



BLACK HAWK BRIDGE FEASIBILITY STUDY



Iowa Department
of Transportation



CH2MHILL

DECEMBER 2004

Report

Black Hawk Bridge Feasibility Study

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Iowa Department of Transportation

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Abbreviations and Acronyms

Corps	U.S. Army Corps of Engineers
DNR	Departments of Natural Resources
DOT	Department of Transportation
EIS	Environmental Impact Statement
FWS	U.S. Fish and Wildlife Service
MRT	Mississippi River Trail
NEPA	National Environmental Policy Act
NRHP	National Register of Historic Places
RIAC	River Industry Action Committee
RTC	Regional Trade Center
TDM	Transportation Demand Management
TSM	Transportation System Management
USCG	U.S. Coast Guard

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Section 1
Project Introduction

SECTION 1

Project Introduction

This section introduces the Feasibility Study and its role in planning the future of the Black Hawk Bridge Mississippi River crossing. It includes a description of the study area (Section 1.1), the proposed action (Section 1.2), and information on the project planning process (Section 1.3). Additionally, the basic goals of this study and roles of project stakeholders are set forth in a project vision statement (Section 1.4).

1.1 Study Area

The general project study area is located in northeastern Iowa (Allamakee County) and southwestern Wisconsin (Crawford County). The Black Hawk Bridge crosses the Mississippi River providing a connection between Lansing, Iowa and the Upper Mississippi River National Wildlife and Fish Refuge in Wisconsin. More specifically, the project area encompasses an area approximately 1,000 feet north of the Black Hawk Bridge to 3,000 feet south of the bridge. The project termini extend from the west Lansing city limits to the Wisconsin State Trunk Highway 82 (WI 82)/WI 35 intersection south of DeSoto, Wisconsin (Exhibit 1-1).


Iowa 9 (IA 9), IA 26, WI 35 and WI 82 are the key highways within the vicinity of the Black Hawk Bridge. IA 9 terminates at the Black Hawk Bridge and becomes WI 82 upon entering Wisconsin. IA 9 extends east-west from the South Dakota/Iowa border to the Iowa/Wisconsin border at Lansing. WI 82 is the causeway through the refuge that connects IA 9 to WI 35. WI 35, which extends from the southwest corner of the state to Superior, WI, provides the primary link from Lansing to La Crosse and Prairie du Chien, WI. La Crosse and to a lesser extent Prairie du Chien are key economic centers for adjacent areas in Wisconsin, Iowa, and Minnesota. IA 26/MN 26 provides a secondary travel option from Lansing to La Crosse along the west side of the Mississippi River valley, with two river crossings available in the vicinity of La Crosse.

The Black Hawk Bridge has a total length of 1,623 feet. This includes a main span of approximately 650 feet across the Mississippi River navigation channel and several smaller approach spans (See Exhibit 1-2). The bridge was built in 1931 as a privately-owned toll bridge and purchased by the Iowa and Wisconsin Departments of Transportation in 1952. Additional information about the Black Hawk Bridge and its history is provided in Appendix A - Black Hawk Bridge Description and History.



10 MILES
APPROX. SCALE

LEGEND

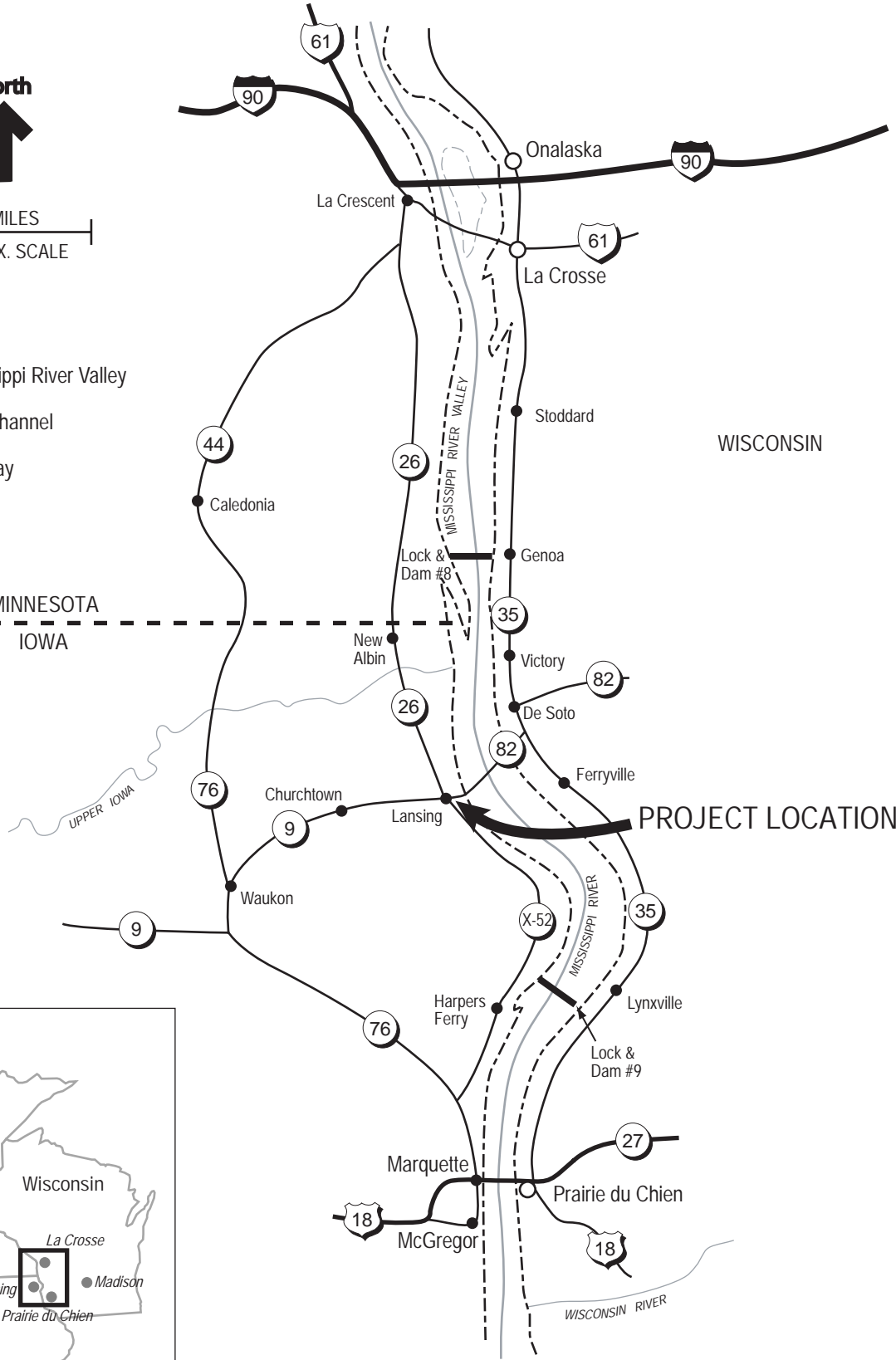
-  Mississippi River Valley
-  River Channel
-  Roadway

MINNESOTA
IOWA

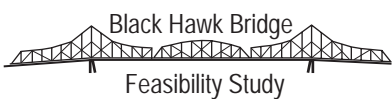
UPPER IOWA

WISCONSIN

PROJECT LOCATION



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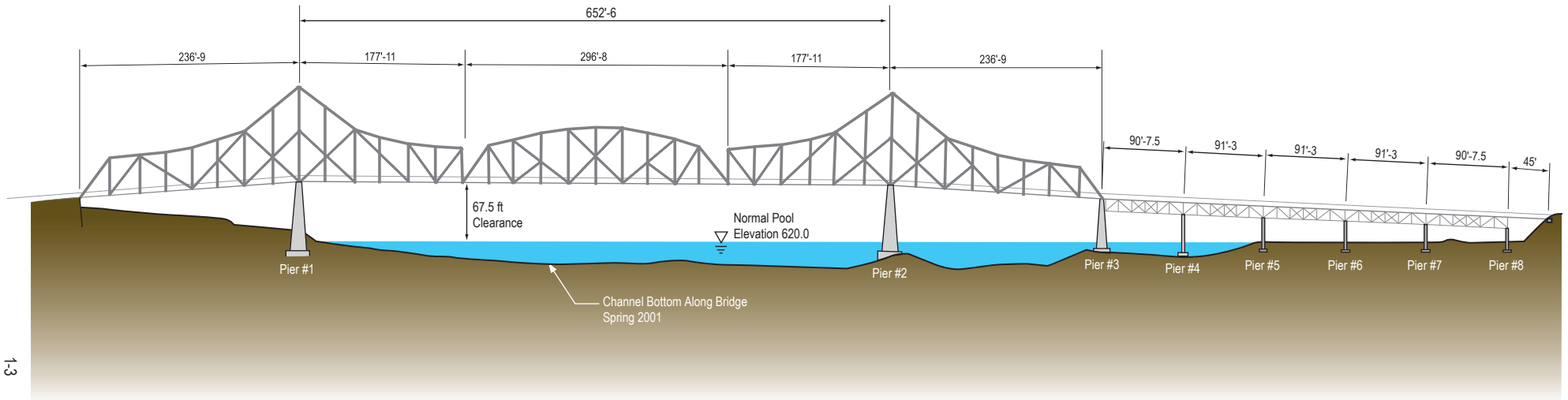


Iowa Department of Transportation

EXHIBIT 1-1
Project Location

West
(IA9 - City of Lansing)

East
(WI82 - Causeway)



1-3

Cross Section



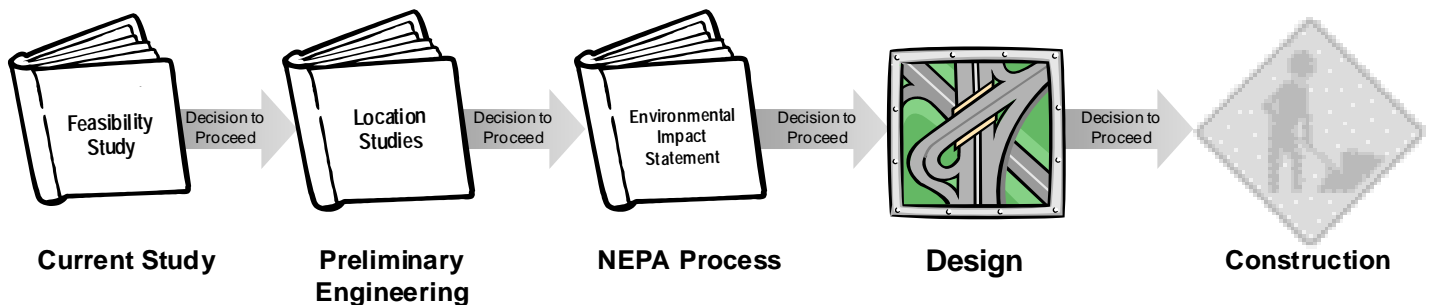
1.2 Proposed Action

In response to local officials, the Iowa and Wisconsin Departments of Transportation initiated this study to investigate the problems of continued maintenance and operations of the Black Hawk Bridge and to consider alternatives for future bridge improvement or replacement. The proposed action is one of several steps that will examine transportation issues surrounding the Black Hawk Bridge. This Feasibility Study will examine a range of environmental and engineering issues that will assist future studies in ultimately identifying a recommended plan for the Black Hawk Bridge (see below). While the initiation of this Feasibility Study does not imply the immediate programming of funds for reconstruction or replacement of the bridge, future considerations for improvements will be based on the results of this study as well as the availability of funding.

1.3 Overview of the Project Planning Process

The Black Hawk Bridge Feasibility Study is a precursor to the National Environmental Policy Act (NEPA) process. NEPA requires that all federal agencies prepare a detailed Environmental Impact Statement (EIS) for major federal actions that will significantly affect the quality of the human environment. The position of the Feasibility Study in the process that ultimately would lead to a construction project is shown in Exhibit 1-3.

EXHIBIT 1-3
Project Planning Process



The development of an EIS (or related document) provides resource agencies and the public with access to project information and the opportunity to participate in the development of transportation projects. It should be noted that the formal decision-making process concerning the Black Hawk Bridge begins during the location work and approval of the NEPA documents. The recommendations included in this Feasibility Study are advisory and will be evaluated in depth during the engineering phase of the future location work.

1.4 Black Hawk Bridge Vision Statement

Early in the development of the Feasibility Study, an Advisory Committee consisting of local, county, regional, and state agencies, as well as local business people and concerned citizens, was formed to provide feedback for use in developing and screening alternatives and to disseminate this information to constituents. The Black Hawk Bridge Advisory Committee created a vision statement to establish basic goals and roles of stakeholders. The Advisory Committee considered the goals of the current study along with the long-term vision for the Black Hawk Bridge and the study area in Iowa and Wisconsin. Also included in the vision statement are steps necessary to implement the vision including roles of stakeholders and steps needed to reach the future vision of the bridge.

Black Hawk Bridge Vision Statement

The Black Hawk Bridge Feasibility Study will establish a plan for the rehabilitation or replacement of the bridge. A wide range of alternatives will be developed to determine feasible and cost-effective solutions.

The Iowa and Wisconsin DOTs and their partners will pursue the following project goals:

- Provide continual use of a regionally important river crossing;
- Provide a bridge that meets structural and functional needs;
- Satisfy and complement local values recognizing Lansing's unique historic and visual qualities and the importance of tourism, recreation, and safe river boat navigation to the community and surrounding areas;
- Develop bridge and approach improvements that are compatible with environmental and community resources.

These goals will be achieved by forming and maintaining positive and cooperative partnerships to address project decision making; funding; bridge maintenance; and bridge rehabilitation or replacement. The Iowa and Wisconsin DOTs will facilitate and provide leadership to achieve these goals with the participation and constructive input from project stakeholders (state, county, and local government and federal agencies, and community members).

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Section 2
Purpose and Need

SECTION 2

Purpose and Need

This section describes the purpose of and need for Black Hawk Bridge improvements being considered. Purpose and need factors encompass improvements that are intended to correct not only existing problems, but also those that may occur in the future.

2.1 Purpose and Need

The purpose of the proposed action is to provide a reliable river crossing connecting northeastern Iowa and southwestern Wisconsin that reduces hazards for barge traffic and minimizes disturbance to the natural and built environment. The proposed improvements have the following objectives:

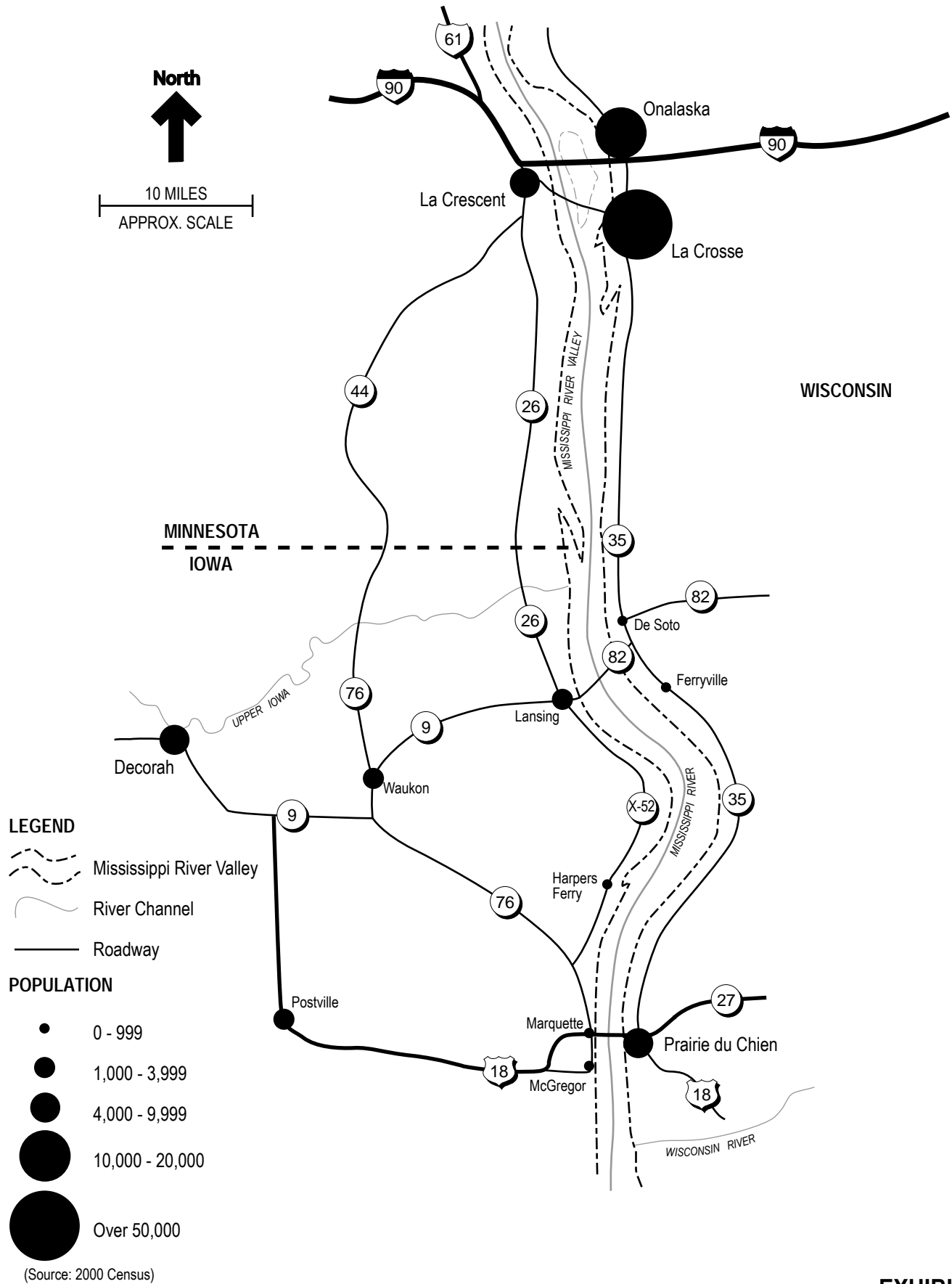
- Provide an interim plan that can be used by Lansing officials, managers of the refuge, and other key resource agencies as a blueprint to assist in future land use and development decisions until the NEPA phase establishes the final plan.
- Provide a bridge that meets current design and operational standards.
- Provide an alignment and a structure design with the appropriate clearances that will enhance the safe passage of barges and other large river vessels within the navigation channel.

The need for transportation improvements is based on a combination of factors including the regional importance of the bridge, the implication of the bridge's functional and structural issues on vehicular traffic and the bridge's navigational issues for river traffic. The remainder of this chapter discusses these factors. The purpose of and need for the proposed improvements sets the stage for developing and evaluating the alternatives discussed in Section 3.

2.2 Regional Importance of the Black Hawk Bridge

The Black Hawk Bridge and the WI 82 causeway structures provide a critical link in the economic fabric of the four-county area encompassing Allamakee and Winneshiek Counties in Iowa, and Crawford and Vernon Counties in Wisconsin. The bridge connects IA 9, IA 26 and northeastern Iowa to WI 35, which is a direct connection to the City of La Crosse, approximately 35 miles north of Lansing. La Crosse is a Regional Trade Center (RTC) according to *Trade Centers of the Upper Midwest 1999 Update*, a report completed by the Center for Urban and Regional Affairs at the University of Minnesota.¹ A RTC is considered a hub for trade and business. The designation as a RTC means La Crosse serves a large geographic area, including Lansing. A comparison of each community's population also serves as an indicator of economic activity. Exhibit 2-1 provides a regional view of the importance of the Black Hawk Bridge by showing the routes from the smaller trade centers such as Decorah, Iowa and Prairie du Chien, Wisconsin to the larger RTC of La Crosse.

¹ *Trade Centers of the Upper Midwest 1999 Update*, a report completed by the Center for Urban and Regional Affairs at the University of Minnesota.



T05200404MKE Exhibit 2-1_Reg Pop 12/16/04/ljls

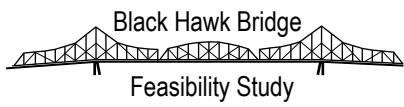


EXHIBIT 2-1
Regional Population Distribution Map



The Chamber of Commerce from the City of Waukon, located approximately 18 miles southwest of Lansing, sent a letter to the Iowa Department of Transportation in December 2002. The Chamber's letter discusses the importance of the Black Hawk Bridge to the northeast Iowa regional economy and considers the Black Hawk Bridge a vital part of all business activity in Waukon. The Waukon Chamber of Commerce strongly supports maintaining the crossing at Lansing (see Appendix C - Correspondence, for a copy of the letter). The corridor is key to many daily functions including employment, access to services, including medical services, and transportation access functions that relate to trucking, retailing, and recreation. These linkages are also essential to Lansing's economy and are very important for highway users on both sides of the river. The nearest crossings of the Mississippi River to the Black Hawk Bridge are in Prairie du Chien (30 miles downstream) and La Crosse (35 miles upstream).

2.2.1 Employment

Many residents of Iowa and Wisconsin commute across the river to work. According to the 2000 census, over 24 percent of Allamakee County residents, and over 14 percent of Winneshiek County residents commute outside of their home counties to work. Many of these workers commute across the river to the La Crosse area and lesser numbers commute to the Prairie du Chien area. In addition, almost 10 percent of Wisconsin workers in the census tracts nearest the river commute outside of Crawford County. Many of these commuters rely on the Black Hawk Bridge. Lansing's largest industry, the Blumenthal Lansing Company, has reported that 26 percent of its 140-person labor force commute across the Black Hawk Bridge to work.

New industrial parks are being developed on IA 9 in the nearby communities of Waukon and Decorah. The existing and future industries in these parks can be expected to rely on the river crossing for the delivery of raw products and the shipment of finished goods to markets. The Lansing area is also in the process of planning an industrial park on the west side of the town.

2.2.2 Health and Emergency Services

The Black Hawk Bridge is a critical link for health care services. Although Lansing provides facilities for routine health care, the nearest emergency care facilities are Gundersen Lutheran and Franciscan Skemp medical centers located in La Crosse. Most of the health care for Lansing and Allamakee County residents is provided by these hospitals and their related clinics in the La Crosse area. These hospitals receive the greatest number of ambulance trips from Lansing and Waukon, and a significant number of emergency calls from Waukon and Postville.

The Lansing Fire Department has a mutual aid agreement with the De Soto, Wisconsin Fire Department; the bridge is a necessary link to support these emergency services. Additionally, the City of Lansing operates a public ambulance service that responds to automobile accidents on the causeway.

2.2.3 Trucking

WI 35 is designated as a truck route on the Wisconsin DOT Truck Operator Map. This designation makes the route desirable for truck traffic traveling to La Crosse. The roadway

is designed to allow for more reliable travel times and faster travel speeds than likely on IA 26, the parallel route on the Iowa side of the river. The Black Hawk Bridge is used as a connection for trucks to the WI 35 truck route from northeast Iowa. Several interstate motor freight carriers are located in the immediate four county area served by the bridge. For many of these carriers, the Black Hawk Bridge provides the nearest access to WI 35 and locations east of the Mississippi River. However, the deficiencies in the Lansing approach network require many carriers to employ a circuitous approach to the bridge or use alternate crossing locations. A mobile home manufacturer also uses the Black Hawk Bridge for moving trailers, including double-wides. In such instances, traffic must be stopped on both sides of the bridge to allow the extra wide truck and trailer to pass through.

The area logging industry also relies on the Black Hawk Bridge river crossing. Several logging companies haul their harvested logs from northeast Iowa to large processing mills in Bangor, Wisconsin located east of La Crosse and to Prairie du Chien. This kind of truck traffic through Lansing can be substantial, depending on the time of year.

2.2.4 Agriculture

The Black Hawk Bridge also supports regional agricultural activity. According to local sources, the bridge is regularly used to transport hay from Iowa to Wisconsin, and Wisconsin farmers rely on sales and implement repair services in Waukon, as well as financial services on the Iowa side of the river.

2.2.5 Retail Opportunities

Allamakee and Winneshiek County residents utilize retail opportunities provided by the La Crosse area, particularly for durable goods, building materials, and automobiles. The communities of Waukon and Decorah and the surrounding rural areas are also dependent on this regional connection to La Crosse. The large Cabela's sporting goods retail and distribution center in Prairie du Chien also attracts traffic from the Allamakee and Winneshiek County area.

2.2.6 Recreational Activity

The Mississippi River attracts large numbers of boaters, hunters, and fishermen, each of whom contribute to the economic viability of river communities such as Lansing. The U.S. Army Corps of Engineers (Corps) maintains records of the types and numbers of vessels locked through each dam on the river. Between 1997 and 2001, downstream bound recreational vessels through lock and dam 8, near Genoa, WI, averaged 4,475/year, while upstream bound recreational vessels through lock and dam 9, near Harpers Ferry, IA, (Exhibit 1-1) averaged 3,151/year. Many of these vessels may originate in or visit the Lansing area. Several companies offer Mississippi River cruises, including one of only five operating steamboats on the entire Mississippi River – the Julia Belle Swain – which offers trips along the Upper Mississippi from the home port of La Crosse, Wisconsin. The only public marina in the vicinity of the Black Hawk Bridge is located in Lansing, just north of the bridge. Two boat landings are also located on the WI 82 causeway. The Big Slough Landing is located just east of the Black Hawk Bridge and the Winneshiek Slough Landing is located half a mile west of the intersection of WI 82 and WI 35. These landings were paved

in 2002 by the FWS and upgrades were made to the landing structures. The parking capacity of the Big Slough Landing is approximately 20 vehicles with trailers.

River-based recreation has a substantial economic impact on the Lansing area. A study by the Corps estimated that the average daily expenditure in 1990 for items consumed on recreational trips to the upper Mississippi River system was \$15.84/person, with an additional \$12.54/person spent on durable items used on such trips, such as boats and fishing equipment.² According to the Corps' study, recreational activities in the 76 counties bordering the Upper Mississippi River System during the study year resulted in direct and secondary expenditures of \$400 million and helped maintain 7,200 jobs.

The Black Hawk Bridge at Lansing connects the Wisconsin and Iowa Great River Roads. The Great River Road parallels the Mississippi River on both the Iowa and Wisconsin sides, and is part of a 10-state route stretching from Louisiana to Minnesota. The Great River Road is a popular route for viewing fall foliage along the Mississippi. Recreational traffic also uses the Black Hawk Bridge crossing to connect to Iowa's scenic byways. IA 9 is part of the Driftless Area Scenic Byway, one of seven state-designated scenic routes. The designated route starts in Postville and winds its way through Harpers Ferry, Waukon, and Lansing. This route connects Lansing to Effigy Mounds National Monument, Pikes Peak State Park, and many other scenic overlooks on the Mississippi River. The Black Hawk Bridge itself is considered a tourist attraction as part of a picturesque setting that includes the river valley and the City of Lansing. Pictures of the Black Hawk Bridge have frequently been used in promotional materials for tourism in Iowa and the Mississippi River valley.

The proposed Mississippi River Trail (MRT)—a bicycle trail that will follow the Mississippi River—is planned to go through Lansing. Once completed, the MRT will link over 2,000 miles of recreational trails through 10 states, including 280 miles in Iowa. The portion of the trail that will run through Lansing has yet to be firmly established; however, the report, *Iowa's Mississippi River Trail Plan*, indicates that a likely MRT route through Lansing would be IA 26 through the city to the junction with County Road X52. Currently, IA 26 is identified to have bicycle lanes added to the roadway. Bicycle lanes will need to be built south of Lansing on County Road X52 to the city of Clayton.³

2.3 The Black Hawk Bridge's Functional and Structural Issues

2.3.1 Black Hawk Bridge Functional Condition

The following is a summary of the bridge's key functional issues:

- **Bridge Cross-section.** The roadway width on the bridge is 21 feet for two lanes of traffic, which is barely adequate to accommodate two opposing lanes of travel. The 21-foot cross-section essentially allows for two 10.5-foot travel lanes with no shoulders. Current Iowa DOT design standards recommend that bridges have the same width as the approaching highway section. This means the Black Hawk Bridge would need a

² Carlson, Bruce D., Dennis B. Propst, Daniel J. Stynes and R. Scott Jackson. 1995. Economic Impact of Recreation on the Upper Mississippi River System, *Technical Report EL-95-16*. U.S. Army Engineers Waterways Experiment Station, Vicksburg, MS. 62 pp.

³ David Plazak, Iowa State University, Center for Transportation Research and Education, April 2003.

minimum width of 36 feet. The existing bridge's substandard travel lane width creates potential opposing traffic lane conflicts, especially for large vehicles meeting each other. When larger vehicles such as trucks, tractors, RVs, buses, or emergency vehicles (fire trucks, ambulances, etc.) meet on the bridge, oncoming vehicles can only pass by each other at slow speeds and can contribute to lowering a drivers comfort level on the bridge (see cross-section in Exhibit 1-2). There are also instances when vehicles such as semi-trailers, farm equipment trailers, or emergency vehicles are simply too large to cross the bridge with traffic in the opposing lane and the bridge must be temporarily shut down to allow these larger vehicles to pass. Temporary shut downs of the bridge may also occur when a vehicle becomes disabled on the bridge and needs to be towed. The lack of shoulders does not allow a disabled vehicle, an emergency response vehicle, or maintenance vehicles a location to seek refuge from the travel lanes. In addition, the lack of shoulders combined with the open grate deck is a deterrent to bicyclists using the bridge.

- **“T” Intersection.** The “T” intersection at the west end of the bridge makes it difficult for larger vehicles, such as semi-trailers, to navigate the 90 degree turn onto the bridge. This is particularly true for the IA 9 eastbound right turns off 2nd Street. In 1992, the intersection was reconstructed to create more clearance for the trucks to complete the turn, but trucks still have to perform wide turns and special maneuvering to safely enter the bridge. On-going turning problems are evidenced by marks left by vehicles on the curb and concrete barriers at the west end of the bridge. The same problem exists at the intersection of 2nd and Main Streets in downtown Lansing. At this location the semi-trailers must use the entire intersection to maneuver the turn. For southbound to westbound right turns, this means proceeding into the oncoming traffic lane, causing other vehicles to stop before entering the intersection or the truck having to wait until the intersection is clear of other vehicles, before it can complete the turn. Cars parked along Main Street also become an obstacle. Larger vehicles making the eastbound to northbound left turn may have a conflict with southbound vehicles stopped at the intersection. The rear wheels of the larger vehicles often times cross the opposing lane of traffic while making this turn. Exhibit 2-2, *IA 9/IA 26 and IA9 Bridge Intersection* and Exhibit 2-3, *Main Street and 2nd Street Intersection Geometry* show the geometry of the intersections and turning movements for semi-trailers.
- **Steep Bridge Approaches.** For the majority of the corridor, the existing ground profile is flat, particularly along WI 82. Because of this, the rate of vertical curvature and stopping sight distances are not a concern overall. However, while the vertical grades on the existing approaches to the Black Hawk Bridge are less than the maximum allowable grade, there is some concern over the rate of curvature and stopping sight distance. A change of grade from 7.18 percent to a zero grade occurs as the bridge approaches tie into the deck of the Black Hawk Bridge. This grade change results in a “peak” on the bridge, which, based on field observations, is uncomfortable to a driver even at low speeds and creates locations of limited sight distance. Exhibit 2-2 provides views of the bridge approach on the Iowa side that help demonstrate the sight-line problem.

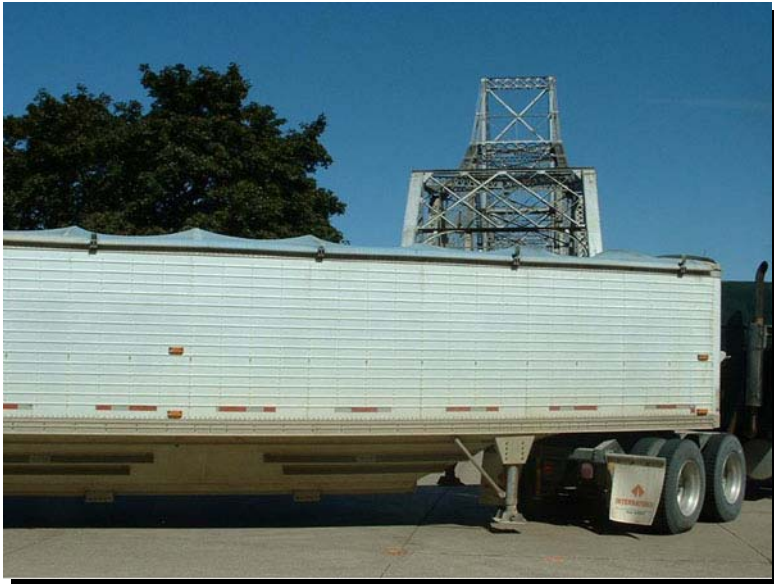


EXHIBIT 2-2
IA 9/IA 26 and IA9 Bridge Intersection



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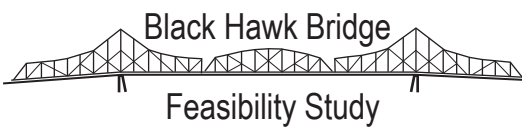


EXHIBIT 2-3
Main Street and 2nd Street Intersection Geometry

2.3.2 Black Hawk Bridge Structural Condition

The Black Hawk Bridge's structural condition is inspected biennially by the Iowa DOT or by a consultant. The most recent bridge inspection (conducted in 2001, with the inspection report published in 2003), which included load testing, showed that the Black Hawk Bridge is structurally sound. Load testing up to 100 tons showed that the liveload stresses in the various members are low and that the bridge should not be at risk for fatigue failure under current loadings and projected traffic. In spite of the results of the 2001 bridge inspection, there are the following structural concerns with the bridge:

- The bridge's open grate deck does not protect the steel beam members underneath from moisture, especially salt-contaminated snow and ice that is carried onto the bridge by vehicles. This has resulted in corrosion of the floor beams, stringers and connections. A review of the bridge's repair history (provided in Appendix A) shows many of these elements were repaired in 1987, 1990, 1994 and 2002 and that the steel under the deck was painted in 1988 and 2000.

The members below and to a height of about 10 feet above the deck are pressure washed annually which helps mitigate the corrosion. However, maintenance and upkeep of the remainder of the structural steel is becoming increasingly difficult and expensive. The entire bridge was repainted in 1955 and 1972.

- The substructure units have had several types of deterioration: 1/16th+ cracks, spalls, scaling, map cracking, and impact damage. Substructure repairs were performed to address this deterioration in 1957, 1971, 1986, and 2002.
- Significant undermining of piers 2 and 3 was found in 1971. Riprap was placed in 1972, and monitoring during subsequent years showed that it has been an effective scour countermeasure. Additional riprap was placed in 1995 and 2002 to assure its continued effectiveness.

Further evidence of the structural (and functional) problems facing the Black Hawk Bridge are found in its National Bridge Inventory rating. The National Bridge Inventory has identified the Black Hawk Bridge as deficient, giving it a sufficiency rating score of 34 out of 100.

The sufficiency rating is derived from a formula that is composed of four separate factors. These factors are combined to calculate the bridge's sufficiency to remain in service. The four factors are:

- Structural Adequacy and Safety
- Serviceability and Functional Obsolescence
- Essentiality for Public Use
- Special Reductions

According to the bridge inspection conducted in 2001, the reductions in Table 2-1 (see page 2-10) were taken from the four factors listed above.

TABLE 2-1
Specific Reductions from Sufficiency Rating Factors

Rating Component	Points Deducted
1. Structural Adequacy and Safety, (55 points of total rating)	-26
Structure Condition – general evaluation of superstructure and substructure	
Inventory Rating – safe load capacity of the structure	
2. Serviceability and Functional Obsolescence, (30 points of total rating)	-25
Structure Constraints – deck geometry, vertical clearance	
3. Essentiality for Public Use, (15 points of total rating)	-15
Essentiality – ADT vs. detour length (greater deduction indicates higher essentiality)	
4. Special Reductions, (-13 points possible)	0 ^a
“Special Reductions” are possible when there are certain unique characteristics of the bridge that can have a negative impact on its sufficiency, including main structure type and traffic safety features on the structure. None apply.	— ^a
Total Reductions	-66

^a Applies only if the total score for the first three factors is greater than 50 points (i.e. the deductions total less than 50)

Source: *Iowa Highway 9 over the Mississippi River Bridge Condition Report*, prepared for Iowa DOT, April 4, 2003. (Note: The actual inspection was performed in 2001, however, the report regarding the inspection was released in 2003). Iowa and Wisconsin DOTs Inspection Report, 2001

Even though recent bridge inspections indicate the Black Hawk Bridge is not at risk of fatigue failure under current loadings, enough deficiencies exist for a deduction of 26 points in the Structural Adequacy and Safety category. Deductions from a sufficiency rating may be taken regardless of the physical condition of a bridge for characteristics such as narrow, substandard roadway widths, substandard vertical clearances, and inadequate waterway openings. The Black Hawk Bridge received a 25-point deduction for these constraints, in the Serviceability and Functional Obsolescence component of the Sufficiency Rating. The 15-point deduction for Essentiality is an indicator of the lack of nearby detour options should the Black Hawk Bridge not be available for crossing the Mississippi River.

Subtracting the total deductions of 66 from the total 100 possible yields the current rating of 34. The Iowa and Wisconsin DOTs generally consider bridges with sufficiency ratings below 50 as candidates for replacement. Bridges with scores below 50 would also be eligible for funds from the federal Highway Bridge Replacement and Rehabilitation Program (HBRRP), if available. Eligibility for federal bridge replacement funding also requires that the structure be classified as functionally obsolete or structurally deficient. The bridge is classified as functionally obsolete due to its narrow roadway.

Unless the bridge is rehabilitated or replaced at some point, continued maintenance can be expected, but this work will not correct structural and geometric deficiencies.

As shown in Table 2-2, all structures on the WI 82 causeway have a higher sufficiency rating than the older Black Hawk Bridge. This is because all causeway bridges were rebuilt in 1956, when the causeway was reopened to traffic. The Black Hawk Bridge's current sufficiency rating of 34 means more emphasis should be placed on the rehabilitation or reconstruction of the structure than on the other slough bridges.

TABLE 2-2
Sufficiency Ratings of All Bridges in the Study Area

Bridge	Sufficiency Rating
Black Hawk Bridge	34.0
Big Slough Bridge	63.7
Stevens Slough Bridge	63.6
Henderson Slough Bridge	63.6
Winneshiek Slough Bridge	61.5

Source: WisDOT, 2001 Inspection Reports

Additionally, Table 2-3 shows that the sufficiency ratings of several other Mississippi River crossings north and south of Lansing have higher sufficiency ratings than the older Black Hawk Bridge.

TABLE 2-3
Sufficiency Ratings of Bridge Near Study Area

Bridge	Location	Year Constructed	Sufficiency Rating
U.S. 20 bridge	Dubuque, IA	1943	51.0
U.S. 61 bridge	Dubuque, IA	1982	89.0
U.S. 18 bridge	Prairie du Chien, WI	1974	76.1
I-90 bridge	La Crosse, WI	1967	77.9
U.S. 14/61 bridge	La Crosse, WI	1940	60.0
MN 43 bridge	Winona, MN	1942	59.0
MN 60 bridge	Wabasha, MN	1988	86.2

Source: Iowa and Wisconsin DOTs

2.3.3 Mississippi River Navigation Issues

According to the Corps' waterborne commerce statistics, over 38 million tons of commodities (mostly grain, coal, and aggregates) moved to, from, within, and past Iowa on the Mississippi River in 1999. These commodities had a combined value of more than \$6.7 billion. Grain comprised the largest quantity of this tonnage, totaling nearly 66 percent overall. Coal followed as the second largest commodity, totaling 13.5 percent of the tonnage. Iowa docks shipped commodities by barge to 14 states and received commodities from 18 other states. The amount of cargo transiting beneath the Black Hawk Bridge by tow was 19 million tons with an average value of \$135 per ton for a total value of \$2.6 billion.

According to recent statistics compiled by the Corps, approximately 2,800 tows travel through Pool 9 every year. Pool 9 is the Corps' designation for the segment of the Mississippi River between Lock and Dam #8, just south of Genoa, Wisconsin, to Lock and Dam #9, just north of Harpers Ferry, Iowa (See Exhibit 1-1, Project Location). The Corps

maintains the official navigation channel through Pool 9 at 300 feet wide, which is marked by red and green buoys. Because of the characteristics of the river and surrounding environment, only one direction of movement is allowed at a time under the Black Hawk Bridge and through a narrow section of channel approximately 3 miles downstream, near the Interstate Power Plant. Tows stay in contact by radio and determine the locations of other tows so that downstream tows can have the right of way. This means that tows headed upstream often must pull over to allow downstream moving tows to pass.

The Black Hawk Bridge has a vertical clearance of 67.5 feet above the normal pool elevation. According to the USCG, a vertical clearance of 60 feet or more is adequate for regular river navigation. The bridge piers in the main channel of the river however are a navigation challenge for tow traffic on the Mississippi River as evidenced by the number of tow impact incidents that have occurred over the years. Maneuverability of the tows traveling downstream is limited. There is a sharp turn (almost 90 degrees) in the navigation channel just upstream of the Black Hawk Bridge (see Exhibit 2-4, *Mississippi River Navigational Channel*, for location of navigational channel within the study area). Tow pilots start preparation for the turn a few miles upstream. Within these few miles the channel meanders and multiple turns

are required to maneuver the tow into position to pass between the Black Hawk Bridge pier 1 on the west shore of the Mississippi River and pier 2 in the navigation channel. Tows moving downstream, with the current, tend to move faster than tows traveling upstream against the current. High water, fast moving current, and strong winds also contribute to difficult maneuverability, especially for tows carrying empty barges. Several new wing dams were constructed upstream from the bridge in the late 1980s to improve the bridge approach, but it is not known how effective they have been in reducing accidents with the bridge.

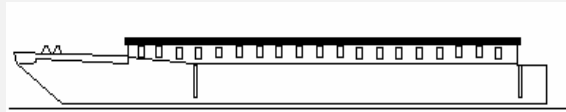
Tows have lost control during maneuvers necessary to navigate the sharp turn upstream from the Black Hawk Bridge and strike either pier 2 or pier 1. There is also documentation of tow hits against the west shoreline along Lansing's riverfront, as much as 1,200 feet down river from the bridge. The total number of tow/bridge collisions is not known, but the USCG's 2nd District office in St. Louis recorded six tow hits to the bridge between 1987 and 1991. However, the Coast Guard only records strikes causing more than \$25,000 in property damage. At least one major tow accident resulted from mechanical failure, which caused the tow to lose its maneuvering ability. Exhibit 2-5, *Black Hawk Bridge Tow Hits*, includes photos of some of the more recent tow accidents.

What is a tow?

Tow – A tow is a pushboat that can be alone or with barges.

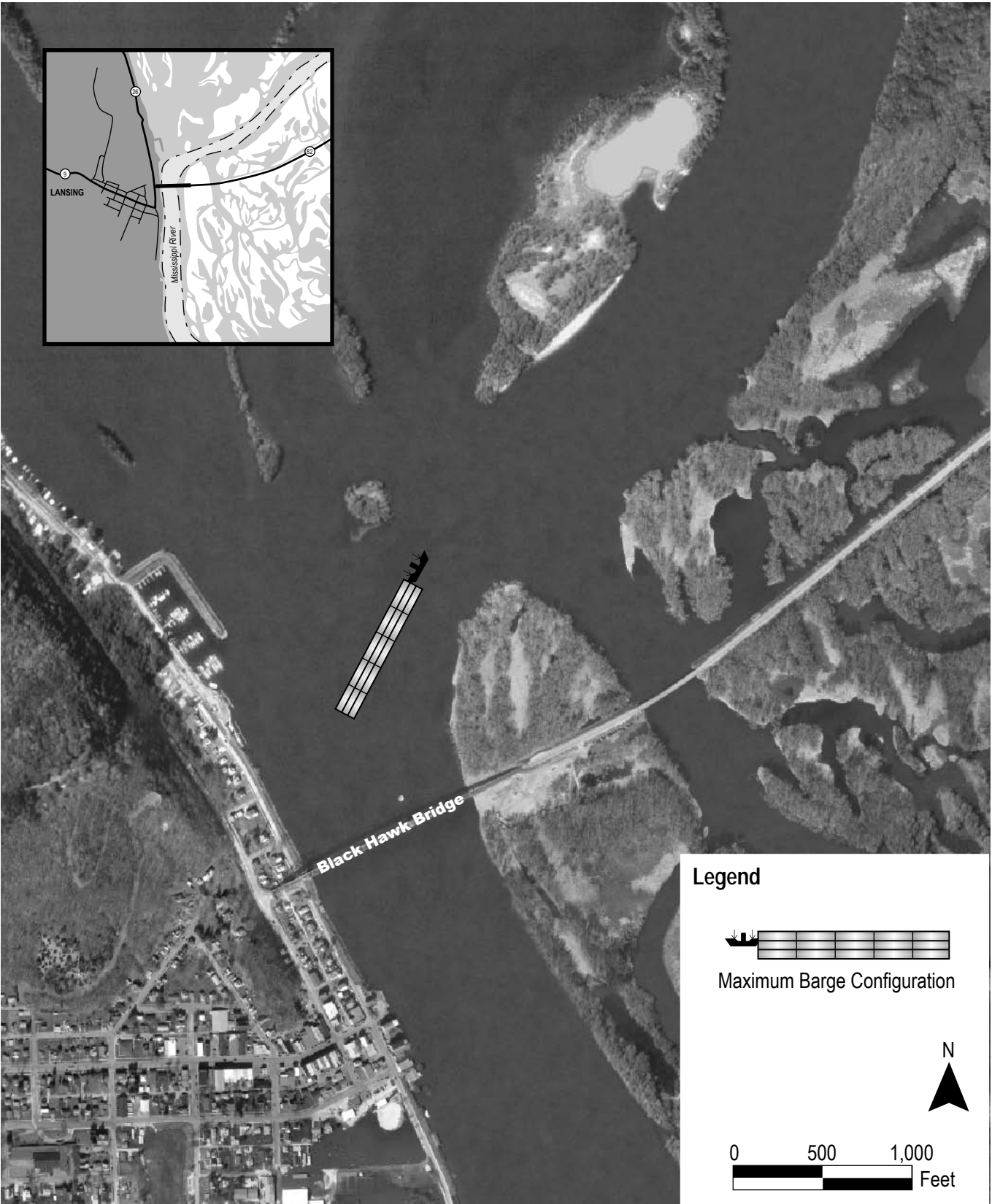
Barge – a floating vessel, pushed by a tow, used to carry cargo

Hopper – common type of container barge used for dry cargo. They may be covered or open (sometimes called "boxes").



Covered Hopper

The maximum barge configuration for a tow is 15 barges, five barges long by three wide. An additional barge can sometimes be positioned right next to the pushboat to make the tow carry 16 barges. A single barge is 200 feet long and 35 feet wide creating a tow with 15 barges a total of 1,165 feet long and 105 feet wide. see Exhibit 2-4, *Mississippi River Navigational Channel*, for an example of the size of a full tow.



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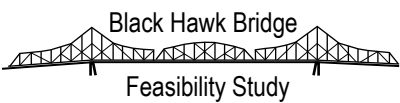


EXHIBIT 2-4
Mississippi River Navigation Channel



1985 tow hit resulting in break away barges



The Actual hit of the pier resulting in the break away string of barges shown in the next two snapshots.



The barges coming apart after cables snapped.



The loose string of barges extending across the channel after hitting the bridge, breaking apart and floating downstream from bridge.



1987 - This run-away tow hit the Lansing shore at the foot of Main Street. The uncoupled barge was punctured by a concrete bulkhead river wall.



1991 - This hit took a chunk out of Pier 2.



1994 - A tow resting against dolphin (dolphin built in 1992).

A protection cell, or “dolphin”, was installed just upstream from pier 2 in 1994 to protect it against tow hits. The dolphin is a circular concrete structure imbedded in the river upstream of pier 2. It is intended to be used as a guide to maneuver beneath the bridge and avoid tow hits on the piers. There are some scrape marks on the dolphin, and local maintenance personnel reported that the dolphin has been hit multiple times. While this dolphin has prevented tow hits of pier 2 since 1994, it has not eliminated the navigation problems faced by tows.

Because of the difficulty tows experience when maneuvering around the bend in the river and under the bridge, the River Industry Action Committee (RIAC), who conducted an informal survey, ranked the Black Hawk Bridge as one of the twelve most difficult bridges to negotiate on the Upper Mississippi River.⁴

Table 2-4 includes a list of these twelve bridges. The Black Hawk Bridge is one of only two highway bridges on the list. The other ten are railroad bridges.

A letter from Brennan Marine, Inc. dated January 8, 2003, provided an estimate for the cost of a tow accident that caused the tows to break away from the towboat (see Appendix C). Table 2-5 provides a breakdown of the cost to the barge

company resulting from a “typical” tow accident. The total estimate is approximately \$53,000 in damages. This estimate does not include possible damage, needed repairs, and maintenance to the bridge structure that was struck by the tow. Additionally, a barge sinking from such a hit would multiply this cost by a factor of 10 to 20 for loss of vessel, cargo, pollution, and salvage.

TABLE 2-4
12 Most Difficult Upper Mississippi Bridges to Negotiate

1	La Crosse (Wis.) R.R. Bridge
2	Ft. Madison (Iowa) R.R. Bridge
3	Sabula (Iowa) R.R. Bridge
4	Crescent R.R. Bridge
5	Burlington (Iowa) R.R. Bridge
6	Pig's Eye (Rock Island Lines) R.R. Bridge
7	Clinton (Iowa) R.R. Bridge
8	Hannibal (Mo.) R.R. Bridge
9	Louisiana R.R. Bridge
10	Dubuque R.R. Bridge
11	Hastings (Minn.)
12	Lansing (Iowa) – Black Hawk Bridge

Source: River Industry Action Committee (RIAC) as cited in *Dubuque Telegraph Herald*, November 10, 1991.

TABLE 2-5
Tow Accident Costs

Reason for Cost	Approximate Cost
Barge Damage	\$26,000
Lost Barge delays	\$3,000
Tug Assist	\$800
Salvage	\$5,500 (to a lighter-damaged barge)
Additional Barge	\$7,500 (receiver barge)
Towing vessel and barges lost time (24 hrs)	\$7,500
Marine Surveyor	\$2,700
Total	\$53,000

Source: Kent Pehler, Brennan Marine, Inc. (letter dated January 8, 2003)

⁴ River Industry Action Committee (RIAC), informal survey.

2.4 Traffic and Accident Summary

2.4.1 Black Hawk Bridge Capacity

In 2001, 2,280 vehicles crossed the Black Hawk Bridge daily. By 2030, 2,920 vehicles are expected to use the bridge every day. The expected 2030 traffic on the Black Hawk Bridge would not exceed the bridge's capacity. However, as traffic increases, the existing Black Hawk Bridge deficiencies will potentially increase. These deficiencies include:

- Number of opposing travel conflicts caused by large vehicles;
- Vehicle conflicts at the intersection of IA 9 and the Black Hawk Bridge;
- Possibility of vehicle breakdowns on the bridge; and
- Approach grade and stopping sight distance concerns.

2.4.2 Safety Performance

No major crash or safety problems exist along the IA 9 corridor in Lansing. The majority of the crashes occurring in the IA 9 corridor occurred west of the intersection of 2nd and Main Street. The intersections of 4th Street and 2nd Street with IA 9 (Main Street) had the highest number of accidents many of which involved parked or backing vehicles. Parking is allowed on both sides of Main Street through this area. Also, large vehicles attempting to make a southbound to westbound right turn at the intersection of 2nd and Main Street do not have adequate room to complete the turn without encroaching into the opposing traffic lane. Vehicles making this movement must also deal with the parked vehicles on either side of Main Street.

The segment of WI 82 east of the existing Black Hawk Bridge has the highest crash history in the corridor. Possible deficiencies in the roadway geometrics, the existing roadside environment, and signing (particularly the posted speed limits) may contribute to these problems. Possible changes in guardrail design, shoulder design, pavement markings, and roadway delineation may be warranted through this area. Appendix B – Traffic and Safety provides more detailed information on traffic and accidents in the project area.

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Alternatives

This section documents the development and analysis of alternatives designed to address the deficiencies of the Black Hawk Bridge that were discussed in Section 2. The factors considered while developing the preliminary bridge location alternatives are discussed in Section 3.1 Development of Location Alternatives. A brief description of each of these alternatives is provided in Section 3.2 Description of Preliminary Location Alternatives.

3.1 Development of Location Alternatives

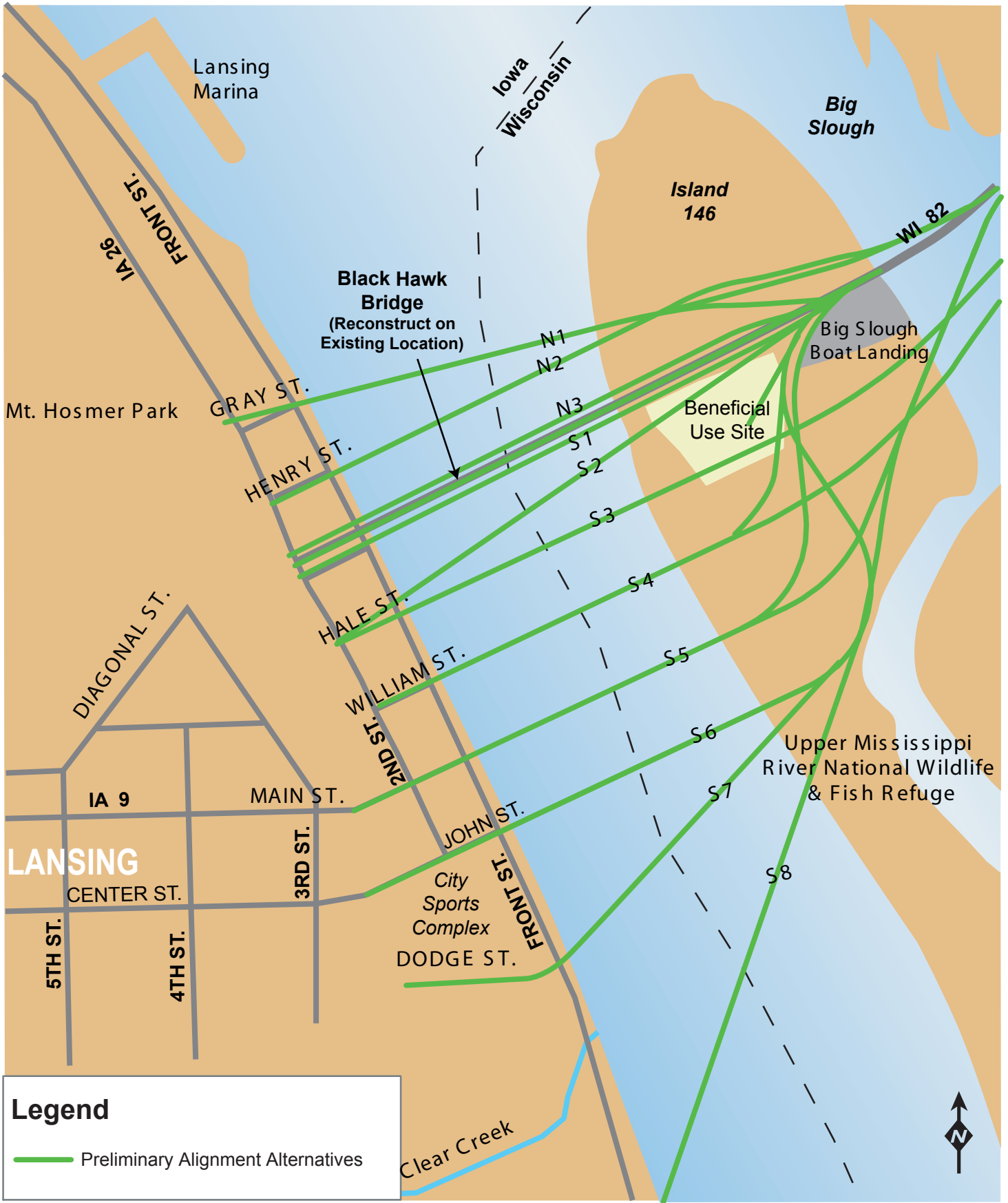
3.1.1 Previous Black Hawk Bridge Report

Studying the replacement of the Black Hawk Bridge dates to 1968 when the Iowa DOT completed the *Mississippi River Toll Bridge at Lansing, Iowa* study.¹ The study examined the possible construction of a new toll crossing at three locations in Lansing; all of which reconnected to the existing WI 82 causeway after crossing the Mississippi River. The three locations studied are summarized below:

- **Alternative A.** A new river crossing at William Street that would continue westward through the bluff to connect with Main Street. This alternative would eliminate the two right turns on IA 9 (the bridge landing point at 2nd Street and at the 2nd and Main Street intersection) and would also require a new Big Slough crossing.
- **Alternative B.** This alternative would be located parallel to and 50 feet upstream of the Black Hawk Bridge. The bridge would touch down approximately 90 feet above the river on the bluff at the intersection of 3rd Street and Diagonal Street. Diagonal Street would require improvements to connect with Main Street.
- **Alternative C.** This alternative would include a skewed Mississippi River crossing located approximately 1,500 feet downstream from the existing bridge. The new river crossing would terminate at Fourth Street in Lansing, approximately 250 feet south of Dodge Street.

Ultimately, no action resulted from the 1968 *Mississippi River Toll Bridge at Lansing, Iowa* study. However, these location alternatives were considered in the development of bridge location alternatives for this Feasibility Study. The three alternatives studied in 1968 are generally represented by one of the alternatives shown in Exhibit 3-1, which is a depiction of the initial range of build alternatives examined in this study. Alternative A of the 1968 study and Alternative S4 cross the Mississippi River at a similar location; however, Alternative A had greater impacts to Lansing as it cut through the edge of the bluff and ran behind the businesses on the north side of Main Street before connecting to Main Street at 3rd Street. Alternative B and Alternative N3 cross the river at a similar location; however Alternative B connected to Diagonal Street on top of the bluff, while Alternative N3 connects to IA 26 (2nd Street) just north of the existing bridge. Alternative C in the 1968 study is similar to Alternative S7.

¹ Bridge Location, Revenue and Traffic Study: *Mississippi River Toll Bridge at Lansing Iowa*. Iowa DOT. July 1968.



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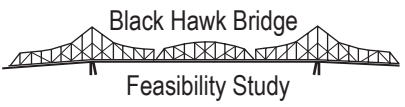


EXHIBIT 3-1
Preliminary Alignment Alternatives



The 1968 study also discussed bridge types, some of which are evaluated as options in Section 3.6; however, the assumptions used at that time (most notably a 565-foot main span distance) are no longer valid.

3.1.2 Key Assumptions Used to Develop Preliminary Alternatives

Three key assumptions were used to develop the preliminary range of Black Hawk Bridge replacement options. First, any reasonable alternative must tie into the existing WI 82 causeway. The U.S. Fish and Wildlife Service indicated that any portion of the existing causeway not used with the proposed improvements would need to be removed. Therefore, alternatives that tie into the causeway near the east end of the existing bridge would tend to be less expensive and have fewer impacts on the Upper Mississippi River National Wildlife and Fish Refuge (for a description of the Refuge, see Section 4.1.2). The second assumption was that whether the existing bridge was rehabilitated or a new bridge was built, the new structure would be a two-lane facility. This decision was based on the traffic data that showed a two-lane structure would have sufficient capacity to safely accommodate forecast traffic (See Appendix B for project area traffic data). Lastly, it was assumed that if a new bridge were constructed, the existing Black Hawk Bridge would be removed. A new river crossing would meet the transportation needs of the area, so removal of the Black Hawk Bridge would eliminate it as an obstacle to river traffic and would avoid additional Iowa DOT liability and maintenance concerns. Additional information about the bridge demolition process is provided in Sections 4.1 and 4.3.

3.2 Description of Preliminary Location Alternatives

A wide range of preliminary alternatives was developed to identify feasible and cost-effective solutions for correcting the deficiencies of the existing river crossing. The preliminary build alternatives described below are depicted in Exhibit 3-1. As seen, variations of crossing location alternatives are possible (particularly with respect to reconnection to the WI 82 causeway east of the Big Slough Bridge, which would require a new crossing of the Big Slough).

3.2.1 No-Build Alternative

In the near term, no new major construction would occur under the No-Build Alternative. The existing maintenance program on the bridge's superstructure and substructure would continue. Improvements at the east and west bridge approaches would be limited to normal pavement maintenance. If the Black Hawk Bridge were not reconstructed within the next 20 years, it is anticipated that the bridge deck would have to be replaced. Replacement of the bridge deck represents a substantial investment of time and money that could potentially require closure of the river crossing for an extended period of time.

The duration of reconstruction activities associated with bridge deck replacement will be dependent upon two key factors: the type of traffic control implemented, and the condition of other structural components at the time of reconstruction. Each factor is described briefly below:

- **Traffic control.** Options range from closure of one lane of traffic on the bridge to complete closure of the bridge for the duration of reconstruction. With complete closure,

one option would be to close the bridge at night (reconstruction activities occur in the evening so that traffic can cross during the day), representing a compromise option.

- **Condition of other structural components.** Bridge structure components that are connected to the bridge deck, primarily floor beams and deck stringers, may also require repair or replacement at the time of bridge deck replacement (with replacement having a greater impact on duration of reconstruction). An assessment of the condition of these components will be required prior to deck replacement activities.

Several bridge deck replacement scenarios are feasible; however consideration of the two factors listed above helps to generally identify the potential duration of reconstruction activities. The following two scenarios are representative of the range of reconstruction requirements under the No-Build Alternative:

- **Scenario #1 – Restricted River Crossing Closure Period.** (Replacement of the deck, *repairs* to other components as necessary) – 1 to 2 months of daytime lane closures (one lane of traffic on the bridge), followed by approximately 10 months of night closure, to allow for reconstruction activities in the evening, with the bridge re-opening to traffic in both directions during the day.
- **Scenario #2 – Extensive River Crossing Closure Period.** (Replacement of the deck, *and* replacement of all floor beams and deck stringers) – approximately 18 months of full-time closure of the crossing in addition to another 6 months of activities that may require limited lane closure or night closure periods.

Closure of the river crossing requires a detour to either the La Crosse, WI (35 miles north of Lansing) or Prairie du Chien, WI (30 miles south of Lansing) Mississippi River crossing locations.

3.2.2 Transportation Demand and System Management Alternative

Transportation Demand Management (TDM) and Transportation System Management (TSM) considerations evaluate the potential to implement low-impact options for improving traffic operations. TDM measures typically examine opportunities to more fully utilize an existing public transit service or find methods to increase auto occupancy rates as a means to reduce the number of autos on the existing roadway network. TSM measures generally consist of improvements such as combining access points with the use of frontage roads, turn lanes or passing lanes to improve capacity, or lighting and shoulder improvements.

The TDM and TSM alternatives would be unable to address the bridge's functional problems and the navigation issues the bridge poses for barge traffic.

3.2.3 New Bridge Construction on Existing Location

This alternative would remove the existing bridge and construct a new two-lane bridge in the same location. During construction of the new bridge, there would be no connection between Iowa and Wisconsin at Lansing. As described above, the nearest river crossing alternatives are located a minimum of 30 miles from Lansing. New bridge construction activities would mean possibly two years without a direct river crossing at Lansing.

3.2.4 Alternatives N1 Gray Street & N2 Henry Street—North of the Existing Bridge

The N1 and N2 alternatives are located approximately 550 feet and 250 feet north of the existing bridge, respectively. Alternatives N1 and N2 would diverge from WI 82 immediately west of the Big Slough Bridge on Island 146. Alternative N1 would touch down in Lansing on Gray Street; Alternative N2 would touch down on Henry Street.

3.2.5 Alternative N3—Adjacent to Bridge to the North

This alternative proposes a new river crossing alignment approximately 50 feet north (upstream) of the Black Hawk Bridge. Alternative N3 would diverge from WI 82 on Island 146 west of Big Slough and continue over the Mississippi River paralleling the existing bridge. The new crossing would connect to 2nd Street immediately north of the current connection.

3.2.6 Alternative S1—Adjacent to Bridge to the South

This alternative is similar to Alternative N3, but would be located 50 feet south (downstream) of the existing bridge, touching down in the vicinity of Ballou Street. This alternative would go through the northern portion of the Corps of Engineers Beneficial Use Site on Island 146.

3.2.7 Alternative S2—Hale Street (Skewed Crossing)

This alternative would deviate from WI 82 west of the Big Slough Bridge, cross Island 146 (primarily through the Beneficial Use Site) and the river at a skewed angle, and touch down at 2nd and Hale Street, approximately 300 feet south of the existing Black Hawk Bridge.

3.2.8 Alternative S3—Hale Street (Parallel Crossing)

Like Alternative S2, this alternative touches down at 2nd and Hale Street. However, rather than crossing the river at a skew, it crosses the river parallel to the existing Black Hawk Bridge. This alternative utilizes the existing Big Slough Bridge crossing and deviates from the causeway on Island 146, generally following the eastern and southern edges of the Beneficial Use Site before crossing the river.

3.2.9 Alternative S4—William Street

This alternative deviates from the causeway west of the Big Slough Bridge and crosses Island 146 south of the Beneficial Use Site. Alternative S4 crosses the river parallel to the existing bridge and touches down at William Street, approximately 625 feet south of the Black Hawk Bridge.

3.2.10 Alternative S5—Main Street

This alternative deviates from the causeway west of the Big Slough Bridge and crosses Island 146 at a skewed angle. Alternative S5 would cross the Mississippi River and touch down at Main Street, approximately 950 feet south of and parallel to the existing bridge. This alternative eliminates the turning movements at 2nd and Main Street and the west bridge approach concerns associated with the above alternatives.

3.2.11 Alternative S6—John Street

This alternative utilizes John Street (one block south of Main Street and approximately 1,250 feet south of the existing Black Hawk Bridge) to create a perpendicular crossing of the river. For purposes of preliminary comparison, this alternative could either turn sharply north and connect to the causeway west of the Big Slough, or construct a new Big Slough crossing and connect to the causeway east of Big Slough. While, this alternative also has several potential options for returning to IA 9, a new connection on the west side of Lansing that would use the John Street/Center Street corridor is used for consideration of this alternative.

3.2.12 Alternatives S7 (Dodge Street) and S8 (Valley Drive)

These southernmost alternatives diverge from WI 82 east of the existing Big Slough Bridge and cross Island 146 and the river at a skew. Alternative S7 touches down approximately $\frac{1}{3}$ mile (1,740 feet) south of the existing bridge at an angle to Dodge Street and then curves to join the existing street. Alternative S8 touches down approximately $\frac{1}{2}$ mile (2,640 feet) south of the existing bridge at an angle to Valley Drive (south of Clear Creek) and curves to join the existing street. Because Dodge Street and Valley Drive do not connect to IA 9, these alternatives would include constructing new roadway connections to IA 9.

3.3 Development of Bridge Location Screening Criteria

The bridge location screening process took place in three steps, which are described below:

- Alternative Screening Step 1** (see this section below (3.3.1.1 – 3.3.1.7) and Section 3.4 Initial Screening of Preliminary Location Alternatives). Preliminary location alternatives initially were evaluated to determine whether they meet the project purpose and need (discussed in Section 2). This evaluation included consideration of engineering and socioeconomic/environmental impacts of the preliminary location alternatives. However, only the impacts of touching down on the Lansing side and reconnecting to the existing causeway on the Wisconsin side were considered in this step. Input received at the April 29, 2003 public information meeting (see Section 5 for a review of public and agency involvement) was also incorporated in this screening step. Alternatives that were found to meet the project purpose and need while minimizing potential impacts (or conversely, maximizing potential benefits) were carried forward to the next screening step. Socioeconomic/environmental impacts for selected Build Alternatives and the No-Build Alternative are examined in-depth in Section 4.
- Alternative Screening Step 2** (see Section 3.5 Roadway Improvement Alternatives Screening). In this step, the roadway improvements required to connect the location alternative to the local road network were evaluated. This screening process included examining the potential impacts of alternatives to the intersection of 2nd Street and Main Street. Alternatives that would tie into Main Street or south of Main Street would require improvements along Main Street or other streets and an eventual connection to IA 9. Public input from the February 5, 2004 public information meeting was also incorporated into this screening step. Alternatives that minimized impacts were carried forward to Step 3.

- **Alternative Screening Step 3** (see Section 3.6 Bridge Type Alternatives). Alternatives carried forward from Step 2 were evaluated to determine what bridge types would be appropriate based on considerations from the first two screening steps. Span lengths of up to 700 feet and greater than 900 feet were initially considered during this step and shared with the public at the February 5, 2004 public information meeting.

The preliminary range of alternatives was developed with input from resource agencies, the project advisory committee, and the public. A discussion of key issues considered during the screening of the preliminary alternatives is provided below.

3.3.1 Functional Deficiencies

The narrow, 21-foot width and the lack of shoulders on the existing bridge (see Section 2.3 for more details) would be addressed by all of the alternatives with the exception of the No-Build Alternative and the Transportation Demand and System Management Alternative. All new location concepts assume a 44-foot wide roadway, including one 12-foot-wide lane and a 10-foot-wide shoulder for each direction of travel (see Section 3.6 for more discussion of the assumed bridge characteristics).

3.3.2 Lansing Street System and Iowa Highway 9 Connectivity

As discussed in Section 2.3.1, the existing bridge requires traffic using IA 9 and WI 82 to pass through the west bridge approach intersection and the 2nd Street/Main Street intersection, both 90-degree turns that can be difficult for large vehicles to negotiate. The preliminary alternatives screening process will consider the ability of an alternative to resolve the turning movement problems for through traffic and the connection made to the existing Lansing street network.

3.3.3 Use of Existing Structure during Rehabilitation/Reconstruction/Construction

Lansing residents have noted the importance of an uninterrupted bridge connection between Iowa and Wisconsin during any river crossing construction and/or maintenance program. The closest river crossing connections for Lansing residents would be at La Crosse (35 miles north) and Prairie Du Chien (30 miles south). As described in Section 3.2.1, reconstruction/rehabilitation activities under the No-Build Alternative could require periods of complete closure of the Black Hawk Bridge.

3.3.4 River Clearance/Navigation Requirements

The ability of alternatives to address river navigation issues were considered during the preliminary alternatives screening analysis. These issues include a number of tow impact incidents, occasionally involving the protection cell for Black Hawk Bridge pier 2, at the east edge of the navigation channel, just downstream of the nearly 90-degree turn in the navigation channel (see Section 2.3.3). In general, alternatives that are downstream of the existing bridge offer an opportunity to reduce the occurrence of such incidents. Input from the Coast Guard regarding the horizontal clearance requirements between pier 1 and pier 2 is integral to this screening topic. It is anticipated that requirements for clearance of barge traffic will resolve any concerns related to clearance for trains using the railroad that runs along Front Street. All alternatives considered in this document would provide adequate clearance for railroad traffic.

3.3.5 Impacts to Environmental/Natural Resources

Much of the habitat on Island 146 on the Wisconsin side is composed of wetlands, with the higher quality wetlands and habitat located on the southern portion of the island.

On the Iowa side of the crossing, there are steep bluffs along the west side of 2nd Street. Clear Creek, a cold water stream known to provide habitat for trout, flows through the southern portion of Lansing. A complex of wetlands associated with Clear Creek extends north of the stream, coming close to existing Main Street in the western portion of Lansing. Clear Creek runs through the middle of the 100-year floodplain in Lansing. The floodplain is generally located in the area south of the developed portions of Lansing and north of Valley Street. The Wisconsin side of the project area, including the causeway, is entirely within the Mississippi River's 100-year floodplain.

3.3.6 Impacts to Community/Historic Resources

Because of the dense development in the study area, the preliminary build alternatives will affect residential and commercial properties. In addition, given the historic nature of Lansing, it is likely that any alternative will involve impacts to site(s) already listed or potentially eligible for the National Register of Historic Places (NRHP). According to survey work conducted as part of this study (published separately from this report and summarized in Section 4), the least dense area of eligible/potentially eligible sites is north of the existing bridge, most notably the area around Henry Street (Alternatives N2 and N3). The Black Hawk Bridge is eligible for listing on the NRHP. Additionally potential historic archaeological sites have also been identified in the study area.

3.3.7 Resource Agency Input

Agency input on various technical topics was valuable to alternative development and screening. All agency coordination meetings were critical to determining alignment constraints for the preliminary alternatives.

3.3.7.1 U.S. Coast Guard (USCG)

Preliminary information was received from the USCG regarding clearance of the navigation channel and location of the bridge piers. The Iowa DOT met with the USCG on May 7, 2003, in Lansing to discuss requirements. During this meeting, the USCG indicated that pier 1 (currently located on the Iowa bank of the Mississippi River) cannot be located in the river. The USCG also confirmed that their standard 60-foot vertical clearance above normal river elevation requirement is adequate for the crossing (the current vertical clearance is 67 feet). The vertical clearance requirement begins at a point 25 feet east of pier 1. The issue of horizontal clearance (the distance between pier 1 and pier 2) was discussed by the Iowa DOT and the USCG on May 28, 2004. The agencies agreed that the minimum horizontal clearance between piers 1 and 2 would be 700 feet at the Alternative S1 river crossing location. Consequently, the assumption has been made that a 700-foot main span will apply to all of the alternatives studied in detail in Section 4 of this study. This will allow uniformity of comparison in the detailed assessment of alternatives. Future coordination with the USCG will be required in the future phases to determine the main span requirements for the remaining alternatives.

The USCG also noted that the use of a pier protection cell, or “dolphin” upstream of pier 2 is acceptable, if determined necessary during final design of a new bridge. A future consideration could include the potential need for a longer horizontal span if a new crossing is located upstream of the current bridge. The potential for impacts to the barge waiting area, a location downstream of the Black Hawk Bridge where upstream-bound barges wait for downstream barges to pass through the area, could also affect the horizontal clearance during final design.

3.3.7.2 U.S. Army Corps of Engineers (Corps)

Iowa DOT met with Corps representatives on September 4, 2002. At this meeting, the Corps emphasized the importance of the Beneficial Use Site on Island 146 (see Section 4.4.2 for specific information). While the Corps noted that the Beneficial Use Site potentially could be moved, they also noted that the new location must be accessible for the placement of dredged material by either mechanical or hydraulic means, as well as remaining accessible to the public. The costs of operating the dredged materials site increases considerably if heavy equipment operators must move sand and gravel more than 400 feet from the barge location.

At a project scoping meeting of resource agencies held in Lansing on June 17, 2003, the Corps noted that the Beneficial Use Site had just been expanded to the full extent of its permitted size (five acres). The Corps stated a preference for avoiding the direct impacts involved with an alternative like S2, which goes through the middle of the site. Additionally, the Corps noted that other alternatives (notably S1 and S3) may have impacts on the functionality of the site. For instance, the structure or a new causeway could limit site accessibility or operations.

3.3.7.3 U.S. Fish and Wildlife Service (FWS)

In a meeting with the FWS on May 15, 2003, the FWS indicated a preference for new alignment alternatives that have the most direct route back to the existing causeway (Alternatives N3 and S1). The FWS noted that any unused portion of the existing causeway would have to be obliterated and any new construction in the Refuge would require mitigation. The FWS also noted that the highest quality wetlands and habitat within the study area are located on the south side of Island 146 (south of the Beneficial Use Site and the boat landing). The FWS noted that mitigation for Refuge land impacts (this is different from mitigation requirements for wetland impacts), while required to be at a minimum 1:1 ratio, often end up higher due to market forces and the types of land parcels available. Mitigation for wetlands impacted on Refuge lands is often at a 2:1 or 3:1 ratio and could occur as part of the mitigation for Refuge land impacts if, for instance, the replacement lands were restored to wetlands.²

² In the case of this project, where almost all Refuge land is also wetlands, an example scenario of mitigation is as follows: One acre of Refuge impacted turns out to also be all wetland. Assume a 1-acre private property inholding was found adjacent to the Refuge and purchased to mitigate for the 1-acre of Refuge impacted (satisfying the 1:1 requirement for Refuge lands). Even if that one acre of newly purchased land were restored to wetlands, there would still be a need to restore at least one more acre of land to wetlands in order to satisfy the 2:1 minimum wetland mitigation requirement. This would likely result in the need to purchase another acre of land for wetland restoration. In many cases, there isn't an available private property inholding that exactly meets the project's ultimate mitigation needs. Rather, the case may be that a 10-acre parcel is the most appropriate and available mitigation opportunity at the time, even if only 1 acre of Refuge was impacted.

The FWS also noted that the causeway has a hydrologic effect on the surrounding water resources, acting as a dam, with consequent downstream and upstream impacts. Any future designs for a new causeway should incorporate a hydrologic study to better understand the effects of the causeway. In terms of the habitat impacts of this proposed project, the FWS stated that more emphasis would likely be placed on in-water construction effects on resources than on upland habitat effects.

3.3.7.4 Iowa and Wisconsin Departments of Natural Resources (DNR)

Meetings with the Iowa and Wisconsin Departments of Natural Resources, including a May 19, 2003 conference call, covered issues related to threatened and endangered species. Representatives from both the Iowa and Wisconsin DNRs generally concurred with the FWS that they preferred alternatives that have the most direct route back to the existing causeway (Alternatives N3 and S1). Concerns were also discussed about impacts to potential fish spawning areas on the Lansing side of the Mississippi River, and the potential for rare or endangered mussel species to exist in the area.

The DNRs concurred with the FWS regarding the need for a hydrologic modeling exercise to determine the upstream and downstream effects of the causeway. Iowa DNR noted that the Big Lake area immediately north of Lansing was a prime fishery. Iowa DNR owns a boat landing approximately two miles south of the study area at Village Creek that is the primary boat landing available on the Iowa side of the river.

At the scoping meeting held on June 17, 2003, the DNRs stated that one valuable aspect of the hydrologic model would be to assist in determining a “footprint” of area that should be covered for biological surveys (e.g. for evaluation of potential impacts to endangered mussels). An often overlooked aspect of the footprint of impact is how the bridge will be constructed.

3.4 Initial Screening of Preliminary Location Alternatives

The initial screening was done for all of the alternatives described in Section 3.2. The alternatives were screened based on how well each alternative met the project’s purpose and need (see Section 2.1), and the goals as set forth in the Vision Statement (see Section 1). Input from the public and resource agencies also played a large role in the preliminary screening. A summary of the anticipated impacts of the Preliminary Location Alternatives is provided in Table 3-1, and is also summarized below.

3.4.1 No-Build Alternative

The Black Hawk Bridge was built in 1931 and has a long history of rehabilitation and repairs (see Appendix A). The existing geometric (functional) deficiencies would remain with the No-Build Alternative. The operational efficiency and safety of the existing bridge would not be improved. Maintaining pier 2 in its current location would also represent no change from the current situation, where river navigation is complicated by the pier and its protective “dolphin.” Under this alternative, the Iowa DOT anticipates the need to replace the bridge deck within the next 20 years.

TABLE 3-1
Preliminary Alternatives Impact Summary

Location Issues	Unit Measures	Alternatives ^a												
		No-Build	Replace Existing	N1	N2	N3	S1	S2	S3	S4	S5	S6	S7	S8
Bridge Location	Street Name	Same	Same	Gray St.	Henry St.	Next to Bridge	Ballou St.	Hale St.	Hale St.	William St.	Main St.	John St.	Dodge St.	Valley St.
Alternative Length (assumed to end at 2nd St.)	Miles	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.7	0.8	0.9
Impact to Refuge	Low, Medium, or High	Low	Low	Med.	Med.	Med.	Med.	Med.	Med.	Med.	Med.	High	High	High
Total Displacements^b	Number	0-5	0-5	0-5	0-5	0-5	0-5	6-10	6-10	6-10	6-10	6-10	0-5	11+
Historical Impacts	Yes/No	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Impact to Beneficial Use Site	Yes/No	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
Impact to Boat Landing	Yes/No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Length of Abandoned Causeway	Miles	0	0	0.1	0.1	0	0	0.2	0.1	0.1	0.1	0.1	0.3	0.3
Geometry/Design Considerations	Poor, Fair, or Good	Poor	Good	Good	Good	Good	Good	Fair	Fair	Fair	Fair	Fair	Poor	Poor
Comments	See Note #	c	d	f	e, f	e, f	e, f	e, f	e, f	e, f	e, f	e, f	e, f, g	e, f, g

^a Impacts for alternatives calculated based on a 44-foot wide bridge/roadway; 3:1 sideslopes along the embankment connecting to the causeway; and do not consider potential impacts along 2nd Street or at the intersection of 2nd and Main Streets.

^b Total displacements include structures listed or potentially eligible for the NRHP.

^cThe No-Build Alternative provides for continued regular maintenance of the Black Hawk Bridge and rehabilitation of the Black Hawk Bridge. The primary improvement would be rehabilitation of the bridge deck/roadway surface. Widening the bridge or major structural repairs are not feasible, due to the bridge structure type. This option would also involve closure of the Black Hawk Bridge river crossing during rehabilitation. However, the closure period would be less than in the bridge replacement alternative (Note 5).

^d Bridge replacement would involve removal of the existing bridge and construction of a new bridge at the current location. This option helps to limit the impacts listed above, but it involves closure of the river crossing at Lansing for approximately two years.

^e Causeway Impacts will occur in cases where a new connection to the causeway is created. The portion of the existing causeway (WI 82) that would be "bypassed" would need to be removed.

^fA "Yes" to Big Slough Boat Landing impacts indicates that the existing layout would be directly impacted, most notably the existing road entry from WI 82. While a "No" indicates no direct impacts, the configuration of the landing would need to change (a new roadway access would be required) due to the need to abandon causeway as described in Note 6. Similarly, access to the Dredged Materials site would be modified.

^gA new bridge crossing of the Big Slough is required under this alternative.

Recommendation: The No-Build Alternative fails to address the deficiencies associated with the existing bridge. However, this alternative will be retained for additional analysis and be used as a baseline for comparing the build alternatives. This alternative received some community support at the April 2003 Public Information meeting, primarily because it would maintain the existing character and image of the community.

3.4.2 Transportation Demand and System Management Alternative

Given the low population density in the Lansing area, the majority of those living in the area drive alone in personal vehicles when traveling. As discussed in Section 2.4 and Appendix B, traffic volumes on the existing bridge and connecting roadways are not expected to reach capacity in the next 25 years.

Recommendation: The TDM and TSM Alternative will not be carried forward for additional analysis. These measures, which tend to be utilized in urban areas with high rates of transit usage or high traffic transportation corridors (e.g. greater than 10,000 vehicles per day), are not particularly feasible in the Black Hawk Bridge project area. Additionally, the measures involved would not address key components of this study's purpose and need, such as the functional deficiencies of the Black Hawk Bridge or the river navigation issues relating to the location of the bridge piers.

3.4.3 New Bridge Construction on Existing Location

From an environmental standpoint, this alternative would minimally impact both the Iowa and Wisconsin sides. Nonetheless, there would be no connection between Lansing and the east side of the river except for the bridges at La Crosse and Prairie Du Chien during construction of the new bridge. This would mean possibly two years without a direct connection between Iowa and Wisconsin at Lansing. Additionally, impacts to the Refuge and Lansing side would still occur as a result of constructing a wider bridge. This, combined with the substantial crossing closure period, does not offer any compelling benefits over Alternatives N3 or S1 – the upstream and downstream adjacent alternatives. This alternative received some level of support at the first public information meeting primarily because it would maintain bridge location continuity.

Recommendation: This alternative is being eliminated from further consideration because an important community/regional connection would be lost for an extended period during the construction of a new bridge. While impacts to the surrounding environment would be minimized, the widening of the bridge would still create impacts to both sides of the river. This lack of impact avoidance provides further evidence that the considerable closure period is not warranted.

3.4.4 Alternative N1 Gray Street and N2 Henry Street—North of Existing Bridge

These alternatives would be positioned closer to the bend in the navigation channel than the existing bridge. To accommodate navigational traffic, the main spans of both of these alternatives would need to be substantially longer than on the existing bridge. The span of N1 Gray Street would also be skewed, increasing the length of the main span even more. In general, the USCG opposes alternatives that move further upstream into the bend of the Mississippi River navigation channel. In order to obtain approval of such a location, the proposed bridge crossing main span would need to eliminate potential complications

resulting from locating a pier in the channel. This would likely result in a requirement to span the width of the river channel at the N1 and N2 locations. Additionally, these alternatives retain the problem of the two 90-degree turning movements located on 2nd Street.

Recommendation: Alternatives N1 and N2 are being eliminated from further consideration primarily because of USCG opposition and the likelihood of these alternatives complicating barge navigation if a main span length comparable to the existing bridge would be used. Otherwise a span distance of at least 1,000 feet would likely be necessary in either case. Moreover, these alternatives offer no discernable advantages over Alternative N3.

3.4.5 Alternative N3—Adjacent to Bridge to the North

Alternative N3, by crossing the Mississippi approximately 50 feet upstream of the existing bridge, minimizes the amount of causeway that would need to be abandoned as well as the amount of impact to undisturbed habitat on Island 146, an important issue to the resource agencies. A new causeway approach, on the north side, would also limit the amount of improvement required to maintain the roadway access currently available to the Beneficial Use Site and Big Slough boat landing. The public has also noted that bridge locations that are closer to the existing bridge help to minimize the change in community character that could result from a new bridge. This alternative also avoids direct impacts to historic properties, but retains the problem of the two 90-degree turning movements located on 2nd Street.

Recommendation: Alternative N3 will be retained for further consideration given its ability to minimize impacts.

3.4.6 Alternative S1—Adjacent to Bridge to the South

Alternative S1 focuses impacts along the existing bridge corridor, and offers a direct route back to the existing causeway. This results in minimal impacts to undisturbed habitat in the Refuge by using land currently occupied by the Beneficial Use Site and Big Slough boat landing. As with Alternative N3, the resource agencies have expressed support for this alternative due to its impact minimization. Unlike N3, impacts to the Beneficial Use Site may require mitigation measures to restore the size of this community asset. Such measures could result in indirect impacts to the Refuge. One residential property that is eligible for the NRHP would likely be impacted with this alternative. This alternative retains the problem of the two 90-degree turning movements located on 2nd Street. This alternative, and all other alternatives downstream of the existing bridge, may require modifications to or reconstruction of the Big Slough Bridge if that crossing of the Big Slough is to remain in its current location (i.e. this alternative, as currently proposed, returns to the causeway west of Big Slough, on Island 146).

Recommendation: As the downstream version of Alternative N3, this alternative will be retained for further consideration.

3.4.7 Alternative S2—Hale Street skewed

Due to the skewed crossing of the Mississippi River, Alternative S2 requires a longer main span than its nearest perpendicular crossing options (Alternatives S1 or S3), to achieve the

horizontal navigation clearance requirements as set forth by the USCG. Longer spans are more costly to build and the resultant structural requirements may also cause greater environmental impacts. Alternative S2 would bisect the Beneficial Use Site, creating difficulties in mitigating for impacts to the site and a greater likelihood of indirect impacts related to site restoration. This alternative retains the problem of the two 90-degree turning movements located on 2nd Street.

Recommendation: Eliminate from further consideration primarily because of the longer main span required by the skew and impacts to the Beneficial Use Site. Moreover, this alternative does not offer any compelling benefits over Alternatives S1 or S3.

3.4.8 Alternative S3—Hale Street perpendicular

Alternative S3 may have navigational benefits over the Build Alternatives to the north because it is located further away from the bend in the navigation channel. S3 also offers the opportunity to minimize impacts to the Beneficial Use Site and Big Slough boat landing, by keeping the impacts to the periphery of these resources. Additionally, by utilizing portions of these resources, impacts to undisturbed habitat in the Refuge would be limited. One concern noted by the Iowa DNR with this alternative is that impacts to the bluffs on the west side of 2nd Street may occur. This alternative retains the problem of the two 90-degree turning movements located on 2nd Street.

Recommendation: This alternative will be retained for further consideration because it is the first south alternative that potentially addresses navigation issues posed by the existing bridge, with minimal impacts (compared to the other downstream options).

3.4.9 Alternative S4—William Street

Similar to Alternative S3, this alternative would provide river navigational benefits over alternatives to the north. But Alternative S4 would have greater impacts to the Refuge than S3, including impacts to some of the higher quality habitat found on Island 146, as described by the resource agencies at their June 2003 meeting in Lansing. Additionally, this alternative would potentially impact an area with a higher concentration of historic structures that are potentially eligible for the NRHP as compared to other upstream alternatives.

This alternative retains the problem of the two 90-degree turning movements located on 2nd Street. While the turning movement problem also exists for all alternatives north of this option, the impacts associated with Alternative S4 are likely to be greater than any other alternative to the north, because of the area topography, Alternative S4 would require a steep approach grade (10 percent or greater) to avoid raising the roadway or cutting into the bluff.

Recommendation: Eliminate from further consideration because it has similar navigational benefits to S3, but would result in greater impacts to the Refuge and Lansing residents without correcting the turning movement intersection issues.

3.4.10 Alternative S5—Main Street

Alternative S5 is the first alternative that eliminates turning movements from the IA 9 corridor in Lansing. The benefits of eliminating these turning movements, avoiding the potential for new impacts to the bluffs along 2nd Street, and further removing the bridge

from the difficult navigational turn in the river are notable and could potentially justify the additional impact to the Refuge on the Wisconsin side.

Many Lansing residents have assumed that the S5 location is the “logical” crossing location. However, this alternative could result in substantial impacts to the businesses located between Front Street and 2nd Street. Depending on the touch down point, businesses between 2nd and 3rd Streets could be impacted as well. A Main Street bridge location would represent a dramatic change in the character of Lansing, especially given the historic nature of the city.

Recommendation: Retain for further consideration primarily because this alternative has been discussed by local residents for some time and it would be prudent to conduct more work to better understand its roadway impacts.

3.4.11 Alternative S6—John Street

Alternative S6 has the ability to tie into the existing Lansing street network with fewer impacts to the Lansing downtown business district than S5. S6 also offers the opportunity to reduce or eliminate the existing sharp turning movements for through traffic by relocating IA 9 to John and Center Streets and tying back into existing IA 9 on the west side of Lansing. Turns would still be required, however, to access Main Street businesses.

S6 poses the greatest potential for impacting sites currently listed on or eligible for the NRHP in Lansing. This alternative would also have greater impacts to the Refuge (including the higher-quality habitat found on Island 146), but the S6 location further downstream of the river bend provides additional river navigation benefits.

Recommendation: Retain for further consideration primarily because this alternative, like S5, has the potential to address the intersection issues at Main and 2nd Street and at the west bridge approach with fewer business displacements than S5.

Based on a review of engineering and environmental constraints, Alternative S6 has been refined to clarify its route. After this screening step, Alternative S6 will be described as including the “West Connection” to IA 9 on the west side of Lansing. Additionally, a new Big Slough crossing on the Wisconsin side is incorporated into the design, thereby placing the connection to WI 82 east of Big Slough.

3.4.12 Alternatives S7 (Dodge Street) and S8 (Valley Drive)

These alternatives would deviate from WI 82 east of the Big Slough Bridge, cross the Big Slough at a new location and then cross the Mississippi River at a severe skew. Due to the skewed angle of the river crossing, both of these alternatives require main span distances longer than any of the other Build Alternatives. These Longer spans would be more costly to build and outweigh the navigational benefits of getting away from the upstream river navigational challenge. Additionally, these alternatives would result in greater impacts to the Refuge. No clear route back to the IA 9 corridor exists for Alternatives S7 or S8. Neither the resource agencies nor the community of Lansing has expressed support for these alternatives.

Recommendation: Due to a lack of community support and no clear benefits over other available alternatives, eliminate both alternatives from additional analysis.

3.4.13 Preliminary Location Alternative Screening Results

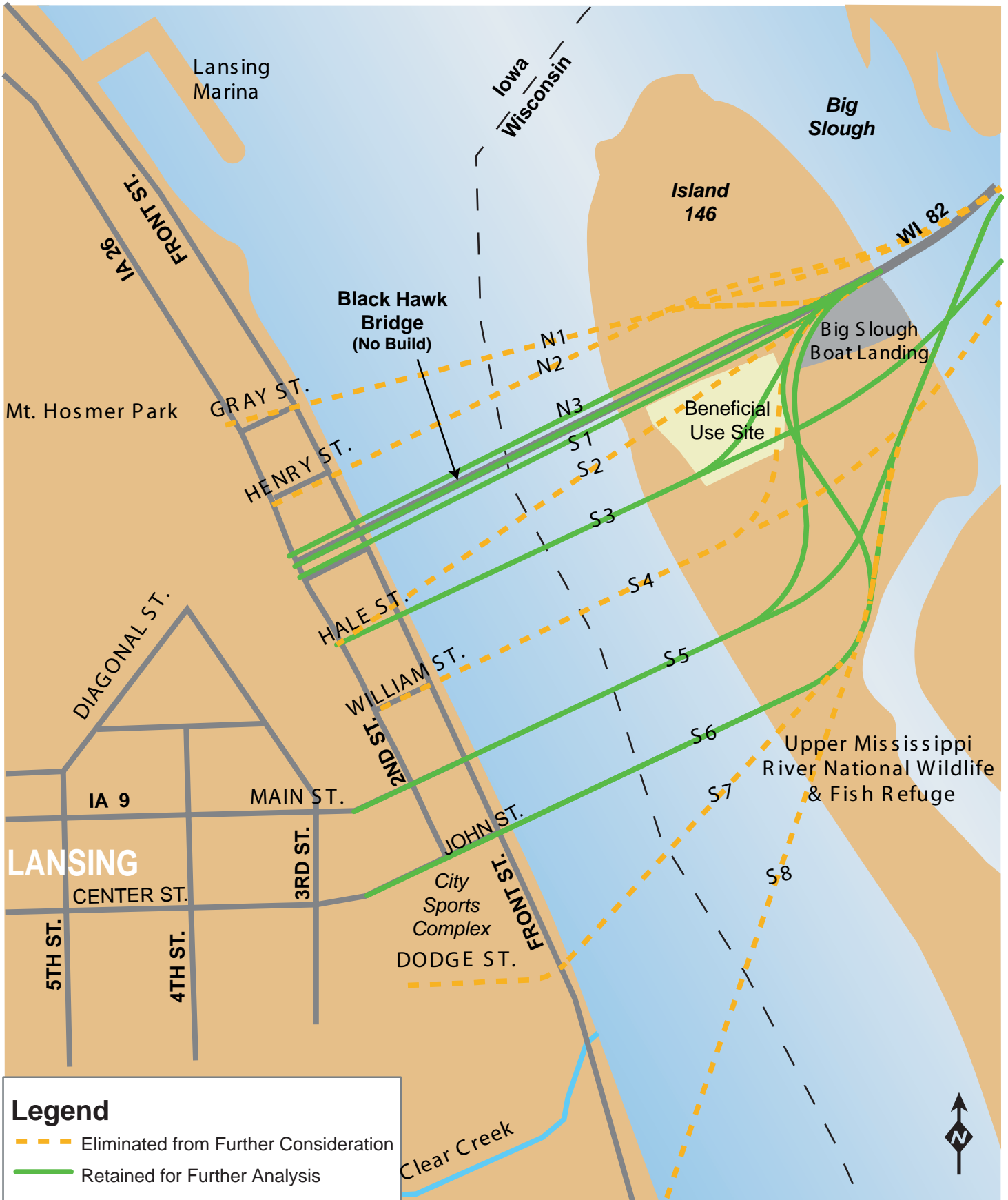
Each alternative described above includes a recommendation either for or against further analysis. The process included public and agency reviews (described in more detail in Section 5). A summary of the preliminary location initial impacts review is provided in Table 3-1, with screening results shown in Table 3-2 and Exhibit 3-2.

TABLE 3-2
Preliminary Alternatives Screening Recommendations

Preliminary Alternative	Description	Retain for Analysis	Eliminate from Further Study
N1 (Gray St.)	Diverges from WI 82 east of the Big Slough Bridge; Touches down on Gray St.		X
N2 (Henry St.)	Diverges from WI 82 over the eastern portion of Island 146; Touches down on Henry St..		X
N3 (Adjacent to bridge)	Directly north and adjacent to the existing bridge; Diverges from WI 82 on Island 146; Touches down close to Ballou St.	X	
Reconstruct on Existing Location	Remove the existing bridge and constructs a new 2-lane bridge in the same location.		X
S1 (Adjacent to bridge – Ballou St.)	Similar to N3, however, parallels the existing bridge to the south; Touchdown point is near Ballou St.	X	
S2 (Hale St. – skewed)	Diverges from WI 82 over Island 146 and angles over the river at a skew; Touches down at Hale St.; Results in a longer main span in order to achieve navigation clearances required by the USCG.		X
S3 (Hale St.)	Crosses the river perpendicularly after coming across Island 146 generally on the south edge of the Beneficial Use Site; touches down at Hale St.	X	
S4 (William St.)	Similar to S3, but touches down on the Lansing Side at William Street; a perpendicular crossing minimizes the main span distance		X
S5 (Main St.)	Perpendicular crossing of the river that touches down at Main Street	X	
S6 (John St.)	Similar to S5, but touches down in Lansing at John St., one block south of Main Street, uses a new Big Slough Bridge in the Refuge	X	
S7 (Dodge St.)	S7 Alternative diverges from WI 82 on a new Big Slough Bridge, crosses Mississippi at a skew; touches down at an angle to Dodge St. Alternative.		X
S8 (Valley Dr.)	S8 touches down at an angle to Valley Drive.		X
No-Build	Major rehabilitation of the bridge deck would occur under this alternative, requiring closure of the river crossing for several months; No other major bridge or roadway construction, beyond routine maintenance (e.g. repainting), would occur.	X	

3.5 Roadway Improvement Alternatives Screening

The second phase of the alternatives screening process focuses on the five remaining new location alternatives – N3, S1, S3, S5, and S6, and the No-Build alternative. Input from the public and resource agencies regarding impacts associated with these alternatives was considered during this portion of the screening process.

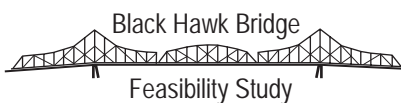


Legend

- - - Eliminated from Further Consideration
- Retained for Further Analysis

EXHIBIT 3-2

Preliminary Location Alternative Screening Results



The Iowa DOT also considered how the five remaining build alternatives would connect to the street network in Lansing. Preliminary roadway designs were developed for the bridge approaches and adjoining street network based on guidance from the Iowa DOT.

3.5.1 Bridge Approaches and Connections to the Existing Road Network

The “bridge approach” is the physical connection between a bridge structure and the local road network. Iowa DOT's design criteria for this project specifies a maximum approach grade of 8 percent. The approaches for the existing bridge are 7.18 percent. Achieving a grade of less than 8 percent can be difficult on the Iowa side because the west bank of the Mississippi River is relatively close to 2nd Street and steep bluffs run alongside 2nd Street, constraining the ability to create a lower grade by extending the approach westward. Achieving a grade of less than 8 percent is less difficult with Alternatives S5 and S6 because there are no bluffs to constrain the bridge approach.

Given the topography in the area – with 2nd Street rising in elevation as it runs north from Main Street – the alternatives located north of the existing bridge are more conducive to achieving an approach grade of less than 8 percent on the Iowa side of the river. Assuming no changes to 2nd Street, it is possible to achieve grades of less than 6 percent at locations adjacent to and north of the Black Hawk Bridge. As 2nd Street drops in elevation from the existing bridge location to the S3 location, an approach grade at S3 would be greater than 10 percent if no changes were made to 2nd Street (i.e. build up 2nd Street to a higher elevation or shift the road location further west toward or into the bluffs).

There are five deck truss approach spans on the east end of the Black Hawk Bridge that carry the roadway over the east bank of the river and touch down to grade a few hundred feet beyond the east river bank. East of this touch down point, the approach is supported on an earthen embankment through a backwater area of the Mississippi River (slough) and the Refuge. The Big Slough Bridge is located approximately 1,000 feet east of the existing bridge. Given this distance, it is not anticipated that any of the alternatives would have problems meeting the 8 percent grade requirement on the eastern approaches.

Input from the USCG regarding their preferences on vertical clearances above the river are key to determining bridge approach requirements. As described in Section 3.3.1.7, the USCG has allowed the 60-foot vertical clearance requirement to take effect a distance of 25-feet east of pier 1 (the pier located on the Iowa bank of the river). This helps lessen the approach grade impacts of reconnecting to the existing roadway.

Though not an element of the alternatives screening to this point, some additional assumptions relative to a new bridge across the Mississippi River were made to facilitate the discussion of roadway options. The assumptions include:

- A 6.5-foot structure depth for the development of bridge approaches and river clearance requirements.
- For alternatives north of Main Street, a “flared” approach coming off of the bridge to 2nd Street, is possible regardless of the bridge type considered (i.e. roadway widening to accommodate the turning movements of larger vehicles will not be constrained by the structure of the bridge).

A discussion of bridge approach issues for each of the alternatives is provided below.

3.5.1.1 Alternative N3 (Upstream Adjacent)

Bridge Approaches. The roadway profile required for Alternative N3 would tie into existing 2nd Street with less than an 8 percent approach grade. The “T” intersection at the existing bridge approach was reconstructed in 1992 to facilitate turning movements for large trucks (see Section 2.3.1). The approach for Alternative N3 could use this intersection (minimizing the amount of new right-of-way required) so that the new approach would not cut into the bluffs west of 2nd Street or raise the elevation of 2nd Street.

Alternative N3 appears to be the only alternative that could tie into the causeway and transition into the existing alignment of the Big Slough Bridge. The west side of the Big Slough Bridge curves slightly to the north, and Alternative N3 is the only alternative that has an approach alignment that curves to the north at that crossing. Because all other alternatives come into the causeway from the south, they would have a series of reverse curves tying the proposed alignments into the existing causeway. For all alternatives except N3, it is likely that the Big Slough Bridge would need to be reconstructed. Alternative N3 should not alter the existing access to the Beneficial Use Site or boat landing.

Connection to Existing Lansing Road Network. Because this alternative ties into 2nd Street north of Main Street, Alternative N3 does not address the turning movement problem at the intersection of 2nd Street and Main Street. Section 3.5.3 describes the options that were discussed with the public for improving that intersection.

As described above, in the assumptions for review of roadway approaches, the flared approach to 2nd Street from the bridge would further improve the turning movements for large vehicles. However, a roughly 90-degree turn would still be required for all traffic crossing the Mississippi River.

Screening-Level Review of Potential Impacts. Resource agencies have indicated that a direct route back to the existing causeway is preferred in order to reduce impacts to the Beneficial Use Site and boat landing areas. Because N3 is north of the existing bridge, no impacts to the Beneficial Use Site would occur. This alternative provides a direct routing to the existing causeway, and would result in fewer impacts to the Refuge as compared to the other alternatives. This alternative also offers the highest potential for tying into the slight curvature in the existing Big Slough Bridge, making it the only alternative that provides an opportunity to utilize the existing Big Slough Bridge.

Three residential properties would be directly impacted by this alternative. None of these properties are eligible for listing on the NRHP at this time. No potential archaeological sites were identified relative to this alternative location.

Disadvantages of this alternative include the possible necessity of a longer main span as compared to the other alternatives, given it is closer to the bend in the navigation channel than the existing bridge. This alternative may also require replacement of the dolphin. However, this depends on the pier location and pier separation requirements. Lansing community members expressed support for N3 primarily for maintaining a sense of bridge location continuity for the local community.

Roadway Screening Recommendation. Upon review of the roadway requirements and associated impacts of Alternative N3, the recommendation is to **retain** this alternative for further consideration.

3.5.1.2 Alternative S1 (Downstream Adjacent)

Bridge Approaches. Similar to Alternative N3, this alternative can tie into existing 2nd Street with approach grades less than the 8 percent maximum and utilize the 2nd Street improvement from 1992 to avoid bluff impacts or additional impacts to 2nd Street.

On the Wisconsin side of the Black Hawk Bridge, Alternative S1 is able to quickly tie into WI 82 and minimize the amount of causeway that would need to be abandoned. While this is similar to Alternative N3, this option has a direct impact on the Beneficial Use Site and would, at a minimum, alter access to the boat landing. Additionally, connecting the Alternative S1 roadway to the existing Big Slough Bridge would require the use of reverse curves, which are not desirable from a design or driver standpoint. This leads to a greater likelihood that the Big Slough Bridge would need to be reconstructed.

Connection to Existing Lansing Road Network. Alternative S1 has the same connection issues as Alternative N3. Alternative S1 does not address the turning movement problem at the intersection of 2nd Street and Main Street. Section 3.5.3 below describes the options that were discussed with the public for improving that intersection.

As described above, in the assumptions for review of roadway approaches, the flared approach to 2nd Street from the bridge would further improve the turning movements for large vehicles. However, a roughly 90-degree turn would still be required for all traffic crossing the Mississippi River on the Black Hawk Bridge.

Screening-Level Review of Potential Impacts. Two residential properties would be directly impacted by this alternative. One of these properties is eligible for listing on the NRHP. No potential archaeological sites have been identified relative to this alternative.

Similar to Alternative N3, S1 focuses impacts, along the Wisconsin side to the already disturbed corridor of the existing bridge and also offers a direct route back to the existing causeway resulting in minor impacts to the Refuge, the Beneficial Use Site, and the boat landing. While N3 would directly impact lands that are currently undisturbed habitat, Alternative S1 would run through the existing Beneficial Use Site – impacting approximately 1.5 acres of the Site. The impacts to the Site would require mitigation to the Corps to replace this lost acreage. However, there are no direct impacts to habitat on Island 146. Also, like N3, the community has expressed support for this alternative.

Roadway Screening Recommendation. Upon review of the roadway requirements and associated impacts of Alternative N3, the recommendation is to **retain** this alternative for further consideration.

3.5.1.3 Alternative S3 (Hale Street)

Bridge Approaches. At Hale Street, the proposed location of Alternative S3, the elevation of 2nd Street is low enough that the bridge approach could not meet the maximum 8 percent grade requirement set by Iowa DOT. To reduce the approach grade, Alternative S3 would require relocating 2nd Street to the west (directly impacting existing houses, businesses, and the bluff)

or raising existing 2nd Street approximately 2 feet at the bridge approach (thus avoiding bluff impacts, but indirectly impacting existing homes and businesses along 2nd Street).

On the Wisconsin side, the bridge and approach from the causeway would directly impact the south edge of the Beneficial Use Site. By utilizing this site, it would be possible to limit direct wetland impacts on Island 146 and tie into the causeway west of the Big Slough Bridge. As with the S1 Alternative, however, reconstruction of the Big Slough Bridge may be necessary regardless of the tie-in location. Access to the boat landing would also be impacted, with potential alterations to the landing configuration required to accommodate a new access location.

Connection to Existing Lansing Road Network. In addition to the street relocation issues related to touching down at 2nd Street, as described above, Alternative S3 would have the same Lansing roadway connection and turning movement issues found in the N3 and S1 Alternatives. The location of this alternative would also cause the closure of Hale Street between 2nd Street and Front Street.

Screening-Level Review of Potential Impacts. At least four properties would be directly impacted by this alternative, if the “raise 2nd Street 2 feet” option were selected. This would also introduce new retaining walls along 2nd Street that would indirectly impact several other residences. To avoid raising the grade of 2nd Street, a westward shift of the roadway would be required, creating more direct impacts to commercial and residential properties on the west side of 2nd Street. Additionally, shifting 2nd Street approximately 50 feet would likely create new impacts to the bluffs, a resource of concern for the Iowa Department of Natural Resources.

While the slight downstream shift of this alternative would provide some relief for barge turning movements, USCG requirements for the main span length remain unchanged from the S1 Alternative. While no reduction of the main span distance would be realized, Alternative S3 would result in more impacts to the Refuge than N3 or S1.

Alternative S3 does not solve the “T” intersection problem with the bridge and 2nd Street. Also, S3 potentially requires corrective measures such as raising the roadway or cutting into the bluff on the Iowa side to achieve an 8 percent grade coming down to 2nd Street.

Regardless of the intersection design at 2nd Street, one property that is eligible for listing on the NRHP would be impacted, in addition to one site that has been identified as a potential archaeological resource. These cultural resource impacts are similar to most of the alternatives reviewed in this study.

Several residents of Lansing in attendance at the February 5, 2004 public information meeting (see Section 5 for more information) responded negatively to this alternative. Among the chief concerns were the residential impacts for an alternative that has limited advantages or benefits as compared to the other remaining alternatives.

Roadway Screening Recommendation. Upon review of the roadway requirements and associated impacts of Alternative S3, the recommendation is to **eliminate** this alternative from further consideration.

3.5.1.4 Alternative S5 (Main Street)

Bridge Approaches. From Alternative S3 to Main Street (the location of Alternative S5), the elevation of 2nd Street continues to drop, further compounding the problems that were encountered at Alternative S3. To obtain an approach grade of 8 percent and still connect at 2nd Street, the roadway at that location would need to be built-up an additional 6 feet. Alternatively, the roadway could be extended further west and tie into Main Street 230 feet west of the 2nd Street intersection, requiring closure of the intersection of Main Street and 2nd Street. Either option would require the use of retaining walls along Main Street resulting in a substantial change in the character of the downtown Lansing business district. Exhibit 3-3 demonstrates the anticipated impacts of Alternative S5 to some of the businesses located along Main Street.

While it is possible to return to the causeway on Island 146 (west of the Big Slough Bridge), an equally viable option would be to take a more direct route to the causeway that includes construction of a new Big Slough crossing. However, unlike Alternative S3, which is potentially able to minimize immediate impacts to the Refuge by utilizing some of the Beneficial Use Site, Alternative S5, under either tie-in alternative, would impact currently undisturbed wetland habitat on Island 146. Either option results in impacts to how the Beneficial Use Site and boat landing are accessed, likely requiring additional impacts to the Refuge to accommodate those resources.

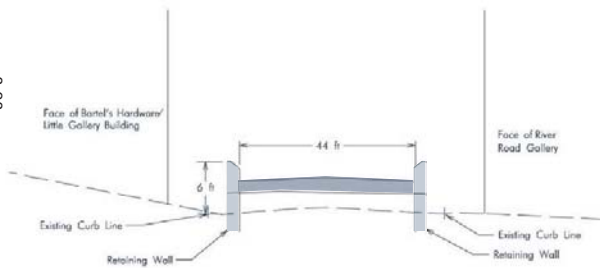
Connection to Existing Lansing Road Network. For drivers crossing the Mississippi River at Lansing, Alternative S5 eliminates the turning movement problems associated with the other alternatives by allowing traffic on Main Street in Lansing to continue east across the river without need for a turn. This is a substantial improvement over the existing situation and the primary reason this alternative made it through the first screening process. If 2nd Street is not built up 6 feet to accommodate this alternative, retaining walls associated with the bridge approach would permanently close the intersection of 2nd and Main Street. This closure would create route problems for travelers wishing to travel from eastbound IA 9 to northbound IA 26 or southbound IA 26 to westbound IA 9. A re-route would consist of several turns through residential and recreational portions of the city (likely to use 3rd Street, John Street, Front Street, and one of the roads between Front Street and 2nd Street – See Exhibit 3-2) that would be difficult to navigate, especially for large vehicles.

Screening-Level Review of Potential Impacts. As stated and shown in Exhibit 3-3, Alternative S5 would dramatically alter the character of downtown Lansing. While it might be feasible to limit the direct building impacts related to a new bridge at this location through the use of retaining walls, several buildings along Main Street would have retaining walls approximately 15 feet from the store fronts, effectively eliminating on-street parking at those locations and blocking any ground-level view of, or from, the building. More impacts would occur if the bridge approach were to include raising 2nd Street 6 feet in order to keep that intersection open (e.g. extensive retaining walls would also become necessary on 2nd Street north and south of Main Street).

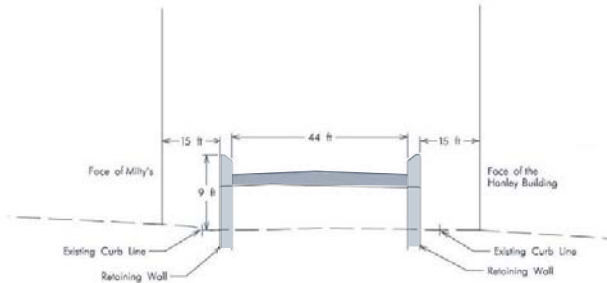
As previously described, this alternative would impact areas of Island 146 that are currently undisturbed. Resource agencies have identified this southern portion of Island 146 as having the highest-quality habitat found on the island.



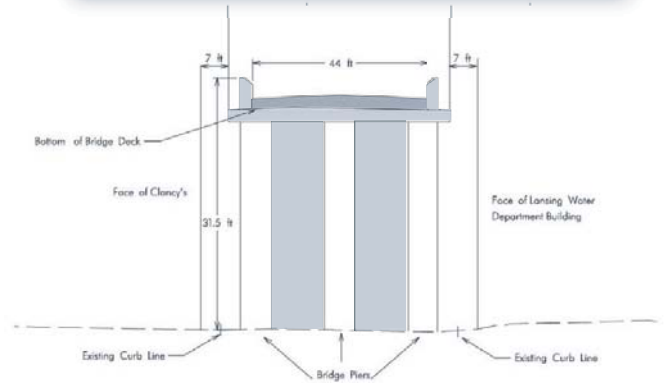
3-23



West of 2nd Street



Near 2nd Street



Just West of River

Several buildings along Main Street are eligible for listing on the NRHP and contribute to the historic character of Lansing. The introduction of a bridge approach on Main Street would alter the historic setting and context that have made Lansing a unique setting and popular tourist attraction.

The key benefit of this option is that turning movements for through traffic across the Mississippi River would be eliminated. Additionally, this alternative location would provide greater relief from the turn in the river that poses such difficulties for river navigation.

Residents of Lansing in attendance at the February 5, 2004 public information meeting expressed a strong desire to eliminate Alternative S5 from further consideration (see Section 5 for a summary of this meeting). People were concerned about maintaining the viability of the Lansing business district, as well as the historic character of the city, which is viewed as vital to the economic well being of Lansing.

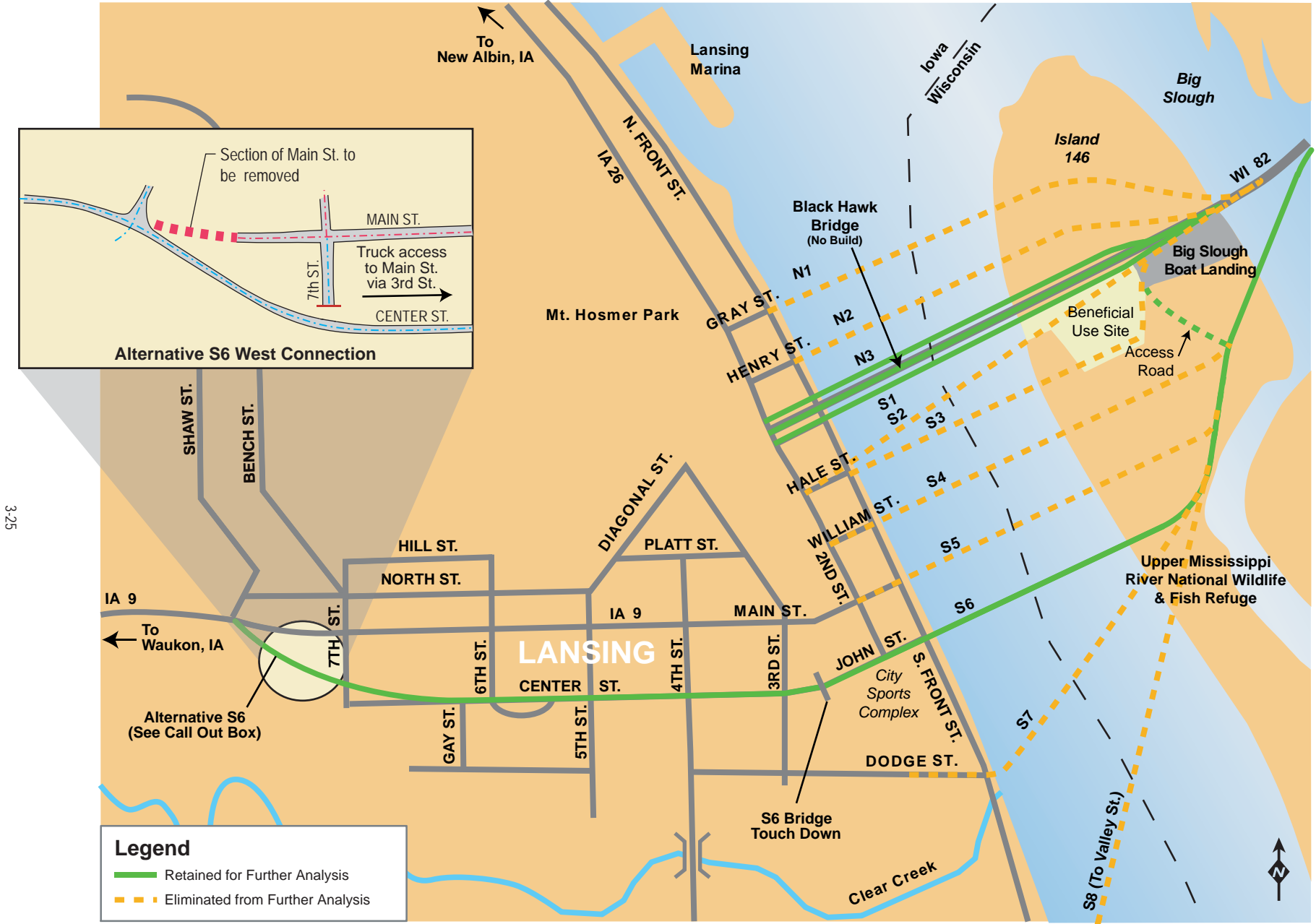
Roadway Screening Recommendation. Upon review of the roadway requirements and associated impacts of Alternative S5, the recommendation is to **eliminate** this alternative from further consideration.

3.5.1.5 Alternative S6 (John Street)

Bridge Approaches. Unlike alternatives N3, S1, and S3, it is possible to extend the west end of the bridge beyond 2nd Street for the S6 alignment alternative. To obtain the maximum 8 percent grade at alternative S6, the Iowa approach would have to connect with John Street approximately 530 feet west of 2nd Street (approximately at the 3rd Street intersection, as shown on Exhibit 3-4). The length of this proposed tie-in is due to the existing topography of John Street. A depression is located approximately mid-block between 2nd and 3rd Streets. Retaining walls of up to 20 feet tall would be required in this area to accommodate this construction.

To maintain a 2nd Street connection to John Street, the roadway at that intersection would need to be raised approximately 14 feet, with substantial impacts to businesses and residences in the area. Therefore, the proposed bridge approach for this alternative would not incorporate a direct connection to 2nd Street. Rather, the bridge approach would create a dead end of 2nd Street at John Street.

On the Wisconsin side, this alternative is similar to Alternative S5, only with greater impacts to the Refuge due to its location further downstream, away from the causeway. In the case of this alternative, the option to route the corridor back to the causeway on Island 146 is not considered viable based on the combination of engineering constraints (horizontal curves and the likely need to rebuild the Big Slough Bridge) and impacts to Island 146. Instead, a new Big Slough Bridge crossing would be utilized so that the new corridor would connect to the existing corridor east of Big Slough.



3-25

EXHIBIT 3-4
Results of the Alternatives Screening Process

Connection to Existing Lansing Road Network. This alternative's use of John Street as a connection provides another option for resolving the turning movement problems currently encountered by through traffic at 2nd Street. John Street runs one-block south of, and parallel to Main Street. West of 2nd Street, John Street becomes Center Street. For purposes of this report, "John Street" and "Center Street" are synonymous. A new connection to IA 9 on the west side of Lansing would be required to provide a continuous route through Lansing and across the Mississippi River. This connection is known as the "West Connection" and is described in more complete detail in Section 3.5.4.

In short, the West Connection consists of a westerly extension of Center Street that reconnects to IA 9, allowing traffic to stay on IA 9 without the need to make two 90-degree turns. While through-traffic would no longer need to make the 90-degree turns, any traffic from IA 9 destined for Main Street would need to make two turning movements: one off of IA 9 (Center Street) and then another on to Main Street. Modifications to 3rd Street would need to be made to accommodate these turning movements, particularly for large vehicles.

Due to the long bridge approach distance on the Iowa side, 2nd Street would need to be closed at its current intersection with John Street. Any traffic traveling southbound on IA 26 would still need to make the 90-degree turn at the intersection of 2nd Street and Main Street, and then two more turns to get onto IA 9, presumably at 3rd Street.

Screening-Level Review of Potential Impacts. Alternative S6 is the furthest downstream of any remaining alternative, and therefore would provide the most relief from the difficult turn for barge navigation. Because of this downstream location, it also has the largest impact on the Refuge. As noted in the S5 alternative discussion, the higher-quality habitat found on Island 146 is generally located where this alternative would pass through. The west connection on the Lansing side would also create some impacts to wetlands associated with Clear Creek, in the area south of Main Street and west of 7th Street. None of the other alternatives would impact these wetlands.

Besides the S5 alternative, this is the only option that allows through-traffic to cross the Mississippi River without making any turns. The new IA 9 corridor (Center Street) would be generally located through a residential area, with the High School, a church, and the City Sports Complex also adjacent to the roadway. While safety concerns were not raised as a problem on the existing IA 9/Main Street corridor, the new IA 9 corridor would present some new, but manageable, safety issues. Access to the Sports Complex, City Hall/Police Station, and City Public Works buildings would need to be modified. These facilities have unique needs (e.g. large maintenance vehicles, emergency service requirements, etc.).

The Kerndt & Brothers Elevator and Warehouses are located immediately north of the Alternative S6 corridor. Impacts to these NRHP-listed properties would not be expected. However, two NRHP-eligible properties would be directly impacted by this alternative. Several additional buildings could also be directly impacted under this alternative, but this number could be reduced with limitations on the extent to which 3rd Street is modified for the turning movements to Main Street.

The long bridge approach would require the use of retaining walls, primarily along the block of John Street between 2nd and 3rd Streets. Retaining walls over 10 feet high would be required along much of this block. These walls would help to reduce direct impacts to buildings, but would create visual and access impacts for their occupants.

Roadway Screening Recommendation. Upon review of the roadway requirements and associated impacts, it is recommended that S6 be **retained** for further consideration, primarily because of the ability of this alternative to eliminate turning movements onto 2nd Street and, from a river navigation standpoint, to provide an alternative that contrasts from the northern alternatives.

3.5.2 Lansing Roadway Network Alternative Screening Results

The above description of alternatives included a screening recommendation for further analysis in this report. The process included public and agency reviews (described in more detail in Section 5). A summary of the location screening results is provided in Table 3-3 and Exhibit 3-4 (page 3-25).

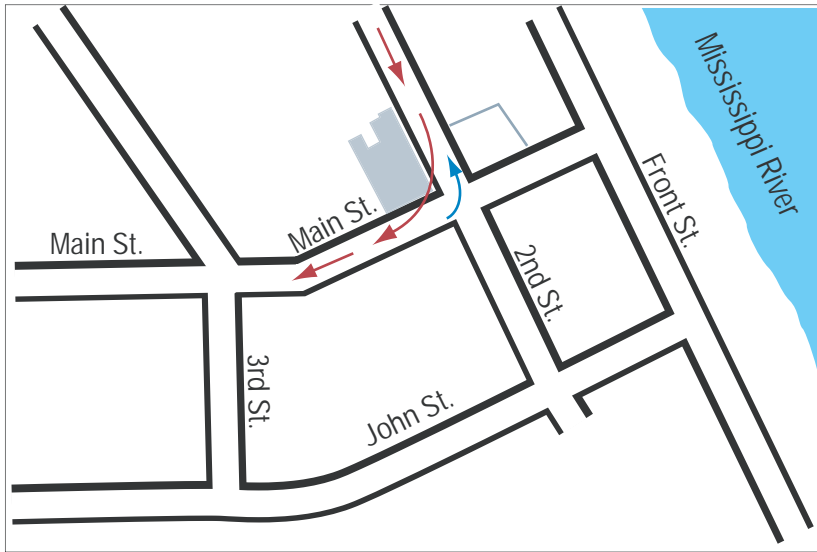
TABLE 3-3
Lansing Roadway Improvements Screening Recommendations

Alternative	Description	Retain for Analysis	Eliminate from Further Study
N3 (Adjacent to bridge)	Directly north and adjacent to the existing bridge; Diverges from WI 82 on Island 146	X	
S1 (Adjacent to bridge–Ballou St.)	Similar to N3, but parallels the existing bridge to the south; Touchdown point is near Ballou St..	X	
S3 (Hale St.)	Crosses the river perpendicularly after coming across Island 146 generally on the south edge of the Beneficial Use Site; touches down at Hale St.		X
S5 (Main St.)	Perpendicular crossing of the river that touches down at Main Street		X
S6 (John St.)	Similar to S5, but touches down in Lansing at John St., one block south of Main Street	X	
No-Build	No new major bridge or roadway construction would occur. Costs are associated with maintenance and major repairs of the existing Black Hawk Bridge that are necessary to maintain the crossing.	X	

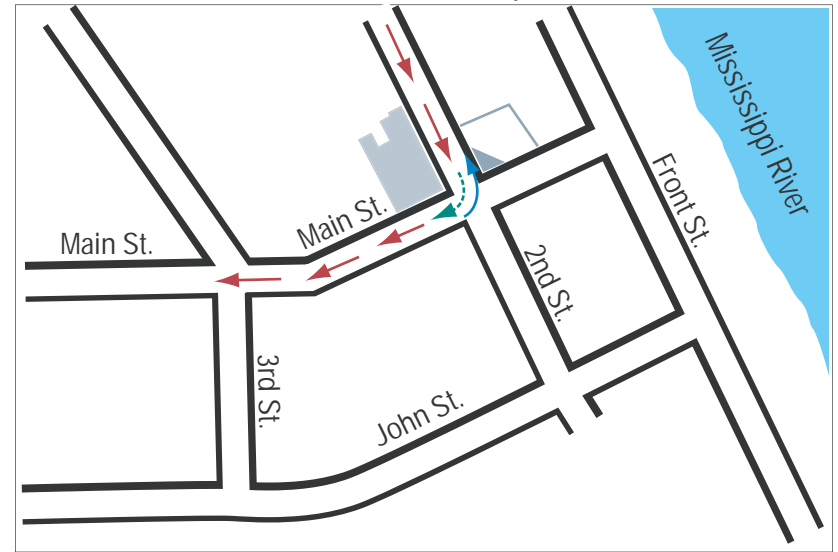
3.5.3 Intersection of Main Street and 2nd Street Improvement Options

Alternatives N3 and S1 do not resolve the existing turning movement problem for large vehicles at the intersection of 2nd Street and Main Street. It may be possible to correct the turn on to 2nd Street from the bridge with a “flared” bridge approach to accommodate large vehicles. The improvement options discussed below are all options for improving the turning movements at the intersection of 2nd Street and Main Street. All four of the improvement options discussed below and depicted in Exhibit 3-5 are compatible with the N3 and S1 alternatives. In addition to the four intersection improvement options discussed below, it is noted that Lansing residents have expressed support for the “No-Build” intersection improvement option. Under the No-Build Option, no intersection improvements would be made at the intersection of Main and 2nd Streets.

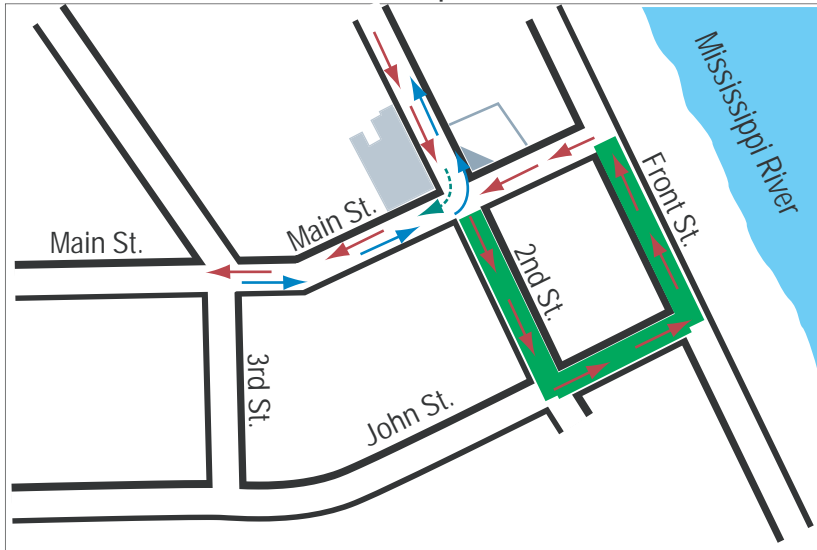
OPTION A - Northwest Corner Impact



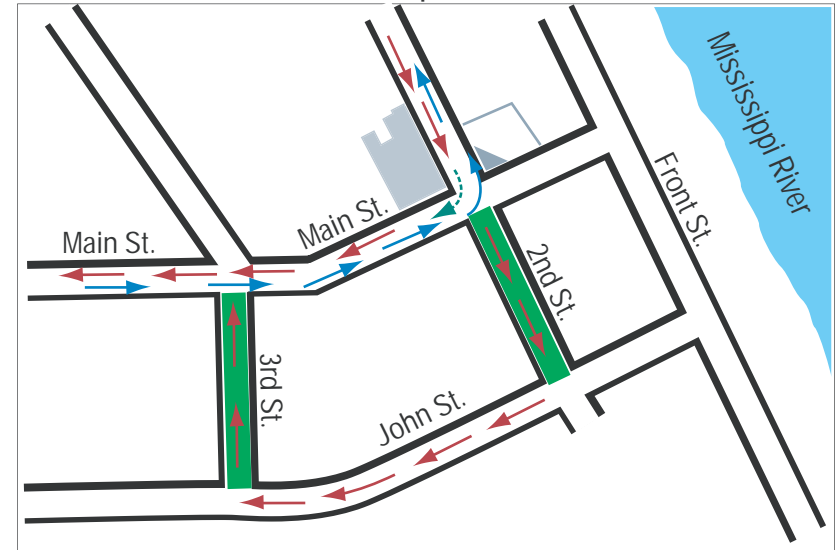
OPTION B - Northeast Corner Impacts



OPTION C - Front Street Loop






OPTION D - 3rd Street Loop



3.28



LEGEND

-  Trucks
-  Cars right-hand turn
-  One-way sections

The improvement options described below demonstrate that opportunities exist for reducing or eliminating the turning movement problem that would remain in place under the Alternative N3 or Alternative S1 scenarios. The project team is not selecting an intersection improvement option at this time given that the intersection does not currently have a crash or safety problem. However, all of the intersection options except for Option C—Front Street Loop—are recommended for further consideration in the future.

3.5.3.1 Option A—Northwest Corner Impact

This option, with the removal of one building at the northwest corner of the Main Street/2nd Street intersection (currently a restaurant with second floor residential units) and widening the roadway into that quadrant would enable large trucks to make the turn without crossing over into the opposing lane of traffic. This configuration would resolve the turning conflicts for both the southbound to westbound right turn and the eastbound to northbound left turn movements. This would prevent situations where other vehicles waiting at the stop sign need to move to accommodate the turning movement of the truck. Based on observation of the intersection, it is a common occurrence to have a stopped vehicle back up to make room for the turning truck.

Other impacts of this improvement would be the loss of two or three parallel parking stalls on the north side of Main Street and the sidewalk would need to be replaced. No impact to the northeast corner of the intersection or to parking stalls on the south side of Main Street would be expected.

3.5.3.2 Option B—Northeast Corner Impact

Option B avoids impacts to the northwest corner of the Main Street/2nd Street intersection by removing most of the parking stalls located along the south side of Main Street between 2nd Street and 3rd Street. This allows eastbound traffic on Main Street to use that area to approach the stop sign. Pavement markings could be used to shift this eastbound traffic nearer the curb, providing additional room for the southbound to westbound right-turning truck to swing out and around the corner. The frequency of large vehicles swinging across the newly marked centerline to make the turn from southbound 2nd Street to westbound Main Street would be reduced. Still, semi-trailers may need to cross over the centerline to make the turn.

Under this scenario, minor impacts to the northeast corner of the intersection would be required to allow the eastbound to northbound turning movement of large vehicles. However, because this lot is currently vacant, the impact to this corner would not be as extensive as to the northwest corner under Option A. These minor impacts would mainly include relocating the sidewalk. Widening the intersection at that location would also remove up to three parallel parking stalls located on the east side of 2nd Street.

3.5.3.3 Option C—Front Street Loop

This option would convert portions of the downtown street system into one-way streets to resolve the southbound to westbound turning movement problem. The eastbound to northbound turn in this option is nearly identical to that in Option B – with some impacts to parking on the south side of Main Street and the northeast corner of the Main and 2nd Street intersection.

A raised median island would prohibit large vehicles from making the right turn to westbound IA 9. Instead, large vehicles would need to continue south on 2nd Street, turn left (or east) onto John Street, turn left on to Front Street, and then turn left on to Main Street, to continue directly west through Lansing on IA 9. In order to allow this travel pattern, 2nd Street, between Main and John, would be converted to a one-way (southbound) street, John Street, between 2nd Street and Front Street, would be one-way (eastbound), and Front Street would also become one-way (northbound) between John Street and Main Street. By making these areas one-way only, the large vehicles would be able to utilize the entire street width to navigate each turn, minimizing the needed improvements and impacts to other intersections. The spacing of the median island would still allow passenger cars and vehicles towing boats to complete the right turn as they do today, at the intersection of 2nd Street and Main Street.

Converting these streets to one-way traffic would also have an impact to local traffic wishing to access businesses along Main Street east of 2nd, along Front Street between Main and John Street, and along 2nd Street between Main and John Street. This one way route may violate a driver's expectancy because a westbound through driver would have to go east and then back north before being allowed to continue west. Also, this would create a one-way street in front of the Lansing Fire Station which could result in EMS operational problems. Due to the location of the railroad line along Front Street, impacts to the northwest quadrant of the Front and John Street intersection may be required to prevent turning trucks from conflicting with the railroad tracks.

As described above, this option is not considered to be a desirable alternative to improving the turning movement at the intersection of 2nd Street and Main Street. The Front Street route is not consistent with driver expectations, and it creates a potentially problematic situation with a one-way street in front of an emergency services building. Upon review, the recommendation is to **eliminate** this alternative from further consideration.

3.5.3.4 Option D—3rd Street Loop

This option is nearly identical to Option C, in that it also uses the one-way street approach to resolve the turning movement problem. However instead of directing traffic on a loop that uses Front Street, a right turn on to John Street from 2nd Street and then a right turn on to 3rd Street is used. The large vehicles would then need to make a left turn on to Main Street and continue westbound on IA 9. Again, one-way streets would be used to enable the turning movements in this loop; however John Street would remain a two-way street. As in Option C, passenger vehicles and vehicles towing boats would still be able to make the direct right turn from southbound to westbound at the intersection of 2nd Street and Main Street.

This option also has the same impacts to parking along Main Street and 2nd Street as in Options B and C. Sidewalk replacement and possible impacts to the two gas stations on the corner of Main and 3rd Streets could also occur to accommodate the turning paths of the WB-62 design vehicle. Building impacts would not be expected, however. Additional impacts to the northeast corner of the 3rd Street and John Street intersection could be expected to occur because of the required intersection improvements for turning vehicles.

3.5.4 West Connection Re-Route of Iowa Highway 9 for Alternative S6

Alternative S6 is the alignment with the Mississippi River crossing at John Street in Lansing. This alignment would essentially relocate IA 9 from Main Street and 2nd Street to Center Street in Lansing (see Exhibit 3-4). To relocate IA 9 through Lansing and eliminate the turning movement problems that are currently encountered by large vehicles, a connection between existing Center Street and existing IA 9 on the western side of Lansing would be required.

Under this alternative, through traffic would utilize the west connection and travel down Center Street. Route continuity would be improved in that through traffic would not be required to make turns to remain on IA 9 as they do today. As shown in Exhibit 3-4, a portion of Main Street/existing IA 9 immediately east of Shaw Street on the west side of Lansing would be obliterated to define the new IA 9 corridor. Vehicles wishing to access Main Street in Lansing would go through existing side streets off of Center Street, particularly 3rd Street. Improvements to the 3rd Street intersection with Main and John Streets would be needed to properly handle turning traffic, large vehicles in particular. Right-of-way impacts could be expected with this side street improvement, and would likely include the relocation of one residence, the displacement of the pump island at one gas station, and partial property impacts to one residence and one business.

By routing traffic down Center Street, through traffic would pass the City Hall/Police Station, the City Publics Works building, the Lansing High School and football field, a church, the City Sports Complex and recreational area, and through residential areas. Additionally, removing through traffic from Main Street could have an actual or perceived impact to businesses along Main Street and 2nd Street.

The west connection would include two 12-foot lanes with curb and gutter and 4-foot sidewalks on both sides of the alignment. The west connection would pass through an area that is depressed and contains wetlands and natural springs related to the nearby Clear Creek. The assumption is that the west connection would be on embankment fill. All homes and businesses would maintain their current access from existing alleyways and any access to property from Center Street would be maintained.

As described in the discussion of Alternative S6, portions of John Street east of 3rd Street would need to be raised to meet the 8 percent grade requirement for the bridge approach. To avoid relocations of existing homes and businesses along John Street, 2nd Street would become a dead-end street at the intersection with John Street and retaining walls would be used along John Street to a point just east of the 3rd Street intersection. Access to the City Sports Complex, the Lansing Police Department, City Hall, and city maintenance shops would still be maintained from Front Street. A new access would be required from John/Center Street. Because of the elevation of the proposed new roadway, the access to the Public Works Building area would be located further west, and would curve down to near the Sports Complex property line.

3.6 Bridge Type Alternatives

Structure type alternatives were developed while the location alternatives were being screened. As stated in the roadway screening discussion, input from the public and USCG early in the project helped establish some initial structural design criteria for a new crossing. Those criteria and the list of initial structure types are discussed below.

3.6.1 Bridge Design Criteria

3.6.1.1 Horizontal Clearance—Required Main Span

The existing bridge main span of 652 feet provides approximately 640 feet of horizontal clearance between the west pier (pier 1), located on the west bank of the river and the east pier (pier 2) located in the river. The main navigation channel bends sharply just north of the existing bridge crossing. Because of this, barge navigation at the existing crossing is challenging, especially in the southbound (downstream) direction. Barges must simultaneously negotiate a substantial bend in the main channel and steer to the west to avoid pier 2. The west riverbank itself becomes a hazard for downstream barges that have occasionally run into the bank avoiding pier 2.

On May 28, 2004, the USCG determined, in coordination with Iowa DOT, that the minimum horizontal clearance (at the Alternative S1 location) for a new bridge should be 50 feet greater than at the existing bridge. This translates to a horizontal clearance of approximately 690 feet between pier 1 and pier 2 and a main span distance of approximately 700 feet for any new bridge option. As described in Section 3.3.1.7, a 700-foot main span distance has been assumed for all new river crossing locations. This allows for comparison of alternatives until a future date, when a determination may be made for the allowed main span distance at the N3 and S6 crossing locations. More information about the potential bridge types assessed in this study is further presented, below, in this section.

3.6.1.2 Vertical Clearance—Vertical Profile

On May 7, 2003, the USCG indicated that a new river bridge would be required to have a minimum vertical clearance of 60 feet above the normal pool elevation of 620.0. The required vertical clearance applies to the main span, where river vessels would pass under a new bridge. The USCG allowed the 60-foot vertical clearance requirement to stop 25 feet east of pier 1. That is, the vertical clearance can be less than 60 feet from the Iowa river bank to a point 25 feet east of pier 1. This reduction in vertical clearance requirement helps to make the bridge approach from 2nd Street less steep than would otherwise be needed.

The existing Black Hawk Bridge, as a through-truss structure, has its supporting trusses above and adjacent to the roadway deck. This configuration results in the majority of the structural supporting elements being located above the roadway, thus providing the maximum amount of vertical clearance for a given roadway profile. Given the vertical clearance and approach grade requirements for a new structure, it was determined that all main span structure types examined in this study should provide the main structural support system above the roadway.

3.6.1.3 Bridge Width—Typical Section

Iowa DOT guidance for the roadway width of a proposed replacement bridge was for a 44-foot wide roadway consisting of two 12-foot travel lanes and two 10-foot shoulders. Standard concrete barriers on each side add another 3 feet to the total width. Since, as stated above, all major spans over the river must have the main supporting structures above the roadway. This requirement affects bridge types differently, which leads to a range of bridge widths varying from 50 to 56 feet, depending on the bridge type considered. Each bridge type requires specific bridge elements, which adds to the 44-foot wide roadway.

3.6.2 Structure Types Considered

Two categories of main span lengths were initially considered for development of alternative structure types – those up to 700 feet long, and those greater than 900 feet long. Table 3-4 summarizes the structures considered during the development and screening of alternatives. Exhibits 3-6 and 3-7 show each bridge type that was examined.

TABLE 3-4
Bridge Types Considered in the Black Hawk Bridge Feasibility Study

Structure Type	Main Span Length Category	
	Up to 700 Feet Long (Distance as shown in Exhibit 3-6)	Greater than 900 Feet Long (Distance as shown in Exhibit 3-7)
Truss	Yes (700')	No
Steel Tied Arch	Yes (700')	Yes (940')
Cable Stayed	Yes (700')	Yes (920')
Suspension	No	Yes (1,020')

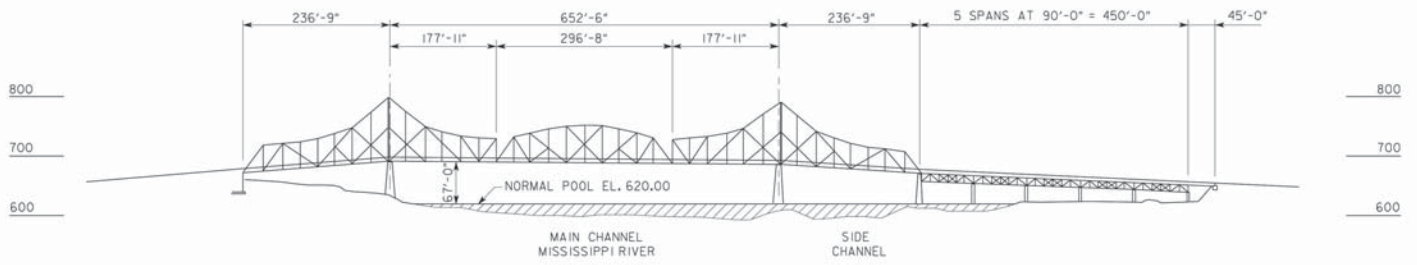
3.6.2.1 Truss

The existing bridge is a variable-depth, through type truss. Trusses are efficient structures capable of spanning 640 feet and further, making it a suitable replacement structure type for this crossing. Historically, variable depth trusses were often used to minimize material and make the trusses as light as possible for a given span. Modern trusses can be made more cost efficient by simplifying and standardizing fabrication. For this study, a constant depth truss with regular repeating alternating diagonals was assessed. The repeating pattern and fit of the individual elements can be set up and jigged in the fabrication shop to help lower the overall fabrication cost of the trusses. The truss alternative is developed as a continuous 3-span structure. Continuity over the main span piers helps control the overall depth of the structure and allows the main span to stretch to 700 feet.

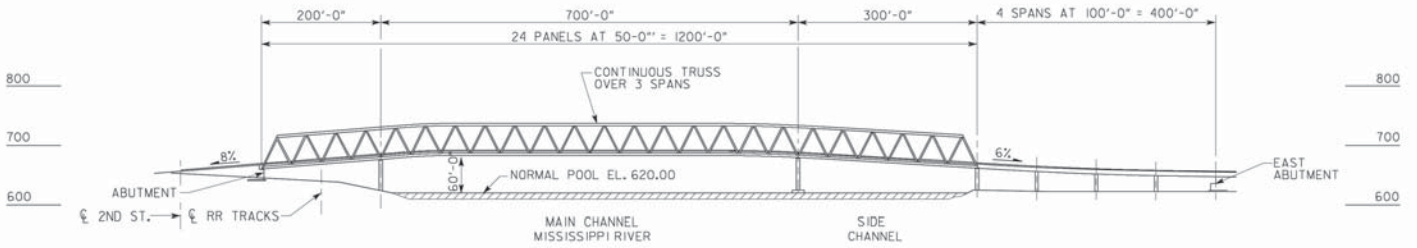
A drawback of the continuous truss alternative for all the alternatives is the shorter west end span distance available if the structure is to end at 2nd Street – as it would in the N3 and S1 alternatives. The requirement for a pier on the west bank allows for a relatively short 200-foot west end span. Ideally, the end span should be more than twice this length. This issue is solvable from a structural design standpoint for spans up to 700 feet. For spans greater than 700 feet the short end span is considered too much of a limitation to make this structure type a reasonable alternative.

3.6.2.2 Steel Tied Arch

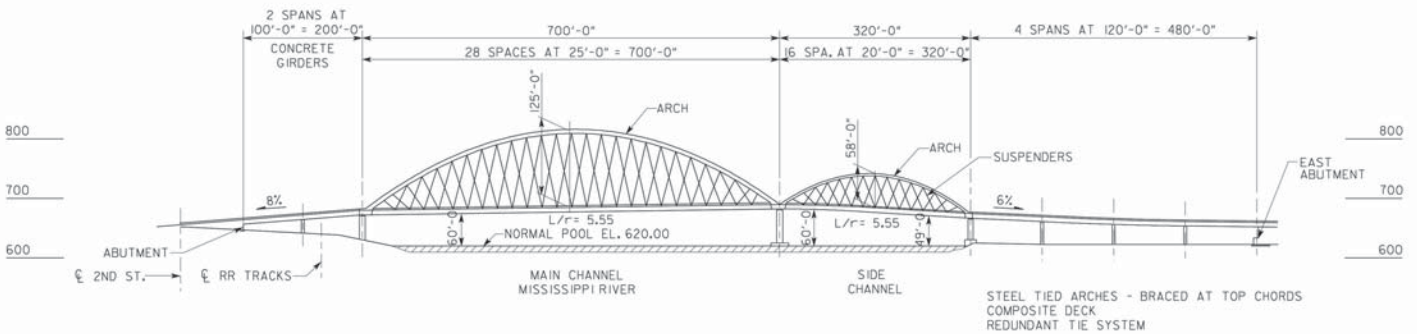
Steel tied arches are capable of spanning beyond 600 feet and are considered a suitable replacement bridge type for the existing bridge. Arch bridges are pleasing in appearance and are often selected for that reason even if a cost premium is involved. Steel arches increase in size and become more expensive to fabricate, ship, and assemble at spans beyond 600 feet.



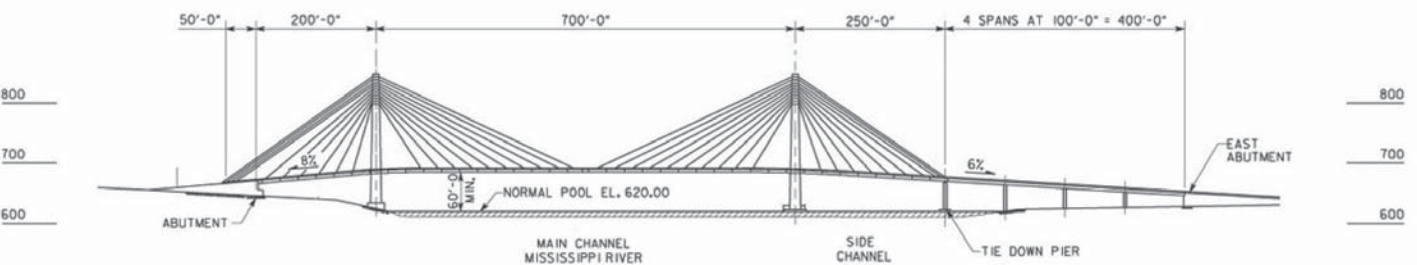
EXISTING TRUSS BRIDGE
(LOOKING NORTH)



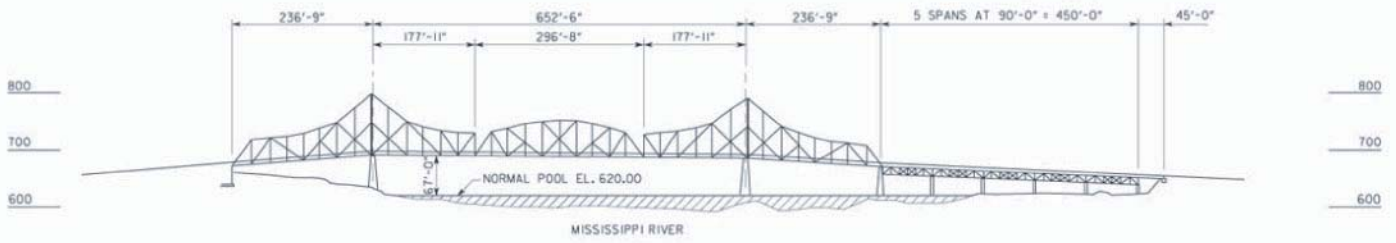
TRUSS BRIDGE ALTERNATIVE - 700' SPAN
(LOOKING NORTH)



ARCH BRIDGE ALTERNATIVE - 700' SPAN
(LOOKING NORTH)

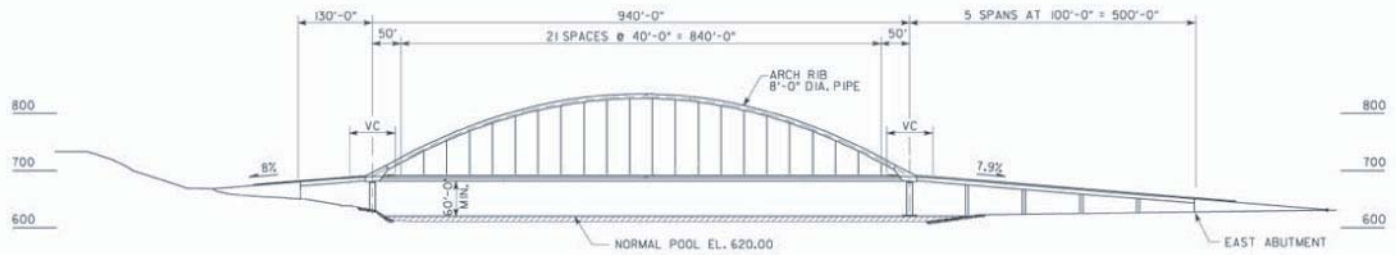


CABLE STAY BRIDGE ALTERNATIVE - 700' SPAN
(LOOKING NORTH)



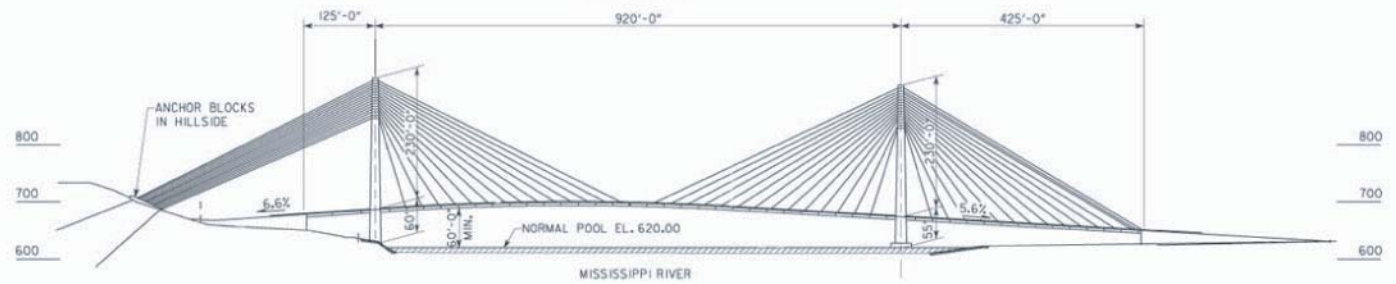
EXISTING TRUSS BRIDGE

(LOOKING NORTH)



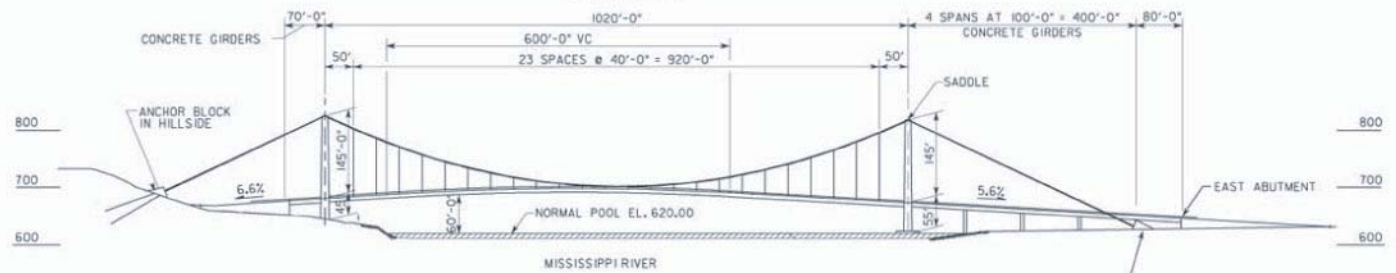
ARCH BRIDGE ALTERNATIVE - 940' SPAN

DEPICTED AT ALIGNMENT N3, ALSO FEASIBLE AT ALIGNMENTS S1 & S3.
(LOOKING NORTH)



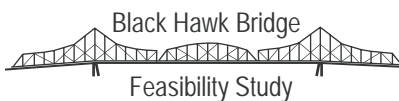
CABLE STAY BRIDGE ALTERNATIVE - 920' SPAN

DEPICTED AT ALIGNMENT N3, ALSO FEASIBLE AT ALIGNMENTS S1 & S3.
(LOOKING NORTH)



SUSPENSION BRIDGE ALTERNATIVE - 1020' SPAN

DEPICTED AT ALIGNMENT N3, ALSO FEASIBLE AT ALIGNMENTS S1 & S3.
(LOOKING NORTH)



A 700-foot span steel tied arch design is shown in Exhibit 3-6. The 700-foot span is shown with a secondary 320-foot arch span just east of the main span. Depending on final clearance requirements, this second arch could alternatively be replaced with girder approach spans to lower the cost of the arch alternative.

A 940-foot steel tied arch design option is shown in Exhibit 3-7. While the 940-foot span is technically feasible, this span length may not be economically practical compared to other bridge type options of equal or greater length. As with all long-span bridges examined in this Feasibility Study, the 900-foot span steel tied arch is considerably taller than the Black Hawk Bridge. The existing bridge rises approximately 90 feet above the bridge deck, while the 940-foot span would reach to 144 feet above the bridge deck at its highest point.

3.6.2.3 Cable Stayed

Cable stayed bridges are efficient long-span structures that are able to achieve main span distances of between 600 to 1,200 feet (see Exhibits 3-6 and 3-7). For this study, a 700-foot span and a 920-foot span were examined. The 920-foot main span was evaluated for Alternatives N3 and S1. The short end span distance on the west end of the structure (between the bluffs and pier 1) poses a problem for providing room to anchor the concentrated back stay cables. To solve this, the back stay cables would be spread laterally (north and south) and bunched so that they cross over the 2nd Street roadway.

A more traditional cable layout could be utilized for Alternative S6 because the limitation on the west side span (the bluffs) does not exist with the shorter span options. The 700-foot span was assessed at this location based on the potential for the USCG to allow a shorter main span distance in those more downstream locations. This allows the cable arrangement to be symmetrical, which is a reasonable simplification for modest cable stay structures.

One notable difference between the 700-foot and the 920-foot cable stayed bridge types considered is the height of the towers that would be required to support the cables. The 700-foot main span requires towers that rise 160 feet above the roadway while the 920-foot main span option requires towers that rise 235-feet above the roadway, notably higher in elevation than the current bridge.

One potential benefit of the cable stayed alternative is the potential to construct the bridge entirely from above the river by progressively building out from the two towers and adding cable attachments as the bridge span progresses. This construction method would cause minimal disruption to barge traffic.

3.6.2.4 Suspension

Suspension bridges are considered the most proficient for accommodating long spans. The longest spans in the world are accomplished using this structural system. A layout that results in a 1,000-foot main span was analyzed for this study (see Exhibit 3-7). This layout could be extended, if desired, to place the east pier completely out of the river.

The suspension bridge alternative provides the challenge of finding a location to anchor the suspension cable on the west end of the bridge. The bluff just west of 2nd Street would possibly provide a convenient and perhaps visually appealing anchor point for Alternatives N3 and S1. The west cable anchorage would be located west of 2nd Street and fly over the existing roadway to the west bank (Iowa side) pier 1. However, for alternative S6, the cable

anchors would need to go beyond the 2nd Street intersection and run parallel to John Street. Because of the potential impacts associated with using a suspension bridge at Alternative S6, the suspension bridge type alternative is only considered viable for Alternatives N3 and S1.

The west end span is envisioned to be a conventional girder structure not supported from the main span cable (see Exhibit 3-7). This option allows flexibility in the end span design because it can be flared to a wider cross-section to accommodate truck turning movements. Because of this, relocation of 2nd Street becomes unnecessary and additional impacts to the bluff (beyond the anchoring of cables) are avoided.

On the Wisconsin side, the cables are anchored into the ground along the east end spans. In an effort to lower costs, the cables would only support the central, main span. This has the advantage of allowing the approaches and side spans to be constructed independently from the suspended span. Further, the approaches and side spans that are a sizable percentage of the overall bridge length, become conventional construction. Both of these points should help to lower the construction cost of the suspension span alternative.

3.6.3 Bridge Type Screening Results

Screening of bridge types for retention in this study's analysis of impacts (Section 4) was based on a combination of the design criteria requirements as well as other impact concerns described by the public and resource agencies. As described earlier in this section, there is the potential for slightly different bridge design criteria (primarily the horizontal clearance requirement) based on further study that may occur in the future. However, such determinations are not going to be made at this time. For purposes of this study, the assumption has been made that the same bridge criteria apply to all new crossing locations (i.e. Alternatives N3, S1, and S6). The bridge types retained for further study are the truss bridge and steel tied arch bridge options. Table 3-5 summarizes the screening results and comments pertaining to the decisions.

TABLE 3-5
Bridge Type Screening Results

Bridge Type	Comment	Screening Decision	
		Retain for Analysis	Eliminate from Further Study
Truss	With a 700-foot main span, the short west end span is feasible and avoids impacts to the bluffs on Alternatives N3 and S1. Same bridge type as existing bridge.	X	
Steel Tied Arch	A 700-foot main span distance is feasible, and could be extended further if horizontal clearance requirements are lengthened. This bridge type is currently being built at the La Crosse, WI crossing of the Mississippi River.	X	
Cable Stayed	More commonly used on spans longer than 700 feet. Structure size would be notably larger than existing bridge. Anchoring the stay cables on the Iowa side would involve additional bluff (Alternative N3 or S1) or community impacts (Alternative S6)		X
Suspension	Bridge type not considered for the 700-foot main span distance. More appropriate for longer main spans. Cable anchor issues are the same as with the Cable Stayed bridge type (bluff or community impacts).		X

3.7 Alternatives Retained for Consideration

3.7.1 No-Build Alternative

The existing maintenance program on the bridge would continue. Improvements at the east and west bridge approaches would be limited to normal pavement maintenance. If the Black Hawk Bridge were not constructed within the next 20 years, it is anticipated that the bridge deck would have to be replaced. Bridge deck replacement could involve closure of the Black Hawk Bridge for a period of several months and require a detour to either the La Crosse or Prairie du Chien Mississippi River crossing locations. See Section 3.2.1 for additional information about the potential deck replacement. Additionally, the No-Build Alternative will serve as a baseline for comparison of the Build Alternatives.

3.7.2 New River Crossing Location Alternatives

As shown on Exhibit 3-8 and the Aerial Photo Exhibit at the back of this study, three new location “Build” alternatives remain. All Build Alternatives discussed in the Feasibility Study assume the new bridge will be a two-lane roadway with 10-foot shoulders (a total bridge roadway cross-section of 44 feet). Except where noted, the new crossing alternatives utilize the existing roadway network in Lansing and in Wisconsin (the WI 82 causeway).

- **Alternative N3 – Adjacent to Black Hawk Bridge to the North.** This alternative proposes a new river crossing alignment approximately 50 feet north (upstream) of the Black Hawk Bridge. Alternative N3 would depart from 2nd Street and continue east over the Mississippi River parallel to the existing bridge. The new crossing would connect to WI 82 on Island 146 and continue on the existing causeway.
- **Alternative S1 – Adjacent to Black Hawk Bridge to the South.** This alternative is similar to Alternative N3, but would be located 50 feet south (downstream) of the existing bridge. This alternative would go through the northern portion of the U.S. Army Corps of Engineers’ Beneficial Use Site on Island 146 in the Refuge and would possibly include replacement of the Big Slough Bridge.
- **Alternative S6 – John Street.** This alternative would utilize John Street (one block south of Main Street in Lansing and approximately 1,250 feet south of the existing Black Hawk Bridge) to create a perpendicular crossing of the river. Once in the Refuge, this alternative would involve construction of a new Big Slough crossing and connect to the causeway east of Big Slough. A new access to the Beneficial Use Site and the Big Slough Boat Landing would be provided. Alternative S6 would also involve a new connection to IA 9 on the west side of Lansing. The new IA 9 corridor would run along John Street and Center Street through Lansing before utilizing a short segment of new roadway for connecting back to IA 9. Main Street in downtown Lansing would no longer be the IA 9 route through town.

3.7.3 Bridge Type Alternatives

After review of four different bridge types, two types have been retained as appropriate for further consideration. The **truss** and **tied arch** bridge types (shown on Exhibit 3-6) have been retained based on their ability to achieve the identified clearance requirements while also providing the greatest potential for minimizing cost and environmental impacts.

3-39



EXHIBIT 3-8
Remaining Alternatives

For purposes of evaluation of impacts in Section 4 of this study, no difference between the two bridge types is assumed. Additionally, as described in Section 3.3.1.7, a 700-foot main span distance has been assumed for all three new bridge locations.

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Section 4

**Affected Environment, Environmental
Consequences, and Measures to Minimize Harm**

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SECTION 4

Affected Environment, Environmental Consequences, and Measures to Minimize Harm

This section describes the existing social, economic, and environmental setting of the study area that may be affected by the “reasonable alternatives” described in Section 3.

Environmental resources discussed in this section, such as wetlands and floodplains are shown on the aerial photo at the back of this document. This section also describes the beneficial and adverse social, economic, and environmental consequences of the No-Build and Build Alternatives that have been retained for detailed evaluation and measures to minimize unavoidable impacts. Discussions are arranged by impact category, and alternatives (as applicable) are presented within each impact category.

The information in Section 4 is provided to allow objective comparisons among the Build Alternatives and the No-Build Alternative. The Build Alternatives are described in Section 3.7 and illustrated on the Aerial Photo Exhibit attached to the back of this study. As described in Section 3.7.3, two bridge types have been determined reasonable for comparison: the truss and steel tied arch bridges. Both bridge types are feasible at all three Build Alternative locations. For purposes of impact review, these bridge types are identical.

Where appropriate, the potential impacts of improvements to the intersection of 2nd Street and Main Street are separately identified. These options (described in Section 3.5) pertain only to Alternatives N3 and S1.

The project study area covers an area approximately 0.5 mile on either side of the IA 9/WI 82 corridor from the west limits of Lansing to WI 35. However, much of the environmental analysis in this section focuses on the project’s engineering limits which encompasseses the area needed to tie a Black Hawk Bridge replacement alternative into the causeway on the Wisconsin side and into the Lansing street network on the Iowa side. Given the range of reasonable alternatives, the environmental analysis generally incorporates an area 100 feet upstream of the Black Hawk Bridge (Henry Street) and downstream to Clear Creek, approximately 0.4 miles south of the bridge, the City of Lansing, as well as the Upper Mississippi River National Wildlife and Fish Refuge (primarily Island 146 - shown on Exhibit 4-1). In evaluating socioeconomic impacts, the potential impacts of a new river crossing requires analysis beyond this immediate project area and incorporates a larger study area as appropriate. The anticipated direct impacts of the proposed project is the focus of this study. However in some cases, potential indirect and cumulative impacts are discussed for resources that may be sensitive to future actions.



4.1 Land Use and Socioeconomic Characteristics

4.1.1 Land Use

4.1.1.1 Land Use—Affected Environment

Lansing is located on the Mississippi River in northeastern Allamakee County, Iowa. Crawford County, Wisconsin lies to the east across the main navigation channel of the Mississippi River. Areas to the east of Lansing are within the floodplain of the Mississippi River, with the main navigation channel, braided channels, abandoned oxbows, marshes, and wooded serpentine islands. Land east and west of the Mississippi River floodplain rises to form high, deeply dissected bluffs, mostly wooded with oak forest and hill prairies (goat prairies) in dry south and west exposures.

City of Lansing. The study area is largely urbanized west of the Mississippi River in Lansing. Exhibit 4-1 provides a summary of the major land uses within the City, including commercial, industrial, residential, and other uses such as public, recreational, and institutional. Relatively undeveloped areas of Lansing include the bluffs area along the northern city limits and portions of the floodplain of Clear Creek near the southern city limits. Lansing is characterized by many historic buildings, several of which are either currently on or eligible for listing on the National Register of Historic Places (NRHP) (see Section 4.2 for more information on the historic resources in Lansing). These and other environmental features of Lansing can also be seen on the Aerial Photo Exhibit at the back of this study.

The Black Hawk Bridge is located in the northern portion of Lansing, where the city is defined by a bluff that runs west of and parallel to IA 26 (2nd Street). The area between 2nd Street and the River in this northern portion of Lansing is characterized by residential land use. Main Street from Front Street to approximately 5th Street is the heart of the commercial district in Lansing.¹ Retail shops, professional offices, antique shops, craft stores and art galleries are some of the types of businesses currently located in the commercial area. Gas stations, variety stores, restaurants, and gift shops are also located in the commercial portion of Lansing.

Much of the remainder of Lansing is residential, with institutional (schools and churches) and commercial land uses scattered throughout the city. Immediately south of John Street, west of South Front Street and north of Clear Creek, is Lansing's primary recreational park, the City Sports Complex. Adjacent to the sports complex, and also on the south side of John Street is Lansing's City Hall and its associated public maintenance shops and facilities.

Further south, approximately one-quarter mile south of Clear Creek, is another developed portion of Lansing consisting of residential properties. This area is generally separated from the rest of Lansing. Still part of the city, this area is connected to the central portion of Lansing by crossings of Clear Creek at South Front Street and 4th Street.

¹ The City of Lansing does not identify specific land uses for lands within the city (i.e. there is no zoning code for land use). As such, there is no defined commercial district.

Upper Mississippi Fish and Wildlife Refuge. On the Wisconsin side of the Mississippi River, the Refuge—which includes the Beneficial Use Site and the Big Slough Boat Landing—is the only land use. The Black Hawk Bridge touches down on Refuge Island 146 immediately east of Lansing. The island is generally characterized by undisturbed habitat; however the Beneficial Use Site and Big Slough Boat Landing are also located on the island, immediately south of the WI 82 causeway. The Big Slough forms the eastern edge of this island. Additional information about the Refuge is provided in Section 4.1.2 below.

4.1.1.2 Land Use—Consequences

This section focuses on a review of the land use consequences of the alternatives. That is, it addresses the question, “to what extent will land use *change* with any of the alternatives?” Other sections within this study describe impacts to land uses such as residential areas (Section 4.1.5); or commercial and industrial (Section 4.1.4).

While impacts to the Refuge are associated with each of the Build Alternatives, changes to this land use will not occur due to the protections afforded by its status with the U.S. Fish and Wildlife Service.

No-Build Alternative. No changes to land use would occur under the No-Build Alternative.

Alternatives N3 and S1. These alternatives would require the acquisition of residential properties between N. Front Street and 2nd Street to accommodate the right-of-way required for a new bridge and the Iowa approach. No new right-of-way is expected to be necessary west of 2nd Street.

These alternatives leave open the possibility of improving the turning movement problem that exists at the intersection of 2nd Street and Main Street. See the discussion below for the potential land use impacts related to that improvement.

Alternative S6. The John Street/Center Street corridor utilized by this alternative is primarily residential in nature; however there are parcels along this corridor that have institutional (e.g., a church and the high school), and recreational uses. Compared to the other alternatives, this alternative represents a greater departure from the existing bridge and as such, could spur changes to land use in Lansing. Even with a reroute of IA 9, including through open land on the west side of Lansing, no substantial changes to land use along this developed corridor are anticipated at this time.

Potential Future Improvements to the Intersection of 2nd Street and Main Street. Improvements to the turning movement at this intersection could result in the loss of a commercial (restaurant) property on the northwest corner if Option A were implemented. All three remaining intersection options discussed in Section 3.5.3 have the potential to use a portion of the northeast corner of the intersection, currently an undeveloped lot. Option D (the 3rd Street Loop) is not expected to cause any land use changes along the westbound one-way street route that would run south on 2nd Street, west on John Street, and north on 3rd Street.

Build Alternatives: Summary of Potential for Land Use Change. There currently is not a large-scale demand for new land in Lansing as evidenced by economic and population rate growth factors (see Section 4.1.7 for discussion of population change in Lansing and Section 4.1.4 for discussion of the growing tourism industry in the area). Traffic volumes are not

anticipated to increase greatly. As a result, the current two-lane bridge would be replaced with a new two-lane bridge that would not open up substantial tracts of land to new development. In the case of Alternatives N3 and S1, the bridge would move approximately 50 feet from the current location, either upstream or downstream. In the case of Alternative S6, open land that is used for the west connection would be difficult to develop, as it is located partially in a floodplain. In general, the combination of flat growth in the Lansing area and minor amounts of change created by any of the new bridges indicate that there is little potential for land use change caused by this project.

4.1.2 Parks and Open Space

4.1.2.1 Parks and Open Space—Affected Environment

Upper Mississippi Fish and Wildlife Refuge. The portion of the study area east of Lansing, on the Wisconsin side of the river, is part of the Upper Mississippi River Wildlife & Fish Refuge (Refuge) (Shown in Exhibit 4-1). The Refuge is the longest wildlife refuge in the lower 48 states, extending 261 miles along the Mississippi River from the Chippewa River in Wisconsin to near Rock Island, Illinois and encompassing approximately 194,000 acres in parts of Minnesota, Wisconsin, Iowa, and Illinois.²

All of the land east of the Mississippi River main channel within the study area is included within the Refuge, which is administered by the United States Fish and Wildlife Service (FWS). The Refuge is nearly 2.4 miles wide at the WI 82 causeway. In the vicinity of the study area, the Refuge consists of a mix of aquatic habitats such as floodplain forest, open water, aquatic beds, and emergent marshes maintained primarily for wildlife and fish habitat and outdoor recreation.

The National Wildlife Refuge System was created to conserve fish, wildlife, and plants and the accompanying habitats. The mission of the Refuge is, “To provide for public benefits associated with fish, wildlife, and wild areas, by preserving the Upper Mississippi River floodplain ecosystem for the enjoyment and use of this and future generations.” In addition to this general mission, the Refuge has goals related to environmental quality; migratory birds; fisheries and aquatic resources; other wildlife; endangered species; historic preservation; interpretation and recreation; and public involvement.

These conservation efforts have provided the public with opportunities to participate in “compatible wildlife-dependent recreation, including fishing and hunting, on System lands and to better appreciate the value of and need for fish and wildlife conservation” (National Wildlife Refuge System Improvement Act of 1997 PL 105-57).³ This philosophy is reflected within the Refuge through the Environmental Impact Statement – Refuge Master Plan (July 1987) which indicates that one of its goals is to, “Gain active public support for the preservation of the vulnerable floodplain ecosystem; to provide interpretation and

² The Refuge is divided into four management districts. The portion of the Refuge within the study area falls within the McGregor (Iowa) District. This District is 78,224 acres in size and is located between Genoa, Wisconsin (15 miles north of Lansing) and Dubuque, Iowa (approximately 75 miles south of Lansing).

³ Definitions from the National Wildlife Refuge System Improvement Act of 1997:
Compatible Use—a wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgement of the Director, will not materially interfere with or detract from the fulfillment of the mission of the System or the purposes of the refuge. Wildlife-dependent recreation and wildlife-dependent recreational use—use of a refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation.

education opportunities; to provide a wide range of opportunities for compatible, wildlife/wildlands-oriented recreation; to allow other compatible traditional recreation uses” (Upper Mississippi Wildlife and Fish Refuge EIS, Refuge Master Plan, July 1987, p. 2.10). Additionally, Executive Order 12996, issued on March 25, 1996, recognized that “compatible wildlife-dependent recreational uses involving hunting, fishing, wildlife observation and photography, and environmental education and interpretation as priority public uses of the Refuge System.”

Public use opportunities that exist within the McGregor District of the Refuge include hunting and fishing, boating and picnicking, canoeing, wildlife observation, and hiking and sightseeing. Recreation that occurs on refuge lands must be compatible with the management purposes of the Refuge.

Two Refuge boat landings are accessed from the WI 82 causeway – the Big Slough Boat Landing (located immediately east of the Black Hawk Bridge on Island 146 – see Exhibit 4-1) and the Winneshiek Slough Boat Landing two miles east of the Black Hawk Bridge, near the WI 82 intersection with WI 35. The Winneshiek Landing is managed by the FWS in cooperation with the Wisconsin Department of Natural Resources. Big Slough landing is managed by the FWS.

The Winneshiek Boat Landing is a paved parking lot and boat ramp. The parking lot will accommodate approximately 18 vehicles with trailers. No restrooms or other facilities are available at this landing.

Big Slough Boat Landing. The Big Slough Boat Landing provides access to the Mississippi River through a boat ramp into the Big Slough. This site, approximately 1 acre in size, includes a paved and landscaped parking lot that will accommodate 20 vehicles with trailers and three vehicles without trailers. Designated disabled parking is available, as well as a ramp to assist disabled people with getting in and out of boats. Park benches and an information kiosk are also provided. No restroom facilities are available at this landing.

Beneficial Use Site. The US Army Corps of Engineers (the Corps) maintains the main navigation channel of the Mississippi River at a minimum, nine-foot depth through dredging and the operation of locks and dams. River substrate dredged by the Corps is deposited on a five-acre portion of the Refuge directly across the main channel from Lansing and immediately downstream from the existing causeway of the Black Hawk Bridge. The site, known as the Beneficial Use Site, was originally 3.2 acres but it was expanded to five acres in 2002 to meet additional material placement needs. The site has capacity for approximately 129,000 cubic yards of dredged material. The sand and gravel is available free-of-charge to the public and is regularly utilized by the Allamakee County (Iowa) Public Works Department.

Lansing Parks and Open Space. *Mt. Hosmer Park.* Mt. Hosmer Park is owned by the City of Lansing and is located on the high bluff north of downtown Lansing. The park includes an upper and lower scenic overview that provide a panoramic view of the Mississippi River. Park facilities include picnic areas, a picnic shelter, restrooms, parking, and a WWI memorial. Mt. Hosmer Park is approximately 95 acres (City of Lansing – Clerk’s Office, personal communication April 2004).

Lansing City Sports Complex. The Lansing City Sports Complex (between John Street and Clear Creek – see Exhibit 4-1) has a picnic area, restrooms, baseball field, basketball courts, tennis courts, and green space along the north side of Clear Creek. The 22- acre Lansing City Sports Complex is the only municipal multi-use recreational area in the City of Lansing. It is also used for community festival events and parking for high school football games.

Kee High School Football Field and Practice Field. The Kee High School Football Field is located between 4th and 5th Streets south of Center Street. An open field (also known as the “practice field”) is also located immediately west of 7th Street at the terminus of Center Street (on the west side of town). Approximately 0.5 acre of useable space is available at the practice field. When not used as fields for football games or practices, both of these fields are utilized by the schools in Lansing as playgrounds for physical education activities and recess. These open space areas are used primarily for school functions and are not considered part of a Lansing parks program or as Section 4(f) resources in Section 4.4 of this study.

4.1.2.2 Parks and Open Space—Consequences

The impact estimates discussed in this section and summarized in Table 4-1 are based on a Build Alternative scenario that utilizes a combination of structure and embankment, similar to current conditions, on the Wisconsin side of the river, through the Refuge.

TABLE 4-1
Impacts to Parks and Open Space by Alternative

Project Area Parks and Open Space	Alternatives			
	No-Build	N3	S1	S6
Upper Mississippi Fish and Wildlife Refuge	No Change	2.8 acres	1.0 acre	8.5 acres ^a
Big Slough Boat Landing	No Change	No direct impacts	Western 0.3 acre	New access
Beneficial Use Site	No Change	0.5 acre	1.5 acres	New access
City Sports Complex	No Change	No Change	No Change	No direct impact of the complex, but possible change to vehicular and pedestrian access
Football Game and Practice Fields/Open Space	No Change	No Change	No Change	No change to the high school game field, complete use of the 0.5-acre practice field.

Note: The impacts described in this table assume a Wisconsin-side footprint similar to existing conditions (i.e. combined use of structure and embankment for reconnection to the causeway).

^a This total includes construction of an assumed new access to the Beneficial Use Site and Big Slough Boat Landing, resources that are avoided by this route back to the WI 82 causeway. All existing causeway on WI 82 would be removed.

No-Build Alternative. No direct impacts to Parks and Open Spaces would occur under the No-Build Alternative. However, as described in Section 3.2.1, there is the potential for closure of the river crossing for bridge deck replacement. Closure of the river crossing

would reduce access to the Wisconsin side resources (Refuge, Beneficial Use Site, and boat landings) from the Iowa side of the river.

Alternatives N3 and S1. Impacts to the Refuge from Alternatives N3 and S1 would be limited to Island 146 since it is possible to reconnect to the WI 82 causeway west of the Big Slough Bridge as quickly as possible. These alternatives represent the options for a new river crossing that minimize impacts to the Refuge.

The footprint of Alternative S1, on the east approach, would directly impact approximately 2.5 acres of the Beneficial Use Site. Also, the footprint of Alternative S1 would directly impact approximately 0.3 acre of the Big Slough Boat Landing. This impact would be on the western portion of the Landing, where access and small vehicle parking is currently provided. Such an impact would require a reconfiguration of site access and traffic patterns, with a result being the loss of parking stalls for trucks with trailers (the loss is estimated to be between 5 and 10 stalls).

Alternative S6. Alternative S6 would impact 8.5 acres of the Refuge. This acreage estimate includes the creation of a new access to the Beneficial Use Site and the Big Slough Boat Landing. The new access is not expected to substantially alter how the sites are used or capacity of either site, however, some minor modifications of traffic patterns may be required.

4.1.3 Transportation Service

4.1.3.1 Transportation Service—Affected Environment

Highways. IA 9 is classified as a two-lane primary highway in an urban area. The IA 9 corridor in Lansing begins at the west city limits and continues east (as Main Street) to the intersection with 2nd Street. At this intersection, IA 9 turns north and follows 2nd Street for several blocks to the west Black Hawk Bridge approach where IA 9 turns east, crosses the Mississippi River and joins WI 82 at the Wisconsin state line. All cross streets in Lansing are local residential streets and the posted speed limit is 25 mph through the IA 9 corridor. Approximately 2,300 vehicles per day cross the Black Hawk Bridge (see Appendix A).

WI 82 is an east-west, two-lane Wisconsin state trunk highway that is classified as a minor arterial. The WI 82 corridor begins at the Wisconsin state line (at the Black Hawk Bridge) and continues to the east for approximately 2.5 miles to the junction with WI 35. The WI 82 corridor is located on a causeway that passes through the Refuge. The speed limit through the WI 82 corridor is 25 mph on the existing Black Hawk Bridge and 55 mph east of the bridge.

An analysis of five years of crash data (1997-2001 – summarized in Appendix B) for the study corridor, from 7th Street in Lansing to the junction of WI 82 and WI 35 in Wisconsin, showed that the majority of the crashes involved single vehicles along the WI 82 causeway or were parking-related crashes along Main Street in Lansing. Nearly 77 percent of all crashes were parking related (i.e. directly involving a parked vehicle or involved a vehicle trying to access or leave a parking stall).

Two businesses (gas stations at the 3rd Street intersection) have direct access to IA 9 (Main Street). Remaining businesses have on-street parking along both sides of Main Street but do not have driveways/entrances along IA 9 (Main Street). The land use along 2nd Street is

mostly residential with some commercial buildings. An alley east of 2nd Street provides access to the residential units. On-street parking is allowed along the east side of 2nd Street.

There are no residential or commercial structures adjacent to the WI 82 causeway; however, there is an access point on Island 146 that provides access to the Beneficial Use Site and the Big Slough public boat landing, and another access point near WI 35 for the Winneshiek boat landing.

The Great River Road parallels the Mississippi River on both the Iowa and Wisconsin sides, and is part of a 10-state route stretching from Louisiana to Minnesota. IA 26 (north of Lansing) and County Road A-52 (south of Lansing) form the Iowa-side portion of the Great River Road in the project area. Recreational traffic also uses the Black Hawk Bridge crossing to connect to Iowa's scenic byways. IA 9 is part of the Driftless Area Scenic Byway, one of seven state-designated scenic routes. The designated route starts in Postville and winds its way through Harpers Ferry, Waukon, and Lansing. WI 35, the Wisconsin-side portion of the Great River Road, runs along the east side of the Refuge and is the primary roadway connection between La Crosse and Prairie du Chien.

Local Roads. Table 4-2 summarizes existing characteristics of key local roads and streets that would be potentially impacted by the Build Alternatives.

TABLE 4-2
Summary of Existing Local Road Characteristics in the Project Area

Street Name (segment)	ADT ^a	Pavement Width (ft) ^b	Parking ^c		Sidewalk Width (ft) ^b	
			Eastbound or Northbound	Westbound or Southbound	Eastbound or Northbound	Westbound or Southbound
Main St. (3rd St. to 2nd St.)	4860	57	Angle	Parallel	10	10
Main St. (2nd St. to Front St.)	2380	57	Angle	Angle	10	10
John St. (East of 3rd St.)	1930	24	No Parking	No Parking	4	No Sidewalk
John St./Center St. (West of 3rd St.)	Not Available	42	Parallel	Parallel	4	4
William St.	Not Available	30	Parallel	Parallel	No Sidewalk	No Sidewalk
Hale St.	Not Available	25	Parallel	Parallel	No Sidewalk	No Sidewalk
2nd St. (North of Hale)	3400	30	No Parking	No Parking	4.5	4
2nd St. (Main St. to John St.)	820	34	Parallel	Parallel	5	4 to 8

^a Average Daily Traffic; Per Iowa Department of Transportation 2001 Traffic Flow Map of Lansing

^b Distances (curb-to-curb where applicable) based on field measurements, as-built plans, and estimations from aerial photography

^c Based on field visits and aerial photography

The intersection of Main Street and 2nd Street is four-way stop controlled. All other intersections along Main Street are stop controlled on the minor streets only. Traffic entering Lansing from Wisconsin is required to stop at the west end of the Black Hawk Bridge before turning onto 2nd Street. While no issues regarding pedestrian safety have been identified, portable stop signs are frequently used at the four intersections of Main Street and Center Street, at 5th and 6th Streets, during school hours to provide a temporary four-way stop controlled intersections.

Railroad. The Iowa, Chicago & Eastern (IC & E) freight railroad runs along the Mississippi River through the City of Lansing and is immediately east of Front Street. The IC & E freight line runs along the Mississippi River for a large portion of the Iowa eastern border with lines running to Chicago, IL, Kansas City, MO, Minneapolis, MN and several lines extending westward. The railroad tracks through Lansing do not currently accommodate passenger train service. The IC & E carries freight through the City of Lansing approximately 3 times per day.

River Navigation. The closest Corps operated Lock and Dam to Lansing is #9 near Harpers Ferry, IA. This Lock and Dam is typically open with river traffic passing through it approximately nine months per year (from March to December). Table 4-3 summarizes recent trends in annual traffic volume at this location. Years with extended periods of high water (such as 2001) experience lower levels of river traffic due to the reduced timeframe of safe navigation. See also Section 2.3.3 for additional information on Mississippi River navigation.

TABLE 4-3
Lock & Dam 9 River Traffic Volume Counts (Located south of Lansing at River Mile 647.9)

	1997	1998	1999	2000	2001
Number of Commercial Vessels (Including Tows)	1,524	1,662	1,717	1,475	1,131
Number of Barges	15,031	16,196	18,108	16,373	13,152
Number of Recreational Boats	6,649	7,213	6,839	5,776	5,021

Source: US Army Corps of Engineers; Lock Performance Monitoring System (LPMS)

Recreational/Bicycle Facilities. As described above, the Great River Road passes through Lansing. Additionally, the Driftless Area Scenic Byway utilizes IA 26 and IA 9 in the project area. The Iowa DOT's *Transportation Map for Bicyclists* categorizes Iowa's highways with respect to their suitability for bicycling. Highways in the vicinity of Lansing are described as follows:

- IA 26 from the Minnesota border to the City of Lansing is classified as a "two-lane paved highway with no 6-foot paved shoulder" and has an Average Daily Traffic (ADT) range of 1,000-4,999.
- IA 9 from Waukon to Lansing is classified as a "two-lane paved highway with no 6-foot paved shoulder" and has an ADT range of 1,000-4,999.

- County Road A-52 from Lansing south to Waukon Junction, designated as the Great River Road, is classified as a “two-lane paved highway with no paved 6-foot shoulder” and has an ADT range of 0-999.

The lack of a paved shoulder on these Iowa highways makes them less than ideal for bicycle traffic. Low traffic volumes on these highways generally limit the number of potential bicycle/vehicle conflicts. The Black Hawk Bridge’s narrow roadway width (21 feet total for both lanes), open grate, and steep grade on the Wisconsin side make it unattractive to bicyclists. However, recognizing the growing demand for bicycle use in the area – there are ongoing plans to improve the conditions for bicyclists on IA 26, including the addition of a shoulder in each direction.

The WI 82 causeway in Wisconsin (with paved shoulders that are 2 feet wide) is not currently suitable for bicycle traffic, according to the *Bicycling Conditions Map for Crawford County* published by the Wisconsin DOT. WI 35, in the vicinity of the WI 82 causeway, is two-lanes with paved shoulders, and is suitable for bicycle traffic.

4.1.3.2 Transportation Services—Consequences

Highways. The speed limits in Lansing are not expected to change for any of the alternatives. The speed limit along WI 82 will remain at 55 mph. However, there are some questions concerning where along Alternative S6, the speed limit would transition from 25 or 30 mph to 55 mph. The transition point will depend on where a new bridge would tie back to the causeway – either east or west of the Big Slough.

No-Build Alternative. As described in Section 3.2.1, the No-Build Alternative would involve at least partial or periodic closure of the bridge crossing for rehabilitation of the deck. Depending on the extent of repairs made at the time of deck rehabilitation, closure of the crossing could be limited to single-lane closures that would allow continued use of the bridge. Alternatively, the bridge could be completely closed to traffic for several months. During periods of complete closure, traffic on IA 9 bound for Wisconsin would have to use alternate Mississippi River crossings at La Crosse, WI (35 miles north of Lansing) via IA 26, or Prairie du Chien, WI (30 miles south of Lansing) via County Road X-52. After rehabilitation is completed, traffic patterns would return to existing conditions. This alternative would also retain the option for improvements to the intersection of 2nd Street and Main Street. See below for discussion of potential impacts.

Alternatives N3 and S1. Alternatives N3 and S1 would not alter traffic patterns along local highways. Both alternatives would allow the Black Hawk Bridge to remain open during construction, with only temporary impacts at the crossing or associated roadways related to connection of the new bridge to the existing roadways. As with the No-Build Alternative, these alternatives leave open the possibility for improvements to the turning movement at the intersection of 2nd Street and Main Street. See below for discussion of potential impacts.

Alternative S6. Alternative S6 would route IA 9 traffic from Main Street to John/Center Street with 3rd Street serving as the main connection back to Main Street. As described in Section 3.5, this alternative would provide route continuity to through traffic, eliminating the two ninety-degree turns currently on the IA 9 route in Lansing.

Potential Future Improvements to the Intersection of 2nd Street and Main Street. Improvements to this intersection would not result in any changes to the route taken by eastbound traffic through Lansing. All vehicles would still make the left hand turn on to 2nd Street from Main Street. For westbound traffic, only the large vehicles (e.g. trucks with trailers) would potentially be impacted depending on the option. The “3rd Street One Way Loop” option would require a slight re-route for large vehicles on to a one way roadway that could better accommodate the turning movements required for these vehicles. The one way route would consist of 2nd Street between Main Street and John Street, John Street from 2nd Street to 3rd Street (two way traffic would be maintained on this link), and 3rd Street back to Main Street, where a left hand turn would be possible to get back onto Main Street and the IA 9 corridor. Small vehicles such as automobiles (including those pulling boat trailers and small campers) and motorcycles would still be able to make right hand turns from 2nd Street to westbound Main Street.

Local Roads. No-Build Alternative. While bridge closure during rehabilitation would impact regional traffic, it would not substantially impact traffic on local streets. Local traffic on Front Street may be temporarily interrupted or detoured during construction. After rehabilitation, local traffic patterns would be the same as they exist now.

Alternative N3. Alternative N3 would have a negligible impact on local roads during construction. Local traffic along Front Street may be interrupted periodically during bridge construction. Local traffic patterns would not be substantially altered after bridge construction.

With this alternative, the potential for an improvement to the intersection of 2nd Street and Main Street still exists. Implementation of any of the proposed options would have an impact on local traffic, most notably under the “one-way loop” options (See Section 3.5 under subheading, Intersection of Main Street and 2nd Street Improvement Options, and Exhibit 3-5 that shows the potential intersection improvement options).

Alternative S1. Similar to Alternative N3, this alternative would have negligible impact on the local road system. Portions of Front Street may be closed periodically during construction activities. Ballou Street, a half-block long access point to residences in the vicinity of the existing bridge would no longer exist. Access to these residences would be maintained via Henry Street, Hale Street, Front Street, or the alley that runs between Front Street and 2nd Street.

Similar to Alternative N3, improvements to the intersection of 2nd Street and Main Street are possible under this alternative. Implementation of any of the proposed options would have an impact on local traffic, most notably under the “one-way loop” options (see Section 3.5.3 and Exhibit 3-5 which shows the potential intersection improvement options).

Alternative S6. Several changes to the Lansing road network would occur with this alternative. Due to the need for retaining walls at the intersection of 2nd Street with John Street, 2nd Street would be closed at the intersection (traffic would not be able to turn on to John Street from 2nd Street). This would likely result in an increased use of the alley between 2nd and 3rd Streets.

The re-route of IA 9 from Main Street to John Street/Center Street, and a new western connection to existing IA 9 eliminates the turning movement problems currently

encountered by through traffic. However, to maintain access to Main Street, at least one intersection (and possibly two) would need improvement to accommodate the new higher-frequency turning movements off of John Street/Center Street. The most likely intersection for improvement is 3rd Street.

As seen in Table 4-2, the current pavement width on John Street/Center Street is 42 feet. This width currently accommodates parallel parking. The removal of on-street parking is possible as the result of applying Iowa highway route design criteria to the new IA 9 route. The portion of Center Street that would be most noticeably affected is in the vicinity of the intersection with 5th Street, where parallel and angle parking spaces that are close to a church, the high school, and the high school football field could be lost.

To facilitate the new IA 9 route on the west side of Lansing, a small portion of the existing Main Street/IA 9 corridor between 7th Street and Shaw Street would be demolished and terminated with a cul-de-sac (see Exhibit 3-4). No accesses to local residences or streets would be lost with this change. This would help to minimize driver confusion and clearly identify the new IA 9 route.

Local traffic on South Front Street may be temporarily interrupted or detoured during construction activities. A detour that utilizes Valley Road and the 4th Street crossing of Clear Creek is available.

Railroad. The potential bridge and approach improvements and removal of the Black Hawk Bridge involved in the Build Alternatives would likely interrupt freight rail service through Lansing for brief periods of time when construction or demolition activities are over the railroad. Additional coordination with the railroad would be required during the next phase of the project.

River Navigation. Many construction activities associated with the bridge replacement are likely to be done during the active river barge season (late March to mid-December) and may present some temporary interruptions in river commerce and further limit the ability of barges to safely navigate the turn in the Mississippi River located immediately north of the existing bridge.

Recreational/Bicycle Facilities. All Build Alternatives being considered include a 44-foot wide bridge deck consisting of two 12-foot lanes and two 10-foot shoulders. The shoulders would accommodate bicyclists and pedestrians and enable such users to access Island 146. This would be a step toward connecting cycling opportunities in northeast Iowa with those opportunities in western Wisconsin. However, there are currently no plans to widen the shoulders east of the Black Hawk Bridge touchdown along the WI 82 causeway or otherwise accommodate bicyclists.

4.1.3.3 Transportation Service—Measures to Minimize Harm and Mitigation

Proposed bridge demolition, construction, and maintenance activities would be coordinated with State DOTs so that proper notification of lane and/or roadway closures or other impacts to the system is provided. The No-Build Alternative would require an extensive period of reconstruction activity on the Black Hawk Bridge to repair the bridge deck. As described in Section 3.2.1, there is a possibility to utilize reconstruction approaches that minimize the extent to which the river crossing would need to be closed.

All demolition and construction activities will be coordinated with the IC & E Railroad. Coordination of activities that affect the railroad will help to minimize the impact on rail service through Lansing.

Methods to minimize potential interruptions to river navigation during the active river barge season will be coordinated with appropriate agencies. Proposed bridge demolition, construction, and maintenance activities will be coordinated with the Corps and the USCG. To the extent practicable, the period between approximately mid-December and late March, when the river is typically closed to river barge traffic, will be utilized for demolition, construction, and maintenance activities. This would serve to minimize potential impacts to river navigation.

For times when in-stream bridge work occurs during the barge season, there is the potential for use of a “helper” tow to be located in Lansing at all times for the sole purpose of assisting barges past the work area. One strategy to prepare tow operators for this procedure would be to set new navigational buoys in the river prior to the in-stream work so that river pilots could become accustomed to the required navigational changes.

4.1.4 Economic Development

4.1.4.1 Economic Development—Affected Environment

Tourism. Lansing’s location in the hills and bluffs of northeastern Iowa, combined with the historic character of the city and the presence of the Mississippi River, make it a popular tourist destination. A contributing factor to Lansing’s tourist attraction is the Black Hawk Bridge, images of which are often used in promotional materials for the region and the state.

Tourism plays an important role in supporting the economy of Lansing. While it is difficult to quantify the economic effects of tourism, the U.S. Travel Data Center⁴ publishes an annual report titled “The Economic Impact of Travel on Iowa Counties.” The report estimated approximately \$22 million dollars in travel expenditures in Allamakee County in 2002. These expenditures are estimated to be responsible for 190 jobs in the county, a substantial number when compared to the top employers in Allamakee County (shown below in this section).

The Mississippi River attracts large numbers of boaters, hunters, and fishermen who contribute to the economic viability of river communities, including Lansing. Records from the Corps show that between 1997 and 2001, downstream bound recreational vessels through Lock and Dam #8 (the location of each project area Lock and Dam is shown in Exhibit 1-1) averaged almost 4,500/year, while upstream bound recreational vessels through Lock and Dam #9 averaged over 3,000/year. Many of these vessels potentially originate in or visit the Lansing area.

River based recreation has been shown to have an important economic impact on local economies. The Corps estimated that the average daily expenditure in 1990 for items consumed on recreational trips to the upper Mississippi River system totaled \$15.84/person,

⁴ The U.S. Travel Data Center is sponsored by the Travel Industry Association of America in Washington D.C. Their estimate of the economic impact of travel is based on a model that utilizes data from several national travel organizations and federal agencies, including the U.S. Census Bureau. More information about the travel economic impact modeling is available at the Iowa Tourism Office and the following web site: http://www.traveliowa.com/travel_industry/research/county_impact.htm

with an additional \$12.54/person spent on durable items used on these trips, such as boats and fishing equipment (Carlson, et al., 1995). According to the Corps study, recreational activities in the 76 counties bordering the Upper Mississippi River System during the study year resulted in direct and secondary expenditures of \$400 million and helped maintain 7,200 jobs.

4.1.4.2 Employment

As shown in Table 4-4, Lansing and Allamakee County have a fairly diverse economic base dominated by manufacturing and health, educational, and social services. The leading occupational category for Lansing is production, transportation and material moving, followed by sales and office occupations. The distribution of occupations for Allamakee County is similar, but management, professional and related occupations lead the county. The similarity between Lansing's and Crawford County's percent population by employment indicates a likelihood for employees to be commuting across the river for their jobs.

TABLE 4-4
Percent Population by Employment Category

Occupation	Lansing, IA	Allamakee Co., IA	Crawford Co., WI	State of Iowa
Management, professional and related	19.4	28.6	23.5	31.3
Service	14.4	13.4	18.1	14.8
Sales and office	23.0	20.0	21.0	25.9
Farming, fishing and forestry	1.1	4.6	2.7	1.1
Construction, extraction and maintenance	15.5	10.6	9.1	8.9
Production, transportation and material moving	26.6	22.9	25.5	18.1

Source: 2000 Census

Major employers in Allamakee County are listed in Table 4-5. The leading employer in Lansing is Blumenthal Lansing Company – a manufacturer, importer and distributor of buttons, buckles and other products. Blumenthal Lansing employs 140 people. Agriprocessors is currently the largest employer in Allamakee County, followed by the Allamakee Community School District.

Leading employers in Crawford County, Wisconsin, all of which are located in Prairie du Chien, include 3M Company – an adhesives manufacturer with 600 employees; Cabela's, an outdoor equipment retailer with 500-999 employees; Wal-Mart with 250-499 employees; and the Prairie du Chien Memorial Hospital, also with 250-499 employees.

Census data from the 2000 study of county to county worker flows shows that over 75 percent of Allamakee County's workforce are employed inside the county. Over twenty-four percent commute outside of the county, and of those, nearly ten percent travel to Wisconsin to work. As described in Section 2.2, almost 10 percent of Wisconsin workers in the census tracts nearest the project area commuted outside of Crawford County, Wisconsin. Many of these commuters rely on the Black Hawk Bridge.

TABLE 4-5
Major Employers in Allamakee and Crawford Counties

Company	Product or Service	Employees
Allamakee County, IA		
Agriprocessors	Manufacturing	638
Allamakee Comm. School District	Education	300
Quillin's	Retail	161
Veteran's Memorial Hospital	Health Care	140
Blumenthal Lansing Company*	Manufacturing	140
Good Samaritan Society, Inc.	Health Care	137
East. Allamakee Comm. Schools*	Education	135
Industrial Laminates/Norplex	Manufacturing	120
Allamakee County	Government	94

*in City of Lansing

Source: Iowa Workforce Development, Employment Statistics Bureau 2000; iowasmart.com, 2003; Iowa Dept. of Economic Development

Crawford County, WI		
3 M Company	Adhesive Products	600
Cabela's	Outdoor Equipment	500-999
Wal-Mart Associates	Retail	250-499
Design Homes	Prefabricated Homes	450
Miniature Precision Components	Plastic Parts	275
Prairie du Chien Public Schools	Education	123
Prairie du Chien Memorial Hospital	Health Care	250-499
Quality Wood Treating	Wood Preserving	180
Crawford County	Government	100-249
Clinicare Corp	Residential Care	100-249

Source: WI DWD, Bureau of Workforce Information; www.dwd.state.wi.us; Mississippi River Regional Planning Commission; www.greatschools.net

The Center for Urban and Regional Affairs at the University of Minnesota has established a hierarchy for ranking regional trade centers in the upper Midwest (Casey, 1999). Level 0 represents major metropolitan areas and Level 7 represents hamlets based on an analysis of nine variables including population and numbers and types of business establishments. The City of Lansing was not specifically studied; however, it meets the requirements of a Level 6 Regional Trade Center—“Minimum Convenience Center” because it provides some retail, commercial and manufacturing establishments. Prairie du Chien was rated as a Level 3 trade center, one level higher than its 1990 ranking. The highest ranked center in Iowa (near

Lansing) was Decorah, which was rated Level 3 (unchanged since 1990). Waukon and Postville were ranked 4 and 5, respectively. The study noted a trend towards consolidation, expansion and growth in the higher level centers coupled with erosion and loss of market share in smaller places. This study reinforces the importance of regional centers like Prairie du Chien and La Crosse for small communities such as Lansing and the continuing trend for these centers to play an increasing role as the smaller economic centers decline. These findings also reinforce the need to provide access across the Mississippi for Lansing and other communities in northeastern Iowa.

4.1.4.3 Economic Development—Consequences

Tourism. No-Build Alternative. Lansing would not be directly accessible by vehicle from the east side of the river during closure of the existing bridge for rehabilitation (Section 3.2.1 describes the potential range of traffic closures for rehabilitation). Potential visitors to Lansing from east of the river would need to cross the river at another location and drive either north or south to Lansing. Given this inaccessibility by vehicle, there is a high potential that tourism would be negatively impacted while the bridge is closed for planned rehabilitation activities. However, rehabilitation is not expected to interfere with river navigation, so river-based recreational traffic would not likely be impacted by the No-Build Alternative.

Build Alternatives. The Black Hawk Bridge would remain open during construction of any of the Build Alternatives. Therefore, Lansing would remain accessible to tourists throughout the entire construction period. Construction of a new bridge and removal of the Black Hawk Bridge would, however, represent a change in one of Lansing's most visible features.

All of the Build Alternatives would impact river navigation during construction. The timeframe and extent of the disruption would depend on the bridge type constructed. Section 2.2 describes how river recreation can contribute to the local economies along the Mississippi River. The Big Slough Boat Landing would be impacted at least temporarily (with the N3 Alternative), or more directly, with changes to layout and access probably required (for the S1 or S6 Alternatives). There is a possibility that the number of boaters visiting Lansing would decrease during the time of disruption and potentially for an indefinite period depending on whether a landing is maintained at that location after construction of a new bridge. However, boaters would still be able to utilize nearby landing options, such as the Iowa DNR Village Creek Landing south of Lansing. Additionally, it is possible that the City of Lansing could temporarily reinstall a public boat landing that had previously been located at the City Marina.

4.1.4.4 Existing Businesses

No-Build Alternative. While the No-Build Alternative would not have a footprint impact on businesses in Lansing, a period of bridge closure for deck rehabilitation (see Section 3.2.1) could have an economic impact. The cost of delivering raw materials and products may increase because alternate shipping routes would need to be used. There is a potential that these costs would be passed onto consumers. The bridge closure would also increase the commute times for those employees commuting to or from Lansing. Potential economic impacts would be temporary and only associated with bridge maintenance and rehabilitation.

Alternatives N3 and S1. Commercial or industrial property would not be directly impacted by these Build Alternatives in the vicinity of the bridge approaches. There is potential for direct building and parking impacts if improvements are made at the intersection of 2nd Street and Main Street (see Section 3.5.3 and Exhibit 3-5 for additional details).

Alternative S6. The footprint of this alternative would impact up to six commercial properties. Four of the properties would be impacted by the bridge footprint or roadway connection. Additionally, two commercial buildings would potentially be impacted by intersection improvements required to accommodate turning movements back to Main Street from 3rd Street.

An additional concern with Alternative S6 is the reroute of IA 9 off of Main Street. The new route would remove through traffic from the primary business district of Lansing. This could result in a decrease in “drive-by” business for local store owners; however, the business district would still be easily accessible from IA 9. Additionally, roadway signs could be used to help direct motorists to the Lansing business district.

Table 4-6 summarizes the impacts the three Build Alternatives would have on commercial properties. As discussed above, Alternative S6 would result in a higher number of impacts to commercial properties than Alternatives N3 and S1.

TABLE 4-6
Commercial Property Impacts

	Alternative N3	Alternative S1	Alternative S6
Direct Impacts from Bridge Footprint or Roadway Connection	0	0	4
Partial Property with Potential Direct Impacts (Includes Potential Turning Movement Improvements at 2nd and Main or 3rd and Main)	1 ^a	1 ^a	2
Total Potential Business Property Impacts	1^a	1^a	6

^a One commercial structure would be directly impacted by one of the turning movement options associated with Alternatives N3 and S1. See Section 3.5.3 and Exhibit 3-5 for more information.

4.1.4.5 Economic Development—Measures to Minimize Harm and Mitigation

Regardless of the alternative selected, reduction of bridge closure periods will be an important part of the impact minimization strategy. Citizens of Lansing and other users of the bridge will need to be given advance notice for those times when closure is necessary.

As shown above, there are more properties potentially impacted only partially by the proposed alternatives than properties and the building directly impacted. In cases where roadway improvements are designed after selection of a bridge location, there may be opportunities to reduce the impacts associated with turning movement options or new roadway construction by utilizing less intrusive construction methods.

4.1.5 Residential Development

4.1.5.1 Residential Development—Affected Environment

Housing in the project area in Lansing includes a mix of single family residences, apartment buildings and mobile homes. Of the 573 housing units within the Lansing city limits recorded by the 2000 census, approximately 61 percent are single unit structures, 20 percent are apartments and 19 percent are mobile homes. As described in Section 4.1, residential areas in the core portion of Lansing are located primarily north and west of the central business district, and also north of Main Street between the river and IA 26. Residential areas within Lansing are depicted in Exhibit 4-1.

The homeowner vacancy rate was 2.4 percent and the rental vacancy rate was 12.5 percent. The levels are higher than the Allamakee County vacancy rates (1.9 and 6.7 percent, respectively), and the Iowa statewide and national vacancy rates, which were both 1.7 percent for homeowners and 6.8 percent for rentals.

There were 141 vacant housing units in Lansing in 2000, which translated into a vacancy rate of 24.5 percent. Ninety-nine of these vacant units (20.5 percent) were classified as seasonal, recreational or occasional use. The statewide seasonal vacancy rate was 1.3 percent. This data reinforces the economic importance of seasonal tourism centered on the natural and cultural resources of the Mississippi River on the city of Lansing.

The median reported value of owner occupied housing was \$70,400 in 2000, less than the statewide median value of \$82,500. Almost 55 percent of the units had an estimated value of \$50,000 to \$99,999. Approximately 30 percent of the owner occupied units were valued at less than \$50,000. Eight structures were valued between \$200,000 to \$299,999 – the highest home values reported. At the corner of Center Street and 7th Street on the west side of Lansing is a multi-unit, privately-owned complex of apartments that are available for low-to-moderate income tenants. Vouchers from the Department of Housing and Urban Development (HUD) may be used toward rent at this complex.

According to the 2000 Census of Population and Housing, more than 54 percent of the housing structures in Lansing were constructed prior to 1940 and 70 percent were built before 1960. A high concentration of older single family homes is located on the west side of Front Street adjacent to the north and south sides of the existing bridge. A mixture of single family and multi-family homes are present along 2nd Street between the existing bridge and Main Street.

4.1.5.2 Residential Development—Consequences

Several residences could be impacted by the range of Build Alternatives. These structures would be demolished or relocated as appropriate to accommodate bridge construction and associated local roadway reconstruction. The potential impacts are summarized in Table 4-7. The primary impact of Alternative S6 is to place a large retaining wall in front of the houses along John Street east of 3rd Street. This retaining wall for the bridge approach would eliminate access to these houses from John Street. The west connection would not directly impact houses or cause any relocations, but would require the use of portions of residential properties, including outbuildings associated with them.

TABLE 4-7
Residential Property Impacts

	Alternative N3	Alternative S1	Alternative S6
Residential relocations resulting from direct bridge footprint or roadway connection	3	2	4
Potential residential relocation resulting from potential direct impacts (Includes Potential Turning Movement Improvements to Main Street)	1 ^a	1 ^a	0
Partial property impacts (no relocation required)	1	0	15 ^b

^a The property is a multi-unit apartment complex on top of a commercial establishment at the corner of 2nd Street and Main Street – potentially impacted by possible future improvements to that turning movement.

^b A small portion of right-of-way from the edge of several properties on the west side of Lansing would be required in order to complete the West Connection – described in Section 3.5.4

4.1.5.3 Residential Development—Measures to Minimize Harm and Mitigation

A review of the *Allamakee Journal* and real estate magazines from October 2003 through February 2004 revealed that available homes for sale in Lansing (comparable in characteristics and price of impacted homes) exceeded the number of homes that would be impacted by any of the Build Alternatives. During later phases of this project, when impacts to residences could be more clearly quantified, the Iowa DOT would work with affected home/property owners.

Retaining walls are proposed for incorporation to minimize direct impacts to properties. While direct impacts are avoided, the use of retaining walls can create additional indirect impacts.

An extensive environmental review process will need to be completed prior to the acquisition of any properties. The Iowa DOT does not have plans to begin environmental reviews at this time; therefore, there are no plans for right-of-way acquisition. However, if the Iowa DOT moves forward with a new river crossing, the acquisition and relocation program would be conducted in accordance with the *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970*, as amended when the project moves into the NEPA phase. Relocation resources are available to all residential and business owners facing relocation without discrimination. However, as noted above, there are no plans for any right-of-way acquisitions at this time.

4.1.6 Institutional and Public Services

4.1.6.1 Institutional and Public Services—Affected Environment

Exhibit 4-1 shows the locations of public lands that accommodate community resources and facilities in the IA 9/ WI 82 Corridor Feasibility Study area.

Fire, Ambulance, and Police Protection. The Lansing Fire Station is located at the southwest corner of the intersection of Front Street and Main Street. The Fire Department also stores equipment at a building located on the north side of John Street near Front Street.

The Lansing Fire Department is staffed by 30 volunteer fire fighters. In addition to serving Lansing, the Department provides services to the Iowa towns of New Albin, Harpers Ferry, Waukon, Waterville, and Postville, based on Mutual-Aid agreements. The Lansing Fire Department also has Mutual-Aid agreements to provide services to the entire Wisconsin Highway 82 causeway, De Soto, Wisconsin, and rural areas south on Wisconsin Highway 35 toward Ferryville.

The Lansing Ambulance Service uses Lansing Fire Department garage space on South Front Street. When individuals require hospitalization, they are often transported by ambulance from Lansing to the Veterans Memorial Hospital in Waukon on IA 9. If an illness or injury is more serious, patients are often transported to either the Gundersen-Lutheran Hospital or Franciscan Skemp Hospital in La Crosse, Wisconsin. Patients may also be transferred from the Lansing Ambulance Service to another ambulance service at a point between Lansing and La Crosse. The preferred and fastest ambulance route to La Crosse is via WI 82 and then north on WI 35. The estimated drive time along this route is approximately 30 minutes. In cases of severe injury or illness, The Lansing Ambulance Service contacts MedLink helicopter service in La Crosse. The time from the call to helicopter arrival is 10 minutes.

The Police Department is located at the City Hall (201 John Street). The City of Lansing has two full time police officers. The service area of the Lansing Police Department includes rural areas around the City of Lansing through Mutual-Aid agreements.

Health Care Facilities. While there are no hospitals in Lansing, the Gundersen Lutheran Clinic at 50 N. Fourth Street provides routine health care services, including a vision center, on-staff family practitioners, and medical professionals. The clinic is open 8 a.m. to 5 p.m. on Mondays through Fridays. Routine (non-emergency) hospital service for Lansing is also provided out of Waukon. The nearest emergency care facilities are Gundersen Lutheran and Franciscan Skemp hospitals located in La Crosse. Most of the health care for Lansing and Allamakee county residents is provided by these hospitals and their related clinics in La Crosse. These hospitals also receive the majority of ambulance trips from Lansing and Waukon and a substantial portion of emergency calls from Waukon and Postville. Prairie du Chien Memorial Hospital, which is less frequently used, is approximately 31 miles south of Lansing with an estimated driving time of 40 minutes.

The Thornton Manor Nursing Center, a senior assisted living residence, is located at 1329 Main Street. The Center has a maximum capacity of 60 beds plus an additional 13 assisted-living suites. Occupancy rates fluctuate; however, in February 2004, the regular beds were approximately 80-90 percent full. As of February 2004, 3 of the 13 assisted-living suites were occupied. The suites were completed in November 2003.

Schools. Lansing is part of the Eastern Allamakee Community School District that includes the Lansing Middle School and the Kee High School. Information about schools located in the Eastern Allamakee Community School District located in Lansing is summarized in Table 4-8. The New Albin Elementary School, in New Albin serves children in pre-school through 3rd grade.

Libraries. The Lansing Public Library is located at 515 Main Street and is part of the Northeast Iowa Library Service that serves Allamakee and surrounding counties in northeast Iowa.

TABLE 4-8
Key Characteristics of Schools in Lansing

School	Location	Number of Students	Number of Teachers	Bus Service
Lansing Middle School (grades 4th – 8th)	696 Main Street	195	16	Yes
Kee High School	569 Center Street	189	15	Yes

Utilities. The water supply for Lansing is supplied by two wells – one located northwest of Mount Hosmer and the other located at the intersection of Main and Front Streets adjacent to the Mississippi River. Each well is approximately 700 feet deep.

The wastewater treatment plant for Lansing is located approximately ¼ mile south of the City limits on County Road A-52. The treatment plant was built in 1968. Input to the wastewater treatment plant is primarily sanitary waste. A small volume of stormwater enters the wastewater treatment plant, though the majority of it is directed to the Mississippi River without stormwater detention.

The Alliant Energy Lansing Power Station is located at 2320 Power Plant Drive, approximately 3 miles south of Lansing on CR 52. The Alliant Energy facility is coal-fired. All coal used by the Alliant plant is supplied via river barge. High tension power lines run above-ground from the Alliant plant north toward Lansing. An electrical substation is located southwest of Lansing on Valley View Road. Telephone service is provided to Lansing by Qwest using above-ground telephone lines. Cable service, provided by MediaCom to Lansing, uses the same telephone poles. Currently, no natural gas is supplied to the City of Lansing. The Black Hawk Bridge is not used to convey any utilities across the Mississippi River. However, there are electrical conduits located on the bridge that are used to power lights that assist barges in navigation past the bridge. In June 2004, ornamental lights were added to the Black Hawk Bridge. These ornamental lights were privately funded (by the “Bridge Lighting Committee”) and are not meant for river navigation purposes, nor are they maintained by either DOT.

Churches and Cemeteries. Table 4-9 describes the approximate locations of the churches and cemeteries in the vicinity of Lansing.

TABLE 4-9
Project Area Cemeteries and Churches

Name	Location
Our Savior's Lutheran Church	480 Diagonal Street, approximately 300 feet north of IA 9
United Methodist Church	490 Center Street, approximately 600 feet south of IA 9
Immaculate Conception Catholic Church	648 Main Street (IA 9)
Gethsemane Cemetery	Approximately 2.5 miles west of Lansing on IA 9
Old Oak Hill Cemetery	Western side of Lansing, on South Road

4.1.6.2 Institutional and Public Services—Consequences

No-Build Alternative. As described above, routine hospital service for Lansing is typically provided out of Waukon and would not be impacted by a closure of the crossing. During the time the bridge is closed for rehabilitation, the Lansing ambulance service would need to use IA 26 for northbound emergency trips to the La Crosse hospitals. The Lutheran and Franciscan Skemp Hospitals are located on the south side of La Crosse, requiring a southbound trip on WI 35 after crossing at the U.S. 14/61 Mississippi River crossing. Not only is the trip on IA 26 slower than the existing WI 35 route, but also the trip through La Crosse to the hospital adds more time to the reroute – creating a trip time that is approximately 10-15 minutes longer than the current route.

The primary impact to fire department services for Lansing would be the inability of fire departments on either side of the river to fulfill their mutual-aid agreements (i.e. the Lansing fire department would not be able to respond to a fire in DeSoto, WI).

The No-Build Alternative would not have a measurable impact on other public services or utilities in the City of Lansing. The No-Build Alternative would not impact churches or cemeteries in or around the City of Lansing.

Build Alternatives. The Black Hawk Bridge would remain open during the construction period for Build Alternatives N3, S1, and S6. These alternatives would not hinder emergency services (i.e. ambulance and fire) required to cross the Mississippi River on the Black Hawk Bridge and the WI 82 causeway.

Build Alternatives N3 and S1 would not measurably impact schools in Lansing. Compared to existing conditions, Alternative S6 would route more traffic past Kee High School, located on Center Street, though this would mean less traffic being routed past Lansing Middle School, located on Main Street. The potential for collisions increases when local and regional traffic is routed near school-related traffic such as pick-up and drop-off areas. Additionally, the Alternative S6 location (being nearly adjacent to the City Hall) would cause a substantial change in how police officers access their offices, as their regular parking area is on the north side of City Hall.

Exact locations of utility lines and conveyances would have to be located prior to construction activities associated with the Build Alternatives. Disruptions to utilities associated with construction, if any, are expected to be minor and temporary.

No churches or cemeteries would be impacted by any of the Build Alternatives.

4.1.6.3 Institutional and Public Services—Measures to Minimize Harm

Phasing of bridge deck rehabilitation so that the crossing could remain open during certain periods of the day is a potential measure to minimize the impact on services that require use of the bridge. However, such an approach would lengthen the deck rehabilitation period up to an additional six to eight months.

The Iowa DOT would assist those associated with institutions and public services located within and serving the City of Lansing and the surrounding communities in addressing any special needs that they may encounter during any construction process. Efforts would be made to minimize service disruptions to users of these facilities.

4.1.7 Demographics—Population Levels and Trends

The population most directly affected by the proposed action is the City of Lansing; therefore, that is where much of the analysis in this section is focused. However, because this river crossing serves a broader population than Lansing, data is also provided for the larger area as appropriate. It should be noted that within this study area, there are no commercial buildings or residences on the Wisconsin side of the Mississippi River.

4.1.7.1 Demographics—Population Levels and Trends—Affected Environment

According to the 2000 U.S. Census, Lansing has 1,012 residents—roughly 7 percent of Allamakee County’s population of 14,426. In 1990, Lansing’s population was 1,007 and Allamakee County’s population was 13,855. On the other side of the Black Hawk Bridge is Crawford County, WI. The population of Crawford County, WI was 17,062 in 2000, up from 15,940 in 1990. Prairie du Chien, the Crawford County seat, is located in the southern part of the county, and has a population of 6,018, up from 5,657 in 1990.

TABLE 4-10
Percent Population by Age

Age in Years	Lansing, IA	Allamakee Co., IA	State of Iowa
Under 5	5.4	5.9	6.4
5 to 19	16.9	21.8	21.8
20 to 64	50.3	54.0	56.8
65+	27.3	18.5	14.8

Source: 2000 Census

Age. Table 4-10 shows that, in general, there is a high concentration of elderly people in northeast Iowa. Over 27 percent of Lansing residents and 18.5 percent of the county residents are over the age of 65. This is greater than both the state average of 14.8 percent and the national average of 12.4 percent. Southwest Wisconsin also has a higher concentration of elderly residents than the Wisconsin statewide average or the national average. The higher than average percentage of elderly people in Lansing is important to consider, particularly for providing convenient access to major hospitals and health care facilities.

TABLE 4-11
Percent Population by Race

Racial Group	Lansing, IA	Allamakee Co., IA	State of Iowa
White	99.0	95.9	93.9
African American	0.1	0.1	2.1
American Indian or Alaska Native	0.0	0.2	0.3
Asian	0.4	0.3	1.3
Native Hawaiian and Other Pacific Islander	0.0	0.0	0.0
Latino or Hispanic (of any race)	0.6	3.5	2.8
Other or Two or More Races	0.0	3.5	2.4

Source: 2000 Census

Race. Racial distribution in Lansing is shown and compared to Allamakee County and Iowa in Table 4-11. The percentages in this table sum to over 100.0% because of double

counting that occurs with the “Latino or Hispanic” and “Two or More Races” categories.

Income and Poverty Levels.

Table 4-12 shows that median household incomes for Lansing and Allamakee County were \$29,482 and \$33,367, respectively – both of which are lower than the statewide median household income.

Table 4-13 shows that approximately 4 percent of families in Lansing were below the poverty level, compared to 6 percent of Iowa families and 9.2 percent of families nationally. However, 12.4 percent of Lansing residents over the age of 65 were below the poverty level in 2000, compared to 7.7 percent for Iowa and 9.9 percent nationally. The Census Bureau poverty threshold for a family of four in 2000 was \$17,603. The poverty threshold for a family of two with individuals aged 65 years or over was \$10,419.

TABLE 4-12
Percent Population by Income Status

Income	Lansing, IA	Allamakee Co., IA	State of Iowa
Less than \$10,000	8.2	8.6	8.2
\$10,000-\$24,999	30.6	24.9	21.1
\$25,000-\$49,999	39.6	39.7	33.7
\$50,000-\$74,999	14.5	16.2	21.0
\$75,000-\$99,999	5.8	6.7	8.8
\$100,000-\$149,999	0.7	2.8	4.9
\$150,000 or more	0.6	1.2	2.4
Median Household Income (Dollars)	\$29,482	\$33,367	\$39,469

Source: 2000 Census

TABLE 4-13
Percent Population Below Poverty Level

	Lansing, IA	Allamakee Co., IA	State of Iowa
Families	4.2	6.4	6.0
With related children under 18 years	3.3	10.7	9.3
With related children under 5 years	0.0	12.7	12.7
Persons over 65 years	12.4	8.1	7.7

Note: The U.S. Bureau of the Census determines poverty thresholds and updates these thresholds annually based on the Consumer Price Index.

4.1.7.2 Demographics—Population Levels and Trends—Consequences

Based on discussions with local community officials and review of the data provided in Tables 4-12 and 4-13 none of the alternatives would be expected to have an inordinate impact on the demographics of Lansing. No disproportionate impacts to low-income, elderly, or minority residents of Lansing are anticipated.

4.1.8 Community Characteristics

4.1.8.1 Community Characteristics—Affected Environment

Aesthetics. The project area has high visual interest and diversity. The bluffs west of the Mississippi River within the historical City of Lansing contrast with the relatively flat low-lying floodplain east of the river. The Mississippi River provides scenes typical of a big river and is the most visually impressive natural feature in the project area. Because of its age and

truss design, the Black Hawk Bridge is visually interesting. The summit of Mount Hosmer offers a particularly noteworthy view of the Black Hawk Bridge. Images of the Black Hawk Bridge have been used frequently for tourism marketing to attract visitors to Lansing and Northeast Iowa in general. The City of Lansing provides scenes typical of a small river community.

Community Cohesion. Community cohesion refers to the social bonds that currently exist among Lansing residents, as well as people from the surrounding areas who support the local businesses, use public resources, and participate in the social activities within the community.

The business district area of Lansing that surrounds Main Street forms the core of daily life in Lansing, with restaurants, convenience stores, banking, and a grocery store available. Immediately south of the business district is the City Sports Complex, the location for many of Lansing's social events, including "Fish Days." South Front Street and 2nd Street form natural pedestrian and vehicular connections to this recreational area. Additionally, the Complex's parking area serves as a spillover parking area for downtown businesses. North of the city is Mount Hosmer Park, which is accessed by a road that climbs the bluff starting just west of 6th Street.

4.1.8.2 Community Characteristics—Consequences

Aesthetics. All of the Build Alternatives would impact views both of and from the Black Hawk Bridge. Views of and from a proposed facility are considered in evaluating aesthetic or visual impacts. The impacts of any of the Build Alternatives on the view of the Lansing area would be judged by the "intactness" of the affected areas. Intactness refers to the degree to which the landscape retains its conditions. Generally, the Build Alternatives would create more visual changes than the No-Build Alternative.

No-Build Alternative. There would be no aesthetic impacts under the No-Build Alternative; the Black Hawk Bridge would remain a prominent feature in the river view for motorists, tourists, and Lansing residents.

Alternatives N3 and S1. The three Build Alternatives would impact the aesthetics of the Mississippi River valley, particularly that of the viewshed from the scenic overlook at the top of Mount Hosmer Park. Alternatives N3 and S1 would place a new bridge in only a slightly different location than the existing bridge (approximately 50 feet in either direction). Given the limited land use changes and deviation from existing location, views of the river crossing (beyond those of the bridge aesthetics, described below) and views from the river crossing would not appreciably change under either of these alternatives.

Alternative S6. Alternative S6 would result in a more noticeable change in the Mississippi River view given that this alternative is located approximately 1,260 feet farther downstream from the existing bridge. Views from this bridge location would provide an entirely new view of the City of Lansing. Whereas the current location does not provide a direct view of the downtown that goes much beyond Front Street, Alternative S6 would offer a view of the heart of the business district. Views of the bridge would also change—the river crossing would be more visible than the current bridge, which is generally obscured by the bluffs on the north side of town.

The use of retaining walls for the roadway approach down to John Street from the bridge would represent a substantial change in aesthetics for residents located north of John Street between 2nd Street and 3rd Street. The retaining wall would be up to 12 feet tall in some locations. East of 2nd Street, the use of structure (i.e. piers) would help to reduce the aesthetic impacts of a bridge crossing at John Street; however the structure would have a shading effect on properties to the north.

South of John Street, aesthetic impacts would be limited to the City Hall, where the bridge approach retaining wall would come close to the building. There would be no indirect impacts to the City Sports Complex (however a “constructive use” discussion would be important for future development of a Section 4(f) evaluation – see Section 4.4 for more on this topic).

New Bridge Structure. From a community character perspective, loss of the Black Hawk Bridge would have an impact. The existing bridge, while not as old as many of the buildings in Lansing, is representative of the community’s history. A new crossing would change the connectivity between the river crossing and the historic character of Lansing.

Of the two bridge structures retained for analysis, the truss bridge option is most consistent with the current Black Hawk Bridge (which is also a truss bridge). If the truss bridge option were selected for a new crossing, there may be opportunities to reflect a style similar to that of the current bridge.

Community Cohesion.

No-Build Alternative. The No-Build Alternative is not expected to permanently alter the existing level of community cohesion in Lansing. This alternative would leave the bridge and existing highway corridors in their existing locations, thereby not introducing a new river crossing location or highway corridor that might be perceived as a disruption to community cohesion.

There is some potential for a temporary disruption in community cohesion while the bridge is undergoing major rehabilitation. The Black Hawk Bridge would be unusable for a lengthy period of time if full closure of the bridge is required for bridge deck rehabilitation. Individuals who normally use the bridge to travel to and from Lansing (e.g. residents of nearby communities in Wisconsin) could reduce the frequency of their trips, given the temporary inconvenience of needing to go upstream or downstream to cross the river.

Alternatives N3 and S1. These Build Alternatives are not expected to permanently or temporarily alter the existing level of community cohesion in Lansing. A new bridge would be built either directly north (N3) or south (S1) of the existing bridge and no new highway corridor would be created. Additionally, the existing bridge would remain in use while a new bridge is being constructed under either alternative. Therefore, there would be less disruption to aspects of community cohesion from these alternatives during construction as compared to the No-Build Alternative.

Alternatives S6. The new bridge and IA 9 corridor location that would be introduced under Alternative S6 may be perceived as a community divide, most notably for residents of Lansing living south of Center Street who would need to cross new IA 9 to access the Lansing business district. Alternative S6 would direct traffic into areas of Lansing where little traffic had occurred previously.

Traffic on southbound 2nd Street would be dead-ended at John Street where through traffic (and access to the City Sports Complex and City Hall) is currently possible. Pedestrian access to the Sports Complex from 2nd Street would also potentially be lost, eliminating a primary connection between downtown and the events that take place at the complex. Approximately one-third of the public parking area (about 10 stalls) located by the Sports Complex could also be lost under the S6 Alternative. As described above, this parking area serves multiple uses, for use by visitors of City Hall, City Sports Complex users, and also as spillover parking for downtown visitors.

As with Alternatives N3 and S1, the existing bridge would remain in use while a new bridge is being constructed under Alternative S6.

4.1.8.3 Community Characteristics—Measures to Minimize Harm and Mitigation

Any future study will include further detailed analysis of whether or not a new river crossing and corridor would potentially cause an adverse impact to any community or neighborhood. Efforts will be made to ensure individual and community impacts are integrated into the decision making process for the project. Measures to minimize adverse impacts to aesthetics and community cohesion could include roadway design features to blend with the existing landscape, if feasible, maintenance of pedestrian access at key locations such as the 2nd Street corridor between downtown and the Sports Complex, and consideration of vegetative screening where practicable to minimize visual impacts on adjacent properties.

4.2 Cultural Resources

Information in this section is based on a cultural resources report prepared for this study entitled Cultural Resources Review for the Region Surrounding the Community of Lansing, Allamakee County, Iowa, and Adjoining Parts of Crawford County, Wisconsin (March 2003) and its Addendum (May 2004). Hereafter, the documents shall be referred to as the “Cultural Resources Review.” The primary goals of the Cultural Resources Review were: (1) to identify architectural properties listed in or potentially eligible for nomination to the National Register of Historic Places (NRHP), and (2) evaluate the potential for prehistoric and historic archeological properties. Resources identified in this study are depicted in the Aerial Photo Exhibit, attached to the back of this study.

As described in Section 4.1.1, there are no buildings on the Wisconsin side of the project study area. For this reason, the historic architectural review focused primarily on downtown Lansing and adjoining areas fronting the Mississippi River and the bluffs overlooking the confluence of Clear Creek and the Mississippi River. The archeological review covered the same area, but also areas further west in the Clear Creek valley and on the valley floor of the Mississippi River (concentrating on the area of alternatives review).

4.2.1 Cultural Resources—Affected Environment

4.2.1.1 Historic Architectural Resources

Approximately 250 structures in Lansing were identified as meeting the minimum criteria for consideration as historic properties. Of those properties, 44 were identified as historically

significant and individually met the eligibility criteria for listing on the NRHP. The Black Hawk Bridge is one of the structures identified as eligible for listing. As shown in Table 4-14, five structures in Lansing have already been listed on the NRHP. The Aerial Photo Exhibit shows the locations of eligible and listed properties within the alternatives study area.

TABLE 4-14
NRHP-Listed Structures in Lansing, Iowa

Structure	Address/Location	Description
G. Kerndt & Brothers Elevator and Warehouse	60-90 South Front Street	Date of Listing: October 18, 1979. Mixed materials grain elevator and warehouse buildings next to the Main Street levee; constructed in 1868 and 1880.
Lansing Fisheries Building	South Front Street north of Dodge Street	Date of Listing: December 23, 1991. Constructed in 1925 as the Lansing Fish Rescue Station and later used as a state fish hatchery.
Kerndt Brothers Office Block	391 Main Street	Date of Listing: November 10, 1982. Three-story brick commercial block built in 1863; now used as community building. Anchors the western end of the lower downtown business district.
Lansing Stone School	509 Center Street	Date of Listing: December 18, 1973. Greek revival style stone schoolhouse built in 1864.
Old Allamakee County Courthouse	650 South Second Street (south of Clear Creek)	Date of Listing: February 24, 1983. Two-story stone Greek revival style county courthouse built in 1861.

A conclusion from the historical and architectural survey conducted in the Cultural Resources Review was the following:

“Lansing is one of the best preserved historic areas in the Upper Mississippi Valley, with a rich rivertown history and outstanding architectural heritage. The overall appearance and pattern of its built environment was shaped in large part by nineteenth century land uses, architectural styles, and building traditions that remain dominant in the city’s older commercial and residential neighborhoods.”

4.2.1.2 Prehistoric Archeological Resources

The March 2003 portion of the Cultural Resources Review concluded that the potential for encountering Native American burials within the Lansing area is high. However, many of these are likely to be located on the upland summits/bluffs overlooking the Mississippi River. The May 2004 addendum to the Cultural Resources Review documents soil tests that were conducted on the Wisconsin side of the river in the area of alternatives review. The results were used to assess the Mississippi River islands for their potential to contain prehistoric archaeological resources. The constantly changing nature of these floodplain islands (with annual flooding events and continually shifting islands), indicates that it was unlikely that permanent land uses would ever have been established and remain in place for discovery at a future date. Because of this, it was determined that there is little potential for finding prehistoric archaeological resources on these islands. The Cultural Resources Review recommended that no additional cultural resources work be conducted for the Mississippi River islands within the area of potential effect for the alternatives being studied.

One burial site, recorded prior to completion of the Cultural Resources Review, is known to have occurred near Clear Creek. Remains and artifacts have been removed from this site, and the current historical significance of the site is unknown. This site is situated well south of Alternative S6 and would not be disturbed by construction activities.

4.2.1.3 Historic Archeological Resources

Based on the Cultural Resources Review, 50 potential archeological sites (historical structures that no longer exist) have been documented within the city limits of the City of Lansing. Many of these potential archaeological sites have no potential to be impacted by the proposed alternatives for replacement of the Black Hawk Bridge because of their locations.

4.2.2 Cultural Resources—Environmental Consequences

4.2.2.1 Historic Resources

The No-Build Alternative would not affect historic architectural resources. Additionally, the Black Hawk Bridge, which is eligible for listing on the NRHP, would remain in place. Although the bridge deck rehabilitation that is part of the No-Build Alternative is not anticipated to be a potential historic impact, coordination with the cultural resource staff in Iowa DOT's Office of Location and Environment and the Iowa SHPO will be necessary before any work is started. Alternatives N3, S1, and S6 would all result in the removal of the Black Hawk Bridge. Additionally, Alternative S1 would impact one historic structure that is eligible for the NRHP. Alternative S6 would impact three properties that are either currently listed on the NRHP or NRHP-eligible.

4.2.2.2 Archaeological

No prehistoric archeological sites have been identified in the area of potential effect. Alternative S6 could have impacts to two potential historic archeological sites.

4.2.3 Cultural Resources—Measures to Minimize Harm and Mitigation

The Cultural Resources Review identified historic and archaeological sites and recommended further review of them only upon formal implementation of the NEPA and Section 106 processes. This recommendation was made primarily because one of the archaeological sites is considered unlikely to contain any historic artifacts, and the other is considered to be marginally located in a potential area of impact for the S6 alternative.

The sites identified in the consequences section above will require further review under the requirements of Section 4(f) at the time of NEPA documentation. The Iowa DOT will coordinate with the State Historic Preservation Office (SHPO) and owners of the properties to minimize and/or mitigate for impacts to historic or archeological resources impacted by any of the alternatives that were retained for additional analysis. In order for Section 4(f) to be applicable to an eligible site, a determination of “use” of the resource is needed. See Section 4.4 for a review of Section 4(f) and the list of resources identified as needing further consideration in the future.

Under any of the Build Alternative scenarios, the Black Hawk Bridge would not be retained by the Iowa DOT for transportation purposes. The Iowa DOT would, however, under the Section 106 process, seek a responsible agency or group to whom they could transfer ownership of the existing bridge. The new owner would be responsible for any future maintenance, liability, and

repair of the bridge. The new owner would also be responsible for, per USCG requirements, the demolition of the bridge when it no longer serves a transportation purpose. Unless Iowa DOT transfers ownership of the Black Hawk Bridge to another agency or group, it would be demolished to remove the obstacle from the river, for river traffic.

Upon official determination of an adverse effect on the Black Hawk Bridge, Iowa DOT would develop, in coordination with the FHWA and the State Historic Preservation Officer, a Memorandum of Agreement documenting the mitigation efforts.

4.3 Environmental Resources

4.3.1 Surface Water and Water Quality

The National Cooperative Highway Research Program (NCHRP) Report # 474 - Assessing the Impacts of Bridge Deck Runoff Contaminants in Receiving Waters, Volume 1: Final Report and Volume 2: Practitioner's Handbook (Dupuis 2002) provides a concise list of road runoff-related water quality constituents that are the focus of this section.

4.3.1.1 Surface Water and Water Quality—Affected Environment

The reach of the Mississippi River in the study area is not listed as an impaired water as summarized in either the 1998 or 2002 "303d List of Impaired Waters," though several River reaches that are a considerable distance downstream are listed as impaired.

Clear Creek, a tributary of the Mississippi River, flows through Lansing. Clear Creek is a cold water stream. Per Iowa Senate File 2293 (2002 General Assembly) and Iowa's Water Quality Standards in 567 Iowa Administrative Code, Chapter 61.3 (5) "e," the reach of Clear Creek from its mouth to the west line of Section 25, Township 99N, Range 4W (i.e. within the project area) is designated as a High Quality (HQ) Water. The Iowa Department of Natural Resources (DNR) defines HQ Waters as "waters with exceptionally better quality than the levels specified in the Water Quality Standards and with exceptional recreational and ecological importance."

Historical water quality data for the Mississippi River was obtained from the U.S. Environmental Protection Agency's (EPA) STORET database for the 1994-1998 period, the most recent data available. The EPA samples were taken from a sampling station located near Lynxville, Wisconsin (approximately 17 miles downstream of Lansing) above Lock and Dam #9. Table 4-15 summarizes relevant data from these samples. The measured constituent concentrations are generally compliant with Iowa water quality standards, with the exception of an occasional aberrant low dissolved oxygen concentration. The standard for the minimum concentration of oxygen in surface water is 5 mg/L, though oxygen concentrations of less than 5 mg/L have been recorded at the Lynxville monitoring station.

The Average Daily Traffic (ADT), in general, is positively correlated with levels of water quality constituents. The 2001 ADT on the Black Hawk Bridge was 2,280 vehicles per day (vpd), and the 2030 projected ADT is 2,920 vpd. (See Appendix B for additional information on the existing and projected traffic in the study area). Generally, roadway runoff (or in the case of the Black Hawk Bridge, direct discharge through the open steel grate deck) does not pose a substantial threat to the water quality of the receiving waters when ADTs are under 30,000 vpd (Dupuis 1985).

TABLE 4-15
Historical Surface Water Quality, Mississippi River at Lynxville (17 miles downstream from Lansing, IA)

Parameter (1994-98)	Iowa Water Quality Standards		Measured Levels of Selected Water Quality Constituents		
	Acute	Chronic	Average	Minimum	Maximum
Chloride (mg/L)	No standard	No Standard	15.4	7.9	24
Nitrite + Nitrate (mg/L as N)	No standard	No standard	1.27	0.07	2.47
Nitrogen, Ammonia (mg/L as N)	9.8	2.0	0.1	0.01	0.44
Nitrogen, Kjeldahl (mg/L as N)	No standard	No standard	1.1	0.5	1.7
Oxygen, Dissolved (mg/L)	5.0	5.0	10.5	4	18.1
Phosphorus, Dissolved – Orthophosphate (mg/L as P)	No standard	No standard	0.068	0.002	0.162
Phosphorus (mg/L as P)	No standard	No standard	0.148	0.056	0.237
Total Suspended Solids – Particulates (mg/L)	750	750	28	2	88

Source: USEPA – STORET Database

The concentration of water quality constituents prior to and after mixing in the Zone of Initial Dilution (ZID) is important to consider. Water quality studies involving wastewater effluent and bridge deck runoff provide examples that demonstrate this relationship. Miller and Hallberg (1997) found that wastewater effluent (prior to mixing in the ZID) at the Lansing Wastewater Treatment Plant was highly toxic to a species of water flea and to the fathead minnow, two species commonly used in toxicity research. However, they found that the wastewater effluent at the end of the ZID was not toxic to these species. Similarly, bridge deck runoff may contain toxic levels of constituents while on the bridge; however, levels would not be toxic when diluted with massive volumes of water; e.g. at the end of the ZID.

Several design features and maintenance procedures on the Black Hawk Bridge are relevant to a discussion of existing water quality conditions. The deck of the Black Hawk Bridge is an open grid and no deicing salts are currently applied to the deck (personal communication, City of Lansing, November 2003). The Black Hawk Bridge requires periodic re-painting; however, this procedure is done in compliance with the Clean Water Act, and only negligible amounts of paint related debris enter the Mississippi River.

4.3.1.2 Surface Water and Water Quality—Environmental Consequences

The effect on water quality of the proposed bridge replacement alternatives in comparison to the existing bridge is dependent on several factors of bridge design, construction/demolition, bridge operation, maintenance, and bridge approach (e.g. 2nd Street) drainage design, such as:

Bridge Design. All proposed new bridge alternatives would have a solid concrete deck as opposed to the open grate deck on the existing Black Hawk Bridge. This implies that de-

icing salts would be applied to the future bridge deck, whereas salt is not currently applied on the existing bridge.

Bridge deck runoff likely would drain directly into the Mississippi River for all proposed bridge alternatives, with a similar effect on water quality as the existing bridge. The existing and projected ADTs for the bridge are well below the level that would contribute to substantial water quality degradation (see Appendix B).

Bridge length is positively correlated with the probability of hazardous spills on the bridge. However, the difference in bridge length between the Build Alternatives and the existing bridge is small thereby making any spill hazard difference negligible. Spill hazard is also a function of on-bridge collision frequency. On-bridge collision frequency would be less probable on a wider bridge as proposed with any of the Build Alternatives when compared to the existing bridge. Additionally, a concrete deck (as proposed for the new bridge alternatives) would provide an opportunity to contain a hazardous spill, whereas the current open grate deck would allow contaminants to spill directly into the river.

Bridge Construction/ Demolition. Demolition of the existing Black Hawk Bridge is assumed for all of the Build Alternatives. Bridge construction and demolition can have an unfavorable effect on water quality, especially given the presence of lead paint on the structure. Several techniques are available to minimize harm to aquatic habitats. These are discussed below.

4.3.1.3 Surface Water and Water Quality—Permits

Several water quality-related permits or certifications may be applicable to rehabilitation of the existing bridge or construction of a new bridge. These permits or certifications may include:

- Section 401 (Clean Water Act) Water-Quality Certification
- Section 402 (Clean Water Act) National Pollution Discharge Elimination System (NPDES)
- Stormwater Discharge Permits
- Section 404 (Clean Water Act) and Section 10 (Rivers and Harbors Act) may also be applicable.

4.3.1.4 Surface Water and Water Quality—Measures to Minimize Harm and Mitigation

Bridge Operations and Maintenance. Concrete, the likely construction material of the proposed bridge alternatives, would periodically require maintenance such as application of sealant or paint. Additionally, exposed steel on the proposed bridge would require periodic re-painting. Similarly, the existing steel bridge requires re-painting. Such maintenance is and will be compliant with recommended procedures in the Clean Water Act and will have negligible impacts on the water quality of the Mississippi River.

Bridge Construction/Demolition. Several proven techniques and Best Management Practices (BMPs) can be incorporated into bridge demolition, construction, and maintenance plans to minimize impacts in ecologically sensitive areas. Key methods with potential applications to the proposed project are described below:

- **Silt curtains.** Silt curtains are a means of settling sediment created from in-stream work from the water column using impermeable geotextiles. The upper edge of the silt curtain

is buoyant as a result of flotation materials. The lower edge of the silt curtain is weighted. Silt curtains function most efficiently where they remain permanently closed throughout the duration of in-stream work. Silt curtains can be used to minimize water quality impacts of pier work; however, silt curtains function best in an environment where water currents are less than 1-2 knots (1.7 - 3.4 feet/second).

- **Gunderbooms.** Gunderbooms are similar to silt curtains, though they are constructed out of permeable geotextiles designed for filtration. Thus, with gunderbooms, some water is allowed to flow through while sediment is not. Like silt curtains, gunderbooms are buoyant along their top edge and weighted along their bottom edge. Where water velocities are too great for silt curtains, gunderbooms provide an alternative.
- **Coffer dams.** Coffer dams of sheet pilings are commonly used for bridge pier construction. These are effective in preventing suspended sediments from entering the river.
- **Low-impact pier removal.** Expansive materials for pier demolition have been used on several environmentally sensitive bridge replacements. The process involves drilling a network of holes in each pier to be demolished and filling the holes with a slurry that expands upon hardening. With this method, bridge piers are reduced to rubble without the use of explosives.
- **Alternative de-icing chemicals.** Several alternative roadway de-icing technologies have been tested and found to be effective. The Minnesota Department of Transportation (2003) found that pre-wetting the pavement with a diluted salt brine solution during a storm event reduced the amount of solid sodium chloride required by 20 percent. The Minnesota Technology Transfer (1999) found that calcium magnesium acetate (CMA) and potassium acetate (KA) were effective in removing roadway ice and “unlike salt [sodium chloride], CMA does not corrode vehicles, harm highway concrete or vegetation, or pose significant health or environmental concerns.”
- **Work windows.** Mussel relocations can be successful if completed when air temperatures are moderate, e.g. in late Spring or early Fall.

4.3.2 Geology and Groundwater

4.3.2.1 Geology and Groundwater—Affected Environment

Areas within the project area that are higher in elevation than the Black Hawk Bridge/2nd Street intersection are generally underlain by thick deposits of bedrock consisting of Prairie du Chien, Galena, Decorah, and Platteville dolomites; and St. Peter, Trempeleau, and Franconia sandstones with frequent outcrops. Away from the floodplain, the landscape is extremely hilly as is characteristic of the Driftless Area, a large area unglaciated in the Wisconsin glacial advance encompassing (in part) extreme Northeastern Iowa. Thin soils atop steep bedrock are mostly deposits of loess, a fine-particled soil of wind-blown origin.

Historically, St. Croix sandstone, Oneota limestone, and to a lesser degree St. Peter sandstone and Trenton limestone have been quarried in the vicinity of Lansing, Iowa. Currently, three active rock quarries are operating within an 8-mile radius of Lansing. An inactive quarry, approximately 3.5 miles southwest of Lansing, is used sporadically. There

are also inactive quarries within Lansing city limits. While these are no longer being used, regulations do not prohibit reactivation.

The Soil Survey for Allamakee County, Iowa (1997) maps two soil associations in portions of the project area lying within Iowa. Areas close to IA 9 are mapped as the Ion-Eitzen-Bertrand Soil Association, and areas higher in elevation are mapped as the La Crescent-Fayette-Village Soil Association.

The Soil Survey for Crawford County, Wisconsin (1961) maps only one soil association in portions of the project area lying within Wisconsin: Alluvial Land (wet, sandy soils on bottom lands). The Alluvial Land Soil Association is formed from river-deposited materials such as gravel, sand, and silt.

Drinking water for the City of Lansing is pumped from two wells, each approximately 700 feet deep. These deep aquifers lie within sandstone geologic formations well beneath the elevation of the Mississippi River. A perched water table is present at the elevation of the Mississippi River and in areas slightly more elevated than the Mississippi River along the Clear Creek valley bottom. Perched water tables are not used for drinking water in the City of Lansing.

Clear Creek, which flows through the City of Lansing, is a cold water stream. Cold temperatures in Clear Creek are attributed to the significant groundwater influence on flow volume. Groundwater seeps, or springs, have been identified on the west side of Lansing, south of IA 9 and in the vicinity of Shaw Street (See Exhibit 4-2). Groundwater comes to the surface at this location year-round and drains to Clear Creek via overland flows.

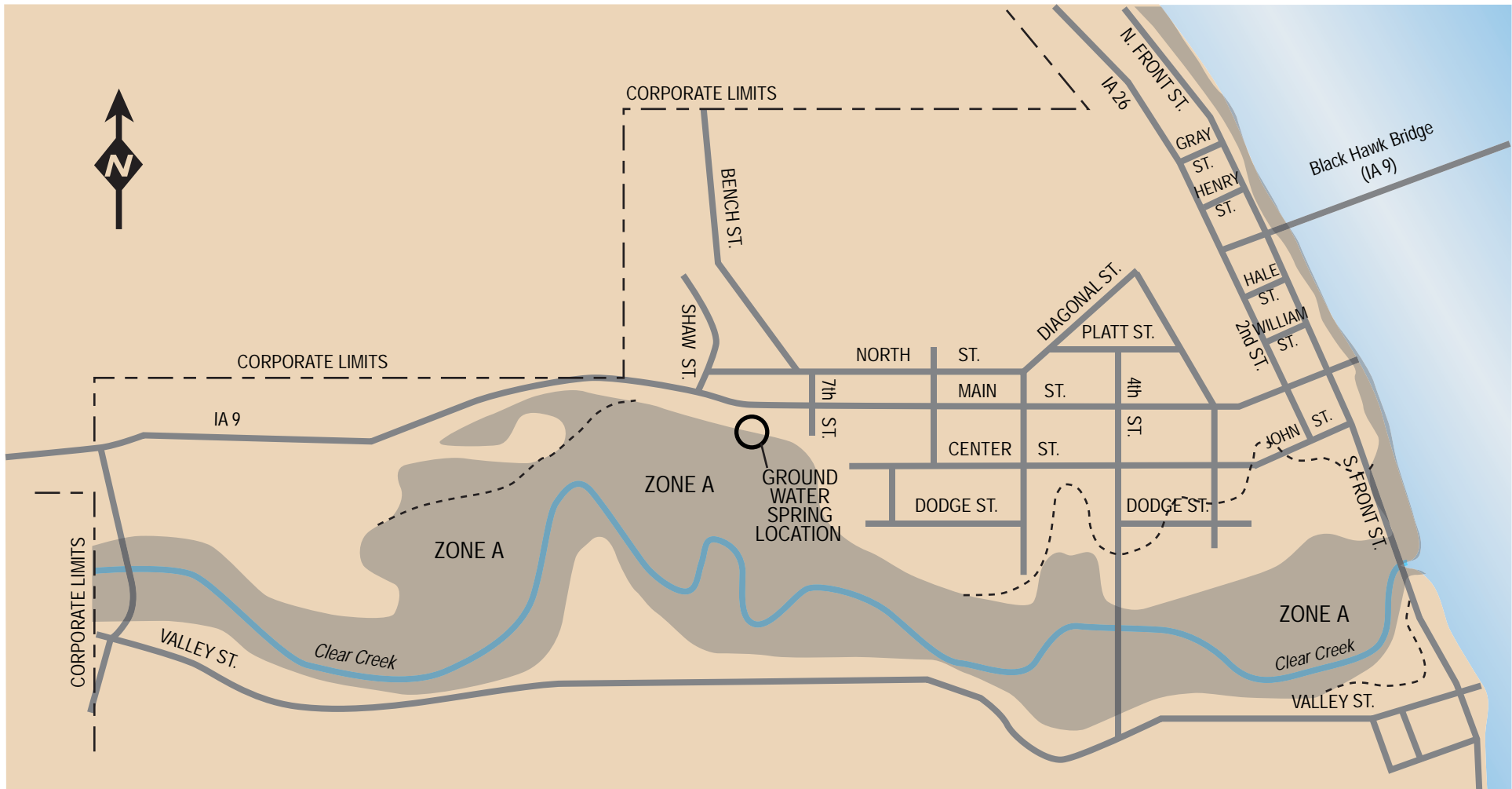
4.3.2.2 Geology and Groundwater—Environmental Consequences

The West Connection area of Alternative S6 would cross directly over a groundwater seep area on the south side of IA 9. Impacts to groundwater flow toward Clear Creek would likely occur as a result. Additionally, roadway construction complications could arise due to the presence of these groundwater seeps. It is not anticipated that any of the proposed new bridge locations or the operation and maintenance of the existing or a new bridge would negatively impact groundwater quality or flow patterns. Bridge deck runoff would be diverted to storm sewers and ultimately the Mississippi River, thus precluding impacts to groundwater.

4.3.2.3 Geology and Groundwater—Measures to Minimize Harm and Mitigation

The following measures are recommended to minimize potential impacts to groundwater:

- Remove potential sources of contaminants, e.g. USTs, in the vicinity of proposed construction activities.
- Assure that bridge deck runoff is diverted from the well-head and that bridge abutments are constructed to prevent the introduction of surface contaminants into the groundwater.
- Groundwater hydrology in the vicinity of Clear Creek associated with the West Connection of Alternative S6 would need to be examined and measures taken to ensure that earthmoving work would have minimal impact on groundwater hydrology.

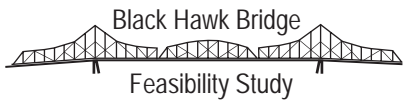


4-36

Sources: Department of Housing and Urban Development, Flood Insurance Administration; Map ID# 190006A panels 01, 02, & 03; Date: November 22, 1977 (100-year Floodplain); Bill Burke (Observed 1965 Flood Limits)

- FEMA 100-year Floodplain
- 1965 Flood Limits (areas of variation from 100-year Floodplain)

EXHIBIT 4-2 Lansing Floodplain Map



T052004004MKE Exh 4-2_FloodplainMap_rev4 12-17-04lll



4.3.3 Floodplains and Hydraulics

4.3.3.1 Floodplains and Hydraulics—Affected Environment

The mapped 100-Year Floodplain, as delineated on Flood Insurance Rate Maps (FIRM) by the Federal Emergency Management Agency (FEMA), is nearly ubiquitous in areas adjacent to the Black Hawk Bridge and the IA 9/ WI 82 causeway. FIRM maps also delineate the 100-Year Floodplain along Clear Creek, which flows through the City of Lansing to the Mississippi River. Mapped 100-Year Floodplains for the City of Lansing are depicted on FIRM Panel Number 190006A. See Exhibit 4-2.

Portions of the City of Lansing have been inundated with several historical Mississippi River floods. River levels have been at or above flood stage five times since 1880. The highest river level recorded in Lansing was in 1965 when the stage reached 22.5 feet above the normal pool elevation. The second highest flood stage was in April of 2001, with a flood stage of 19.93 feet above the normal pool elevation. Several homes along South Front Street in Lansing were damaged by floodwaters during the flood of 1965. Low areas near Clear Creek, such as the baseball diamond at the City Sports Complex, were inundated with several feet of water during the flood of 2001. Most of Lansing, however, is situated at higher elevations and is not prone to flooding.

The existing WI 82 causeway acts as a dam with consequent impacts on up- and downstream water elevations. The in-stream piers and the base of causeway of the existing bridge are within the 100-Year Floodplain of the Mississippi River, though the deck of the bridge and the roadway atop the causeway are not within the 100-Year Floodplain.

4.3.3.2 Floodplains and Hydraulics—Environmental Consequences

Floodplains are protected by Executive Order 11988 (1977), Floodplain Management, which directs federal agencies to avoid conducting, allowing, or supporting actions on a floodplain, where practicable. U.S. DOT Order 5650.2, Floodplain Management and Protection (1979), prescribes policies and procedures for ensuring that proper consideration is given to avoiding and mitigating adverse floodplain impacts in agency actions, planning programs, and budget requests.

All Build Alternatives would have a transverse crossing of the Mississippi River floodplain and place embankment or piers in the floodplain for reconnection to the WI 82 causeway. The S6 Alternative alignment would create the greatest potential impact to the floodplain in this area (see Exhibit 4-3 – Potential Direct Wetland Impacts in the next resource section for an overview of the maximum areas potentially impacted by each alternative), most notably if the option to build a new Big Slough Bridge is used. With the N3 and S1 Alternatives, the floodplain impacts would be nearly identical in terms of the area affected. However, there may be advantages or disadvantages to either alternative that are unknown until a hydraulic modeling exercise for this area is completed (see text below for additional information about modeling).

Beneficial floodplain values include flood desynchronization and attenuation, potential filtration/settling of sediments, potential groundwater recharge, and recreational opportunities. Net impacts to beneficial floodplain values can be estimated by comparing the footprint of the bridge with that of the proposed alternatives. For discussion, the footprint refers to the area of all parts of the existing or proposed structures that lie within the mapped 100-Year Floodplain.

In Lansing, Alternative S6 would impact the floodplain associated with Clear Creek in the area of the “west connection” between Center Street and IA 9. The area of floodplain potentially impacted by this alternative has been estimated to be approximately 1.5 acres.

A hydraulic study will need to be completed in the future to determine the effect of proposed fill and fill removal on the 100-Year floodplain and the hydraulics upstream and downstream of the Mississippi River. The proposed improvements to the Black Hawk Bridge would not lead to development incompatible with floodplains.

4.3.3.3 Floodplains and Hydraulics—Permits

In Lansing, the Iowa Department of Natural Resources has permitting authority to regulate construction within floodplains. The City of Lansing does not regulate development in floodplains. In Wisconsin, the Wisconsin Department of Natural Resources provides standards and mapping for floodplains, though regulation of encroachments is enforced through local municipal ordinances.

4.3.3.4 Floodplains and Hydraulics—Measures to Minimize Harm and Mitigation

Impacts to mapped 100-Year Floodplains could be minimized utilizing several methods under any of the Build Alternative scenarios:

- Proposed alternatives that minimize the bridge and causeway length would reduce the amount of impacted 100-Year Floodplain
- Where practicable and safe, the use of steeper causeway embankments and guard rail would reduce impacts to the 100-Year Floodplain
- Where practicable, the use of an elevated bridge deck with piers over Island 146, with no filled causeway, would reduce impacts to the 100-Year Floodplain
- Use of a reduced pier footprint design would reduce impacts to the 100-Year Floodplain

The feasibility of these methods would be evaluated as the bridge engineering process progresses beyond preliminary design. Regardless of the causeway reconnection method, hydraulic modeling (e.g. HEC-2 Modeling) would likely be required before construction for assessing potential upstream and downstream hydraulic impacts. Consideration of construction and post-construction conditions are important for determining the potential impacts of replacing the Black Hawk Bridge.

Compensation for floodplain impacts will be determined through permitting activities and coordination with the Federal Emergency Management Agency (FEMA) and their state representatives.

4.3.4 Wetlands

4.3.4.1 Wetlands—Affected Environment

Palustrine wetlands in the IA 9/ WI 82 Corridor were assessed in the field with a windshield survey. Published literature such as National Wetland Inventory (NWI) mapping, aerial photography, GIS Land Cover (2000), county soil surveys, and USGS topographic maps were examined prior to and during fieldwork. Two wetland complexes were identified within the IA 9/ WI 82 Corridor during wetland reconnaissance work;

wetlands on the Wisconsin side of the Mississippi River associated with the Refuge, and wetlands associated with Clear Creek on the Iowa side.

Wetland types near the Black Hawk Bridge and IA 9/ WI 82 causeway are floodplain forest, emergent marsh, aquatic bed, and open water. The only upland areas within the 2.6 mile causeway are the road bed, road embankment, and other areas developed on wetland fill such as boat landings and the Beneficial Use Site. Estimated wetland boundaries within the area of alternatives analysis are depicted on Exhibit 4-3 and also shown in the Aerial Photo Exhibit.

Major wetland types adjacent to Clear Creek are a mosaic of floodplain forest, scrub-shrub wetland, and emergent marsh. Less common wetland types along portions of Clear Creek are groundwater seeps and springs which are an important contributor of cold groundwater to Clear Creek. A large complex of groundwater springs and seeps are present south of Main Street (IA 9) near the west end of Lansing located between Seventh Street and Shaw Street. Spring water, culverted under Main Street (IA 9) at two locations in the same vicinity, also contributes to the hydrology of a marsh complex. Ditches and natural intermittent streams convey overflow from this marsh complex into Clear Creek.

4.3.4.2 Wetlands—Environmental Consequences

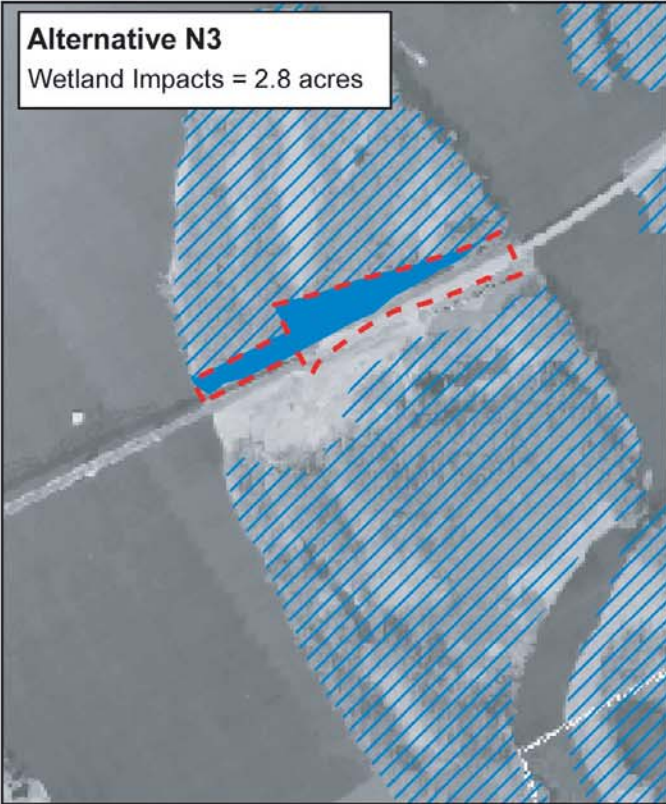
Presidential Executive Order 11990, Protection of Wetlands, establishes requirements that federal agencies must minimize detrimental actions affecting wetlands while preserving and enhancing the natural and beneficial values that wetlands provide. The Clean Water Act, Section 404, authorizes the Corps to regulate discharges in the waters of the United States, including wetlands, and establishes the requirement to demonstrate wetland sequencing in the course of development, i.e. wetland impact avoidance, wetland impact minimization, and wetland impact mitigation.

The Build Alternatives would affect wetlands east of the main navigation channel in Wisconsin, and/or within the West Connection of Alternative S6 in Lansing. Wetland types potentially impacted east of the main navigation channel include forested wetland (floodplain forest), emergent marsh, aquatic bed, and open water wetlands. In terms of habitat, the wetlands located on the southern portion of Island 146 (i.e. impacted by Alternative S6) are considered to be of higher quality than on other portions of the island.

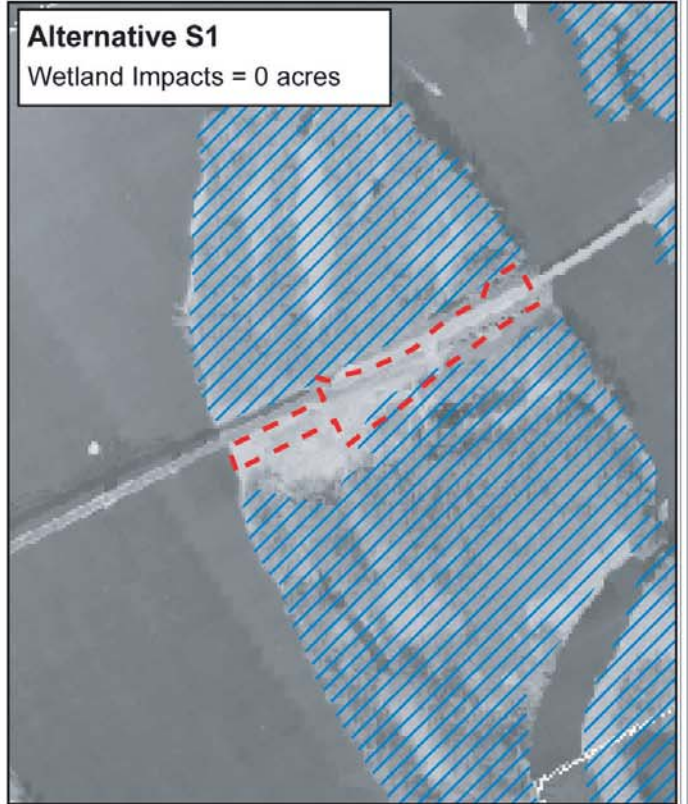
Wetland types potentially impacted in the west connection of Alternative S6 would include a complex of emergent marsh wetland, scrub-shrub wetland, and a minor component of forested wetland. Of note, wetlands in the footprint of the west connection of Alternative S6 are fed hydrologically by groundwater springs and seeps that flow throughout the year.

Estimates of wetland impacts excluded upland areas developed on wetland fill, e.g. WI 82 road bed and embankment, the FWS Big Slough Boat Landing, and the Beneficial Use Site. For all proposed alternatives retained for further study, assumed wetland impact estimates are based on the estimated need line for an embankment connection back to the existing roadways (the potential to reduce wetland impacts by use of structure is discussed in the Measures to Minimize Harm section below). The width of the footprint impact varies with respect to topography, i.e. it is wider in low areas. Table 4-16 summarizes an estimate of wetland impact acreage per wetland type and per proposed retained alternative.

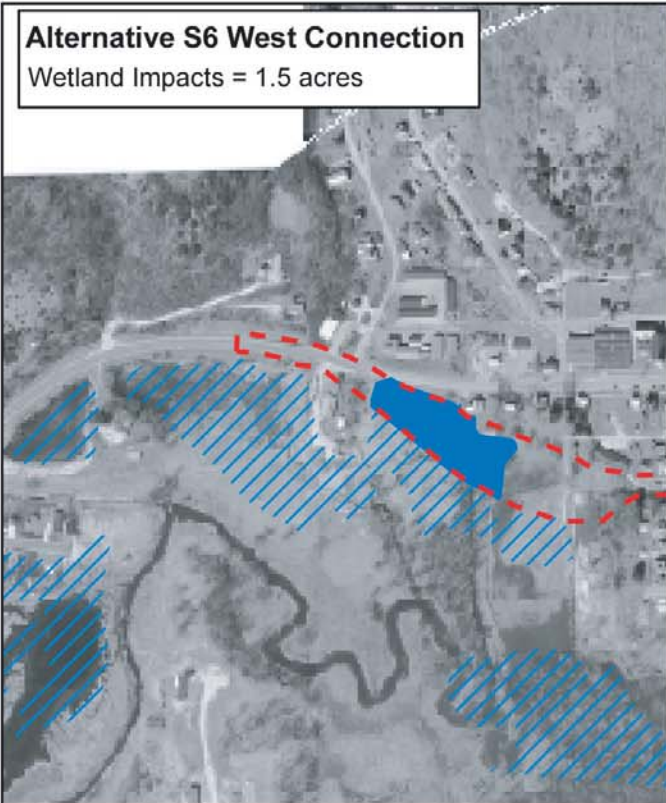
Alternative N3
Wetland Impacts = 2.8 acres



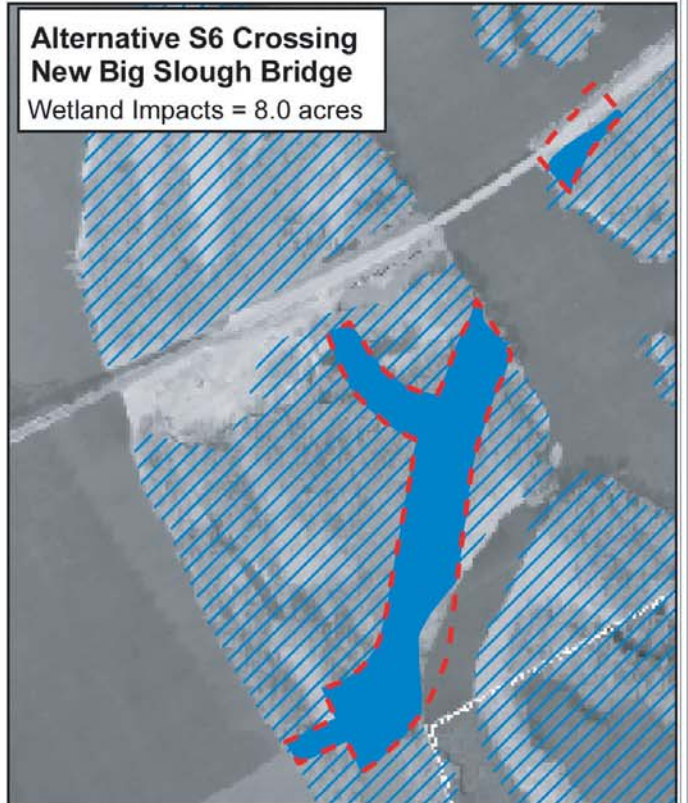
Alternative S1
Wetland Impacts = 0 acres






Alternative S6 West Connection
Wetland Impacts = 1.5 acres



Alternative S6 Crossing New Big Slough Bridge
Wetland Impacts = 8.0 acres



Wetland Types

-  Wetlands
-  Potentially Impacted Wetlands
-  Maximum Right-of-Way Needs Lines

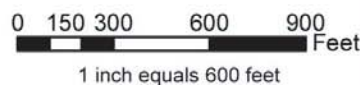


EXHIBIT 4-3
Potential Direct Wetland Impacts



T052004004MKE Exh 4-3_wetlands 12-17-04III



TABLE 4-16
Potential Wetland Impacts per Proposed Bridge Alternative

Bridge Alternative	Wetland Impacts per Wetland Type (acres) ^a				Characteristics of Impacted Wetlands
	FO	EM	SS	Total	
N-3 Adjacent to Bridge	2.7	0.1	0.0	2.8	Somewhat degraded wetland near toe-of-slope of WI 82 causeway
S-1 Adjacent to Bridge - Ballou Street	1.0	0.0	0.0	1.0	Somewhat degraded wetland near toe-of-slope of WI 82 causeway
S-6 John Street	6.2	2.8	0.5	9.5	Higher quality wetland complex on Island 146 and groundwater seep area on west side of Lansing

Note: Estimation of wetland impacts excluded upland areas developed on wetland fill, e.g. the IA 9/ WI 82 road bed and embankment, the FWS Big Slough Boat Landing, and the Corps Beneficial Use Site.

^a Note: "FO" = forested wetland (floodplain forest), "EM" = emergent wetland / aquatic bed, and "SS" = scrub-shrub wetland.

4.3.4.3 Wetlands—Measures to Minimize Harm and Mitigation

The Clean Water Act, Section 404 establishes the requirement to demonstrate wetland sequencing in the course of a development, i.e. wetland impact avoidance, wetland impact minimization, and wetland impact mitigation, as described below.

Wetland Avoidance. Complete avoidance of wetlands in the course of improving the Black Hawk Bridge would not be feasible. Wetlands are nearly ubiquitous from Island 146 eastward. In addition, it is impractical to avoid the extensive wetlands along Clear Creek with Alternative S6.

Minimize Wetland Impacts. Options for minimizing wetland impacts involve a combination of Best Management Practices (BMPs) and low wetland impact engineering techniques that may include the following:

- Utilizing structure rather than embankment to limit the area of impact for bridge approaches
- Providing adequate cross drainage to assure that fills/excavations associated with the highway result in minimal amounts of damming or draining of adjacent or hydrologically connected wetlands
- Rapid re-vegetation of road embankment with established restoration techniques to minimize siltation impacts to wetlands
- Properly constructed, monitored, and maintained silt fences - specifications of which will be incorporated into site plan sheets
- Establishment of construction staging areas in areas well away from wetlands

Wetland Compensation. Because the majority of potential wetland impacts would occur on the Refuge property, appropriate wetland mitigation would require on-going discussion and negotiation with the FWS. Additional wetland impacts, not within the Refuge, would

occur if the “West Connection” of Alternative S6 were constructed. For impacts associated with the “West Connection,” it might be feasible to use the same mitigation area as will be used for impacts occurring on the Refuge. Likely sites for on-site wetland mitigation would be private property inholdings adjacent to Refuge lands that contain drained hydric soils, i.e. on-site mitigation. Appropriate wetland mitigation ratios would be a matter of negotiation between the Corps, the FWS, and the Iowa and Wisconsin DNRs, and Departments of Transportation. The mitigation ratio typically used by the FWS for wetland impacts to the Refuge is 2:1 or 3:1. Most inholdings appropriate for wetland mitigation adjacent to the Refuge are currently zoned as Agricultural or Floodplain. The FWS is required by law to offer landowners fair market value for inholdings.

4.3.4.4 Wetlands—Indirect and Cumulative Impacts

The proposed improvements to the Black Hawk Bridge are not anticipated to lead to further development in wetlands. The existing two-lane bridge would be replaced with a new two-lane bridge. No development or growth pressures have been identified within the study area. As such, these bridge improvements would not lead to substantial secondary impacts or contribute to any substantial cumulative impacts. Mitigation for wetland impacts would offset any wetland losses associated with the proposed bridge improvements.

4.3.4.5 Wetlands—Permits

Several wetland-related permits, federally and state-issued, would be required prior to construction associated with the proposed bridge improvements. These are:

- **Individual Section 404 Permit.** Given the estimated acreage of wetland impacts associated with proposed improvements to the Black Hawk Bridge, the requirement of the Individual Section 404 Permit (as opposed to the Nationwide Permit) seems likely.
- **Regional Permit #7 (Clean Water Act).** Currently the Regional Permit #7 is no longer in effect, though it is being revised for reinstatement
- **Section 401 Water Quality Certification.** Departments of Natural Resources (Iowa and Wisconsin) will issue a 401 Certification
- **National Pollutant Discharge Elimination System (NPDES) Permit.** This permit may be triggered by the bridge improvement itself or by the proposed wetland mitigation if the mitigation is larger than 5 acres. Note that the acreage threshold triggering the NPDES permit may soon be 1 acre, rather than the current 5 acres.
- **Floodplain Permit.** This permit would be required by the Iowa Department of Natural Resources for the bridge improvements as well as for any wetland mitigation that would occur within the 100-Year Floodplain.

4.3.5 Fisheries and Mussels

4.3.5.1 Fisheries and Mussels—Affected Environment

Fisheries. The *Distribution and Relative Abundance of Mississippi River Fishes* (UMRCC, 1995) lists 76 species of fish in the general project area, categorized as uncommon, occasionally collected, commonly taken, or abundant. An additional seven species of fish are listed as

rare. Historical records exist for many more fish species in Pool 9, though they have either been totally removed or are exceedingly rare. Common or abundant game fish in Pool 9 of the Mississippi River are listed in Table 4-17.

TABLE 4-17
Common Game Fish in Pool 9 of the Mississippi River

Common Name	Scientific Name	Common Name	Scientific Name
longnose gar	<i>Lepisosteus osseus</i>	northern pike	<i>Esox lucius</i>
shortnose gar	<i>Lepisosteus platystomus</i>	white bass	<i>Morone chrysops</i>
common carp	<i>Cyprinus carpio</i>	rock bass	<i>Ambloplites rupestris</i>
river carpsucker	<i>Carpionodes carpio</i>	pumpkinseed	<i>Lepomis gibbosus</i>
quillback	<i>Carpionodes cyprinus</i>	bluegill	<i>Lepomis macrochirus</i>
smallmouth buffalo	<i>Ictiobus bubalus</i>	largemouth bass	<i>Micropterus salmoides</i>
bigmouth buffalo	<i>Ictiobus cyprinellus</i>	white crappie	<i>Pomoxis annularis</i>
spotted sucker	<i>Minytrema melanops</i>	black crappie	<i>Pomoxis nigromaculatus</i>
shorthead redhorse	<i>Moxostoma macrolepidotum</i>	sauger	<i>Stizostedion canadense</i>
channel catfish	<i>Ictalurus punctatus</i>	walleye	<i>Stizostedion vitreum</i>
flathead catfish	<i>Pylodictis olivaris</i>	freshwater drum	<i>Aplodinotus grunniens</i>

Source: The *Distribution and Relative Abundance of Mississippi River Fishes* (UMRCC 1995)

The reach of the Mississippi River at Lansing has not been specifically documented as a walleye spawning area; however, it has characteristics of walleye (*Stizostedion vitreum*) spawning habitat studied elsewhere in Pool 9 and Pool 13 of the Mississippi River. These characteristics include swift current along the outside bank of a broad river curve and a clean swept river substrate with rock rubble or hard clay. Walleye spawning habitat is often coexistent with mussel beds (Iowa DNR pers. comm., Sept. 26, 2002) (Pitlo 1989). Only 30-50 acres of Pool 13 (28,100 acres total) are considered to be prime walleye spawning habitat. Thus, based on river bottom substrate type and current flow characteristics, it is deemed possible that walleye spawning habitat may be present along the Iowa side of the main navigation channel of the Mississippi River, just upstream and downstream from the existing Black Hawk Bridge. Additional study of this potential habitat may be necessary during the NEPA process.

Clear Creek, which flows through the City of Lansing to the Mississippi River, is a cold water trout stream. Clear Creek is stocked with brown trout (*Salmo trutta*), rainbow trout (*Oncorhynchus mykiss*), and brook trout (*Salvelinus fontinalis*). While brown trout are not a native species, the population in Clear Creek is naturally reproducing and spawning. Densities of brown trout and rainbow trout in Clear Creek are estimated to be 230 fish/stream mile and 83 fish/mile, respectively (personal communication, Iowa Department of Natural Resources, August 2003). Other fish species generally associated with cold water and known to occur in Clear Creek are the longnose dace (*Rhinichthys cataractae*), the brook stickleback (*Culea inconstans*) and the state threatened burbot (*Lota lota*). Federally or state-

listed fish species that are potentially in the study area are discussed in detail in Section 4.3.7.

Mussels. Based on several mussel surveys (including Helms 2002, Corps various years) several common species have been documented in the Mississippi River near the existing Black Hawk Bridge. Common species include the black sandshell (*Ligumia recta*), fragile papershell (*Leptodea fragilis*), giant floater (*Pyganodon grandis*), mucket (*Actinonaias ligamentina*), paper pondshell (*Utterbackia imbecillis*), plain pocketbook (*Lampsilis cardium*), threeridge (*Amblyma plicata*), and the washboard (*Megaloniaias nervosa*).

In addition, the non-native invasive zebra mussel (*Dreissena polymorpha*) is known to be extremely abundant in the reach of the Mississippi River near the existing Black Hawk Bridge – and throughout most of the main navigation channel of the Mississippi River.

Many mussel species (including the Higgins Eye pearly mussel) are either state or federally-listed; these species are discussed below in detail in Section 4.3.7.

4.3.5.2 Fisheries and Mussels—Environmental Consequences

With implementation of appropriate Best Management Practices (BMPs), e.g. cofferdams, gunderbooms, and other silt filtration techniques, impacts to the Mississippi River fish and mussel populations as a result of bridge construction, operation, and maintenance would be expected to be negligible. In-stream work could be timed to avoid critical fish spawning times.

All of the retained Build Alternatives (N3, S1, and S6) would require similar levels of in-stream work in the Mississippi River. The No-Build Alternative, while requiring extensive maintenance and repairs to the existing Black Hawk Bridge for the rest of its useful life, would not require substantial in-stream work. Maintenance and repair activities on the existing bridge associated with the No-Build Alternative, e.g. painting, and re-decking, would be completed using methods that would minimize introduction of toxic substances into the Mississippi River.

4.3.5.3 Fisheries and Mussels—Measures to Minimize Harm and Mitigation

Given the possibility that walleye may spawn in the study area, it would be important to avoid in-stream work in the Mississippi River from March through May so as to avoid disruptions to this activity. Male walleye begin spawning in March when the water temperature is very cold. The larger females arrive later. Walleye spawning is at its peak when water temperature ranges from 42 to 50 degrees, i.e. April or May.

Impacts to fisheries and mussel beds can occur during all phases of bridge replacement and roadway improvement activities, such as; demolition/construction, operations, and maintenance. A detailed discussion of BMPs and low-impact engineering techniques that would minimize impacts to water quality (and therefore fisheries and mussel beds) is found in detail in Section 4.3.1 – Surface Water and Water Quality.

Though there is low likelihood for in-stream work in Clear Creek associated with the “West Connection” of Alternative S6, the most appropriate work window would be summer to avoid the fall spawning season of stocked brown trout. The November to March timeframe is a sensitive period for brown trout, encompassing spawning and egg incubation times.

Populations of rainbow and brook trout are not naturally reproducing in Clear Creek and therefore do not have a defined spawning season.

As described in Section 4.3.1, Clear Creek within the project area is designated as a High Quality (HQ) Water. Special protection is warranted to maintain the unusual, unique, or outstanding physical, chemical, or biological characteristics which these waters possess.” If necessary, appropriate BMPs and construction techniques consistent with the regulatory needs for the HQ Water status of Clear Creek will be developed in coordination with the Iowa DNR.

4.3.6 Uplands/Wildlife and Waterfowl Habitat

4.3.6.1 Uplands/Wildlife and Waterfowl Habitat—Affected Environment

Wildlife habitat in the project study area is dominated by water-based ecosystems of the Refuge, primarily suited for waterfowl and other birds. Some state and federally listed threatened and endangered species are located within the study area. These species are discussed in Section 4.3.7. Large open-water pools in the vicinity of the IA 9/WI 82 Corridor are frequented by diving ducks such as canvasbacks (*Aythya valisineria*), scaup (*Aythya affinis*), and ring-necked ducks (*Aythya collaris*). Emergent marshes and aquatic beds are often used by dabbling ducks such as mallards (*Anas platyrhynchos*) and blue-winged teal (*Anas discors*). The abundant mosaic of bottomland forest, emergent marsh, and braided channels provides suitable nesting, foraging, and brood cover habitat for the wood duck (*Aix sponsa*). The wood duck generally nests in tree cavities, often in mature silver maple (*Acer saccharinum*), at a preferred height range of 20-50 feet above ground.

Shorebirds such as great blue herons (*Ardea herodias*), great white egrets (*Casmerodius albus*), American bitterns (*Botaurus lentiginosus*), black terns (*Chlidonias niger*), rails (*Rallus limicola*), and double-crested cormorants (*Phalacrocorax auritus*) nest and forage in wetland habitat in the vicinity of the IA 9/WI 82 Corridor. Tundra swans (*Cygnus colombianus*) frequently use aquatic areas near the IA 9/WI 82 Corridor as stopover habitat during migrations. The cerulean warbler (*Dendroica caerulea*), an uncommon neotropical migratory songbird and Federal Candidate species, is known to nest in the vicinity of the IA 9/ WI 82 Corridor, based on an element occurrence record from 1995. The prothonotary warbler (*Protonotaria citrea*), a neotropical migratory songbird, nests in wooded swamps like those present near the IA 9/WI 82 Corridor.

4.3.6.2 Uplands/Wildlife and Waterfowl Habitat—Environmental Consequences

Road improvement-related impacts to waterfowl have two components; direct impacts and indirect impacts. Direct impacts, for purposes of this study, are “footprint impacts” and represent a permanent change in land use that precludes waterfowl use. Indirect impacts are proximity impacts imposed by a roadway improvement that may diminish the habitat suitability for waterfowl use in areas close to the “footprint.” Such indirect impacts to waterfowl may result from traffic-related noise and other disturbances. Noise disturbances are expected to be intense during construction of roadway improvements; however, such construction impacts are temporary and would not likely impact waterfowl to a great extent (long term). Noise resulting from operation of the improved bridge and causeway are expected to be negligible as the predicted Average Daily Traffic is not anticipated to rise substantially from existing conditions.

Alternative N3. The footprint of Alternative N3 would impact approximately 4.8 acres of land on Island 146 of which 2.8 acres are wetland and the remainder is current embankment or otherwise disturbed lands (i.e. the boat landing). This alternative is close to the existing causeway, therefore the existing habitat quality in this area is already somewhat compromised.

Alternative S1. The footprint of alternative S1 would impact approximately 4.7 acres of land most of which is currently developed land, used either as part of the Corps' Beneficial Use Site or the Big Slough Boat landing, operated by the FWS. As such, direct land impacts associated with Alternative S1 on Island 146 would have a minimal impact on waterfowl and wildlife habitat. However, impacts to the Beneficial Use Site or the boat landing may require that these facilities expand in acreage concomitant with impact acreages to operate at a capacity similar to current conditions. Expansion of these facilities could in turn impact waterfowl or wildlife habitat on Island 146.

Alternative S6. The footprint of Alternative S6 would impact approximately 8.5 acres of Refuge land, primarily on Island 146, much of which is undisturbed, including some of the higher-quality habitat on the island. A small portion of the acreage impact would occur on the east side of Big Slough, in the area where the new alignment reconnects with the WI 82 causeway. This alternative would impact undisturbed habitat on Island 146 that has been recognized by resource agencies as the highest-quality habitat on the island (see Section 3.3.1.7 for resource agency input on the Refuge).

4.3.6.3 Uplands/Wildlife and Waterfowl Habitat—Measures to Minimize Harm and Mitigation

The measures described below are written specifically for wood ducks. However, the measures generally apply to any waterfowl or neotropical migratory species.

Impacts to the wood duck can be minimized by conducting any required tree clearing activities on Island 146 in the early autumn. Wood duck mate selection begins in October and young are fledged in July, and thus, it is important to minimize impacts to the wood duck during this seasonal period. Further, losses in nesting opportunities as a result of required tree clearing activities can be offset by installing man-made wood duck nesting structures in adjacent intact floodplain forest. A pair of nesting wood ducks may require 20 acres of habitat without nesting structures; whereas, habitat with man-made structures can successfully support a considerably higher population density (per acre) of wood ducks. Potential floodplain acquisitions, serving as mitigation for roadway-related FWS Refuge impacts, may also provide suitable habitat to enhance wood duck and other waterfowl nesting.

4.3.7 Threatened and Endangered Species

4.3.7.1 Threatened and Endangered Species—Affected Environment

State-Listed Species. Many species listed as Endangered, Threatened, or of Special Concern in Iowa and/or Wisconsin have biogeographical ranges that overlap the project area and have habitat preferences for aquatic or riparian plant communities. Most state-listed species in the vicinity of the Lansing Bridge are mussel and fish species. Status of Wisconsin and Iowa-listed macroinvertebrate and fish species potentially within the project area are presented in Table 4-18. Status of Wisconsin and Iowa-listed bird species potentially within the project area are presented in Table 4-19.

TABLE 4-18

Wisconsin and Iowa State-listed Macroinvertebrate and Fish Species Potentially within the Lansing Bridge Project Area

Common Name	Scientific name	Group	State - Status *	
			IA	WI
Purple wartyback (likely extirpated from the Mississippi River)	<i>Cyclonaias tuberculata</i>	mussel	SE	Not listed
Sheepnose (likely extirpated from the Mississippi River.)	<i>Plethobasus cyphus</i>	mussel	SE, FC	Not listed
Round pigtoe	<i>Pleurobema coccineum</i>	mussel	SE	SSC
Washboard	<i>Megalonaias nervosa</i>	mussel	Not listed	SSC
Salamander mussel (likely extirpated from the Mississippi River)	<i>Simpsonaias ambigua</i>	mussel	Not listed	ST
Squawfoot (Strange Floater)	<i>Strophitis undulatus</i>	mussel	ST	Not listed
Butterfly mussel	<i>Ellipsaria lineolata</i>	mussel	ST	SE
Higgins eye pearly mussel	<i>Lampsilis higginsi</i>	mussel	SE, FE	SE, FE
Yellow sandshell	<i>Lampsilis teres</i>	mussel	SE	SE
Slough sandshell	<i>Lampsilis teres teres</i>	mussel	SE	SE
Monkeyface	<i>Quadrula metanerva</i>	mussel	Not listed	ST
Rock pocketbook	<i>Arcidens confragosus</i>	mussel	Not listed	ST
Warty back	<i>Quadrula nodulata</i>	mussel	Not listed	ST
Spectacle case (extremely unlikely to be in the project area)	<i>Cumberlandia monodonta</i>	mussel	Not listed	ST
Buckhorn (extremely unlikely to be in the project area)	<i>Tritogonia verrucosa</i>	mussel	Not listed	ST
Russet-tipped clubtail dragonfly	<i>Stylurus plagiatus</i>	dragonfly	Not listed	SSC
Elusive clubtail	<i>Stylurus notatus</i>	dragonfly	Not listed	SSC
Crystal darter	<i>Crystallaria asprella</i>	Fish	SE	Not listed
Western sand darter	<i>Ammocrypta clara</i>	Fish	SE	Not listed
Lake sturgeon	<i>Acipenser fulvescens</i>	Fish	SE	Not listed
Pallid shiner	<i>Notropis amnis</i>	Fish	Not listed	SE
Black redhorse	<i>Moxostoma desquesnei</i>	Fish	Not listed	SE
Goldeye	<i>Hiodon alosoides</i>	Fish	Not listed	SE
Bluntnose darter	<i>Etheostoma chlorosomum</i>	Fish	Not listed	SE
Blue sucker	<i>Cycleptus elongatus</i>	Fish	Not listed	ST
Black buffalo	<i>Ictiobus niger</i>	Fish	Not listed	ST
Skipjack herring	<i>Alosa chrysochloris</i>	Fish	Not listed	SE
Speckled chub	<i>Machyropsis aestivalis</i>	Fish	Not listed	ST
River redhorse	<i>Moxostoma carinatum</i>	Fish	Not listed	ST
Greater redhorse	<i>Moxostoma valenciennesi</i>	Fish	Not listed	ST
Paddlefish	<i>Polyodon spathula</i>	Fish	Not listed	ST
Pirate perch	<i>Aphredoderus sayanus</i>	Fish	Not listed	SSC
American eel	<i>Arguilla rostrata</i>	Fish	Not listed	SSC
Burbot	<i>Lota lota</i>	Fish	ST	Not listed
Weed shiner	<i>Notropis texanus</i>	Fish	SE	SSC
Pugnose minnow	<i>Notropis anogenus</i>	Fish	SE	SSC
Mud darter	<i>Etheostoma caerulea</i>	Fish	Not listed	SSC

SE = State-endangered, ST = State-threatened, SSC = State-special concern, FE = Federally-endangered

TABLE 4-19
Wisconsin and Iowa State-listed Bird Species Potentially within the Lansing Bridge Project Area

Common Name	Scientific name	Group	State - Status *	
			IA	WI
Forster's tern	<i>Sterna forsteri</i>	bird	Not listed	SE
Red-shouldered hawk	<i>Buteo lineatus</i>	bird	SE	ST
Great white egret	<i>Casmerodius albus</i>	bird	Not listed	ST
Cerulean warbler	<i>Dendroica cerulea</i>	bird	Not listed, FC	ST, FC

SE = State-endangered, ST = State-threatened, SSC = State-special concern, FE = Federally-endangered, FC = Federal Candidate species.

Close coordination with appropriate agencies will be required to determine the most current status and locations of these species. Where feasible, avoidance and minimization of impacts to these species will be accomplished through BMPs. For unavoidable impacts, mitigation measures, e.g. relocation of populations, where appropriate, will be developed with agency consultation.

Federally-Listed Species. Based on coordination with FWS and state Departments of Natural Resources (Iowa and Wisconsin), several federally-listed or monitored species have been documented in the vicinity of Lansing. These include the federally threatened bald eagle (*Haliaeetus leucocephalus*), the peregrine falcon (*Falco peregrinus*) (recently de-listed federally but still monitored), and the federally endangered Higgins eye pearly mussel (*Lampsilis higginsii*).

The Bald Eagle (*Haliaeetus leucocephalus*). Correspondence with the FWS in 2000 revealed that two active bald eagle nests were documented in the vicinity of the Black Hawk Bridge; one nest less than a mile upstream from the Big Slough boat landing and the other less than a mile downstream from the Winneshiek boat landing. The FWS documented twenty-nine active bald eagle nests in Pool 9 of the Mississippi River during a survey completed in 2002. Bald eagles frequently change nesting locations from year to year thus, ongoing coordination with resource agencies will be necessary to determine potential new bald eagle nesting locations.

Bald eagles migrate southward along the Mississippi River in large numbers beginning in September. Approximately 2,500-4,000 bald eagles winter along the Mississippi River from St. Paul to St. Louis. Large populations of wintering bald eagles tend to congregate near dams and power plants where fish and open water are abundant year around. During the winter months bald eagles require perching and roosting trees - often tall, large diameter eastern cottonwoods (*Populus deltoides*) or other large trees that are close to the River. Bald eagles nest from November through April, eggs are laid in March or April, and the young hatch in May or June.

Bald eagle nesting and roosting locations with respect to future bridge construction activities must be monitored to determine if an impact is anticipated associated with a proposed alternative.

The Peregrine Falcon (Falco peregrinus). Based on communication with the FWS in 2000, peregrine falcons (*Falco peregrinus*) have been successfully fledging for more than two years at an artificial nest structure at the Alliant Energy Power Plant which is approximately three river miles downstream of the Black Hawk Bridge. The peregrine falcon is federally delisted but still monitored. Peregrine falcon nest locations change over time; therefore, ongoing coordination with resource agencies will be necessary to determine new peregrine falcon nest locations.

The peregrine falcon historically nested in cliff crevices along the Mississippi River including reaches near Lansing. Now, artificial nesting structures have proved beneficial in the recovery of this species. The peregrine falcon lays its eggs in March or June, hatching occurs generally in July, and fledging occurs in August or September.

Peregrine falcon nesting locations with respect to future bridge construction activities must be monitored to determine if an impact is anticipated associated with a proposed alternative.

The Higgins Eye Pearly Mussel (Lampsilis higginsii). Navigation Pool 9 of the Mississippi River has long been recognized as providing refuge for several rich mussel beds. One such mussel bed, termed “The Whiskey Rock” bed, extends from near Lansing to approximately nine miles downstream, along the right descending bank of the Mississippi River. The Whiskey Rock mussel bed is extremely narrow – about 3 to 6 feet wide where river depths are about 4 to 6 feet. Based on several historical mussel surveys, the Higgins eye pearly mussel (*Lampsilis higginsii*), a federally endangered mussel species, is known from several locations within The Whiskey Rock mussel bed and other locations in Pool 9 of the Mississippi River. Results of recent surveys for the Higgins eye pearly mussel (*Lampsilis higginsii*) in the vicinity of the Blackhawk Bridge are summarized below:

- **June 2002.** Fieldwork for a mussel survey was completed and summarized in Mussel Survey for the WI 82 Bridge over the Mississippi River Pool 9 (River Mile 663.4) Crawford County, Wisconsin Near Lansing, Iowa (Helms and Associates, July, 2002). This study was initiated as a result of the need for maintenance work on the Blackhawk Bridge piers for scour prevention. The survey was conducted on Piers 2, 3, and 4; the piers that lie closest to and between the dolphin and Island 146. No portion of the Iowa side of the Blackhawk Bridge was examined in this study. Areas lying more than 0.5 meters from the base of each bridge pier were not surveyed in this effort. While five live species of native mussels were collected in this survey, no Higgins eye pearly mussels (*Lampsilis higginsii*) or any other federally-listed mussel species were located in this effort.
- **July 2002.** Helms and Associates (July 2002) completed a mussel survey along the west bank of the Mississippi River in Lansing approximately between William Street and John Street as part of an impact assessment for the proposed riverboat “Julia Belle Swain.” A total of 31 live native mussels comprising 8 species were found at this site. No Higgins eye pearly mussels (*Lampsilis higginsii*) or any other federally or state-listed mussels were found here. Zebra mussels (*Dreissena polymorpha*), an invasive species, were found to be abundant throughout the survey area.

- **1995, 2000, 2001, 2002.** The Corps conducted mussel surveys on the “Whiskey Rock” mussel bed (See introduction paragraph under The Higgins Eye Pearly Mussel) every year from 2000 to 2002 and also in 1995. The Whiskey Rock Mussel bed is located between River Mile 655.8 and 658.4, whereas the existing Blackhawk Bridge is located at River Mile 663.5. The Higgins eye pearly mussel (*Lampsilis higginsii*) is found annually at several locations within the Whiskey Rock mussel bed. A trend analysis of this data indicates that total native mussel density is decreasing, percent contribution of Higgins eye pearly mussel (*Lampsilis higginsii*) to total native mussel density is increasing, and the zebra mussel population is increasing dramatically.
- **1980s.** James Eckblad was contracted by the Corps to conduct a mussel survey approximately 0.5 mile upstream from the Lansing Bridge. The study was initiated as a result of a Corps channel re-alignment project. No state or federally-listed mussel species were found in this survey; however, the survey method used was mussel brailing which is considered a far less effective method than a diving survey.

Prior to replacement of the Lansing Bridge, a reconnaissance mussel dive survey will likely be required. The survey area would need to include all areas potentially affected by all proposed alternatives. If federally-listed mussel species are found, then a Section 7 (Endangered Species Act) Consultation would need to be initiated between respective DOTs and the FWS. The DOT's would write a Biological Assessment (BA) concerning the subject federally-listed species and submit it to the FWS. The FWS would then write a Biological Opinion (BO) as a response to the BA, stating how the proposed bridge replacement would likely affect the subject species. If the Higgins eye pearly mussel (*Lampsilis higginsii*) is found in areas potentially affected by the bridge replacement, there is a potential that mussel bed relocation would be required.

Because of declining populations, the Higgins eye pearly mussel (*Lampsilis higginsii*) is likely to become extinct in 50 years if no action is taken, therefore incidental takes of the Higgins eye pearly mussel (*Lampsilis higginsii*) are no longer permitted (FWS 2000).

Cerulean Warbler (*Dendroica cerulea*). The cerulean warbler, a neo-tropical migrant bird species, is currently being considered for federal listing. The FWS - Region 3 currently lists the cerulean warbler (*Dendroica cerulea*) as a species of management concern and a resource conservation priority. The *Cerulean Warbler Status Assessment* was published in April 2000, as a step in the federal listing process. This species migrates along the Mississippi River corridor and uses nesting habitat in the floodplain forest, an abundant plant community within the project area.

4.3.7.2 Threatened and Endangered Species—Environmental Consequences

Field surveys for aquatic and terrestrial species that are Federally or State-listed and documented to occur in the vicinity of the Black Hawk Bridge study area would need to be completed during the NEPA process and prior to construction of a new bridge and approaches.

The federal endangered status of the Bald Eagle should be tracked as the Bald Eagle may soon be de-listed. Requirements for monitoring the Bald Eagle may apply after de-listing occurs.

Mussel surveys within a buffer around each proposed in-stream bridge pier, for each alternative would need to be completed prior to construction. Typically, the mussel survey

area is within 30 feet outside of the proposed coffer dam location surrounding each proposed pier. The mussel survey would include removing all mussels from the survey area, destroying all non-native invasive mussel species, and relocating native mussels to an appropriate mussel bed out of harms way.

The existing Black Hawk Bridge has 3 in-stream piers. All proposed bridge alternatives and bridge styles would have 1 or 2 in-stream piers, thus minimizing disturbance of river bottom sediments. Appropriate Best Management Practices (BMPs) should be implemented to minimize potential impacts to aquatic organisms (listed or other). See Section 4.3.1 Surface Water Quality, for a discussion of BMPs that pertain to listed aquatic organisms.

Several State-listed fish species may be present in the vicinity of the Black Hawk Bridge (see Section 4.3.7 for a list of state and federally fish species). Fish surveys using sampling techniques appropriate for the subject species may be required.

Bird surveys may be required for the Forster's Tern, Red-Shouldered Hawk, Great White Egret, and the Cerulean Warbler. Construction activities should be timed to avoid nesting periods of these bird species.

4.3.8 Agricultural Resources

Mapped soil associations and series within the project area are based on published Soil Surveys for Allamakee, Iowa (1997) and Crawford County, Wisconsin (1961). There is no land within the study area that is currently used for agricultural purposes, such as row-cropping or pasturing.

4.3.9 Hazardous Materials and Regulated Substances

4.3.9.1 Hazardous Materials and Regulated Substances—Affected Environment

A Phase I Environmental Site Assessment (ESA) was conducted for the Black Hawk Bridge Feasibility Study project corridor. The Phase I ESA consisted of a review of topographic maps; a review of federal and state environmental regulatory agency database information; a review of state agency records; a corridor reconnaissance (windshield survey); and an interview with the Iowa DNR. The database search conducted as part of this review included properties within a quarter-mile radius from the Black Hawk Bridge Feasibility Study project corridor. A windshield survey was conducted August 5, 2003 to visually inspect properties located along the corridor. The windshield survey and agency interview were used to confirm and supplement information obtained during the records review and database search.

The project corridor through Lansing contains numerous residential properties and businesses. Only those properties that were determined to represent a moderate to high degree of environmental risk based on the information gathered, and also those low risk properties that may potentially be impacted by construction activities based on the range of alternatives currently under development, are discussed below.

A phased approach was used for evaluate the nine properties initially identified from the records review and corridor reconnaissance. A set of guidelines were established to prioritize the properties according to their potential for environmental contamination and cleanup cost. The properties categorized into one of the following levels of risk:

- **High risk.** CERCLA sites; RCRA Corrective Action sites; RCRA Transportation, Storage, or Disposal sites; State Hazardous Waste Sites classified as “a” or “b” (as defined in Iowa Code 567.148); CERCLIS sites; RCRA sites under Administrative Orders; former manufactured gas plant sites; or any property where evidence of a release of regulated materials was observed during the field corridor review or site visit.
- **Moderate risk.** LUST sites (except those with a No-Further-Action designation by Iowa DNR), State Hazardous Waste Sites classified as “c” or “d” (as defined in Iowa Code 567.148), automobile junkyards and salvage yards, and commercial and industrial facilities where the potential for regulated materials was observed during the field corridor review or site visit and sloppy housekeeping practices were observed to an extent that the potential for environmental contamination is higher than if normal waste management practices had been followed.
- **Low risk.** LUST sites with a No-Further-Action designation, State Hazardous Waste Sites classified as “e” (as defined in Iowa Code 567.148), RCRA Small-Quantity or Large-Quantity Generators, CERCLIS sites with a No-Further-Remedial-Action-Planned determination, UST sites, above-ground storage tank sites, permitted users or generators of regulated materials that do not have releases listed in environmental databases or other documentation, sites regulated under air emissions permits, animal confinement operations sites, and commercial/industrial facilities where the potential for regulated materials to be present was observed during the site visits but no evidence of releases was observed or reported.
- **Minimal risk.** Houses, farms, agricultural land, vacant or timbered land, and commercial properties where a low potential or no potential for regulated materials to be present was observed during the site visits.

No properties were identified as having high risk, one property was identified as having moderate risk, and four properties within the study area were identified as having low risk. The following identified properties are located in the vicinity of alternatives being assessed by this study.

Moderate Risk Property. Knopf Standard Service—115 N 2nd Street, Lansing, Iowa. This property is designated as a LUST site. A Tier 2 report has been submitted to the Iowa DNR and is currently under review. A total of three tanks were removed in 1993 and consisted of (one) 2,000 gallon gasoline tank, and (two) 1,000 gallon gasoline tanks. The soil contamination at the site extends beneath 2nd Street. The site has been classified as moderate risk by the Iowa DNR. Based on current alternative development, no right-of-way impacts are expected to occur at this site.

Low Risk Properties. The following property was initially classified as a moderate risk; however, further investigation revealed that the property should be reclassified as low risk.

Hawkeye Liquor & Convenience—287 Main Street, Lansing, Iowa. This property is designated as a LUST site. A Tier 3 report for the property indicated “steady and declining conditions in groundwater concentrations with no evidence of significant vertical or horizontal migration of the contaminant plume.” Free product recovery was stopped in June 2002 and the Iowa DNR has assigned a “No Action Required” classification to the site. Iowa DNR records indicate that “A No Further Action Certificate” will be issued pending the submittal

of additional information about the site. As the result of the above circumstances at the site, this property was classified as low risk.

Including the convenience store listed above, four low risk properties identified in the Phase I ESA are in the vicinity of proposed alternatives. The remaining low risk properties identified during the database search fell directly into the low risk classification described above. No additional information was identified during the assessment to indicate a different classification was warranted. No impacts are expected to occur to any of the following low risk properties. As a result, the remaining low risk properties did not warrant further investigation.

- Eastern Allamakee Community School District – 480 Center St.
- D J Murphy – 399 Center St.
- Goodells Service – 61 S 2nd Street

Black Hawk Bridge. In addition to the low risk properties identified above, the Black Hawk Bridge was also identified as low risk. Coordination with Iowa DOT staff indicated that spot painting had been done on the Black Hawk Bridge in the past to remove portions of lead based paint that had been applied to the structure. However, it was noted that the bridge still contains hazardous levels of lead based paint above the deck structure on the trusses. Because the bridge is already a DOT structure, it is not considered a “site” in the same way as those listed above; however the existence of lead paint is documented herein for future demolition and materials management purposes.

4.3.9.2 Hazardous Materials and Regulated Substances—Environmental Consequences

Only one property, Knopf Standard Service, was identified as having moderate risk. No right-of-way impacts are expected to occur on that property. However, some of the soil contamination related to that site is known to extend beneath 2nd Street. Alternatives N3 and S1 would require some minor road reconstruction to create a new bridge approach and connection. Based on studies of the site to date, the risk for encountering contaminated materials as part of the bridge approach construction is minimal.

Demolition of the Black Hawk Bridge will require precautions to contain the lead-based paint currently on the structure. Additional study of how best to control lead paint on the structure and manage bridge materials during demolition may need to occur in future stages of the project.

4.3.10 Air Quality

The study area meets national and state air pollution attainment criteria, therefore, no transportation control measures apply to the study. Because the study area is located in an attainment area for transportation-related pollutants and future traffic volumes are below the respective thresholds, neither the No-Build Alternative nor any of the Build Alternatives would exceed National Ambient Air Quality Standards for carbon monoxide.

Construction contractors would be required to comply with the regulation on air pollution control. These regulations would apply to fugitive dust control and open burning of grub material.

4.3.11 Noise

4.3.11.1 Noise—Affected Environment

The existing Black Hawk Bridge, because of its steel, open-grate deck structure and open grate deck, is conducive to higher traffic noise volumes. All build alternatives, on the other hand, would utilize concrete decking which would provide a quieter bridge as compared to existing conditions.

Due to the rural nature of the project area, low traffic volumes on IA 9 now and in the future, and the consideration of Build Alternatives that are similar to existing conditions (i.e. two-lane bridges), a detailed noise analysis and special traffic noise abatement features were deemed unnecessary for purposes of the Feasibility Study.

4.3.11.2 Noise—Environmental Consequences

With all proposed alternatives, noise deriving from traffic approaching and crossing the bridge at Lansing is not anticipated to rise dramatically within a reasonable time horizon of forecasting. Although traffic volumes on IA 9 would increase slightly in the future, noise levels are not anticipated to exceed FHWA noise abatement criterion. Alternative S6, by relocating the IA 9 corridor to Center Street, would have the greatest potential for noise impacts.

While a detailed analysis was not completed for this study, one will need to be conducted as part of any future NEPA process requirements. That study will provide more details on noise characteristics in the study area.

Construction Noise Impacts. During construction, typical construction equipment will be used including dump trucks, graders, bulldozers, and pavement construction equipment. Adverse effects related to construction noise are anticipated to be of a localized, temporary, and transient nature.

4.3.11.3 Noise—Measures to Minimize Harm and Mitigation

The following standard measures will be taken to minimize construction noise impacts:

- Install and maintain effective mufflers on equipment.
- Locate equipment and vehicle staging areas as far from residential areas as possible.
- Limit unnecessary idling of equipment.
- Limit construction procedures to daylight hours where possible.

4.4 Public Use Lands and Section 4(f) Considerations

This section addresses potential impacts of the alternatives on resources that have the potential to be eligible for review under Section 4(f) of the 1966 Department of Transportation (DOT) Act.⁵ As this Feasibility Study is not an official NEPA document, this Section 4(f) review does not represent the Draft Section 4(f) Evaluation that might typically accompany a Draft EIS. Rather, this section provides a review of issues within the project area that have potential to qualify as Section 4(f) Resources. The designation of an area,

⁵ In January 1983, as part of an overall recodification of the DOT Act, Section 4(f) was amended and codified in 49 U.S.C. Section 303. However, the regulation is more commonly known as “Section 4(f).”

property, or site as a Section 4(f) Resource requires coordination with and concurrence from the SHPO and the FHWA. Such designation of a resource has not occurred as part of this Feasibility Study.

4.4.1 Section 4(f) Background and Application to the Feasibility Study

FHWA Technical Advisory T6640.8A (T6640.8A) provides guidelines for preparation of Section 4(f) Evaluations. The format and content of this Section 4(f) Evaluation generally follows guidance in TA 6640.8A; however, it is anticipated that salient Section 4(f) issues and coordination requirements will be treated more fully during the NEPA phase of this project. This documentation is warranted because the project review has determined that the reasonable alternatives would result in impacts to, or the “use” of areas, properties, or sites that should be considered in a Section 4(f) context.⁶

The Section 4(f) legislation, as established under the DOT Act of 1966 (49 USC 303, 23 USC 138), provides protection for publicly owned parks, recreation areas, historic sites, wildlife and/or waterfowl refuges from conversion to a transportation use. The FHWA may not approve the use of land from a significant publicly owned park, recreation area, or wildlife and waterfowl refuge, or any significant historic site unless a determination is made that:

- There is no feasible and prudent alternative to the use of land from the property; and
- The action includes all possible planning to minimize harm to the property resulting from such use (23 CFR 771.135).

The Section 4(f) process requires that any impacts from use of a publicly owned park, recreation area, historic site, wildlife or waterfowl refuge for highway purposes be evaluated in context with the proposed highway construction/reconstruction activity. An inventory of historical, archaeological, and publicly-owned recreational properties was completed based on a review of the design concept drawings and the project’s impacts on the properties.




4.4.2 Review of Potential Section 4(f) Resources

Due to the historic nature of Lansing, there are many buildings and related sites that are eligible for or listed on the National Register of Historic Places (NRHP) or, in cases where the structure is no longer intact, as a potential historical archaeological site. Exhibit 4-4 provides an overview of the general area for alternatives review in downtown Lansing. The Cultural Resources Review (Bear Creek, 2003, 2004) described in Section 4.2 and conducted in conjunction with this study provides a detailed review of the historical and archaeological resources in the project area.

⁶ The FHWA’s “Policy Paper” on Section 4(f) (September 24, 1987, revised June 7, 1989) also describes the topic of a “constructive use.” That is, use of a Section 4(f) site “can occur when the capability to perform any of the site’s vital functions is substantially impaired by the proximity impacts from a transportation project. Determination of a constructive use is a rarity and requires careful consultation with the FHWA in making such a determination.



Legend

-  Parks/Recreational Facilities
-  Listed on National Register of Historic Places
-  Eligible for National Register of Historic Places

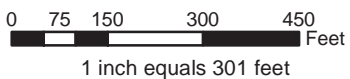


EXHIBIT 4-4
Potential Section 4(f) Resources

In completing this review of Section 4(f) resources in the project area, no official coordination with property owners or the SHPO was conducted regarding the applicability of Section 4(f) to the project and the resource. Several resources in Lansing are potentially eligible for review as Section 4(f) resources. However in many cases, either the qualities of a site are unknown and require further investigation or the potential impacts of an alternative cannot be fully determined and hence, a determination regarding “use” of the property cannot be made. The Section 4(f) resources listed in the bullets below may be impacted by one or more of the alternatives detailed in this study.

- **City Sports Complex.** While the complex itself is clearly a Section 4(f) resource, no alternatives directly impact the property. A parking lot located between the complex and John Street, has the potential to be impacted by Alternative S6. However, the parking lot is *not* within the official Sports Complex boundaries. Further coordination with the City of Lansing would be required during the NEPA phase to determine the extent of impacts and whether the impacts are considered a use of the property.
- **Historic Structures.** Two properties are either eligible for the NRHP or currently listed on the NRHP. Further details of the alternative corridors (including potential construction impacts) would be required to officially determine the extent to which these properties may or may not be impacted.
- **Potential Historic Archeological Sites.** As described in Section 4.2.1.2, two potential historic archeological sites have been identified as being within or near the Alternative S6 impact area. However, the Cultural Resources Review made the recommendation to delay further site work because of the likelihood that few or no artifacts remain at one site, and the other appears to be outside the impacts area. When the NEPA phase begins, a closer look at these sites will be needed to verify the applicability of Section 4(f) to these resources.

The resources described in the bullets above will require further analysis during the NEPA phase of environmental documentation when the impacts of reasonable alternatives can be better defined and official coordination with the appropriate federal and resource representatives can take place.

4.4.3 Section 4(f) Resources Impacted by One or More Alternatives

4.4.3.1 Black Hawk Bridge

Consequences. All Build Alternatives would result in the probable demolition of this structure, an NRHP eligible property. Demolition of this bridge would occur shortly after opening the new river crossing to traffic.

Avoidance Alternatives. The No-Build Alternative utilizes ongoing maintenance activities and a major rehabilitation of the bridge deck to retain use of the Black Hawk Bridge as the Mississippi River crossing at Lansing.

Measures to Minimize Harm. As described above in Section 4.2.1.3, the Black Hawk Bridge would be made available for purchase by a responsible agency or group. Maintenance of the bridge would become the sole responsibility of the new owner.

4.4.3.2 Upper Mississippi Fish and Wildlife Refuge

Consequences. All Build Alternatives require use of Refuge property. Alternative S6 would impact up to 8.5 acres of undisturbed Refuge land. The N3 alternative would impact up to 3.0 acres of Refuge land, while S1 is able to minimize impacts to the Refuge (less than 2 acres of undisturbed land) by utilizing lands already disturbed by the beneficial use site and boat landing. As inferred, these impacts do not include the Big Slough Boat Landing, which is described separately below.

Avoidance Alternatives. The No-Build Alternative is the only alternative that avoids direct impacts to the refuge. The size of the Refuge prevents the development of any feasible and prudent Build Alternatives that totally avoid impacts to the Refuge.

Measures to Minimize Harm. The impacts described above for the respective alternatives was based on a “maximum footprint” scenario, where embankment is used for all portions of the crossing over Island 146. Use of structure at any of the river crossing alternatives would help to reduce the impacts of the Build Alternatives.

The presence of the Beneficial Use Site and the Big Slough Boat Landing on Island 146 creates the dilemma of potentially needing to mitigate impacts to those resources. Assuming the mitigation of impacts to these resources occurs on Island 146, there would likely be additional impacts to undisturbed habitat on the island. The tradeoffs involved in impacts caused by the project and related mitigation measures on Island 146 demonstrate the need for continued coordination with the FWS during future phases of project development. An opportunity to reduce impacts for each of the alternatives on Island 146 is to utilize structure to the extent possible for the approach back to the causeway.

Where impacts to the Refuge are unavoidable, mitigation generally would imply acquisition of private property inholdings situated adjacent to the Refuge. The mitigation ratio would, at a minimum, be 1:1 (impacted acres: mitigated acres), with a high probability for higher mitigation ratios to be required based on impacts to wetlands. Determination of the impacted acreage would be a matter of negotiation between the FWS, the Corps, and the Iowa and Wisconsin DOTs; it may comprise just the footprint acreage impacts or it may comprise the footprint acreage plus some indirect impact acreage. The use of an elevated structure across Island 146, if practicable, may serve to reduce the footprint of the project on Refuge lands, allow better hydraulic flow through the project area, enhance wildlife movement, and potentially may reduce the amount of compensatory acquisition.

4.4.3.3 Big Slough Boat Landing

The Big Slough Boat Landing, while part of the Refuge, is discussed separately because of its unique characteristics compared to generally undisturbed habitat of the Refuge.

Consequences. Alternative S1 would impact 0.3 acre of the one-acre boat landing. This impact to the boat landing represents a disruption to the resource that would require substantial changes to site access and layout (with potential expansion impacts to the Refuge) in order to maintain the same level of capacity and service at that site. Alternative S6 would result in minor impacts related to changes in how vehicles would access the boat landing.

Avoidance Alternatives. The N3 Alternative and the No-Build Alternative avoid impacts to the boat landing on Island 146. With Alternative N3, minor adjustments to site access from the WI 82 causeway would be required. Under the No-Build scenario, the bridge could possibly be closed for a temporary period to accommodate major rehabilitation of the deck. This closure would limit accessibility to the boat landing from the Iowa side of the river.

Measures to Minimize Harm. The new Big Slough Bridge option for Alternative S6 involves crossing the Big Slough south of the existing bridge and connecting further east. This would avoid impacts to the Beneficial Use Site and boat landing, however, access to these sites would need to be altered. The best option for access as described in Section 3 of this study would be to build a short spur road through the undisturbed habitat of Island 146 to provide access directly off of the new Alternative S6 causeway. This would relocate the entrance from the northwest side to the southwest side of the site.

4.4.3.4 Beneficial Use Site

The Beneficial Use Site is also part of the Refuge, but like the Big Slough Boat Landing is a distinct portion of Island 146 that has unique uses.

Consequences. Based on the use of a bridge approach similar to that currently on Island 146, only Alternative S1 would have a direct impact on the Beneficial Use Site. Alternative S1 would impact approximately the northern 1.5 acres of the Site. Such an impact would require the creation of a new access point, realignment of traffic patterns on the site, and changes to how the Corps delivers material from the river onto the site. In order to restore the Site's capacity, an expansion would likely be required. An expansion of the Beneficial Use Site would cause additional Refuge impacts.

Alternative S6 would require changes to how the Beneficial Use Site is accessed. However, the impacts of a new access from Alternative S6 are not anticipated to cause any other impacts to the Site's capacity or functionality.

Avoidance Alternatives. The No-Build Alternative avoids direct impacts to the Beneficial Use Site. However, any bridge closure period (as described in Section 3.2.1) would limit access to the Site from Lansing, unless prospective users in Lansing were willing to travel a round trip of approximately 120 miles (reroute across the river at Prairie du Chien and back).

Measures to Minimize Harm. The use of structure on Island 146 for the Build Alternatives greatly reduces their footprint impacts. In the case of Alternative N3, impacts to the Beneficial Use Site would likely be completely avoided with use of structure. Additionally, in the case of the No-Build Alternative, an alternative deck rehabilitation approach (where construction activities occur during a defined work period each day and then the bridge is opened for use on the non-construction hours) could maintain access to the Beneficial Use Site throughout rehabilitation of the bridge deck. As with the Big Slough Boat Landing, access to the site would be relocated from the north side to the south side of the site via a new access connection directly from the S6 alignment on Island 146.

4.4.3.5 Historic Architectural Structures

Consequences. All or portions of two Lansing properties that are eligible for the NRHP lie within the footprint of a river crossing alternative. One property is underneath the footprint of the S1 Alternative and the other would be impacted by the S6 Alternative.

Avoidance Alternatives. The No-Build Alternative and Alternative N3 avoid impacts to these properties.

Measures to Minimize Harm. The location of the property in the footprint of Alternative S1 could create an opportunity to leave the house in place if the structural elements of the new crossing would not require use of the land (e.g. the short span between 2nd Street and Pier 1 goes over the house). However, coordination with Iowa DOT and FHWA would be necessary to determine the feasibility of such an arrangement. At this point, it appears as though there is no potential to minimize harm to the property under the Alternative S6 footprint.

Mitigation for impacts to historical or archaeological sites or structures can involve moving them out of harms way or rigorously documenting and archiving the documentation.

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Section 5

Public and Agency Involvement

SECTION 5

Public and Agency Involvement

The Iowa DOT has demonstrated a commitment to public and agency involvement in development of the Feasibility Study and will continue to encourage public input as this project moves into future stages of development (e.g. documentation in an EIS). At the beginning of the Feasibility Study process, Iowa DOT developed a *Public Involvement Plan* which served as a comprehensive “blueprint” for public involvement activities carried out during the course of the Feasibility Study. The objective was to ensure that interests and issues related to the project area are considered and addressed through a proactive coordination and communication program.

The purpose of this section is to document the public and agency involvement process used while completing this study. Input was received by using a variety of formats, including the Project Advisory Committee, coordination with resource agencies, and public information meetings. The public involvement process described below did not exclude any persons because of income, race, color, religion, national origin, sex, age, or handicap.

5.1 Agency Involvement

5.1.1 Project Advisory Committee

Prior to beginning the Feasibility Study, a Project Advisory Committee, composed of representatives from Wisconsin DOT, Iowa DOT and local agencies and businesses, was established to provide local input to the study team and to serve as a local link between area citizens and the study team (see Table 5-1). The advisory committee met seven times during the development of the Feasibility Study. The meetings were structured to encourage an exchange of information and ideas that guide the development of alternatives, and the evaluation and selection process. The Iowa DOT scheduled and facilitated these meetings.

Below is a list of Project Advisory Committee meetings held over the course of the study and a brief summary of what was discussed at each meeting:

TABLE 5-1
Black Hawk Bridge Feasibility Study Project Advisory Committee Members

Agencies and Groups Represented on the Project Advisory Committee	
Federal Highway Administration	Crawford County Engineer
Iowa DOT	Crawford County Land Conservation & Development
Wisconsin DOT	Crawford County Highway Committee
Allamakee County (IA), County Supervisors	Upper Explorerland Regional Planning Commission
Allamakee County, County Engineer	Mississippi River Regional Planning Commission
Allamakee County Conservation	Black Hawk Bridge Lighting Committee
City of Lansing	Lansing Chamber of Commerce
Crawford County (WI) Supervisors	

5.1.2 Advisory Committee Meeting #1 (August 26, 2002)

This meeting served as the “kick-off” meeting for the study. Project team members introduced themselves and the roles they would have on the project. The role of the advisory committee was also discussed. Other topics of discussion included:

- Introductions to the Environmental Impact Statement (EIS) process and its components
- Sharing of information on the approach to the study, including anticipated issues such as Section 4(f) coordination, threatened and endangered species, and river navigation requirements
- Planned public involvement activities

5.1.3 Advisory Committee Meeting #2 (October 21, 2002)

The focus of this meeting was to describe the change in project approach. Instead of documenting the transportation challenges the Black Hawk Bridge poses for vehicular and barge traffic in an EIS, Iowa DOT decided to evaluate the same range of issues using a Feasibility Study approach. The Feasibility Study would follow the general outline of an EIS, but would not provide the environmental clearance that would be necessary before the project could proceed to a design phase. The reason for changing the approach to the project was due to construction funding constraints and no near-term plans for construction. The Feasibility Study was determined to be a better use of planning study funds than an EIS at this time. Federal regulation requires that a major action, such as final design, right-of-way acquisition, or approval of plans, specifications, and estimates occur within three years of completing an EIS. If no action is taken on an EIS within three years, then the EIS must be re-evaluated or revised. A Feasibility Study is based largely on literature review of existing data, with field confirmation of results where possible. When an EIS does become necessary, the Feasibility Study will be used as a building block on which to begin the EIS.

Other topics covered in the meeting included:

- Items that would be likely be included in the Feasibility Study
- The study’s statement of purpose and the decision to conclude the study with several reasonable alternatives rather than identifying a preferred alternative.
- The condition of the bridge, including the sufficiency rating, structural condition, and turning movements and navigation issues

5.1.4 Advisory Committee Meeting #3 (February 11, 2003)

Much of this meeting focused on the historical and archaeological resources in the study area. It was noted that at least 50 properties are potentially eligible for the NRHP, and that five structures are already included on the Register. Approximately 50 potential historic archaeological sites were identified in the study area. Future subsurface testing explorations on the Wisconsin side will be included in the Feasibility Study.

Other topics covered in the meeting included:

- The purpose and need for this study, especially the development of graphics that will be used for describing the existing conditions and deficiencies found in the study area – to be used in both the Feasibility Study and the first public information meeting
- Input was received from the committee towards development of a vision statement for the project as it relates to the Black Hawk Bridge and the community needs
- Plans for the first public information meeting were discussed, including the development of alternative river crossing locations for display and public comment at the meeting

5.1.5 Advisory Committee Meeting #4 (April 9, 2003)

Based on input received at the third committee meeting, a draft vision statement was developed and presented to the committee. Comments on the vision statement were taken and incorporated accordingly. The final vision statement, resultant from this meeting, is presented in Section 1 of this Feasibility Study. Displays for use at the public information meeting were presented in draft form for response from the committee, and edits were recommended for the sufficiency rating and crash data exhibits.

The preliminary range of alternatives (as described in Section 3.2) were presented to the committee, including a discussion of the assumptions made (e.g. vertical clearance, tie-in to existing street network location at 2nd Street). Issues such as the allowed location of piers, horizontal clearance allowances, and approach grades were also discussed. A review of potential bridge types was also provided, including a display of example bridges for use at the public information meeting.

5.1.6 Advisory Committee Meeting #5 (July 9, 2003)

Additional discussion of alternatives was the focus of the first part of this meeting, with an update of activities since the last committee meeting, and recommendations for the first screening of alternatives. Several meetings with agencies were held to obtain their input (see the Agency Coordination discussion in this section), including a field review meeting with the USCG, meetings or teleconferences with the FWS and the State DNRs, and an Agency Scoping Meeting in Lansing on June 17, 2003.

Based on input from the committee, the public and agencies, a set of screening recommendations were made and presented in a technical memorandum to the committee. Some of the considerations in screening revolved around environmental constraints. A brief presentation was given regarding identified constraints such as habitat impacts on the Wisconsin side, a potential fish spawning area, and threatened and endangered species.

The last half of the meeting focused on the results of a load testing and fatigue life study recently completed for the Black Hawk Bridge. Findings from the study indicated no near-term concerns, based on anticipated traffic volumes.

Other topics covered in the meeting included:

- Comments received at the April 2003 public information meeting
- Upcoming archaeology field studies on the Wisconsin side of the river

5.1.7 Advisory Committee Meeting #6 (January 14, 2004)

Materials presented at this meeting generally consisted of items for display and discussion at the upcoming public information meeting (to be held on February 5, 2004). Based on the first round of screening, displays were created to show a possible footprint of a new bridge at each remaining location, along with the necessary roadway improvements for connecting the bridge to the street system. Because Alternatives N3 and S1 retain the turning movement at the intersection of 2nd Street and Main Street, options for minimizing conflicts between eastbound and westbound turning movements as discussed previously, in section 3.5.3, were also presented to the committee for their input prior to the public information meeting.

Other topics covered in the meeting included:

- Additional screening of alternatives is likely based on input received from the public at the scheduled public information meeting, to be held on February 5th.
- The USCG will be providing additional information about the necessary minimum horizontal clearance requirements across the navigation channel of the Mississippi River, probably leading to bridge type screening decisions.
- Detailed impact analyses will be conducted for the alternatives that remain after the final round of screening.
- A Bridge Management Plan will be developed to document a recommended maintenance plan for ongoing use of the Black Hawk Bridge.

5.1.8 Advisory Committee Meeting #7 (August 31, 2004)

This meeting gave a preview of the final recommendations of the Feasibility Study and materials to be presented at the final public information meeting (to be held September 21, 2004). Three new location alternatives remain (N3, S1, and S6) after the S3 and S5 alternative locations were dropped from consideration. Public input indicated that the business impacts of S5 and residential impacts of S3 were too great compared to the remaining reasonable options. One of the four options for improving the intersection of 2nd Street and Main Street was also dropped from consideration (Option C – the “Front Street Loop”). Should the Iowa DOT decide to improve that location at a future date, the three remaining options will be further assessed.

The USCG’s input on horizontal clearance was discussed – they recommended a 700-foot clearance at the S1 location, but would not commit to a distance at the other two locations (N3 and S6) without further study. While it is possible the USCG would recommend a longer clearance at the other locations, the Feasibility Study assumes a 700-foot clearance at all three remaining Build Alternative locations for uniformity of comparison in the document. The Bridge Management Plan was also described to the committee. Generally, the plan will consist of three components: inspections procedures, maintenance program, and repairs.

5.2 Resource Agency Involvement

The project team coordinated project development with, and solicited input from, resource agencies including the FWS, the Corps, USCG, and state DNRs. A summary of agency meetings is provided below. Copies of official agency correspondence are provided in Appendix C of this Feasibility Study.

5.2.1 Preliminary Agency Input Meetings

Agency input regarding various technical topics was valuable in determining alignment constraints for the preliminary alternatives screening. Specific information regarding agency expectations for clearance of the navigation channel, location of the piers, and the length of the main span was provided by the USCG and the Corps at a meeting in Lansing on May 7, 2003.

Meetings with the FWS and the Iowa and Wisconsin DNRs in May 2003 provided information on natural resources in the project area, including threatened and endangered species, wetlands, and avoidance of impacts to the Upper Mississippi National Wildlife and Fish Refuge.

5.2.2 Agency Scoping Meeting

A Resource Agency Scoping Meeting was held June 17, 2003, at the Kerndt Brothers Community Room in Lansing Iowa. Representatives from Iowa DOT, the Corps, FWS, and Iowa and Wisconsin DNRs, were in attendance. The purpose of this meeting was to:

- Review materials for the project purpose and need
- Obtain input on environmental resources in the project area
- Review the preliminary alternatives development and screening process
- Discuss potential changes to the preliminary alternatives based on potential impacts to the environment

For the Wisconsin side of the Mississippi River, agencies at this meeting confirmed the importance of minimizing impacts to the Refuge. It was noted that the Beneficial Use Site is a valuable resource to local communities by providing sand and gravel free-of-charge to the public and local public works departments. Additionally, the FWS described Island 146 as having better-quality habitat on the southern portion of the island, in the vicinity of Alternatives S5 to S8.

On the Iowa side, the Iowa DNR stated that the bluffs located parallel to 2nd Street on the north side of town should be avoided and that any potential for impact in that area would require more detailed field studies to assess the possible existence of rare or threatened species. Additionally, the area along the Iowa shoreline has the characteristics of a good fish spawning location, although no determination of such use by fish has been made at this time.

5.2.3 River Navigation Requirements Meeting

On May 28, 2004, representatives from Iowa DOT met with the USCG to clarify the horizontal clearance requirements for the remaining alternative bridge locations (N3, S1,

and S6). The USCG stated that a 700-foot main span distance at the S1 location would be allowed. However, no distance was determined for the other locations due to a likely need for additional information such as the potential impacts on barge “storage,” where upstream bound barges wait for the downstream barge to pass before continuing upstream of Lansing, and the potential need for barge movement modeling under an Alternative N3 scenario.

5.2.4 Alternatives Screening Update

An Alternatives Screening Update Memo was sent to the attendees of the Agency Scoping Meeting, plus the USCG, on July 28, 2004. The memo provided an update of the alternative screening process resulting in the three remaining build alternative locations (N3, S1, and S6) and the No-Build Alternative for detailed discussion in the Feasibility Study. Resource agencies were encouraged to provide additional input about the remaining alternatives and any resource information that applies to them.

The Corps responded with a confirmation of the importance of the Beneficial Use Site on Island 146 and its value to the surrounding communities. The Wisconsin DNR noted that they support the viable alternatives (N3 and S1) which minimize impacts to Refuge lands and that they cannot support alternatives such as S6 which have greater impacts to the Refuge.

The FWS also stressed the importance of minimizing impacts to the Refuge, stating that whichever alternative is selected will need to meet criteria for a “determination of compatibility.” This requirement dates back to the 1918 Migratory Bird Treaty Act, and has had legal meaning for all National Wildlife Refuges since passage of the Refuge Recreation Act of 1962. A compatible use is an allowed use that will not materially interfere or detract from the purposes for which the individual refuge was established.

5.3 Public Involvement

Three open-house public information meetings were held during the study. These meetings provided information to and gathered feedback from the public regarding the project. All meetings were held at the Kerndt Brothers Savings Bank Community Center in Lansing (located at 395 Main Street). The Iowa DOT has developed “Meeting Summary Booklets” for the public information meetings which provide an overview of the materials displayed, handouts, and comments received at the meetings.

Public announcements of the information meetings were made available through display advertisements in the following newspapers: the *Lansing Allamakee Journal*, *The Waukon Standard*, the *NE Iowa Extra Shopper*, the *Courier Press* and *Courier Press Shopper* (Prairie du Chien, WI), the *Vernon County (WI) Broadcaster* and the *La Crosse Tribune* (La Crosse, WI). Public information meeting invitations were also sent to representatives of local government, schools, emergency service providers, tribal officers, and state and federal resource agencies.

5.3.1 Public Information Meeting #1 (April 29, 2003)

The first public information meeting was held on April 29, 2003 from 4 p.m. to 7 p.m. Forty-seven people attended the meeting. The purpose of this meeting was to introduce the project and to gather information and feedback from the public regarding traffic and transportation issues in Lansing and on the WI 82 causeway as well as general information about resources within the study area.

The entire range of preliminary alternatives for a new bridge location was presented at this meeting. The range of alternatives consisted of three locations upstream of the Black Hawk Bridge, eight locations downstream, and the current location (with either a new bridge or no-build option possible). See Section 3.2 for a complete description of the preliminary range of alternatives.

The following topics were discussed:

- The purpose of a Feasibility Study for the Black Hawk Bridge
- The history of the Black Hawk Bridge, including periods of construction, closure, and a review of barge collisions
- Existing and future conditions of the Black Hawk Bridge and related street network, including the recent crash history and traffic volumes in the project area
- The initial range of location alternatives
- Community and natural resource characteristics that should be considered when describing the affected environment, including a preliminary comparison of potential impacts for each of the preliminary alternatives
- Bridge types that may be considered in the development of new river crossing alternatives (e.g. truss, tied arch, or cable-stayed bridges)

Comments received from meeting attendees included the following:

- Keeping a Mississippi River crossing at Lansing is vital to the community
- Maintain the existing bridge for as long as possible
- Improve the turns onto 2nd Street from the bridge and Main Street; trucks can be a problem
- Provide space on a new bridge for a walkway or recreational trail
- Impacts to the Refuge should be minimized
- Tourism is important to Lansing's economy
- Avoid impacts to the Lansing business district

5.3.2 Public Information Meeting #2 (February 5, 2004)

The second public information meeting was held on February 5, 2004, from 5 p.m. to 7 p.m. Twenty-seven people attended this meeting. The purpose of this meeting was to obtain

input on the first round of alternatives screening and potential additional screening of alternatives, obtain input on the bridge concepts that have been developed, and describe other progress on the study, including agency coordination.

As described above, the first round of alternatives screening was presented. At this point, one upstream new location alternative (N3), the No-Build Alternative, and four downstream new location alternatives (S1, S3, S5, and S6) remained. Six new location alternatives from the first public meeting were eliminated from further consideration. Additional information about the alternatives screening process is provided in Section 3.4.

Among the items for discussion were the following:

- The reasons for dropping certain alternatives from further consideration
- Input from the resource agencies received during the agency scoping meetings, such as the potential for a fish spawning area along the Iowa shoreline
- Concept drawings of potential bridge types for two potential span lengths, those up to 700 feet long, and those greater than 900 feet long
- The potential for additional location screening based on input received from the public
- The range of potential improvements for the intersection of 2nd Street and Main Street
- Input from the public regarding the potential impacts of the Main Street alternative

Comments received from meeting attendees included the following:

- Impacts to residential areas, especially with Alternative S3 should be avoided
- Avoid impacts to local businesses; Alternative S5 has too many negative impacts
- Locations adjacent to the existing bridge make the most sense, from an impact minimization standpoint
- Consider the use of an embankment on the WI 82 causeway, floodwaters have almost overtopped the causeway
- Community impacts of Alternative S6 may outweigh the benefits of a direct IA 9 route
- Avoid impacts to the high school and the historic “stone” school (listed on the NRHP)

5.3.3 Public Information Meeting #3 (September 21, 2004)

The third public information meeting was held on September 21, 2004 from 5 p.m. to 7 p.m. Fourteen people attended this meeting. The purpose of the third public information meeting was to provide an overview of the final recommendations from the Feasibility Study (including the remaining location and bridge alternatives), describe what will happen after the study, and obtain input from the public about the recommendations. Prior to this meeting, the final screening of alternatives resulted in the elimination of Alternatives S3 and S5 from further consideration.

Materials presented to meeting attendees included:

- The remaining three new location alternatives (N3, S1, and S6), the impacts of which are studied in detail in Section 4 of the Feasibility Study
- The final two bridge alternatives considered for a potential new river crossing
- Roadway impacts of each Build Alternative, including options for improving the intersection of 2nd Street and Main Street
- An impact summary of the Build and No-Build Alternatives
- Plans for continued management of the existing bridge's condition

Comments received from meeting attendees included the following:

- The existing bridge is an icon closely associated with Lansing and the Northeast Iowa region
- Continue to track the issue of how the embankment affects hydraulics upstream and downstream of the bridge
- Keep the public informed about progress on future phases of the project (i.e. detailed study in an Environmental Impact Statement)

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Section 6

**Black Hawk Bridge Feasibility Study
Summary and Conclusions**

Black Hawk Bridge Feasibility Study Summary and Conclusions

6.1 Project Location

The Black Hawk Bridge crosses the Mississippi River at Lansing, Iowa, which is located in the bluff region of northeastern Iowa's Allamakee County. Iowa Highway 9 (IA 9), and Wisconsin State Trunk Highway 82 (WI 82) are the key highways within the vicinity of the Black Hawk Bridge. IA 9 terminates at the Black Hawk Bridge and becomes WI 82 upon entering Wisconsin. WI 82 runs through the Upper Mississippi River National Wildlife and Fish Refuge. The Black Hawk Bridge provides the only crossing over the Mississippi River between Iowa and Wisconsin in the project area. The next closest Mississippi River crossings to Lansing are the Interstate 90 and US Highway 14/61 bridges in La Crosse (35 miles north) and the U.S. Highway 18 bridge at Prairie du Chien, McGregor/Marquette (30 miles south).

The study area for this Feasibility Study encompasses an area approximately 1,000 feet north of the existing Black Hawk Bridge over the Mississippi River to 3,000 feet south of the bridge. The study area is wide enough to evaluate a full range of alternatives for bridge replacement north, south, and adjacent to the existing structure. The study area and the range of alternatives (described below) are depicted in Exhibit 6-1.

6.2 Proposed Action and Purpose and Need

The purpose of this Feasibility Study is to evaluate a range of alternatives that could correct the problems of the existing Black Hawk Bridge over the Mississippi River in Lansing. While the initiation of this study does not imply the immediate programming of funds for reconstruction or replacement of the bridge, future considerations for improvements will be based on the results of this study as well as the availability of funding. The Iowa and Wisconsin DOTs, in response to local officials, initiated this study to investigate in detail the issues of continued maintenance and operations of the existing bridge and to consider alternatives for future bridge improvement or replacement.

The Black Hawk Bridge is more than 70 years old and warrants attention because of the functional problems it poses for vehicular traffic and challenges it poses for barge traffic. The project needs, which are identified below, highlight the reasons why planning is currently underway to maintain the long-term integrity of the river crossing, which includes the examination of potential new bridge locations at Lansing. The key needs for considering a new river crossing in Lansing include:

- Maintain the local and regional linkages provided by the Black Hawk Bridge and causeway;

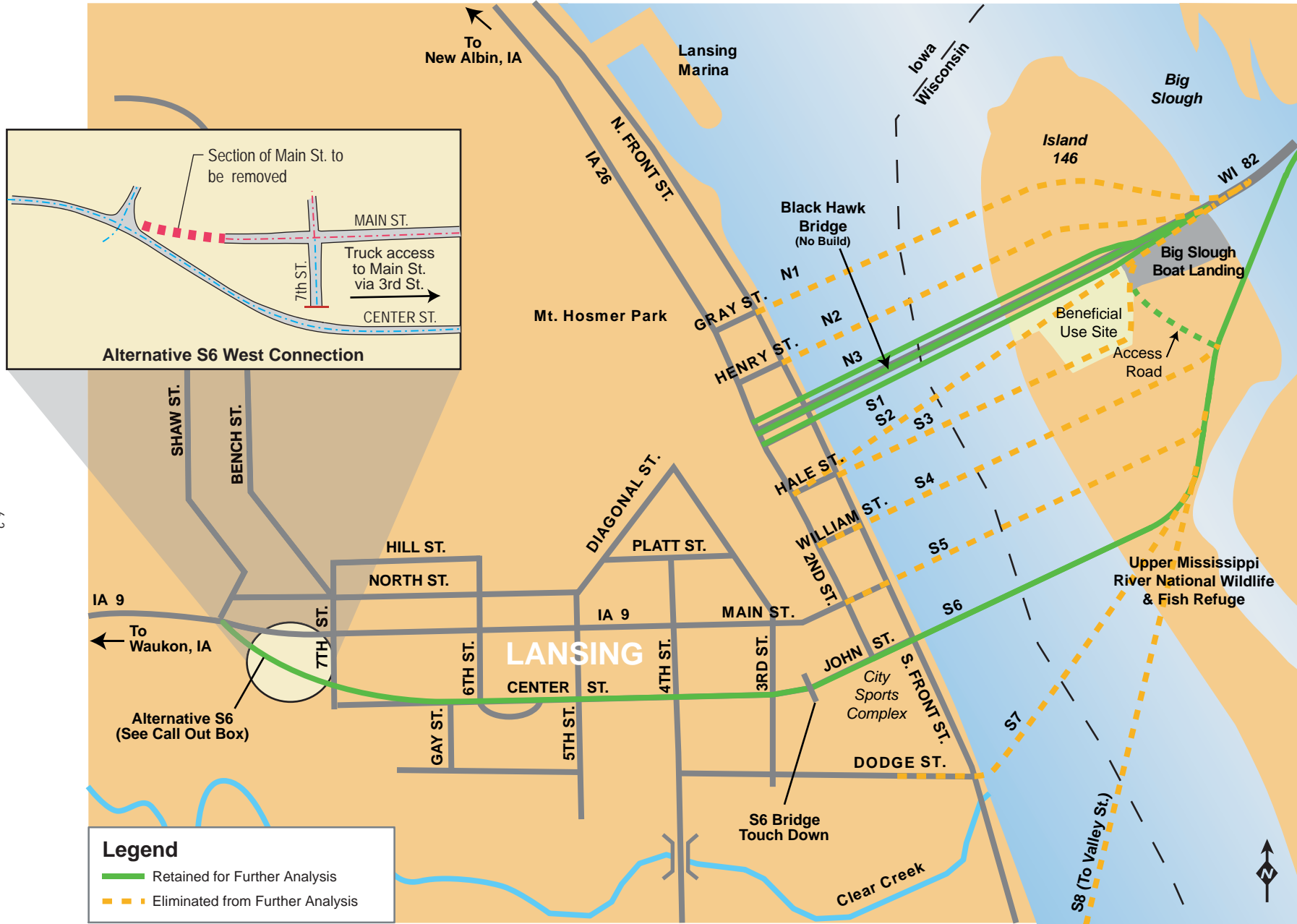


EXHIBIT 6-1
Remaining Alternatives

- Address planning for a bridge that was designed and constructed in a different era and that has a very long history of rehabilitation and repairs;
- Ensure that the crossing will meet the appropriate functional roadway design standards and performance objectives;
- Provide an alignment, clearance height, and a clear span length and configuration that will provide safe passage for tows (river barges) and other large river vessels; and
- Provide for other functions considered appropriate and desirable for a major bridge in the Lansing community – for example, reasonable aesthetics and recreational functions.

6.3 Alternatives

6.3.1 Bridge Location Alternatives

A wide range of initial alternatives was developed early in the Feasibility Study, during the project’s data gathering, public involvement and agency coordination activities. These initial alternatives (shown in Exhibit 6-1) were screened and refined to a short list of reasonable alternatives for detailed evaluation in the Feasibility Study. Three “Build Alternatives” (consisting of constructing a new bridge at a new location) and the “No-Build Alternative” have been retained for further study. A brief description of these alternatives is provided below.

6.3.1.1 No-Build Alternative

The existing maintenance program on the bridge would continue. Improvements at the east and west bridge approaches would be limited to normal pavement maintenance. If the Black Hawk Bridge were not constructed within the next 20 years, it is anticipated that the bridge deck would have to be replaced. Bridge deck replacement may involve closure of the Black Hawk Bridge for a period of several months and require a detour to either the La Crosse or Prairie du Chien Mississippi River crossing locations.

6.3.1.2 Build Alternatives

All Build Alternatives discussed in the Feasibility Study assume the new bridge will be a two-lane roadway with ten-foot shoulders (a total bridge roadway cross-section of 44 feet). Except where noted, the new crossing alternatives utilize the existing roadway network in Lansing and in Wisconsin (the WI 82 causeway).

Alternative N3—Adjacent to Black Hawk Bridge to the North. This alternative proposes a new river crossing alignment approximately 50 feet north (upstream) of the Black Hawk Bridge. Alternative N3 (shown on Exhibit 6-1) would depart from 2nd Street and continue east over the Mississippi River parallel to the existing bridge. The new crossing would connect to WI 82 on Island 146 and continue on the existing causeway.

Alternative S1—Adjacent to Black Hawk Bridge to the South. This alternative is similar to Alternative N3, but would be located 50 feet south (downstream) of the existing bridge, touching down in the vicinity of Ballou Street. This alternative would go through the northern portion of the Corps’ Beneficial Use Site on Island 146 in the Refuge.

Alternative S6—John Street. This alternative utilizes John Street (one block south of Main Street in Lansing and approximately 1,250 feet south of the existing Black Hawk Bridge) to create a perpendicular crossing of the river. Once in the Refuge, this alternative would involve construction of a new Big Slough crossing and connect to the causeway east of Big Slough. Alternative S6 also involves a new connection to IA 9 on the west side of Lansing. The new IA 9 corridor would run along John Street and Center Street through Lansing before utilizing a short segment of new roadway for connecting back to IA 9 (see Exhibit 6-1 on page 6-2). Main Street in downtown Lansing would no longer be the IA 9 route through town.

6.3.2 Other Alternatives Not Carried Forward

Several alternatives studied in the Feasibility Study were eliminated from further consideration. These eliminated alternatives, shown on Exhibit 6-1, included one option to use transportation management techniques to avoid new construction, and nine Build Alternatives, including one option to build a new bridge at the current river crossing location. Table 6-1 (page 6-9) provides an overview of the rationale for eliminating alternatives from further consideration.

6.3.3 Bridge Types Considered in the Feasibility Study

Several bridge types were evaluated to determine what type of structure would be appropriate for a new bridge location. Exhibit 6-2 provides a diagram of the existing Black Hawk Bridge for comparison to the major bridge types studied in this Feasibility Study (shown in Exhibit 6-3). The bridge types considered were the following: Truss, Tied Arch, Cable Stay, and Suspension. Initially, bridge span lengths of up to 700 feet and greater than 900 feet were considered and shared with the public at the February 5, 2004, public information meeting. After discussions with the U.S. Coast Guard resulted in the assumption, for comparison purposes, of a 700-foot main span distance for all crossing locations, the bridge types were screened down to two types that are feasible at any of the three new bridge alternative locations.

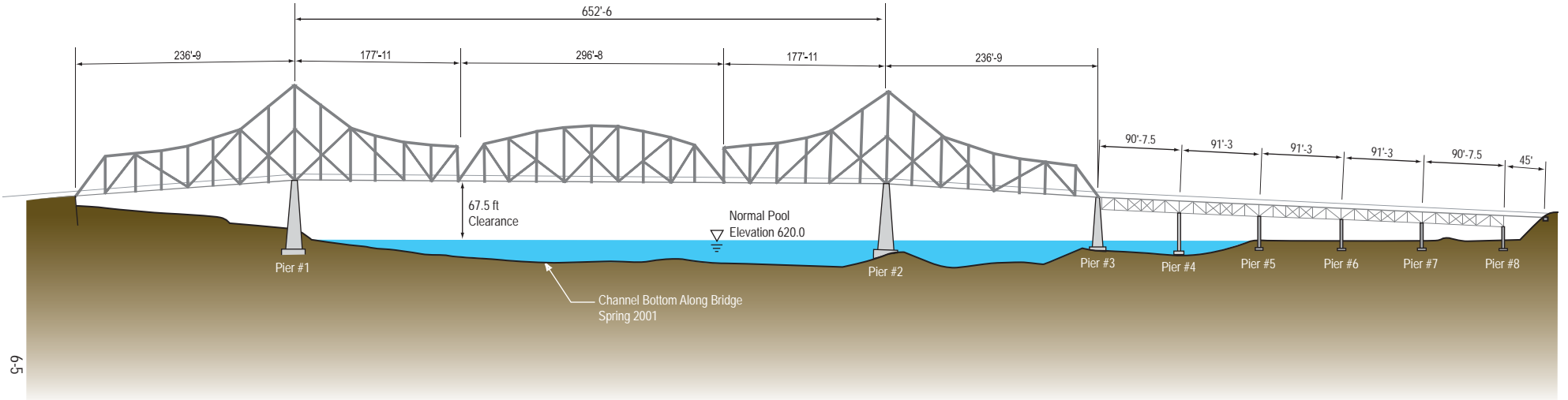
The Truss and Tied Arch bridge types were considered to be the most appropriate types for further study. These bridge types tend to be more appropriate and cost-effective for the 700-foot span length. The Cable Stay and Suspension bridges tend to be used for longer main span distances and would likely be more expensive on a square-foot basis compared to the other bridge types. For purposes of impact review in the Feasibility Study, the Truss and Tied Arch bridges are identical in the impacts they would cause.

6.4 Socioeconomic/Environmental Impacts

Primary impacts associated with the range of remaining alternatives include residential and business relocations, wetland and floodplain encroachment, as well as other habitat impacts to the Refuge, and historical, archeological, and cultural resource impacts in Lansing. Comparisons of each of the proposed alternatives are provided in Table 6-2 (page 6-10). See also the discussion below regarding additional studies that may be necessary in the future, as this project progresses through further environmental review.

West
(IA9 - City of Lansing)

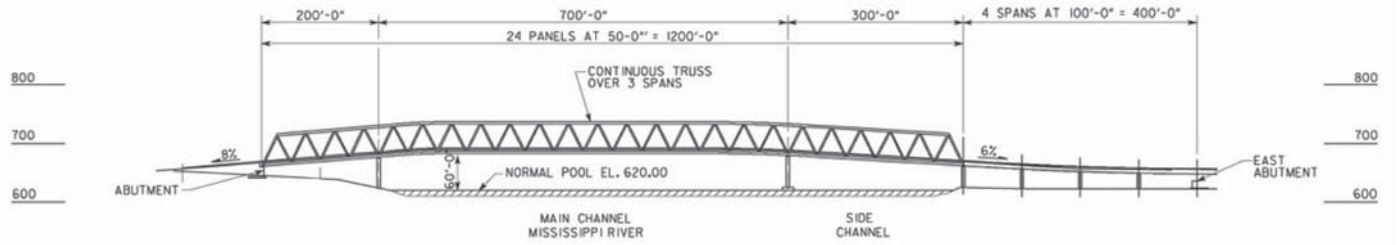
East
(WI82 - Causeway)



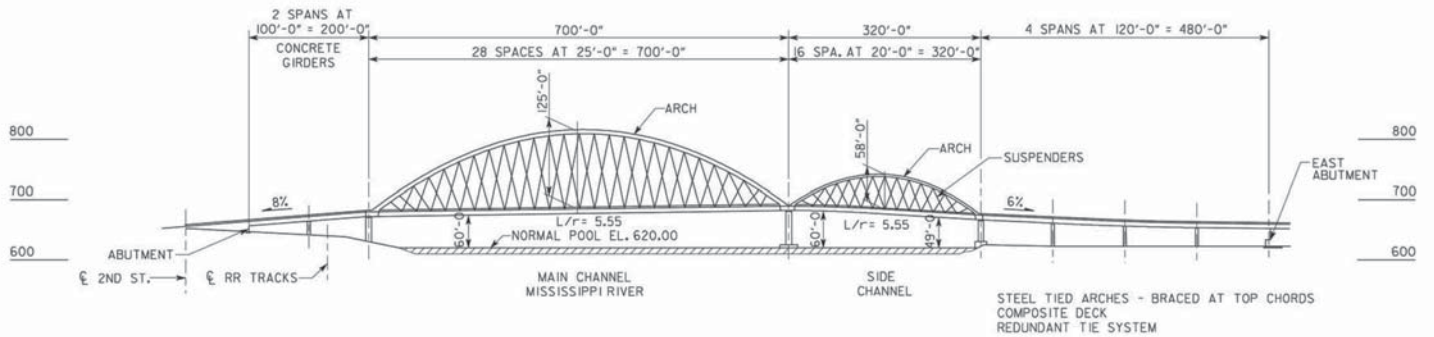
6-5

Cross Section

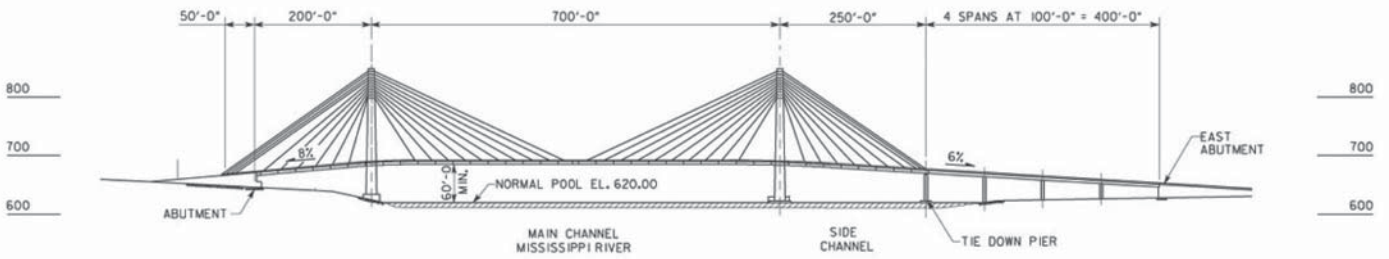




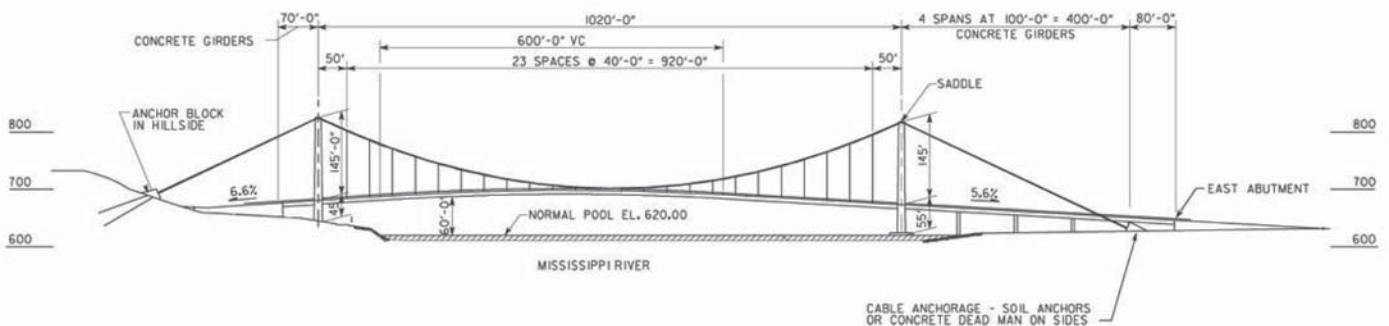
TRUSS BRIDGE ALTERNATIVE - 700' SPAN - RETAINED FOR ANALYSIS



ARCH BRIDGE ALTERNATIVE - 700' SPAN - RETAINED FOR ANALYSIS



**CABLE STAY BRIDGE ALTERNATIVE - 700' SPAN
- ELIMINATED FROM CONSIDERATION**



**SUSPENSION BRIDGE ALTERNATIVE - 1020' SPAN
- ELIMINATED FROM CONSIDERATION**

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As shown in Table 6-2, the No-Build Alternative is generally able to avoid impacts to resources in the project area. However, the need to replace the bridge deck in the future may result in closure of the river crossing for several months. This closure of the crossing would have several socioeconomic impacts to residents of Lansing and those who travel there (such as commuters or tourists to or from Wisconsin).

6.5 Additional Studies Needed in the Future

The Black Hawk Bridge Feasibility Study is a precursor to the National Environmental Policy Act (NEPA) process. NEPA represents environmental legislation enacted by Congress to promote efforts to prevent, minimize, or eliminate impacts to the environment. NEPA ensures that programs or activities receiving federal financial assistance, including transportation projects, provide the proper documentation in the form of Environmental Impact Statements (EIS) or Environmental Assessments (EAs). Although not an official NEPA document, this study will show evidence of compliance with NEPA guidance in the development of the alternatives and is intended to facilitate the future coordination and development of an EIS for a proposed new river crossing at Lansing.

When this proposed project is studied in a future EIS, several additional studies will be required to fully assess the potential impacts of a new river crossing at Lansing. The following is a list of some of the major studies or actions that will be required during EIS development:

- A Section 4(f) Evaluation will be needed to fully assess the project's impacts to the Upper Mississippi River National Wildlife and Fish Refuge as well as the historical/archaeological resources eligible for or listed on the National Register of Historic Places, potentially in the Lansing area. This Evaluation will require additional coordination with owners of Section 4(f) resources to determine the extent of impacts and potential mitigation measures.
- Further coordination with the U.S. Coast Guard regarding horizontal clearance (main span) distance will be needed for the remaining Build Alternatives. At this time, the 700-foot clearance has only been determined for Alternative S1, but assumed to apply to Alternatives N3 and S6 for purposes of comparison in this Feasibility Study.
- A study of the hydraulic impacts of a new bridge location, including the potential removal of existing causeway will be needed to assess impacts to the Mississippi River. This study will also be used to assess the extent to which embankment or structure should be used as part of the bridge approach on the Wisconsin side of the river.
- Additional environmental investigations will be necessary to assess impacts to potential threatened or endangered species such as the Higgins Eye Pearly Mussel, and to potential historical and archeological resources in the study area.

6.6 Public Input

A comprehensive public information program was used to solicit input from residents of Lansing, public agencies, and other interested stakeholders. Three public information

meetings were held in Lansing, along with several Advisory Committee meetings. Input received from the public was instrumental in making alternative screening decisions.

The most frequently heard comments from the public included:

- Maintain the river crossing at Lansing. The crossing is vital to the well-being of Lansing and the greater northeast Iowa-southwest Wisconsin region.
- Retain use of the current bridge for as long as possible. The existing bridge serves the needs of the community and has become a symbol of the historic character and beauty of this Mississippi River region.

6.7 Recommendations

The purpose of this Feasibility Study is to evaluate a range of alternatives that could correct the problems of the existing Black Hawk Bridge over the Mississippi River in Lansing. Three new location “Build Alternatives” and a “No-Build Alternative” have been identified as feasible alternatives worthy of more detailed analysis.

The three new location alternatives (shown on Exhibit 6-1, attached to the back of this summary) are as follows:

- Alternative N3 – approximately 50 feet upstream of the existing bridge;
- Alternative S1 – approximately 50 feet downstream of the existing bridge;
- Alternative S6 – approximately 1,250 feet downstream of the existing bridge, at John Street, and use Center Street as the new Iowa Highway 9 (IA 9) corridor with a new connection on the west side of Lansing.

The existing bridge (shown in Exhibit 6-2) has a main span distance of approximately 650 feet. Two bridge types have been retained as being feasible for the new river crossing locations. As shown in Exhibit 6-3, they are the truss and arch bridge type alternatives. A 700-foot main span distance has been assumed for comparison of the remaining river crossing location alternatives.

In addition to the Feasibility Study, a separate bridge management plan document is being developed. This plan will identify the inspection and maintenance programs and bridge repairs that will be required during the interim period before a decision is made about building a new river crossing.

TABLE 6-1
Alternatives Screening Recommendations

Alternative	Comments	Retain for Analysis	Eliminate from Further Study
N1 (Gray St.)	Eliminated from further consideration primarily due to the likelihood of complicating barge navigation if a main span length comparable to the existing bridge would be used. Otherwise a span distance of at least 1,000 feet would be necessary. No discernable advantages over Alternative N3.		X
N2 (Henry St.)	See comments for Alternative N1.		X
N3 (Adjacent to bridge-upstream)	Retained for further consideration given its ability to minimize impacts.	X	
Reconstruct on Existing Location	This alternative was eliminated from further consideration because an important community/regional connection would be lost for an extended period during the construction of a new bridge.		X
S1 (Adjacent to bridge-downstream)	As with Alternative N3, the impacts of a new river crossing are minimized.	X	
S2 (Hale St. – skewed)	Eliminate from further consideration primarily because of the longer main span required by the skew and impacts to the Beneficial Use Site, with little advantages over S1 or S3.		X
S3 (Hale St.)	Several residences would be directly impacted by this alternative, in addition to the potential shift of 2nd Street into the adjacent bluffs.		X
S4 (William St.)	Offers no compelling benefits when compared to the other Build Alternatives – more refuge impact and retains the turning movement problem at 2nd Street and Main Street intersection.		X
S5 (Main St.)	Impacts to the historic downtown business district would be substantial, including loss of access to businesses and parking, and extensive use of retaining walls.		X
S6 (John St.)	Provides a new transportation option that avoids the current turning movement problems at 2nd Street	X	
S7 (Dodge St.)	Due to the skewed angle of the river crossing, a long main span distance is required. This longer span would be more costly to build and outweigh the navigational benefits of getting away from the upstream river navigational challenge. Additionally, this alternative results in greater impacts to the Refuge.		X
S8 (Valley Dr.)	See comments for Alternative S7.		X
No-Build	Major rehabilitation of the bridge deck would occur under this alternative, and may require closure of the river crossing for several months; No other major bridge or roadway construction, beyond routine maintenance (e.g. repainting), would occur. Retained based on public support and for its ability to avoid environmental impacts.	X	
Transportation Demand and System Management	These measures, which tend to be utilized in urban areas with high rates of transit usage or high traffic transportation corridors (e.g. greater than 10,000 vehicles per day), are not particularly feasible in the Black Hawk Bridge project area.		X

TABLE 6-2
Impact Summary— Black Hawk Bridge Reasonable Alternatives

Environmental Issue	Alternatives			
	No Build	N3 (immediately north of existing bridge)	S1 (immediately south of existing bridge)	S6 (John Street)
Real Estate and Right-of-Way				
Residential Relocations	0	3 residences	2 residences	4 residences ^a
Business Relocations ^a	0 (with 1 potential indirect impact)	0 (with 1 potential indirect impact)	0 (with 1 potential indirect impact)	4 (with 2 potential indirect impacts)
New Right-of-Way Needed	0 acres	4.0 acres	4.0 acres	12.0 acres
Parks and Open Space^b				
Upper Mississippi Fish and Wildlife Refuge	No Impact	2.8 acres	1.0 acre	8.5 acres
Big Slough Boat Landing	No Impact	Minor impacts related to change in access	0.3 acre	Minor impacts related to change in access
Beneficial Use Site	No Impact	Minor impacts related to change in access	1.5 acres	Minor impacts related to change in vehicular access
Other Open Space	No Impact	No Impact	No Impact	Change to vehicular and pedestrian access at the City Sports Complex; impacts to practice field ^c
Cultural Resources				
Historic Architectural Resources	No Impact	Demolition of the Black Hawk Bridge	Demolition of the Black Hawk Bridge; direct impacts to one other structure eligible for the NRHP	Demolition of the Black Hawk Bridge; direct impacts to two structures eligible for the NRHP
Historic Archaeological Resources ^d	No Impact	No Impact	No Impact	Two potential sites would require further study
Natural Resource Issues^c				
Wetlands	No Impact	1.8 acres	No Impact	9.5 acres
Floodplain	No Impact	Mississippi River – 3.5 acres	Mississippi River – 3.5 acres	Mississippi River – 9.0 acres; Clear Creek – 1.5 acres
Contaminated Properties	No Impact	No Impact	No Impact	No Impact
Threatened and Endangered Species	None	None	None	None

^a Potential indirect business relocations could occur as a result of proximity to the new bridge location or as a result of turning movement improvements at intersections on Main Street.

^b The impacts described in this table assume a combination of structure and embankment on the Wisconsin side of the river, structure on the Iowa side bridge approach, and use of embankment on the west side of Lansing (in Alternative S6) for calculation of areas.

^c An area of open space south of Main Street and west of 7th Street that is currently used for football practice and other school activities would be directly impacted by the new roadway required for Alternative S6.

^d Surveys for prehistoric archeological resources did not identify any such resources in the project area and described a low potential for their existence on the Wisconsin side of the river, however further study may be required to make a determination about the existence of prehistoric archeological resources in any one of the alternative corridors.

A Black Hawk Bridge Description and History.....A-1
Bridge Description.....A-1
Bridge History and Previous RepairsA-1

Tables

A-1 Black Hawk Bridge Construction and Significant Repair HistoryA-3
A-2 Summary of Recent Black Hawk Bridge InspectionsA-4

Appendix A

Black Hawk Bridge Description and History

Black Hawk Bridge Description and History

The information below describes the Black Hawk Bridge in some detail, including its repair history.

Bridge Description

The Black Hawk Bridge is a steel truss structure consisting of a 650-foot main span over the Mississippi River navigation channel plus subsidiary approach spans on the eastern shore. The bridge's most distinctive feature is the main channel crossing, a three span cantilevered truss that contains one arch-shaped span in the center that is supported by two cantilever trusses. Vertical clearance of the bridge is 67.5 feet above the normal pool elevation. In addition to the main channel crossing, the bridge includes six approach spans, 500 feet in total length, that are used to raise WI 82 from the slough bottoms up to the elevation of the main bridge. The bridge roadway is 21 feet wide with a minimum vertical clearance of 18.5 feet and has a total length, including the main channel crossing and approach spans, of 1,623 feet. See Exhibit 1-2, *Existing Bridge Dimensions*, for a profile view of the bridge.

Three main piers and five approach piers support the entire Black Hawk Bridge superstructure. Two of the main concrete piers — pier 1 and pier 2 — carry the cantilevered unit that crosses the Mississippi River navigation channel. Pier #1 is located on the western shore of the river channel and pier 2 is located in the river channel, approximately 650 feet east of the western shore (see Exhibit 1-2, *Existing Bridge Dimensions*). The navigational channel of the Mississippi River is located between piers 1 and 2. A third main pier is located approximately 237 feet east of pier 2, which supports the main structure and approach span (pier #3 in Exhibit 1-2). Five smaller piers support the approach spans and are evenly distributed, approximately 91 feet apart, from the eastern-most main pier eastward toward the slough bottoms (piers #4-#8 in Exhibit 1-2). There is a full height, closed abutment, and retaining walls at the west end of the structure and a stub abutment on the east end.

Bridge History and Previous Repairs

The Iowa-Wisconsin Bridge Company commenced construction of the Black Hawk Bridge in March 1929, with construction funds coming from a stock issue of \$750,000. The bridge was dedicated and opened to traffic on June 17, 1931.¹

The bridge operated as a toll facility until 1945. In that year an ice jam against the wooden relief structures over the sloughs caused damage to the Winneshiek Slough Bridge near the WI 82/WI 35 intersection. The resulting damage closed the Black Hawk Bridge to traffic for the next twelve years. During the period the Black Hawk Bridge was closed, northbound

¹ *The Book of the Black Hawk Bridge*. 1931. Albert Tousley, Editor. The Tepee Press, Lansing, Iowa.

traffic needing to cross the river traveled up the Iowa-Minnesota side and crossed in La Crosse, Wisconsin; and southbound traffic crossed in Marquette/Prairie du Chien. Iowa and Wisconsin acquired the bridge in 1952. The main span was refurbished and redecked and the subsidiary spans and connecting roadways reconstructed. The bridge was reopened to traffic in 1957 as a toll-free crossing.

A Bridge Location, Revenue and Traffic Study titled *Mississippi River Toll Bridge at Lansing Iowa* was completed by the Iowa DOT in 1968. The report was one of several comparable bridge studies to be conducted as part of the statewide Iowa Toll Bridge Program. The preliminary feasibility report examined the possible construction of a new toll crossing in the Lansing area. The study provided analysis for three possible alternative locations, which are summarized below:

- **Alternative A.** A new river crossing at William Street that would continue westward through the bluff to connect with Main Street. This alternative would eliminate the two right turns on IA 9 (the bridge landing point at 2nd Street and at the 2nd and Main Street intersection) and would also require a new Big Slough crossing.
- **Alternative B.** This alternative would be located parallel to and 50 feet upstream of the Black Hawk Bridge. The bridge would touch down approximately 90 feet above the river on the bluff at the intersection of 3rd Street and Diagonal Street. Diagonal Street would require improvements to connect with Main Street.
- **Alternative C.** This alternative would include a skewed Mississippi River crossing located approximately 1,500 feet downstream from the existing bridge. The new river crossing would terminate at Fourth Street in Lansing, approximately 250 feet south of Dodge Street.

No action resulted from the study. The Black Hawk Bridge remains in its original location and continues to operate as a toll-free facility.

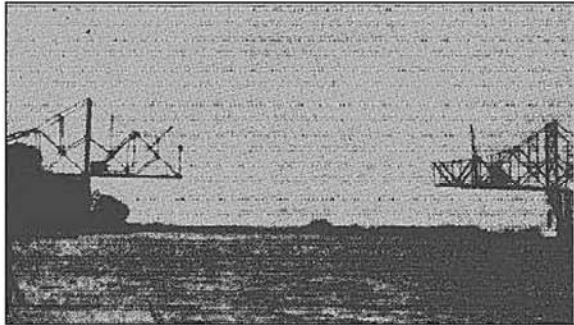
There have been numerous repairs completed on the bridge since its completion in 1931. This includes miscellaneous repairs to the superstructure and the addition of a pier protection cell, also called a “dolphin” that was built to protect the upstream side of pier 2. Table A-1 summarizes the construction and repair history of the bridge. The Iowa DOT or its consultant inspects the bridge biennially. Table A-2 is a summary of the findings of some of the recent inspections of the Black Hawk Bridge.

TABLE A-1
Black Hawk Bridge Construction and Significant Repair History

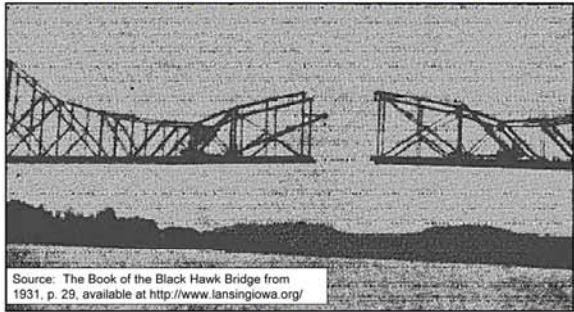
Year	Repair/Construction
1931	Construction completed and bridge opened to traffic as a toll bridge
1945	Ice damaged one of the slough bridges forcing the closing of the Black Hawk Bridge
1955	Bridge refurbished and four approach roadway structures reconstructed; Black Hawk Bridge strengthened and fitted with an open steel grid deck replacing the original timber decking; navigation lighting installed and miscellaneous substructure repairs were performed; the bridge was painted at this time
1957	Added steel collars to tops of columns at piers 4 and 5 to reinforce deteriorating concrete
1971	Repairs to top of pier 4 cap; river navigation lighting improvements
1972	Granular backfill placed in undermined areas and placed rip-rap protection to a height of 5 feet above the footings of piers 2 and 3
1973	Epoxy paint applied to bridge
1984	Wing dikes installed along the river upstream of the bridge to improve the navigable channel and facilitate passage of tows past the bridge as a result of a history of river navigation challenges
1987	Substructure repairs to west abutment, pier 1 and pier 2; Structural steel repairs to floor beams and stringers
1988	Structural steel below deck was repainted
1991	Structural steel repairs to floor beams, stringers and bearings
1992	Improvements made to bridge/IA 26 intersection to ease right angle turn issues
1993	Pier 2 protection “dolphin” constructed
1994	Structural steel repairs to floor beams and stringers
1996	Placed additional rip-rap at piers 2 and 3
2000	Structural steel below deck cleaned and repainted with epoxy and a polyurethane top coat
2002	Miscellaneous repair of concrete and structural steel; placed rip-rap at piers 2, 3 and 4

TABLE A-2
Summary of Recent Black Hawk Bridge Inspections

Year	Inspections
1985	Inspection completed by consultant, Collins Engineers, Inc.; they ultimately recommended installation of a pier protection cell (or dolphin) upstream of pier 2 to prevent further damage by tows.
1988	<i>An In-Depth Inspection and Condition Report</i> was conducted for the Iowa DOT by consultant, Wilbur Smith and Associates.
1993	The bridge was inspected by consultant, HNTB. Inspections included underwater dive inspections of the piers and soundings of the river bottom.
1997	The bridge was inspected by consultants for Iowa DOT. The inspection included underwater dive inspections of the piers and soundings of the river bottom and an ultra-sonic testing of 56 chord and hanger pins. The pins were in acceptable condition.
2001	Consultant, Collins Engineering, monitored the streambed during the spring 2001 flood. Subsequent to the flood they again checked the streambed and conducted an underwater inspection to check the condition of the submerged portion of the piers.
2001	Consultant, WJE, performed a detailed inspection in 2001 including an analysis of the remaining fatigue life of the existing structure. Load testing of up to 100 tons indicates that the bridge is not at risk for fatigue failure.



Construction of the Black Hawk Bridge (1929-1931)



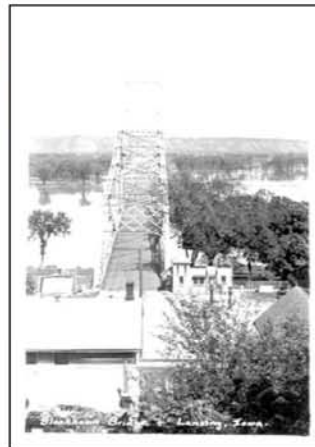
Source: The Book of the Black Hawk Bridge from 1931, p. 29, available at <http://www.lansingiowa.org/>



Black Hawk Bridge (1950s)



Black Hawk Bridge (2002)



Construction of the Black Hawk Bridge begins in March

The bridge is acquired by Iowa and Wisconsin

The main span of the Black Hawk Bridge is refurbished and resurfaced; the slough bridges and connecting roadway are reconstructed

The bridge is dedicated and opened to traffic on June 17, 1931; the original bridge was operated as a toll facility

An ice jam causes damage to at least one of the slough bridges on WI 82 (between Black Hawk Bridge and WI 35); damage to the slough bridge(s) causes the Black Hawk Bridge to be closed for the next twelve years

The Black Hawk Bridge is reopened to traffic

The Iowa DOT conducts a bridge feasibility study to look at building a new toll bridge in Lansing

Iowa DOT report concludes Black Hawk Bridge should be given high priority for replacement

Iowa and Wisconsin DOTs conduct a bridge feasibility study

"Dolphin" installed upstream of Black Hawk Bridge's Pier 2 to prevent additional damage by tow hits; the Iowa 9/2nd Street intersection was reconstructed

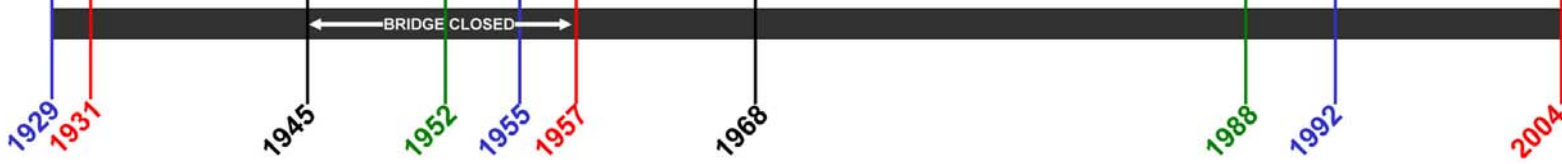


EXHIBIT A-1 Black Hawk Bridge History

B Traffic and Safety B-1
Existing and Projected Traffic B-1
Safety Performance..... B-1

Tables

B-1 Existing and Future Traffic Volumes – IA 9 through Lansing..... B-1

Traffic and Safety

Existing and Projected Traffic

The following table, Table B-1, includes the existing traffic volumes that travel through Lansing along IA 9, as well as projected traffic volumes for the years 2020 and 2030. The truck percentages in the study area are projected at around five percent.

TABLE B-1
Existing and Future Traffic Volumes—IA 9 through Lansing

Segment	Existing Traffic Volumes (2001)	Future Traffic Volumes (2020)	Future Traffic Volumes (2030)
City Limits to 4th Street	4740	5200	5700
4th Street to 2nd Street	4860	5600	6100
2nd Street to Black Hawk Bridge	3400	3920	4270
Across Black Hawk Bridge	2280	2700	2920

Source: Iowa Department of Transportation

Exhibit B-1, *Existing and Future Traffic Volumes*, shows the locations and traffic volumes through Lansing described in Table B-1 above.

These projections show that the Black Hawk Bridge is not expected to exceed its capacity by 2030. However, as traffic increases, the existing deficiencies associated with the Black Hawk Bridge will potentially increase. These include:

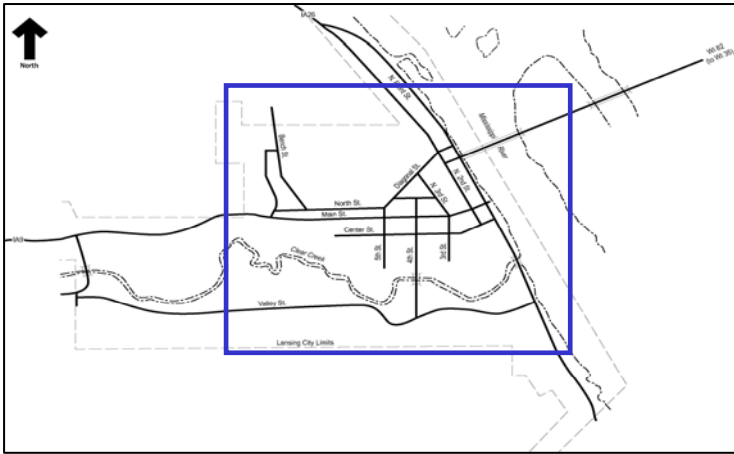
- Number of opposing travel conflicts caused by large vehicles;
- Vehicle conflicts at the intersection of IA 9 (2nd Street) and the Black Hawk Bridge (see Exhibit B-2);
- Possibility of vehicle breakdowns on the bridge; and
- Approach grade and stopping sight distance concerns.

Safety Performance

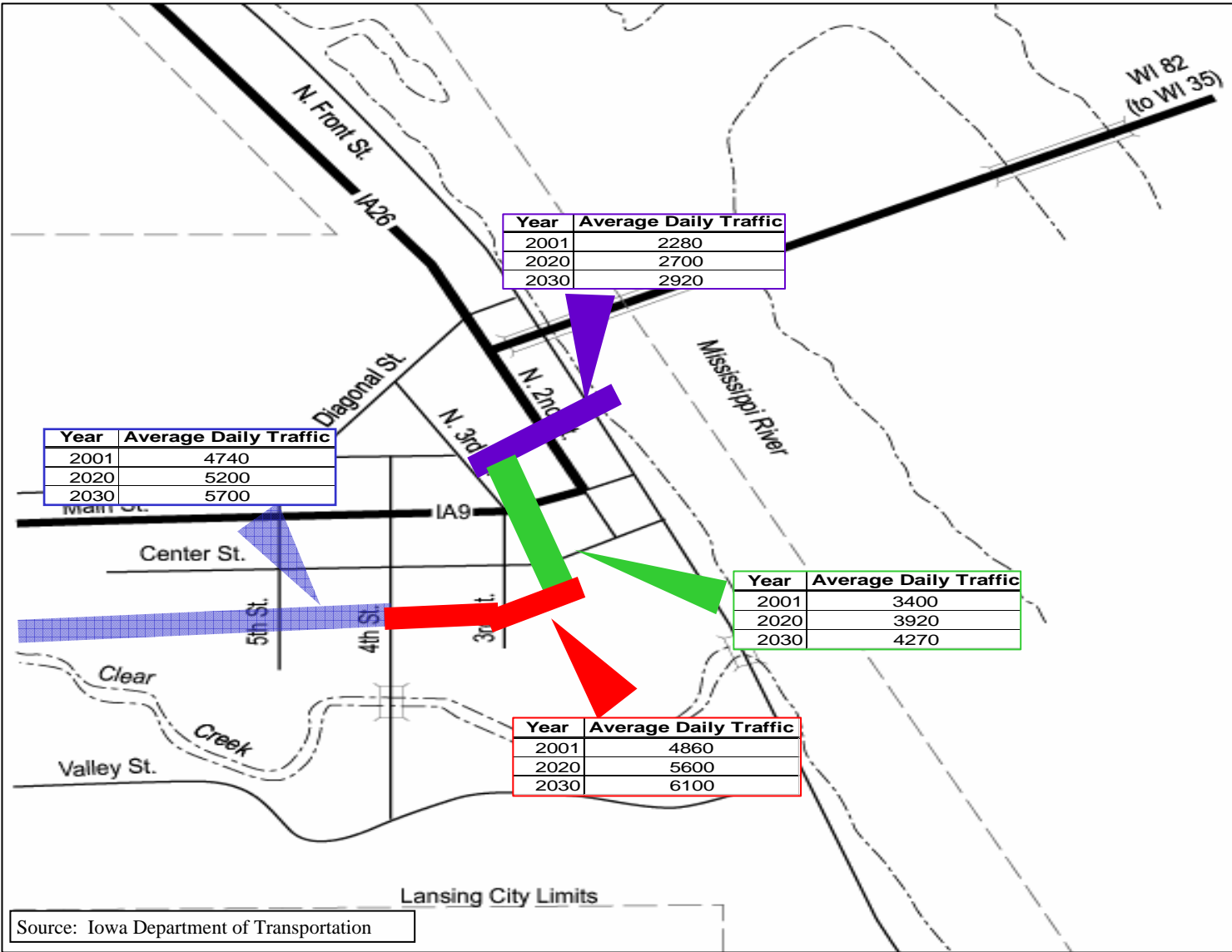
Overall, it appears that no major crash or safety problems exist along the IA 9 corridor in Lansing. The crash history does not indicate a severity concern for the corridor in the 5 years of data analyzed, between 1997 and 2001. The majority of the crashes occurring in the IA 9 corridor occurred west of the intersection of 2nd and Main Street. The intersections of 4th Street and 2nd Street with IA 9 (Main Street) had the highest number of accidents, many of which involved parked or backing vehicles. Parking is allowed on both sides of Main

Street through this area. This may indicate possible deficiencies in parking configuration, such as inadequate sight distance for vehicles exiting parking stalls. It may also indicate that lane widths through this area are insufficient to allow backing vehicles to exit a parking stall without crossing into the opposing lane of traffic. As was noted in the field, large vehicles attempting to make a southbound to westbound right turn at the intersection of 2nd and Main Street do not have adequate room within the intersection to complete the turn without encroaching into the opposing traffic lane. Vehicles making this movement must also deal with the parked vehicles on either side of Main Street.

The segment of WI 82 east of the existing Black Hawk Bridge has the highest crash history in the corridor. Possible deficiencies in the roadway geometrics, the existing roadside environment, and signing (particularly the posted speed limits) may contribute to these problems. Possible changes in guardrail design, shoulder design, pavement markings, and roadway delineation may be warranted through this area.



The map below shows historic and projected annual average daily traffic volumes for selected roadway segments within the study area.





Northbound to eastbound truck turning movement at the intersection of IA 9/IA 26 and the Black Hawk Bridge

EXHIBIT B-2

IA 9/IA 26 and IA9 Bridge Intersection Geometry

Appendix C
Correspondence



IN REPLY REFER TO:

United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE

Upper Mississippi River National Wildlife and Fish Refuge

P.O. Box 460
McGregor, IA 52157
(563) 873-3423



*Celebrating a
Century
of Conservation!*

September 14, 2004

Timothy Thoreen, AICP
CH2M Hill
1380 Corporate Center Curve
Suite 200
Eagan, Minnesota 55121

Dear Mr. Thoreen,

Thank you for the opportunity to comment on the Black Hawk Bridge (Lansing, IA) Feasibility Study that your company has prepared in cooperation with the Iowa Department of Transportation (DOT) and the Wisconsin DOT.

The U.S. Fish and Wildlife Service has a strong interest in your study. Any changes in the current bridge alignment will have a direct impact on the lands owned and administered by the Upper Mississippi River National Wildlife and Fish Refuge (Refuge). We have previously stated our concerns that any realignment outside of the current footprint of the existing bridge would have to undergo careful scrutiny to determine the impact that this action would have on the Refuge. Further, any new construction or realignment of the bridge would require that the Refuge complete a Compatibility Determination. It is important that as the agencies you represent plan for the future, they understand this is a rigorous threshold to achieve. A realignment may only meet compatibility standards through extensive and perhaps expensive mitigation.

The Refuge Improvement Act, passed by Congress in 1997, includes provisions to protect our National Wildlife Refuges from further encroachment and fragmentation including roadways, power lines, gas lines, etc. Under this Legislation, the Refuge Manager must determine whether or not a proposed use of Refuge lands, in this case changes in the road/bridge alignment, are deemed compatible with the purpose for which the Refuge was established.

Any major changes on a National Wildlife Refuge, such as those proposed with a realignment of the Black Hawk Bridge would require an extensive review of the potential impacts to the Refuge.

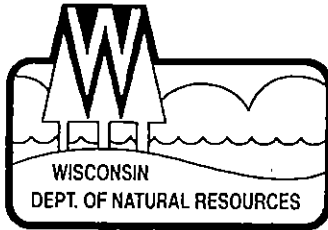
If you need additional information from our office, please contact us.

Sincerely,

John Lindell
District Manager

TL:dp

CC: Don Hultman, Winona HQ
Gary Wege, ES, Twin Cities Field Office



State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Jim Doyle, Governor
Scott Hassett, Secretary
Scott Humrickhouse, Regional Director

West Central Region Headquarters
1300 W. Clairemont Avenue
PO Box 4001
Eau Claire, Wisconsin 54702-4001
Telephone 715-839-3700
FAX 715-839-6076
TTY 715-839-2786

July 8, 2003

IN REPLY REFER TO:

Timothy Thoreen
CH2M Hill
1380 Corporate Center Curve
Suite 200
Eagan, MN 55121

SUBJECT: WDOT/WDNR Initial Project Review
Project Title: Black Hawk River Bridge Feasibility Study
Highway: WI STH 82 and IA STH 9, Lansing IA
County: Crawford

Dear Mr. Thoreen:

The Department has reviewed the information presented in the Agency Scoping Meeting No. 1 on June 17, 2003. Although this project is far from the design phase I thought is important to provide you with written documentation on our position to date. Currently seven alternatives, including the no-build alternative, have been proposed to be retained for further consideration. At this time the Department cannot support all seven alternatives, particularly alternatives S3A, S5, S5A, S6, and S6A due to the potential environmental impacts to the Upper Mississippi River National Wildlife and Fish Refuge.

Alternatives N-1 and S-1 are located immediately adjacent to the existing bridge. Both of these alternatives appear to have the least amount of direct impact to the refuge. Since both of these alternatives are located close the existing bridge much of the existing approach fill could be used for a new approach as well as partial mitigation.

Alternative S-2 has been recommended for elimination from further consideration due to the bridge skew and impacts to the beneficial use site owned by the US Army Corps of Engineers. This alternative however does minimize impacts to the Refuge since much of the land is currently disturbed. For this reason the Department would support retaining this alternative for further consideration.

Alternative S-3 avoids the beneficial use site. However in avoiding this site the roadway is pushed further to the south and more of the Refuge land is directly impacted. The Department recommends this alternative be located as close to the beneficial use site as possible to minimize Refuge impacts.

With all the above alternatives there are several issues that must be considered in detail.

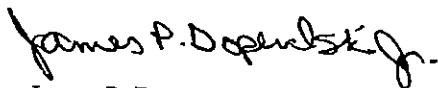
1. All alternatives may impact the floodplain of the Mississippi River. A floodplain analysis will be required. This analysis should include the entire causeway.

2. Placing fill onto Refuge land will have direct and indirect impacts. An analysis must be conducted to determine both direct (i.e. footprint size) and indirect (i.e. change in hydrology) impacts.
3. Waterway impacts must be identified and analyzed. As pointed out in the scoping meeting the potential fish habitat is high and is susceptible to impacts as a result of this project.
4. Some of the alternatives may impact the beneficial use site. Since the COE has expressed an interest in maintaining access to this site and they require these sites be replaced if impacted an analysis must be conducted on this site. The analysis must include any potential relocation site and the impacts associated with the new site disturbance.
5. Secondary impacts must be considered. Secondary impacts may include additional traffic and bike and pedestrian trails.
6. Although construction is quite a ways off it is not too early to consider the methods. For example are barges or temporary falsework necessary? These structures, whether temporary or not will require an analysis of their impacts such as mussel surveys or navigational channel restrictions.

Finally the Department believes that the WI STH 82 causeway to the Black Hawk Bridge should be analyzed for its effects on the surrounding area during the formal environmental review process. There are four other bridges within the existing causeway and replacing these structures could effect the surrounding environment. By examining the entire area we could obtain a better understanding as to how the bridge and causeway affect the environment.

The Department looks forward to working with you during this process. Should you have any questions please contact me at 715-839-1609.

Sincerely,



James P. Doperski Jr.
Environmental Analysis and Review Specialist

cc. Dave Heath – La Crosse
Beth Price – DOT 5
Bob Swartz – DOT 5

**WAUKON CHAMBER OF COMMERCE
101 WEST MAIN
WAUKON, IA 52172
563-568-4110**

December 2002

Iowa Department of Transportation

To who it may concern:

Transportation-shipping and receiving-to Waukon and Allamakee County by truck over the bridge at Lansing is a vital part of all businesses in Waukon. All businesses receiving and shipping goods East of the Mississippi use this bridge. Closing the Lansing Bridge would add cost to all goods and would hurt the economic growth and stability of the area. Due to Allamakee County's central U.S. location, overnight trucking can be made to more than one-fourth of the U.S. population. Closing the bridge at Lansing would encumber all forms of shipping

The Lansing Bridge plays in important part in many lives. Employees and employers depend on the bridge for transportation from one side of the river to the other. Tourism is a major industry of Northeast Iowa. The bridge is a vital link to transportation for Northeast Iowa business. Tourism, industry, travel of private citizens would be jeopardized if we did not have this bridge.

The Waukon Chamber of Commerce strongly supports retaining and maintaining the bridge at Lansing.

Sincerely



Danny Schlitter
Director

BRENNAN MARINE, INC.

820 BAINBRIDGE · BOX 2557 · LA CROSSE, WI 54602-2557

PHONE: 608 / 782-3670 FAX: 608 / 785-2090

January 8, 2003

TO: Mr. William Burke
Mead & Hunt

Mr. Tim Thoreen
CH2M Hill

RE: Lansing Highway Bridge

Gentlemen:

I apologize for the delay in my response. It seems there is not much change in the pace regardless of navigation closing.

I offer the following information for your review:

1). Value of cargo transiting through the above referenced bridge annually is 19,000,000 tons with an average value of \$135 per ton for a total of \$2,565,000,000.

2). Costs incurred in an average hit that "breaks up tow" runs something like this:

Barge damage:	\$26,000
Lost barge days:	\$3,000
Tug assist:	\$800
Salvage:	\$5,589 (to lighter damage barge)
Additional barge:	\$7,500 (receiver barge)
Towing vessel and barges lost time (24 hrs) cost:	\$7,500
Marine surveyor	<u>\$2,700</u>

\$53,089

Note: This does not include any "structure damage". Additionally, a barge sinking from such a hit would multiply this cost by a factor of 10 to 20 for loss of vessel, cargo, pollution and salvage.

3). Solutions;

- a). Wider span which removes any pier located in the navigable channel.
- b). Complete relocation of the bridge from a severe bend to a straight away stretch of the River.
- c). Change the route of the navigable channel to a straight path through the bridge. This of course would change the location of the "vertical clearance" location of the bridge as well.

BRENNAN MARINE, INC.

820 BAINBRIDGE · BOX 2557 · LA CROSSE, WI 54602-2557

PHONE: 608 / 782-3670 FAX: 608 / 785-2090

Note: This information is information provided by Brennan. I have not yet received any input from RIAC. As they provide their input, I will forward this to you. Furthermore, if we have any additional thoughts we will be sure to forward them to you. I hope you find this information helpful. Please do not hesitate to call me at (608) 782 3670 x229 or email kpehler@jfbrennan.com with additional questions.

Sincerely,

Kent A. Pehler

Aerial Photo Exhibit

Legend

-  Wetlands
-  Listed on National Register of Historic Places
-  Eligible for National Register of Historic Places



0 600 1,200 2,400 Feet
1 inch equals 600 feet

Aerial Photos taken in 2001

