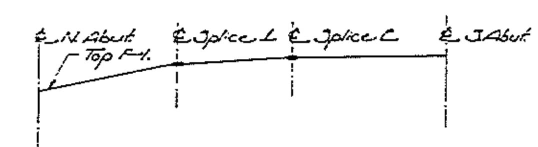
DETAIL OF BEARING AT PIERS 1, 3 & ABUTS.

DETAIL OF BEARING AT PIER 2

DETAIL OF SPLICE

ELEVATION TOP OF BEAMS

Location	Bm. 1	Bm. 2	Bm. 3	Bm. 4	Bm. 5
℄ Brg. N. Abt.	699.09	699.18	699.20	699.16	699.05
℄ Hinge	699.42	699.51	699.54	699.49	699.39
℄ Pier 1	699.59	699.65	699.71	699.67	699.56
℄ Splice 1	700.24	700.33	700.36	700.32	700.22
℄ Pier 2	700.39	700.48	700.51	700.47	700.37
℄ Splice 2	700.53	700.63	700.66	700.62	700.52
℄ Pier 3	700.76	700.86	700.89	700.85	700.75
℄ Hinge	700.82	700.92	700.95	700.92	700.82
℄ Brg. S. Abt.	700.95	701.05	701.09	701.05	700.95



ERECTION DIAGRAM

TABLE OF "T" DIMENSIONS

Location	Bm. 1	Bm. 2	Bm. 3	Bm. 4	Bm. 5
℄ Brg. N. Abt.	—	3/16"	2"	—	—
℄ Pier 1	—	3/16"	2"	—	—
℄ Pier 2	—	6"	2"	—	—
℄ Pier 3	—	5/16"	2"	—	—
℄ Brg. S. Abt.	—	—	7/16"	—	—

DESIGNED
CHECKED
DRAWN
CHECKED
EXAMINED
PASSED
APPROVED

STEEL LAYOUT & BEARING DETAILS
F.A.I. RT. 80 ~ SEC. 06-2-HB
BUREAU COUNTY
STA. 342+38.40

1-23-63 W.R. Added High Strength Bolts to end diaphragms; located ℄ Hinge, & revised Sec. @ Abut.

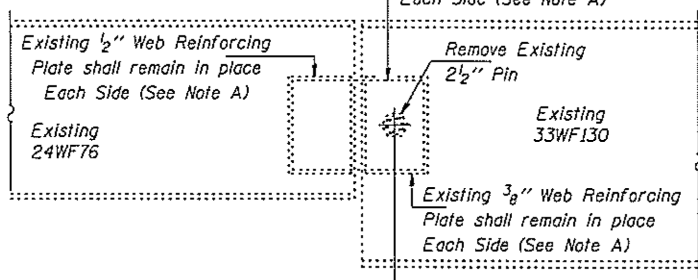
UNIT

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

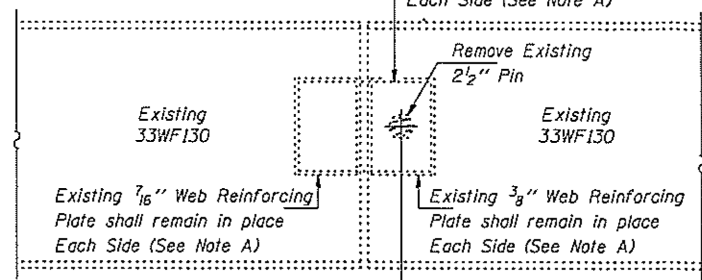
* D-2 BRIDGE PIN REPLACE 1997-1

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
FAI 80	*	BUREAU	26	18
FED. ROAD DIST. NO. 7		ILLINOIS FED. AID PROJECT-		

SHEET NO. 1
4 SHEETS

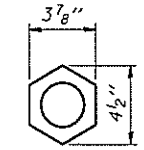


ELEVATION AT EXISTING PIN ASSEMBLY
FOR INTERIOR BEAMS

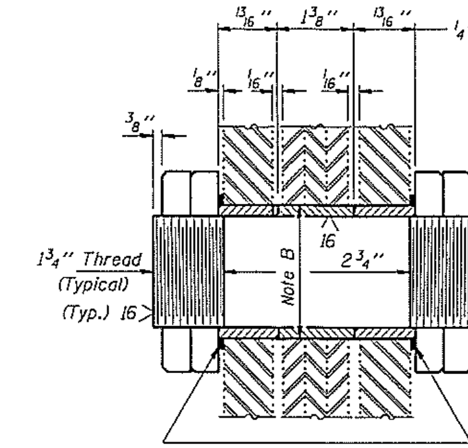


ELEVATION AT EXISTING PIN ASSEMBLY
FOR EXTERIOR BEAMS

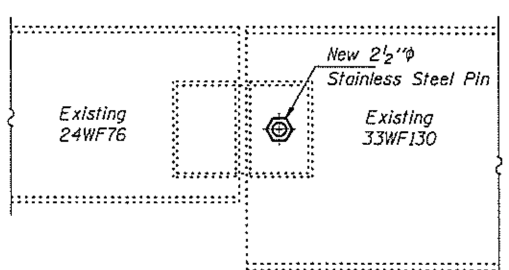
Any Pins that can be easily removed without damage to the pin shall be salvaged and the Bridge Engineer shall be contacted for disposition. Cost of salvage is included in "Pin Replacement".



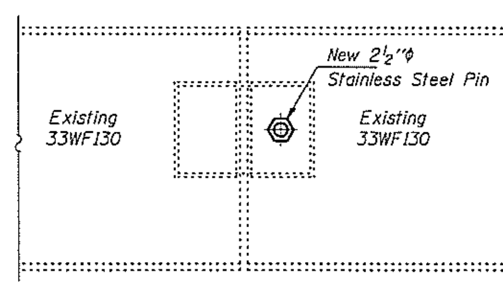
NUT DETAIL
(40 Required)



SECTION THRU PIN
(10 Required)



ELEVATION AT NEW PIN ASSEMBLY
FOR INTERIOR BEAMS



ELEVATION AT NEW PIN ASSEMBLY
FOR EXTERIOR BEAMS

Note A:
Existing welds shall be inspected for cracks using liquid dye penetrant or magnetic particle testing. Any cracks that are found shall be identified and reported to the Bureau of Bridges and Structures for further disposition. Clean and paint before installing new pins.

Note B:
Bore diameter for bushing in existing link plates, webs and web reinforcement plates shall correspond to bushing manufacturer's allowable tolerances for proper functioning. Hole diameter may be adjusted to allow use of stock bushings.

Note C:
Actual bushing thickness per manufacturer's specifications, 1/4" is approximate. Bushings shall be a self lubricating filament wound epoxy matrix backed Duralon Bearing, metal backed Fiber Glide Bearing or equivalent. No primer or grease shall be allowed on bushings. Bushings shall be suitable for dynamic loads of 20,000 psi.

Note D:
Tighten inside nuts to bring all bushings into firm contact, then back off 1/4 turn and tighten outer nuts.

Note E:
Place sealant around nuts after installation. Sealant shall be suitable for prolonged exterior exposure without losing flexibility or adhesion to painted steel surfaces. Proposed products shall be subject to Department's acceptance based on documented testing or other evidence.

GENERAL NOTES

All new structural steel shall conform to AASHTO Classification M-270 Gr. 36. unless otherwise noted.

The Contractor shall provide support and/or shoring systems for the beam in the area of existing pin replacement. See Special Provision "Temporary Support System."

The inorganic zinc rich primer/acrylic/acrylic paint system shall be used for shop and field painting of new structural steel except where otherwise noted. The color of the acrylic finish coat shall be Interstate Green, Munsell No. 7.5G 4/8. See Special Provisions "Cleaning and Painting New Metal Structures". Cost shall be included in the cost of "Pin Replacement".

Existing Structural steel shall be cleaned and painted as required by the Special Provision "Cleaning and Painting Adjacent Areas of Existing Steel Structures". Cost shall be included in the cost of "Pin Replacement."

Plan dimensions and details relative to existing structure have been taken from existing plans and are subject to nominal construction variations. It shall be the Contractor's responsibility to verify such dimensions and details in the field, except the pin diameters, and make necessary approved adjustments prior to construction or ordering of materials. Such variations shall not be cause for additional compensation for a change in the scope of the work, however, the Contractor will be paid for the quantity actually furnished at the unit price bid for the work.

The Pins shall conform to the minimum Charpy V-Notch Toughness of 25 ft.-lbs. at 40° F.

The pins, bushings, nuts and silicone sealant are the items included in "Pin Replacement".

TOTAL BILL OF MATERIAL

ITEM	UNIT	QUANTITY
Temporary Support System	Each	10
Pin Replacement	Each	10
Silicone Joint Sealer	Foot	68

MAXIMUM REACTIONS AT PIN

R℄	(K)	15.1
R℄	(K)	27.7
Imp.	(K)	8.3
R (Total)	(K)	51.1

DESIGNED	KPS
CHECKED	NJS
DRAWN	Paul Summer
CHECKED	KPS NJS

APRIL 29, 1997
EXAMINED Todd E. Ahrens
ENGINEER OF STRUCTURAL SERVICES
PASSED
ENGINEER OF BRIDGES AND STRUCTURES

PIN REPLACEMENT
FAS 188 SEC. 06-3HB-1
BUREAU COUNTY
STA. 745+74.52
STR. No. 006-0112

006-0112

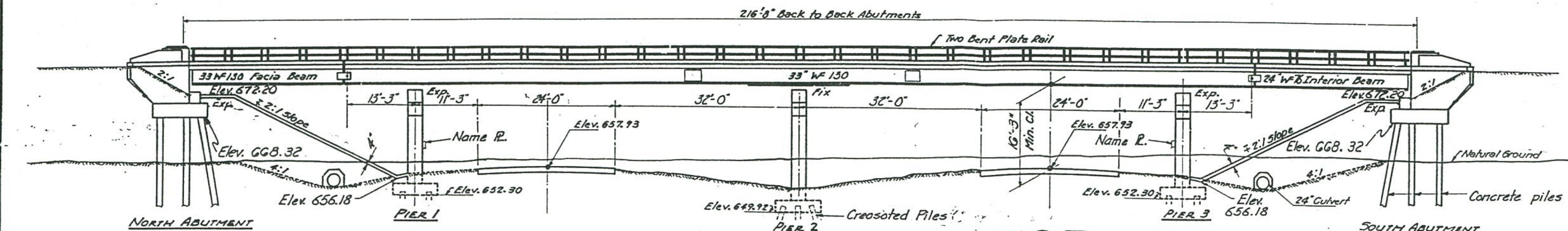
B. M.: Spike and washer in side of Telephone Pole 32' Lt. Sta. 241+90 F.A.I. 80-1 Elev. 660.31 (U.S.G.S. Datum)

No Existing Structure

STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS

Route No.	Section	County	Total Sheets	Sheet No.
		BUREAU	26	20
Fed. Road Dist. No. 7	Illinois	Fed. Aid Project I-80-2(7)50		

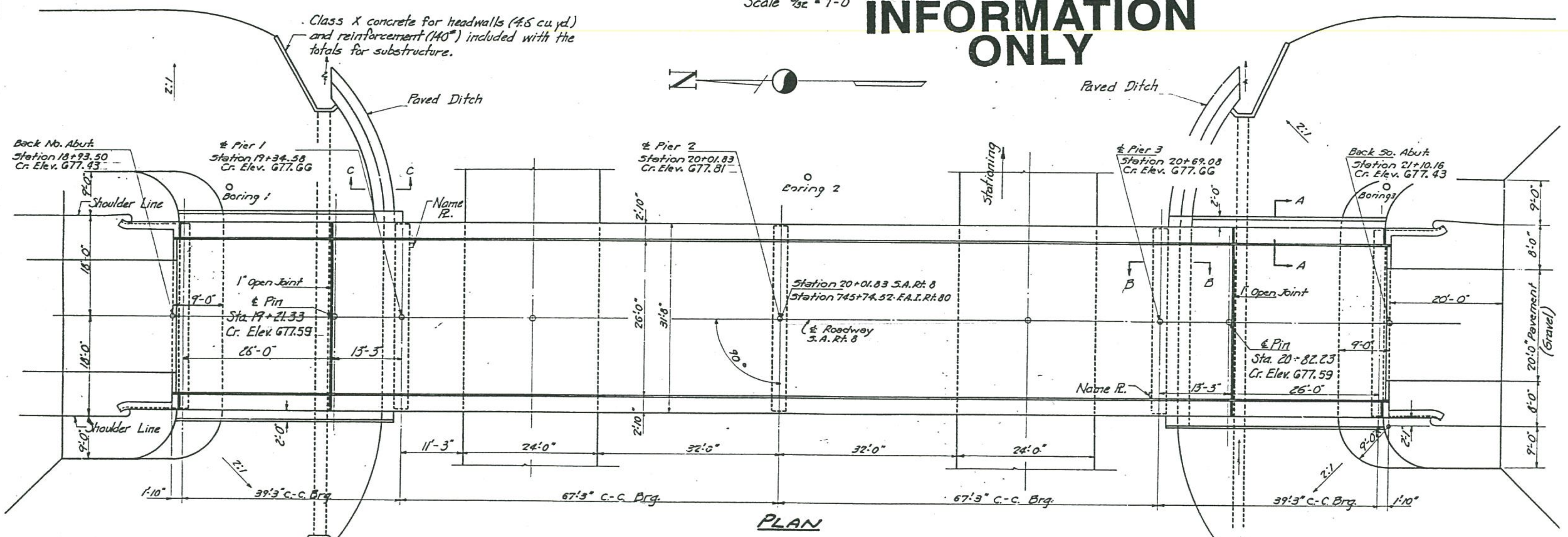
SHEET NO. 3
4 SHEETS



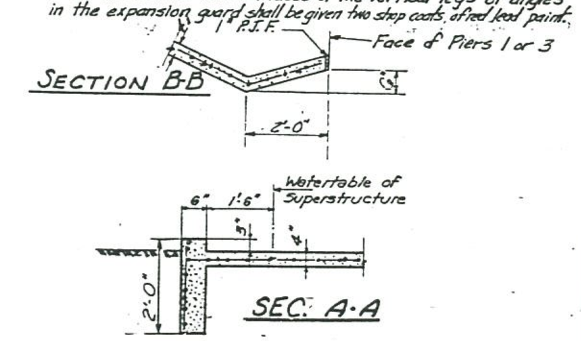
ELEVATION

Scale 1/32" = 1'-0"

FOR INFORMATION ONLY



PLAN



GENERAL NOTES

Class X Concrete shall be used throughout except in Handrail end Posts.

Handrail Concrete shall be used in Handrail end Posts.

The Concrete floor slab shall be finished in accordance with Art. 51.19 of the Standard Specifications.

Slope wall shall be reinforced with welded wire fabric 6"x6" mesh #4 wires, weighing 58# per 100 sq. ft.

All rockers, bearing plates, lead plates, pintles and anchor bolts shall be fabricated and set in accordance with Art. 51.15 of the standard specifications and are included in quantity of structural steel. Est. Wt. = 6740

Anchor Bolts shall be set before riveting diaphragms over supports.

Expansion Guards shall be fabricated and erected in accordance with Art. 51.13 (d) of the Standard Specifications.

Expansion Guards are included in quantity of Structural Steel. Est. Weight = 2260 #

Except as otherwise provided, all Structural Steel shall receive one shop coat of red lead paint and two field coats of aluminum paint. See Art. 56.1 to 56.5 inclusive of the Standard Specifications.

All paint shall be furnished and applied by the Contractor.

The Contractor shall drive two test piles as directed by the Engineer before ordering remainder of Piles. One timber test pile in the vicinity of Pier 1 and one concrete pile (in a permanent location) at South Abutment.

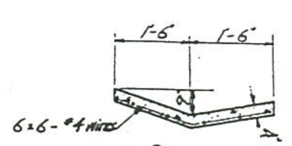
All Structural Steel shall conform to the A.S.T.M. Spec. A-36.

Rivets 3/4 ϕ, Open Holes 13/16" ϕ Unless noted.

Layout of paved ditch may be varied to suit ground conditions in the field, as directed by the Engineer. Quantity of paved ditch is included with slopewall.

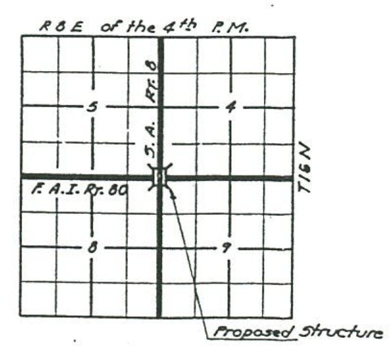
Abutment Piles shall be precored thru embankment in accordance with article 60.9(c) of the Standard Specifications.

All the outside vertical faces of the vertical legs of angles in the expansion guard shall be given two shop coats of red lead paint.

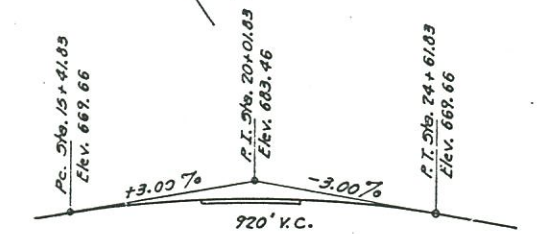


STATION 745+74.52
BUILT 19 BY
STATE OF ILLINOIS
F.A.I. RT. 80 - SEC. 06-3HB-1
PROJ. ~~I-80-1( )~~ I-80-2(7)50
LOADING H15-S12

Name Plate Lettering
See Std. 2113
For Location see Sheet 7 of 9



LOCATION SKETCH



GRADE PROFILE - S.A. RT. 8

-0.70%
Sta. 658.2 Elev. 661.95
Sta. 770 Elev. 640.95

GRADE PROFILE F.A.I. RT. 80

TOTAL BILL OF MATERIAL

Item	Unit	Super.	Substr.	Total
Class X Concrete	Cu. Yds.	188.5	204.3	392.8
Handrail Concrete	Cu. Yds.	2.3		2.3
Reinforcement Bars	Lbs.	31990	14530	46520
Structural Steel	Lbs.	163,070		163,070
Name Plates	Each		2	2
Metal Handrail	Lin. Ft.	430		430
Class A Excav. for Structures	Cu. Yds.		107	107
Slope Wall 4"	Sq. Yds.		440	440
Concrete Piles	Lin. Ft.		544	544
Test Piles (Concrete)	Each		1	1
Creosoted Piles	Lin. Ft.		630	630
Test Piles (Timber)	Each		1	1
Pipe Culvert Type 2-24"	Lin. Ft.			152

DESIGN STRESSES
fc 1400 #/□" Super & Sub.
vc 75 #/□" "
fs 20000 #/□" Reinf.
fs 18000 #/□" Struct.
n 10

Loading H15-S12-44

DESIGNED	J. M. Tjzowski
CHECKED	R. A. Pearson
DRAWN	J.R.S. Jr. M. Miller
CHECKED	R.D.P.

Sept. 22 1959

EXAMINED — Engineer of Bridge and Traffic Structures
PASSED — Engineer of Design
APPROVED — Chief Highway Engineer

GENERAL PLAN & ELEVATION

PROJ. I-80-2(7) 50
F.A.I. RT. 80 - SEC. 06-3HB-1
BUREAU COUNTY
STATION 745+74.52

Revised 8-27-63 H.P.G. Project Number Revised in Name Plate Lettering
Revised 1-3-61 J.M.J. Change Clearance from 15'-0" to 16'-3" Changed all Cr. Elev. and revised Total Bill of Material.

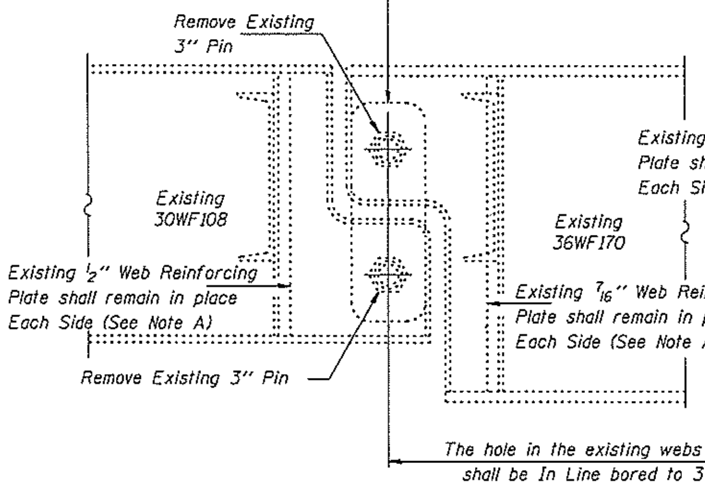
UNIT

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
FAI 80	-	BUREAU	26	6
FED. ROAD DIST. NO. 7	ILLINOIS	FED. AID PROJECT-		

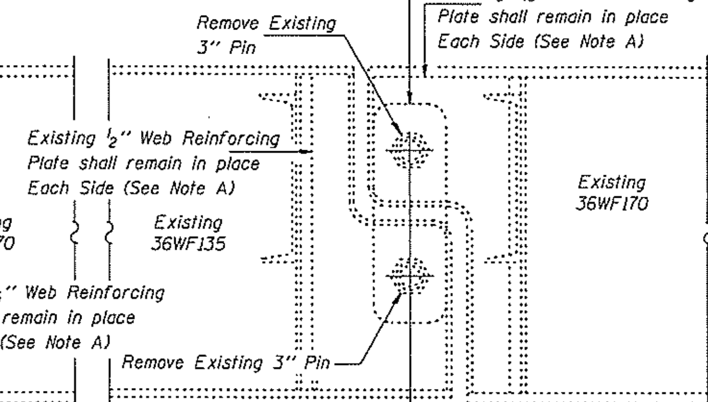
SHEET NO. 3
6 SHEETS

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

" D-2 BRIDGE PIN REPLACE 1997-1

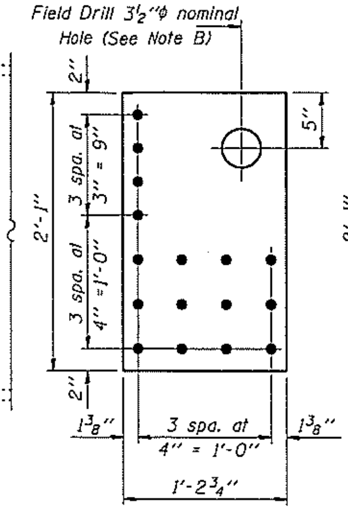


ELEVATION AT EXISTING PIN ASSEMBLY FOR INTERIOR BEAMS



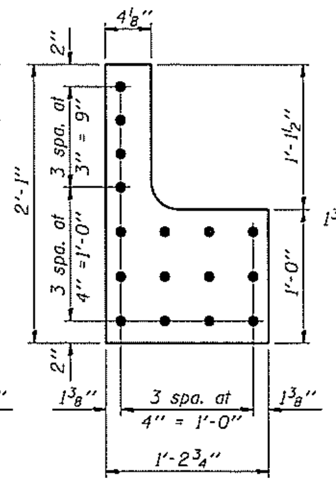
ELEVATION AT EXISTING PIN ASSEMBLY FOR EXTERIOR BEAMS

Any Pins that can be easily removed without damage to the pin shall be salvaged and the Bridge Engineer shall be contacted for disposition. Cost of salvage is included in "Pin and Link Plate Replacement".



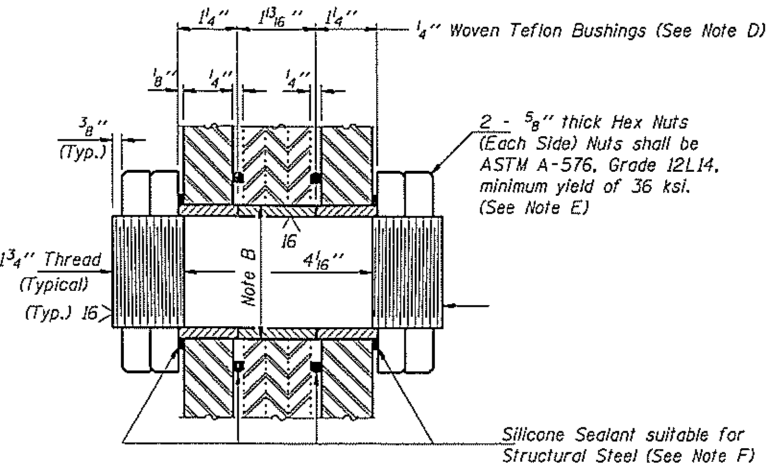
LINK PLATE DETAIL

(24 Required)



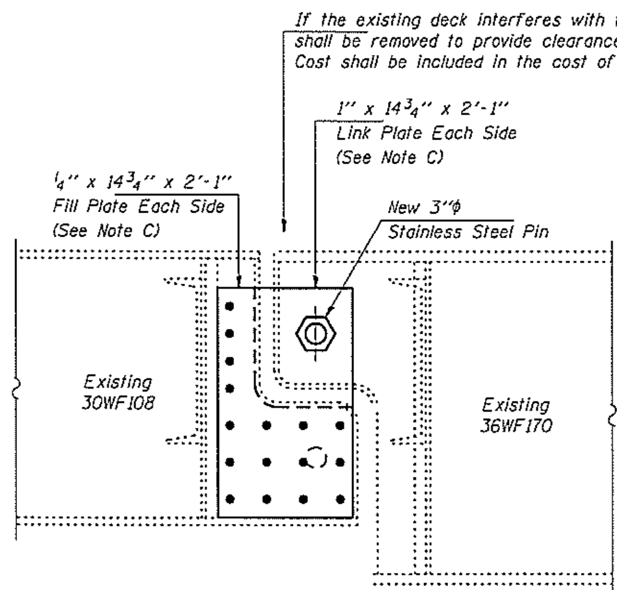
FILL PLATE DETAIL

(24 Required)

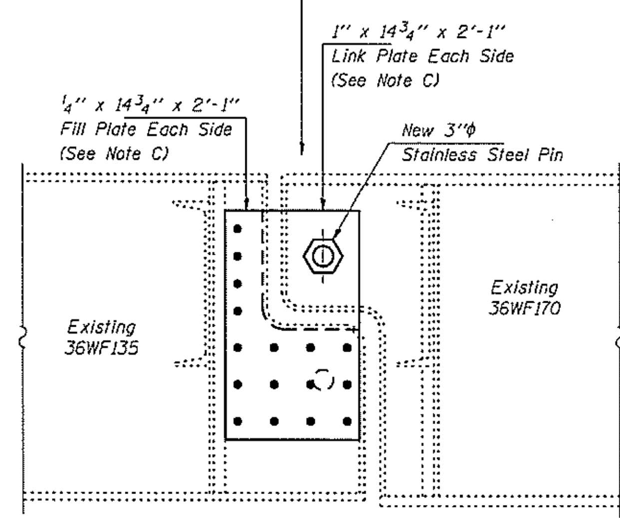


SECTION THRU PIN

(12 Required)



ELEVATION AT NEW PIN ASSEMBLY FOR INTERIOR BEAMS



ELEVATION AT NEW PIN ASSEMBLY FOR EXTERIOR BEAMS

Note A:
Existing welds shall be inspected for cracks using liquid dye penetrant or magnetic particle testing. Any cracks that are found shall be identified and reported to the Bureau of Bridges and Structures for further disposition. Clean and paint before installing new link plates.

Note B:
Bore diameter for bushing in link plate, existing webs and web reinforcement plates shall correspond to bushing manufacturer's allowable tolerances for proper functioning. Hole diameter may be adjusted to allow use of stock bushings.

Note C:
Inside face of new link plates shall receive first field coat in shop. The primer shall pass the M.E.K. Rub Test before the first field coat is applied.

Note D:
Actual bushing thickness per manufacturer's specifications, $\frac{1}{4}$" is approximate. Bushings shall be a self lubricating filament wound epoxy matrix backed Duralon Bearing, metal backed Fiber Glide Bearing or equivalent. No primer or grease shall be allowed on bushings. Bushings shall be suitable for dynamic loads of 20,000 psi.

Note E:
Tighten inside nuts to bring all bushings into firm contact, then back off $\frac{1}{4}$ turn and tighten outer nuts.

Note F:
Apply $\frac{3}{8}$" bead to face of the web reinforcing plates approximately $\frac{1}{2}$" from bushing immediately before installing new link plates. Place sealant around nuts after installation. Sealant shall be suitable for prolonged exterior exposure without losing flexibility or adhesion to painted steel surfaces. Proposed products shall be subject to Department's acceptance based on documented testing or other evidence.

GENERAL NOTES

All new structural steel shall conform to AASHTO Classification M-270 Gr. 36, unless otherwise noted.

All new fasteners shall be high strength bolts. Holes shall be subpunched or subdrilled $\frac{11}{16}$"φ and reamed in the field to $\frac{13}{16}$"φ for $\frac{3}{4}$"φ high strength bolts unless otherwise noted after structural steel sections are properly fitted into position.

The Contractor shall provide support and/or shoring systems for the beam in the area of existing pin and link plate replacement. See Special Provisions for "Temporary Support System."

The inorganic zinc rich primer/acrylic/acrylic paint system shall be used for shop and field painting of new structural steel except where otherwise noted. The color of the acrylic finish coat shall be Interstate Green, Munsell No. 7.5G 4/8. See Special Provisions "Cleaning and Painting New Metal Structures". Cost shall be included in the cost of "Pin and Link Plate Replacement".

Existing Structural steel shall be cleaned and painted as required by the Special Provision "Cleaning and Painting Adjacent Areas of Existing Steel Structures". Cost shall be included in the cost of "Pin and Link Plate Replacement."

All existing steel surfaces behind link plates shall be cleaned and primed before installation of new link plates. Cost shall be included in the cost of "Pin and Link Plate Replacement."

Plan dimensions and details relative to existing structure have been taken from existing plans and are subject to nominal construction variations. It shall be the Contractor's responsibility to verify such dimensions and details in the field, except the pin diameters, and make necessary approved adjustments prior to construction or ordering of materials. Such variations shall not be cause for additional compensation for a change in the scope of the work, however, the Contractor will be paid for the quantity actually furnished at the unit price bid for the work.

The Pins and Link Plates shall conform to the minimum Charpy V-Notch Toughness of 25 ft.-lbs. at 40° F.

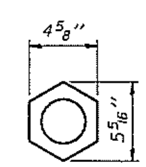
The pins, link plates, fill plates, bushings, nuts, silicone sealant and high strength bolts are the items included in "Pin and Link Plate Replacement".

BILL OF MATERIAL

ITEM	UNIT	QUANTITY
Temporary Support System	Each	12
Pin and Link Plate Replacement	Each	12

MAXIMUM REACTIONS AT PIN

R D.L.	(K)	22.0
R L.L.	(K)	31.9
Imp.	(K)	9.6
R (Total)	(K)	63.4



NUT DETAIL

(48 Required)

DESIGNED	KPS
CHECKED	NJS
DRAWN	Paul Summer
CHECKED	KPS NJS

APRIL 29, 1997

EXAMINED Todd E. Ahrens
ENGINEER OF STRUCTURAL SERVICES

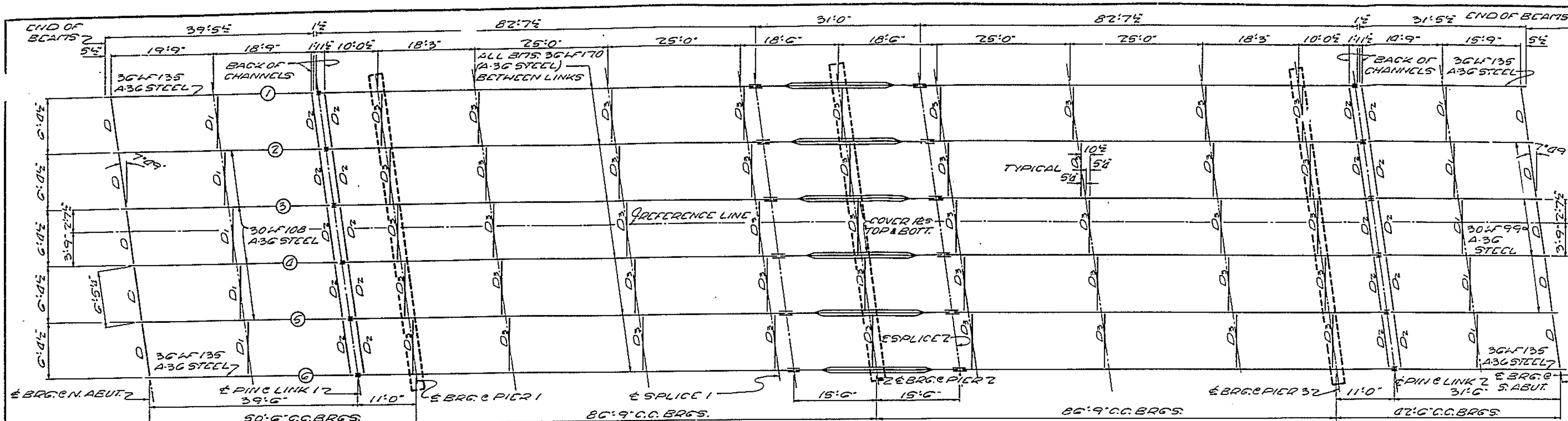
PASSED
ENGINEER OF BRIDGES AND STRUCTURES

PIN AND LINK PLATE REPLACEMENT
F.A.I. RT. 80 SEC. 06-2HB-1
BUREAU COUNTY
STA. 475+09.54
STR. No. 006-0089

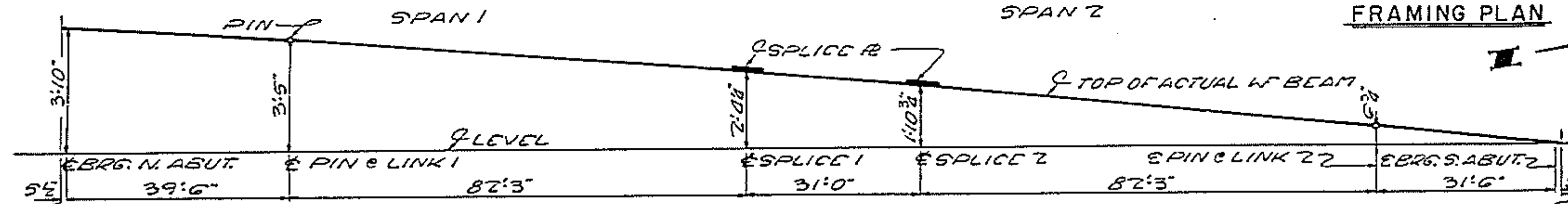
006-0089

BUREAU

BRIDGE SHEET 5 OF 6

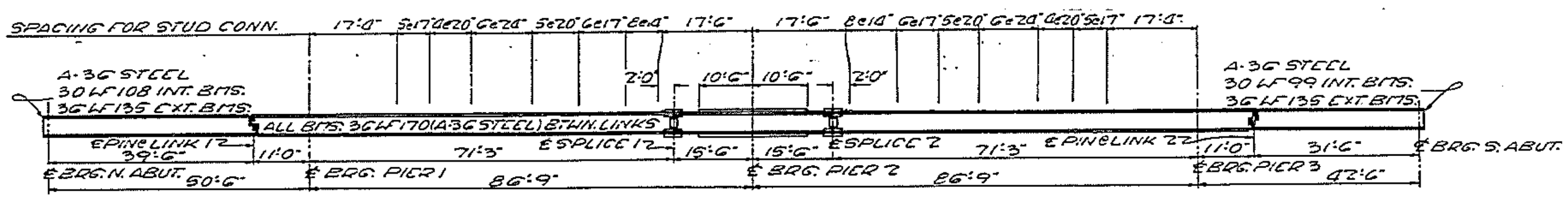


FRAMING PLAN



PROFILE OF BEAMS

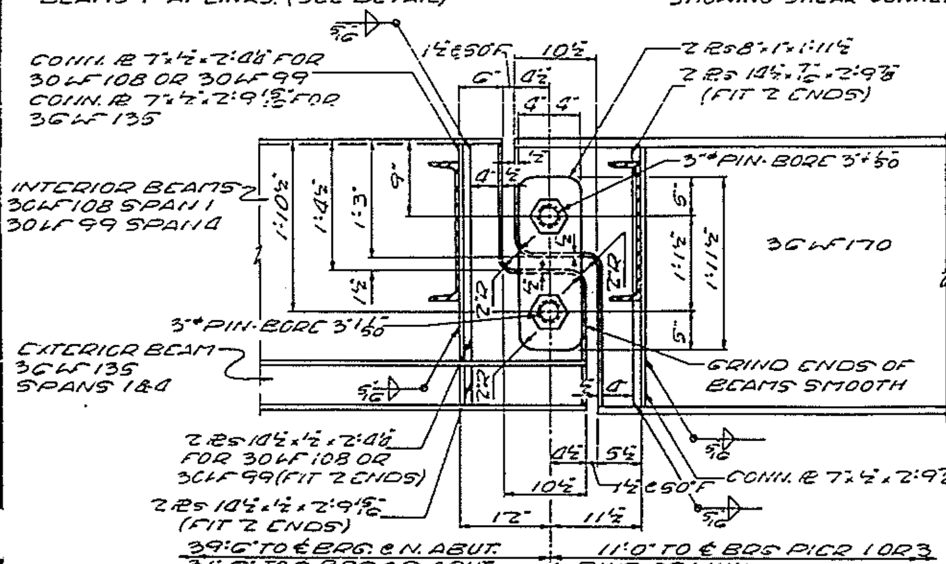
FOR INFORMATION ONLY



BEAM ELEVATION

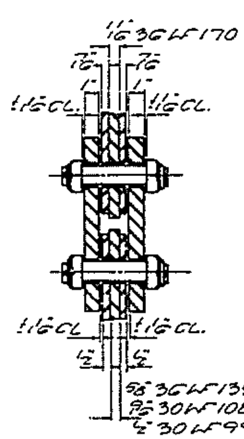
SHOWING SHEAR CONNECTOR SPACING

NOTE: COPE TOP FLANGE OF ALL BEAMS 1" AT LINKS. (SEE DETAIL)



LINK DETAIL

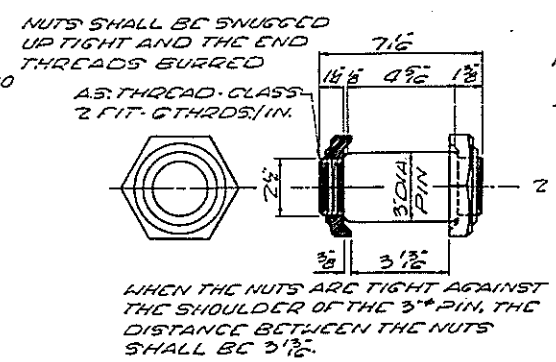
NOTE: USE SAME DETAIL FOR ALL BEAMS EXCEPT FOR LENGTH OF PIN PLATES IN CONNECTION OF BEAMS TOWARDS ABUTMENTS



SECTION THRU LINK

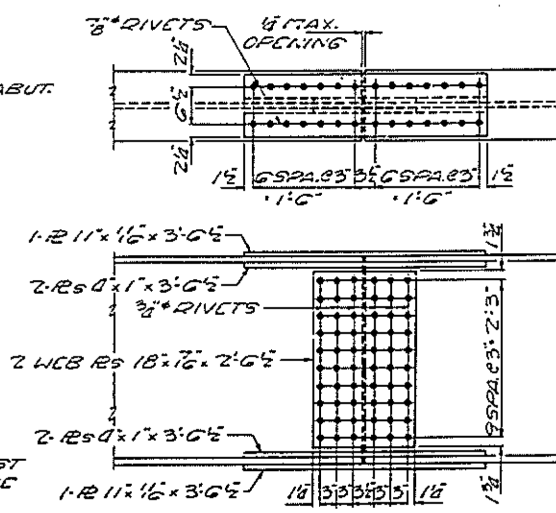
COPING DETAIL AT LINKS

(TOP FLANGE ONLY)

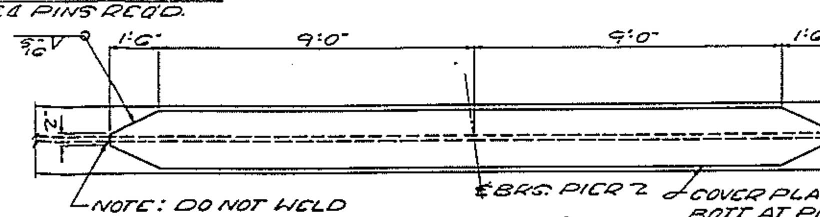


PIN NUT & PIN DETAIL

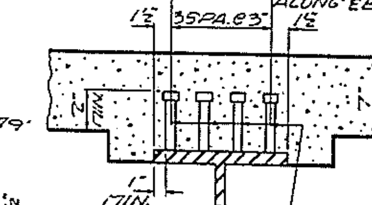
24 PINS REQD.



SPLICE DETAIL



COVER PLATE DETAIL



STUD CONNECTOR DETAILS

QUANTITY OF STRUCTURAL STEEL INCLUDES 1650 LBS. FOR SHEAR CONNECTORS.

BASED ON THE WEIGHT OF STUDS AT THE RATE OF 98 LBS PER 100 STUDS.

GENERAL NOTES

ALL BEAMS 1 THRU 6, ALL SPLICE COMPONENTS, AND ALL COVER PLATES SHALL BE OF A-36 STEEL.

ALL ROCKERS, BOLSTERS, BEARING PLATES, PINTLES, AND ANCHOR BOLTS SHALL BE FABRICATED AND SET IN ACCORDANCE WITH ARTICLE 51.15 OF THE STANDARD SPECIFICATIONS AND ARE INCLUDED IN QUANTITY OF STRUCTURAL STEEL EST. 9,210 LBS.

ANCHOR BOLTS SHALL BE SET BEFORE RIVETING DIAPHRAGMS OVER PIERS AND ABUTMENTS.

ALL RIVETS 3/4" OPEN HOLES 13/16" UNLESS OTHERWISE NOTED. ALL WF BEAM SPLICES SHALL BE SUBPUNCHED, REAMED AND MATCH-MARKED. SUBPUNCH 11/16" AND REAM TO PROPER SIZE.

ALL WF BEAMS SHALL BE SHOP ASSEMBLED TO THEIR PROPER GRADE AND ALIGNMENT WITH OR WITHOUT DIAPHRAGMS, INSPECTED AND REAMED WHILE SO ASSEMBLED.

EXCEPT AS OTHERWISE PROVIDED FOR, ALL STRUCTURAL STEEL SHALL RECEIVE ONE SHOP COAT OF RED LEAD PAINT AND TWO FIELD COATS OF ALUM. PAINT. ALL PAINT SHALL BE FURNISHED AND APPLIED BY THE CONTRACTOR INVOLVED. STRUCTURAL STEEL SHALL BE INSPECTED BY ILLINOIS DIVISION OF HIGHWAYS BEFORE PAINTING.

* ELEVATION TOP OF WF BEAMS

LOCATION	BM. 1	BM. 2	BM. 3	BM. 4	BM. 5	BM. 6
℄ BRG. N. ABUT.	663.69	663.55	663.41	663.27	663.13	662.99
℄ PIN @ LINK 1	663.27	663.13	662.99	662.85	662.71	662.57
℄ BRG. PIER 1	663.13	662.99	662.85	662.71	662.57	662.43
℄ SPLICE 1	662.21	662.07	662.93	662.79	662.65	662.51
℄ BRG. PIER 2	661.98	661.84	661.70	661.56	661.42	661.28
℄ SPLICE 2	661.75	661.61	661.47	661.33	661.19	661.05
℄ BRG. PIER 3	660.60	660.46	660.32	660.18	660.04	659.90
℄ PIN @ LINK 2	660.42	660.28	660.14	660.00	659.86	659.72
℄ BRG. S. ABUT.	659.86	659.72	659.58	659.44	659.30	659.16

* ELEVATIONS REFER TO TOP OF TOP FLANGES OF ACTUAL ROLLED BEAMS. DOES NOT INCLUDE SPLICE PLS OR COVER PLS. THESE ELEVATIONS ARE THEORETICAL AND ARE TO BE USED FOR FABRICATION OF STRUCTURAL STEEL AND DO NOT INCLUDE ANY ALLOWANCE FOR DEFLECTION.

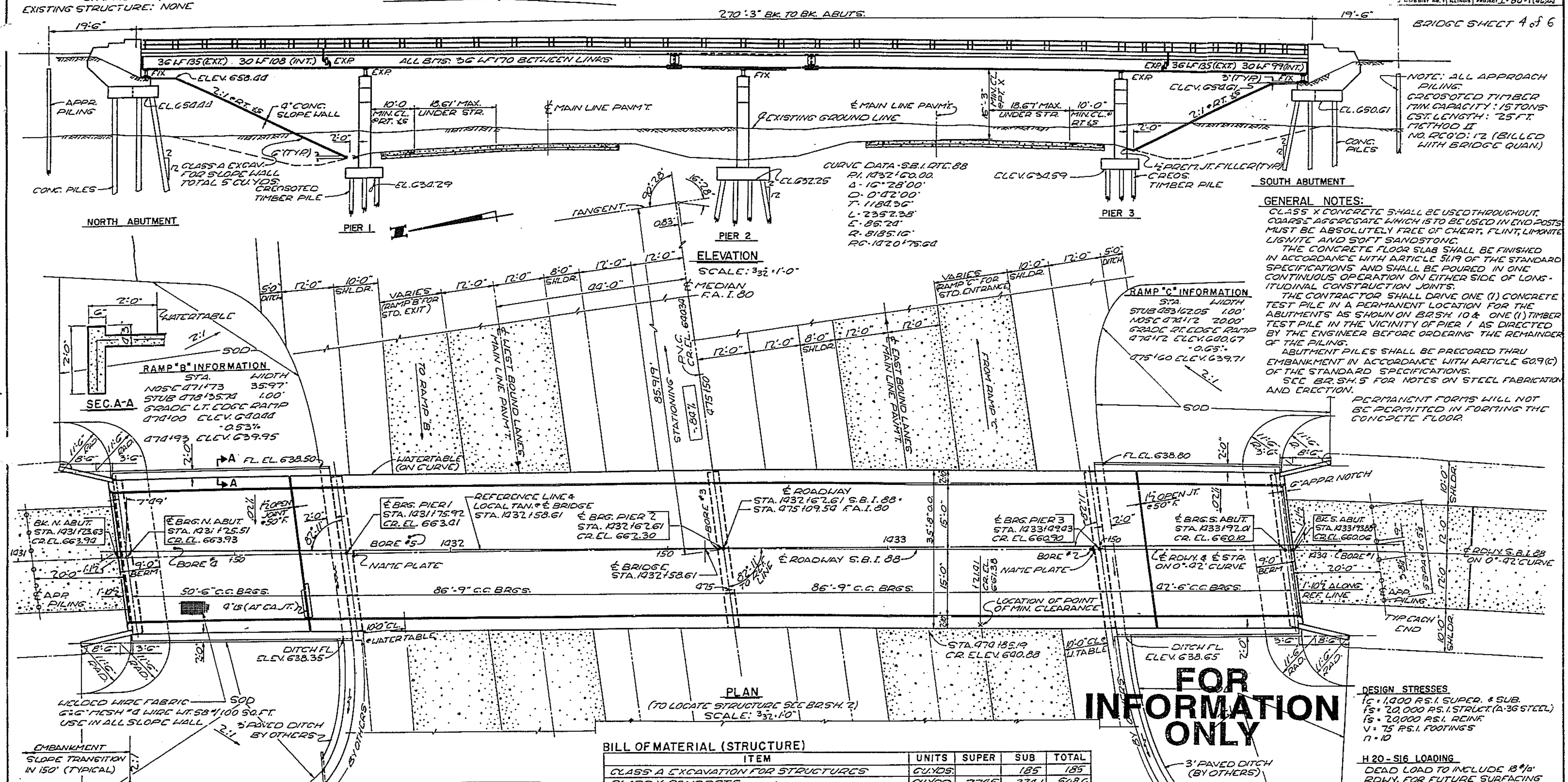
STEEL FRAMING PLAN & DETAILS
F.A.I. RTE. 80 SEC. 06-2HB-1
S.B.I. RTE. 88 OVER F.A.I. RTE. 80
BUREAU COUNTY, ILL.
STA. 475+09.54 F.A.I. 80

		COUNTY	TOTAL SHEETS	SHEET NO.
		BUREAU		
	ILLINOIS	PROJECT I-80-1(46)45		

BRIDGE SHEET 4 of 6

B.M. #37 ~ CHISELED "□" ON CONC. HEADWALL 280' LT. STA. 475+20 (F.A.I. 80) ELEV. 647.80 (U.S.G.S. DATUM)

EXISTING STRUCTURE: NONE



GENERAL NOTES:

CLASS X CONCRETE SHALL BE USED THROUGHOUT. COARSE AGGREGATE WHICH IS TO BE USED IN END POSTS MUST BE ABSOLUTELY FREE OF CHERT, FLINT, LIMONITE, LIGNITE AND SOFT SANDSTONE.

THE CONCRETE FLOOR SLAB SHALL BE FINISHED IN ACCORDANCE WITH ARTICLE 51.19 OF THE STANDARD SPECIFICATIONS AND SHALL BE POURED IN ONE CONTINUOUS OPERATION ON EITHER SIDE OF LONGITUDINAL CONSTRUCTION JOINTS.

THE CONTRACTOR SHALL DRIVE ONE (1) CONCRETE TEST PILE IN A PERMANENT LOCATION FOR THE ABUTMENTS AS SHOWN ON BR. SH. 10 & ONE (1) TIMBER TEST PILE IN THE VICINITY OF PIER 1 AS DIRECTED BY THE ENGINEER BEFORE ORDERING THE REMAINDER OF THE PILING.

ABUTMENT PILES SHALL BE PRECORED THRU EMBANKMENT IN ACCORDANCE WITH ARTICLE 60.9(C) OF THE STANDARD SPECIFICATIONS.

SEE BR. SH. 5 FOR NOTES ON STEEL FABRICATION AND ERECTION.

PERMANENT FORMS WILL NOT BE PERMITTED IN FORMING THE CONCRETE FLOOR.

FOR INFORMATION ONLY

DESIGN STRESSES

f'c = 1,400 P.S.I. SUPER. & SUB.
fs = 20,000 P.S.I. STRUCT. (A-36 STEEL)
fs = 20,000 P.S.I. REINF.
V = 75 P.S.I. FOOTINGS
n = 10

H 20 - S16 LOADING

DEAD LOAD TO INCLUDE 18#/□' RDWY. FOR FUTURE SURFACING

BILL OF MATERIAL (STRUCTURE)

ITEM	UNITS	SUPER	SUB	TOTAL
CLASS A EXCAVATION FOR STRUCTURES	CU. YDS.		185	185
CLASS X CONCRETE	CU. YDS.	274.5	274.1	548.6
ERECTING STRUCTURAL STEEL	LBS.	304,840		304,840
FURNISHING AND ERECTING METAL HANDRAIL.	LIN. FT.	536		536
REINFORCEMENT BARS	LBS.	63,550	28,390	91,940
FURNISHING CREOSOTED PILES 20.1 TO 38 FT.	LIN. FT.		1,854	1,854
TEST PILE TIMBER	EACH		1	1
DRIVING TIMBER PILES	LIN. FT.		1,854	1,854
PROTECTIVE COAT	SQ. YDS.	1,330		1,330
DRIVING CONCRETE PILES	LIN. FT.		1,000	1,000
FURNISHING CONCRETE PILES	LIN. FT.		1,000	1,000
TEST PILE CONCRETE	EACH		1	1
NAME PLATES	EACH		2	2
SLOPE WALL - 4 INCH	SQ. YD.		479	479

STA. 475+09.54
BUILT 196_ BY
STATE OF ILLINOIS
F.A.I. RT. 80 - SEC. 06-2 HB-1
F.A. PROJ. I-80-1(46)
LOADING H20-S-16

LETTERING FOR NAMEPLATE
SEE STD. 2113

DESIGNED BY: T.D. GAZDA
CHECKED BY: J. DUNLAP
DRAWN BY: F.H. & R.R.

GENERAL PLAN & ELEVATION
F.A.I. RTE. 80 - SEC. 06-2 HB-1
PROJECT I-80-1(46)45
S.B.I. RTE. 88 OVER F.A.I. RTE. 80
BUREAU COUNTY, ILLINOIS
STA. 475+09.54 F.A.I. 80

10-31-61

PLANS PREPARED BY ROBERT HOFMANN & ASSOCIATES, CONSULTING ENGINEERS, DIXON, ILLINOIS

Massachusetts Department of Transportation

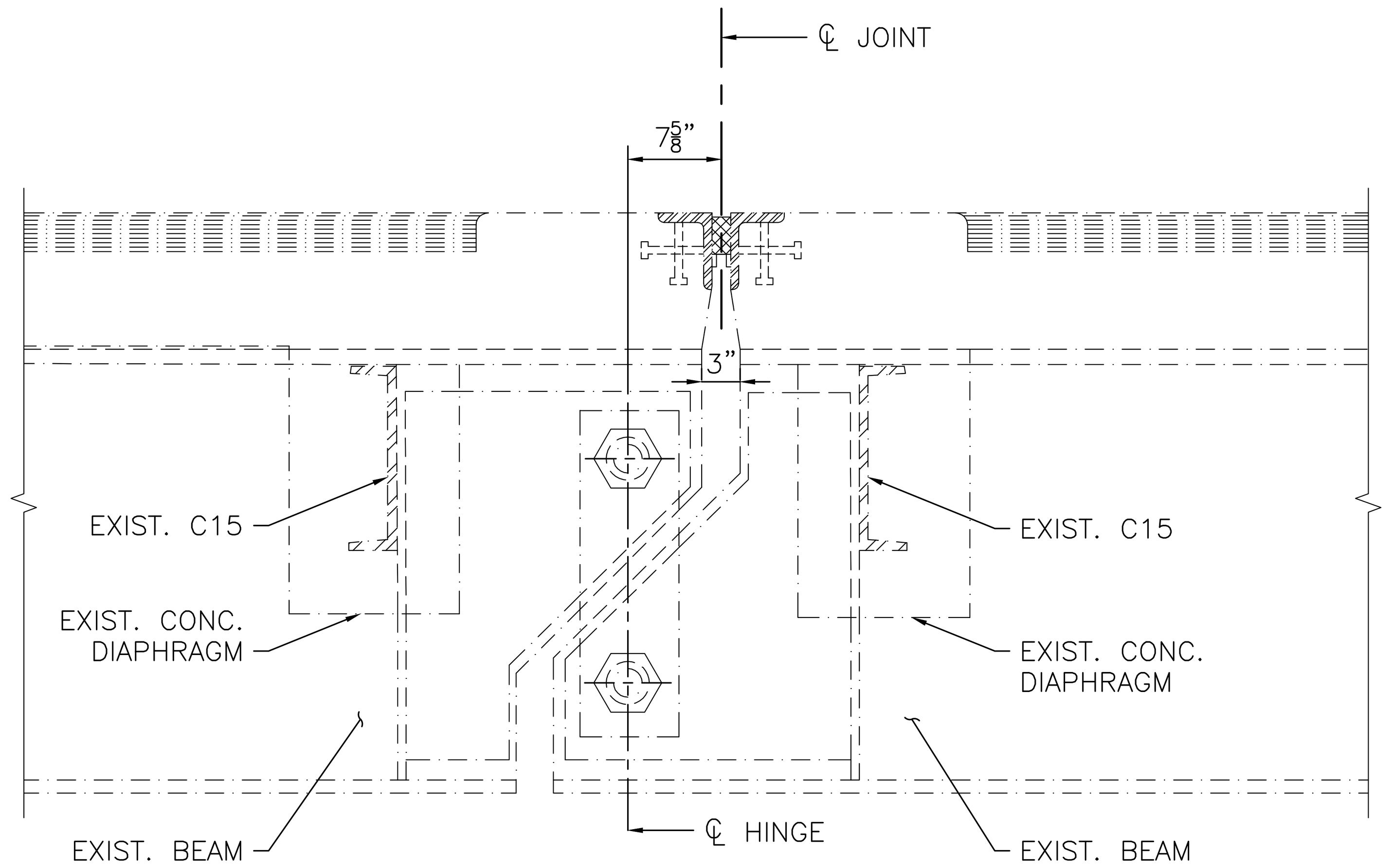
Design drawings – ship lap joint assembly.

SPRINGFIELD
I-91 NB/SB

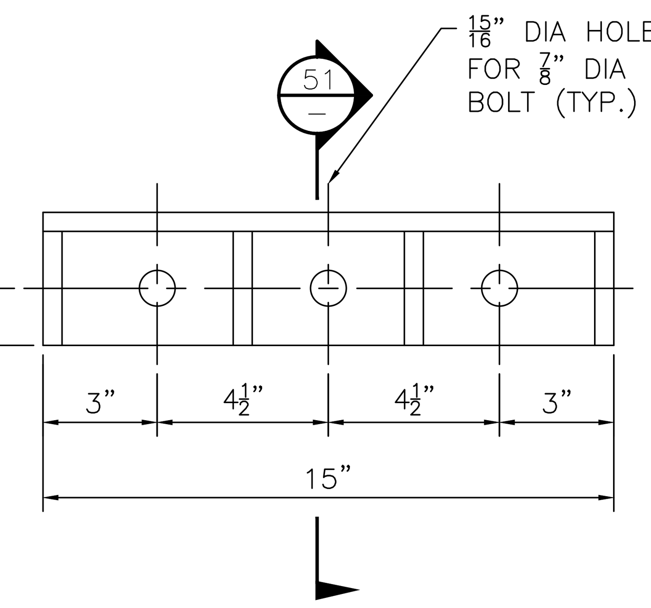
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	NHP-091-1(173)	381	505

PROJECT FILE NO. 607731

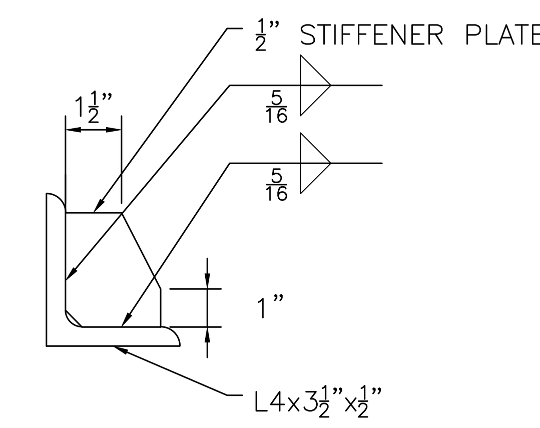
PIN AND HANGER DETAILS I



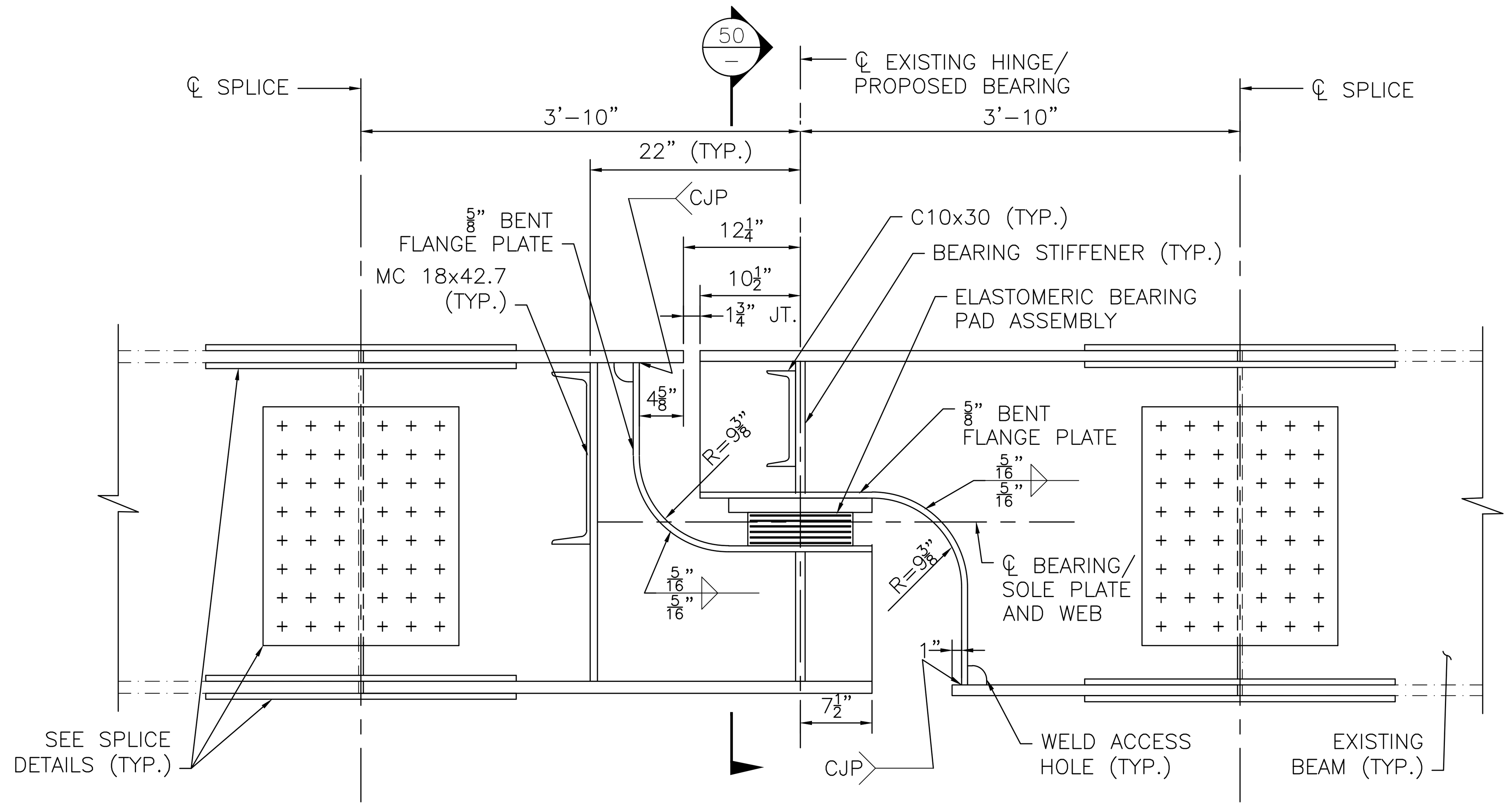
PIN AND HANGER – EXISTING CONDITION
SCALE: 1" = 1'-0"



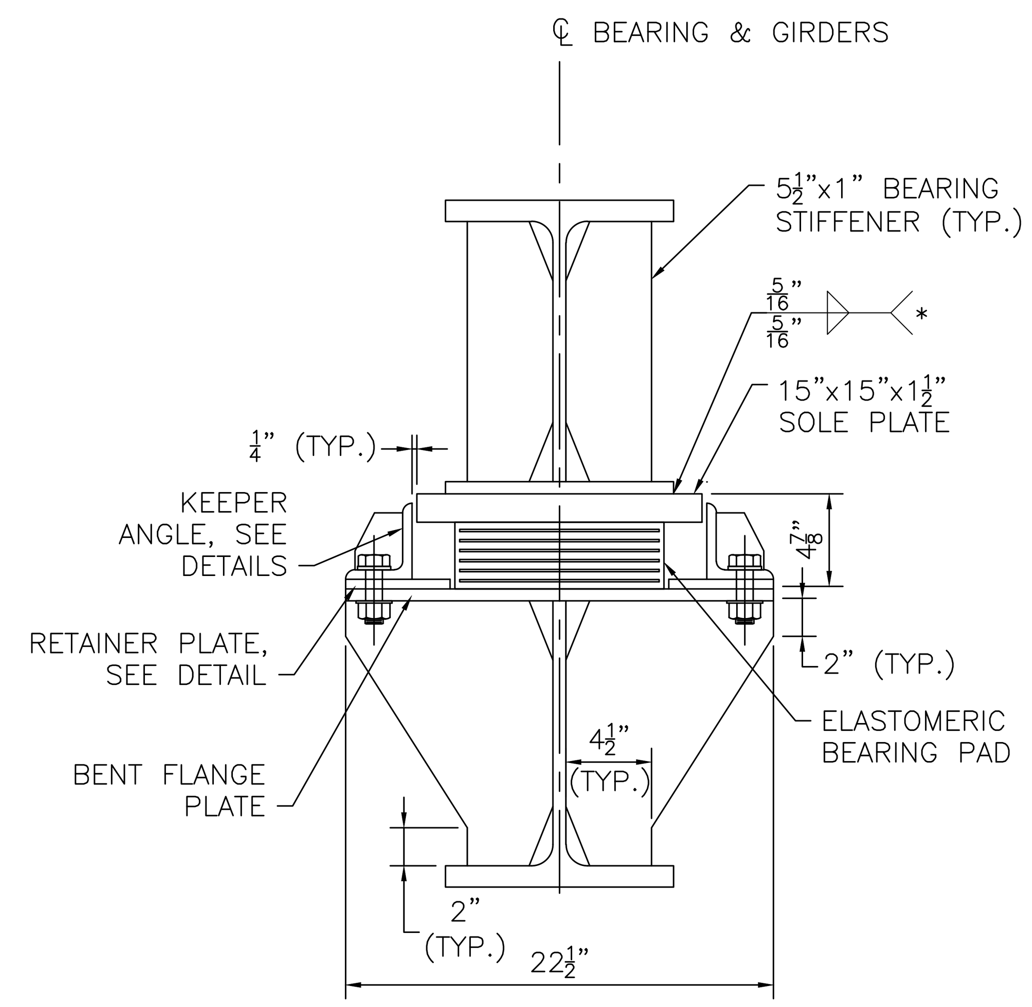
KEEPER ANGLE DETAIL
SCALE: 3" = 1'-0"



SECTION 51
SCALE: 3" = 1'-0"

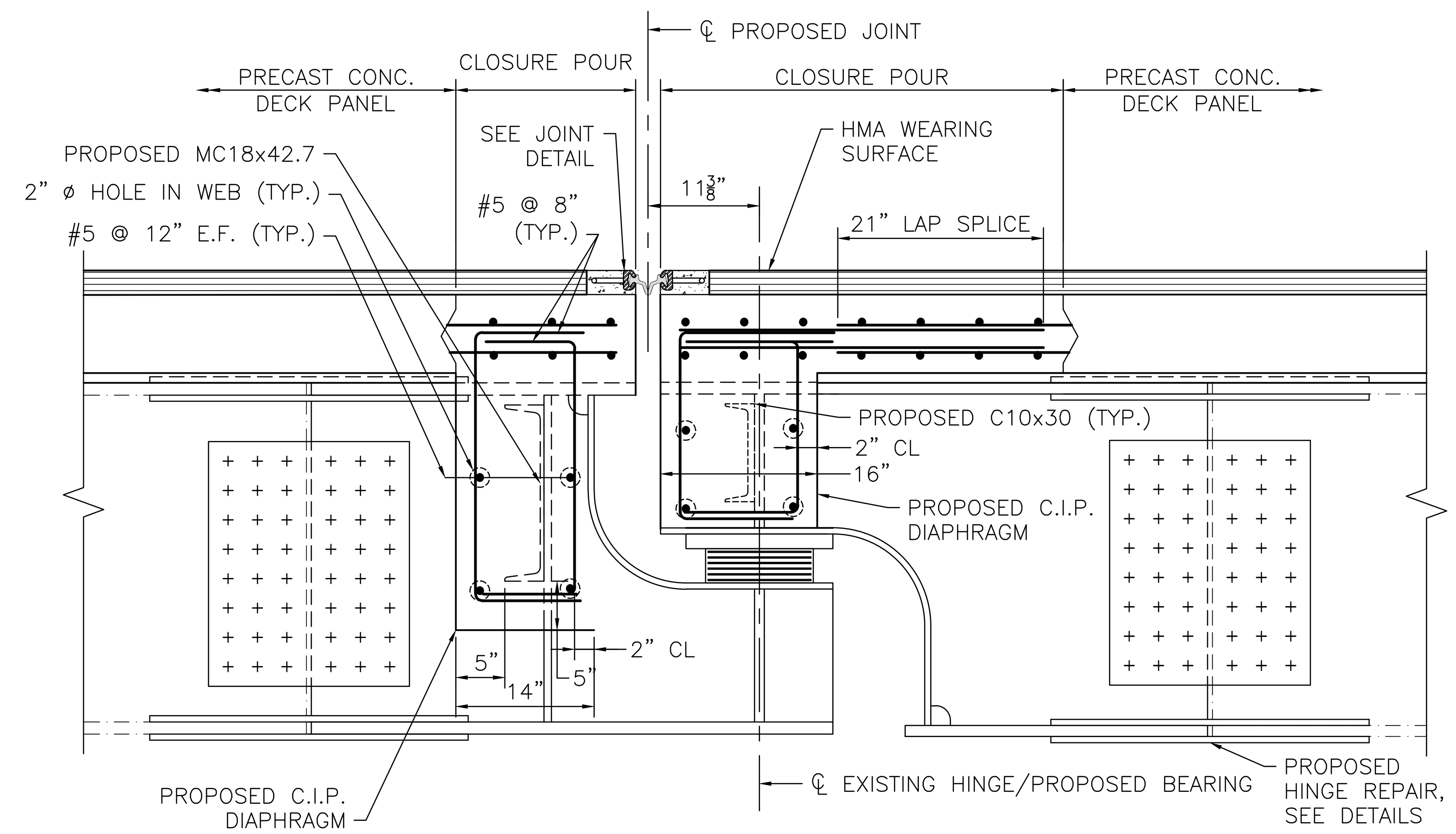


PIN AND HANGER – PROPOSED REPAIR
SCALE: 1" = 1'-0"
NOTE: RETAINER PLATE AND KEEPER ANGLE NOT SHOWN FOR CLARITY.

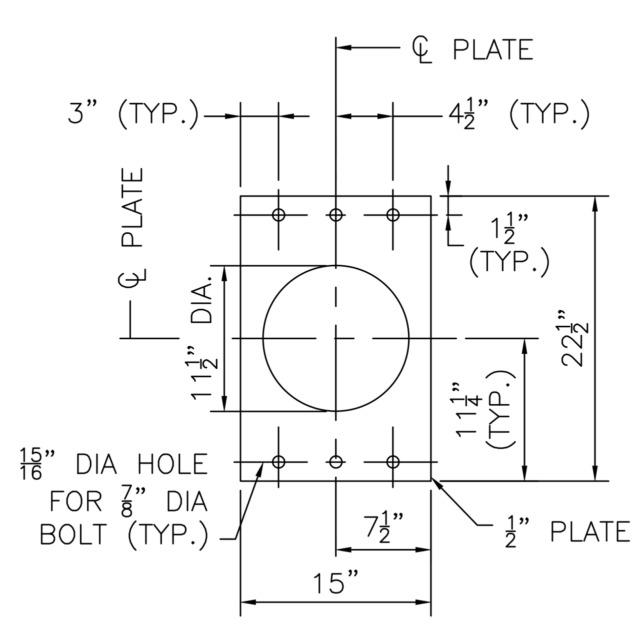


(*) – WELDS SHALL TERMINATE ¼" FROM EDGE OF PLATE.

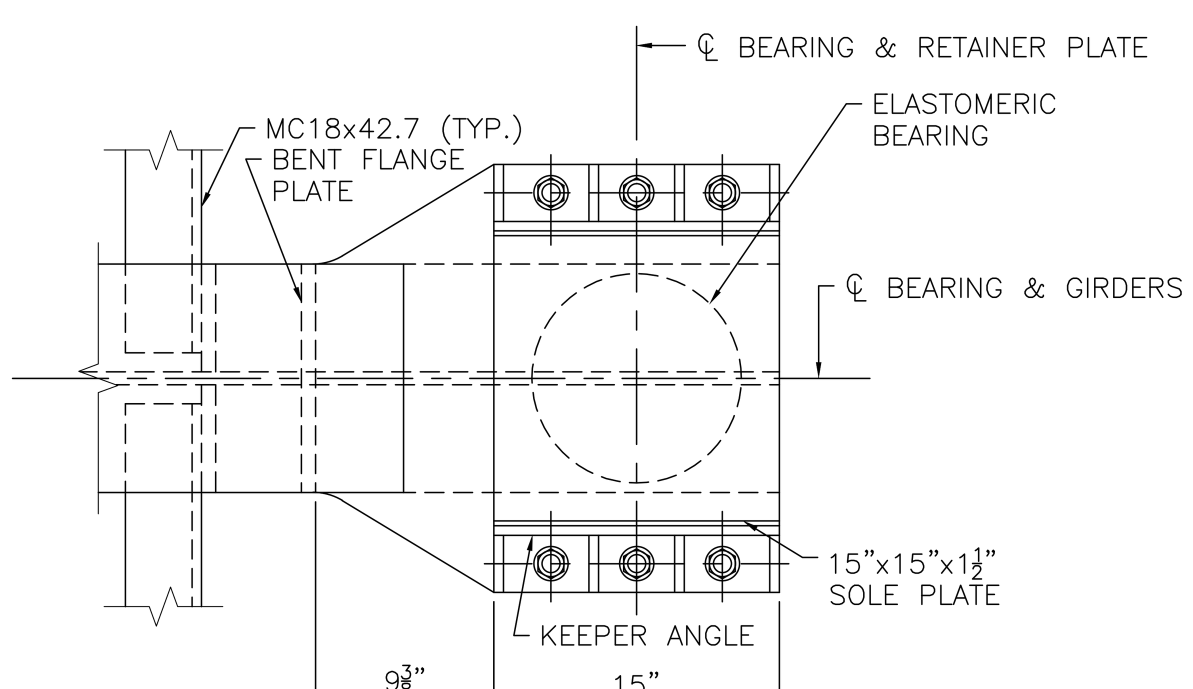
SECTION 50
SCALE: 1½" = 1'-0"



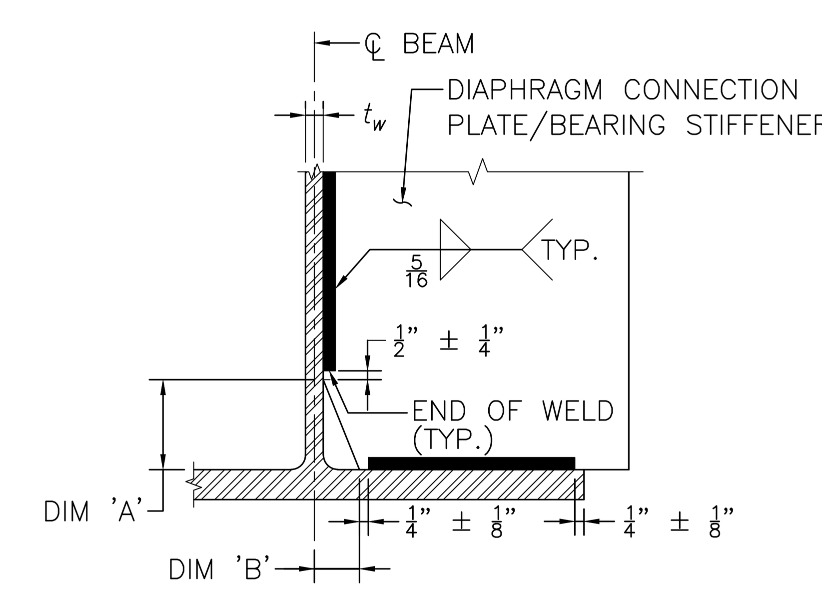
PROPOSED DECK SECTION BETWEEN STRINGERS
SCALE: 1" = 1'-0"
NOTE: RETAINER PLATE AND KEEPER ANGLE NOT SHOWN FOR CLARITY.



RETAINER PLATE DETAIL
SCALE: 1" = 1'-0"



PLAN – RETAINER PLATE DETAIL
SCALE: 1½" = 1'-0"
NOTE: UPPER PIN AND HANGER ASSEMBLY NOT SHOWN FOR CLARITY.



CLIP DETAIL
NOT TO SCALE

CLIP DIMENSIONS		
BEAM SIZE	DIM 'A'	DIM 'B'
W36X135	3.00	0.12
W36X150	3.13	0.13
W36X160	3.25	1.30
W36X170	3.40	1.36
W36X182	3.65	1.46
W36X194	3.80	1.52
W36X230	3.80	1.52

*
10J
10K
10L

DATE	DESCRIPTION
SEPT 20, 2014	ISSUED FOR CONSTRUCTION

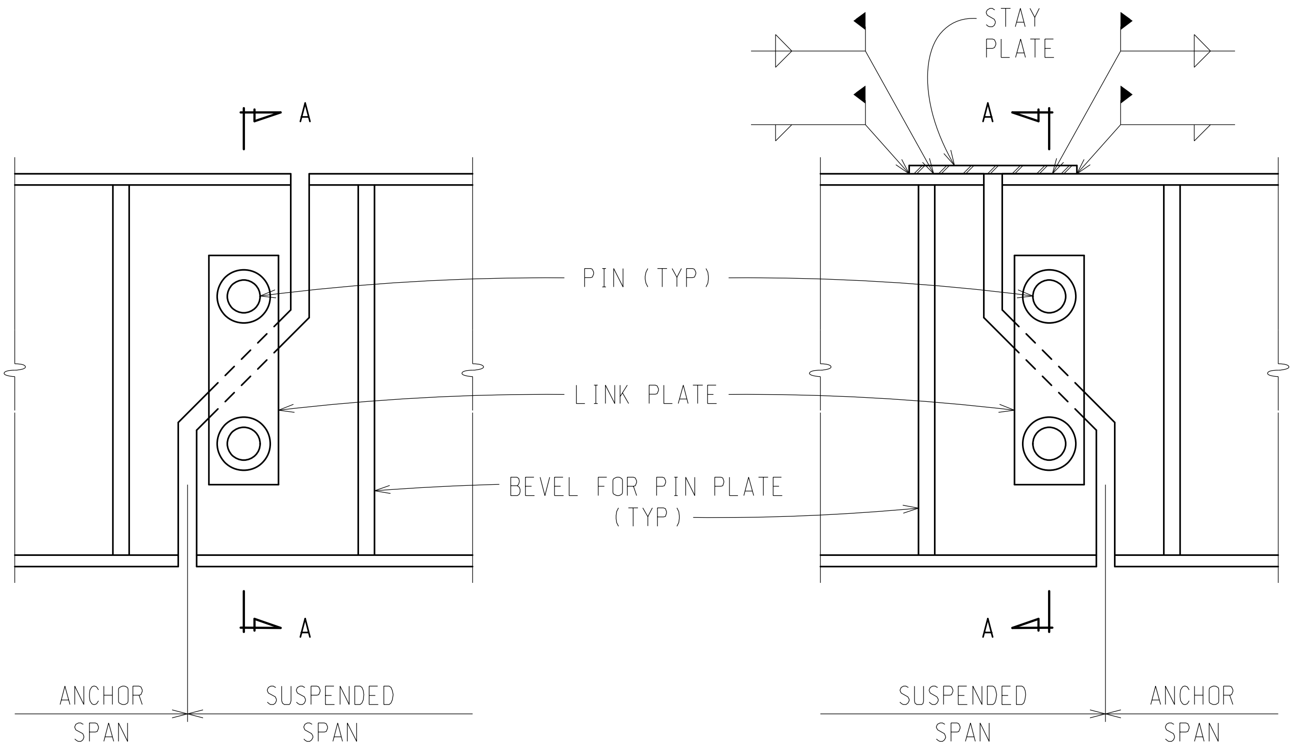
USE ONLY PRINTS OF LATEST DATE

SHEET 89 OF 208 SHEETS BRIDGE NO. S-24-061 (*)

Michigan Department of Transportation

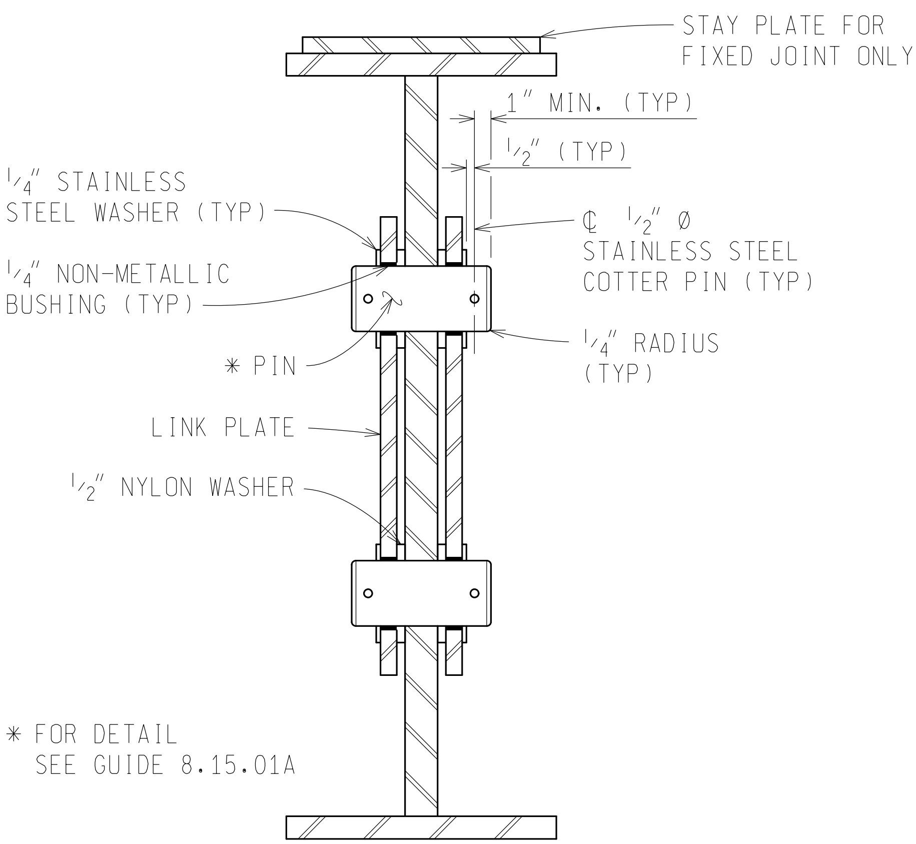
Design drawings - Pin and hanger assembly replacement.

DRAWN BY: BLT CHECKED BY: VZ APPROVED BY: DAJ	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAY DEVELOPMENT **SUSPENDER DETAILS FOR CANTILEVERED PLATE GIRDERS**	ISSUED: 06/25/12 SUPERSEDES: 05/04/06



ELEVATION
EXPANSION JOINT

ELEVATION
FIXED JOINT

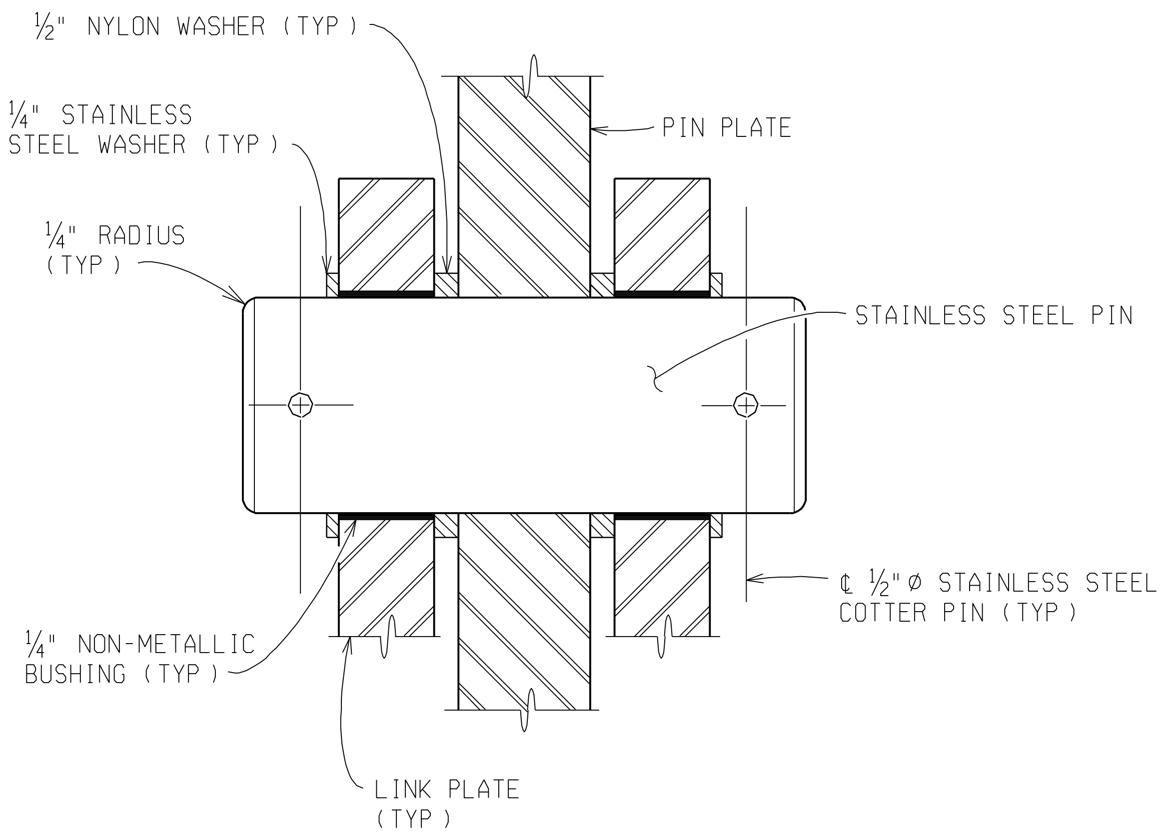


* FOR DETAIL SEE GUIDE 8.15.01A

SECTION A-A

PREPARED BY DESIGN DIVISION	8.15.01

DRAWN BY: BLT CHECKED BY: VZ APPROVED BY:	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAY DEVELOPMENT PIN DETAIL	ISSUED: 05/04/06 SUPERSEDES: 11/27/01

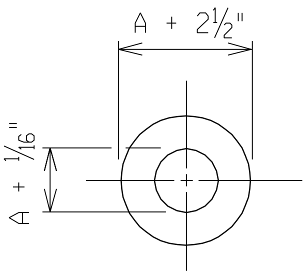


PIN DETAIL

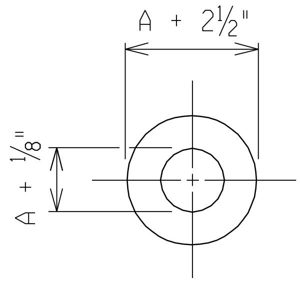
NOTE:
SEE GUIDE 8.16.02 FOR WASHER DETAILS.

PREPARED BY DESIGN SUPPORT AREA | 8.15.01A

DRAWN BY: BLT CHECKED BY: VZ APPROVED BY:	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAY DEVELOPMENT SUSPENDER DETAILS FOR ROLLED BEAMS	ISSUED: 05/04/06 SUPERSEDES: 11/27/01

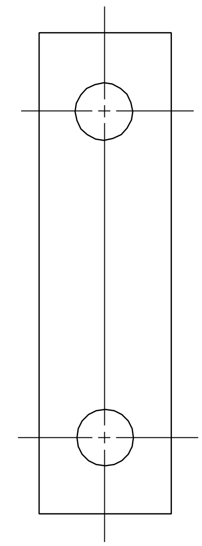


¼" STAINLESS STEEL WASHER

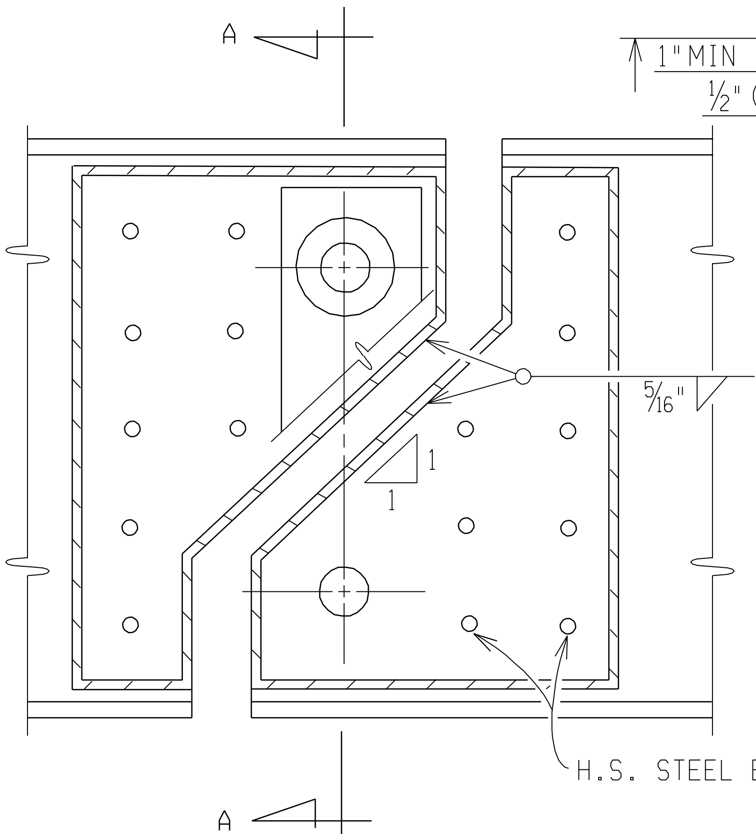


½" NYLON WASHER

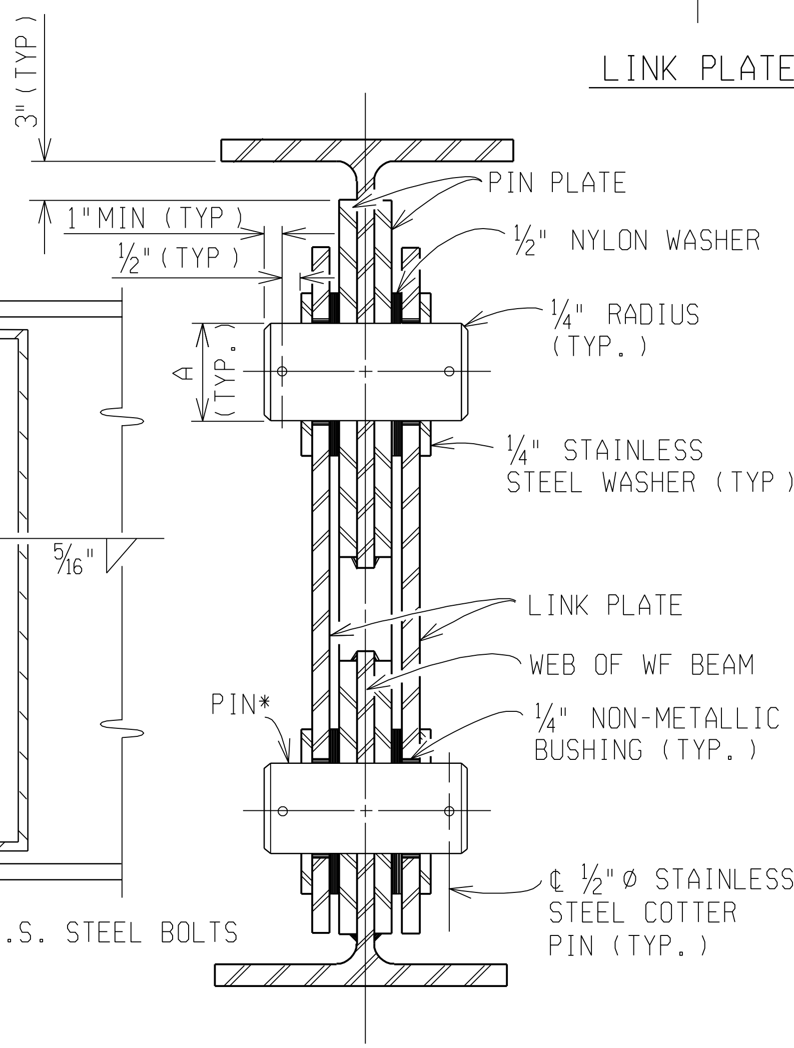
INCLUDED IN THE BID ITEM "STRUCTURAL STEEL, ______, FURN AND FAB."



LINK PLATE



WELDED PIN PLATES



SECTION A-A

*FOR DETAIL SEE 8.15.01A

NOTE:
SPACING OF THE H.S. STEEL BOLTS SHALL BE ACCORDING TO THE CURRENT AASHTO SPECIFICATIONS.

PREPARED BY DESIGN SUPPORT AREA

Oklahoma Department of Transportation

Design drawings - catcher beam system.

FED. ROAD DIST. NO	PROJECT NO.	SHEET NO.	TOTAL SHEETS
6		1	

REVISIONS	
DESCRIPTION	DATE
⚠1 ADDED SHEETS	11-16-89
⚠2 ADDED SHEET	1-29-90

R.E.M.

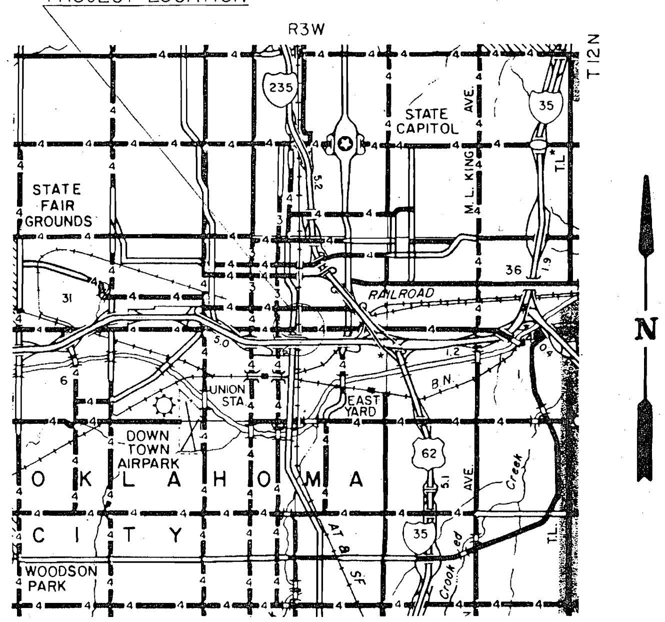
STATE OF OKLAHOMA
DEPARTMENT OF TRANSPORTATION

PLAN OF PROPOSED
STATE HIGHWAY

STATE AID PROJECT NO.
E-SAP-55(595)
FEDERAL HIGHWAY NO.
I-40

NBIS 550690805
STATE JOB NO. 11246(05)
CONTROL SECTION NO. 55-69

OKLAHOMA COUNTY



INDEX OF SHEETS

THE FOLLOWING STANDARDS ARE REQUIRED FOR THIS PROJECT

T.C.D.-1-8
T.C.D.-3-3
T.C.D.-6-4
T.C.D.-8-5
T.C.D.-10-4

DESIGN DATA

ADT 198 -
ADT 200 -
DHV -
D -
T(% OF ADT) -
V -

SCALES 1"

PLAN 1" -
PROFILE HOR. 1" -
VER. 1" -
LAYOUT MAP 1" -

CONVENTIONAL SYMBOLS

PROPOSED ROADS
RAILROADS
RANGE & TOWNSHIP
SECTION LINES
QUARTER SECTION LINES
FENCES
GROUND LINE
EXISTING ROADS
BASE LINE
GRADE LINES
TELEPHONE & TELEGRAPH
POWER LINES
OIL WELLS
BUILDINGS
DRAINAGE STRUCTURES-IN PLACE
DRAINAGE STRUCTURES-NEW
PRES. R/W RIGHT-OF-WAY LINES-EXISTING
R/W RIGHT-OF-WAY LINES-NEW
RIGHT-OF-WAY MARKERS-IN PLACE
RIGHT-OF-WAY MARKERS-REMOVE & RESET
RIGHT-OF-WAY MARKERS-NEW
CONTROLLED ACCESS
RIGHT-OF-WAY FENCE

1988 OKLAHOMA STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION GOVERN APPROVED BY THE DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION JANUARY 3, 1989.
SPECIAL PROVISIONS GOVERN OVER STANDARD SPECIFICATIONS.

PROJECT ENGINEER- W. PETERS
SQUAD SUPERVISOR- R. MCGUIRE
SQUAD MEMBERS-

CHECKED BY-

P.E. NO. 11246(01)

PE/BOSS-PETERS/MCGUIRE

REPAIR & MODIFY EXPANSION PIERS

ROADWAY LENGTH___ 0.000 FT.___0.000 MI.
BRIDGE LENGTH____ 0.000 FT.___0.000 MI.
PROJECT LENGTH______________ 0.000 MI.

EQUATIONS: NONE
EXCEPTIONS: NONE

OKLAHOMA DEPARTMENT OF TRANSPORTATION	DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION
DATE APPROVED	DATE APPROVED
BY	BY
CHIEF ENGINEER	DIVISION ADMINISTRATOR

S. W. O. PROJECT NO. E-SAP-55(595) SHEET NO. 1

GENERAL NOTES

SPECIFICATIONS:
All construction and materials shall be in accordance with the 1988 Oklahoma Standard Specifications for Highway Construction and Special Provisions. (See Proposal for Special Provisions).

ANCHOR BOLTS:
a) Material: Anchor bolts shall be either hot rolled continuously threaded bars conforming to AISI 4140 or deformed reinforcing bars of sufficient size to produce threads of the UNC series for bolt size called for on the Plans. Minimum sizes of reinforcing bars, if used, shall be as follows: 1" Bolt - #9 Bar, 1 1/4" Bolt - #11 Bar, 1 1/2" Bolt - #14 Bar.
All anchor bolts, nuts, and washers shall be galvanized in accordance with AASHTO M232.
b) Installation: Anchor bolts may be preset at the time the concrete is poured.
If the Contractor elects to place the anchor bolts after the concrete is poured, the setting of the anchor bolts shall be in accordance with the following procedure:
Holes of sufficient depth shall be preset at all anchor bolt locations. The material used to form holes shall not be oiled or greased and must be removed before the placing of the anchor bolts. Diameter of holes shall be 1 1/2" larger than the anchor bolts. Anchor bolts shall be set in melted sulphur or an approved pourable embedding material before bearing assemblies are set in place. The use of non-shrink grout for embedding anchor bolts will not be permitted.
c) Sizing: The minimum requirement for anchor bolt size and length (Fixed or Expansion Bearing) is:
Spans 50 feet in length and less: 1" dia. bolt - set 10" into concrete.
Spans over 50 feet to 100 feet in length: 1 1/4" dia. bolt - set 12" minimum into concrete.
Spans over 100 feet to 150 feet in length: 1 1/2" dia. bolt - set 15" minimum into concrete.
Anchor Bolt holes shall be drilled with a rotary type drill. Care shall be taken to avoid cutting existing reinforcing steel.

CLASS AA CONCRETE
A high range water reducer shall be used in all "Class AA Concrete" required for this project in accordance with Section 701.03 of the Specifications.

VERIFICATION OF EXISTING CONDITIONS:
All dimensions of the existing bridge components shown on the Plans are approximate. The Contractor shall verify all dimensions necessary to connect the new material and shall be solely responsible for the accuracy thereof.
Bidders will fully inform themselves of the nature of the work and condition under which it will be performed. The Contractor shall adopt methods consistent with good construction practice and shall take all necessary precautions to prevent damage to the existing bridge or attachments. Any damage to the existing bridge structure or roadway due to the Contractor's negligence shall be repaired at the Contractor's expense, to the satisfaction of the Engineer.

LP/EPOXY CONCRETE ADHESIVES FOR CONSTRUCTION JOINTS:
a) Purpose: LP/Epoxy Concrete Adhesives shall be used in the construction joint to bond the new Portland Cement Concrete to the old concrete in place.
b) Surface Preparation: Surface preparation for Portland Cement Concrete: Remove all loose and unsound material from the surface prior to application of LP/Epoxy Concrete Adhesive. If the concrete is unsound, use a jackhammer or pick to uncover sound concrete. Small pieces of concrete and dust shall be removed with air, water, or broom.
c) Installation: LP/Epoxy Concrete Adhesive may be applied by brush, roller, spray, or broom. An even 5-10 mil film thickness shall be applied for optimum adhesion between surfaces.
d) Precautions: Porous concrete absorbs adhesive and leaves a dry surface. Application shall be made immediately before concrete is poured. Do not apply wet concrete over dry areas. Reapply adhesives to dry areas. Surface must show wet adhesive to be effective.
e) Method of Payment: All costs of LP/Epoxy Concrete Adhesives shall be included in the price bid for other items of work.

STRUCTURAL STEEL:
a) All permanent structural steel shall be A-36 except new stainless steel pins.
b) Shop Drawings: The "Bearing Support Bracket" is detailed and dimensioned from calculated slopes. No accounting has been made in the details for actual conditions. Shop drawings will include such adjustments as are necessary to provide a level surface and the proper height to place the bearing assembly.
c) Construction: After the "Bearing Support Bracket" has been placed, the contractor shall verify that the bearing arm of the bracket is level. Maximum tolerance shall be 1%. If the arm slope is greater than 1% from absolute level and or the vertical dimension at centerline of bearing is not within ½" of the plan dimension (10½"), the "Bearing Support Bracket" shall be refabricated such that it falls within the allowable tolerance. REFER TO ADJUSTABLE HEIGHT BEARING ASSEMBLY NOTE FOR MORE INFORMATION.
d) High Strength Bolts: High strength A-325 steel bolts shall be used for all field and shop connections. Unless otherwise noted or shown
High strength bolts shall be tightened by using "Turn-of-Nut" method or by means of "Direct Load Indicators". The "Calibrated Wrench" method shall not be used. Tightening by means of "Direct Load Indicators" will be permitted, provided an accurate direct measurement procedure confirms that the bolts have been tightened to attain the specified tension.
Refer to Special Provision 724-1 for additional requirements for high strength bolting.
e) Welding: All welding for structural steel shall conform to the BRIDGE WELDING CODE ANSI/AASHTO/AWS D1.5.
No field or shop welding will be allowed except as shown on the plans.
Metal used in shop or field welds will not be measured for payment.
f) Inspection Requirements: Radiographic and Ultrasonic, or Magnetic Particle Inspections will be required as appropriate.
g) Painting: All disturbed existing structural steel and all new structural steel shall be painted with a "Red Lead Ready-Mixed Three (3) Coat System" or an approved method. All painting shall be in accordance with the 1988 Standard Specifications. All cost of painting shall be included in the price bid per lb. of structural steel. Temporary steel used in Falsework shall not be painted.
h) Inspection Requirements: Radiographic and Ultrasonic, or Magnetic Particle Inspections will be required as appropriate.

PINS AND RECESSED NUTS: (PIERS 77, 82, and 7 Ramp 22)
All hanger pins at Piers 77, 82 and 7 Ramp 22 shall be removed intact without burning. The contractor shall mark the pins removed such that they can be identified by span, location, girder, and upper or lower pin. The Engineer shall examine the pins for defects. If any defective pins are discovered, those pins shall be returned to the Bridge Division and remain the property of the State. All remaining pins shall become the property of the contractor and shall be disposed of in an approved manner.
The pins shall be replaced with new 3" minimum diameter stainless steel pins using M169 steel at all locations that are not directly over the new concrete pedestal. Replacing the pins at the concrete column locations are optional and are not included in the estimated quantity for "Structural Steel". The new pins shall be insulated with rubber hose or the void filled with silicone or other approved method. The new pins shall be installed after the bearing arm brackets are in place. All cost of removing existing pins, new stainless steel pins, installing new pin, necessary hardware and incidentals shall be included in the unit price bid for "Structural Steel".

ADJUSTABLE HEIGHT BEARING ASSEMBLY (PIERS 77 and 82 and PIER 7 RAMP 22)

SEQUENCE OF CONSTRUCTION:

(1) Block existing hanger pins with oak blocks to insure that no movement is possible.

(2) Field drill bolt holes through the Support Bracket and existing girder as shown on the plans. Bolt the Support Bracket to the existing girder with 1 1/4" bolts.

(3) Cope the diaphragm and remove the lower part of the bolted connection as shown on the plans. Install filler plates as required. Tack weld the prepunched 1/2" plate to the existing web plates as shown on the plans. Field drill the bolt holes through the filler plates and the existing web. Install the double angles with 1" bolts through the web. Bolt the Hanger Bars to the extended stiffener plates on the Bearing Pad Support Bracket using 7/8" bolts. Field drill the bolt holes through the double angles for connection to the prepunched Hanger Bars. Bolt the Hanger Bars to the double angles using 7/8" bolts.

(4) Slide the bearing assembly into place.

(5) Begin jacking until the jacks are in bearing. DO NOT RAISE THE GIRDERS. more than 1/8".

(6) Adjust the vertical height on the bearing assembly. The 2" plate under the elastomeric bearing pad must be perfectly level. The dimension from the bottom of the girder to base of the bearing assembly must be exactly 9¾" at the centerline of bearing. After the height has been adjusted, holes shall be drilled in the double angles and bolted to hold the correct position.

(7) Fill the void between the bearing plate and the Bearing Support Bracket using the Epoxy Resin Injection System to transfer full bearing onto the Bearing Pad Support Bracket in accordance with special provision "Structural Concrete Repair by Sealing and Injection". All cost shall be included in the unit price bid per gallon of "Epoxy Resin, Above Water".

(8) Field weld the bearing assembly to the bottom flange of the existing girder as shown on the plans.

(9) Remove and reinstall the pins in accordance with the PINS AND RECESSED NUTS note and remove the jacks, placing bearing on the Bearing Support Bracket.

(10) Install the crossframe angles as shown on the plans.

BEARING PADS AT HANGER BRACKETS
All bearing pads shall be included in the price bid for "Structural Stee".

THREE UNIT CONCRETE ANCHOR EXPANSION BOLTS:
All costs of materials, tools, labor, and incidentals necessary to place three unit concrete anchor expansion bolts shall be included in the price bid for other items of work.

FALSEWORK AND JACKING:
Pay Item "Falsework and Jacking" shall include all excavation and backfilling the excavated void when falsework is removed , metal strapping, drilled holes in pier cap, structural steel, jacks, welds, labor, materials, cleaning the pier cap and section of angle to be placed on the west side of the pier cap, and incidentals necessary to place a total of nineteen (19) girders at Pier 78 and Pier 8 ramp 22 on temporary supports.
The jacking sequence shall be in the numerical sequence indicated on the plans. All jackings with the same number may be jacked in any sequence, but all jackings with the same number shall be completed before beginning the next jacking number. All girders shall be jacked simultaneously at Pier 7 Ramp 22. Additional jacking may be required.
Jacking shall compensate for any settlement which has occurred on the west side of Pier 78 and Pier 8 ramp 22. The contractor shall obtain profile data in the vicinity of the expansion joint. If necessary, the beams shall be raised to produce an even grade across the joint. Profile adjustment and jacking cost shall be included in the price bid for Falsework and Jacking.
The contractor shall have the option of using used steel provided the sections meet or exceed the member sizes shown on the plans. For the crossbeams the Contractor may use the crossbeams from Pier 81 as described in "ITEMS OF WORK CARRIED OVER FROM E-SAP-55(578)" or shall use used beams from the Norman I-35 Maintenance Yard. Beams will require some modification to meet the span requirements needed for the crossbeams. The Contractor may need to remove some of the shear connectors. The Bridge Division will determine which sections will be used. If in the opinion of the Engineer the Contractor damages one of these beams while they are in his possession, the Contractor shall provide full compensation to the County for the damaged beam. Price bid for Falsework and Jacking shall include cost of modifying and transporting these beams to the project site and removing these beams and transporting them back to the Norman Yard.

BEARINGS ON FOOTINGS (PIERS 78 and PIER 8 RAMP 22) :
After the contractor has excavated to expose the top of the footing, the area where the sole plate is to be placed shall be sandblasted and ground with a carborundum brick before placement of the piling sole plates. If leveling is necessary, this shall be achieved with shim plates (plywood may be used as directed by the Engineer). Leveling shall be done before metal straps are wrapped at the third point of the columns. All cost of bearing shims shall be included in the price bid for "Falsework and Jacking".

ANGLE FOR CONCRETE FORMWORK (PIER 78 and PIER 8 RAMP 22)
The contractor shall place a 6x8x½ angle and 3-unit concrete anchors across the west side of the pier cap as shown on the plans before the crossbeam is placed. All cost of Angle for Concrete Formwork shall be included in the price bid for Falsework and Jacking.

METAL STRAPPING
Metal Strapping or and approved alternate shall be wrapped around the column and piling a minimum of three (3) double wraps as approved by the Engineer. The minimum size of metal strap shall be two (2) inches. All cost of Metal Strapping shall be included in the price bid for "Falsework and Jacking".

JACKING EXTERIOR GIRDERS (PIERS 78, 81 and PIERS 7 and 8 RAMP 22)
When jacking the exterior girders at Piers 78 and 81 the lane above the girder shall be closed to traffic. When jacking the girders at Piers 7 and 8 Ramp 22 the ramp shall be closed to traffic.

BEARING PADS:
All bearing pads shall be placed when the temperature is between 50°F and 70°F.

PIER COLUMN REPAIR:(PIERS 77, 82, and 7 RAMP 22)
The Pier Columns at Piers 77 and 82 shall be encased with a nine (9) inch reinforced collar and a five (5) foot cap extension. A concrete pedestal shall be formed on the cap extension to provide bearing for the sixty (60) foot girders. Pier 7 Ramp 22 shall have a pedestal formed as shown on the plans.
All loose concrete shall be removed and the existing columns shall be sandblasted to ensure a clean bonding surface.
Bearing shall not be placed on the new pedestals until the concrete has been in place 10 days and meets the strength requirement of subsection 701.01(d) of the Standard Specifications. All cost of repairing pier columns shall be included in the unit price bid per each "Repair Concrete Pier". Individual quantities are shown on the Pier sheet for estimating purposes only.

CLEANING PIER CAPS:
After all the beams on the west side of Pier 78 and Pier 8 ramp 22 have been placed on temporary supports, the contractor shall remove all of the broken concrete and debris from the west side of the pier cap and pedestals. All cost of cleaning pier caps shall be included in the price bid for "Repair Concrete Pier".

REPAIR CONCRETE PIER
Pay item "Repair Concrete Pier" includes the following 8 Piers: 77 left, 77 right, 7 Ramp 22, 78 left, 78 right, 8 Ramp 22, 82 left and 82 right.

REPAIR CONCRETE PIER (PIER 78 Right and Left)
Item "Repair Concrete Pier" consists of removing the elevated section of the pier cap to twelve (12) inches above the lower section of Pier 78 right and left. A new epoxy coated reinforced pier cap section shall be formed using "Class A Concrete" as shown on the plans. All cost of Class A Concrete, Epoxy Coated Reinforcing Steel repairing the cracks and spalls in the cap and columns as directed by the Engineer, materials,labor, and incidentals necessary to restore the pier cap shall be included in the price bid for "Repair Concrete Pier".
Estimated quantities for this item as follows;

Class AA Concrete	C.Y.	34.7
Epoxy Coated Reinforcing Steel	LB.	3530.0
Three Unit Concrete Expansion Bolts	EA.	55.0

Item "Repair Concrete Pier" shall be completed and the concrete shall obtain a minimum strength of 3000 psi prior to any jacking of bearing placed on the pier cap.

CONSTRUCTION SEQUENCE (PIER NO. 78 and PIER 8 RAMP 22)
The contractor shall replace the existing bearing shoes on the east side of Pier 78 and Pier 8 Ramp 22 as shown on the plans before "Repair Concrete Pier" begins. See **"FIXED BEARING ASSEMBLY (PIER NO. 78 and Pier 8 RAMP 22)"** note.

FIXED BEARING ASSEMBLY (PIER NO. 78 and PIER NO. 8 RAMP 22)
Item "Fixed Bearing Assembly" shall consist of removing and replacing the existing bearing assemblies on the west side of Pier 78 and Pier 8 Ramp 22 in accordance with the Standard Specifications and as shown on the plans. All cost of elastomeric bearing pads, bearing plates, anchor bolts, nuts, materials, labor, and incidentals necessary to replace the existing bearings shall be included in the unit price bid per each "Fixed Bearing Assembly".

SHIM PLATE WELDS UNDER BEAMS (PIER 78, AND PIER 8 RAMP 22):
In order to allow for future grade adjustments and for the placement of the new bearing assembly under the girders, additional jacking may be required. Crossbeams placed directly under bridge girders shall not be welded to the shim plates. All shim plates shall be welded to each other and to the vertical supporting member in place to provide stability. All cost of shim plate welds shall be included in the price bid for "Falsework and Jacking".

CONSTRUCTION SEQUENCE (PIER 81)
The contractor shall replace the existing bearing shoes on the west side of Pier 81 with new elastomeric bearing assemblies as shown on the plans. All cost of replacing the expansion bearing shoes shall be included in the price bid per each "Expansion Bearing Assembly".

EXPANSION JOINTS:
The finger Expansion Joints (left side of I-40) at all Expansion Piers of this project have had plates welded to one side of the device during a previous overlay project. It shall be necessary to torch cut the finger extrusion on the free side of the device to allow for jacking as approved by the Engineer. All cost of torch cutting shall be included in the price bid for "Falsework and Jacking".
All debris shall be removed from the expansion devices at Piers 77, 78, 81, 82 and Piers 7 and 8 Ramp 22 while traffic control is in place on I-40. The contractor shall also check the driving surface at these locations. If the driving surface is not even, adjustments shall be necessary on bearing arm brackets. All cost of removing debris and evening the driving surface shall be included in other items of work.

PIER DRAIN PIPES:
Six (6) and eight (8) inch drain pipes are anchored to the Pier Cap and Columns. The drains shall be temporarily disconnected from the scuppers and moved to allow for Falsework and or Construction. The Drain Pipes shall be reconnected after the construction is completed. All cost of moving and resetting Drain Pipes shall be included in other items of work.

REMOVE AND RESET GUARDRAIL, LIGHT POLES, AND CHAIN-LINK FENCE:
The guardrail, light poles, and chain-link fence shall be temporarily removed to allow for construction and equipment in the area of Piers 77 and 78. When construction is completed, these items shall be returned to their original position and condition. The contractor shall contact Steve Klika with COTPA, 300 East California, Oklahoma City, Oklahoma, 73104 before removal is begun. All cost of removing and resetting shall be included in other items of work.

PENETRATING WATER REPELLENT SURFACE TREATMENT
A Penetrating Water Repellent Surface Treatment shall be applied to the top, side, and end surfaces of Piers 78 and 81 and Piers 7 and 8 Ramp 22 and the top and end surfaces of the 5'-0" cap extensions on the columns of Piers 77 and 82. All cost of treatment shall be included in the unit price bid per S.Y. of "Penetrating Water Repellent Surface Treatment". Estimated quantities are as follows;

Pier 77	95.0	S.Y.
Pier 7 Ramp 22	20.0	S.Y.
Pier 78	360.0	S.Y.
Pier 8 Ramp 22	60.0	S.Y.
Pier 81	435.0	S.Y.
Pier 82	95.0	S.Y.

VALUE ENGINEERING:
Alternate designs made by Professional, Registered Engineer, registered in the State of Oklahoma will be considered, but must be approved by the Oklahoma Department of Transportation, Bridge Division.

REVISIONS		
REV. NO.	DESCRIPTION	DATE

ITEMS OF WORK CARRIED OVER FROM E-SAP-55(578)
The falsework located at Pier 81 must remain in place until the bearing assemblies have been replaced on the west side of Pier 81 as shown on the plans. Due to the location of the falsework at Pier 81 the following items shall be placed on this project. Costs shall be included in other items of pay.

(1) Remove falsework at Pier 81 after the bearing assemblies have been installed on the west side of Pier 81. The crossbeam of the falsework shall be inspected by the Engineer for yielding, web buckling, or cracks. If in the opinion of the Engineer, the contractor damages the crossbeam while in his possession, the contractor shall provide full compensation to the County for damages. If the crossbeam is approved by the Engineer the contractor may reuse it for the falsework at Pier 78. If the contractor elects to reuse the crossbeam it shall be subjected to the same inspection and conditions as when it was removed at Pier 81 after construction is completed at Pier 78. If the crossbeam is approved by the Engineer, the contractor shall deliver the crossbeam to the Norman Maintenance Yard and the remaining members of falsework removed from Pier 81 shall be returned to Jensen Construction Company, P.O. Box 9919, Tulsa Oklahoma 74157. All cost of removing falsework members and returning them to their respective locations shall be included in the price bid for "Falsework and Jacking". After the falsework has been removed from Pier 81 the existing structural Steel members shall be filled, ground smooth, and painted in accordance with the Standard Specifications. The new stiffeners shall also be painted. All cost of repairing and painting structural steel at Pier 81 shall be included in other items of work

(2) Remove any remaining forms from the pier cap and pedestals. Repair concrete spalls and cracks on the pier cap, pedestals and columns of Pier 81. Falsework bolts and sleeves shall also be removed from the pier cap and the spalls and holes shall be filled and repaired as directed by the Engineer. All cost of repairing Pier 81 shall be included in other items of work.

(3) Apply "Penetrating Water Repellent Surface Treatment" to the top, side, and ends of Pier 81 pier cap. All cost of treatment shall be included in the unit price bid per S.Y. of "Penetrating Water Repellent Surface Treatment". The estimated quantity for this item is 435.0 S.Y..

(4) The 6x8x½ angle on Pier 81 shall be ground to remove all traces of clip angles used to support the formwork. The angles shall have all excess overhangs cut off and returned to Jensen Construction Company. The angles shall remain in place and shall be painted in accordance with the Standard Specification.

(5) The contractor shall backfill the excavated void to the footings of Pier 81. All cost backfilling shall be included in other items of work

(6) The contractor shall reinstall the conduit and wire for lighting at Pier 81. All cost of reinstalling shall be included in other items of work.

(7)The contractor shall repair the diaphragm between girder 14 and 15 on the east side of Pier 81 as approved by the Engineer. All cost of removing and replacing damaged portion of diaphragm shall be included in other items of work.

(8)Bearing Pads shall be installed on the east side of Pier 81. The pads are fabricated and in the possession of the Engineer. All cost of installing bearing pads shall be included in other items of work.

I-40 CROSSTOWN — OKLAHOMA COUNTY

GENERAL NOTES

Design	
Detail	LKB 8/89
Check	
Squad	McGUIRE
Engr.	PETERS

STATE OF OKLAHOMA — DEPARTMENT OF TRANSPORTATION

PROJ. NO. E-SAP-55(595) SHEET NO. 2

REVISIONS		
REV NO.	DESCRIPTION	DATE

DESIGN DATA

LOAD FACTOR DESIGN:

CONCRETE CLASS AA	$f'c = 3{,}500$ psi
REINFORCING STEEL (GRADE 60)	$fy = 60{,}000$ psi

ALLOWABLE STRESS DESIGN:

STRUCTURAL STEEL (A36)	$fs = 20{,}000$ psi

LOADING: HS-20 or STD. OKLAHOMA O'LOAD TRUCK

DESIGN: AASHTO SPECIFICATIONS 1989 EDITION AND AWS SPECIFICATIONS

REACTIONS FOR JACKING PURPOSES:

PIERS 77, 82, and 7 RAMP 22

R_{DL} = 20 TONS
R_{LL+I} = 26 TONS

R_{TOTAL} = 46 TONS/GIRDER

PIERS 78 (WEST), 81(EAST), AND 8 RAMP 22 (WEST)

R_{DL} = 20 TONS
R_{LL+I} = 26 TONS

R_{TOTAL} = 46 TONS/GIRDER

PIERS 78(EAST), 81(WEST), AND 8 RAMP 22(WEST)

R_{DL} = 28 TONS
R_{LL+I} = 38 TONS

R_{TOTAL} = 66 TONS/GIRDER

TRAFFIC OPERATIONS PAY QUANTITY NOTES

(TO-19) THIS ITEM INCLUDES AN ESTIMATED 500 L.F. 4" WHITE AND 500 L.F. 4" YELLOW STRIPE. THE CONTRACTOR SHALL PROVIDE AND INSTALL "3M CORP. DETOUR GRADE REMOVABLE TAPE" OR "CATAPHOTE CORP. DETOUR GRADE REMOVABLE TAPE" OR AN APPROVED EQUAL.

(TO-70) THIS ITEM IS AN ESTIMATED QUANTITY TO BE USED AS DEEMED NECESSARY BY THE ENGINEER.

TRAFFIC OPERATIONS GENERAL CONSTRUCTION NOTES

DUE TO THE TEMPORARY NATURE OF CONSTRUCTION SIGNING, FOOTINGS WILL HAVE NO REINFORCING STEEL.

ALL SIGNS SHALL BE CONSTRUCTED TO MEET THE CURRENT OKLAHOMA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS.

ONE (1) WING BARRICADE SHALL BE SET ON EACH SIDE OF THE ROADWAY 250' IN ADVANCE OF THE FIRST ADVANCE WARNING SIGN IN EACH ADVANCE WARNING SERIES.

THIS PROJECT SHALL BE CONSTRUCTED WITHOUT CLOSING TRAFFIC ON CROSS STREETS. A MINIMUM OF ONE LANE IN EACH DIRECTION SHALL BE MAINTAINED AT ALL TIMES.

THE CONTRACTOR SHALL REPAIR OR REPLACE ANY NEW OR EXISTING SIGNS WHICH ARE DAMAGED DUE TO HIS NEGLIGENCE OR CARELESS HANDLING DURING THE CONSTRUCTION OF THIS PROJECT. THIS SHALL BE DONE AT THE CONTRACTORS EXPENSE.

TRAFFIC CONDITIONS MAY NECESSITATE CHANGES IN THE USE AND/OR QUANTITIES OF THE TRAFFIC CONTROL DEVICES AS SHOWN IN THE PLANS OR IN THE STANDARDS. ANY SUCH CHANGES ARE SUBJECT TO THE APPROVAL OF THE ENGINEER.

ANY SIGNS AND/OR DELINEATORS WHICH ARE TO BE REMOVED DURING THIS PROJECT WILL BE STORED IN A PROTECTED AREA DESIGNATED BY THE RESIDENT ENGINEER, UNTIL SUCH A TIME THAT THEY ARE TO BE RESET BY THE CONTRACTOR. COST OF THIS WORK TO BE INCLUDED IN OTHER ITEMS OF WORK.

ANY EXISTING SIGNING CURRENTLY IN PLACE WHICH IS IN CONFLICT WITH THE INDICATED CONSTRUCTION SIGNING AS SHOWN THE PLANS, OR ON THE T.C.D. STANDARD DRAWINGS, SHALL BE EITHER COVERED OR REMOVED AND STORED FOR THE DURATION OF THE PROJECT. THESE SIGNS SHALL BE EITHER UNCOVERED OR RE-INSTALLED, BY THE CONTRACTOR, UPON COMPLETION OF THE PROJECT. COST OF THIS WORK TO BE INCLUDED IN OTHER ITEMS OF WORK.

ALL CHANNELIZING DEVICES INITIALLY PROVIDED ON THIS PROJECT SHALL BE EITHER NEW OR IN LIKE NEW CONDITION AND SHALL BE APPROVED FOR USE ON THIS PROJECT BY THE ENGINEER.

ALL WORK ON I-40 MAINLINE OR OFF RAMPS WHICH WILL REQUIRE THE REDIRECTING OF TRAFFIC SHALL BE LIMITED TO THE HOURS BETWEEN 9 A.M. AND 3 P.M. MONDAY THRU FRIDAY AND ANYTIME ON SATURDAY OR SUNDAY. IF WORK IN THIS AREA IS PERFORMED ON SATURDAY OR SUNDAY IT WILL BE DONE ONLY DURING THE HOURS DEEMED TO BE SAFE BY THE ENGINEER.

REGULATORY SPEED LIMIT SIGNS SHALL BE USED TO SLOW TRAFFIC ENTERING LANE TAPERS ON I-40. THESE SPEED LIMITS SHALL BE REDUCED A MINIMUM OF 10 M.P.H. BUT MAY BE FURTHER REDUCED AT THE DISCRETION OF THE ENGINEER.

P A Y   Q U A N T I T I E S

REPAIR EXP. HANGERS

ITEM	DESCRIPTION	UNIT	QUANTITY
506(A)	STRUCTURAL STEEL	LB.	77,180.00
515	PENETRAT WATER REPELL SURF.TR.	S.Y.	1,060.00
520(C)SP	EPOXY RESIN ABOVE WATER	GAL.	17.50
640	FIELD OFFICE	EA.	1.00
641	MOBILIZATION	L.SUM	1.00
900.41SP	FIXED BEARING ASSEMBLY	EA.	19.00
900.42SP	EXPANSION BEARING ASSEMBLY	EA.	32.00
900.51SP	FALSEWORK AND JACKING	L.SUM	1.00
900.73SP	REPAIR CONCRETE PIER	EA.	8.00

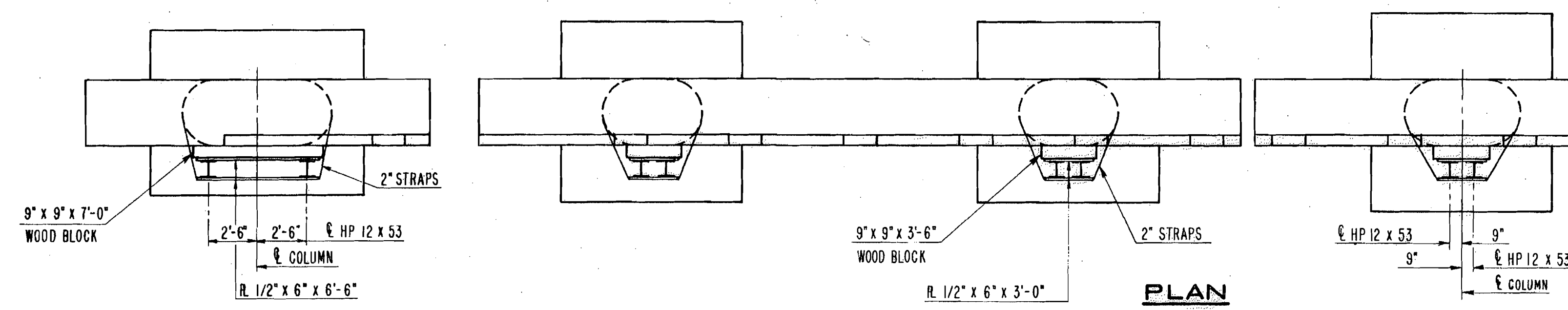
P A Y   Q U A N T I T I E S

IC CONTROL I-40 & E.K. GAYLORD

ITEM	DESCRIPTION	UNIT	QUANTITY
856(B)	REMOVABLE PAVEMENT MARKING TAPE (4"WIDE) (TO-19)(TO70)	L.F.	1,000.00
880(C)	ADVANCE WARNING DEVICE(TYPE C)	S.D.	30.00
880(D)	SIGNS 0 TO 6.25 SF	S.D.	1,575.00
880(E)	SIGNS 6.26 TO 15.99 SF	S.D.	300.00
880(F)	SIGNS 16.0 SF TO 32.99 S.F.	S.D.	870.00
880(H)	BARRICADES(TYPE I)	S.D.	30.00
880(I)	BARRICADES(TYPE II)	S.D.	30.00
880(J)	BARRICADES(TYPE III)	S.D.	270.00
880(K)	WING BARRICADES	S.D.	270.00
880(M)	TYPE A LIGHT	S.D.	750.00
880(O)	TYPE C LIGHT	S.D.	3,150.00
880(P)	DRUMS	S.D.	3,150.00

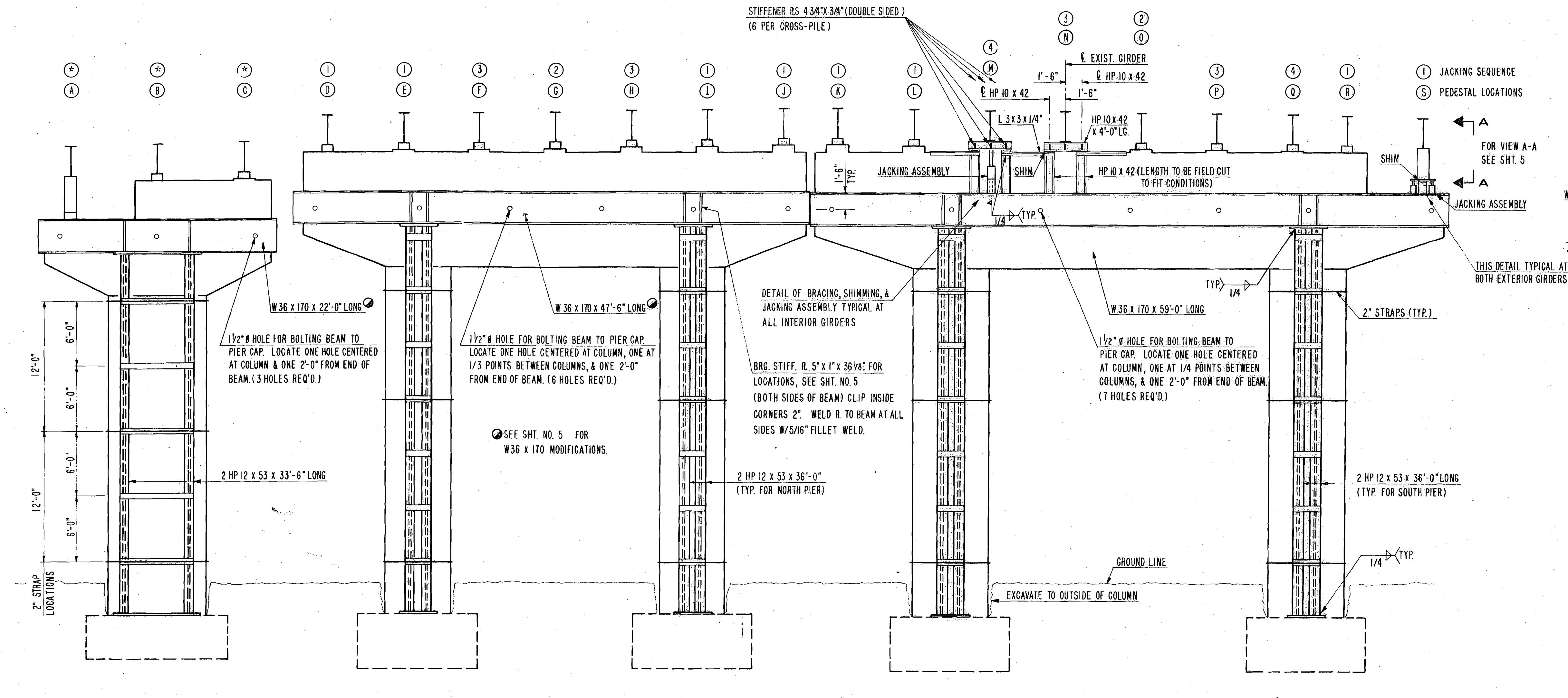
SUMMARY OF PAY QUANTITIES (BRIDGE AND TRAFFIC) GENERAL NOTES (TRAFFIC)	Design	
	Detail	LKB 8/89
	Check	
	Squad: McGUIRE	
	Engr.: PETERS	
STATE OF OKLAHOMA	DEPARTMENT OF TRANSPORTATION	
	PROJ. NO. E-SAP-55(595)	SHEET NO. 3

REV. NO.	DESCRIPTION	DATE
	REVISIONS	



PLAN

* FOR PIER NO. 8 JACKING SEQUENCE SEE NOTE ON SHT. 6

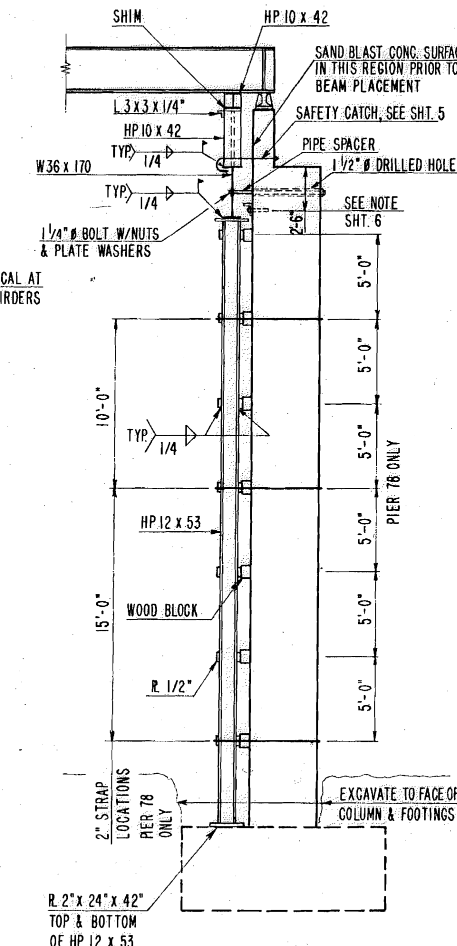


PIER NO. 8 RAMP NO. 22

NORTH - PIER 78

SOUTH - PIER 78

ELEVATION



SIDE VIEW

PEDESTAL HEIGHTS																		
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
8"	2"	3 1/2"	2"	3 5/16"	4 5/8"	5 15/16"	7 1/4"	8 9/16"	9 7/8"	10 13/16"	9 1/2"	8 3/16"	6 7/8"	5 9/16"	4 1/2"	2 15/16"	2"	8"

QUANTITIES			
ITEM NO.	ITEM	UNIT	TOTAL
900.51SP	FALSEWORK AND JACKING	L.SUM	1.00
900.41SP	FIXED BEARING ASSEMBLY	EA.	19
900.73S	REPAIR CONCRETE PIER	EA.	1.00

I-40 OVER E. K. GAYLORD　　OKLAHOMA COUNTY

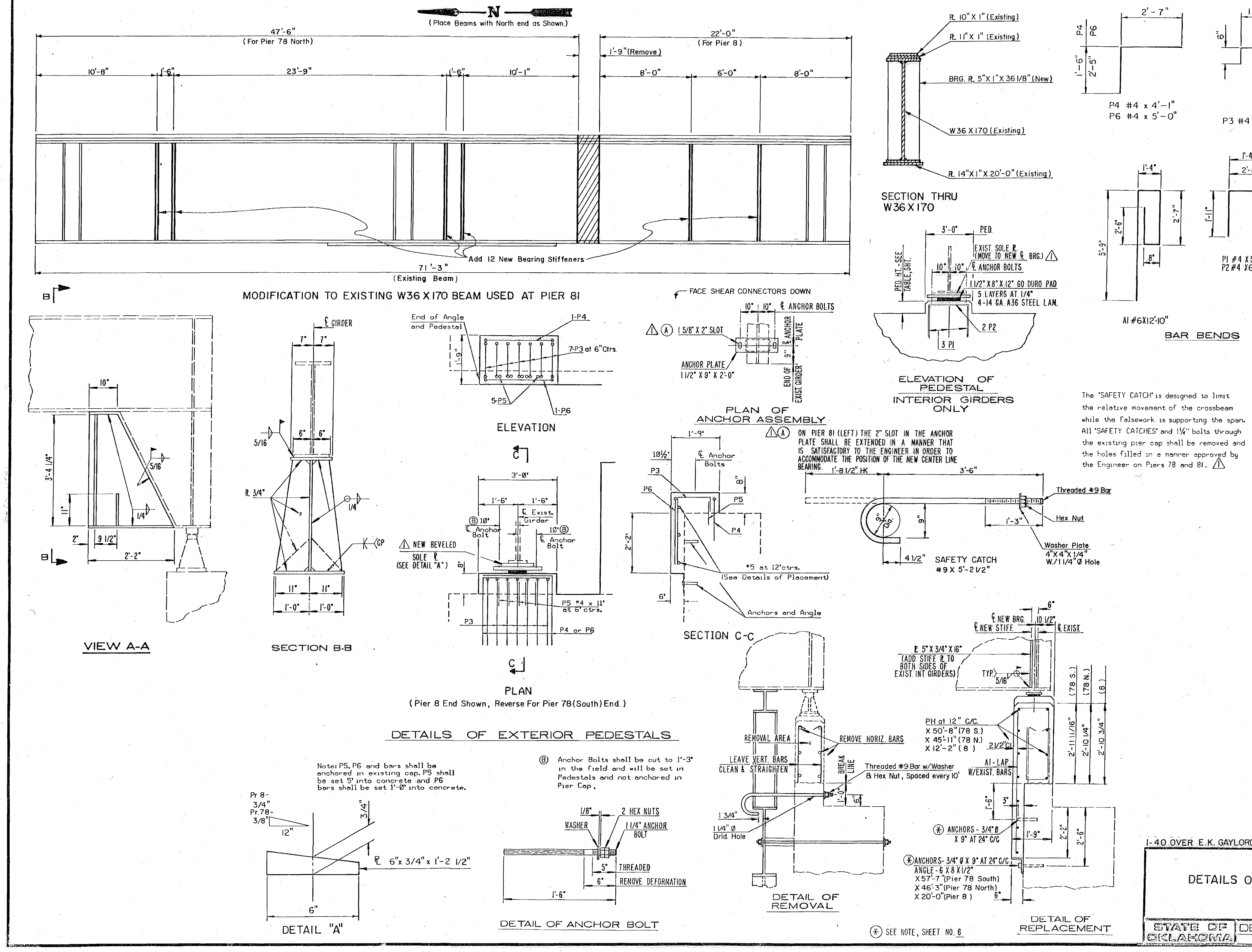
JACKING LOCATIONS AND FALSEWORK

Design	MWJ	8/89
Detail	CDR	8/89
Check		
Squad: McGUIRE		
Engr.: PETERS		

STATE OF OKLAHOMA — DEPARTMENT OF TRANSPORTATION

PROJ. NO. E-SAP-55(595)　SHEET NO. 4

REV. NO.	DESCRIPTION	DATE
1	REVISED NOTES	9/14/89



BAR LIST EPOXY COATED

MARK	NO.	SIZE	FORM	LENGTH
PIER 78 - SOUTH				
A1	52	#6	BNT	12'-10"
P1	24	#4	BNT	5'-2"
P2	16	#4	BNT	6'-6"
P3	7	#4	BNT	4'-3"
P4	2	#4	BNT	4'-1"
P5	5	#4	STR	11"
P6	2	#4	BNT	5'-0"
PH	11	#5	STR	50'-8"
PIER 78 - NORTH				
A1	47	#5	BNT	12'-10"
P1	21	#4	BNT	5'-2"
P2	14	#4	BNT	6'-6"
PH	11	#5	STR	45'-11"
PIER 8 - RAMP 22				
A1	13	#6	BNT	12'-10"
P1	6	#4	BNT	5'-2"
P2	4	#4	BNT	6'-6"
P3	7	#4	BNT	4'-3"
P4	2	#4	BNT	4'-1"
P5	5	#4	STR	11"
P6	2	#4	BNT	5'-0"
PH	11	#5	STR	12'-2"

I-40 OVER E.K. GAYLORD & COMPRESS ST. OKLAHOMA COUNTY

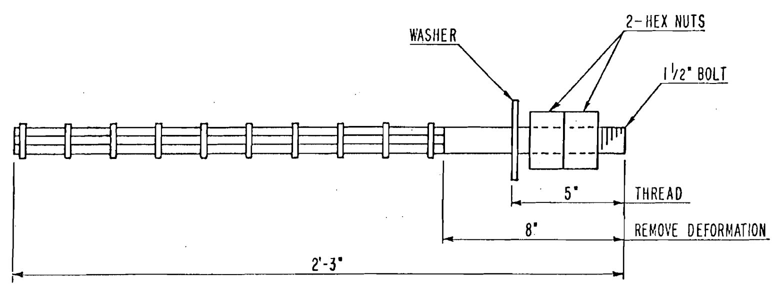
DETAILS OF BRIDGE REPAIRS

Design	MWJ	8/89
Detail	JPW	8/89
Check		
Squad: MC GUIRE		
Engr.: PETERS		

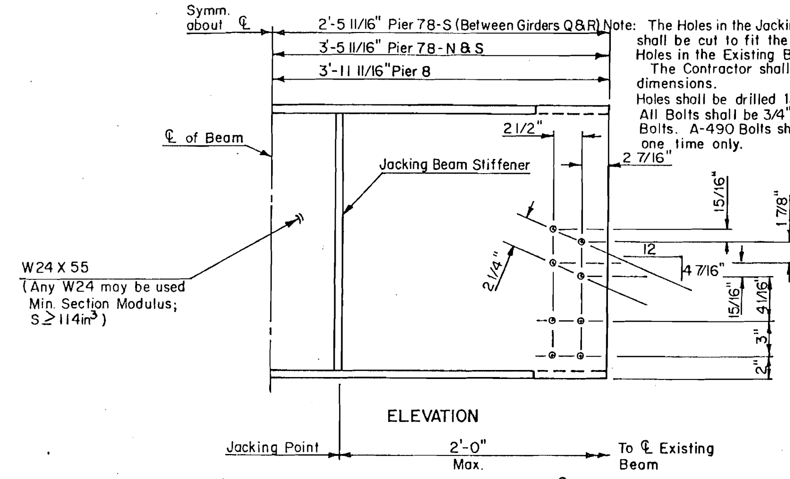
STATE OF OKLAHOMA — DEPARTMENT OF TRANSPORTATION

PROJ. NO. E-SAP-55(595) SHEET NO. 5

BRUNING 40-21 69876



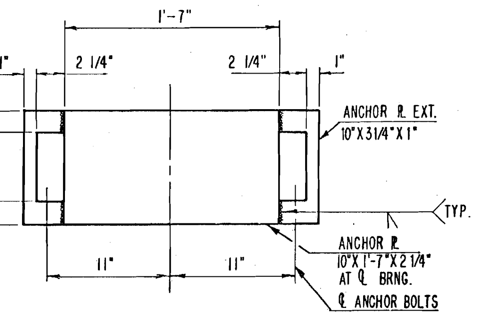
GALVANIZED ANCHOR BOLT DETAIL



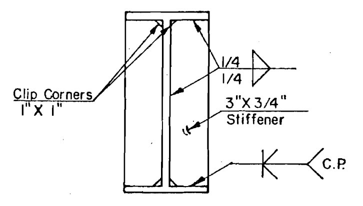
Note: The Holes in the Jacking Beams shall be cut to fit the Existing Holes in the Existing Beam Stiffeners. The Contractor shall verify these dimensions. Holes shall be drilled 13/16" Ø. All Bolts shall be 3/4" Ø A-490 Bolts. A-490 Bolts shall be used one time only.

ELEVATION

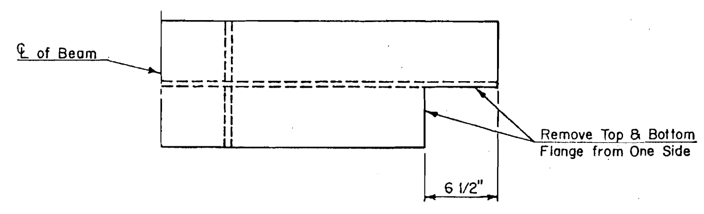
(Note: The distance from the Jacking Point to the ℄ of existing Girder shall not be more than 2'-0" for this system.)



PLAN

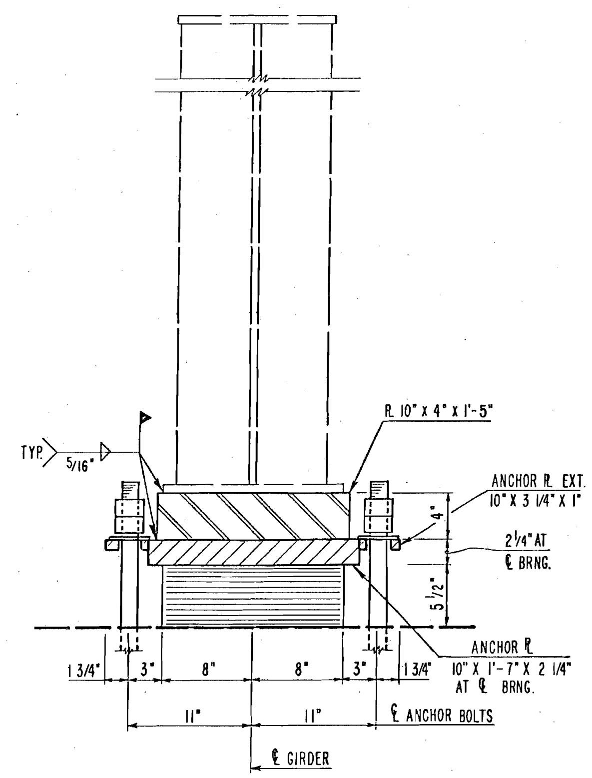


JACKING BEAM STIFFENER DETAIL

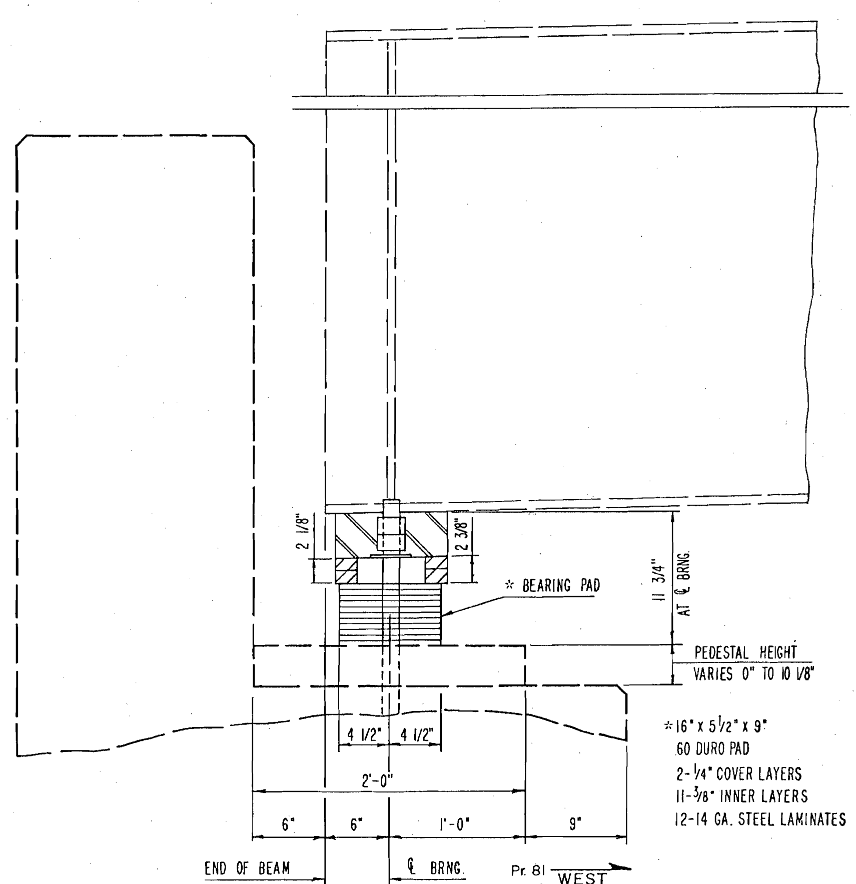


PLAN

JACKING BEAM DETAIL

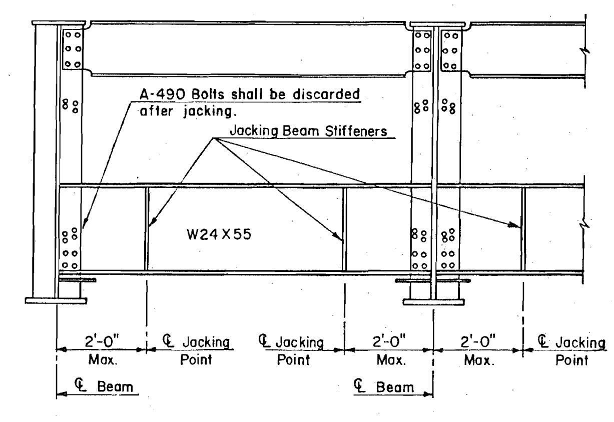


ELEVATION



☆16" x 5 1/2" x 9"
60 DURO PAD
2-1/4" COVER LAYERS
11-3/8" INNER LAYERS
12-14 GA. STEEL LAMINATES

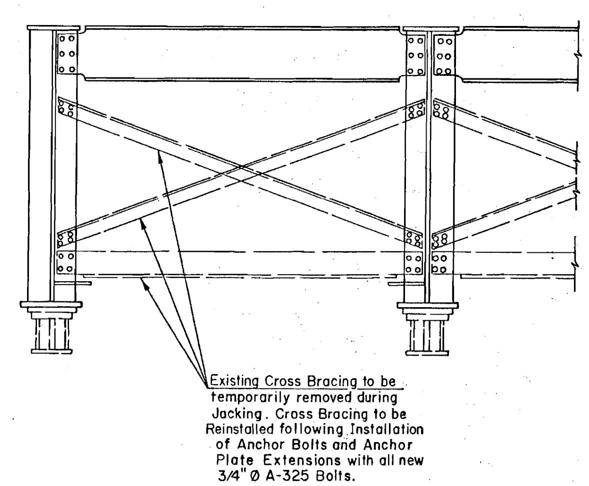
PROFILE



TYPICAL EXTERIOR (1) BEAM

TYPICAL INTERIOR BEAM

DETAIL OF JACKING BEAM PLACEMENT



DETAIL OF CROSS BRACING TO BE REMOVED

REV. NO.	DESCRIPTION	REVISIONS	DATE

Pay Item Expansion Bearing Assembly shall consist of removing and replacing the existing bearing assembly in accordance with these plans and the Standard Specifications. This item shall include jacking, cleaning, elastomeric bearing pads, bearing plates, anchor bolts, W 24 X 55 Beams, materials, labor and incidentals required to replace the existing bearing assembly on the west side of Pier 81 and the east side of Pier 78. The Contractor shall follow the following construction sequence:

(1) Jacking shall be done when the temperature is between 50° F. and 70° F. Jacking shall be restricted to off-peak traffic hours, such as Sunday mornings.
(2) The Contractor shall temporarily remove the existing crossframes except for the top member.
(3) The Contractor shall bolt the jacking beam to the 72" plate girder as shown on the plans using the bolt holes from the crossframes and all new A-490 bolts and jack the girder as shown on the plans to take the load off the existing expansion assembly. On the ramp, all three (3) girders shall be jacked simultaneously. The reaction is approximately 70 tons per girder.
(4) It is recommended that the Contractor torch the sole plate on all four sides and remove the existing bearing assembly. It may be necessary to torch the pintle. The anchor bolts should be cut off flush with the top of the pier cap.
(5) The Contractor shall clean the top of the pedestal as directed by the Engineer. Sandblasting may be required. Concrete surfaces in the bearing area shall be ground with a carborundum brick. In the bearing area, the bottom of the steel girder shall be ground smooth.
(6) The Contractor shall slide in the new bearing assembly, release the jacks, remove the jacking assembly, drill 3" holes for the 1-1/2" anchor bolts, and drop in the new anchor bolts. The anchor plate extensions shall be welded to the anchor plate.
(7) The anchor bolts shall be grouted in accordance with the standard anchor bolt note shown on Sheet 2. The anchor plates shall be welded to the girder and the crossframes restored in accordance with the plans using new A-325 bolts.
(8) The anchor plates, anchor plate extensions, 3/4" dia A325 bolts & nuts, shall be painted in accordance with the Standard Specifications.

*If it is necessary to jack more than one (1) inch, the Contractor shall be required to jack the girders on both sides of the pier. The jacking sequence for this operation shall be obtained from the Bridge Division. If jacking is required on both sides, the elevated pier cap repair shall be completed and have obtained a minimum strength of 3,000 p.s.i. prior to jacking both sides as a safety precaution for the falsework.

The existing bearing assembly shall become the property of the Contractor and shall be removed from the project site in accordance with the Standard Specifications.

All structural steel shall be A-36. Used steel shall not be allowed except for the jacking beam.

QUANTITIES

ITEM NO.	ITEM	UNIT	TOTAL
900.42 SP 6165	EXPANSION BEARING ASSEMBLY	EA.	32

(1) The jacking of the exterior girders shall be done from the inside only and shall be jacked only under dead load. In order to accomplish this traffic will have to be removed from the exterior lanes during the jacking. For further details see traffic notes on Sheet No. 3

NOTE: For Construction Sequence at Pier 78 refer to Sheet No. 2

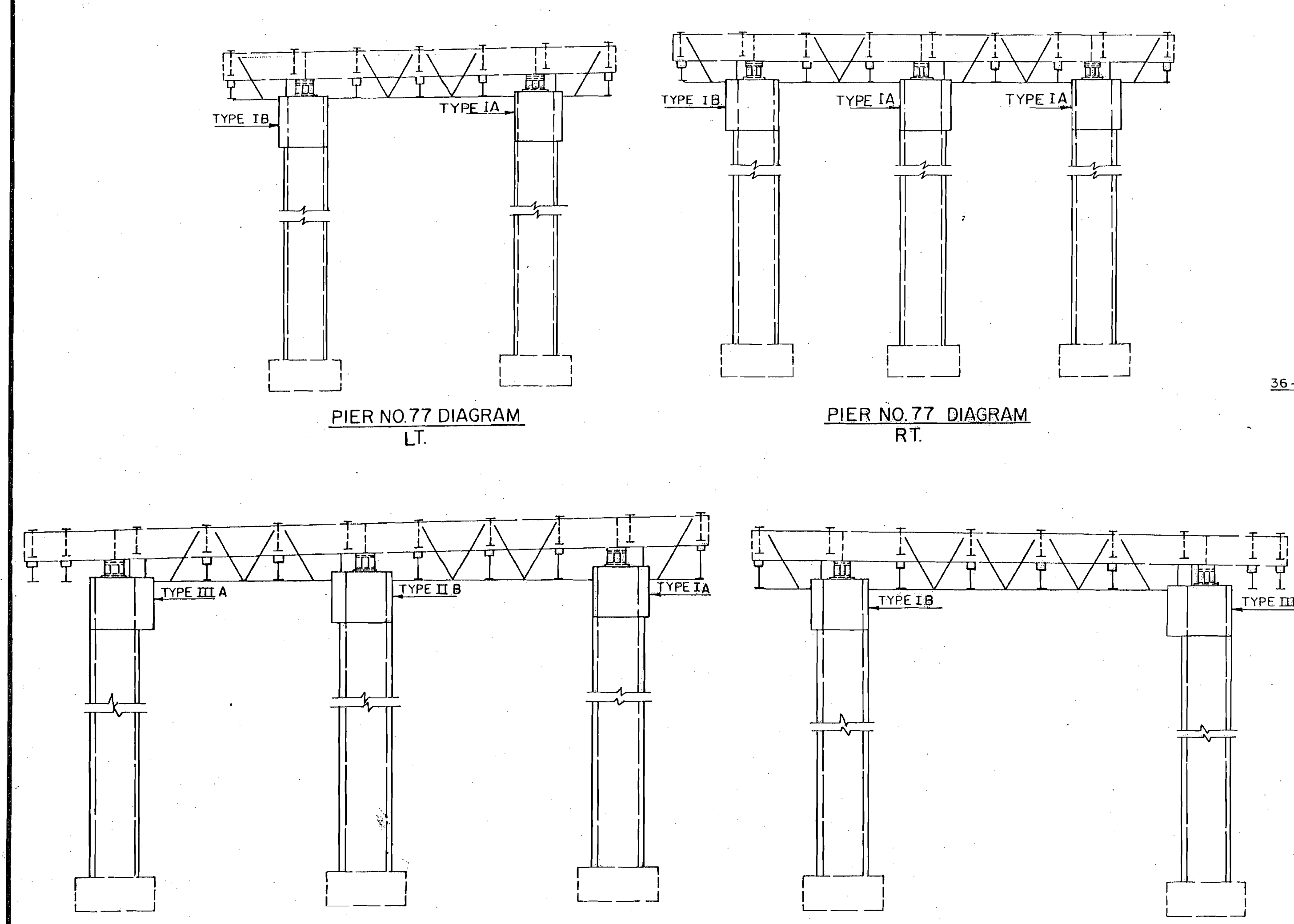
I-40 OVER E.K. GAYLORD & COMPRESS ST. OKLAHOMA COUNTY

BEARING REPLACEMENT
AT PIER 78, PIER 81
AND PIER 8 RAMP 22

Design	DDA	9/89
Detail	JPW	9/89
Check		
Squad:	MCGUIRE	
Engr.:	PETERS	

STATE OF OKLAHOMA | DEPARTMENT OF TRANSPORTATION | PROJ. NO. E-SAP-55(595) | SHEET NO. 6

BRUNING 40-21 69876

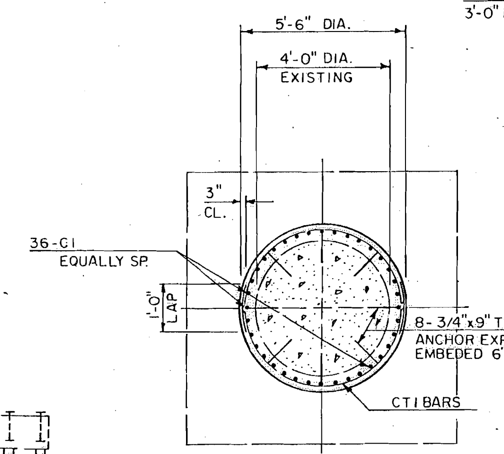


PIER NO.77 DIAGRAM LT.

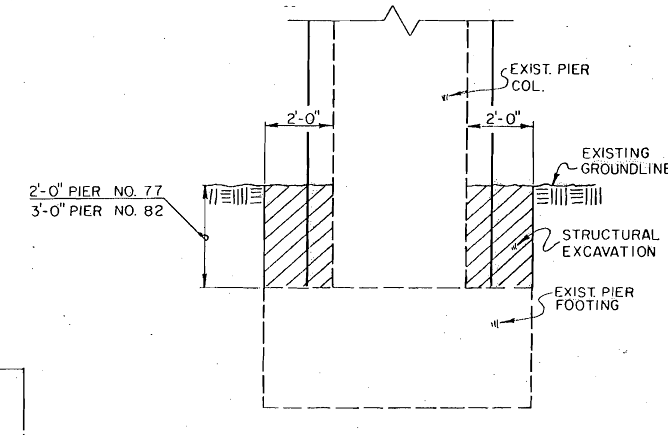
PIER NO.77 DIAGRAM RT.

PIER NO.82 DIAGRAM LT.

PIER NO.82 DIAGRAM RT.



SECTION "A-A"



EXCAVATION DIAGRAM

CLASS AA CONCRETE
All "Class AA Concrete" shall be placed in accordance with section 509.04 of the Specifications. All concrete placed in the Pier Columns shall be poured continuously. The concrete shall be deposited through a thinwalled, flexible plastic tremie or as approved by the Engineer. An optional construction joint may be used at the midheight of the column (one (1) construction joint per column).

PIER NO.82 BAR LIST EPOXY COATED GRADE (60)

MARK	NO.	SIZE	FORM	LENGTH
A1	20	#5	BNT	5'-2"
A2	20	#5	STR	2'-2"
A3	10	#5	BNT	5'-10"
A4	5	#5	BNT	7'-10"
BV1	64	#7	STR	4'-6"
U1	60	#7	BNT	13'-4"
GRADE (60)				
C2	180	#9	STR	41'-8"
CT1	430	#4	BNT	8'-10"

PIER NO.77 BAR LIST EPOXY COATED GRADE (60)

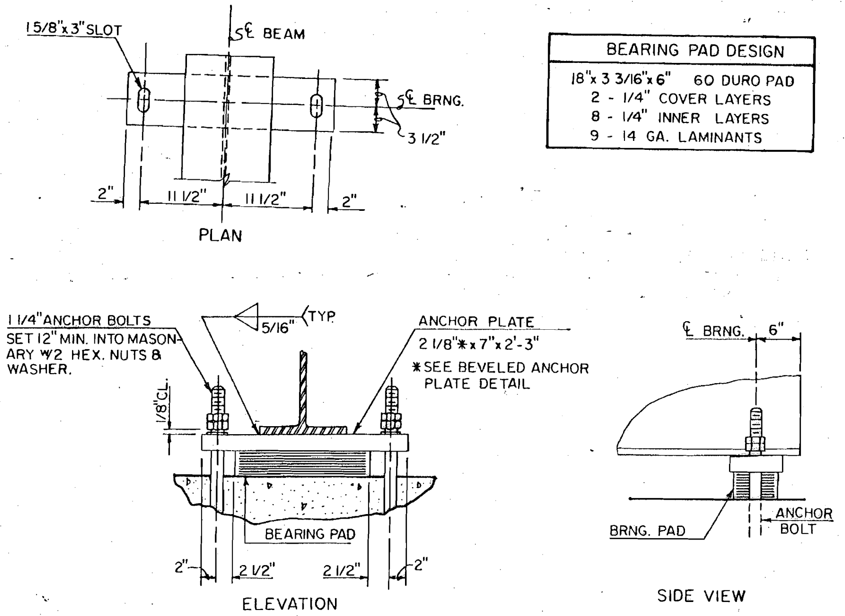
MARK	NO.	SIZE	FORM	LENGTH
A1	20	#5	BNT	5'-2"
A2	20	#5	STR	2'-2"
A3	10	#5	BNT	5'-10"
A4	5	#5	BNT	7'-10"
BV1	60	#7	STR	4'-6"
U1	60	#7	BNT	13'-4"
GRADE (60)				
C1	180	#9	STR	39'-8"
CT1	410	#4	BNT	8'-10"

PIER NO.7 RAMP 22 BAR LIST EPOXY COATED GRADE (60)

MARK	NO.	SIZE	FORM	LENGTH
P1	3	#7	BNT	5'-6"
P2	4	#7	BNT	4'-7"
P3	4	#5	BNT	6'-2"
P4	4	#5	STR	6'-1"
P5	11	#5	STR	3'-0"
P6	4	#7	STR	1'-4"
P7	2	#7	STR	3'-0"

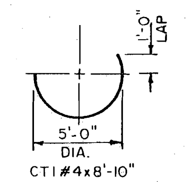
QUANTITIES		PIER 77	PIER 82	PIER 7
ITEM	UNIT	TOTAL	TOTAL	TOTAL
REINFORCING STEEL GR.60	LB.	26,470	28,040	—
REINFORCING STEEL GR.60 (EPOXY COATED)	LB.	2,440	2,480	260
CLASS AA CONCRETE	C.Y.	91.5	98.7	0.8
STRUCTURAL STEEL	LB.	730	730	150
SUBSTRUCTURE EXCAVATION COMMON	C.Y.	10.0	398.0	—

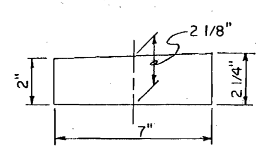
NOTE:
PIER MODIFICATION AND REPAIR IS PAID FOR PER EACH "REPAIR CONCRETE PEIR". THE QUANTITIES SHOWN ARE FOR ESTIMATION PURPOSES ONLY.



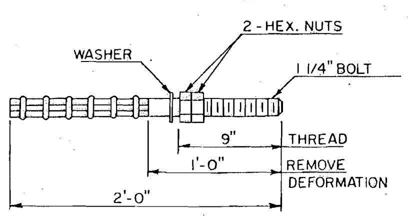
BEARING PAD DESIGN
18"x 3 3/16"x6" 60 DURO PAD
2 - 1/4" COVER LAYERS
8 - 1/4" INNER LAYERS
9 - 14 GA. LAMINANTS

BEARING ASSEMBLY DETAIL
(PIERS NO. 77 & 82)

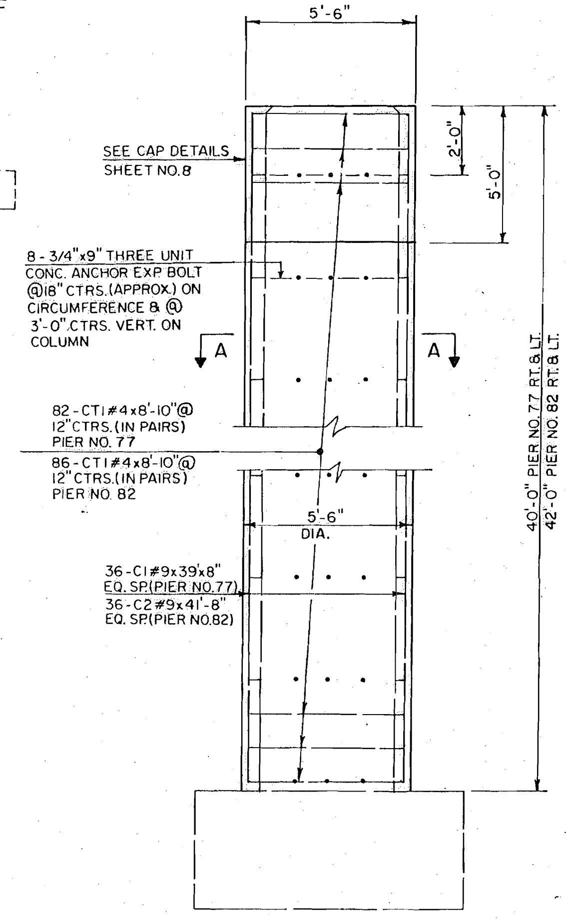




BEVELED ANCHOR ℙ DETAIL



ANCHOR BOLT DETAIL



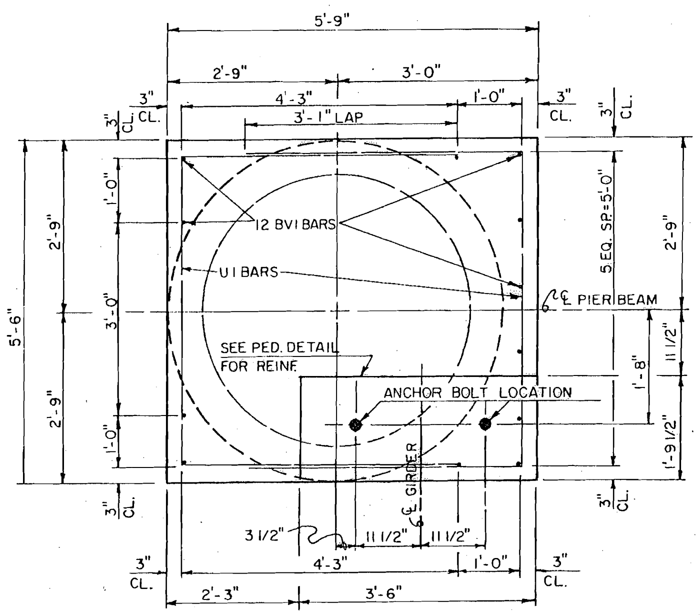
COLUMN ELEVATION
(TYP.)

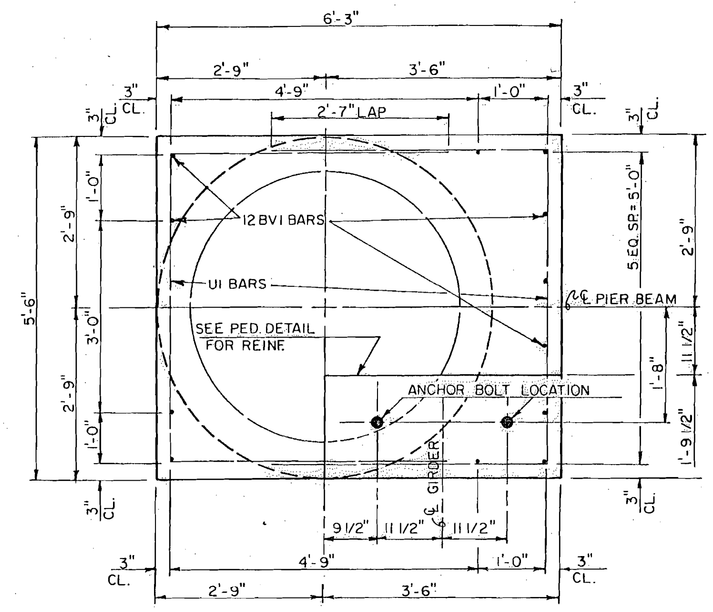
REV. NO.	DESCRIPTION	DATE
REVISIONS		

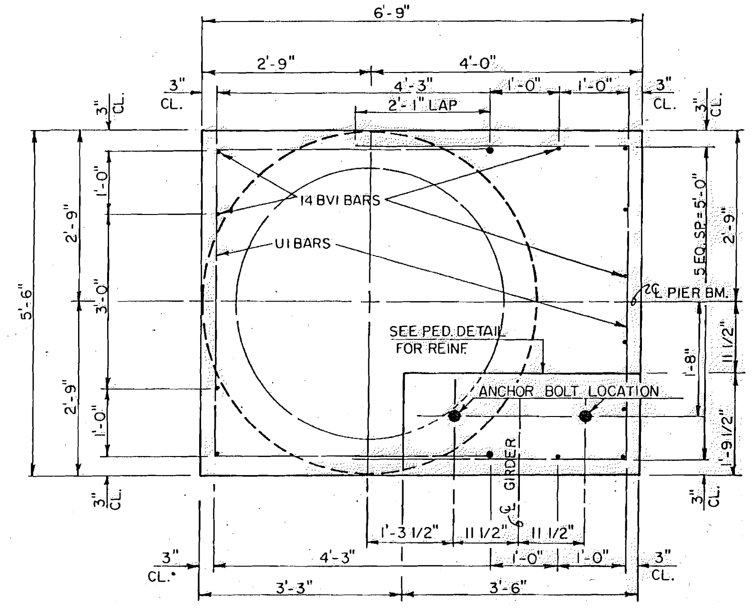
I-40 CROSSTOWN — OKLAHOMA COUNTY

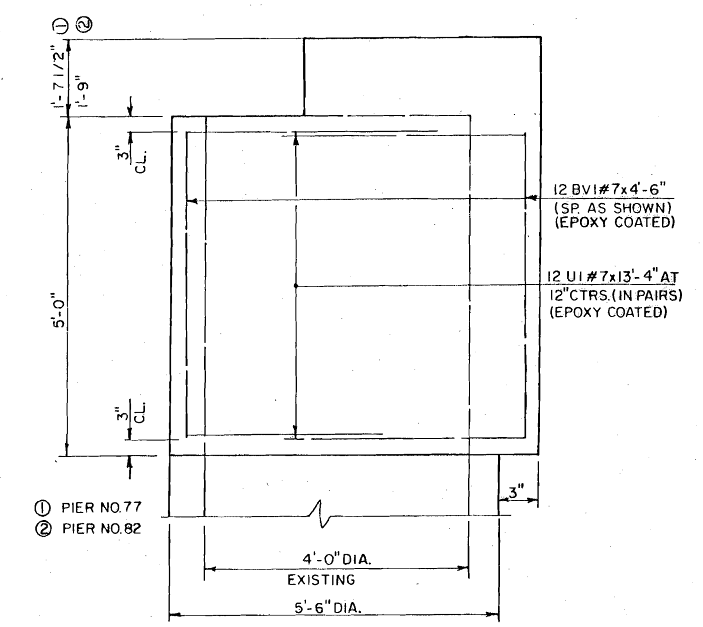
COLUMN REPAIR DETAILS	
Design	MWJ 8/89
Detail	BEW 8/89
Check	
Squad:	MC GUIRE
Engr.:	PETERS

STATE OF OKLAHOMA — DEPARTMENT OF TRANSPORTATION
PROJ. NO. ESAP-55(595) — SHEET NO. 7

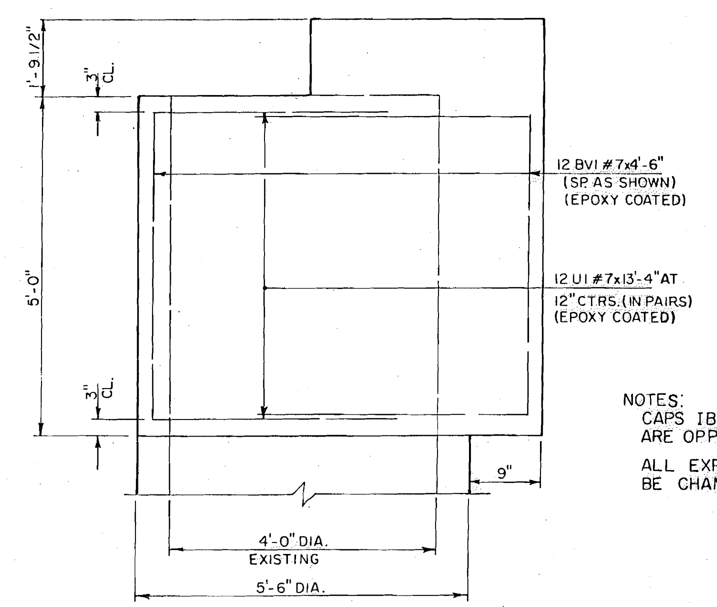








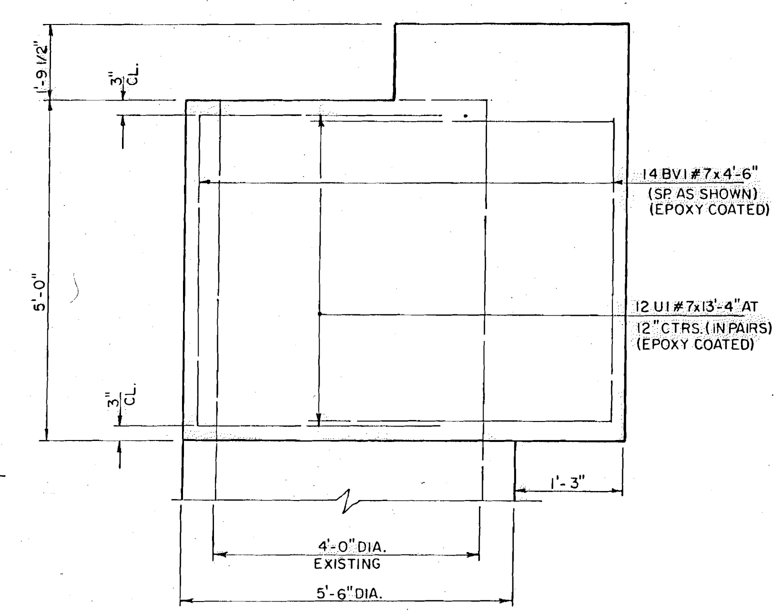
DETAIL OF TYPE IA CAP



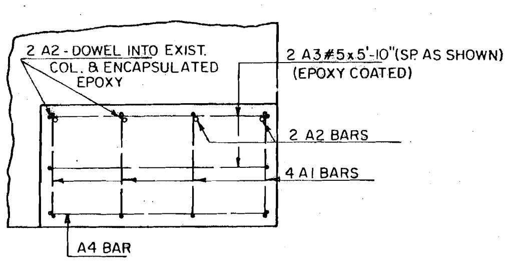
DETAIL OF TYPE IIA CAP

NOTES:
CAPS IB, IIB, & IIIB ARE OPPOSITE HAND.

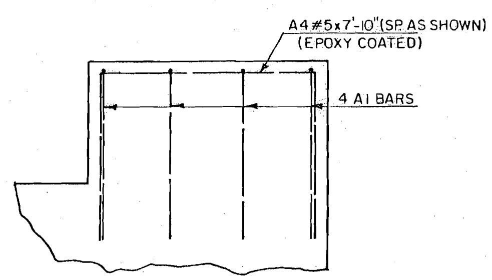
ALL EXPOSED EDGES SHALL BE CHAMFERED AT 1 1/2".



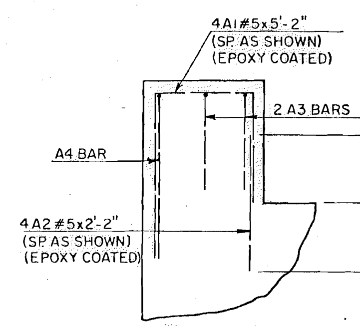
DETAIL OF TYPE IIIA CAP



PLAN

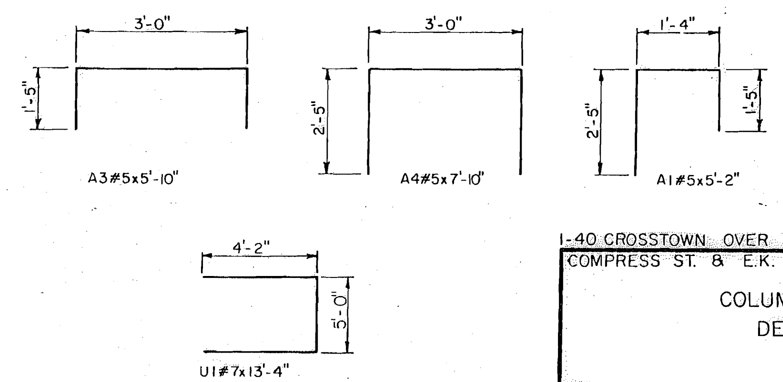


ELEVATION



END VIEW

PEDESTAL DETAIL
(TYPICAL)



REVISIONS

REV. NO.	DESCRIPTION	DATE

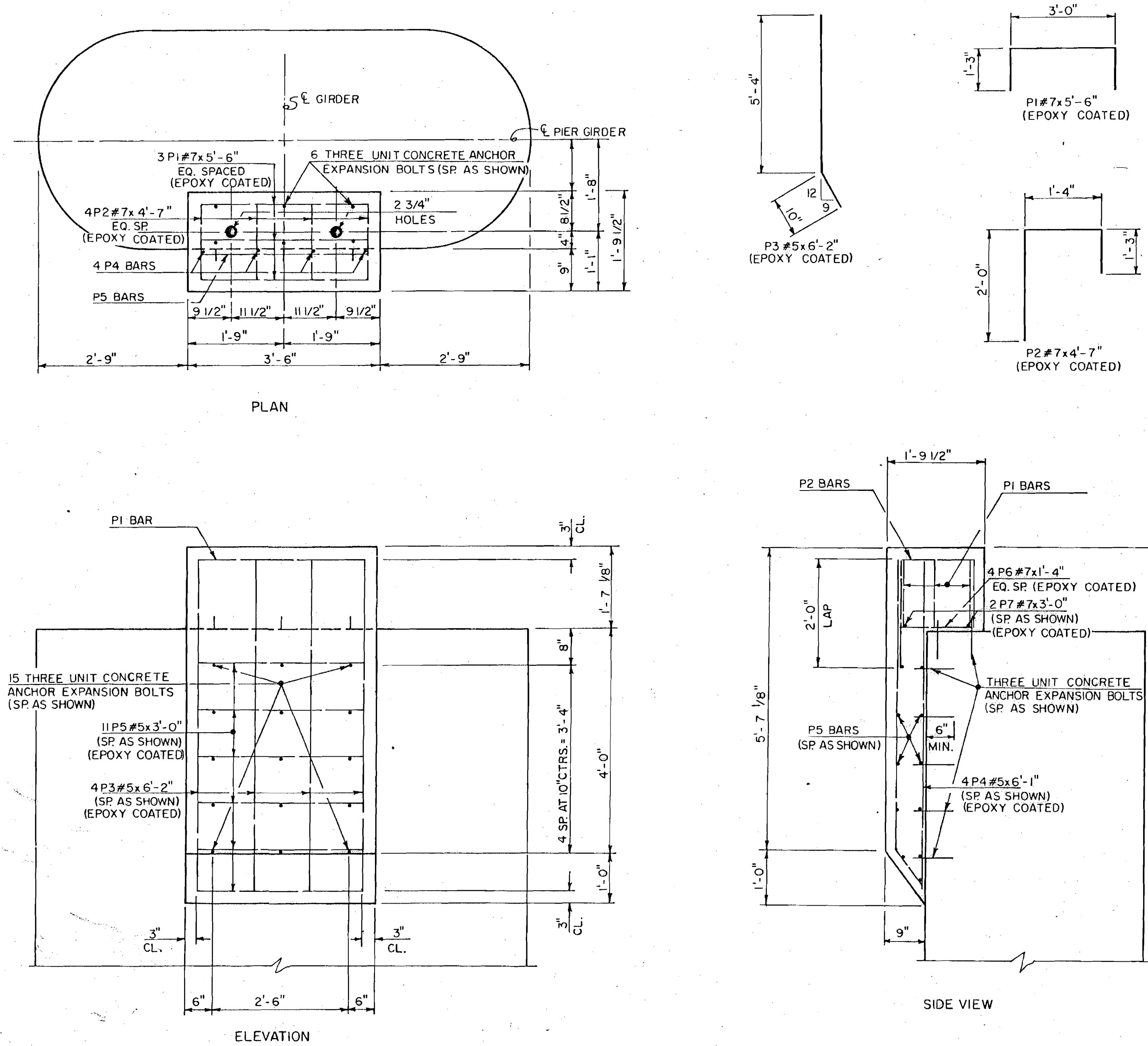
I-40 CROSSTOWN OVER COMPRESS ST. & E.K. GAYLORD — OKLAHOMA COUNTY

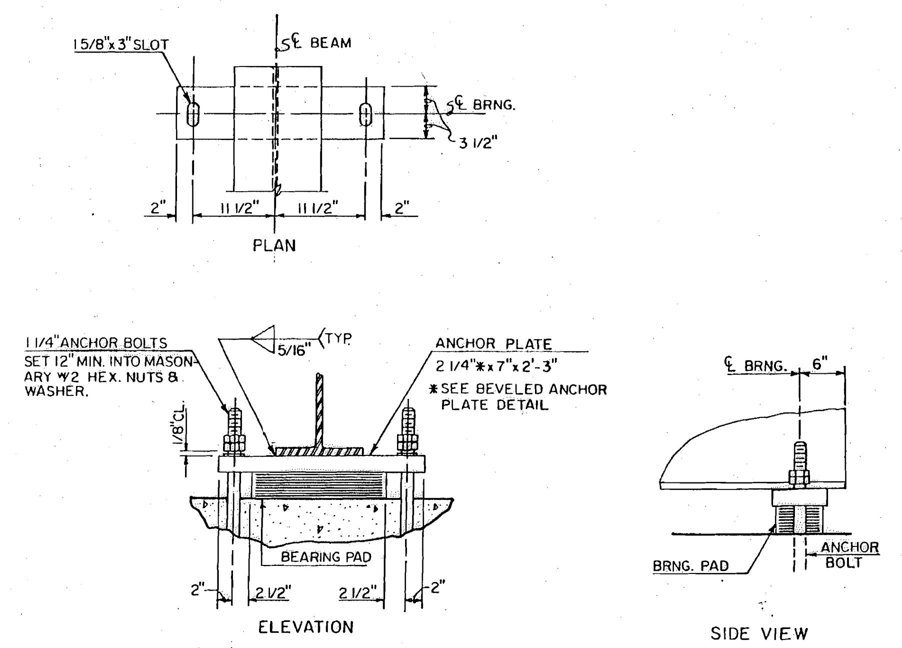
COLUMN CAP DETAILS

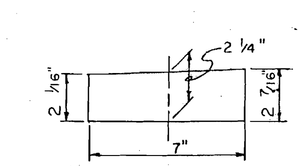
Design	MWJ 8/89
Detail	BEW 8/89
Check	
Squad:	MC GUIRE
Engr.:	PETERS

STATE OF OKLAHOMA — DEPARTMENT OF TRANSPORTATION

PROJ. NO. E-SAP-55(595) — SHEET NO. 8







BEVELED ANCHOR ℗ DETAIL

NOTE:
ALL 3-UNIT CONCRETE ANCHORS SHALL BE 3/4" DIA. x 9" LONG, EMBEDDED 6" INTO EXISTING CONCRETE.

BEARING PAD DESIGN
18"x 3 3/16"x 6" 60 DURO PAD
2 - 1/4" COVER LAYERS
8 - 1/4" INNER LAYERS
9 - 14 GA. LAMINANTS

PIER NO. 7 RAMP 22
MODIFICATION

I-40 CROSSTOWN — OKLAHOMA COUNTY

PIER MODIFICATION

Design	MWJ	8/89
Detail	BEW	8/89
Check		
Squad: MC GUIRE		
Engr.: PETERS		

STATE OF OKLAHOMA — DEPARTMENT OF TRANSPORTATION

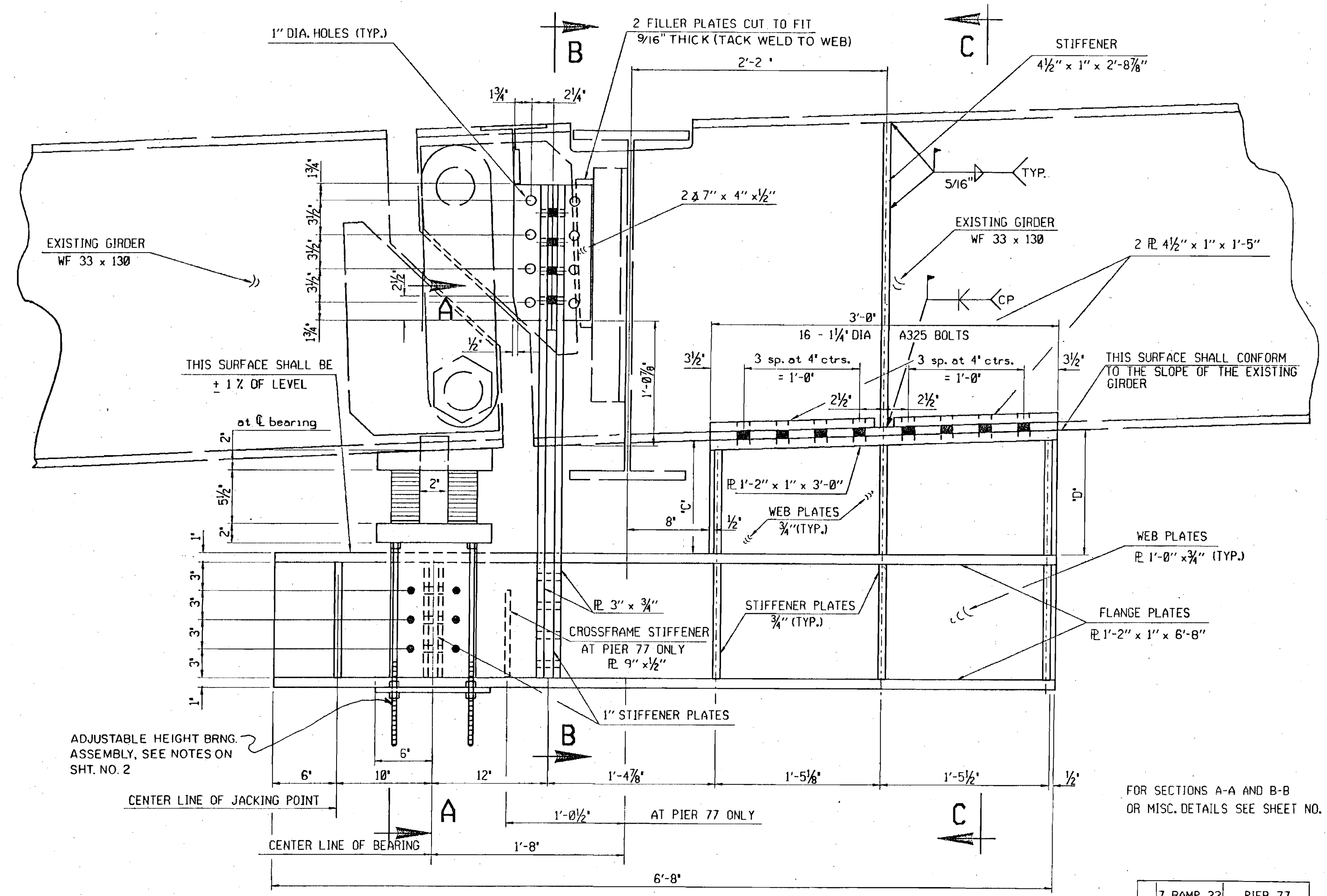
PROJ. NO. ESAP-55(595) — SHEET NO. 9

REV. NO	DESCRIPTION	DATE

REVISIONS

BEARING PAD DESIGN
12" x 5½" x 9"
60 DURO. PAD
2-¼" COVER LAYERS
11-3/8" INNER LAYERS
12-14 GA. LAMINATES

PAD VULCANIZED TO TOP & BOTTOM ANCHOR PLATES

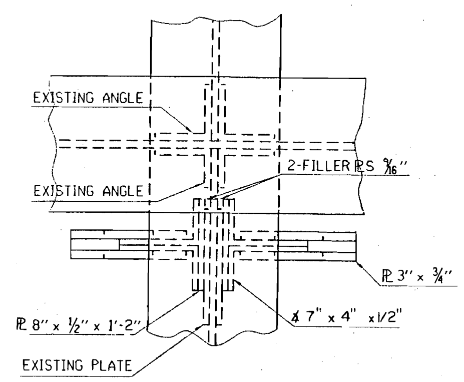


FOR SECTIONS A-A AND B-B OR MISC. DETAILS SEE SHEET NO. 12

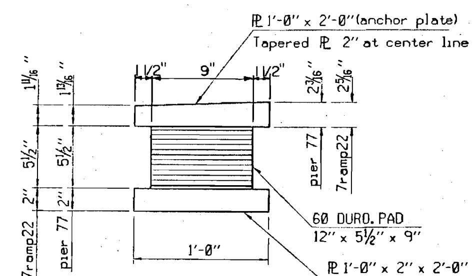
	7 RAMP 22	PIER 77
C	1'-0⅛"	11⅞"
D	1'-1⅝"	1'-0¾"

DETAIL OF BEARING SUPPORT BRACKET

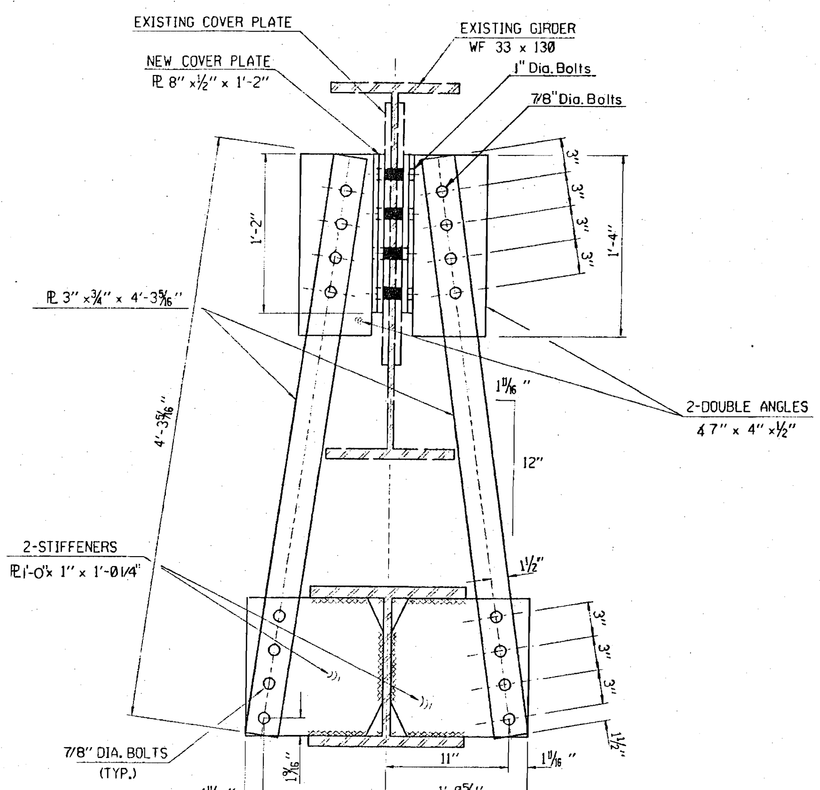
PIER 77 AND 7 RAMP 22



TOP VIEW OF SECTION B-B

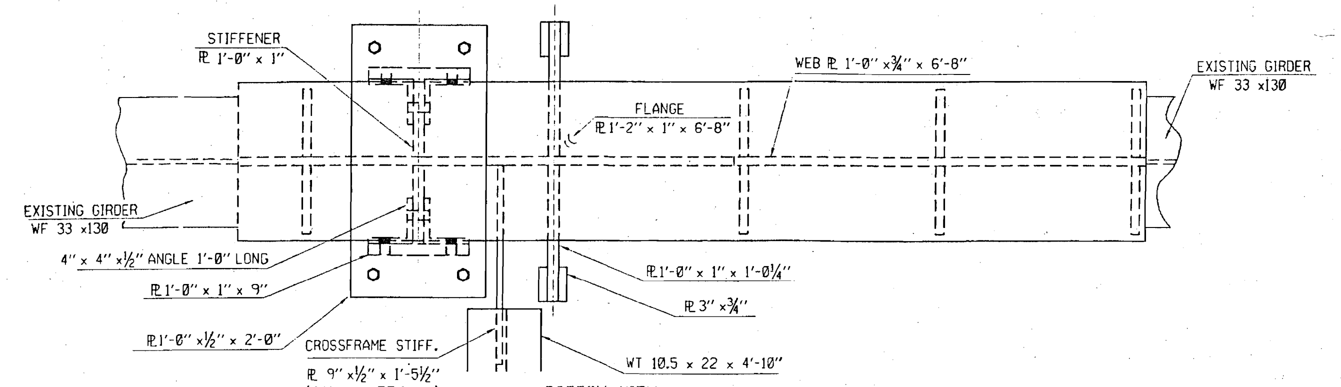


BEARING PAD & ANCHOR PLATE DETAIL FOR PIER 77 & 7 RAMP 22



SECTION B-B

PIER 77 AND 7 RAMP 22



BOTTOM VIEW

I-40 CROSSTOWN

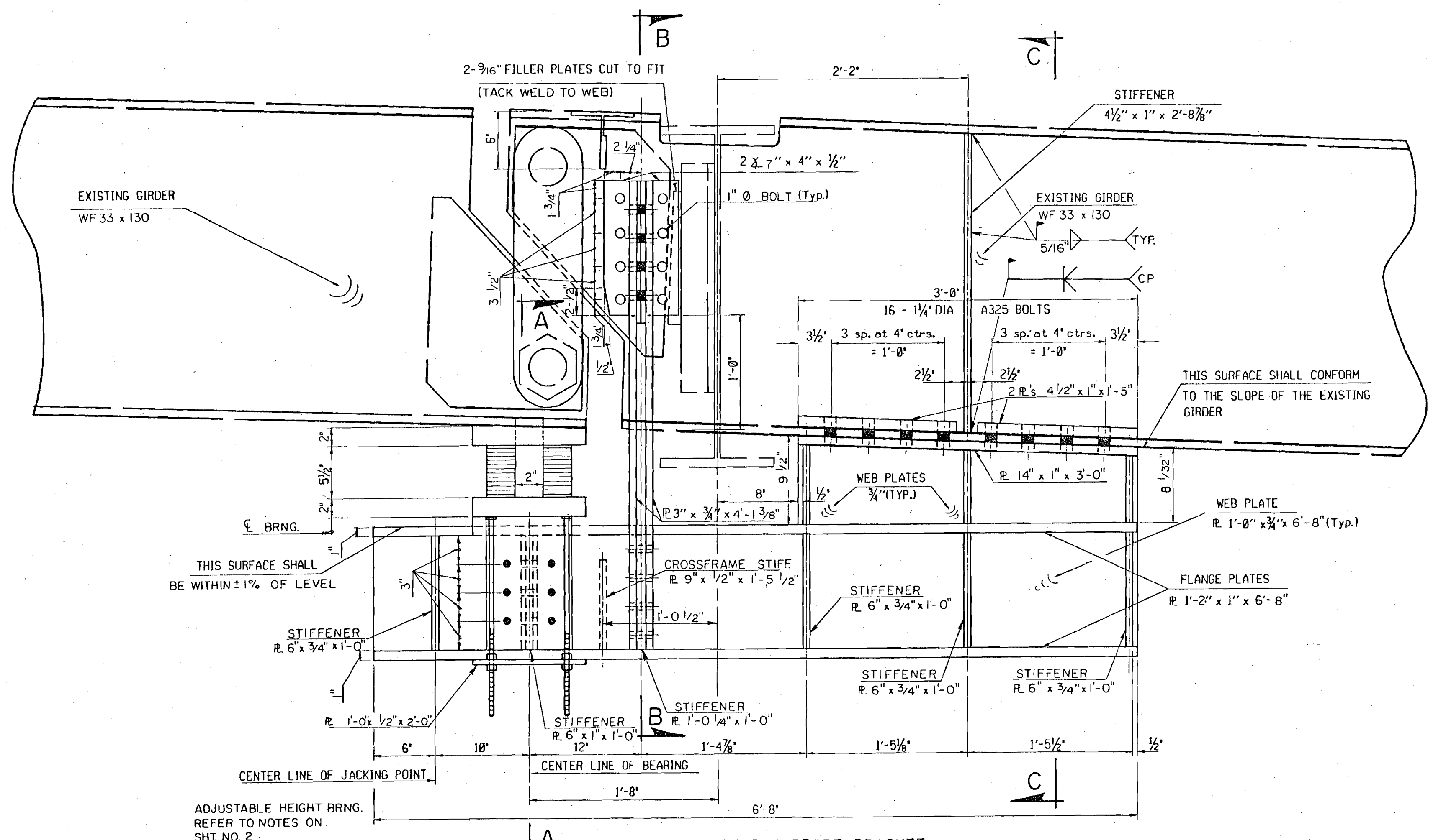
OKLAHOMA COUNTY

DETAIL OF BEARING SUPPORT BRACKET

Design	DDa	4/89
Detail	[illegible]	9/89
Check		
Squad: McGUIRE		
Engr.: PETERS		

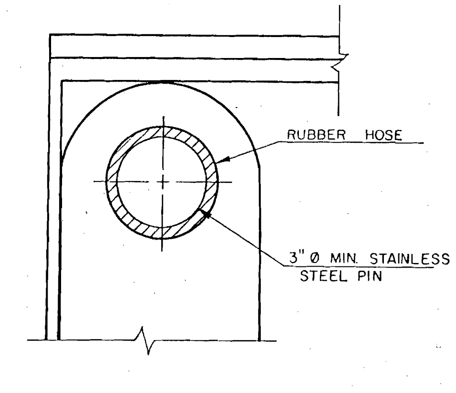
STATE OF OKLAHOMA DEPARTMENT OF TRANSPORTATION

PROJ. NO. E-SAP-55(595) SHEET NO. 10

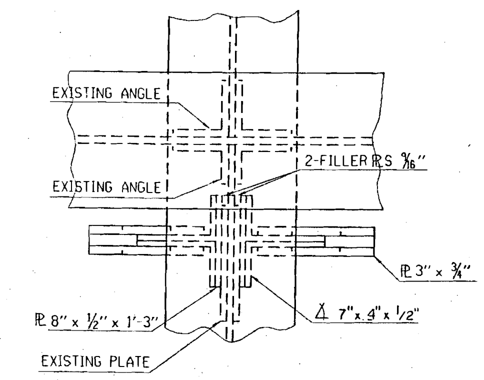


A DETAIL OF BEARING SUPPORT BRACKET

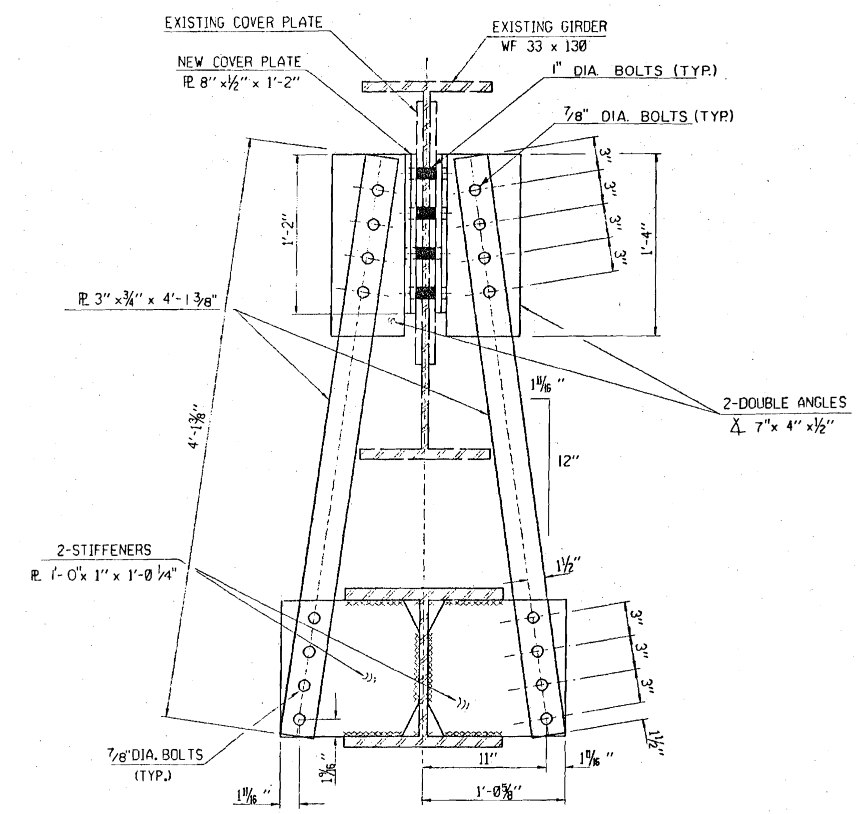
PIER 82



PIN DETAIL



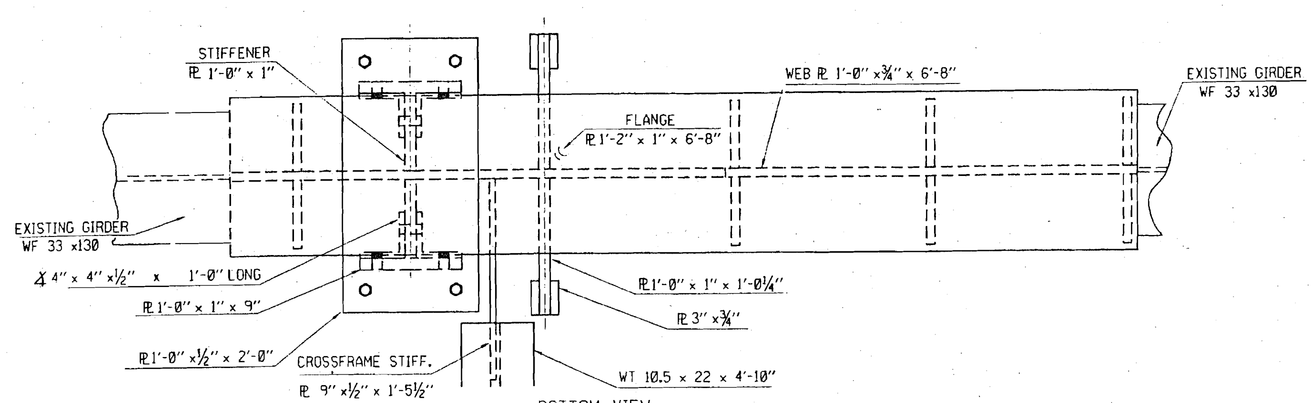
TOP VIEW OF SECTION B-B



SECTION B-B

PIER 82

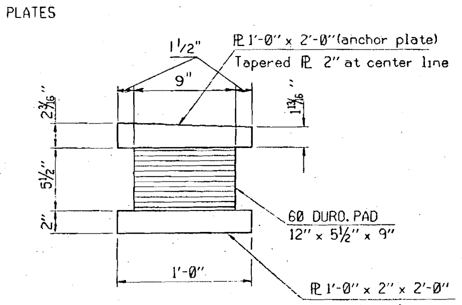
FOR SECTIONS A-A AND B-B OR MISC. DETAILS SEE SHEET NO. 12



BOTTOM VIEW

BEARING PAD DESIGN
12" x 5½" x 9"
60 DURO. PAD
2-¼" COVER LAYERS
11-3/8" INNER LAYERS
12-14 GA. LAMINATES

PAD VULCANIZED TO TOP & BOTTOM ANCHOR PLATES



BEARING PAD & ANCHOR PLATE DETAIL FOR PIER 82

I-40 CROSSTOWN — OKLAHOMA COUNTY

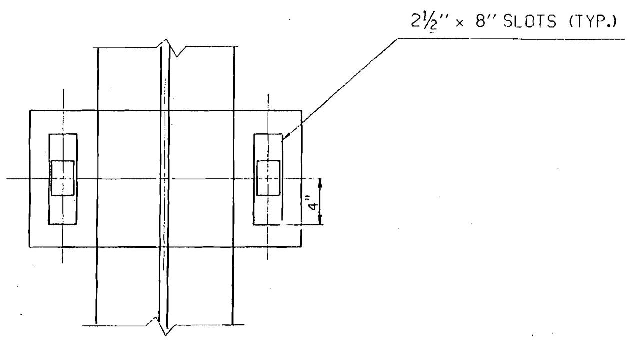
DETAIL OF BEARING SUPPORT BRACKET

Design	XDa	9/89
Detail	CwL	9/89
Check		
Squad: McGUIRE		
Engr.: PETERS		

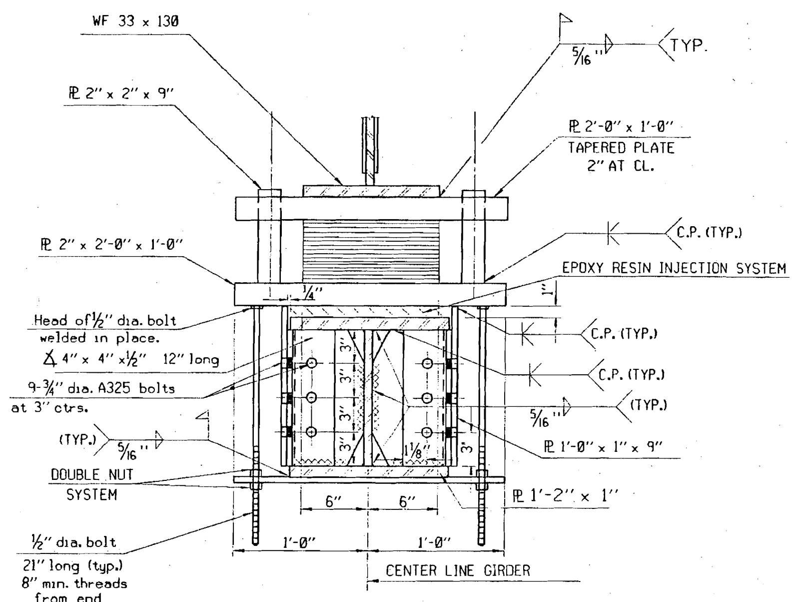
STATE OF OKLAHOMA — DEPARTMENT OF TRANSPORTATION

PROJ. NO. E-SAP-55(595) — SHEET NO. 11

REV NO	DESCRIPTION	DATE
	REVISIONS	

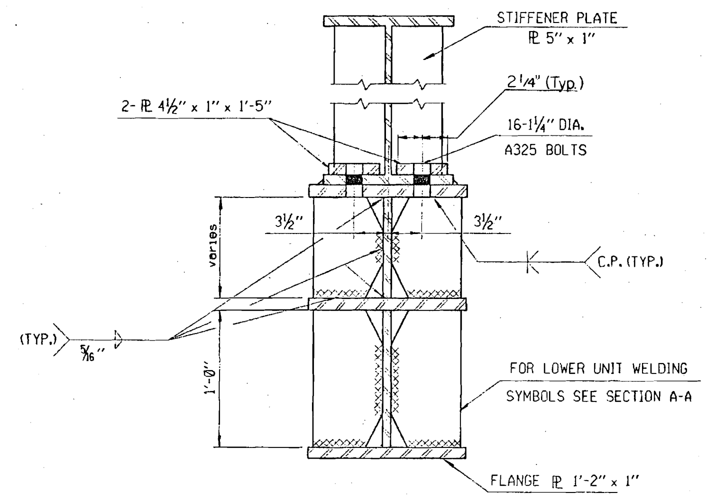


TOP VIEW OF SECTION A-A



SECTION A-A

ADJUSTABLE HEIGHT BEARING ASSEMBLY



SECTION C-C

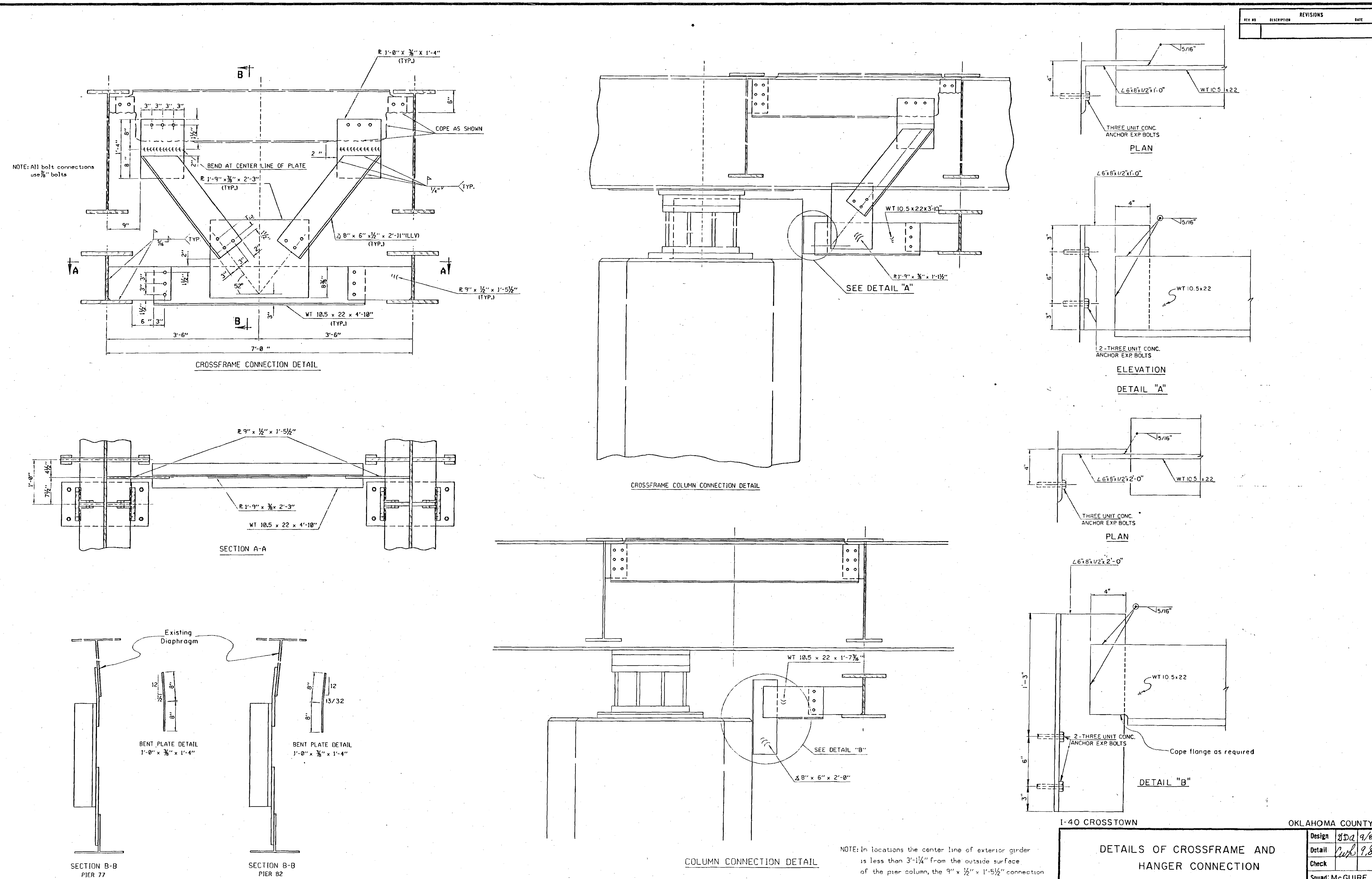
I-40 CROSSTOWN — OKLAHOMA COUNTY

MISCELLANEOUS DETAILS

Design	[illegible]	9/89
Detail	CWL	9/89
Check		
Squad: McGUIRE		
Engr.: PETERS		

STATE OF OKLAHOMA — DEPARTMENT OF TRANSPORTATION

PROJ. NO. E-SAP-55(595) — SHEET NO. 12



NOTE: In locations the center line of exterior girder is less than 3'-1 1/4" from the outside surface of the pier column, the 9" x 1/2" x 1'-5 1/2" connection plate shall change to a length of sufficient amount to connect directly to the angle on the column.

I-40 CROSSTOWN — OKLAHOMA COUNTY

DETAILS OF CROSSFRAME AND HANGER CONNECTION

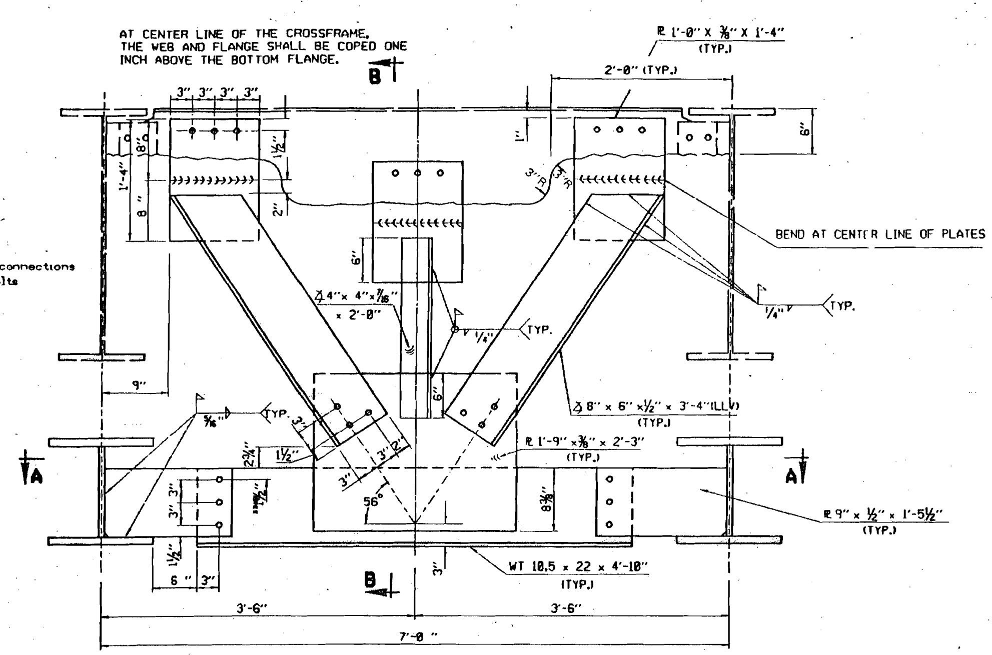
Design		9/89
Detail		9/89
Check		
Squad: McGUIRE		
Engr.: PETERS		

STATE OF OKLAHOMA — DEPARTMENT OF TRANSPORTATION

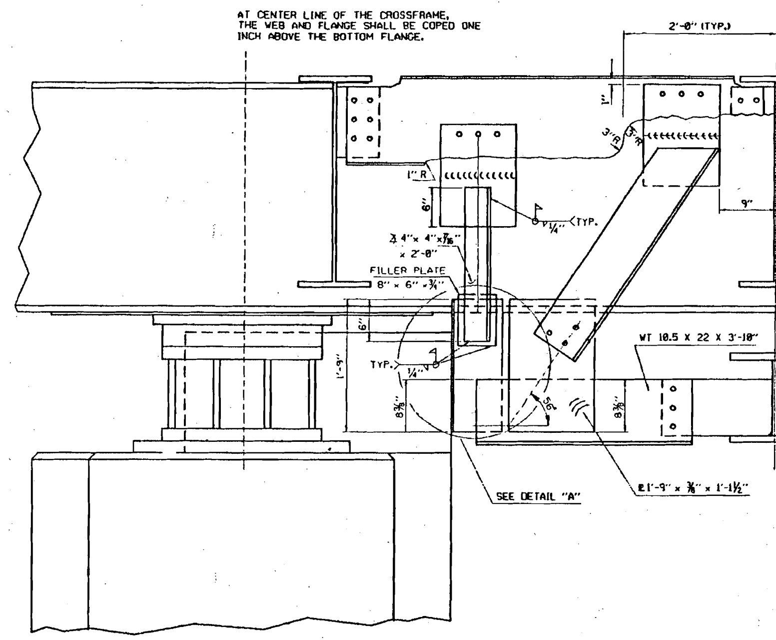
PROJ. NO. E-SAP-55(595) — SHEET NO. 13

REV. NO.	DESCRIPTION	REVISIONS	DATE

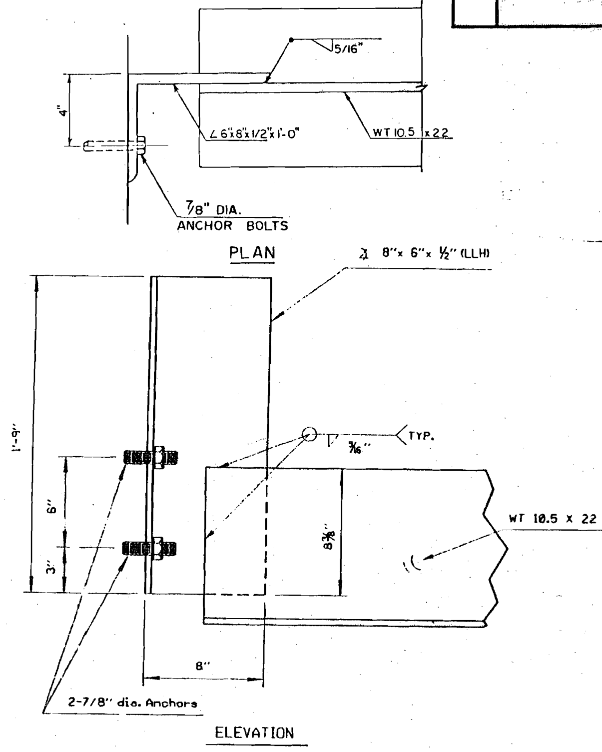
NOTE: All bolt connections use ⅞" bolts



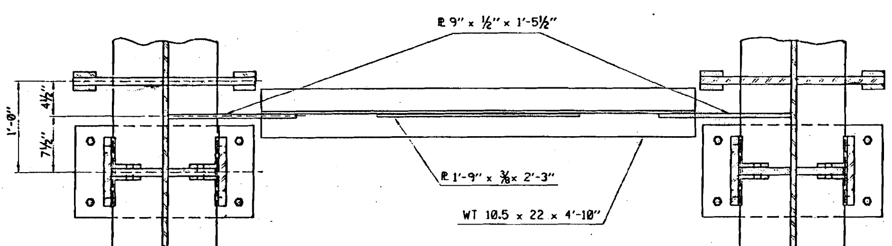
CROSSFRAME CONNECTION DETAIL



CROSSFRAME COLUMN CONNECTION DETAIL

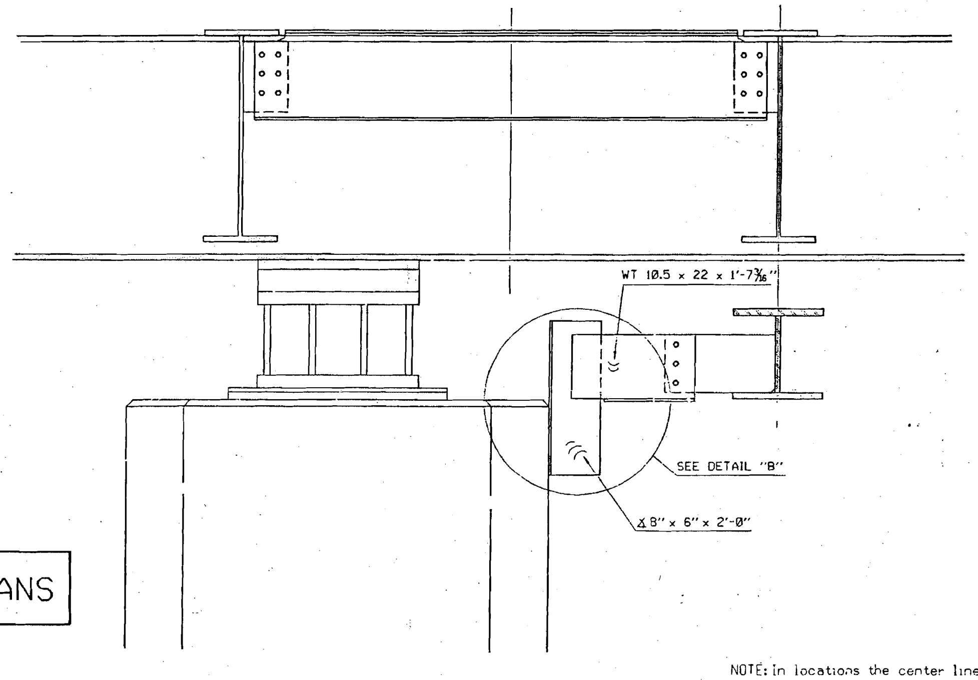


DETAIL "A"

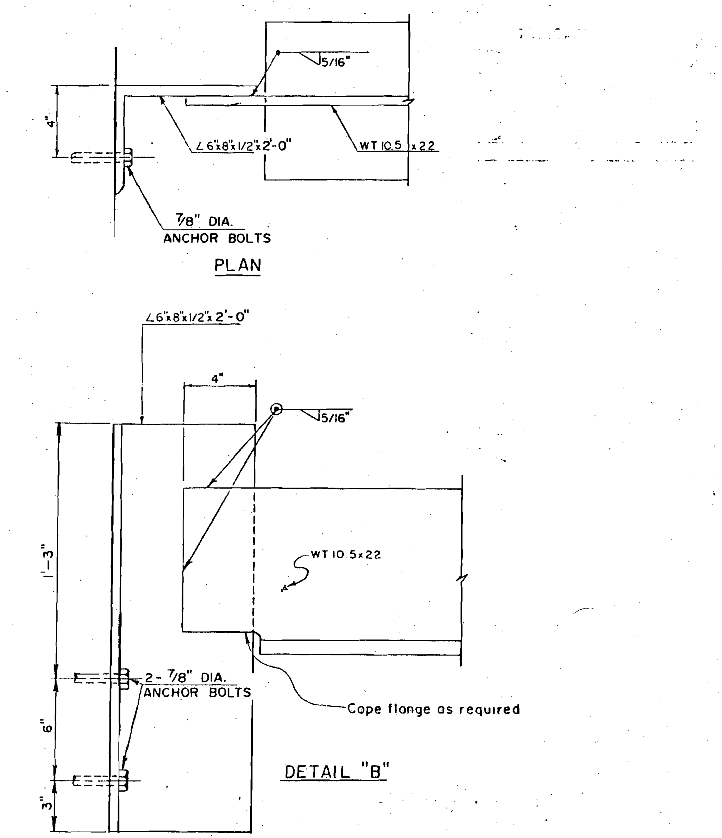


SECTION A-A

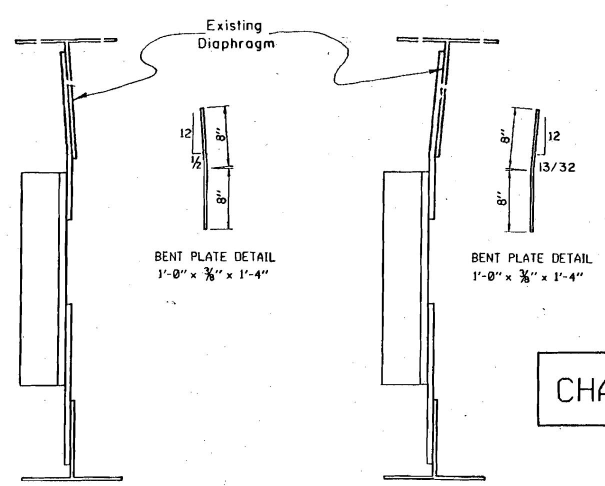
CROSSFRAME COLUMN CONNECTION DETAIL



COLUMN CONNECTION DETAIL



DETAIL "B"



SECTION B-B PIER 77

SECTION B-B PIER 82

CHANGE - IN - PLANS

NOTE: In locations the center line of exterior girder is less than 3'-1¼" from the outside surface of the pier column, the 9" x ½" x 1'-5½" connection plate shall change to a length of sufficient amount to connect directly to the angle on the column.

I-40 CROSSTOWN — OKLAHOMA COUNTY

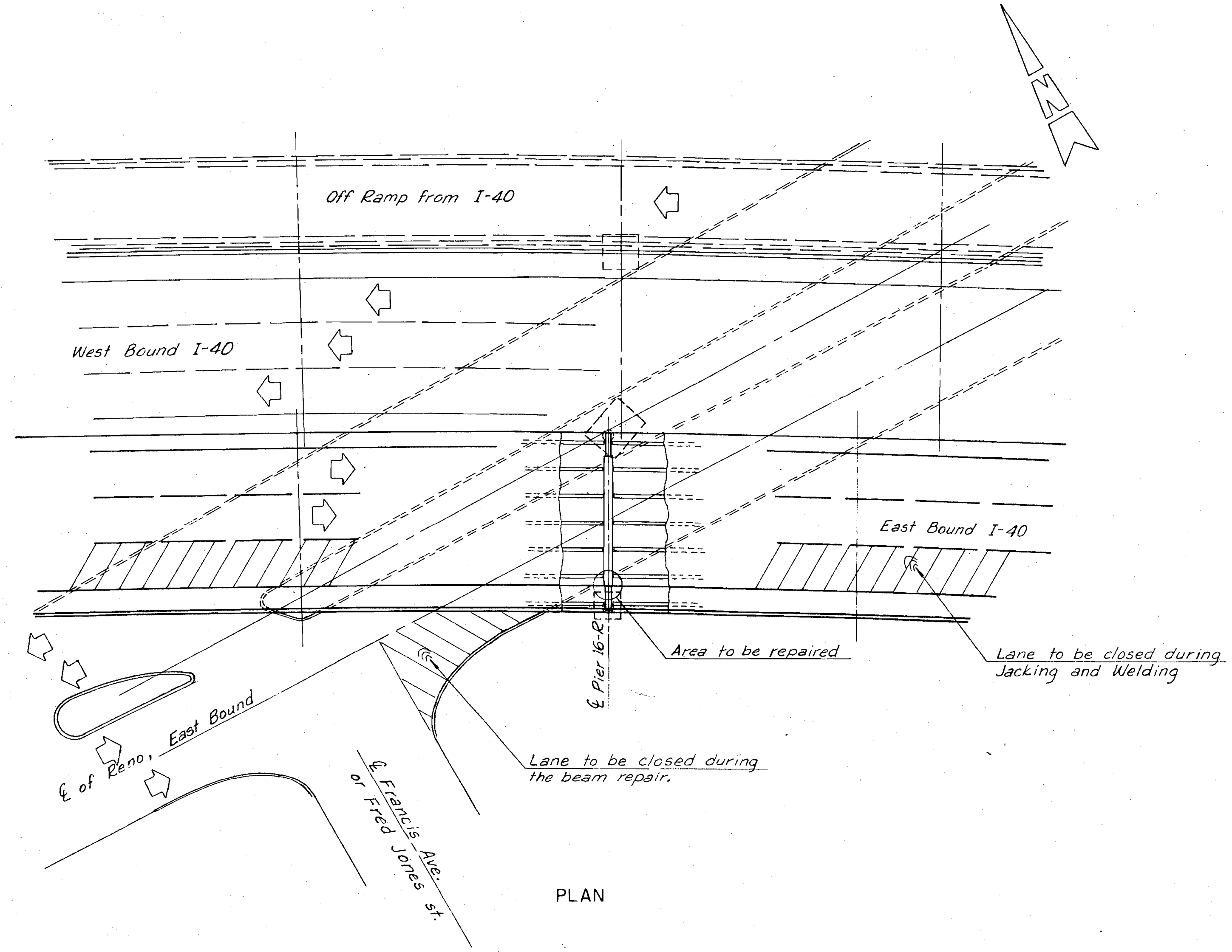
DETAILS OF CROSSFRAME AND HANGER CONNECTION

Design	JDa	9/89
Detail	Cwh	1/90
Check		
Squad: McGUIRE		
Engr.: PETERS		

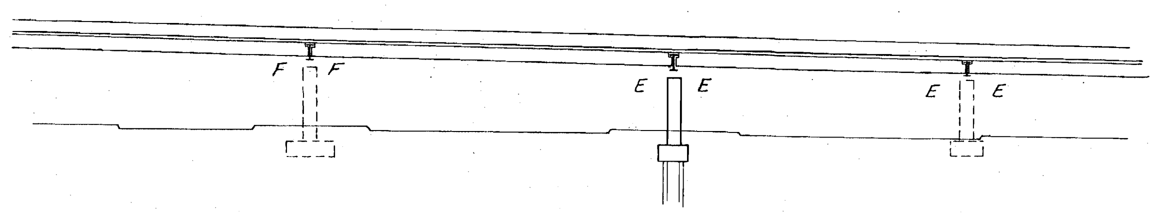
STATE OF OKLAHOMA — DEPARTMENT OF TRANSPORTATION

PROJ. NO. E-SAP-55(595) — SHEET NO. 13-A

BRUNING 40-21 69876



PLAN



ELEVATION

TRAFFIC OPERATIONS GENERAL CONSTRUCTION NOTES

DUE TO THE TEMPORARY NATURE OF CONSTRUCTION SIGNING, FOOTINGS WILL HAVE NO REINFORCING STEEL.

ALL SIGNS SHALL BE CONSTRUCTED TO MEET THE CURRENT OKLAHOMA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS.

ONE (1) WING BARRICADE SHALL BE SET ON EACH SIDE OF THE ROADWAY 250' IN ADVANCE OF THE FIRST ADVANCE WARNING SIGN IN EACH ADVANCE WARNING SERIES.

THE CONTRACTOR SHALL REPAIR OR REPLACE ANY NEW OR EXISTING SIGNS WHICH ARE DAMAGED DUE TO HIS NEGLIGENCE OR CARELESS HANDLING DURING THE CONSTRUCTION OF THIS PROJECT. THIS SHALL BE DONE AT THE CONTRACTORS EXPENSE.

TRAFFIC CONDITIONS MAY NECESSITATE CHANGES IN THE USE AND/OR QUANTITIES OF THE TRAFFIC CONTROL DEVICES AS SHOWN IN THE PLANS OR IN THE STANDARDS. ANY SUCH CHANGES ARE SUBJECT TO THE APPROVAL OF THE ENGINEER.

ANY EXISTING SIGNING CURRENTLY IN PLACE WHICH IS IN CONFLICT WITH THE INDICATED CONSTRUCTION SIGNING AS SHOWN THE PLANS, OR ON THE T.C.D. STANDARD DRAWINGS, SHALL BE EITHER COVERED OR REMOVED AND STORED FOR THE DURATION OF THE PROJECT. THESE SIGNS SHALL BE EITHER UNCOVERED OR RE-INSTALLED, BY THE CONTRACTOR, UPON COMPLETION OF THE PROJECT. COST OF THIS WORK TO BE INCLUDED IN OTHER ITEMS OF WORK.

ALL CHANNELIZING DEVICES INITIALLY PROVIDED ON THIS PROJECT SHALL BE EITHER NEW OR IN LIKE NEW CONDITION AND SHALL BE APPROVED FOR USE ON THIS PROJECT BY THE ENGINEER.

THIS PROJECT SHALL BE CONSTRUCTED WITHOUT CLOSING TRAFFIC ON CROSS STREETS. A MINIMUM OF ONE LANE IN EACH DIRECTION SHALL BE MAINTAINED AT ALL TIMES.

EXISTING ROADWAY SHALL REMAIN OPEN DURING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER BARRICADES, LIGHTS, AND SIGNING WITHIN THE LIMITS OF CONSTRUCTION. ALL CONSTRUCTION SIGNING WILL BE DONE ACCORDING TO STANDARDS SET FORTH IN THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, 1987 EDITION", AND AS SHOWN ON TCD STANDARD DRAWINGS.

PRE-CAST CONCRETE MEDIAN SHALL BE USED TO REDUCE THE EASTBOUND TRAFFIC ON RENO TO ONE (1) LANE. THE BARRIER IS INTENDED TO PROTECT THE FALSE-WORK IN PLACE UNDER I-40. A MINIMUM OF 12'-0" SHALL BE ALLOWED FOR THROUGH TRAFFIC ON RENO EASTBOUND.

IN THE CLOSURE OF THE RIGHT EASTBOUND LANE, CARE WILL BE TAKEN NOT TO RESTRICT TRAFFIC ON ANY CROSS STREETS.

TRAFFIC OPERATIONS PAY QUANTITY NOTES

All traffic quantities shall be included in the Lump Sum price bid for "Beam Repair".

The 200' of Concrete Median Barrier will be supplied by the Division. The Contractor shall unload, set, remove, and reload the Concrete Median barriers and the cost shall be included in the price bid for "Beam Repair".

During the repair work, the right lane of eastbound I-40 shall be closed to traffic.

VERIFICATION OF EXISTING CONDITIONS:

All dimensions of the existing bridge components shown on the Plans are approximate. The Contractor shall verify all dimensions necessary to connect the new material and shall be solely responsible for the accuracy thereof.

Bidders will fully inform themselves of the nature of the work and condition under which it will be performed. The Contractor shall adopt methods consistent with good construction practice and shall take all necessary precautions to prevent damage to the existing bridge or attachments. Any damage to the existing bridge structure or roadway due to the Contractor's negligence shall be repaired at the Contractor's expense, to the satisfaction of the Engineer.

See Title Sheet for required Traffic std's.

TRAFFIC – QUANTITIES			
ITEM NO.	ITEM	UNIT	TOTAL
880 (C)	Advanced Warning Device (Type C)	S.D.	30
880 (D)	Signs 0 to 6.25 S.F.	S.D.	300
880 (E)	Signs 6.25 to 15.99 SF	S.D.	240
880 (F)	Signs 16.0 to 32.99 SF	S.D.	300
880 (H)	Barricades (Type I)	S.D.	60
880 (I)	Barricades (Type II)	S.D.	60
880 (J)	Barricades (Type III)	S.D.	180
880 (K)	Wing Barricades	S.D.	120
880 (M)	Type A Light	S.D.	180
880 (O)	Type C Light	S.D.	750
880 (P)	Drums	S.D.	750

REVISIONS		
REV. NO.	DESCRIPTION	DATE

BRIDGE NOTES

SPECIFICATIONS:

All construction and materials shall be in accordance with the 1988 Oklahoma Standard Specifications for Highway Construction and Special Provisions. (See Proposal for Special Provisions).

"Falsework and Jacking" shall include all excavation, backfilling of excavated void, metal strapping, structural steel, timber, jacks, welds, labor, materials and incidentals necessary to complete beam repair. All "Falsework and Jacking" shall be included in the price bid for "Beam Repair".

The Contractor shall have the option of using used steel provided the sections meet or exceed member sizes shown on the plans.

The materials used for the Falsework shall remain the property of the Contractor after the repair is completed.

Structural Steel requirements shall be waived for the falsework assemblies.

Careful attention shall be taken to insure that the column sections of the falsework assemblies are vertical.

The location of the Pier crossbeam stiffener plates shall be determined after the column sections of the falsework assemblies are erected.

Metal strapping or approved alternate shall be wrapped around the column a minimum of three (3) double wraps as approved by the Engineer. The minimum size of metal straps shall be two (2) inches.

Care shall be taken to avoid overtensioning the straps at the column falsework assembly. Small timber spacers may be used, if necessary.

After the Contractor has excavated to expose the top of the footing, the area where the sole plate is to be placed shall be sandblasted and ground with carborundum brick before placement of the piling sole plates. If leveling is necessary, this shall be achieved with shim plates (plywood may be used as directed by the Engineer). Leveling shall be done before metal straps are wrapped at the third point of the columns. All cost of bearing shims shall be included in "Falsework and Jacking".

The jacks shall be placed directly under the web of the crossbeam.

Jacking shall be done concurrently at both falsework assemblies.

Jacking shall stop when the crossbeam has been lifted approximately 1/8" off of the existing shoe.

Total required jacking force is approximately 200 tons.

Ø **The contractor shall saw off (Do Not Torch Cut) a 2 1/2" x 2 1/2" (min.) piece of the Top Flange at the end of the damaged pier beam. The sample is needed by the Department for a charpy V-notch test. See sheet no. 15 for detail.**

Pay Item "Beam Repair" shall include all costs of preheating, removing cracked metal, welding flange, spot painting of the affected area and additional stiffener plates, and labor, materials, and incidentals necessary to complete crack repair and "Falsework and Jacking".

Painting and preparation shall be done in accordance with Sections 506.04(d) and 730.04(c) of the 1988 Oklahoma Standard Specifications for Highway Construction.

Primers meeting SSPC specifications for paint #11 may be substituted for red lead and basic lead silico chromate primers.

The beam shall be sufficiently heated before welding repair shall begin. All cracked metal shall be removed thoroughly. The removal of crack shall extend the entire width of the flange to insure complete removal of insufficient metal. All heating of beam, removal of unsound metal and welding shall conform to the Bridge Welding Code ANSI/AASHTO/AWS D1.5 (including current revisions). Also, welding shall conform to the 1988 Oklahoma Standard Specifications for Highway Construction except that the references to AWS D1.1 will be replaced by ANSI/AASHTO/AWS D1.5.

INSPECTION REQUIREMENTS:

Radiographic and Ultrasonic or Magnetic Particle Inspection will be required for the repair weld on the beam.

QUANTITIES			
ITEM NO.	ITEM	UNIT	TOTAL
900.39 Sp.	Beam Repair	L.Sum	1.

CHANGE OF PLANS NO._______

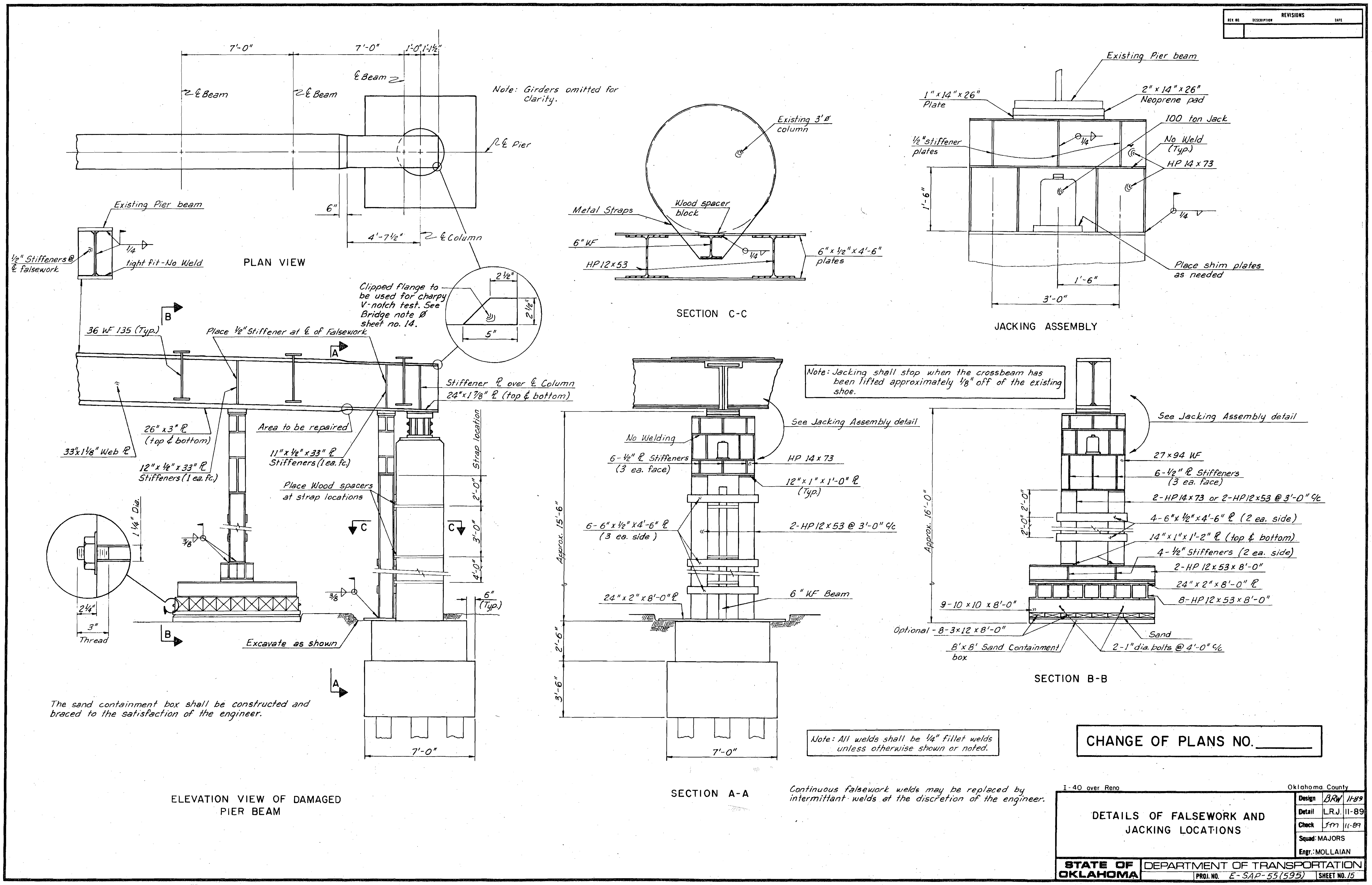
I-40 over Reno — Oklahoma County

LOCATION OF CONSTRUCTION AND GENERAL NOTES

Design	?KW	11-89
Detail	K.W.	11-89
Check	Jm	11-89
Squad: MAJORS		
Engr.: MOLLAIAN		

STATE OF OKLAHOMA — DEPARTMENT OF TRANSPORTATION

PROJ. NO. E-SAP-55(595) — SHEET NO. 14



REVISIONS
REV. NO. DESCRIPTION DATE
7'-0"
7'-0"
1'-0" 1'-1½"
℄ Beam
℄ Beam
℄ Beam
Note: Girders omitted for clarity.
℄ Pier
6"
4'-7½"
℄ Column
PLAN VIEW
Existing Pier beam
½" Stiffeners @ ℄ falsework
¼
tight fit-No Weld
Clipped flange to be used for charpy V-notch test. See Bridge note Ø sheet no. 14.
2½"
2½"
5"
36 WF 135 (Typ.)
Place ½" Stiffener at ℄ of Falsework
B
A
Stiffener ℞ over ℄ Column
24"x1⅞" ℞ (top & bottom)
26" x 3" ℞ (top & bottom)
33"x1⅛" Web ℞
12" x ½" x 33" ℞ Stiffeners (1 ea. fc.)
Area to be repaired
11" x ½" x 33" ℞ Stiffeners (1 ea. fc.)
Place Wood spacers at strap locations
Strap location
2'-0"
3'-0"
4'-0"
6" (Typ.)
C
C
⅜
⅜
1¼" Dia.
2¼"
3" Thread
Excavate as shown
7'-0"
The sand containment box shall be constructed and braced to the satisfaction of the engineer.
ELEVATION VIEW OF DAMAGED PIER BEAM
Existing 3' Ø column
Metal Straps
Wood spacer block
6" WF
HP 12x53
¼
6" x ½" x 4'-6" plates
SECTION C-C
Note: Jacking shall stop when the crossbeam has been lifted approximately ⅛" off of the existing shoe.
See Jacking Assembly detail
No Welding
6-½" ℞ Stiffeners (3 ea. face)
HP 14 x 73
12" x 1" x 1'-0" ℞ (Typ.)
6-6" x ½" x 4'-6" ℞ (3 ea. side)
2-HP 12 x 53 @ 3'-0" c/c
24" x 2" x 8'-0" ℞
6" WF Beam
Approx. 15'-6"
2'-6"
3'-6"
7'-0"
SECTION A-A
Existing Pier beam
1" x 14" x 26" Plate
2" x 14" x 26" Neoprene pad
100 ton Jack
½" stiffener plates
No Weld (Typ.)
HP 14 x 73
1'-6"
¼
Place shim plates as needed
1'-6"
3'-0"
JACKING ASSEMBLY
See Jacking Assembly detail
27 x 94 WF
6-½" ℞ Stiffeners (3 ea. face)
2-HP 14 x 73 or 2-HP 12 x 53 @ 3'-0" c/c
4-6" x ½" x 4'-6" ℞ (2 ea. side)
14" x 1" x 1'-2" ℞ (top & bottom)
4-½" Stiffeners (2 ea. side)
2-HP 12 x 53 x 8'-0"
24" x 2" x 8'-0" ℞
8-HP 12 x 53 x 8'-0"
9-10 x 10 x 8'-0"
Optional - 8-3 x 12 x 8'-0"
Sand
8' x 8' Sand Containment box
2-1" dia. bolts @ 4'-0" c/c
Approx. 16'-0"
2'-0" 2'-0"
SECTION B-B
Note: All welds shall be ¼" fillet welds unless otherwise shown or noted.
CHANGE OF PLANS NO.
Continuous falsework welds may be replaced by intermittant welds at the discretion of the engineer.
I-40 over Reno
Oklahoma County
DETAILS OF FALSEWORK AND JACKING LOCATIONS
Design BRW 11-89
Detail L.R.J. 11-89
Check JM 11-89
Squad: MAJORS
Engr.: MOLLAIAN
STATE OF OKLAHOMA
DEPARTMENT OF TRANSPORTATION
PROJ. NO. E-SAP-55(595)
SHEET NO. 15

Pennsylvania Department of Transportation

Design drawings – catcher beam system.

GENERAL NOTES

THE WORK OF THIS CONTRACT INCLUDES INSTALLATION OF AUXILIARY SUPPORT BEAMS LOCATED BENEATH THE GIRDERS AT THE HINGE LOCATIONS IN SPANS 3 AND 6 OF THE WESTBOUND STRUCTURE AND SPANS 3 AND 5 OF THE EASTBOUND STRUCTURE.

DETAILS AND DIMENSIONS SHOWN ON THESE DRAWINGS TO DESCRIBE THE EXISTING STRUCTURE WERE TAKEN FROM THE DRAWINGS FROM WHICH THE STRUCTURE WAS ORIGINALLY BUILT AND MAY NOT REFLECT PRESENT CONDITIONS. VERIFY ALL DIMENSIONS AND GEOMETRY OF THE EXISTING STRUCTURE IN THE FIELD, AS NECESSARY, FOR PROPER FIT OF THE PROPOSED CONSTRUCTION.

CONTRACT PLANS AND SHOP DRAWINGS FOR THE EXISTING BRIDGE ARE AVAILABLE FROM THE PENNSYLVANIA DEPARTMENT OF TRANSPORTATION, AT A NOMINAL REPRODUCTION COST. CONTACT DISTRICT BRIDGE ENGINEER TO MAKE ARRANGEMENTS FOR ORDERING A SET OF CONTRACT PLANS AND FOR SELECTING THOSE SHOP DRAWINGS REQUIRED. DO NOT ASSUME THAT ALL THE SHOP DRAWINGS RELATING TO THE PROPOSED NEW WORK ARE AVAILABLE. DO NOT CONSIDER ANY OF THE DATA ON THE EXISTING STRUCTURE SUPPLIED IN THE ORIGINAL DESIGN DRAWINGS OR MADE AVAILABLE BY THE DEPARTMENT OR ITS AUTHORIZED AGENTS, AS POSITIVE REPRESENTATIONS OF ANY OF THE CONDITIONS THAT WILL BE ENCOUNTERED IN THE FIELD. THIS INFORMATION IS NOT PART OF THE PLANS, PROPOSAL, OR CONTRACT, AND IS NOT TO BE CONSIDERED A BASIS FOR COMPUTATION OF THE UNIT PRICES USED FOR BIDDING PURPOSES. THERE IS NO EXPRESSED OR IMPLIED AGREEMENT THAT INFORMATION IS CORRECTLY SHOWN. ASSUME THE POSSIBILITY THAT CONDITIONS AFFECTING THE COST AND/OR QUANTITIES OF WORK TO BE PERFORMED MAY DIFFER FROM THOSE INDICATED.

PROVIDE ALL MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH PENNSYLVANIA DEPARTMENT OF TRANSPORTATION SPECIFICATIONS PUBLICATION 408/87, CURRENT SUPPLEMENTS, AASHTO/AWS BRIDGE WELDING CODE D1.5-88 AND CONTRACT SPECIAL PROVISIONS.

PROVIDE STRUCTURAL STEEL CONFORMING TO ASTM A633, GRADE E, 60 KSI Y.P., EXCEPT WHERE NOTED OTHERWISE. PROVIDE STRUCTURAL STEEL CONFORMING TO ASTM A36 FOR STEEL DENOTED A36, AND CONFORMING TO ASTM A572 WHERE STEEL IS DENOTED A572.

FABRICATE AUXILIARY SUPPORT BEAM FLANGE PLATES, WEB PLATES AND STIFFENERS AND BEARING PLATE ASSEMBLIES USING ASTM A633 STRUCTURAL STEEL TO CONFORM TO THE REQUIREMENTS OF AASHTO GUIDE SPECIFICATIONS FOR FRACTURE-CRITICAL NON-REDUNDANT STEEL BRIDGE MEMBERS. PROVIDE MATERIAL CONFORMING TO THE BASE METAL CHARPY V-NOTCH REQUIREMENTS LISTED IN THE SPECIAL PROVISIONS.

FABRICATE ALL FRACTURE CRITICAL COMPONENTS AT AN AISC CATEGORY III FABRICATION SHOP WITH FRACTURE CRITICAL CERTIFICATION.

DESIGN SPECIFICATIONS ARE DIVISION I OF 1983 AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES INCLUDING INTERIMS THROUGH THE 1986 INTERIM SPECIFICATIONS AND AS SUPPLEMENTED BY THE PENNSYLVANIA DEPARTMENT OF TRANSPORTATION DESIGN MANUAL, PART 4 (INCLUDING CURRENT REVISIONS.)

LIVE LOAD DISTRIBUTION TO GIRDERS IS BASED UPON THE AASHTO METHOD.

DEAD LOAD INCLUDES THE ORIGINAL WEIGHT OF THE STRUCTURE AND 30 POUNDS PER SQUARE FOOT FOR FUTURE WEARING SURFACE ON THE DECK SLAB.

LIVE LOAD IS HS25 APPLIED BY THE LOAD FACTOR METHOD. A LIVE LOAD OF THE PENNSYLVANIA PERMIT LOAD P-82 AND 125 PERCENT OF THE ALTERNATE MILITARY LOADING ARE ALSO APPLIED BY THE LOAD FACTOR METHOD.

IN ADDITION TO THE NORMAL REQUIREMENTS OF PENNDOT AND AASHTO, THE DESIGN OF PORTIONS OF THE PROPOSED CONSTRUCTION IS CONTROLLED BY THE STRESSES OCCURRING AT THE INSTANT THE AUXILIARY SUPPORT SYSTEM BECOMES ACTIVE (WHEN A PORTION OF THE STRUCTURE WILL DROP A SHORT DISTANCE). FOR THIS CASE, A DYNAMIC IMPACT FACTOR IS APPLIED TO ALL LOADS AND THE FOLLOWING LOAD COMBINATIONS ARE USED.

HS20 LOADING:	1.30 (D + L + I) (DYNAMIC FACTOR)*
HS25 LOADING:	1.20 (D + L + I) (DYNAMIC FACTOR)*
P-82 PLUS HS25:	1.05 (D + L + I) (DYNAMIC FACTOR)*

MEMBERS SUBJECT TO THESE LOADINGS ARE EVALUATED AT LOAD FACTOR OPERATING RATING STRESS LEVELS. THE "STRENGTH-IN-EXCESS-OF-FIRST-YIELD" CAPACITY IS NOT USED. THE OVERLOAD PROVISIONS OF AASHTO DO NOT APPLY.

FATIGUE DESIGN IS BASED ON AN ADTT OF 6000 WITH 2,000,000 CYCLES OF AASHTO HS25 TRUCK LOADING.

ALL DIMENSIONS SHOWN ARE PARALLEL AND NORMAL TO THE AXIS OF THE MAIN GIRDERS, EXCEPT AS NOTED.

DIMENSIONS SHOWN FOR NEW STEEL ARE FOR A NORMAL TEMPERATURE OF 68 DEGREES F.

FIELD SPLICES OF NEW AUXILIARY SUPPORT BEAM ARE NOT PERMITTED.

ALL NEW FASTENERS ARE ASTM-A325 HIGH-STRENGTH BOLTS, UNLESS NOTED AS ASTM-A490 HIGH STRENGTH BOLTS.

FILL ANY BOLT HOLES NOT USED AS PART OF THE FINAL CONSTRUCTION WITH HIGH-STRENGTH BOLTS.

PAINT NEW STRUCTURAL STEEL IN ACCORDANCE WITH PUBLICATION 408/87, SECTION 1060. PAINT EXISTING STRUCTURAL STEEL IN ACCORDANCE WITH SECTION 1070.

FIELD-WELDING ON ANY PART OF THE EXISTING BRIDGE IS NOT PERMITTED WITHOUT PRIOR APPROVAL OF THE ENGINEER.

THE MINIMUM RADIUS FOR RE-ENTRANT CUTS IS 2".

IN PERFORMANCE OF WORK OPERATIONS, EXERCISE CARE TO PREVENT DAMAGE TO THOSE PORTIONS OF THE STRUCTURE WHICH WILL REMAIN IN PLACE. REPAIR OR REPLACE ANY PORTION OF THE STRUCTURE DAMAGED BY CONSTRUCTION OPERATIONS, AT THE DISCRETION OF THE ENGINEER, AND AT NO ADDITIONAL COST TO THE DEPARTMENT. PERFORM THIS WORK TO THE SATISFACTION OF THE ENGINEER.

* SEE DESIGN LOAD TABLE, SHEET 4, FOR DYNAMIC FACTOR.

SYMBOLS FOR FASTENERS

(ALL FASTENERS 7/8"⌀ UNLESS NOTED)

- • NEW FIELD-INSTALLED HIGH-STRENGTH BOLT IN NEW HOLE.
- o EXISTING BOLT TO REMAIN.
- ◌ NEW FIELD-INSTALLED HIGH-STRENGTH BOLT IN NEW HOLE, HIDDEN.

Mark	Description	By	Chk'd.	App'd.	Date

REVISIONS

S.R. 0080 PREVIOUSLY KNOWN AS L.R. 1009

Commonwealth of Pennsylvania

DEPARTMENT OF TRANSPORTATION

CLEARFIELD-CENTRE COUNTIES
S.R. 0080 SECTION B13
SEGMENT 1382 OFFSET 000
S.R. 0080-000 STA. 0+00
OVER MOSHANNON CREEK
MULTIPLE SPAN WELDED PLATE GIRDER BRIDGES
GENERAL NOTES

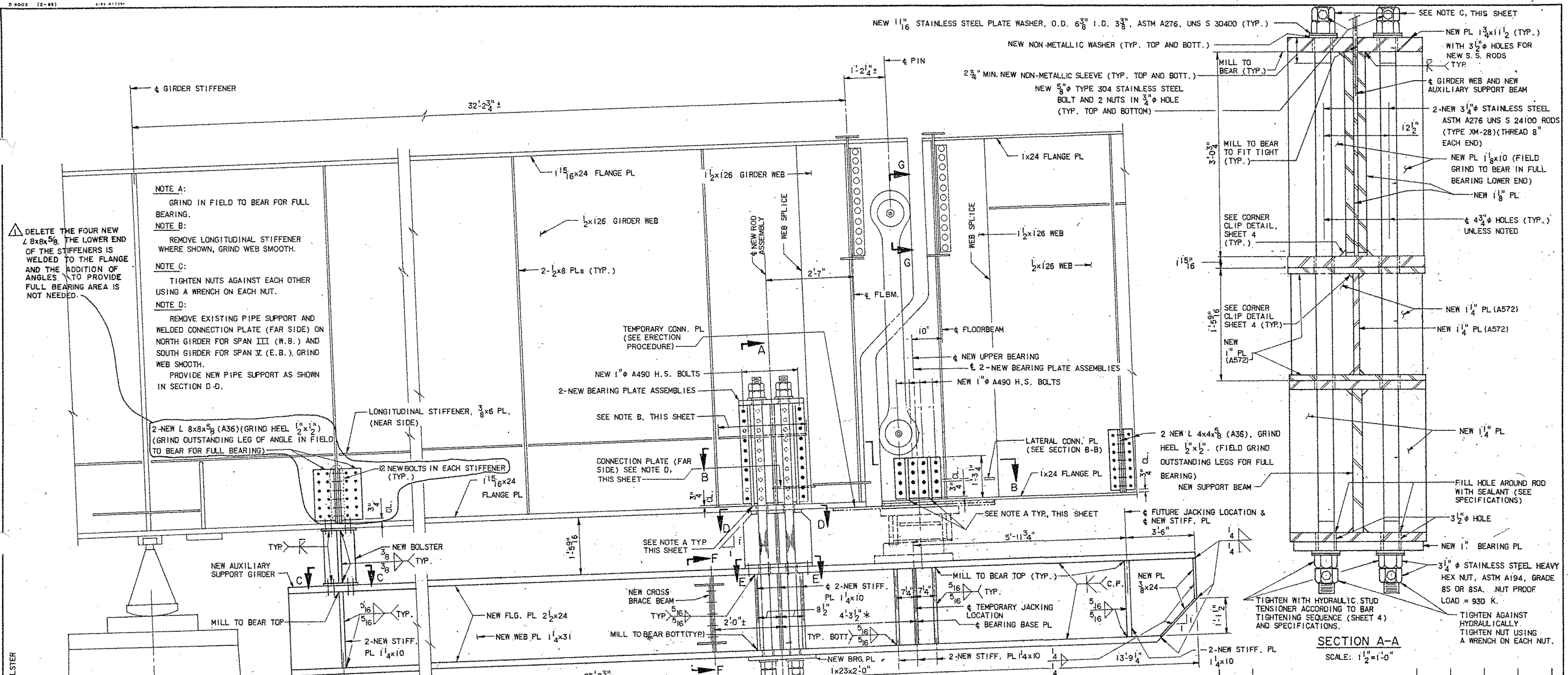
RECOMMENDED NOV 14 1989

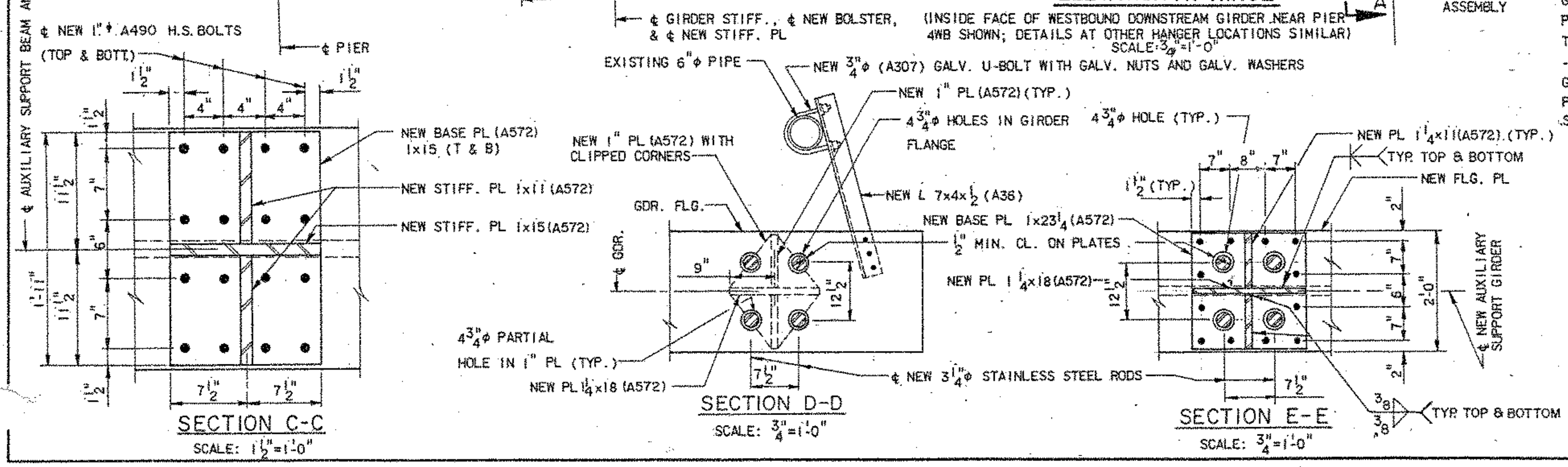
SHEET 2 OF 7

S-18043

DES: CWH | DR: CWH | CK: NEK

GNOTES





∗ THIS DIMENSION HAS BEEN SET BASED ON FIELD MEASUREMENTS OF THE ACTUAL GAP BETWEEN THE GIRDERS AT EACH HANGER LOCATION ON THE BRIDGE. THE BASE PLATE LENGTH HAS BEEN DETAILED TO ACCOMODATE THE ANTICAPATED POSITION OF THE UPPER BEARING AT EACH HANGER LOCATION AT ALL TEMPERATURES BETWEEN -10°F AND +110°F. BECAUSE OF DIFFERENCES IN THE ACTUAL GAP BETWEEN GIRDERS AT DIFFERENT HANGER LOCATIONS, THE RELATIVE POSITION OF THE BASE PLATE AND UPPER BEARING AT THE TIME OF INSTALLATION WILL NOT BE THE SAME AT EACH HANGER LOCATION.

NOTES:

FOR GENERAL NOTES, SEE SHEET 2.
FOR DETAILS OF SECTIONS B-B, F-F AND G-G, SEE SHEET 4.
ALL DETAILS SHOWN THIS SHEET ARE TYPICAL AT HINGE LOCATIONS IN SPANS III AND VI W.B. ROADWAY AND SPANS III AND V E.B. ROADWAY.
WORK IS TO BE DONE AT THE HINGES ON BOTH UPSTREAM AND DOWNSTREAM GIRDERS.
C.P. INDICATES COMPLETE PENETRATION GROOVE WELD.
FOR BEARING DETAILS, SEE SHEET 5.
JACKING OF THE SUSPENDED GIRDER AT "FUTURE JACKING POINT" MAY BE DONE ONLY UNDER REDUCED LIVE LOAD.
SEE CORNER "CLIP DETAIL", SHEET 4.
WORK THIS SHEET WITH SHEET 4.
ALL MATERIAL IS EXISTING UNLESS NOTED AS NEW.
FOR ERECTION PROCEDURES SEE SHEETS 6 AND 7.

Mark	Description	By	Chk'd.	App'd.	Date
△	DELETE ∠s 8x8x5/8				

REVISIONS

Commonwealth of Pennsylvania
DEPARTMENT OF TRANSPORTATION

CLEARFIELD - CENTRE COUNTIES
S.R. 0080 SECTION B13
SEGMENT 1382 OFFSET 000
S.R. 0080-000 STA. 0+00
OVER MOSHANNON CREEK
MULTIPLE SPAN WELDED PLATE GIRDER BRIDGES
GIRDER AUXILIARY SUPPORT DETAILS-1

RECOMMENDED NOV 14 1989

SHEET 3 OF 7
SCALE: AS NOTED
S-18043
DES: CJB DR: ELS CK: MCI