CEDAR RIVER
290th STREET BRIDGE AT ROCHESTER, IOWA
SECTION 14 STREAMBANK STABILIZATION PROJECT

FEASIBILITY REPORT

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US Army Corps
of Engineers®
Rock Island District

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CEDAR RIVER
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FEASIBILITY REPORT

1. INTRODUCTION

1.1. Purpose of the Report. The purpose of this report is to document a U.S. Army Corps of Engineers (Corps) feasibility level study to determine if there is a need for and Federal Interest in designing and constructing measures for the *Cedar River 290th Street Bridge at Rochester, Iowa, Section 14 Streambank Stabilization Project* (Project) [Federal Highway Administration (FHWA) #018490] in Rochester Township, Iowa. Upon completion, if a Federal interest is determined, this report will provide planning, engineering and construction details of adequate depth to select a Recommended Plan. The Recommended Plan will then proceed to final design and construction subsequent to the approval of the plan and appropriation of funding.

1.2. Project Location. The Project area consists of a length of the Cedar River channel and banks beginning downstream of the 290th Street Bridge (Rochester Bridge) and extending approximately 2.1 miles upstream near Rochester Township, Cedar County, Iowa. The Project area is located within Sections 2 and 11 of Township 79N Range 3W. Project location coordinates are: 41° 40' 8.0034", -91° 9' 29.988". A location map is shown in figure 1.

Note that all elevations in this report are given in the North American Vertical Datum of 1988 (NAVD 88). Bridge inspection reports and construction drawings are in a local datum. To convert the local datum to NAVD 88, subtract 19.4 feet from the local datum.

1.3. Project Authorization and Scope. The Cedar River emergency infrastructure stabilization project is authorized under Section 14 of the Flood Control Act of 1946, as amended, 33 U.S.C. 701r. This program is designed to implement projects to protect public or non-profit public facilities and/or services which are open to all on equal terms, have been properly maintained but threatened by natural processes on stream banks and shorelines and are essential and important enough to merit Federal participation in their protection (ER 1105-2-100, F13).

The scope of the study will encompass an appropriate planning horizon for the river channel and stream banks around the Bridge, piers and approach, approximately 2.1 river miles (RM). This study will be limited in terms of time to completion and technical depth due to the Corps' experience in completing the type of work required for this project and the urgent nature of the need for stabilization of the Bridge.

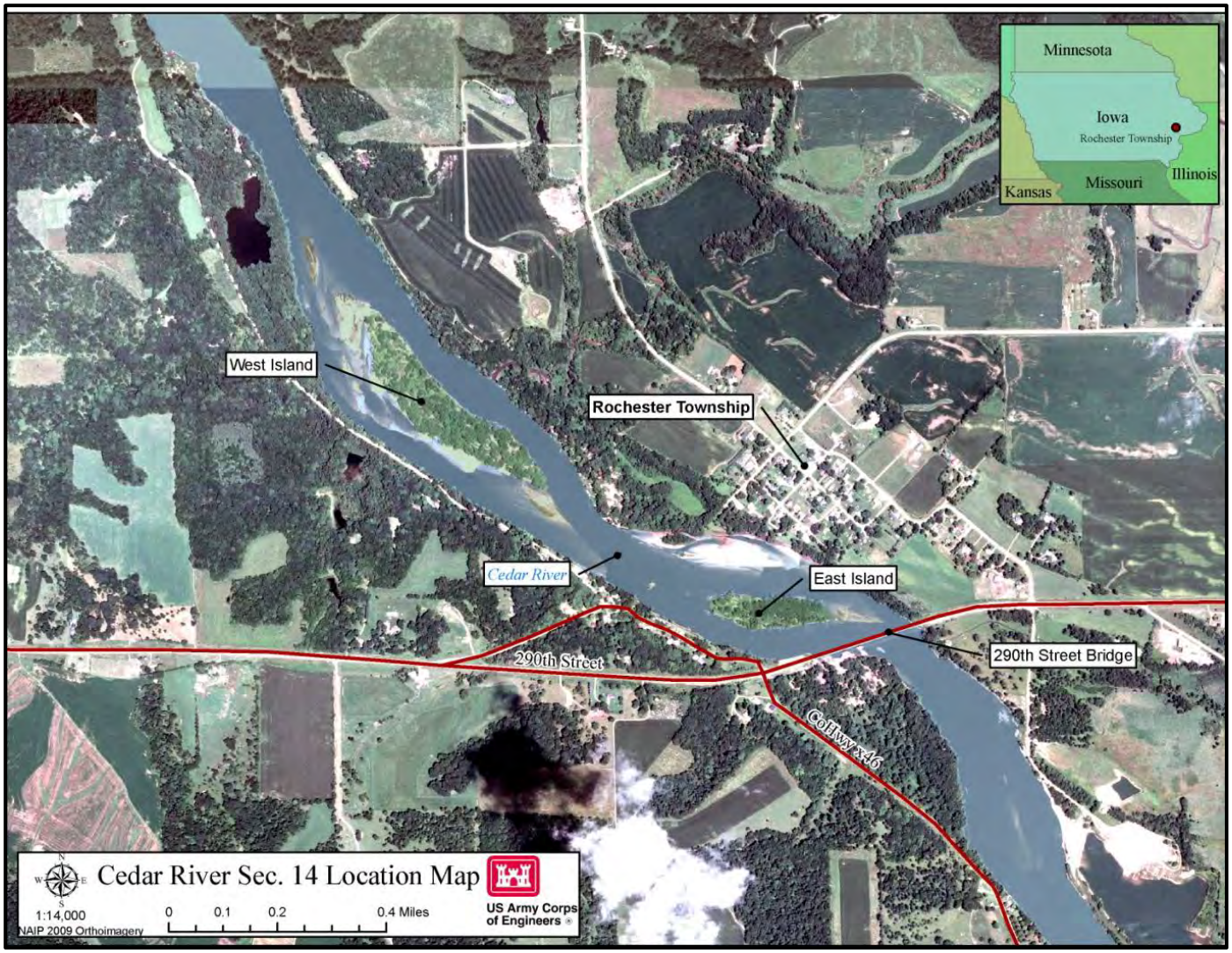


Figure 1. Vicinity and Location Map

1.4. General Project Planning. Development of this feasibility study will follow the Corps' six-step planning process specified in Engineering Regulation (ER) 1105-2-100. This process identifies and responds to problems and opportunities associated with the Federal objectives, as well as specified state and local concerns. The process provides a flexible, systematic and rational framework to make determinations and decisions at each step. This allows the interested public and decision makers to be fully aware of the basic assumptions employed; the data and information analyzed; the areas of risk and uncertainty; and the significant implications of each alternative plan.

As part of identifying the Recommended Plan, a number of alternative plans will be developed and compared with the "No Action" alternative, allowing for the ultimate identification of the National Economic Development (NED) Plan. National Economic Development plans are defined in the Planning Guidance Notebook (ER 1105-2-100) as plans that increase the net value of the national output of goods and services, expressed in monetary units. Contributions to NED are the direct net benefits that accrue in the planning area and the rest of the Nation.

The steps used in the plan formulation process are as follows:

1. Identify Problems and Opportunities. The specific problems and opportunities are identified and the causes of the problems discussed and documented.

2. Inventory and Forecast Resource Conditions. This step characterizes and assesses existing conditions in the potential Project area and forecasts the most probable without-project condition (or "no action alternative") over the period of analysis. The "without-project condition" is a projection of what the area and its uses are anticipated to be over an appropriate period of analysis without any infrastructure stabilization implemented as a result of this study (accounting for foreseeable actions taken by entities other than the Corps). The "with-project condition" is a projection of what the area and its uses are anticipated to be if infrastructure stabilization measures are implemented. This assessment gives the basis by which to compare various alternative plans and their impacts.

3. Formulate Alternative Plans. Potential features are proposed to meet the identified objectives. Specific design measures are developed for these features. These measures may be combined and recombined or evaluated independently into alternative plans in a systematic manner to ensure that reasonable alternatives are evaluated. Refer to figure 2 for a conceptual diagram of this process.

4. Evaluate Alternative Plans. The evaluation of each alternative consists of measuring or estimating the benefits, costs, technical considerations and social and economic effects of each plan, and comparing the effects of each plan with the without-project conditions.

5. Compare Alternative Plans. Alternative plans are compared, focusing on the differences among the plans identified in the evaluation phase and public comment.

6. Select an Alternative. A *Tentatively Selected Plan* (TSP) or the NED Plan is selected. If a viable plan is not identified, the selected plan will be the "No Action Alternative." In most cases, the NED Plan will be selected from among the most cost effective plans. The NED Plan should be evaluated on the basis of acceptability, completeness, effectiveness and efficiency.

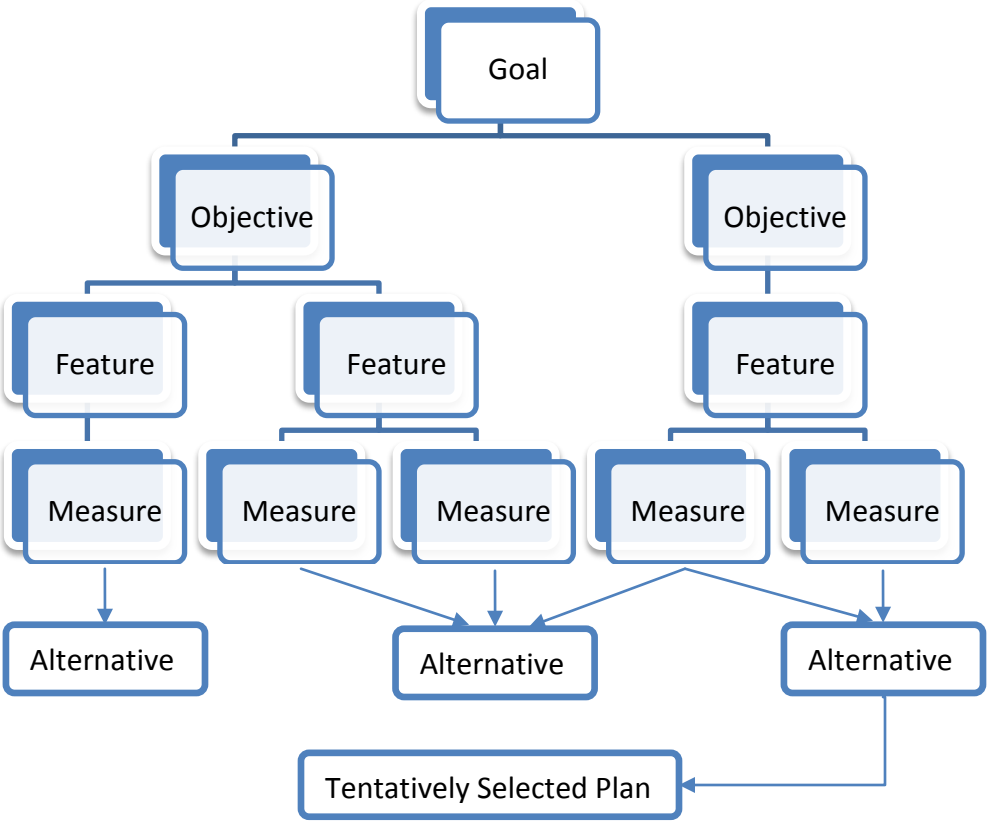


Figure 2. Schematic Diagram of Formulation Process (Step 3 in the process)

This report will be organized to follow the planning process; therefore, it will not follow the planning steps exactly as they occurred. The planning process is iterative. As such, as additional information was learned in subsequent steps, it was necessary to revisit and repeat portions of the previous step(s).

2. PROBLEMS AND OPPORTUNITIES

2.1. General. Major flooding in the area in June 2008 caused the river to change course and approach the Rochester Bridge at an oblique angle, rather than the more nearly parallel angle to the piers that the Bridge was designed to withstand.

2.2. Problem. Erosion is threatening the right descending streambank of the west Bridge abutment and several piers of the Bridge over the Cedar River. If the Bridge fails, the nearest alternate crossing for the various roads is between 7 and 30 miles. More specifically this problem is related to two separate issues. The first issue is related to severe erosion of the right descending foreslope and toe slope of the streambank adjacent to the western Bridge abutment and roadway that was observed in 2008 (photographs 1 and 2). In addition, there is question of the stability during low flows of the sheet pile structure that currently provides toe slope protection for the area in closest proximity to the Bridge abutment.

Photograph 1. Eroded Streambank Following the 2008 Storm Event

Photograph 2. Eroded Streambank Following the 2008 Storm Event

The second issue is related to the increased scour potential at the piers due to the change in the angle of the rivers approach to the Bridge structure. The increased scour potential has led the Bridge to be identified as scour critical on the Iowa Department of Transportation's (IDOT) most recent Structure Inventory and Assessment Bridge Inspection Report (Appendix G). A Bridge may be identified as scour critical for a variety of reasons including actively degrading channel, exposed piles with unknown or insufficient embedment, loss of abutment and/or pier protection. Scour critical indicates a need to take immediate action to prevent Bridge failure. If left untreated, the Bridge piers and roadway may fail during the next large storm event, resulting in loss of a critical transportation route. Turbulence at the piers during low flow can be seen in photograph 3.

Photograph 3. Pier Turbulence at Low Flow Conditions

2.2. Opportunities. The primary opportunity of this project is to protect this public Bridge from natural erosion processes on the streambank. The Bridge serves as a primary route for local travel and commerce, a vital crossing for the agricultural industry, and an alternate route for I-80, one of the primary east-west interstates in the country.

If the Rochester Bridge fails or is no longer passable, the nearest alternate route would be between 7 to 30 miles. Table 1 shows the traffic count since 1998 and detour information for the nearest bridges (Traffic Counts provided by IDOT, detour distances calculated using googlemaps).

Table 1. Traffic Count and Detour Information

Bridge	1998	2002	2006	2010	Detour Distance to the 290th St Bridge	Detour Distance to the I-80 Bridge
290th St	600	760	680	460	-	7
I-80	29,600	31,100	32,600	32,300	7	-
F36	1,510	1,820	1,650	1,760	24	30
US-6	1,850	2,180	1,960	2,060	21	16

3. INVENTORY AND FORECAST OF RESOURCE CONDITIONS

The following paragraphs will describe the current conditions within and around the Cedar River Rochester Bridge for the purpose of establishing a baseline condition upon which to later compare the effects of the future without action and potential action measures.

3.1. General. On October 18, 2010, the Corps' Product Delivery Team (PDT) conducted a site visit to the proposed project site. On that date, the Cedar River water surface elevation was at low stage. Although there is no stream gage for the Cedar River at Rochester, stage readings were obtained from the nearby Cedar Rapids, IA (gage 4.51 ft, elevation 704.98 NGVD 29) and Conesville, IA (gage 7.46 ft, elevation 589.41 NGVD 29) (www.rivergages.com) stream gages.

During the site visit the PDT identified that north of the Rochester Bridge there are two islands that divide flow. The island farthest from the Bridge was identified by the PDT as the west island and the island closest to the Bridge was identified by the PDT as the east island. In the recent past, the main river channel flowed on the west side of the west island and the east side of the east island. Due to substantial scour and sedimentation that has occurred in the area, the course of the river in this area has altered such that the historic main channel has become a side channel and the historic side channel has become the main channel.

During the October 18, 2010 site visit, the PDT observed that the new main channel was passing nearly all of the river's flow during low flow conditions. While a small amount of water was observed flowing through the historic main channel along the western island, this channel has become braided and shallow, with large deposits of sand visible within the channel. Similarly, the historic main channel along the east island was observed to be nearly completely blocked off with large deposits of sand from the eastern riverbank to the east island.

Figure 3 provides an aerial view of the Rochester Bridge along with the respective west and east islands and historic and current main channels.

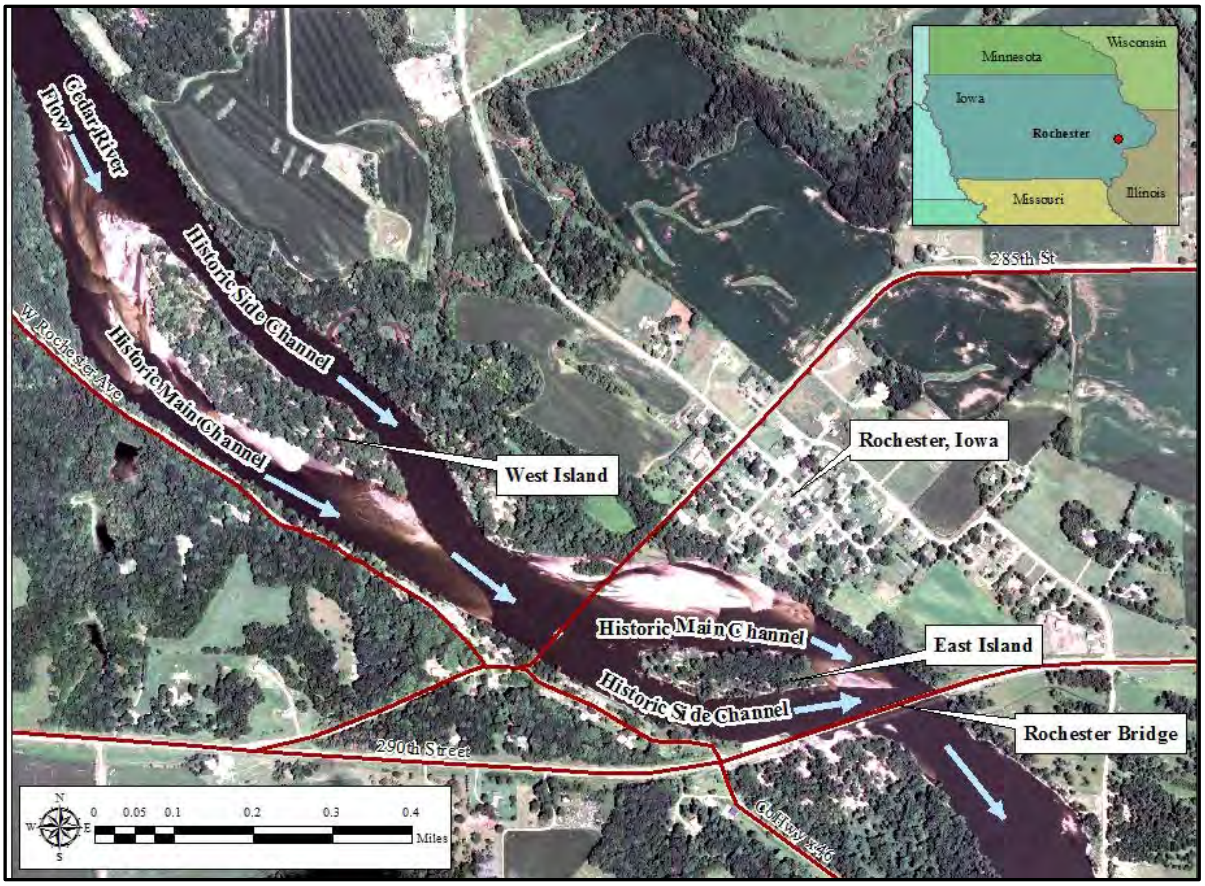


Figure 3. Aerial Imagery Location Map

3.2. Land Use and Infrastructure

3.2.1. Land Use. In the watershed upstream of the Rochester Bridge Project Area, very little land use change has occurred over the past 20 years as a whole. The land is predominantly agricultural with some areas converted to wood land. Significant land use changes along the Cedar River have occurred in the metro Cedar Rapids area approximately 42 miles upstream of the project site. Much of this land use change occurred between 1990 and 2004 based on the available aerial photography. Cedar County has developed a future land use plan that shows significant development planned for the area near the project site including a large commercial and residential area near where 290th Street connects to IA-38.

Repair work around the Rochester Bridge was conducted by Cedar County after the major flood events of 1993 and 2008. In 2008, Cedar County performed emergency repair work under a Nationwide Permit to "restore pre-flood conditions and provide protection to existing facilities from future floods." This work included removing debris, repairing some pier scour, and replacing some eroded portions of the earthen embankment (Cedar County #2008-1036).

3.2.1.1. Left Descending Bank. The town of Rochester is located immediately upstream of the Rochester Bridge along the left descending bank (LDB). Immediately upstream and

immediately adjacent to the Bridge the streambank has been substantially stabilized with concrete rubble and rock riprap. The bank is relatively steep, with a thin row of trees on the top of the bank. During recession of the 2008 floodwaters a significant amount of sand was deposited in the channel directly in front of the Rochester residences that are located on the top of the LDB (photograph 4). This river has historically been a sand rich system as evidenced by old sand quarries that are no longer operational both up and down stream and a rock dike structure that is visible from West Rochester Avenue, located approximately 1.5 miles upstream of the Bridge.

Photograph 4. Sand Accumulation in Main Channel Due to 2008 Flood Event

3.2.1.2. Right Descending Bank. Downstream of the Rochester Bridge, the bank line transitions to upper terrace rapidly which has resulted in some small sediment deposits in several locations. The transition appears to be stable as it is fairly well vegetated and has very little erosion. This upper terrace is primarily composed of bottomland forest tree species.

Immediately upstream of the Rochester Bridge rock riprap has been placed on the foreslope adjacent to the Bridge abutment as part of the emergency work conducted in 2008 by Cedar County. Photograph 5 shows the current condition of the protected streambank.

Photograph 5. Current Condition of Slope Erosion and Rock Riprap Repair

On the right descending bank (RDB) beginning approximately 0.4 miles upstream there are houses and mobile house structures. These structures may be subject to flooding during extreme flooding events based on the presence of a FEMA buyout easement on at least one of the parcels near the Bridge. This area has relatively steep slopes that have been partially stabilized in many locations by concrete debris and riprap. Some minor erosion is evident, along unprotected portions. Further upstream, there are additional houses, many with stairways leading to docks along the bank of the River. Access to all of the houses is provided by West Rochester Avenue, which runs along the top of the RDB of the River.

3.2.2. Infrastructure. The existing Bridge was constructed in the mid 1940s by the Iowa State Highway Commission who ultimately transferred ownership to Cedar County. The original design drawings indicate that there was a late revision that added a sheet pile structure at the toeslope of the RDB immediately adjacent to the Bridge abutment. The note on the drawing states that the riprap at the Southwest end of the Bridge was damaged by the Spring and early Summer flood of 1947 and was to be repaired and strengthened by driving sheet pile in accordance with details shown on the sheet. The sheet pile structure forms a J shape around the abutment with the greatest length extending upstream approximately 60 feet. The sheet pile structure is driven to approximately 20 feet in depth. Figure 4 shows a cross-sectional schematic of the existing state of the sheet pile structure immediately upstream of the Bridge abutment. Original construction details of the sheet pile structure are located in Appendix B. A series of reports developed by VJ Engineering following the 2008 flood event documents the attributes of the Bridge infrastructure in the following paraphrased text (VJ Engineering, 2008).

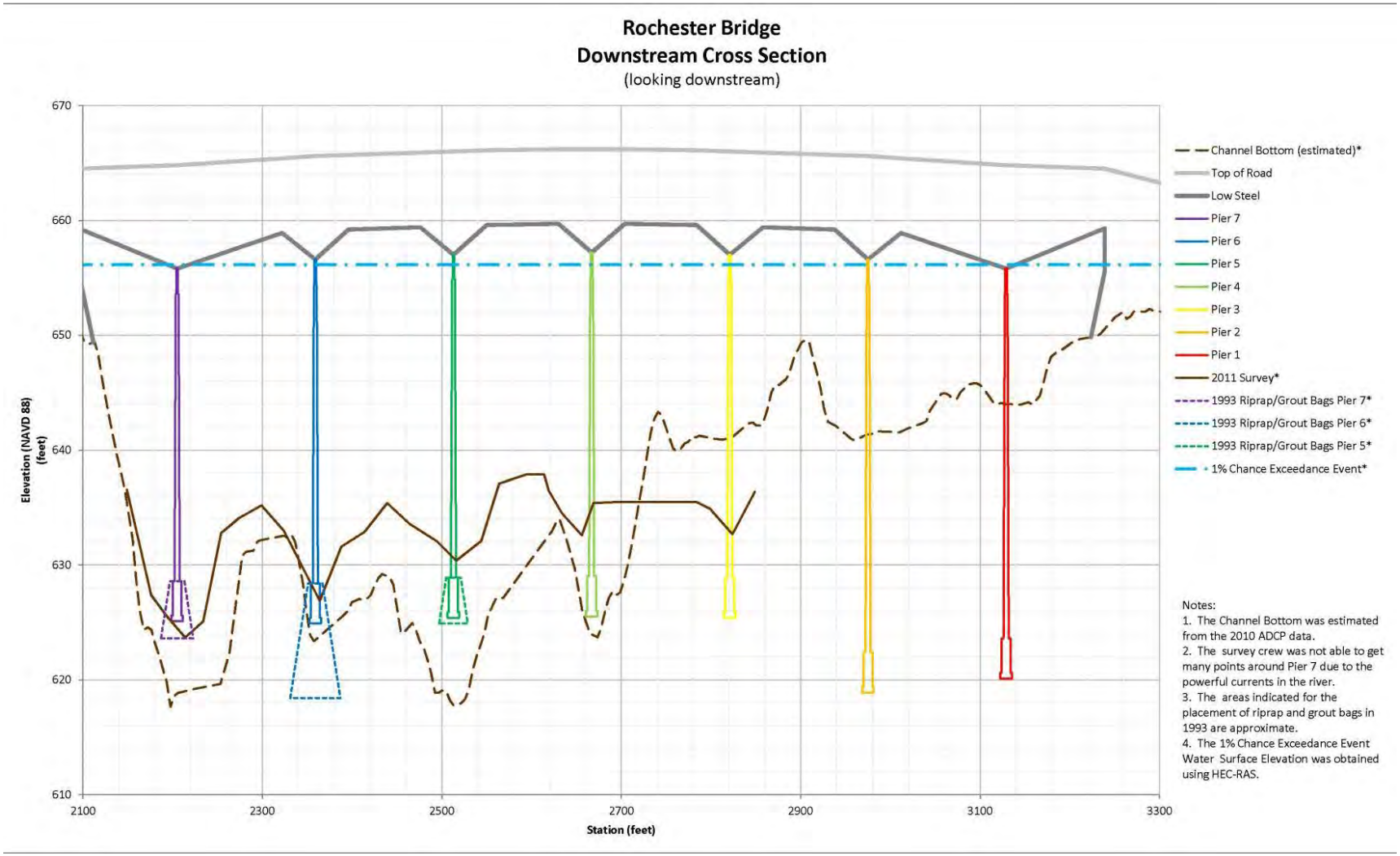


Figure 4. Existing Condition of the Bridge Piers (Downstream Cross-Section)

The Rochester Bridge was built in 1948 and carries Old Highway 979 over the Cedar River. The Bridge had reconstruction work done in 1985. The two-lane, eight-span Bridge has variable depth continuous steel girders; a 29-foot, 9-inch by 1145-foot reinforced concrete deck; seven reinforced concrete piers; and stub abutments. For the purpose of this Report, the piers will be numbered from west to east. Piers 1 and 2 are founded into a minimum of 6 inches of bedrock whereas the remaining piers are founded on battered timber friction piling driven to full penetration (20 feet to 25 feet) and a minimum bearing of 18 tons. The concrete abutments are founded on timber piles driven to full penetration or to rock and a minimum bearing of 18 tons. Riprap was added at Piers 5, 6 and 7 after the 1993 flood, and grout bags at piers 4, 5, and 7 following the 2008 flood. The estimated average daily traffic in 2010 was 460 vehicles per day.

On August 27, 2010 a follow up inspection (VJ Engineering, August 2010), debris removal, and scour repair was performed on the Rochester Bridge west of Rochester, IA. After removing the debris located at Piers 4 & 7, the divers detected scour at these piers that had previously been concealed by the large debris. Grout bags installed in 2008 were missing at piers 4 & 7 so it was recommended that scour repair consisting of grout bags be added at Piers 4 & 7 and that a hydraulic study be performed to determine the systemic cause for the scour. This report concluded that the scour critical rating of 7 on the May 2010 Structure Inventory and Appraisal form (Appendix G) is not appropriate based on the inspection findings and should be rated a 3 for scour critical.

Due to the VJ Engineering 2010 inspection report, the Structure Inventory and Appraisal form was updated to reflect a scour critical rating of 3. The superstructure is also rated a 3 which is considered a serious condition (primary structure affected and severe corrosion) and the substructure is rated a 4 which is considered poor condition (advanced deterioration). The Structure Inventory and Appraisal form uses a Structure Rating number from 1-100; the 290th St Bridge is officially rated a 34.5. Personal communication with the IDOT uncovered that they begin planning for bridge replacement when a bridge falls below 50 on the structure rating. The IDOT indicated that the planning and construction tend to take approximately 10 years from start to finish.

The original Bridge design drawing showing the piers and timber piles with respect to the stream bottom is in Appendix B. The existing condition showing the piers and timber piles with respect to the stream bottom may be seen in figure 5.

Table 2 and the text that follows provide a chronological breakdown of the repairs that have been conducted to this Bridge since construction.

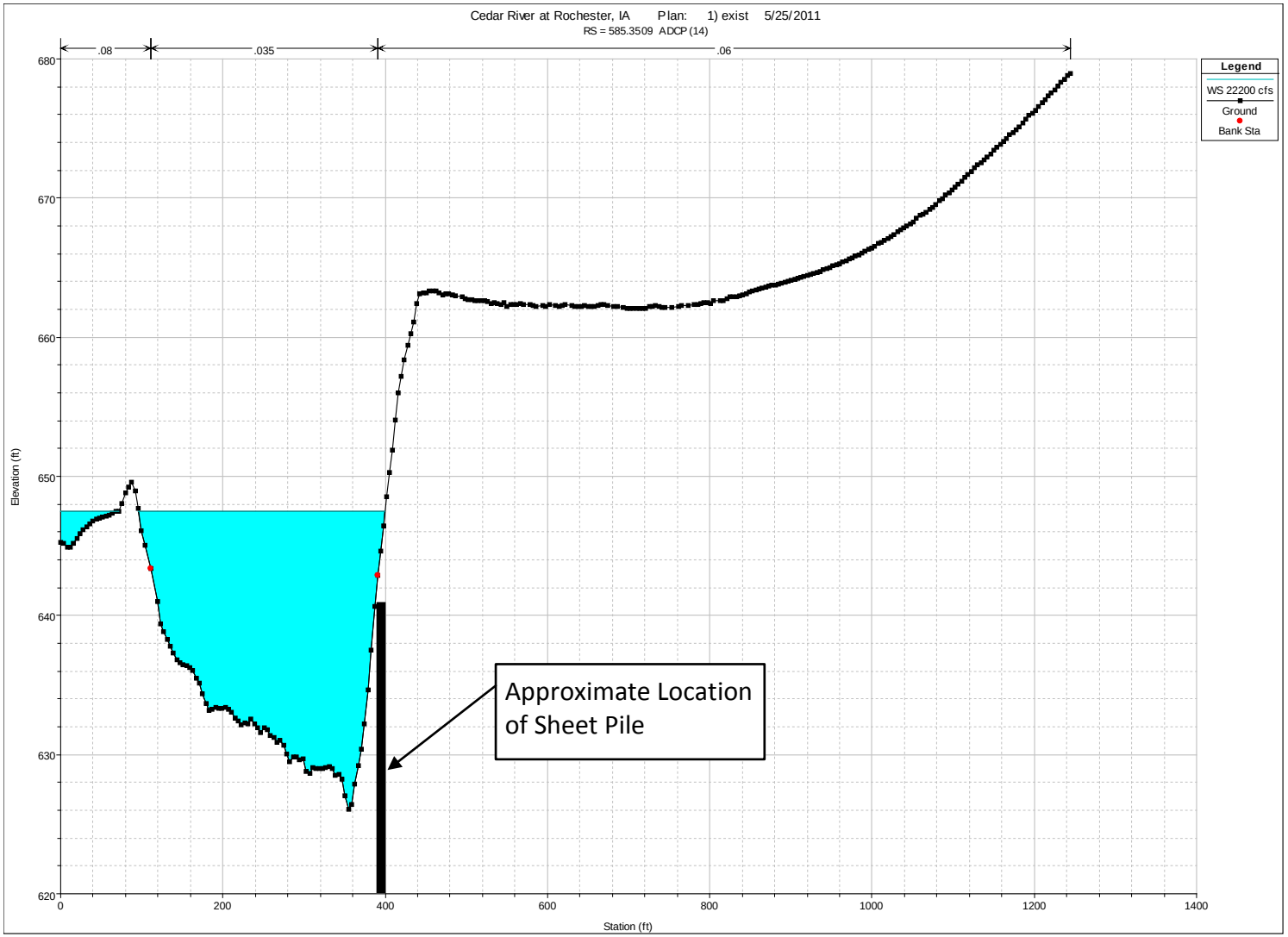


Figure 5. Current Channel Proximity to Sheet Pile Structure

Table 2. Summary of Repair Work

Year	Activity	Reason for Activity	Source
1946	Bridge constructed	State Highway 979	As-built drawings
1947	Sheet pile structure added to toeslope of RDB near western Bridge abutment.	1947 Flood caused failure of rock riprap on SW end of Bridge.	As-built drawings
1980	No Repair Activity; Bridge transferred from State to Cedar County	Transfer of Responsibility	Cedar County Engineer
1985	Deck repair	Aging deck surface	Post-flood inspection report
1993	Rock riprap pier protection	1993 Flood resulted in scour at multiple piers	Post-flood inspection report
2008	Rock riprap and grout bag pier protection	2008 Flood resulted in loss of some rock placed in 1993 and in the need for additional pier protection due to pier scour.	Post-flood inspection report
2010	Grout bag pier protection	Inspection identified need for additional scour protection on select piers.	Post-flood inspection report

After the 1993 flood on the Cedar River, Iowa Class E riprap was added to Piers 5, 6, and 7 of the Rochester Bridge. The Bridge inspection performed by VJ Engineering after the 2008 flood found the following (VJ Engineering, 2008):

- Piers 1 & 2 – no significant scour
- Pier 3 – minor scour on the east side (scour filled in by September 12, 2008)
- Pier 4 – minor scour on the east side
- Pier 5 – some scour on the east side
- Pier 6 – no significant scour – riprap from 1993 was still in place
- Pier 7 – significant scour on the west side, timber piles exposed

The following actions were taken in September 2008 to remediate the damage discovered during the 2008 inspection:

- Piers 1 – 3 & 6 – no protection added
- Pier 4 – 20 grout bags (60 pounds) staked with rebar added to the east side
- Pier 5 – 112 grout bags added and staked with rebar
- Pier 7 – 560 grout bags added and staked with rebar

In April and August 2010, the Bridge was inspected again and the following was found (VJ Engineering, May 2010 and November 2010):

- Piers 1 & 2 – no scour
- Pier 3 – scour on the east and west sides, grout bags with #5 rebar stakes were added
- Pier 4 – scour on the west side, grout bags from the east side were washed away
- Pier 5 & 6 – no scour
- Pier 7 – some grout bags had washed away

In October 2010, 600 grout bags were placed at Piers 4 and 7 to protect the piers and replace the grout bags that had washed away. Historically, grout bags and riprap have provided some protection for the piers, however, monitoring and replacement will continue to be required.

3.3. Geotechnical Conditions

3.3.1. Geology. According to the Iowa Geological and Water Survey "The present land surface across Iowa is dominated by loose materials much younger than the bedrock beneath. These materials consist of sediment originating from ice sheets, meltwater streams, and strong winds during a series of glacial events between 2.5 million and 10,000 years ago (Quaternary). This familiar "dirt" consists of pebbly clay, sand, gravel, and abundant silt, which over time have weathered into Iowa's productive loamy soils. These easily eroded "Ice Age" deposits account for the gently rolling appearance of much of the Iowa (and Midwestern) landscape." (http://www.igsb.uiowa.edu/browse/geoiowa/geoiowa.htm)

The upper and middle Cedar River basin, that specifically provides flow to the Rochester Bridge, is located geologically in the Iowan Surface region. The Iowan Surface has gently rolling topography with long slopes, low relief, and a mature drainage pattern. The surficial material is primarily glacial drift with thin layers of windblown loess on the ridges and alluvium near the streams (USGS, http://pubs.usgs.gov/circ/circ1210/introduction.htm).

The abundance of loose sand and other alluvial materials is a significant factor in the Cedar River basin as it is a sandy bottom stream that directly feeds the Devonian Aquifer (figure 6). The Cedar River is a sand rich system with portions of bedrock. This is an important consideration in geomorphology as well as types of structural foundations.

3.3.2. Geomorphology. In order to better understand the current condition of the Cedar River, aerial photos from the 1930s, 1960s, 1990s and 2009 were digitized and evaluated to determine the rate of erosion in this area and better understand the channel's natural evolution. Figures 7 and 8 provide the aerial comparison that is explained in the following sections.

3.3.2.1. Left Descending Bank. Aerial photos indicate that along the LDB, the erosion rates upstream of the current Bridge were fairly stable from 1930-present, with exception to the area adjacent to the lower tip of the west island. This area appears to have experienced moderate erosion since 1990. However erosion downstream of the Bridge was significant between 1930 and 1990. The erosion rates appear to have stabilized in the past 20 years.

3.3.2.2. Right Descending Bank. Aerial photos indicate that the RDB adjacent to the west island (upstream of Bridge) experienced significant deposition between 1930 and 1960 but has since stabilized. According to the as-built drawings developed in the late 1940s, the RDB directly adjacent to the bridge was at the equivalent of 646-ft current elevation when the bridge was first installed. Along the RDB immediately upstream of the Bridge, there was steady erosion that occurred between 1930 and 1960 and then a period of significant erosion between 1960 and 1990. A resident explained to the PDT during a site visit that ice jams contributed to some of the erosion that occurred during this period. The neighbor offered photos from the 1980s ice jams that show the extent to which significant chucks of ice were pushed up the slope and onto the roadway (photograph 6). The aerial photos show that between 1990 to present the erosion rate appears to have been stable but as mentioned in the prior section there was significant erosion that occurred at this location during the 2008 floods which has since been repaired with rock riprap. The aerial photos show that downstream of the Bridge there was a significant deposition of material between 1930 and 1960 but since that time the bankline has remaining fairly stable.

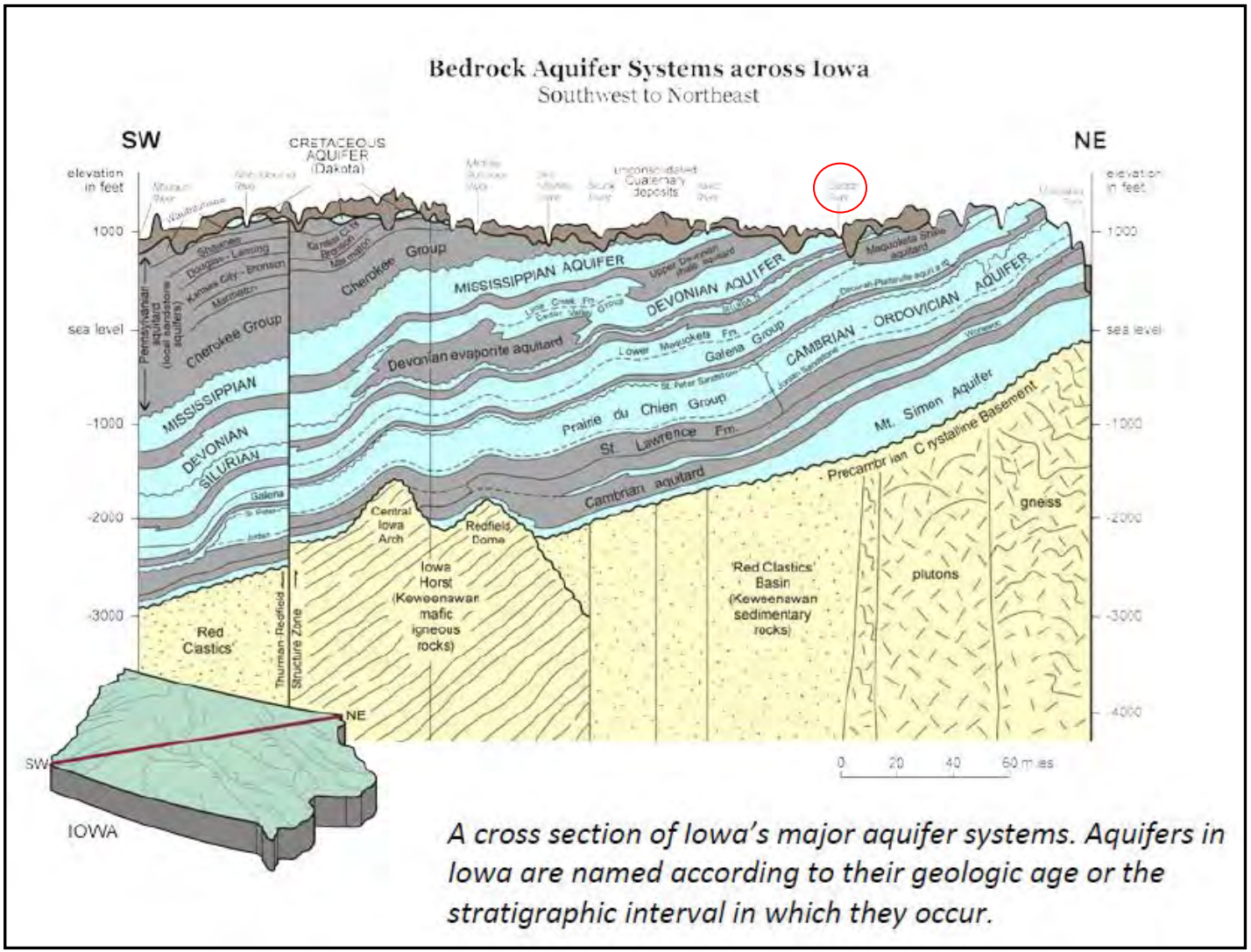
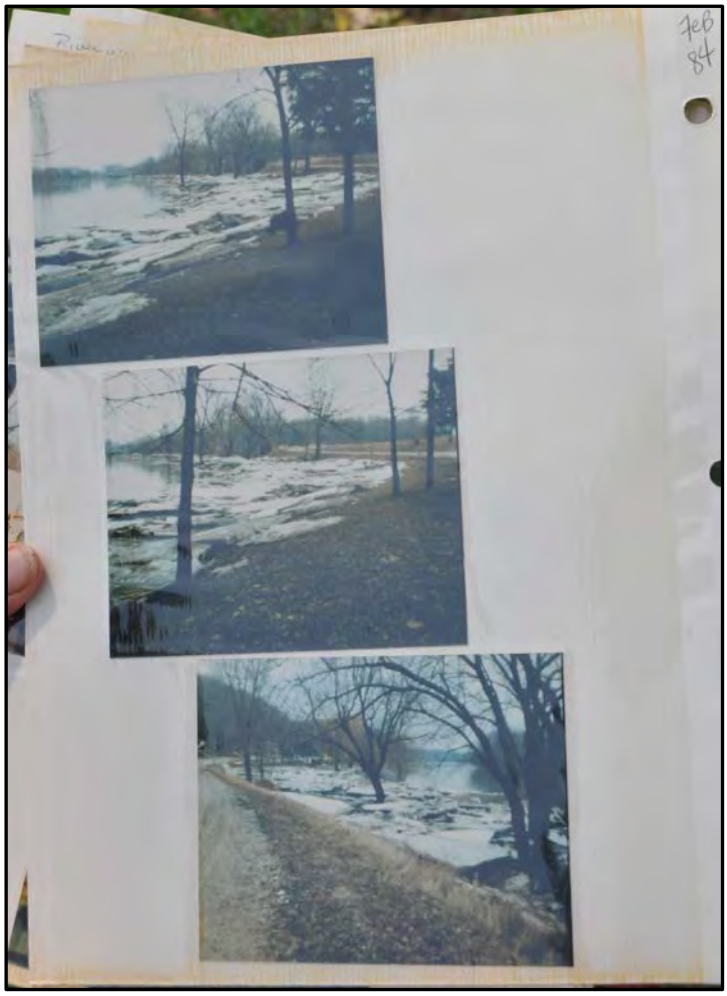


Figure 6. Cedar River Geology and Groundwater



Photograph 6. Photographs of Ice Jams Along Right Descending Bank, February 1984

3.3.2.3. West Island: Aerial photos indicate that the west island has decreased in size significantly since the 1930s. The island has also become more centralized in the channel where it was once much closer to the LDB. The greatest change in this island size occurred between 1930 and 1990. Based on the aerial photos the island has experienced a relatively small change in size from 1990 to the present.

3.3.2.4. East Island: Aerial photos indicate that the east island has also decreased significantly in size since the 1930s and has become more centralized in the channel. This island experienced the largest change in size between 1960 and 1990.

Following the 2008 flood event, the main channel had a significant amount of deposition on the east side of the east island which filled the conveyance area on that side of the island. Due to erosion and deposition that has occurred upstream of the Bridge, the majority of the flow (especially at low flow rates) currently approaches the Bridge roughly parallel to the Bridge deck and not perpendicular to the Bridge deck as was the situation when the Bridge was designed.

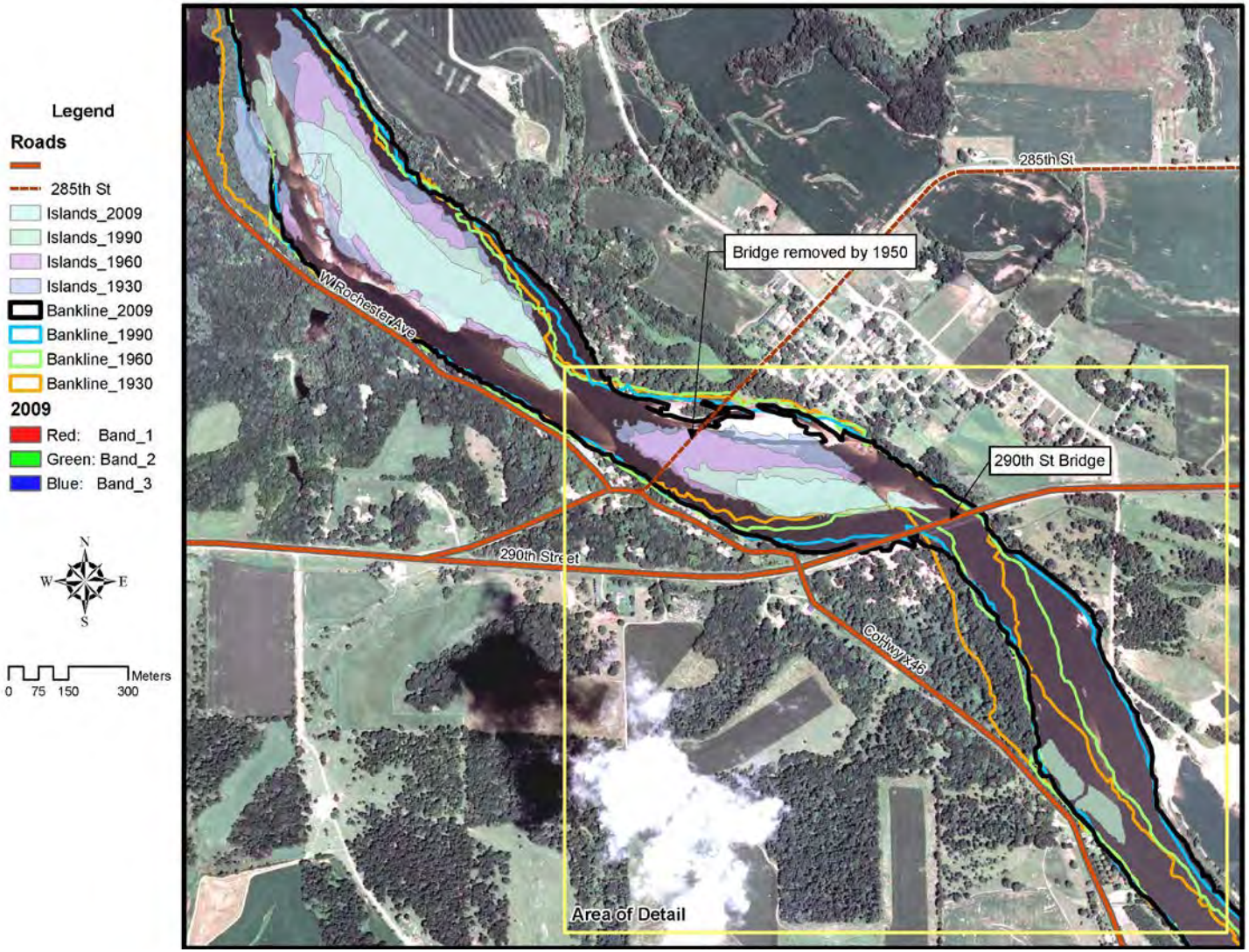


Figure 7. Systemic View of Island and Channel Evolution

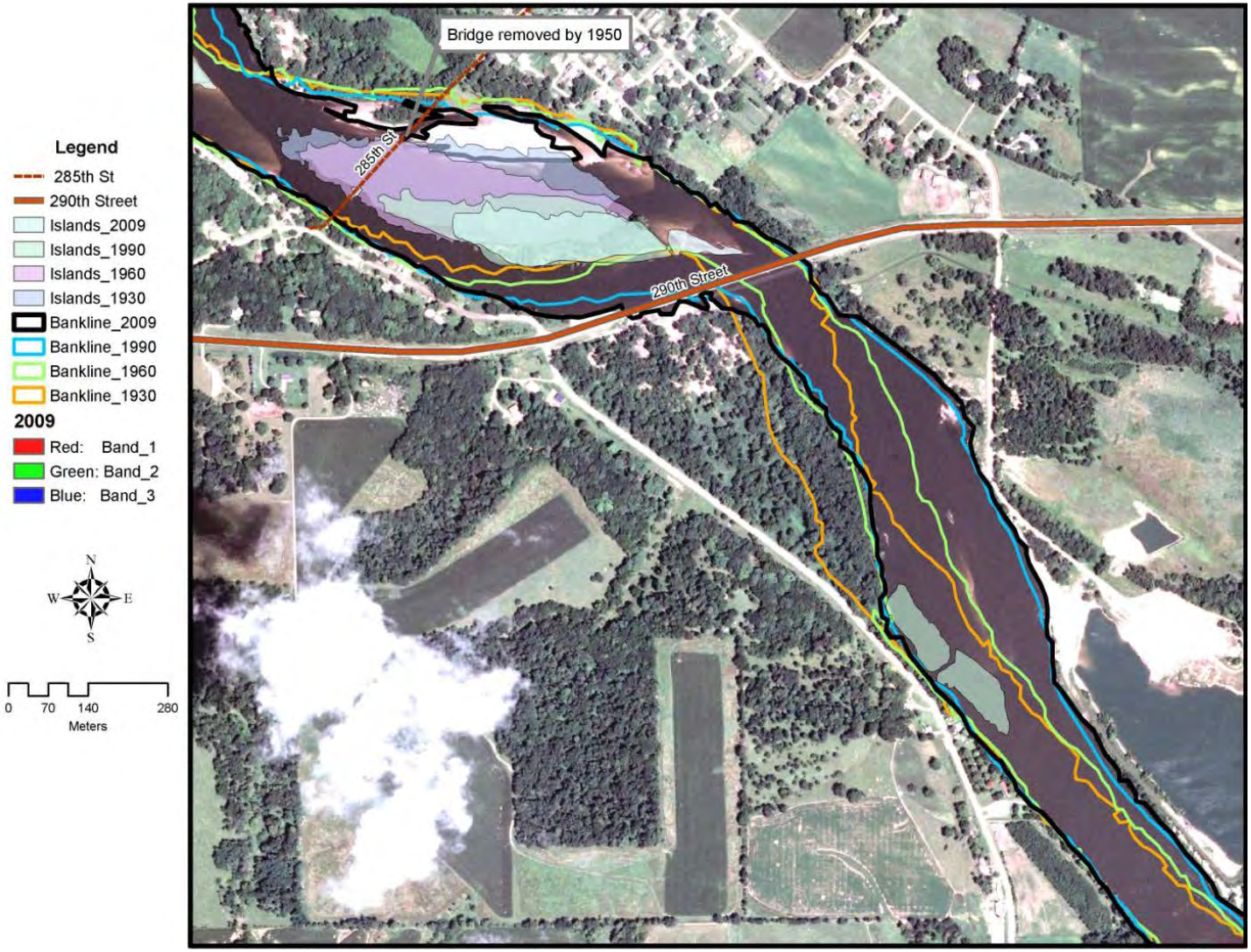


Figure 8. Localized View of Lower Island and Channel Evolution

3.3.3. Slope Stability Considerations. The existing Bridge design drawings state that there was a sheet pile structure added in response to rock riprap damages resulting from significant flood events in the Spring and early Summer in 1947 on the Cedar River. Based on the aerial imagery presented in figure 9, it appears that the right descending streambank was approximately 300 feet from the rock riprap during the 1947 storm event which resulted in damage to the riprap structure. This most likely occurred due to localized erosion which undermined the toe of the slope. The current condition of the channel is immediately adjacent to the sheet pile structure such that much of the soil has been removed from the face of the sheet pile. This soil on the face of the sheet pile provides a resisting force to prevent the sheet pile from falling into the stream channel. A schematic of the sheet pile structure may be seen in figure 9.

The amount of soil on the face of the sheet pile structure varies from elevation 634 to 628.75 feet. The area where the amount of soil is greatest is underneath the Bridge while the area with the least amount of soil material on the face is near the river's thalweg. It is anticipated that should failure occur, it would occur at this location first. Stability of the sheetpile wall was analyzed using a computer program with the acronym CWALSHT. Analysis of the wall was for current stability as well as future stability should additional scour occur.

The CWALSHT program determined that the current factor of safety of the sheet pile structure at elevation 634 is 3.5 which is an acceptable factor of safety per Engineering Manual 1110-2-2504, *Design of Sheet Pile Walls*, which requires a Factor of Safety of 1.5 for sheet pile walls. The portion of the sheet pile structure at elevation 628.75 has a factor of safety of approximately 2.0 which is above 1.5 so is currently acceptable. However, when looking at potential future scour the factor of safety drops below 1.5 to 1.1 at an elevation of 626. With less than 3 feet of soil depth providing stability to the sheet pile structure and given the proximity of the thalweg of the river with respect to the sheet pile structure as well as the river's high scour potential (see Section 3.4.3), the sheet pile structure is currently at risk for scour of the remaining 3 feet of material and may cause failure due to overturning.

Soil parameters were determined from historical exploratory borings and available geotechnical information. No additional borings and/or soil testing was conducted for this feasibility report. Information concerning the data used and the geotechnical analysis are located in the District files and available upon request.

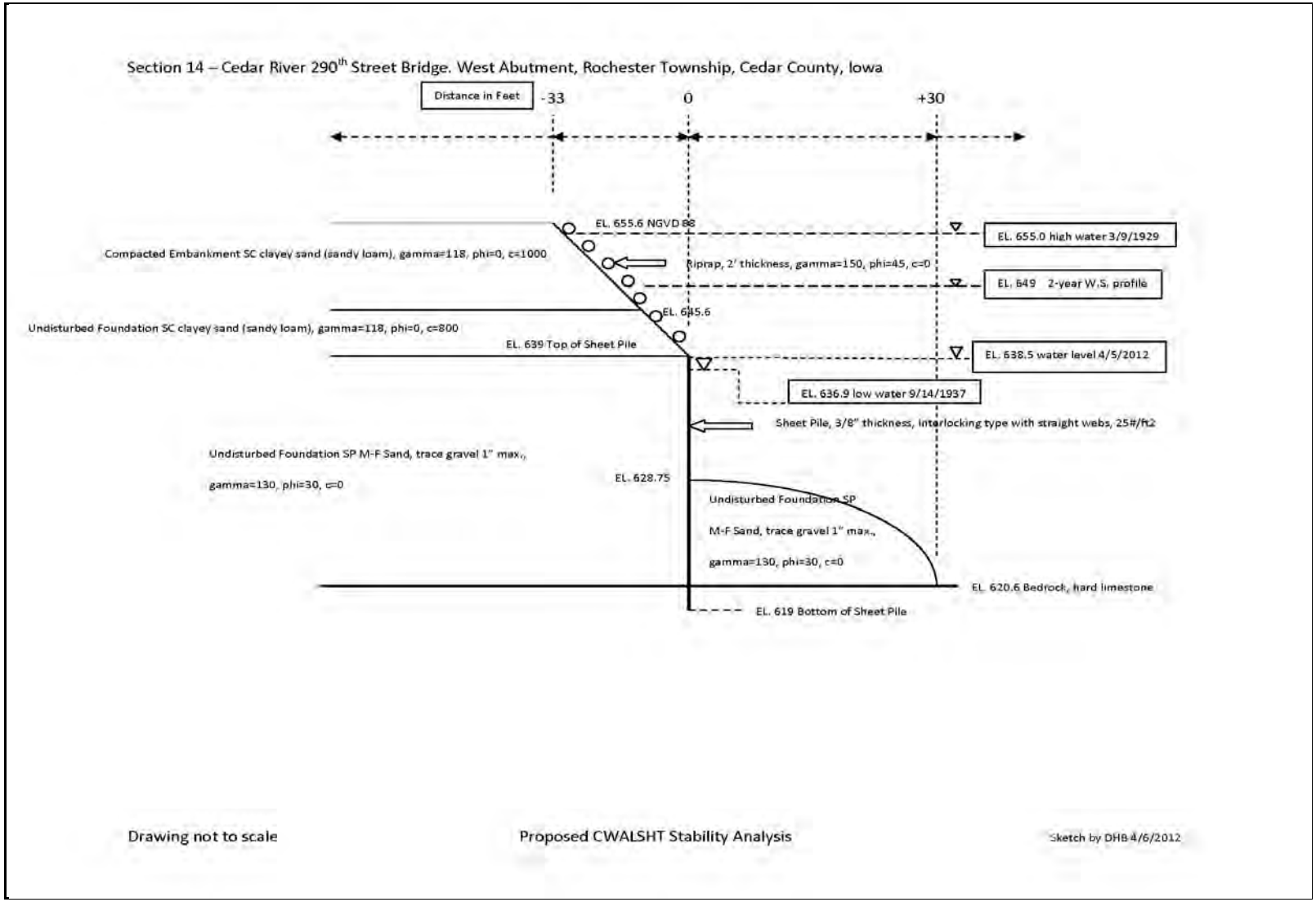


Figure 9. Schematic of Sheet Pile Structure in Current Condition

3.4. Hydraulic and Hydrologic Conditions

3.4.1 Hydrology. The climate of Cedar County is characterized by large seasonal variations in temperature. Low temperatures in the winter can be less than -30° F. High temperatures in the summer can exceed 100° F. The normal annual precipitation for the Cedar County area is approximately 33 inches.

The Cedar River flows through northern and central parts of Iowa and drains an area of 7,819 square miles at its mouth. It is a major tributary of the Iowa River which outlets to the Mississippi River between Muscatine, Iowa and Burlington, Iowa. The drainage area of the Cedar River at Rochester, Iowa is 7,218 square miles. Major floods on the Cedar River have historically been caused by either heavy rainfall or a combination of rainfall and snowmelt. Major floods on the Cedar River at Rochester occurred in 1961, 1993, and 2008. There is no gage at Rochester; however, there are USGS gages in nearby Cedar Rapids (USGS ID 05464500) and Conesville (USGS ID 05465000). A flood in 1947 which led to the addition of the sheet pile structure is one of the top 10 largest flood events on record at both the Cedar Rapids and Conesville gages. See Appendix E for a list of the 10 largest floods of record.

The Cedar River was evaluated at various flow rates during the course of this study. These flow rates were obtained from both the 1993 Bridge Repair plan and the regression equations for the State of Iowa. Table 3 summarizes these flow rates and their sources.

Table 3. Flow Frequency Data

		Elevation (ft)		
% Exceedance	**Flow (cfs)**	**Local Datum**	**NAVD 88**	**Velocity (feet per sec)**
50	27,000[1]	NA[3]	NA[3]	NA[3]
20	43,000[1]	NA[3]	NA[3]	NA[3]
10	54,000[2]	674.0	654.6	6.0
4	68,000[2]	676.5	657.1	6.4
2	77,000[2]	678.1	658.7	6.7
1	86,000[2]	679.5	660.1	6.9

[1] Values obtained using the State of Iowa Regression Equations (Eash, 2001)
[2] Values obtained from the 1993 Bridge Repair Plans
[3] Values not provided in the 1993 Bridge Repair Plans

3.4.2. Hydraulics. The Cedar River in the vicinity of the Rochester Bridge was modeled using both the HEC-RAS and the Surface Water Modeling System (SMS) in conjunction with the Adaptive Hydraulics Modeling system (ADH). HEC-RAS was used to numerically model the river with a one-dimensional steady flow regime. SMS is an interface that is used as a pre- and post-processor for surface water modeling and design with ADH, in this case. ADH is a two-dimensional modeling program that uses adaptive numerical meshes to simulate flow in a riverine system. These existing condition models were calibrated and then used as the foundation for evaluating proposed alternatives.

It can be observed that the velocity in the historic main channel is currently lower than that of the side channels throughout this reach. The flow rate of the historic main channel is also lower than that of the historic side channel. Table 4 summarizes the distribution of flow results from the ADH model

run for the existing conditions. A total flow rate of 27,000 cfs (2-year return flow) was used to generate the results in table 4. Please note that the primary concern is the distribution of flow adjacent to the east island.

Table 4. ADH/SMS Results for the Flow Discharge of 27,000 cfs (Existing Condition)

Flow Adjacent to the West (Upstream) Island			
Historic Main Channel		**Historic Side Channel**	
Discharge	**% of Total Discharge**	**Discharge**	**% of Total Discharge**
12,457 cfs	46%	14,543 cfs	54%

Flow Adjacent to the East (Downstream) Island			
Historic Main Channel		**Historic Side Channel**	
Discharge	**% of Total Discharge**	**Discharge**	**% of Total Discharge**
12,970 cfs	48%	14,030 cfs	52%

Based on the hydraulic modeling, it can be seen that under existing conditions for the flow rate of 27,000 cfs, only 48% of the water flows through the historic main channel upstream of the Bridge. This decrease in flow through the historic main channel is important because the lower depth of flow and lower velocity results in a lack of sediment movement out of the channel and may lead to greater sediment deposition in the historic main channel.

It is also of interest to analyze the velocity of the water flowing in the vicinity of the Rochester Bridge because this affects the water's potential to scour the west embankment and the Bridge piers. Table 5 shows the maximum velocities passing the area between the piers for the existing condition for the 2-year return period flow (Q = 27,000 cfs).

Table 5. Maximum Flow Velocities Between Piers for Q = 27,000 cfs (Existing Condition)

Right Bank and Pier 3 (161' wide):	**3.2**
Pier 3 and Pier 4 (149' wide):	**3.6**
Pier 4 and Pier 5 (149' wide):	**4.3**
Pier 5 and Pier 6 (149' wide):	**4.2**
Pier 6 and Pier 7 (149' wide):	**4.6**
Pier 7 and Left Bank (41' wide):	**1.8**

Inspection of the area near the Rochester Bridge shows that velocities along the west bank upstream of the Bridge are higher than those along the east bank. This explains why severe erosion is threatening the west Bridge abutment upstream of the Rochester Bridge. The distribution of velocities may be seen in figures 10 and 11.

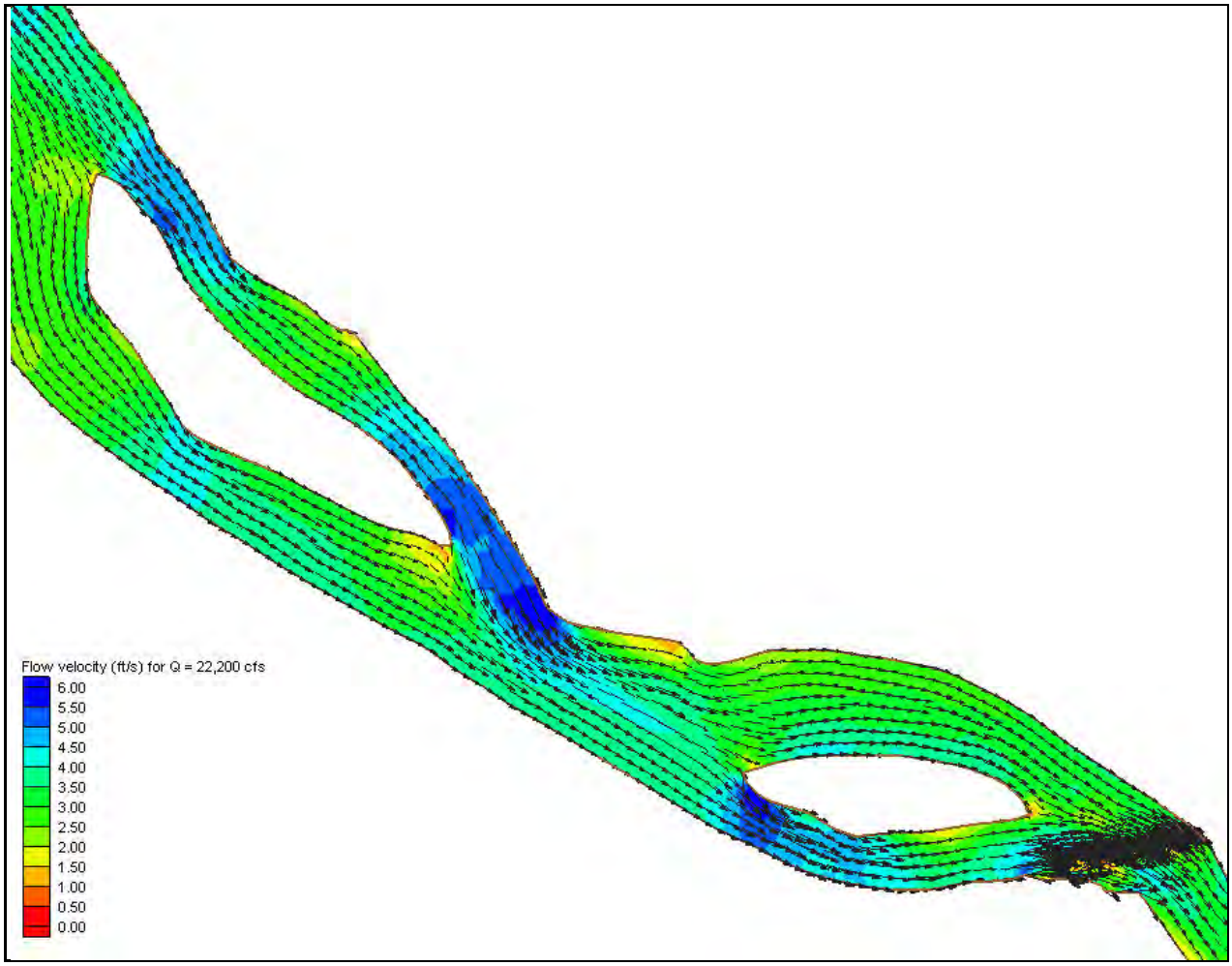


Figure 10. Velocity of the Cedar River in the Area of the Rochester Bridge (Q = 22,200 cfs)

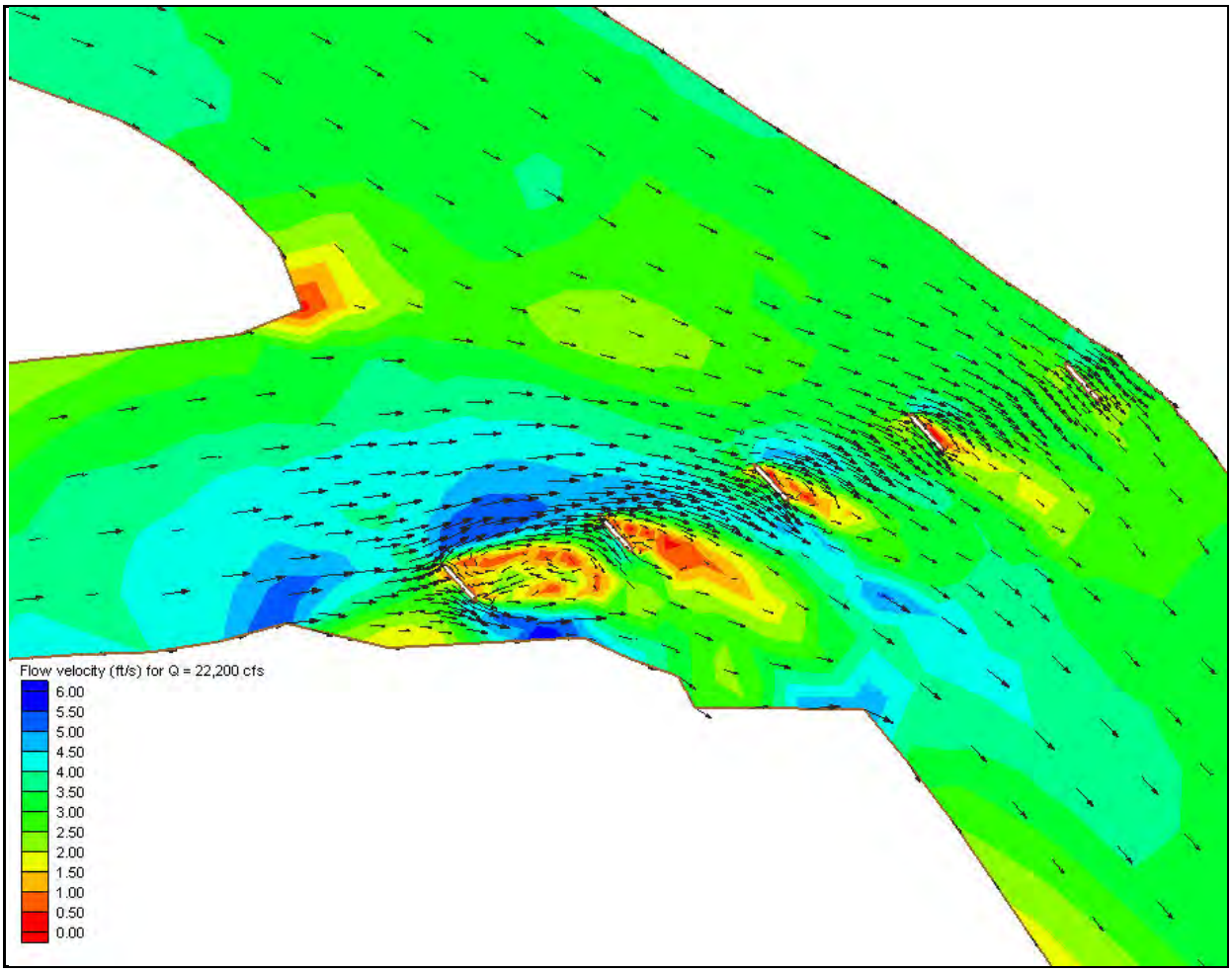


Figure 11. Close-up of the Velocity of the Cedar River in the Area of the Rochester Bridge (Q = 22,200 cfs)

3.4.3. Pier Scour. Scour depths were computed using equation 6.1 (page 6.2) from the Federal FHWA Hydraulic Engineering Circular 18 (HEC 18) dated May 2001 titled *Evaluating Scour at Bridges*. The pier geometry used a length of 49 feet and a width of 5 feet. The sediment factors assumed a D_{50} of 0.7 mm and D_{95} of 3mm with no impact from bed armoring. The analysis assumes an angle of attack which varies between 10 and 55 degrees for the existing condition at each pier. Scour depths were computed for the 2-year (50% chance exceedance) and the 100-year (1% chance exceedance) flows which are 27,000 cfs and 87,000 cfs, respectively. The computations are based on the flow frequency relationship at the project site and the modeled hydraulic parameters as shown in table 6. The alignment of the velocity vectors greatly impacts the resulting scour depth.

Table 6. Scour Depth Parameters and Computation

Pier	Chance Exceedance	Velocity (feet per sec)	Flow Depth	Existing Condition Scour Depth
3	50%	3.6	19 ft	31.0 ft
3	1%	5.2	31 ft	38.8 ft
4	50%	4.3	20 ft	33.7 ft
4	1%	4.3	33 ft	35.7 ft
5	50%	4.2	24 ft	26.4 ft
5	1%	5.2	36 ft	30.5 ft
6	50%	4.6	17 ft	24.0 ft
6	1%	5.7	30 ft	28.4 ft
7	50%	1.8	11 ft	10.0 ft
7	1%	3.4	23 ft	14.6 ft

The existing pier protection is preventing the scour from developing to the extent indicated in table 6 but must be regularly repaired. No matter what project is implemented at this Bridge site, scour protection and regular monitoring at the piers is required.

3.5. Natural Resources Conditions. There are two federally-threatened species listed for Cedar County, Iowa (Table 7). Neither of the federally-listed species, the Western prairie fringed orchid (*Platanthera praeclara*) or the prairie brush clover (*Lespedeza leptostachya*), are expected to be impacted by this project. The Iowa Department of Natural Resources (IDNR) has 7 endangered species, 13 threatened species, and 15 species of concern listed for Cedar County, Iowa (Table 8). There is potential for the listed mussel, fish, and turtle species to be located within the proposed Project Area. There is also potential for wetland and aquatic plants to be present within the proposed Project Area. However, the available habitat for plant species along the river bank is limited due to steep banks, fluctuating water levels, and shifting sediments. The affected area for this project would be limited to the aquatic environment and thus would not impact upland plants or animals. Although the bald eagle is listed as a species of concern and would not be afforded protection under the Endangered and Threatened Plants and Animal Act, it is still afforded protection under the Bald and Golden Eagle Protection Act. There were no bald eagles noted, nor were there any eagle nests observed during the initial site visit. The proposed project is in the area of the Cedar River which falls under the Sovereign Lands, List of Meandered Sovereign Rivers. The portions of the Cedar River protected under this program are from the Iowa River to the west line of Section 7, Township 89 North, Range 13 West, Black Hawk County. This means that a sovereign lands construction permit must be received from the IDNR prior to any construction on, above, or under state-owned lands or waters.

Table 7. Federally-Listed Species for Cedar County, IA

Common Name	Scientific Name	Status	Habitat
Western Prairie Fringed Orchid	*Platanthera praeclara*	Threatened	Wet prairies and sedge meadows
Prairie Bush Clover	*Lespedeza leptostachya*	Threatened	Dry to mesic prairies with gravelly soil

http://www.fws.gov/midwest/endangered/lists/iowa_cty.html

Table 8. State-Listed Species for Cedar County, IA

Common Name	Scientific Name	Class	Status [1]
Bald Eagle	*Haliaeetus leucocephalus*	Birds	S
Least Darter	*Etheostoma microperca*	Fish	E
Pistolgrip	*Tritogonia verrucosa*	Freshwater Mussels	E
Purple Wartyback	*Cyclonaias tuberculata*	Freshwater Mussels	T
Yellow Sandshell	*Lampsilis teres*	Freshwater Mussels	E
Black Huckleberry	*Gaylussacia baccata*	Plants (Dicots)	T
Hill's Thistle	*Cirsium hillii*	Plants (Dicots)	S
James Cristatella	*Polanisia jamesii*	Plants (Dicots)	E
Kitten Tails	*Besseya bullii*	Plants (Dicots)	T
Lance-leaved Violet	*Viola lanceolata*	Plants (Dicots)	S
Meadow Beauty	*Rhexia virginica*	Plants (Dicots)	T
Pink Milkwort	*Polygala incarnata*	Plants (Dicots)	T
Slender Copperleaf	*Acalypha gracilens*	Plants (Dicots)	S
Spring Avens	*Geum vernum*	Plants (Dicots)	S
Sweet Indian Plantain	*Cacalia suaveolens*	Plants (Dicots)	T
Toothcup	*Rotala ramosior*	Plants (Dicots)	S
Violet	*Viola macloskeyi*	Plants (Dicots)	S
Water Starwort	*Callitriche heterophylla*	Plants (Dicots)	S
Wood Stonecrop	*Sedum ternatum*	Plants (Dicots)	S
Grassleaf Rush	*Juncus marginatus*	Plants (Monocots)	S
Great Plains Ladies'-tresses	*Spiranthes magnicamporum*	Plants (Monocots)	S
Green Arrow Arum	*Peltandra virginica*	Plants (Monocots)	E
Low Nut Rush	*Scleria verticillata*	Plants (Monocots)	T
Pale Green Orchid	*Platanthera flava*	Plants (Monocots)	E
Slender Dayflower	*Commelina erecta*	Plants (Monocots)	T
Slender Fimbry	*Fimbristylis autumnalis*	Plants (Monocots)	S
Slender Ladies'-tresses	*Spiranthes lacera*	Plants (Monocots)	T
Slim-leaved Panic Grass	*Dichanthelium linearifolium*	Plants (Monocots)	T
Wolf Spike-rush	*Eleocharis wolfii*	Plants (Monocots)	S
Yellow-eyed Grass	*Xyris torta*	Plants (Monocots)	E
Ledge Spikemoss	*Selaginella rupestris*	Plants (Pteriodophytes)	S
Northern Adder's-tongue	*Ophioglossum pusillum*	Plants (Pteriodophytes)	S
Royal Fern	*Osmunda regalis*	Plants (Pteriodophytes)	T
Blanding's Turtle	*Emydoidea blandingii*	Reptiles	T
Ornate Box Turtle	*Terrapene ornata*	Reptiles	T

[1] T - Threatened; E – Endangered; S - Special Concern - https://programs.iowadnr.gov/naturalareasinventory/pages/Query.aspx

3.6. Historic and Cultural Resources. The Corps consulted with the State of Iowa archeological site Geographic Information Systems (GIS) databases and determined that the there have been no cultural resource surveys within the immediate vicinity of the 290th Street Bridge. There are four previous surveys within 1 mile of the Bridge. Seven archaeological sites have been recorded within a mile of the Bridge and based on the information available, all but one date to the prehistoric period (one is listed as a paleontological site). Currently only two sites have relatively accurate boundaries reported. These two are highly unlikely to be impacted by the project as they are downstream and almost a mile from the Bridge. Two of the remaining site locations are reported to be adjacent to the current channel of the Cedar River and will need to be examined in more detail if it is determined that project related construction may be in the vicinity.

Based on the presence of previously recorded archaeological sites in the vicinity of the Project Area, it does appear that there is a strong probability that archaeological resources could exist within in the Project Area. These resources could range from prehistoric to the historic period. Once project alternatives have been determined, tribal consultation and consultation with the Iowa State Historic Preservation Office will need to be conducted.

3.7. Socio-economic Conditions. The Rochester Bridge serves as a primary route for local travel and commerce (Rochester Township), as well as an alternate route to I-80. Rochester Township is a rural community in Cedar County, Iowa. There is limited census data available for Rochester Township, so Cedar County numbers are substituted where necessary. Table 9 provides employment demographic information for Cedar County.

Table 9. Cedar County Employment Data[1]

Industry	Number Employed	Percent
Educational, Health & Social Services	2,060	21.1
Manufacturing	1,637	16.8
Wholesale & Retail Trade	1,566	16.1
Other Services (not Public Admin.)	437	4.5
Construction	736	7.5
Transport, Warehousing, Utilities	658	6.7
Agriculture	681	7.0
Entertainment & Recreation	481	4.9
Finance, Insurance, Real Estate	431	4.4
Public Admin. & Government	323	3.3
Professional Services	494	5.1
Active Military Duty	10	0.1

[1] Data based on 2000 Census and gathered from http://www.city-data.com/township/Rochester-Cedar-IA.html

The Township occupies approximately 26.4 square miles. It is located northwest of the Quad Cities metro area, approximately 10 miles north of I-80. The population within the limits of Rochester Township is approximately 603 people. The population density is 23 people per square mile. Other demographics breakdown as follows:

- The racial makeup is predominately White (98.2%)
- The median age is 40.0 years old
- 48.9 percent of the population is female and 51.1 percent is male
- The median income for a household in the city is $26,603
- The average household size is 2.66
- About 16.8 percent of people are below the poverty line

3.8. Hazardous, Toxic & Radioactive Waste (HTRW). An Environmental Site Assessment Transaction Screening Process was conducted on June 9, 2011. This process included evaluation of historic aerial photographs, land survey maps, topographical maps, records research and an interview. These inquiries revealed no evidence of hazardous substances or other regulated contaminants in connection with the potential project site. It is recommended that no further HTRW assessments be conducted for this site. Additional information on the HTRW report may be found in Appendix H.

4. GOALS, OBJECTIVES AND POTENTIAL FEATURES

4.1. Future Without Project Condition.

4.1.1 Streambank. The condition without any action will result in the Cedar River thalweg remaining immediately adjacent to the sheet pile protection structure. Without action any transport of material from the face of the sheetpile structure may lead to an unacceptable factor of safety and ultimately failure of the sheet pile structure. Failure of the sheet pile structure that supports the toe of the slope will likely result in failure of the extensive rock riprap slope protection work that the County completed following the 2008 storm event. These failures may make the Bridge abutment immediately vulnerable to erosion and potential failure during a high energy storm event.

The condition without action will result in the river bend immediately upstream of the bridge continuing to be undercut and may eventually lead to the flow getting behind the sheet pile structure which could result in failure of the sheet pile structure and failure of the extensive rock riprap slope protection work. In addition, the stream continues to erode the RDB immediately downstream of the bridge. This erosion threatens to impact the downstream portion of the western abutment.

4.1.2 Bridge Piers. The condition without any action will result in the Cedar River continuing to approach and flow through the Rochester Bridge at an oblique angle which will cause the piers to continue to experience localized scour. This localized scour will continue to occur below the pier and pile interface such that the timber friction piles are vulnerable to debris damaging them during storm events as well as loss of the friction characteristics that make them a stable foundation for the piers. Undermining of the friction timber pile structure will result in instability of the piers and related Bridge decking. Ultimately without taking significant action to prevent scour of the piers the Bridge will fail which will create a detour for traffic and produce adverse economic impacts.

Cedar County, Iowa is the non-Federal Sponsor (NFS); it has indicated that there are 238 bridge structures throughout the county, and approximately 1/3 of those structures are in need of some level of repair or replacement and that in order to replace this structure within the 10 years recommended by the VJ Engineering reports and the IDOT standard general rule that they would have to forego any repairs on all of the other bridges.

However, in accordance with Corps planning guidance the PDT must assume that the NFS will act in a rational manner to protect their structure and protect public life and safety when establishing the future without project condition. It is assumed that in order to protect life and safety the County will follow the IDOT general rule for beginning planning and design for replacement of the Bridge which will take approximately 10 years.

Therefore, the future without project condition is assumed that the NFS will continue to monitor the Bridge bi-annually, and place rock or grout bags in order to provide adequate pier protection.

4.1.3 Overall Bridge Condition. The future without project will result in some level of minor repairs being done to the super structure and substructure until which time funds are appropriated by the state to begin design and construction of a new Bridge, the county issues bonds for capital investment or the Bridge fails.

The temporary pier protection measures installed to date have proven only marginally effective which indicates a vulnerability that a large storm event may wipe out the temporary measures and lead to Bridge failure due to pier scour and/or failure of the sheet pile structure and Bridge abutment. Independent of the temporary measures to protect against pier scour and sheet pile structure instability the NFS will need to conduct significant repairs or replacement to the sub and super structure portions of the Bridge in approximately 10 years or the Bridge may fail resulting in a detour for traffic which will produce adverse economic impacts.

4.2. Planning Constraints and Considerations. The authority that this project is being conducted under is constrained by the implementation of measures to stabilize the streambank and shoreline area only. This means that measures that may be implemented with Federal funds will be required to connect to the streambank and result in greater stability of the streambank.

Iowa does not have any rivers designated as Wild and Scenic as defined under the Wild and Scenic Rivers Act of 1968 (16 U.S.C. 1271) as referenced at the National Park Service website www.rivers.gov. However the State of Iowa and the Nationwide Rivers Inventory have designated several areas as protected waterways. The Cedar River is one of these designated areas from the confluence of the Iowa River to Highway 6 (approximately 26 miles upstream). The Rochester Bridge project is located within this designated area and may be subject to limitations on construction activities that would significantly alter its course or take away from its aesthetic value. The aesthetic value of the river is a planning consideration.

4.3. Goals, Objectives and Features. The overarching goal for this project is to protect the public bridge which is in imminent threat of damage or failure from natural erosion processes on the streambank.

The primary goals and objectives for the Project include:

Goal 1: Determine how to stabilize the RDB in the area around the western Bridge abutment by preventing excessive erosion and toe slope failure.

- Objective 1: Reduce the amount of toe erosion occurring on the river bend immediately upstream of the sheet pile structure.

- Objective 2: Reduce the risk of failure of the sheet pile structure.
- Objective 3: Reduce the erosion potential in the area immediately downstream of the abutment structure.

Goal 2: Identify how to reduce scour at the Bridge piers so they will not fail during high energy storm events.

- Objective 1: Reduce the active scour at the bridge piers

The following features have been identified for addressing these objectives:

- dredging
- channel rerouting (through measures other than dredging)
- bank stabilization
- bridge pier stabilization

4.4. Potential Measures. Potential measures are actions within a feature which may contribute to achieving the project objectives. Table 10 contains the project features and all of the related potential measures that were considered for the Rochester Bridge project; a brief description of each measure follows the table.

Table 10. Potential Measures by Feature

Dredging	Channel Rerouting	Bridge Pier Protection	Bank Stabilization
D0 - No Action	C0 - No Action	BP0 - No Action	BS0 - No Action
D1 – Dredging East Channel @ E. Island	C1 – Closing Dam @ E. Island head	BP1 - Deflection structure	BS1 – Vegetative
D2 – Dredging West Channel @ W. Island	C2 – Closing Dam @ W. Island head	BP2 - Riprap	BS2 – Riprap Revetment
	C3 – Wingdike between Islands		BS3 – Stream Barbs
			BS4 - Long Peak Stone Toe Protection
			BS5 – High Energy Turf Reinforcement Mat

D0 – No Action. The "No Action" measure means that dredging activities would not be implemented at either of the islands and therefore would result in no change to the current channel.

D1 - Dredging East Channel at East Island. This measure consists of dredging out a channel on the eastern side of the east island. This action would direct the majority of the river's flow back to the eastern side of the east island where it had been prior to the 2008 storm event. This dredging would return the flow to a desirable Bridge approach angle.

D2 - Dredging West Channel at West Island. This measure consists of dredging out a channel on the western side of the west island. This action would direct the majority of the river's flow back to the western side of the west island where it had been prior to the 2008 storm event. This dredging would encourage the flow to restore a sinuous pattern and naturally scour out the material on the east side of the east island in order to return the primary flow to a desirable Bridge approach angle.

C0 - No Action. The "No Action" measure means that no cut off structures would be constructed at either the head or toe of either of the islands. Therefore, there would be no attempt to redirect the channel by use of a control structure.

C1 – Closing Dam at East Island Head. This measure is a control structure in the form of a rock barrier that would be constructed across the channel at the head of the east island which would result in the main flow of the river being permanently diverted back to the eastern side of the island.

C2 – Closing Dam at West Island Head. This measure is a control structure in the form of a rock barrier that would be constructed across the channel at the head of the west island which would result in the main flow of the river being permanently diverted to the western side of the west island.

C3 – Wingdike Between Islands. This measure is a rock riprap wingdike that is constructed along the right descending bankline between the islands. This measure would extend into the stream channel approximately ¼ of the channel width in order to divert flow to the eastern side of the east island.

BP0 - No Action. The "No Action" measure means that no efforts would be made to stabilize the Bridge piers. This measure may eventually lead to the failure of the Bridge piers and the loss of the Bridge.

BP1 - Deflection Structure. This measure is the construction of a deflection structure in the immediate vicinity of the Bridge piers in an attempt to keep the water flows from hitting the Bridge piers directly. This measure would include a sheet pile structure that is driven below the scour potential elevation which is then filled with sand material and capped with concrete.

BP2 – Riprap. This measure involves the placement of riprap materials around the existing piers of the Bridge as a direct protection of the piers from hi-flow conditions and debris. This measure may require some excavation and placement to assure rock protection is in place below the scour potential elevation.

BS0 - No Action. The "No Action" measure means that no efforts would be made towards stabilizing the banks of the river in the Project Area.

BS1 – Vegetative. This measure involves re-shaping the river banks and planting vegetation to stabilize the banks.

BS2 – Riprap Revetment. This measure involves the placement of riprap materials along the RDB along the slope of the bank from the toe of the slope to the top of the slope. This revetment would begin where the County installed revetment ends and continue upstream around the nearest bend.

BS3 – Riprap Stream Barbs. This measure involves the placement of in-stream structures placed along the RDB. The structures are keyed into the bank at 90 degrees and bend to point upstream at approximately 45 degrees. The in-channel portion of the structure is submerged and changes the velocity, depth and sediment transport in the vicinity of the structure. Structure directs the channel away from the existing streambank line and allows for deposition of sand material behind the structure. This sediment deposition provides protection for the sheet pile structure and toe of the existing riprap revetment.

BS4 – Longitudinal Peaked Stone Toe Protection. This measure involves the construction of a continuous stone dike running parallel to the toe of the bank. The ends of the dike must be keyed into the bank at 20 – 30 degrees to the flow. Structure may also require additional tie-backs as necessary to stream forces. This measure shifts the current away from the eroding bank and allows the dike to capture material on the landward side which builds up material to stabilize the bank.

BS5 – High Energy Turf Reinforcement Mats. This measure consists of using a geosynthetic turf reinforcement mat placed on the bank line to prevent erosion. This allows for vegetation to be re-established for low energy erosion control along with geosynthetic properties to minimize erosion during high energy storm events.

5. EVALUATION, SCREENING AND ALTERNATIVE FORMULATION

5.1. Measure Evaluation and Screening. Due to the numerous possible combinations of measures, each measure was evaluated for their effectiveness and screened to the extent practical prior to being combined into alternatives.

5.1.1. Dredging Measures. The measures associated with dredging were able to be screened because they are not cost effective. They would only provide for temporary realignment and a preliminary cost estimate determined that the measures would cost approximately $1.5 million plus planning and design costs .

5.1.2. Channel Rerouting Measures. Hydraulic analysis determined that only "C1 – Closing Dam at the east island head" had the desired effect of rerouting the channel to flow on the east side of the east island; therefore measures C2 and C3 were able to be screened out due to their ineffectiveness in achieving the desired result.

5.1.3. Bridge Pier Protection Measures: Measure BP1 – Deflection Structure was screened due to the complex nature of the construction and the high cost. Due to the proximity of the Bridge superstructure special low rise sheet piling equipment would be necessary to install the sheet pile. The sheet piles would need to be driven in 5-foot lengths and welded together. The PDT did locate one example of this work being done in New Orleans. The cost for this work was determined to be exorbitant for the scope of this project.

5.1.4. Streambank Stabilization Measures: The PDT conducted a site visit to walk the right descending streambank to determine the need for surface treatments to protect the abutment from erosion. The PDT concluded that the existing rock riprap revetment and vegetation were adequate and stable such that no additional surface treatments were necessary at this time. This determination resulted in the screening of *BS1 – Vegetative, BS2 – Riprap Revetment,* and *BS5 – High Energy Turf Reinforcement Mats.* Note: there continued to be concerns with toe slope erosion near the upstream river bend as well as the continual erosion of the streambank immediately downstream of the bridge which threatens the downstream portion of the western abutment.

Table 11 presents the remaining measures to be combined into alternatives.

Table 11. Measures to Formulate Alternatives

Channel Rerouting	Bridge Pier Protection	Bank Stabilization
C0 - No Action	BP0 - No Action	BS0 - No Action
C1 – Closing Dam at East Island Head	BP2 - Riprap	BS3 – Riprap Stream Barbs
		BS4 – Longitudinal Peaked Stone Toe Protection

5.2. Alternative Formulation. In addition to the measures that have been identified, the PDT also considered the replacement of the Bridge structure. Bridge Replacement is a standalone alternative that is understood to be outside of the implementation authority of this project but must be included in formulation as it is a viable alternative. The alternatives are as follows and have been re-designated in alphabetical letters for simplicity:

A. No Action. No action on the part of the District (meaning no Federal design or funding). This alternative would not preclude the NFS to take action using its design and implementation resources. No Action would result in the conditions described in the future without project section.

B. Replacement of the 290th Street Bridge. This alternative would include construction of a new Bridge and the existing Bridge would be removed. This alternative would provide a solution to the problem because the costs would far exceed the benefits. In addition, bridge replacement is a local responsibility.

C. Riprap Stream Barbs. This alternative involves the placement of in-stream structures placed along the RDB. The structures are keyed into the bank at 90 degrees and bend to point upstream at approximately 45 degrees. The in-channel portion of the structure is submerged and changes the velocity, depth and sediment transport in the vicinity of the structure. Structure directs the channel away from the existing streambank line and allows for deposition of sand material behind the stream barbs. This alternative would provide protection for the streambank on the upstream bend but does not adequately protect the sheet pile structure during low flows or address the scour issues around the western abutment or Bridge piers.

D. Longitudinal Peaked Stone Toe Protection with Sheet Pile Protection. This alternative would involve the construction of a continuous stone dike running parallel to the toe of the bank. The end of the dike must be keyed into the bank at 20–30 degrees to the flow. The beginning of the rock dike would be placed directly against the sheet pile structure to counter forces incurred during extreme

low flows. This alternative shifts the current away from the eroding bank and allows the dike to capture material on the landward side which would build up material and stabilize the bankline behind the rock protection. This alternative restores the RDB at the abutment to the as-built elevation which helps rebuild the shore lost around piers 1, 2, 3 and 4.

E. Riprap Bridge Pier Protection. This alternative would involve placing riprap around the Bridge piers to prevent scour. This alternative would protect the Bridge piers but would not protect the streambank and sheet pile structure.

F. Longitudinal Peaked Stone Toe Protection with Sheet Pile Protection, Riprap Stream Barbs. This alternative would consist of a combination of Alternatives C, D, and E. This alternative would protect all of the Bridge piers as well as protecting the streambank (upstream bend and downstream portion of western abutment) and sheet pile structure.

G. Closing Dam (w/ Riprap Island Protection). This alternative would redirect the Cedar River to a prior course. A closing dam would be constructed across the current main channel redirecting flow to the opposite channel. Rip rap would be placed at the head of the island. This alternative would provide a better approach to the Bridge but will not provide protection against pier scour. This closure structure would likely slow the flowrate along the streambank and allow for deposition of material that would protect the streambank and sheet pile structure.

H. Closing Dam (w/ Riprap Island Protection), and Bridge Pier Protection. This alternative would redirect the Cedar River to a prior course. A closing dam would be constructed across the current main channel redirecting flow to the opposite channel. Riprap would be placed at the head of the island and around the Bridge piers. This alternative would provide a better approach to the Bridge and will protect against pier scour.

6. COMPARISON OF ALTERNATIVES

In accordance with planning guidance, alternatives must be compared to consider their completeness, effectiveness, efficiency, and acceptability. When considering efficiency planning guidance requires that Section 14 Emergency Streambank Stabilization projects select the least cost alternative that will address the problems. Completeness refers to the extent that an alternative plan provides all necessary investments or actions to assure realization of the planned effect. Effectiveness refers to an alternatives ability to alleviate the specified problems and achieve the opportunities. Efficiency refers to the extent of an alternative plan's cost effectiveness in alleviating the problems and achieving the opportunities. For this study the preliminary costs were used to identify the lowest cost option which serves as the most efficient option. Acceptability refers to the workability and viability of an alternative with respect to acceptance of Federal, state and local entities and general public and compatibility of existing laws, regulations and public policies.

Alternative A, the *No-Action* alternative, is an acceptable, complete and efficient plan although it is not an effective plan in addressing the project goals.

Alternative B, *Bridge Replacement*, is an acceptable, complete and presumably effective (based on design) alternative but is not efficient in terms of immediate Bridge protection within the scope of this

project. Bridge Replacement costs are estimated to be $6 million which exceeds the benefits of the bridge. Bridge Replacement is a local responsibility and not implementable by the Corps.

Alternative C, *Stream Barbs*, is an acceptable, complete, and efficient alternative but is not effective in achieving the streambank (sheet pile protection and downstream portion of western abutment) and pier protection objectives.

Alternative D, *Longitudinal Peaked Stone Toe Protection* with Sheet Pile Protection, is an acceptable, complete and efficient alternative but is not effective in achieving the streambank (upstream bend) and pier protection objectives.

Alternative E, *Pier Protection*, is a complete and efficient alternative but is not effective in achieving the streambank protection (sheet pile protection, upstream bend and downstream portion of western abutment) objectives. This alternative is acceptable only if the NFS implements the pier protection measure as the Corps is constrained by the project authority.

Alternative G, *Closing Dam,* is a complete alternative but is not efficient compared to other alternatives or effective in achieving the streambank (sheet pile protection) and pier protection objective. This alternative is not acceptable based on preliminary coordination with agencies due to the environmental and water quality implications as well as the permanent alteration of a designated protected waterway. More specifically, environmental and water quality concerns were raised whether this was the "least damaging potential alternative" under Section 404(b)(1) guidelines. The PDT determined that other alternatives would achieve the project goals with less environmental impact.

Alternative H, *Closing Dam and Bridge Pier Protection*, is a complete and effective alternative but is not efficient compared to other alternatives. This alternative is not acceptable based on preliminary coordination with agencies due to the environmental and water quality implications as well as the permanent alteration of a designated protected waterway. More specifically, environmental and water quality concerns were raised whether this was the "least damaging potential alternative" under Section 404(b)(1) guidelines. The PDT determined that other alternatives would achieve the project goals with less environmental impact.

Based on the comparison of alternatives it appears that the only plan that is complete, efficient, effective and acceptable is Alternative F, *Longitudinal Peaked Stone Toe Protection with Sheet Pile Protection, and Riprap Stream Barbs*.

In accordance with planning guidance, the least cost alternative must have a benefit to cost ratio (BCR) greater than 1:1 in order to support a Federal interest in design and implementation of the project. The PDT evaluated Alternative F against a 10-year period of benefits and provided the following information to address whether there is a Federal interest in design and implementation of this project. Economic evaluation is provided in Section 9 and Appendix C. The Summary of Costs and Benefits is as follows:

Total Annual Benefits	$516,209
Annual Cost	$219,657
Annual Net Benefits	$296,551
Benefit-to-Cost Ratio	2.4 : 1

Because Alternative F has a BCR greater than 1:1, it is the TSP.

7. TENTATIVELY SELECTED PLAN

7.1. General. The Tentatively Selected Plan is Alternative F, *Longitudinal Peaked Stone Toe Protection with Sheet Pile Protection, Riprap Stream Barbs and Riprap Bridge Pier Protection* (figure 12). This alternative would restore a portion of the RDB to the elevation shown in the as-built drawings.

7.2. Description of the Tentatively Selected Plan

7.2.1 Longitudinal Peaked Stone Toe Protection with Rock Riprap Sheet Pile Protection. This measure would start at the upstream end of the sheet pile structure on the RDB and extend approximately 60ft downstream. The sheet pile protection portion of this measure would be constructed at an elevation of 646 ft (NAVD 1988). This measure would be 8 feet wide at the top of the sheet pile structure and would fall at a 2H:1V slope to the bottom of the stream channel. This measure would maintain an elevation of 646 but narrow to a peak. This peaked stone structure would extend parallel with the bridge approximately 520ft until making a 90degree bend and extending another 200ft where it ties into the RDB downstream of the bridge. The peaked stone structure would fall from the peak at a 2H:1V slope to the respective bottom of the stream channel. This structure would be constructed of Iowa Class A rock riprap.

7.2.2. Stream Barbs. Two stream barbs would be constructed along the RDB of the Cedar River immediately upstream of the stone toe protection measure. These barbs would be 42 feet in length and would be angled at 45 degrees to the bank. The barbs would be constructed with Iowa Class A rock riprap. This sizing was based on the estimated velocity of water at the location of the proposed stream barbs. The barbs would have an 8.75 foot deep key and rise from the riverbed at a 2H:1V slope to elevation 631.0 feet and then at a 10H:1V slope to elevation 633.0 feet where they tie into the existing shoreline. The barbs would serve to deflect water away from the Bridge abutment, accumulate sediment between the structures to protect against scour at the toe of the existing revetment. The east (downstream) barb would require 800 CY (1,320 tons) of material. Please refer to the Stream Barb Engineering Design Memorandum in Appendix B. For more information on riprap sizing, please see Appendix E.

7.2.3. Pier Protection (Installed by the NFS). Iowa Class A, 400 lb top size rock riprap would be placed around 3 of the piers of the Rochester Bridge. The piers for rock placement are piers 5,6 and 7. Pier 5 would receive approximately 435 CY (720 tons); Pier 6, approximately 1065 CY (1760 tons); Pier 7, approximately 1855 CY (3060 tons). The riprap would be placed to an elevation of 635.8 feet (NAVD 88). The rock riprap would be placed around Piers 5&6 to double the width of the Piers, or approximately 11 feet. The riprap on Piers 5&6 would slope to the riverbed at a slope of 2H:1V. The rock riprap would be placed around Pier 7 to triple the width of the Piers, or approximately 16.5 feet. The riprap on Pier7 would slope to the riverbed at a slope of 3H:1V. Please refer to the Design Plates and the Pier and Sheetpile Protection Engineering Design Memorandum in Appendix B. For more information on pier protection, please refer to Appendix E.

Figure 12. Tentatively Selected Plan

7.3. Construction Considerations. All construction would be done by floating plant (Barge). The floating plant would need to be mobilized during a period of high enough water to assure adequate clearance of the vessel but low enough water to minimize issues related to high velocity. A potential temporary construction staging area was identified in the NE corner of the intersection of 290th Street and W Rochester Ave. This staging area would allow for dump trucks to place rock and then a machine to load the floating plant from the shore. A high voltage power line runs along the downstream side of the 290th Street Bridge. Caution should be observed when working near the power lines. Given variability in the stream channel bottom the contractor should do soundings prior to construction in order to identify the topography and provide a work plan to outline how they will place bedding stone and rock riprap in the designated locations without damaging the piers (or piles if exposed).
A stormwater permit would need to be acquired by the contractor before commencing work on-site. Additional permits to be obtained include a regional permit as well as a floodplain permit and a sovereign lands permit. An Iowa joint permit application has been filled out to initiate the permitting process. The permit application is included in Appendix A.

7.4. Construction Sequence. The following is the probable construction sequence; however, no sequence will be required contractually.

1. Mobilize Floating Plant from Downstream Public Dock.
2. Place Rock Riprap around Bridge Piers
3. Excavate Stream Barb Keyway
4. Place Rock Riprap in Keyway
5. Complete Stream Barb and Sheet Pile Rock Placement to Design
6. Minor Grading to Restore Temporary Staging Area
7. Seed Disturbed Portion of Temporary Staging Area

7.5. Operation, Maintenance, Repair, Replacement, and Rehabilitation (OMRR&R) Considerations. There are no operational requirements for this project. Typically, 5 percent of the rock riprap installed is estimated to be replaced every 10 years due to the action of the river. However, since this project has a 10 year period of analysis there is no maintenance costs estimated for this project.

No additional cost to the NFS is expected in terms of inspections as a Bridge inspection is already performed every 2 years and after major flood events. If a major flood event were to occur within this 10 year period of analysis, the NFS would be solely responsible for the cost of inspection and repairs per their current operation and maintenance responsibilities.

7.6. Value Engineering. A Value Engineering (VE) study will be completed during the design and implementation phase of the project prior to 35 percent design completion. This is recommended based on the projected Project cost of greater than $1 million and less than $10 million. This is in accordance with ER 11-1-321, Army Programs, Value Engineering, dated 01 Jan 2011 (formerly EC 11-1-114, Army Programs, Value Management/Value Engineering, dated 28 Feb 2003).

7.7. Project Schedule. Table 12 presents the schedule for Project completion.

Table 12. Schedule for Project Completion

Required Project Item	Duration (Days)	Start	Completion
DPR and PPA			
District Quality Control Review	64	6/25/2012	8/29/2012
Agency Technical Review	20	8/2/2013	08/22/2013
Alternative Formulation Briefing	14	08/26/2013	02/10/2014
Public Review	30	02/13/2014	03/12/2014
Independent External Peer Review (Not Applicable)	0	N/A	N/A
MVD Approval of DPR	14	03/16/2014	03/30/2014
FONSI signed by District Commander Approval	7	03/31/2014	04/07/2014
MVD PPA Approval	30	04/12/2014	05/11/2014
Plans and Specifications			
VE Study	14	05/15/2014	05/29/2014
Prepare Plans and Specifications	120	05/29/2014	10/21/2014
District Quality Control Review	14	10/22/2014	11/07/2014
Agency Technical Review	30	11/10/2014	12/10/2014
Bid-ability, Constructability, Operability &	30	12/11/2014	01/10/2015
Contract Award	30	01/11/2015	02/10/2015
Construction	180	02/11/2015	08/10/2015

8. COST ESTIMATE

Table 13 provides the Estimated Cost, Project First Costs (Constant Dollar Estimate) and Total Project Cost (Fully Funded Estimate), based on the proposed construction schedule, expected escalation costs, and a contingency factor by Project component based on risk. This estimate represents the money expected to be spent at the end of Project construction based on expected escalation costs to mid-point of construction. Quantities and costs may vary during final design. All cost estimates are calculated using present worth (October 2013). Details for the cost estimate are contained in Appendix C, *Cost Estimate and Economic Assessment*.

Table 13. Detailed Project Cost Summary (in $1000's)

Acct Code	Item	Estimated Cost	Project First Costs (CDE)	Total Project Cost (FFE)
01	**Lands and Damages**			
	Lands and Damages and Non-Federal Incidental Acquisition Expenses	7	7	7
09	**Project Features**			
	Channels and Canals: Riprap Longitudinal Peaked Stone To Protection Rock Dike and Stream Barbs	1,508	1,539	1,560
30	**Planning Engineering and Design (PED)**	194	197	199
31	**Construction Management**	59	61	62
	Total Project Cost	**1,768**	**1,804**	**2,258**

9. ECONOMIC EVALUATION

9.1. Methodology. This study assesses the feasibility of providing protective action to curtail bank erosion which is threatening a city street/bridge. The study site is the 290th Street bridge located in Rochester Township (Cedar County), Iowa. The road is also known as County Highway F44. The erosion area extends along the east bank of the Cedar River. Continued erosion will eventually result in closure and/or failure of this bridge. The annual benefits and costs of the proposed action were computed using 2013 price levels and a 3.75 % discount rate. The period of analysis is 10 years.

9.2. Benefits of Protective Action. The benefits of protective action are derived from considering what would occur if no action were taken. The benefits were calculated by examining all potential detour costs avoided. The analysis was done according to guidance in ER 1105-2-100.

9.2.1. Detour Costs. Without protection, continuing erosion will likely cause failure and closure of the Bridge within the year. This will cause motorists to use detour routes, incurring additional costs for vehicle operation and opportunity of time. Benefits to be derived from avoided detour costs were estimated based on the following:

- The 290th Street Bridge has an average daily traffic count of 460 vehicles (IDOT, 2010) which would be subjected to detour under Bridge failure conditions. The daily number of trips by type of vehicle was provided by the County Engineer. Table 14 shows the number of daily and annual trips by passenger cars and all other vehicles, including trucks, school buses, mail vehicles, farm machinery, and emergency vehicles

Table 14. Annual Traffic Analysis

Type of Vehicle	Detour Days Per Year	Daily Number of Trips	Total Annual Number of Trips
Passenger Car	365	368	134,320
Heavy Truck	313	69	21,597
Farm Machinery	200	23	4,600
Total Number of Trips:		**460**	**160,517**

- The shortest average detour route would require an additional distance of 7 miles. This detour would require an additional .18 hours of travel at an assumed average speed of 40 miles per hour.

- The estimated 2013 average cost (variable expense) for operating passenger cars is $0.205 per mile, and $.58 per mile for heavy trucks and farm machinery (source: 2013 Mid-West Truckers Assoc; and 2013 AAA). These cost estimates include fuel, tire and maintenance/ repair costs. Table 15 shows the detour costs for a 1-year period.

Table 15. Vehicle Operating Costs

Type of Vehicle	Detour Miles (one way)	Annual Number of Trips	Costs Per Mile	Total Added Operating Costs
Passenger Car	7.0	134,320	$0.205	$ 192,749
Heavy Truck	7.0	21,597	$0.586	$ 88,591
Farm Machinery	7.0	4,600	$0.586	$ 18,869
		Total Additional Operating Costs:		**$ 300,209**

- According to the US Department of Labor, the average hourly rate for Cedar County, IA was $14.05 in 2009. Average passenger car occupancy of 1.6 adults and one child was assumed. Travel time costs of one-third and one-twelfth of the average local hourly wage rate was used for adults and children (as guidance recommends). Therefore, the opportunity cost of time for passenger cars is estimated to be $8.66 per hour per vehicle [($14.05*1.6*1/3) + ($14.05*1.0*1/12) = $8.66] (table 16). The general median hourly wage rates for Iowa were used as the value of time for heavy truck operators ($18.87) and farm equipment operators ($12.12). Table 16 shows the opportunity cost of time.

Table 16. Opportunity Cost of Time

Type of Vehicle	Time Per Trip (hours)	Annual No. of Trips	Time Cost Per Hour	Opportunity of Time Cost
Passenger Car	0.175	134,320	$8.66	$203,562
Heavy Truck	0.175	21,597	$18.87	$71,319
Farm Machinery	0.175	4,600	$12.12	$9,757
		Total Annual Opportunity Costs Added–All Vehicles:		**$284,638**

- As shown in tables 15 and 16, yearly detour costs resulting from increased vehicle operating costs and opportunity of time costs amount to $300,209 and $284,638, respectively, for a total of $584,847 in yearly cost.

9.2.2. Annual Benefits. At the current erosion rates, it is estimated that the Bridge closure would occur within 1 year. Therefore, the benefits of project implementation would be the annual detour costs avoided by project construction. Total detour costs avoided are $516,209. This amount is the annual benefit of project implementation. Since bridge closure is expected to occur with the timeframe of seasonal high water events, no discounting of benefits is needed.

9.3. Cost of Recommended Action. The preventive action involves a rock riprap dike and two rock riprap stream barbs on the right descending streambank of the west abutment, with an estimated total project cost of $1,804,000.

9.3.1. Annual Costs. Total project costs were annualized over a 10-year period at a 3.75% rate, as shown in table 17. Interest during construction was not included due to the short construction period.

Table 17. Annualized Project Cost
(2013 Prices, 10-Year Period, 3.75 %)

Item	First Cost	OMRR&R	Annual Cost
Total Project Cost	$1,804,000	$0	$219,657

9.3.2. Benefit and Cost Summary. As shown in table 18, the project exhibits Federal interest with $296,551 in net benefits, and a benefit-to-cost ratio of 2.4 to 1.0.

Table 18. Benefit and Cost Summary

Total Annual Benefits	Annual First Cost	Annual Net Benefits	BCR
$516,209	$219,657	$296,551	2.4

10. STATUS OF ENVIRONMENTAL STATUTE COMPLIANCE

Early coordination with the various Federal, State and other natural resource conservation organizations and cultural agencies has been completed. There were no questions raised by agencies during this early coordination period. An Environmental Assessment has been prepared which will undergo public review after internal and external district reviews have been completed. Anticipate that a FONSI will be signed approximately early-November of 2013. Permit requirements and significant effects related to environmental quality, regional development and other social effects are provided in Appendix A, *Environmental Assessment*.

11. IMPLEMENTATION RESPONSIBILITIES

11.1. Federal Responsibilities. The Federal Government will provide 65 percent of the first costs of the Tentatively Selected Plan. The Federal portion of this Project is estimated at $1,172,600. The Rock Island District is responsible for Project management and coordination with the USFWS and other affected agencies. The Rock Island District will submit the Definite Project Report (DPR) for approval, design, and prepare plans and specification, complete all NEPA requirements, execute a Project Partnership Agreement (PPA) with Cedar County, advertise and award a construction contract, and perform construction contract supervision and administration.

11.2. Non-Federal Responsibilities. Cedar County is the NFS for this Project. This section describes the responsibilities of the NFS in conjunction with the Federal Government to implement the Recommended Plan. A model Section 14 Project Partnership Agreement (PPA) has been reviewed by the NFS and its legal representation. The NFS is aware of the responsibilities. The PPA will be executed prior to implementation.

The Feasibility Report costs were cost shared in accordance with the FCSA. Construction, Plans and Specifications, Engineering during Construction, and Construction Management costs shall be included as part of the total Project costs to be shared 65 percent Federal and 35 percent non-Federal. The NFS shall:

- Provide all lands, easements, rights-of-way, relocations, and excavated or dredged material disposal areas (LERRD), and provide or pay the Federal government the cost of providing all

retaining dikes, wasteweirs, bulkheads, and embankments at any dredged or excavated material disposal areas determined by the Federal government to be necessary for construction, operation, and maintenance of the Project.

- Provide, during construction, any additional costs as necessary to make the total non-Federal contributions equal to 35 percent of the total Project costs. The non-Federal share is estimated at $631,400. The NFS is required to provide 5% of the total project cost as cash. The non-Federal cash requirement is estimated at $90,200. The NFS may only receive credit towards its share of Project costs for the value of the LERRD provided that they do not already own the land or possess an easement and therefore must acquire the easement for Project purposes. The estimated costs of the LERRD required for the Project is approximately $12,000.
- For so long as the Project is authorized, operate, maintain, repair, replace, and rehabilitate the completed Project or functional portion of the completed Project, at no cost to the Federal government, in accordance with the applicable Federal and state laws and any specific directions prescribed by the Federal government. There are no estimated OMRR&R costs.
- Hold harmless and save the Federal government from damages due to the construction and operation and maintenance of the Project, except where such damages are due to the fault or negligence of the Federal government or its contractors.
- Grant the Federal government a right to enter, at reasonable times and in a reasonable manner, upon land which the NFS owns or controls for access to the Project for the purpose of inspection, and, if necessary, for the purpose of completing, operating, maintaining, repairing, replacing, or rehabilitating the Project.
- Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the Project to the extent and in such detail as will properly reflect total Project costs for a minimum of 3 years after completion of the accounting for which such books, records, documents, and other evidence are required.
- Perform, or cause to be performed, any investigations for hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 USC 9601-9675, that may exist in, on, or under lands, easements, or rights-of-way necessary for construction, operation, and maintenance of the Project; except that the NFS shall not perform such investigations on lands, easements, or rights-of-way that the Federal government determines to be subject to the navigation servitude without prior specific written direction by the Federal government.
- Assume complete financial responsibility for all necessary cleanup and response costs of any CERCLA-regulated materials located in, on, or under lands, easements, or rights-of-way that the Federal government determines are necessary for construction, operation, and maintenance of the Project.
- Agree that, as between the Federal government and the NFS, the NFS shall be the operator of the Project for the purpose of CERCLA liability, and to the maximum extent practicable, operate, maintain, repair, replace, and rehabilitate the Project in a manner that will not cause liability to arise under CERCLA.

- Prevent obstructions of, or encroachments on, the Project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) that might reduce the function or benefits of the Project.
- Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended (42 U.S.C. 4601-4655), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way required for construction, operation, maintenance, repair, replacement, and rehabilitation of the Project, including those required for relocations, the borrowing of material, or disposal of dredged or excavated material, and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.
- Comply with all applicable Federal and state laws and regulations, including, but not limited to: Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d) and Department of Defense Directive 5500.11 issued pursuant thereto; Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army"; and all applicable Federal labor standards requirements, including, but not limited to, 40 U.S.C. 3141-3148 and 40 U.S.C. 3701-3708 (revising, codifying and enacting without substantive change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a *et seq*.), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 *et seq*.), and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c).
- Provide the non-Federal share of that portion of the costs of data recovery activities associated with historic preservation that are in excess of the 1 percent of the total amount authorized to be appropriated for the Project, in accordance with the cost sharing provisions of the Project Cooperation Agreement.
- Not use Federal funds to meet the NFS's share of total Project costs unless the Federal granting agency verifies in writing that the expenditure of such funds is authorized.

11.3. Real Estate Considerations. The lower 157 miles of the Cedar River are designated as meandered meaning the State of Iowa owns the stream bed up to the ordinary high water mark at the proposed Project location. The State would likely not release permanent land rights for the sake of this project and would likely dispense a channel improvement/easement through a Sovereign Lands Construction Permit from the Iowa Department of Natural Resources in the project area. The acreage proposed for a channel improvement/easement on the portion of the Project owned by the State of Iowa is 2.04 acres. The acreage proposed for an easement on private lands is 0.71 acres (Appendix D). In accordance with Continuing Authorities Program Section 14 guidance the NFS may not receive credit towards its share of Project costs for the value of the LERRD provided for Project purposes on lands they already own. The estimated costs of the LERRD required for the Project is approximately $12,000. This includes approximately $1,000 in estimated land value, approximately $11,000 in estimated incremental real estate costs, and approximately $0 in severance damages. The total Real Estate estimate is currently $12,000 based on lands and damages, any incidental costs, and other Federal costs.

Additional information relating to real estate aspects can be found in Appendix D, *Real Estate Plan.*

12. REFERENCES

VJ Engineering. 2008. *Post-Flood Bridge Evaluation Report, Old Iowa Hwy. 979 Rochester Bridge, Rochester, IA, Cedar County.*

May, 2010. *Underwater Structural Inspection 2010 Old Iowa Hwy. 979 – Rochester Bridge, Rochester, IA, Cedar Valley Road Bridge, Cedar Valley, IA, Cedar County, IA.*

November, 2010. *Scour Repair and Debris Removal 2010 Old Iowa Hwy. 979 – Rochester Bridge, Rochester, IA, Cedar Valley Road Bridge, Cedar Valley, IA, Cedar County, IA.*

CEDAR RIVER
290th STREET BRIDGE AT ROCHESTER, IOWA
SECTION 14 STREAMBANK STABILIZATION PROJECT

FEASIBILITY REPORT

RECOMMENDATIONS

I have weighed the benefits to be obtained from the full implementation of this emergency stabilization Project against its estimated cost and have considered the various alternatives proposed, impacts identified, and overall scope. In my judgment, this Project, as proposed, justifies expenditure of Federal funds. I recommend that the Mississippi Valley Division Engineer approve the proposed Project to include construction of rock riprap stream barbs and rock riprap longitudinal peaked stone toe protection structures.

The current estimated first cost of the Recommended Plan is $1,804,000. This total includes construction of the Project features, preconstruction engineering and design, construction management, and real estate. The feasibility planning component was cost shared in accordance with the approved and executed Feasibility Cost Sharing Agreement. Project design and implementation would be cost shared 65 percent by Federal Government and 35 percent by the non-Federal Sponsor, Cedar County, Iowa. The Federal contribution is estimated at $1,172,600. It is the non-Federal Sponsor's responsibility to provide the real estate and conduct the operation and maintenance after construction. There are no Operation, Maintenance, Repair, Replacement, and Rehabilitation costs associated with the Project.

At this time, I further recommend that funds in the amount of $1,172,600 be allocated for the initiation and completion of the Design and Implementation Phase.

_____ _____

(Date)

Mark J. Deschenes
Colonel, U.S. Army
Commander & District Engineer

CEDAR RIVER
290th STREET BRIDGE AT ROCHESTER, IOWA
SECTION 14 STREAMBANK STABILIZATION PROJECT

FEASIBILITY REPORT

DRAFT FINDING OF NO SIGNIFICANT IMPACT

I have reviewed the information in this Environmental Assessment, along with data obtained from Federal and State agencies having jurisdiction by law or special expertise, and from the interested public. I find that placement of riprap for construction of two stream barbs, sheet pile protection, longitudinal peaked stone toe protection, and bridge pier along the right descending bank of the Cedar River near Rochester, Cedar County, Iowa would not significantly affect the quality of the human environment. Therefore, it is my determination that an Environmental Impact Statement is not required. This determination will be reevaluated if warranted by later developments.

This Finding of No Significant Impact is based on the following factors:

a. The project would have only minor and short-term impacts on fish and wildlife resources and on water quality.

b. The proposed project would prevent further deterioration of the right descending bank and protect the western bridge abutment, sheet pile structure, and bridge piers.

c. No significant adverse social, economic, environmental, or cultural impacts are anticipated as a result of the proposed action.

d. The U.S. Army Corps of Engineers, Rock Island District would receive Section 401 of the Clean Water Act certification and the Sovereign Lands Permit from the State of Iowa prior to any construction measures being performed on the site.

_____ _____

(Date)

Mark J. Deschenes
Colonel, U.S. Army
Commander & District Engineer

SECTION 14, CEDAR RIVER, 290TH STREET BRIDGE
ROCHESTER, IOWA

APPENDIX A

ENVIRONMENTAL ASSESSMENT

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SECTION 14, CEDAR RIVER, 290TH STREET BRIDGE
ROCHESTER, IOWA

APPENDIX A
ENVIRONMENTAL ASSESSMENT

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SECTION 14, CEDAR RIVER, 290TH STREET BRIDGE
ROCHESTER, IOWA

APPENDIX A
ENVIRONMENTAL ASSESSMENT

I. INTRODUCTION

This Section 14 project (Project) for emergency streambank and erosion protection would stabilize the right descending bank (RDB) of the Cedar River and protect the 290th Street Bridge. The 290th Street Bridge crosses the Cedar River near the Village of Rochester, Cedar County, Iowa. The site is located in Township 79 North, Range 3 West, Sections 11 and 2. The Project area consists of approximately 1,200 feet along the RDB of the Cedar River and the 290th Street Bridge (figure EA-1).

II. PURPOSE AND NEED FOR THE ACTION

The main channel of the Cedar River has shifted from its prior course, and the flood event of 2008 appears to be the cause of this final course change. The 290th Street Bridge sits on a bend in the Cedar River and the approach to the bridge is now at an oblique angle, rather than perpendicularly as the bridge was designed to withstand. On the upstream side of the bridge, the current main channel carries water in a nearly parallel direction to the bridge (figure EA-1). Bank erosion and scour continue to threaten the structural integrity of the streambank and bridge, especially during high water events. Low water events also threaten the structural integrity of the western bridge abutment. Analysis of the existing sheet pile structure determined that extreme low water events may cause failure of the sheet pile due to lack of counter forces applied by water from the Cedar River. If left untreated the current conditions of the streambank and bridge would continue to degrade; resulting in eventual loss of a critical transportation route. The nearest crossing to the north is a 23-mile round trip and to the south is 7-mile round trip. 290th Street serves as a primary route for local travel and commerce, as an alternate route to Interstate 80, and as a vital crossing for the agricultural industry.

III. AUTHORITY

The formal authorization for the U.S. Army Corps of Engineers, Rock Island District (District) to perform this emergency streambank protection comes from Section 14 of the 1946 Flood Control Act, as amended. This program is designed to implement projects to protect public or non-profit private facilities and/or services which are open to all on equal terms; have been properly maintained, but threatened by natural processes on streambanks and shorelines; and are essential and important enough to merit Federal participation in their protection.

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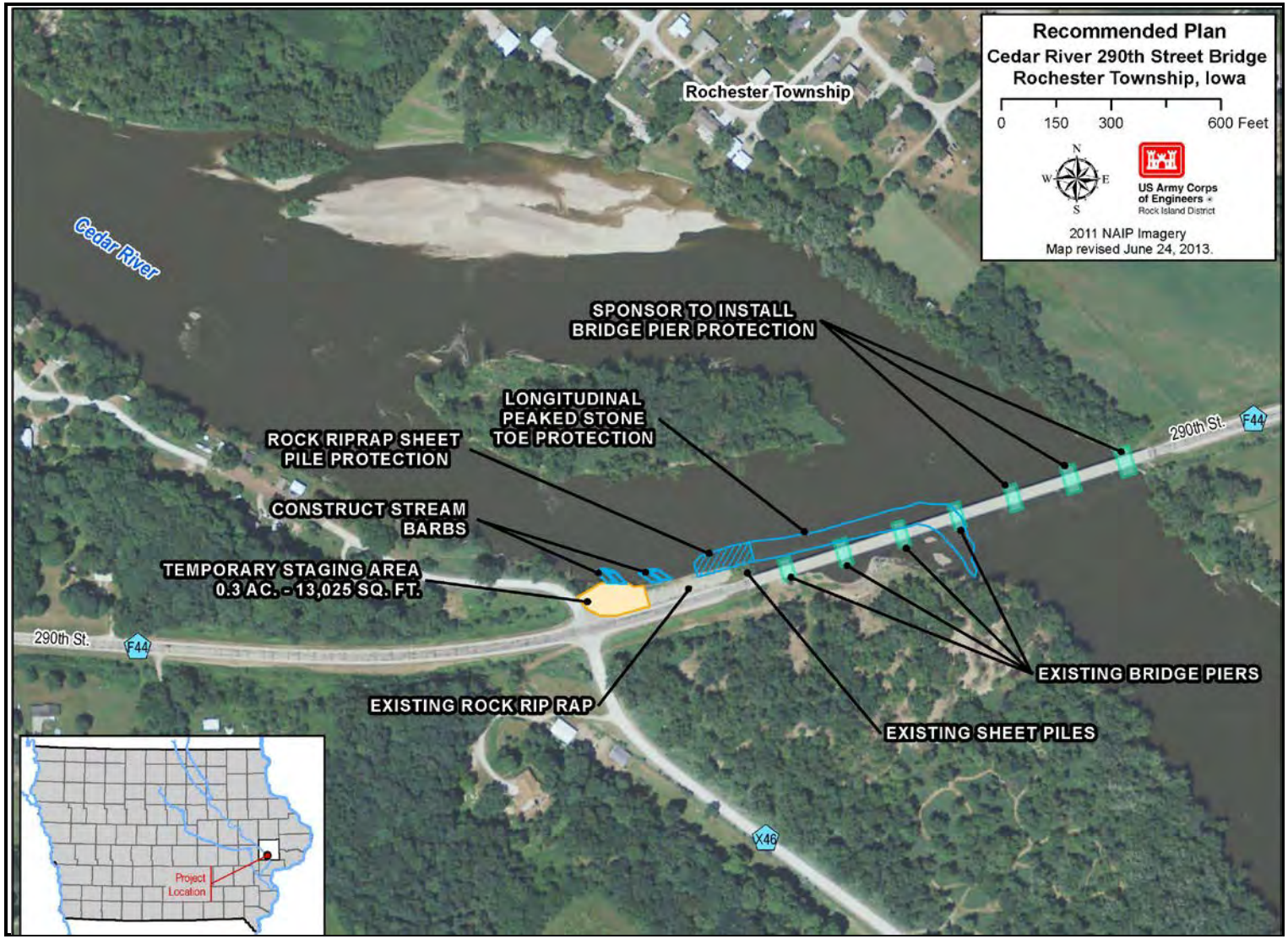

Figure EA-1 Project Map

IV. PROJECT DESCRIPTION

Riprap sheet pile protection would be placed around the existing sheet pile along the RDB. The riprap sheet pile protection would be placed to an 8 foot width at elevation 646.0 feet and would slope at 2H:1V to the existing riverbed elevation, which is approximately 628.0 feet. This measure would tie into the exiting riprap upstream of the sheet pile structure and extend approximately 60 feet downstream. Riprap sheet pile protection would reduce erosion along the sheet pile and provide stability during low flow periods. The Longitudinal Peaked Stone Toe Protection (LPSTP) would connect to the sheet pile protection. The LPSTP would extend approximately 620 feet to the 4th bridge pier and angle downstream approximately 160 feet where it ties into the bank. The LPSTP would be placed to elevation 646.0 feet and have a 2H:1V slope to the riverbed. The base width of the LPSTP structure ranges between 40 feet and 80 feet. The LPSTP would provide protection to the stream bank, bridge approach, and help reestablish eroded shoreline. The sheet pile protection and LPSTP would require a total of 11,227 CY of riprap.

Two stream barbs would be constructed along the RDB of the Cedar River, just upstream of the riprap sheet pile protection. The east (downstream) barb would be placed along the existing riprap bank protection from elevation 633.0, having a 20H:1V slope to elevation 631.0 and then having a 2H:1V slope to the existing riverbed at approximate elevation 628.0. The west barb would be located 75 feet upstream of the east barb. The west (upstream) barb would be placed from where it ties into the existing shoreline at elevation 633.0 and slope at a 20H:1V slope to elevation 631.0. From elevation 631.0 the stream barb would have a slope of 2H:1V to elevation 628.0. The barbs would have an 8.75-foot deep key and rise from the riverbed at a 1H:1V slope to elevation 628.0 feet where it meets the exiting riverbed elevation. The barbs would rise from the 8.75-foot deep key at a 2H:1V slope to elevation 631.0 feet and then at a 20H:1V slope to elevation 633.0 feet where they tie into the existing shoreline. The barbs would be constructed at a 45 degree angle to the shoreline and serve to deflect water away from the steam bank and bridge approach. The east (downstream) barb would 70 feet in length and require 800 cubic yards (CY) of material. The west (upstream) barb would be 95 feet in length and require 805 CY of material. All construction will be done from the shoreline or parts of the project that have already been constructed. A staging area is depicted in the NE corner of the intersection of 290th Street and West Rochester Avenue to allow for storage of riprap until it is placed.

All rock riprap for erosion protection for the project is to come from a USACE, Rock Island District approved quarry, either new or existing. The riprap will be Iowa Class E, 250 lb top size stone.

Cedar County, which is the non-Federal sponsor (NFS) for this Project, would place riprap around bridge piers as part of operation and maintenance (O&M) responsibilities for the bridge. Riprap on bedding stone would be placed around three of the seven piers of the 290th Street Bridge. Pier 5 would receive 435 CY; Pier 6, 1065 CY; Pier 7, 1855 CY. Riprap would be placed to an elevation of 635.8 feet and would be placed around the piers to double the width of the piers, or 11 feet. The riprap would slope to the riverbed at a slope of 2H:1V. All work around the piers will be done from floating plant.

Any work or staging from land would occur at the proposed staging area, just upstream of the bridge on the RDB. For any required water access, the District or the NFS would use the boat ramp near Rochester Park, located approximately 2/3 of a mile downstream of the 290th Street Bridge. A temporary easement would be required for the staging area. Permanent land access and channel

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improvement easements would be required in the area of the stream barbs and the area of riprap placement for sheet pile protection and LPSTP.

V. ALTERNATIVES

A. No Action. No action on the part of the District (meaning no Federal design or funding). This alternative would not preclude action by the project sponsor on their own initiative using their own funding.

B. Replacement of the 290th Street Bridge. Through this alternative a new bridge would be constructed and the existing bridge would be removed. This alternative would provide a solution to the problem but could not be justified because of cost.

C. Riprap Stream Barbs. This alternative involves the placement of in-stream structures placed along the RDB. The structures are keyed into the bank at 90 degrees and bend to point upstream at approximately 45 degrees. The in-channel portion of the structure is submerged and changes the velocity, depth and sediment transport in the vicinity of the structure. The structure directs the channel away from the existing streambank line and allows for deposition of sand material behind the stream barbs. This alternative would provide protection for the bank but would not address the potential failure of the existing sheet pile structure or scour issues around the western bridge abutment and bridge piers.

D. Longitudinal Peaked Stone Toe Protection and Sheet Pile Protection. This alternative would involve the construction of a continuous stone dike running parallel to the toe of the bank. The end of the dike must be keyed into the bank at 20-30 degrees to the flow. The beginning of the rock dike would be placed directly against the sheet pile structure to counter forces incurred during extreme low flows. This alternative shifts the current away from the eroding bank and allows the dike to capture material on the landward side which would build up material and stabilize the bankline behind the rock protection. This alternative restores the RDB at the abutment to the as-built elevation which would additionally protect four of the seven bridge piers.

E. Riprap Bridge Pier Protection. This alternative would involve placing riprap around the Bridge piers to prevent scour. This alternative would protect the Bridge piers but would not protect the streambank and sheet pile structure.

F. Longitudinal Peaked Stone Toe Protection with Sheet Pile Protection, Riprap Stream Barbs and Riprap Bridge Pier Protection. This alternative would consist of a combination of Alternatives C, D and E. This alternative would protect all of the Bridge piers as well as protecting the streambank (upstream bend and downstream portion of western abutment) and sheet pile structure.

G. Closing Dam and Riprap Island Protection. This alternative would redirect the Cedar River to a prior course. A closing dam would be constructed across the current main channel redirecting flow to the opposite channel. Riprap would be placed at the head of the island. This alternative would provide a better approach to the bridge but will not provide protection against pier scour. This closure structure would likely slow the flow rate along the streambank and allow for deposition of material that would protect the streambank and sheet pile structure. A closure structure would reduce or eliminate the flow of water from select channels, which would further reduce the natural processes of

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the Cedar River. This alternative would not provide protection for the sheet pile structure and would have more environmental impacts than Alternatives C, D, E, and F.

H. Closing Dam, Riprap Island Protection, and Bridge Pier Protection. This alternative would redirect the Cedar River to a prior course. A closing dam would be constructed across the current main channel redirecting flow to the opposite channel. Riprap would be placed at the head of the island and around the bridge piers. This alternative would provide a better approach to the bridge, protect the bridge piers from scour, and protect the RDB from erosion by closing off the channel. A closure structure would reduce or eliminate the flow of water from select channels, which would further reduce the natural processes of the Cedar River. This alternative would not provide protection for the sheet pile structure and would have more environmental impacts than Alternatives C, D, E, F and G.

Based on the comparison of alternatives it appears that if the NFS implements the pier protection measure since the Corps is constrained by the project authority, the only plan that is complete, efficient, effective and acceptable is Alternative F, Longitudinal Peaked Stone Toe Protection with Sheet Pile Protection, Riprap Stream Barbs and Riprap Bridge Pier Protection. Alternative F is the Tentatively Selected Plan for this Project.

VI. AFFECTED ENVIRONMENT

A. Natural Resources. The Cedar River has recently switched main channels within the Project area. As the former main channel began to fill with sediment the new main channel began to capture more flow. The flood event of 2008 seems to be the cause of the final course change. The former main channel is now nearly choked with sand, only small channels of water exist during most times of the year. Only during high water conditions does water flow on both sides of the islands. High water on the Cedar River has the potential to carry large amount of sediment and debris. During low water conditions this stretch of the Cedar River becomes very shallow in some areas; exposing deposits of sand. The area just upstream of the bridge along the RDB has previously been protected by sheet pile, concrete, and riprap. Repairs were made to the bridge and the bank after the 1993 and 2008 floods. Grout bags have previously been placed around the bridge piers to attempt to prevent scour around the bridge piers.

The aquatic impact zone substrate is primarily sand but also contains some silt, small gravel, and a mixture of some organic matter like leaves and twigs/branches. Some of the proposed construction areas have been previously impacted by the placement of sheet pile, riprap, and grout bags.

The terrestrial area of impact would be limited to the proposed staging area. The vegetation in this area is typical of a roadside ditch, being primarily composed of herbaceous vegetation like smooth brome grass (*Bromus inermis*), reed canary grass (*Phalaris arundinacea*), yellow sweet clover (*Melilotus officinalis*), and goldenrod (*Solidago sp.*). Several trees are located within the proposed staging area and would likely be removed. They include one black walnut (*Juglans nigra*), two silver maples (*Acer saccharinum*), and a common hoptree (*Ptelea trifoliata*)

The Cedar River is on the List of Meandered Sovereign Rivers from the Iowa River to the west line of Section 7, Township 89 north, Range 13 west, in Black Hawk County. The proposed project falls within this range. Meandered sovereign rivers are those rivers which, at the time of the original

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Federal government surveys, were surveyed as navigable and important water bodies. They were transferred to the states upon their admission to the union to be transferred or retained by the public in accordance with the laws of the respective states upon their admission to the union. The state of Iowa holds sovereign title in trust for the benefit of the public to the beds of these rivers. The State of Iowa requires a sovereign lands construction permit be received from the Department of Natural Resources prior to any construction on, above, or under state-owned lands or waters.

B. Endangered Species. Three federally threatened or endangered species have been identified for Cedar County, Iowa. The endangered Indiana bat (*Myotis sodalis*), the threatened prairie bush clover (*Lespedeza leptostachya*), and the threatened western prairie fringed orchid (*Platanthera praeclara*).

The Indiana bat is known to occur in Cedar County, IA. During the summer, it is predominantly found along small to medium river and stream corridors with well-developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. During the summer, the Indiana bat frequents the corridors of small streams with well-developed riparian woods as well as mature upland forests. Indiana bats roost and forage in trees during summer months. The species rears its young beneath the loose bark of large trees—often dead or dying—but also live trees like the shagbark hickory (*Carya ovata*). Loss of forested habitat, particularly stands of large, mature trees, can affect bat populations. Fragmentation of forest habitat may also contribute to declines.

The prairie bush clover is listed as threatened and considered to potentially occur statewide in Iowa based on historical records and habitat distribution. It occupies dry to mesic prairie with gravelly soils grassland habitats. There is no critical habitat designated for this species. Federal regulations prohibit any commercial activity involving this species or its destruction, malicious damage, or removal of this species from Federal land or any other lands in knowing violation of State law or regulation, including state criminal trespass law. A search for this species should occur whenever wet prairie remnants are encountered.

The western prairie fringed orchid is listed as threatened and considered to potentially occur statewide in Iowa based on historical records and habitat distribution. It occupies wet to mesic grassland habitats. There is no critical habitat designated for this species. Federal regulations prohibit any commercial activity involving this species or its destruction, malicious damage, or removal of this species from Federal land or any other lands in knowing violation of State law or regulation, including state criminal trespass law. This species should be searched for whenever wet prairie remnants are encountered.

Although the bald eagle is listed as a species of concern and would not be afforded protection under the Endangered Species Act, it is still afforded protection under the Bald and Golden Eagle Protection Act. The Act prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The Act defines “take” as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.”

C. Cultural Resources. The District consulted with the State of Iowa archaeological site and survey Geographic Information System databases and determined that there were no previously recorded archaeological sites within the project area and that the area had not been previously surveyed.

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D. Socioeconomic Resources. The village of Rochester is located just upstream of the 290th Street Bridge, along the left descending bank. Several houses are also located along West Rochester Avenue, which is located just upstream of the 290th Street Bridge along the RDB of the Cedar River. The village of Rochester is located in a rural area surrounded primarily by agriculture. Rochester has a population of 133 people, according to the 2010 Census.

VII. ENVIRONMENTAL IMPACTS OF THE PREFERRED ALTERNATIVE

A. Created Resources. The 290th Street Bridge and 290th Street are created resources. Riprap and sheet piling have been placed near the bridge for erosion protection. These structures would not be adversely affected by construction. The 290th Street Bridge, bank, and sheet piling would be protected from further erosion and scour by the placement of rock in the project area. Rock riprap would protect the existing sheet pile structure. The two proposed barbs would redirect water away from the bank and toward the center of the channel. Riprap placed around the bridge piers would prevent scour and extend the life of the bridge.

B. Natural Resources. Temporary disturbances to vegetation, local wildlife, and fisheries may occur during the construction phase. The impact area includes a temporary construction staging area (0.3 acres) (figure EA-1). This area would require clearing of all vegetation to allow for equipment access, rock placement, and work barge loading. The aquatic substrate would be covered with stone in the footprint of the riprap sheet pile protection (0.10 acres), steam barbs (0.04 acres), bridge pier protection (0.12), and LPSTP structure (0.50 acres) (figure EA-1). Some areas along the bank and under the bridge have been previously impacted. Riprap and sheet pile have been placed along the RDB of the river, just upstream of the bridge. Grout bags have previously been placed underneath the bridge in attempt to reduce scour. Any rock for erosion protection for the project is to come from a District approved location, either new or existing. If the rock erosion protection is obtained from a new location, the area must be reviewed for impacts to endangered species by the resource agencies prior to commencement of the project. The marginal habitat value of the project site limits the scope and severity of potential impacts. The placed rock for bank protection also would provide additional attachment sites, shelter, and feeding areas for aquatic invertebrate organisms and small fish. No significant adverse impacts are anticipated due to implementation of the proposed Project.

The habitat requirements for western prairie fringed orchids and prairie bush clover are not present in the project impact area and should not be impacted by implementation of the proposed Project. Tree removal would be limited to four trees located in the proposed staging area. Tree removal from the staging area would have no effect on the Indiana bat or bald eagle. The benthic community present in this area of the Cedar River should return after the placement of riprap. It is the District's determination that implementation of this Project, as proposed, would have no effect on any federally-listed threatened or endangered species or their critical habitat.

C. Cultural Resources. The District formally defined the Area of Potential Effect (APE) with determinations of effect to historic properties and provided that determination to the State Historical Society of Iowa (SHSI), relevant federally-recognized tribes and interested public by letter dated July 17, 2013. In that letter the District defined the APE including two permanent easement areas for construction (the bridge – 2.5 acres and the stone dike area 0.7 acres), the proposed stream barb area

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(0.3 acres), and a temporary construction staging area and easement (0.3 acres) for a total of 3.7 acres. The APE is not on tribal lands [reference 36CFR 800.15(d); 36CFR 800.4(a)(1); and 36CFR800.4(c).

The District determined that this Section 14 project would have no effect on historic properties. The majority of the project is to be completed within the Cedar River channel (stream barb construction) and around the piers of the 290th Street Bridge. The terrestrial portion of the project (temporary construction staging area and easement), is limited to near surface impacts on previously disturbed ground at the northeastern corner of the intersection of W Rochester Road and 290th Street.

The SHSI concurred with this determination by letter dated 30 July 2013 (R&C#:1109160048). No other comments were received the relevant federally-recognized tribes or members of the interested public.

While the District is assured that no historic properties would be affected by the preferred alternative; if any undocumented cultural resources are identified or encountered during the undertaking, the District would discontinue project activities and resume coordination with the consulting parties to identify the significance of the historic property and determine any potential effects.

D. Air Quality. Minor, temporary increases in airborne particulates are anticipated to occur as a result of mobilization and use of construction equipment. Disturbances to nearby residents during workdays would be minimal, and no air quality standards should be violated.

E. Water Quality. Temporary increases in turbidity may occur during construction, but turbidity levels are expected to return to pre-project levels or lower, since the bankline would no longer be eroding into the river. For these reasons, no long-term impacts to water quality would be anticipated. Any temporary impacts to the stream ecosystem during project construction would be offset by the ultimate preservation of the streambank.

F. Hazardous, Toxic, and Radioactive Waste (HTRW). The Project area is currently a streambank adjacent to the 290th Street Bridge. Based on the historical research, topographic maps and historical aerial photos, the Project area has been a vegetated streambank along the Cedar River since the1830's. At some time between the 1930's and 1950's, 290th Street was constructed. Agricultural land surrounds the Project area, and the village of Rochester is located approximately 1000 feet northwest. There are no indications of residential, commercial or industrial activity within the immediate vicinity of the Project area.

An Environmental Site Assessment Transaction Screening Process was completed on 9 June 2011 for the proposed work and staging area for the proposed Project in general conformance with ASTM Practices E 1528-06, ER 1165-2-132, and MVD DIVR 1165-2-9. The inquiry consisted of an inspection of aerial photographs (1930, 1950, 1960, 1990, 2004 and 2010), an 1838 land survey map, an 1889 and 1990 USGS Topographical Map, records research and an interview. These inquiry activities revealed no evidence of hazardous substances, HTRW, or other regulated contaminants in connection within the Project Area.

While there may be minimal recognized environmental conditions on target properties due to trace amounts of fertilizers, pesticides, fungicides and herbicides because of agricultural activities, there are no physical signs, records or specialized knowledge indicating a significant environmental condition of concern for the project.

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G. **Benthos.** Some initial minor loss of riparian habitat and benthic organisms may result from access to and construction of project features. Once the project is completed, the area should quickly re-colonize with benthic organisms.

H. Cumulative Impacts. Potential cumulative impacts should be insignificant. No other specific bankline erosion control projects or instream habitat improvement projects are known for this vicinity.

VIII. SOCIAL AND ECONOMIC EFFECTS OF THE PREFERRED ALTERNATIVE

A. Community and Regional Growth. The preferred alternative would stabilize the RDB, sheet pile structure, and bridge piers. Through protection of the streambank, sheet pile structure, and bridge piers the 290th Street Bridge would remain operational. No incremental impact on community or regional growth is anticipated.

B. Community Cohesion. There would be no impacts to community cohesion. No public opposition has been expressed, nor is any expected.

C. Displacement of People. No residential displacements would occur from the proposed Project.

D. Property Values and Tax Revenues. No significant impacts to property values or tax revenues are expected.

E. Public Facilities and Services. Positive impacts on public facilities and services are anticipated. Through protection of the streambank, sheet pile structure, and bridge piers the 290th Street Bridge would remain operational.

F. Life, Health, and Safety. Positive impacts to life, health and safety concerns are anticipated, as the proposed Project would protect the RDB and the 290th Street Bridge. Erosion and scour have caused streambank loss and threatened the structural integrity of the bridge, which may lead to a potential failure situation. Failure of the Bridge would likely cause negative impacts to human health life and safety. 290th Street serves as a primary route for local travel and commerce, as an alternate route to Interstate 80, and as a vital crossing for the agricultural industry. The nearest crossing to the north is a 23-mile round trip and to the south is 7-mile round trip.

G. Business and Industrial Growth. No long-term impacts to business and industrial growth would result.

H. Employment and Labor Force. No direct long-term impacts on employment and labor force in Cedar County would be realized from the project.

I. Farm Displacement. The Project would not result in the conversion of any prime, unique, or State or locally important farmland to nonagricultural uses. No farms would be displaced by the preferred alternative.

J. Noise Levels. The Village of Rochester and other residential properties are located within a quarter mile of the project site. Heavy machinery would temporarily increase noise levels during

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project construction; however following completion, noise levels would return to existing conditions and no significant long-term noise impacts are anticipated.

K. Aesthetics. Riprap and sheet pile have previously been placed along the bank near the 290th Street Bridge and 290th Street. Riprap for the stream barbs, LPSTP, and the County's bridge pier protection would be placed below the normal water line. Any new visible riprap would occur on the bank, along existing riprap and sheet pile. No negative impacts to the area aesthetics are anticipated from implementation of the proposed Project.

IX. COMPLIANCE WITH ENVIRONMENTAL QUALITY STATUTES

A. Endangered Species Act of 1973, as amended. The proposed action has been coordinated with the U.S. Fish and Wildlife Service (USFWS), the Iowa DNR, and other interested conservation groups. No comments were received from coordination of the District's preferred alternative.

B. National Historic Preservation Act of 1966, as amended. Project plans have been coordinated with the SHSI, relevant federally-recognized tribes, and the interested public by letter dated July 17, 2013. The SHSI concurred with the District determination of no effect to historic properties by letter dated 30 July 2013 (R&C#:110916048).

C. Federal Water Project Recreation Act. No increases or decreases in current public recreational opportunities would be realized if this Project were implemented.

D. Fish and Wildlife Coordination Act. Project plans have been coordinated with the USEPA, the USFWS, and the Iowa DNR. Coordination responses can be found in Appendix A.

E. Wild and Scenic Rivers Act of 1968, as amended. The Cedar River is not listed on the National Rivers Inventory used to identify rivers, or sections of rivers that may be designated by Congress to be component rivers in the National Wild and Scenic Rivers Systems. However, portions of the Cedar River are listed on the State of Iowa Sovereign Lands, List of Meandered Sovereign Rivers. The portions of the Cedar River protected under this program are from the Iowa River to the west line of Section 7, Township 89 North, Range 13 West, Black Hawk County. A Sovereign Lands Permit will be obtained from the Iowa DNR prior to construction.

F. Executive Order 11988 (Flood Plain Management). Implementation of the preferred alternative would avoid, to the extent possible, long- and short-term adverse impacts associated with the occupancy and modification of the base floodplain. The preferred alternative also avoids direct and indirect support of development or growth (construction of structures and/or facilities, habitable or otherwise) in the base floodplain wherever there is a practicable alternative. Therefore, the project, as proposed, is judged to be in full compliance.

G. Executive Order 11990 (Protection of Wetlands). The Project would not impact wetlands.

H. Clean Water Act (Sections 401 and 404), as amended. A Section 404(b)(1) Evaluation been prepared and is located in Appendix B of this EA. Section 401 Water Quality Certification from the State of Iowa would be obtained prior to construction.

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I. Clean Air Act, as amended. No aspect of the proposed Project has been identified that would result in violations to air quality standards. The outdoor atmosphere would not be exposed to contaminants/pollutants in such quantities and of such duration as may be or may tend to be injurious to human, plant, or property, or which unreasonably interferes with the comfortable enjoyment of life, or property, or the conduct of business. If implemented, this Project would be in full compliance.

J. Farmland Protection Policy Act of 1981. The proposed Project would not result in the conversion of any prime, unique, or State or locally important farmland to nonagricultural uses.

K. National Environmental Policy Act of 1970, as amended. The compilation of the EA and the signing of the FONSI fulfill National Environmental Policy Act compliance.

L. National Economic Development (NED) Plan. The NED Plan is the plan which best satisfies the Federal planning objectives of increasing the Nation's output of goods and services and produces the most improvement to the national economic efficiency. The proposed Project would be consistent with the NED objective.

M. Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds). Implementation of the preferred alternative, to the extent appropriate and practicable, would promote the conservation of migratory birds. This Project is not likely to have a measurable negative impact on migratory bird populations. This Project would be in full compliance.

N. Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations). This Executive Order (EO) requires the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including a racial, ethnic, or a socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of Federal, State, local, and tribal programs and policies. Meaningful involvement means that:

- potentially affected community residents have an appropriate opportunity to participate in decision making about a proposed activity that could affect their environment and/or health;
- the public's contribution can influence the regulatory agency's decision;
- the concerns of all participants involved will be considered in the decision making process; and
- the decision makers seek out and facilitate the involvement of those potentially affected.

The District has complied with the provisions of the EO through the coordination and the NEPA review process. No concerns regarding this Executive Order surfaced during this process.

O. Executive Order 13112 Invasive Species. This Project does not authorize or carry out any actions that are likely to promote invasive species proliferation. Any subsequent occurrence of any invasive species in the project vicinity should not solely be the result of the implementation of this Project. This Project is in full compliance.

DRAFT

X. ENVIRONMENTAL IMPACTS OF NON-PREFERRED ALTERNATIVES

Alternative A. No Federal Action (meaning no Federal design or funding). This alternative would not preclude action by the project sponsor on their own initiative using their own funding. Without Federal action, it is expected that erosion and scour would continue, leading further loss of streambank and potential failure of the 290th Street Bridge.

Alternative B. Replacement of the 290th Street Bridge. Through this alternative a new bridge would be constructed and the existing bridge would be removed. Impacts would occur as a result of staging, removal of the existing bridge, and construction of a new bridge at a new location. The full scope of impacts of a constructing a new bridge would depend on the site selected. These would likely include modification of transportation routes, impacts to aquatic habitat, and to modification of channel flow patterns.

Alternative C. Riprap Stream Barbs. This alternative would consist of two low; stream barbs to deflect the flow away from the bank and back toward center of the river channel. This alternative would provide protection for the RDB upstream of the bridge. Impacts would occur from creation of the staging area for construction equipment and placement of the riprap within the footprint of the stream barbs.

Alternative D. Longitudinal Peaked Stone Toe Protection and Sheet Pile Protection. This alternative would involve the construction of a continuous stone dike running parallel to the toe of the bank. The end of the dike must be keyed into the bank at 20-30 degrees to the flow. The beginning of the rock dike would be placed directly against the sheet pile structure to counter forces incurred during extreme low flows. This alternative shifts the current away from the eroding bank and allows the dike to capture material on the landward side which would build up material and stabilize the bankline behind the rock protection. This alternative restores the RDB at the abutment to the as-built elevation which would also protect four of the seven bridge piers. Impacts would occur from creation of the staging area for construction equipment and placement of riprap within the footprint of the LPSTP and sheet pile structures.

Alternative E. Riprap Bridge Pier Protection. This alternative would involve placing riprap around the bridge piers to prevent scour. This alternative would protect the bridge piers but would not protect the bank. Impacts would occur from creation of the staging area for construction equipment and placement of riprap within the footprint of the riprap bridge pier protection.

Alternative G. Closing Dam and Riprap Island Protection. This alternative would redirect the Cedar River to a prior course. A closing dam would be constructed across the current main channel redirecting flow to the opposite channel. Riprap would be placed at the head of the island. This alternative would provide a better approach to the bridge but will not provide protection against pier scour. This closure structure would likely slow the flow rate along the streambank and allow for deposition of material that would protect the streambank and sheet pile structure. Impacts would occur in the footprint of the closing dam, island protection, and equipment staging area. Impacts would also occur as a result of closing off the current main channel. The current main channel would lose flow except for when the closing dam is topped during high water levels. The current side channel, which is filled with sand, would become the main channel. Sand from the current side channel would be washed downstream impacting aquatic resources below the project site.

DRAFT

Alternative H. Closing Dam, Riprap Island Protection, and Bridge Pier Protection. This alternative would redirect the Cedar River to a prior course. A closing dam would be constructed across the current main channel redirecting flow to the opposite channel. Riprap would be placed at the head of the island and around the bridge piers. This alternative would provide a better approach to the bridge, protect the bridge piers from scour, and protect the RDB from erosion by closing off the channel. Impacts would occur in the footprint of the closing dam, island protection, bridge pier protection, and equipment staging area. Impacts would also occur as a result of closing off the current main channel. The current main channel would lose flow except for when the closing dam is topped during high water levels. The current side channel, which is filled with sand, would become the main channel. Sand from the current side channel would be washed downstream impacting aquatic resources below the project site.

XI. PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

Due to the machinery and rock placement required for the project, there would be a temporary increase in noise and a slight decrease in the air and water quality during construction. Also, disturbance to some ground vegetation, including some trees and shrubs, would occur so the equipment could access the banklines and maneuver to construct and maintain the bank protection.

Future requirements to maintain the rock bank protection would require permanent land access easements in total of approximately 0.67 acre along the RDB. A permanent channel improvement easement of 3.05 acres would be required around the stream barbs, sheet pile protection, and LPSTP structures. These access areas would require periodic clearing of woody vegetation so heavy equipment would have access to the rock work for necessary maintenance through the life of the project. After initial construction is complete, the bank protection must be kept free of woody vegetation growing among the rocks. Also, rock that may be displaced or damaged as a result of high water events must be replaced.

XII. RELATIONSHIP BETWEEN SHORT-TERM USE AND LONG-TERM PRODUCTIVITY

The temporary increase in noise and the slight, temporary decrease in air and water quality which would occur during construction, are minor, temporary negative environmental impacts associated with a project that would produce positive social and economic benefits. The Project would stabilize the piers and the bank of the 290th Street Bridge, extending the life of the bridge.

DRAFT

XIII. ANY IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES IF THE PROPOSED ACTION SHOULD BE IMPLEMENTED

The fuel which machinery uses and construction materials such as rock riprap would be irretrievable commitments of resources associated with this Project. Net primary production (plant growth) from the vegetation currently in the impact zone (particularly the trees/saplings/grasses) would be lost and is considered irretrievable. Loss of net primary production from the area of the impact zone that would require periodic clearing/maintenance to keep the access corridors open is considered irreversible and irretrievable for the life of the project.

XIV. RELATIONSHIP OF THE PROPOSED PROJECT TO LAND-USE PLANS

The proposed action is consistent with known land-use plans for this area.

XV. CONCLUSIONS

A review of the proposed action indicates that there would be no significant adverse impacts on the environment, with any adverse effects being short-term and/or minor. The proposed action for bridge pier protection and bank stabilization would protect the 290th Street Bridge by preventing further bank erosion and scour from the Cedar River, extending the life of the bridge.

XVI. COORDINATION

Coordination for the project has been and will be maintained with the following State and Federal agencies and other interested publics:

U.S. Fish and Wildlife Service
U.S. Environmental Protection Agency, Region 7
Iowa Department of Natural Resources
The Nature Conservancy, Iowa Field Office
USDA, Natural Resources Conservation Service
State Historical Society of Iowa

The USFWS responded by email dated June 8, 2012. They had no objection or concerns for the proposed Project so far.

The SHSI responded by letter dated July 5, 2012. They concluded that the proposed Project has little potential to effect historic properties and therefore concurred with the District's determination of "no historic properties".

The SHSI responded by letter dated July 30, 2013. They concluded that the proposed Project has little potential to effect historic properties and therefore concurred with the District's determination of "no historic properties".

DRAFT

SECTION 14, CEDAR RIVER, 290TH STREET BRIDGE
ROCHESTER, IOWA

APPENDIX A

ENVIRONMENTAL ASSESSMENT

APPENDIX A-A

PERTINENT CORRESPONDENCE

DRAFT

R/C # 1109 16048
JUL 22 2013

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS – ROCK ISLAND DISTRICT
CLOCK TOWER BUILDING - PO BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO
ATTENTION OF

July 17, 2012

Regional Planning and Environmental
Division North (RPEDN)

SEE DISTRIBUTION LIST

In September of 2011 (revised June 2012), the U.S. Army Corps of Engineers, Rock Island District (District) proposed an emergency infrastructure stabilization Project authorized under Section 14 of the Flood Control Act of 1946, as amended, 33 U.S.C. 701r for the Cedar River 290th Street Bridge. The Bridge is located just south of the town of Rochester in Cedar County, Iowa (see Enclosure 1).

When the current 290th Street Bridge was constructed, the main channel of the Cedar River was flowing on the north side of the small island just northwest of the Bridge and was hitting the Bridge piers at an almost 90 degree angle. However, the river has shifted its channel to the south side of the island resulting in substantial erosion of the right descending bank and around the piers of the Bridge. Without some type of erosion control Project in the vicinity of the 290th Street Bridge it appears that the river will continue to scour out the Bridge supports. In addition, erosion of the right descending bank could result in the loss of a substantial section of 290th Street on the west side of the Cedar River.

The Project has been revised after review of the comments received on the original submission (including State Historical Society of Iowa R&C #110916048) and further evaluation of the possible alternatives to protect the Bridge. Section *Review of Existing Information and Level of Future Identification Efforts* of this correspondence discusses the revised plan for protecting the Bridge below.

Federal Undertaking

Pursuant to the National Historic Preservation Act (NHPA) of 1966, as amended, and its implementing regulations, 36 CFR Part 800, the District has determined that the development of Bridge pier protection, a closure structure, temporary diversion channel, and staging areas in the proposed locations have potential to cause effects to archeological historic properties [36 CFR 800.3(a)(1)] and as a consequence will require a determination of effect within the Area of Potential Effect.

Area of Potential Effect

The Area of Potential Effect for the Project includes all of the construction, staging, and access areas included in the Project (see Enclosure 1). The features shown in the Enclosure total approximately 3 acres and are discussed in detail. See *Review of Existing Information and Level of Future Identification Efforts* on page 2.

Consulting Parties

The District finds the organizations identified on the Distribution List are entitled to be consulting parties, as set out in 36 CFR 800.2, and invites them by copy of this letter to participate in the Section 106 process.

State Historic Preservation Officer (SHPO) Invitation

The District invites the SHPO to:

- identify any other consulting parties as per 36 CFR 800.3(f);
- comment as per 36 CFR 800.2(d)(3) on the District' plan to involve the public by utilizing the District' normal procedures for public involvement under the National Environmental Policy Act (NEPA); and,
- comment on or contribute to identification efforts including definition of the APE, all as per 36 CFR 800.4(a-b).

Identification of Historic Properties

Review of Existing Information and Level of Future Identification Efforts:

Additional analysis led to changes in project design in order to provide support to the existing sheet pile structure, streambank, and bridge piers. A new structural measure has been proposed to further protect the right descending streambank from further erosion. The District is re-coordinating the new measure, which incorporates a Longitudinal Peaked Stone Toe Protection (LPSTP) structure into the District's new preferred alternative

The District is proposing to construct the rock riprap LPSTP from the end of the existing sheetpile, over to the 4th bridge pier, and angle downstream. The LPSTP structure would be approximately 780 feet long and range in base width from 40 feet to 70 feet. The rock riprap that extended around the end of the sheeptile in the previous preferred alternative has been removed and replaced with the LPSTP structure. Rock riprap would still be placed in the water along the existing sheet pile structure and along a portion of the existing rock riprap bank protection. This riprap would extend into the Cedar River approximately 30 feet and be placed at a 1:2 slope. The riprap would extend up the bank, over the existing sheetpile, and tie off to high ground (see Enclosure 1).

Two stream barbs would be constructed; the eastern stream barb would be constructed near the upstream end of the existing riprap while the western stream barb would be located approximately 140 feet upstream; along the proposed staging area. Bridge pier protection around piers 1, 2, 3, and 4 has been eliminated and has been replaced by the LPSTP structure. Pier protection around piers 5, 6, and 7 would be placed by Cedar County as part of operation and maintenance of the bridge (see Enclosure 1).

The District used its geographic information systems (GIS) archeological site/survey databases to conduct an archival search for historic properties. No historic properties have been previously identified in the Project area.

It is the District's opinion that there will be **no historic properties affected** by the Project for the following reasons:

- The temporary construction staging area and easement totals 0.3 acre and is located in the northeastern corner of the intersection of 290th Street and West Rochester Road. This area has been previously disturbed by the construction of the two roads.
- The remainder of the impacts consists of the addition of stream barbs in the Cedar River that tie into an existing rip rapped bank and Bridge pier protection on the existing Bridge.

Request for Information from Consulting Parties:

The District is seeking information from all consulting parties regarding their concerns with issues relating to the potential effects of this undertaking on historic properties and, particularly, the tribes' concerns with identifying properties that may be of religious and cultural significance to them and may be eligible for the NRHP [36 CFR 800.4(a)(3-4)]. Concerns about confidentiality [36 CFR 800.11(c)] regarding locations of properties can be addressed under Section 304 of the NHPA which provides withholding from public disclosure the location of properties under several circumstances,
including in cases where it would cause a significant invasion of privacy, impede the use of a traditional religious site by practitioners, endanger the site, etc.

We request your written comments on this Project within 30 days, pursuant to 36 CFR 800.3(c)(4). Results of all consultation and determination shall be included in the Environmental Assessment for additional public review this year.

If you have any questions regarding this matter, please call Mr. Brant Vollman of our Environmental Compliance Branch, (309) 794-5857, or write to our address above, ATTN: Environmental Compliance Branch (Brant Vollman).

CONCUR

NAME Dan Fitzgerald

DATE 7/30/13

Sincerely,

Kenneth A. Barr
Chief, Environmental Planning Branch RPEDN

Enclosure

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS – ROCK ISLAND DISTRICT
CLOCK TOWER BUILDING -
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO
ATTENTION OF

July 15, 2013

Regional Planning and Environmental
Division North (RPEDN)

SEE DISTRIBUTION LIST

This letter is in reference to the 290th Street Bridge Section 14 Project (Project) on the Cedar River near Rochester, in Cedar County, Iowa. The U.S. Army Corps of Engineers, Rock Island District (District) is currently preparing an Environmental Assessment (EA). The District sent out the initial coordination letter for this Project dated May 25, 2012 and a second coordination letter dated September 13, 2012 for increased stability measures. Additional analysis led to changes in project design in order to provide support to the existing sheet pile structure, streambank, and bridge piers. A new structural measure has been proposed to further protect the right descending streambank from further erosion. The District is re-coordinating the new measure, which incorporates a Longitudinal Peaked Stone Toe Protection (LPSTP) structure into the District's new preferred alternative

The District is proposing to construct the rock riprap LPSTP from the end of the existing sheetpile, over to the 4th bridge pier, and angle downstream. The LPSTP structure would be approximately 780 feet long and range in base width from 40 feet to 70 feet. The rock riprap that extended around the end of the sheeptile in the previous preferred alternative has been removed and replaced with the LPSTP structure. Rock riprap would still be placed in the water along the existing sheet pile structure and along a portion of the existing rock riprap bank protection. This riprap would extend into the Cedar River approximately 30 feet and be placed at a 1:2 slope. The riprap would extend up the bank, over the existing sheetpile, and tie off to high ground (Enclosures 1, 2, and 3).

Two stream barbs would be constructed; the eastern stream barb would be constructed near the upstream end of the existing riprap while the western stream barb would be located approximately 140 feet upstream; along the proposed staging area. Bridge pier protection around piers 1, 2, 3, and 4 has been eliminated and has been replaced by the LPSTP structure. Pier protection around piers 5, 6, and 7 would be placed by Cedar County as part of operation and maintenance of the bridge (Enclosures 1, 2, and 3).

Impacts to the river bottom would occur as a result of placement of rock and would be confined to footprint of the structures. Some additional ground would be impacted by clearing of existing vegetation to allow for a staging area and equipment access, which would allow the equipment to place the rock protection structures. Any stone riprap for the proposed action would be obtained from an approved quarry. For any required water access, the District proposes to use the boat ramp near Rochester Park, located approximately 2/3 of a mile downstream of the 290th Street Bridge.

-2-

There are three federally-listed species for Cedar County, Iowa—the endangered Indiana bat, the threatened prairie bush clover, and the threatened western prairie fringed orchid (Enclosure 4). The Iowa Department of Natural Resources has listed 39 species for Cedar County, which includes state endangered, threatened, and special concern species (Enclosure 4). The Cedar River is on the List of Meandered Sovereign Rivers from the Iowa River to the west line of Section 7, Township 89 north, Range 13 west, in Black Hawk County. The proposed Project falls within this range. Previous coordination for this Project has not revealed any significant resource impacts.

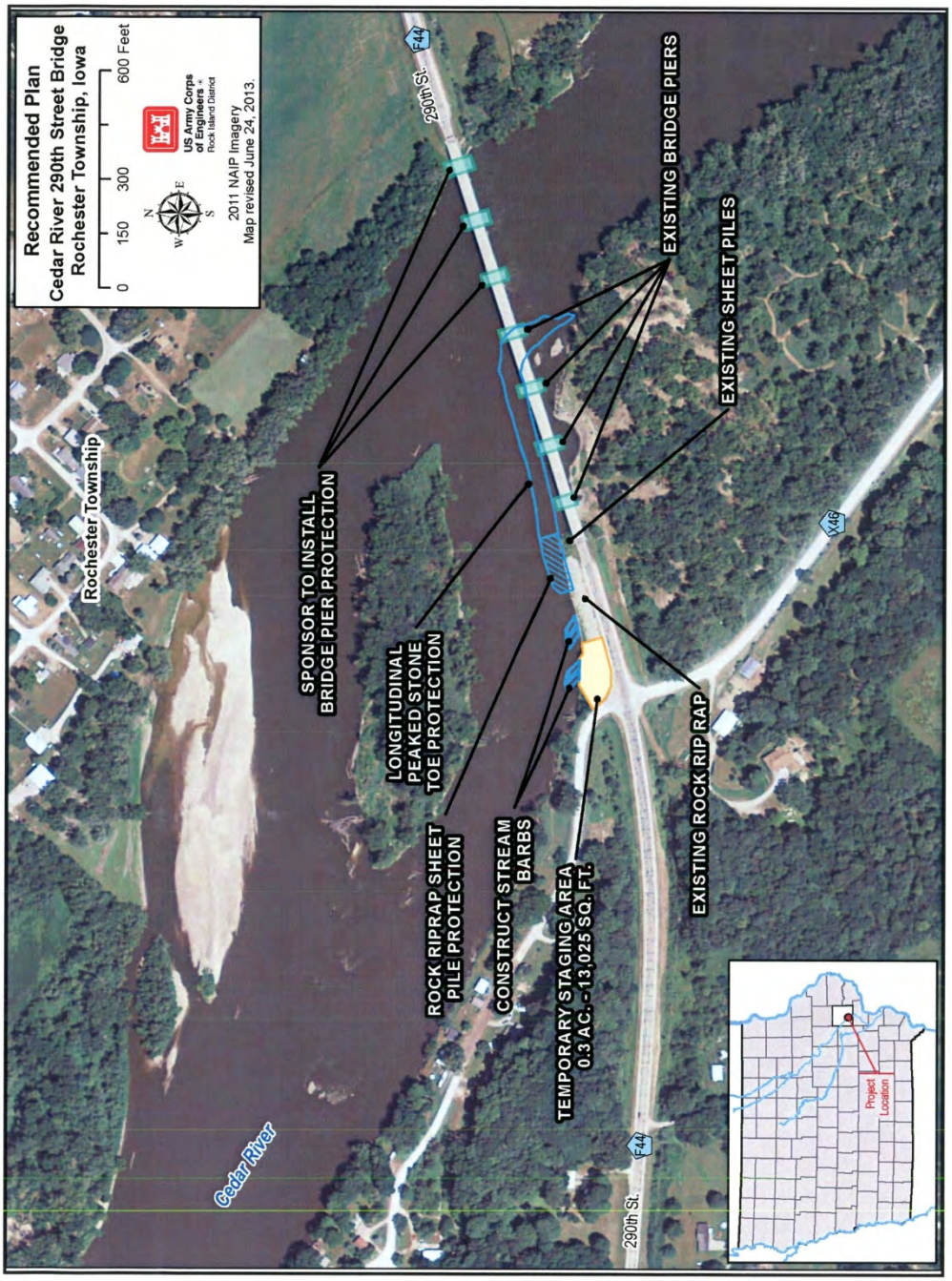
We request your comments on this Project with respect to concerns with, or anticipated effects on, any resources within your agency's area of interest. Please provide any comments you may have on this action within 30 days of the date of this letter for incorporation into the EA. If no comments are received within this timeframe, we will assume that you have no concerns with or objections to the proposed action.

If you have any questions or wish to request additional information, please contact Mr. Matt Afflerbaugh of our Environmental Compliance Branch, telephone (309)794-5384, email: matthew.j.afflerbaugh@usace.army.mil, or in writing to our address, ATTN: Environmental Compliance Branch (Afflerbaugh).

Sincerely,

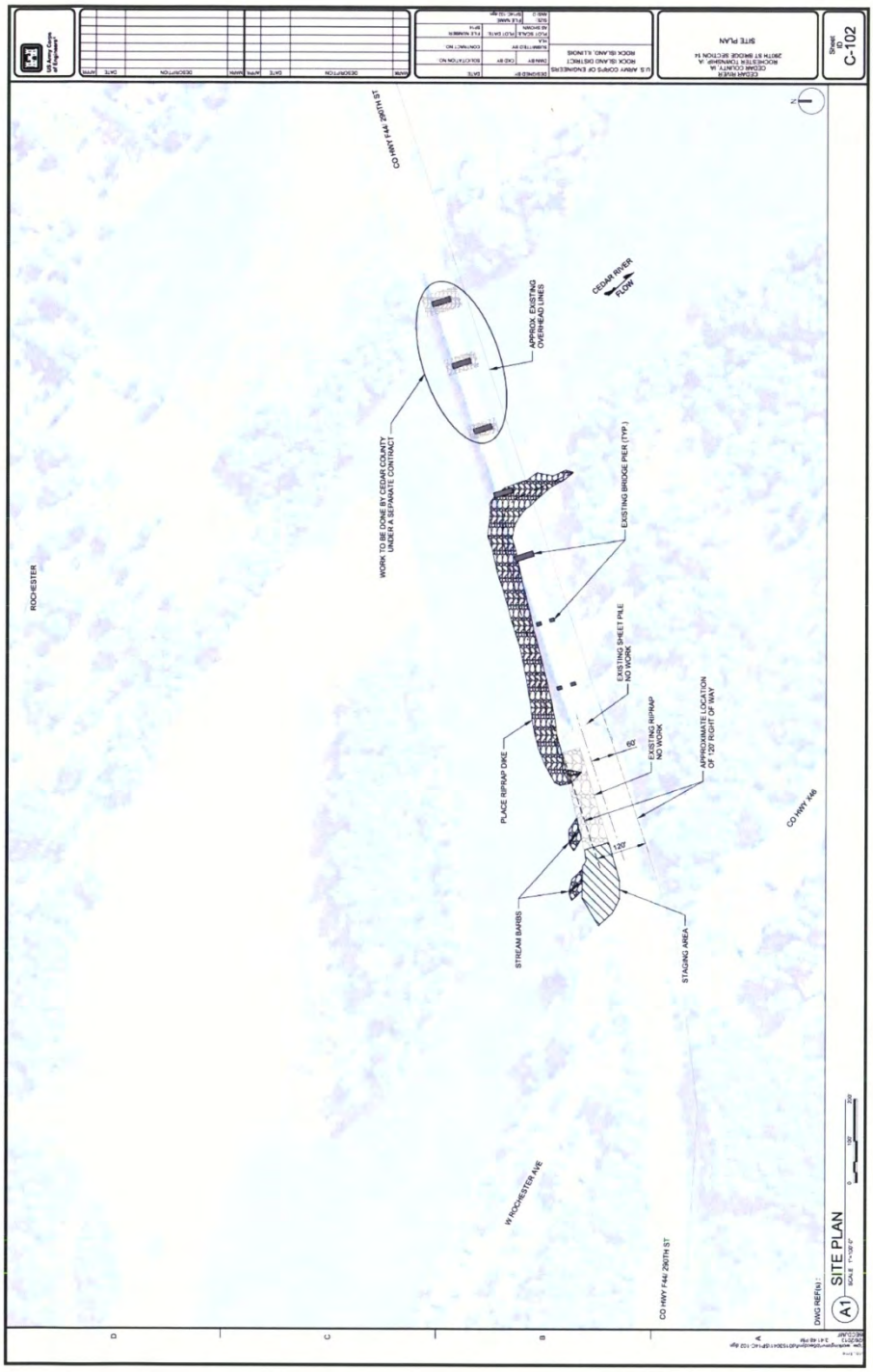
for Kenneth A. Barr
Chief, Environmental Planning Branch (RPEDN)

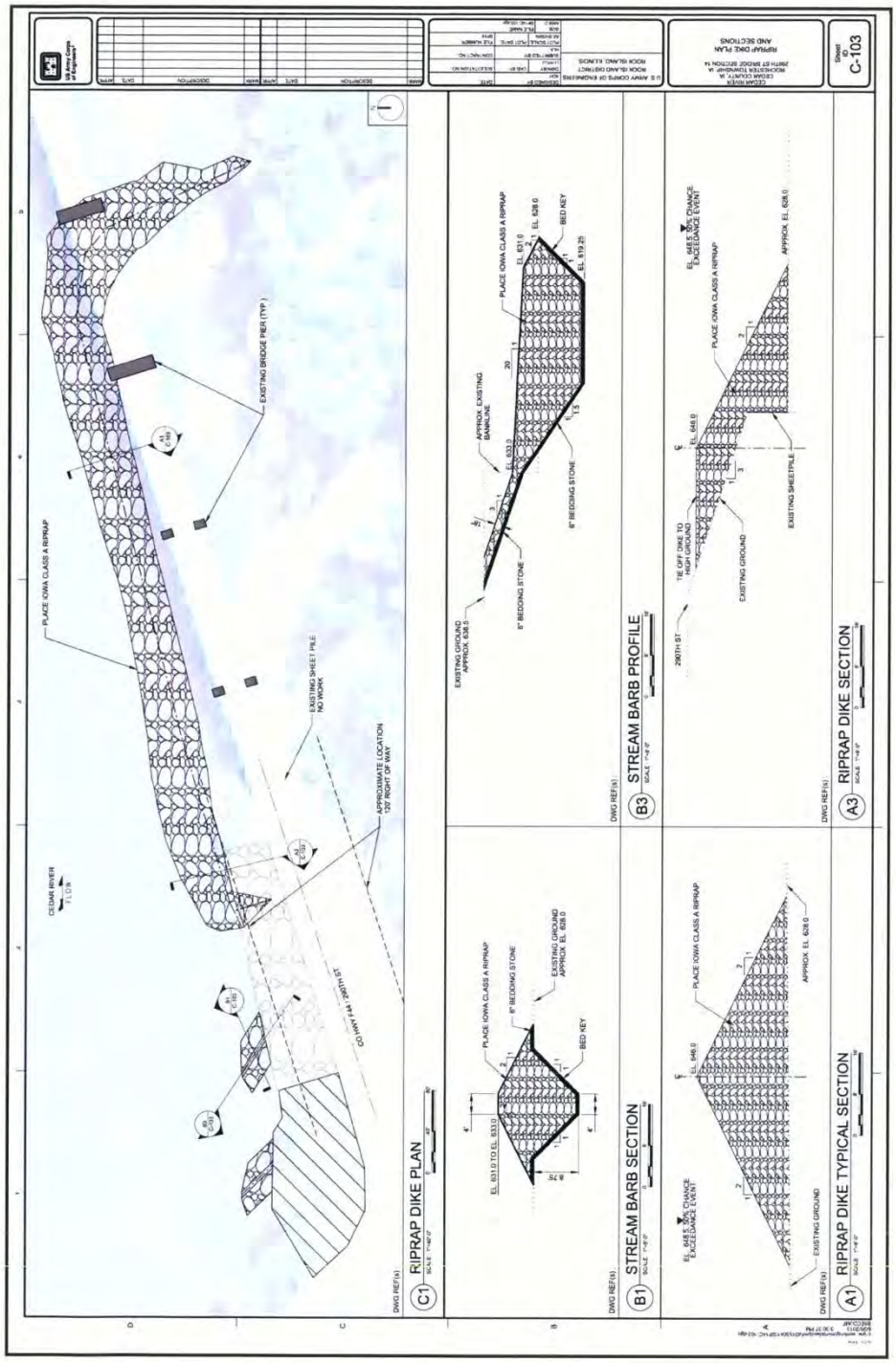
Enclosures (4)


Recommended Plan
Cedar River 290th Street Bridge
Rochester Township, Iowa
0 150 300 600 Feet
N
W
E
S
US Army Corps of Engineers
Rock Island District
2011 NAIP Imagery
Map revised June 24, 2013.
Rochester Township
Cedar River
290th St.
F44
X46
SPONSOR TO INSTALL BRIDGE PIER PROTECTION
LONGITUDINAL PEAKED STONE TOE PROTECTION
ROCK RIPRAP SHEET PILE PROTECTION
CONSTRUCT STREAM BARBS
TEMPORARY STAGING AREA 0.3 AC. - 13,025 SQ. FT.
EXISTING ROCK RIP RAP
EXISTING BRIDGE PIERS
EXISTING SHEET PILES
Project Location

ENCLOSURE 1

ENCLOSURE 2


US Army Corps of Engineers
DATE
DESCRIPTION
DATE
DESCRIPTION
DATE
DESIGNED BY
DRAWN BY
CHK BY
SOLICITATION NO.
CONTRACT NO.
FILE NUMBER
SIZE
CODE IDENT NO.
N/A
SCALE
PLOT DATE
PLOT SCALE
PLOT MODE
AS SHOWN
N/A
PLOT DATE
SHEET
OF
U.S. ARMY CORPS OF ENGINEERS
ROCK ISLAND DISTRICT
ROCK ISLAND, ILLINOIS
CEDAR RIVER
CEDAR COUNTY, IA
ROCHESTER TOWNSHIP, IA
290TH ST BRIDGE SECTION 14
SITE PLAN
Sheet
C-102
CO HWY F44/ 290TH ST
CEDAR RIVER FLOW
APPROX. EXISTING OVERHEAD LINES
WORK TO BE DONE BY CEDAR COUNTY UNDER A SEPARATE CONTRACT
EXISTING BRIDGE PIER (TYP.)
ROCHESTER
EXISTING SHEET PILE NO WORK
PLACE RIPRAP DIKE
EXISTING RIPRAP NO WORK
APPROXIMATE LOCATION OF 120' RIGHT OF WAY
CO HWY A46
120'
STREAM BARBS
STAGING AREA
W ROCHESTER AVE
CO HWY F44/ 290TH ST
DWG REF(s):
A1
SITE PLAN
SCALE: 1" = 100'-0"
0
100
200


C1 RIPRAP DIKE PLAN
B1 STREAM BARB SECTION
B3 STREAM BARB PROFILE
A1 RIPRAP DIKE TYPICAL SECTION
A3 RIPRAP DIKE SECTION
PLACE IOWA CLASS A RIPRAP
EXISTING BRIDGE PIER (TYP)
EXISTING SHEET PILE NO WORK
APPROXIMATE LOCATION 132' RIGHT OF WAY
CEDAR RIVER
290TH ST
CO HWY E-41
EL. 631.0 TO EL. 633.0
6" BEDDING STONE
EXISTING GROUND APPROX. EL. 628.0
BED KEY
EL. 646.0
EL. 645.5 2% CHANCE EXCEEDANCE EVENT
APPROX. EL. 628.0
EXISTING GROUND
APPROX. EXISTING BANKLINE
EL. 633.3
EL. 631.0
EL. 628.0
EL. 619.25
1.5'
EXISTING GROUND APPROX. 638.5
TIE OFF DIKE TO HIGH GROUND
EXISTING SHEETPILE
DWG REF(s)
C-103

ENCLOSURE 3

Federally-listed Species for Cedar County Iowa

Indiana bat	*Myotis sodalis*	Endangered	Caves, mines (hibernacula);small stream corridors with well developed riparian woods; upland forests (foraging)
Prairie bush clover	*Lespedeza leptostachya*	Threatened	Dry to mesic prairies with gravelly soil
Western prairie fringed orchid	*Platanthera praeclara*	Threatened	Wet prairies and sedge meadows

State-listed Species for Cedar County Iowa
E = Endangered, T = Threatened, S = Special Concern

Common Name	Scientific Name	Class	Status
Bald Eagle	*Haliaeetus leucocephalus*	BIRDS	S
Barn Owl	*Tyto alba*	BIRDS	E
Least Darter	*Etheostoma microperca*	FISH	E
Pistolgrip	*Tritogonia verrucosa*	FRESHWATER MUSSELS	E
Purple Wartyback	*Cyclonaias tuberculata*	FRESHWATER MUSSELS	T
Yellow Sandshell	*Lampsilis teres*	FRESHWATER MUSSELS	E
Black Huckleberry	*Gaylussacia baccata*	PLANTS (DICOTS)	T
Hill's Thistle	*Cirsium hillii*	PLANTS (DICOTS)	S
James Cristatella	*Polanisia jamesii*	PLANTS (DICOTS)	E
Kitten Tails	*Besseya bullii*	PLANTS (DICOTS)	T
Lance-leaved Violet	*Viola lanceolata*	PLANTS (DICOTS)	S
Meadow Beauty	*Rhexia virginica*	PLANTS (DICOTS)	T
Pink Milkwort	*Polygala incarnata*	PLANTS (DICOTS)	T
Slender Copperleaf	*Acalypha gracilens*	PLANTS (DICOTS)	S
Spring Avens	*Geum vernum*	PLANTS (DICOTS)	S
Sweet Indian Plantain	*Cacalia suaveolens*	PLANTS (DICOTS)	T
Toothcup	*Rotala ramosior*	PLANTS (DICOTS)	S
Violet	*Viola macloskeyi*	PLANTS (DICOTS)	S
Water Starwort	*Callitriche heterophylla*	PLANTS (DICOTS)	S
Wood Stonecrop	*Sedum ternatum*	PLANTS (DICOTS)	S
Field Sedge	*Carex conoidea*	PLANTS (MONOCOTS)	S
Glomerate Sedge	*Carex aggregata*	PLANTS (MONOCOTS)	S
Grassleaf Rush	*Juncus marginatus*	PLANTS (MONOCOTS)	S
Great Plains Ladies'-tresses	*Spiranthes magnicamporum*	PLANTS (MONOCOTS)	S
Green Arrow Arum	*Peltandra virginica*	PLANTS (MONOCOTS)	E
Low Nut Rush	*Scleria verticillata*	PLANTS (MONOCOTS)	T
Pale Green Orchid	*Platanthera flava*	PLANTS (MONOCOTS)	E
Slender Dayflower	*Commelina erecta*	PLANTS (MONOCOTS)	T
Slender Fimbry	*Fimbristylis autumnalis*	PLANTS (MONOCOTS)	S
Slender Ladies'-tresses	*Spiranthes lacera*	PLANTS (MONOCOTS)	T
Slim-leaved Panic Grass	*Dichanthelium linearifolium*	PLANTS (MONOCOTS)	T
Wolf Spike-rush	*Eleocharis wolfii*	PLANTS (MONOCOTS)	S
Yellow-eyed Grass	*Xyris torta*	PLANTS (MONOCOTS)	E
Ledge Spikemoss	*Selaginella rupestris*	PLANTS (PTERIODOPHYTES)	S
Northern Adder's-tongue	*Ophioglossum pusillum*	PLANTS (PTERIODOPHYTES)	S
Royal Fern	*Osmunda regalis*	PLANTS (PTERIODOPHYTES)	T
Woodland Horsetail	*Equisetum sylvaticum*	PLANTS (PTERIODOPHYTES)	T
Blanding's Turtle	*Emydoidea blandingii*	REPTILES	T
Ornate Box Turtle	*Terrapene ornata*	REPTILES	T

ENCLOSURE 4

DISTRIBUTION LIST

PAUL SLEEPER
LAKE MACBRIDE FISHERIES MGMT OFFICE
IOWA DEPT. OF NATURAL RESOURCES
3525 HWY 382
SOLON, IA 52333

ROBERT FANGMANN
OFFICE OF THE COUNTY ENGINEER
COURTHOUSE; 400 CEDAR STREET
TIPTON, IA 52772-1752

BERNIE SCHONOHOFF
IOWA DEPT. OF NATURAL RESOURCES
FAIRPORT FISHERIES MANAGEMENT OFFICE
3390 HWY. 22
MUSCATINE, IA 52761

ANDY ROBBINS
IOWA DEPT. OF NATURAL RESOURCES
9726 CO RD X-61
WAPELLO, IA, 52653

BILL OHDE
IOWA DEPT. OF NATURAL RESOURCES
111 LAKE DARLING RD
BRIGHTON, IA, 52540

SCOTT GRITTERS
IOWA DEPT. OF NATURAL RESOURCES
24143 HWY 52
BELLEVUE, IA, 52031

JOHNATHAN MATZ
DISTRICT CONSERVATIONIST
USDA NATURAL RESOURCES CONSERVATION SERVICE
TIPTON SERVICE CENTER
205 W. SOUTH ST. STE. 2
TIPTON, IA 52772-1658

JOHN ARTHUR
AREA DIRECTOR, USDA
TIPTON SERVICE CENTER
205 W. SOUTH STREET
TIPTON, IA 52772

THE NATURE CONSERVANCY
EASTERN IOWA PROJECT OFFICE
1620 231ST STREET
LETTS, IA 52754

RICHARD NELSON
FIELD SUPERVISOR
US FISH AND WILDLIFE SERVICE
1511 47TH AVE.
MOLINE, IL 61265

DENNIS OSTWINKLE
WASHINGTON FIELD OFFICE
IOWA DEPT. OF NATURAL RESOURCES
1023 WEST MADISON STREET
WASHINGTON, IA 52353-1623

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS – ROCK ISLAND DISTRICT
CLOCK TOWER BUILDING - PO BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO
ATTENTION OF

July 17, 2012

Regional Planning and Environmental
Division North (RPEDN)

SEE DISTRIBUTION LIST

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Federal Undertaking

Pursuant to the National Historic Preservation Act (NHPA) of 1966, as amended, and its implementing regulations, 36 CFR Part 800, the District has determined that the development of Bridge pier protection, a closure structure, temporary diversion channel, and staging areas in the proposed locations have potential to cause effects to archeological historic properties [36 CFR 800.3(a)(1)] and as a consequence will require a determination of effect within the Area of Potential Effect.

Area of Potential Effect

The Area of Potential Effect for the Project includes all of the construction, staging, and access areas included in the Project (see Enclosure 1). The features shown in the Enclosure total approximately 3 acres and are discussed in detail. See *Review of Existing Information and Level of Future Identification Efforts* on page 2.

Consulting Parties

The District finds the organizations identified on the Distribution List are entitled to be consulting parties, as set out in 36 CFR 800.2, and invites them by copy of this letter to participate in the Section 106 process.

State Historic Preservation Officer (SHPO) Invitation

The District invites the SHPO to:

- identify any other consulting parties as per 36 CFR 800.3(f);
- comment as per 36 CFR 800.2(d)(3) on the District' plan to involve the public by utilizing the District' normal procedures for public involvement under the National Environmental Policy Act (NEPA); and,
- comment on or contribute to identification efforts including definition of the APE, all as per 36 CFR 800.4(a-b).

Identification of Historic Properties

Review of Existing Information and Level of Future Identification Efforts:

Additional analysis led to changes in project design in order to provide support to the existing sheet pile structure, streambank, and bridge piers. A new structural measure has been proposed to further protect the right descending streambank from further erosion. The District is re-coordinating the new measure, which incorporates a Longitudinal Peaked Stone Toe Protection (LPSTP) structure into the District's new preferred alternative

The District is proposing to construct the rock riprap LPSTP from the end of the existing sheetpile, over to the 4th bridge pier, and angle downstream. The LPSTP structure would be approximately 780 feet long and range in base width from 40 feet to 70 feet. The rock riprap that extended around the end of the sheeptile in the previous preferred alternative has been removed and replaced with the LPSTP structure. Rock riprap would still be placed in the water along the existing sheet pile structure and along a portion of the existing rock riprap bank protection. This riprap would extend into the Cedar River approximately 30 feet and be placed at a 1:2 slope. The riprap would extend up the bank, over the existing sheetpile, and tie off to high ground (see Enclosure 1).

Two stream barbs would be constructed; the eastern stream barb would be constructed near the upstream end of the existing riprap while the western stream barb would be located approximately 140 feet upstream; along the proposed staging area. Bridge pier protection around piers 1, 2, 3, and 4 has been eliminated and has been replaced by the LPSTP structure. Pier protection around piers 5, 6, and 7 would be placed by Cedar County as part of operation and maintenance of the bridge (see Enclosure 1).

The District used its geographic information systems (GIS) archeological site/survey databases to conduct an archival search for historic properties. No historic properties have been previously identified in the Project area.

It is the District's opinion that there will be **no historic properties affected** by the Project for the following reasons:

- The temporary construction staging area and easement totals 0.3 acre and is located in the northeastern corner of the intersection of 290th Street and West Rochester Road. This area has been previously disturbed by the construction of the two roads.
- The remainder of the impacts consists of the addition of stream barbs in the Cedar River that tie into an existing rip rapped bank and Bridge pier protection on the existing Bridge.

Request for Information from Consulting Parties:

The District is seeking information from all consulting parties regarding their concerns with issues relating to the potential effects of this undertaking on historic properties and, particularly, the tribes' concerns with identifying properties that may be of religious and cultural significance to them and may be eligible for the NRHP [36 CFR 800.4(a)(3-4)]. Concerns about confidentiality [36 CFR 800.11(c)] regarding locations of properties can be addressed under Section 304 of the NHPA which provides withholding from public disclosure the location of properties under several circumstances,
including in cases where it would cause a significant invasion of privacy, impede the use of a traditional religious site by practitioners, endanger the site, etc.

We request your written comments on this Project within 30 days, pursuant to 36 CFR 800.3(c)(4). Results of all consultation and determination shall be included in the Environmental Assessment for additional public review this year.

If you have any questions regarding this matter, please call Mr. Brant Vollman of our Environmental Compliance Branch, (309) 794-5857, or write to our address above, ATTN: Environmental Compliance Branch (Brant Vollman).

Sincerely,

Kenneth A. Barr
Chief, Environmental Planning Branch RPEDN

Enclosure

DISTRIBUTION LIST

Historic Preservation Coordinator
Sac and Fox Nation of Mississippi in Iowa
349 Meskwaki Road
Tama, IA 52339-9629

Iowa Tribe of Kansas and Nebraska
Native American Heritage Museum
RR1 Box 152 C
Highland, KS 66035

Tribal Chairperson
Iowa Tribe of Kansas and Nebraska
3345 Thrasher Road #8
White Cloud, KS 66094-4028

R&C Coordinator
State Historical Society of Iowa
600 East Locust
Des Moines, IA 50319-0290

Cultural Preservationist
Iowa Tribe of Oklahoma
Route 1, Box 721
Perkins, OK 74059

NAGPRA Coordinator
Sac and Fox Nation of Oklahoma
Route 2, Box 246
Stroud, OK 74079

Iowa County Genealogical Society
P.O. Box 372
Marengo, IA 52301-0372

Ho-Chunk Nation
Cultural Resources Department
405 Airport Road
PO Box 667
Black River Falls, WI 54615

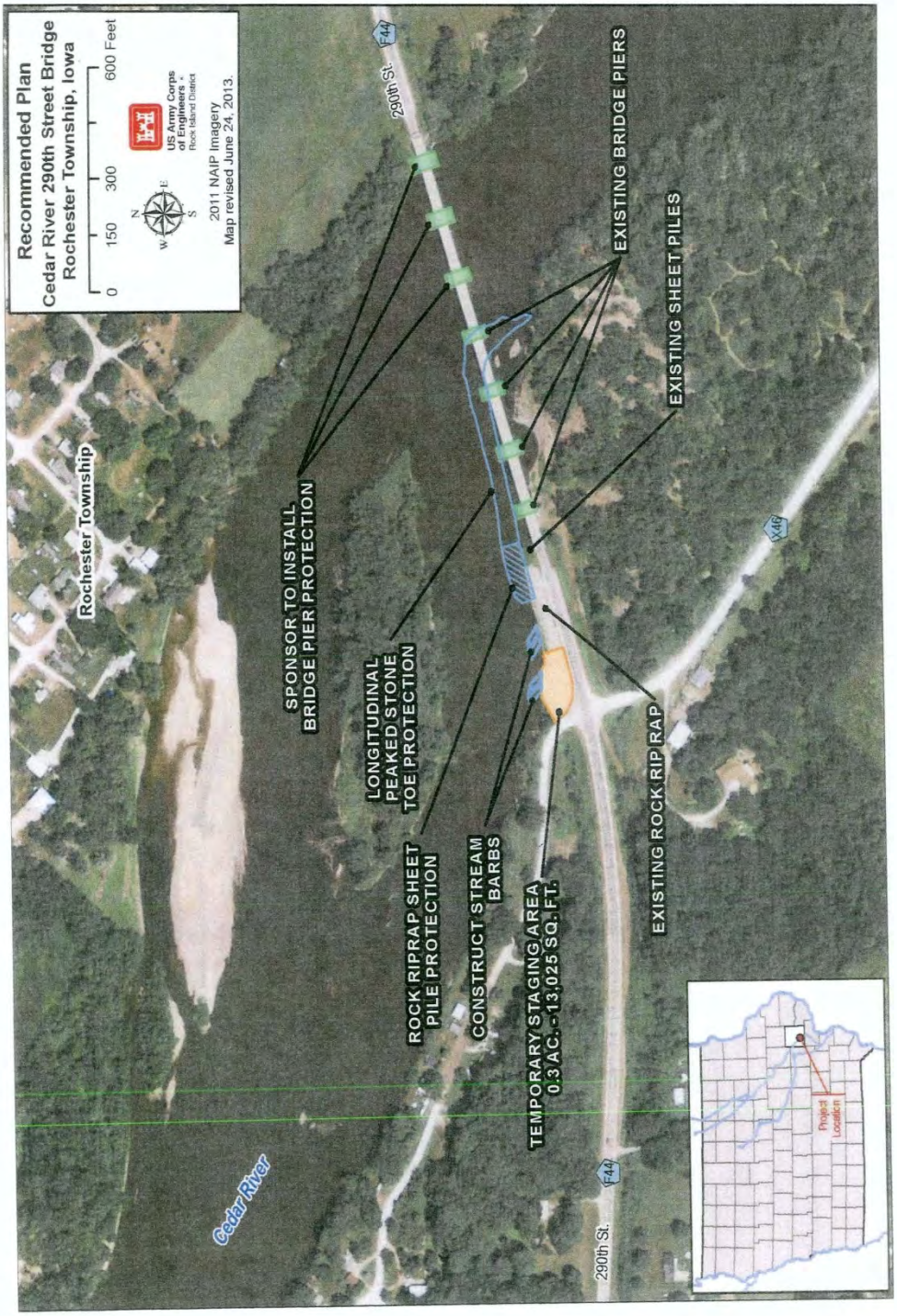
NAGPRA Coordinator
Otoe-Missouria Tribe of Oklahoma
Otoe-Missouria Tribal Office
Rt.1, Box 62
Red Rock, OK 74651

Chairman
Otoe-Missouria Tribal Council
P.O. Box 68
Red Rock, OK 74651

Cultural Preservation Officer
Winnebago Tribe of Nebraska
P.O. Box 687
Winnebago, NE 68071

Chairman
Yankton Sioux Tribal Business
and Claims Committee
Box 248
Marty, SD 57361

NAGPRA Coordinator
Sac & Fox Nation of Missouri in
Kansas and Nebraska
305 North Main
Reserve, KS 66434-9723


Recommended Plan
Cedar River 290th Street Bridge
Rochester Township, Iowa
0 150 300 600 Feet
N
W E
S
US Army Corps of Engineers
Rock Island District
2011 NAIP Imagery
Map revised June 24, 2013.
Rochester Township
Cedar River
290th St.
F44
SPONSOR TO INSTALL BRIDGE PIER PROTECTION
LONGITUDINAL PEAKED STONE TOE PROTECTION
ROCK RIPRAP SHEET PILE PROTECTION
CONSTRUCT STREAM BARBS
TEMPORARY STAGING AREA 0.3 AC. - 13,025 SQ. FT.
EXISTING BRIDGE PIERS
EXISTING SHEET PILES
EXISTING ROCK RIP RAP
X46
Project Location

Enclosure 1

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS – ROCK ISLAND DISTRICT
CLOCK TOWER BUILDING - PO BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO
ATTENTION OF

May 25, 2012

Regional Planning and Environmental
Division North (RPEDN)

SEE DISTRIBUTION LIST

The U.S. Army Corps of Engineers, Rock Island District (District) will be preparing an Environmental Assessment (EA) for protection of the 290th Street Bridge on the Cedar River near Rochester, in Cedar County, Iowa. Section 14 of the Flood Control Act of 1946, as amended, authorizes the Corps of Engineers to construct emergency streambank protection measures to protect public or non-profit private facilities and/or services.

The main channel of the Cedar River has shifted from its prior course. The current side channel, the prior main channel, is nearly completely choked with sand. At base and low flows only small channels of water run through the side channel (Enclosure 1). The 290th Street Bridge sits on a bend in the Cedar River. On the upstream side of the bridge, the current main channel carries water in a nearly parallel direction to the bridge (Enclosure 2). Scour around the bridge piers and bank erosion continue to threaten the structural integrity of the bridge, especially during high water events.

The District proposes to construct two weirs along the right descending bank and place riprap around the bridge piers for scour protection (Enclosure 3). The plan calls for a temporary staging area along the right descending bank, near the proposed weirs. A permanent easement would be required in the area of the weirs and the area of riprap placement around the bridge piers. The two weirs would be constructed in the area of the existing sheetpile, extending from the bank approximately 30 feet. The weirs would be approximately 30 ft wide at the base and would be below the water surface. The current channel bottom is approximately 628 feet. The top of the weirs would be approximately 633 feet near the toe of the bank and 631 feet at the end of the weir. Bridge pier protection would require riprap to be placed on the river bottom and around the bridge piers to prevent scour.

Impacts to the river bottom would occur as a result of placement of riprap and would be confined to footprint of the structures. Some additional ground would be impacted by clearing of existing vegetation to allow for a staging area for equipment access, which would allow the equipment to place the riprap. Any stone riprap for the proposed action would be obtained from an approved quarry. For any required water access, the District proposes to use the boat ramp near Rochester Park, located approximately 2/3 of a mile downstream of the 290th Street Bridge.

The District has considered a number of other measures to address erosion and scour at the 290th Street Bridge. While some could not be justified because of cost and potential environmental impacts, others did not provide any more protection than the proposed action. The following measures have been considered:

-2-

- Bridge replacement
- Construction of a wingdam along the right descending bank
- Dredging the side channel to provide a better approach to the bridge
- Redirecting the river through construction of one or multiple closure structures
- Placing riprap around the bridge piers
- Reconfiguring the shape of the bridge piers to provide less resistance to river flow
- Selective dredging

There are three federally-listed species for Cedar County, Iowa—the endangered Indiana bat and the threatened prairie brush clover and western prairie fringed orchid (Enclosure 4). The Iowa Department of Natural Resources has listed 38 species for Cedar County, which includes state endangered, threatened, and special concern species (Enclosure 4). The Cedar River is on the List of Meandered Sovereign Rivers from the Iowa River to the west line of Section 7, Township 89 north, Range 13 west, in Black Hawk County. The proposed project falls within this range.

We request your comments on this project with respect to concerns with, or anticipated effects on, any resources within your agency's area of interest. Please provide any comments you may have on this action within 30 days of the date of this letter, for incorporation into the EA. If no comments are received within this timeframe, we will assume that you have no concerns with or objections to the proposed action.

If you have any questions or wish to request additional information, please contact Mr. Matt Afflerbaugh of our Environmental Compliance Branch, telephone (309)794-5384, email: matthew.j.afflerbaugh@usace.army.mil, or in writing to our address, ATTN: Environmental Compliance Branch (Afflerbaugh).

Sincerely,

(for) Kenneth A. Barr
Chief, Environmental Planning Branch (RPEDN)

Enclosures

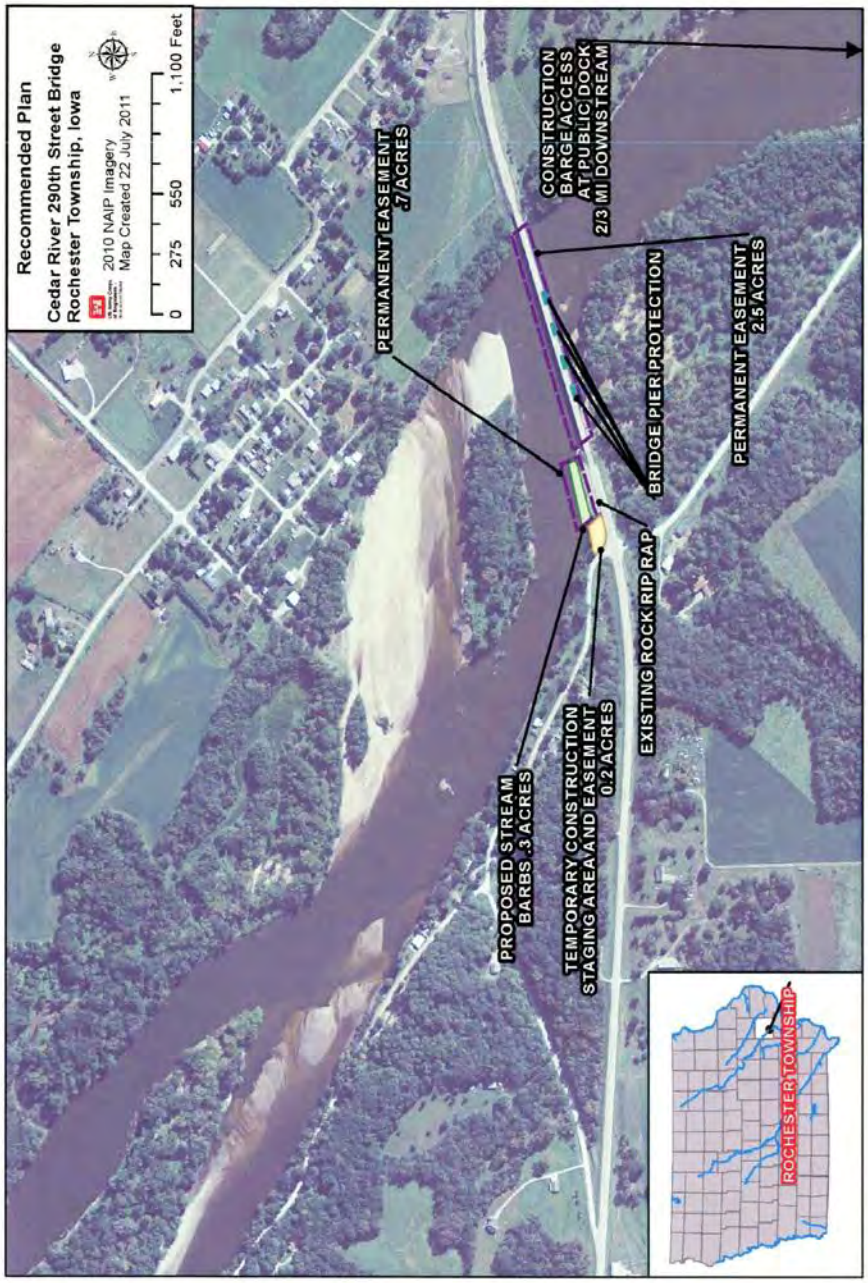
Looking Upstream Through the Current Side Channel

Looking Downstream Through the Current Side Channel

Looking Downstream Toward the 290th Street Bridge

Looking Downstream Toward the 290th Street Bridge

ENCLOSURE 2


Recommended Plan
Cedar River 290th Street Bridge
Rochester Township, Iowa
2010 NAIP Imagery
Map Created 22 July 2011
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275
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1,100 Feet
PERMANENT EASEMENT
.7 ACRES
CONSTRUCTION
BARGE ACCESS
AT PUBLIC DOCK
2/3 MI DOWNSTREAM
BRIDGE PIER PROTECTION
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2.5 ACRES
EXISTING ROCK RIP RAP
PROPOSED STREAM
BARBS .3 ACRES
TEMPORARY CONSTRUCTION
STAGING AREA AND EASEMENT
0.2 ACRES
ROCHESTER TOWNSHIP

ENCLOSURE 3

Federally-listed Species for Cedar County Iowa

Indiana bat	*Myotis sodalis*	Endangered	Caves, mines (hibernacula);small stream corridors with well developed riparian woods; upland forests (foraging)
Prairie bush clover	*Lespedeza leptostachya*	Threatened	Dry to mesic prairies with gravelly soil
Western prairie fringed orchid	*Platanthera praeclara*	Threatened	Wet prairies and sedge meadows

State-listed Species for Cedar County Iowa

Common Name	Scientific Name	Class	Status [1]
Bald Eagle	*Haliaeetus leucocephalus*	Birds	S
Least Darter	*Etheostoma microperca*	Fish	E
Pistolgrip	*Tritogonia verrucosa*	Freshwater Mussels	E
Purple Wartyback	*Cyclonaias tuberculata*	Freshwater Mussels	T
Yellow Sandshell	*Lampsilis teres*	Freshwater Mussels	E
Black Huckleberry	*Gaylussacia baccata*	Plants (Dicots)	T
Hill's Thistle	*Cirsium hillii*	Plants (Dicots)	S
James Cristatella	*Polanisia jamesii*	Plants (Dicots)	E
Kitten Tails	*Besseya bullii*	Plants (Dicots)	T
Lance-leaved Violet	*Viola lanceolata*	Plants (Dicots)	S
Meadow Beauty	*Rhexia virginica*	Plants (Dicots)	T
Pink Milkwort	*Polygala incarnata*	Plants (Dicots)	T
Slender Copperleaf	*Acalypha gracilens*	Plants (Dicots)	S
Spring Avens	*Geum vernum*	Plants (Dicots)	S
Sweet Indian Plantain	*Cacalia suaveolens*	Plants (Dicots)	T
Toothcup	*Rotala ramosior*	Plants (Dicots)	S
Violet	*Viola macloskeyi*	Plants (Dicots)	S
Water Starwort	*Callitriche heterophylla*	Plants (Dicots)	S
Wood Stonecrop	*Sedum ternatum*	Plants (Dicots)	S
Field Sedge	*Carex conoidea*	Plants (Monocots)	S
Glomerate Sedge	*Carex aggregata*	Plants (Monocots)	S
Grassleaf Rush	*Juncus marginatus*	Plants (Monocots)	S
Great Plains Ladies'-tresses	*Spiranthes magnicamporum*	Plants (Monocots)	S
Green Arrow Arum	*Peltandra virginica*	Plants (Monocots)	E
Low Nut Rush	*Scleria verticillata*	Plants (Monocots)	T
Pale Green Orchid	*Platanthera flava*	Plants (Monocots)	E
Slender Dayflower	*Commelina erecta*	Plants (Monocots)	T
Slender Fimbry	*Fimbristylis autumnalis*	Plants (Monocots)	S
Slender Ladies'-tresses	*Spiranthes lacera*	Plants (Monocots)	T
Slim-leaved Panic Grass	*Dichanthelium linearifolium*	Plants (Monocots)	T
Wolf Spike-rush	*Eleocharis wolfii*	Plants (Monocots)	S
Yellow-eyed Grass	*Xyris torta*	Plants (Monocots)	E
Ledge Spikemoss	*Selaginella rupestris*	Plants (Pteriodophytes)	S
Northern Adder's-tongue	*Ophioglossum pusillum*	Plants (Pteriodophytes)	S
Royal Fern	*Osmunda regalis*	Plants (Pteriodophytes)	T
Woodland Horsetail	*Equisetum sylvaticum*	Plants (Pteriodophytes)	T
Blanding's Turtle	*Emydoidea blandingii*	Reptiles	T
Ornate Box Turtle	*Terrapene ornata*	Reptiles	T

[1] E = Endangered
T = Threatened
S = Special Concern

DISTRIBUTION LIST

Robert Fangmann
Office of The County Engineer
Courthouse; 400 Cedar Street
Tipton, IA 52772-1752

Paul Sleeper
Lake Macbride Fisheries Management Office
Iowa Dept. of Natural Resources
3525 Hwy 382
Solon, IA 52333

Bernie Schonohoff
Fairport Fisheries Management Office
Iowa Dept. of Natural Resources
3390 Hwy. 22
Muscatine, IA 52761

Andy Robbins
Iowa Dept. of Natural Resources
9726 Co Rd X-61
Wapello, IA 52653

Bill Ohde
Iowa Dept. of Natural Resources
111 Lake Darling Rd
Brighton, IA 52540

Scott Gritters
Iowa Dept. of Natural Resources
24143 Hwy 52
Bellevue, IA 52031

Johnathan Matz
District Conservationist
USDA Natural Resources Conservation Service
Tipton Service Center
205 W South St Ste 2
Tipton, IA 52772-1658

John Arthur
Area Director, USDA
Tipton Rural Development Area Office
127 West South Street
Tipton, IA 52772

The Nature Conservancy
Eastern Iowa Project Office
1620 231st Street
Letts, IA 52754

Richard Nelson
Filed Supervisor
US Fish and Wildlife Service
1511 47th Ave.
Moline, IL 61265

Dennis Ostwinkle
Washington Field Office
Iowa Dept. of Natural Resources
1023 West Madison Street
Washington, IA 52353-1623

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS – ROCK ISLAND DISTRICT
CLOCK TOWER BUILDING - PO BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO
ATTENTION OF

June 8, 2012

Regional Planning and Environmental
Division North (RPEDN)

SEE DISTRIBUTION LIST

In September of 2011 the U.S. Army Corps of Engineers, Rock Island District (District) proposed an emergency infrastructure stabilization Project authorized under Section 14 of the Flood Control Act of 1946, as amended, 33 U.S.C. 701r for the Cedar River 290th Street Bridge. The Bridge is located just south of the town of Rochester in Cedar County, Iowa (Enclosure 1).

When the current 290th Street Bridge was constructed, the main channel of the Cedar River was flowing on the north side of the small island just northwest of the Bridge and was hitting the Bridge piers at an almost 90 degree angle. However, the river has shifted its channel to the south side of the island resulting in substantial erosion of the right descending bank and around the piers of the Bridge. Without some type of erosion control Project in the vicinity of the 290th Street Bridge it appears that the river will continue to scour out the Bridge supports. In addition, erosion of the right descending bank could result in the loss of a substantial section of 290th Street on the west side of the Cedar River.

The Project has been revised after review of the comments received on the original submission (including State Historical Society of Iowa R&C #110916048) and further evaluation of the possible alternatives to protect the Bridge. Section *Review of Existing Information and Level of Future Identification Efforts* of this correspondence discusses the revised plan for protecting the Bridge below.

Federal Undertaking

Pursuant to the National Historic Preservation Act (NHPA) of 1966, as amended, and its implementing regulations, 36 CFR Part 800, the District has determined that the development of Bridge pier protection, a closure structure, temporary diversion channel, and staging areas in the proposed locations have potential to cause effects to archeological historic properties [36 CFR 800.3(a)(1)] and as a consequence will require a determination of effect within the Area of Potential Effect.

Area of Potential Effect

The Area of Potential Effect for the Project includes all of the construction, staging, and access areas included in the Project (Enclosure). The features shown in the Enclosure total approximately 3.7 acres and are discussed in detail Section *Review of Existing Information and Level of Future Identification Efforts*.

Consulting Parties

The District finds the organizations identified on the Distribution List are entitled to be consulting parties, as set out in 36 CFR 800.2, and invites them by copy of this letter to participate in the Section 106 process.

State Historic Preservation Officer (SHPO) Invitation

The District invites the SHPO to:

- identify any other consulting parties as per 36 CFR 800.3(f);
- comment as per 36 CFR 800.2(d)(3) on the District' plan to involve the public by utilizing the District' normal procedures for public involvement under the National Environmental Policy Act (NEPA); and,
- comment on or contribute to identification efforts including definition of the APE, all as per 36 CFR 800.4(a-b).

Identification of Historic Properties

Review of Existing Information and Level of Future Identification Efforts. The District used its geographic information systems (GIS) archeological site/survey databases to conduct an archival search for historic properties. No historic properties have been previously identified in the Project area.

It is the District's opinion that there will be **no historic properties affected** by the Project for the following reasons:

- The temporary construction staging area and easement totals 0.2 acre and is located in the northeastern corner of the intersection of 290th Street and West Rochester Road. This area has been previously disturbed by the construction of the two roads.
- The remainder of the impacts consists of the addition of stream barbs in the Cedar River that tie into an existing rip rapped bank and Bridge pier protection on the existing Bridge.

Request for Information from Consulting Parties: The District is seeking information from all consulting parties regarding their concerns with issues relating to the potential effects of this undertaking on historic properties and, particularly, the tribes' concerns with identifying properties that may be of religious and cultural significance to them and may be eligible for the NRHP [36 CFR 800.4(a)(3-4)]. Concerns about confidentiality [36 CFR 800.11(c)] regarding locations of properties can be addressed under Section 304 of the NHPA which provides withholding from public disclosure the location of properties under several circumstances,

including in cases where it would cause a significant invasion of privacy, impede the use of a traditional religious site by practitioners, endanger the site, etc.

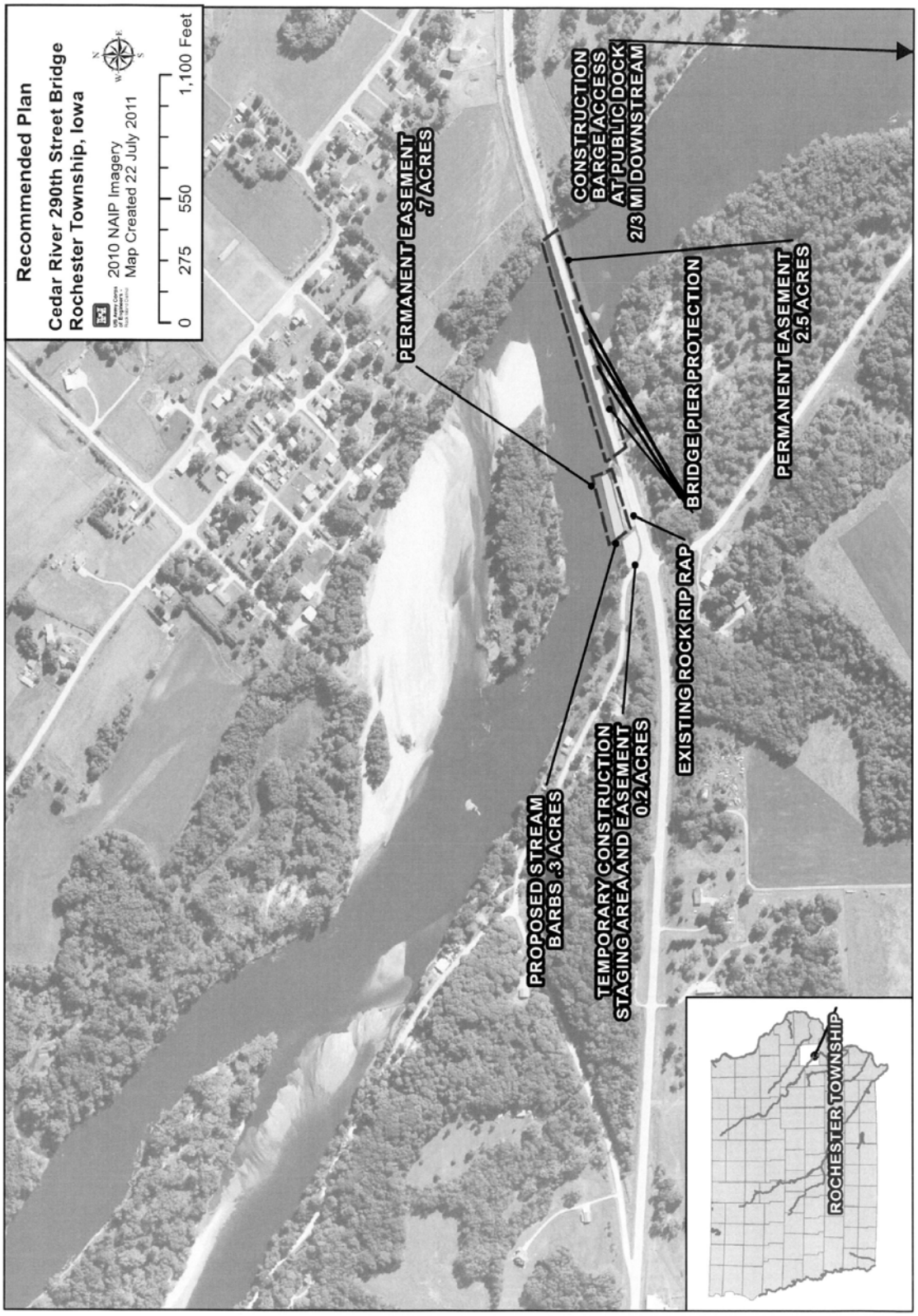
We request your written comments on this Project within 30 days, pursuant to 36 CFR 800.3(c)(4). Results of all consultation and determination shall be included in the Environmental Assessment for additional public review this year.

If you have any questions regarding this matter, please call Mr. Brant Vollman of our Environmental Compliance Branch, (309) 794-5857, or write to our address above, ATTN: Environmental Compliance Branch (Brant Vollman).

Sincerely,

Mark A. Cornish
for
Kenneth A. Barr
Chief, Environmental Planning Branch RPEDN

Enclosure


Recommended Plan
Cedar River 290th Street Bridge
Rochester Township, Iowa
2010 NAIP Imagery
Map Created 22 July 2011
0 275 550 1,100 Feet
PERMANENT EASEMENT .7 ACRES
CONSTRUCTION BARGE ACCESS AT PUBLIC DOCK 2/3 MI DOWNSTREAM
BRIDGE PIER PROTECTION
PERMANENT EASEMENT 2.5 ACRES
EXISTING ROCK RIP RAP
PROPOSED STREAM BARBS .3 ACRES
TEMPORARY CONSTRUCTION STAGING AREA AND EASEMENT 0.2 ACRES
ROCHESTER TOWNSHIP

IOWA DEPARTMENT OF
CULTURAL AFFAIRS
MARY TIFFANY COWNIE, DIRECTOR

TERRY E. BRANSTAD, GOVERNOR
KIM REYNOLDS, LT. GOVERNOR

STATE HISTORICAL SOCIETY of IOWA
JEROME THOMPSON
ADMINISTRATOR

IOWA ARTS COUNCIL
MATTHEW HARRIS
ADMINISTRATOR

600 E. LOCUST
DES MOINES, IOWA
50319

T. (515) 281-5111
F. (515) 282-0502

CULTURALAFFAIRS.ORG

July 5, 2012

In response to: 110916048

Mr. Brant Vollman
Economic and Environmental Analysis Branch
Corps of Engineers – Rock Island District
Clock Tower Building P.O. Box 2004
Rock Island, IL 61204-2004

RE: COE – CEDAR COUNTY – CITY OF ROCHESTER – SECTION 14 EMERGENCY INFRASTRUCTURE STABILIZATION – 290TH STREET BRIDGE PROJECT

Dear Mr. Vollman,

We have received your June 8, 2012 submittal regarding the above-referenced federal undertaking. We provide the following review based upon our examination of this material and in accordance with Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. 470 *et seq.*) and its implementing regulations 36 CFR Part 800 (revised, effective August 5, 2004).

Considering the scope and location of the undertaking, it is our consulting opinion that the proposed action has little potential to effect historic properties. Therefore, based upon the available information, we are able to concur with your determination of 'no historic properties'.

If design changes are made for this project which would involve undisturbed new rights-of-way or easements, please forward additional information to our office for further comment along with the Agency Official's determination of effect. If project activities uncover an item(s) that might be of archeological, historical or architectural interest, or if important new archeological, historical or architectural data should be encountered in the project APE, the applicant should make reasonable efforts to avoid further impacts to the property until an assessment can be made by a qualified archaeologist.

You may reach me at (515) 281-8744 or by email at daniel.higginbottom@iowa.gov if you have any questions or require further assistance in this matter.

Sincerely,

Daniel K. Higginbottom, Archaeologist
Iowa State Historic Preservation Office

From: Jon_Duyvejonck@fws.gov
To: Afflerbaugh, Matthew J MVR
Subject: EA for Sec. 14 in Cedar Co., Iowa
Date: Friday, June 08, 2012 8:15:52 AM

Matt,

I reviewed the information sent on May 25th regarding the Sect. 14 project on the Cedar River near Rochester, Iowa. I have no objections or concerns so far.

Jon Duyvejonck
US Fish & Wildlife Service
1511 - 47th ave
Moline, IL 61265
telephone 309/757-5800, ext. 207

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, ROCK ISLAND DISTRICT
CLOCK TOWER BUILDING - PO BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO
ATTENTION OF

September 13, 2012

T:\HANCKS FILES\AFFLERBAUGH2012LTRS/13SEP2012/Cedar River Coorindation/mer/5384

Regional Planning and Environmental
Division North (RPEDN)

SEE DISTRIBUTION LIST

This letter is in reference to the 290th Street Bridge Section 14 Project (Project) on the Cedar River near Rochester, in Cedar County, Iowa. The U.S. Army Corps of Engineers, Rock Island District (District) is currently preparing an Environmental Assessment (EA). The District sent out a coordination letter for this Project on May 25, 2012. During internal review of the Project design, a reviewer requested a more detailed geotechnical analysis of the sheet pile structure. The additional analysis led to changes in Project design in order to provide support to the sheet pile structure and prevent it from failure during low flow periods. The District is re-coordinating the change in project design and the expanded area of impact that will be required by adding riprap to protect the sheet pile structure.

Rock riprap would be placed in the water along the existing sheet pile structure. The riprap would be placed directly under the bridge deck where the sheet pile begins to become exposed and would end approximately 60 feet upstream of the end of the sheet pile structure on the right descending bank. The rock riprap sheet pile protection would be 8 feet wide at the top of the sheet pile structure and fall at a 1.5:1 slope to the bottom of the stream channel. The footprint of the rock riprap sheet pile protection would extend approximately 30 feet out from the sheet pile (Enclosure 1).

The District is still proposing to construct two stream barbs, referred to as weirs in the May 25, 2012 coordination letter. The location of the downstream stream barb would be changed to accommodate the rock riprap sheet pile protection. The stream barb would be placed on the outside of the rock riprap sheet pile protection rather than being constructed against the sheet pile. The District still plans to place riprap around the bridge piers and to use the area at the intersection of County Highway F44 (290th Street) and West Rochester Road as a temporary staging area (Enclosure 1).

Impacts to the river bottom would occur as a result of placement of riprap and would be confined to the footprint of the structures. Some additional ground would be impacted by clearing of existing vegetation for a staging area for access for the equipment needed to place the riprap. Any stone riprap for the proposed action would be obtained from an approved quarry. For any required water access, the District proposes to use the boat ramp near Rochester Park, located approximately 2/3 of a mile downstream of the 290th Street Bridge.

There are three federally-listed species for Cedar County, Iowa—the endangered Indiana bat and the threatened prairie brush clover and western prairie fringed orchid (Enclosure 2). The Iowa Department of Natural Resources has listed 38 species for Cedar County, which includes

-2-

state endangered, threatened, and special concern species (Enclosure 2). The Cedar River is on the List of Meandered Sovereign Rivers from the Iowa River to the west line of Section 7, Township 89 north, Range 13 west, in Black Hawk County. The proposed project falls within this range.

The District requests your comments on this project with respect to concerns with, or anticipated effects on, any resources within your agency's area of interest. Please provide any comments you may have on this action within 30 days of the date of this letter for incorporation into the EA. If no comments are received within this timeframe, we will assume that you have no concerns with or objections to the proposed action.

If you have any questions or wish to request additional information, please contact Mr. Matt Afflerbaugh of our Environmental Compliance Branch, telephone (309)794-5384, email: matthew.j.afflerbaugh@usace.army.mil, or in writing to our address, ATTN: Environmental Compliance Branch (Afflerbaugh).

Sincerely,

Jim Ross for

ORIGINAL SIGNED BY

Kenneth A. Barr
Chief, Environmental Planning Branch (RPEDN)

Enclosures

CF: w/encl
Dist File (PM-M)
PD-F (Smith)
PD-C (Afflerbaugh)

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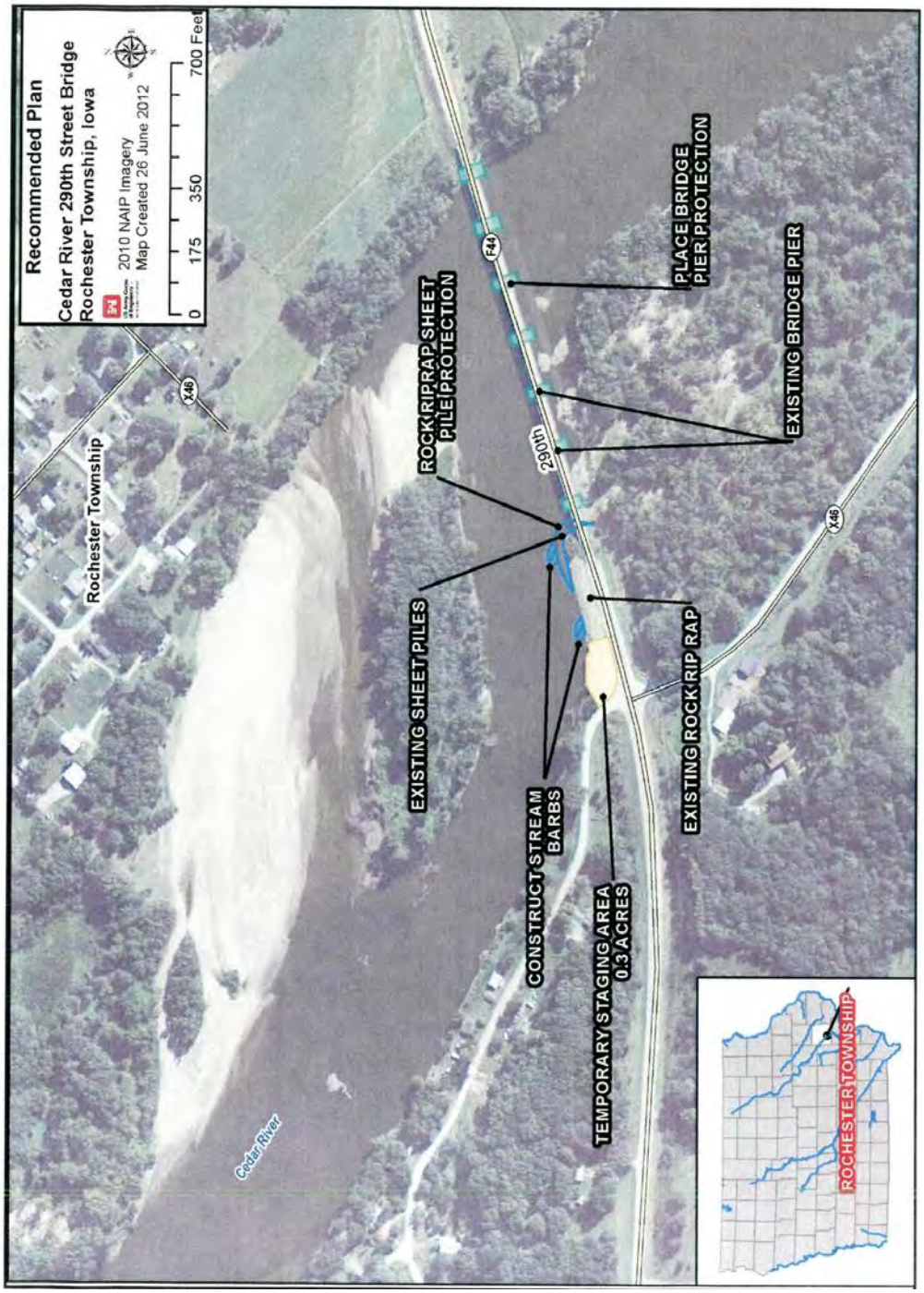
Recommended Plan
Cedar River 290th Street Bridge
Rochester Township, Iowa
2010 NAIP Imagery
Map Created 26 June 2012
0
175
350
700 Feet
Rochester Township
X46
ROCK RIPRAP SHEET PILE PROTECTION
F41
290th
PLACE BRIDGE PIER PROTECTION
EXISTING BRIDGE PIER
EXISTING SHEET PILES
CONSTRUCT STREAM BARBS
TEMPORARY STAGING AREA 0.3 ACRES
EXISTING ROCK RIP RAP
Cedar River
ROCHESTER TOWNSHIP

ENCLOSURE 1

Federally-listed Species for Cedar County Iowa

Indiana bat	*Myotis sodalis*	Endangered	Caves, mines (hibernacula);small stream corridors with well developed riparian woods; upland forests (foraging)
Prairie bush clover	*Lespedeza leptostachya*	Threatened	Dry to mesic prairies with gravelly soil
Western prairie fringed orchid	*Platanthera praeclara*	Threatened	Wet prairies and sedge meadows

State-listed Species for Cedar County Iowa

Common Name	Scientific Name	Class	Status
Bald Eagle	*Haliaeetus leucocephalus*	Birds	Special Concern
Least Darter	*Etheostoma microperca*	Fish	Endangered
Pistolgrip	*Tritogonia verrucosa*	Freshwater Mussels	Endangered
Purple Wartyback	*Cyclonaias tuberculata*	Freshwater Mussels	Threatened
Yellow Sandshell	*Lampsilis teres*	Freshwater Mussels	Endangered
Black Huckleberry	*Gaylussacia baccata*	Plants (Dicots)	Threatened
Hill's Thistle	*Cirsium hillii*	Plants (Dicots)	Special Concern
James Cristatella	*Polanisia jamesii*	Plants (Dicots)	Endangered
Kitten Tails	*Besseya bullii*	Plants (Dicots)	Threatened
Lance-leaved Violet	*Viola lanceolata*	Plants (Dicots)	Special Concern
Meadow Beauty	*Rhexia virginica*	Plants (Dicots)	Threatened
Pink Milkwort	*Polygala incarnata*	Plants (Dicots)	Threatened
Slender Copperleaf	*Acalypha gracilens*	Plants (Dicots)	Special Concern
Spring Avens	*Geum vernum*	Plants (Dicots)	Special Concern
Sweet Indian Plantain	*Cacalia suaveolens*	Plants (Dicots)	Threatened
Toothcup	*Rotala ramosior*	Plants (Dicots)	Special Concern
Violet	*Viola macloskeyi*	Plants (Dicots)	Special Concern
Water Starwort	*Callitriche heterophylla*	Plants (Dicots)	Special Concern
Wood Stonecrop	*Sedum ternatum*	Plants (Dicots)	Special Concern
Field Sedge	*Carex conoidea*	Plants (Monocots)	Special Concern
Glomerate Sedge	*Carex aggregata*	Plants (Monocots)	Special Concern
Grassleaf Rush	*Juncus marginatus*	Plants (Monocots)	Special Concern
Great Plains Ladies'-tresses	*Spiranthes magnicamporum*	Plants (Monocots)	Special Concern
Green Arrow Arum	*Peltandra virginica*	Plants (Monocots)	Endangered
Low Nut Rush	*Scleria verticillata*	Plants (Monocots)	Threatened
Pale Green Orchid	*Platanthera flava*	Plants (Monocots)	Endangered
Slender Dayflower	*Commelina erecta*	Plants (Monocots)	Threatened
Slender Fimbry	*Fimbristylis autumnalis*	Plants (Monocots)	Special Concern
Slender Ladies'-tresses	*Spiranthes lacera*	Plants (Monocots)	Threatened
Slim-leaved Panic Grass	*Dichanthelium linearifolium*	Plants (Monocots)	Threatened
Wolf Spike-rush	*Eleocharis wolfii*	Plants (Monocots)	Special Concern
Yellow-eyed Grass	*Xyris torta*	Plants (Monocots)	Endangered
Ledge Spikemoss	*Selaginella rupestris*	Plants (Pteriodophytes)	Special Concern
Northern Adder's-tongue	*Ophioglossum pusillum*	Plants (Pteriodophytes)	Special Concern
Royal Fern	*Osmunda regalis*	Plants (Pteriodophytes)	Threatened
Woodland Horsetail	*Equisetum sylvaticum*	Plants (Pteriodophytes)	Threatened
Blanding's Turtle	*Emydoidea blandingii*	Reptiles	Threatened
Ornate Box Turtle	*Terrapene ornata*	Reptiles	Threatened

SECTION 14, CEDAR RIVER, 290TH STREET BRIDGE
ROCHESTER, IOWA

APPENDIX A

ENVIRONMENTAL ASSESSMENT

APPENDIX A-B

CLEAN WATER ACT
SECTION 404(b)(1) EVALUATION

DRAFT

SECTION 14, CEDAR RIVER, 290TH STREET BRIDGE
ROCHESTER, IOWA

APPENDIX A

ENVIRONMENTAL ASSESSMENT

APPENDIX A-B
CLEAN WATER ACT
SECTION 404(b)(1) EVALUATION

DRAFT

I. PROJECT DESCRIPTION

A. Location and Description. See EA Section IV, *Project Description*.

B. Authority and Purpose. For Project Authority see EA Section III. For *Purpose and Need for the Action* reference EA Section II.

C. General Description of Dredged/Fill Material. Fill (construction) materials for the stream barbs, sheet pile protection, longitudinal peaked stone toe protection (LPSTP), and bridge pier protection would consist of physically stable and chemically non-contaminating stone. Construction would be bound by the requirements and conditions set forth in *Guide Specification, Civil Works Construction for Environmental Protection,* CW-1430, July 1978, Section 7.3.

D. Description of the Proposed Placement Sites. The steam barbs would be located along the RDB of the Cedar River, just upstream of the 290th Street Bridge. The riprap sheet pile protection would be placed just upstream of the bridge along the existing sheet pile structure and bankline riprap. The LPSTP would connect to the sheet pile protection, extend out to the fourth bridge pier, and curve downstream where it ties into the bank. The bridge pier protection would be placed around three of the seven bridge piers of the 290th Street Bridge by the NFS as part of operation and maintenance (O&M) responsibilities.

E. Description of the Proposed Placement Methods. All rock material would be placed mechanically with bulldozers, backhoes or similar machinery. It may become necessary at some of the areas for the machinery to work from land or from the river. A work barge would be used to transport and place rock material if water access is required for placement.

II. FACTUAL DETERMINATIONS

A. Physical Substrate Determinations.

1. Substrate Elevation. Substrate elevation of the river in the project area is approximately between 628.0 and 632.8 feet National Geodetic Vertical Datum 1929 (NGVD). The two year water surface elevation is approximately 648.5 feet NGVD.

2. Substrate Type. The substrate type is primarily sand but also contains some silt, small gravel, and a mixture of some organic matter like leaves and twigs/branches. Some of the proposed construction areas have been previously impacted by the placement of sheet pile, riprap, and grout bags.

3. Dredged/Fill Material Movement. No dredging is required by this Project. No movement of the stone riprap is anticipated after placement.

4. Actions Taken to Minimize Impacts. The construction footprint was kept as small as possible minimizes impacts to the benthic community. Construction materials to be used are physically stable and chemically non-contaminating, which reduces the chances for impacting the river.

B. Water Circulation and Fluctuation

1. Water. The rock material for construction would be basically inert material that would have little effect on water chemistry. Water clarity, odor, taste, pH, temperature, and dissolved gas levels would not change. The nature of all fill materials would not cause any significant changes in nutrient levels. The construction measures should not impair the aquatic ecosystem's capability to sustain life, or reduce the suitability of the Cedar River for populations of aquatic organisms, and for human consumption, recreation, and aesthetics.

2. Current Patterns and Water Circulation. The construction of steam barbs, sheet pile protection, LPSTP, and bridge pier protection would result in local changes to current patterns and water circulation. These changes would be localized in nature and would not produce large-scale changes in river velocities.

3. Normal Water Level Fluctuation. Construction measures would not alter normal water level fluctuations in the area, or cause prolonged periods of inundation, exaggerated extremes of high and low water, alter erosion or sedimentation rates, aggravate water temperature extremes, or upset the nutrient and dissolved oxygen balance of the aquatic ecosystem. Therefore, this Project should not alter or destroy communities and populations of aquatic animals and vegetation, induce populations of nuisance organisms, reduce food supplies, or restrict movement of aquatic animals.

4. Actions Taken to Minimize Impacts. The construction footprint was kept as small as possible minimizes impacts to the benthic community. Construction materials to be used are physically stable and chemically non-contaminating, which reduces the chances for impacting the river.

C. Suspended Particulate/Turbidity Determinations

1. Effects on Physical and Chemical Properties of the Water Column. The construction measures should not change the kinds and concentrations of suspended particulate/turbidity in the construction area, after construction is complete. During construction temporary turbidity impacts would be experienced due to excavation, placement of construction material and movement of equipment. Impacts should be localized and limited to physical changes to the water column. No

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significant chemical impacts are anticipated. The placement of riprap should not cause any violation of applicable water quality standard, or lead to loss of environmental values.

2. Effects on Biota. Deposition of the construction materials for the bankline protection in the waters of the United States should not cause significant reductions in levels of light penetration that could lower photosynthesis and plant growth. Biota should re-colonize the area after the completion of construction.

3. Actions Taken to Minimize Impacts. The construction footprint was kept as small as possible minimizes impacts to the benthic community. Construction materials to be used are physically stable and chemically non-contaminating, which reduces the chances for impacting the river.

D. Contaminant Determinations. Please refer to EA Section VII, F, *Hazardous, Toxic, and Radioactive Waste.*

E. Aquatic Ecosystem and Organism Determinations

1. Effects on Plankton and Nekton. Both phytoplankton and zooplankton may be impacted during construction. These organisms shouldn't be significantly impacted for the long-term. Nektonic (free-swimming) organisms should be able to avoid the project area during construction and shouldn't be impacted. Both phytoplankton and zooplankton should re-colonize the area after the completion of construction.

2. Effects on Benthos. The benthic community within the footprint of the bankline stabilization would be lost. This loss constitutes only a small fraction of the over-all benthic community in the project area, or this reach of the Cedar River.

3. Effects on Aquatic Food Web. The loss of the benthic organisms within the footprint of the riprap bank protection should not cause any significant impact to any level/segment of the aquatic food web, or disrupt the flow of energy between any trophic level. This small benthic loss should not result in the reduction or potential elimination of food chain organism populations and should not cause any decrease in the overall productivity and nutrient export capability of the ecosystem.

4. Effects on Special Aquatic Sites. There are no geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values that would be significantly impacted in the project area. These areas are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region. No sanctuaries or refuges, wetlands, mudflats, vegetated shallows, or riffle/pool complexes would be impacted. The habitat in the project area is unvegetated river.

5. Threatened and Endangered Species. Please refer to EA Section VI. B, *Endangered Species.*

6. Other Wildlife. Please refer to EA Section VI. B, *Endangered Species.*

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7. Actions Taken to Minimize Impacts. The construction footprint was kept as small as possible minimizes impacts to the benthic community. Construction materials to be used are physically stable and chemically non-contaminating, which reduces the chances for impacting the river.

F. Proposed Placement Site Determinations

1. Mixing Zone Determinations. A mixing zone is an area in which discharge water is allowed to mix with the receiving water. The assimilation capacity of the Cedar River in the vicinity of the Rochester, Iowa would provide an adequate mixing zone for any sediment related contaminants that may be present. No violation of any water quality standard resulting from dredged or fill material connected with this Project is anticipated.

2. Determination of Compliance with Applicable Water Quality Standards. No State violations to any Iowa water quality standard should occur. State certification under Section 401 of the Clean Water Act would be obtained before any construction activities begin

3. Potential Effects on Human-Use Characteristics. Implementation of this Project would have no significant effect either directly, indirectly, or cumulatively on municipal or private water supplies; commercial or recreational fishery; parks; national or historic monuments; wilderness areas; or other similar preserves.

G. Determination of Cumulative Effects on the Aquatic Ecosystem. Cumulative effects are the total effect, including both direct and secondary (indirect) effects, on a given resource, ecosystem, and human community of all actions, no matter who (Federal, non-Federal, or private) has taken the actions.

No significant cumulative impacts are anticipated from impacts to aquatic or terrestrial resources. No significant cumulative adverse impacts are anticipated to cultural/historical resources. No significant adverse socio-economic impacts are anticipated if this Project were to be implemented.

H. Determination of Secondary Effects on the Aquatic Ecosystem. No secondary/indirect impacts are anticipated.

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III. FINDINGS OF COMPLIANCE OR NONCOMPLIANCE WITH RESTRICTIONS ON PLACEMENT

A. No significant adaptations of the 404(b)(1) Guidelines were made relative to this evaluation.

B. Alternatives which were considered for the proposed action are:

- No Action
- Replacement of the 290th Street Bridge
- Riprap Stream Barbs
- Longitudinal Peaked Stone Toe Protection and Sheet Pile Protection
- Riprap Bridge Pier Protection
- Longitudinal Peaked Stone Toe Protection with Sheet Pile Protection, Riprap Stream Barbs and Riprap Bridge Pier Protection
- Closing Dam and Riprap Island Protection
- Closing Dam, Riprap Island Protection, and Bridge Pier Protection

C. Section 401 Water Quality Certification from the State of Iowa would be received before project construction would begin.

D. The Project, as proposed, would not cause concentrations of hazardous substances or other regulated contaminants in the waters of the United States to exceed applicable or relevant and appropriate limits.

E. No significant adverse impacts to State or federally-listed endangered or threatened species are anticipated from this Project.

F. No municipal or private water supplies would be affected. There would be no adverse impacts to recreational or commercial fishing. No significant adverse changes to the ecology of the Cedar River system would result from this action.

G. No contamination of the Cedar River is anticipated. The Project would cause only minimal and short-term adverse environmental impacts.

H. No other practicable alternative has been identified that would address the project goals and objectives better than the preferred alternative. The proposed action would not significantly impact water quality. The proposed action is in compliance with Section 404(b)(1) of the Clean Water Act, as amended.

_____ _____

Date

Mark J. Deschenes
Colonel, US Army
Commander & District Engineer

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SECTION 14, CEDAR RIVER, 290TH STREET BRIDGE
ROCHESTER, IOWA

APPENDIX A

ENVIRONMENTAL ASSESSMENT

APPENDIX A-C
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SECTION 14, CEDAR RIVER, 290TH STREET BRIDGE
ROCHESTER, IOWA

APPENDIX B

DESIGN CONSIDERATIONS

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US Army Corps of Engineers
Rock Island District

ENGINEERING DESIGN MEMORANDUM

PIER AND SHEETPILE PROTECTION

GENERAL INFORMATION

PROJECT NAME: Cedar River 290th Street Bridge Section 14
PROJECT LOCATION: Rochester Township, IA
REPORT DATE: 8/27/2013
PROJECT EDM NO.: 1 of 2

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Anthony Heddlesten	Project Engineer	CEMVR-EC-DN
Jason T. Smith	Study Manager/Civil Engineer	RPEDN-PDF

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SECTION 2: PROJECT DESCRIPTION

The Cedar River 290th Street Bridge Section 14 project entails placement of stone protection on the right descending bank (RDB) adjacent to the west bridge abutment. This structure begins at the sheet pile structure and spans approximately 520 ft before making a 90 degree turn to terminate approximately 200ft downstream on the RDB. This project also includes placement of stone protection around bridge piers 5,6 and 7 (installed by the Sponsor) and constructing stream barbs in the Cedar River immediately upstream of the bridge on the RDB. The project location is shown on Sheet C-101.

SECTION 3: REFERENCES

CWALSHT sheet pile wall stability analysis

IADOT Bridge & Highway Specifications for Iowa Class E 250 lb. nominal top size riprap stone

EM 1110-2-1601 stone guidance

FHWA NHI Hydraulic Engineering Circular No. 23 Design Guidance for Bridge Scour and Stream Instability

SECTION 4: PROJECT FEATURE DESCRIPTION AND PERTINENT DATA

Protection around bridge piers will be accomplished with designed placement of selected stone in three locations presently experiencing varying degrees of ongoing scour. The site plan and sections are shown on Sheets C-102 and C-301 through C-302, respectively. An increase in scour depth around the piers was caused from the 2008 high river event that redirected flowage on the Cedar River. The purpose for this action is to protect the wood timber piles supporting the concrete piers.

Stream barbs will be constructed at two locations. The site plan and section/profile are shown on Sheet C-102 and C-103, respectively. Their purpose will be to redirect the bank line flowage further offshore to prevent potential river bank scour.

Protection of the existing west bridge abutment will include a longitudinal stoned toe rock dike which will provide protection for the sheet piling at the west abutment. Further survey is required during plans and specs to verify that the critical depth of scour has been achieved. The site plan is shown on Sheets C-102 and C-103.

SECTION 5: ENGINEERING STUDIES, INVESTIGATIONS, AND DESIGN

SECTION 5-1: DESIGN CONSIDERATIONS AND CALCULATIONS

Iowa Department of Transportation Class E riprap was selected as the ideal stone to use in all three cases discussed in Section 4. The nominal top size of this stone is 250 pounds with at least 50% of the stones weighing more than 90 pounds and at least 90% of the stones weighing more than 5 pounds. This same sizing was previously used by the Cedar County, Iowa maintenance department with a high degree of success. The 10 percent chance of exceedence indicates the Cedar River flow rate velocity at 6 feet per second. This same stone sizing was confirmed by EC-HH to be adequate for the intended use.

Stability of the sheetpile wall was analyzed using CWALSHT. A cross-section including soil stratigraphy and properties was provided for the bridge abutment on the right descending bank of the river. Analysis of the wall was for current stability as well as future stability should scour occur.

The sheetpile is shown to be 20 feet long, driven to bedrock, with about 8-15 feet of soil embedment. The sheet pile is typically completely submerged but the sheet pile may become exposed during periods of low water such as in 1937 when the stream elevation was approximately 636.9. Using conservative assumptions of a low water level in the river (636.9) with groundwater level reaching the top of wall on the protected side (639), a factor of safety (FS) between 3.6 and 2.0 was calculated for the current condition depending on what portion of the wall is being evaluated. EM 1110-2-2504, Design of Sheet Pile Walls, requires a FS of 1.5 for sheetpile walls.

After establishing the stability of the existing cross-section, sections potentially subject to scour were analyzed by lowering the riverbed at one foot intervals. The riverbed currently varies between EL 634 for the portions under the bridge structure to approximate El 629 for the portions immediately adjacent to

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the stream. Potential future scour leading to a riverbed EL of 627, would result in the wall stability FS of 1.7. The FS drops to an unacceptable 1.1 with scour of the riverbed to EL 626. Table B-1 provides the results from the sensitivity analysis of the sheet pile structure.

Table B-1: Stability Analysis

Riverbed Elevation (NAVD 88)	Protected Side GW Elevation (NAVD 88)	River Side Elevation (NAVD 88)	Factor of Safety
634	639	636.9	3.6
631	639	636.9	3.0
629	639	636.9	2.0
627	639	636.9	1.7
626	639	636.9	1.1

Due to the sensitivity of the analysis exhibited by changes in the FS with respect to the amount of scour, coupled with any uncertainties about the riverbed topography, soil properties, and modeling program accuracy, action to stabilize this section is recommended.

SECTION 5-2: QUANTITY TAKEOFFS

Rough quantities were calculated assuming a flat river bottom at various elevations based on survey data taken by the hydraulics department. A formal survey has not been performed of this area. Protection around piers 5 and 6 would be placed at a width of 2 times the pier width, or 11 feet on each side. Protection around pier 7 would be placed at a width of 3 times the pier width, or 16.5 feet on each side. All pier protection would be placed to a depth of 3 feet above the design (1947) river bottom.

The quantities based on the hydraulics survey are:

Pier 5 – 485 CY required (800 Tons)

Pier 6 – 1200 CY required (1975 Tons)

Pier 7 – 2070 CY required (3415 Tons)

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The sheet pile protection portion of the rock dike would be constructed at an elevation of 646 ft (NAVD 1988), 8 feet wide at the top of the sheet pile structure and would fall at a 2H:1V slope to the bottom of the stream channel.The rock dike would maintain an elevation of 646 but narrow to a peak. This peaked stone structure would extend parallel with the bridge approximately 520ft until making a 90degree bend and extending another 200ft where it ties into the RDB downstream of the bridge. The peaked stone structure would fall from the peak at a 2H:1V slope to the respective bottom of the stream channel.

The estimated volume of stone to construct the sheet pile protection and stone dike structure is 11,227 CY.

SECTION 5-3: COST ESTIMATE AND CONSTRUCTION SCHEDULE

Cost estimates and a proposed construction schedule is outlined in both the cost appendix and the main report.

SECTION 6: GRAPHICAL INFORMATION AND MAPS

See Sheets C-301, C-102.

SECTION 7: SUMMARY AND RECOMMENDATIONS

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US Army Corps of Engineers
Rock Island District

ENGINEERING DESIGN MEMORANDUM

STREAM BARBS

GENERAL INFORMATION

PROJECT NAME: CEDAR RIVER, 290TH STREET BRIDGE, SECTION 14
PROJECT LOCATION: ROCHESTER TOWNSHIP, IA
REPORT DATE:6/20/2012
PROJECT EDM NO.: 2 OF 2

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Heather Bishop	Hydraulic Engineer	EC-HH

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SECTION 2: PROJECT DESCRIPTION

The Cedar River 290th Street Bridge Section 14 project entails placement of stone protection on the right descending bank (RDB) adjacent to the west bridge abutment. This structure begins at the sheet pile structure and spans approximately 520 ft before making a 90 degree turn to terminate approximately 200ft downstream on the RDB. This project also includes placement of stone protection around bridge piers 5,6 and 7 (installed by the Sponsor) and constructing stream barbs in the Cedar River immediately upstream of the bridge on the RDB. The project location is shown on Sheet C-101.

SECTION 3: REFERENCES

Technical Supplement 14H – Flow Changing Techniques

SECTION 4: PROJECT FEATURE DESCRIPTION AND PERTINENT DATA

Two stream barbs will be constructed along the right descending bank of the Cedar River near the abutment for 290th Street Bridge. The upstream (west) barb will be located near the RDB river bend. The downstream (east) barb will be located near the beginning of the sheetpile section of the bridge abutment. These barbs are shown in detail on Sheet C-103. The stream barbs will extend approximately 1/10 of the way across the river channel and will have a top elevation at the bank of 633.0 feet.

SECTION 5: ENGINEERING STUDIES, INVESTIGATIONS, AND DESIGN

SECTION 5-1: DESIGN CONSIDERATIONS AND CALCULATIONS

Technical Supplement 14H was used to develop the design for the two stream barbs. As the stream barbs are designed predominantly to prevent abutment failure and not to realign the Cedar River, they are at the minimum effective length suggested. (Width of river divided by 10) The approximate channel width for this area of the Cedar River is 300 feet, so the effective length is 300/10 or 30 feet.

*W = 300 feet

*L_e = 30 feet

The next design consideration was the height of the stream barb (weir). The suggested height is 1/3 to ½ of the average bankfull flow depth. In the area closest to the abutment, we know the river bottom to be at approximately 628.0 feet and the bankfull elevation to be approximately 638.5 feet. This means that the average depth is 10.5 feet and our weir height should be between 3.5 and 5.25 feet. (631.5 feet to 633.25). The selected height was 633.0 at the shoreline sloping down to 631.0 at the furthest point into the river.

*H_w = 633.0 feet

To determine an angle to set the barb at (theta), the ratio of radius of bend to bankfull width needs to be calculated. The radius in this bend is approximately 2,550 feet, giving us a R/W ratio of 8.5. If the R/W ratio is greater than 6, the angle should be between 30 and 45 degrees. At a ratio of 9 or greater the angle should be 45 degrees.

*R = 2,550 feet

*R/W = 8.5

*Theta = 45 degrees

With the angle determined, you can then determine the actual weir length, which is the effective length divided by the sine of that angle. 30/Sin 45 = 42 feet.

*L = 42 feet

The depth of the bed key (S) is calculated out as 2.5 times the average flow depth times 1/3 to ½. As the stream barb is minimally sized, using the smaller value gives a key depth of 8.75 feet.

DRAFT

*S = 8.75 feet

14H also provides graphical information on laying out stream barbs around the bend of the river. As these barbs are being placed along a straight section of the river, the only rule is that they not be spaced further apart than 5 times the weir length. This maximum distance is referred to as: L_s.

*L_s = 210 feet

SECTION 5-2: QUANTITY TAKEOFFS

East Barb – 872 CY (1439 Tons)

West Barb – 878 CY (1450 Tons)

SECTION 5-3: COST ESTIMATE AND CONSTRUCTION SCHEDULE

Cost estimates and a proposed construction schedule are outlined in both the cost appendix and the main report.

SECTION 6: GRAPHICAL INFORMATION AND MAPS

See Sheet C-103

SECTION 7: SUMMARY AND RECOMMENDATIONS

Based on the width of the stream barbs constructed, it will not be necessary to add additional armoring to the toe of the sheetpile wall. The stream barb will act as toe protection in addition to helping build the bank back in this area and moving the thalweg further from shore.

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FED. ROAD DIST. NO.	STATE	F PROJ. NO	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
5	IOWA	469 (3)			

STATE OF IOWA

STATE HIGHWAY COMMISSION

DESIGNS FOR

BRIDGES AND CULVERTS

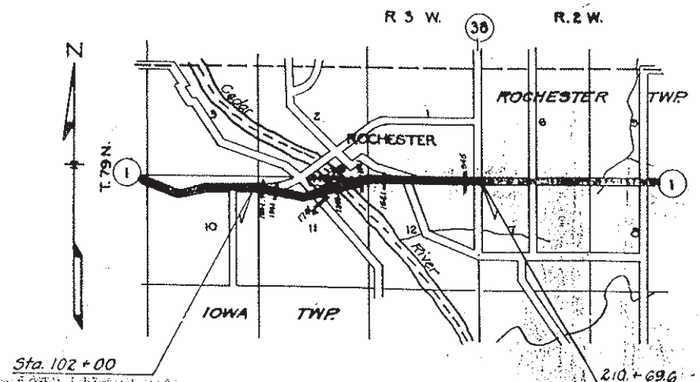
PRIMARY ROAD SYSTEM F. PROJ. NO 469 (3)

CEDAR COUNTY

JANUARY 1942-44

F 469 (3)

DESIGN	LOCATION SEC.	TOWNSHIP	STATION	DESCRIPTION SIZE AND TYPE	Conc. Seal Coat Cu. Yds	ESTIMATE OF QUANTITIES Concrete Cu. Yds	Reinforc. Steel Lbs	Excavat. Cu. Yds Cl. I	Cl. II	Filling Lin. Ft. Treated	Untr.	Str. Ct Stl. Lbs	Rip Rap No. 3 Sq. Yd	Steel Sheet Piling Sq. Ft.
* 1241	11	Iowa	107+04	4'x5'x82' Rein. Conc. Box		48.7	4239	28						
1341	"	"	111+54	4'x4'x155' " " "		93.8	9035	71						
1441	"	Rochester	156+50	4'x5½'x65' " " "		45.8	4230	70						
1541	1-12	Rochester	165+26	3'x4'x60' " " "		30.1	1728	17						
545	"	"	202+00	4'x5½'x59' " " "		38.1	3200	28						
1741a	11	Iowa	133+75 124' Rt.	4'x4'x58' " " "		32.0	2984	19						
				Totals		288.5	25416	233						
• 1244	11	Rochester	144+15	144'x26' Contin. Steel Girder Br.	148.8	2011.8	211955	566	~~1093~~ 21830 ~~1093~~ 21830 1970	~~1870~~ 37625 ~~1870~~ 37625 6060	~~1870~~ 310 ~~1870~~ 310	1155	3280#	
□ 446	2 11	Rochester Iowa	149+56	Tree Stream Retards	Retards 816'		Untreated Piling 244 @ 25' = 6100		Clearing & Grubbing Lump Sum					
▲ 446a	"	"	"	Rock Bank Protection	Rock Bank Protection 88.54 Tons		Rock Jetties 1200 Tons		Clearing & Grubbing 7.5 Acres					



Specifications:
Design: Standard Iowa State Highway Commission, Series of 1925; A.A.S.H.O. 1941, H20 & H15 Loading
Constr.: " " " " " " 1937.
Special Provisions " " " for Painting, Mar. 17, 1947.
" " " " " " Construction Div. II Oct. 16, 1945

Revised 6-23-47, Class II excavation corrected on Design 1244.
▲ Revised 11-1-46, Design 446a Supersedes design 446
□ Revised 9-27-46, Design 446 added.
Revised 6-21-46, Structural Steel estimate and Special Paint Provisions changed.
Revised 1-25-46 - Project changed to F 469 (3)
Revised 1-10-46 Estimates changed & Design 545 added.
* Revised June 28, 1945 - Estimate revised 8-25-45

APPROVED
CHIEF ENGINEER
IOWA HIGHWAY COMMISSION

RECOMMENDED FOR APPROVAL
DISTRICT ENGINEER
PUBLIC ROADS ADMINISTRATION
FEDERAL WORKS AGENCY

APPROVED
DIVISION ENGINEER
PUBLIC ROADS ADMINISTRATION
FEDERAL WORKS AGENCY

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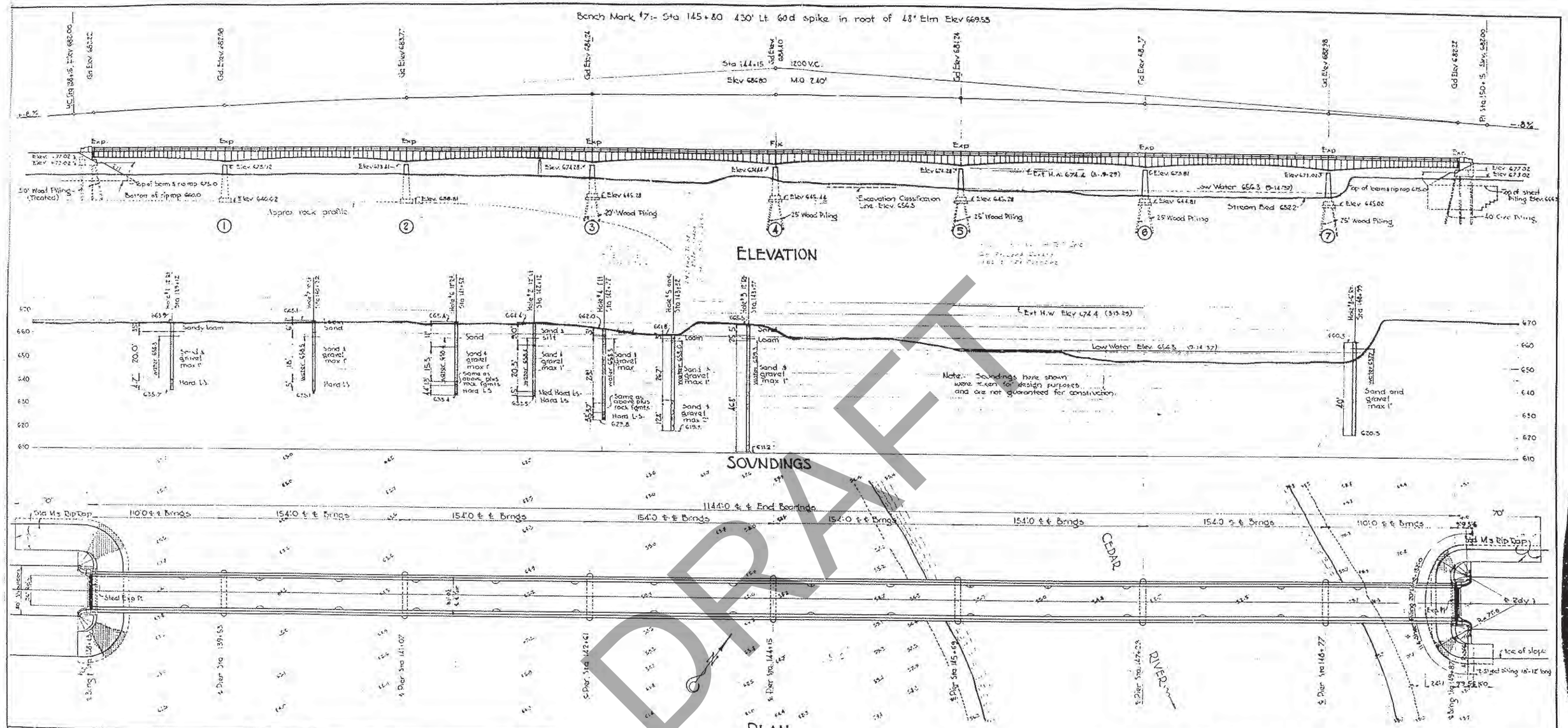
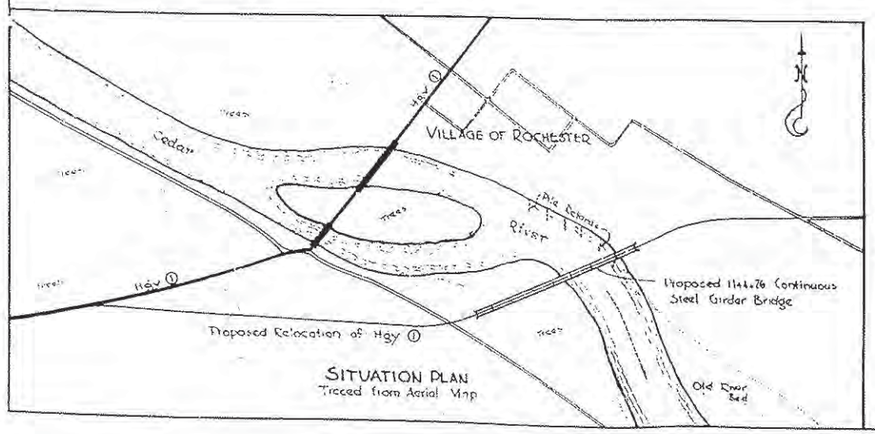
FWHA 08490

UPDATE ONE SEE P. 3

Cedar County, Project No. F 469 (3) File # 11426





General Notes:

This bridge is designed under the standard 1941 Specifications of the A.A.S.H.O. for H-20 loading except floor slab which is designed for H-15. Provision is made for additional load of 19# per sq ft. of roadway for future wearing surface and also for 100% increased live load (except on floor slab) with not to exceed 50% overstress.

Berms at ends of bridge are to be made and compacted before piling are driven.

Rip rap on berms and side slopes (std M.3 except as shown) and sheet piling at North end to be placed by bridge contractor, see sheet 2 for details.

Construction is to be in accordance with standard 1937 specifications of the Iowa Highway Commission except as modified by the following special provisions.

1. Special Provisions for painting, Mar 17, 1947.
2. Special Provisions for Construction Projects Div II Oct. 16 1945.

Revised 6-18-46 Quantities changed for exp. of revision. Spec. Prov for Painting changed 4-2-47
Revised 1-26-46 Project changed to F 469 (3)
Revision 1-2-46 Steel sheet piling added at N. end and special provisions, riprap, pile length at N. abutment and quantities changed. Rev. 6-21-47. Class II Excav changed

ESTIMATED QUANTITIES

PARTS / ITEMS	Structural Steel lbs	Reinforcing Steel lbs	Concrete Class A cy	Concrete Seal Coat cy	Wood Piling Treated	Wood Piling Untreated	Excavation cy Class I	Excavation cy Class II	Rip Rap sq yd	Sheet Piling sq ft
Super-str.	1,810,310	1,528,223	870					1,649.3		
Substructure		683,132	1141.5	148.8	1470'	3160'	566	[illegible]		
Total	1,810,310	2,211,355	2011.5	148.8	1470'	6160'	566	[illegible]	1155	3280

Design for

1144'x26' CONTINUOUS STEEL GIRDER BRIDGE

2-110' END SPANS — 6-154' INTERIOR SPANS

GENERAL DRAWING

Station 144+15 Federal Proj No. 469 (3)

CEDAR COUNTY

Iowa Highway Commission

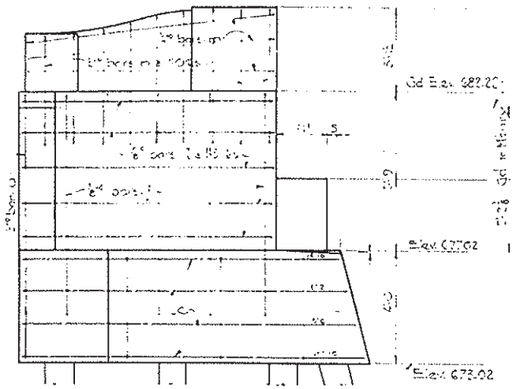
Location
In Section 11
Iowa & Rochester } Twps
Cedar County
Over Cedar River

June 1944 Sheet 1 of 7 Scale 1" = 40'

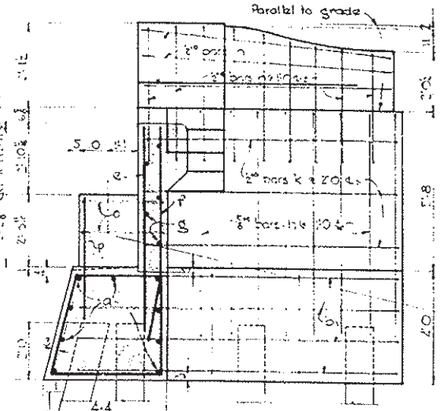
Design 1244 Cedar Wis File 11426

DRAFT

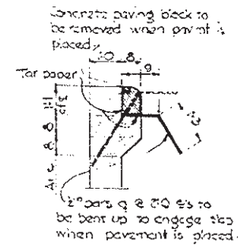
B.M. #7 Sta 145+80 430' Lt. 60d. spike in root 48" Elm Elev. 689.58

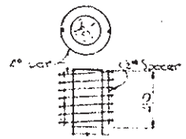


WING ELEVATION OUTSIDE



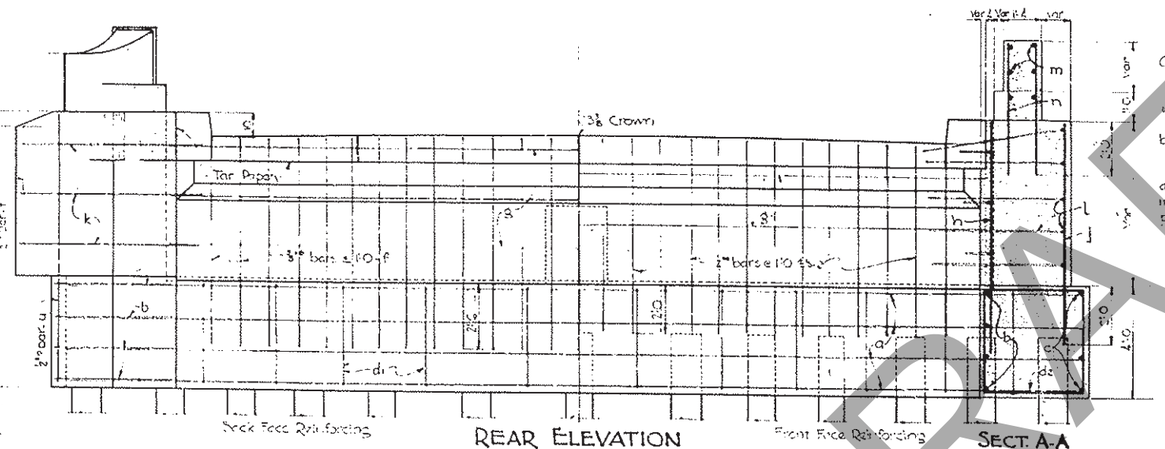
WING ELEVATION INSIDE





Each pile to be capped with a spiral consisting of 7 turns of 1/4" bar @ 21" diam and 3" pitch on 2-2" spacers

Center bearing block is to be placed after steel is fully erected but before floor and back wall are placed. End floor beam is to be jacked slightly while concrete is being worked under masonry plate and then lowered to let mas. pl. bed itself in concrete. As soon as concrete has taken its initial set, bolts are to be removed and beam jacked clear of mas. pl. and left in this position until concrete has attained full strength



REAR ELEVATION

SECT. A-A

General Notes:

All concrete is to be Class A.

All exposed corners 90° or sharper to be filleted with 1" dressed beveled strips.

All reinforcing to be securely wired in place before concrete is placed.

All piling to be treated.

All piling to be driven to full penetration or to rock and to a minimum bearing value of 18 tons. Jetting may be resorted to if necessary to secure full penetration.

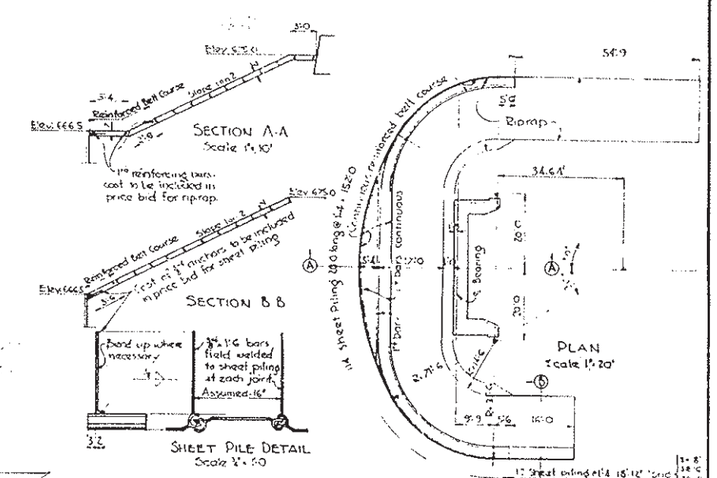
REINFORCING BAR LIST (2 Abutments)

Mrk.	Description		Size	Nmbr	Length	Shape	Weight
a	Pile cap longit		1"	18	56'0		1728
b	Wing base horz	B.F.	5/8"	16	20'0		354
c	" "	F.F.	5/8"	16	var		507
d1	Pile cap horzt		5/8"	24	15'0		374
d2	Wing base "		5/8"	12	15'0		187
e	Backwall vert	F.F.	1/2"	54	7'0		252
f	" "	B.F.	5/8"	54	7'0		421
g	" horz		1/2"	10	20'0		155
h	Wing vert	B.F.	5/8"	52	8'0		246
j	" "	F.F.	5/8"	70	7'6		330
k	" horiz	B.F.	1/2"	12	13'6		108
l	" "	F.F.	5/8"	20	13'6		251
m	Wing Rail horiz		1/2"	24	9'0		144
n	" " vert		1/2"	72	var		214
o	Center bearing block horz		1/2"	4	8'2		22
p	" " vert		1/2"	4	4'0		11
q	Pavement anchors		1/2"	30	4'0		80
r	Pile cap spirals		1/4"	58	40'0		253
s	Spiral spacers		1/2"	76	2'0		101
t	Wing vertical	B.F.	1/2"	4	3'6		15
u	" "	"	1/2"	4	2'4		25
v	Backwall dowels	B.F.	1/2"	10	4'0		32
Total	Reinforcing (2 Abuts)						5970 lbs
"	Concrete	"					1015 cy
"	Creosoted Piling	"		21 @ 30' + 21 @ 40'			1470 L.F.
"	Excavation CLT	"					110 cy

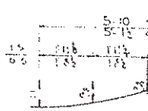
Riprap and Sheet Piling Notes:

Riprap is to be Std M3 except that mesh reinforcing shown on std is to be omitted and at the North end a reinforced bell course is to be introduced as shown. Construction joints may be introduced in bell course at the contractors option, providing the reinforcing is run continuous thru such joints. Reinforcing bars may be spliced if lapped 40 diameters.

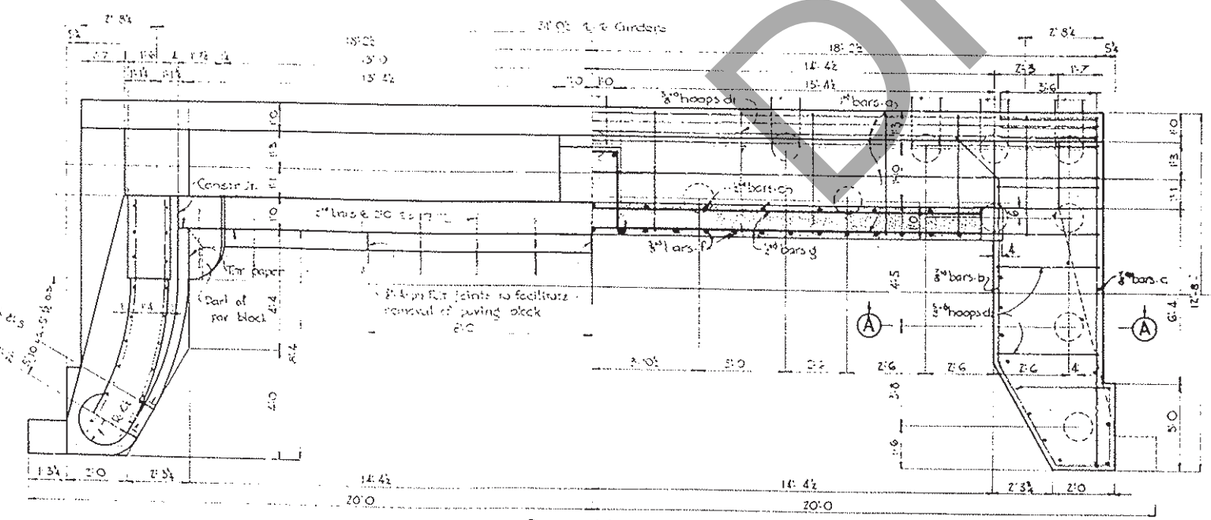
Sheet piling may be either new or used material in good serviceable condition. It is to be of the interlocking type with webs straight or approximately so, and not less than 3/8" in thickness, and it shall weigh not less than 23# per sq ft of wall. All sheet piling shall be given one coat of red lead paint, which is to be thoroughly dry before piling are driven.



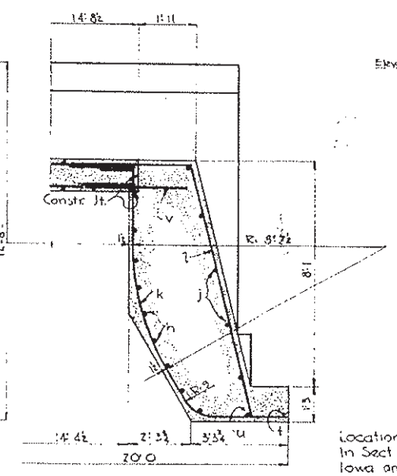
RIPRAP & SHEET PILE DETAILS AT NORTH ABUTMENT



TOP OF WING (Developed)



PLAN VIEW



Design for

1144'x26' CONTINUOUS STEEL GIRDER BRIDGE

2-110' END SPANS — 6-154' INTERIOR SPANS

ABUTMENT DETAILS

Station 144+15 Federal Proj No. 469 (3)

CEDAR COUNTY

Iowa Highway Commission

Location: In Sect 11, Iowa and Rochester Twps, Cedar Co. Over Cedar R.

June 1944

Sheet 2 of 7

Scale: 3/8" = 1'0

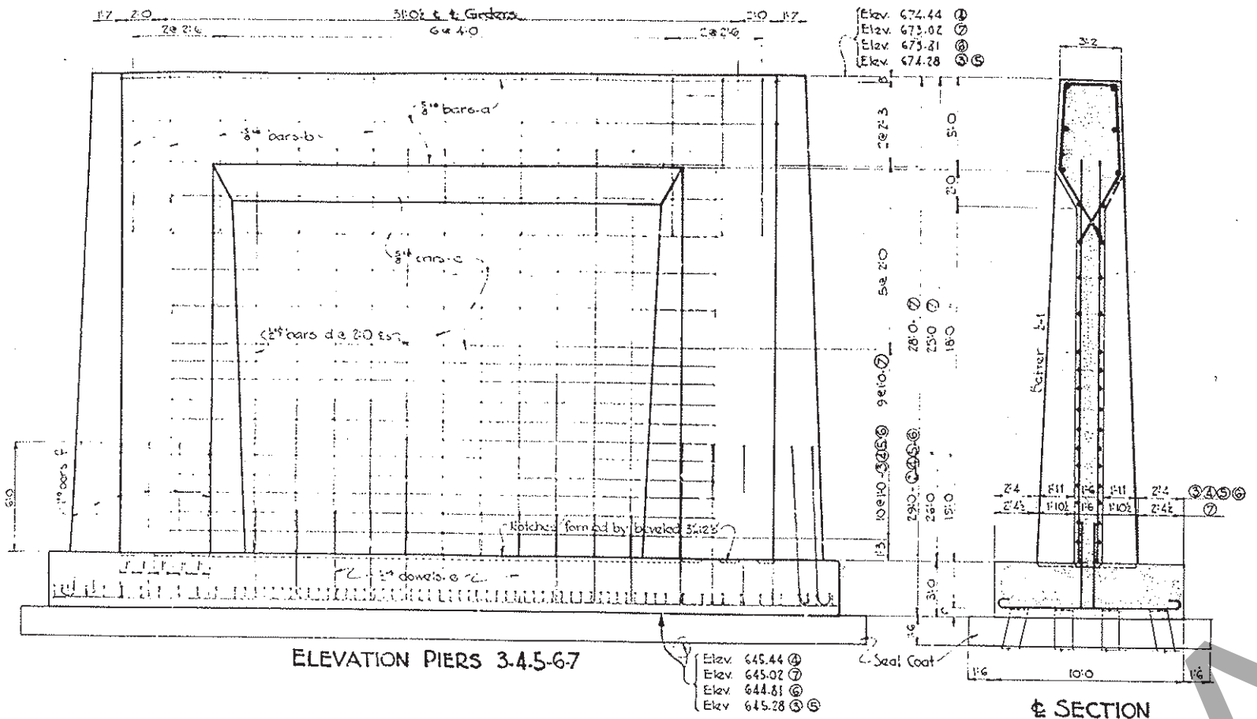
Revision 1-2-46:- Riprap and sheet piling details added to this sheet and pile lengths for N. Abut changed

Design 1244 Cedar

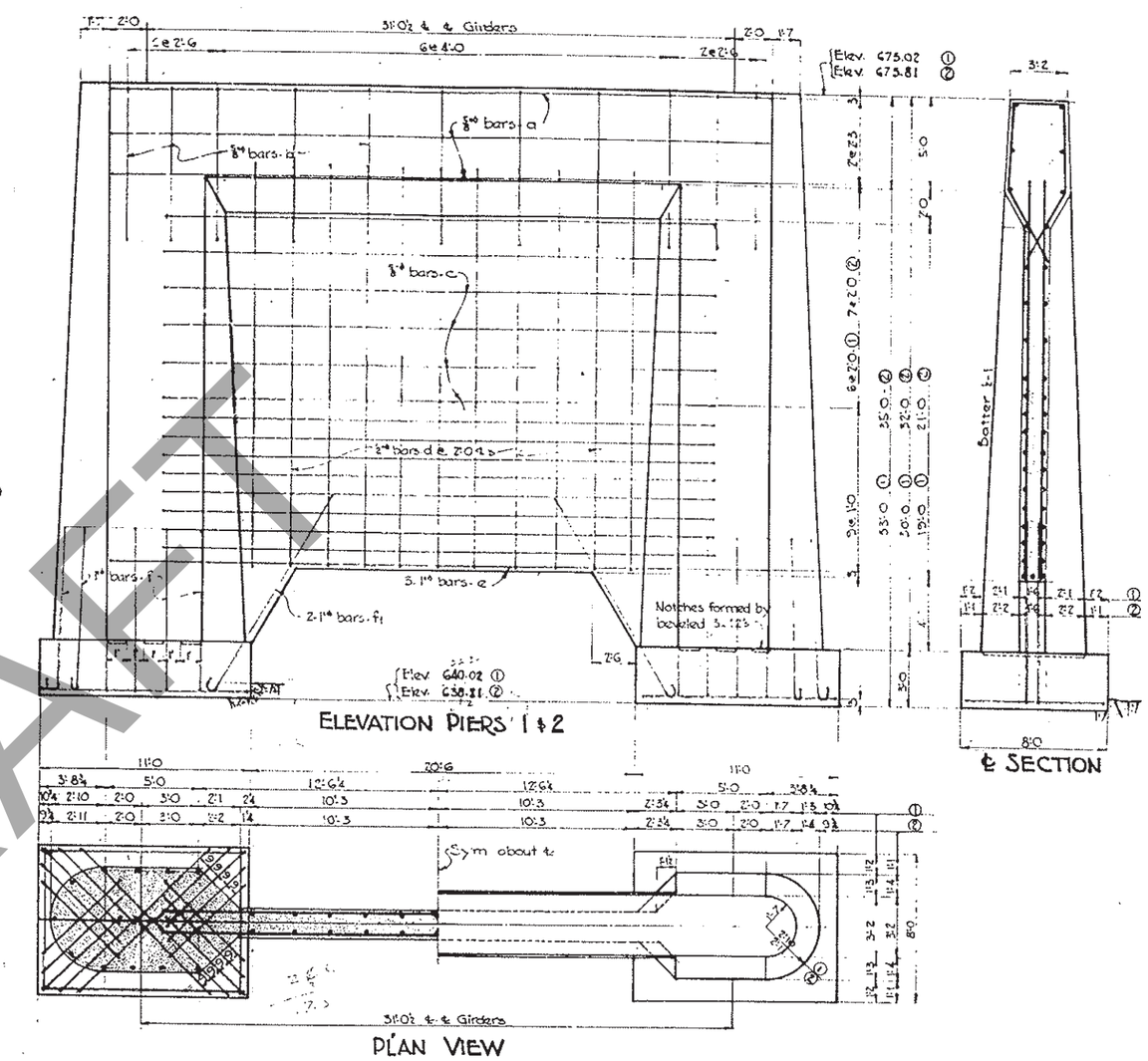
File 1142G

DRAFT

Bench Mark #7: Sta. 145+80 430' Lt. 60d. spike in root 48" Elm Elev. 669.53



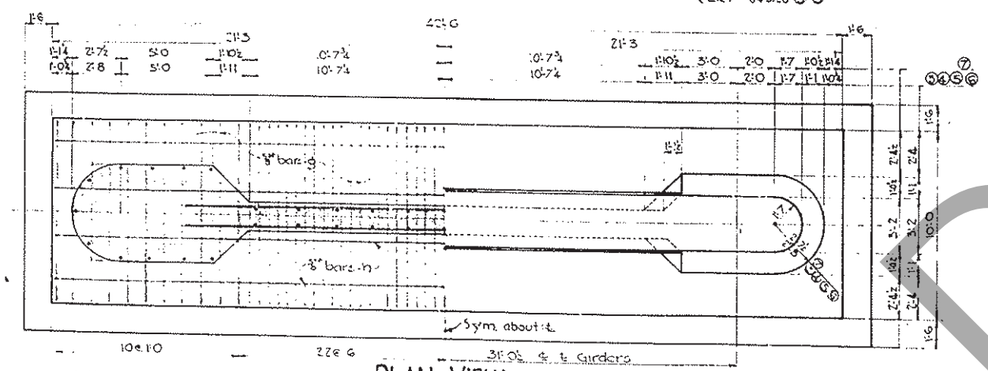
ELEVATION PIERS 3-4-5-6-7



ELEVATION PIERS 1 & 2

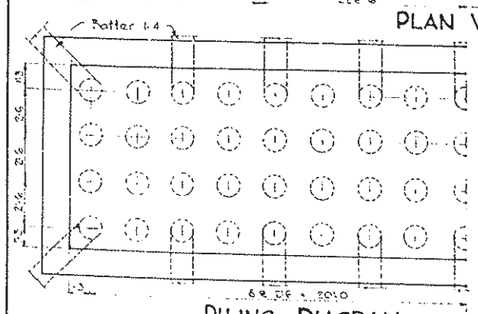
℄ SECTION

℄ SECTION



PLAN VIEW

PLAN VIEW



PILING DIAGRAM
Pier 3 68 @ 20'
Piers 4-5-6-7 each 68 @ 25'

REINFORCING BAR LIST

PIER 3-4-5-7-6

Mark	Description	Size	Nmbr	Lngth.	Shape	Wt.
a	Cap Lngtl	⅝"	30	35'0	—	1095
b	" Vert.	1	55	20'0	U	1147
c	Diaph Horiz	1	148	30'0	—	4651
d	" Vert.	½"	110	8'6" 2'3" 2'3"	—	1525
e	" dowels	1	110	4'0	—	704
f	Footing "	1"	110	9'4	⟵	2736
g	" Transv	⅝"	325	11'0	⟷	5729
h	" Lngtl	1	40	22'3	—	928
	Total Reinforcing (5 Piers)					16065 lbs
	Concrete 752.8 cy Cl A					438 cy Seal Coat
	Excavation 236 cy Cl I 1224 ~~1052~~ cy C. II					
	Untreated Piling 272 @ 25' + 68 @ 20' = 8160 L.F.					

PIERS 1-2

Mark	Description	Size	Nmbr	Lngth	Shape	Wt.
a	Cap Lngtl	⅝"	12	35'0	—	442
b	" Vert.	1	22	20'0	U	457
c	Diaph Horiz	1	62	30'0	—	1940
d	" Vert	½"	44	8'6" 2'3" 2'3"	—	626
e	" Horiz Bott.	1"	6	35'0	—	560
f	Footing Dowels	1"	44	9'4	⟵	1095
fi	" "	1"	8	13'0	⟵	277
g	" diag	⅝"	80	6'3	⟵	522
h	" Lngtl	½"	12	10'9	—	86
J	Transv	½"	8	7'9	—	42
	Total Reinforcing (2 Piers)					6067 lbs
	Total Concrete 287.5 cy Cl A					
	Total Excavation 220 cy Cl I 4253 ~~4229~~ cy Cl II					
	Untreated Piling					

General Notes:-
All concrete is to be Class A.
All reinforcing to be securely wired in place before concrete is placed.
Footings for piers 1 - 2 are to be carried at least 6' into solid rock. If suitable bearing is not found at elevations indicated footings are to be carried deeper.
All piling are to be driven to full penetration and a min bearing value of 13 Tons. Jetting may be resorted to if necessary to secure full penetration.

Rev. 6-21-47 Class II Excav. changed

3/8

Location
Section 11 -
Iowa & Rochester Twps
Cedar County
Over Cedar River

Design For

1144'x26' CONTINUOUS STEEL GIRDER BRIDGE

2-110' END SPANS 6-154' INTERIOR SPANS

PIER DETAILS

Station 144+15 Federal Aid Proj No 469 (3)

CEDAR COUNTY

Iowa Highway Commission

June 1944 Scale 1"=1'0

Sheet 3 of 7

Design 1244 Cedar File 11428

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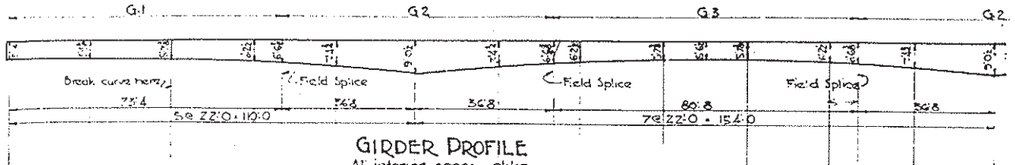
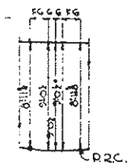
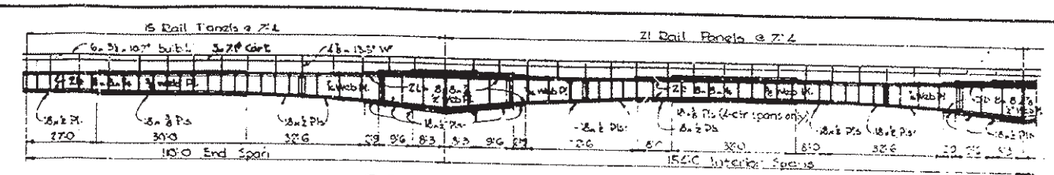
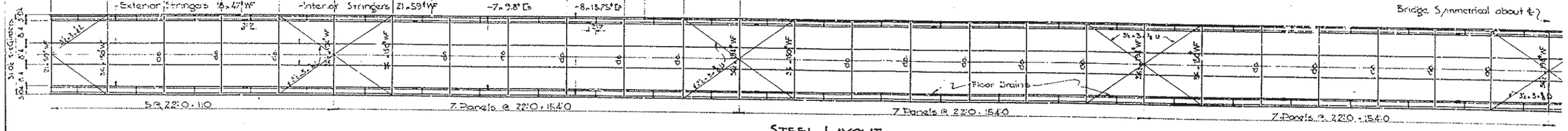


GIRDER PROFILE
All interior spans alike

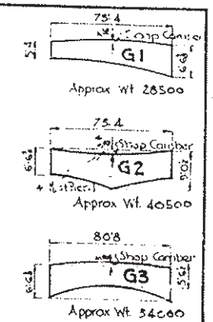


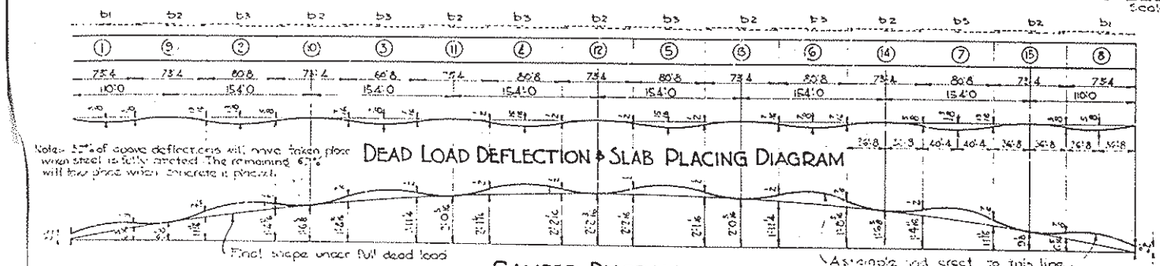


GIRDER MAKE-UP
All interior spans alike
except as noted



STEEL LAYOUT
Scale 1" = 20'





DEAD LOAD DEFLECTION & SLAB PLACING DIAGRAM

CAMBER DIAGRAM

GENERAL NOTES:- This bridge is designed under the 1941 specifications of the A.A.S.H.O
Dead Load used:- 25.08# per ft of girder including 19#/sq ft of rdy. for future wearing surface
Live load used:- Girders stringers and floor beams H-20 with provision for 100% overload with not to exceed 50% overstress; Floor slab H-S.

Construction is to be in accordance with 1937 specifications of the Iowa Highway Commission and special provisions listed on sheet 1.

Girders are to be assembled in shop for inspection after which splices are to be reamed.

All field connections are to be riveted except as shown.

All rivets to be ¾" except as shown.

All reinforcing is to be properly supported on bar chairs and securely wired in place before concrete is placed.

Floor slab is to be placed in sections and in order indicated.

Curbs may be placed continuously.

Paint is to be omitted from tops of top flanges of floor beams and stringers and from other surfaces in contact with concrete.

All rockers to be so set that they will be vertical at normal temperature (45°F)

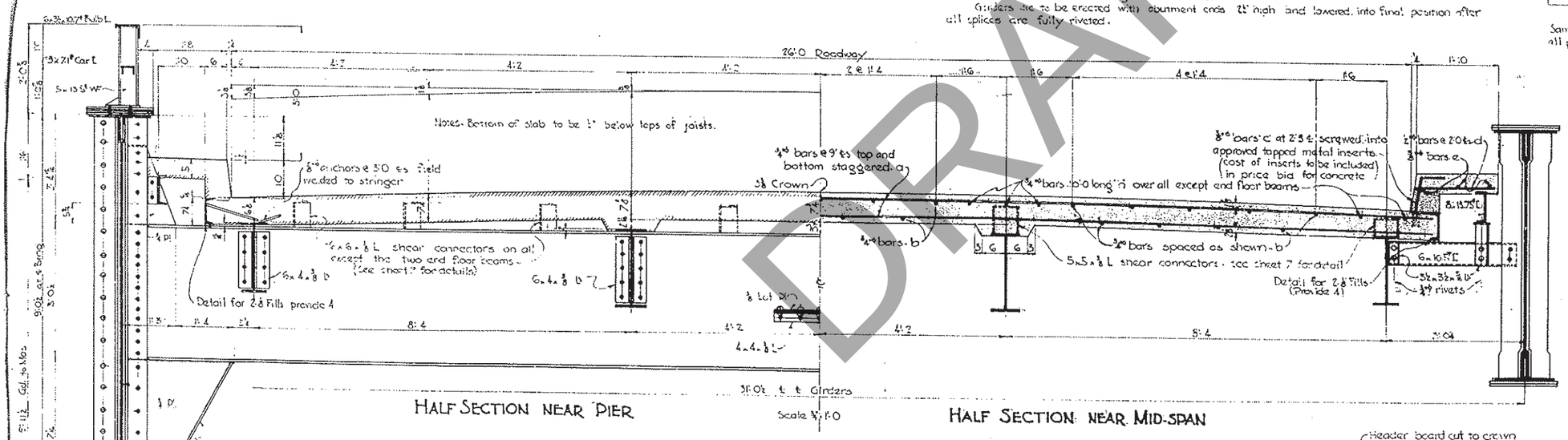
Deflection of exterior stringers when slab is placed will be about 8" and is to be compensated for when setting strike channel.

Girders are to be erected with abutment ends 2½" high and lowered into final position after all splices are fully riveted.

BILL OF REINFORCING STEEL

Mark	Description	Nmbr	Size	Length	Shape	Wt
a	Slab transverse top & bott	2860	½"	27'0	—	115765
b1	- longitudinal - -	108		35'4	—	9384
b2	- - -	378		37'9	—	21433
b3	- - - -	324		44'5	—	21534
c	Curb dowel (threaded)	1040	⅝"	1'8	⌐	1807
d	Curb transverse	1146	½"	1'8	—	1270
e	Curb longitudinal	186	⅝"	35'0	—	7565
f	End Floor beam cross	52	½"	4'0	⌐	139
g	- -	2	⅝"	27'6	—	56
h	Floor longitudinal over F.B.	510	½"	10'0	—	7660
	Total Reinforcing					135833

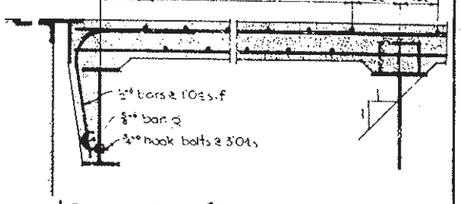
Same for all panels: bars-c 10¼ 9 x 2'3 10¼ 10¼; bars-a 10¼ 27'2 9" 10¼ 10¼



HALF SECTION NEAR PIER

Scale ¼" = 1'0

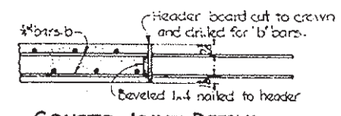
HALF SECTION NEAR MID-SPAN



LONGITUDINAL SECTION FLOOR SLAB
Scale ¾" = 1'0

ESTIMATED QUANTITIES - SUPERSTR

	Gross	Cuts & Copes	Net
Girders	1125565 lb	19000	1106565 lb
Floor Beams str	530025	5345	524680
Miscellaneous	178480	245	178235
Total	1834370 lb	24590	1810310 lb
Concrete Floor	870 c.y.	Reinforcing Steel	135833 lb



CONSTR JOINT DETAIL

STRESS LOADING U

	+ POSITIVE MOMENTS				NEGATIVE MOMENTS		REACTION ON BEARINGS				
	1st Span	2nd Span	3rd Span	4th Span	1st Pier	2nd Pier	3rd Pier	4th Pier	Abut	1st Piers	2nd Piers	3rd Pier	4th Pier
Dead Load	1346000	1714000	1908000	1622000	-5300000	-5750000	-5623000	-5660000	77500	375000	388000	385000	385500
D.L. Adjustment	-339000	-165000	77000	27000	-678000	+300000	-117000	74000	-7500	15100	-19500	4200	-2400
Live Load unif	1090000	1230000	1305000	1325000	-2050000	-2470000	-2560000	-2600000	35000	31800	144300	149000	147000
Live load concn.	462000	461000	462000	462000	-683000	-730000	-740000	-710000	22000	31100	31700	31100	31100
Impact	325000	358000	295000	322000	-490000	-575000	-578000	-602000	12100	29410	31800	32200	32100
Total	3065000	3529000	3743000	3724000	-9348000	-9705000	-9658000	-9520000	134100	582400	584600	601500	593300

% Overload governs. ** See general notes

Rev. 6-13-46 Quantities changed for Exp & Revision

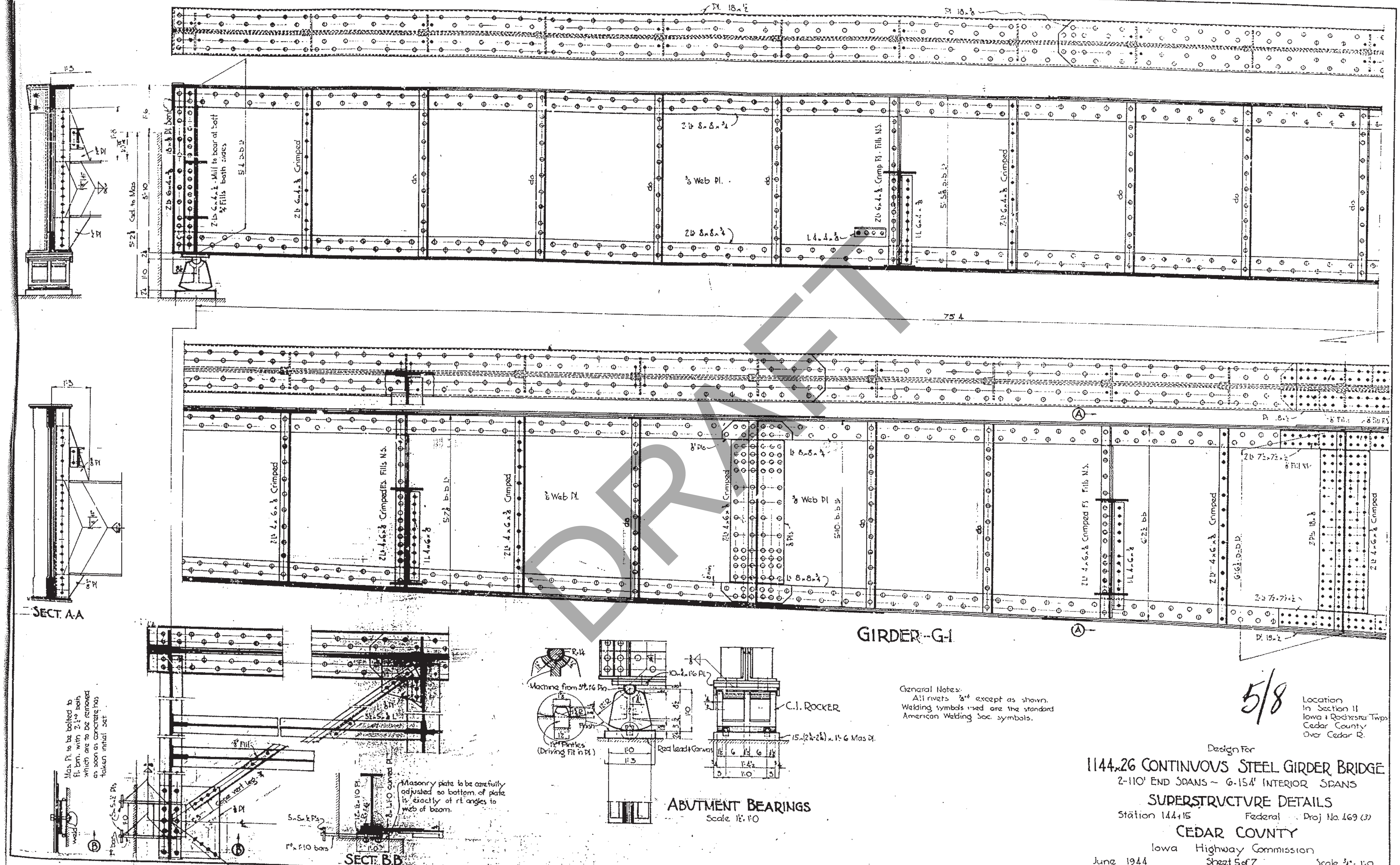
Location
In Sect. 11
Iowa and Rochester Twps
Cedar Co.
Over Cedar R.

Design For
1144' x 26' CONTINUOUS STEEL GIRDER BRIDGE
2 - 110' END SPANS ~ 6 - 154' INTERIOR SPANS
SUPERSTRUCTURE DETAILS
Station 144+15 Federal Proj No. 469 (3)
CEDAR COUNTY
Iowa Highway Commission
June 1944 Sheet 4 of 7 Scale ¼" = 20'-0"

4/8

Design 1244 Cedar Dset File 11426

DRAFT



General Notes:
All rivets 7/8" except as shown.
Welding symbols used are the standard American Welding Soc. symbols.

5/8

Location
In Section 11
Iowa & Rochester Twps
Cedar County
Over Cedar R.

Design For

1144 x 26 CONTINUOUS STEEL GIRDER BRIDGE

2-110' END SPANS ~ 6-154' INTERIOR SPANS

SUPERSTRUCTURE DETAILS

Station 144+15 Federal Proj No. 469 (3)

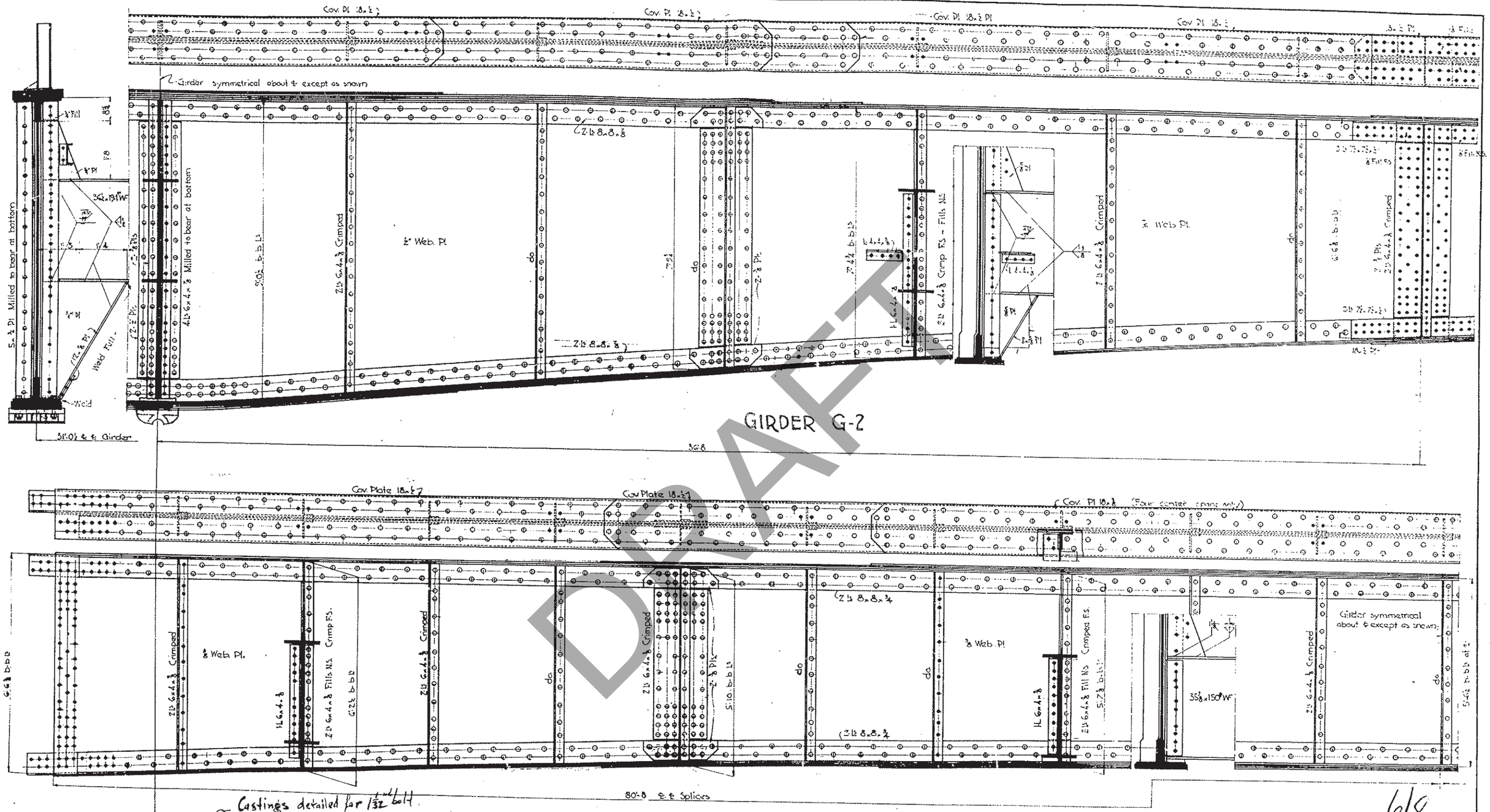
CEDAR COUNTY

Iowa Highway Commission

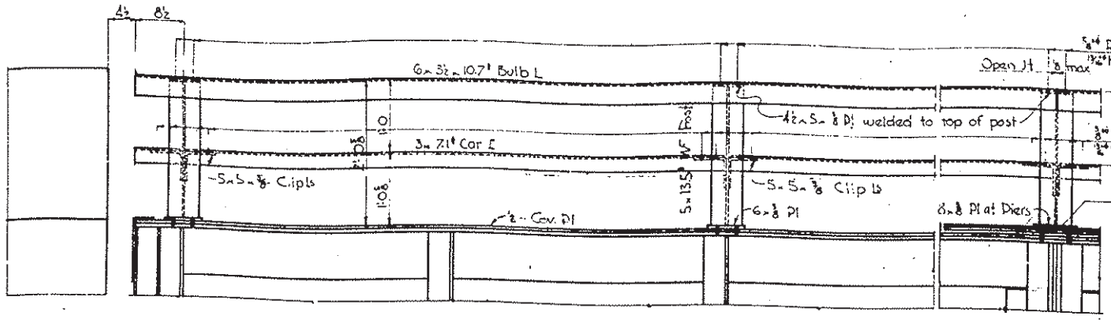
June 1944 Sheet 5 of 7 Scale 3/4" = 1'-0

Design 1244 Cedar File 11426

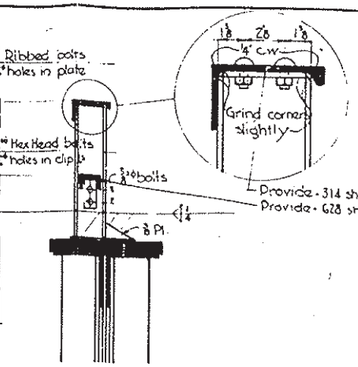
DRAFT

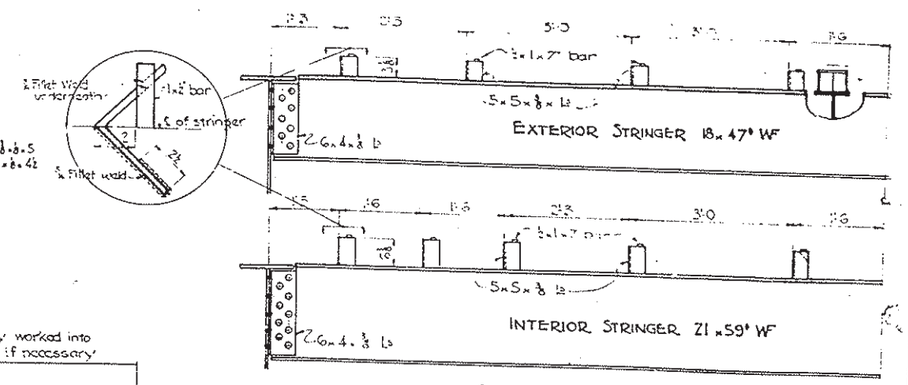

Cov. Pl. 18 x ½
Cov. Pl. 18 x ½
Cov. Pl. 18 x ½ Pl
Cov. Pl. 18 x ½
Girder symmetrical about ℄ except as shown
5 x ½ Pl. Milled to bear at bottom
Weld Fill
Weld
31'-0½ ℄ to Girder
4 Lb 6 x 4 x ⅜ Milled to bear at bottom
2 Lb 6 x 4 x ⅜ Crimped
½" Web Pl.
do
2 Lb 8 x 8 x ⅜
7 x ½ Pl
2 Lb 6 x 4 x ⅜ Crimp F.S. – Fills N.S.
⅜ Web Pl.
2 Lb 6 x 4 x ⅜ Crimped
36'-8
GIRDER G-2
Cov. Plate 18 x ½
Cov. Plate 18 x ½
Cov. Pl. 18 x ½ (Four center spans only)
2 Lb 6 x 4 x ⅜ Crimped
⅜ Web Pl.
2 Lb 6 x 4 x ⅜ Crimp F.S.
1 L 6 x 4 x ⅜
2 Lb 6 x 4 x ⅜ Fills N.S.
G 22½ b.b.Lb
2 Lb 6 x 4 x ⅜ Crimped
2 Lb 8 x 8 x ¾
2 x ⅜ Pl
S 10 b.b.Lb
do
2 Lb 8 x 8 x ¾
⅜ Web Pl
1 L 6 x 4 x ⅜
2 Lb 6 x 4 x ⅜ Fill N.S.
S 7½ b.b.Lb
35⅜ x 150# WF
Girder symmetrical about ℄ except as shown
2 Lb 6 x 4 x ⅜ Crimped
do
80'-8 ℄ to Splices
Castings detailed for 1 1/32" bolt
Holes for (M) Turned Bolts
⅜ Pl
GIRDER G-3
General Notes:
All rivets and bolts ⅞" except as shown.
Location
In Section 11
Iowa and Rochester } Twps
Cedar County
Over Cedar R.
6/8
Design For
1144' x 26' CONTINUOUS STEEL GIRDER BRIDGE
2-110' END SPANS 6-154' INTERIOR SPANS
SUPERSTRUCTURE DETAILS
Station 144+15 Federal Proj No 469 (3)
CEDAR COUNTY
Iowa Highway Commission
June 1944 Sheet 6 of 7 Scale ¼"=1'-0
Design 1244 Cedar File 11426

DRAFT

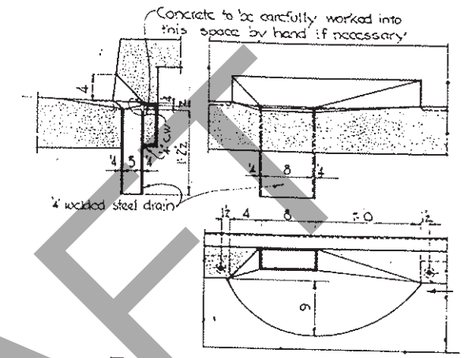


RAIL DETAILS

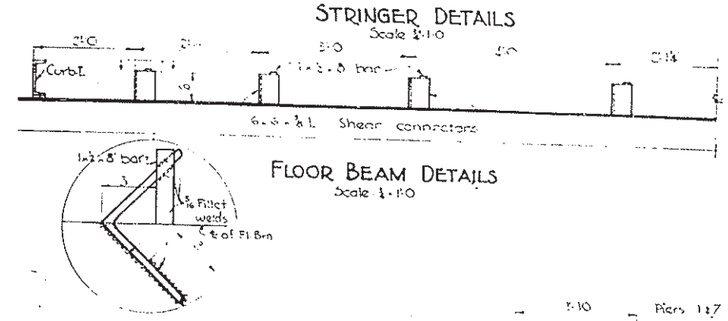




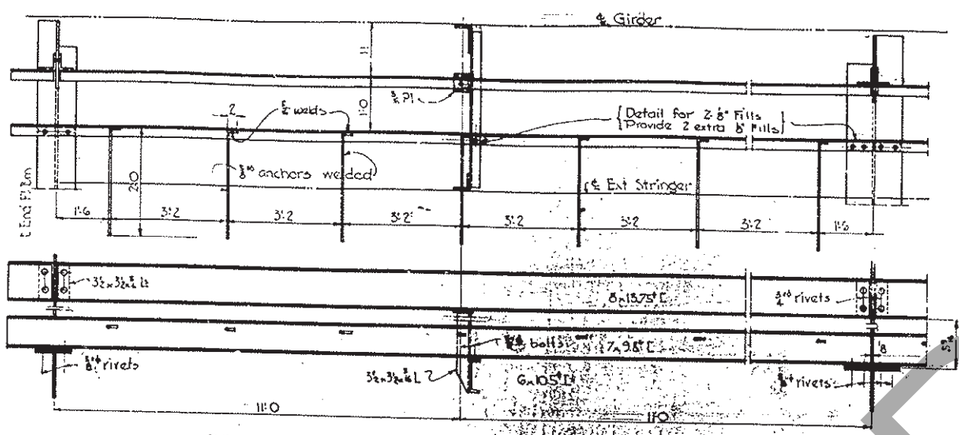
STRINGER DETAILS
Scale ½" = 1'-0"



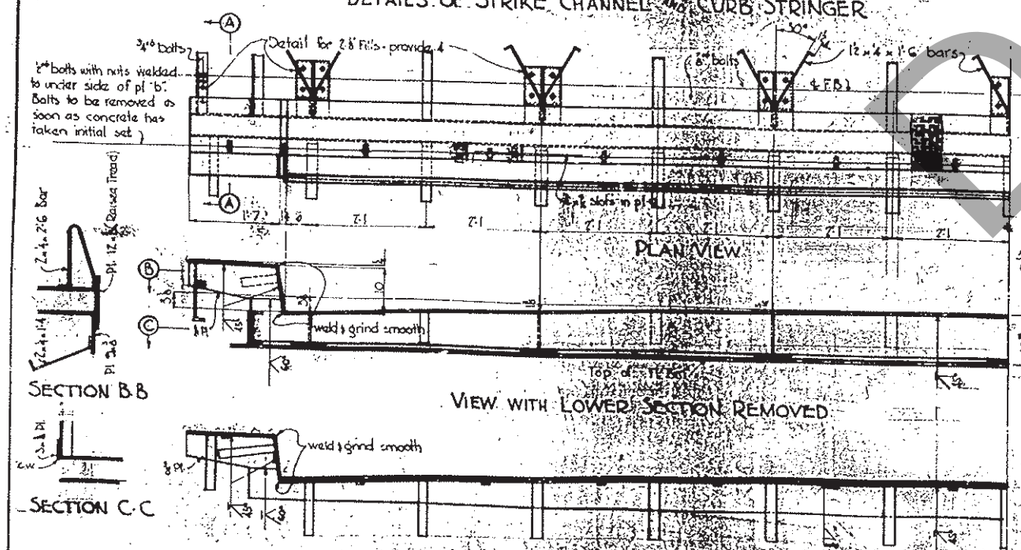
FLOOR DRAIN DETAILS



FLOOR BEAM DETAILS
Scale ½" = 1'-0"



DETAILS OF STRIKE CHANNEL & CURB STRINGER



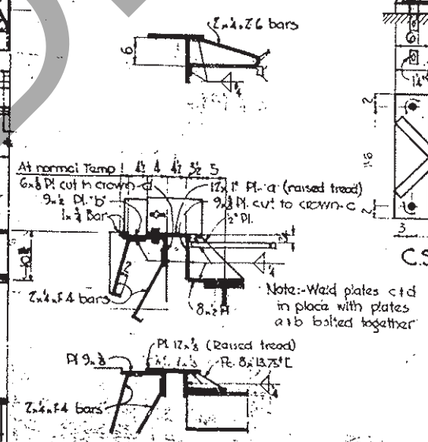
PLAN VIEW

SECTION B-B

VIEW WITH LOWER SECTION REMOVED

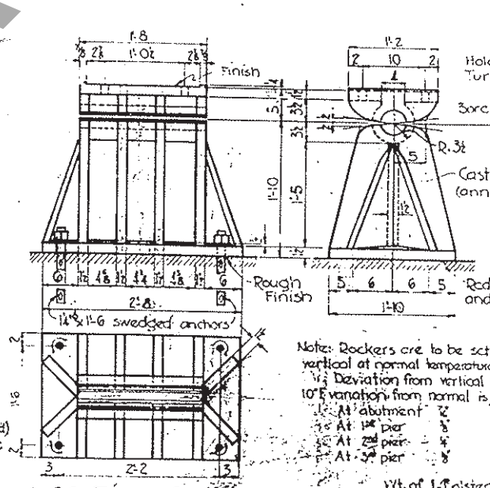
SECTION C-C

EXPANSION PLATE DETAILS
Scale 1" = 1'-0"



SECTION A-A

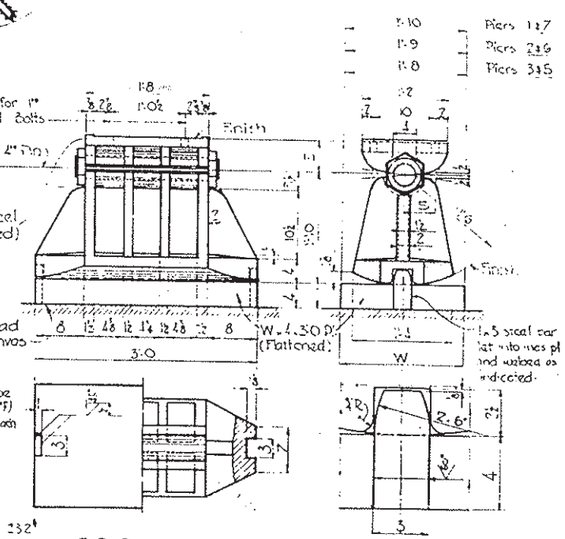
Note: Exp. plate opening is to be varied by ⅛" for each 10°F variation from normal at time of setting. Decrease for higher temperature and vice versa.



C.S. FIXED SHOE

Note: Rockers are to be set to be vertical at normal temperature (45°F)
Deviation from vertical for each 10°F variation from normal is;
At abutment ⅛"
At 1st pier ⅜"
At 2nd pier ¼"
At 3rd pier ⅜"

Wt. of 1 Roller	232#
" " Shoe	1190
" " Rocker	1010
" " Mas. Pl.	660 avg
" " Pins & Nuts	87



C.S. ROCKER

General Notes:
All bolts and rivets to be ⅞" except as shown.
Welding symbols used are those of the American Welding Society.

Design For 7/8

Location: In Sect. 11 Iowa and Rochester Twps Cedar Co. Over Cedar R.

144 x 26 CONTINUOUS STEEL GIRDER BRIDGE

2 - 110' END SPANS — 6 - 154' INTERIOR SPANS

SUPERSTRUCTURE DETAILS

Station 144+15 Federal Proj No. 469 (3)

CEDAR COUNTY

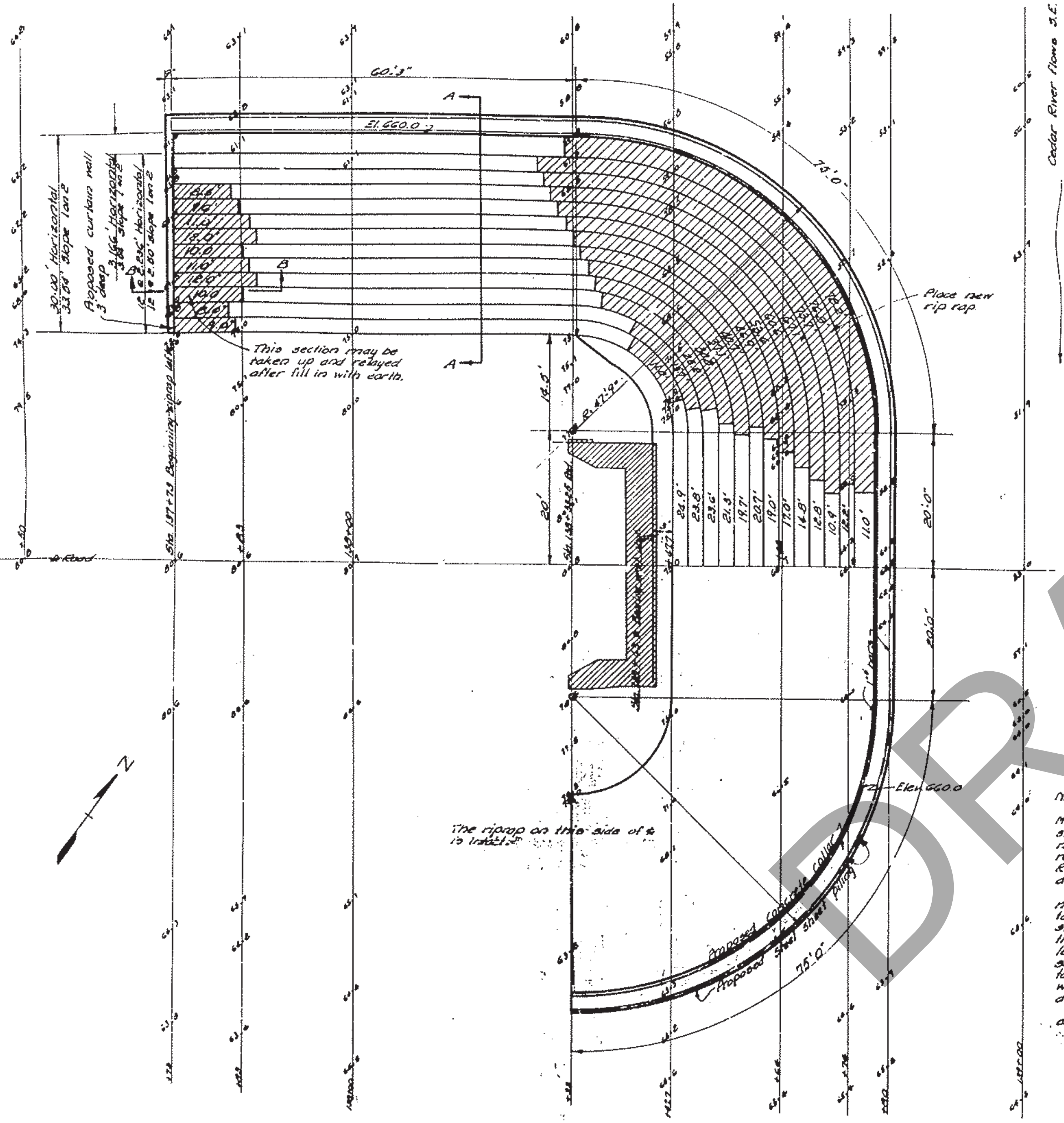
Iowa Highway Commission

June 1944 Sheet 7 of 7 Scale 1" = 1'-0"

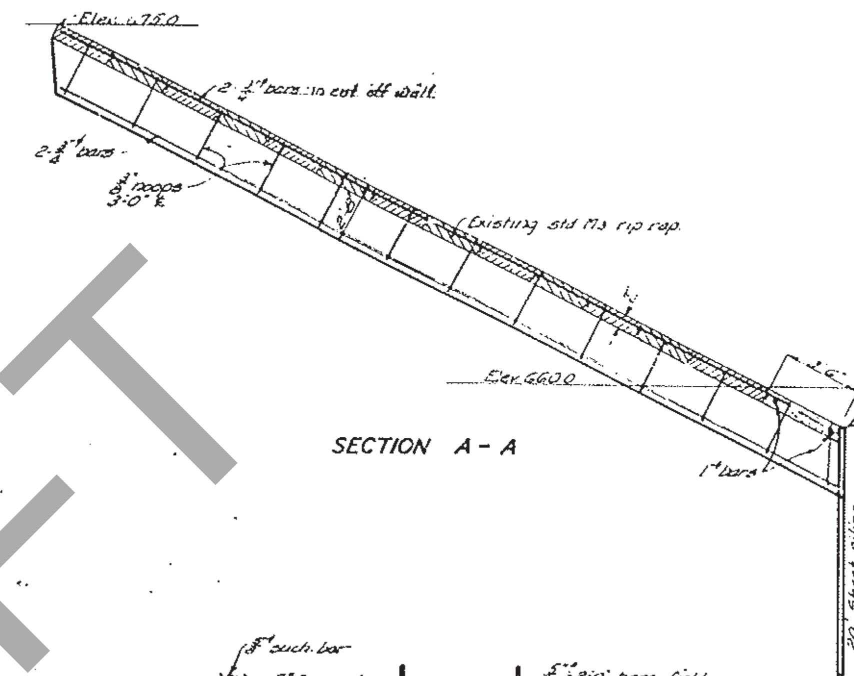
Revision 6-15-46 Expansion pl changed from ⅜ to 1".

Design 1244 Cedar File 11426

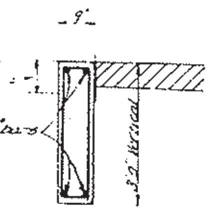
DRAFT



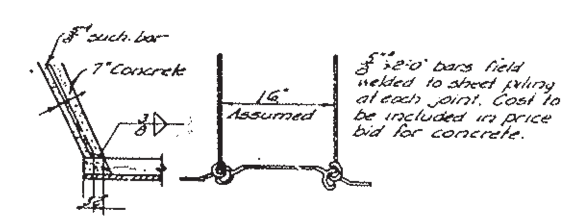
SCALE 1" = 10'-0"



SECTION A - A



SECTION B-B



SHEET PILE DETAIL
SCALE 3/4" = 1'-0"

Note:-
Rip rap replacement is to be standard M-3 except that mesh reinforcing shown on standard is to be omitted. Construction joints may be introduced in belt course providing reinforcing is run continuous thru such joints. Reinforcing bars may be spliced if lapped 40 diameters.

Sheet piling may be either new or used material in good serviceable condition. It is to be of the interlocking type with webs straight or approximately so and not less than 3/8" in thickness and it shall weigh not less than 23# per sq. ft. of wall. All sheet piling shall be given one coat of paint equivalent to the "shop coat" referred to in the specifications which is to be thoroughly dry before pilings are driven.

Sheet piling to be driven to firm bearing on rock and cut off at elevation shown if necessary.

General Notes:
The rip rap at the south west end of this bridge was damaged by the spring and early summer flood, of 1947 and is to be repaired and strengthened by driving sheet piling in accordance with details shown on this sheet.

Construction is to be in accordance with the 1937 Specifications of the Iowa Highway Commission and
1. Special Provisions for painting 3-12-47.
2. Special Provisions for construction Project Div II Oct. 16, 1945

8/8

ESTIMATED QUANTITIES		
Take up and relay rip rap	sq. yds.	28
Rip rap	sq. yds.	298
Steel sheet piling	sq. ft.	5005

Note:- Curtain wall quantities are included in rip rap estimate on basis of equivalent cubic yards of concrete.

Location
in Section 11
Iowa & Rochester Twp
Cedar County.
Over Cedar River

DESIGN FOR
1144' X 26' CONTINUOUS STEEL GIRDER BRIDGE
2-110' END SPANS 6-154' INTERIOR SPANS
RIP RAP & SHEET PILING-SOUTH ABUT
STATION 144+15 FEDERAL PROJECT NO 469 3
CEDAR COUNTY
IOWA STATE HIGHWAY COMMISSION
SEPT. 6 1947 SHEET 7A SCALE 1" = 40'

Design No 1244 Cedar County File 11426

E.R.C.

DRAFT

BRIDGE

FM-16(8)--55-16

CEDAR COUNTY

Letting Date Nov. 15, 1993

ARCHAEOLOGICAL NOTE

IF ARCHAEOLOGICAL MATERIALS ARE ENCOUNTERED DURING THE CONSTRUCTION PHASE OF THIS PROJECT, THE OFFICE OF PROJECT PLANNING AND/OR THE OFFICE OF LOCAL SYSTEMS (I.D.O.T.) MUST BE CONTACTED IMMEDIATELY SO THE PROPER AUTHORITIES CAN BE NOTIFIED ACCORDING TO THE EXISTING FEDERAL REGULATIONS AND STATE PROCEDURES. ADDITIONALLY, IT SHOULD BE NOTED THAT FINDINGS AND RECOMMENDATIONS FOR CLEARANCE FOR FURTHER TESTING CANNOT BE CONSIDERED FINAL UNTIL CONCURRENCE IS RECEIVED FROM THE OFFICE OF THE STATE HISTORIC PRESERVATION OFFICER.

OFFICE OF PROJECT PLANNING 515-239-1225
OFFICE OF LOCAL SYSTEMS 515-239-1528

PERMITS

IOWA DEPARTMENT OF NATURAL RESOURCES
PERMIT NO. FP 93-134
DATE: JULY 29, 1993

UNITED STATES ARMY CORPS OF ENGINEERS
PERMIT NO. CENCR-OD-S-274840
DATE: SEPTEMBER 29, 1993

SHOP DRAWINGS

ALL SHOP DRAWINGS AND FALSEWORK DRAWINGS THAT REQUIRE APPROVAL SHALL BE SUBMITTED TO:
NNW, INC.
316 E. COLLEGE ST.
IOWA CITY, IOWA 52240
(319) 351-2166

IOWA DEPARTMENT OF TRANSPORTATION

Highway Division

PLANS OF PROPOSED IMPROVEMENT ON THE

FARM TO MARKET CEDAR COUNTY BRIDGE REPAIR

The Standard Specifications, Series of 1992, of the Iowa Department of Transportation Shall Apply to Construction Work on this Project

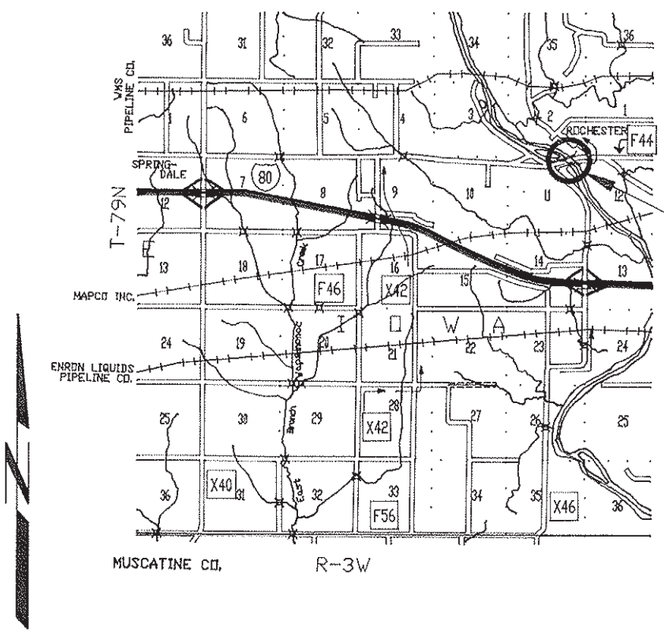
Plus Current Special Provisions and Supplemental Specifications

Scales: As Noted

DRAFT

PROJECT TRAFFIC CONTROL PLAN

THROUGH TRAFFIC WILL BE MAINTAINED DURING CONSTRUCTION. LOCAL TRAFFIC TO ADJACENT PROPERTIES WILL BE MAINTAINED AS PROVIDED FOR IN ARTICLE 1107.08, 1992 STANDARD SPECIFICATIONS PLUS CURRENT SUPPLEMENTAL SPECIFICATIONS. TRAFFIC CONTROL DEVICES, PROCEDURES AND LAYOUTS SHALL BE AS PROVIDED FOR BY SUPPLEMENTAL SPECIFICATIONS FOR TRAFFIC CONTROLS FOR STREET AND HIGHWAY CONSTRUCTION AND MAINTENANCE OPERATIONS, SPECIFICATION 5055.



PROJECT LOCATION

Location Map Scale
0 1 2 3
miles

AADT _____ V.P.D.

FM-16(8)---55-16

No.	Description
1.	TITLE SHEET
2.	ESTIMATED PROJECT QUANTITIES, BID NOTES, GENERAL NOTES
3.	SITUATION PLAN
4.	GENERAL PLAN & DETAILS
5.	CROSS SECTIONS
6.	TRAFFIC CONTROL

Div.	Location	Lin.Ft.	Miles
	BRIDGE AT STA 144+15	000.0	0.0000

The following Standard Plans shall be considered applicable to construction work on this project.

Identification	Date	Identification	Date	Identification	Date

(May be obtained at Bridge Design Services)

Standard	Date Issued	Latest Revision	Standard	Date Issued	Latest Revision

Approved Cedar County Engineer

Approved Cedar County Board of Supervisors

Iowa Department of Transportation
Authorized for Letting
Local Systems Engineer Date

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly Registered Professional Engineer under the laws of the State of Iowa.

Signature:
Name:
Date _____ Reg. No. _____
(Month, day, year)
My registration renewal date is December 31, ____

Iowa Department of Transportation
Authorized for Letting
Deputy Chief Engineer Date

U.S. Department of Transportation
Federal Highway Administration
Approved
Division Engineer Date

ESTIMATE OF QUANTITIES

ITEM NO.	ITEM	UNIT	TOTAL
1	MOBILIZATION	Lump Sum	L.S.
2	RIP RAP	Ton	824
3	TRAFFIC CONTROL	Lump Sum	L.S.
4	TEMPORARY LOADING FACILITY, BUILD AND REMOVE	Lump Sum	L.S.
5	DEBRIS REMOVAL	Lump Sum	L.S.

SPECIFICATIONS

DESIGN: A.A.S.H.T.O. STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SERIES OF 1989, PLUS CURRENT INTERM SPECIFICATIONS.
CONSTRUCTION: STANDARD SPECIFICATIONS OF THE IOWA DEPARTMENT OF TRANSPORTATION-HIGHWAY DIVISION, SERIES OF 1992, PLUS CURRENT SPECIAL PROVISIONS AND SUPPLEMENTAL SPECIFICATIONS.

GENERAL NOTES

THE PURPOSE OF THIS PROJECT IS TO PROTECT THE RIVER PIERS OF ROCHESTER BRIDGE BY THE PLACEMENT OF RIP RAP AROUND THE EXPOSED PILING IN THE RIVER. PLACEMENT OF RIP RAP SHALL BE FROM A BARGE OR SIMILAR VESSEL OR FROM A CAUSEWAY. PLACEMENT OF RIP RAP FROM THE BRIDGE WILL NOT BE PERMITTED

THE FOLLOWING LIMITATIONS SHALL APPLY TO THIS PROJECT:
WORKING DAYS: 40
START DATE: NOVEMBER 15, 1993
RIVER LEVEL: IF, AT ANY TIME DURING THE PROJECT THE LEVEL OF THE CEDAR RIVER AT ROCHESTER BRIDGE IS ABOVE ELEVATION 668.0, WORK SHALL CEASE AND WORKING DAYS WILL NOT BE COUNTED UNTIL THE RIVER RETURNS TO BELOW SAID ELEVATION. ALSO, IF THE RIVER LEVEL EXCEEDS SAID ELEVATION AT THE ABOVE PRESCRIBED STARTING DATE THE STARTING DATE SHALL BE POSTPONED UNTIL 5 DAYS AFTER THE RIVER LEVEL RETURNS TO BELOW SAID ELEVATION.
LIQUIDATED DAMAGES: $200.00 PER DAY

WHERE PUBLIC UTILITY FIXTURES ARE SHOWN AS EXISTING ON THE PLANS OR ENCOUNTERED WITHIN THE CONSTRUCTION AREA, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO NOTIFY THE OWNERS OF THOSE UTILITIES PRIOR TO THE BEGINNING OF CONSTRUCTION. THE CONTRACTOR SHALL AFFORD ACCESS TO THESE FACILITIES FOR NECESSARY MODIFICATION OF SERVICES. UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS AND RECORDS, AND THEREFORE THEIR LOCATIONS MUST BE CONSIDERED APPROXIMATE ONLY. IT IS POSSIBLE THERE MAY BE OTHERS, THE EXISTENCE OF WHICH IS PRESENTLY NOT KNOWN OR SHOWN. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THEIR EXISTENCE AND EXACT LOCATION AND TO AVOID DAMAGE THERETO. NO CLAIMS FOR ADDITIONAL COMPENSATION WILL BE ALLOWED TO THE CONTRACTOR FOR ANY INTERFERENCE OR DELAY CAUSED BY SUCH WORK.

THE CONTRACTOR SHALL SUBMIT, FOR REVIEW, TO THE ENGINEER HIS PLAN FOR SHEETING AND FILLING THE LOADING FACILITY OR THE CONSTRUCTION OF A CAUSEWAY. THE PLANS, INCLUDING COMPUTATIONS AND DRAWINGS, SHALL BE SUBMITTED SUFFICIENTLY IN ADVANCE OF THE TIME THE CONTRACTOR INTENDS TO START WORK IN ORDER TO AFFORD TIME FOR THE ENGINEER'S REVIEW. NO WORK SHALL BE STARTED PRIOR TO THE RECEIPT BY THE CONTRACTOR OF AGREED-UPON PLANS. HOWEVER, THIS REVIEW SHALL NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY FOR SATISFACTORY RESULTS AND SAFETY OF THE WORKERS ON THE PROJECT.

THE ACCESS ROAD AND LOADING FACILITY SHALL BE REMOVED, ALL MATERIAL SHALL BECOME THE PROPERTY OF THE CONTRACTOR, AND SHALL BE REMOVED FROM THE SITE BY THE CONTRACTOR AND DISPOSED OF AT A SITE PROVIDED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER. FIRES FOR THE DISPOSAL OF RUBBISH ON THE SITE ARE EXPRESSLY PROHIBITED. DEMOLITION MATERIAL WHICH FALLS INTO THE RIVER SHALL BE REMOVED PROMPTLY AND EVERY CAUTION EXERCISED TO PRESERVE STREAM QUALITY.

THE CONTRACTOR SHALL PROVIDE THE ENGINEER SAFE ACCESS TO THE BRIDGE PIERS, THROUGHOUT THE PROJECT, FOR THE PURPOSE OF SOUNDING AROUND THE PIERS AND CHECKING PLACEMENT OF RIP RAP. THE ACCESS MAY BE ON THE CONTRACTOR'S BARGE OR OTHER VESSEL.

THE CONTRACTOR IS HEREBY NOTIFIED OF THE LIMITED CLEARANCE BETWEEN THE WATER AND LOW STEEL OF THE EXISTING BRIDGE. THE CONTRACTOR SHALL USE EXTREME CARE WORKING UNDER AND AROUND THE EXISTING STRUCTURE. ANY DAMAGE TO THE EXISTING BRIDGE BY THE CONTRACTOR SHALL BE IMMEDIATELY REPORTED TO THE ENGINEER. ANY DAMAGE SHALL BE REPAIRED AS DIRECTED BY THE ENGINEER. THE COST TO REPAIR ANY SUCH DAMAGE SHALL BE PAID FOR BY THE CONTRACTOR.

BIDITEM DESCRIPTIONS

ITEM NO.	DESCRIPTION

2 RIP RAP

THIS ITEM SHALL INCLUDE FURNISHING AND PLACING STONE RIP RAP AROUND THE PIERS AS SHOWN ON THE PLANS.

MATERIAL FOR RIP RAP SHALL BE TAKEN FROM BLASTED ROCK WITH NO ADDITIONAL PROCESSING NECESSARY, BUT THE METHOD OF LOADING SHALL BE SUCH THAT ASSURES REASONABLE COMPLIANCE WITH THESE REQUIREMENTS FOR EACH LOAD. ROCK SHALL BE SOUND LIMESTONE, DOLOMITE, OR QUARTZITE. AFTER VISUAL INSPECTION AND PRIOR TO LOADING, THE ENGINEER MAY REQUIRE MATERIAL TO BE LOADED FROM ANOTHER AREA. FIELD STONES OR BOULDERS WILL NOT BE ACCEPTED.

RIP RAP SHALL HAVE A NOMINAL MAXIMUM SIZE OF 250 POUNDS AND SHALL BE A WELL-GRADED MATERIAL MEETING THE FOLLOWING ADDITIONAL SIZE LIMITATIONS.

STONE WT., LBS	MINIMUM % LARGER THAN
90	50
5	90

NO MORE THAN 5% SHALL PASS THE 1/2 INCH SIEVE.

THE CONTRACTOR SHALL PLACE RIP RAP USING A CHUTE OR OTHER DEVICE WHICH WILL ENSURE PROPER PLACEMENT OF THE MATERIAL. RIP RAP SHALL BE PLACED FROM A BARGE OR OTHER VESSEL. NO DUMPING OR PLACEMENT FROM THE BRIDGE WILL BE ALLOWED.
PLACEMENT OF RIP RAP SHALL PROCEED AT A UNIFORM RATE ON BOTH SIDES OF A PIER SO THAT THE TWO SIDES ARE KEPT CLOSE TO THE SAME ELEVATION WITH NO MORE THAN ONE BARGE FULL DIFFERENCE.

THE ESTIMATED QUANTITIES ARE BASED ON THE FOLLOWING ESTIMATE OF MATERIAL PER PIER.

PIER	RIP RAP (TONS)
5	161
6	650
7	13

	824

THE QUANTITY OF RIP RAP WILL BE MEASURED IN TONS. ONLY MATERIAL PLACED IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS WILL BE MEASURED. UNLESS THE CONTRACTOR CAN DEMONSTRATE A MATERIAL DIFFERENCE IN THE RIVER GEOMETRICS SHOWN ON THE PLANS AND AN INCREASE IS APPROVED BY THE ENGINEER, THE MAXIMUM QUANTITY SHALL NOT EXCEED THE PLAN QUANTITY BY MORE THAN 5%.

FOR THE QUANTITY OF RIP RAP FURNISHED AND PLACED, THE CONTRACTOR WILL BE PAID THE CONTRACT PRICE PER TON. THIS PAYMENT SHALL BE FULL COMPENSATION FOR ALL WORK, INCLUDING FURNISHING AND PLACING ALL MATERIAL, AND FOR FURNISHING ALL EQUIPMENT, TOOLS, AND LABOR NECESSARY TO COMPLETE THE WORK ACCORDING TO THE PLANS AND SPECIFICATIONS.

3 TRAFFIC CONTROL

THE CONTRACTOR WILL BE PAID THE LUMP SUM CONTRACT PRICE FOR 'TRAFFIC CONTROL' AS DESIGNATED BY THE PLANS. THIS PAYMENT WILL BE FULL COMPENSATION FOR FURNISHING ALL MATERIALS, LABOR, AND EQUIPMENT FOR ERECTING, MAINTAINING, MOVING AND REMOVING ALL TRAFFIC CONTROL DEVICES REQUIRED BY THE PLANS AND SPECIFICATIONS INCLUDING SIGNS, MARKINGS, AND BARRICADES.

BIDITEM DESCRIPTIONS

ITEM NO.	DESCRIPTION

4 TEMPORARY LOADING FACILITY, BUILD AND REMOVE

THE CONTRACTOR SHALL BUILD AND REMOVE A LOADING FACILITY FOR LOADING RIP RAP ON TO HIS BARGE OR OTHER VESSEL. THE CONTRACTOR SHALL SUBMIT, FOR REVIEW, TO THE ENGINEER HIS PLAN FOR SHEETING AND FILLING THE LOADING FACILITY OR FOR A CAUSEWAY. THE LOADING FACILITY SHALL BE BUILT TO FIT THE CONTRACTOR'S EQUIPMENT AND OPERATION. THE PLANS, INCLUDING COMPUTATIONS AND DRAWINGS, SHALL BE SUBMITTED SUFFICIENTLY IN ADVANCE OF THE TIME THE CONTRACTOR INTENDS TO START WORK IN ORDER TO AFFORD TIME FOR THE ENGINEER'S REVIEW. NO WORK SHALL BE STARTED PRIOR TO THE RECEIPT BY THE CONTRACTOR OF AGREED-UPON PLANS. HOWEVER, THIS REVIEW SHALL NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY FOR SATISFACTORY RESULTS AND SAFETY OF THE WORKERS ON THE PROJECT.

THE CONTRACTOR SHALL MAINTAIN THE LOADING FACILITY FOR THE DURATION OF THE PROJECT.

UPON COMPLETION OF THE PROJECT THE TEMPORARY LOADING FACILITY SHALL BE REMOVED AND THE AREA RESTORED TO PRECONSTRUCTION CONDITIONS. THIS SHALL INCLUDE REMOVING ALL SHEETING, FILL ROCK AND RESTORING THE DISTURBED AREA.

FOR THIS WORK OF BUILDING, REMOVING AND RESTORING A TEMPORARY LOADING FACILITY THE CONTRACTOR WILL BE PAID THE LUMP SUM CONTRACT PRICE. THIS PAYMENT SHALL BE FULL COMPENSATION FOR ALL WORK, INCLUDING FURNISHING, PLACING AND REMOVING ALL MATERIAL, AND FOR FURNISHING ALL EQUIPMENT, TOOLS, AND LABOR NECESSARY TO COMPLETE THE WORK ACCORDING TO THE PLANS AND SPECIFICATIONS.

4 DEBRIS REMOVAL

THE CONTRACTOR SHALL REMOVE DRIFT DEBRIS FROM PIERS 5, 6 & 7, AND DISPOSE OF IT AT A SITE PROVIDED BY THE CONTRACTOR.

FOR THIS WORK OF REMOVAL AND DISPOSAL OF DEBRIS THE CONTRACTOR WILL BE PAID THE LUMP SUM CONTRACT PRICE. THIS PAYMENT SHALL BE FULL COMPENSATION FOR ALL WORK, INCLUDING FURNISHING, PLACING AND REMOVING ALL MATERIAL, AND FOR FURNISHING ALL EQUIPMENT, TOOLS, AND LABOR NECESSARY TO COMPLETE THE WORK ACCORDING TO THE PLANS AND SPECIFICATIONS.

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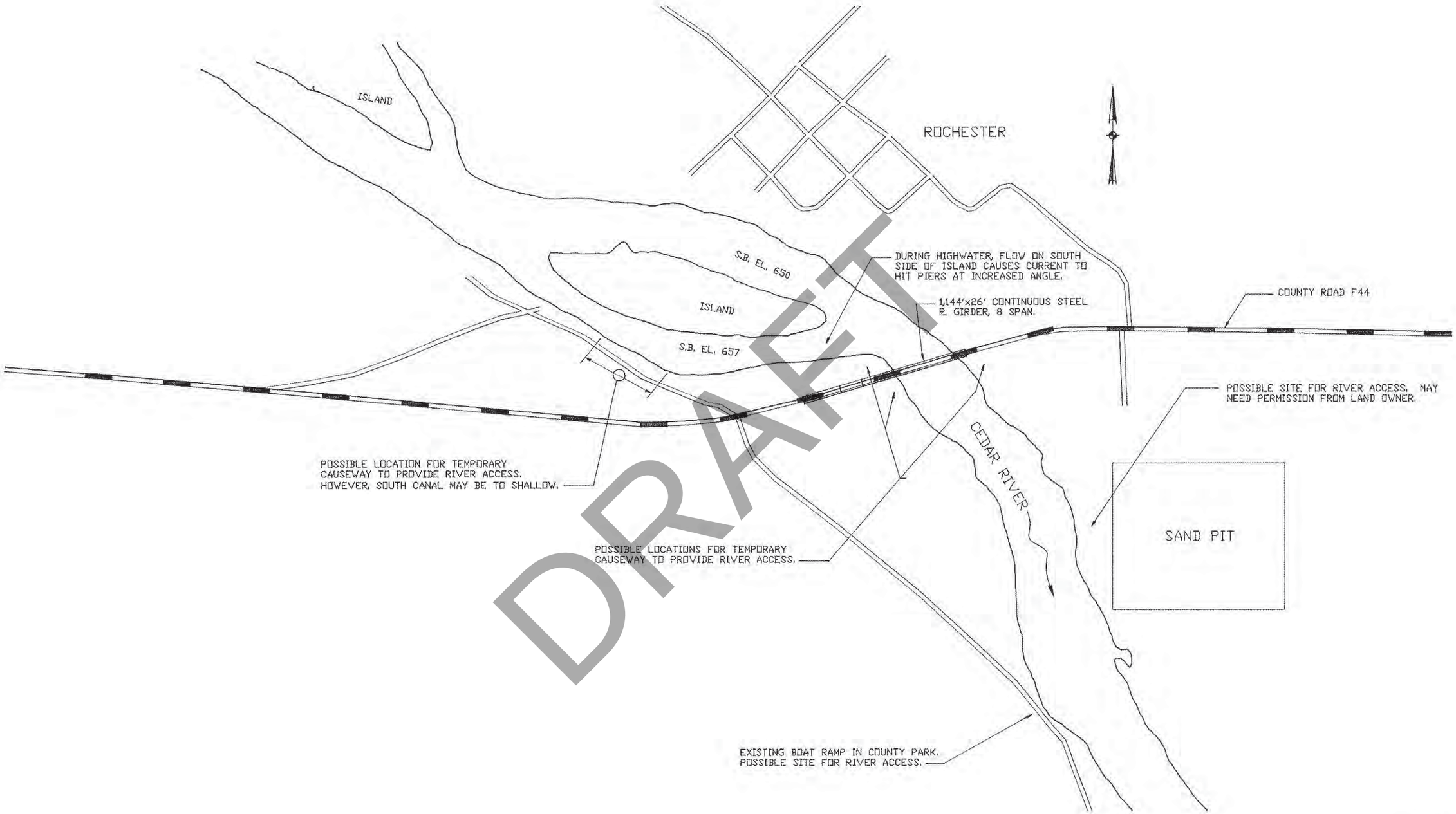
QUANTITIES AND NOTES
ROCHESTER BRIDGE
PIER PROTECTION
OVER THE CEDAR RIVER
CEDAR COUNTY

BENCHMARK: TOP OF PIER 7 = ELEV. 673.02, (TAKEN FROM ORIGINAL BRIDGE PLANS).



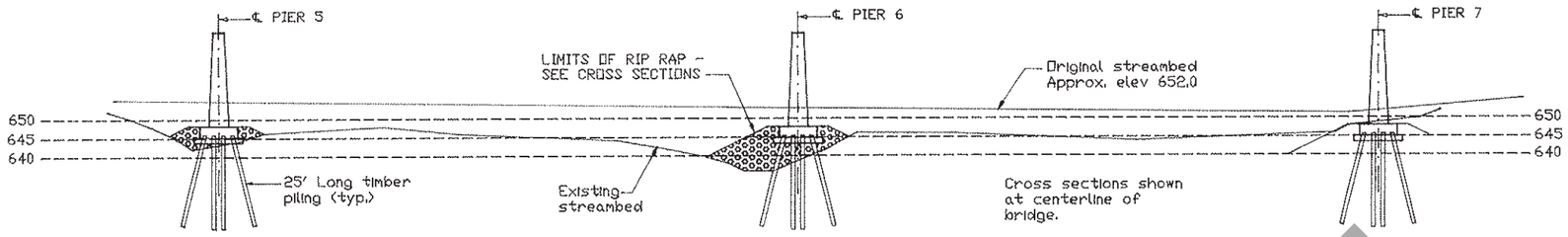
DRAFT

SITUATION PLAN
PIER SCOUR PROTECTION
ROCHESTER BRIDGE OVER
THE CEDAR RIVER
CEDAR COUNTY

W INC. IOWA CITY, IOWA
(319)351-2186 FAX (319)351-0256

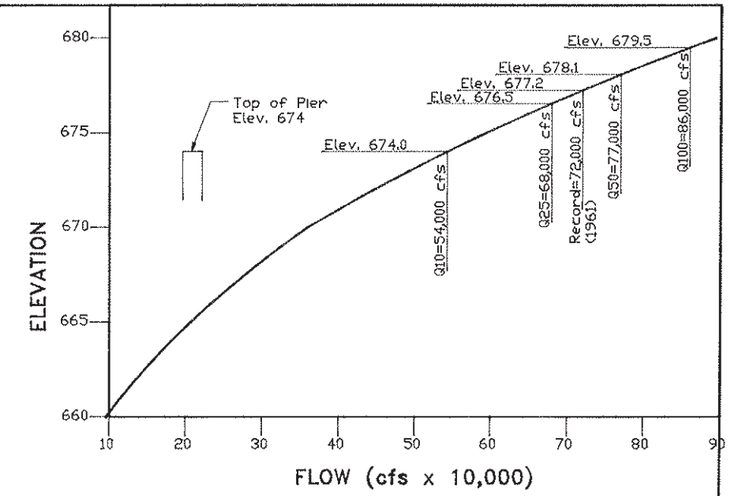
PROJECT NUMBER	STATE	FED. ROAD DIST. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
FM-16(8)--55-16	IOWA	5		3	6

BENCHMARK: TOP OF PIER 7 = ELEV. 673.02, (TAKEN FROM ORIGINAL BRIDGE PLANS).



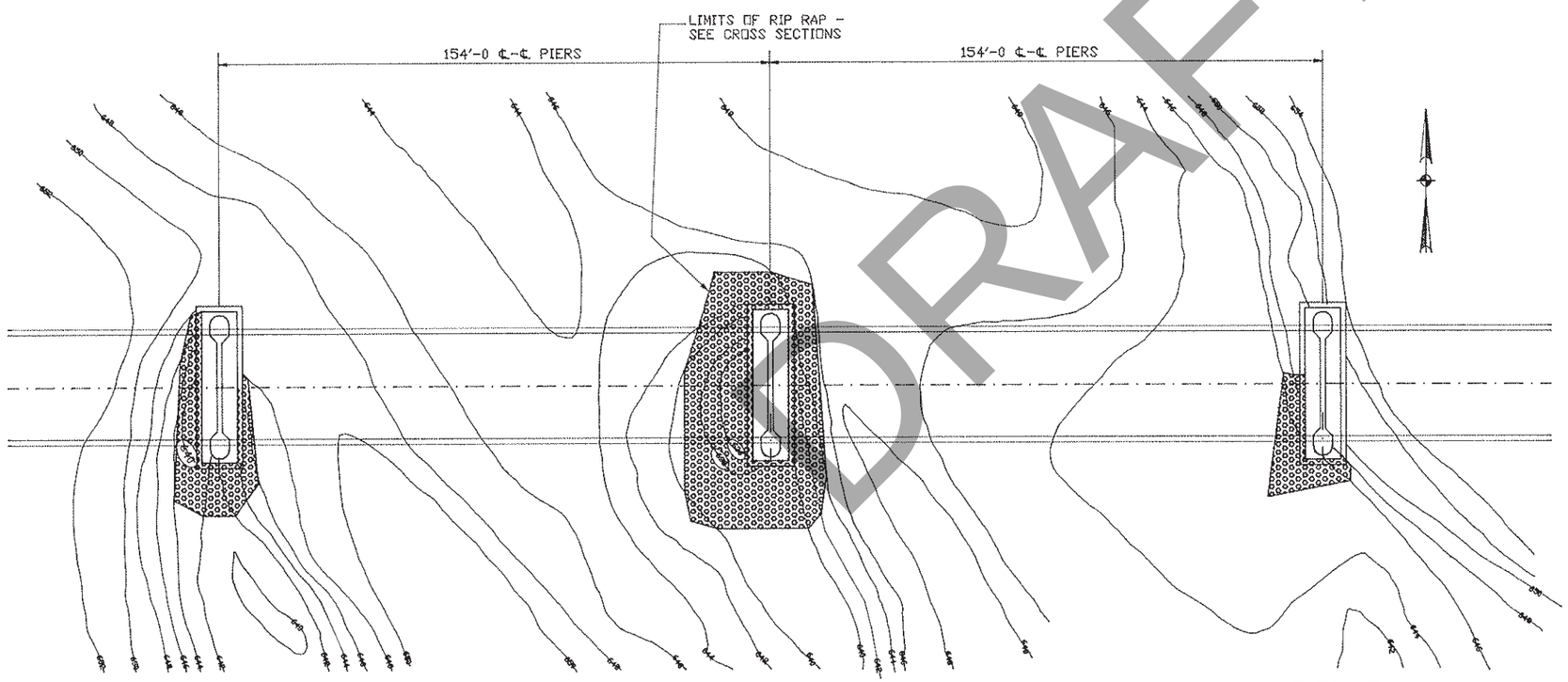
ELEVATION

SCALE: 1" = 20'



HYDRAULIC DATA

DRAINAGE AREA		7218	sq.mi.
MAIN CHANNEL SLOPE		2.17	ft/mile
FREQUENCY (year)	FLOW (cfs)	ELEV.	VELOCITY (fps)
10	54,000	674.0	6.0
25	68,000	676.5	6.4
50	77,000	678.1	6.7
100	86,000	679.5	6.9
RECORD (1961)	72,000	677.2	
DESIGN (1929)	56,000	674.4	



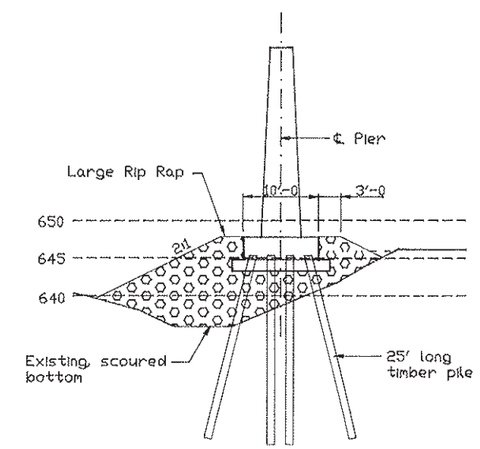
PIER 5
Bottom of cap 645.28
Bottom of seal 643.78

PIER 6
Bottom of cap 644.81
Bottom of seal 643.31

PIER 7
Bottom of cap 645.02
Bottom of seal 643.52

PLAN

SCALE: 1" = 20'



PIER PROTECTION DETAIL

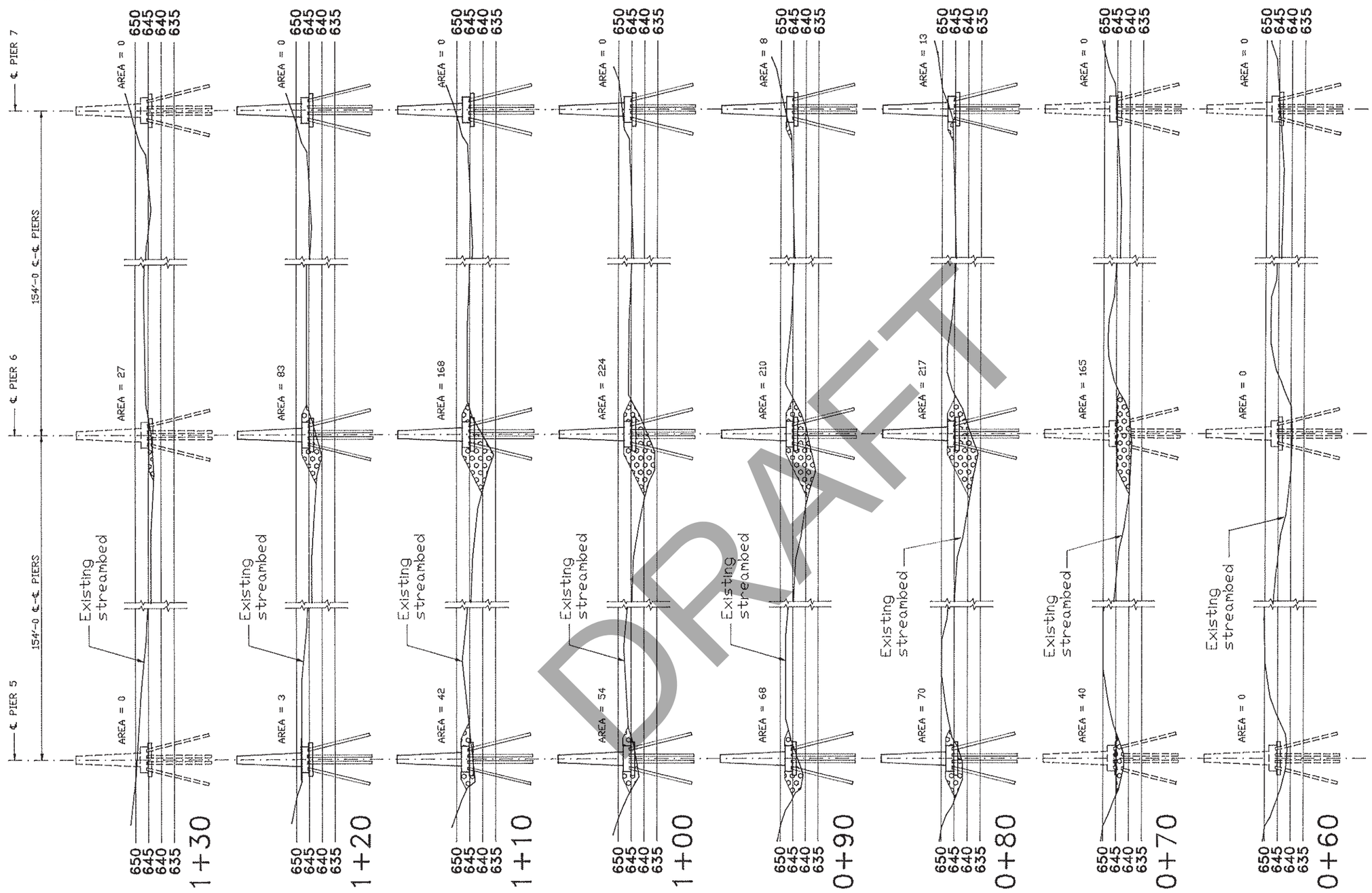
GENERAL PLAN
PIER SCOUR PROTECTION
ROCHESTER BRIDGE OVER THE CEDAR RIVER
CEDAR COUNTY

DRAFT

NNW INC. IOWA CITY, IOWA
(319)351-2166 FAX (319)351-0266

PROJECT NUMBER	STATE	FED. ROAD DIST. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
	IOWA	5		4	6

BENCHMARK: TOP OF PIER 7 = ELEV. 673.02, (TAKEN FROM ORIGINAL BRIDGE PLANS).



STATION EQUATION:
1+00 = ℄ BRIDGE
(ALL SECTIONS LOOKING UPSTEAM)

SCALE: 1" = 20'-0

DATE OF SURVEY:
MAY 26, 1993

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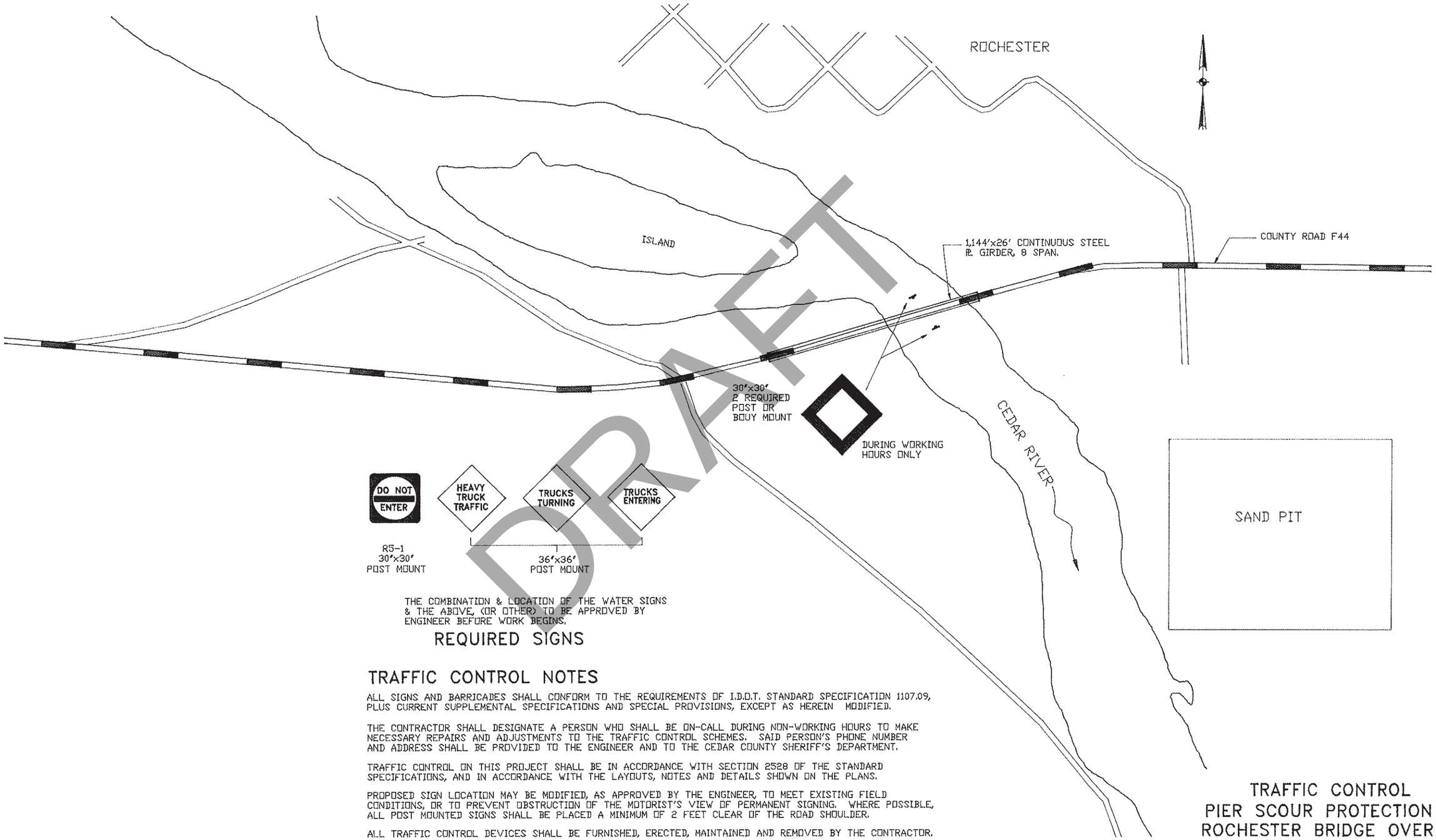
RIVER CROSS SECTIONS
PIER SCOUR PROTECTION
ROCHESTER BRIDGE OVER
THE CEDAR RIVER
CEDAR COUNTY

NW INC. IOWA CITY, IOWA
(319)351-2166 FAX (319)351-0255

PROJECT NUMBER	STATE	FED. ROAD DIST. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
FM-16(8)--55-16	IOWA	5		5	6



THE COMBINATION & LOCATION OF THE WATER SIGNS & THE ABOVE, (OR OTHER) TO BE APPROVED BY ENGINEER BEFORE WORK BEGINS.

REQUIRED SIGNS

TRAFFIC CONTROL NOTES

ALL SIGNS AND BARRICADES SHALL CONFORM TO THE REQUIREMENTS OF I.D.O.T. STANDARD SPECIFICATION 1107.09, PLUS CURRENT SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS, EXCEPT AS HEREIN MODIFIED.

THE CONTRACTOR SHALL DESIGNATE A PERSON WHO SHALL BE ON-CALL DURING NON-WORKING HOURS TO MAKE NECESSARY REPAIRS AND ADJUSTMENTS TO THE TRAFFIC CONTROL SCHEMES. SAID PERSON'S PHONE NUMBER AND ADDRESS SHALL BE PROVIDED TO THE ENGINEER AND TO THE CEDAR COUNTY SHERIFF'S DEPARTMENT.

TRAFFIC CONTROL ON THIS PROJECT SHALL BE IN ACCORDANCE WITH SECTION 2528 OF THE STANDARD SPECIFICATIONS, AND IN ACCORDANCE WITH THE LAYOUTS, NOTES AND DETAILS SHOWN ON THE PLANS.

PROPOSED SIGN LOCATION MAY BE MODIFIED, AS APPROVED BY THE ENGINEER, TO MEET EXISTING FIELD CONDITIONS, OR TO PREVENT OBSTRUCTION OF THE MOTORIST'S VIEW OF PERMANENT SIGNING. WHERE POSSIBLE, ALL POST MOUNTED SIGNS SHALL BE PLACED A MINIMUM OF 2 FEET CLEAR OF THE ROAD SHOULDER.

ALL TRAFFIC CONTROL DEVICES SHALL BE FURNISHED, ERECTED, MAINTAINED AND REMOVED BY THE CONTRACTOR.

THE CONTRACTOR WILL BE PAID THE LUMP SUM CONTRACT PRICE FOR 'TRAFFIC CONTROL'. THIS PAYMENT WILL BE FULL COMPENSATION FOR FURNISHING ALL MATERIALS, LABOR AND EQUIPMENT FOR ERECTING, MAINTAINING, MOVING AND REMOVING ALL TRAFFIC CONTROL DEVICES REQUIRED BY THE PLANS AND SPECIFICATIONS.

TRAFFIC CONTROL
PIER SCOUR PROTECTION
ROCHESTER BRIDGE OVER
THE CEDAR RIVER
CEDAR COUNTY

DRAFT

NNW INC. IOWA CITY, IOWA
(319)351-2166 FAX (319)351-0258

PROJECT NUMBER	STATE	FED. ROAD DIST. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
FM-16(8)--55-16	IOWA	5		6	6

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SECTION 14, CEDAR RIVER, 290TH STREET BRIDGE
ROCHESTER, IOWA

APPENDIX C
COST ESTIMATE AND ECONOMIC ASSESSMENT

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SECTION 14, CEDAR RIVER, 290TH STREET BRIDGE
ROCHESTER, IOWA

APPENDIX C
COST ESTIMATE AND ECONOMIC ASSESSMENT

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- A. Introduction C-1
- B. Project Description C-1
- C. Cost Methodology C-1
- D. Project Feature Accounts C-3
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- B. Benefits of Protective Action C-3
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C-C Project Schedule
C-D Total Project Cost Summary

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SECTION 14, CEDAR RIVER, 290TH STREET BRIDGE
ROCHESTER, IOWA

APPENDIX C
COST ESTIMATE AND ECONOMIC ASSESSMENT

I. COST ESTIMATE

A. Introduction. This appendix contains a detailed project cost estimate prepared for the Cedar River, 290th Street Bridge, Section 14 Project (Project). The proposed Project is located near the township of Rochester, in Cedar County, Iowa and is along the Cedar River.

B. Project Description. The Cedar River is causing severe erosion of bridge abutments and roadway near Rochester Township, IA. If left untreated, the bridge abutments and roadway may be lost resulting in loss of a critical transportation route. If the bridge becomes too unsafe to travel, the nearest crossing to the north is a 23-mile round trip and to the south is 7-mile round trip. An opportunity exists to stabilize the bank and protect the abutments and roadway from further erosion. The Project would also protect public utilities adjacent to the stream and roadway. 290th Street (and the bridge by extension) serves as a primary route for local travel and commerce, as an alternate route to Interstate 80, and as a vital crossing for the agricultural industry.

C. Cost Methodology

1. General. This Fully Funded Estimate (FFE) has been prepared to Aug 2013 price levels. The costs are considered to be fair and reasonable to a well-equipped and capable contractor and include overhead and profit. The preparation of this estimate was created in accordance with ER 1110-1-1300, *Cost Engineering Policy and General Requirements* (26 Mar 1993) and ER 1110-2-1302, *Civil Works Cost Engineering*, (15 Sep 2008). The FFE was completed in accordance with *EM 1110-2-1304 – Civil Works Construction Cost Index System*, (revised 31 Mar 2012).

The estimate was developed using Micro Computer Aided Cost Estimate System MII v4.1 cost estimating software. Applicable crews and equipment were applied in the estimate to correspond with the work being performed. Material prices were developed using the MII Cost Book, R.S. Means references. The midpoint of construction is anticipated to be the 4th quarter of 2014, and was used to determine the FFE. The MII report of the Work Breakdown Structure can be found in Appendix C-A.

This project is assumed to be an 8A contract. Other methods of procurement were discussed and properly evaluated in the abbreviated risk analysis in order to determine the contingency.

2. Direct Cost. Direct costs are based on the anticipated material, equipment, and labor needed to construct the Project based on the current scope of work. Direct costs were calculated independent of the contractor assigned to perform the work. Contractor assignments were determined after the formulation of the direct costs. The majority of the work is assumed to be done by the subcontractor.

a. Labor-Rate Determination. Labor Rates are based on 2012 Davis-Bacon Wage Rates general decision IA130003 dated August 9, 2013.

b. Equipment Rates. All equipment costs are from MII Equipment Region 5 2011 and MII English Cost Book 2010.

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c. Fuel Rates. Rates have been updated as of August 5, 2013. Current fuel prices are based on Midwest averages from http://www.eia.doe.gov/ which includes gasoline, on-road diesel, and off-road diesel.

d. Overtime Considerations. Overtime was considered and deemed not necessary due to the durations of the Project, so it was not applied in the estimate.

e. Sales Tax. The Rock Island District does not use sales tax in the creation of estimates as contractors are issued tax exemption numbers to use when purchasing materials.

f. Productivity. Production rates were created based on historical rates used in the District's Cost Engineering Section and on what was determined reasonable by the cost estimator. In addition, user crews were created using the estimator's judgment.

3. Indirect Costs - Prime Contractor

a. Job Office Overhead (JOOH). The Prime Contractor was set up using a calculated job office overhead. The JOOH markup of 16.22% was used for a prime contractor.

b. Home Office Overhead (HOOH). Overhead rates for HOOH were applied as a running percentage. It is assumed that the prime contractor will be an 8(a) contractor, his HOOH will be high. In this case, a value of 12% was applied for the prime contractor. HOOH includes such items as office rental/ownership costs, utilities, office equipment ownership/maintenance, office staff (managers, accountants, clerical, etc.), insurance, and miscellaneous costs. In reality, the range of home office overhead can be quite broad and depends largely on the contractor's annual volume of work and the type of work that is generally performed by the contractor.

c. Profit. Profit has been included using the profit guidelines used within this office. In this case, a value of 9.0 percent was used for the prime contractor.

d. Bond. Bond was included as a running percentage of 1.0 percent.

4. Escalation. The Project costs have been escalated to the midpoint of construction, assumed to be the 4th quarter of 2014.

5. Contingency. After review of Project documents and discussion with members of the Project development team involved in the design of the Project, an informal risk analysis was conducted resulting in the development of a contingency. This contingency was developed reflecting the uncertainty associated with the work features. The contingency matrix is shown in Appendix C-B. The contingencies applied to PED and Construction Management feature accounts were provided by the Project Engineer.

6. Other Assumptions

a. Mobilization. Equipment needs were identified from work items in the MII estimate. Equipment was assumed to be mobilized within 200 miles.

b. Government Furnished Materials. The estimate is based on no government furnished materials.

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c. Site Access. Access to the construction site is readily available. It is assumed that the site can be accessible 365 days/year except in the event of a flood.

d. Waste Disposal. No waste disposal is anticipated.

D. Project Feature Accounts

1. (01) Lands and Damages. This account contains values that consist of the real estate to be acquired for this Project.

2. (9) Channels. This account includes placement of the riprap dike and riprap stream barbs

3. (30) Planning, Engineering, and Design. The work covered under this account includes the project management, engineering, and design costs spent to date as well as the remaining estimated costs that will be associated with the engineering and design for this Project. The percentages for PED were determined by the Project Engineer and Project Manager.

4. (31) Construction Management. The work covered under this account includes the expected costs for contract supervision, contract and construction administration, technical management activities, district office supervision, and administration costs. The percentages for Construction Management were determined by the Project Engineer and Project Manager.

E. Project Schedule. The estimated construction duration of the Project is 4 months. The schedule was created following the durations for crews and equipment in the MII estimate. Days for weather inefficiency were not added in the Project schedule. The Project schedule is found in Appendix C-C.

F. Estimated Project Cost Summary. The estimated total Project cost including the feasibility study is $2,258,000. Based on the construction schedule, work will begin in June 2014. Cost-sharing between the Corps and the non-Federal sponsor is 65 percent/35 percent. The estimated Federal cost is $1,188,000 and estimated non-Federal cost is $640,000. The Federal feasibility study cost is $265,000 while the non-Federal feasibility cost is $165,000. The Federal feasibility CAP cost is $325,000. The Total Project Cost Sheet (TPCS) can be found in Appendix C-D.

II. ECONOMIC ASSESSMENT

A. Methodology. This study assesses the feasibility of providing protective action to curtail bank erosion which is threatening a city street/bridge. The study site is the 290th Street Bridge located in Rochester Township (Cedar County), Iowa. The road is also known as County Highway F44. The erosion area extends along the east bank of the Cedar River. Continued erosion will eventually result in closure and/or failure of this bridge. The annual benefits and costs of the proposed action were computed using 2013 price levels and a 3.75 percent discount rate. The period of analysis is 10 years.

B. Benefits of Protective Action. The benefits of protective action are derived from considering what would occur if no action were taken. The benefits were calculated by examining all potential detour costs avoided. The analysis was done according to guidance in ER 1105-2-100.

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1. Detour Costs. Without protection, continuing erosion will likely cause failure and closure of the Bridge within the year. This will cause motorists to use detour routes, incurring additional costs for vehicle operation and opportunity of time. Benefits to be derived from avoided detour costs were estimated based on the following:

a. Average Daily Traffic Count. The 290th Street Bridge has an average daily traffic count of 460 vehicles (IA Dept of Transportation, 2010) which would be subjected to detour under bridge failure conditions. The daily number of trips by type of vehicle was provided by the County Engineer. Table C-1 shows the number of daily and annual trips by passenger cars and all other vehicles, including trucks, school buses, mail vehicles, farm machinery, and emergency vehicles

Table C-1. Annual Traffic Analysis

Vehicle Type	Detour Days Per Year	Daily Number of Trips	Total Annual Number of Trips
Passenger Car	365	368	134,320
Heavy Truck	313	69	21,597
Farm Machinery	200	23	4,600
Total Number of Trips		460	160,517

b. Average Detour Route. The shortest average detour route would require an additional distance of 7 miles. This detour would require an additional .18 hours of travel at an assumed average speed of 40 miles per hour.

c. 2008 Average Costs. The estimated 2013 average cost (variable expense) for operating passenger cars is $0.205 per mile, and $.58 per mile for heavy trucks and farm machinery (source: 2008 Mid-West Truckers Assoc; and 2013 AAA). These cost estimates include fuel, tire and maintenance/ repair costs. Table C-2 shows the detour costs for a one-year period.

Table C-2. Vehicle Operating Costs

Vehicle Type	Detour Miles (One Way)	Annual Number of Trips	Costs Per Mile	Total Added Operating
Passenger Car	7.0	134,320	$.205	$192,749
Heavy Truck	7.0	21,597	$.586	$88,591
Farm Machinery	7.0	4,600	$.586	$18,869

Total Additional Yearly Operating Costs = $300,209

d. Average Hourly Rate. According to the US Department of Labor, the average hourly rate for Cedar County, IA was $14.05 in 2009. Average passenger car occupancy of 1.6 adults and one child was assumed. Travel time costs of one-third and one-twelfth of the average local hourly wage rate was used for adults and children (as guidance recommends). Therefore, the opportunity cost of time for passenger cars is estimated to be $8.66 per hour per vehicle [($14.05*1.6*1/3) + ($14.05*1.0*1/12) = $8.66].

The general median hourly wage rates for Iowa were used as the value of time for heavy truck operators ($18.87) and farm equipment operators ($12.12) to calculate the opportunity cost of time (table C-3).

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Table C-3. Opportunity Cost of Time

Vehicle Type	Time Per Trip (hours)	Annual Number of Trips	Time Cost Per Hour	Opportunity of Time Costs
Passenger Cars	.175	134,320	$8.66	$203,562
Heavy Trucks	.175	21,597	$18.87	$71,319
Farm Machinery	.175	4,600	$12.12	$9,757

Total Yearly Opportunity Costs Added–All Vehicles = $284,638

As shown in tables C-2 and C-3, yearly detour costs resulting from increased vehicle operating costs and opportunity of time costs amount to $300,209 and $ 284,638, respectively, for a total of $584,847 in yearly costs.

2. Annualized Benefits. At the current erosion rates, it is estimated that the Bridge closure would occur within one year. Therefore, the benefits of Project implementation would be the annual detour costs avoided by Project construction. Total detour costs avoided are $516,209. This amount is the annual benefit of Project implementation. Since Bridge closure is expected to occur with the timeframe of seasonal high water events, no discounting of benefits is needed.

C. Estimated Cost of Recommended Action. The preventive action involves riprap protection along approximately 60 lineal feet of sheet pile as well as two stream barbs along the right descending bank and rock riprap protection of the Bridge piers. The estimated total project cost (at FY13 price level) of the recommended plan is $1,804,000.

1. Annual Costs. Total project costs were annualized over a 10-year period at a 3.75 percent rate, as shown in table C-4. Interest during construction was not included due to the short construction period.

Table C-4 Annualized Project Cost
(2013 Prices, 10-Year Period, 3.75 %)

Item	First Cost	Operation and Maintenance	Total Annual Cost
Total Project Cost	$1,804,000	$0	$219,657

2. Benefit and Cost Summary. As shown in table C-5, the Project exhibits Federal interest with $296,551 in net benefits, and a benefit-to-cost ratio of 2.4 to 1.0.

Table C-5. Benefit and Cost Summary

Total Annual Benefits	Annual Cost	Annual Net Benefits	Benefit-to-Cost Ratio
$516,209	$219,657	$296,551	2.4

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SECTION 14, CEDAR RIVER, 290TH STREET BRIDGE
ROCHESTER, IOWA

APPENDIX C-A
MII COST ESTIMATE

DRAFT

Print Date Tue 20 August 2013
Eff. Date 8/2/2013

U.S. Army Corps of Engineers
Project SP14: Cedar River, 290th Street Bridge, Rochester, IA
Standard Report for Rock Island

Time 16:17:55
Title Page

Cedar River, 290th Street Bridge, Rochester, IA
This MII estimate is for the Selected Plan for the Cedar River, 290th Street Bridge, Section 14 Project.

The estimator assumes rock will be quarried from one of the several stone quarries within a 10 mile radius. The stone around the bridge piers will be placed by excavator on a barge. Stone for the stream barbs and along the bank will be placed using land based equipment.

Estimated by	CEMVR-EC-TE
Designed by	CEMVR-EC-DN
Prepared by	Jack McDaniel and Garrett Mattila
Preparation Date	8/2/2013
Effective Date of Pricing	8/2/2013
Estimated Construction Time	Days

This report is not copyrighted, but the information contained herein is For Official Use Only.

Labor ID: IA120003 EQ ID: EP11R05

Currency in US dollars

TRACES MII Version 4.1

Print Date Tue 20 August 2013
Eff. Date 8/2/2013

U.S. Army Corps of Engineers
Project SP14: Cedar River, 290th Street Bridge, Rochester, IA
Standard Report for Rock Island

Time 16:17:55

Project Owner Summary Page 1

Description	UOM	Quantity	ContractCost	ProjectCost
Project Owner Summary			149,289	149,289
09 01 30 Channels - Stream Barbs and Dike	LS	1	149,289	149,289
Mobilization and Demobilization	LS	1	148,245	148,245
Mobilize Equipment	LS	1	74,123	74,123
Demobilize Equipment	LS	1	74,123	74,123
Riprap Dike	LS	1	648	648
Bedding Stone	LS	1	318	318
Riprap	LS	1	330	330
Stream Barbs	LS	1	396	396
Bedding Stone	LS	1	192	192
Riprap	LS	1	204	204

Labor ID: IA120003 EQ ID: EP11R05

Currency in US dollars

TRACES MII Version 4.1

SECTION 14, CEDAR RIVER, 290TH STREET BRIDGE
ROCHESTER, IOWA

APPENDIX C-B
CONTINGENCY DETERMINATION

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Abbreviated Risk Analysis

Project (less than $40M): **Cedar River, 290th Street Bridge, Section 14**
Project Development Stage: **Feasibility (Recommended Plan)**
Risk Category: **Low: Simple-No Life Safety**

Total Construction Contract Cost = **$ 1,171,216**

	WBS	Potential Risk Areas	Contract Cost	% Contingency	$ Contingency	Total
1	09 01 CHANNELS	**Riprap Dike**	**$ 1,060,384**	29.55%	$ 313,335	$ 1,373,719.05
2	09 01 CHANNELS	**Stream Barbs**	**$ 85,046**	26.27%	$ 22,345	$ 107,391.52
12		**Remaining Construction Items**	**$ 25,786**	5.72%	$ 1,475	$ 27,260.67
13	30 PLANNING, ENGINEERING, AND DESIGN	**Planning, Engineering, & Design**	**$ 181,000**	6.95%	$ 12,587	$ 193,587.06
14	31 CONSTRUCTION MANAGEMENT	**Construction Management**	**$ 50,000**	19.61%	$ 9,806	$ 59,805.58

Totals					
Total Construction Estimate	$ 1,171,216	28.79%	$ 337,156	$ 1,508,371
Total Planning, Engineering & Design	$ 181,000	0.00%	$ 12,587	$ 193,587
Total Construction Management	$ 50,000	0.00%	$ 9,806	$ 59,806
Total	$ 1,402,216		$ 359,548	$ 1,761,764

Appendix C-B
Contingency Determination

Cedar River, 290th Street Bridge, Section 14
Feasibility (Recommended Plan)
Abbreviated Risk Analysis

Meeting Date: 18-Jun-12

Risk Level

	Negligible	Marginal	Significant	Critical	Crisis
Very Likely	2	3	4	5	5
Likely	1	2	3	4	4
Possible	0	1	2	3	4
Unlikely	0	0	1	2	3

Risk Element	Potential Risk Areas	Concerns Pull Down Tab (ENABLE MACROS THRU TRUST CENTER) (Choose ALL that apply)	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Likelihood	Impact	Risk Level
Project Scope Growth							
						Max Potential Cost Growth	40%
PS-1	Riprap Dike	• Investigations sufficient to support design assumptions?	• Potential for scope growth, added features and quantities? • Investigations sufficient to support design assumptions?	Conditions could change before construction begins due to high water flows. Survey data could be old by the time construction begins. Scour holes could be larger or smaller. Adding or subtracting rock from the project wont have a significant change to the overall cost of the project.	Possible	Significant	2
PS-2	Stream Barbs	• Investigations sufficient to support design assumptions?	• Potential for scope growth, added features and quantities? • Investigations sufficient to support design assumptions?	Similar to the above, adding additional rock to the project will not increase the project cost a great deal. Gabions or geotextile fabric may be needed.	Possible	Significant	2
PS-12	Remaining Construction Items	• Potential for scope growth, added features and quantities?	• Potential for scope growth, added features and quantities?	Costs for mobilization and demobilization are minimal compared to the overall project cost.	Unlikely	Negligible	0
PS-13	Planning, Engineering, & Design	• Design confidence?	• Potential for scope growth, added features and quantities? • Design confidence?	Funding may be delayed due to current budget policies, affecting the schedule.	Possible	Marginal	1
PS-14	Construction Management	• Potential for scope growth, added features and quantities?	• Potential for scope growth, added features and quantities?	It is assumed that the project will go small business and the estimate is set up to reflect this acquisition strategy.	Possible	Marginal	1
Acquisition Strategy							
						Max Potential Cost Growth	30%
AS-1	Riprap Dike	• Limited bid competition anticipated?	• 8a or small business likely? • Requirement for subcontracting? • Limited bid competition anticipated?	The PDT agreed that using an 8a contractor will likely be used to construct this project. There is the possibility that some of this work may be subcontracted, but the assumption is that an 8a will rent marine equipment and use their own land based equipment for construction.	Possible	Marginal	1
AS-2	Stream Barbs	• Limited bid competition anticipated?	• 8a or small business likely? • Requirement for subcontracting? • Limited bid competition anticipated?	The PDT agreed that using an 8a contractor will likely be used to construct this project. There is the possibility that some of this work may be subcontracted, but the assumption is that an 8a will rent marine equipment and use their own land based equipment for construction.	Possible	Marginal	1
AS-12	Remaining Construction Items	• 8a or small business likely?	• 8a or small business likely? • Requirement for subcontracting? • Limited bid competition anticipated?	The remaining features of work are mobilization and demobilization, which should be the same regardless of whether this work is subcontracted or not.	Unlikely	Marginal	0
AS-13	Planning, Engineering, & Design	• 8a or small business likely?	• 8a or small business likely? • Requirement for subcontracting? • Limited bid competition anticipated?	The PDT does not see much risk for this category.	Possible	Negligible	0
AS-14	Construction Management	• 8a or small business likely?	• 8a or small business likely? • Requirement for subcontracting? • Limited bid competition anticipated?	When we deal with a small or 8A business, the risk for poor management is possible.	Likely	Marginal	2

Construction Elements							
						Max Potential Cost Growth	15%
CE-1	Riprap Dike	• Potential for construction modification and claims?	• High risk or complex construction elements, site access, in-water? • Unique construction methods? • Special mobilization? • Special equipment or subcontractors needed? • Potential for construction modification and claims?	Construction is not that complicated as similar rock jobs have been completed in the district in the recent past. Some manne equipment will be rented and may cost more than anticipated.	Possible	Significant	2
CE-2	Stream Barbs	• Special equipment or subcontractors needed?	• High risk or complex construction elements, site access, in-water? • Unique construction methods? • Special mobilization? • Special equipment or subcontractors needed? • Potential for construction modification and claims?	Construction is not that complicated as similar rock jobs have been completed in the district in the recent past. Work is land based and may need some river placment.	Possible	Significant	2
CE-12	Remaining Construction Items	• High risk or complex construction elements, site access, in-water?	• High risk or complex construction elements, site access, in-water?	There is limited space for the contractor to work. Mob of river items is possibly a problem and they will be trucked in.	Possible	Marginal	1
CE-13	Planning, Engineering, & Design	• High risk or complex construction elements, site access, in-water?	• High risk or complex construction elements, site access, in-water?	Would result in additonal design work.	Possible	Significant	2
CE-14	Construction Management	• Special equipment or subcontractors needed?	• High risk or complex construction elements, site access, in-water? • Unique construction methods? • Special mobilization? • Special equipment or subcontractors needed? • Potential for construction modification and claims?	Modifications are likely due to shifting river conditions	Likely	Marginal	2
Quantities for Current Scope							
						Max Potential Cost Growth	20%
Q-1	Riprap Dike	• Sufficient investigations to develop quantities?	• Possibility for increased quantities due to loss, waste, or subsidence? • Sufficient investigations to develop quantities?	It is a fact that the river will change before construction begins. No one can predict how much of a change there will be.	Likely	Significant	3
Q-2	Stream Barbs	• Sufficient investigations to develop quantities?	• Possibility for increased quantities due to loss, waste, or subsidence? • Sufficient investigations to develop quantities?	If there are high flows before construction begins, significant scour could occur.	Likely	Significant	3
Q-12	Remaining Construction Items	• Possibility for increased quantities due to loss, waste, or subsidence?	• Possibility for increased quantities due to loss, waste, or subsidence?	There are no quantities in this item.	Unlikely	Negligible	0
Q-13	Planning, Engineering, & Design	• Possibility for increased quantities due to loss, waste, or subsidence?	• Possibility for increased quantities due to loss, waste, or subsidence?	There are no quantities in this item.	Unlikely	Negligible	0
Q-14	Construction Management	• Sufficient investigations to develop quantities?	• Possibility for increased quantities due to loss, waste, or subsidence? • Sufficient investigations to develop quantities?	Measuring quantities in the field could present difficulties. We would have to rely on the supplying quarry.	Possible	Marginal	1

SECTION 14, CEDAR RIVER, 290TH STREET BRIDGE
ROCHESTER, IOWA

APPENDIX C-C
PROJECT SCHEDULE

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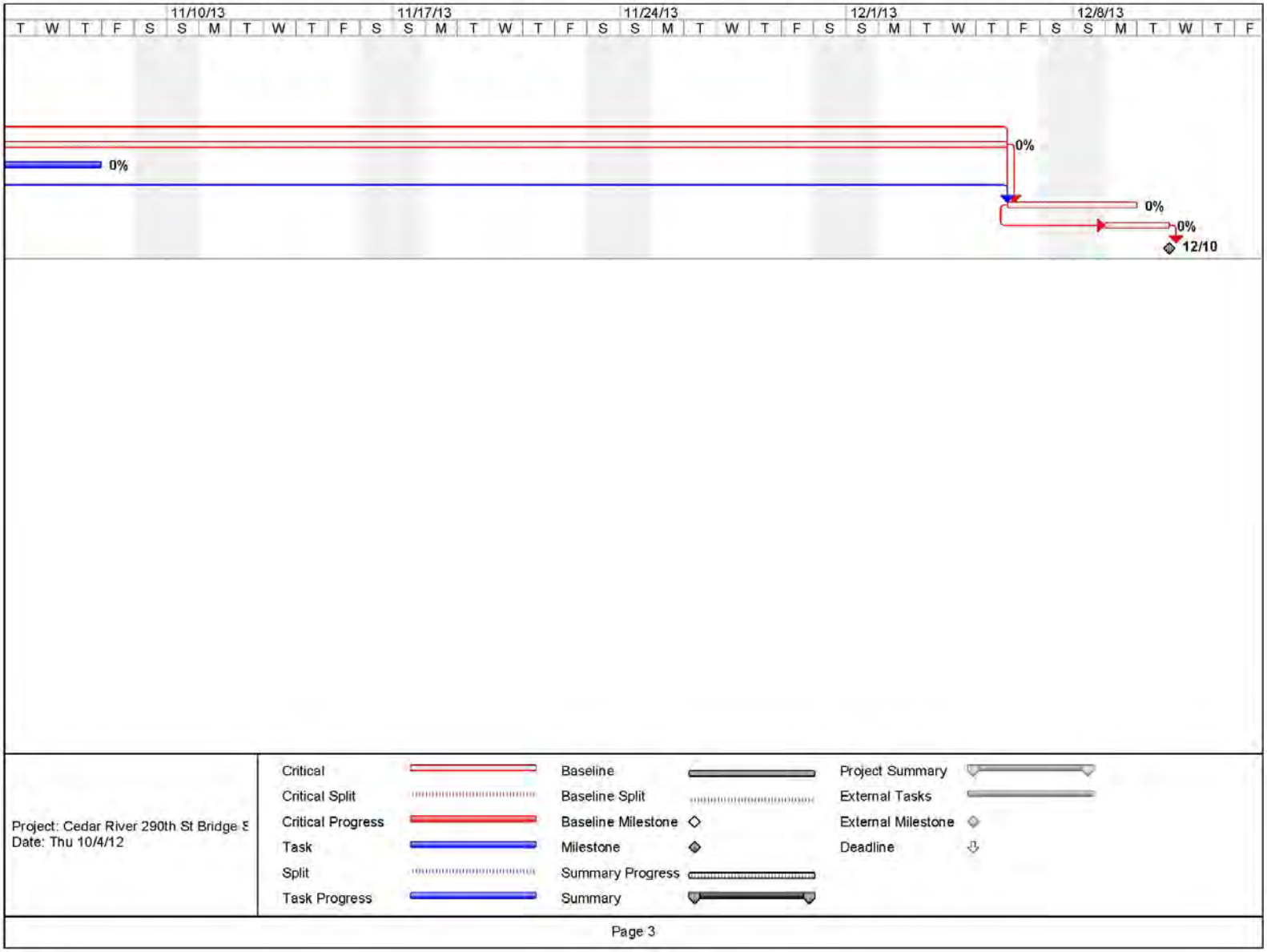
Appendix C-C
Project Schedule



SECTION 14, CEDAR RIVER, 290TH STREET BRIDGE
ROCHESTER, IOWA

APPENDIX C-D
TOTAL PROJECT COST SUMMARY (TPCS)

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Section 14, Cedar River, 290th Street Bridge
Rochester, Iowa

Appendix C-D
Total Project Cost Summary

****** TOTAL PROJECT COST SUMMARY ******

Printed:8/20/2013
Page 1 of 2

PROJECT: **Cedar River 290th St Bridge Section 14**
PROJECT NO: **324837**
LOCATION: **Rochester, IA**

DISTRICT: **MVR ROCK ISLAND** PREPARED: **8/8/2013**
POC: **CHIEF, COST ENGINEERING, Charles Van Laarhoven**

This Estimate reflects the scope and schedule in report: Cedar River 290th St Bridge Section 14 Streambank Stabilization Feasibility Report

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
						Program Year (Budget EC): 2014 Effective Price Level Date: 1 OCT 13								
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Spent Thru: 10/1/2013 ($K)		COST ($K)	CNTG ($K)	FULL ($K)
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
09	CHANNELS & CANALS	$1,171	$337	29%	$1,508.41	2.1%	$1,195	$344	$1,539			$1,211	$349	$1,560
	CONSTRUCTION ESTIMATE TOTALS:	$1,171	$337		$1,508.41	2.1%	$1,195	$344	$1,539			$1,211	$349	$1,560
01	LANDS AND DAMAGES	$5	$1	23%	$6.64	2.1%	$6	$1	$7			$6	$1	$7
22	FEASIBILITY STUDY (CAP studies)									$430				$430
30	PLANNING, ENGINEERING & DESIGN	$181	$13	7%	$193.58	1.8%	$184	$13	$197			$186	$13	$199
31	CONSTRUCTION MANAGEMENT	$50	$10	20%	$59.81	1.8%	$51	$10	$61			$52	$10	$62
	PROJECT COST TOTALS:	$1,408	$361	26%	$1,768.44		$1,436	$368	$1,804	$430		$1,455	$373	$2,258

_____	CHIEF, COST ENGINEERING, Charles Van Laarhoven
_____	PROJECT MANAGER, Chris Haring
_____	CHIEF, REAL ESTATE, Stuart Jackson
_____	CHIEF, PLANNING, xxx
_____	CHIEF, ENGINEERING, xxx
_____	CHIEF, OPERATIONS, xxx
_____	CHIEF, CONSTRUCTION, xxx
_____	CHIEF, CONTRACTING, xxx
_____	CHIEF, PM-PB, xxxx
_____	CHIEF, DPM, xxx

ESTIMATED FEDERAL COST:	65%	**$1,188**
ESTIMATED NON-FEDERAL COST:	35%	**$640**
FEASIBILITY FEDERAL COST:		**$265**
FEASIBILITY NON-FEDERAL COST:		**$165**
ESTIMATED TOTAL PROJECT COST:		**$2,258**

Filename: SP14ATR_TPCS3.xlsx
TPCS

Appendix C-D
Total Project Cost Summary

****** TOTAL PROJECT COST SUMMARY ******

Printed:8/20/2013
Page 2 of 2

****** CONTRACT COST SUMMARY ******

PROJECT: Cedar River 290th St Bridge Section 14
LOCATION: Rochester, IA
This Estimate reflects the scope and schedule in report; Cedar River 290th St Bridge Section 14 Streambank Stabilization Feasibilty Report

DISTRICT: MVR ROCK ISLAND PREPARED: 8/8/2013
POC: CHIEF, COST ENGINEERING, Charles Van Laarhoven

WBS Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 8/8/2013 Effective Price Level: 10/1/2013				Program Year (Budget EC): 2014 Effective Price Level Date: 1 OCT 13								
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	RISK BASED CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	INFLATED (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	PHASE 1 or CONTRACT 1													
09	CHANNELS & CANALS	$1,171	$337	28.8%	$1,508	2.1%	$1,195	$344	$1,539	2014Q4	1.3%	$1,211	$349	$1,560
	CONSTRUCTION ESTIMATE TOTALS:	$1,171	$337	28.8%	**$1,508**		$1,195	$344	$1,539			$1,211	$349	$1,560
01	LANDS AND DAMAGES	$5	$1	23.0%	$7	2.1%	$6	$1	$7	2014Q2	0.4%	$6	$1	$7
30	PLANNING, ENGINEERING & DESIGN													
	Project Management	$15	$1	7.0%	$16	1.8%	$15	$1	$16	2014Q2	0.5%	$15	$1	$16
	Planning & Environmental Compliance	$25	$2	7.0%	$27	1.8%	$25	$2	$27	2014Q2	0.5%	$26	$2	$27
	Engineering & Design	$81	$6	7.0%	$87	1.8%	$82	$6	$88	2014Q2	0.5%	$83	$6	$89
	Engineering Tech Review ITR & VE	$20	$1	7.0%	$21	1.8%	$20	$1	$22	2014Q2	0.5%	$20	$1	$22
	Contracting & Reprographics	$10	$1	7.0%	$11	1.8%	$10	$1	$11	2014Q2	0.5%	$10	$1	$11
	Engineering During Construction	$30	$2	7.0%	$32	1.8%	$31	$2	$33	2014Q4	2.6%	$31	$2	$33
	Planning During Construction			7.0%										
	Project Operations			7.0%										
31	CONSTRUCTION MANAGEMENT													
	Construction Management	$50	$10	19.6%	$60	1.8%	$51	$10	$61	2014Q4	2.6%	$52	$10	$62
	Project Operation:			19.6%										
	Project Management			19.6%										
	CONTRACT COST TOTALS:	$1,408	$361		**$1,768**		$1,436	$368	$1,804			$1,455	$373	**$1,828**

Filename: SP14ATR_TPCS3.xlsx
TPCS

SECTION 14, CEDAR RIVER, 290TH STREET BRIDGE
ROCHESTER, IOWA

APPENDIX D

REAL ESTATE PLAN

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SECTION 14, CEDAR RIVER, 290TH STREET BRIDGE
ROCHESTER, IOWA

APPENDIX D
REAL ESTATE PLAN

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SECTION 14, CEDAR RIVER, 290TH STREET BRIDGE
ROCHESTER, IOWA

APPENDIX D
REAL ESTATE PLAN

I. PURPOSE

This Real Estate Plan supports the *Section 14, Emergency Streambank Protection - Cedar River 290th Street Bridge, Cedar County, Iowa* Project (Project). The Project authorization is Section 14 of the 1946 Flood Control Act, as amended (33 USC 701r). Cedar County, Iowa is the proposed non-Federal Sponsor (NFS). There are no other Real Estate Plans that support this Project.

The Cedar County Board of Supervisors has requested assistance from the U.S. Army Corps of Engineers, Rock Island District (District) in seeking a solution to protect the 290th Street Bridge (Bridge) from continuing erosion from the Cedar River (River). The River is eroding the right descending streambank adjacent to the western bridge abutment and roadway as well as increased scour at the Bridge piers. The main channel of the River has shifted from its prior course, and the flood event of 2008 appears to be the cause of this final course change. The 290th Street Bridge sits on a bend in the River and the approach to the Bridge is now at a slanted angle, rather than perpendicularly as the Bridge was designed to withstand. On the upstream side of the Bridge, the current main channel carries water in a nearly parallel direction to the Bridge. Scour around the Bridge piers and bank erosion continue to threaten the structural integrity of the Bridge, especially during high water events. If left untreated, the Bridge abutments and roadway may be lost resulting in the loss of a critical transportation route. The nearest crossing to the north is a 23-mile round trip and to the south is a 7-mile round trip. 290th Street serves as a primary route for local travel and commerce, as an alternate route to Interstate 80, and as a vital crossing for the agricultural industry.

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II. DESCRIPTION OF THE LANDS, EASEMENTS, AND RIGHTS-OF-WAY (LER) REQUIRED FOR CONSTRUCTION, OPERATION, AND MAINTENANCE

The 290th Street Bridge crosses the Cedar River near the Village of Rochester, Cedar County, Iowa. The site is located in the North half (N ½) of the Northeast Quarter (NE¼) of Section Eleven (11), Township seventy-nine (79) North, Range three (03) West, of the 5th Prime Meridian in Cedar County, Iowa. The Project area consists of the 290th Street Bridge and the area along the right descending bank of the Cedar River approximately from the Bridge west to the junction of West Rochester Avenue and County Highway F44 (290th Street). The landscape surrounding the Project site is predominantly agricultural and lowland forest.

The recommended plan is alternative F which consists of embankment toe protection, to include longitudinal peaked stone with sheet pile protection, riprap stream barbs and riprap bridge pier protection.

Longitudinal Stone Toe Protection with Rock Riprap Sheet Pile Protection:
This measure would start at the upstream end of the sheet pile structure on the right descending bank and extend approximately 60 feet downstream. The sheet pile protection portion would be constructed at an elevation of 646.0' (NAVD 1988). This measure would be 8 feet wide at the top of the sheet pile structure and would fall at a 2H:1V slope to the bottom of the stream channel. This measure would increase in height to an elevation of 646.0' and narrow to a peak. This peaked stone structure would extend parallel with the Bridge approximately 320 feet until making a 90 degree bend and tying into the right descending bank downstream of the Bridge. The peaked stone structure would fall from the peak at a 2H:1V slope to the respective bottom of the stream channel. This structure would be constructed of Iowa Class A rock riprap.

Stream Barbs:
Two stream barbs would be constructed along the right descending bank of the Cedar River immediately upstream of the stone toe protection measure. The barbs would be 42 feet in length and would be angled at 45 degrees to the bank. The barbs would be constructed with Iowa Class A rock riprap. This sizing was based on the estimated velocity of water at the location of the proposed stream barbs. The barbs would have an 8.75 foot deep key and rise from the riverbed at a 2H:1V slope to elevation 631.0' (NAVD 1988) and then at a 10H:1V slope to elevation 633.0' where they tie into the existing shoreline. The barbs would serve to deflect water away from the bridge abutment and accumulate sediment between the structures to protect against scour at the toe of the existing revetment. The east (downstream) barb would require 800 cubic yards (1,320 tons) of material.

Pier Protection (Installed by the NFS):
Iowa Class A, 400 lb top size rock riprap would be placed around 3 of the piers of the Bridge. The piers for rock placement are piers 5, 6, and 7. Pier 5 would receive approximately 435 cubic yards (720 tons); Pier 6, approximately 1065 cubic yards (1760 tons); and, Pier 7, approximately 1855 cubic yards (3060 tons). The riprap would be placed to an elevation of 635.8' (NAVD 1988). The rock riprap would be placed around Piers 5 and 6 to double the width of the piers, or approximately 11 feet. The riprap on Piers 5 and 6 would slope to the riverbed at a slope of 2H:1V. The rock riprap would be placed around Pier 7 to triple the width of the pier, or approximately 16.5 feet. The riprap on Pier7 would slope to the riverbed at a slope of 3H:1V.

All construction will be done by floating plant (barge). The floating plant would need to be mobilized during a period of high enough water to assure adequate clearance of the vessel but low enough water to minimize issues related to high velocity. The planned staging area is located in the Northeast corner of the intersection of 290th Street and West Rochester Avenue to allow for placement and loading of riprap onto the floating plant. This area is shown on the project area map (Enclosure 1) and identified as the "Isabel Property". A Channel Improvement Easement will be acquired for purposes as required in connection with said work of improvement.

Typically a permanent easement would be required in the area of the stream barbs and the area of riprap placement around the bridge piers. However, in this situation, the lower 157 miles of the Cedar River are designated as meandered. Accordingly, the State of Iowa owns the stream bed up to the Ordinary High Water Mark (OHWM) at the proposed Project location. This area is illustrated on Enclosure 1 as a Channel Improvement Easement/Permit and it's reasonable to assume that the State will not release permanent land rights for the sake of this project and would likely dispense their approval through a Sovereign Lands Construction Permit in those areas. Any construction on, above,

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or under State-owned lands and/or waters must secure a Sovereign Lands Construction Permit from the Iowa Department of Natural Resources in advance of work.

For any required water access, the District would utilize the boat ramp near Rochester Park, located approximately 2/3 of a mile downstream of the 290th Street Bridge as shown on Enclosure 2.

Type of Estate	No. & Type of Owner	Size in Acres
Channel Improvement Easement	2 - Privately-owned Property	approx. 0.71 acre
Channel Improvement Easement/ Sovereign Lands Construction Permit	1 - State of Iowa	approx. 2.04 acres

III. NON-FEDERAL SPONSOR-OWNED LANDS

Research done at the Cedar County Assessor's office indicates that there is an existing easement for public highway along 290th Street, to include the Bridge, which spans 60 feet on either side of the centerline for a total width of approximately 120 feet. This easement was granted to the Iowa State Highway Commission in 1944. In 1984, the State Department of Transportation granted by Quit-Claim Deed to Cedar County, Iowa, all rights, easements, title and interest in all land used as street and highway right of way (ROW) to include the easement along 290th Street. The existing County easement along 290th Street is anticipated to be wide enough to complete the pier work under the Bridge but does not satisfy all land requirements for the purpose of the Project. Once a Project Partnership Agreement (PPA) is executed, the NFS will be required to perform an official survey based on District ROW maps. The official survey will then clearly delineate ownership lines and easement areas. Since the NFS's current land interest is not sufficient for Project requirements, the NFS will have to acquire all the real estate rights necessary to construct this Project and provide verification to the District's Real Estate Office before solicitation can take place.

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IV. NON-STANDARD ESTATES

The Project does not require the use of any non-standard estate.

V. EXISTING FEDERAL PROJECT WITHIN LER REQUIRED FOR THE PROJECT

There is no Federal project within the LER required for this Project. There is no evidence available that indicates that the LER required was previously provided as an item of local cooperation.

VI. EXISTING FEDERALLY-OWNED LAND

There are no federally-owned lands within the Project ROW.

VII. NAVIGATIONAL SERVITUDE

The Project area is not located within or adjacent to a navigable watercourse which would serve a purpose in the aid of commerce; therefore, navigation servitude does not apply.

VIII. MAP DEPICTING THE AREA

The real estate Project Area Maps are attached as Enclosures 1 and 2.

IX. POSSIBILITY OF INDUCED FLOODING

There is no possibility that the Project would induce flooding.

X. BASELINE COST ESTIMATE

	Non-Federal	Federal
Lands and Damages	$1,250	$0
Relocation Assistance (91-646)	$0	$0
Incidental Acquisition Costs		
a. Monitoring NFS Acquisition		$5,500
b. Survey	$600	$
c. Title Evidence	$300	$
d. Negotiation/Closing	$1,500	$
e. Appraisal	$1,000	$
f. Administrative	$2,000	$
GRAND TOTAL	**$6,650**	**$5,500**

The NFS will not receive credit for the value of Lands, Easement, Rights-of-Way, Relocation of Utilities or Other Existing Structures & Disposal Areas (LERRD) it provides that are part of the tract of land on which the facility or structure to be protected is located, if such tract of land is owned by either the NFS or the owner of the facility or structure on the date that the PPA is executed.

XI. RESIDENCE/BUSINESS/FARM RELOCATION ASSISTANCE BENEFITS

The Project does not require any relocation of persons, farms, or businesses; therefore, there are no anticipated Public Law 91-646 Relocation Assistance Benefit payments.

XII. MINERAL ACTIVITY/TIMBER HARVESTING IN THE PROJECT AREA

No mineral activity or timber harvesting is known to exist within the Project boundary.

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XIII. NON-FEDERAL SPONSOR'S LEGAL AND PROFESSIONAL ACQUISITION CAPABILITY TO ACQUIRE LER

The *Non-Federal Sponsor's Real Estate Acquisition Capability Checklist* is included as Enclosure 3. The NFS has been advised of the necessity for documenting all expenses for LERRD credit purposes.

XIV. ZONING ORDINANCES

No application or enactment of zoning ordinances is proposed to facilitate acquisition in connection with the Project.

XV. SCHEDULE OF LAND ACQUISITION MILESTONES

The following schedule would be utilized with specific dates applied once the final footprint is confirmed and a final ROW map with notice to proceed has been supplied to the NFS.

Survey	4 to 6 weeks
Title	4 to 6 weeks
Appraisal	4 to 6 weeks
Negotiations	30 days minimum
Final preparation and closings	2 Weeks

XVI. FACILITY/UTILITY RELOCATIONS

There is no facility or utility relocations anticipated for this Project; however, ITC Midwest, an independent electric transmission company, owns a 21-foot wide permanent electric line easement along the north Lovell property line, parallel and adjacent to the 290th Street road right of way. No permanent real estate rights are anticipated to be needed in the electric line easement area but due to potential construction efforts, the contractor may need to intermittently cross and work under the power lines/poles. Electric line clearance requirements and barge staging areas will need to be coordinated with the appropriate personnel at ITC Midwest prior to commencement of any construction work. It may be determined at a later point that a temporary work area easement be acquired in this area pending more detailed information on specific construction staging and coordination efforts with ITC Midwest.

XVII. IMPACTS OF SUSPECTED OR KNOWN CONTAMINANTS

An Environmental Site Assessment Transaction Screening Process was completed on 9 June 2011 for the proposed work and staging area for the proposed project in general conformance with ASTM Practices E 1528-06, ER 1165-2-132, and MVD DIVR 1165-2-9. The inquiry consisted of an inspection of aerial photographs (1930, 1950, 1960, 1990, 2004 and 2010), an 1838 land survey map, an 1889 and 1990 USGS Topographical Map, records research and an interview. These inquiry activities revealed no evidence of hazardous substances, HTRW, or other regulated contaminants in connection within the Project area.

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While there may be minimal recognized environmental conditions on target properties due to trace amounts of fertilizers, pesticides, fungicides and herbicides because of agricultural activities, there are no physical signs, records or specialized knowledge indicating a significant environmental condition of concern for the Project

XVIII. LANDOWNERS SUPPORT OR OPPOSITION TO THE PROJECT

The NFS is in favor of the proposed Project. Adjoining and nearby landowner concerns are not anticipated. The Project does not require any relocation of persons, farms, or businesses, and the constructed Project will help allow the Bridge to continue functioning.

XIX. RISKS OF ACQUIRING LANDS BEFORE EXECUTION OF THE PROJECT PPA

The NFS has been made aware of the risks associated with acquiring the necessary rights in land prior to the execution of the PPA and the Government's formal notice to proceed with acquisition.

XX. OTHER REAL ESTATE ISSUES RELEVANT TO THE PROJECT

There are no other known real estate issues at this time.

This report was prepared by Jason Appel, Realty Specialist, Rock Island District

APPROVAL:

Date: 9/1/2015

Kevin Sommerland
Chief, Planning and Acquisition Branch
Regional Real Estate Division North

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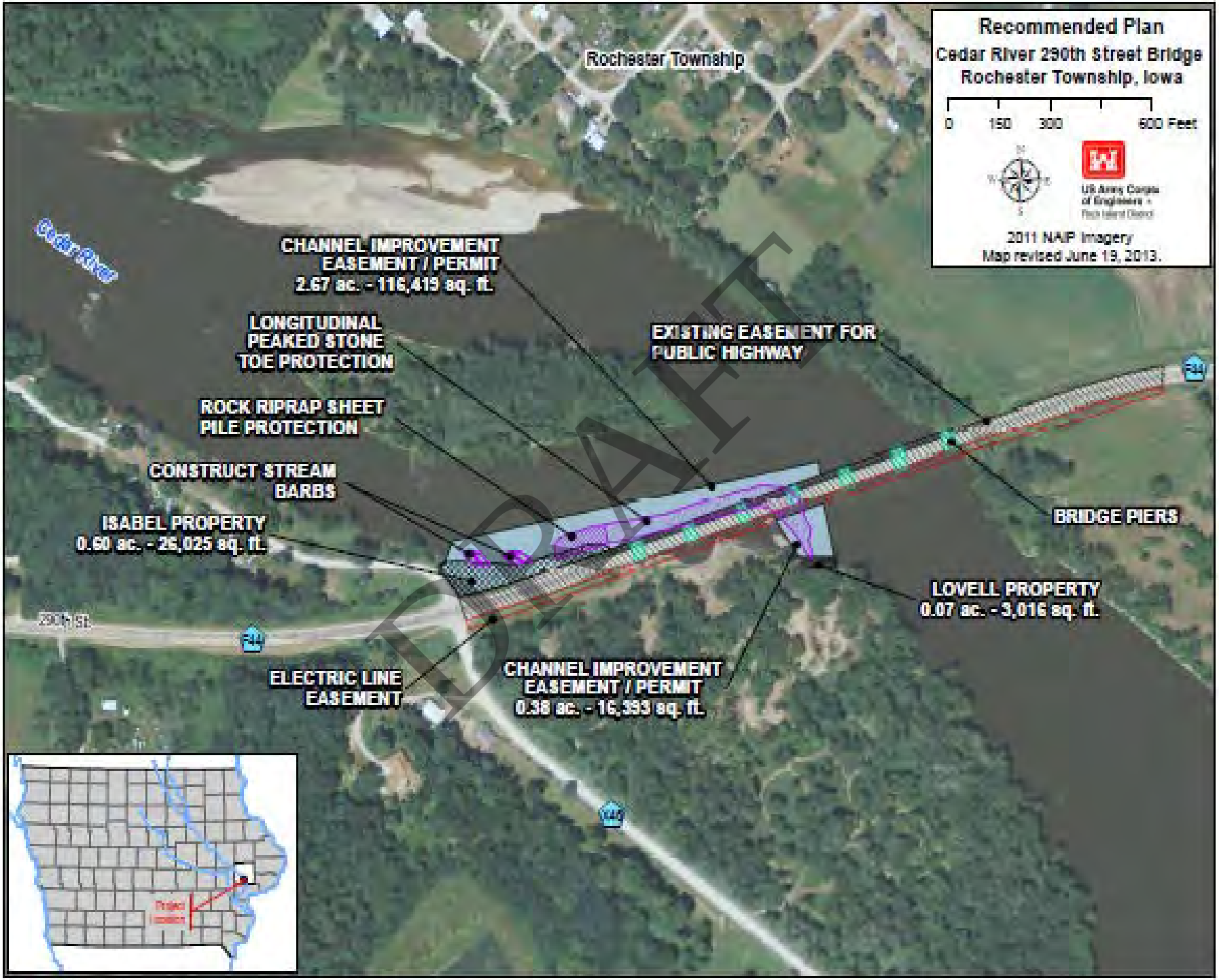
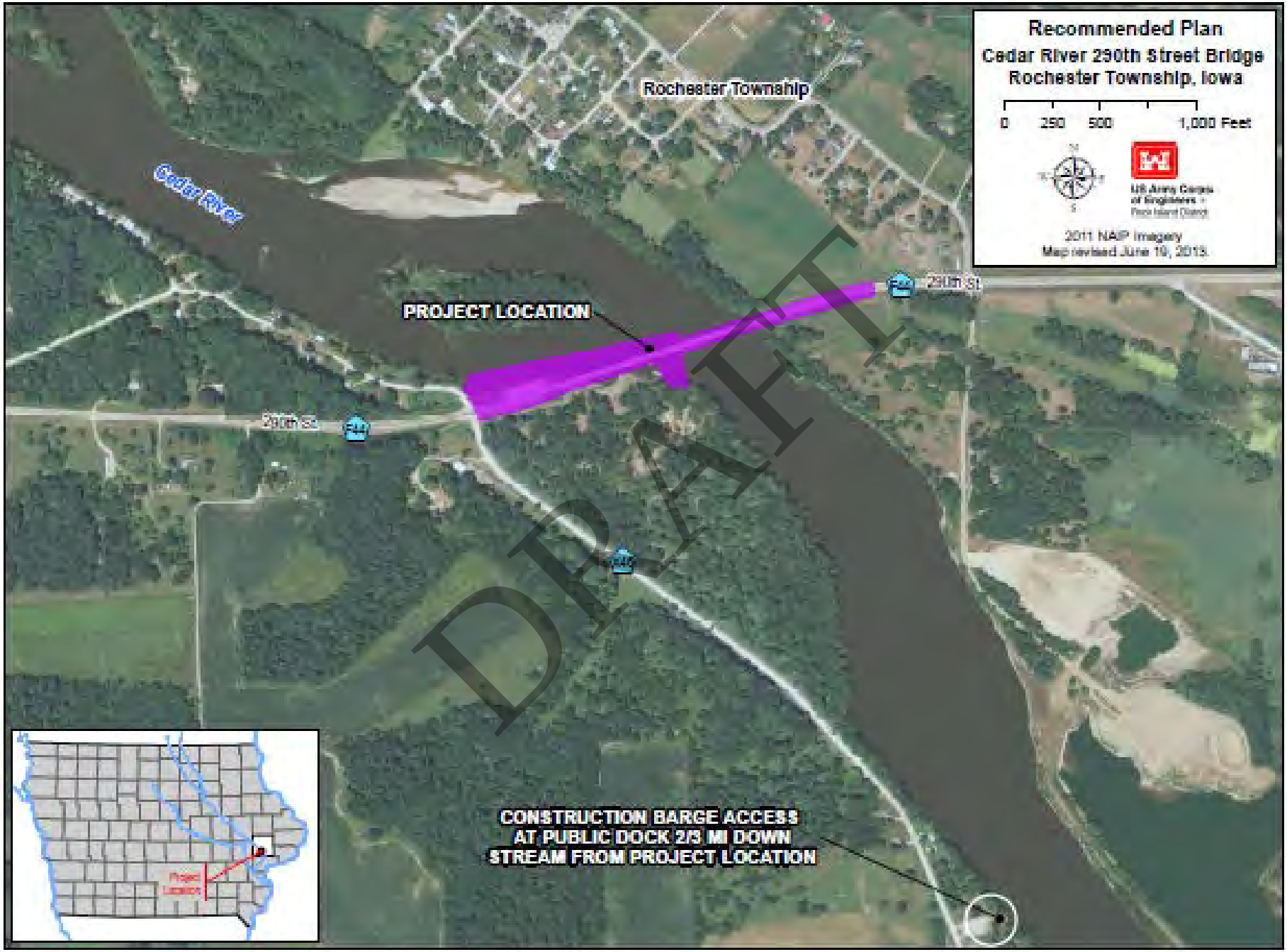


ENCLOSURE 1
PROJECT AREA MAP



ENCLOSURE 2
PROJECT AREA MAP

ENCLOSURE 3

ASSESSMENT OF NON-FEDERAL SPONSOR'S REAL ESTATE ACQUISITION CAPABILITY

I. LEGAL AUTHORITY

Does the NFS have legal authority to acquire and hold title to real property for project purposes? **Yes**

Does the NFS have the power of eminent domain for this project? **Yes**

Does the NFS have "quick take" authority for this project? **No**

Are any of the land/interests in land required for the Project located outside the NFS's political boundary? **No**

Are any of the lands/interests in land required for the Project owned by an entity whose property the NFS cannot condemn? **No**

II. HUMAN RESOURCE REQUIREMENTS

Will the NFS's in-house staff require training to become familiar with the real estate requirements of Federal projects including P.L. 91-646, as amended? **No**

If the answer to II.A is "yes", has a reasonable plan been developed to provide such training?

Does the NFS's in-house staff have sufficient real estate acquisition experience to meet its responsibilities for the Project? **Yes**

Is the NFS's projected in-house staffing level sufficient considering its other work load, if any, and the Project schedule? **Yes**

Can the NFS obtain contractor support, if required in a timely fashion? **Yes**

Will the NFS likely request USACE assistance in acquiring real estate? (If "yes", provide description). **"Yes, the County anticipates working cooperatively with USACE throughout the process in order to ensure any property acquisition is completed as per Federal Code." – County's response**

III. OTHER PROJECT VARIABLES

Will the NFS's staff be located within reasonable proximity to the Project site? **Yes**

Has the NFS approved the Project/real estate schedule/milestones? **No, once a PPA is executed a detailed real estate schedule will be developed.**

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IV. OVERALL ASSESSMENT

Has the NFS performed satisfactory on other USACE projects? **Not aware of any previous partnerships with the Corps of Engineers.**

With regard to this project, the NFS is anticipated to be: **Capable**

V. COORDINATION

Has this assessment been coordinated with the NFS? **Yes**

Does the NFS concur with this assessment? (If "no", provide explanation). **Yes**

Date: 9/1/2013

Kevin Sommerland
Chief, Planning and Acquisition Branch
Regional Real Estate Division North

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SECTION 14, CEDAR RIVER, 290TH STREET BRIDGE
ROCHESTER, IOWA

APPENDIX E
HYDROLOGY AND HYDRAULICS

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SECTION 14, CEDAR RIVER, 290TH STREET BRIDGE
ROCHESTER, IOWA

APPENDIX E
HYDROLOGY AND HYDRAULICS

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NOTE: Alternative measures were studied during the course of hydraulic analysis associated with this Feasibility Study and are discussed in this hydraulic appendix. These alternative measures are specific to this appendix only. Table E-4 relates the alternatives studied during the course of the hydraulic analysis with the measures discussed in the main report.

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SECTION 14, CEDAR RIVER, 290TH STREET BRIDGE
ROCHESTER, IOWA

APPENDIX E
HYDROLOGY AND HYDRAULICS

I. INTRODUCTION

The Cedar River, 290th Street Bridge emergency streambank stabilization project is authorized under Section 14 of the Flood Control Act of 1946. Figure E-1 shows the location of the 290th Street Bridge (Federal Highway Administration #018490). The 290th Street Bridge (hereafter referred to as the Rochester Bridge) over the Cedar River near the Village of Rochester in Cedar County, Iowa is experiencing recurring scour at several of the piers and along the adjacent right descending bank (RDB). The erosion affecting the RDB of the Cedar River is threatening 290th Street.

290th Street (F44) is a primary route for local travel and commerce through Cedar County, Iowa. It is an alternate route to Interstate 80 and a vital route for the agricultural industry. The closest bridges for agricultural vehicle traffic use (tractors and combines) are Cedar Valley Road F36 (6.6 river miles upstream) and US Highway 6 (11 river miles downstream). Approximately 680 vehicles per day used the Rochester Bridge in 2006. If left untreated, the bridge and/or roadway may fail resulting in the loss of a critical transportation route.

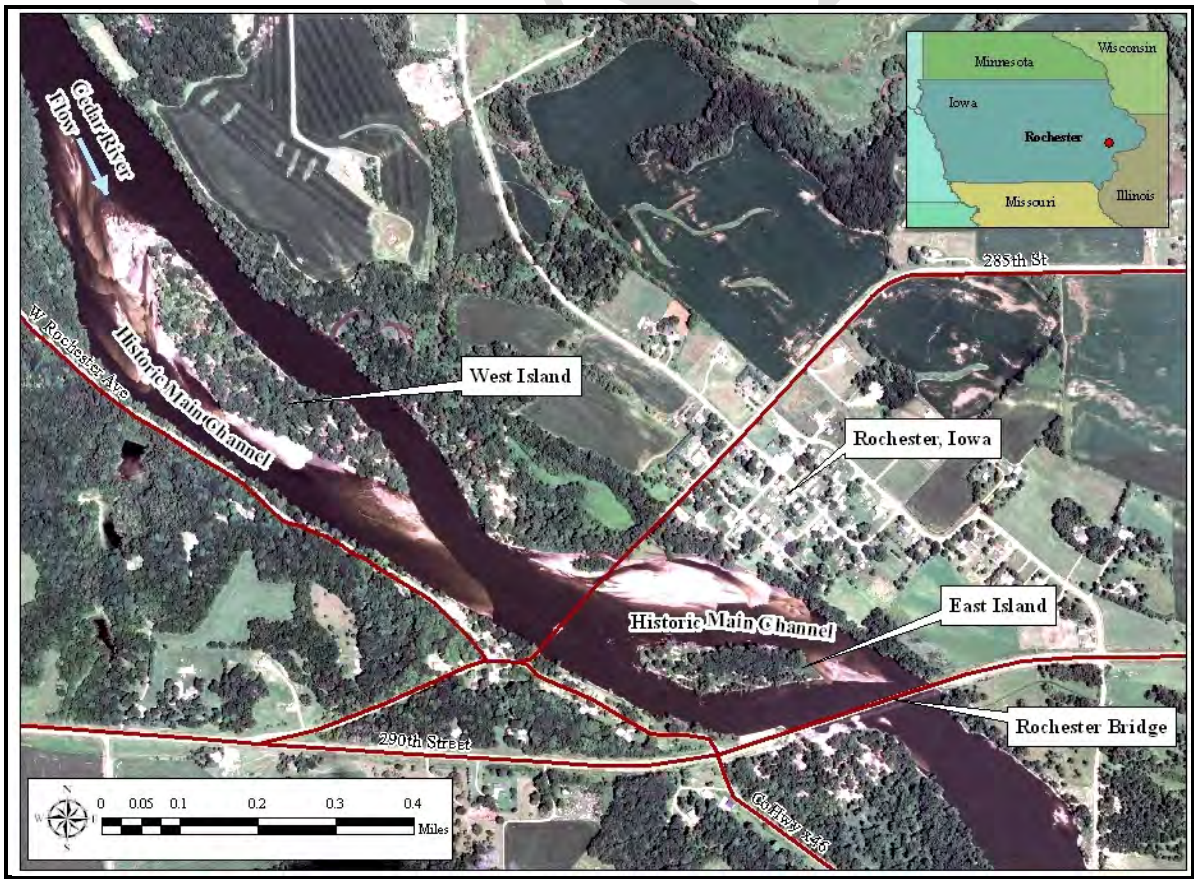

Figure E-1. Rochester Bridge Vicinity Map

II. BACKGROUND

The project site is located at the Rochester Bridge over the Cedar River. The Rochester Bridge is maintained by Cedar County, Iowa. "The Rochester Bridge has a variable depth steel girder superstructure with seven reinforced concrete Piers" (VJ Engineering, 2008). Throughout this report the seven Piers of the Rochester Bridge will be numbered from west to east. The easterly five Piers (Piers 3 – 7) and both concrete abutments are founded on timber piling. Piers 1 and 2 are founded on bedrock. The bridge is a two-lane, eight-span structure with a 29'-9" by 1145'-0" reinforced concrete deck. Figures E-2 and E-3 show the upstream and downstream cross-sections of the bridge. Note that all elevations in this report are given in the North American Vertical Datum of 1988 (NAVD 88). Bridge inspection reports and construction drawings are in a local datum. To convert the local datum to NAVD 88, subtract 19.4 feet from the local datum. The cross section data is from ADCP measurements discussed later in this report.

The Cedar County Engineer contacted the U.S. Army Corps of Engineers and its congressional representatives for assistance in investigating and recommending a solution to the erosion problem that exists at the Rochester Bridge.

A. Study Reach. The Rochester Bridge is located on the Cedar River approximately 2.1 miles upstream of the I-80 Bridge. The study area for this project includes the Cedar River from approximately 0.7 miles upstream to approximately 4.4 miles upstream of the I-80 Bridge. The study area shown in Figure E-1 includes two islands referred to as the East and West Islands. This study was completed under Section 14 of the Flood Control Act of 1946 and was conducted from June 2009 to July 2013.

B. Problem Description. Alluvial streams, including the Cedar River, tend to "meander" or change course over the years. When the Rochester Bridge was constructed, the majority of the water in the Cedar River flowed around the east of the island immediately upstream of the bridge (East Island) and approached the bridge approximately in-line with the piers resulting in flow roughly straight through the bridge. At that time there was a small branch of flow that diverted to the west of the East Island and rejoined the main flow immediately upstream of the bridge. The flow pattern of the Cedar River has changed and currently the majority of the flow has shifted to the west of the East Island. The channel to the east of the island has experienced much deposition and been transformed into a series of sand bars. Figure E-4 illustrates how the river has changed course over the years. The Cedar River flow was generally aligned with the piers of the Rochester Bridge initially. The altered flow pattern caused erosion/scour at the embankments and Piers.

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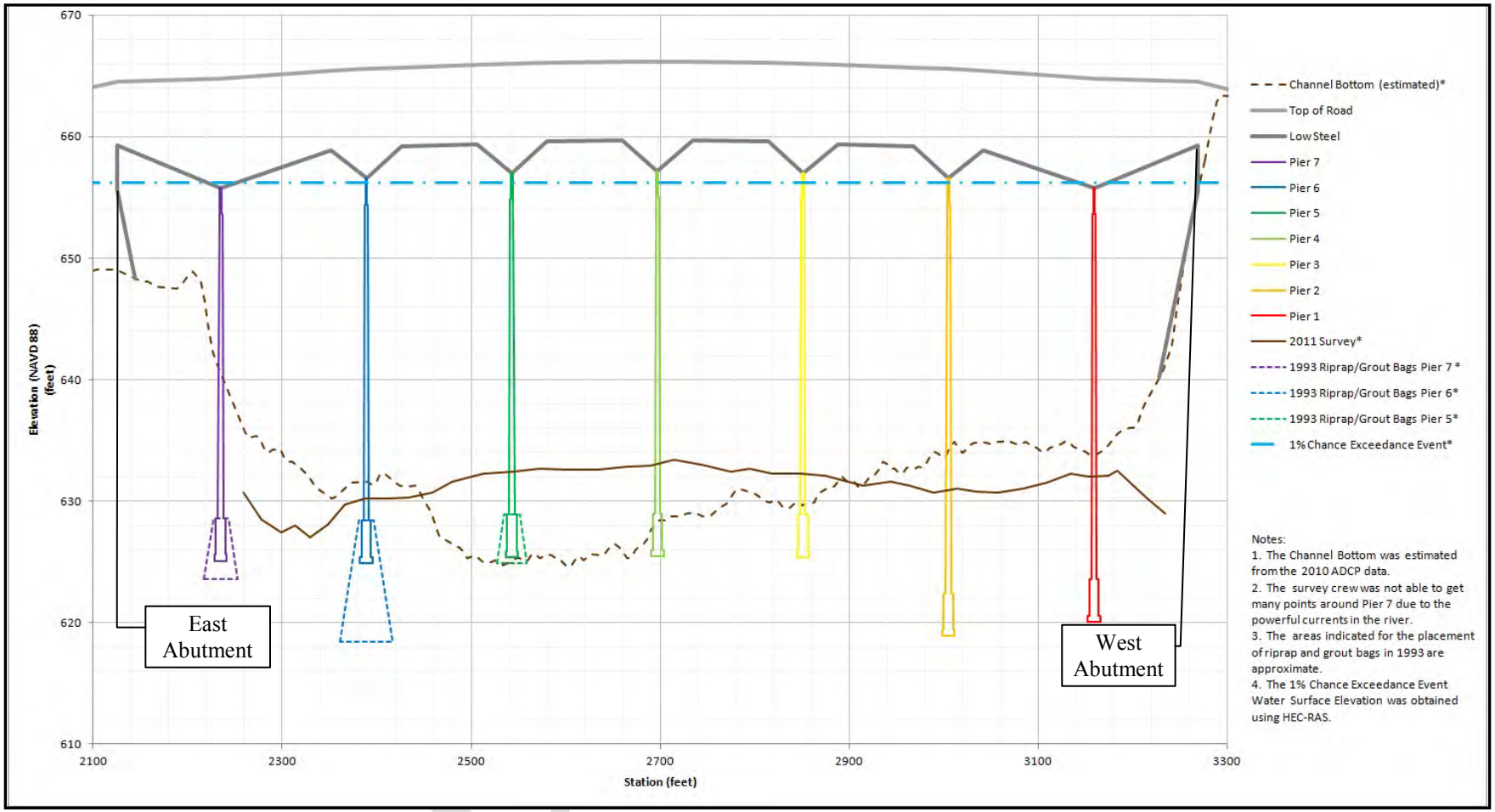

Figure E-2. Upstream Cross-Section of the Rochester Bridge (looking downstream)

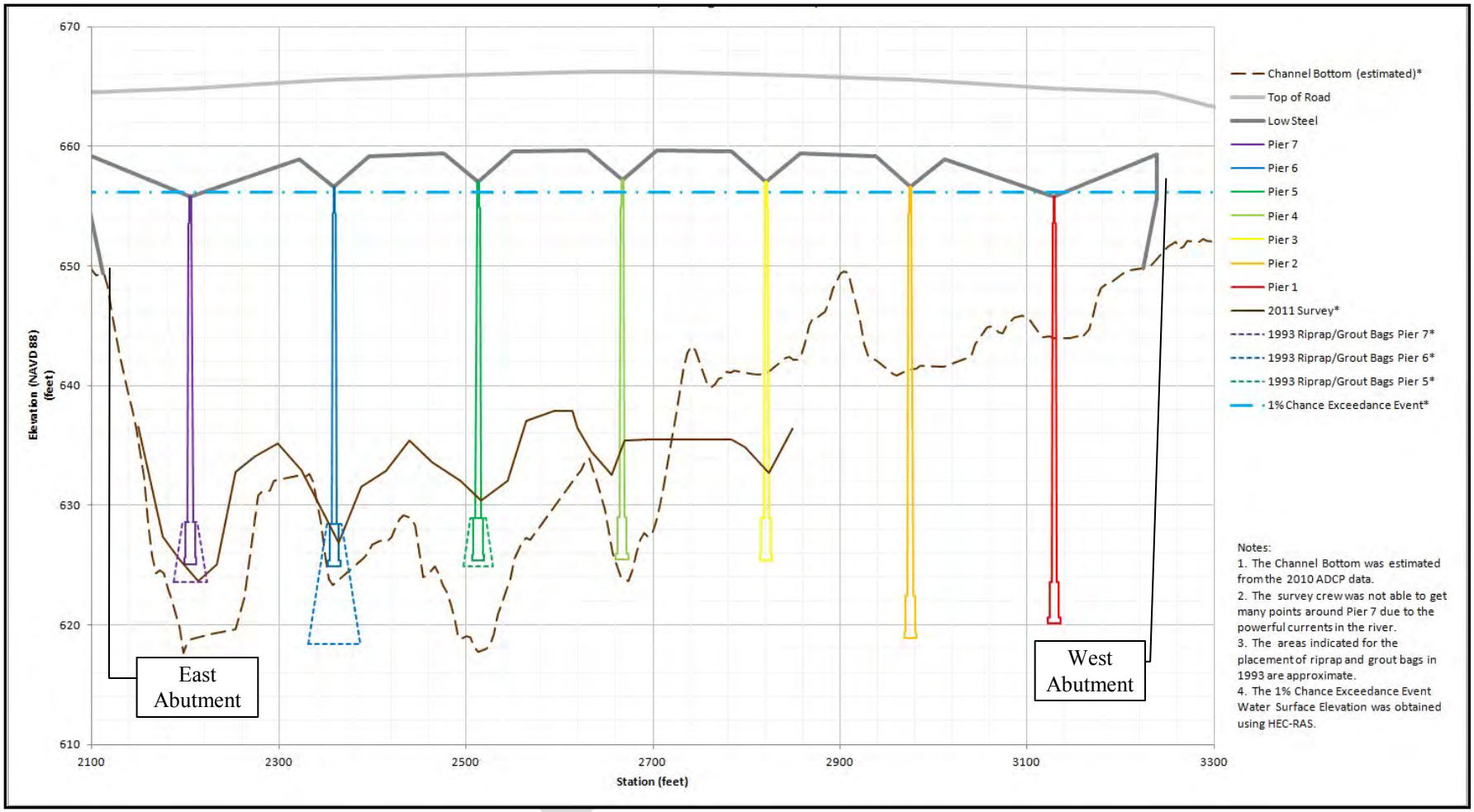

Figure E-3. Downstream Cross-Section of the Rochester Bridge (looking downstream)

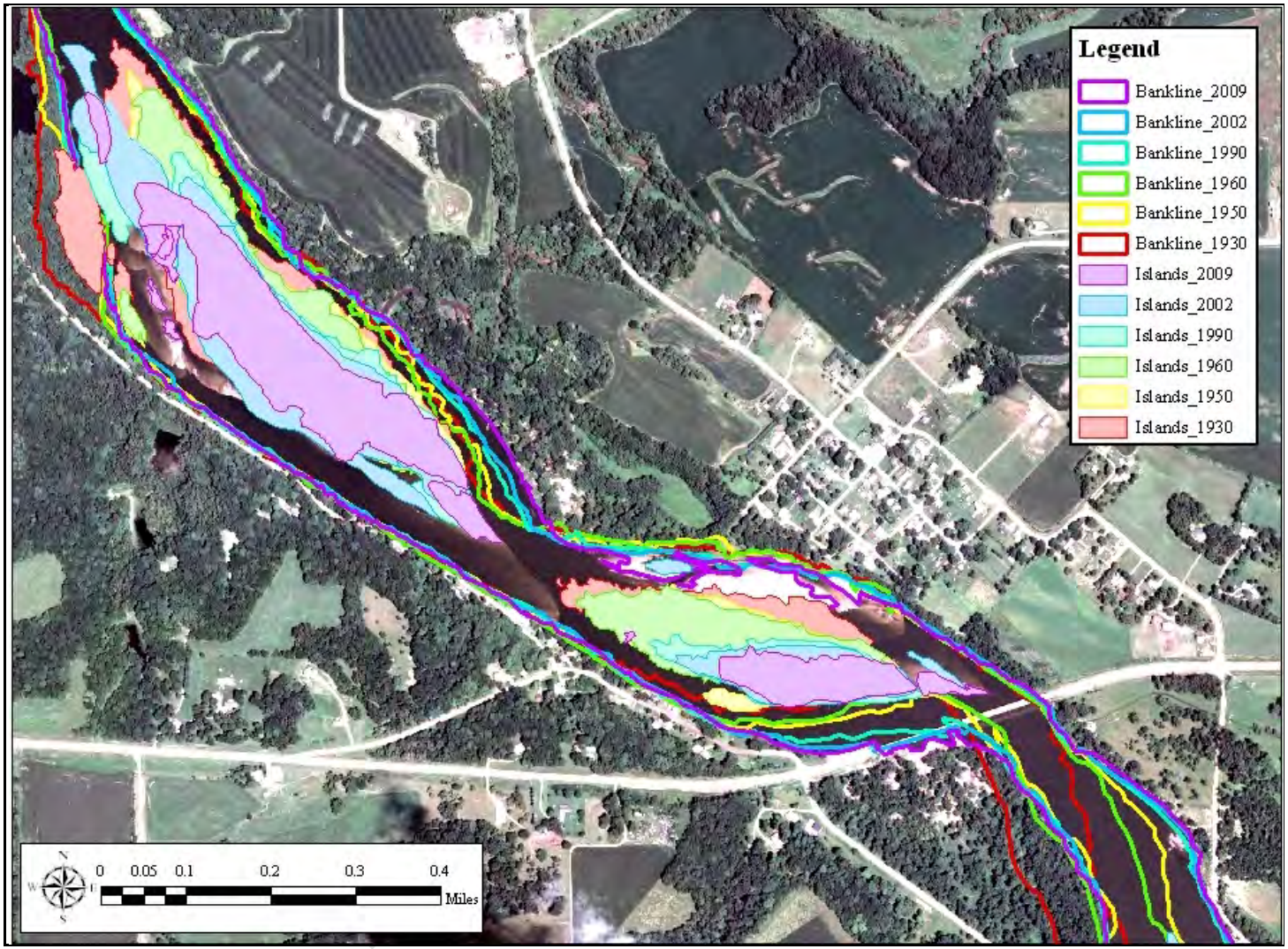

Figure E-4. Schematic of Bankline and Island Migration

The north foreslope of the road embankment (west of the bridge) (RDB) and the buffer area at the toe of that slope were entirely scoured away during the 2008 flood. After the flood, Cedar County replaced the fore slope of the road and protected it with riprap. Added protection was also placed around some of the piers to lessen the effects of scour. The main channel currently flows along the fore slope of the road and parallel to the bridge deck (roughly perpendicular to the piers) bridge until after the fourth Pier before it turns 90 degrees to pass through the bridge and continue downstream. This flow pattern creates an unfavorable scenario for scour to occur around the piers of the structure, because the majority of the flow is perpendicular to the piers (parallel to the bridge deck).

Figure E-5 shows a cross section schematic of the historic side channel approximately 600 feet upstream of the bridge. According to the construction drawings, the original 20 feet sheet piling is located at the abutment of the roadway/bridge extending from elevation 639 down to 619 (VJ Engineering, 2008). The elevations were converted from the local datum to NAVD 88.

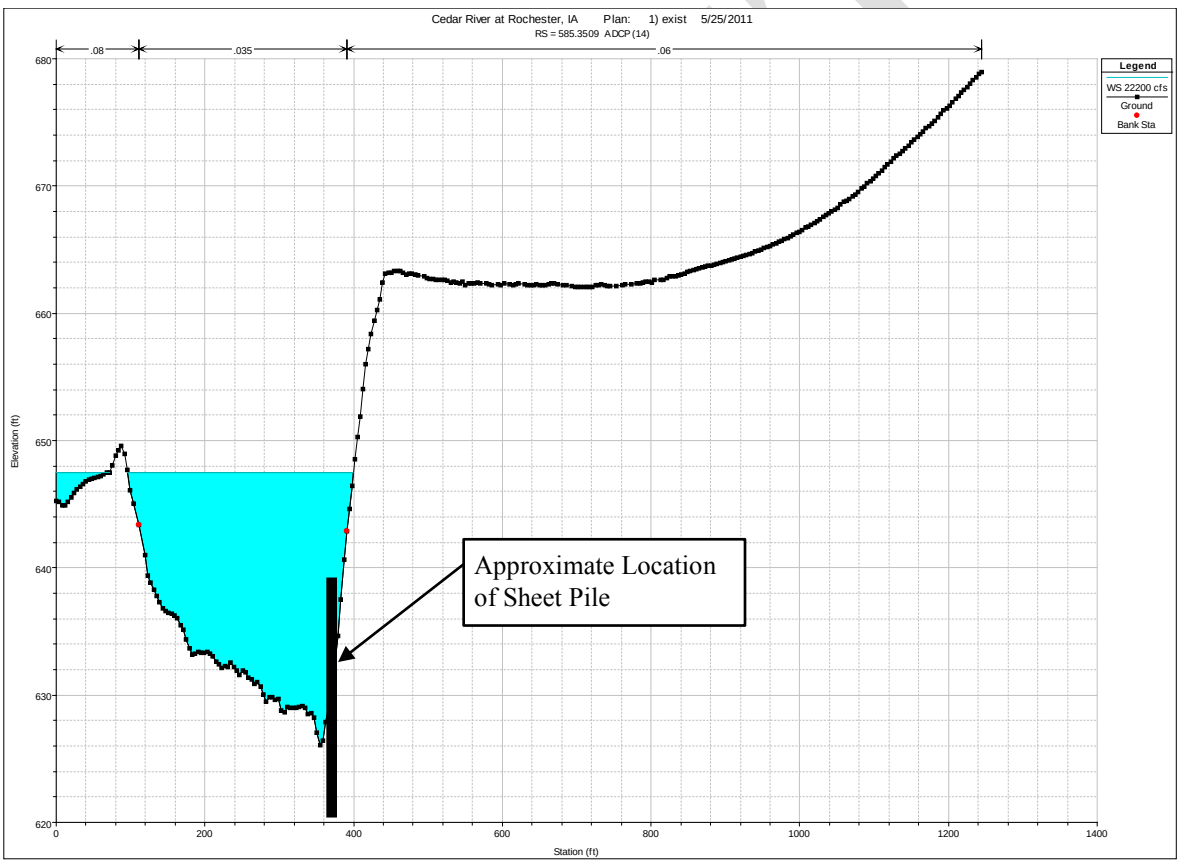

Figure E-5. Cross Section of Historic Side Channel Approximately 600 Feet Upstream of the Rochester Bridge

C. History. The Rochester Bridge was constructed in 1946. Reconstruction work was performed on the bridge in 1985. After the 1993 flood on the Cedar River, Iowa Class E riprap was added to Piers 5, 6, and 7 of the Rochester Bridge. The results of the bridge inspections and repairs conducted in 2008 and 2010 are detailed in the main report. Historically, grout bags and riprap have provided some protection for the piers, however, monitoring and replacement will continue to be required.

D. Hydrology. The Cedar River flows through northern and central parts of Iowa and drains an area of 7,819 square miles at its mouth. It is a major tributary of the Iowa River. The Iowa River in turn enters the Mississippi River between Muscatine, Iowa and Burlington, Iowa. The drainage area of the Cedar River at Rochester, Iowa is 7,218 square miles. Major floods on the Cedar River have historically been caused by either heavy rainfall or a combination of rainfall and snowmelt. Major floods on the Cedar River at Rochester occurred in 1961, 1993, and 2008. There is no gage at Rochester; however, the nearest USGS gages to the Rochester Bridge are located in Cedar Rapids (USGS ID 05464500) and Conesville (USGS ID 05465000). The 10 largest floods at the Cedar Rapids and Conesville gages are listed in tables E-1 and E-2, respectively. Data from both gages were utilized during this study. The drainage area of the Cedar River at the Cedar Rapids and Conesville gages is 6,510 and 7,787 square miles, respectively. The Rochester Bridge is approximately half-way between these two gages. The drainage area of the Cedar River at the Rochester Bridge is 7,218 square miles.

Table E-1. Cedar River Floods of Record at Cedar Rapids

Year	Discharge (cfs)	Gage Height (feet)	Elev NAVD 88 (Feet)
2008	140,000	31.12	731.50
1961	73,000	19.66	720.04
1993	71,000	19.27	719.65
1965	66,800	18.51	718.89
1929	64,000	20.00	720.38
2004	62,500	18.30	718.68
1999	62,300	18.31	718.69
1933	58,400	18.60	718.98
1947	56,200	18.23	718.61
1906	55,700	17.60	717.98

Table E-2. Cedar River Floods of Record at Conesville

Year	Discharge (cfs)	Gage Height (feet)	Elev NAVD 88 (Feet)
2008	127,000	23.37	605.15
1993	74,000	17.11	598.89
1961	70,800	16.62	598.40
2004	70,200	17.00	598.78
1965	68,100	16.85	598.63
1999	60,900	16.80	598.58
1990	60,100	16.87	598.65
1947	60,000	15.35	597.13
1960	58,800	15.60	597.38
1969	55,200	16.05	597.83

Figure E-6 shows the published 25- and 50-year profiles for the Cedar River at Rochester, Iowa (USGS, 1963). The 25- and 50-year discharges used in this are 67,200 and 73,400 cfs, respectively. The profiles from the high flow events in 1960 (57,800 cfs) and 1961 (71,600 cfs) are also shown in this figure. Please note that the elevations in this are given in NGVD 29. To convert from NGVD 29 to NAVD 88, use the following equation:

$$\text{Elev}_{\text{NAVD 88}} = \text{Elev}_{\text{NGVD 29}} - 0.17 \text{ ft}$$

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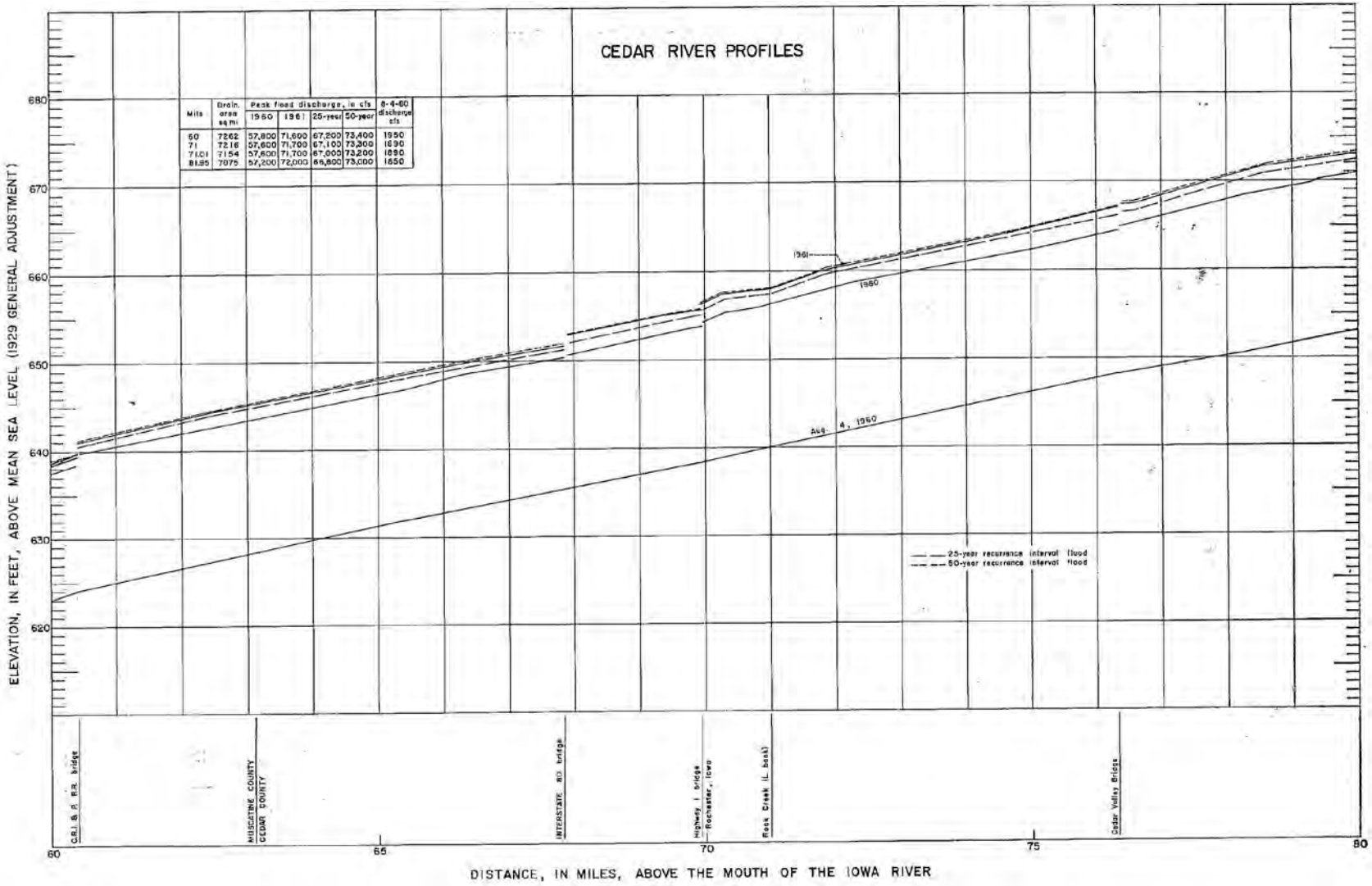

Figure E-6. Cedar River Profile at Rochester, Iowa

The Cedar River was studied at various flow rates during the course of this study. These flow rates were obtained from both the 1993 Bridge Repair Plan (IDOT, 1993) and the regression equations developed by the U.S. Geological Survey for the State of Iowa (Eash, 2001). Table E-3 summarizes these flow rates. Flow rates with a 10%, 4%, 2% and 1% chance of exceedance were obtained from the 1993 Bridge Repair plans. These values compare well with the flow values generated using the state regression equations.

Table E-3. Flow Frequency Data

		Elevation (feet)		
% Chance Exceedance	**Flow (cfs)**	**Local Datum**	**NAVD 88**	**Velocity (fps)**
50	27,000[1]	NA[3]	NA[3]	NA[3]
20	43,000[1]	NA[3]	NA[3]	NA[3]
10	54,000[2]	674.0	654.6	6.0
4	68,000[2]	676.5	657.1	6.4
2	77,000[2]	678.1	658.7	6.7
1	86,000[2]	679.5	660.1	6.9

[1] Values obtained using the State of Iowa Regression Equations (Eash, 2001)
[2] Values obtained from the 1993 Bridge Repair Plans
[3] Values not provided in the 1993 Bridge Repair Plans

For flows with recurrence intervals of 2 and 5 years, the values developed using the state regression equations were used. Figure E-7 shows the curve developed using the state regression equations.

Elevation and velocity quantities for flows with recurrence intervals between 1- and 10-percent chance exceedance were determined by the Iowa Department of Transportation (IDOT) and published in the 1993 Bridge Repair Plan. Quantities were not developed flow rate, elevation, or velocity by the IDOT for flows with recurrence intervals between 20- and 50-percent chance exceedance.

III. STUDY PURPOSE AND GOALS

The purpose of this hydraulic study is to formulate an acceptable alternative to stabilize the bank line of the Cedar River and address concerns expressed by the county regarding scour at the Rochester Bridge Piers, thereby protecting the bridge, its approach, and adjacent roadway from further erosion. In addition, there is question of the stability of the sheet pile structure that currently provides toe slope protection for the area in closest proximity to the bridge abutment. Both one- and two-dimensional hydraulic modeling techniques were used to evaluate existing conditions at the bridge and analyze possible alternatives developed to reduce the erosion of the bridge piers. During the course of this study, the scour at the piers was investigated, and the procedure used and results are summarized in Section VI, *Pier Scour Protection & Riprap Sizing*, of this appendix.

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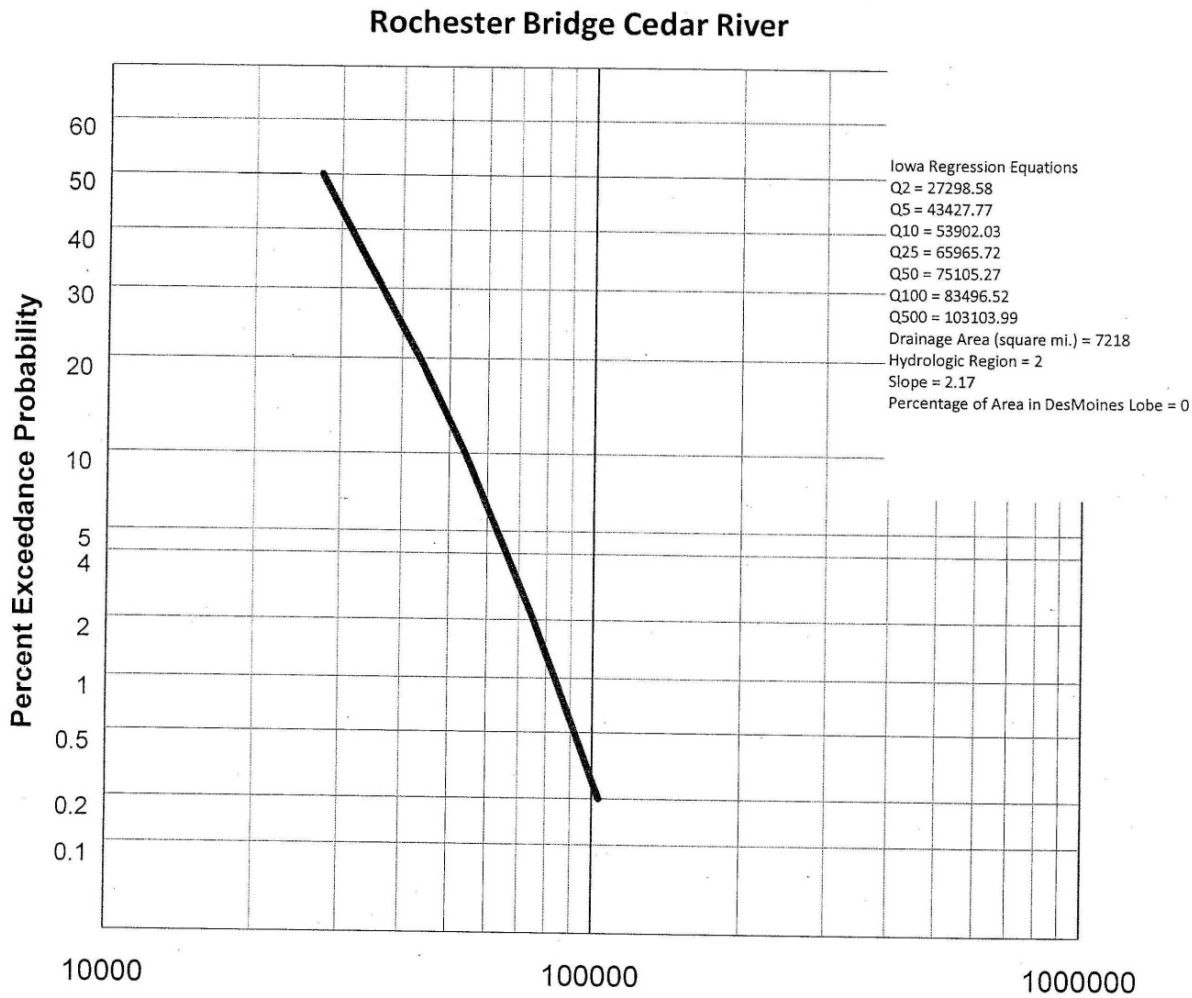

Figure E-7. Flow Frequency Curve

IV. ALTERNATIVES EVALUATED

The primary problem is the direction of flow at the bridge. Seven plausible hydraulic alternatives for stabilizing the shoreline near the Rochester Bridge were developed based on the engineering expertise of the Corps. These alternatives are listed in table E-4 and shown in Figure E-8. The resultant flow patterns and velocity distributions of the various alternatives were analyzed to determine the most favorable alternative.

Various alternatives were considered as possible solutions to the Rochester Bridge erosion problem. Alternatives were solicited from various disciplines within the Corps and the County. Ideas discussed included: protection of Piers with riprap, construction of closing structures and dikes to redirect flow, longitudinal stone toe protection (LSTP), stream barbs, and dredging.

Table E-4. Alternatives Studied in This Project

Hydraulics Alternative	Associated Measure(s) Discussed in the Main Report	Description
1	C1	One closing structure adjacent to the East Island
2	C1 & C2	One closing structure adjacent to the East Island and one closing structure adjacent to the West Island
3	C1	One closing structure adjacent to the East Island and bed change in the East downstream main channel
4	NA	Two dikes near the bridge in the West downstream side channel and bed change in the East downstream main channel
5	C1 & C3	One closing structure adjacent to the East Island, one dike between the two islands, & bed change in the East downstream main channel
6	C3	Two dikes near the bridge in the West downstream side channel, one dike between the two islands, & bed change in the East downstream main channel
7	BS3	Longitudinal stone toe protection adjacent to the Western bridge Pier sheet pile extending out to Pier 4 and joining the shoreline downstream of the bridge, & two stream barbs upstream of the bridge

Note: Bed change is not identified as a measure in the Main Report. Based on engineering expertise it was assumed that bed change in the East downstream main channel would occur naturally after certain structures were in place. The dikes identified near the bridge in the West downstream side channel as discussed in this hydraulic appendix are different than the stream barbs & LSTP discussed as Measure BS3 in the Main Report

During the course of this hydraulic study, alternatives involving closing structures and dikes as identified in the table E-4 were modeled using hydraulic methods. These methods are discussed in this section and Section V, *Numerical Modeling Description*. It was determined, based on modeling results, that the closing structures and dikes would not eliminate the need for protecting the bridge piers with riprap. This led to the development of Measure BS3 which includes stream barbs and longitudinal stone toe protection (LSTP). The main intent of this alternative is to protect the existing sheet pile structure, although localized benefits to stream flow are likely to occur.

The modeling of the above alternatives was performed using a top elevation of 643 for both the closing structures and dike elements. The top elevation of the longitudinal stone toe protection was 646 and the stream barbs slope downward from 648 to 638. The two year water surface elevation at the Rochester Bridge is approximately 649. The two-year flood has approximately a 50-percent chance of occurrence in any year and is generally considered the "bank full" or "channel forming" discharge. Factors such as the quantity of rock required to construct the structures and percentage of time the structures would be overtopped were taken into account when the elevation was selected.

Numerical modeling (which will be discussed in the following sections) and the development of the alternatives were performed concurrently. This allowed the study team to concentrate on more favorable alternatives in terms of cost and flow realignment. After alternatives 1 and 2 were modeled, it was determined that the upstream closure structure adjacent to the west island had little effect on the flow change that occurred at the Rochester Bridge (assuming no channel adjustments) and it would approximately double the construction costs of the project; therefore, alternative 2 was removed from further consideration. Based on engineering expertise, it was determined that most of the alternatives proposed would affect "bed change" in the historic main channel, therefore Alternative 1 was removed from further consideration.

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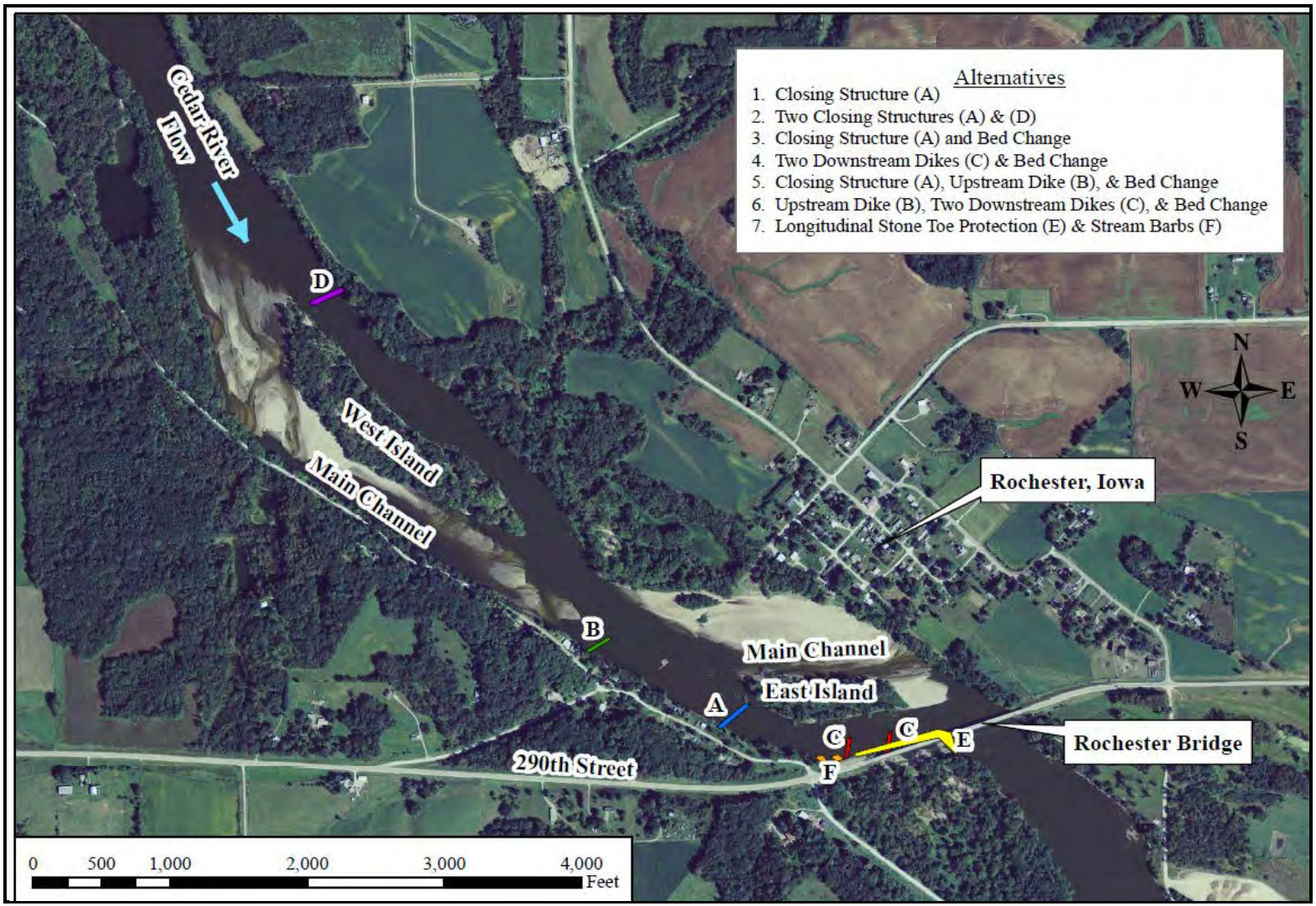

Figure E-8. Rochester Bridge Design Alternatives

Alternatives 3 through 6 were formulated to include a "bed change" element. This refers to the natural scouring of the "historic main channel" to the north of the East Island that is expected to occur after the flow is diverted back to the historic main channel through the construction of either an upstream dike (B) or a closure structure (A). Currently the flow rate in the historic main channel is lower than it was prior to the flood of 2008, and there is significant deposition. Once the closure structure has been constructed, it is assumed that the majority of the normal daily flow will be diverted back to the historic main channel which is the natural course of the river prior to the 2008 flood. This increased flow should allow the deposited material to be scoured and return the channel to its pre-flood depth. Although Alternative 4 includes bed change as one of its elements, it is not certain that significant bed change will occur in this scenario.

A bank stabilization alternative (Hydraulics Alternative 7) was also developed. This alternative is referred to as measure BS3 in the main report. The goal of Measure BS3 is to stabilize the bank on the RDB of the Cedar River near the existing sheetpile, to protect the sheetpile from further erosion.

Alternative 7 was formulated to redirect flow away from the westernmost bridge Piers (1-3) while avoiding channel constriction. It was designed to maintain an approximate opening of 500 ft perpendicular to the flow which is typical of channel cross sections throughout this region of the Cedar River. It is expected that as the LSTP is overtopped by events, natural sedimentation will occur on the downstream side of the structure.

V. NUMERICAL MODELING DESCRIPTION

The Cedar River in the vicinity of the Rochester Bride was modeled using both the HEC-RAS and the Surface Water Modeling System (SMS) in conjunction with the Adaptive Hydraulics Modeling system (ADH). The purpose was to establish an existing condition model and evaluate the discussed in Section IV. HEC-RAS was used to numerically model the river with a one-dimensional steady flow regime. SMS is an interface that is used as a pre- and post-processor for surface water modeling and design with ADH, in this case. ADH is a two-dimensional modeling program that uses adaptive numerical meshes to simulate flow in a riverine system.

Both the ADH and HEC-RAS models were used to model the existing condition and proposed alternatives. The ADH model was used to develop 2-dimensional velocity information for the study area. The HEC-RAS model was used to calculate water surface profiles for the study reach. The velocity information and water surface profiles were used to evaluate and compare the proposed alternatives.

A. Existing Conditions. The existing conditions in the Cedar River were modeled using HEC-RAS and ADH. These existing condition models were calibrated and used as the foundation for evaluating the proposed alternatives.

1. ADH Modeling. The bathymetric and flow data from the Acoustic Doppler Current Profiler (ADCP) survey performed by the Corps on November 5, 2009 (with a flow rate of 22,200 cfs) was used in conjunction with the Light Detection and Ranging (LiDAR) data from the Iowa LiDAR Mapping Project (flight dates of 1 April 2009, 11 April 2009, and 17 April 2010) aerial topographic survey were combined to develop the elevation data mesh for the Cedar River used in modeling.

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Figure E-9 shows the location of the ADCP transects. The horizontal datum used for the ADH model is UTM Zone 15 NAD 83 converted to feet and the vertical datum is NAVD 1988 U.S. Survey Feet.

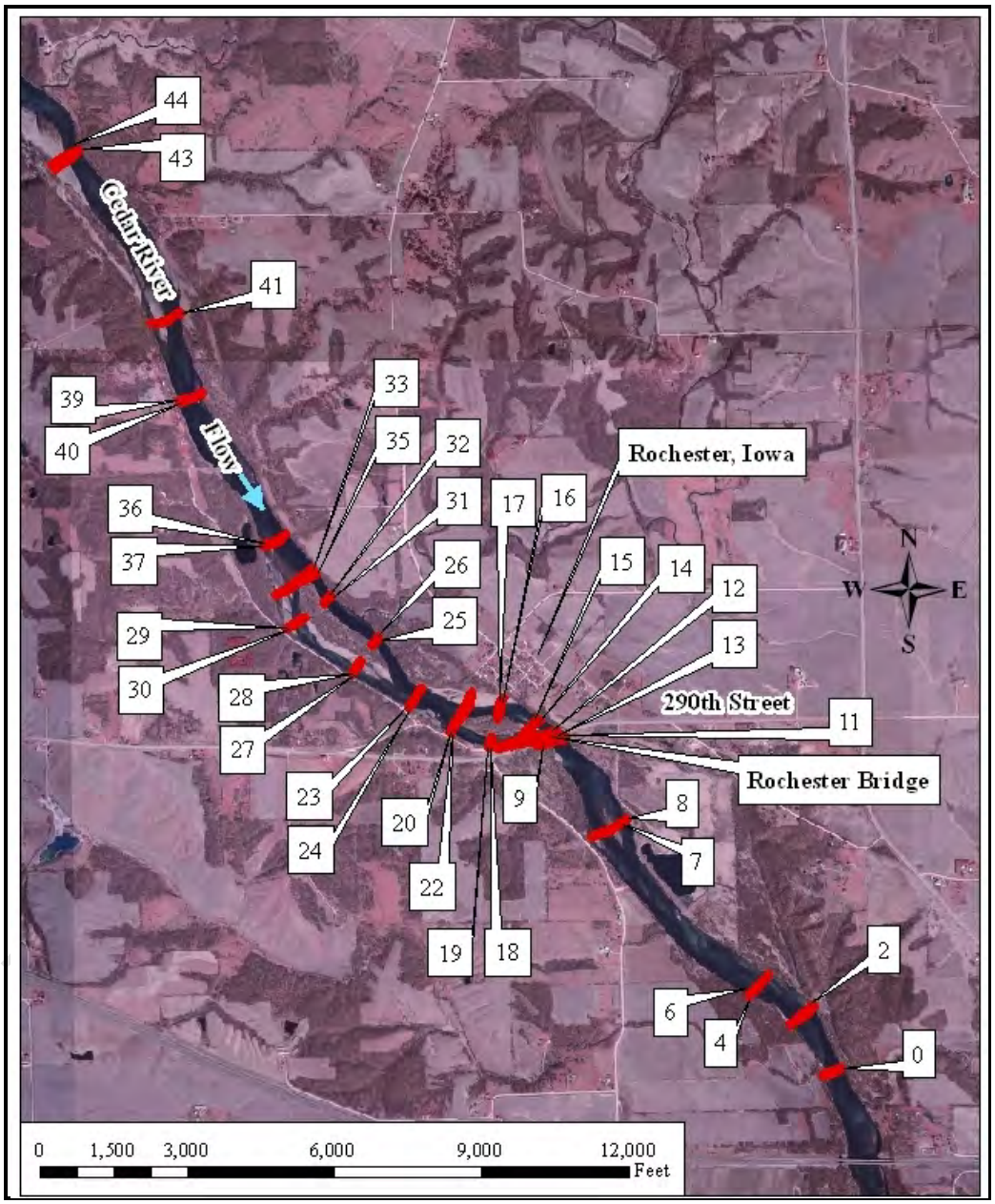

Figure E-9. ACP Transects (shown in red)

The mesh used by ADH to model the Cedar River, was created in SMS version 10.0.7. Figures E-10 and E-11 show this mesh. In addition to x-y location and depth, ADCP measurements contain velocity information. This velocity information was used to calibrate the completed model. Downstream boundary conditions for the ADH model were developed using the published Cedar River profiles shown in figure E-6.

Figure E-10. Low Flow ADH Mesh (4,089 Nodes and 7,379 Elements)

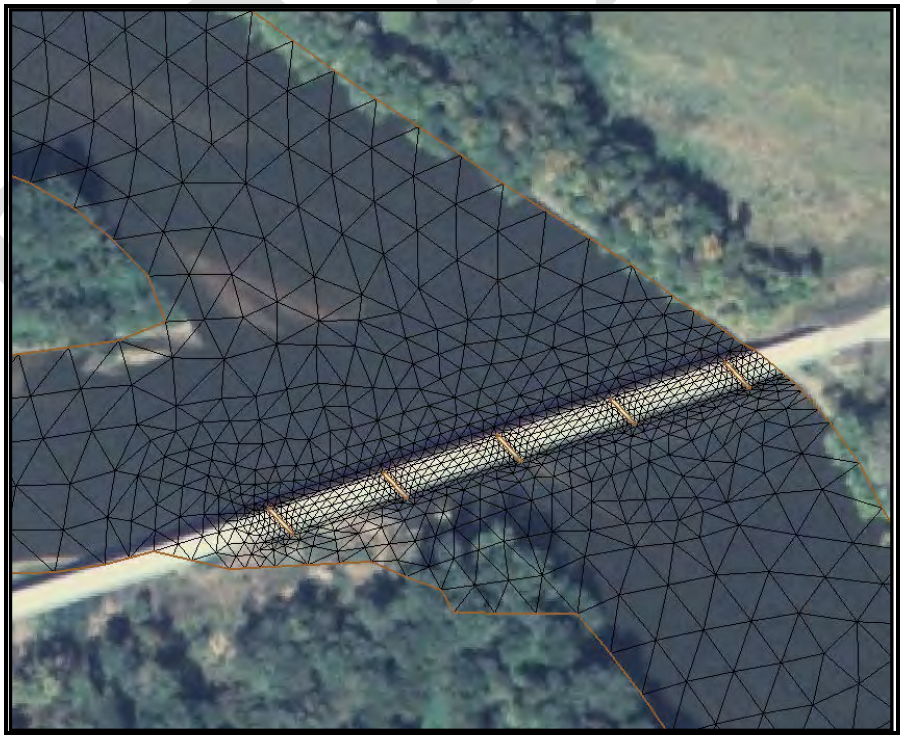

Figure E-11. Low Flow ADH Mesh Around Rochester Bridge

Four different material categories were developed to simulate the components of the river and overbanks. A Manning's n value was assigned to each category. The selected Manning's n values for each material category are shown in table E-5.

Table E-5. Material Categories and Corresponding n Values

Material Category	Selected Manning's n value
Side Channel	0.0335
Main Channel	0.032
Overbank	0.045
Closing Structure or Dike	0.06

Because ADH uses a time series of flow data, the wetting and drying of areas can become an issue. For this model, issues with wetting and drying values were minimized to the point where convergence was not impacted. A value of 0.25 was found to be the lowest value for both wetting and drying that would not cause convergence problems or significantly decrease model performance.

The model was run initially with zero adaptation. It was determined, however, that the resulting error within the major study area was relatively large. This ADH model was then run with two levels of adaptation.

The model was calibrated at a flow rate of 22,200 cfs which corresponds to the flow rate of the Cedar River when the ADCP measurements were collected on November 5, 2009. During calibration, 32 ADCP transects were selected for comparison between the ADH simulated velocities with the ADCP observed velocities. The velocities for both the calculated ADH cross-sections (or "strings") and the measured ADCP transects vary across the width of the channel. Figures showing the velocity variations over the width of the channel for all the analyzed cross sections are located in figures E-12, E-13 and Appendix E-A, *ADH Calibration Figures*. The average velocities for each of the cross sections/transects selected for comparison are shown in table E-6.

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Table E-6. Comparison of Observed (ADCP) and Calculated (ADH) Velocities at Each Cross Section

Transect/ Cross-Section	Observed Avg Velocity (fps)	Simulated Avg Velocity (fps)	Velocity Difference (fps)
4	3.78	3.32	0.46
6	4.00	3.40	0.60
7	3.13	2.53	0.60
8	2.96	2.48	0.48
9	3.25	2.78	0.47
11	2.77	2.68	0.09
12	4.05	3.69	0.36
13	4.22	3.71	0.51
14	3.33	3.06	0.27
15	3.39	3.15	0.24
16	2.98	3.02	-0.04
17	2.95	2.82	0.13
18	3.83	3.50	0.33
19	4.12	3.59	0.53
20	3.11	2.98	0.13
22	3.24	3.14	0.10
23	3.95	3.51	0.44
24	4.13	3.54	0.59
25	4.51	4.68	-0.17
26	4.47	4.16	0.31
27	3.55	3.50	0.05
28	3.35	3.06	0.29
29	2.75	2.41	0.34
30	3.03	2.61	0.42
31	3.93	3.82	0.11
32	4.20	3.94	0.26
33	3.26	2.84	0.42
35	3.14	2.90	0.24
36	4.27	3.94	0.33
37	4.09	3.88	0.21
39	4.10	3.49	0.61
40	4.15	3.46	0.69

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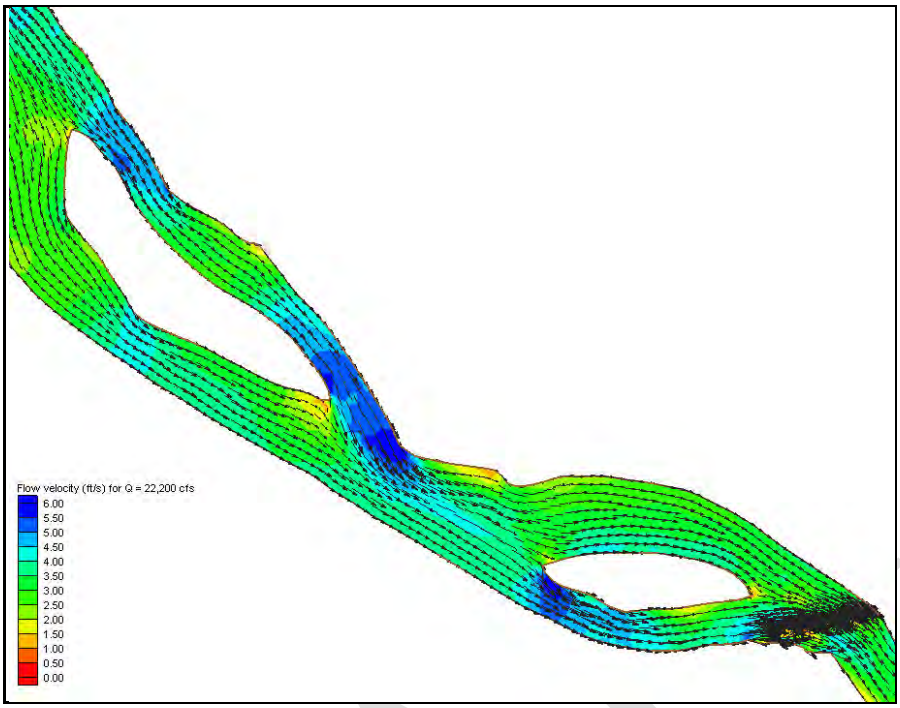

Figure E-12. Velocity of the Cedar River in the Area of the Rochester Bridge (Q = 22,200 cfs)

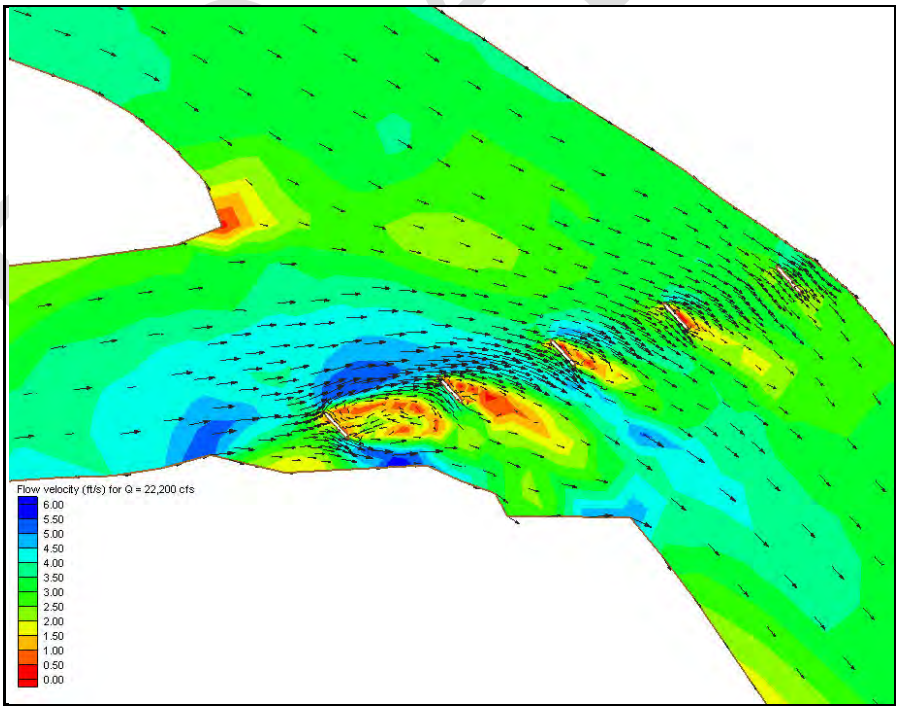

Figure E-13. Close-up of the Velocity of the Cedar River in the Area of the Rochester Bridge (Q = 22,200 cfs)

2. Updates to the ADH Mesh. Alternative 7 was developed at a later date than the original six alternatives. At this time, additional bridge survey data had become available and the mesh was updated to reflect these changes as well as to accommodate Piers 1 and 2, which were essentially part of the existing shoreline. The updated mesh is illustrated in figures E-14 and E-15 and was utilized throughout all of the Alternative 7 model runs. The updates to the mesh geometry demonstrated minimal change to the existing conditions when compared to the original mesh.

Figure E-14. Updated Model Mesh Used for Alternative 7 (13,871 nodes and 26,870 elements)

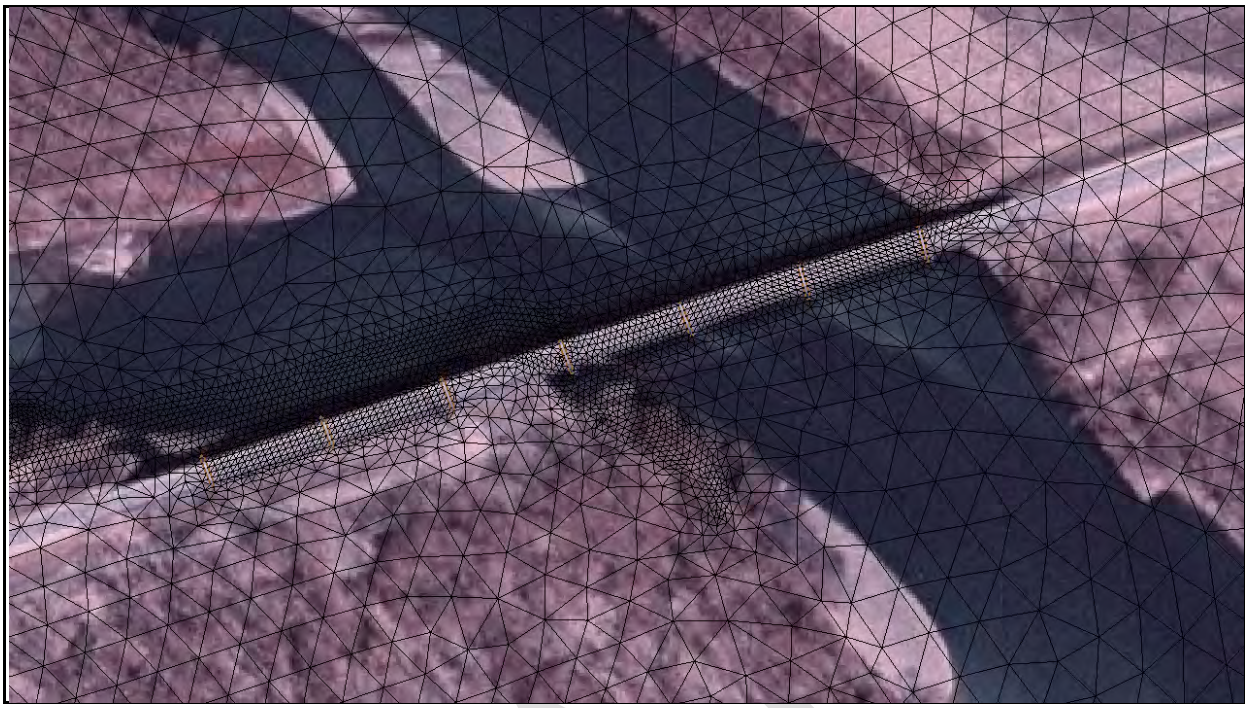

Figure E-15. Alternative 7 ADH mesh around Rochester Bridge

3. HEC-RAS Modeling. The bathymetric data from the 2009 ADCP survey and LiDAR data from the Iowa LiDAR Mapping Project (flight dates of 1 April 2009, 11 April 2009, and 17 April 2010) aerial topographic survey aerial topographic survey were used to develop the cross section geometry used in the HEC-RAS model. Bridge data was provided by Cedar County. The horizontal datum used for the HEC-RAS model is Iowa State Plane South. The vertical datum for the HEC-RAS is NAVD 1988 U.S. Survey Feet. All data used in modeling was converted to the above datums.

An initial model run was performed using a downstream boundary condition with a normal slope of 0.0022 (roughly the slope of the channel bottom). Another model run was performed with a known downstream boundary condition (obtained from the ADH model) for a flow rate of 22,200 cfs. The 22,200 cfs model run was used in conjunction with the differences in elevation of the water surface profiles at the bridge obtained from the initial model run and the slope of those water surface profiles to develop downstream water surface elevations for the modeled flow rates.

The HEC-RAS model was calibrated to the ADCP water surface elevation data for a flow rate of 22,200 cfs. The existing condition HEC-RAS model was also run for the following flow rates and return periods: 27,000 cfs (2-year), 43,000 cfs (5-year), 54,000 cfs (10-year), 68,000 cfs (25-year), 77,000 cfs (50-year), and 86,000 cfs (100-year). The profiles generated by the HEC-RAS modeling are shown in figure E-16.

The flow of the Cedar River splits in the vicinity of the East and West Islands of the Cedar River. The flow rates in the historic main channel and side channel are optimized in the HEC-RAS model using the flow optimization options. The optimization routine balances the flow in each channel until the energy gradelines of the receiving streams are within a specified tolerance.

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4. Modeling Comparison. Both HEC-RAS and ADH were used to model the existing condition of the Cedar River in the study area. Figure E-17 compares the calculated water surface elevations from HEC-RAS and ADH with the existing water surface elevations measured using the ADCP data. For comparison purposes, average values of water surface elevation were computed for each of the ADCP transects and the ADH cross-sections.

The downstream water surface elevations (boundary condition) corresponding to the flow rates modeled using HEC-RAS were estimated using a procedure which took into account both the existing ADH model and an initial HEC-RAS model run. An initial model run was performed using HEC-RAS and a normal depth slope equal to 0.0022 (which roughly corresponds to the slope of the thalweg in this area) as the downstream boundary condition. As a result of this initial model run, water surface elevations for each flow rate were determined at the Rochester Bridge. The results from the ADH model were used to estimate an average water surface elevation (645.5) at the downstream end of the HEC-RAS model corresponding to a flow rate of 22,200 cfs. The differences between the water surface elevations at the Rochester Bridge which resulted from the initial HEC-RAS model run were used in conjunction with the starting water surface elevation of 645.5 to obtain downstream water surface elevations for the other flow rates. This procedure allowed for a better comparison between the two modeling techniques used.

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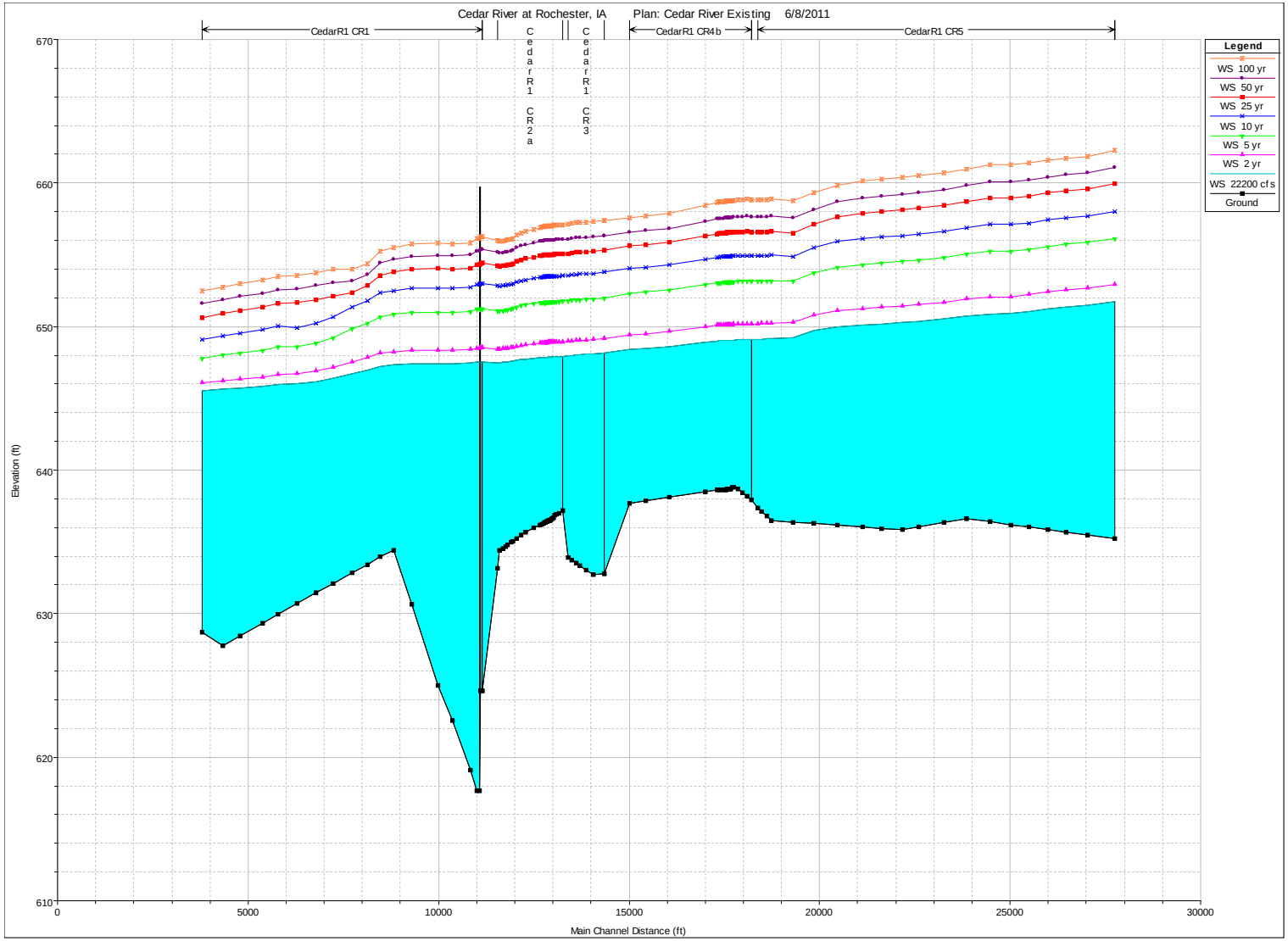

Figure E-16. HEC-RAS Water Surface Profile

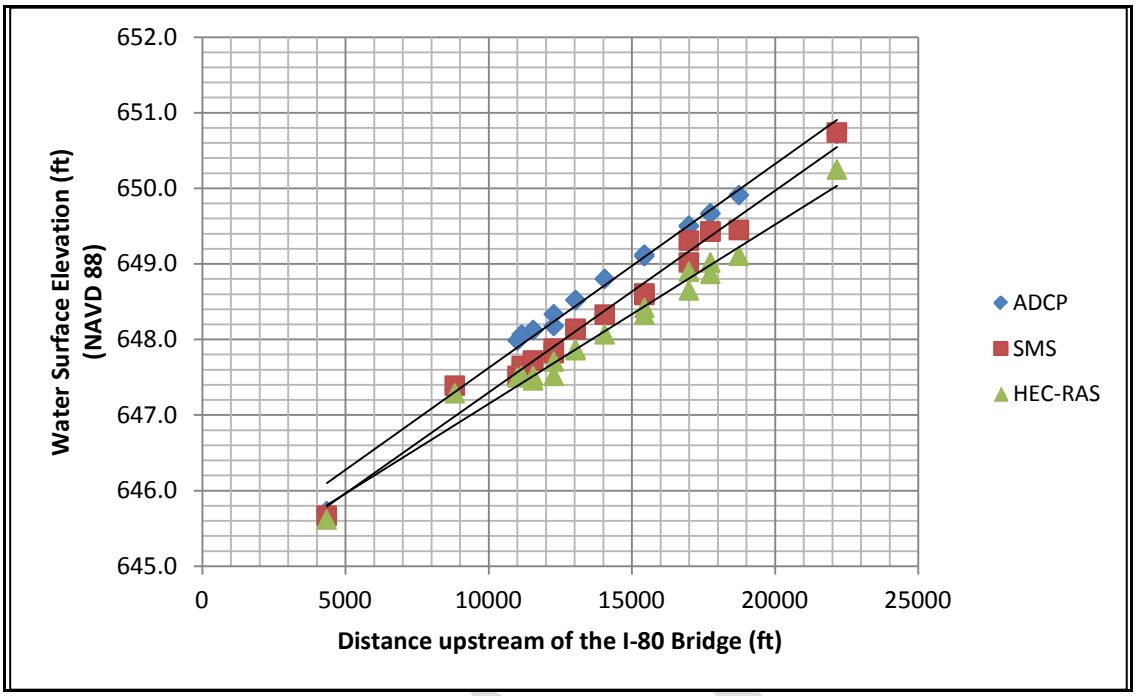

Figure E-17. Water Surface Profiles for a Flow Rate of 22,200 cfs

Table E-7 is used to compare the measured average velocity of the Cedar River at selected locations (ADCP data) with the calculated average velocity at the same locations obtained using ADH and HEC-RAS. Please note that for comparison purposes, the velocity was averaged across the ADCP transects and ADH cross sections. HEC-RAS computes an average velocity at each cross section.

Table E-7. Velocity Comparison

Transect/ Cross Section	Velocity (fps)		
	ADCP	SMS	HEC-RAS
4	3.78	3.32	2.79
7	3.13	2.53	2.30
9	3.25	2.62	1.65
12	4.05	3.69	1.34
14	3.33	3.06	2.94
16	2.98	3.02	2.45
18	3.83	3.5	2.26
20	3.11	2.98	3.13
23	3.95	3.51	2.73
25	4.51	4.68	2.17
27	3.55	3.5	1.69
29	2.75	2.41	3.43
31	3.93	3.82	2.94
33	3.26	2.71	2.79
36	4.27	3.94	2.30
39	4.1	3.49	1.65

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B. Alternative Modeling and Results. The seven alternatives discussed in Section IV were modeled using ADH. Once a preferred alternative was selected, HEC-RAS was used to determine how it impacted the floodplain at different recurrence intervals. The numerical modeling procedures and results are discussed in the following sections.

1. ADH Modeling. The alternatives discussed earlier (with a top elevation of the dikes and closure structures of 643, LSTP of 646, and stream barbs 648 to 638) were analyzed with ADH for seven different discharges representing a broad range of flow regimes. The discharge (flow rates) used in this study are summarized in table E-8. The corresponding return period, percent chance of annual exceedance, and water surface elevation at the downstream boundary for each discharge are also summarized in the table. Figures showing how the ADH mesh was altered for each alternative are shown in Appendix E-3.

Table E-8. Flow Rates Analyzed

Discharge (cfs)	Return Period	Percent Chance Exceedance	Water Surface Elevation (feet)
22,200	NA	NA	645.52
27,000	2-year	50%	647.2
43,000	5-year	20%	651.3
54,000	10-year	10%	654.0
68,000	25-year	5%	656.5
77,000	50-year	2%	658.1
86,000	100-year	1%	659.5

Each of the alternatives studied results in the majority of the Cedar River flow in the historic main channel adjacent to the east (downstream) island. This in turn results in an increased velocity of flow in the historic main channel, which will aid in the removal of deposited sediment. Table E-9 summarizes the distribution of flow that resulted from the ADH model runs for each of the alternatives studied.

Based on the hydraulic modeling, it can be seen that under existing conditions for a total flow rate of 27,000 cfs, only 46 percent of the water flows through the historic main channel upstream of the bridge. All of the alternatives modeled would redirect the flow such that 57 to 66 percent of the water would flow through the historic main channel. This increase in flow through the historic main channel is important because it will help maintain the depth of flow and velocity to move sediment out of and prevent sediment from depositing in the historic main channel. While this was the goal for Alternatives 1-6, this also is also an additional benefit of the streambank protection offered by Alternative 7.

It is also of interest to analyze the velocity of the water flowing in the vicinity of the Rochester Bridge because this affects the water's potential to scour the west embankment and the bridge piers. Table E-10 shows the maximum velocities passing the area between the piers for the existing condition and each of alternatives for the 2-year return period flow (Q = 27,000 cfs).

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Table E-9. ADH Results for the Flow Discharge of 27,000 cfs[1]

FLOW ADJACENT TO THE WEST (UPSTREAM) ISLAND

	Historic Main Channel		Side Channel	
Alternative	**Discharge (cfs)**	**% of Total Discharge**	**Discharge (cfs)**	**% of Total Discharge**
Existing Condition	12,457	46	14,543	54
Alternative 1	12,503	46	14,498	54
Alternative 2	14,266	53	12,735	47
Alternative 3	12,459	46	14,556	54
Alternative 4	12,439	46	14,561	54
Alternative 5	12,464	46	14,536	54
Alternative 6	12,455	46	14,545	54
Alternative 7	11,340	42	15,660	58

FLOW ADJACENT TO THE EAST (DOWNSTREAM) ISLAND

	Historic Main Channel		Side Channel	
Alternative	**Discharge (cfs)**	**% of Total Discharge**	**Discharge (cfs)**	**% of Total Discharge**
Existing Condition	12,970	48	14,030	52
Alternative 1	16,425	61	10,576	39
Alternative 2	16,406	61	10,594	39
Alternative 3	17,696	66	9,315	34
Alternative 4	17,093	63	9,907	37
Alternative 5	17,842	66	9,158	34
Alternative 6	17,269	64	9,731	36
Alternative 7	15,390	57	11,610	43

[1] A total flow rate of 27,000 cfs (2-year return flow) was used to generate the results in this table.

Table E-10. Maximum Flow Velocities Under the Rochester Bridge for Q = 27,000 cfs

MAXIMUM FLOW VELOCITY (FT/S) BETWEEN PIERS

Alternative	**Right Bank & Pier 3 (161' wide)**	**Pier 3s & 4 (149' wide)**	**Piers 4 & 5 (149' wide)**	**Piers 5 & 6 (149' wide)**	**Pier 6s & 7 (149' wide)**	**Pier 7 & Left Bank (41' wide)**
Existing Condition	3.2	3.6	4.3	4.2	4.6	1.8
Alternative 1	2.5	3.2	3.6	4.3	5.5	1.4
Alternative 2	2.6	3.2	3.6	4.3	5.4	1.4
Alternative 3	2.4	3.0	3.3	4.5	5.6	1.4
Alternative 4	1.7	2.0	3.5	5.0	5.5	1.3
Alternative 5	2.3	2.9	3.2	4.5	5.5	1.4
Alternative 6	1.7	2.0	3.5	5.0	5.5	1.2
Alternative 7	0.7	0.9	3.5	4.7	5.5	1.5

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For the existing condition, the water with the highest velocity flows between Piers 6 and 7. All of the alternatives reduce the velocity of the water flowing through the majority of the bridge openings; however, the velocity is increased between Piers 5 and 6 and between Piers 6 and 7 for all alternatives. This increased velocity is due to the increase in flow through this area. The distribution of the flow is changed such that more flow and higher velocities occur more toward the east between Piers 5, 6, and 7. The increased velocity is of little concern because the direction, not the magnitude, is the critical factor. Figures E-B-1 through E-B-16 in Appendix E-B, *Velocity Figures and Water Surface Profile Comparison Figures,* illustrate the velocity of the water in the vicinity of the Rochester Bridge for the existing condition and each of the alternatives studied with a flow rate of 27,000 cfs. The differences in velocity between the existing condition and each of the alternatives are shown in figures E-B-17 through E-B-23 for a flow rate of 27,000 cfs.

In higher flow conditions, water flows over the overbank area and islands. The ADH mesh was modified to include the overbank area and islands shown in figure E-18. The following scenarios were modeled using this modified mesh:

- Existing Condition
- Alternative 3
- Alternative 4
- Alternative 5
- Alternative 6

Figure E-18. Modified ADH Mesh (12,006 Nodes and 23,179 Elements)

Recall that the updated mesh illustrated in figures E-14 and E-15 was used to model Alternative 7. The following flow regimes were used for analysis:

- 5-year return period flow (43,000 cfs)
- 10-year return period flow (54,000 cfs)
- 25-year return period flow (68,000 cfs)
- 50-year return period flow (77,000 cfs)
- 100-year return period flow (86,000 cfs)

Figures showing the velocity distribution for each scenario and the velocity difference between the existing condition and each alternative for the five flow rates studied with the expanded mesh are located in figures E-B-24 through E-B-75 in Appendix E-B, *Velocity Figures and Water Surface Profile Comparison Figures*. As discussed earlier, Alternatives 1 and 2 were not considered effective; therefore, they were not studied at the higher flow regimes. As can be seen in these figures, the velocity differences between the existing condition and each of various alternatives reduce as the flow rate increases.

Comparisons of water surface profiles between the existing condition and Alternatives 3, 4, 5, 6, or 7 for the 100-year return period flow of 86,000 cfs are shown in figures E-B-76 to E-B-80 in Appendix E-B. According to these figures, the impact of these alternatives on the 100-year water surface profile is negligible, i.e. there are no backwater affects on the 100-year flood profile from installing the closing dam or dike with a top elevation of 643 ft or the LSTP at an elevation of 646 ft. This is significant for permitting purposes; however, it should be noted that these alternatives assume some channel scour but not deposition. The scour is expected as the structures redirect streamflow away from the eroding bank, relocating the thalweg over time due to changes in velocity and resulting scour. The slackwater areas between structures encourage deposition. Additional one-dimensional modeling performed using HEC-RAS (discussed in Section V. B.2, *Alternative Modeling and Result*) will more directly relate to permitting requirements.

Analysis of the model run results for Alternatives 3, 4, 5, 6, and 7 (with a top elevation of all closing structures and dikes at 643 or the LSTP at 646) indicated that Alternative 7 performed well and was within the Section 14 jurisdiction. Further consideration of the constructability, cost of construction, and likelihood for success of each alternative, indicated that Alternative 7 would be the best choice of the alternatives studied to accomplish the project's goals, thus Alternative 7 was selected as the preferred alternative.

To calculate water surface elevation profiles generated using ADH for the existing condition and Alternative 7, an alignment was selected and is shown in figure E-19. The profiles generated from the alignment are shown in figures E-20 and E-21 for the existing condition and Alternative 7. According to this analysis, the hydraulic impact of the longitudinal stone toe protection (with a top elevation of 646) and the two upstream stream barbs (sloping from 648 to 638) on the water surface profile (for a flow rate of 27,000 cfs) is minimal with a maximum rise of 0.052 ft during the 1 percent chance exceedance flow. Since a detailed Flood Study has not been performed throughout this area of the Cedar River, this is well within the State of Iowa's maximum rise guidelines Therefore significant floodplain construction permitting issues are not anticipated.

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It is not anticipated that the proposed structures will aggravate existing conditions during events larger than the 1% ACE. Above the 1% ACE water surface elevation, flow will expand around the bridge and into the floodplain and it is not expected that additional velocity, scour, or sedimentation will occur.

A map of the proposed Alternative 7 is illustrated in Figure E-22.

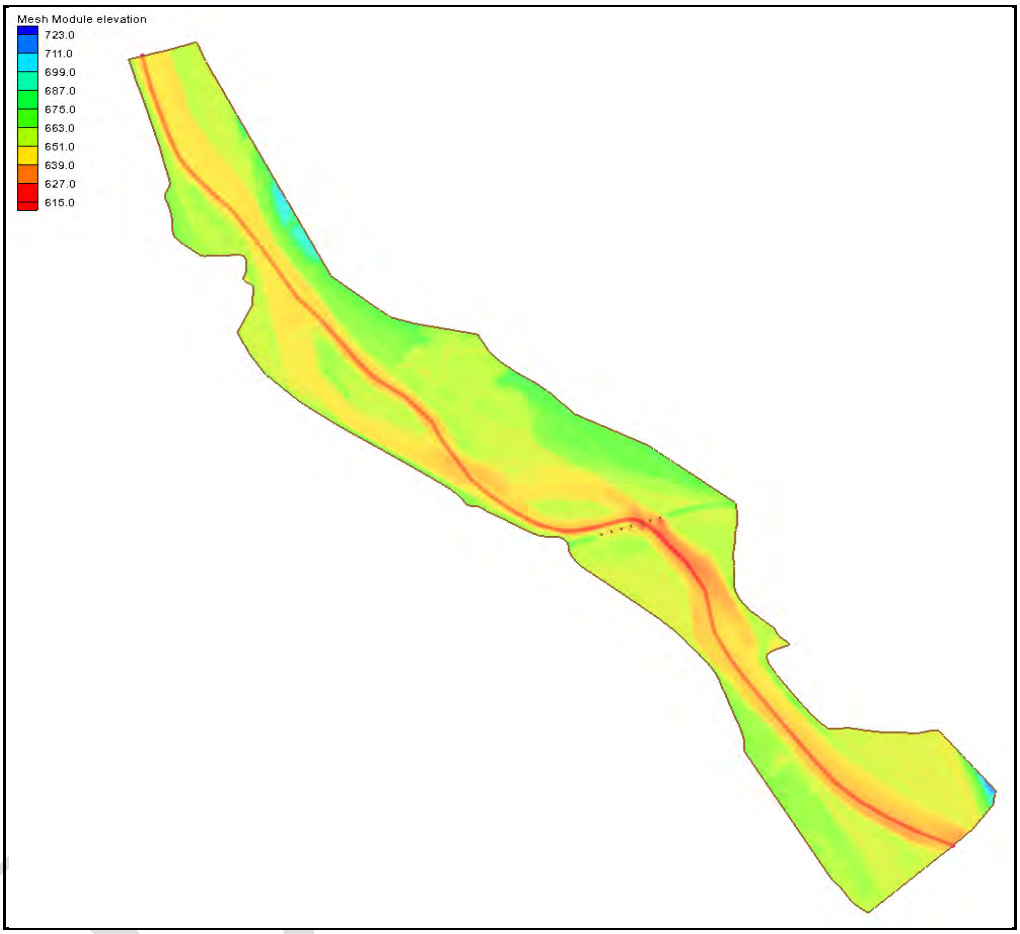

Figure E-19. Historic Main Channel Alignment

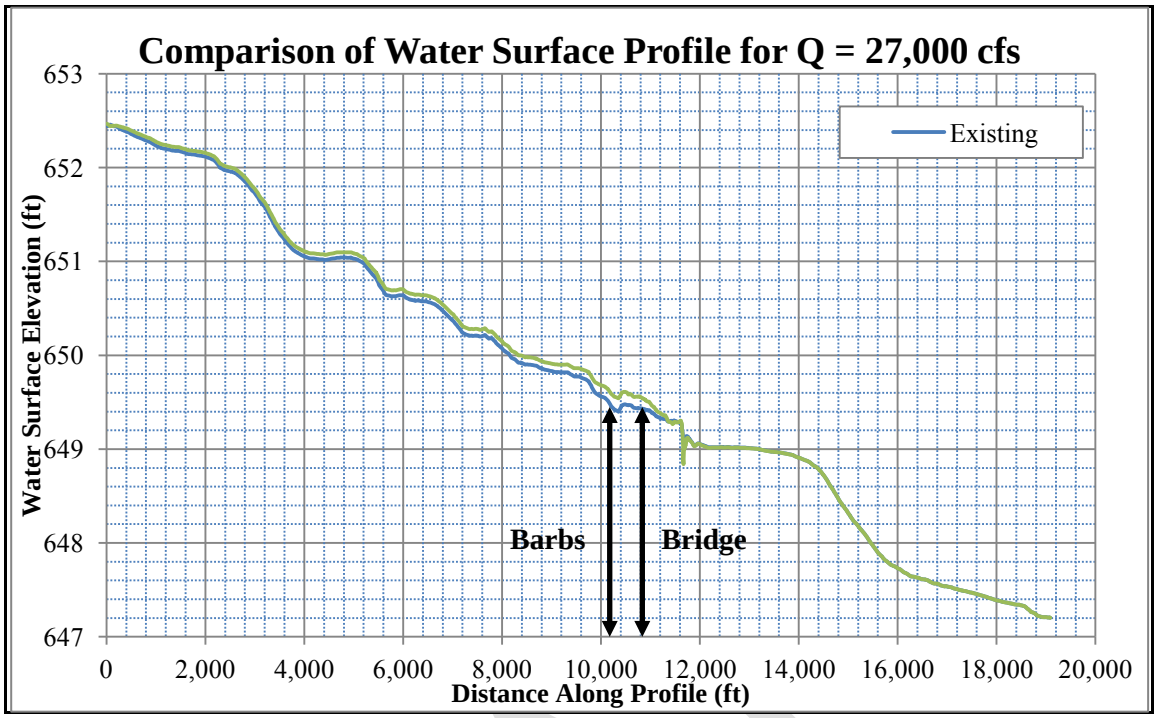

Figure E-20. Water Surface Profile of Historic Main Channel for Existing Condition and Alternative 7 (50% Chance Exceedance)

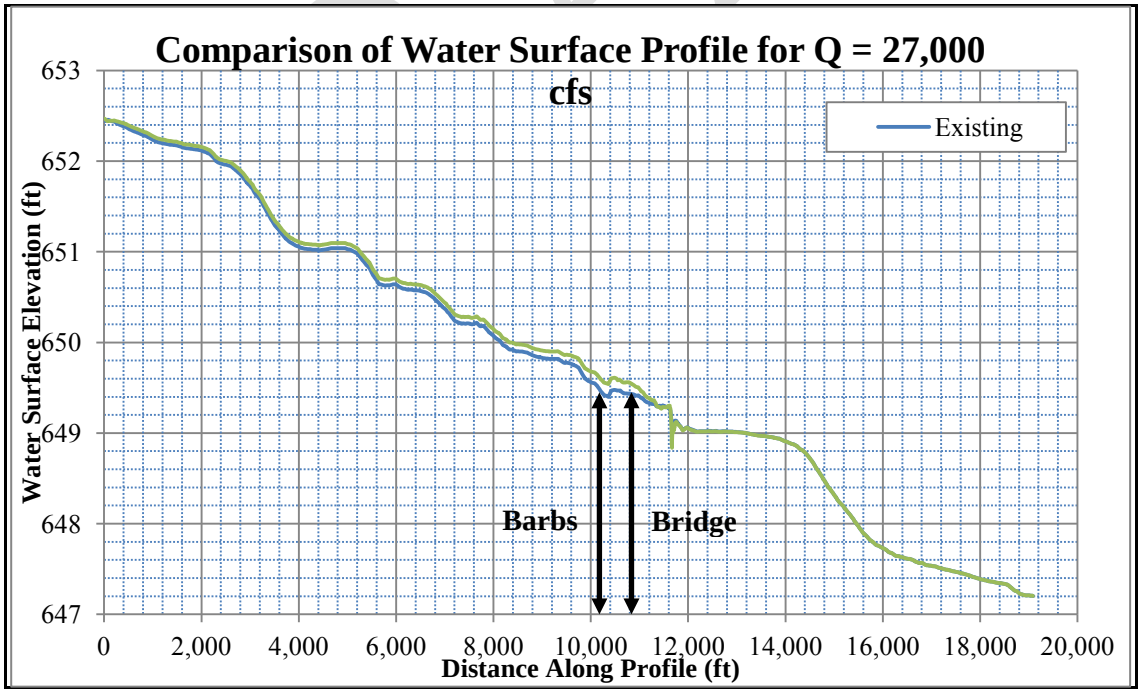

Figure E-21. Water Surface Profile of Historic Side Channel for Existing Conditions and Alternative 7 (1% Chance Exceedance)

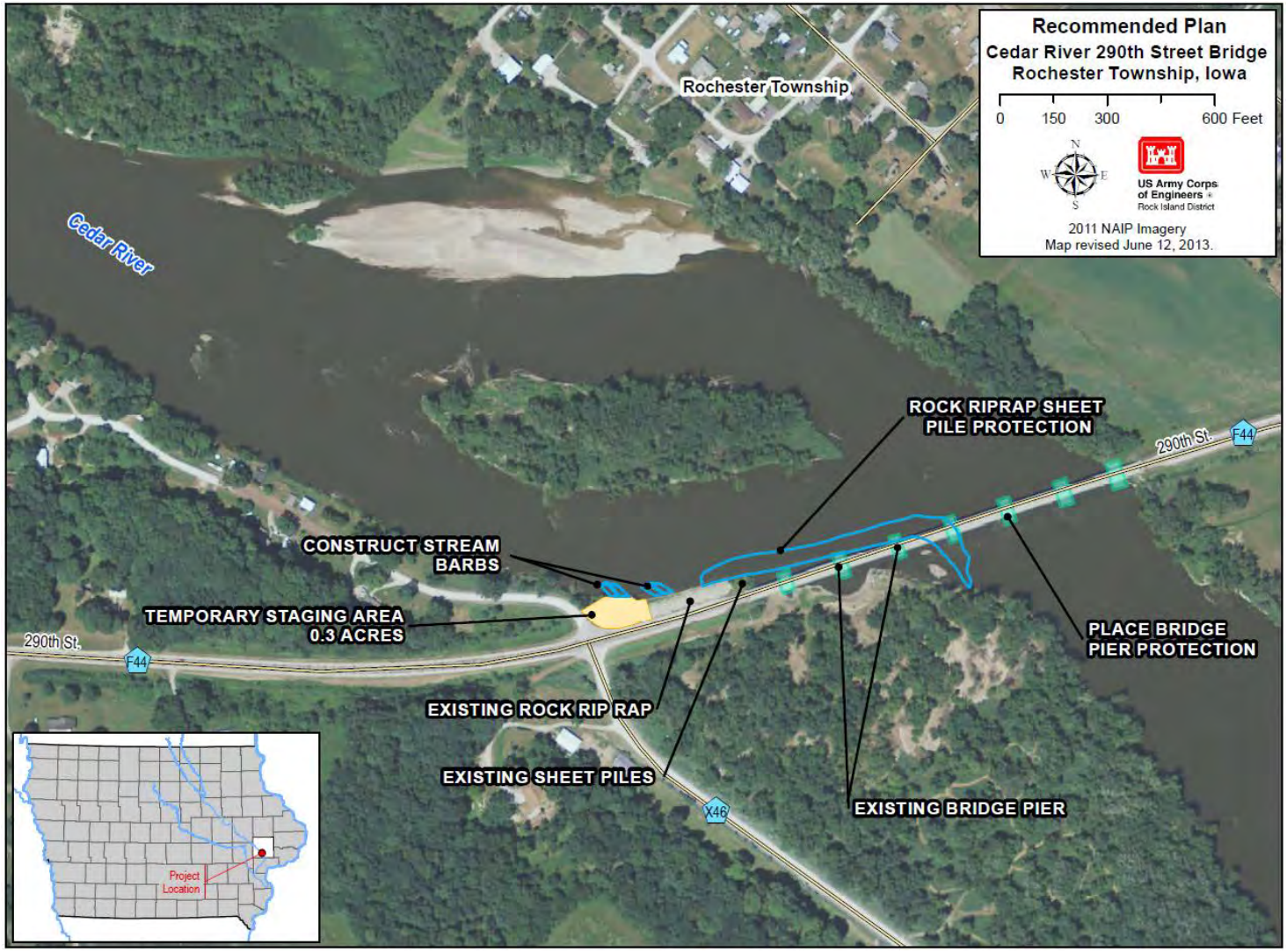

Figure E-22. Recommended Plan (Alternative 7) Layout

2. HEC-RAS Modeling. HEC-RAS modeling of the alternatives was also performed to determine what impacts, if any, were present on the 100-year profile. HEC-RAS modeling is required by the State of Iowa to obtain floodplain construction permits. For the following example of the modeling of Alternative 3 (a previously selected alternative prior to the development of Alternative 7), the closure structure was modeled with top elevations of both 643. Figure E-23 shows a cross section of the closure structure.

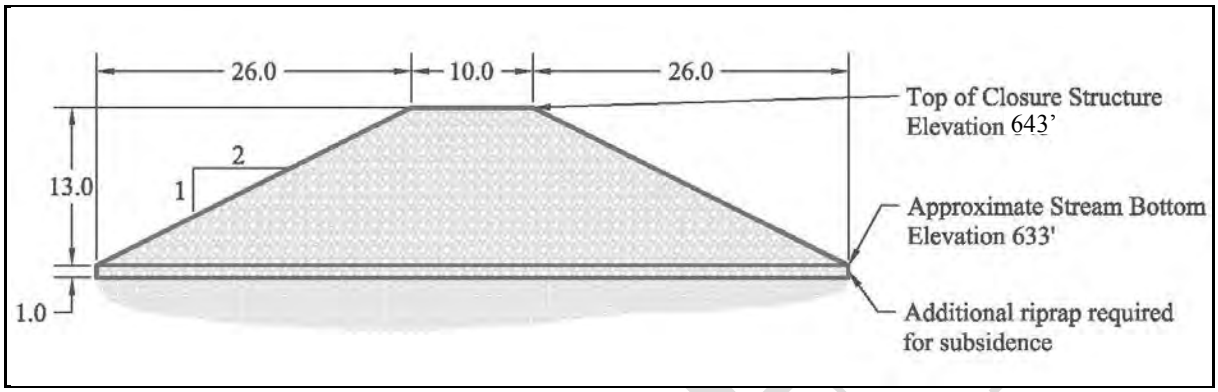

Figure E-23. Cross Section of Modeled Closure Structure

Figure E-24 show the HEC-RAS cross section of the historic side channel and the closure structure.

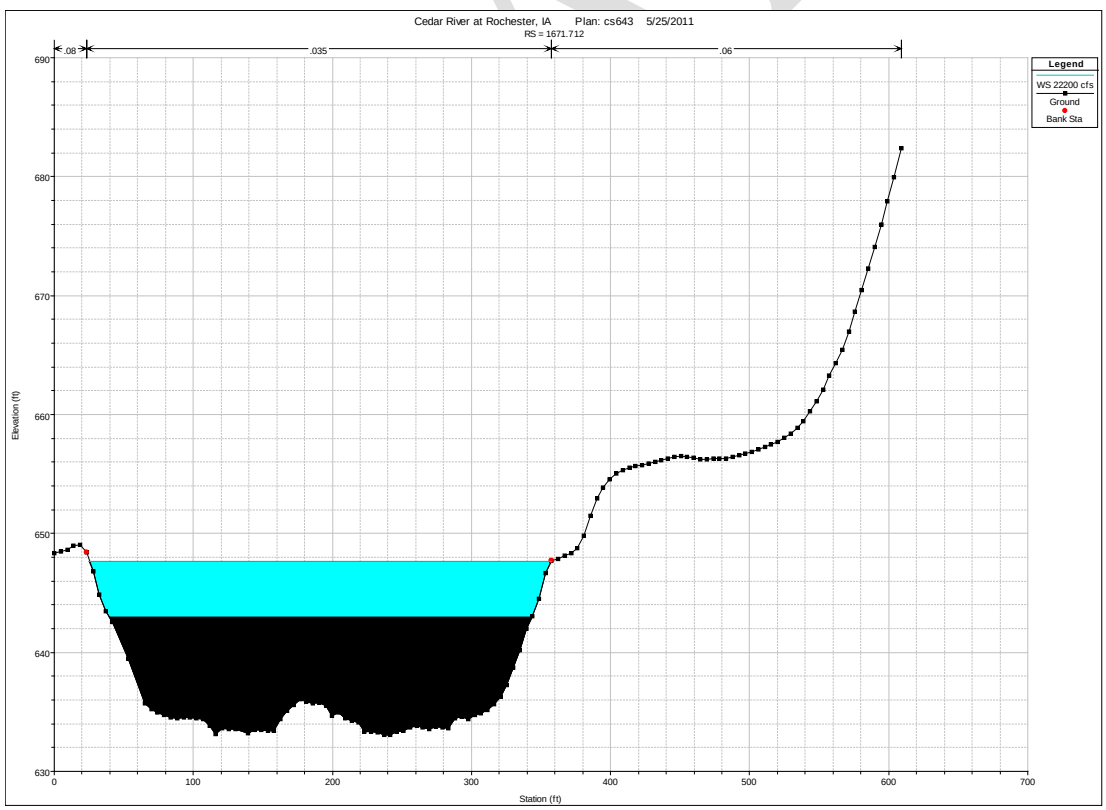

Figure E-24. HEC-RAS Cross Section With the Closure Structure With a Top Elevation of 643 Feet

The HEC-RAS modeling corroborates the findings of the ADH modeling. Although the purpose of modeling Alternative 3 with HEC-RAS is not to determine flow distribution, it is interesting to note that when the model is run with the closure structure, the flows in the historic main channel increase over the existing condition. Because the ADH model is used to evaluate flow distribution, the flow values calculated by optimizing the split flow between the historic main and side channel in HEC-RAS will not be discussed here.

As stated above, the purpose of the HEC-RAS model is to evaluate impacts to the water surface profiles of the Cedar River when the closure structure is in place. Figure E-25 illustrates the impacts to the water surface profile for closure structures with the closure structure in place.

As expected, the impacts to the water surface profile decreases as the flow rate increases. The 100-year water surface profile for Alternative 3 with a closure structure top elevation of 643 is approximately 0.14 feet higher than the water surface profile for the existing condition upstream of the closure structure. There has been no floodway defined for this area by the Federal Emergency Management Agency (FEMA), so a 1 foot increase in the 100-year water surface profile is allowable.

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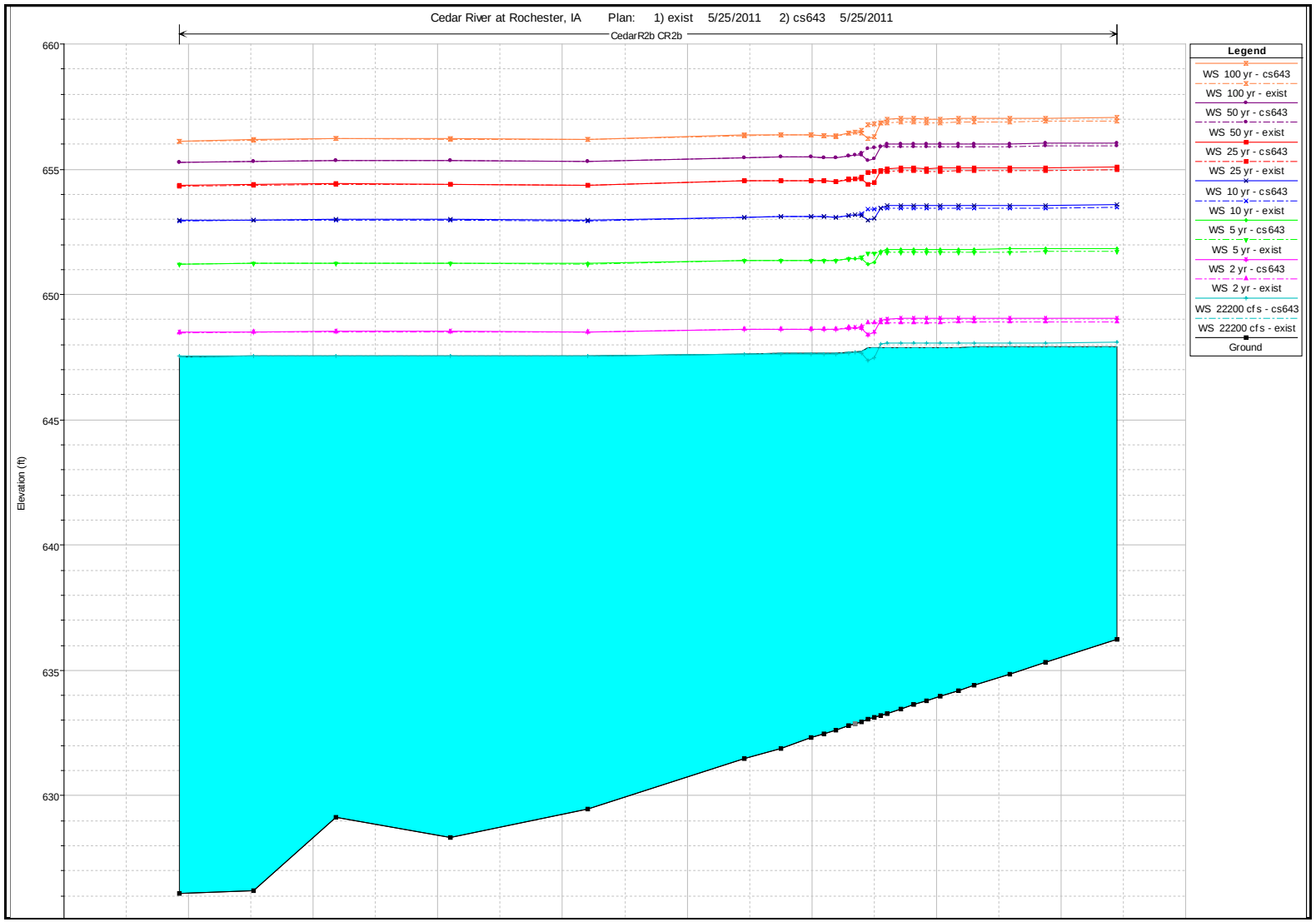

Figure E-25. Comparison of the Existing Condition vs. Alternative 3 With a Top Elevation of 643 Feet

VI. PIER SCOUR PROTECTION & RIPRAP SIZING

Scour depths were computed using equation 6.1 (page 6.2) from the Federal Highway Administration (FHWA) Hydraulic Engineering Circular 18 (HEC 18) dated May 2001 titled "Evaluating Scour at Bridges." The Pier geometry used a length of 49 feet and a width of 5 feet. The sediment factors assumed a D_{50} of 0.7 mm and D_{95} of 3mm with no impact from bed armoring. The analysis assumes an angle of attack which varies between 10 and 55 degrees for the existing condition at each Pier. Scour depths were computed for the 2-year (50% chance exceedance) and the 100-year (1% chance exceedance) flows which are 27,000 cfs and 87,000 cfs, respectively. The computations are based on the flow frequency relationship at the project site and the modeled hydraulic parameters as shown in table E-11. The alignment of the velocity vectors greatly impacts the resulting scour depth.

Table E-11. Scour Depth Parameters and Computation

Pier	Chance Exceedance	Velocity (fps)	Flow Depth (ft)	Existing Condition Scour Depth (ft)
3	50%	3.6	19	31.0
3	1%	5.2	31	38.8
4	50%	4.3	20	33.7
4	1%	4.3	33	35.7
5	50%	4.2	24	26.4
5	1%	5.2	36	30.5
6	50%	4.6	17	24.0
6	1%	5.7	30	28.4
7	50%	1.8	11	10.0
7	1%	3.4	23	14.6

The existing Pier protection is preventing the scour from developing to the extent indicated in table E-11 but must be regularly repaired. No matter what project is implemented at this bridge site, scour protection and regular monitoring at the piers is required.

Based on the guidance provided in FHWA HEC 23 dated March 2001 titled Bridge Scour and Stream Instability Countermeasures and an assumed velocity of 7 fps, riprap protection at the piers should be as described in the following paragraph. It should be noted that the assumed design velocity is significantly greater than velocities determined from the modeling. This increase in design velocity is conservative and based on engineering judgment considering the potential for concentrated flow in portions of the bridge opening as discussed in the guidance. Please note that, as per FHWA HEC 23, if rock riprap is used as Pier scour protection, the bridge should be "monitored and inspected during and after each high flow event to insure that the riprap is stable."

For eroded Piers, the top of the riprap should be even with the top of the base of Pier and extend horizontally twice the pier width from the edge of the pier. The riprap should then be sloped at 2 (Horizontal) on 1 (Vertical) down to the existing streambed. At Piers with a base that is not above the streambed, the top of the riprap mat should be placed at the same elevation as the streambed. The riprap blanket around Piers 3, 4, 5, and 6 should extend horizontally a distance of two times the pier width. Additional riprap is required at Pier 7 because of the scour history around this Pier. It is recommended that the riprap mat extend a distance of three times the pier width from the edge of the pier at this location.

The following values were obtained using Section 8.3 of FHWA HEC 23. The median stone diameter (D_{50}) was calculated to be 0.74 feet (or 34 pounds) based on the rearranged Isbash Equation.

$$D_{50} = \frac{0.692\,(KV)^2}{(S_s - 1)\,2g}$$

where:

D_{50} = median stone diameter (ft)
K = coefficient for Pier shape = 1.5 for round-nose Pier
V = velocity of the water on the pier = 7 ft/s (assumed)
Ss = specific gravity of riprap = 2.6 (assumed)
which corresponds to the unit weight of riprap = γ_s = 162 lb/ft^3
g = gravity = 32.2 ft/s^2

The thickness of the riprap mat should be at least three times the median stone diameter.

$$3 * D_{50} = 3 * 0.74 \text{ ft} = 2.2 \text{ ft}$$

Based on engineering judgment, the thickness of the riprap blanket should be increased to 3 feet for this project.

The maximum rock size should be no larger than twice D_{50}.

$$2 * D_{50} = 2 * 0.74 \text{ ft} = 1.5 \text{ ft}$$

Based on the calculations above, it was determined that Iowa Class E revetment would be suitable material. Based on engineering judgment, it was determined that larger stone would be preferable for this project due to the scour problems that have been experienced in the past; therefore, Iowa Class A revetment is recommended. The specifications for Iowa Class A revetment are as follows (IA DOT 4130.02.A):

- Nominal top size of 400 pounds (180 kg).
- At least 75% of the stones shall weigh more than 75 pounds (35 kg).
- None less than 50 pounds (25 kg).
- Stones shall have at least one flat face with one dimension at least 15 inches (375 mm).

Hydraulic modeling using ADH of the existing condition and Alternative 4 (two dikes near the bridge in the West downstream side channel) shows that the velocity near the proposed stream barbs does not exceed 7 feet per second for the flow rates studied. Although the dikes proposed in Alternative 4 do not have the same configuration to the stream barbs and LSTP proposed in Alternative 7 (BS3), they are similar to the proposed stream barbs in that they will constrict and redirect flow. Assuming a velocity of water of 7 fps, a unit weight of riprap of 162 lb/ft^3, and high turbulence conditions, the average weight of D_{50} and D_{100} riprap for stream barb construction were calculated to be approximately 180 lb and 360 lb, respectively, using EM 1110-2-1601 and NRCS Technical Supplement 14H. The nominal top size for Iowa Class A revetment is larger than the required D_{100}, so it is appropriate for the construction of the stream barbs.

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VII. RECOMMENDATIONS

After modeling Alternatives 1 through 6, environmental concerns regarding those alternatives were identified. The sand bar that has been established on the left descending bank of the Cedar River upstream of the Rochester Bridge would most likely be eroded after construction of a closure structure or upstream dike. This would adversely affect the downstream environment as large amounts of sand would be transported downstream. The large quantity of material required for the construction of Alternatives 1 through 6 was also a concern because of the associated construction costs.

Due to these concerns, an additional alternative, the recommended alternative (Hydraulics Alternative 7), was developed. The recommended alternative, which consists of two small stream barbs and the longitudinal stone toe protection (Measure BS3) and riprap protection at the piers, was then modeled using ADH, as previously discussed. This alternative will be modeled using hydraulic methods during the final design phase. This recommended alternative is anticipated to have a considerably lower construction cost and have fewer environmental concerns than Alternatives 1 through 6 and also falls within the objectives and scope of a Section 14 project.

Pier protection, including riprap, is recommended to protect the piers from scour. The inspection program must be continued and scour protection maintained over time to ensure the integrity of the bridge.

The two stream barbs that are proposed in the recommended alternative will be constructed along the RDB of the Cedar River upstream of the abutment for the Rochester Bridge. The stream barbs will extend approximately $^{1}/_{10}$ of the way across the river channel and will have a top elevation at the bank of 648.0 feet sloping downward into the channel to an elevation of 633.0 feet. The purpose of the stream barbs is to stabilize the shoreline.

The longitudinal stone toe protection will be constructed along the RDB of the Cedar River starting alongside the abutment and continuing eastward the curving along Pier 4 and tying back into the downstream shoreline. The LSTP will have a top elevation of 646.0 feet which is the historic bank elevation as illustrated on the bridge construction drawings. Slopes of the LSTP will be 2 (Horizontal) on 1 (Vertical). The portion of the LSTP along the sheet pile will extend outward 8 feet at elevation 646.0 before continuing sloping downward at 2:1 and merging with the existing streambed. The purpose of the LSTP is to protect and repair the shoreline along with providing support to the sheet pile structure. It is expected that the area behind the LSTP will in time fill in with sedimentation during overtopping flow events.

Pier protection, including riprap, is recommended to protect the piers from scour. The inspection program must be continued and scour protection maintained over time to ensure the integrity of the bridge.

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VIII. REFERENCES

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SECTION 14, CEDAR RIVER, 290TH STREET BRIDGE
ROCHESTER, IOWA

APPENDIX F

GEOTECHNICAL

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SECTION 14, CEDAR RIVER, 290TH STREET BRIDGE
ROCHESTER, IOWA

APPENDIX F
GEOTECHNICAL

A global stability analysis for the 290th Street Bridge project was performed using SLOPE/W. The site geometry and material properties were provided for a section through the sheetpile supported embankment at the site. The main concern at the site is that the thalweg of the river is eroding material near the sheetpile, making it unstable. If the surface of the riverbed is appreciably different from that analyzed, additional analyses taking this into account would be required.

The critical loading for this site occurs when the river is at low water. The historic low water elevation of 636.9ft was used for the analyses. Based on the recommendations of EM 1110-2-2504, *Design of Sheetpile Walls*, and EM 1110-2-1902, *Slope Stability*, a Factor of Safety (FS) of 1.5 is required for the embankment.

Three potential failure scenarios were analyzed: a failure of the slope above the top of sheetpile, a failure at the toe of the sheetpile, and a failure through the sheetpile which takes into account the structural capacity of the sheetpile.

The first analysis examined the stability of the slope retained by the sheetpile, see Figure F-1. In this figure, the critical failure surface is shown in green. The failure surface was constrained so that the failure daylights at the elevation of the top of sheetpile or higher. The resulting FS of 2.3 meets the stability requirements.

The second analysis examined the stability of the embankment with a failure through the toe of the sheetpile (Figure F-2). The sheetpile was driven to competent limestone when it was installed, so a deeper failure surface shouldn't develop. The FS for this condition is 1.3. This FS is lower than Corps requirements and suggests action to stabilize the embankment is warranted.

The third analysis examined the embankment stability without restraining the failure surface above or below the sheetpile. Figure F-3 presents this analysis when the structural capacity of the sheetpile is ignored. After consulting with EC-DS, it was determined that the PS-27.5 sheetpile has the structural capacity to resist a 560 lb per lineal foot unbalanced load. Accounting for the resistance provided by a 500lb/lf load, the FS for this section is 0.8.

To satisfy Corps criteria, a stability berm or other repair is required. For the feasibility level study, a stability berm composed of riprap has been considered. The repair, as shown in Figure F-4, consists of an 8ft bench of riprap placed to the top of the sheetpile wall. The riprap placement then slopes to the riverbed at a 1.5H:1V slope. This provides a FS=1.6.

Migration of the Cedar River's thalweg towards the 290th St Bridge abutment has prompted concern about the stability of the embankment analyzed. A global stability analysis suggests that there is a marginal FS for the embankment at historic low flows. A repair to address this low FS and potential erosion of riverbed materials stabilizing the embankment is recommended. One acceptable repair is the installation of a riprap berm, as shown in Figure F-4.

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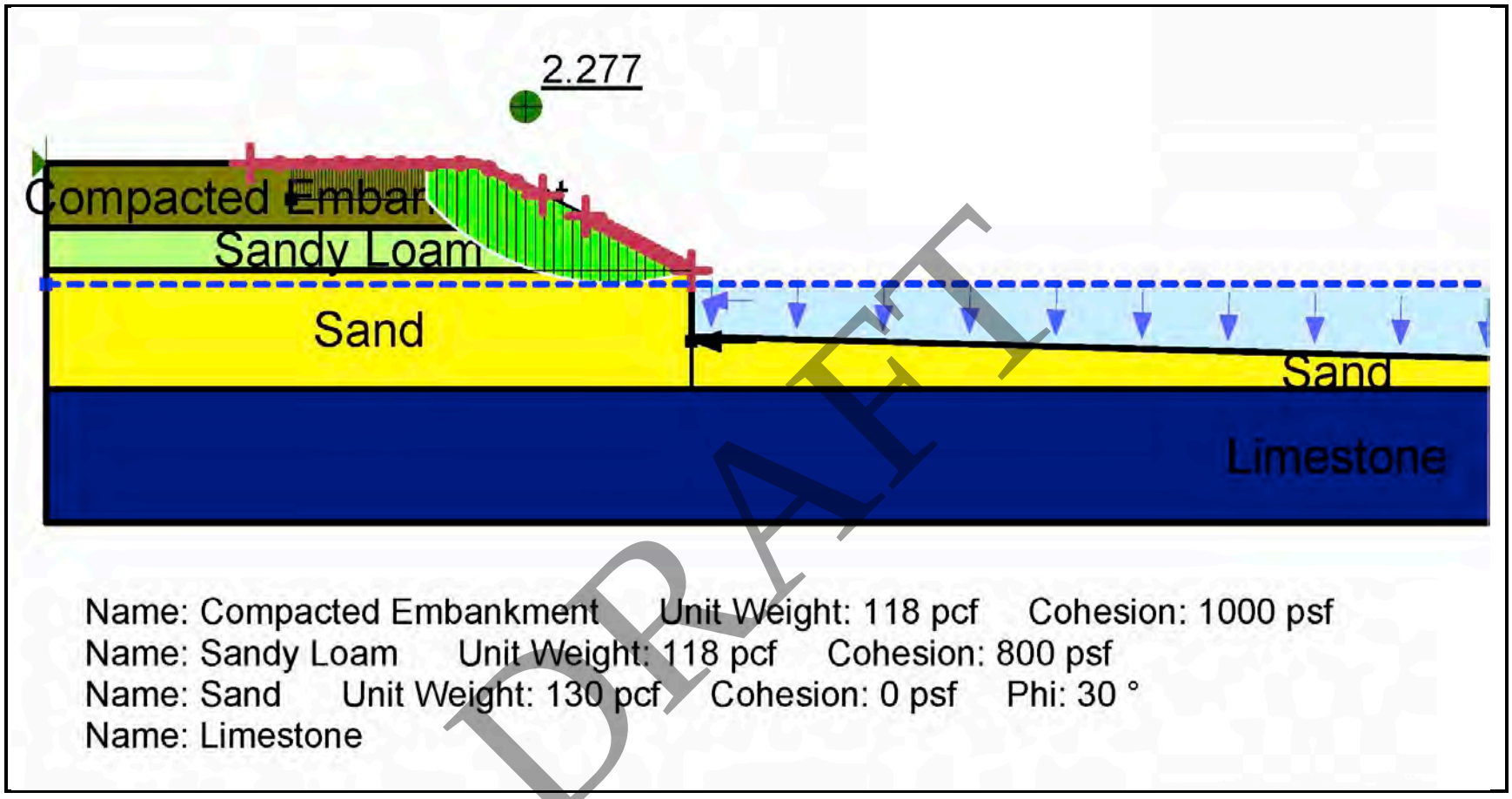

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Figure F-1. Stability of Upper Slope.

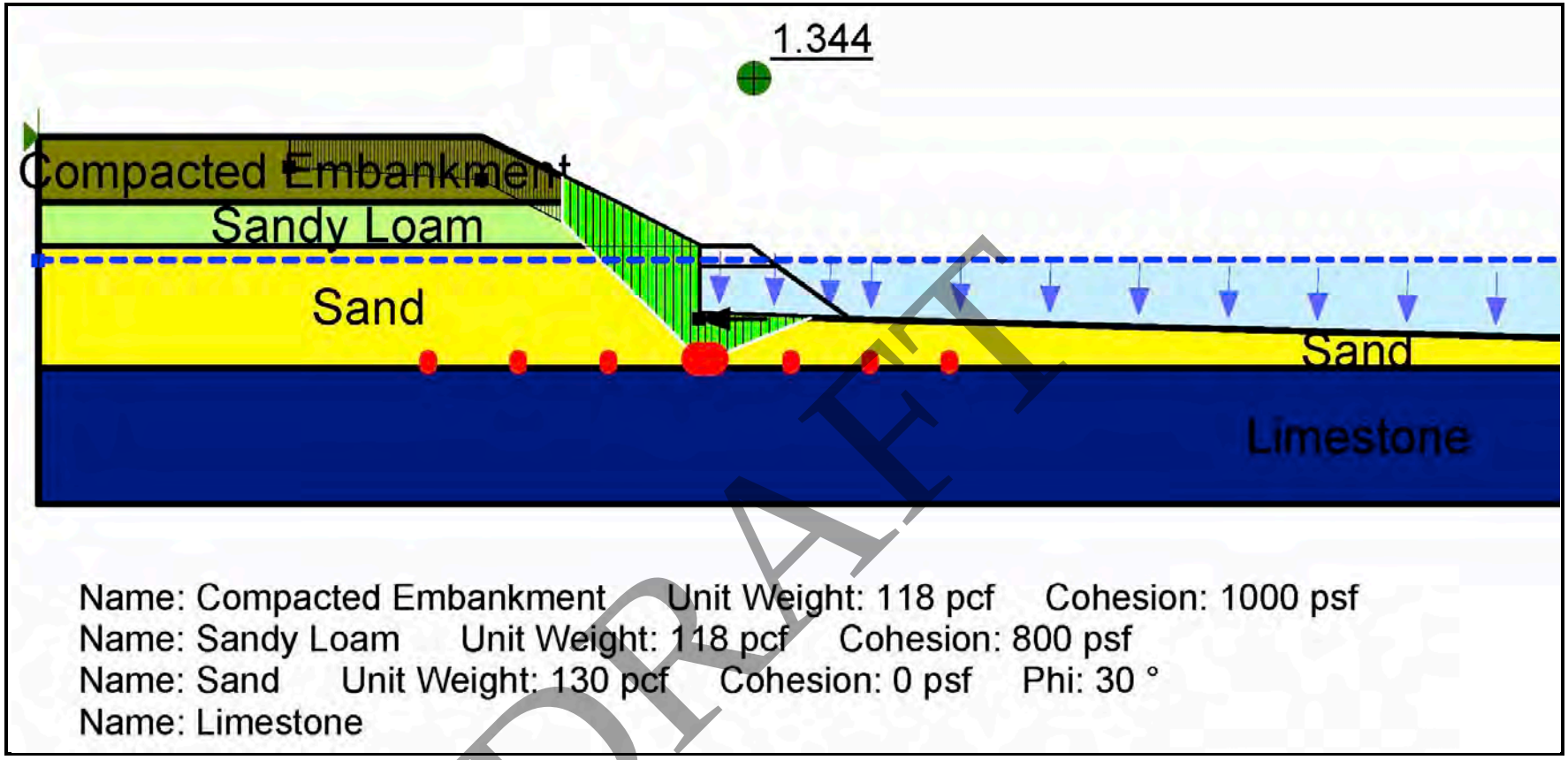

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Figure F-2. Stability at Lower Toe of Slope

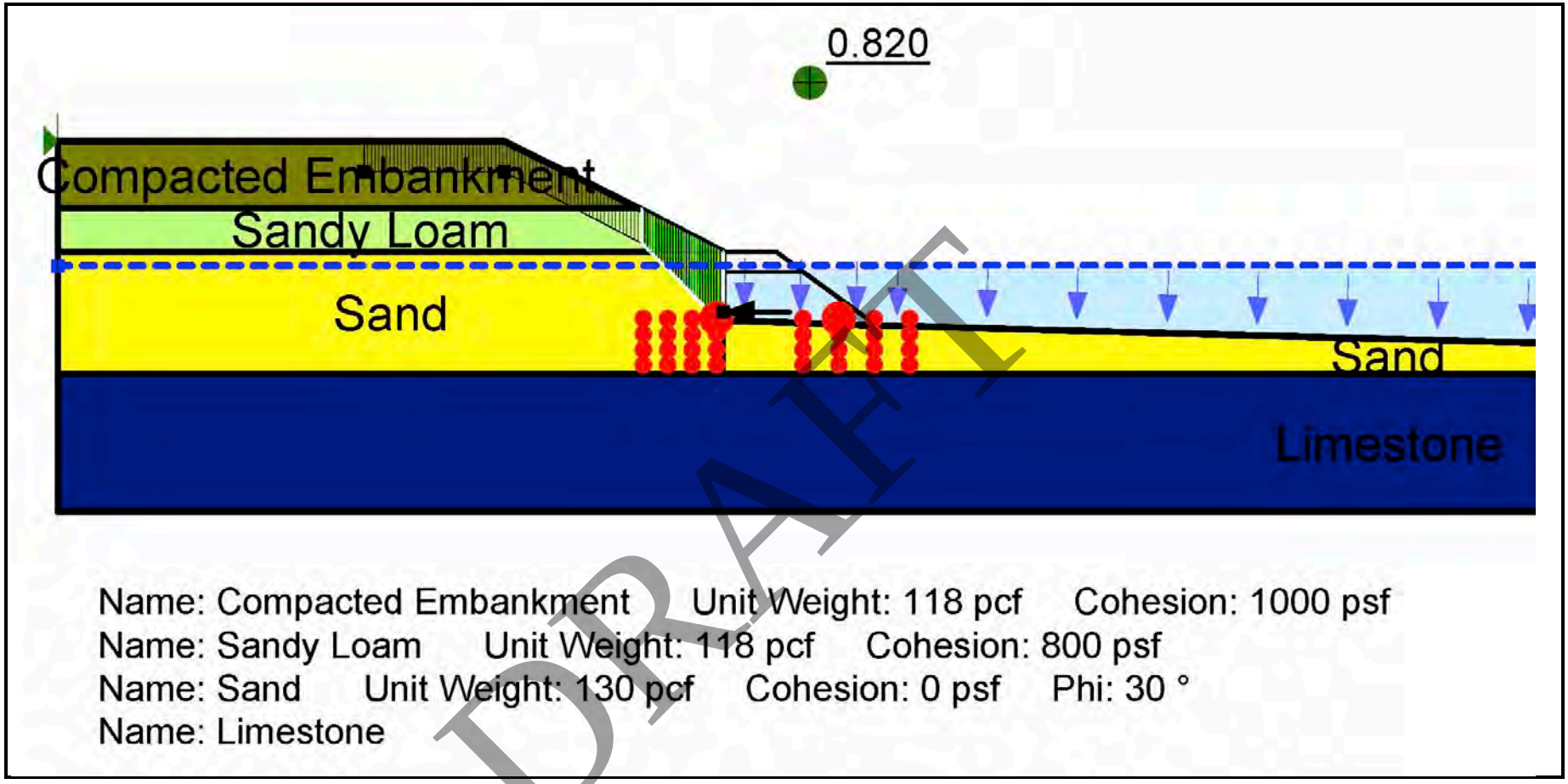

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Figure F-3. Unrestrained Slope Failure

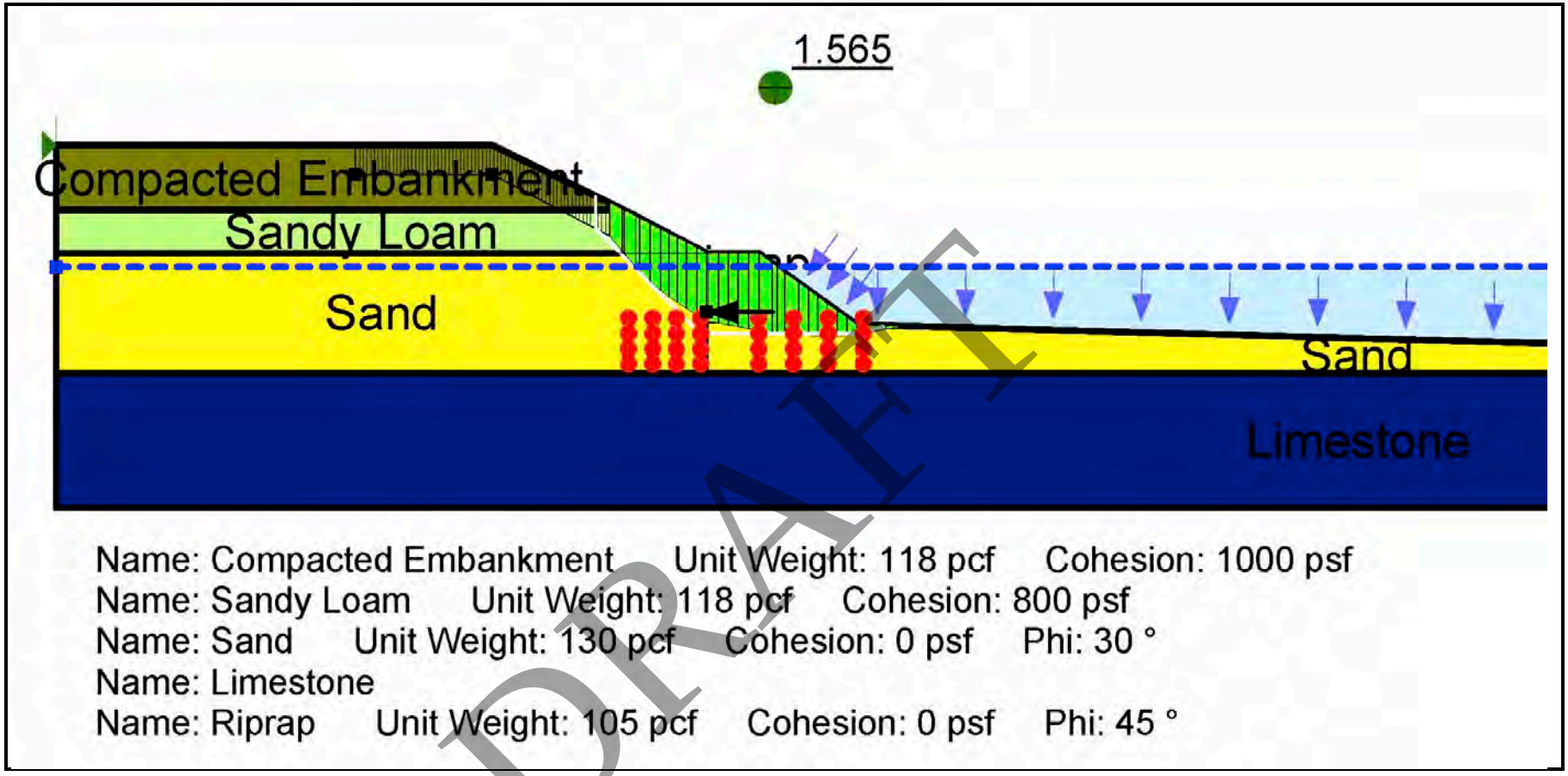

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Figure F-4. Unrestrained Slope Failure with Riprap Repair

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SECTION 14, CEDAR RIVER, 290TH STREET BRIDGE
ROCHESTER, IOWA

APPENDIX G

INSPECTION REPORTS

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FLOOD 2008

POST-FLOOD BRIDGE EVALUATION REPORT
OLD IOWA HWY. 979 ROCHESTER BRIDGE, ROCHESTER, IA
CEDAR COUNTY

DRAFT

Prepared for Cedar County
by
VJ Engineering
December 2008

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ROCHESTER BRIDGE
OVER THE CEDAR RIVER
OLD IOWA HWY. 979
ROCHESTER, IOWA
FHWA NO. 18490

Executive Summary

The Rochester Bridge west of Rochester, IA was closed to pedestrian and vehicular traffic on or around June 12, 2008 by Cedar County officials due to flooding of the Cedar River.

On July, 11, 2008, after the river stage had receded sufficiently, the bridge superstructure, piers and abutments were visually inspected and an underwater structural inspection was performed on submerged piers. In general, the bridge suffered few detrimental effects during the flood. It is recommended that riprap and/or armoring be added around piers that received scour damage and debris be carefully removed from the structured.

Bridge Description

The Rochester Bridge has a variable depth steel girder superstructure with seven reinforced concrete piers. The piers and concrete abutments are founded on timber piling. For the purpose of this report, the piers will be numbered from west to east. The deck of the bridge is reinforced concrete. The bridge was built in 1948 and had reconstruction work done in 1985.
Riprap revetment was done following the 1993 flood on piers 5, 6 and 7.

The bridge deck is 29'-9" wide and 1145'-0" in length. It carries two vehicle lanes and sidewalks on both sides with steel guard rails on the edges of the deck. The estimated average daily traffic in 2006 was 680 vpd.

Investigative Methods

The superstructure, piers and abutments were visually inspected for delamination, exposed reinforcing, lateral displacement and other damage due to the high water event.

Underwater structural inspection was performed by a team of qualified DOT approved divers for the seven submerged piers. The underwater inspection examined all of the piers that were submerged in the Cedar River during the high water event. Photographs of the findings can be found in Appendix A.

Cedar River data for June 2008 for the nearest gage station at Cedar Rapids, and other historical data can be found in Appendix B. The Cedar Rapids gage station is located approximately 43 miles upstream of the Rochester Bridge.

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Inspection

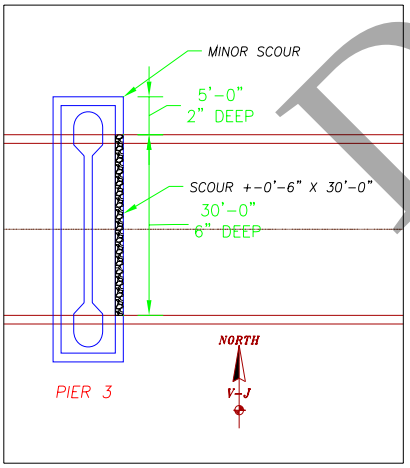
Bridge Deck: The bridge deck surface is in good condition and shows no visible damage as a result of this high water event.

Superstructure: No evidence of damage or movement of the steel girders was observed and the bearings appear in sound condition. The lateral bracing and steel connections show no damage. The bearings and pile caps show no sign of movement or deterioration. Some horizontal members of the superstructure have minor surface rust.

Significant amounts of debris accumulated during the flood are wedged between girders and lateral bracing throughout the superstructure. Pictures of the debris and rust are included in Appendix A.

Piers and Abutments: Overall, both abutments and the piers appear in good condition with some minor concrete pitting. Some debris has collected on Piers 4, 5 and 7 at the north (upstream) bull nose and typically along the west wall of the piers.

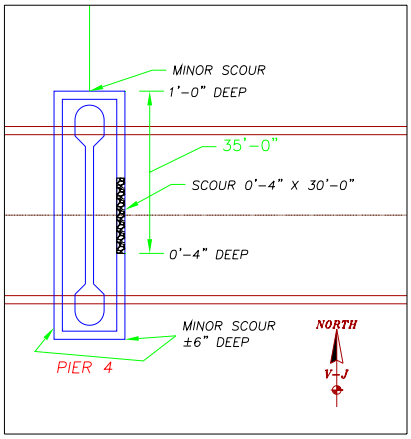
The inspection showed no pitting or spalling of the concrete on Pier 1. The bottom of the concrete pile cap was not exposed so no significant scour was evident at this pier.



Pier 2 also was in good condition and no scour damage was noted.

The concrete at Pier 3 appeared to be in good condition. Upon primary inspection, Pier 3 had some minor scour beginning at the north upstream bull nose and along the east wall at 0'-2" in depth below the pile cap at a distance of 5 ft. downstream, to 0'-6" in depth at a distance of 35 ft. downstream of the north bull nose. The downstream bull nose and the west wall of Pier 3 had no scour.

A second inspection on Pier 3 on September 12, 2008 during scour remediation work revealed the scoured areas had filled back in with hard packed sand approximately 1'-6" around the pier base.



The concrete at Pier 4 also appeared to be in good condition. Pier 4 had some minor scour beginning at the

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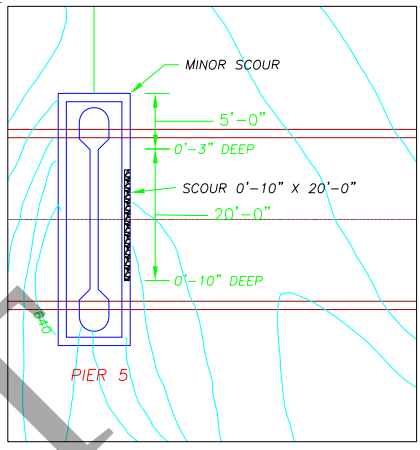
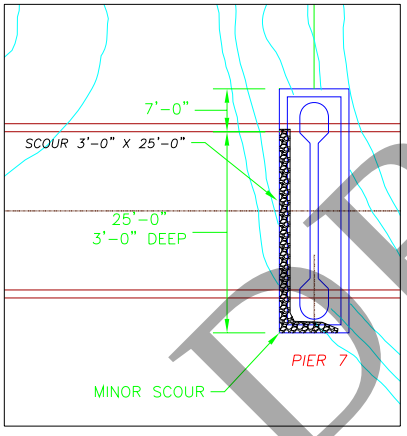
upstream bull nose and along the east wall at 1'-0" in depth below the pile cap at the upstream face of the pier, to 0'-4" in depth at a distance of 35 ft. downstream of the upstream bull nose. The downstream bull nose and the west wall of Pier 4 had 0'-6" of scour. The rest of the riprap was sound and in place
As was noted earlier, a significant amount of debris was present on the west and north side of Pier 4. The east side of Pier 4 had debris under the pier.



The concrete at Pier 5 is in good condition and some of the rip rap was intact along the downstream bull nose and east wall. Pier 5 had minor scour beginning at the north bull nose. Scour was present along the east wall of Pier 5 starting at 0'-3" in depth at a distance of 5 ft. downstream to 0'-10" in depth at a distance of 25 ft. downstream of the north bull nose. The downstream bull nose of Pier 5 had no signs of scour.

Pier 6 has no signs of scour. The concrete is in good condition. The riprap appears intact around the pier. The scour protection revetment from 1993 protected this pier from damage during this event.



The concrete at Pier 7 appeared to be in good condition. Pier 7 had significant scour along the west wall beginning 7'-0" south of the north bull nose. The scour was present along the west wall of Pier 7 at 3'-0" in depth for a distance of 25 ft. downstream. The diver was able to touch the wood piles beneath the pier. The south bull nose had some minor scour. The east wall of Pier 7 had no scour and riprap was still in place.

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Bridge Approaches: Select removal and replacement of damaged asphalt approach roadway should be examined and completed by Cedar County.

Conclusions and Recommendations

1. The approach roadways have cracked and damaged areas of asphalt and should be repaired.

2. Additional armoring was added at the scoured locations of Piers 4, 5 and 7. The armoring will protect the pile caps and timber piles from further undermining and damage due to exposure to extreme flow. Armoring with grout bags was completed at

Piers 4, 5 and 7 on Friday September 12, 2008. See Appendix B for As-Built drawings.

3. Debris on Pier 3, 4, 5 and 7, as well as debris caught under the superstructure has been removed. Care was exercised to not damage any of the bridge components.

A biannual bridge inspection program, as required by the FHWA and IDOT, should be implemented for this structure.

We appreciate this opportunity to work with you on this inspection, and are prepared to assist you in the future. If you have any questions regarding this report or our services, please contact our office.

Sincerely,

Jane Driscoll, PE
Project Manager
VJ Engineering

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APPENDIX A

Photographs

Photo #1 – Superstructure looking west.

Photo #2 – Debris under superstructure.

Photo #3 – Rust on superstructure. Crack on barrier rail.

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Photo #4 – Bearing caps intact. Looking southwest.

Photo #5 – Minor debris and rust on superstructure.

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Photo #6 – Superstructure to abutment connection, no signs of lateral movement.

Photo #7 – Debris under superstructure.

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Photo #8 – No scour at abutments.

Photo #9 – Upstream superstructure, looking southwest.

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Photo #10 – Debris caught on Pier 3 upstream bull nose.

Photo #11 – Debris caught on Pier 4 upstream bull nose.

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Photo #12 – Debris caught on Pier 7 upstream bull nose.

Photo #13 – Debris between superstructure and barrier rail.

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APPENDIX B

As-Built Drawings

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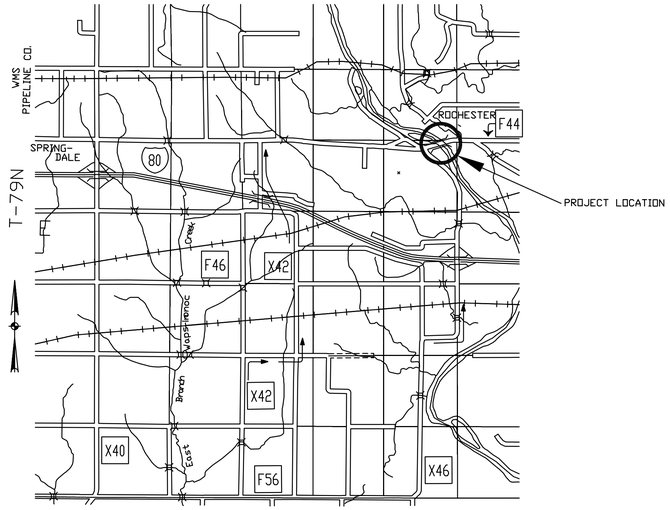
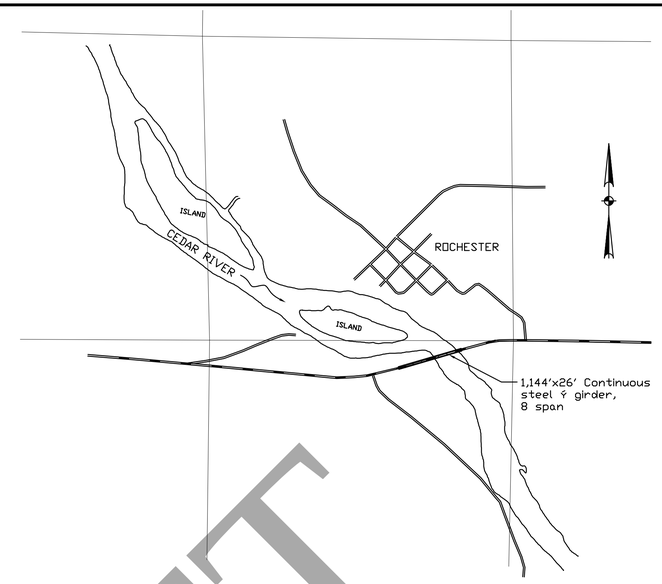
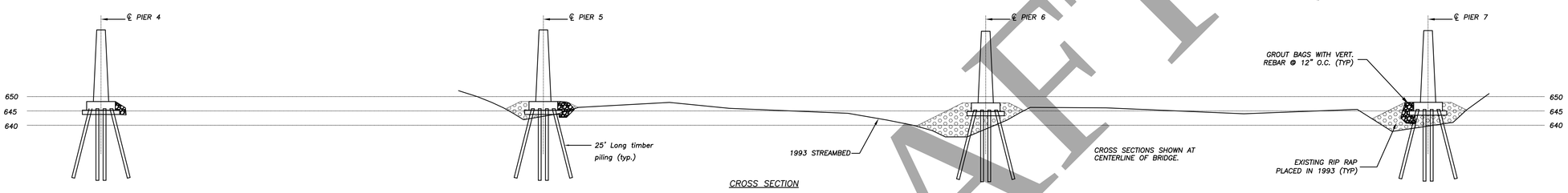


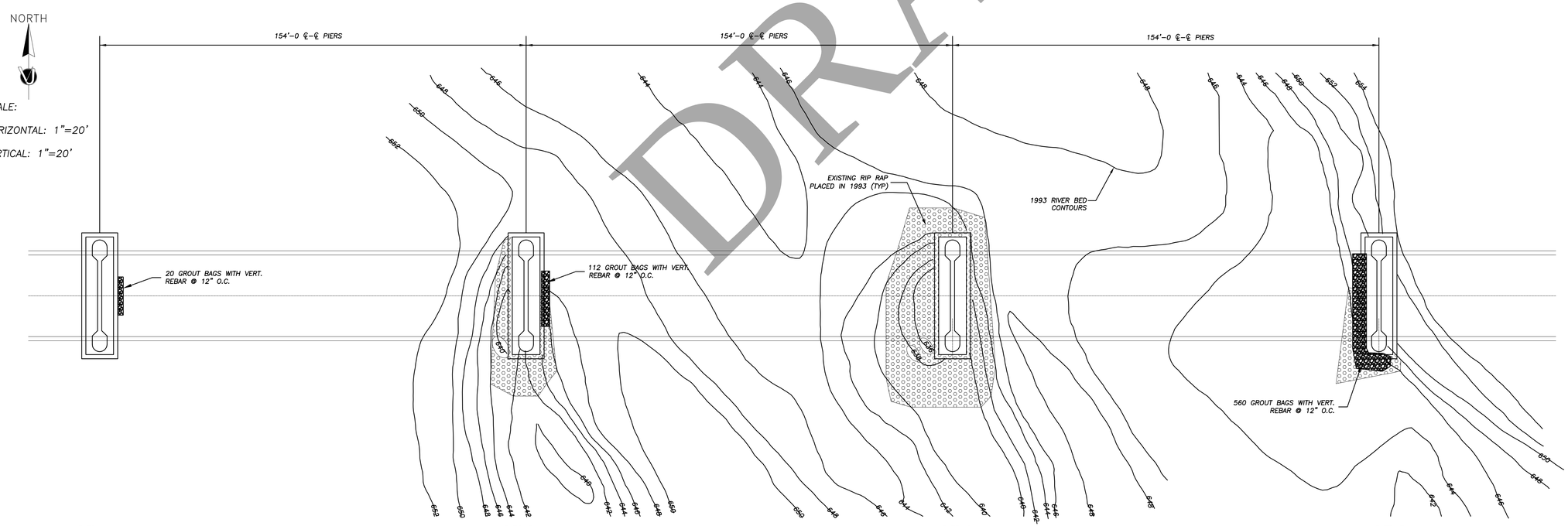
LOCATION MAP



NOTES:
1. ELEVATIONS AND BRIDGE DIMENSIONS TAKEN FROM PLANS & NOTES OF THE EXISTING BRIDGE, FHWA NO. 018490.
2. BENCHMARK: TOP OF PIER 7, ELEVATION = 673.02.
3. 60 LB. GROUT BAGS HAND PLACED BY DIVERS. AS-BUILT LOCATION BASED ON DIVERS MEASUREMENTS.
4. DATE OF PIER SCOUR PROTECTION REPAIR: SEPTEMBER 2008.



CROSS SECTION



PIER 4
Bottom of cap 645.44
Bottom of seal 643.94

PIER 5
Bottom of cap 645.28
Bottom of seal 643.78

PIER 6
Bottom of cap 644.81
Bottom of seal 643.31

PIER 7
Bottom of cap 645.02
Bottom of seal 643.52

PLAN

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vj engineering
2570 holiday road
coralville, iowa - 319-338-4939

BRIDGE PIER SCOUR PROTECTION REPAIR
ROCHESTER BRIDGE OVER THE CEDAR RIVER
CEDAR COUNTY, IOWA

AS-BUILT PLAN AND CROSS SECTION

1

scale	AS NOTED
drawn by	GFF
approved by	JLD
date	01/09/09
revisions	

08IC134

08IC134

Jan 09, 2009 T:\WORK\08-IC-145\dwg\ROCHESTER BRIDGE 2008.dwg

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APPENDIX C

Historical Data
Original Bridge Drawings
1993 Scour Remediation Drawings

GAGE AT CEDAR RAPIDS, IA
43 MILES UPSTREAM OF
ROCHESTER OLD HIGHWAY 979 BRIDGE

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FED. ROAD DIST. NO.	STATE	F PROJ. NO	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
5	IOWA	469 (3)			

STATE OF IOWA

STATE HIGHWAY COMMISSION

DESIGNS FOR

BRIDGES AND CULVERTS

PRIMARY ROAD SYSTEM F. PROJ. NO 469 (3)

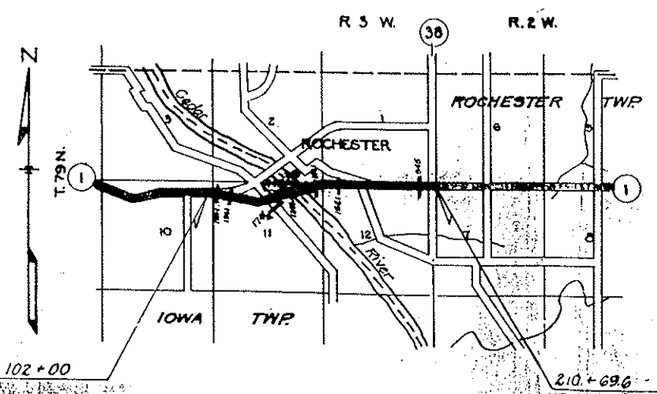
CEDAR COUNTY

JANUARY 1942-44

F 469 (3)

DESIGN	LOCATION SEC.	LOCATION TOWNSHIP	LOCATION STATION	DESCRIPTION SIZE AND TYPE	Conc. Seal Coat Cu. Yds	Concrete Cu. Yds	Reinforc. Steel Lbs	Excavat. Cu. Yds Cl. I	Cl. II	Piling Lin. Ft. Treated	Untr.	Str. Ct Stl. Lbs	Rip Rap No. 3 Sq. Yd	Steel Sheet Piling Sq. Ft.
* 1241	11	Iowa	107+04	4'x5'x 82' Rein. Conc. Box		48.7	4239	28						
1341	"	"	111+54	4'x4'x 155' " " "		93.8	9035	71						
1441	"	Rochester	156+50	4'x5½'x 65' " " "		45.8	4230	70						
1541	1-12	Rochester	165+26	3'x4'x 60' " " "		30.1	1728	17						
545	"	"	202+00	4'x5½'x 59' " " "		38.1	3200	28						
1741a	11	Iowa	133+75 124' Rt.	4'x4'x 58' " " "		32.0	2984	19						
				Totals		288.5	25416	233						
• 1244	11	Rochester	144+15	1144'x26' Contin. Steel Girder Br.	148.8	2011.8	211955	566	1049 1484	21@30' 1070	17@25' 6@20'	1810,310 1807,780	1155	3280"

□ 446	2 11	Rochester Iowa	149+56	Tree Stream Retards	Retards 816'	Untreated Piling 244 @ 25' = 6100	Clearing & Grubbing Lump Sum	
▲ 446a	"	"	"	Rock Bank Protection	Rock Bank Protection 8854 Tons	Rock Jetties 1200 Tons	Clearing & Grubbing 7.5 Acres	



Specifications:
Design: Standard Iowa State Highway Commission, Series of 1925; A.A.S.H.O. 1941, H20 & H15 Loading
Constr.: " " " " " " " 1937.
Special Provisions " " " for Painting, Mar. 17, 1947.
" " " " " " Construction: Div. II Oct. 16, 1945

Revised 6-23-47, Class II excavation corrected on Design 1244.
▲ Revised 11-1-46, Design 446a Supersedes design 446
□ Revised 9-27-46, Design 446 added.
Revised 6-21-46, Structural Steel estimate and Special Paint Provisions changed.
Revised 1-25-46 - Project changed to F 469 (3)
Revised 1-10-46 - Estimates changed & Design 545 added.
* Revised June 28, 1945 - Estimate revised 8-25-45

APPROVED
CHIEF ENGINEER
IOWA HIGHWAY COMMISSION

RECOMMENDED FOR APPROVAL
DISTRICT ENGINEER
PUBLIC ROADS ADMINISTRATION
FEDERAL WORKS AGENCY

APPROVED
DIVISION ENGINEER
PUBLIC ROADS ADMINISTRATION
FEDERAL WORKS AGENCY

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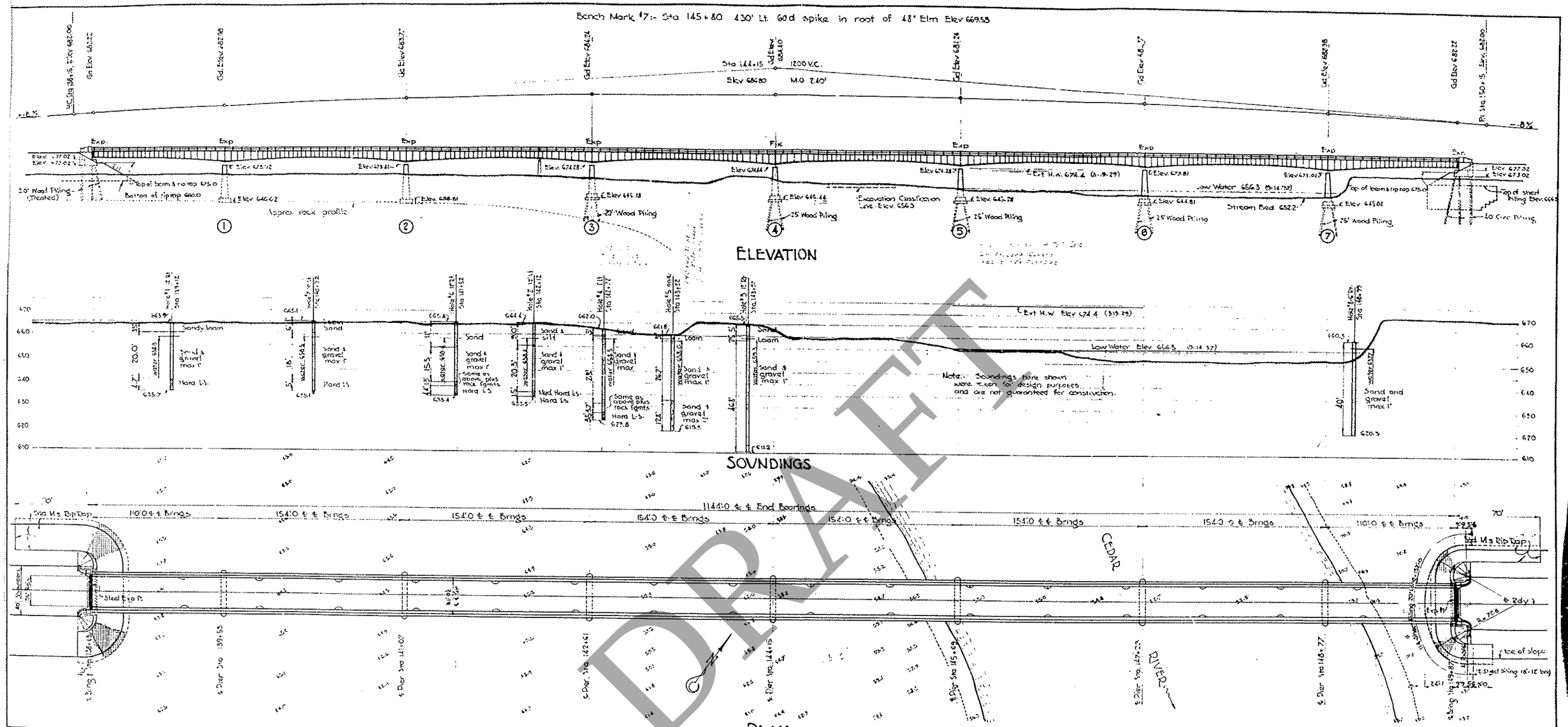
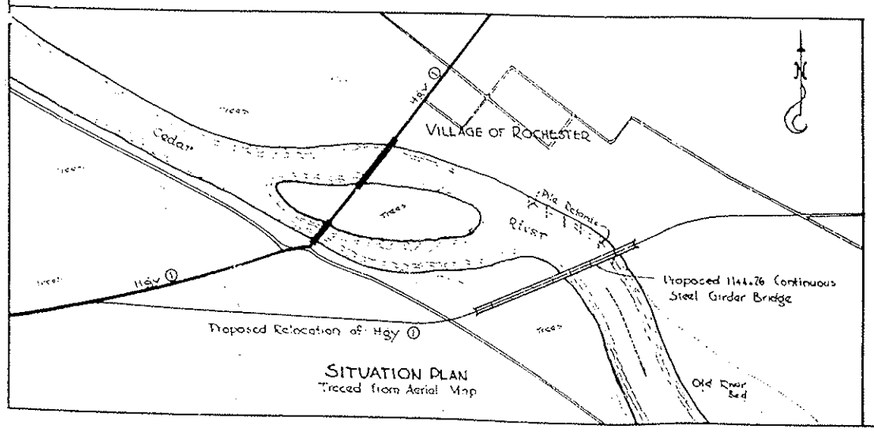
FWHA 018490

UPDATE ONE SEE F 3

Cedar County, Project No. F 469 (3) File# 11426

Bench Mark #7:- Sta 145+80 430' Lt. 60d spike in root of 48" Elm Elev 669.53





General Notes:

This bridge is designed under the standard 1941 Specifications of the A.A.S.H.O. for H-20 loading except floor slab which is designed for H-15. Provision is made for additional load of 19# per sq ft. of roadway for future wearing surface and also for 100% increased live load (except on floor slab) with not to exceed 50% overstress.

Berms at ends of bridge are to be made and compacted before piling are driven.

Rip rap on berms and side slopes (std M3 except as shown) and sheet piling at North end to be placed by bridge contractor. See sheet 2 for details.

Construction is to be in accordance with standard 1937 specifications of the Iowa Highway Commission except as modified by the following special provisions.

1. Special Provisions for painting, Mar 17, 1947.
2. Special Provisions for Construction Projects Div II Oct. 16 1945.

Revised 6-18-46 Quantities changed for exp. of revision. Spec. Prov for Painting changed. 4-2-47
Revised 1-26-46 Project changed to F 469 (3)
Revision: 1-2-46 Steel sheet piling added at N. end and special provisions, riprap, pile length at N. abutment and quantities changed. Rev. 6-21-47. Class II Excav changed

ESTIMATED QUANTITIES

PARTS / ITEMS	Structural Steel lbs	Reinforcing Steel lbs	Concrete Class A c.y.	Concrete Seal Coat c.y.	Wood Piling Treated	Wood Piling Untreated	Excavation c.y. Class I	Excavation c.y. Class II	Rip Rap sq yd	Sheet Piling sq ft
Super-str.	1,610,510	152823	870					1644.8		
Substructure		58122	1141.3	148.8	1470'	8160'	566	1644.8	1155	3280
Total	1,610,310	211055	2011.3	148.8	1470'	8160'	566	1644.8	1155	3280

1/8

Design for

1144'x26' CONTINUOUS STEEL GIRDER BRIDGE

2-110' END SPANS — 6-154' INTERIOR SPANS

GENERAL DRAWING

Station 144+15 Federal Proj No. 469 (3)

CEDAR COUNTY

Iowa Highway Commission

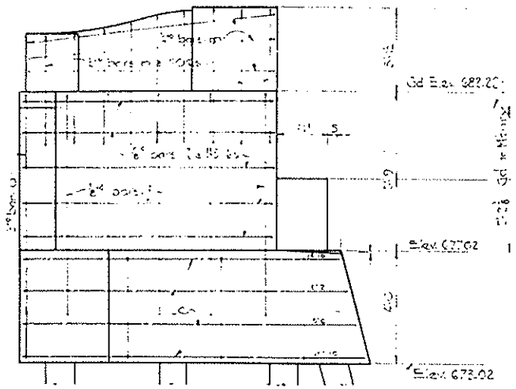
Location
In Section 11
Iowa & Rochester } Twps
Cedar County
Over Cedar River

June 1944 Sheet 1 of 7 Scale 1" = 40'

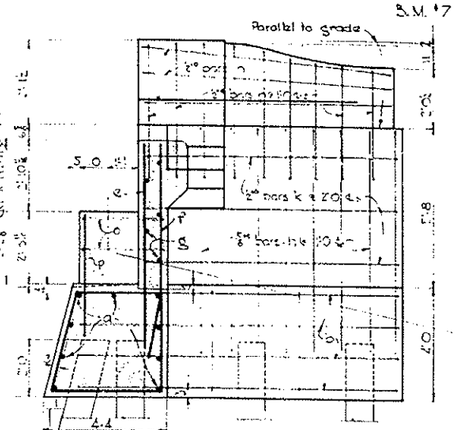
Design 1244 Cedar Wis File 11426

DRAFT

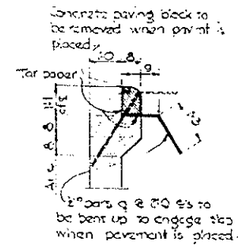
B.M. #7 Sta 145+80 430' Lt. 60 d. spike in root 48" Elm Elev. 689.58

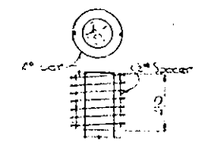


WING ELEVATION OUTSIDE



WING ELEVATION INSIDE



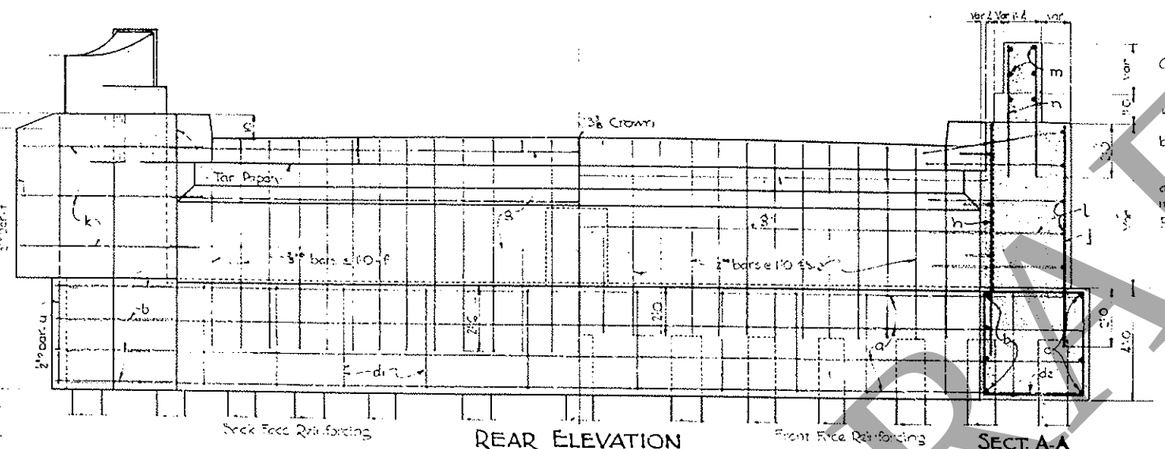


Each pile to be capped with a spiral consisting of 7 turns of ½" bar @ 21" diam and 3" pitch on 2-2½" spacers

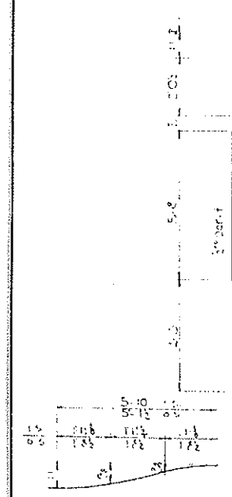
Center bearing block is to be placed after steel is fully erected but before floor and back wall are placed. End floor beam is to be jacked slightly while concrete is being worked under masonry plate and then lowered to let mas. pl. bed itself in concrete. As soon as concrete has taken its initial set, bolts are to be removed and beam jacked clear of mas. pl. and left in this position until concrete has obtained full strength

REINFORCING BAR LIST (2 Abutments)

Mrk	Description		Size	Nmbr	Length	Shape	Weight
a	Pile cap longit		1"	18	36.0		1728
b	Wing base horz	B.F.	⅝"	16	20.0		654
c	" "	F.F.	⅝"	16	var		507
d1	Pile cap horzt		⅝"	24	15.0		374
d2	Wing base "		⅝"	12	15.0		187
e	Backwall vert	F.F.	½"	54	7.0		252
f	" "	B.F.	⅝"	54	7.5		421
g	" horz		½"	10	20.5		155
h	Wing vert	B.F.	⅝"	52	8.0		266
j	" "	F.F.	⅝"	70	7.6		300
k	" horz	B.F.	½"	12	13.0		108
l	" "	F.F.	⅝"	20	13.6		251
m	Wing Rail horz		½"	24	9.0		144
n	" " vert		½"	72	var		216
o	Center bearing block horz		½"	4	8.2		22
p	" " vert		½"	4	4.0		11
q	Pavement anchors		½"	50	4.0		80
r	Pile cap spirals		¾"	56	40.0		253
s	Spiral spacers		½"	75	2.0		101
t	Wing vertical	B.F.	½"	4	3.6		15
u	" "	"	½"	4	2.4		25
v	Backwall dowels	B.F.	½"	12	4.0		32
Total	Reinforcing (2 Abuts)						5070 lbs
"	Concrete						101.5 cy
"	Creosoted Piling			21 @ 30' + 21 @ 40'			1470 L.F.
"	Excavation C.L.T.						110 cy



REAR ELEVATION



TOP OF WING (Developed)

SECT. A-A

General Notes:

All concrete is to be Class A.

All exposed corners 90° or sharper to be filleted with 1" dressed beveled strips.

All reinforcing to be securely wired in place before concrete is placed.

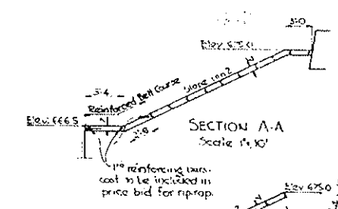
All piling to be treated.

All piling to be driven to full penetration or to rock and to a minimum bearing value of 18 tons. Jetting may be resorted to if necessary to secure full penetration.

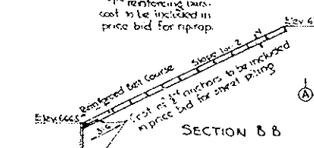
Riprap and Sheet Piling Notes:

Riprap is to be Std M.3 except that mesh reinforcing shown on std is to be omitted and at the North end a reinforced belt course is to be introduced as shown. Construction joints may be introduced in belt course at the contractors option, providing the reinforcing is run continuous thru such joints. Reinforcing bars may be spliced if lapped 40 diameters.

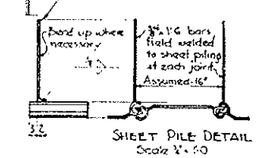
Sheet piling may be either new or used material in good serviceable condition. It is to be of the interlocking type with webs straight or approximately so, and not less than ⅜" in thickness, and it shall weigh not less than 23# per sq ft of wall. All sheet piling shall be given one coat of red lead paint, which is to be thoroughly dry before piling are driven.



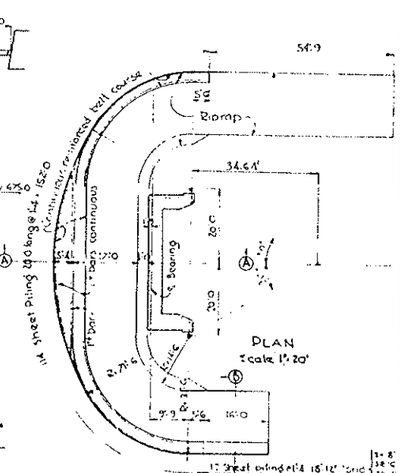
SECTION A-A
Scale 1" = 10'



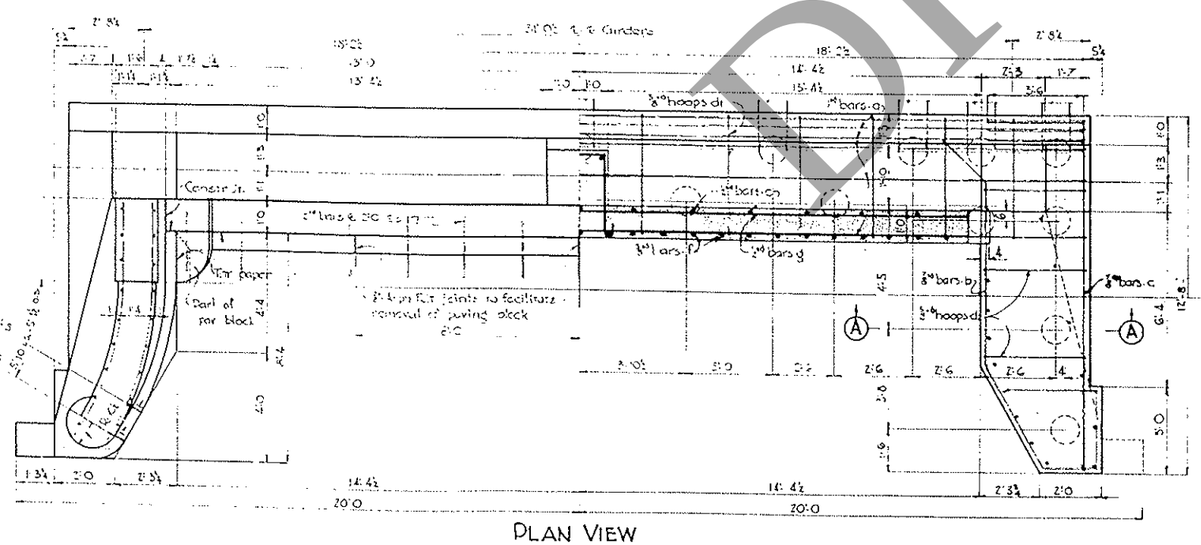
SECTION B-B



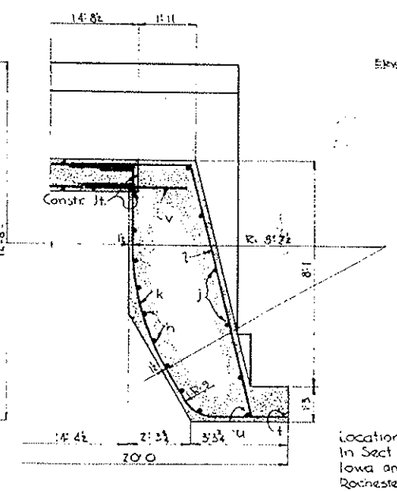
SHEET PILE DETAIL
Scale 1" = 1'-0"



RIPRAP & SHEET PILE DETAILS AT NORTH ABUTMENT



PLAN VIEW



Design for

1144'x26' CONTINUOUS STEEL GIRDER BRIDGE

2-110' END SPANS — 6-154' INTERIOR SPANS

ABUTMENT DETAILS

Station 144+15 Federal Proj No. 469 (3)

CEDAR COUNTY

Iowa Highway Commission

Location: In Sect 11 Iowa and Rochester Twps, Cedar Co. Over Cedar R.

June 1944

Scale ⅛" = 1'-0"

Sheet 2 of 7

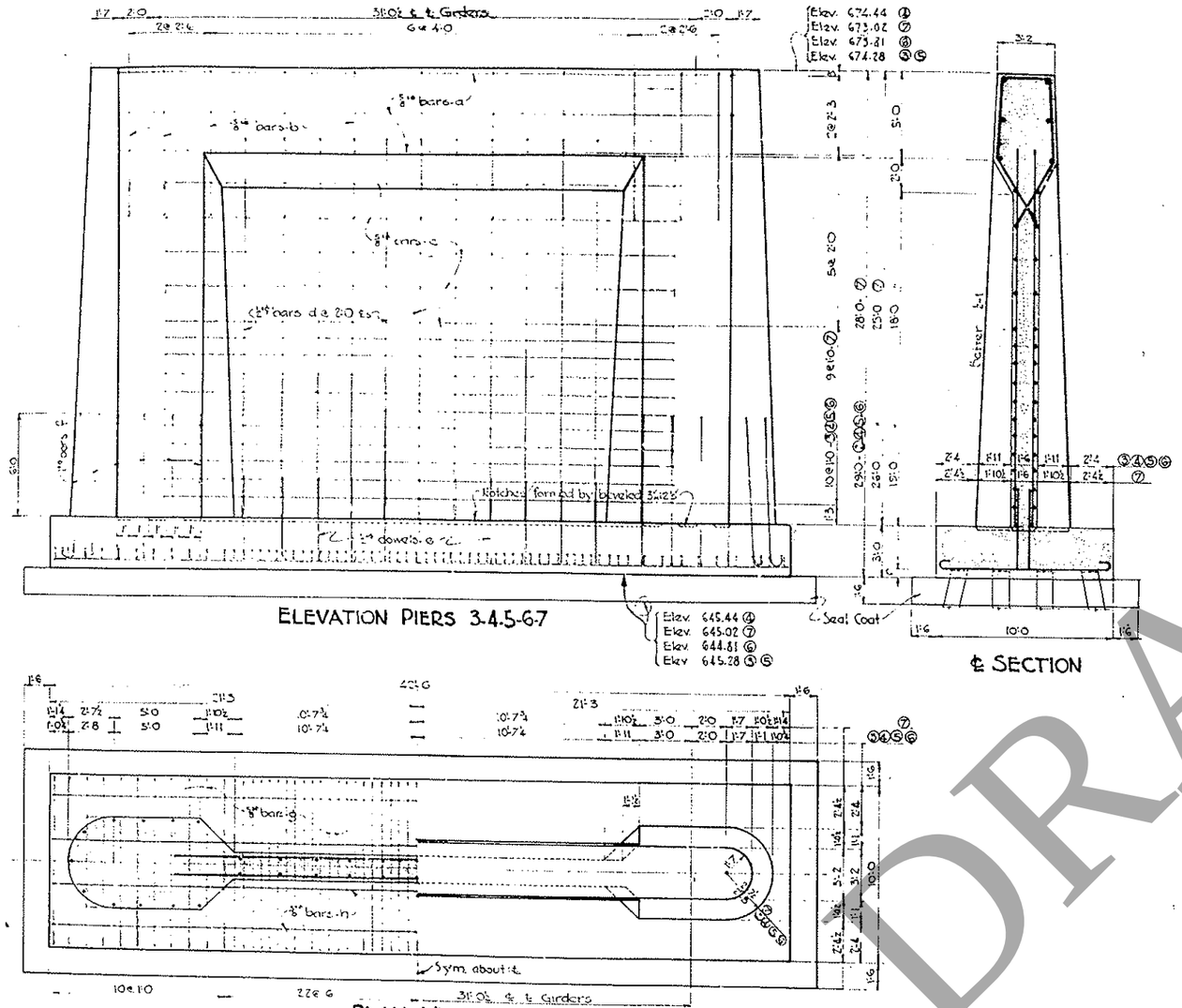
Revision 1-2-46:- Riprap and sheet piling details added to this sheet and pile lengths for N. Abut changed

Design 1244 Cedar

File 1144-26

DRAFT

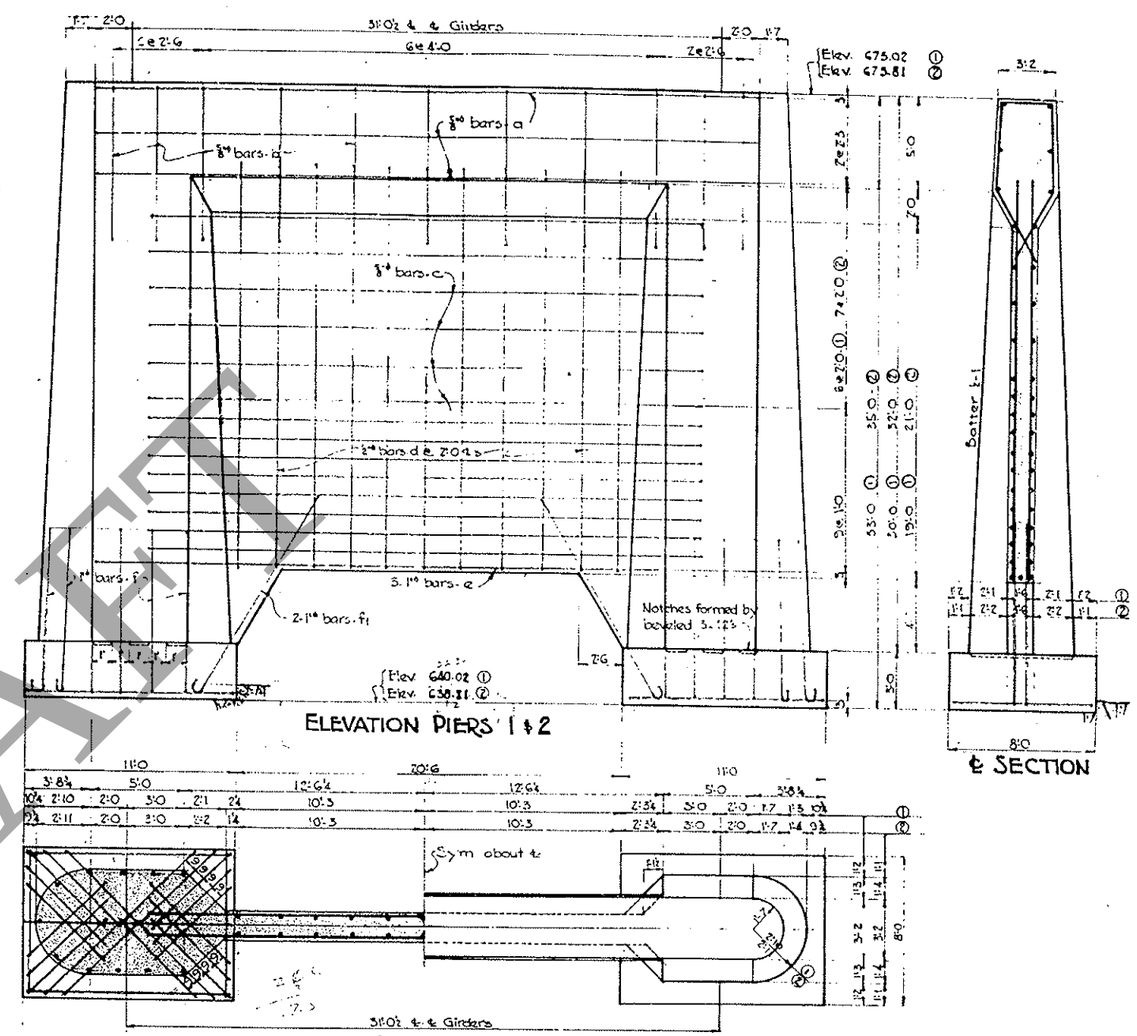
Bench Mark #7: Sta. 145+80 420' Lt. 60d. spike in root 48" Elm Elev. 669.53



ELEVATION PIERS 3-4-5-6-7

℄ SECTION

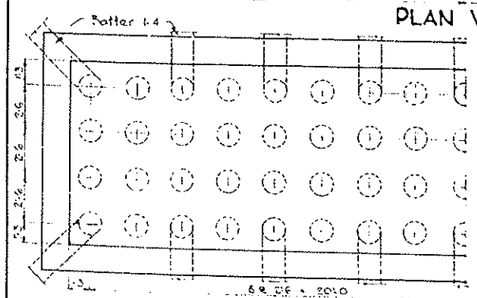
PLAN VIEW



ELEVATION PIERS 1 & 2

℄ SECTION

PLAN VIEW



PILING DIAGRAM

Pier 3 68 @ 20'

Piers 4-5-6-7 each 68 @ 25'

REINFORCING BAR LIST

PIER 3-4-5-7-6

Mark	Description	Size	Nmbr	Length	Shape	Wt.
a	Cap Lngtl	⅝"	50	35'0	—	1095
b	" Vert.	1	55	20'0	U	1147
c	Diaph Horiz	1	148	30'0	—	4631
d	" Vert.	½"	110	8'6" 2'2"	—	1525
e	" dowels	1	110	4'0	—	294
f	Footing "	1"	110	9'4	⌐	2736
g	" Transv	⅝"	325	11'0	⌐	5729
h	" Lngtl	1	40	22'3	—	928
Total Reinforcing		(5 Piers)				16065 lbs
Concrete		752.8 c.y. Cl. A				438 c.y. Seal Coat
Excavation		236 c.y. Cl. I		1124		105 c.y. Cl. II
Untreated Piling		272 @ 25' + 68 @ 20' = 8160 LF				

PIERS 1-2

Mark	Description	Size	Nmbr	Length	Shape	Wt.
a	Cap Lngtl	⅝"	12	35'0	—	442
b	" Vert.	1	22	20'0	U	457
c	Diaph Horiz	1	62	30'0	—	1940
d	" Vert	½	44	8'6" 2'2"	—	646
e	" Horiz Bott.	1"	6	35'0	—	580
f	Footing Dowels	1"	44	9'4	⌐	1095
f1	" "	1"	8	13'0	⌐	277
g	" diag	⅝"	80	6'3	⌐	522
h	" lngtl	⅝"	12	10'9	—	86
J	Transv	⅝"	8	7'9	—	42
Total Reinforcing		(2 Piers)				6067 lbs
Total Concrete		287.5 c.y. Cl. A				
Total Excavation		220 c.y. Cl. I				425 c.y. Cl. II
Untreated Piling						

General Notes:-

All concrete is to be Class A.

All reinforcing to be securely wired in place before concrete is placed.

Footings for piers 1 - 2 are to be carried at least 6' into solid rock. If suitable bearing is not found at elevations indicated footings are to be carried deeper.

All piling are to be driven to full penetration and a min bearing value of 13 Tons. Jetting may be resorted to if necessary to secure full penetration.

3/8

Location
Section 11
Iowa & Rochester Twps
Cedar County
Over Cedar River

Design For

1144'-26' CONTINUOUS STEEL GIRDER BRIDGE

2-110' END SPANS 6-154' INTERIOR SPANS

PIER DETAILS

Station 144+15 Federal Proj No 469 (1)

CEDAR COUNTY

Iowa Highway Commission

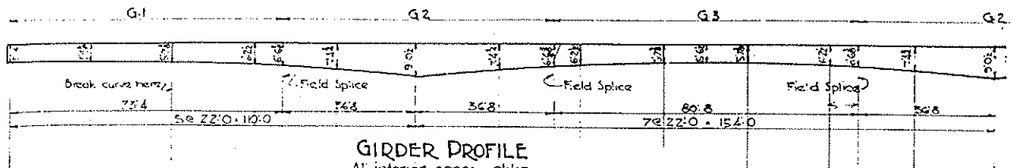
June 1944 Scale 1"=1'0

Sheet 3 of 7

Rev. 6-26-47 Class II Excav. changed

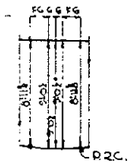
DRAFT

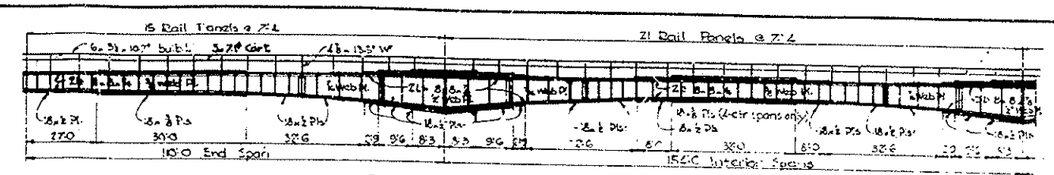
Design 1244 Cedar File 11428



GIRDER PROFILE

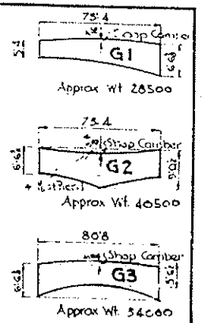
All interior spans alike

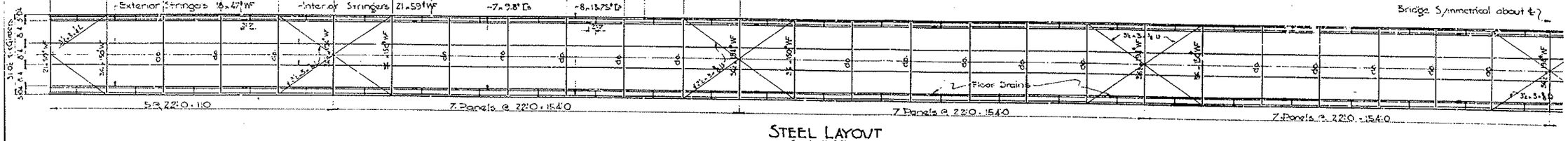




GIRDER MAKE-UP

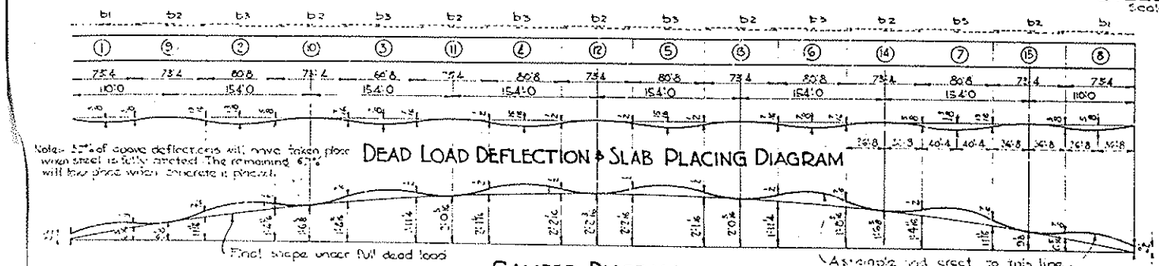
All interior spans alike except as noted





STEEL LAYOUT

Scale 1" = 20'



DEAD LOAD DEFLECTION & SLAB PLACING DIAGRAM

CAMBER DIAGRAM

GENERAL NOTES:- This bridge is designed under the 1941 specifications of the A.A.S.H.O
Dead Load used:- 25.08# per ft of girder including 19#/sq ft of rdy. for future wearing surface
Live load used:- Girders stringers and floor beams H 20 with provision for 100% overload with not to exceed 50% overstress; Floor slab H.S.

Construction is to be in accordance with 1937 specifications of the Iowa Highway Commission and special provisions listed on sheet 1.

Girders are to be assembled in shop for inspection after which splices are to be reamed.

All field connections are to be riveted except as shown.

All rivets to be ¾" except as shown.

All reinforcing is to be properly supported on bar chairs and securely wired in place before concrete is placed.

Floor slab is to be placed in sections and in order indicated.

Curbs may be placed continuously.

Paint is to be omitted from tops of top flanges of floor beams and stringers and from other surfaces in contact with concrete.

All rockers to be to set that they will be vertical at normal temperature (45°F)

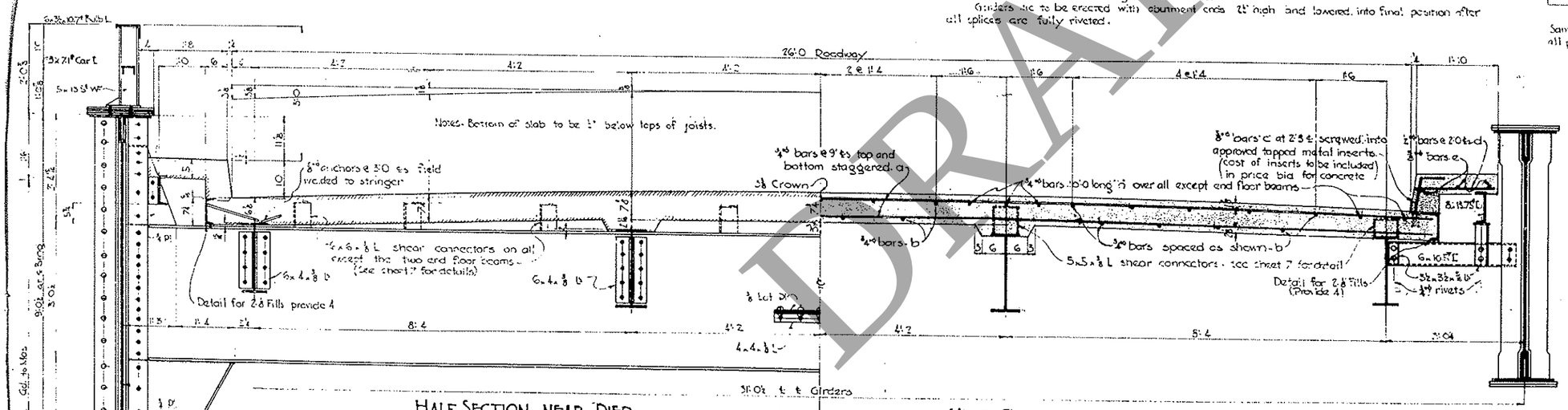
Deflection of exterior stringers when slab is placed will be about ⅜" and ⅛ to be compensated for when setting strike channel.

Girders are to be erected with abutment ends 2½" high and lowered into final position after all splices are fully riveted.

BILL OF REINFORCING STEEL

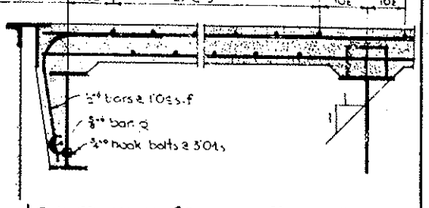
Mark	Description	Nmbr	Size	Length	Shape	Wt
a	Slab transverse top & bott	2860	¾"	27'0	—	115765
b1	" longitudinal " "	108		35'4	—	6384
b2	" "	378		37'0	—	21433
b3	" " " "	324		44'3	—	21534
c	Curb dowel (threaded)	1040	⅝"	1'8	⌐	1807
d	Curb transverse	1146	½"	1'8	—	1270
e	Curb longitudinal	186	⅝"	39'0	—	7565
f	End Floor beam cross	52	½"	4'0	⌐	139
g	" " " "	2	⅝"	27'6	—	56
h	Floor longitudinal over F.B.	510	¾"	10'0	—	7660
	Total Reinforcing					133633

Same for all panels: bars-c 10¼, 9 @ 2'3, 10¼, 10¼; bars-a 10¼, 27 @ 9", 10¼, 10¼



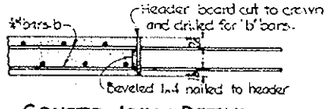
HALF SECTION NEAR PIER

HALF SECTION NEAR MID-SPAN



LONGITUDINAL SECTION FLOOR SLAB

Scale ¾" = 1'0



CONSTR JOINT DETAIL

ESTIMATED QUANTITIES - SUPERSTR

	Gross	Cuts & Copes	Net
Girders	1125565 lb	19000	1106565 lb
Floor Beams str	530025	5345	524680
Miscellaneous	178480	245	178235
Total	1834370 lb	24590	1810310 lb
Concrete Floor	370 c.y.	Reinforcing Steel	133633 lb

STRESS LOADING & POSITIVE MOMENTS

	1st Span	2nd Span	3rd Span	4th Span
Dead Load	1346000	171 4000	1908000	1622000
D.L. Adjustment	- 339000	- 165000	72000	27000
Live Load unif	1080000	1230000	1305000	1325000
Live load concen.	462000	461000	462000	462000
Impact	325000	358000	295000	322000
Total	3055000	3529000	3743000	3724000

NEGATIVE MOMENTS

	1st Pier	2nd Pier	3rd Pier	4th Pier
Dead Load	- 5300000	- 5750000	- 5623000	- 5660000
D.L. Adjustment	- 678000	+ 300000	- 117000	- 74000
Live Load unif	- 2050000	- 2470000	- 2560000	- 2600000
Live load concen.	- 683000	- 730000	- 740000	- 740000
Impact	- 490000	- 575000	- 598000	- 602000
Total	- 9348000	- 9725000	- 9658000	- 9526000

REACTION ON BEARINGS

	Abut	1st Piers	2nd Piers	3rd Pier	4th Pier
Dead Load	77500	375000	388000	385000	385500
D.L. Adjustment	- 7500	15100	- 19500	4200	- 2400
Live Load unif	35000	31800	144300	149000	147000
Live load concen.	22000	31100	31700	31100	31100
Impact	12100	29410	31800	32200	32100
Total	134100	582400	584600	601500	593300

% Overload governs. ** See general notes

Rev. 6-13-46 Quantities changed for Exp. & Revision

Location: In Sect. 11, Iowa and Rochester Twps, Cedar Co. Over Cedar R.

4/8

Design For

1144' x 26' CONTINUOUS STEEL GIRDER BRIDGE

2 - 110' END SPANS ~ 6 - 154' INTERIOR SPANS

SUPERSTRUCTURE DETAILS

Station 144+15 — Federal Proj No. 469 (3)

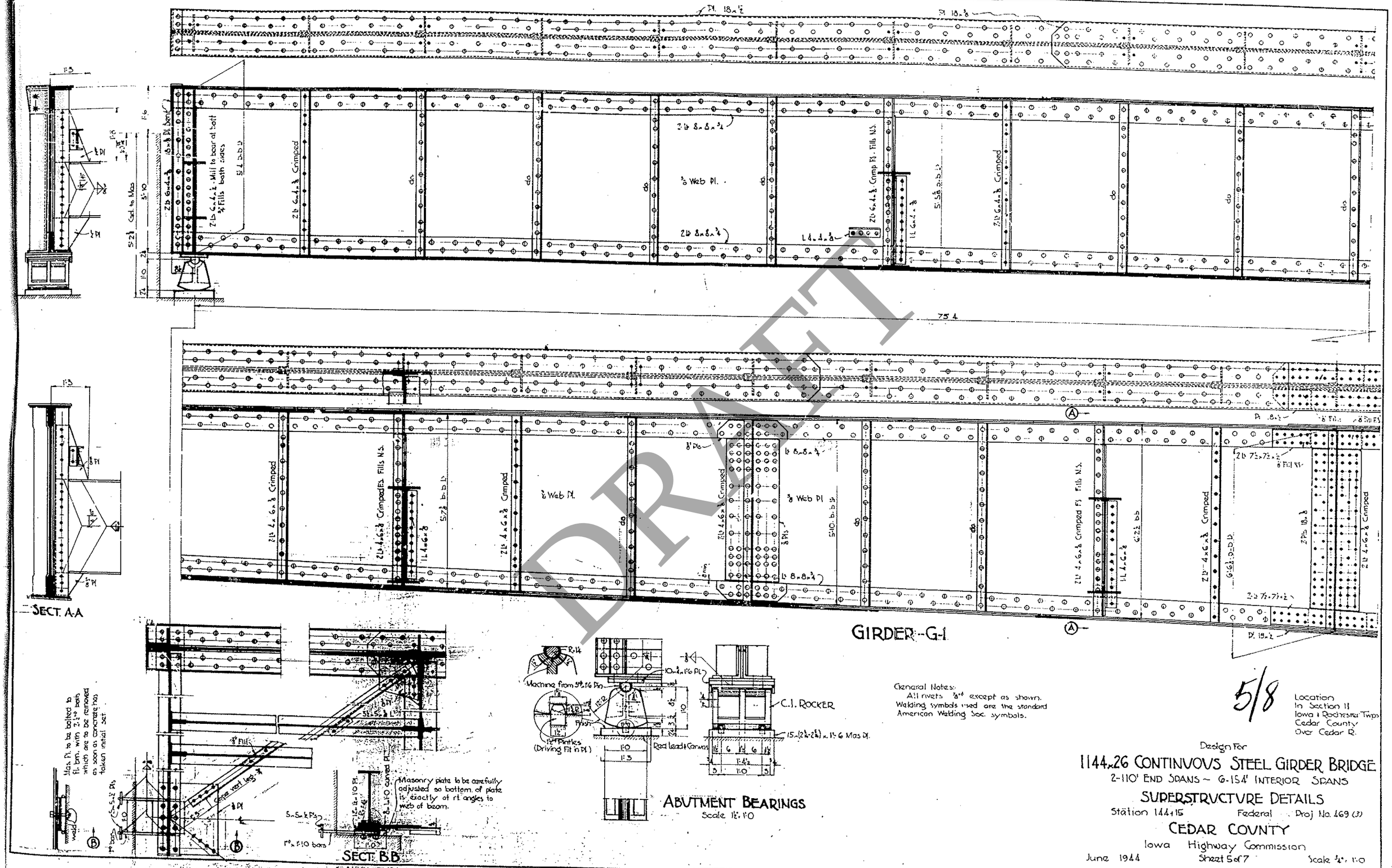
CEDAR COUNTY

Iowa Highway Commission

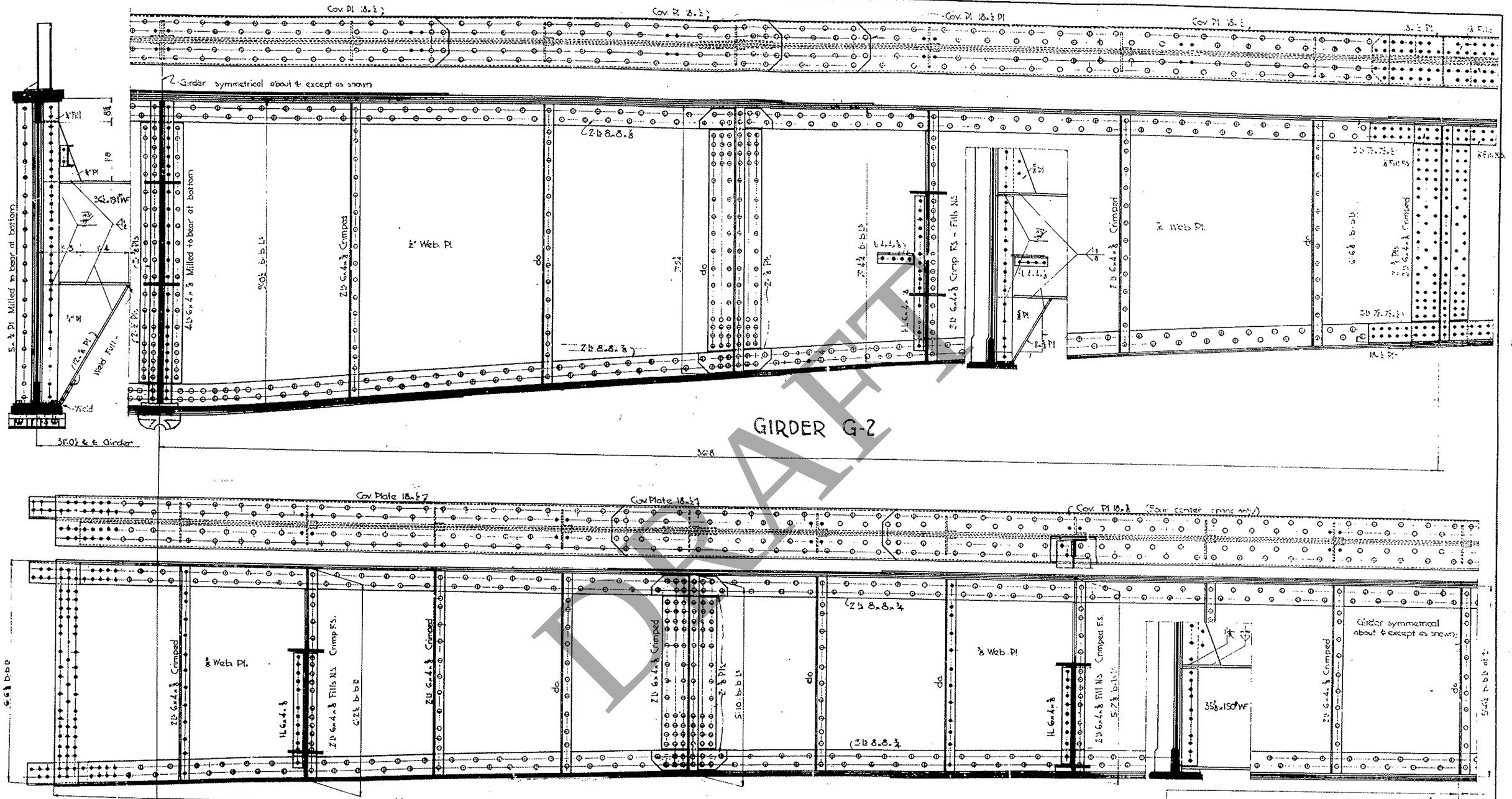
June 1944 — Sheet 4 of 7 — Scale 1" = 20'

Design 1244 Cedar — File 11426

DRAFT


SECT. A-A
GIRDER--G-1
SECT. B-B
ABUTMENT BEARINGS
Scale 1½" = 1'-0
C.I. ROCKER
Machine from 5/8" x 1'-6" Pl.
Red lead & Canvas
Masonry plate to be carefully adjusted so bottom of plate is exactly at rt angles to web of beam.
Mas. Pl. to be bolted to fit bm. with 2 1/4" bolts which are to be removed as soon as concrete has taken initial set
Grind vert. leg
Web Pl.
Crimped
Fills N.S.
Cut to Mas
Mill to bear at bolt & Fills both sides
Grimp Pl. Fills N.S.
Pl. 18 x 1/2
Pl. 18 x 3/8
75'-4"
General Notes:
All rivets 7/8" ϕ except as shown.
Welding symbols used are the standard American Welding Soc. symbols.
5/8
Location
In Section 11
Iowa & Rochester Twps
Cedar County
Over Cedar R.
Design For
1144.26 CONTINUOUS STEEL GIRDER BRIDGE
2-110' END SPANS ~ 6-154' INTERIOR SPANS
SUPERSTRUCTURE DETAILS
Station 144+15
Federal Proj. No. 469 (3)
CEDAR COUNTY
Iowa Highway Commission
June 1944
Sheet 5 of 7
Scale 3/4" = 1'-0
Design 1244 Cedar
File 11426

DRAFT



General Notes:
All rivets and bolts ⅞" except as shown.

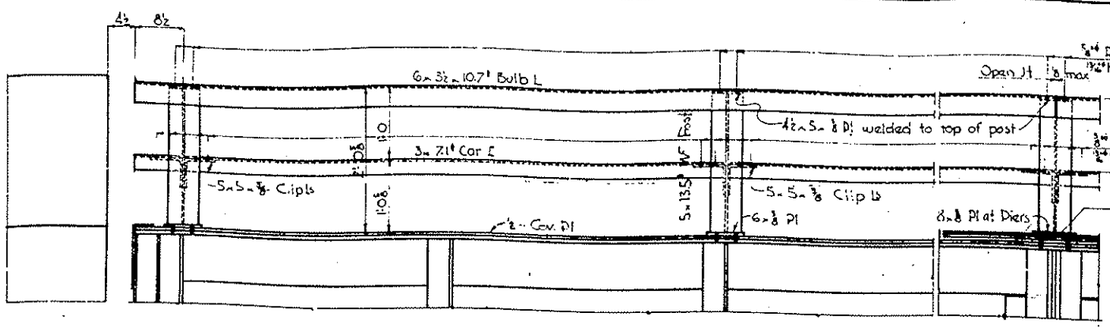
Location
In Section 11
Iowa and Rochester } Twps
Cedar County
Over Cedar R

6/8

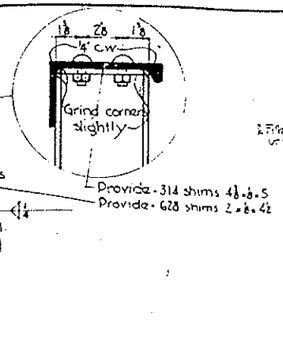
Design For
1144'x26' CONTINUOUS STEEL GIRDER BRIDGE
2-110' END SPANS 6-154' INTERIOR SPANS
SUPERSTRUCTURE DETAILS
Station 144+15 Federal Proj No 469 (3)
CEDAR COUNTY
Iowa Highway Commission
June 1944 Sheet 6 of 7 Scale ¼"=1'-0

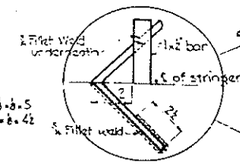
Design 1244 Cedar File 11426

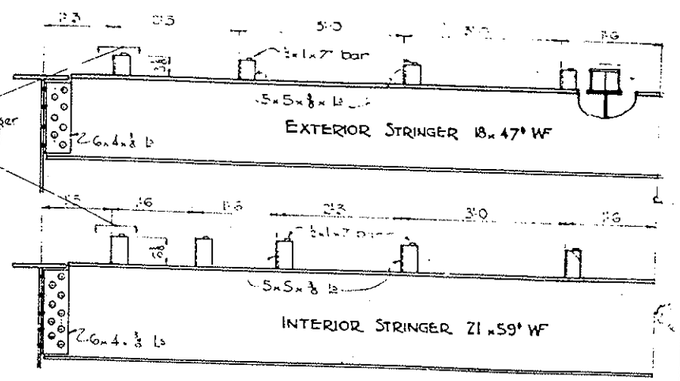
DRAFT



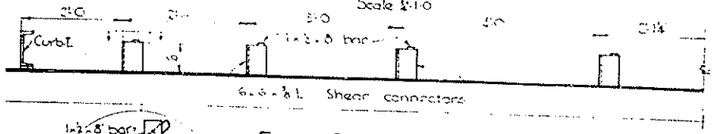
RAIL DETAILS



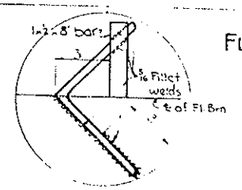


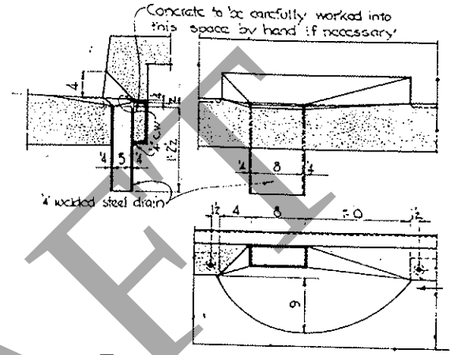


STRINGER DETAILS
Scale ½" = 1'-0"

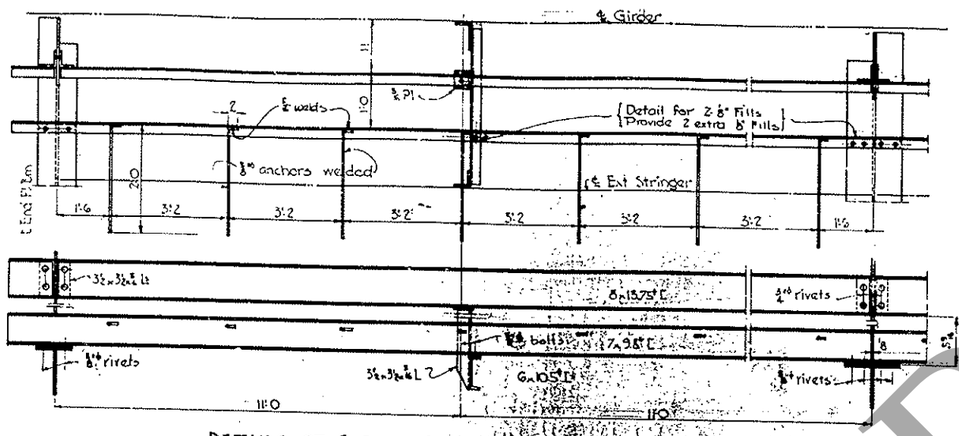


FLOOR BEAM DETAILS
Scale ½" = 1'-0"

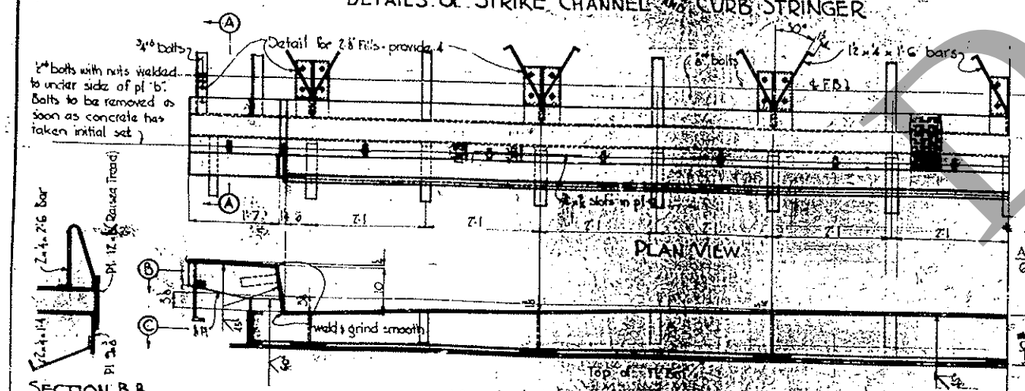




FLOOR DRAIN DETAILS



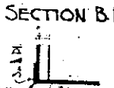
DETAILS OF STRIKE CHANNEL & CURB STRINGER



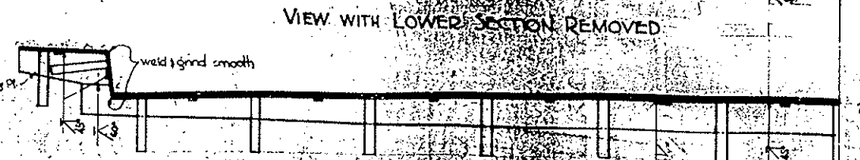
PLAN VIEW

VIEW WITH LOWER SECTION REMOVED

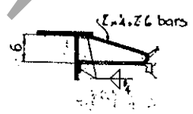
SECTION B-B

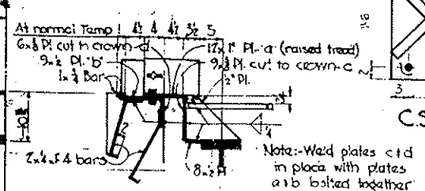


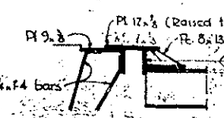
SECTION C-C



EXPANSION PLATE DETAILS
Scale 2" = 1'-0"

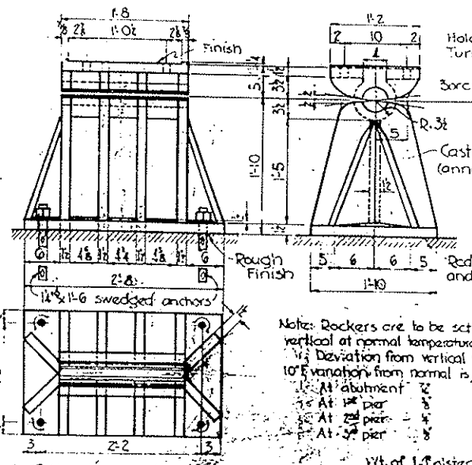




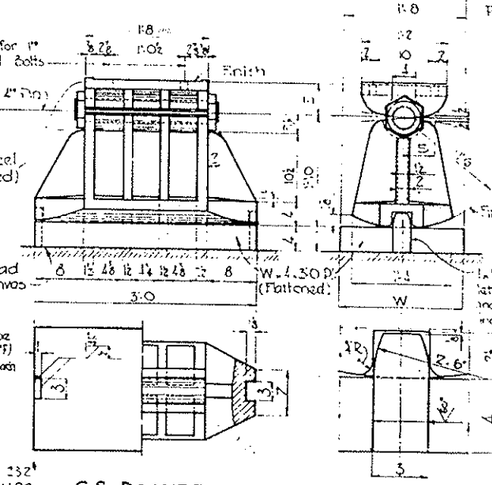


SECTION A-A

Note: Exp. plate opening is to be varied by ⅛" for each 10°F variation from normal at time of setting. Decrease for higher temperature and vice versa.



C.S. FIXED SHOE



C.S. ROCKER

Note: Rockers are to be set to be vertical at normal temperature (45°F)
½" Deviation from vertical for each 10°F variation from normal is;
At abutment ⅞
At 1st pier ⅜
At 2nd pier ¼
At 3rd pier ⅛

Wt. of 1 Roller	232#
" " Shoe	1190
" " Rocker	1010
" " Mas. Pl.	660 avg
" " Pins & Nuts	87

General Notes:
All bolts and rivets to be ¾" except as shown.
Welding symbols used are those of the American Welding Society.

Piers 1 & 7
Piers 2 & 6
Piers 3 & 5

Design For 7/8

Location: In Sect. 11 Iowa and Rochester Twps Cedar Co. Over Cedar R.

144 x 26 CONTINUOUS STEEL GIRDER BRIDGE

2 - 110' END SPANS ~ 6 - 154' INTERIOR SPANS

SUPERSTRUCTURE DETAILS

Station 144+15 Federal Proj No. 469 (3)

CEDAR COUNTY

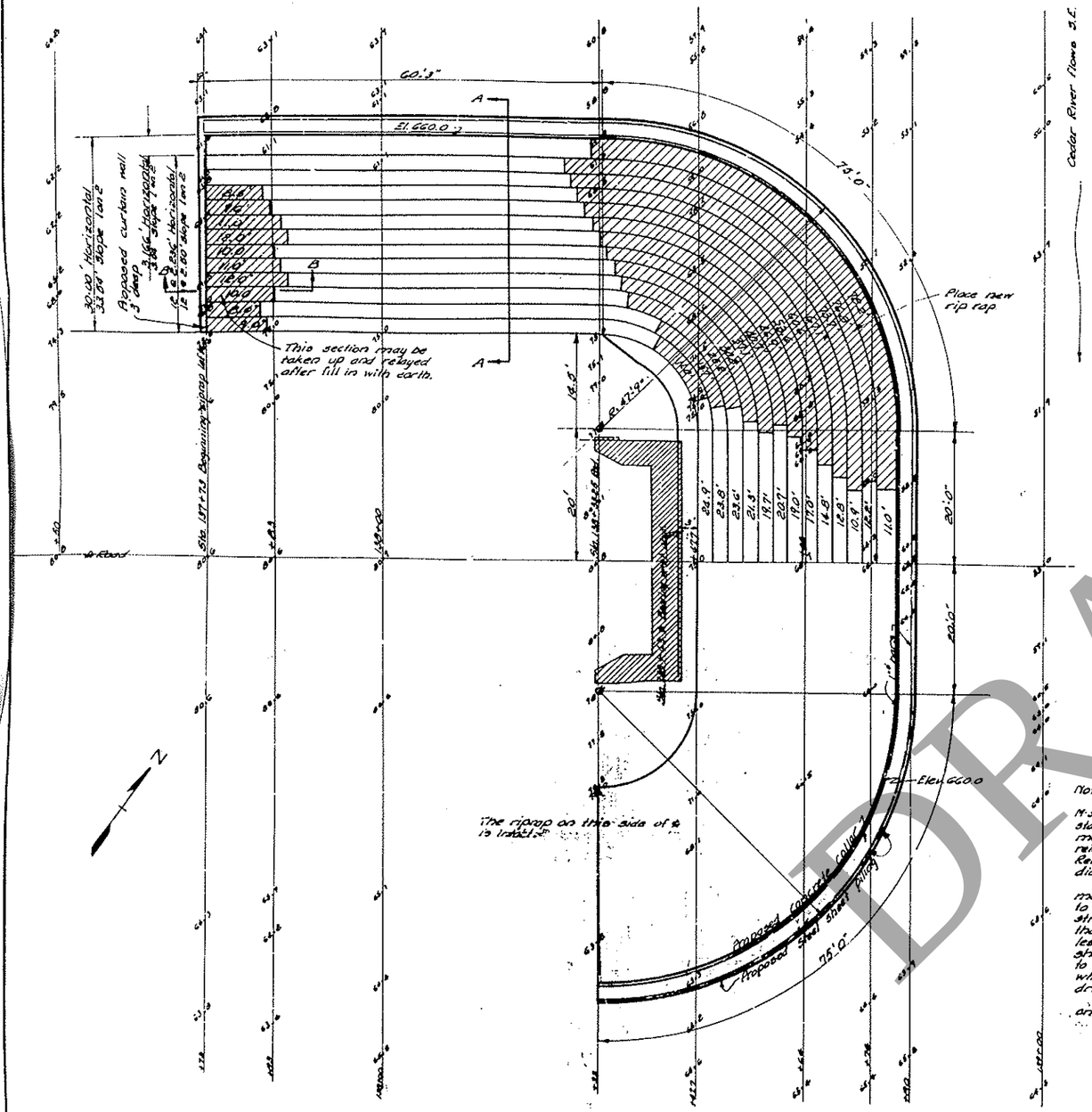
Iowa Highway Commission

June 1944 Sheet 7 of 7 Scale 1" = 1'-0"

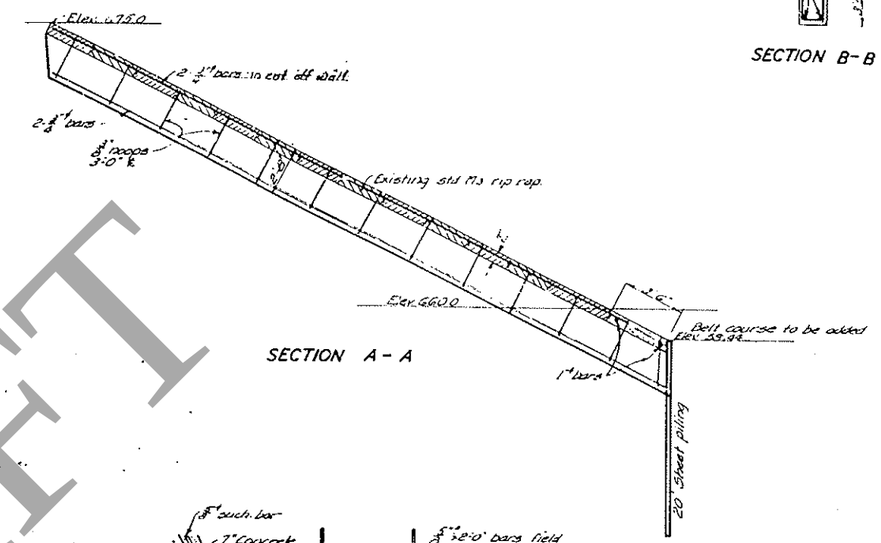
Revision - 6-18-46 Expansion pl changed from ⅜ to 1".

Design 1244 Cedar File 11426

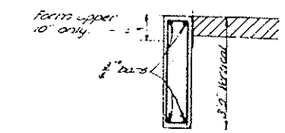
DRAFT



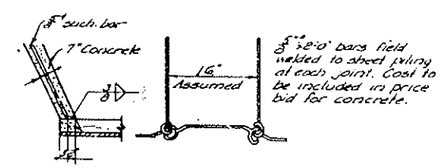
SCALE 1" = 10'-0"



SECTION A - A



SECTION B-B



SHEET PILE DETAIL
SCALE 3/4" = 1'-0"

Note:-

Rip rap replacement is to be standard M-3 except that mesh reinforcing shown on standard is to be omitted. Construction joints may be introduced in belt course providing reinforcing is run continuous thru such joints. Reinforcing bars may be spliced if lapped 40 diameters.

Sheet piling may be either new or used material in good serviceable condition. It is to be of the interlocking type with webs straight or approximately so and not less than ⅜" in thickness and it shall weigh not less than 23# per sq. ft. of wall. All sheet piling shall be given one coat of paint equivalent to the "shop coat" referred to in the specifications which is to be thoroughly dry before pilings are driven.

Sheet piling to be driven to firm bearing on rock and cut off at elevation shown if necessary.

General Notes:

The rip rap at the south west end of this bridge was damaged by the spring and early summer flood, of 1947 and is to be repaired and strengthened by driving sheet piling in accordance with details shown on this sheet.

Construction is to be in accordance with the 1937 Specifications of the Iowa Highway Commission and

1. Special Provisions for painting 3-12-47.
2. Special Provisions for construction Project Div. II Oct. 16, 1945

ESTIMATED QUANTITIES		
Take up and relay rip rap	sq. yds.	28
Rip rap	sq. yds.	298
Steel sheet piling	sq. ft.	3005

Note:- Curtain wall quantities are included in rip rap estimate on basis of equivalent cubic yards of concrete.

8/8

Location
in Section 11
Iowa & Rochester Twp
Cedar County
Over Cedar River

DESIGN FOR

1144' X 26' CONTINUOUS STEEL GIRDER BRIDGE

2-110' END SPANS 6-154' INTERIOR SPANS

RIP RAP & SHEET PILING-SOUTH ABUT

STATION 144+15 FEDERAL PROJECT NO 469 3

CEDAR COUNTY

IOWA STATE HIGHWAY COMMISSION

SEPT. 6 1947 SHEET 7A SCALE 1" = 40'

Design No 1244 Cedar County File 11-2-6

E.R.C. W.S.M.

DRAFT

BRIDGE

FM-16(8)--55-16

CEDAR COUNTY

Letting Date Nov. 15, 1993

ARCHAEOLOGICAL NOTE

IF ARCHAEOLOGICAL MATERIALS ARE ENCOUNTERED DURING THE CONSTRUCTION PHASE OF THIS PROJECT, THE OFFICE OF PROJECT PLANNING AND/OR THE OFFICE OF LOCAL SYSTEMS (I.D.O.T.) MUST BE CONTACTED IMMEDIATELY SO THE PROPER AUTHORITIES CAN BE NOTIFIED ACCORDING TO THE EXISTING FEDERAL REGULATIONS AND STATE PROCEDURES. ADDITIONALLY, IT SHOULD BE NOTED THAT FINDINGS AND RECOMMENDATIONS FOR CLEARANCE FOR FURTHER TESTING CANNOT BE CONSIDERED FINAL UNTIL CONCURRENCE IS RECEIVED FROM THE OFFICE OF THE STATE HISTORIC PRESERVATION OFFICER.

OFFICE OF PROJECT PLANNING 515-239-1225
OFFICE OF LOCAL SYSTEMS 515-239-1528

PERMITS

IOWA DEPARTMENT OF NATURAL RESOURCES
PERMIT NO. FP 93-134
DATE: JULY 29, 1993

UNITED STATES ARMY CORPS OF ENGINEERS
PERMIT NO. CENCR-OD-S-274840
DATE: SEPTEMBER 29, 1993

SHOP DRAWINGS

ALL SHOP DRAWINGS AND FALSEWORK DRAWINGS THAT REQUIRE APPROVAL SHALL BE SUBMITTED TO:
NNW, INC.
316 E. COLLEGE ST.
IOWA CITY, IOWA 52240
(319) 351-2166

IOWA DEPARTMENT OF TRANSPORTATION

Highway Division

PLANS OF PROPOSED IMPROVEMENT ON THE

FARM TO MARKET CEDAR COUNTY BRIDGE REPAIR

The Standard Specifications, Series of 1992, of the Iowa Department of Transportation Shall Apply to Construction Work on this Project

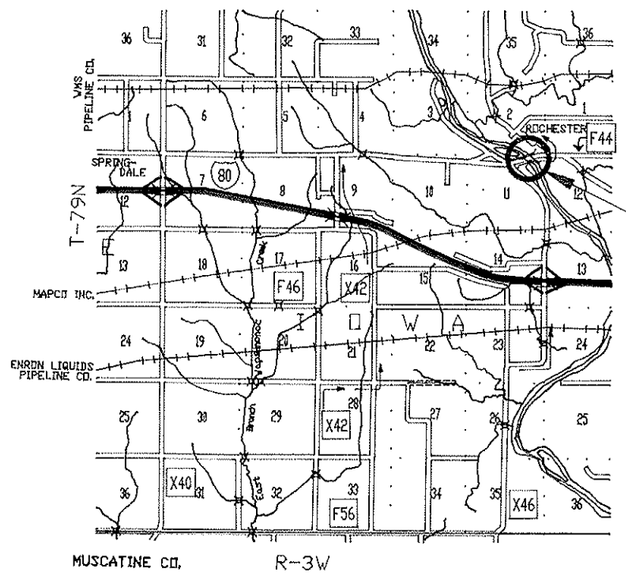
Plus Current Special Provisions and Supplemental Specifications

Scales: As Noted

DRAFT

PROJECT TRAFFIC CONTROL PLAN

THROUGH TRAFFIC WILL BE MAINTAINED DURING CONSTRUCTION. LOCAL TRAFFIC TO ADJACENT PROPERTIES WILL BE MAINTAINED AS PROVIDED FOR IN ARTICLE 1107.08, 1992 STANDARD SPECIFICATIONS PLUS CURRENT SUPPLEMENTAL SPECIFICATIONS. TRAFFIC CONTROL DEVICES, PROCEDURES AND LAYOUTS SHALL BE AS PROVIDED FOR BY SUPPLEMENTAL SPECIFICATIONS FOR TRAFFIC CONTROLS FOR STREET AND HIGHWAY CONSTRUCTION AND MAINTENANCE OPERATIONS, SPECIFICATION 5055.



PROJECT LOCATION

Location Map Scale
0 1 2 3
miles

AADT _____ V.P.D.

FM-16(8)---55-16

No.	Description
1.	TITLE SHEET
2.	ESTIMATED PROJECT QUANTITIES, BID NOTES, GENERAL NOTES
3.	SITUATION PLAN
4.	GENERAL PLAN & DETAILS
5.	CROSS SECTIONS
6.	TRAFFIC CONTROL

Div.	Location	Lin.Ft.	Miles
	BRIDGE AT STA 144+15	000.0	0.0000

The following Standard Plans shall be considered applicable to construction work on this project.

Identification	Date	Identification	Date	Identification	Date

(May be obtained at Bridge Design Services)

Standard	Date Issued	Latest Revision	Standard	Date Issued	Latest Revision

Approved Cedar County Engineer

Approved Cedar County Board of Supervisors

Iowa Department of Transportation
Authorized for Letting
Local Systems Engineer Date

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly Registered Professional Engineer under the laws of the State of Iowa.

Signature:
Name:
Date _____ Reg. No. _____
(Month, day, year)
My registration renewal date is December 31, ____

Iowa Department of Transportation
Authorized for Letting
Deputy Chief Engineer Date

U.S. Department of Transportation
Federal Highway Administration
Approved
Division Engineer Date

ESTIMATE OF QUANTITIES

ITEM NO.	ITEM	UNIT	TOTAL
1	MOBILIZATION	Lump Sum	L.S.
2	RIP RAP	Ton	824
3	TRAFFIC CONTROL	Lump Sum	L.S.
4	TEMPORARY LOADING FACILITY, BUILD AND REMOVE	Lump Sum	L.S.
5	DEBRIS REMOVAL	Lump Sum	L.S.

SPECIFICATIONS

DESIGN: A.A.S.H.T.O. STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SERIES OF 1989, PLUS CURRENT INTERM SPECIFICATIONS.
CONSTRUCTION: STANDARD SPECIFICATIONS OF THE IOWA DEPARTMENT OF TRANSPORTATION-HIGHWAY DIVISION, SERIES OF 1992, PLUS CURRENT SPECIAL PROVISIONS AND SUPPLEMENTAL SPECIFICATIONS.

GENERAL NOTES

THE PURPOSE OF THIS PROJECT IS TO PROTECT THE RIVER PIERS OF ROCHESTER BRIDGE BY THE PLACEMENT OF RIP RAP AROUND THE EXPOSED PILING IN THE RIVER. PLACEMENT OF RIP RAP SHALL BE FROM A BARGE OR SIMILAR VESSEL OR FROM A CAUSEWAY. PLACEMENT OF RIP RAP FROM THE BRIDGE WILL NOT BE PERMITTED

THE FOLLOWING LIMITATIONS SHALL APPLY TO THIS PROJECT:
WORKING DAYS: 40
START DATE: NOVEMBER 15, 1993
RIVER LEVEL: IF, AT ANY TIME DURING THE PROJECT THE LEVEL OF THE CEDAR RIVER AT ROCHESTER BRIDGE IS ABOVE ELEVATION 668.0, WORK SHALL CEASE AND WORKING DAYS WILL NOT BE COUNTED UNTIL THE RIVER RETURNS TO BELOW SAID ELEVATION. ALSO, IF THE RIVER LEVEL EXCEEDS SAID ELEVATION AT THE ABOVE PRESCRIBED STARTING DATE THE STARTING DATE SHALL BE POSTPONED UNTIL 5 DAYS AFTER THE RIVER LEVEL RETURNS TO BELOW SAID ELEVATION.
LIQUIDATED DAMAGES: $200.00 PER DAY

WHERE PUBLIC UTILITY FIXTURES ARE SHOWN AS EXISTING ON THE PLANS OR ENCOUNTERED WITHIN THE CONSTRUCTION AREA, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO NOTIFY THE OWNERS OF THOSE UTILITIES PRIOR TO THE BEGINNING OF CONSTRUCTION. THE CONTRACTOR SHALL AFFORD ACCESS TO THESE FACILITIES FOR NECESSARY MODIFICATION OF SERVICES. UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS AND RECORDS, AND THEREFORE THEIR LOCATIONS MUST BE CONSIDERED APPROXIMATE ONLY. IT IS POSSIBLE THERE MAY BE OTHERS, THE EXISTENCE OF WHICH IS PRESENTLY NOT KNOWN OR SHOWN. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THEIR EXISTENCE AND EXACT LOCATION AND TO AVOID DAMAGE THERETO. NO CLAIMS FOR ADDITIONAL COMPENSATION WILL BE ALLOWED TO THE CONTRACTOR FOR ANY INTERFERENCE OR DELAY CAUSED BY SUCH WORK.

THE CONTRACTOR SHALL SUBMIT, FOR REVIEW, TO THE ENGINEER HIS PLAN FOR SHEETING AND FILLING THE LOADING FACILITY OR THE CONSTRUCTION OF A CAUSEWAY. THE PLANS, INCLUDING COMPUTATIONS AND DRAWINGS, SHALL BE SUBMITTED SUFFICIENTLY IN ADVANCE OF THE TIME THE CONTRACTOR INTENDS TO START WORK IN ORDER TO AFFORD TIME FOR THE ENGINEER'S REVIEW. NO WORK SHALL BE STARTED PRIOR TO THE RECEIPT BY THE CONTRACTOR OF AGREED-UPON PLANS. HOWEVER, THIS REVIEW SHALL NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY FOR SATISFACTORY RESULTS AND SAFETY OF THE WORKERS ON THE PROJECT.

THE ACCESS ROAD AND LOADING FACILITY SHALL BE REMOVED, ALL MATERIAL SHALL BECOME THE PROPERTY OF THE CONTRACTOR, AND SHALL BE REMOVED FROM THE SITE BY THE CONTRACTOR AND DISPOSED OF AT A SITE PROVIDED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER. FIRES FOR THE DISPOSAL OF RUBBISH ON THE SITE ARE EXPRESSLY PROHIBITED. DEMOLITION MATERIAL WHICH FALLS INTO THE RIVER SHALL BE REMOVED PROMPTLY AND EVERY CAUTION EXERCISED TO PRESERVE STREAM QUALITY.

THE CONTRACTOR SHALL PROVIDE THE ENGINEER SAFE ACCESS TO THE BRIDGE PIERS, THROUGHOUT THE PROJECT, FOR THE PURPOSE OF SOUNDING AROUND THE PIERS AND CHECKING PLACEMENT OF RIP RAP. THE ACCESS MAY BE ON THE CONTRACTOR'S BARGE OR OTHER VESSEL.

THE CONTRACTOR IS HEREBY NOTIFIED OF THE LIMITED CLEARANCE BETWEEN THE WATER AND LOW STEEL OF THE EXISTING BRIDGE. THE CONTRACTOR SHALL USE EXTREME CARE WORKING UNDER AND AROUND THE EXISTING STRUCTURE. ANY DAMAGE TO THE EXISTING BRIDGE BY THE CONTRACTOR SHALL BE IMMEDIATELY REPORTED TO THE ENGINEER. ANY DAMAGE SHALL BE REPAIRED AS DIRECTED BY THE ENGINEER. THE COST TO REPAIR ANY SUCH DAMAGE SHALL BE PAID FOR BY THE CONTRACTOR.

BIDITEM DESCRIPTIONS

ITEM NO.	DESCRIPTION

2 RIP RAP

THIS ITEM SHALL INCLUDE FURNISHING AND PLACING STONE RIP RAP AROUND THE PIERS AS SHOWN ON THE PLANS.

MATERIAL FOR RIP RAP SHALL BE TAKEN FROM BLASTED ROCK WITH NO ADDITIONAL PROCESSING NECESSARY, BUT THE METHOD OF LOADING SHALL BE SUCH THAT ASSURES REASONABLE COMPLIANCE WITH THESE REQUIREMENTS FOR EACH LOAD. ROCK SHALL BE SOUND LIMESTONE, DOLOMITE, OR QUARTZITE, AFTER VISUAL INSPECTION AND PRIOR TO LOADING, THE ENGINEER MAY REQUIRE MATERIAL TO BE LOADED FROM ANOTHER AREA. FIELD STONES OR BOULDERS WILL NOT BE ACCEPTED.

RIP RAP SHALL HAVE A NOMINAL MAXIMUM SIZE OF 250 POUNDS AND SHALL BE A WELL-GRADED MATERIAL MEETING THE FOLLOWING ADDITIONAL SIZE LIMITATIONS.

STONE WT., LBS	MINIMUM % LARGER THAN
90	50
5	90

NO MORE THAN 5% SHALL PASS THE 1/2 INCH SIEVE.

THE CONTRACTOR SHALL PLACE RIP RAP USING A CHUTE OR OTHER DEVICE WHICH WILL ENSURE PROPER PLACEMENT OF THE MATERIAL. RIP RAP SHALL BE PLACED FROM A BARGE OR OTHER VESSEL. NO DUMPING OR PLACEMENT FROM THE BRIDGE WILL BE ALLOWED.
PLACEMENT OF RIP RAP SHALL PROCEED AT A UNIFORM RATE ON BOTH SIDES OF A PIER SO THAT THE TWO SIDES ARE KEPT CLOSE TO THE SAME ELEVATION WITH NO MORE THAN ONE BARGE FULL DIFFERENCE.

THE ESTIMATED QUANTITIES ARE BASED ON THE FOLLOWING ESTIMATE OF MATERIAL PER PIER.

PIER	RIP RAP (TONS)
5	161
6	650
7	13

	824

THE QUANTITY OF RIP RAP WILL BE MEASURED IN TONS. ONLY MATERIAL PLACED IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS WILL BE MEASURED. UNLESS THE CONTRACTOR CAN DEMONSTRATE A MATERIAL DIFFERENCE IN THE RIVER GEOMETRICS SHOWN ON THE PLANS AND AN INCREASE IS APPROVED BY THE ENGINEER, THE MAXIMUM QUANTITY SHALL NOT EXCEED THE PLAN QUANTITY BY MORE THAN 5%.

FOR THE QUANTITY OF RIP RAP FURNISHED AND PLACED, THE CONTRACTOR WILL BE PAID THE CONTRACT PRICE PER TON. THIS PAYMENT SHALL BE FULL COMPENSATION FOR ALL WORK, INCLUDING FURNISHING AND PLACING ALL MATERIAL, AND FOR FURNISHING ALL EQUIPMENT, TOOLS, AND LABOR NECESSARY TO COMPLETE THE WORK ACCORDING TO THE PLANS AND SPECIFICATIONS.

3 TRAFFIC CONTROL

THE CONTRACTOR WILL BE PAID THE LUMP SUM CONTRACT PRICE FOR 'TRAFFIC CONTROL' AS DESIGNATED BY THE PLANS. THIS PAYMENT WILL BE FULL COMPENSATION FOR FURNISHING ALL MATERIALS, LABOR, AND EQUIPMENT FOR ERECTING, MAINTAINING, MOVING AND REMOVING ALL TRAFFIC CONTROL DEVICES REQUIRED BY THE PLANS AND SPECIFICATIONS INCLUDING SIGNS, MARKINGS, AND BARRICADES.

BIDITEM DESCRIPTIONS

ITEM NO.	DESCRIPTION

4 TEMPORARY LOADING FACILITY, BUILD AND REMOVE

THE CONTRACTOR SHALL BUILD AND REMOVE A LOADING FACILITY FOR LOADING RIP RAP ON TO HIS BARGE OR OTHER VESSEL. THE CONTRACTOR SHALL SUBMIT, FOR REVIEW, TO THE ENGINEER HIS PLAN FOR SHEETING AND FILLING THE LOADING FACILITY OR FOR A CAUSEWAY. THE LOADING FACILITY SHALL BE BUILT TO FIT THE CONTRACTOR'S EQUIPMENT AND OPERATION. THE PLANS, INCLUDING COMPUTATIONS AND DRAWINGS, SHALL BE SUBMITTED SUFFICIENTLY IN ADVANCE OF THE TIME THE CONTRACTOR INTENDS TO START WORK IN ORDER TO AFFORD TIME FOR THE ENGINEER'S REVIEW. NO WORK SHALL BE STARTED PRIOR TO THE RECEIPT BY THE CONTRACTOR OF AGREED-UPON PLANS. HOWEVER, THIS REVIEW SHALL NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY FOR SATISFACTORY RESULTS AND SAFETY OF THE WORKERS ON THE PROJECT.

THE CONTRACTOR SHALL MAINTAIN THE LOADING FACILITY FOR THE DURATION OF THE PROJECT.

UPON COMPLETION OF THE PROJECT THE TEMPORARY LOADING FACILITY SHALL BE REMOVED AND THE AREA RESTORED TO PRECONSTRUCTION CONDITIONS. THIS SHALL INCLUDE REMOVING ALL SHEETING, FILL ROCK AND RESTORING THE DISTURBED AREA.

FOR THIS WORK OF BUILDING, REMOVING AND RESTORING A TEMPORARY LOADING FACILITY THE CONTRACTOR WILL BE PAID THE LUMP SUM CONTRACT PRICE. THIS PAYMENT SHALL BE FULL COMPENSATION FOR ALL WORK, INCLUDING FURNISHING, PLACING AND REMOVING ALL MATERIAL, AND FOR FURNISHING ALL EQUIPMENT, TOOLS, AND LABOR NECESSARY TO COMPLETE THE WORK ACCORDING TO THE PLANS AND SPECIFICATIONS.

4 DEBRIS REMOVAL

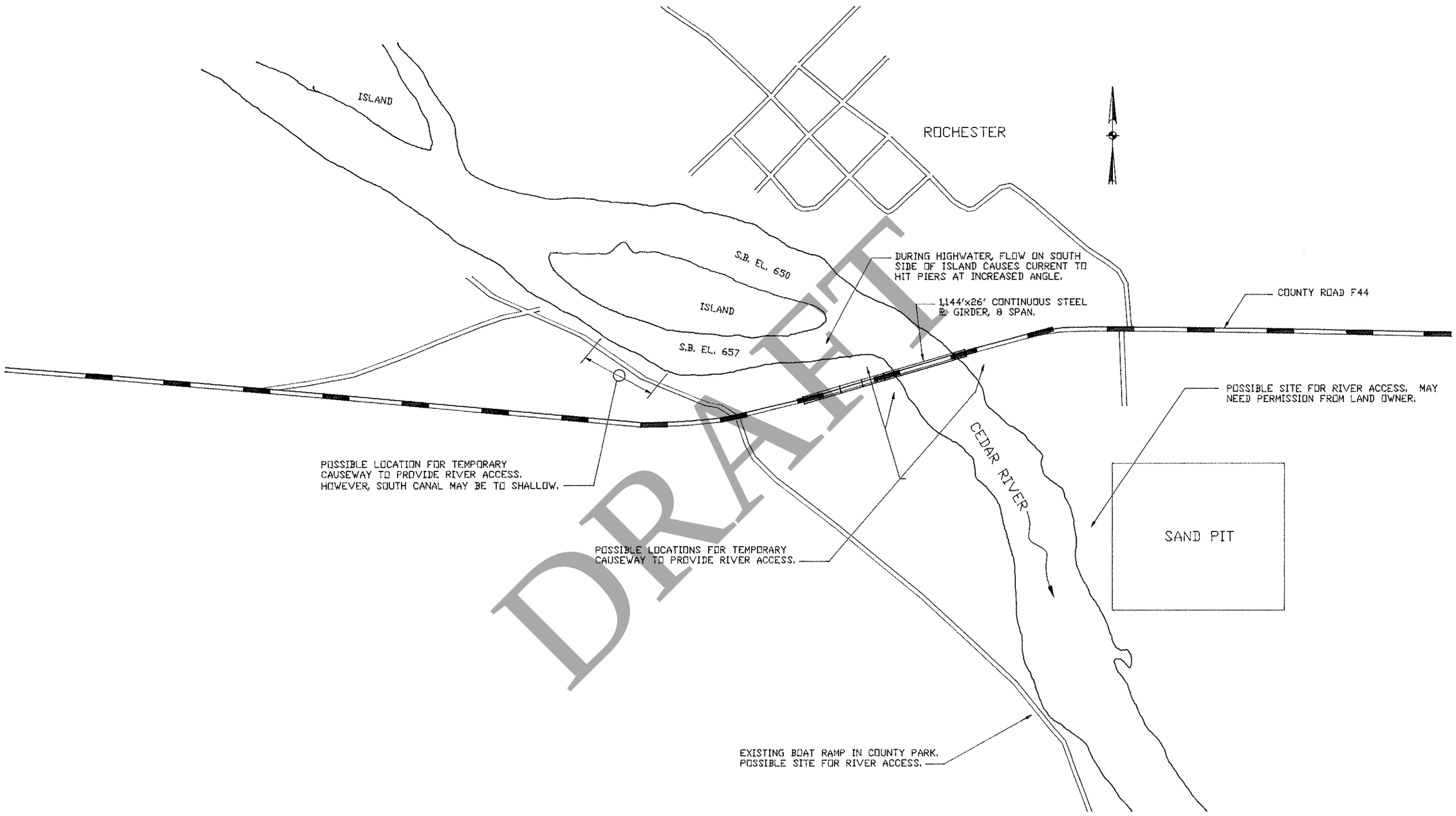
THE CONTRACTOR SHALL REMOVE DRIFT DEBRIS FROM PIERS 5, 6 & 7, AND DISPOSE OF IT AT A SITE PROVIDED BY THE CONTRACTOR.

FOR THIS WORK OF REMOVAL AND DISPOSAL OF DEBRIS THE CONTRACTOR WILL BE PAID THE LUMP SUM CONTRACT PRICE. THIS PAYMENT SHALL BE FULL COMPENSATION FOR ALL WORK, INCLUDING FURNISHING, PLACING AND REMOVING ALL MATERIAL, AND FOR FURNISHING ALL EQUIPMENT, TOOLS, AND LABOR NECESSARY TO COMPLETE THE WORK ACCORDING TO THE PLANS AND SPECIFICATIONS.

DRAFT

QUANTITIES AND NOTES
ROCHESTER BRIDGE
PIER PROTECTION
OVER THE CEDAR RIVER
CEDAR COUNTY

BENCHMARK: TOP OF PIER 7 = ELEV. 673.02, (TAKEN FROM ORIGINAL BRIDGE PLANS).



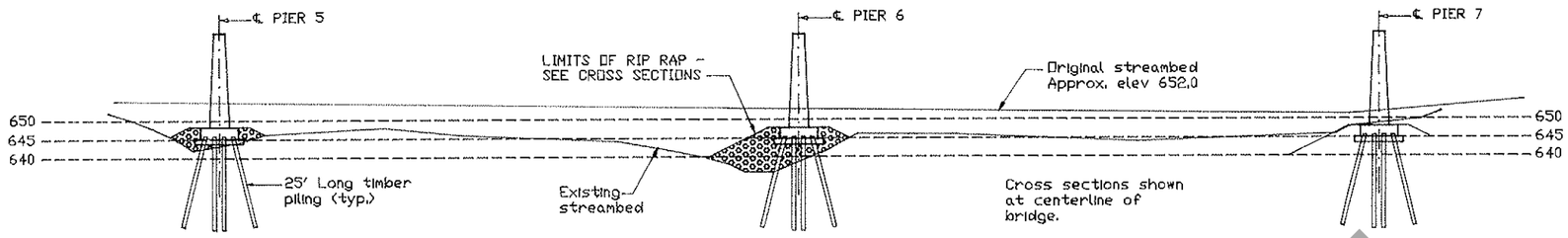
DRAFT

SITUATION PLAN
PIER SCOUR PROTECTION
ROCHESTER BRIDGE OVER
THE CEDAR RIVER
CEDAR COUNTY

W INC. IOWA CITY, IOWA
(319)351-2166 FAX (319)351-0256

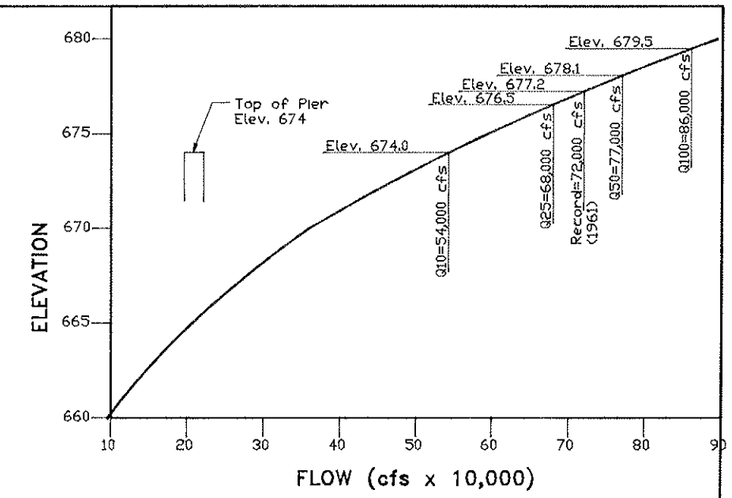
PROJECT NUMBER	STATE	FED. ROAD DIST. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
FM-16(8)--55-16	IOWA	5		3	6

BENCHMARK: TOP OF PIER 7 = ELEV. 673.02, (TAKEN FROM ORIGINAL BRDIGE PLANS).



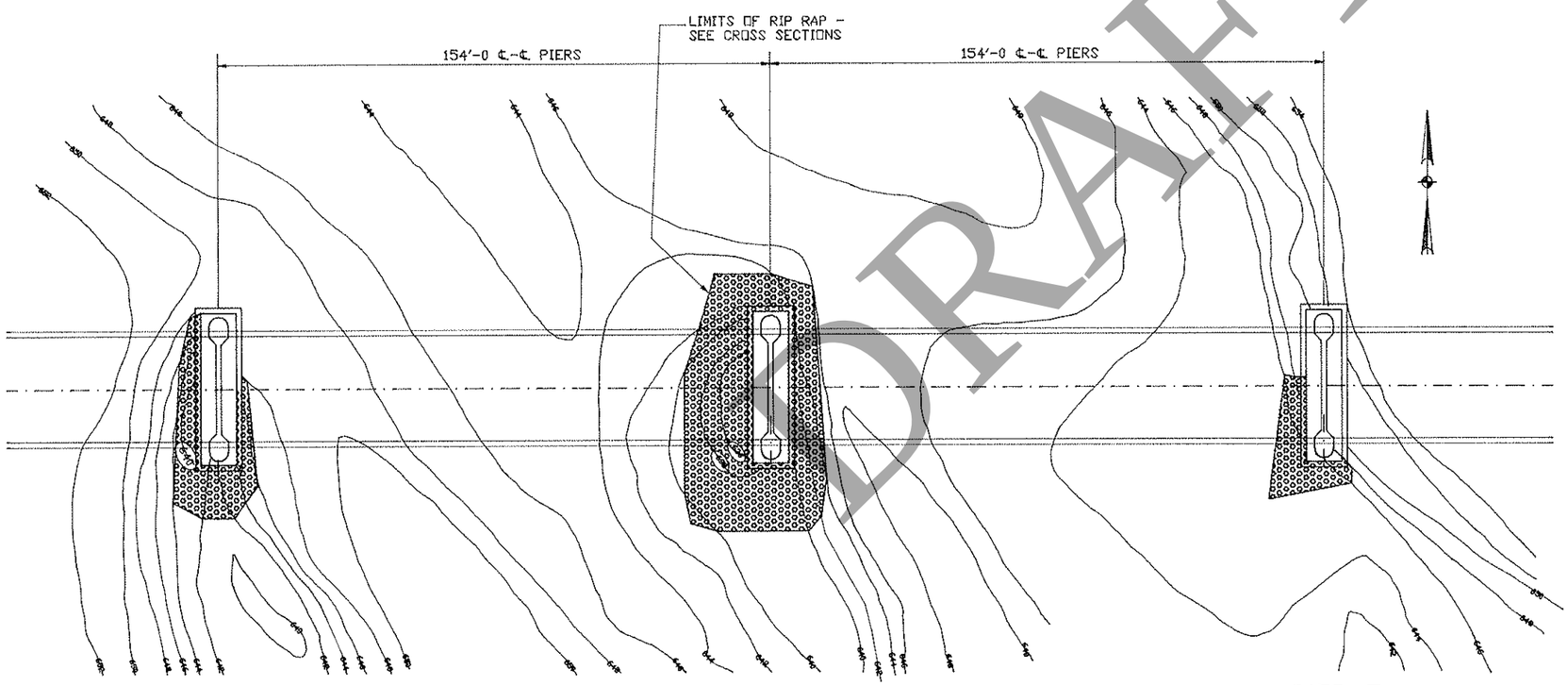
ELEVATION

SCALE: 1" = 20'



HYDRAULIC DATA

DRAINAGE AREA		7218	sq.mi.
MAIN CHANNEL SLOPE		2.17	ft/mile
FREQUENCY (year)	FLOW (cfs)	ELEV.	VELOCITY (fps)
10	54,000	674.0	6.0
25	68,000	676.5	6.4
50	77,000	678.1	6.7
100	86,000	679.5	6.9
RECORD (1961)	72,000	677.2	
DESIGN (1929)	56,000	674.4	



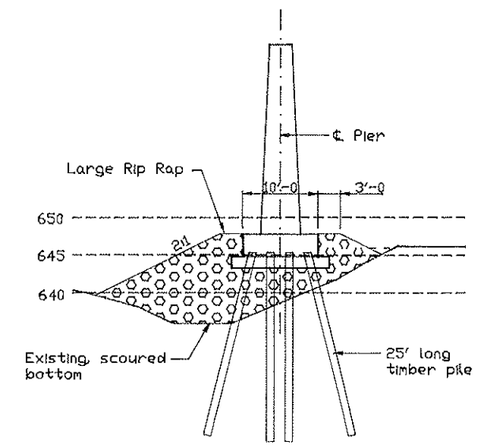
PIER 5
Bottom of cap 645.28
Bottom of seal 643.78

PIER 6
Bottom of cap 644.81
Bottom of seal 643.31

PIER 7
Bottom of cap 645.02
Bottom of seal 643.52

PLAN

SCALE: 1" = 20'



PIER PROTECTION DETAIL

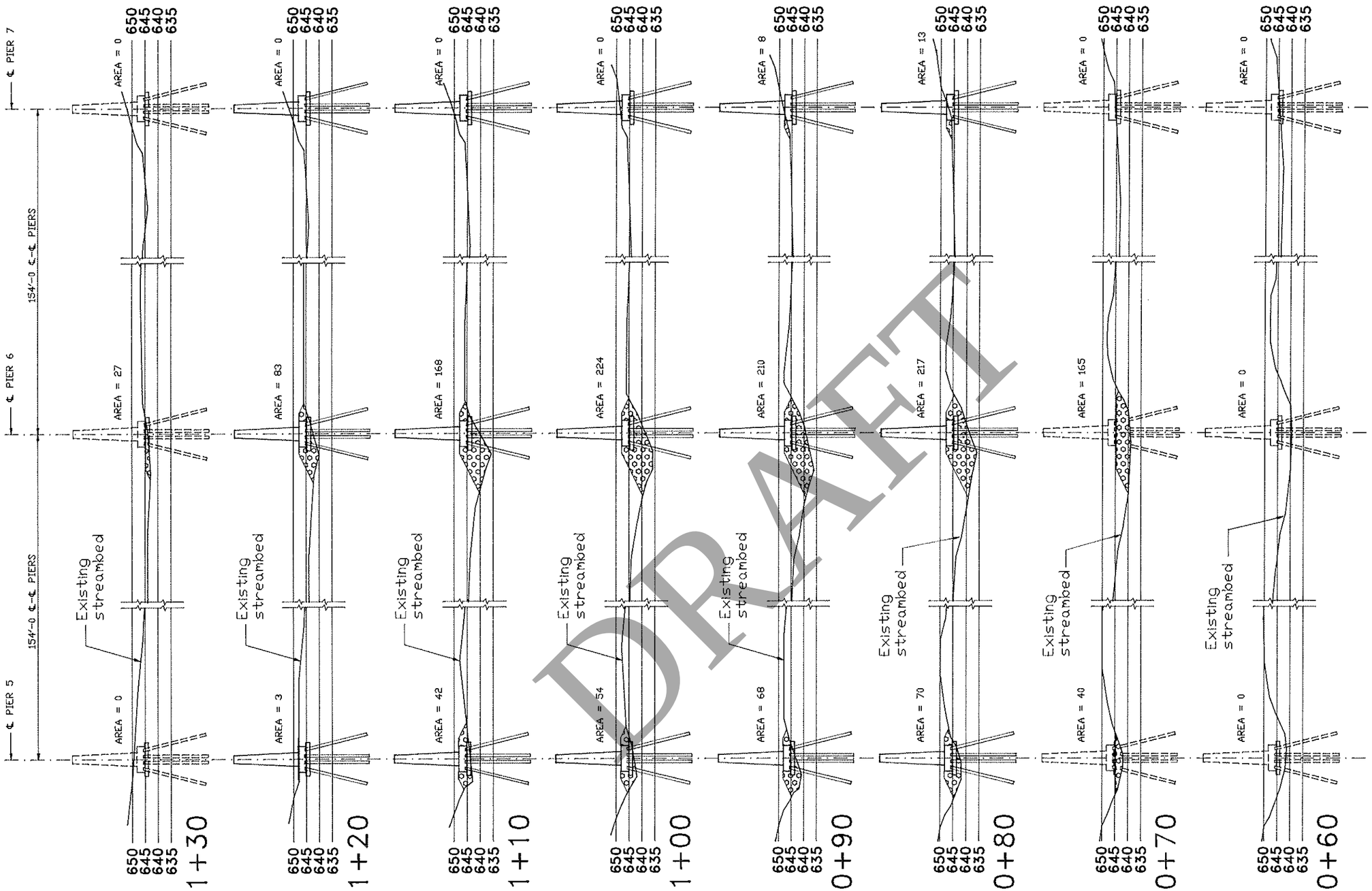
GENERAL PLAN
PIER SCOUR PROTECTION
ROCHESTER BRIDGE OVER THE CEDAR RIVER
CEDAR COUNTY

DRAFT

NNW INC. IOWA CITY, IOWA
(319)351-2166 FAX (319)351-0266

PROJECT NUMBER	STATE	FED. ROAD DIST. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
	IOWA	5		4	6

BENCHMARK: TOP OF PIER 7 = ELEV. 673.02, (TAKEN FROM ORIGINAL BRIDGE PLANS).



STATION EQUATION:
1+00 = ℄ BRIDGE
(ALL SECTIONS LOOKING UPSTEAM)

SCALE: 1" = 20'-0

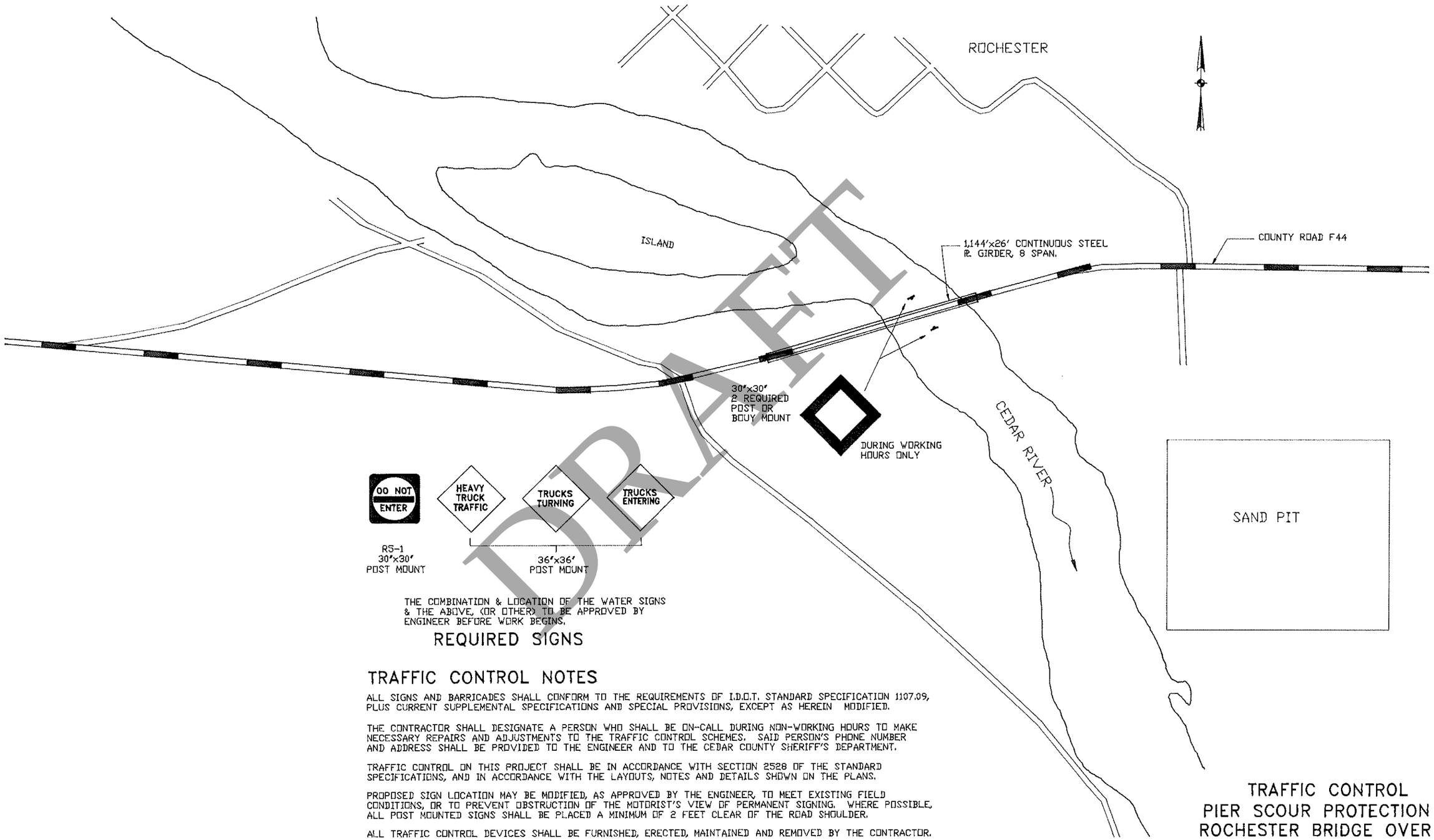
DATE OF SURVEY:
MAY 26, 1993

DRAFT

RIVER CROSS SECTIONS
PIER SCOUR PROTECTION
ROCHESTER BRIDGE OVER
THE CEDAR RIVER
CEDAR COUNTY

NW INC. IOWA CITY, IOWA
(319)351-2166 FAX (319)351-0255

PROJECT NUMBER	STATE	FED. ROAD DIST. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
FM-16(8)--55-16	IOWA	5		5	6



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THE COMBINATION & LOCATION OF THE WATER SIGNS & THE ABOVE, (OR OTHER) TO BE APPROVED BY ENGINEER BEFORE WORK BEGINS.

REQUIRED SIGNS

TRAFFIC CONTROL NOTES

ALL SIGNS AND BARRICADES SHALL CONFORM TO THE REQUIREMENTS OF I.D.O.T. STANDARD SPECIFICATION 1107.09, PLUS CURRENT SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS, EXCEPT AS HEREIN MODIFIED.

THE CONTRACTOR SHALL DESIGNATE A PERSON WHO SHALL BE ON-CALL DURING NON-WORKING HOURS TO MAKE NECESSARY REPAIRS AND ADJUSTMENTS TO THE TRAFFIC CONTROL SCHEMES. SAID PERSON'S PHONE NUMBER AND ADDRESS SHALL BE PROVIDED TO THE ENGINEER AND TO THE CEDAR COUNTY SHERIFF'S DEPARTMENT.

TRAFFIC CONTROL ON THIS PROJECT SHALL BE IN ACCORDANCE WITH SECTION 2528 OF THE STANDARD SPECIFICATIONS, AND IN ACCORDANCE WITH THE LAYOUTS, NOTES AND DETAILS SHOWN ON THE PLANS.

PROPOSED SIGN LOCATION MAY BE MODIFIED, AS APPROVED BY THE ENGINEER, TO MEET EXISTING FIELD CONDITIONS, OR TO PREVENT OBSTRUCTION OF THE MOTORIST'S VIEW OF PERMANENT SIGNING. WHERE POSSIBLE, ALL POST MOUNTED SIGNS SHALL BE PLACED A MINIMUM OF 2 FEET CLEAR OF THE ROAD SHOULDER.

ALL TRAFFIC CONTROL DEVICES SHALL BE FURNISHED, ERECTED, MAINTAINED AND REMOVED BY THE CONTRACTOR.

THE CONTRACTOR WILL BE PAID THE LUMP SUM CONTRACT PRICE FOR 'TRAFFIC CONTROL'. THIS PAYMENT WILL BE FULL COMPENSATION FOR FURNISHING ALL MATERIALS, LABOR AND EQUIPMENT FOR ERECTING, MAINTAINING, MOVING AND REMOVING ALL TRAFFIC CONTROL DEVICES REQUIRED BY THE PLANS AND SPECIFICATIONS.

TRAFFIC CONTROL
PIER SCOUR PROTECTION
ROCHESTER BRIDGE OVER
THE CEDAR RIVER
CEDAR COUNTY

NNW INC. IOWA CITY, IOWA
(319)351-2166 FAX (319)351-0256

PROJECT NUMBER	STATE	FED. ROAD DIST. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
FM-16(8)--55-16	IOWA	5		6	6

Historic Data For Cedar River at Cedar Rapids, IA

Stream Name: Cedar River
Gage Zero: 700.46 Ft. NGVD 1929
Flood Stage: 12 Ft.

Longitude: -91.66694000
Latitude: 41.97060000
River Mile: 112.7 miles above the mouth of the Iowa River

Record High Elevation : **731.58 Ft.**
Drainage Area - 6510.00 Mi^2

Record High Stage: **31.12 Ft.**
Record High Stage Date: **06/13/2008**

Location of Gage: Located in Linn County, Cedar Rapids, IA. on the right bank 400 ft upstream from the 8th Ave bridge and 2.7 miles upstream from Prairie Creek.

This gage is cooperatively operated by the US Geological Survey (Iowa District) and the city of Cedar Rapids, IA.

For official Flow data, please visit the USGS website:

http://waterdata.usgs.gov/ia/nwis/uv/?site_no=05464500&PARAmeter_cd=00065,00060,72020

DATE	Discharge cfs (Mean)	Gage Height feet (Mean)	Elevation feet (6:00 CST)
6/1/2008	30,100	11.14	711.6
6/2/2008	32,000	11.56	712.02
6/3/2008	29,800	11.06	711.52
6/4/2008	29,600	11.02	711.48
6/5/2008	29,050	10.9	711.36
6/6/2008	30,000	11.12	711.58
6/7/2008	27,300	10.51	710.97
6/8/2008	27,100	10.46	710.92
6/9/2008	42,700	13.79	714.25
6/10/2008	62,100	17.54	718
6/11/2008	73,900	19.62	720.08
6/12/2008	M	25.88	726.34
6/13/2008	M	31.03	731.49 **731.58****
6/14/2008	150,040	29.23	729.69
6/15/2008	111,000	24.93	725.39
6/16/2008	87,346	21.95	722.41
6/17/2008	76,900	20.13	720.59
6/18/2008	69,400	18.85	719.31
6/19/2008	55,300	16.25	716.71
6/20/2008	41,900	13.63	714.09
6/21/2008	34,600	12.12	712.58
6/22/2008	29,200	10.94	711.4
6/23/2008	25,700	10.15	710.61
6/24/2008	23,100	9.53	709.99
6/25/2008	21,200	9.09	709.55
6/26/2008	21,200	8.63	709.09
6/27/2008	17,400	8.16	708.62
6/28/2008	16,500	7.92	708.38
6/29/2008	15,400	7.65	708.11
6/30/2008	15,000	7.53	707.99

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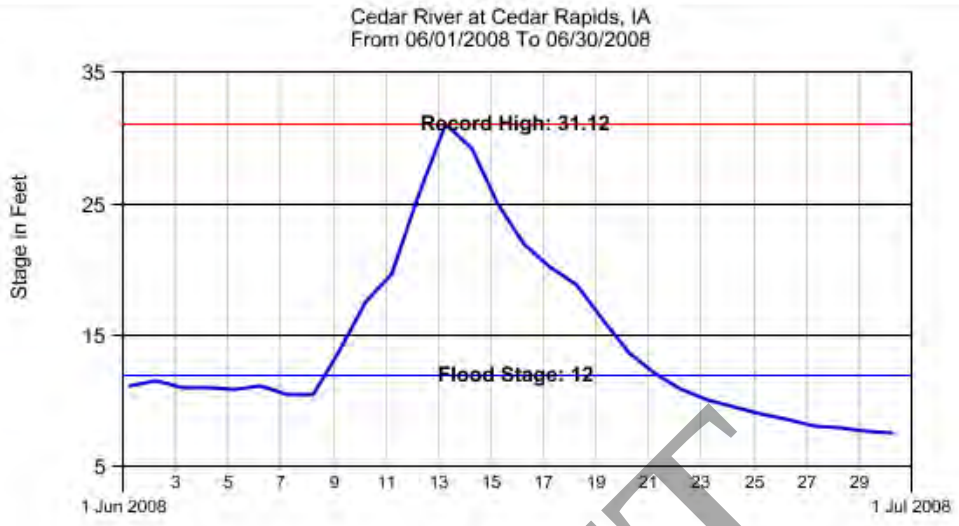
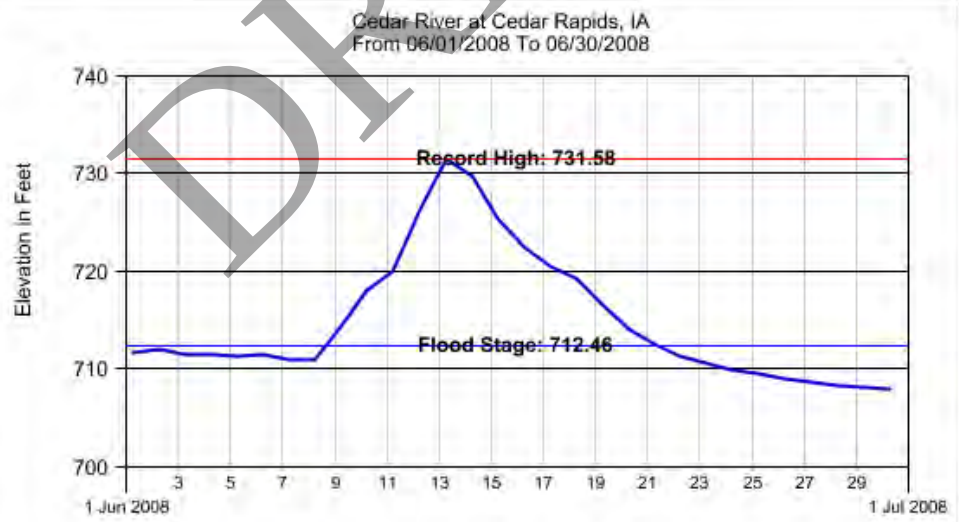
Cedar River at Cedar Rapids, IA
(06:00 Central)



US Army Corps of Engineers - Rock Island District - Water Control Center - Contact Us

Cedar River at Cedar Rapids, IA
(06:00 Central)



US Army Corps of Engineers - Rock Island District - Water Control Center - Contact Us

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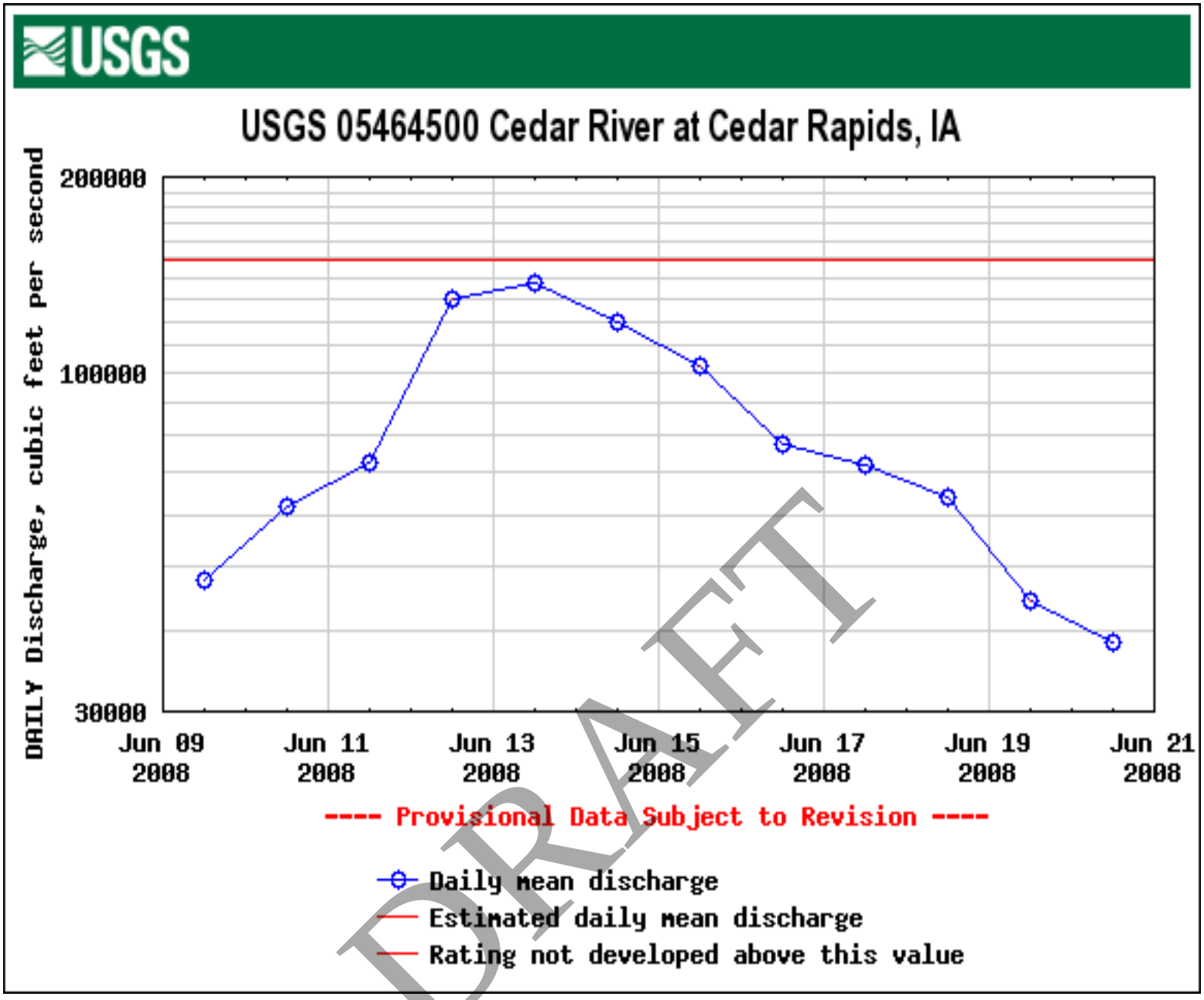

Record High Stages For Cedar River at Cedar Rapids, IA	
Stage	Date
18.05	07/12/1993
18.23	06/16/1947
18.30	05/27/2004
18.31	07/25/1999
18.51	04/10/1965
18.60	04/04/1933
19.27	04/04/1993
19.66	03/31/1961
20.00	03/18/1929
20.00	06/01/1851
31.12	06/13/2008

UNDERWATER STRUCTURAL INSPECTION 2010

OLD IOWA HWY. 979-ROCHESTER BRIDGE, ROCHESTER, IA
CEDAR VALLEY ROAD BRIDGE, CEDAR VALLEY, IA
CEDAR COUNTY, IA

ROCHESTER BRIDGE

CEDAR VALLEY BRIDGE

DRAFT

Prepared for Cedar County
by
VJ Engineering
May 2010

DRAFT

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OLD IOWA HWY. 979 ROCHESTER BRIDGE

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CEDAR VALLEY ROAD BRIDGE

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ROCHESTER BRIDGE
OVER THE CEDAR RIVER
OLD IOWA HWY. 979
ROCHESTER, IOWA
FHWA NO. 18490

Executive Summary

On April 28, 2010 an inspection was performed on the Rochester Bridge west of Rochester, IA. This bridge carries Old Iowa Highway 979 over the Cedar River. The bridge superstructure, piers and abutments were visually inspected and an underwater structural inspection was performed on the submerged piers. In general, the bridge suffered few detrimental effects from recent high water events. It is recommended that riprap and/or armoring be added around Pier 3 which received scour damage and that all debris is carefully removed from the structure.

Bridge Description

The Rochester Bridge was built in 1948 and carries Old Highway 979 over the Cedar River. The two-lane, eight span bridge has variable depth continuous steel girders, a 29'-9" by 1145'-0" reinforced concrete deck, seven reinforced concrete piers and stub abutments. Piers 1 and 2 are founded into a minimum of 6 inches of bedrock whereas the remaining piers are founded on battered timber friction piling driven to full penetration (20'-0" – 25'-0") and a minimum bearing of 18 tons. The concrete abutments are founded on timber piles driven to full penetration or to rock and a minimum bearing of 18 tons. For the purpose of this report, the piers will be numbered from west to east. The bridge had reconstruction work done in 1985. Riprap was added at Piers 5, 6 and 7 after the 1993 flood, and at piers 4, 5, and 7 following the 2008 flood.

The estimated average daily traffic in 2006 was 680 vehicles per day.

Investigative Methods

The superstructure, piers and abutments were visually inspected for delamination, exposed reinforcing, lateral displacement and other damage due to recent high water events.
The underwater structural inspection was performed by a team of qualified Iowa DOT approved divers for six of the seven submerged piers. The underwater inspection examined all of the piers that were submerged in the Cedar River with the exception of Pier 5 due to excessive current and concerns for the safety of the diver. Photographs of the findings can be found in Appendix A.

Cedar River data for April 2010 for the nearest gage station at Cedar Rapids can be found in Appendix B. The Cedar Rapids gage station is located approximately 43 miles upstream of the Rochester Bridge.

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Inspection

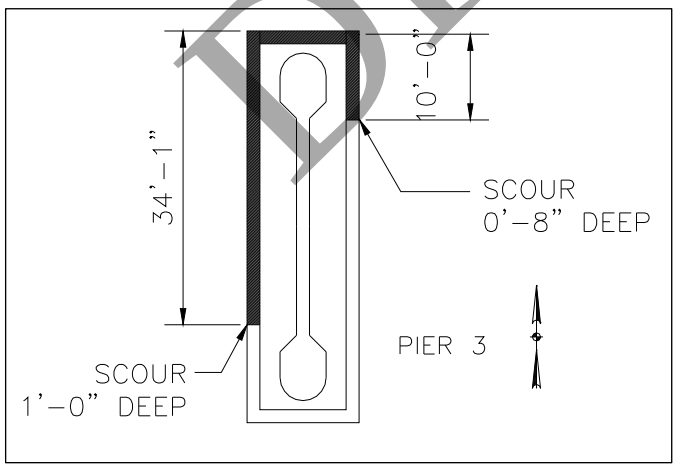
Bridge Deck: The bridge deck surface is in good condition and shows no visible damage as a result of recent high water events.

Superstructure: No evidence of damage or movement of the steel girders was observed and the bearings appear in sound condition. The lateral bracing and steel connections show no damage. The bearings and pile caps show no sign of movement or deterioration. Some of the debris accumulated during the flood of 2008 remains wedged between girders and lateral bracing near the east abutment.

Piers and Abutments: Both abutments were found to be in good condition with only minor cracking observed in the concrete and no undermining. Upon visual inspection of the piers they appeared in good condition with some minor concrete pitting and minor cracking. A large vertical crack was observed on the east side of Pier 2 but is not believed to be detrimental to the structure. Debris has accumulated at the north bull nose of Piers 6 and 7. None of the piers were found to have exposed piling. Pictures can be found in Appendix A.

The inspection found no pitting or spalling of the concrete on Pier 1. No scour was detected and the top of the concrete footing was covered by mud and sand. Many broken pieces of concrete and rock were found all around the pier and small amounts of debris at the north bull nose and east side.

Pier 2 also was in good condition and no scour damage was noted. Broken pieces of concrete and rock were found around the pier and a small amount of debris on the east side near the south bull nose.



The concrete at Pier 3 was found to be in good condition. Scour was detected on the west side that extends about 75% of the pier length from the north bull nose. The scour hole is about 1 foot deep under the pier and extends about 3 feet below the footing. Scour was also found along the east side starting at the north bull nose extending 10 feet along the pier. The scour hole is about 8 inches deep under the pier and extends 3 feet below the footing. Large debris was found at the south end of the pier.

The concrete at Pier 4 was in good condition and no scour damage was detected. The grout bags placed along the east side in 2008 were covered in sand. No debris was found.

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Due to excessive currents at Pier 5 an underwater inspection was not able to be performed. The divers attempted to perform the inspection and the conditions were deemed unsafe. Some minor debris was observed surrounding this pier.

The concrete at Pier 6 was in good condition and no scour was detected. The riprap added around the pier in 1993 remains intact. Some large debris was found at the north bull nose.

The concrete at Pier 7 was in good condition and no scour was detected. The previously added grout bags and riprap are still intact. Some large debris was found at the north end of the pier.

Conclusions and Recommendations

1. The armoring that was added in 2008 at Piers 4 and 7 remains intact and appears to have adequately prevented scour in these locations.

2. It is recommended that armoring, such as grout bags, be added to the scoured locations at Pier 3 to protect the pile caps and timber piles from further undermining and damage due to exposure to extreme flows.

3. It is recommended that the debris at the south end of Pier 3 and north end of Piers 6 and 7 be carefully removed. The minor debris surrounding Pier 5 should also be removed.

4. The underwater inspection of Pier 5 was not completed due to flow conditions. The inspection will be performed within one month of receiving this report or when river conditions permit. A separate report for Pier 5 will be provided following that inspection.

5. The current Scour Critical rating on the Structure Inventory and Appraisal Form is 3. A rating of 3 means that the bridge is scour critical and the foundation is unstable for calculated scour conditions. This rating is appropriate given the findings during this inspection. The Structure Inventory and Appraisal Form can be found in Appendix B.

A biennial bridge inspection program, as required by the FHWA and IDOT, should be continued for this structure and an underwater inspection should be performed at least every 60 months.

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CEDAR VALLEY BRIDGE
OVER THE CEDAR RIVER
CEDAR VALLEY ROAD
CEDAR VALLEY, IOWA
FHWA NO. 103070

Executive Summary

On April 28, 2010 an inspection was performed on the Cedar Valley Bridge in Cedar Valley, IA. The bridge superstructure, piers and abutments were visually inspected and an underwater structural inspection was performed on submerged piers. In general, the bridge suffered no detrimental effects from recent high water events. It is recommended that debris be carefully removed from the structure at Pier 5.

Bridge Description

The Cedar Valley Bridge was built in 1965 and carries Cedar Valley Road over the Cedar River. The two-lane, seven-span bridge has a continuous welded steel girder superstructure, 32'-0" by 827'-2" reinforced concrete deck, six reinforced concrete piers, and stub abutments. The piers and concrete abutments are founded on battered steel piling driven to rock with a minimum of 37 ton bearing. For the purpose of this report, the piers will be numbered from west to east.

The estimated average daily traffic in 2006 was 1650 vehicles per day.

Investigative Methods

The superstructure, piers and abutments were visually inspected for delamination, exposed reinforcing, lateral displacement and other damage due to recent high water events.
The underwater structural inspection was performed by a team of qualified Iowa DOT approved divers for the five submerged piers. Photographs of the findings can be found in Appendix C.

DRAFT

Inspection

Bridge Deck: The bridge deck surface is in good condition and shows no movement or visible damage as a result of recent high water events. A few minor transverse cracks were observed near the piers.

Superstructure: No evidence of damage or movement of the steel girders was observed and the bearings appear in sound condition. The lateral bracing, floor beams, and steel connections show no damage.

Piers and Abutments: Both abutments were found to be in good condition with no movement or undermining observed. A few minor vertical cracks were observed on the abutments. Upon visual inspection of the piers they appeared in good condition. Debris has accumulated at the north bull nose at Pier 5. Pictures can be found in Appendix A.

The inspection showed no pitting or spalling of the concrete on Pier 1. No scour was detected and the top of the concrete footing was covered by mud and sand. No debris around the pier was found.

Pier 2 also was in good condition and no scour damage was noted. No debris was found at the pier and the top of the footing was covered by the riverbed.

Pier 3 also was in good condition and no scour damage was noted. No debris was found at the pier and the top of the footing was covered by the riverbed.

No scour or debris accumulation was found at Pier 4. The footing was covered by the riverbed. Two minor spalled sections, measuring about 6” high by 2’-0” long, with exposed rebar were observed above the water line on the east side. No section loss was observed on the exposed rebar.

Pier 5 was in good condition and no scour damage was detected. The top of the footing was covered by the riverbed. Some large debris was found at the north bull nose.

Pier 6 is not a submerged pier therefore an underwater inspection was not performed. The pier was visually inspected and was free of any major cracks and spalls.

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Conclusions and Recommendations

1. No scour related damage was observed. All of the submerged piers had footings covered by the riverbed. The current Scour Critical rating on the Structure Inventory and Appraisal Form is 8. A rating of 8 means that the bridge foundations are stable and in excellent condition. This rating is appropriate given the findings during this inspection. The Structure Inventory and Appraisal Form can be found in Appendix D.

2. It is recommended that the debris at the north end of Pier 5 be carefully removed.

A biennial bridge inspection program, as required by the FHWA and IDOT, should be continued

for this structure and an underwater inspection should be performed at least every 60 months.

We appreciate this opportunity to work with you on this inspection, and are prepared to assist you in the future. If you have any questions regarding this report or our services, please contact our office.

Sincerely,

Tim McDermott, EI
VJ Engineering

Jane Driscoll, PE
VJ Engineering

DRAFT

APPENDIX A

Rochester Bridge Photographs

Superstructure looking west.

DRAFT

Rock debris accumulation on east side of pier 1.

Map cracking with efflorescence on south bull nose of pier 2.

DRAFT

Large vertical crack on east side of pier 2.

Debris at north bull nose and along west side of pier 7.

DRAFT

DRAFT

APPENDIX B

Rochester Bridge SI&A Form

2008 Rochester Bridge Scour Remediation Drawings

Cedar River Data from Gage at Cedar Rapids, IA
43 Miles Upstream of Rochester Bridge

DRAFT

DRAFT

Iowa Department of Transportation

Structure Inventory and Appraisal

Bridge Name:

FHWA No.: 018490 | Bridge ID: 18490 | SR: 50 | SD/FO:

IDENTIFICATION

7 Facility Carried:	OLD IA 979
5B Rte. Signing Prefix:	
5C Level of Service:	
5D Inventory Route:	
City:	RURAL
3 County:	016
9 Location:	079031115
5E Directional Suffix:	
6 Feature Intersected:	CEDAR RIVER
2 District:	0.0
Garage:	
98 Border Bridge Code:	
% Responsibility:	0
99 Border Bridge No.:	

STRUCTURE TYPE AND MATERIALS

43A Main Span Material:	4 - Steel Continuous
43B Main Span Design:	03 - Girder and Floorbeam System
45 No. of Spans Main Unit:	8
44A Appr. Span Material:	000 - Other
44B Appr. Span Design:	000 - Other
46 No. of Appr. Spans:	0
107 Deck Type:	1 - Concrete Cast-in-Place
108A Wearing Surface:	1 - Monolithic Concrete (concurrently placed with structural deck)
108B Membrane:	0 - None
108C Deck Protection:	0 - None

GEOMETRIC DATA

48 Length Max Span:	154 ft.
49 Structure Length:	1145 ft.
34 Skew:	0°
Deck Area:	29999.0 sq. ft.
50B Curb/Sdwk Width R:	0 ft.
50A Curb/Sdwk Width L:	0 ft.
51 Width Curb to Curb:	26.2 ft.
52 Width Out to Out:	29.8 ft.
32 Appr. Roadway width: (w/ Shoulders)	38 ft.
33 Median:	0 - No median
35 Structure Flared:	00 - No flare
10 Vertical Clearance:	99'99"
47 Horiz. Clearance:	26'02"
53 Min. Vert. Clearance Over:	99'99"
54B Min. Vert. Underclearance:	00'00"
55 Min. Lat. Underclearance R:	0'00"
56 Min. Lat. Underclearance L:	0'00"

NAVIGATION DATA

38 Navigation Control:	0 - No navigation control on waterway (bridge permit not required)
111 Pier Protection:	
39 Vertical Clearance:	00'00"
40 Horiz. Clearance:	000'00"

16 Latitude: 41.66949691 | 17 Longitude: -91.1569334

INSPECTION

90 Inspection Date:	05/01/2008	Inspection Type:	
Inspection Group:		91 Frequency:	24
Next Insp Date:	5/1/2010	Next Insp Type:	Routine
Inspection Agency:	2	Inspection	CALHOUN-BURNS & ASSOC.
93A FC Inspection Date:	7/01/2008		
92A FC Frequency:	24	Next FC Insp.:	7/1/2010
93B UW Inspection Date:			
92B UW Frequebcy:	0	Next UW Insp.:	NA
93C SI Date:			
92C SI Frequency:	0	Next Spec. Insp.:	NA

CONDITION

58 Deck:	7 - Good Condition (some minor problems)
59 Super:	4 - Poor Condition (advanced deterioration)
60 Sub:	4 - Poor Condition (advanced deterioration)
61 Channel/Channel Prot.:	3 - Protection failure
62 Culvert:	N - Not Applicable

APPRAISAL

67 Str. Evaluation:	4 - Meets minimum tolerable limits
68 Deck Geometry:	5 - Somewhat better than minimum adequacy
69 Underclearance, Vert & horiz.:	N - Not applicable
71 Waterway Adequacy:	6 - Occasional Overtopping of Approaches
72 Appraoch Alignment:	6 - Equal to present minimum criteria
36A Bridge Rail:	0 - DOES NOT MEET CURRENT SAFETY STANDARDS, OR IS NOT THERE AND IS NEEDED.
36B Transition:	0 - DOES NOT MEET CURRENT SAFETY STANDARDS, OR IS NOT THERE AND IS NEEDED
36C Approach Rail:	1 - MEETS CURRENT SAFETY STANDARDS.
36D Approach Rail Ends:	0 - DOES NOT MEET CURRENT SAFETY STANDARDS, OR IS NOT THERE AND IS NEEDED
113 Scour Critical:	3 - Scour Critical - Unstable

LOAD RATING AND POSTING

31 Design Load:	2 - H 15		
64 Operating Rating:	39.8 Tons	63 Rating Method:	2 - Allowable Stress (AS)
66 Inventory Rating:	25.1 Tons	65 Rating Method:	2 - Allowable Stress (AS)
70 Posting:	5 - Equal to or above legal loads		
41 Posting Status:	A - Open		

AGE AND SERVICE

27 Year Built:	1948	Design No.:	1244
106 Year Reconstructed:	1985		
42A Type of Service on:	1 - Highway		
42B Type of Service Under:	5 - Waterway		
28A Lanes on:	2	28B Lanes under:	0
29 ADT:	680	30 Year of ADT:	2006
109 Truck ADT:	0 %	Speed Limit:	
19 Detour Length:	7.000 mi.		

CLASSIFICATION

112 NBIS Length:	Y
26 Functional Class:	5
100 STRHNET:	
101 Parallel Structure:	N - No parallel structure
102 Direction of Traffic:	2 - 2-way traffic
22 Owner:	02 - County Highway Agency
21 Custodian:	02 - County Highway Agency
37 Historical Significance:	5 - Not eligible

FRA No. (if RR Bridge):

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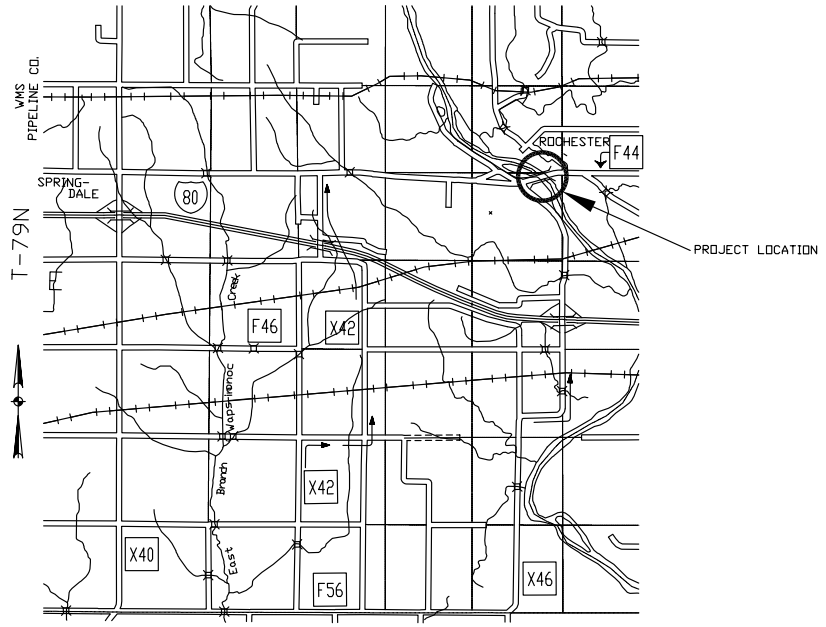
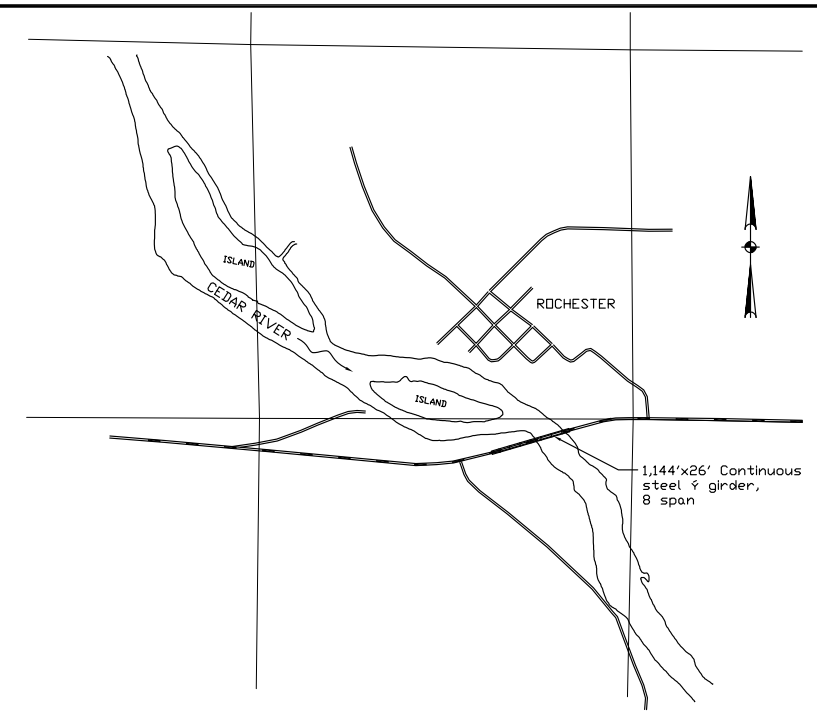
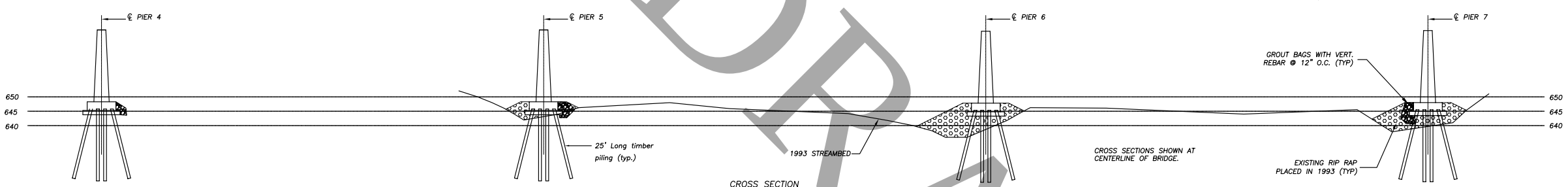


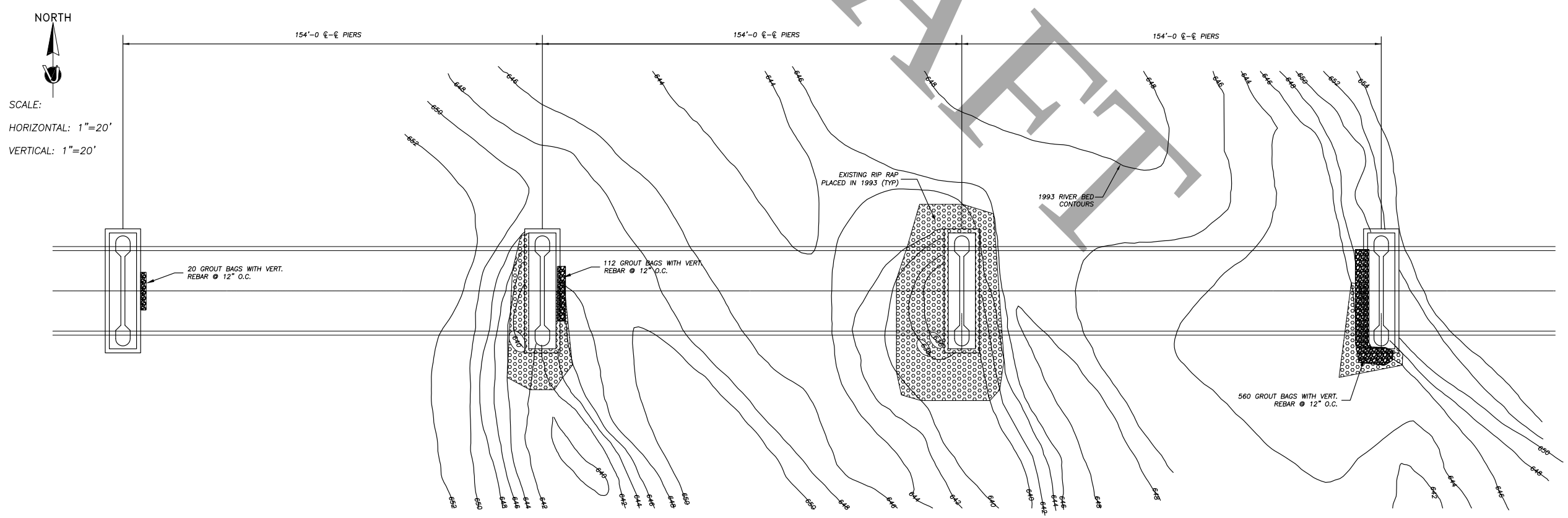
LOCATION MAP



NOTES:
1. ELEVATIONS AND BRIDGE DIMENSIONS TAKEN FROM PLANS & NOTES OF THE EXISTING BRIDGE, FHWA NO. 018490.
2. BENCHMARK: TOP OF PIER 7, ELEVATION = 673.02.
3. 60 LB. GROUT BAGS HAND PLACED BY DIVERS. AS-BUILT LOCATION BASED ON DIVERS MEASUREMENTS.
4. DATE OF PIER SCOUR PROTECTION REPAIR: SEPTEMBER 2008.



CROSS SECTION



PLAN

DRAFT

vj engineering
2570 holiday road
coralville, iowa - 319-338-4939

BRIDGE PIER SCOUR PROTECTION REPAIR
ROCHESTER BRIDGE OVER THE CEDAR RIVER
CEDAR COUNTY, IOWA

AS-BUILT PLAN AND CROSS SECTION

1

scale	AS NOTED
drawn by	GFF
approved by	JLD
date	01/09/09
revisions	

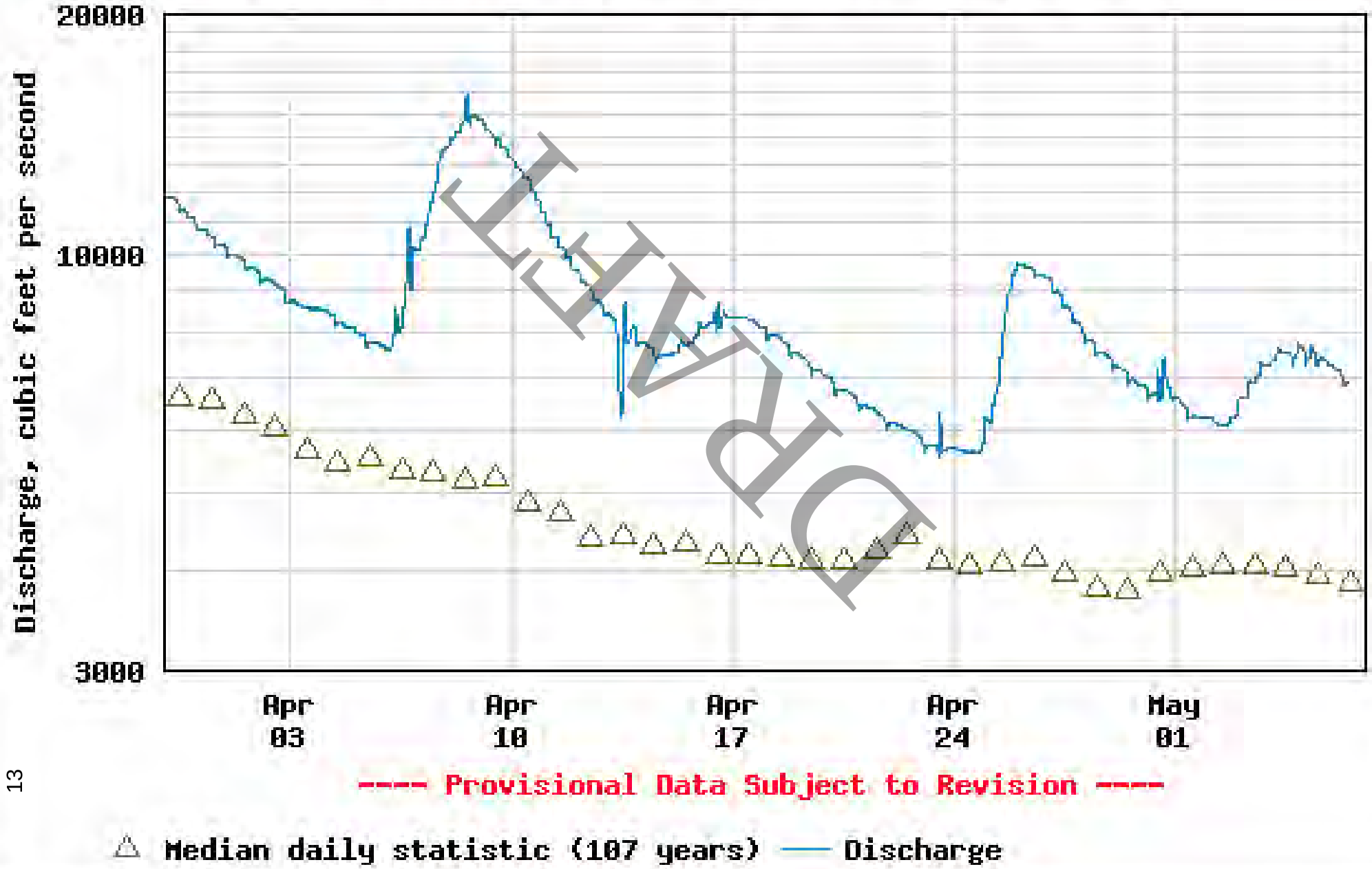
08IC134

12

Jan 09, 2009 T:\WORK\08-IC-146\dwg\ROCHESTER BRIDGE 2008.dwg

USGS

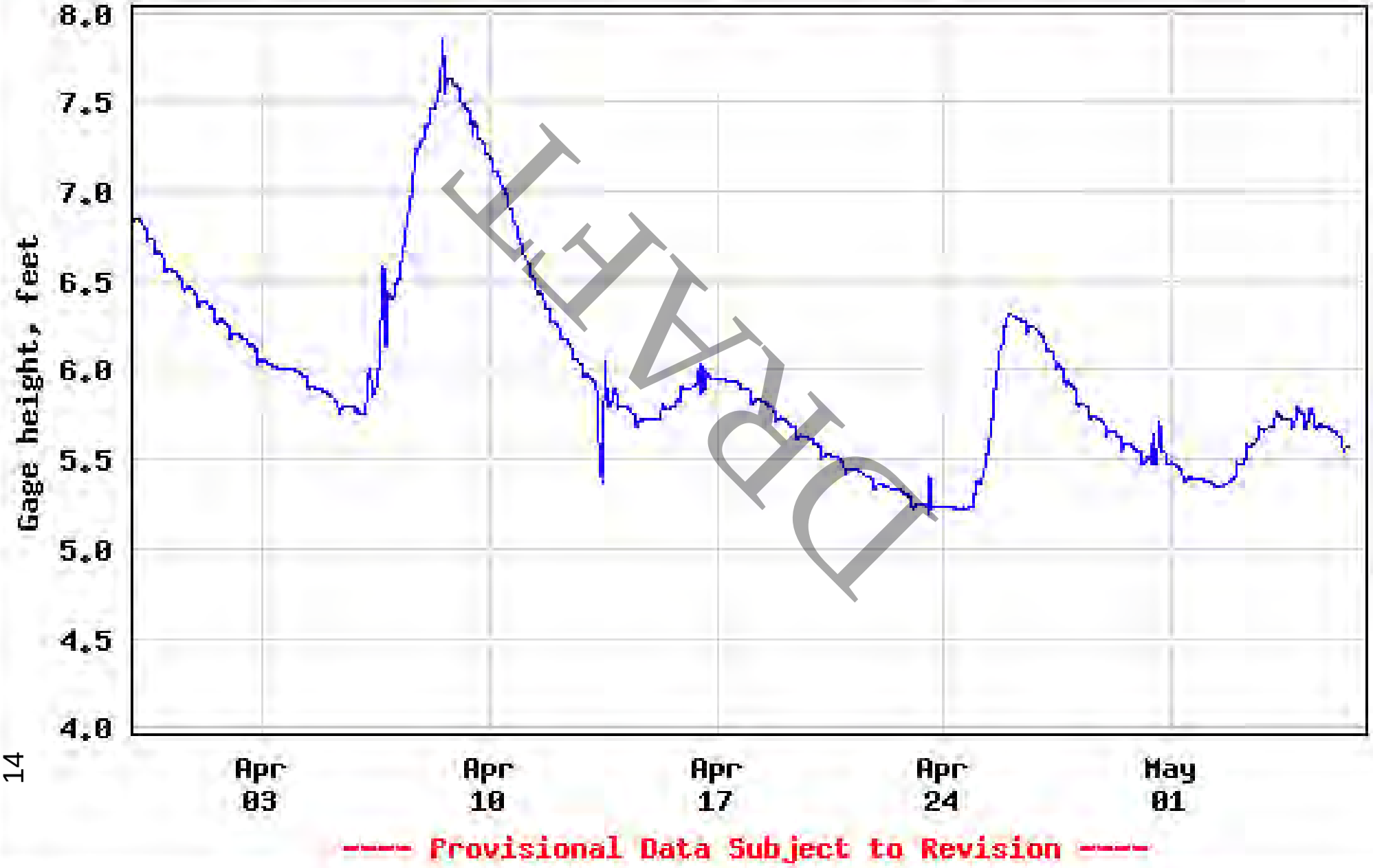
USGS 05464500 Cedar River at Cedar Rapids, IA



FEMA

USGS

USGS 05464500 Cedar River at Cedar Rapids, IA



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APPENDIX C

Cedar Valley Bridge Photographs

Superstructure looking west.

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Superstructure looking east. Bearings and plate girders in good condition.

Debris near north bull nose of Pier 5.

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APPENDIX D

Cedar Valley Bridge SI&A Form

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Iowa Department of Transportation

Structure Inventory and Appraisal

Bridge Name:

FHWA No.: 103070 | Bridge ID: 103070 | SR: 79 | SD/FO:

IDENTIFICATION

7 Facility Carried:	FM
5B Rte. Signing Prefix:	
5C Level of Service:	
5D Inventory Route:	
City:	RURAL
3 County:	016
9 Location:	080031803
5E Directional Suffix:	
6 Feature Intersected:	CEDAR RIVER
2 District:	0.0
Garage:	
98 Border Bridge Code:	
% Responsibility:	0
99 Border Bridge No.:	

STRUCTURE TYPE AND MATERIALS

43A Main Span Material:	4 - Steel Continuous
43B Main Span Design:	03 - Girder and Floorbeam System
45 No. of Spans Main Unit:	7
44A Appr. Span Material:	000 - Other
44B Appr. Span Design:	000 - Other
46 No. of Appr. Spans:	0
107 Deck Type:	1 - Concrete Cast-in-Place
108A Wearing Surface:	1 - Monolithic Concrete (concurrently placed with structural deck)
108B Membrane:	0 - None
108C Deck Protection:	0 - None

GEOMETRIC DATA

48 Length Max Span:	125 ft.
49 Structure Length:	827 ft.
34 Skew:	0°
Deck Area:	23238.7 sq. ft.
50B Curb/Sdwk Width R:	0 ft.
50A Curb/Sdwk Width L:	0 ft.
51 Width Curb to Curb:	28.1 ft.
52 Width Out to Out:	34.2 ft.
32 Appr. Roadway width: (w/ Shoulders)	38 ft.
33 Median:	0 - No median
35 Structure Flared:	00 - No flare
10 Vertical Clearance:	99'99"
47 Horiz. Clearance:	28'01"
53 Min. Vert. Clearance Over:	99'99"
54B Min. Vert. Underclearance:	00'00"
55 Min. Lat. Underclearance R:	0'00"
56 Min. Lat. Underclearance L:	0'00"

NAVIGATION DATA

38 Navigation Control:	0 - No navigation control on waterway (bridge permit not required)
111 Pier Protection:	
39 Vertical Clearance:	00'00"
40 Horiz. Clearance:	000'00"

16 Latitude: 41.73273498 | 17 Longitude: -91.2449648

INSPECTION

90 Inspection Date:	05/01/2008	Inspection Type:	
Inspection Group:		91 Frequency:	24
Next Insp Date:	5/1/2010	Next Insp Type:	Routine
Inspection Agency:	2	Inspection	CALHOUN-BURNS & ASSOC.
93A FC Inspection Date:	5/01/2008		
92A FC Frequency:	24	Next FC Insp.:	5/1/2010
93B UW Inspection Date:			
92B UW Frequebcy:	0	Next UW Insp.:	NA
93C SI Date:			
92C SI Frequency:	0	Next Spec. Insp.:	NA

CONDITION

58 Deck:	4 - Poor Condition (advanced deterioration)
59 Super:	7 - Good Condition (some minor problems)
60 Sub:	7 - Good Condition (some minor problems)
61 Channel/Channel Prot.:	6 - Bank slump, widespread minor damage
62 Culvert:	N - Not Applicable

APPRAISAL

67 Str. Evaluation:	7 - Better than present minimum criteria
68 Deck Geometry:	5 - Somewhat better than minimum adequacy
69 Underclearance, Vert & horiz.:	N - Not applicable
71 Waterway Adequacy:	7 - Slight Chance of Overtopping Bridge
72 Appraoch Alignment:	6 - Equal to present minimum criteria
36A Bridge Rail:	0 - DOES NOT MEET CURRENT SAFETY STANDARDS, OR IS NOT THERE AND IS NEEDED.
36B Transition:	0 - DOES NOT MEET CURRENT SAFETY STANDARDS, OR IS NOT THERE AND IS NEEDED
36C Approach Rail:	1 - MEETS CURRENT SAFETY STANDARDS.
36D Approach Rail Ends:	0 - DOES NOT MEET CURRENT SAFETY STANDARDS, OR IS NOT THERE AND IS NEEDED
113 Scour Critical:	8 - Stable - Excellent Condition

LOAD RATING AND POSTING

31 Design Load:	4 - H 20		
64 Operating Rating:	54.6 Tons	63 Rating Method:	2 - Allowable Stress (AS)
66 Inventory Rating:	35.8 Tons	65 Rating Method:	2 - Allowable Stress (AS)
70 Posting:	5 - Equal to or above legal loads		
41 Posting Status:	A - Open		

AGE AND SERVICE

27 Year Built:	1966	Design No.:	0
106 Year Reconstructed:	0		
42A Type of Service on:	1 - Highway		
42B Type of Service Under:	5 - Waterway		
28A Lanes on:	2	28B Lanes under:	0
29 ADT:	1650	30 Year of ADT:	2006
109 Truck ADT:	74 %	Speed Limit:	
19 Detour Length:	14.000 mi.		

CLASSIFICATION

112 NBIS Length:	Y
26 Functional Class:	5
100 STRHNET:	
101 Parallel Structure:	N - No parallel structure
102 Direction of Traffic:	2 - 2-way traffic
22 Owner:	02 - County Highway Agency
21 Custodian:	02 - County Highway Agency
37 Historical Significance:	5 - Not eligible

FRA No. (if RR Bridge):

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Iowa Department of Transportation

Structure Inventory and Appraisal

Bridge ID: 18490
FHWA No.: 18490

Official	SR: 34.5	SD/FO: Structurally Deficient
Unofficial	SR: 34.9	SD/FO: Structurally Deficient

IDENTIFICATION

7 Facility Carried:	OLD IA 979
5B Rte. Signing Prefix:	4
5C Level of Service:	1 - MAINLINE
5D Inventory Route:	00000
City:	RURAL
3 County:	016 - Cedar
9 Location:	079031115
5E Directional Suffix:	0 - NOT APPLICABLE
6 Feature Intersected:	CEDAR RIVER
2 District:	0
Garage:	
98 Border Bridge Code:	
% Responsibility:	0
99 Border Bridge No.:	

STRUCTURE TYPE AND MATERIALS

43A Main Span	4 - Steel Continuous
43B Main Span Design:	03 - Girder and Floorbeam System
45 No. Spans Main Unit:	8
44A Appr. Span	000 - NA
44B Appr. Span Design:	000 - NA
46 No. of Appr. Spans:	Near 0 Far 0
107 Deck Type:	1 - Concrete Cast-in-Place
108A Wearing Surface:	1 - Monolithic Concrete (concurrently placed with structural deck)
108B Membrane:	0 - None
108C Deck Protection:	0 - None

GEOMETRIC DATA

48 Length Max Span:	154 ft.
49 Structure Length:	1145 ft.
34 Skew:	0°
Deck Area:	34121.0 sq. ft.
50B Curb/Sdwk Width R:	0 ft.
50A Curb/Sdwk Width L:	0 ft.
51 Width Curb to Curb:	26.2 ft.
52 Width Out to Out:	29.8 ft.
32 Appr. Roadway width: (w/ Shoulders)	38 ft.
33 Median:	0 - No median
35 Structure Flared:	00 - No flare
10 Vertical Clearance:	99'99"
47 Horiz. Clearance:	26'02"
53 Min. Vert. Clearance Over:	99'99"
54B Min. Vert. Underclearance:	00'00"
55 Min. Lat. Underclearance R:	00'00"
56 Min. Lat. Underclearance L:	00'00"

NAVIGATION DATA

38 Navigation Control:
0 - No navigation control on waterway (bridge permit not required)

111 Pier Protection:	
39 Vertical Clearance:	00'00"
40 Horiz. Clearance:	000'00"

16 Latitude: 41.66949691 17 Longitude: -91.1569334

FRA No. (if RR Bridge):
Mile Post:

INSPECTION

90 Inspection Date:	05/27/2010	Inspection Type:	N/A
Next Routine Insp Date:	5/27/2012	91 Frequency:	24
		Next Insp Type:	Regular
Inspection Agency:	2 - County	Inspection Group:	CALHOUN-BURNS & ASSOC.
93A FC Inspection Date:	06/21/2010		
92A FC Frequency:	24	Next FC Insp.:	06/21/2012
93B UW Inspection Date:			
92B UW Frequency:	0	Next UW Insp.:	NA
93C SI Date:			
92C SI Frequency:	0	Next Spec. Insp.:	NA
Other Non-NBI Date:			
Other Non-NBI Freq.:		Next Other Insp.:	NA

CONDITION

58 Deck:	7 - Good Condition (some minor problems)
59 Super:	3 - Serious Condition (primary structure affected)
60 Sub:	4 - Poor Condition (advanced deterioration)
61 Channel/Channel Prot.:	3 - Protection failure
62 Culvert:	N - Not Applicable

APPRAISAL

67 Str. Evaluation:	3 - Intolerable - high priority of corrective action
68 Deck Geometry:	5 - Somewhat better than minimum adequacy
69 Underclear Vert & Horiz:	N - Not applicable
71 Waterway Adequacy:	6 - Occasional Overtopping of Approaches
72 Appraoch Alignment:	6 - Equal to present minimum criteria
36A Bridge Rail:	0 - DOES NOT MEET CURRENT SAFETY STANDARDS, OR IS NOT THERE AND IS NEEDED.
36B Transition:	0 - DOES NOT MEET CURRENT SAFETY STANDARDS, OR IS NOT THERE AND IS NEEDED
36C Approach Rail:	1 - MEETS CURRENT SAFETY STANDARDS.
36D Approach Rail Ends:	0 - DOES NOT MEET CURRENT SAFETY STANDARDS, OR IS NOT THERE AND IS NEEDED
113 Scour Critical:	3 - Scour Critical - Unstable

LOAD RATING AND POSTING

31 Design Load:	2 - H 15
63 Rating Method:	2 - Allowable Stress (AS) reported in english tons using HS-20 loading.
64 Operating Rating:	39.8 Tons
65 Rating Method:	2 - Allowable Stress (AS) reported in english tons using HS-20 loading.
66 Inventory Rating:	25.1 Tons
70 Posting:	5 - Equal to or above legal loads
41 Posting Status:	P - Posted for Load

AGE AND SERVICE

27 Year Built:	1948	Design No.:	1244
106 Year Reconstructed:	1985		
42A Type of Service on:	1 - Highway		
42B Type of Service Under:	5 - Waterway		
28A Lanes on:	2	28B Lanes under:	0
29 ADT:	460	30 Year of ADT:	2010
109 Truck ADT:	0 %	Speed Limit:	55
19 Detour Length:	7 mi.		

CLASSIFICATION

112 NBIS Length:	Y
26 Functional Class:	07 - Rural - Major Collector
100 STRAHNET:	0 - Not a defense highway
101 Parallel Structure:	N - No parallel structure
102 Direction of Traffic:	2 - 2-way traffic
22 Owner:	02 - County Highway Agency
21 Custodian:	02 - County Highway Agency
37 Historical Significance:	5 - Not eligible
75A Type of Work Proposed:	31 - Replacement - Load/Geometry
75B Work Done by:	1 - Work to be done by contract

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SCOUR REPAIR AND DEBRIS REMOVAL 2010

OLD IOWA HWY. 979-ROCHESTER BRIDGE, ROCHESTER, IA
CEDAR VALLEY ROAD BRIDGE, CEDAR VALLEY, IA
CEDAR COUNTY, IA

ROCHESTER BRIDGE

CEDAR VALLEY BRIDGE

DRAFT

Prepared for Cedar County
by
VJ Engineering
November 2010

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CEDAR VALLEY ROAD BRIDGE

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CONCLUSIONS AND RECOMMENDATIONS……. 5

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ROCHESTER BRIDGE
OVER THE CEDAR RIVER
OLD IOWA HWY. 979
ROCHESTER, IOWA
FHWA NO. 18490

Executive Summary
On August 27, 2010 a follow up inspection, debris removal, and scour repair was performed on the Rochester Bridge west of Rochester, IA. This bridge carries Old Iowa Highway 979 over the Cedar River. After removing the debris located at Piers 4 & 7, the divers detected scour at these piers that had previously been concealed by the large debris. It is recommended that scour repair consisting of grout bags be added at Piers 4 & 7. Due to the reoccurring scour issues of this bridge, it is also recommended that a hydraulic study be performed to determine the systemic cause for the scour.

Bridge Description
The Rochester Bridge was built in 1948 and carries Old Highway 979 over the Cedar River. The two-lane, eight span bridge has variable depth continuous steel girders, a 29'-9" by 1145'-0" reinforced concrete deck, seven reinforced concrete piers and stub abutments. Piers 1 and 2 are founded into a minimum of 6 inches of bedrock whereas the remaining piers are founded on battered timber friction piling driven to full penetration (20'-0" – 25'-0") and a minimum bearing of 18 tons. The concrete abutments are founded on timber piles driven to full penetration or to rock and a minimum bearing of 18 tons. For the purpose of this report, the piers will be numbered from west to east. The bridge had reconstruction work done in 1985. Riprap was added at Piers 5, 6 and 7 after the 1993 flood, and at piers 4, 5, and 7 following the 2008 flood.

The estimated average daily traffic in 2006 was 680 vehicles per day.

Investigative Methods
The underwater structural inspection was performed by a team of qualified Iowa DOT approved divers for the submerged piers.

Cedar River data for July through October, 2010 for the nearest gage station at Cedar Rapids can be found in Appendix A. The Cedar Rapids gage station is located approximately 43 miles upstream of the Rochester Bridge.

Inspection, Repair, and Debris Removal

Pier 1 was not submerged at the time of inspection so an underwater inspection was not performed.

Pier 2 was in good condition and no scour damage was noted.

The debris found at Pier 3 during the previous inspection was removed. Grout bags and rebar were added per the drawing shown in Appendix A. No new scour was detected.

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Debris was removed from Pier 4. On the West side of the pier for 3/4 of the length starting at the North bullnose, sand is washed out to the bottom of the pile cap but not yet undermining it. A large tree was removed from the West side. Rip rap was still intact for the remaining length of the West side. On the East side of the pier, a 2 foot wide area was found with exposed rebar. This was likely to be the vertical rebar placed to secure the grout bags in 2008 indicating the grout bags have washed away in this location. Scour was detected across this 2 foot area.

Pier 5 was in good condition and the rip rap and grout bags placed in 1993 and 2008 respectively have remained intact. No scour was detected.

Pier 6 was in good condition and no scour damage was noted.

A substantial amount of debris was removed from Pier 7. The pile cap at the south bullnose was exposed and is beginning to scour indicating that the grout bags added in 2008 have washed away.

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Conclusions and Recommendations

1. After removing the debris it is clear that the armoring that was added in 2008 at Piers 4 and 7 has washed away in some locations. This may have been caused by heavy turbulence around the large pieces of debris that had accumulated at these piers.

2. It is recommended that a hydraulic study be performed on the Cedar River near the bridge site to determine if river conditions have changed and are resulting in the reoccurring scour issues.

3. It is recommended that armoring, such as grout bags, be added to the scoured locations at Piers 4 and 7 to protect the pile caps and timber piles from further undermining and damage due to exposure to extreme flows.

4. The current Scour Critical rating on the Structure Inventory and Appraisal Form is 7. A rating of 7 means that the bridge has had countermeasures installed to correct a previous scour problem and is no longer scour critical. This rating is not appropriate given the findings during this inspection. The scour detected during this inspection indicates that the bridge is still Scour Critical and should be rated a 3. The Structure Inventory and Appraisal Form can be found in Appendix A.

A biennial bridge inspection program, as required by the FHWA and IDOT, should be continued for this structure and an underwater inspection should be performed at least every 60 months.

CEDAR VALLEY BRIDGE
OVER THE CEDAR RIVER
CEDAR VALLEY ROAD
CEDAR VALLEY, IOWA
FHWA NO. 103070

Executive Summary

On August 27, 2010 a follow up inspection, debris removal, and scour repair was performed on the Cedar Valley Bridge in Cedar Valley, IA. After removing large debris at Pier 2, scour was detected that had previously been concealed by the debris. It is recommended that scour repair consisting of grout bags be added at Pier 2.

Bridge Description

The Cedar Valley Bridge was built in 1965 and carries Cedar Valley Road over the Cedar River. The two-lane, seven-span bridge has a continuous welded steel girder superstructure, 32'-0" by 827'-2" reinforced concrete deck, six reinforced concrete piers, and stub abutments. The piers and concrete abutments are founded on battered steel piling driven to rock with a minimum of 37 ton bearing. For the purpose of this report, the piers will be numbered from west to east.

The estimated average daily traffic in 2006 was 1650 vehicles per day.

Investigative Methods

The underwater structural inspection was performed by a team of qualified Iowa DOT approved divers for the five submerged piers.

Inspection, Repair, and Debris Removal

Pier 1 was in good condition and no scour damage was noted.

A 20 foot long tree was removed from the North bullnose of Pier 2. After removing the debris, an 8 inch tall scour hole was detected for the entire width of the North bullnose. The pile cap is exposed on the sides of the pier but no scour was detected.

Pier 3 was in good condition and no scour damage was noted.

Pier 4 was in good condition and no scour damage was noted.

A 20 foot long tree was removed from the North bullnose of Pier 5. No scour was detected.

Pier 6 is not a submerged pier therefore an underwater inspection was not performed.

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Conclusions and Recommendations

1. It is recommended that armoring, such as grout bags, be added to the scoured locations at Pier 2 to protect the pile caps and timber piles from further undermining and damage due to exposure to extreme flows

2. The current Scour Critical rating on the Structure Inventory and Appraisal Form is 8. A rating of 8 means that the bridge foundations are stable and in excellent condition. It is recommended that this rating be reassessed due to the discovery of scour at Pier2. The Structure Inventory and Appraisal Form can be found in Appendix B.

A biennial bridge inspection program, as required by the FHWA and IDOT, should be continued for this structure and an underwater inspection should be performed at least every 60 months.

We appreciate this opportunity to work with you on this inspection, and are prepared to assist you in the future. If you have any questions regarding this report or our services, please contact our office.

Sincerely,

Tim McDermott, EI
VJ Engineering

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APPENDIX A

Rochester Bridge SI&A Form

2010 Rochester Bridge Scour Remediation Drawings

Cedar River Data from Gage at Cedar Rapids, IA
43 Miles Upstream of Rochester Bridge

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Iowa Department of Transportation

Structure Inventory and Appraisal

Bridge ID: 18490
FHWA No.: 18490

Official	SR: 49.7	SD/FO: Structurally Deficient
Unofficial	SR: 34.1	SD/FO: Not Deficient or Obsolete

IDENTIFICATION

7 Facility Carried:	OLD IA 979
5B Rte. Signing Prefix:	4
5C Level of Service:	1 - MAINLINE
5D Inventory Route:	00000
City:	RURAL
3 County:	016 - Cedar
9 Location:	079031115
5E Directional Suffix:	0 - NOT APPLICABLE
6 Feature Intersected:	CEDAR RIVER
2 District:	0.0
Garage:	
98 Border Bridge Code:	
% Responsibility:	0
99 Border Bridge No.:	

STRUCTURE TYPE AND MATERIALS

43A Main Span Material:	4 - Steel Continuous
43B Main Span Design:	03 - Girder and Floorbeam System
45 No. of Spans Main Unit:	8
44A Appr. Span Material:	000 - Other
44B Appr. Span Design:	000 - Other
46 No. of Appr. Spans:	0
107 Deck Type:	1 - Concrete Cast-in-Place
108A Wearing Surface:	1 - Monolithic Concrete (concurrently placed with structural deck)
108B Membrane:	0 - None
108C Deck Protection:	0 - None

GEOMETRIC DATA

48 Length Max Span:	154 ft.
49 Structure Length:	1145 ft.
34 Skew:	0°
Deck Area:	29999.0 sq. ft.
50B Curb/Sdwk Width R:	0 ft.
50A Curb/Sdwk Width L:	0 ft.
51 Width Curb to Curb:	26.2 ft.
52 Width Out to Out:	29.8 ft.
32 Appr. Roadway width: (w/ Shoulders)	38 ft.
33 Median:	0 - No median
35 Structure Flared:	00 - No flare
10 Vertical Clearance:	99'99"
47 Horiz. Clearance:	26'02"
53 Min. Vert. Clearance Over:	99'99"
54B Min. Vert. Underclearance:	00'00"
55 Min. Lat. Underclearance R:	0'00"
56 Min. Lat. Underclearance L:	0'00"

NAVIGATION DATA

38 Navigation Control:	0 - No navigation control on waterway (bridge permit not required)
111 Pier Protection:	
39 Vertical Clearance:	00'00"
40 Horiz. Clearance:	000'00"

16 Latitude: 41.66949691 17 Longitude: -91.1569334

FRA No. (if RR Bridge):

INSPECTION

90 Inspection Date:	**05/27/2010**	Inspection Type:	Regular and Fracture Critical
Next Routine Insp Date:	5/27/2012	91 Frequency:	24
		Next Insp Type:	Regular
Inspection Agency:	5 - Consultant	Inspection Group:	CALHOUN-BURNS & ASSOC.
93A FC Inspection Date:	06/21/2010		
92A FC Frequency:	24	Next FC Insp.:	6/21/2012
93B UW Inspection Date:			
92B UW Frequebcy:	0	Next UW Insp.:	NA
93C SI Date:			
92C SI Frequency:	0	Next Spec. Insp.:	NA
Other Non-NBI Date:			
Other Non-NBI Freq.:		Next Other Insp.:	NA

CONDITION

58 Deck:	7 - Good Condition (some minor problems)
59 Super:	3 - Serious Condition (primary structure affected)
60 Sub:	4 - Poor Condition (advanced deterioration)
61 Channel/Channel Prot.:	3 - Protection failure
62 Culvert:	N - Not Applicable

APPRAISAL

67 Str. Evaluation:	4 - Meets minimum tolerable limits
68 Deck Geometry:	5 - Somewhat better than minimum adequacy
69 Underclearance, Vert & horiz.:	N - Not applicable
71 Waterway Adequacy:	6 - Occasional Overtopping of Approaches
72 Appraoch Alignment:	6 - Equal to present minimum criteria
36A Bridge Rail:	0 - DOES NOT MEET CURRENT SAFETY STANDARDS, OR IS NOT THERE AND IS NEEDED.
36B Transition:	0 - DOES NOT MEET CURRENT SAFETY STANDARDS, OR IS NOT THERE AND IS NEEDED
36C Approach Rail:	1 - MEETS CURRENT SAFETY STANDARDS.
36D Approach Rail Ends:	0 - DOES NOT MEET CURRENT SAFETY STANDARDS, OR IS NOT THERE AND IS NEEDED
113 Scour Critical:	7 - Fixed - Not Scour Critical

LOAD RATING AND POSTING

31 Design Load:	2 - H 15		
64 Operating Rating:	39.8 Tons	63 Rating Method:	2 - Allowable Stress (AS)
66 Inventory Rating:	25.1 Tons	65 Rating Method:	2 - Allowable Stress (AS)
70 Posting:	5 - Equal to or above legal loads		
41 Posting Status:	A - Open		

AGE AND SERVICE

27 Year Built:	1948	Design No.:	1244
106 Year Reconstructed:	1985		
42A Type of Service on:	1 - Highway		
42B Type of Service Under:	5 - Waterway		
28A Lanes on:	2	28B Lanes under:	0
29 ADT:	680	30 Year of ADT:	2006
109 Truck ADT:	0 %	Speed Limit:	
19 Detour Length:	7.000 mi.		

CLASSIFICATION

112 NBIS Length:	Y
26 Functional Class:	07 - Rural - Major Collector
100 STRHNET:	0 - Not a defense highway
101 Parallel Structure:	N - No parallel structure
102 Direction of Traffic:	2 - 2-way traffic
22 Owner:	02 - County Highway Agency
21 Custodian:	02 - County Highway Agency
37 Historical Significance:	5 - Not eligible

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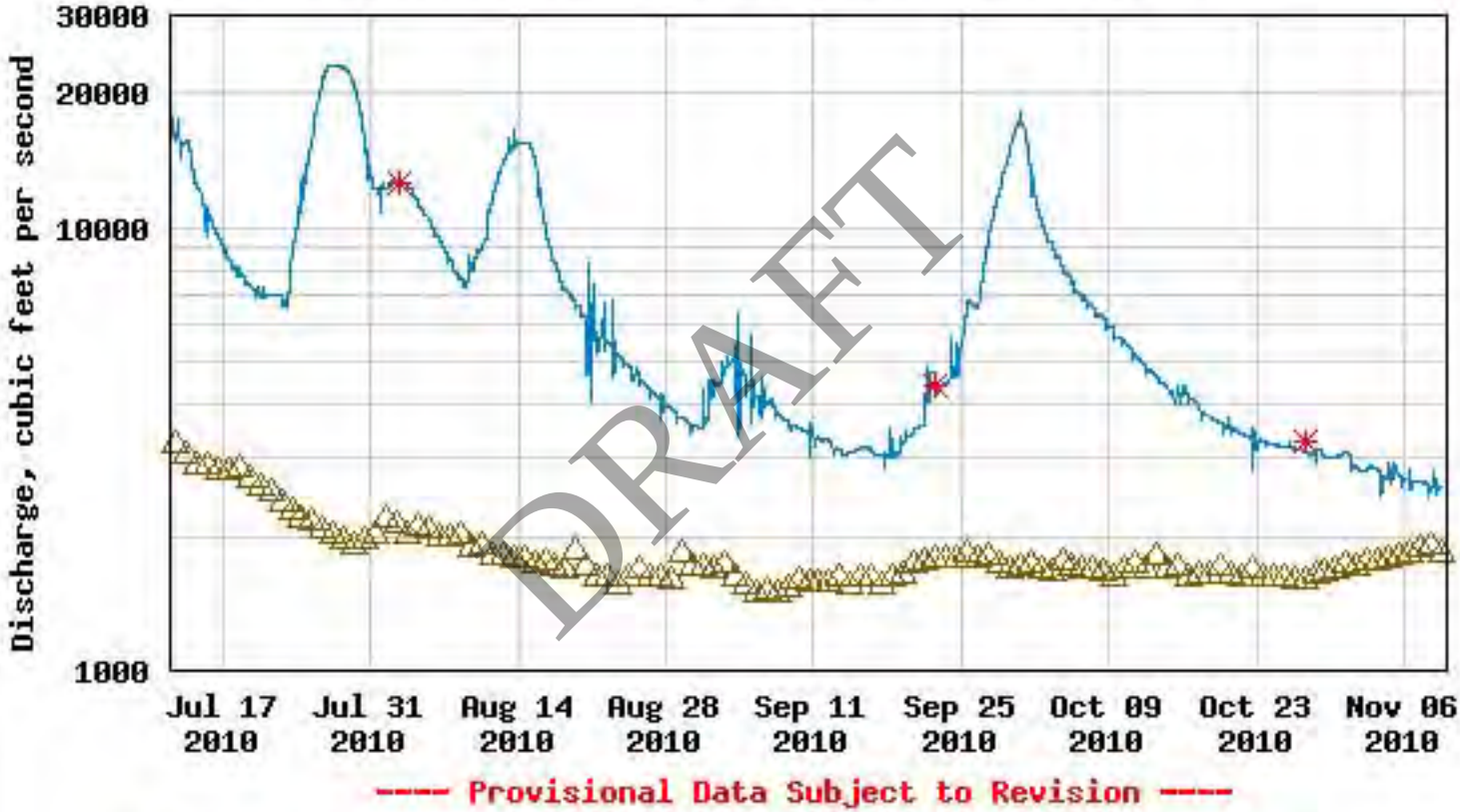
USGS

USGS 05464500 Cedar River at Cedar Rapids, IA



USGS

USGS 05464500 Cedar River at Cedar Rapids, IA

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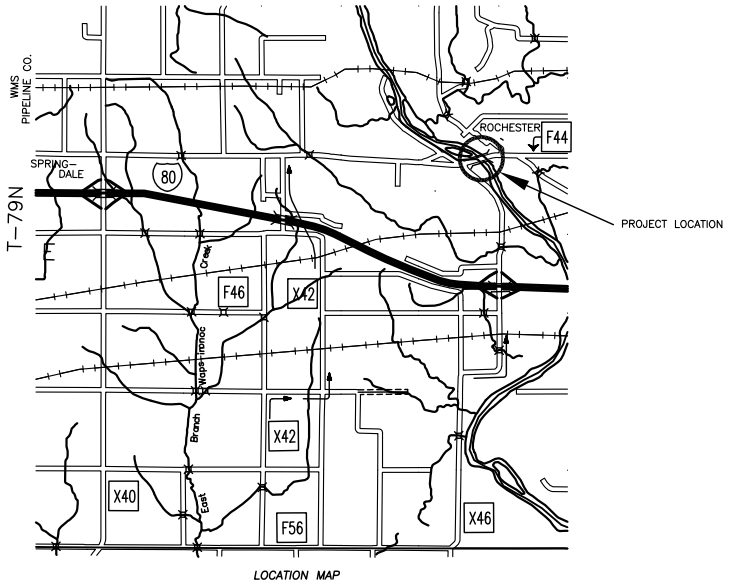
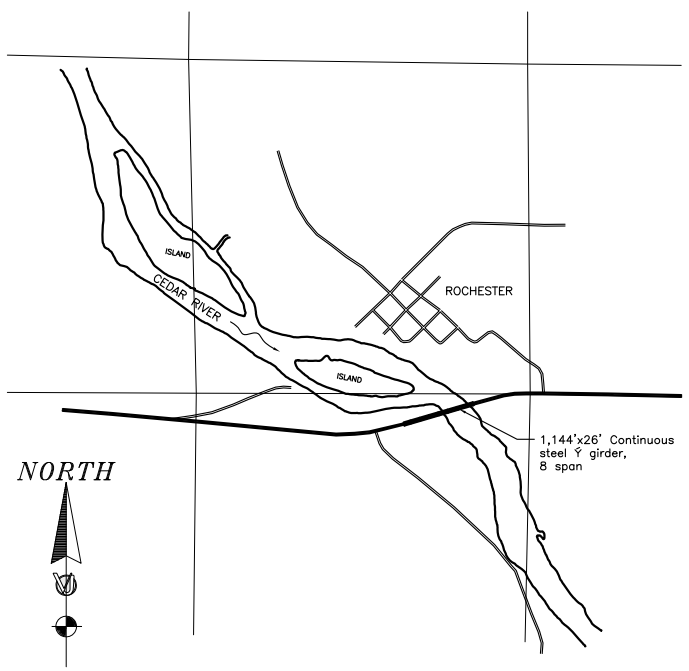
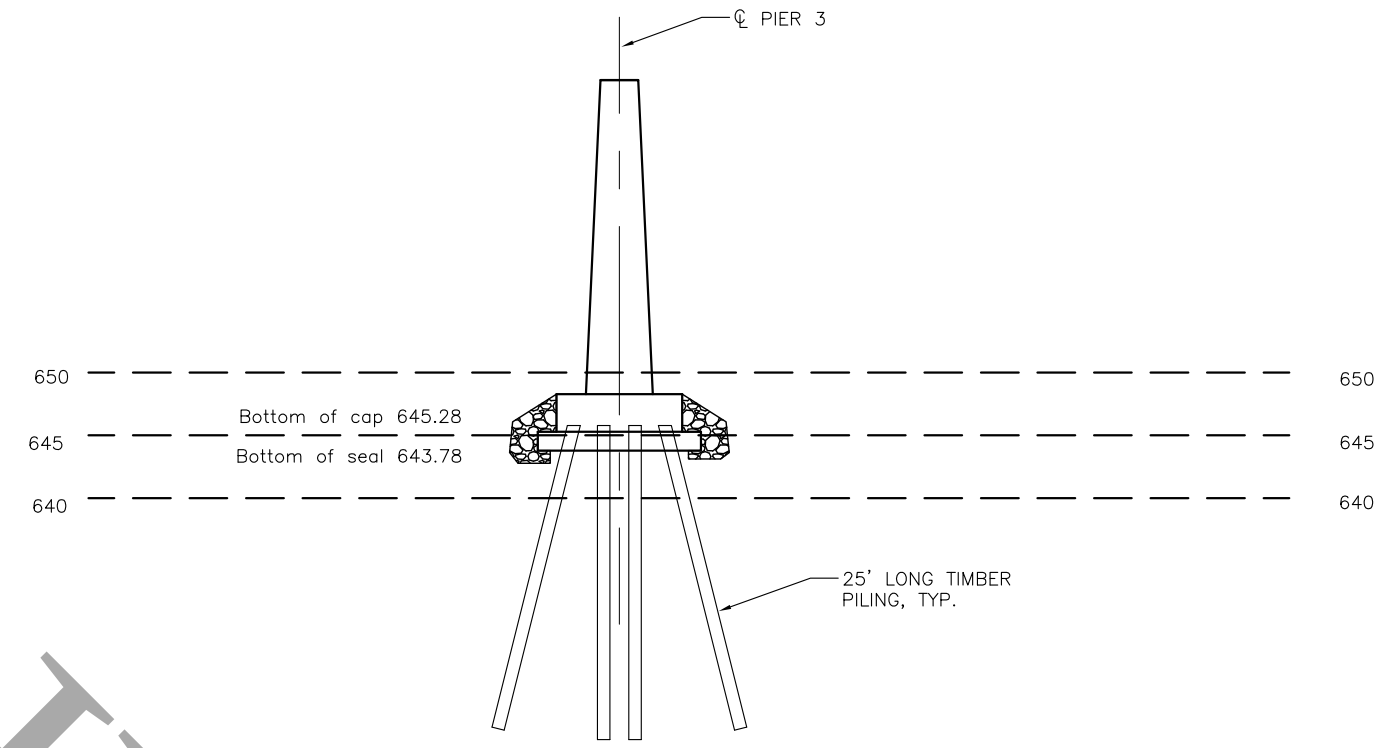
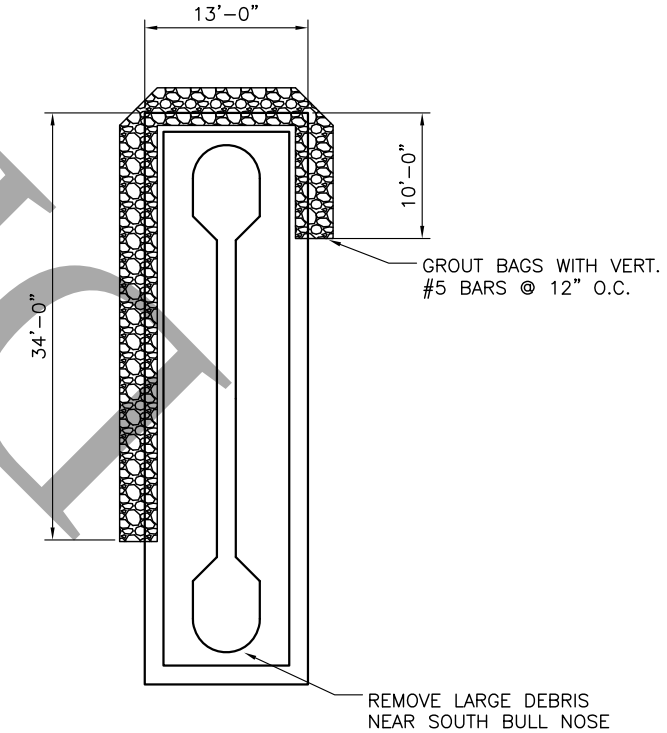


LOCATION MAP





ELEVATION



PLAN

NOTE:
LARGE DEBRIS WAS FOUND AT THE NORTH BULL NOSE AT PIER 6 AND PIER 7. THIS AND ANY OTHER LARGE DEBRIS SHALL BE REMOVED FROM THE STRUCTURE AND DISPOSED OF.

DRAFT

PIER 3 SCOUR PROTECTION PLAN
ROCHESTER BRIDGE
CEDAR COUNTY

vj engineering
506 e. college st.
iowa city, iowa - 319-351-2166

COUNTY	PROJECT NUMBER	SHEET NUMBER
CEDAR		1

APPENDIX B

Cedar Valley Bridge SI&A Form

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Iowa Department of Transportation

Structure Inventory and Appraisal

Bridge ID: 103070
FHWA No.: 103070

Official	SR: 79.3	SD/FO: Structurally Deficient
Unofficial	SR: 79.3	SD/FO: Not Deficient or Obsolete

IDENTIFICATION

7 Facility Carried:	FM
5B Rte. Signing Prefix:	4
5C Level of Service:	1 - MAINLINE
5D Inventory Route:	00000
City:	RURAL
3 County:	016 - Cedar
9 Location:	080031803
5E Directional Suffix:	0 - NOT APPLICABLE
6 Feature Intersected:	CEDAR RIVER
2 District:	0.0
Garage:	
98 Border Bridge Code:	
% Responsibility:	0
99 Border Bridge No.:	

STRUCTURE TYPE AND MATERIALS

43A Main Span Material:	4 - Steel Continuous
43B Main Span Design:	03 - Girder and Floorbeam System
45 No. of Spans Main Unit:	7
44A Appr. Span Material:	000 - Other
44B Appr. Span Design:	000 - Other
46 No. of Appr. Spans:	0
107 Deck Type:	1 - Concrete Cast-in-Place
108A Wearing Surface:	1 - Monolithic Concrete (concurrently placed with structural deck)
108B Membrane:	0 - None
108C Deck Protection:	0 - None

GEOMETRIC DATA

48 Length Max Span:	125 ft.
49 Structure Length:	827 ft.
34 Skew:	0°
Deck Area:	23238.7 sq. ft.
50B Curb/Sdwk Width R:	0 ft.
50A Curb/Sdwk Width L:	0 ft.
51 Width Curb to Curb:	28.1 ft.
52 Width Out to Out:	34.2 ft.
32 Appr. Roadway width: (w/ Shoulders)	38 ft.
33 Median:	0 - No median
35 Structure Flared:	00 - No flare
10 Vertical Clearance:	99'99"
47 Horiz. Clearance:	28'01"
53 Min. Vert. Clearance Over:	99'99"
54B Min. Vert. Underclearance:	00'00"
55 Min. Lat. Underclearance R:	0'00"
56 Min. Lat. Underclearance L:	0'00"

NAVIGATION DATA

38 Navigation Control:	0 - No navigation control on waterway (bridge permit not required)
111 Pier Protection:	
39 Vertical Clearance:	00'00"
40 Horiz. Clearance:	000'00"

16 Latitude: 41.73273498 17 Longitude: -91.2449648

FRA No. (if RR Bridge):

INSPECTION

90 Inspection Date:	**05/24/2010**	Inspection Type:	Regular
Next Routine Insp Date:	5/24/2012	91 Frequency:	24
		Next Insp Type:	Fracture Critical
Inspection Agency:	5 - Consultant	Inspection Group:	CALHOUN-BURNS & ASSOC.
93A FC Inspection Date:	5/01/2008		
92A FC Frequency:	24	Next FC Insp.:	5/1/2010
93B UW Inspection Date:			
92B UW Frequebcy:	0	Next UW Insp.:	NA
93C SI Date:			
92C SI Frequency:	0	Next Spec. Insp.:	NA
Other Non-NBI Date:			
Other Non-NBI Freq.:		Next Other Insp.:	NA

CONDITION

58 Deck:	4 - Poor Condition (advanced deterioration)
59 Super:	7 - Good Condition (some minor problems)
60 Sub:	7 - Good Condition (some minor problems)
61 Channel/Channel Prot.:	6 - Bank slump. widespread minor damage
62 Culvert:	N - Not Applicable

APPRAISAL

67 Str. Evaluation:	7 - Better than present minimum criteria
68 Deck Geometry:	5 - Somewhat better than minimum adequacy
69 Underclearance, Vert & horiz.:	N - Not applicable
71 Waterway Adequacy:	7 - Slight Chance of Overtopping Bridge
72 Appraoch Alignment:	6 - Equal to present minimum criteria
36A Bridge Rail:	0 - DOES NOT MEET CURRENT SAFETY STANDARDS, OR IS NOT THERE AND IS NEEDED.
36B Transition:	0 - DOES NOT MEET CURRENT SAFETY STANDARDS, OR IS NOT THERE AND IS NEEDED
36C Approach Rail:	1 - MEETS CURRENT SAFETY STANDARDS.
36D Approach Rail Ends:	0 - DOES NOT MEET CURRENT SAFETY STANDARDS, OR IS NOT THERE AND IS NEEDED
113 Scour Critical:	8 - Stable - Excellent Condition

LOAD RATING AND POSTING

31 Design Load:	4 - H 20		
64 Operating Rating:	54.6 Tons	63 Rating Method:	2 - Allowable Stress (AS)
66 Inventory Rating:	35.8 Tons	65 Rating Method:	2 - Allowable Stress (AS)
70 Posting:	5 - Equal to or above legal loads		
41 Posting Status:	A - Open		

AGE AND SERVICE

27 Year Built:	1966	Design No.:	0
106 Year Reconstructed:	0		
42A Type of Service on:	1 - Highway		
42B Type of Service Under:	5 - Waterway		
28A Lanes on:	2	28B Lanes under:	0
29 ADT:	1650	30 Year of ADT:	2006
109 Truck ADT:	4 %	Speed Limit:	
19 Detour Length:	14.000 mi.		

CLASSIFICATION

112 NBIS Length:	Y
26 Functional Class:	07 - Rural - Major Collector
100 STRHNET:	0 - Not a defense highway
101 Parallel Structure:	N - No parallel structure
102 Direction of Traffic:	2 - 2-way traffic
22 Owner:	02 - County Highway Agency
21 Custodian:	02 - County Highway Agency
37 Historical Significance:	5 - Not eligible

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Iowa Department of Transportation

Structure Inventory and Appraisal

Bridge ID: 18490
FHWA No.: 18490

Official	SR: 34.5	SD/FO: Structurally Deficient
Unofficial	SR: 34.9	SD/FO: Structurally Deficient

IDENTIFICATION

7 Facility Carried:	OLD IA 979
5B Rte. Signing Prefix:	4
5C Level of Service:	1 - MAINLINE
5D Inventory Route:	00000
City:	RURAL
3 County:	016 - Cedar
9 Location:	079031115
5E Directional Suffix:	0 - NOT APPLICABLE
6 Feature Intersected:	CEDAR RIVER
2 District:	0
Garage:	
98 Border Bridge Code:	
% Responsibility:	0
99 Border Bridge No.:	

STRUCTURE TYPE AND MATERIALS

43A Main Span	4 - Steel Continuous
43B Main Span Design:	03 - Girder and Floorbeam System
45 No. Spans Main Unit:	8
44A Appr. Span	000 - NA
44B Appr. Span Design:	000 - NA
46 No. of Appr. Spans:	Near 0 Far 0
107 Deck Type:	1 - Concrete Cast-in-Place
108A Wearing Surface:	1 - Monolithic Concrete (concurrently placed with structural deck)
108B Membrane:	0 - None
108C Deck Protection:	0 - None

GEOMETRIC DATA

48 Length Max Span:	154 ft.
49 Structure Length:	1145 ft.
34 Skew:	0°
Deck Area:	34121.0 sq. ft.
50B Curb/Sdwk Width R:	0 ft.
50A Curb/Sdwk Width L:	0 ft.
51 Width Curb to Curb:	26.2 ft.
52 Width Out to Out:	29.8 ft.
32 Appr. Roadway width: (w/ Shoulders)	38 ft.
33 Median:	0 - No median
35 Structure Flared:	00 - No flare
10 Vertical Clearance:	99'99"
47 Horiz. Clearance:	26'02"
53 Min. Vert. Clearance Over:	99'99"
54B Min. Vert. Underclearance:	00'00"
55 Min. Lat. Underclearance R:	00'00"
56 Min. Lat. Underclearance L:	00'00"

NAVIGATION DATA

38 Navigation Control:
0 - No navigation control on waterway (bridge permit not required)

111 Pier Protection:	
39 Vertical Clearance:	00'00"
40 Horiz. Clearance:	000'00"

16 Latitude: 41.66949691 17 Longitude: -91.1569334

FRA No. (if RR Bridge):
Mile Post:

INSPECTION

90 Inspection Date:	07/18/2012	Inspection Type:	Regular and Fracture Critical
Next Routine Insp Date:	07/18/2014	91 Frequency:	24
		Next Insp Type:	Regular
Inspection Agency:	5 - Consultant	Inspection Group:	Calhoun-Burns & Associates, Inc.
93A FC Inspection Date:	07/18/2012		
92A FC Frequency:	24	Next FC Insp.:	07/18/2014
93B UW Inspection Date:			
92B UW Frequency:	0	Next UW Insp.:	NA
93C SI Date:			
92C SI Frequency:	0	Next Spec. Insp.:	NA
Other Non-NBI Date:			
Other Non-NBI Freq.:		Next Other Insp.:	NA

CONDITION

58 Deck:	7 - Good Condition (some minor problems)
59 Super:	3 - Serious Condition (primary structure affected)
60 Sub:	4 - Poor Condition (advanced deterioration)
61 Channel/Channel Prot.:	4 - Protect. serverly undermined.. sev. damage
62 Culvert:	N - Not Applicable

APPRAISAL

67 Str. Evaluation:	3 - Intolerable - high priority of corrective action
68 Deck Geometry:	5 - Somewhat better than minimum adequacy
69 Underclear Vert & Horiz:	N - Not applicable
71 Waterway Adequacy:	6 - Occasional Overtopping of Approaches
72 Appraoch Alignment:	6 - Equal to present minimum criteria
36A Bridge Rail:	0 - DOES NOT MEET CURRENT SAFETY STANDARDS, OR IS NOT THERE AND IS NEEDED.
36B Transition:	0 - DOES NOT MEET CURRENT SAFETY STANDARDS, OR IS NOT THERE AND IS NEEDED
36C Approach Rail:	1 - MEETS CURRENT SAFETY STANDARDS.
36D Approach Rail Ends:	0 - DOES NOT MEET CURRENT SAFETY STANDARDS, OR IS NOT THERE AND IS NEEDED
113 Scour Critical:	3 - Scour Critical - Unstable

LOAD RATING AND POSTING

31 Design Load:	2 - H 15
63 Rating Method:	2 - Allowable Stress (AS) reported in english tons using HS-20 loading.
64 Operating Rating:	39.8 Tons
65 Rating Method:	2 - Allowable Stress (AS) reported in english tons using HS-20 loading.
66 Inventory Rating:	25.1 Tons
70 Posting:	5 - Equal to or above legal loads
41 Posting Status:	P - Posted for Load

AGE AND SERVICE

27 Year Built:	1948	Design No.:	1244
106 Year Reconstructed:	1985		
42A Type of Service on:	1 - Highway		
42B Type of Service Under:	5 - Waterway		
28A Lanes on:	2	28B Lanes under:	0
29 ADT:	460	30 Year of ADT:	2010
109 Truck ADT:	0 %	Speed Limit:	55
19 Detour Length:	7 mi.		

CLASSIFICATION

112 NBIS Length:	Y
26 Functional Class:	07 - Rural - Major Collector
100 STRAHNET:	0 - Not a defense highway
101 Parallel Structure:	N - No parallel structure
102 Direction of Traffic:	2 - 2-way traffic
22 Owner:	02 - County Highway Agency
21 Custodian:	02 - County Highway Agency
37 Historical Significance:	5 - Not eligible
75A Type of Work Proposed:	31 - Replacement - Load/Geometry
75B Work Done by:	1 - Work to be done by contract

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SECTION 14, CEDAR RIVER, 290TH STREET BRIDGE
ROCHESTER, IOWA

APPENDIX H

HAZARDOUS, TOXIC AND RADIOACTIVE WASTE

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9 June 2011
S. Gustafson

CEMVR-EC-DN

MEMORANDUM FOR RECORD

SUBJECT: 9 June 2011 Hazardous, Toxic, and Radiological Waste (HTRW) Assessment for the Cedar River, 290th Street Bridge, Section 14 Emergency Streambank Protection Project, Cedar County, Rochester Township, Iowa.

1. Summary. An Environmental Site Assessment (ESA) Transaction Screening Process was completed on 9 June 2011 for the proposed work and staging areas for the 290th Street Bridge Section 14 Emergency Streambank Protection Project in Rochester Township, Iowa (Project Area) in general conformance with ASTM Practices E 1528-06, ER 1165-2-132, and MVD DIVR 1165-2-9. The inquiry consisted of an inspection of aerial photographs (1930, 1950, 1960, 1990, 2004 and 2010), an 1838 land survey map, an 1889 and 1990 USGS Topographical Map, records research and an interview. These inquiry activities revealed no evidence of hazardous substances, HTRW, or other regulated contaminants in connection within the Project Area.

2. Location. The Project Area is located on a on the right descending bank of the Cedar River, immediately adjacent to the 290th Street Bridge in Rochester Township, Cedar County, Iowa. Target properties investigated within the scope of this ESA include:

- Proposed work and staging area.

3. Records Review. There is no documentation to suggest that there have ever been any spills or that any cleanups have been required within the Project Area. A search of United States EPA, Iowa DNR, and National Response Center databases revealed no facilities if concern nor any Recognized Environmental Conditions (REC) within a 1 mile radius of the Project Area.

4. Current and Historic Use. The Project Area is currently a streambank adjacent to the 290th Street Bridge. Based on the historical research, topographic maps and historical air photos, the Project Area has been a vegetated streambank along the Cedar River since the 1830's. At some time between the 1930's and 1950's the 290th Street was constructed. Agricultural land surrounds the Project Area, and the village of Rochester is located approximately 1000 feet northwest. There are no indications of residential, commercial or industrial activity within the immediate vicinity of the Project Area.

5. Interviews. Tim Malott, Cedar County Emergency Management Agency was contacted May 26, 2011. Mr. Malott has no records of spills or incidents at the Project Area.

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6. Site Reconnaissance. Steve Gustafson (EC-DN), Anthony Heddlesten (EC-DN), Jason Smith (PD-F) and Don Bawmann (EC-G) visited the Project Area on June 8, 2011. No indications of Recognized Environmental Conditions were observed.

7. Conclusions and Recommendations. While there may be minimal recognized environmental conditions on target properties due to trace amounts of fertilizers, pesticides, fungicides and herbicides because of agricultural activities, there are no physical signs, records or specialized knowledge indicating a significant environmental condition of concern for the project.

It is recommended that no further HTRW assessments be conducted for this project.

8. The assessment was investigated and documented by Steve Gustafson, P.G.

Heather Anderson, P.E.
Chief, Environmental Engineering Section

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EPA United States Environmental Protection Agency

Cleanups In My Community

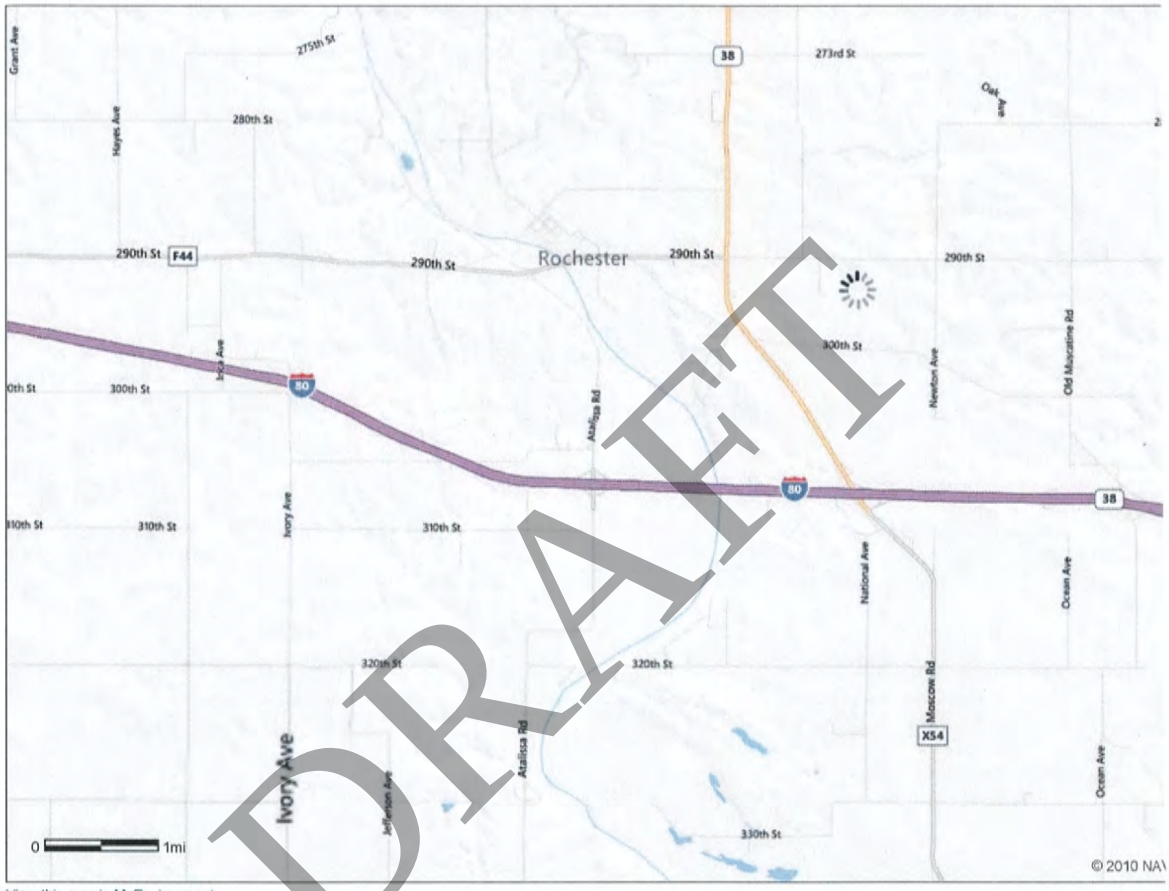
Website Accessibility Map Help About th

Cleanups In My Community Map

Define Your Community: Street Address | Enter address: | Radius (mi): 1 | List It | or | Map It

Cleanup Types: Filter Cleanup Type Brownfields Grants Jurisdictions: Grant Filters

Click on a site for more information (Pop-up hyperlink will link to additional site specific information)



View this map in MyEnvironment

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Contaminated Sites

New Search | Print | Help |

Views

Multi View

Registry

Address Search

Site Name:?

City:?

Program Type:? --Program Type--

County:? Cedar

Project Manager:? --Project Manager--

View Results Clear

1

Site ID	Site Name	Address
1558	Cedar County Landfill	Tipton, IA
1075	Ferrellgas	1148 Highway 30 Stanwood, IA
1979	Pruess Elevator	Lowden, IA
85	Tipton Power Plant	407 Lynn Street Tipton, IA 52772
790	West Branch Oil	412 East Main Street West Branch, IA 523580000
1019	Xerxes Corporation	515 West South Street Tipton, IA 52772

1

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TOXMAP®
Environmental Health e-Maps

Home | TRI Facilities | TRI Releases | TRI Trends | Superfund | Combo | Search | Help | Contact Us

Search | Define Map | ▸ Display Map | Set Region | Other Data | Download

Start over

TRI State Fact Sheets

Current State Air Quality

Map Other Data
- US Census Data
- Income Data
- Health Data
- Reference Data

Chemical Information
- Search NLM TOXNET®
- CDC

Health Risk Information
- CDC ToxFAQs
- NJ Hazardous Substance Fact Sheets
- California Proposition 65 Chemicals
- EPA Risk Screening Tool

Toxicology References for this Map
Search NLM TOXLINE®

- What is the Toxics Release Inventory (TRI)?
- What is the "Superfund" Program?
- Does TOXMAP show all sources of toxic chemicals released into or present in the environment?
- What data sources does TOXMAP use?
- Whom do I contact with questions and/or suggestions?

more...

Search Results [Edit Search]

Start over

All TRI Reporting Facilities: All Chemicals

TRI - Map shows 0 of 20,710 TRI facilities reporting nationwide in 2011

All Superfund NPL Sites: All Chemicals

Superfund - Map shows 0 of 1,673 NPL sites nationwide

Print this map

ZOOM TO

Zoom to a place

Switch to small map

MAP DETAILS

TRI facility details

Superfund site details

Other sources of chemicals

Click on the links above to see details for this map.

MAP CONTROLS

TRI
- None
- Facilities : 2011
- Releases : 2011
- Trends

Superfund
- None
- All NPL
- NPL Final
- NPL Deleted
- NPL Proposed

Demographic
- None
- Population Density - 2000

Apply other demographics

Search chemical | Define a combo map | Start over

Legend
- TRI Facility
- NPL Final
- NPL Deleted
- NPL Proposed

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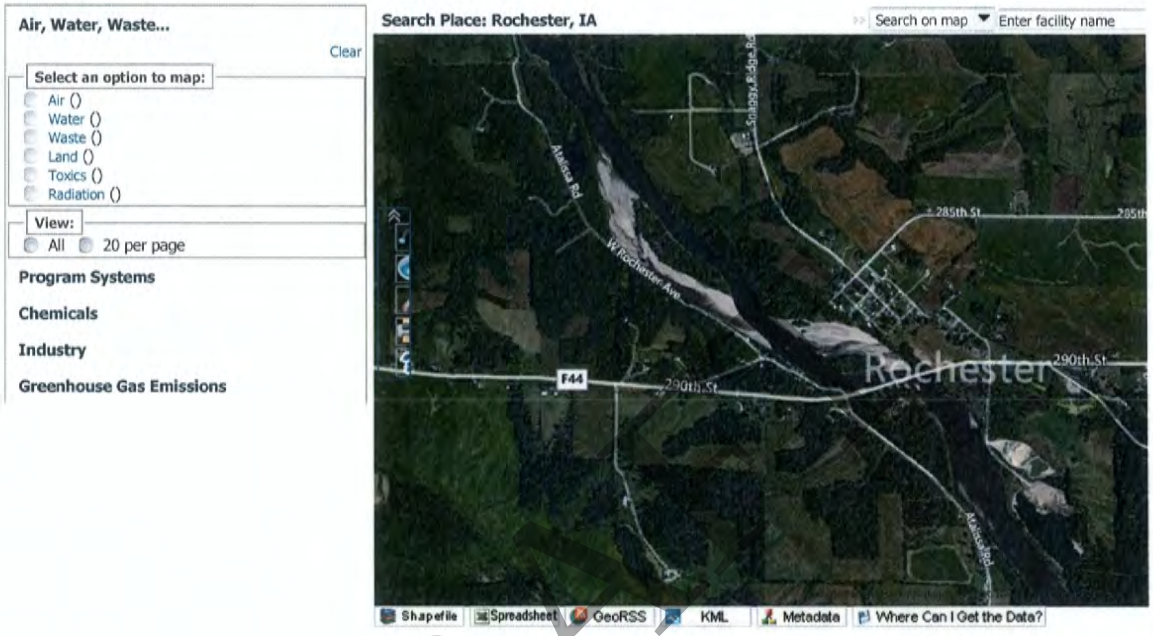
National Institutes of Health, Department of Health & Human Services
Metadata, Copyright, Privacy, Freedom of Information Act, Accessibility
Customer Service: tehip@teh.nlm.nih.gov
Last updated: February 2013, TOXMAP 4.3.4
Data obtained from EPA: TRI - 20 November 2012; EPA: FRS - 20 November 2012; EPA: Superfund - December 2009

EPA: United States Environmental Protection Agency

EnviroMapper for Envirofacts



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EPA: United States Environmental Protection Agency

EnviroMapper for Envirofacts

Facility Name/Address	AIRS/AFS	ACRES	BR	CERCLIS	GHG	PCS/ICIS	RADInfo	RCRAInfo	TRI	TSCA
HWH CORPORATION FRS ECHO 2096 MOSCOW ROAD MOSCOW, IA 52760-9603	View Report	-	-	-	-	View Report	-	View Report	-	-
HWH CORPORATION (WEST) FRS ECHO 2087 307TH STREET MOSCOW, IA 52760-9601	View Report	-	-	-	-	View Report	-	View Report	-	-

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Air, Water, Waste...
Clear
Select an option to map:
Air (2)
Water (5)
Waste (3)
Land (3)
Toxics (0)
Radiation (0)
View:
All
20 per page
Single facility
Facility cluster
Program Systems
Chemicals
Industry
Greenhouse Gas Emissions
Search Place: Rochester, IA
Search on map
Enter facility name
Cedar Valley
Garfield Ave
Snaggy Ridge Rd
273rd St
C E D A R
Springdale
290th St
Loading... Please Wait.
Rochester
F44
80
38
Atalissa Rd
X40
© 2013 Microsoft Corporation
© 2010 NAVTEQ
Shapefile
Spreadsheet
GeoRSS
KML
Metadata
Where Can I Get the Data?

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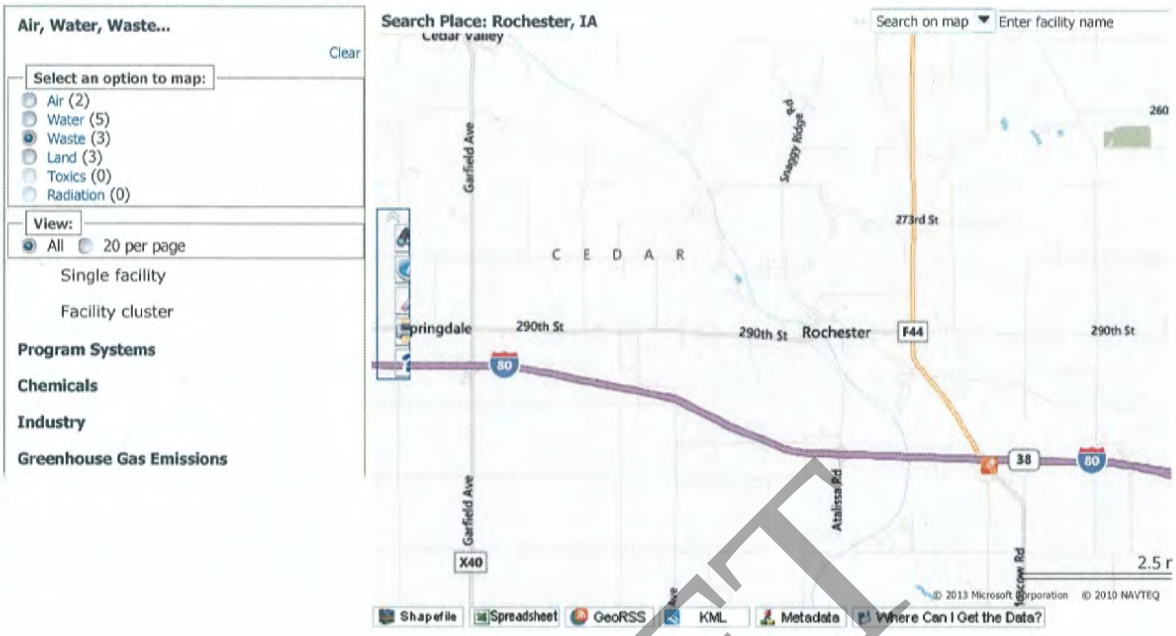
Air, Water, Waste...
Clear
Select an option to map:
Air (2)
Water (5)
Waste (3)
Land (3)
Toxics (0)
Radiation (0)
View:
All
20 per page
Single facility
Facility cluster
Program Systems
Chemicals
Industry
Greenhouse Gas Emissions
Search Place: Rochester, IA
Search on map
Enter facility name
Cedar Valley
Garfield Ave
Sneezy Ridge Rd
273rd St
C E D A R
Springdale
290th St
290th St
Rochester
F44
290th St
80
38
60
Atalissa Rd
Garfield Ave
X40
Moscow Rd
2.5 r
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Shapefile
Spreadsheet
GeoRSS
KML
Metadata
Where Can I Get the Data?

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Iowa Department of Natural Resources
and Public Safety State Fire Marshal Office
Storage Tanks
Leading Iowans in caring for our natural resources

9/13/2013 9:50:54 AM user: Login

Advanced search UST Registration Number for Go

Advanced Search

UST LUST AST UST 3rd Party Inspections UST Certifications

Registration Number:
Site Name:
Site Address:
Site City: MOSCOW
County: --County--
Supplemental Loc:
Site Status: --Status Type--
Site Owner:

Search

1

	Registration No.	Leak No.	Name	Address	Status
	198810779		HEALY PROPERTY	RT 1 BOX 148 Moscow, IA 527600000	Non-regulated Farm/Res <1100 - active
	198603605		THARP FILLING STATION		Regulated tanks - r/f
	198607929		THE COVE RESTAURANT	1288 307TH STREET Moscow, IA 527600000	Regulated tanks - r/f

1

Release # 4.0.2

State of Iowa Home DNR Home Site
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SECTION 14, CEDAR RIVER, 290TH STREET BRIDGE
ROCHESTER, IOWA

APPENDIX I

PLATES

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CEDAR RIVER

CEDAR COUNTY, IA

ROCHESTER TOWNSHIP, IA

290TH ST BRIDGE SECTION 14

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CAP - Section 14

US Army Corps of Engineers®

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
ROCK ISLAND DISTRICT
ROCK ISLAND, ILLINOIS

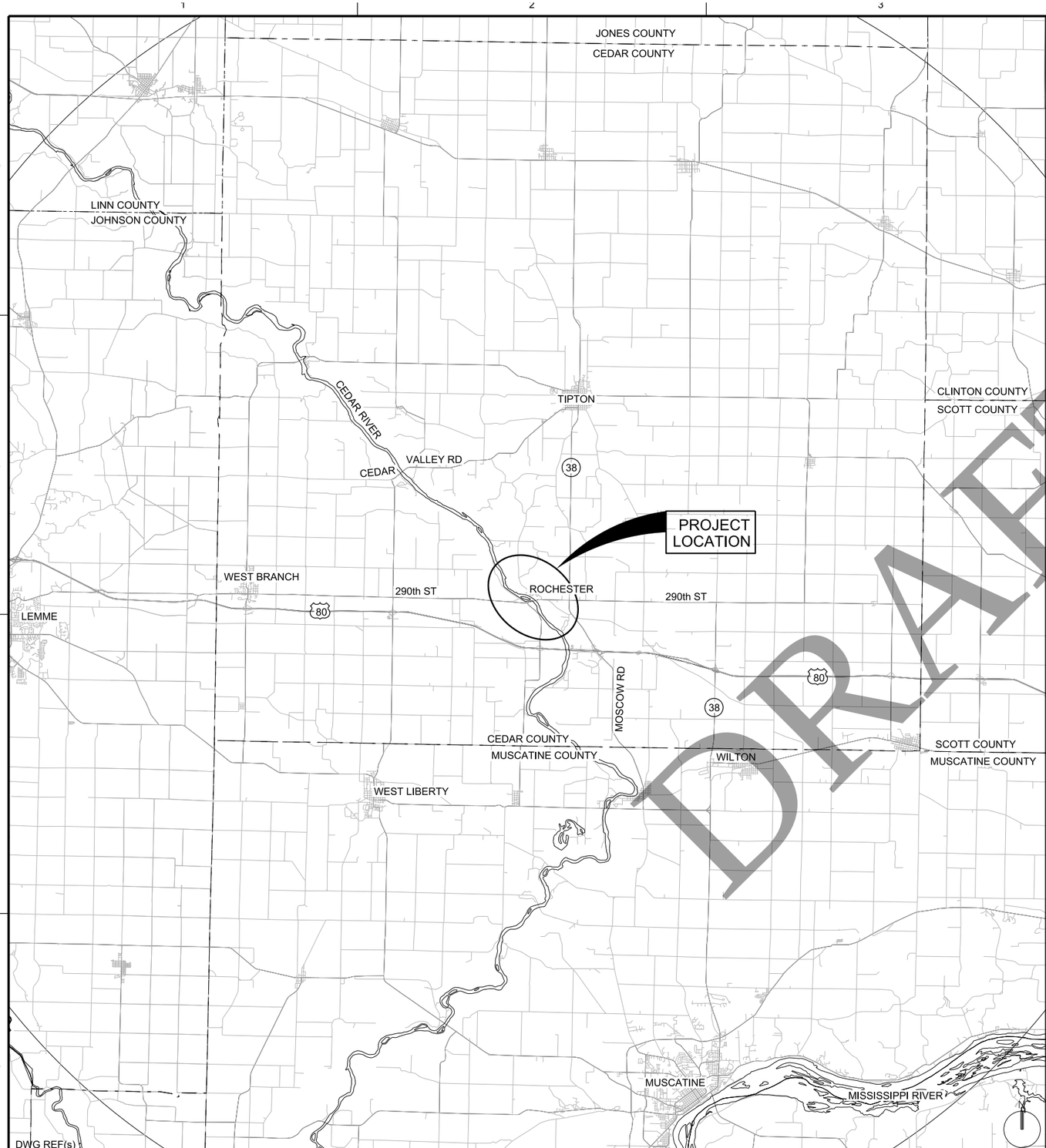
DESIGNED BY: ADH
DWN BY: EJJ
CKD BY:
SUBMITTED BY: HLA
PLOT SCALE: AS SHOWN
PLOT DATE:
SIZE: ANSI D
FILE NAME: SP14G-001.dgn
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER: SP14

CEDAR RIVER
CEDAR COUNTY, IA
ROCHESTER TOWNSHIP, IA
290TH ST BRIDGE SECTION 14

COVER SHEET

Sheet ID
G-001

8/27/2013
c:\pw_work\hgi\mvr\b5edd4ef\d0153097\SP14G-001.dgn
SCHAFS 10:28:44 AM
B5EDDEJJ

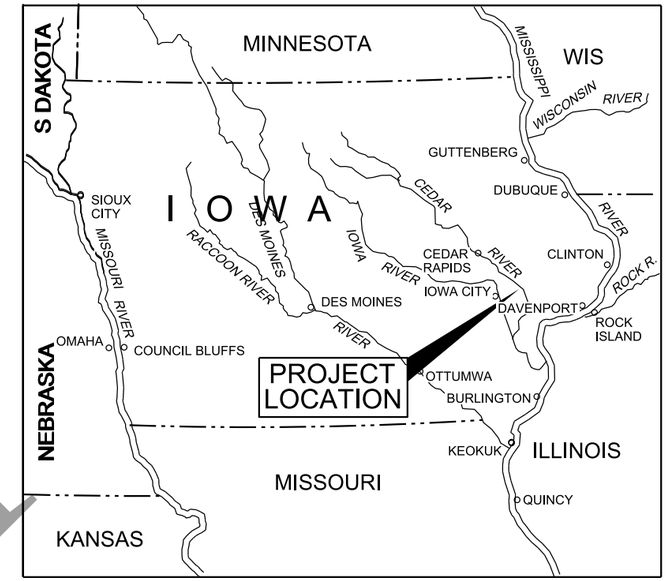


DWG REF(s)

A1 LOCATION PLAN

SCALE : 1"=10000'-0"

0 10000' 20000'



DWG REF(s) :

C4 VICINITY MAP

NO SCALE

N

US Army Corps of Engineers®

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
ROCK ISLAND DISTRICT
ROCK ISLAND, ILLINOIS

DESIGNED BY: ADH
DWN BY: EJJ
CKD BY:
SUBMITTED BY: HLA
PLOT SCALE: AS SHOWN
PLOT DATE:
SIZE: ANSI D
FILE NAME: SP14G-002.dgn
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
SP14

CEDAR RIVER
CEDAR COUNTY, IA
ROCHESTER TOWNSHIP, IA
290TH ST BRIDGE SECTION 14

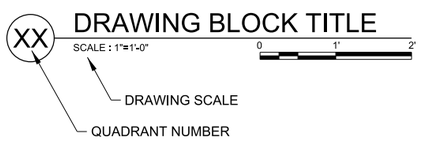
LOCATION PLAN AND VICINITY MAP

Sheet ID
G-002

8/27/2013
c:\pw_work\dgn\mvr\5sedat\u0153097\SP14G-002.dgn
SAVED: 8/27/2013 10:30:58 AM
B5EDDEJJ

DRAWING ANNOTATIONS

DWG REF(s) :



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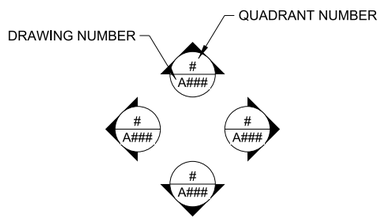

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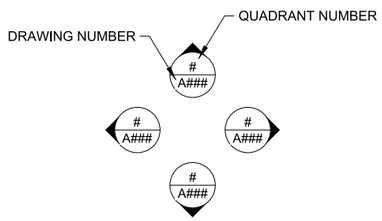

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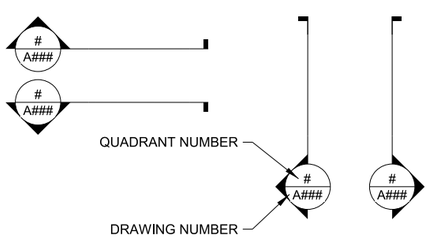
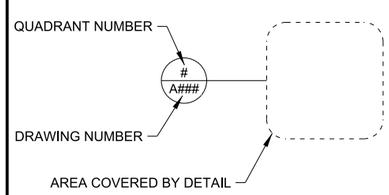


SECTION MARKER



DETAIL CALLOUT

LEGEND

- BEDDING STONE
- BM — BENCHMARK
- BORING LOCATION
- BORROW MATERIAL
- BREAKLINE
- CENTERLINE
- CONTROL POINT
- EXISTING GROUND
- EXISTING LEVEE
- FENCE
- FILL
- FLOW — FLOW ARROW
- GENERIC TREE
- 123 — INTERSTATE HIGHWAY
- NEW LEVEE
- N — NORTH INDICATOR
- RAILROAD
- RIPRAP
- RIVERMILE
- SHEET PILE
- SLOPE
- 123 — STATE HIGHWAY
- 123 — US HIGHWAY
- EL. 500.0 — WATER LEVEL

ABBREVIATIONS

A	
APPROX.	APPROXIMATE
AVE	AVENUE
B	
BM	BENCHMARK
C	
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
COR	CONTRACTING OFFICER REPRESENTATIVE
CY	CUBIC YARDS
D	
DIA	DIAMETER
E	
EL.	ELEVATION
F	
FT	FEET
H	
H	HORIZONTAL
HTRW	HAZARDOUS TOXIC RADIOACTIVE WASTE
I	
INV.	INVERT
M	
MAX	MAXIMUM
MSL	MEAN SEA LEVEL
MIN	MINIMUM
N	
NAD	NATIONAL GEODETIC SURVEY
NGVD	NATIONAL GEODETIC VERTICAL DATUM
NAVD	NORTH AMERICAN VERTICAL DATUM
P	
PI	POINT OF INTERCEPTION
PVC	POINT OF VERTICAL CURVATURE
PVI	POINT OF VERTICAL INTERSECTION
PVT	POINT OF VERTICAL TANGENCY
R	
R	RADIUS
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
RM	RIVERMILE
RR	RAILROAD
S	
ST	STREET
STA	STATION
T	
TYP.	TYPICAL
V	
V	VERTICAL

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290TH ST BRIDGE SECTION 14

LEGEND AND ABBREVIATIONS

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G-003

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Sheet Id	**Sheet Title**
GENERAL	
G-001	COVER SHEET
G-002	LOCATION PLAN AND VICINITY MAP
G-003	LEGEND AND ABBREVIATIONS
G-004	INDEX AND GENERAL NOTES
CIVIL	
C-101	PROJECT AREA
C-102	SITE PLAN
C-103	RIPRAP DIKE PLAN AND SECTIONS
C-301	CEDAR COUNTY SEPARATE CONTRACT - TYPICAL SECTIONS
C-302	CEDAR COUNTY SEPARATE CONTRACT - TYPICAL SECTIONS

GENERAL NOTES

1. HORIZONTAL DATUM IS NAD 83, IOWA SOUTH, US SURVEY FOOT. VERTICAL DATUM IS NAVD 88.

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DWG REF(s) :

A1 INDEX

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INDEX AND
GENERAL NOTES

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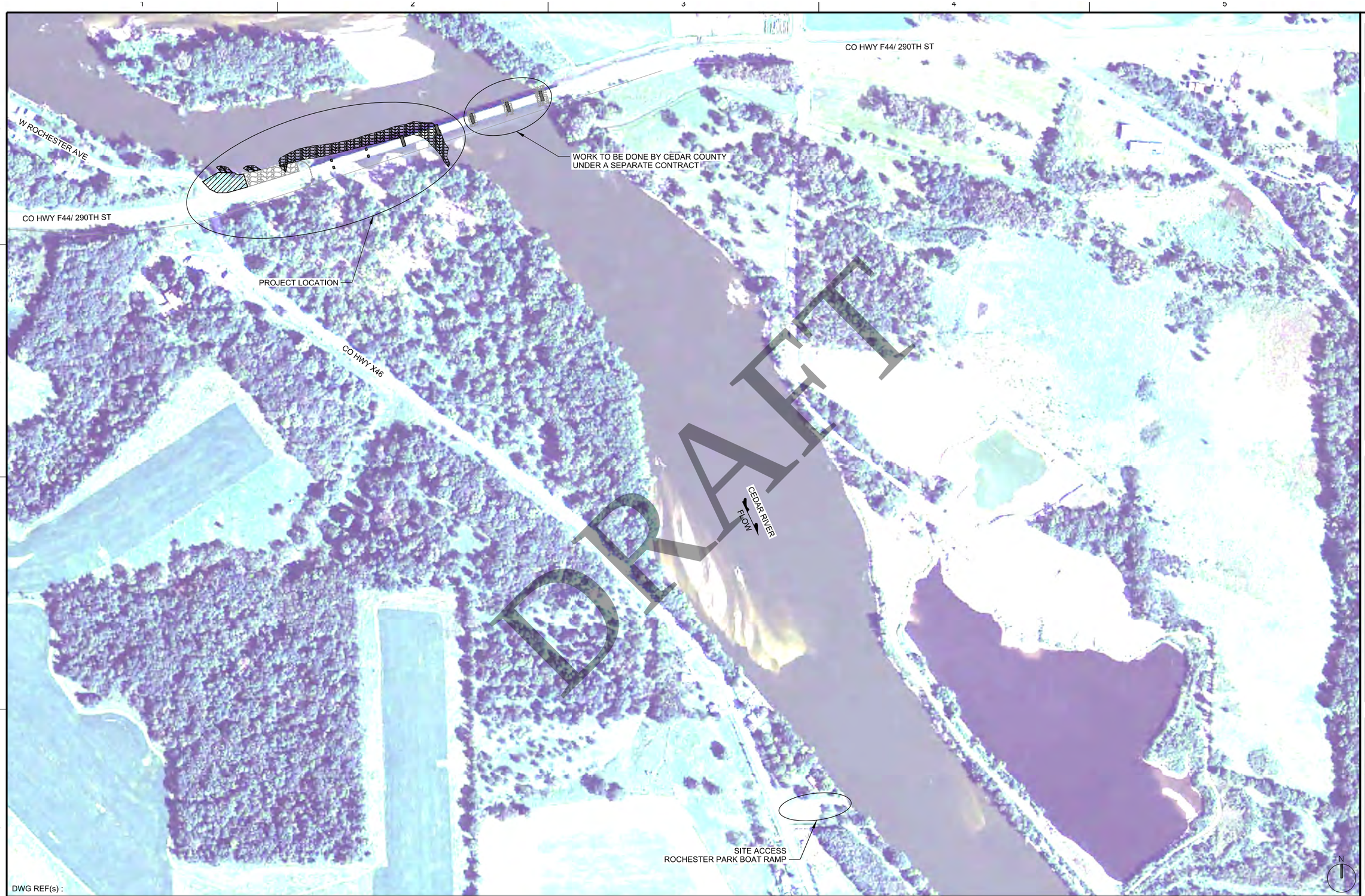

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A1 PROJECT LOCATION

SCALE : 1"=200'-0"

0 200' 400'

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PROJECT LOCATION

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C-101

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DWG REF(s) †

A1 SITE PLAN

SCALE : 1"=100'-0"

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SITE PLAN

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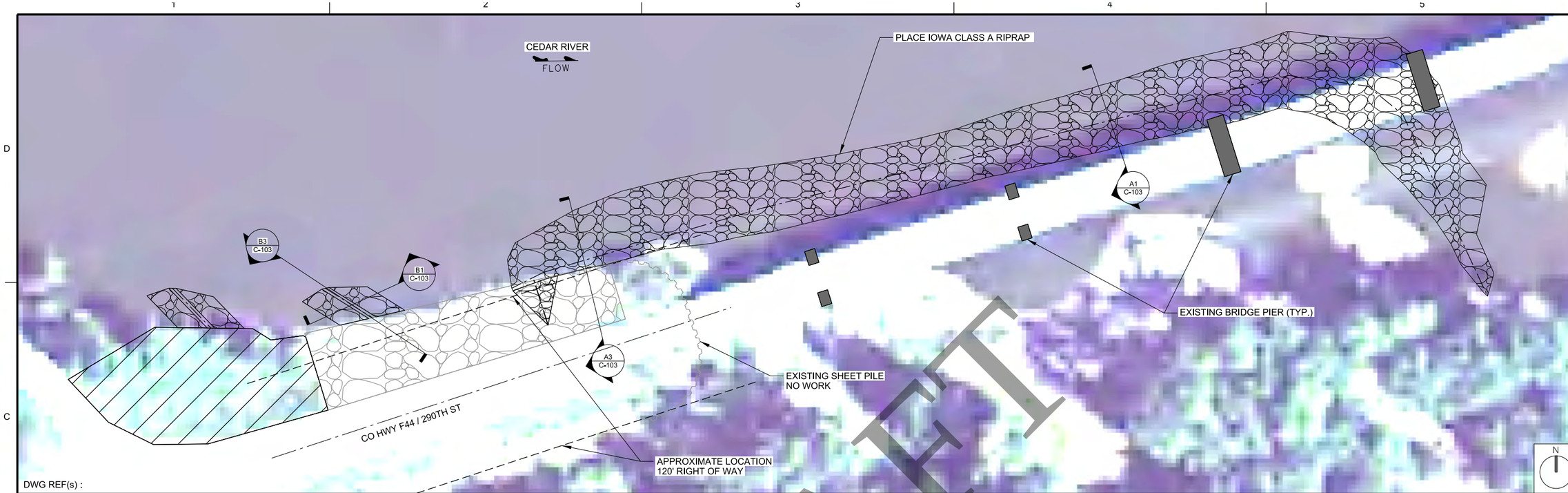

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C1 RIPRAP DIKE PLAN

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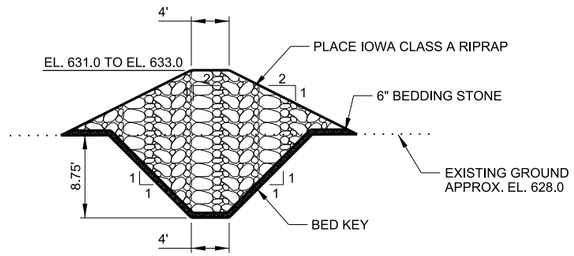

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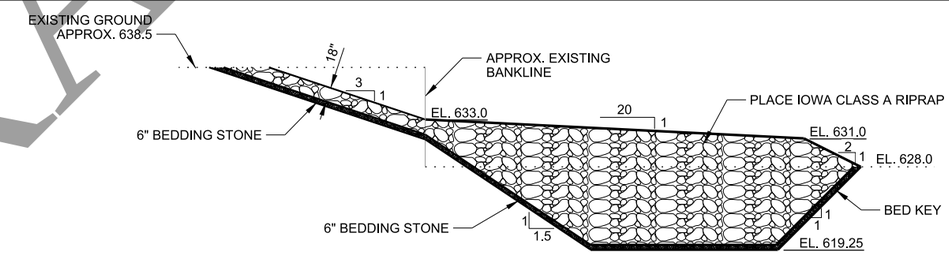

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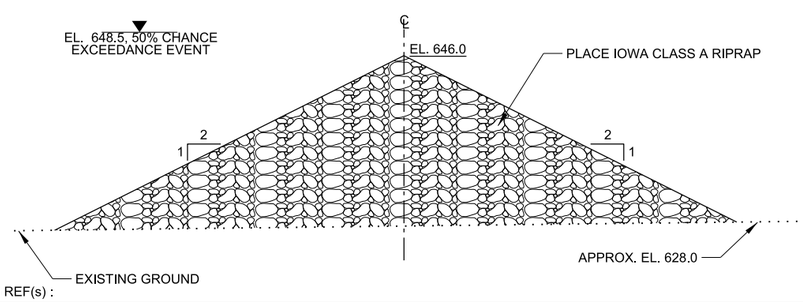

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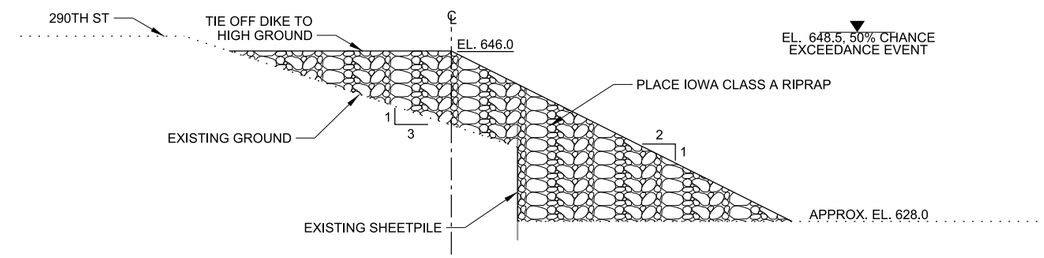

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A3 RIPRAP DIKE SECTION

SCALE : 1"=8'-0" 0 8' 16'

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RIPRAP DIKE PLAN
AND SECTIONS

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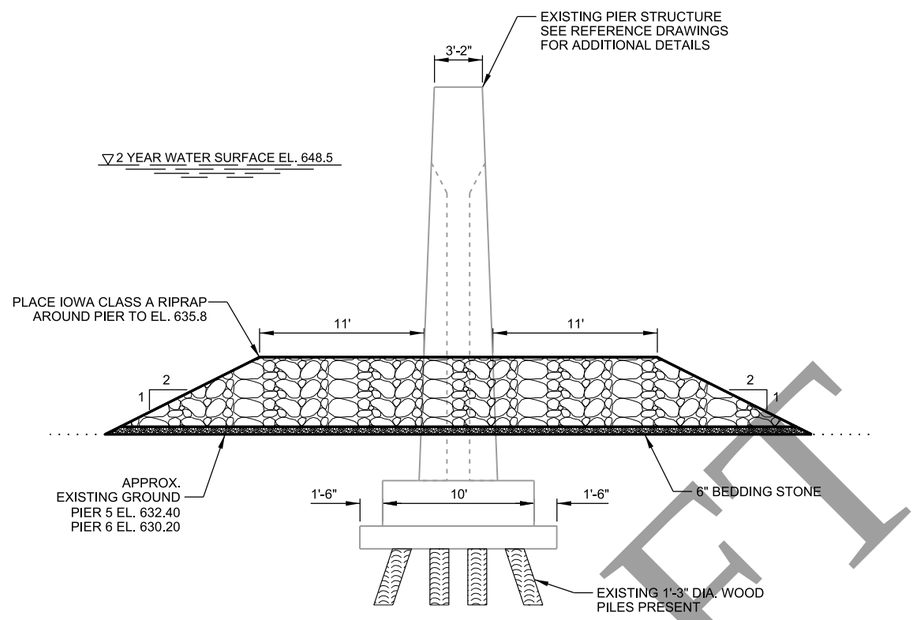

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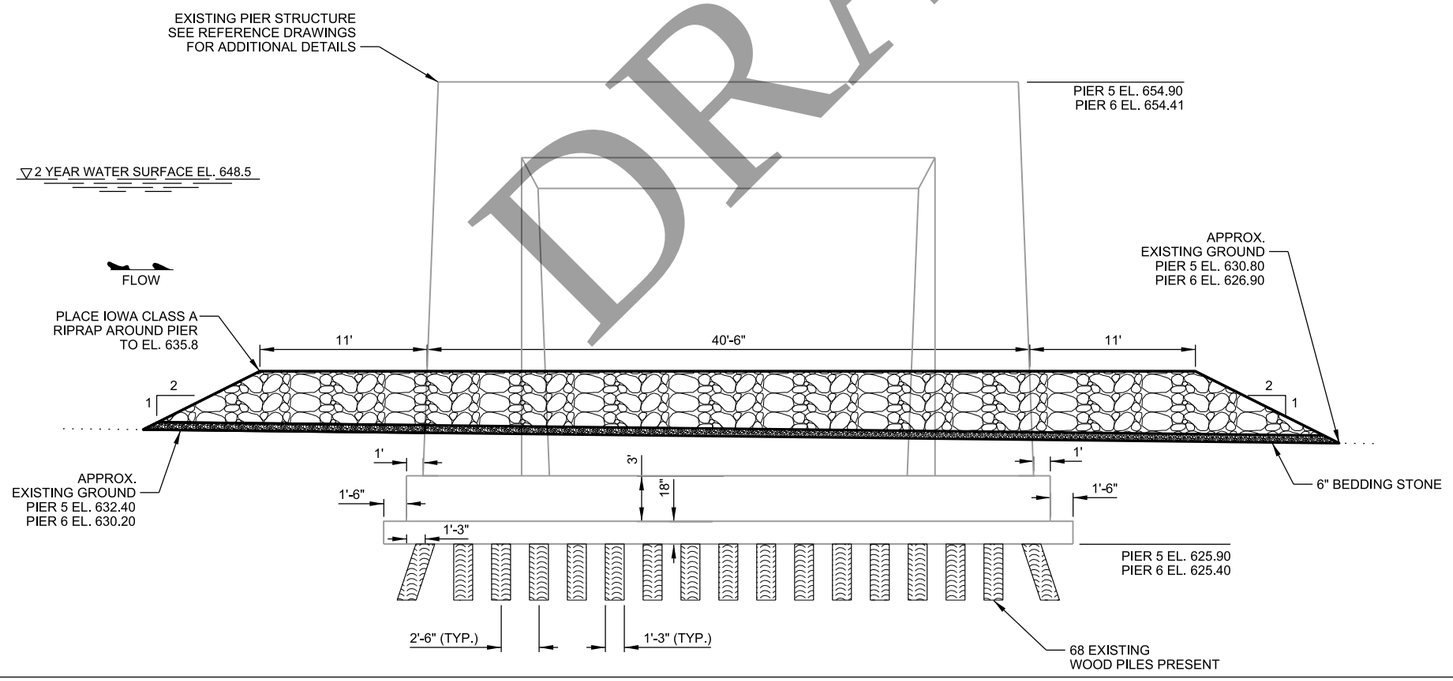

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A1 BRIDGE PIER 5 AND 6 PROTECTION SECTION

SCALE : 1"=5'-0" 0 5' 10'

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CEDAR COUNTY SEPARATE CONTRACT
TYPICAL SECTIONS

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C-301

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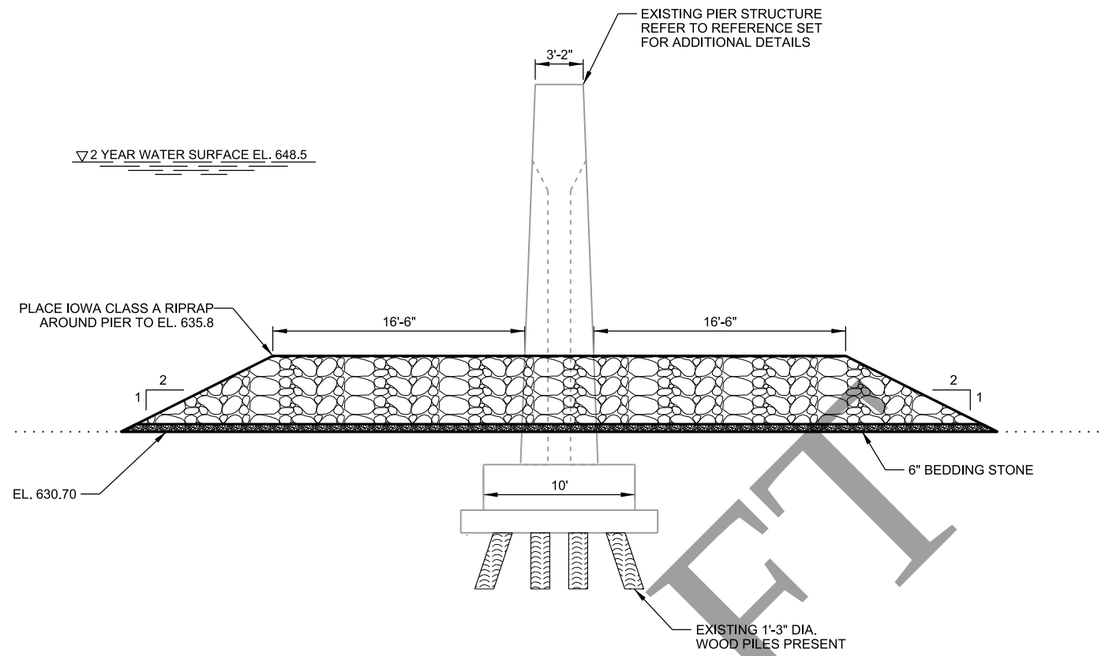

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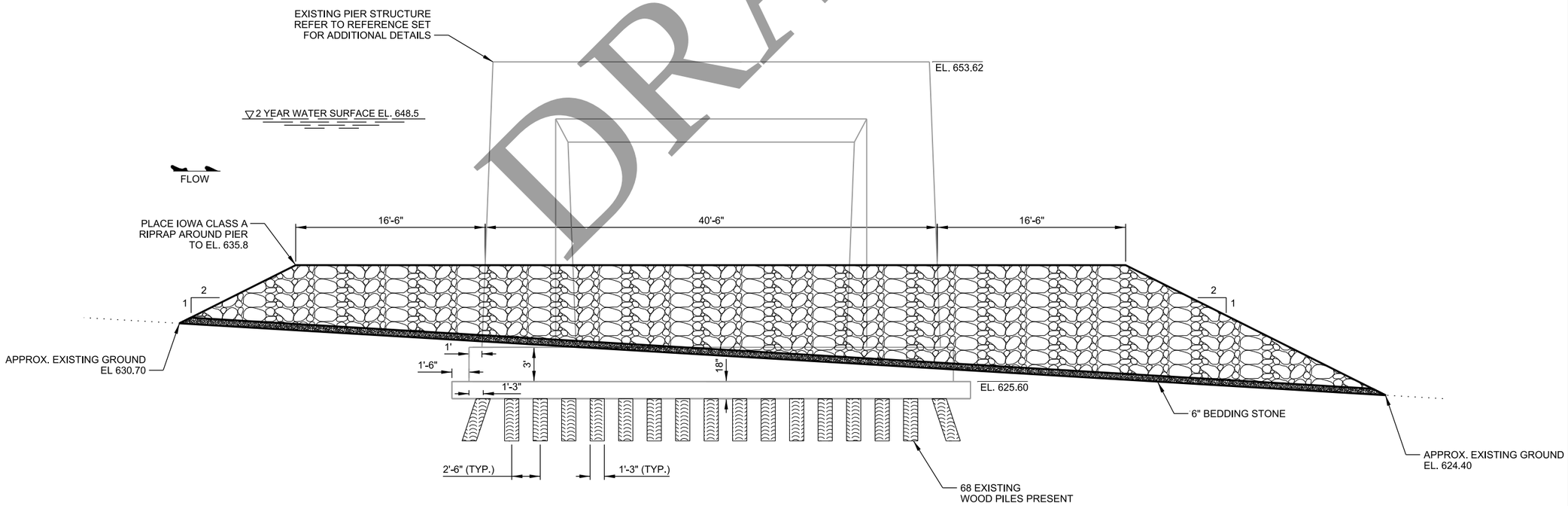

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A1 BRIDGE PIER 7 PROTECTION SECTION

SCALE : 1"=5'-0"

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CEDAR COUNTY SEPARATE CONTRACT
TYPICAL SECTIONS

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West Branch IA 52358-9636

Cedar County Conservation Board
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Tipton IA 52772

Iowa Department of Transportation
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Ames IA 50010

Connie Fett
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Mike Dauber
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Tribal Chairperson
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Red Rock OK 74651

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