Appendix C

Corridor Study Documentation

Toston Missouri River Crossing Corridor

Appendix C: Corridor Study Documentation

Toston Missouri River Crossing Corridor Planning Study

Public Involvement Plan

Prepared For:

Montana Department of Transportation

Prepared By:

Camp Dresser & McKee Inc.

Helena, Montana

December 28, 2009

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1.0 Introduction

The Montana Department of Transportation (MDT) has initiated the process to develop the Toston Missouri River Crossing Corridor Planning Study. The corridor planning study will determine cost-effective ways to address transportation needs within the US 287 corridor near Toston, Montana. The Montana Department of Transportation (MDT) has established the Corridor Planning Process in order to link the current transportation planning processes and the National Environmental Policy Act (NEPA)/Montana Environmental Policy Act (MEPA), as provided for in the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). The Corridor Planning Process will provide information into the NEPA/MEPA process, help advance viable improvement options into NEPA/MEPA, and provide the opportunity for partner involvement at all stages.

An initial step in conducting a corridor planning study process is to develop a Public Involvement Plan that provides for and identifies public involvement activities needed to gain insight and build consensus about existing and future corridor needs. The purpose of this Public Involvement Plan is to ensure a proactive public involvement process that provides opportunities for the public to be involved in all phases of the corridor study process. This is accomplished by providing complete information, timely public notice, opportunities for making comments, and ensuring full access to key decisions.

1.1 Corridor Study Purpose

A corridor planning study is an important document that enhances the linkage between planning and NEPA. The purpose and need for the study is to analyze existing data to determine current and future deficiencies and needs within the corridor, and identify potential environmental issues and mitigation opportunities as projects are moved forward. Public involvement is an important component in any successful corridor planning study process. For this project, a number of public involvement strategies are proposed to reach the most people possible and elicit meaningful participation. These opportunities will:

- Educate the public on the critical elements and the process of planning the US 287 corridor near Toston
- Increase the public's ability to provide input and ask questions in the corridor planning study
- Present findings

1.2 Project Background

In 2006, the Montana Department of Transportation (MDT) and the Federal Highway Administration (FHWA) prepared a Revised Environmental Assessment and "Nationwide" Section 4(f) Evaluation for the Townsend-South (U.S. Highway 287) project. During the EA development, several alternative alignments were identified for possible consideration. One initial alternative alignment included a bypass of Townsend and Toston by relocating U.S. Highway 287 completely west of the Missouri River. This alternative alignment was not carried forward, however, due to significant public opposition.

The EA ultimately identified a Preferred Alternative for U.S. Highway 287, with a project termini beginning at the southern city limits of Townsend, near Milepost 78.1, to an ending project termini located just north of Toston, at Milepost 86.3. In the early stages of developing the EA, alignment alternatives for US 287 near Toston included moving the highway to a new location west of the Missouri River, reconstructing the highway east of the present corridor, and rebuilding the highway on or near the present road. After screening criteria were evaluated via the Townsend-South EA, all of the alternative alignments were eliminated from further consideration due to an increase in scope from that initially envisioned and the potential high cost of highway improvements. A major alignment shift would require MDT to undertake one massive project and the amount of road MDT would be obligated to maintain would significantly increase. Environmental effects were another associated concern for the rejection. There would be an increase in ground disturbance, right of way acquisition, and wetland infringement. All these impacts resulted in the rejection of the alignment options for US 287 near Toston, with the commitment made by MDT to study the area in greater detail. The Toston Missouri River Crossing Corridor Planning Study will address alignment options and focus on associated environmental issues and concerns, as well as technical feasibility and costs.

In 2009, the MDT selected the firm of Camp Dresser & McKee (CDM) Inc. (i.e., the Consultant) of Helena, MT to prepare the Corridor Planning Study.

1.3 Study Area

The termini of the project have been established by the MDT as being along Highway 287 from (RP) Reference Post 86.3 (end point of Townsend-South) to RP 89.1 (beginning point of Toston-South). Physical parameters include the Missouri River, BNSF Railway, and private property boundaries. The study area location for the Corridor Planning Study is shown in Figure 1-1. This figure has been prepared by CDM with the termini of the project shown. The specific study area boundary will be determined at the initial Planning Team meeting.

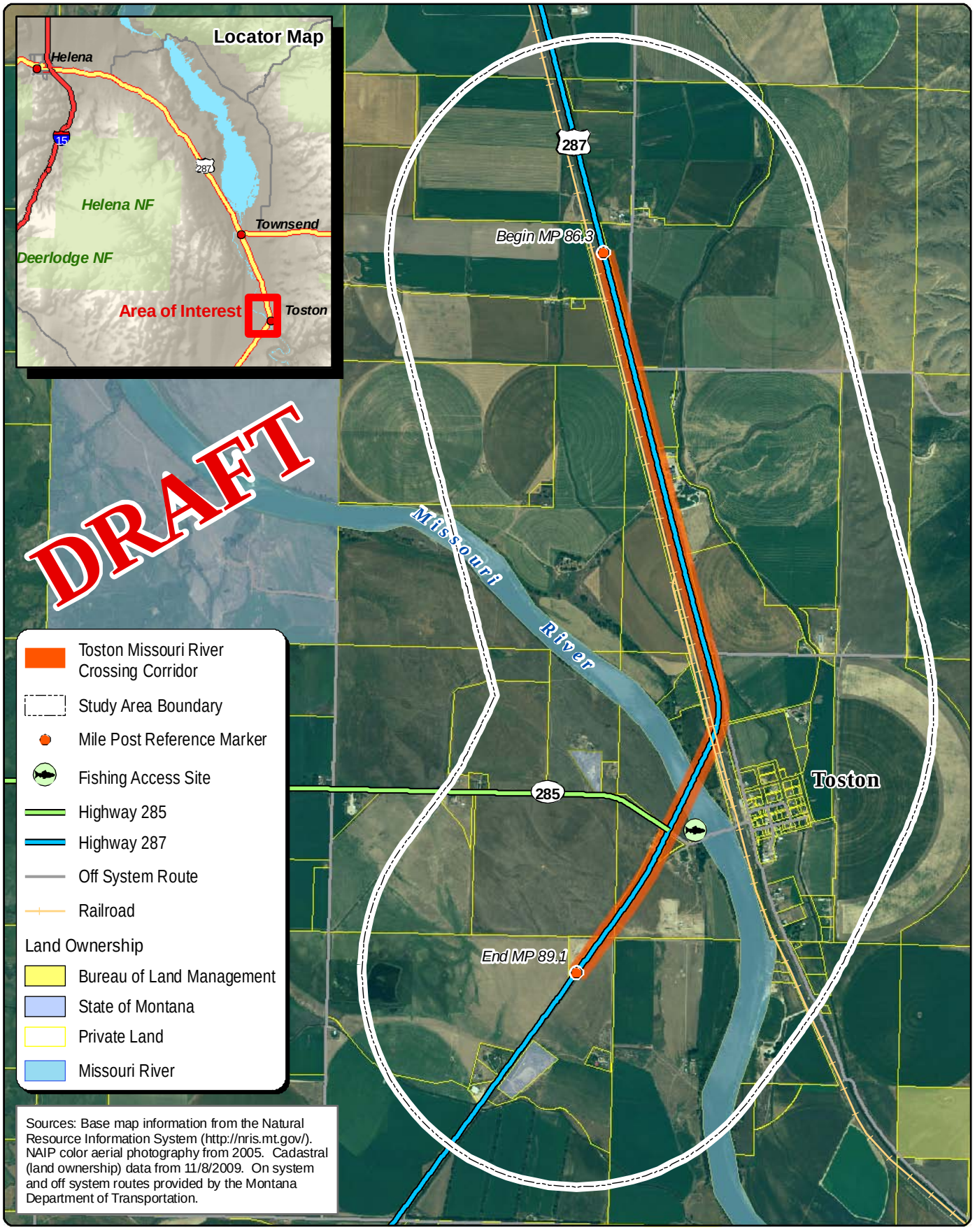

Figure 1-1
Project Study Area
Toston Missouri River Crossing Corridor

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CDM

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1.4 Goals of Public Involvement & Outreach Effort

The goal of MDT and the Consultant is to have ongoing public involvement for this corridor study process. Education and public outreach are an essential part of fulfilling MDT's responsibility to successfully inform the public about the corridor study process. MDT seeks to empower the public to voice their ideas and values regarding issues in the study area. The MDT strives to ensure early and continuous public involvement in all major actions and decisions.

Education and public outreach are an essential part of fulfilling MDT's responsibility to successfully inform the public about the corridor study process.

2.0 Public Involvement Procedures

The Public Involvement Plan describes the public information and input opportunities that will be provided as part of the development of the Toston Missouri River Corridor Planning Study. This plan encourages active participation in identifying and commenting on corridor issues at every stage of the planning process. Participants in this public involvement process include:

- Landowners affected by the study area boundary.
- Residents and business owners within Broadwater County.
- Targeted outreach groups – comprised of Broadwater County Commissioners, Montana Rail Link (which is leased by BNSF Railway), US 287 User's Group, water user's group, Broadwater County's contract planner, and any other groups or individuals that may be identified through the corridor study planning process.
- Resource agencies.

Methods of notifying the public of project status, upcoming meetings, and other information are detailed below. The general public will be kept informed of all aspects of the study, and their input will be sought throughout the process. The public and interested parties will provide input to the Consultant via the methods outlined below.

2.1 Project Contacts

Contact information for MDT and the Consultant will be provided to the public. Telephone numbers and email addresses of project contacts will be published in all information that is released and is also included here.

Montana Department of Transportation (MDT), Statewide and Urban Planning, 2960 Prospect Avenue (PO Box 201001), Helena, MT 59620-1001; (406) 444-9240; Contact – Carol Strizich, cstrizich@mt.gov

Montana Department of Transportation (MDT), Butte District Office, 3751 Wynne (PO Box 3068), Butte, MT 59702-3068; (406) 494-9600; Contact – Joe Olsen, joolsen@mt.gov

Camp Dresser & McKee, Inc. (CDM), 50 West 14th Street, Suite 200, Helena, MT 59601
(406) 441-1400; CDM Project Manager – Jeff Key, P.E., KeyJA@cdm.com

2.2 Publications

Meeting announcements will be developed by CDM and advertised in the *Townsend Star* and the *Independent Record* as display ads at least two weeks prior to meetings. The ads will announce the meeting location, time, and date, the format and purpose of the meeting, and the locations where documents may be reviewed (if applicable). The following print newspaper will carry the display ads.

Townsend Star – print and online http://www.townsendstar.net

Independent Record – print and online http://www.helenair.com

Also, three newsletters will be produced that describe work in progress, results achieved, preliminary recommendations, and other related topics. Each newsletter will be saved as a PDF and posted on the project website.

2.3 Stakeholder Contact List

A stakeholder contact list will be produced that will include individuals, businesses, or groups identified by Broadwater County, the MDT, and/or the Consultant. The intent of developing the stakeholder list is to identify those individuals and groups to actively seek out and engage in all phases of the project. Individuals who attend public meetings will also be added to the project list. The following groups or businesses (at a minimum) will be included in the initial list, providing that addresses and/or emails are obtainable from each respective group for these purposes:

- City of Townsend
- Broadwater County Commissioners
- Montana Rail Link (leased by BNSF Railway)
- BNSF Railway
- Broadwater County contract planner, Shawn Higley (WWC Engineering)
- Broadwater County Development Corporation (BCDC)
- Townsend School District
- US 287 User's Group
- Water User's Group (Missouri River)
- Toston Irrigation District
- Madison-Missouri River Fund
- Pat Barnes Chapter of Trout Unlimited
- Montana Fish, Wildlife, and Parks (Fishing Access Site)
- County Fire Departments and Emergency Medical Personnel
- County Sheriff and Montana State Highway Patrol
- Leonard Lambott (Landowner)
- Landowners in the Corridor

2.4 Document Availability

In general, all project deliverables and working draft technical memorandums will be available in hard copy format at the MDT Statewide and Urban Planning Section office (2960 Prospect Avenue). It is anticipated, however, that hard copy materials may also be made available at the following locations as well (noted below):

Document Availability Locations:

- Broadwater County Commission, 515 Broadway, Townsend, MT
- MDT District 2 Office, 3751 Wynne, Butte, MT
- MDT Statewide and Urban Planning Section Office, 2960 Prospect Avenue, Helena, MT
- Townsend Library

Approved electronic copies of project deliverables will be posted on the project website at the address shown below within 7 days of receiving approval to do so by the project partners

http://www.mdt.mt.gov/pubinvolve/toston/

The following Americans with Disabilities Act (ADA)-required statement will be included on all published materials:

The MDT and CDM attempt to provide accommodations for any known disability that may interfere with a person participating in any service, program, or activity associated with this project. Alternative accessible formats of this information will be provided upon request. For further information, call (406) 441-1400 or TTY (800) 335-7592, or by calling Montana Relay at 711. Accommodation requests must be made at least 48 hours prior to the scheduled activity and/or meeting.

2.5 Meetings

2.5.1 Planning Team Meetings

Planning Team meetings will be scheduled every 2 weeks for the duration of the twelve-month project period. Individuals included in the meetings will be the consultant, Broadwater County, FHWA, MDT personnel, and others as needed. The meetings are intended to track progress and address study development issues and questions. The meetings are considered an important aspect for the exchange of information and ideas during the development of the Study. Throughout these meetings, the issues, problems, and possible solutions will be identified and discussed.

2.5.2 Resource Agency Meeting/Involvement

After the first formal public meeting has been held on the project, a meeting will be scheduled and held with the Resource Agencies that are stakeholders in the project. The meeting will be organized by MDT

and facilitated by CDM. This meeting will occur after the first public meeting has been held on the project.

2.5.3 Public Meetings

Three formal public meeting opportunities will be held throughout the duration of the Corridor Study. The first public meeting will be held early on in the study process and will serve to introduce the study and relevant features and process. This meeting will also serve to receive information from local residents about the study area. The second public meeting will occur when preliminary recommendations have been identified. After the presentation, individual work stations will be set up for participants to move to their areas of interest and review and comment on the preliminary findings. The purpose of this venue will be to present the types of recommended improvements and receive initial feedback from the community. Public comments and concerns will be recorded. The third public meeting will be conducted to present the draft Final Corridor Plan. All three public meetings will be held at the high school in Townsend.

Other meetings will be scheduled for user's groups, emergency services personnel, school district officials, special interest groups, additional Commission meetings, etc., as needed.

2.6 Consideration for Traditionally Underserved Populations

CDM recognizes that additional efforts must be made to involve traditionally underserved segments of the population in the corridor study process, including the disabled, racial and ethnic minorities, and low-income residents. Including these groups leads to planning that reflects the needs of everyone. The following steps will help with these efforts:

Plan Meeting Locations Carefully

- Public meetings will be held in locations that are accessible and compliant with the Americans with Disabilities Act. If a targeted population is located in a certain geographic part of the County, then the meeting location should be in that area for convenience.

Seek Help from Community Leaders and Organizations

- To facilitate involvement of traditionally underserved populations, community leaders and organizations that represent these groups will be consulted about how to most effectively reach their members.

Be Sensitive to Diverse Audiences

- At public meetings, agency staff and the Consultant will attempt to communicate as effectively as possible. Technical jargon will be avoided and appropriate dress and conduct will be adhered to. A variety of visualization techniques may be used to present information on the project, including but not limited to, aerial photographs, maps, graphics, full size posters, color handouts, and powerpoint presentations.

2.7 Project Schedule

Adherence to the project schedule is important to stay on track and keep all participating parties engaged. The project schedule for this Corridor Study is attached as Figure 2-1. It is CDM's intent to adhere to this schedule.

3.0 Overall Project Communication

3.1 Summary

The Toston Missouri River Crossing Corridor Planning Study Public Involvement Plan establishes guidelines and procedures for encouraging public participation. The following communication strategies and techniques may be used in their entirety (or partially) to distribute the information to the community at large and seek a higher level of engagement. The Consultant will utilize as many of these techniques as possible that best suit the Corridor Study development.

- All approved, relevant deliverables and associated materials will be posted on the project website at

  http://www.mdt.mt.gov/pubinvolve/toston/

- Public meeting announcements and press releases for the newspaper may be developed.
- Informational presentations may be made at regional sites, open houses, round tables, or other community forums to receive input from the affected community.
- Select mailings and/or email, as requested by interested parties, may be provided to individuals or groups that have expressed interest or made comments at meetings.
- Study documents and materials may be provided to the MDT for posting to the project's internet site, and also distributed to the Project Team to provide a better understanding of proposed corridor issues and recommendations and, in return, to provide the project entities with feedback and an opportunity for continual comment. Hard copies of all materials will be made available at the MDT Statewide and Urban Planning Section (2960 Prospect Avenue).
- Special presentations may be made, upon request, to community groups and organizations.
- Fact sheets may be used to explain corridor related issues.
- Special issues documents may be announced or reported at meetings and/or via email on relevant corridor issues.

Responses to questions and comments from the public concerning the public participation process, working draft technical memorandums, the draft and public draft Corridor Plan document, and other work products will be made via written response in an Appendix to the actual Corridor Planning Study.

In some circumstances, the Consultant will respond directly to an individual or group by letter, email, or telephone call, or by way of a periodic newsletter.

Figure 2-1: Toston Missouri River Crossing Corridor Planning Study

PROJECT SCHEDULE

PRESENT TIME

WORK TASKS AND DESCRIPTIONS		Dec '09	Jan '10	Feb '10	Mar '10	Apr '10	May '10	June '10	July '10	Aug '10	Sep '10	Oct '10
Task 1:	Interactive Project Evaluation ***(completed)***											
Task 2:	Project Management and Accounting	●	●	●	●	●	●	●	●	●	●	●
Task 3:	Develop Corridor Study Work Plan	●	●									
Task 4:	Develop Existing and Projected Conditions Report	●	●	●	●							
Task 5:	Identify Needs, Issues, Goals, and Screening Criteria				●	●						
Task 6:	Determine Improvement Options Advanced and Not Advanced					●	●					
Task 7:	ArcGIS Spatial Analyst and Microstation/GeoPAK Technical Tool				●	●	●					
Task 8:	Recommend Improvement Options						●	●	●	●		
Task 9:	Prepare Draft Corridor Study Report									●	●	●
	Public Meetings			●						●		●
	Project Committee Meetings	●	●	●	●	●	●	●	●	●	●	●
MISCELLANEOUS DELIVERABLES												
Corridor Setting Document			●									
Public Involvement Plan (PIP)			●									
Corridor Study Website		●	●	●	●	●	●	●	●	●	●	●
Existing and Projected Conditions Report			●									
List/Description of Corridor Transportation Deficiencies			●									
Maps of Known Environmentally Sensitive Areas			●									
Summary of Comments/Concerns By Resource Agencies			●									
List of Initial Avoidance Areas, Potential Mitigation Needs & Opportunities			●									
Project Newsletters - 3 total (electronic only)			●						●			●
Press Releases/Advertisements			●						●			●
List and Description of Corridor Needs, Issues and Goals						●						
List of Screening Criteria						●						
List and Description of the Range of Improvement Options							●					
Documentation of Analysis (Methods and Findings) of Improvement Options							●					
Documentation of Improvement Options and/or Advanced & Not Advanced								●				
Memorandum of Proposed Weighted Options							●					
Package of Improvement Options and/or Option for Improving the Corridor								●				
List and Description of Potential Impacts and Mitigation Opportunities								●				
Corridor Study Report												●
Statement of Purpose and Need												●
Final List of Recommendations and Next Steps												●
Meeting Agendas and Minutes		●	●	●	●	●	●	●	●	●	●	●

Toston Missouri River Crossing Corridor Planning Study

Corridor Setting Document

Prepared For:

Montana Department of Transportation

Prepared By:

Camp Dresser & McKee Inc.

Helena, Montana

February 26, 2010

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1.0 Overview of Corridor Setting Document

The US 287 corridor provides a vital link between I-90 and Helena, Montana and surrounding communities. The segment near Toston, Montana from Reference Post (RP) 86.3 to RP 89.1 will be addressed in the Toston Missouri River Crossing Corridor Planning Study. Safety issues and potential geometric deficiencies on the two bridges, one over the Missouri River and one over BNSF Railway, are of primary concern in the corridor. Improvement options are desired to enhance safety and mobility. The Corridor Planning Study will look at improvement options, in terms of both short-range and long-range improvements, that will address the needs, while at the same time considering cost, feasibility and environmental impacts within the corridor. A figure showing the corridor study area is included herein as Figure 1-1.

This corridor setting document describes the existing corridor in preparation for future detailed research into technical conditions and environmental resources. This document is intended to be the "blueprint" for further investigation that will be made via the Existing and Projected Conditions Report. The Existing and Projected Conditions Report will provide for greater detail for all the items listed in this Corridor Setting Document.

2.0 Description of Corridor

The description of the corridor as contained in this section focuses on the existing roadway aspects of the corridor study area. The study area is defined as 2.8 miles of US Highway 287 near Toston, Montana and spans a width of 4,000 feet east and west of the highway.

2.1 Roadway Aspects

- **Functional Classification**

  US 287 is part of the National Highway System (NHS). US 287 is classified as (NHS) Rural Principal Arterial – Non-Interstate System. A rural principal arterial network provides a high level of mobility at high speeds offering a link between interstate and highways. US 287 is a major north/south highway providing a vital link between I-90 and Helena, Montana and surrounding communities.

- **Right-of-Way and Jurisdictions**

  The US 287 corridor is located primarily along private property. The State of Montana maintains existing right-of-way on each side of the highway. Two small sections of State of Montana Land are within the study area boundary as well. Montana Rail Link MRL) runs through the corridor and is maintained/leased by Burlington Northern Santa Fe Railway (BNSF).

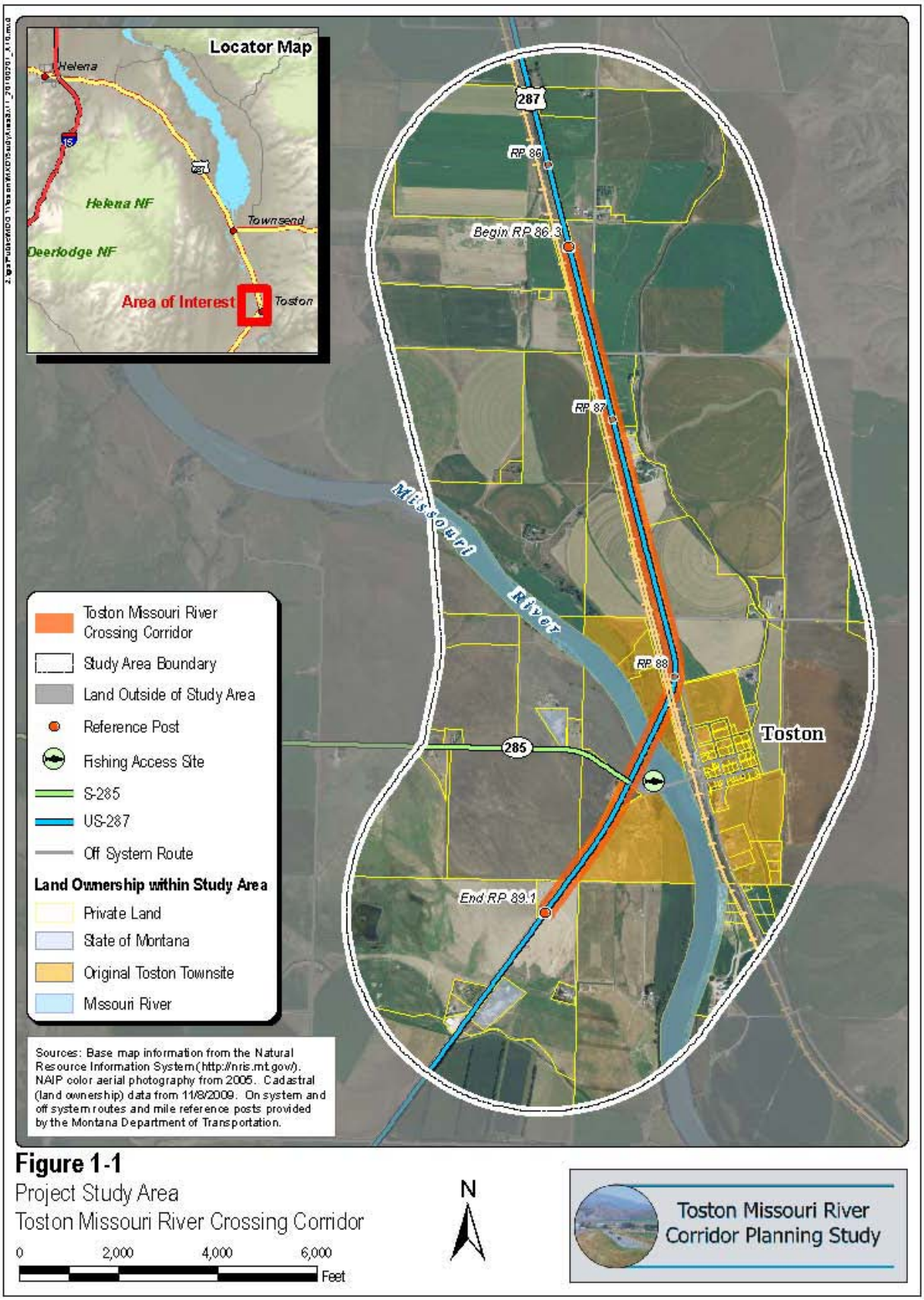

Figure 1-1
Project Study Area
Toston Missouri River Crossing Corridor

- **Geometrics**

  The Existing and Projected Conditions Report will investigate as-built drawings and identify specifications on lane width, passing percentage, and guardrail sites and identify whether the current conditions meet MDT design criteria. The bridge structures along US 287 spans both the Missouri River and BNSF Railway. Whether or not the structures meet the specific design criteria for spanning a major river and railroad transportation system will be further identified in the Existing and Projected Conditions Report.

- **Traffic Data**

  The following table shows traffic data for US 287 through the study area corridor. As shown in the following table, there has been a steady increase in traffic volumes through the corridor in the past 10 years.

	Average Annual Daily Traffic										
Location	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
US 287, RP 86, 2.5 mi N of S-285	2630	2600	3060	2830	3370	3720	3140	3710	4254	3940	3280
US 287, RP 89, .5 mi S of S-285	2560	2390	2690	2690	3160	3500	2960	3530	3520	3570	3110
Average	2595	2495	2875	2760	3265	3610	3050	3620	3887	3755	3195

Source: MDT Traffic Data and Collection Analysis

- **Safety**

  Safety issues are an area of concern throughout the corridor. On September 8, 2009, the MDT Traffic and Safety Bureau conducted a crash analysis along US 287 from mileposts 86.1 to 89.1, which covers the corridor study area boundary. The 10 years of crash data was analyzed from January 1, 1999 to December 31, 2008. The analysis compared the study area with the average crash rates on Non-Interstate National Highway System (NINHS) routes statewide.

- **Roadway Considerations**

  The existing physical and geometric design criteria for US 287 will be evaluated for the study area boundary to identify areas that do not meet the MDT design criteria.

- **Horizontal Alignment**

  The horizontal alignment of US 287 will have a major influence on traffic flow and safety.

- **Vertical Alignment**

  The vertical alignment is a measure of elevation change of a roadway. The length and steepness of grades directly affects the operational characteristics of the roadway. The MDT Road Design Manual lists recommendations for maximum grades on principal arterials according to the type of terrain in the area.

- **Roadside Safety (Clear Zone)**

  Clear zone considerations will be evaluated.

- **Pavement Width**

  The existing pavement width and typical section will be evaluated.

- **Geotechnical**

  Based on the existing geotechnical information, soil resource report, and well logs, the project area has no substantial geotechnical issues.

- **Drainage**

  With the corridor having predominate farm and agriculture use, drainage is a key factor to consider in development of improvement options. Several irrigation ditches and canals exist throughout the corridor and will be addressed as improvement options develop.

- **Bridge Structures**

  Throughout the corridor there are three bridges. These are located as follows:

  RP 87.2, Structure No. P00008087+02291 (Six Mile Creek)

  RP 88.0, Structure No. P00008088+00551 (Bridge over Montana Rail Link)

  RP 88.3, Structure No. P00008088+02901 (Missouri River Bridge)

- **Railroad**

  The presence of Montana Rail Link within the corridor is a key factor in developing improvement options. Guidelines have been established in accordance with construction and development near railroad facilities. These will be evaluated as improvement options are evaluated.

- **Utilities**

Utilities existing throughout the corridor will be addressed in developing improvement options.

2.2 Environmental Setting

The study area environmental setting is an important aspect of this pre-NEPA/MEPA Corridor Study. The following items represent a preliminary list of potential environmental resources that will be further evaluated in the Existing and Projected Conditions Report.

- **Land Use and Ownership**

  The corridor study area boundary has a predominant land use of crop and pasture land. The State of Montana owns the right-of-way along US Highway 287 while MRL maintains the right-of-way along the rail line. Several private parcel ownerships are located throughout the corridor study area.

- **Development**

  Future development is important to the corridor and improvement options that may be proposed. The Montana Business Assistance Connection (MBAC) and Gateway Economic Development District (GEDD), along with Broadwater County, own property that adjoins US Highway 287 south of the Toston Fire Station. Plans for the 21-acre parcel of land are to subdivide 7 commercial lots to be used for small business growth in the area.

- **Surface Waters**

  The Missouri River is the major waterbody crossed by US Highway 287 within the project study area. Several tributaries to the Missouri River confluence exist in proximity to the study area: Dry Creek joins the Missouri River north of the study area; Sixmile Creek from the east; Sixteenmile from the southeast; Warm Springs Creek from the southwest; and multiple unnamed drainages from various locations adjacent to the study area.

- **Recreation**

  An abundance of recreational activities exist within the study area, predominantly due to the presence of the Missouri River. The Toston Fishing Access point is located just southeast of the Missouri River bridge, becoming a common access point for fishing and rafting expeditions.

- **Tribal Concerns**

  There are no tribal concerns and/or coordination issues known within the study area. Archeological sites might be present along the Missouri River.

- **General Vegetation**

  The study area occurs within intermountain valley grasslands and meadows, much of which has been converted to agriculture (pasture, crop and hay land).

- **Wildlife**

  Wildlife species inhabiting or traversing the study area are typical of those that occur in intermountain valley grasslands, cultivated lands, and riparian areas of central Montana. Of the 108 mammal species known to occur in the state, 63 are known or suspected to occur in Broadwater County.

- **Sensitive Species**

  Species of Special Concern

  A search of the Montana Natural Heritage Program species of special concern database revealed one mammal species (gray wolf), two bird species including two occurrences of the bald eagle and one bobolink occurrence, one amphibian (plains spadefoot), and one vascular plant (Annual Indian paintbrush) with occupied ranges within or overlapping the study area.

  Threatened and Endangered Species

  The federal list of endangered and threatened species is maintained by the USFWS. According to the USFWS, only one threatened and endangered species is listed as occurring in Broadwater County (Ute Ladies Tress).

- **Aquatic Resources**

  Fish species abundantly/commonly occurring in the Missouri River and within the study area are the brown trout, common carp, longnose dace, longnose sucker, mottled sculpin, rainbow trout, and white sucker. Species occurring rarely within this river stretch are the mountain whitefish, walleye, burbot, largemouth bass, mountain sucker, northern pike, and redside shiner.

- **Wetlands**

  The study area crosses the Missouri River, and is in proximity to several other drainages and irrigation ditches that serve as tributaries to the river. Hydric and partially hydric soils are mapped just west of the project study area boundary.

- **Air Quality**

The study area is outside any non-attainment air quality zones.

- **Historic Properties**

  Historic properties are properties included in the National Register of Historic Places (NRHP). The old Toston Bridge is the only registered historic place within the corridor. In addition, there are four places that are eligible for historic registration.

- **Noise**

  Based on the rural environment of the corridor, noise contours would be evaluated on a case-by-case basis.

- **Farmlands**

  Due to the large capacity of prime farmland within the corridor, there is potential for farmlands to be impacted as improvement options further develop.

- **Irrigation**

  Based on the 1955 Water Resource Survey Report for Broadwater County, the corridor contains a high level of water use, commonly private irrigation or water users association. Two major ditches exist within the corridor.

- **Section 4(f)and 6 (f)**

  There are six potential Section 4(f) sites. It should be noted there may be additional Section 4(f) sites located within the study area after a cultural resource survey has been completed. According to Montana Department of Fish, Wildlife, and Parks Land and Water Conservation Fund list, Section 6(f) properties do not exist within the study area.

- **Floodplain**

  Based on a review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps for Broadwater County, a delineated 100-year floodplain (Zone A) is located along the Missouri River throughout the corridor.

- **Hazardous Waste**

  The NRIS database has layers for tank sites and leaking tank sites which probably would be the most likely issue to come up regarding contamination within the study area.

- **Geology and Soils**

According to NRIS, the soil conditions within the study area boundary are consistent with the primary land use of crop and pasture lands.

- **Noxious Weeds**

  The MDT and Broadwater County have mapped the following noxious weed species as occurring within the right-of-way along US 287 between RP 80 and RP 90, which encompasses the study area: Canada thistle; whitetop; leafy spurge; and dalmation toadflax.

3.0 Conclusion

Preliminary review of the existing conditions and corridor settings lead to a number of factors and issues that will be further identified and addressed in the Existing and Projected Conditions Report. The highway geometrics will be analyzed and confirmed whether MDT design standards are met or if standards need to be updated with future improvement options. Safety issues and concerns will be addressed in future improvement options in order to increase traffic safety. Environmental concerns and issues will be explained in greater detail in the Existing and Projected Conditions Report in order to minimize environmental impacts with projected improvement options.

4.0 References

Montana Department of Transportation. United States Department of Transportation Federal Highway Administration. Finding of No Significant Impact (FONSI) and Summary of Final Coordination for Townsend-South *Revised Environmental Assessment and "Nationwide" Section 4(f) Evaluations*. Montana, 2007.

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Montana Historical Society. 2009. http://www.his.state.mt.us/

FEMA Map Service Center. 2009. http://www.msc.fema.gov/

Toston Missouri River Crossing Corridor Planning Study

Existing and Projected Conditions Report

Prepared For:

Montana Department of Transportation

Prepared By:

Camp Dresser & McKee Inc.

Helena, Montana

May 7, 2010

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4.0 References

Figures

Tables

Appendices

1.0 Introduction & Objectives

The US Highway 287 (US 287) corridor provides a vital link between I-90 and Helena, Montana and surrounding communities. The segment near Toston, Montana from Reference Post (RP) 86.3 to RP 89.1 is currently being studied for improvements via a Corridor Planning Study. Traffic incidents and design geometrics have historically impeded traffic flow and heightened safety concerns on the two bridges over the Missouri River and BNSF Railway, and also the surrounding roadways and access points. Improvement options are desired to enhance safety and mobility through the US 287 corridor near Toston, while at the same time providing an appropriate level of access to adjacent lands and area residents. The Corridor Planning Study identifies improvement options that address technical requirements and consider environmental impacts.

The objective of this report is to identify both the technical and environmental concerns and issues that exist within the corridor. The information developed for this report will further guide the study process to identify areas of improvements within the corridor in order to increase safety and efficiency, while at the same time defining potential impacts to the surrounding environment resulting from potential improvement options.

1.1 Project Background

The Montana Department of Transportation (MDT) has identified the need for a study along the US 287 corridor near Toston, Montana, based on concerns including safety, constructability, the Missouri River crossing, and the proximity of the railroad and the railroad crossing. This 2.8-mile segment of US 287 addressed in this study is the remaining section of roadway between Toston and Three Forks without planned improvement. The Toston Missouri River Crossing Corridor Planning Study will analyze improvement options while considering associated environmental impacts, as well as technical feasibility and costs.

1.2 Pre-NEPA Planning Guidance

The MDT has established the Corridor Planning Process in order to link the current transportation planning processes and the National Environmental Policy Act (NEPA)/Montana Environmental Policy Act (MEPA). The Federal Highway Administration (FHWA) NEPA/MEPA project development process is an approach to balance transportation decision making that takes into account the potential impacts on the human and natural environment and the public's need for safe and efficient transportation. The Corridor Planning Study is a pre-NEPA/MEPA process that allows for earlier planning-level coordination with the public, resource, and other agencies. Through this process, specific factors will be developed that can be used in the subsequent environmental review process if projects are moved forward from the study. The NEPA/MEPA process also makes sure that environmental information is available to the public and decision makers before decisions are made and carried out.

It is important to note that the Corridor Planning Study is developed strictly as a planning study and not a design project. The results of the study will be used to assist in determining the level of environmental documentation if a project is forwarded into project development. The information can be used in the NEPA/MEPA process and successful project(s) development.

1.3 Purpose of Report

The purpose of this report is to portray the existing and projected conditions throughout the corridor utilizing both technical and environmental factors. The following sections describe the technical (Section 2.0) and environmental (Section 3.0) elements of the corridor in more detail. The findings will help define the constraints in developing improvement options.

The information provided herein is the product of a high-level baseline scan, and therefore lacks detail sufficient to quantify the exact potential impacts resulting from potential improvement options. This general information is provided to guide future detailed analysis and evaluation required at a project level of potential impacts to existing resources present within the defined study area boundary if projects are forwarded from this study.

2.0 Roadway & Physical Characteristics

Section 2.0 of this report focuses on the existing technical aspects of the study area. The study area consists of 2.8 miles along US 287 near Toston, Montana and spans a width of 4,000 feet east and west of the existing highway. The corridor area was determined by the Planning Team in order to fully represent the environment and physical surroundings of the study area. US 287 is classified as a Rural Principal Arterial on the NHS Non-Interstate System and is a major north/south highway providing a vital link between I-90 and Helena, Montana and surrounding communities.

Functional classification is a method by which roads and highways are classified according to the service they provide the public as part of the overall highway system. A rural principal arterial network provides a high level of mobility at high speeds offering a link between interstates and major highways. Highway functional classification provides guidelines in design and maintenance according to federal highway design standards. The following sections will analyze the existing roadway characteristics and address any noted concerns in meeting the Federal guidelines of a rural principal arterial.

2.1 Existing Roadway Users

The primary users of US 287 through the study area are local land owners, commuters, commercial truck drivers, and recreational users accessing the Missouri River area. This corridor is also used by bicyclist during the summer months. Secondary Route 285 (S 285) intersects US 287 just south of the Missouri River Bridge and is primarily used by local traffic.

2.2 Existing Traffic Volumes

Table 2.1 shows the traffic data for US 287 through the study area. There has been a steady increase in traffic volumes through the corridor in the past 10 years.

Location	1998	1999	2000	2001	2002	2003	2004	2005	2006*	2007	2008
US 287, RP 86, 2.5 mi N of S 285	2630	2600	3060	2830	3370	3720	3140	3710	-	3940	3280
US 287, RP 89, 0.5 mi S of S 285	2560	2390	2690	2690	3160	3500	2960	3530	-	3570	3110
Average	*2595*	*2495*	*2875*	*2760*	*3265*	*3610*	*3050*	*3620*	-	*3755*	*3195*

** Data not recorded for 2006.*

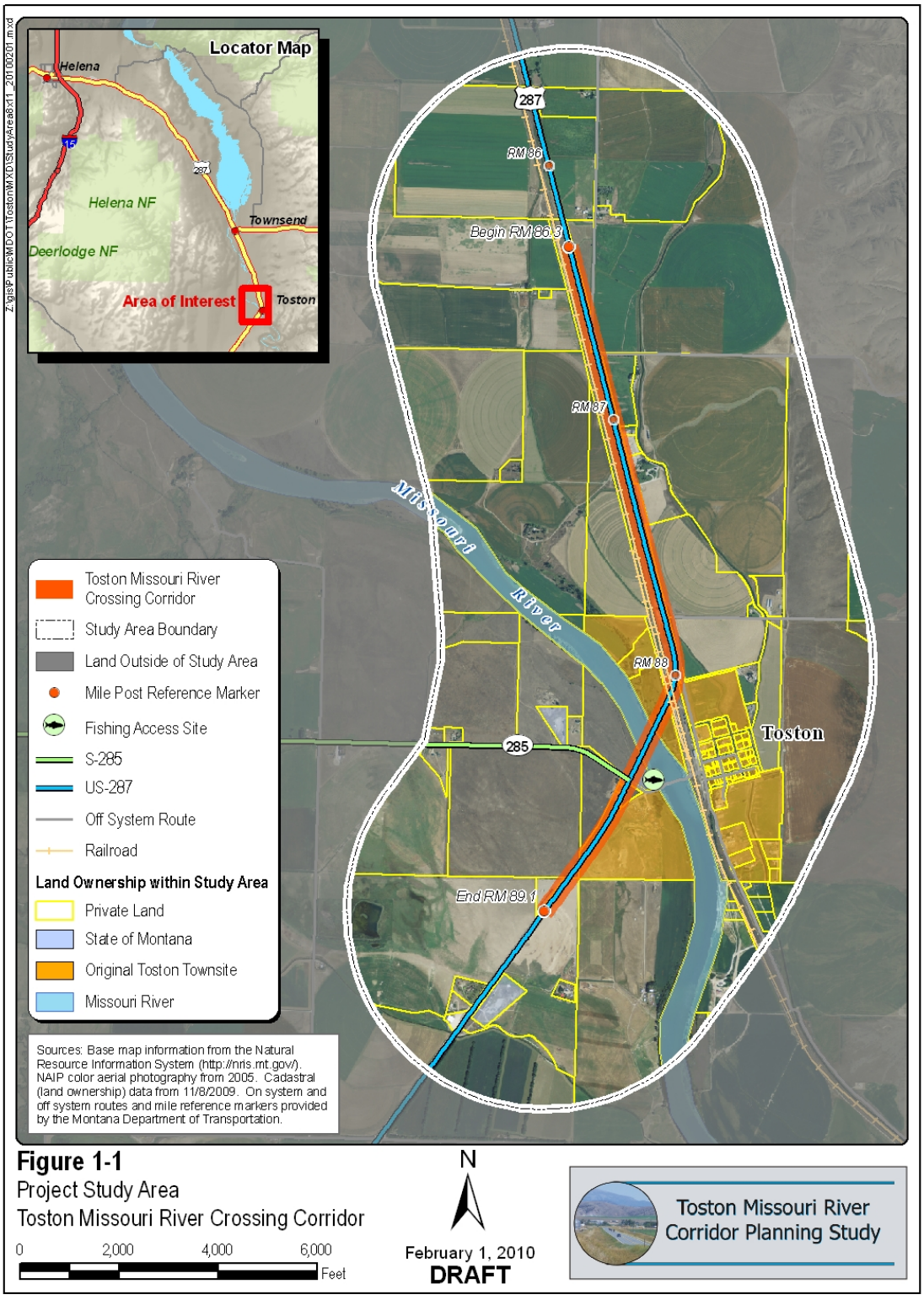
Source: MDT Traffic Data and Collection Analysis

The percentage of truck traffic through the corridor is 11.3%. The projected AADT for the year 2030 is 4,980, according to the Preliminary Field Review Report/Scope of Work Report for the Toston-North Resurfacing Project. The corridor traffic currently does not encounter delays or congestion during peak travel periods. Citizen accounts have stated the prevalence of hazardous encounters at approaches while turning on and off US 287. Trucks and recreational vehicles are common modes of transportation through the corridor. The large truck traffic slows the flow of traffic, especially on grades entering and exiting the bridge approaches.

2.3 Right-of-Way and Jurisdictions

The US 287 corridor study area is located primarily along private property. The State of Montana maintains existing right-of-way on each side of the highway. Two small sections of State of Montana land are within the study area boundary. Montana Rail Link (MRL) infrastructure is located throughout the corridor and is maintained/leased by the BNSF Railway. MRL has double tracks located in the corridor with approximately 75 feet of right-of-way on either side of the track centerline. The Missouri River flows through the corridor, with the Montana Department of Natural Resources and Conservation (DNRC) having jurisdiction for structure crossings over the river. Currently, there is not an existing easement recorded with the State of Montana DNRC for the existing bridge over the Missouri River. The need for an easement will be addressed by MDT Right-of-Way staff. Figure 1-1 shows the land ownership within the study area.

As improvement options are developed, resource agency coordination will include the US Army Corps of Engineers (USACE), US Coast Guard, Montana Fish, Wildlife & Parks (MFWP), Montana Department of Environmental Quality (DEQ), County Floodplain Administrator, and others. Proactive coordination with resource agencies is essential to ensure agency guidelines and requirements are considered.


Locator Map
Helena
15
287
Helena NF
Townsend
Deerlodge NF
Area of Interest
Toston
287
RM 86
Begin RM 86.3
RM 87
Missouri River
RM 88
Toston
285
End RM 89.1
Toston Missouri River Crossing Corridor
Study Area Boundary
Land Outside of Study Area
Mile Post Reference Marker
Fishing Access Site
S-285
US-287
Off System Route
Railroad
Land Ownership within Study Area
Private Land
State of Montana
Original Toston Townsite
Missouri River
Sources: Base map information from the Natural Resource Information System (http://nris.mt.gov/). NAIP color aerial photography from 2005. Cadastral (land ownership) data from 11/8/2009. On system and off system routes and mile reference markers provided by the Montana Department of Transportation.
Figure 1-1
Project Study Area
Toston Missouri River Crossing Corridor
0 2,000 4,000 6,000
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February 1, 2010
DRAFT
Toston Missouri River Corridor Planning Study

2.4 Physical Characteristics

The two-lane paved corridor is in a rural setting classified as level terrain. Level terrain describes a combination of grades and horizontal and vertical alignments that allow heavy vehicles to maintain approximately the same speed as passenger cars. The posted speed limit along the US 287 corridor is 70 mph and 65 mph at night, with a posted truck speed of 60 mph and 55 mph at night. The posted speed limit on the bridge structures is 60 mph. Three bridges occur within the study corridor, with the two larger ones spanning the Missouri River and MRL, respectively. The existing bridge widths do not meet current standards (defined later in this report). The structure spanning the railroad was constructed on a horizontal curve. The alignment does not meet current design standards.

The corridor traverses primarily farm and agricultural land. The landscape consists of grasses, with groves of trees interspersed within farm and pasture land. The terrain is relatively flat with no large cuts or fills, although there has been high fill placed in order to cross the Missouri River and the railroad.

Within the study area, US 287 crosses both the Missouri River and MRL. In addition to these crossings, there is another bridge crossing over Six Mile Creek north of the river and six irrigation drainage crossings along the corridor. Physical characteristics are shown in corridor photos located in Appendix A.

2.5 Design Standards

The geometric design criteria for the Toston Missouri River Corridor are based on the current MDT design standards for the National Highway System – Non-Interstate Principal Arterials. The design speed for this corridor is 70 mph based on the Geometric Design Standards for a Non-Interstate NH project in level terrain. The appropriate roadway width for the facility is determined according to the type of project, whether a reconstruction project or a pavement restoration project. Improvement options that include reconstruction will be designed in accordance with the criteria shown in Table 2.2. The MDT Route Segment Plan suggests a roadway width of US 287 to be 40 feet or greater. This width would be confirmed for appropriateness by the MDT Road Width Committee during project development activities. Note that Table 2.2 includes a varying width for the roadway shoulders.

TABLE 2.2 GEOMETRIC DESIGN CRITERIA FOR RURAL PRINCIPAL ARTERIALS (National Highway System - Non Interstate) U.S. Customary

Design Element			Manual Section	Design Criteria
Design Controls	Design Forecast Year		8.4	2030
	Design Speed	Level	8.3	70 mph
	Level of Service		8.4	Level: B
Roadway Elements	Travel Lane Width		11.2	12'
	Shoulder Width		11.2	Varies*
	Cross Slope	Travel Lane	11.2	2%
		Shoulder		2%
	Median Width		11.3	Varies
Earth Cut Sections	Inslope		11.4	6:1 (Width: 10')
	Ditch	Width	11.4	10' Min.
		Slope		20:1 towards back slope
	Back Slope; Cut Depth at Slope Stake	0' - 5'	11.4	3:1
		5' - 10'		Level: 4:1
		10' - 15'		Level: 3:1
		15' - 20'		Level: 2:1
		> 20'		1.5:1
Earth Fill Slop	Fill Height at Slope Stake	0' - 10'	11.4	6:1
		10' - 20'		4:1
		20' - 30'		3:1
		> 30'		2:1
Alignment Elements	DESIGN SPEED		N/A	70 mph
	Stopping Sight Distance		8.6	730'
	Passing Sight Distance		8.6	2480'
	Minimum Radius (e=8.0%)		9.2	1820'
	Superelevation Rate		9.3	e_{max} = 8.0%
	Vertical Curvature (K-value)	Crest	10.5	247
		Sag		181
	Maximum Grade	Level	10.3	3%
	Minimum Vertical Clearance		10.6	17.0'

Source: Montana Department of Transportation Road Design Manual Chapter 12, Figure 12-3 "Geometric Design Criteria for Rural Principal Arterials"

2.6 Roadway Deficiencies

The existing physical and geometric design were evaluated for US 287 within the study area boundary to identify areas that do not meet current MDT design standards as shown in Table 2.2. The following areas were identified that do not meet current MDT design standards, and are discussed in further detail later in this Section:

- Roadway geometry – substandard horizontal and vertical curves
- Roadside clear zone
- Guardrail deficiencies – Six Mile Creek crossing

To conduct this analysis, a MDT survey file of the existing roadway geometrics was examined with the Microstation/GeoPak Civil Design software package. A best fit horizontal and vertical alignment was developed in relation to the surveyed centerline of the road. The horizontal and vertical alignments were evaluated based upon the MDT design criteria for a rural principal arterial road. The findings of the analysis are summarized in the sections to follow.

2.6.1 Horizontal Alignment

The horizontal alignment of US 287 has a major influence on traffic operation and safety. Horizontal alignment is comprised of elements including curvature, superelevation, and sight distance. These parameters are directly related to the design speed. The MDT Road Design Manual specifies general design principles and controls which determine the overall operational characteristics of the roadway and enhance the aesthetic appearance of the highway. Some general horizontal guidelines include:

- The alignment should have consistency and avoid sudden changes from gently to sharply curving alignment. ***The "sharp" curve on the railroad crossing does not meet this guideline.***
- Sharp curves on long, high fills should be avoided as it is difficult for drivers to perceive the length of the horizontal curve. ***The "sharp" curve on the railroad crossing does not meet this guideline.***
- Special consideration should be made at the intersections of the horizontal alignment with other roadways. ***There are intersections at the north and south ends of the structure crossings that are perceived by the local community as being intersections of concern. The intersections include S 285 and the approach for the town of Toston.***
- Roadway design is important to ensure the driver has clear visibility of the alignment. ***Specifically at the location of the bridge crossings, driver visibility is hindered due to the curvature on the bridge.***

According to the existing roadway geometrics available via the MDT as-built bridge plans, the existing curve at approximately RP 88.0 (MRL crossing) does not meet current design standards. The existing horizontal curve radius is 1,432.5'. The following horizontal alignment deficiencies exist:

1. For a 70 mph design speed, the minimum curve radius is 1,820' with an 8% superelevation rate. The existing curve radius (1,432.5') and superelevation (7.5%) do not meet the current design standards. Superelevation is the amount of cross slope or "bank" a roadway has in order to counterbalance the outward pull of a vehicle traveling around a curve.

2. A spiral curve is required for any curve radius less than 3,820'. A spiral curve does not exist on the current roadway alignment.

The horizontal alignment deficiencies over MRL are perceived as a "sharp" curve to the average driver.

Horizontal sight distance is the ability to see the inside of a horizontal curve with limited sight obstructions. Longitudinal barriers such as guardrail and bridge rails may cause sight distance restrictions at horizontal curves, as is the case on the bridge crossing along the corridor. The segments of US 287 north and south of the bridge have adequate sight distance. Although horizontal sight distance requirements are met, the public has perceived sight distance obstructions due to stopped or slowed vehicles turning at intersections located north and south of the bridge ends. Signage has been another perceived sight obstruction, specifically at the intersection of S 285 and US 287.

2.6.2 Vertical Alignment

The vertical alignment is a measure of elevation change of a roadway. The length and steepness of grades directly affects the operational characteristics of the roadway. The MDT Road Design Manual lists recommendations for maximum grades on principal arterials according to the type of terrain in the area. The maximum grade recommended for level terrain is 3%. The existing roadway does not exceed the maximum grade. The vertical curves near the bridge crossings do not meet the current design standards. The following vertical alignment deficiencies exist:

1. The MRL Bridge has a vertical crest curve k-value of 210.97 which does not meet the minimum k-value of 247.

2. South of the Missouri River Bridge, the vertical sag curve has a k-value of 114.3 which does not meet the minimum k-value of 181.

2.6.3 Roadside Safety (Clear Zone)

The roadside clear zone, starting at the edge of the traveled way, is the total roadside border area available for safe use by errant vehicles. The area may consist of a shoulder, a recoverable slope, a non-recoverable slope, and/or a recovery area. The desired width varies depending on traffic volumes, speeds, and roadside geometry. The corridor was analyzed and determined to have substandard fill and cut slopes which do not meet the roadside clear zone requirements. In the location of the bridge

crossings, there are no clear zone width application requirements as the guardrail acts as a safety barrier.

2.7 Pavement Width

The MDT Roadway Width Committee evaluates and confirms the appropriateness of the suggested pavement width on a project basis. The applicable roadway width for US 287 is 40 feet or greater. The existing corridor roadway width does not meet the minimum recommended 40 feet width. Table 2.3 below shows the roadway width and surfacing thickness through the corridor, based on the MDT Road Log.

Table 2.3 Existing Roadway Surface

Location (Reference Post)	Top Thickness[1] (in)	Bottom Thickness[2] (in)	Top Width[3] (ft)
RP 86.3 to 87.7	5.5	12.0	32
RP 87.7 to 88.0	2.0	12.0	32
RP 88.0 to 88.2	2.0	12.0	28
RP 88.2 to 88.4	2.0	15.0	28
RP 88.4 to 88.7	3.5	15.0	30
RP 88.7 to 89.1	2.0	15.0	30

1: Asphalt
2: Base Course
3: Outside to outside of shoulder
Source: MDT Road Log

Pavement preservation will occur throughout the corridor in order to maintain adequate roadway conditions and extend the life of the pavement. An asphalt resurfacing project is planned within the study area with limits from RP 86.3 to RP 89.1. Because of the thin pavement thicknesses shown in the road log data, core drilling was requested by the MDT to verify the information. It was determined the actual surfacing thickness varies from 5.75" to a maximum thickness of 10.5". A preliminary visual examination of the cores indicates that the MDT may proceed with a 0.2' mill and fill project. This scheduled project will serve as a short term improvement opportunity throughout the corridor.

The existing roadway surface width does not allow adequate width for rumble strips. FHWA recommendations suggest 4 feet or greater of shoulder beyond the rumble strips.

The MDT collects pavement condition data for Montana's roadways. The Ride Index for the corridor was determined to be 77.8. Based on a 0-100 scale, a ride index of 80 to 100 is categorized as "good"; 60 to 79.9 is "fair"; and 0 to 59.9 is "poor". Based on the pavement condition, US 287 is classified as "fair".

2.8 Geotechnical

Based on the existing geotechnical information, soil resource report, and well logs prepared and examined for the Townsend-South project, the study area has no substantial geotechnical issues. A detailed geotechnical investigation report will not be developed for this corridor study.

Gravel borrow located within the corridor is rated fair to poor, indicating any large amounts of borrow will likely need to be obtained off site. Surficial soil has a fair percentage of clay and silt, with a low to moderate frost susceptibility, and moderate plasticity. It can be expected that embankment foundation treatment (typically a combination of well drained well graded gravel and geotextile) will be needed for a major portion of the project where poor soil is encountered. A special borrow subbase may be needed for support of the paving section, especially in locations where the roadway may be widened.

Water well logs in the study area indicate groundwater elevations between 10 and 45 feet below surface, and will fluctuate with proximity to river elevations as well as irrigation locations. The water well logs do not indicate that bedrock was encountered at a depth likely to influence bridge foundation considerations. It appears the majority of material encountered was sand and gravel, with lesser amounts of silt and clay and occasional boulders. The study area is located in a low to moderate seismic risk area. Seismicity will need to be considered for any bridge foundation design.

2.9 Drainage

With the corridor area predominately under farm and agriculture use, drainage is a key factor to consider in the development of improvement options. Several irrigation ditches and canals exist throughout the corridor. The USACE has jurisdiction on canals and ditches returning flow to the Missouri River.

2.10 Hydraulic Structures

A hydraulic analysis of the existing culverts and bridge capacities was not performed for the drainage crossings to determine potential flooding areas of concern for this study. Based on a lack of historical flooding occurrences, it is presumed irrigation ditches, culverts, and bridges are hydraulically adequately sized. A full hydraulic analysis would be recommended if an improvement option is implemented within the study area. Table 2.4 shows the hydraulic structures throughout the corridor.

Table 2.4 Hydraulic Structures		
Approximate Reference Post (RP)	Drainage	Size
86.50	Approach Pipe - West of Hwy	15"
86.60	Culvert	24"
86.60	Approach Pipe - East of Hwy	15"
86.80	Unnamed Irrigation Ditch Crossing	18"
86.80	Approach Pipe - East of Hwy	15"
87.00	Culvert	18"
87.10	Approach Pipe - East of Hwy	15"
87.20	Sixmile Creek Crossing	Single-Span Bridge
87.20	Approach Pipe - East of Hwy	15"
87.70	Big Springs Ditch Crossing	4' x 6' Box Culvert
87.70	Approach Pipe - East of Hwy	24"
87.85	Culvert	24"
88.30	Missouri River Crossing	Multi-Span Bridge
88.38	Approach Pipe - East of Hwy	18"
88.44	Approach Pipe - West of Hwy	18"
88.90	Unnamed Irrigation Ditch Crossing	30"

**Based on MDT mapping. Hydraulics Report will confirm location & size if a project develops.*

2.11 Bridge Crossings

Three bridge crossings are located throughout the corridor. They include the Missouri River Bridge, the MRL Bridge, and the Six Mile Creek Bridge. The Missouri River and MRL Bridges were assessed by the MDT in 2009, and the Six Mile Creek Bridge was assessed in 2010. The assessments determined the Sufficiency Rating (SR) for each structure. The Sufficiency Rating formula is a method of evaluating highway bridge data to obtain a numeric value indicating the sufficiency of the bridge to remain in service. The result of this method is the percentage in which 100 is an entirely sufficient bridge and 0 is an entirely deficient bridge. In order to receive funding through the Highway Bridge Replacement and Rehabilitation Program (HBRRP), structures must be *Structurally Deficient* or *Functionally Obsolete* and have an SR of 80% or below. Structures with an SR of 0 to 49.9% are eligible for replacement, and structures 50 to 80 are eligible for rehabilitation unless otherwise approved by the FHWA. The following criteria determine whether or not a structure is structurally deficient or functionally obsolete:

1. Structurally Deficient. A condition of **4 or less** for any of the following:

   (58) Deck Rating

   (59) Superstructure Rating

(60) Substructure Rating

Or, an appraisal of 2 or less for the following:

(67) Structure Rating

(71) Waterway Adequacy

2. Functionally Obsolete. An appraisal of **3 or less** for the following:

(68) Deck Geometry

(69) Under Clearance

(72) Approach Roadway Alignment

Or, an appraisal of 3 for the following:

(67) Structure Rating

(71) Waterway Adequacy

All three structures are not structurally deficient and not functionally obsolete at the present time. Table 2.5 shows the sufficiency ratings of the three bridge crossings.

Table 2.5 Bridge Sufficiency Rating (SR)

Structurally Deficient SR Criteria		Missouri River	MRL	Six Mile Creek
(58) Deck Rating	≤ 4	6	7	5
(59) Superstructure Rating	≤ 4	7	7	7
(60) Substructure Rating	≤ 4	7	7	7
(67) Structure Rating	≤ 2	7	7	6
(71) Waterway Adequacy	≤ 2	8	-	8
Functionally Obsolete SR Criteria				
(67) Structure Rating	≠ 3	7	7	6
(68) Deck Geometry	≤ 3	4	4	5
(69) Under Clearance	≤ 3	-	5	-
(71) Waterway Adequacy	≠ 3	8	-	8
(72) Approach Roadway Alignment	≤ 3	8	6	8
Design Loading		5 MS 18 (HS 20)	5 MS (HS 20)	2 M 13.5 (H 15)
Sufficiency Rating		82.5%	81.5%	68.6%
Structure Status		*Not Deficient*	*Not Deficient*	*Not Deficient*

Based on the above ratings and available bridge assessment reports, the three structures have twice the legal load capacity posted (40 US tons). Bridge management simulations were conducted by the MDT to determine the remaining service life and maintenance requirements for the structures. Table 2.6 shows the current age of each of the three bridges, along with the estimated year of deficiency if no routine maintenance is performed for each structure in the foreseeable future.

Table 2.6 Bridge Management			
	Missouri River	MRL	Six Mile Creek
Current Age	55	55	79
Year bridge will become deficient and eligible for replacement if no maintenance is done	2050	2028	2023

According to the current American Association of State Highway and Transportation Officials (AASHTO) Bridge Design Code, the three bridges are located in Seismic Zone 3. Seismic zones range from 1, lowest seismic risk, to 4, highest seismic risk. Seismic zones reflect the variation in seismic risk across the country and are used to permit different requirements for methods of analysis, minimum support lengths, column design details, and foundation and abutment design procedures.

All three bridges were designed and constructed before seismic load considerations were incorporated into bridge designs. Six Mile Creek Bridge is a single span structure with low seismic vulnerabilities. Single span bridges generally perform adequately to seismic loads. Both the Missouri River Bridge and MRL Bridge have many seismic vulnerabilities that include high rocker bearings, minimal bearing support, substructure details that allow brittle failure, and undersized foundations for seismic loads. Past performance of bridges with similar details of the MRL and Missouri River Bridges indicate these two structures will not perform well under seismic loading. The bridges may collapse or be damaged and require closure.

2.11.1 Missouri River Bridge

The Missouri River Bridge (Structure No. P00008088+02901) is a two lane structure located at RP 88.3. Constructed in 1955 on a horizontal tangent, the bridge is 690 feet long and 28 feet wide with steel beams supported by five cylindrical reinforced concrete piers. Continuous steel girders support the main span with concrete T-beam end spans. The bridge rail has been retrofitted with a concrete barrier.

A Level II bridge scour analysis for the Missouri River Bridge was conducted in August 2000. The structure was determined to be at Low Risk for scour and moved to a National Bridge Inspection Standards (NBIS) Code 5. Annual peak discharge data was collected for 56 years at the U.S. Geological Survey (USGS) streamflow gaging station (No. 06054500) “Missouri River at Toston, Montana”. Selected flood-frequency data for the 56-year period at the gage yield the results shown in Table 2.7.

Table 2.7 Missouri River Bridge Flood Frequency		
Drainage Area (Sq. Mi.)	100-year (cfs)	500-year (cfs)
14,669	40,000	47,200

Source: USGS, Station No. 06054500

The largest recorded peak discharge at the gage was 34,000 cfs in 1997. The next two largest peak discharges occurred in 1948 (32,000 cfs) and in 1913 (29,800 cfs).

A skid test was completed by the MDT on the bridge deck with the results shown in Table 2.8. A skid test is important because it measures the amount of pavement friction and determines bridge surface susceptibility to vehicles skidding on the bridge deck.

Table 2.8 Missouri River Bridge - Skid Test Results

Reference Post (RP)	Left Lane SN Avg.	Right Lane SN Avg.
88.405	40.6	40.1
88.367	38.6	39.1
88.325	40.1	38.9

Testing was completed at 40 MPH
SN < 30 indicates poor skid resistance
30<SN<40 skid resistance transitional may be adequate depending on traffic and geometry
40<SN skid resistance adequate

The skid test results are primarily within the transitional zone, with some results being adequate. Since this bridge is on a horizontal tangent, an asphalt overlay could be used to improve skid resistance.

In 2006, an underwater inspection was conducted on the Missouri River Bridge. It was determined the substructures are in good condition. There are no major defects below the high waterline and no considerable general or local scour present at the bridge site. There are very shallow 1' deep scour cones around each column, which is exposing the column pedestal at each pier. However, the footings are not exposed.

Based on the above ratings, the Missouri River Bridge is categorized as ***not structurally deficient*** and ***not functionally obsolete***.

2.11.2 MRL Bridge

The MRL Bridge (Structure No. P00008088+00551) is a two lane structure located at RP 88.0. Constructed in 1955 on a horizontal curve, the bridge is 385.5 feet long and 28 feet wide. Continuous steel girders support the main span with concrete T-beam end spans. The bridge rail has been retrofitted with a concrete barrier.

A skid test was completed by the MDT on the bridge deck with the results shown in Table 2.9 below. A skid test is important because it measures the amount of pavement friction and determines bridge surface susceptibility to vehicles skidding on the bridge deck.

Table 2.9 Montana Rail Link Bridge - Skid Test Results		
Reference Post (RP)	Left Lane SN Avg.	Right Lane SN Avg.
88.055	35.7	33.5
88.014	33.4	34.5

Testing was completed at 40 MPH
SN < 30 indicates poor skid resistance
30<SN<40 skid resistance transitional may be adequate depending on traffic and geometry
40<SN skid resistance adequate

The skid test results are within the transitional zone. Options to increase skid resistance for this bridge include a thin epoxy overlay or a concrete overlay. An asphalt overlay is not recommended since the bridge is on a curve.

Based on the above ratings, the MRL Bridge is categorized as ***not structurally deficient*** and ***not functionally obsolete***.

With the location of the railroad within the corridor, certain guidelines must be followed in order to meet railroad requirements. Requirements for roadway structures over the railroad include the following:

- According to railroad operation, the preferred overhead structure would span the entire railroad right of way.
- The minimum permanent vertical clearance is 23'-3 ½" measured from the top of the highest rail to the lowest obstruction under the structure.
- With the presence of double tracks, the standard distance from center to center of the tracks is 20 feet. Currently, the distance is 14 feet. Therefore, in the situation where a new bridge is needed, a longer bridge would need to be constructed in order to meet the current design standards.

As improvement options are developed, consideration will be given to the requirements and parameters in relation to the railroad infrastructure.

From the as-built bridge plans, the curve data for the bridge over MRL indicates a curve radius of 1,432.5'. This does not meet the minimum curve radius requirement of 1,820' for a design speed of 70 mph. Note that a flashing curve speed warning sign of 60 mph is located on each end of the curve to warn of this condition.

2.11.3 Six Mile Creek Bridge

The Six Mile Creek Bridge (Structure No. P00008087+02291) is a two lane structure located at RP 87.22, originally constructed in 1931 and reconstructed in 1939. The bridge is 23 feet long and 36 feet wide. The bridge type is a concrete flat slab with a 5" asphalt overlay. The existing bridge rail consists of concrete post and rail that does not meet current design standards. The guardrail will be upgraded with an upcoming pavement preservation project. The Six Mile Creek Bridge is ***not structurally deficient*** and ***not functionally obsolete***.

2.12 Crash Analysis

Safety issues are a concern throughout the corridor. In 2009, the MDT Traffic and Safety Bureau conducted a crash analysis along US 287 from RP 86.1 to RP 89.1, which covers the corridor study area boundary. The crash analysis included 10 years of crash data from January 1, 1999 to December 31, 2008. The analysis compared the study area with the average crash rates on Non-Interstate National Highway System (NINHS) routes statewide. The results are shown in Table 2.10 below.

Table 2.10 US 287 Crash Statistics (RP 86.1 - RP 89.1)
(from January 1, 1999 - December 31, 2008)

Statewide Average	NINHS Routes	Study Area
All Vehicles Crash Rate	1.07	1.32
All Vehicles Severity Index	2.20	2.64
All Vehicles Severity Rate	2.36	4.28
Truck Crash Rate	0.92	1.01
Truck Severity Index	2.29	3.75
Truck Severity Rate	2.11	3.94
Truck Crashes		4
Total Recorded Crashes		59

Source: MDT Traffic and Safety Bureau, 2009.

Crash rates are defined as the number of crashes per million vehicle miles. Severity index is defined as the ratio of the sum of the level of crash degree to the total number of crashes. Severity rate is defined as the crash rate multiplied by the severity index. Statewide average truck crash rate, truck severity index and truck severity rate are for the years 2003 through 2007. Based on MDT's crash analysis report, the following statistics and observations were obtained:

- An accident cluster was identified between RP 87.6 and RP 88.0. The curve warning signs were upgraded; flashers and centerline rumble strips were installed in 2006. The centerline rumble strips were discontinued over the bridge decks.
- There was a 23.7% occurrence of vehicles hitting the guardrail face and/or guardrail end compared to the 4.9% statewide average for rural Non-Interstate National Highways.
- There were 59 crashes in a 10-year period from January 1, 1999 to December 31, 2008. The main trends were single vehicle run-off-the-road crashes and wild animal-vehicle crashes. There were four fatal crashes (5 fatalities), indicating the high severity rate for the corridor.

- In 2006, there was an accident cluster between RP 88.3 to RP 88.8, but no addressable trend.
- There have been 45 single vehicle crashes, with 14 involving guardrail, 10 involving wild animals, one domestic animal (cow), and 12 vehicles which overturned.
- Of the 59 crashes, 26 occurred on the bridge near RP 88 (MRL Bridge). Of these 26 crashes, 8 occurred during dark-not lighted conditions. Thirteen of the 26 crashes occurred during icy roadway conditions.

A review of the MDT Maintenance Animal Incident Database for the time period from January 1998 through June 2009 indicates that animal-vehicle collisions have occurred multiple times throughout that period on US 287 between RP 86.0 and RP 90.0. With the exception of only a few other animals, white-tail and mule deer account for the vast majority of the recorded wildlife mortality along the highway within the study area. Approximately 50 animal carcasses were recorded within the 4-mile highway corridor over that 10-year time period. The carcass locations are relatively evenly dispersed throughout the corridor on either side of the existing structure over the railroad tracks and the river. This indicates that the animals are moving between cover and food sources and crossing the highway at will. While there are some game trails present within the study area, there is no evidence of an exceptionally high-use highway crossing location within the study area. It is presumed that animals may occasionally make use of the existing structure and opportunistically move under the highway along the river corridor at the bridge location.

As stated above, the crash rate within the Toston Missouri River Corridor is higher than the average comparable routes throughout the state of Montana. Table 2.11 shows the total number of crashes, with a breakdown of crashes by severity, for every tenth of a mile through the corridor.

Table 2.11 US 287 Crash Analysis (RP 86.3 - RP 89.1)
MDT Severity Index Rating

Refernce Post Location	# Crashes	No Injury	Possible / Non-Incapacitating Injury	Incapacitating / Fatal Injury
86.3 - 86.4	1		1	
86.4 - 86.5	0			
86.5 - 86.6	4	2	1	1
86.6 - 86.7	0			
86.7 - 86.8	1	1		
86.8 - 86.9	1	1		
86.9 - 87.0	1		1	
87.0 - 87.1	3	2	1	
87.1 - 87.2	3	3		
87.2 - 87.3	0			
87.3 - 87.4	2		1	1
87.4 - 87.5	0			
87.5 - 87.6	0			
87.6 - 87.7	1	1		
87.7 - 87.8	2	1	1	
87.8 - 87.9	0			
87.9 - 88.0	3	2	1	
88.0 - 88.1	6	4	2	
88.1 - 88.2	11	8	3	
88.2 - 88.3	3	1		2
88.3 - 88.4	3	2		1
88.4 - 88.5	6	2	2	2
88.5 - 88.6	3	1	1	1
88.6 - 88.7	0			
88.7 - 88.8	0			
88.8 - 88.9	1			1
88.9 - 89.0	2	2		
89.0 - 89.1	1		1	
Corridor Total	58	33	16	9

Source: MDT Traffic and Safety Bureau, 2010.
(from January 1, 1999 - July 31, 2009)

2.13 Railroad

The presence of MRL within the corridor is a key factor in developing improvement options. Guidelines have been established defining construction requirements and development standards near railroad facilities. The existing conditions meet railroad requirements. As improvement options develop, consideration will be made to comply with specified railroad requirements.

2.14 Utilities

Several utilities exist throughout the corridor, primarily along US 287 and MRL corridors. Utilities include power (overhead and underground), telephone, and fiber optics. As improvement options develop, it will be important to recognize the impact options may or may not have on the utilities within the

corridor. Utility adjustments and/or relocations may delay projects if they are not identified in the project development process. Consideration will be given to utilities as improvement options develop.

2.15 Access Points

With the US 287 corridor occurring within a primarily farm and agricultural area, there are 23 access points along the highway, 12 east and 11 west. The Radersburg Road and S 285 intersection, south of the Missouri River Bridge encounters both local and thru traffic. The location of the Bunkhouse Bar, southwest of the Missouri River Bridge, is another key element to the traffic in this area. All approaches and access points will be considered as the study develops. Table 2.12 contains a listing of existing private and public approaches by approximate RP locations.

Table 2.12 Private and Public Approach Locations

(RP)	Side	Use	(RP)	Side	Use	(RP)	Side	Use
86.12	East	Private	87.21	West	Private	88.45	West	Public (S 285)
86.12	West	Private	87.30	East	Private	88.45 - 88.51	West	Private
86.23	East	Private	87.74	East	Toston Bypass	88.56	West	Private
86.49	West	Private	87.74	West	Private	88.68	East	Private
86.65	East	Public (Flynn Ln)	87.76	West	Private	88.83	East	Private
86.76	East	Public (Sixmile Rd)	87.81	West	Private	88.83	West	Private
87.10	East	Private	88.39	West	Private	88.87	East	Private
87.21	East	Private	88.45	East	Public (Radersburg Rd)			

3.0 Environmental Settings

In compliance with NEPA/MEPA regulations, all state actions and all federally funded projects require a level of analysis to determine whether improvement options can be developed to avoid, minimize, or mitigate potential impacts to social, economic and natural resources within the Toston Missouri River corridor study area. An Environmental Scan report was prepared for this Corridor Study and addressed these elements within the study area.

The information in this section is gathered from the Environmental Scan and is intended to be an overview of environmental settings including social, economic, and natural resources. All resource information contained in this environmental scan came from public sources and/or is based on review of aerial photographs. There have not been any "on-the-ground" field studies completed to delineate potentially affected resources. A great deal of information was obtained from the Montana Natural Heritage Program databases. Additionally, past Biological Resource Reports (BRR's) and other reports/surveys were collected and reviewed from past studies within the US 287 corridor. A complete list of the sources utilized to complete the environmental scan is included in Section 4.0 (References) of this document.

The level of analysis contained in this Corridor Study report is not intended to meet NEPA/MEPA requirements or provide a detailed account of all resources or potential impacts. This document is intended to identify resources or areas of cultural and environmental concern that have the potential to be impacted in future project development.

3.1 Demographics

There is a direct correlation in motor vehicle travel growth and population and economic growth. For the environmental scan, it is appropriate to present various socio-economic statistics to gain an understanding of historical trends in population, age, ethnicity, employment and income. This is presented for Broadwater County as a whole. Between 1970 and 2000, Broadwater County's population grew by 1,859 persons. The number of jobs grew in the same time period by 1,040 jobs. The population and employment values for Broadwater County, for the period between 1970 and 2000, are shown in Table 3.1.

Table 3.1 Broadwater County Population and Employment Trends

Year	Population *	Employment **
1970	2,526	1,060
1980	3,267	1,480
1990	3,318	1,560
2000	4,385	2,100
Change (1970-2000)	1,859	1,040

** Source: U.S. Bureau of the Census, Census of Population*

*** Source: NPA Date Services, Inc. - DOCUMENTATION FOR REGIONAL ECONOMIC PROJECTIONS SERIES (REPS) ECONOMIC DATABASE 2008 UPDATE*

According to the U.S. Census Bureau, Broadwater County has experienced a population growth of 7.3% from 2000 to 2008. During the same time period, the county has seen a growth of 24.3% in private nonfarm employment.

In addition to overall population and employment growth, it is interesting to note the age composition of the county's residents. Between 1970 and 2000, the number of county residents under the age of 18 increased by 173 persons, residents age 18 to 64 increased by 1,287 persons, and residents 65 and older increased by 399 persons. The change in age composition for residents in Broadwater County can be seen in Table 3.2.

Table 3.2 Broadwater County Age Distribution (1970 - 2000) *

Year	<18	18-64	65+	Total
1970	932	1,274	320	2,526
1980	1,015	1,844	408	3,267
1990	955	1,820	543	3,318
2000	1,105	2,561	719	4,385
Change (1970 - 2000)	173	1,287	399	1,859

** Source: U.S. Bureau of the Census, Census of Population (1970, 1980, 1990 & 2000)*

Table 3.3 depicts the ethnic composition of those residents in Broadwater County during 2000. This information came from the year 2000 US Census Bureau Census of Population.

Table 3.3 Broadwater County Ethnic Composition (Year 2000) *

Ethnicity	Number of People	Percent of Population
White	4,255	97.04
Black or African American	12	0.27
American Indian	51	1.16
Asian	5	0.11
Native Hawaiian and Other Pacific islander	3	0.07
Some Other Race	15	0.35
Hispanic or Latino (of any race)	44	1.00
Total	4,385	100 percent

** Source: U.S. Bureau of the Census, Census of Population (Year 2000)*

Between 1970 and 2000, there was an increase in 1,040 jobs in Broadwater County. All economic sectors either increased or remained steady, with the exception of farm employment, which exhibited a drop of 40 jobs during the time period. Services, manufacturing, and farm employment remained the strongest employment industries for the year 2000, with 400, 370, and 320 jobs, respectively. The largest job increase during the thirty year period of analysis was the manufacturing sector, which recorded an increase of 270 jobs. A summary of economic trends and employment statistics are shown in Table 3.4.

Table 3.4 Broadwater County Employment Trends by Economic Sector (1970-2000) *					
Economic Sector	1970	1980	1990	2000	Change (1970 - 2000)
Farm	360	330	320	320	(40)
Agricultural Services & Forestry	10	20	20	90	80
Mining	20	10	50	80	60
Construction	30	90	70	100	70
Manufacturing	100	150	150	370	270
Transportation & Public Utilities	30	30	110	70	40
Wholesale Trade	0	60	40	50	50
Retail Trade	180	250	220	240	60
Finance, Insurance & Real Estate	30	70	80	80	50
Services	140	180	260	400	260
Federal & Civilian Government	20	50	40	50	30
Military	20	20	30	20	0
State & Local Government	120	210	160	190	70
Residual Employment - Not Allocatable	0	10	10	40	40
Total Employment	1,060	1,480	1,550	2,100	1,040

** Source: NPA Date Services, Inc. - DOCUMENTATION FOR REGIONAL ECONOMIC PROJECTIONS SERIES (REPS) ECONOMIC DATABASE 2008 UPDATE*

Lastly, it is interesting to note that overall income for all industries has increased steadily over the thirty year period. The individual income level (all wages and salaries) rose from $10,640 in the year 1970 to $30,120 in the year 2000. This information is shown in Table 3.5.

Table 3.5 Broadwater County Income (Wage and Salary, All Industries)*	
Year	1970
1970	$10,640
1980	$19,040
1990	$18,050
2000	$30,120
Change (1970-2000)	$19,480

** Source: NPA Date Services, Inc. - DOCUMENTATION FOR REGIONAL ECONOMIC PROJECTIONS SERIES (REPS) ECONOMIC DATABASE 2008 UPDATE*

3.2 Development

Future development is important to the corridor and any improvement options that may be proposed. The Montana Business Assistance Connection (MBAC), Gateway Economic Development District (GEDD), and Broadwater County all own property that adjoins US 287 south of the Toston Fire Station. Plans for the 21-acre parcel of land are to subdivide 7 commercial lots to be used for small business growth in the area.

3.3 Surface Waters

According to available GIS data, several locations of surface waters were identified within the corridor study area. The major water body is the Missouri River that is crossed by US 287 at approximately Reference Post (RP) 88.2. Several tributaries to the Missouri River exist within and in proximity to the study area. Those tributaries include Dry Creek, joining the Missouri River north of the study area; Sixmile Creek, joining from the east; Sixteenmile from the southeast; Warm Springs Creek from the southwest; and multiple unnamed drainages from various locations adjacent to the study area. Figure 3-1 shows the surface waters within the study area. Table 3.6 indentifies the surface waters that cross the existing US 287 corridor.

Table 3.6 Surface Water Resources

Approximate Reference Post (RP)	Description
85.7	Unnamed Irrigation Ditch Crossing
85.9	Big Springs Ditch Crossing
86.2	Unnamed Irrigation Ditch Crossing
86.8	Unnamed Irrigation Ditch Crossing
87.2	Sixmile Creek Crossing
87.7	Big Springs Ditch Crossing
88.2	Missouri River Crossing
88.9	Unnamed Irrigation Ditch Crossing
90.2	Big Springs Ditch (Historic) Crossing

According to the 2008 Water Quality Information summary from the DEQ, the Missouri River is considered an impaired waterbody. Section 303(d) of the Clean Water Act requires the State of Montana to develop a list of water bodies that do not meet water quality standards, hence an impaired water body. The Missouri River is impaired according to the revised 2002, 303(d) impaired water body list. The study area occurs within the Missouri-Sun-Smith watershed, within the Upper Missouri basin. As improvement options develop, the requirements of DEQ's Total Daily Maximum Loads (TMDL) standards and the Water Quality Restoration Plan will be considered. Consideration will also be given to stormwater and spill control on any bridge structures.

The Missouri River is a Section 10 Navigable Waterway. Section 10 of the Rivers and Harbors Appropriation Act of 1899 prohibits the obstruction or alteration of navigable waters of the United States. A Section 10 Permit is required if any work is to be done in, over, or under navigable waters of the United States. Coordination with USACE is essential to determine the appropriate type of permits needed for future development. USACE and the US Coast Guard bridge standards and requirements will need to be met for navigability requirements when considering potential improvement options and/or as projects are developed. As a project is forwarded from this study, resource agency coordination will include the USACE, MFWP, and DEQ.

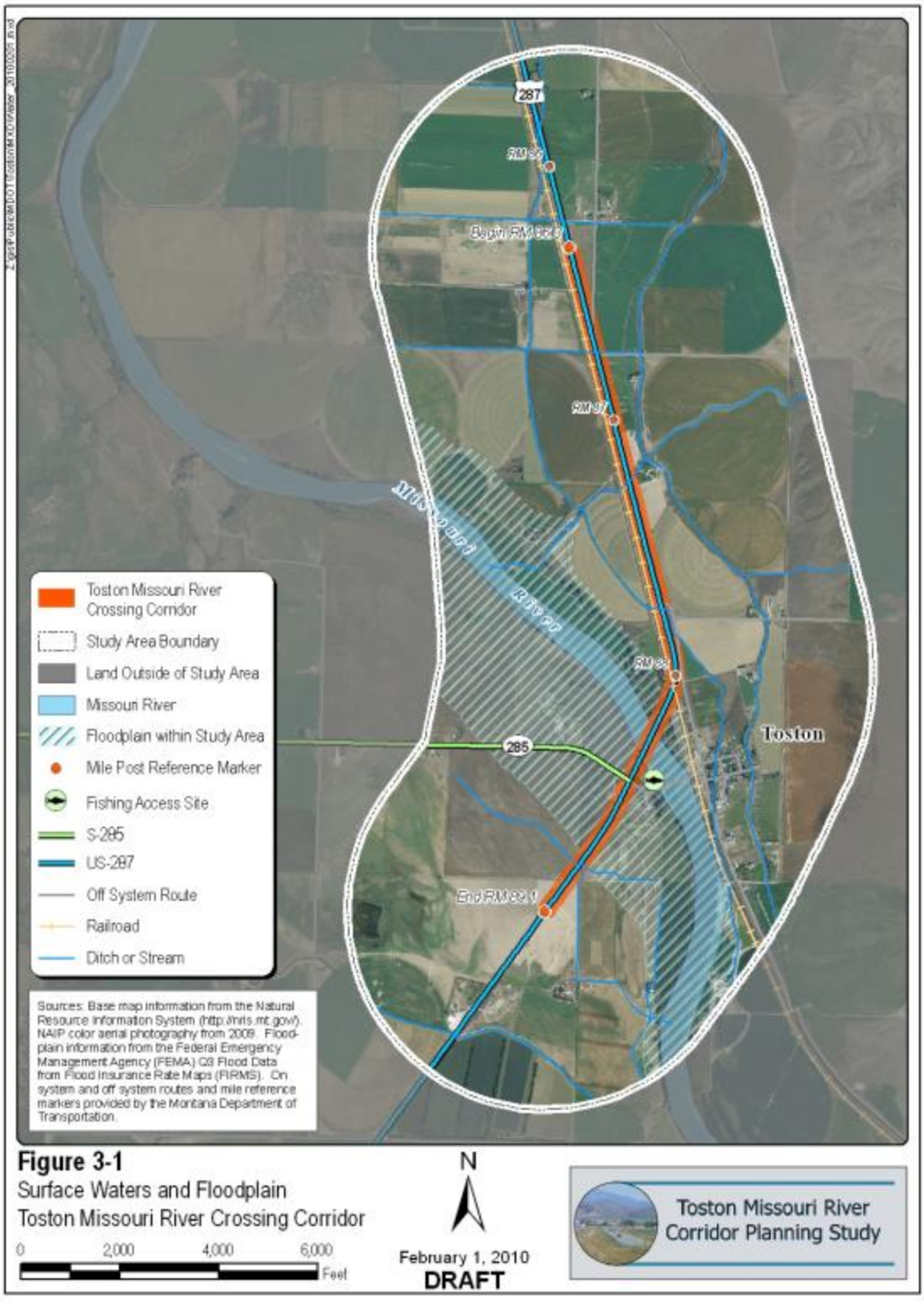


Figure 3-1
Surface Waters and Floodplain
Toston Missouri River Crossing Corridor

3.4 Irrigation

Based on the 1955 Water Resource Survey Report for Broadwater County, the corridor contains a high level of water use, commonly private irrigation or water user associations. Two major ditches exist within the corridor. The major ditches include Big Springs Ditch, which crosses from the east side to the west side of the highway north of Toston, and the Broadwater – Missouri Water Users Association East Side Canal which flows north on the east side of the highway. The historic Broadwater-Missouri Canal (Broadwater – Missouri Water Users Association West Side Canal) laterals the south end of the corridor. Figure 3-2 shows the irrigation systems within the corridor. Irrigation ditches are under local jurisdiction while the USACE has jurisdiction on canals returning flow to the Missouri River. If irrigation ditches are impacted and/or designated for replacement as improvement options are developed, the ditches are considered self mitigating at this point.

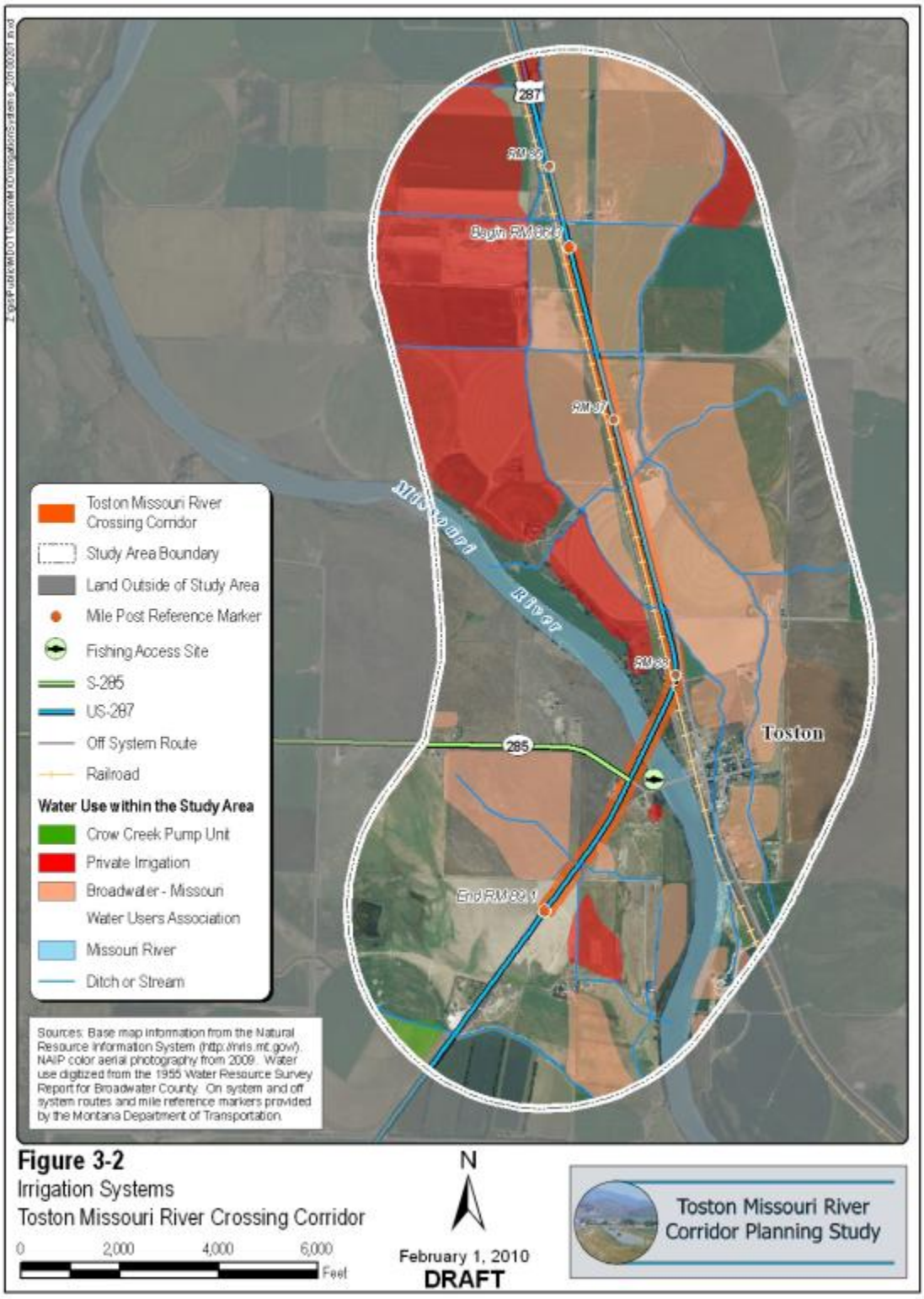


Figure 3-2
Irrigation Systems
Toston Missouri River Crossing Corridor

3.5 Recreation

Recreational activities exist within the study area, predominantly due to the presence of the Missouri River. The Toston Fishing Access is located just southeast of the Missouri River Bridge, becoming a common access point for fishing and rafting expeditions. The fishing access site will be given consideration with particular interest to operational and environmental impacts as improvement options are developed. Figure 3-3 displays the location of the Toston Fishing Access site. As a project is forwarded from this study, stakeholder coordination will include MFWP, the Pat Barnes Missouri River Chapter of Trout Unlimited, and public outreach.

3.6 Cultural Resources & Tribes

The cultural resource file search with the Montana State Historic Preservation Office (SHPO) for Broadwater County resulted in the discovery of listed and eligible places on the National Register of Historic Places. Figure 3-3 presents the listed and eligible historic places within the study area. Furthermore, tribal concerns do not exist within the study area.

Table 3.7 identifies properties previously identified as eligible or listed on the National Register of Historic Places.

Table 3.7 National Register of Historic Places (NRHP)

Name	NRHP Site No.	NRHP Status
Broadwater - Missouri Canals	24BW499	Eligible
Toston Bridge	24BW814	Registered
Montana Rail Link (historically *Old Northern Pacific Railroad*)	24BW818	Eligible
Big Springs Ditch	24BW836	Eligible
Radersburg Historic Mining District	24BW887	Eligible

Source: Montana State Historic Preservation Office

The cultural resources listed in Table 3.7 should not be considered a comprehensive list because a cultural resource inventory has not been completed. Any improvement options within the corridor could impact historic properties. A thorough cultural resource inventory would be required prior to implementing a corridor improvement option.

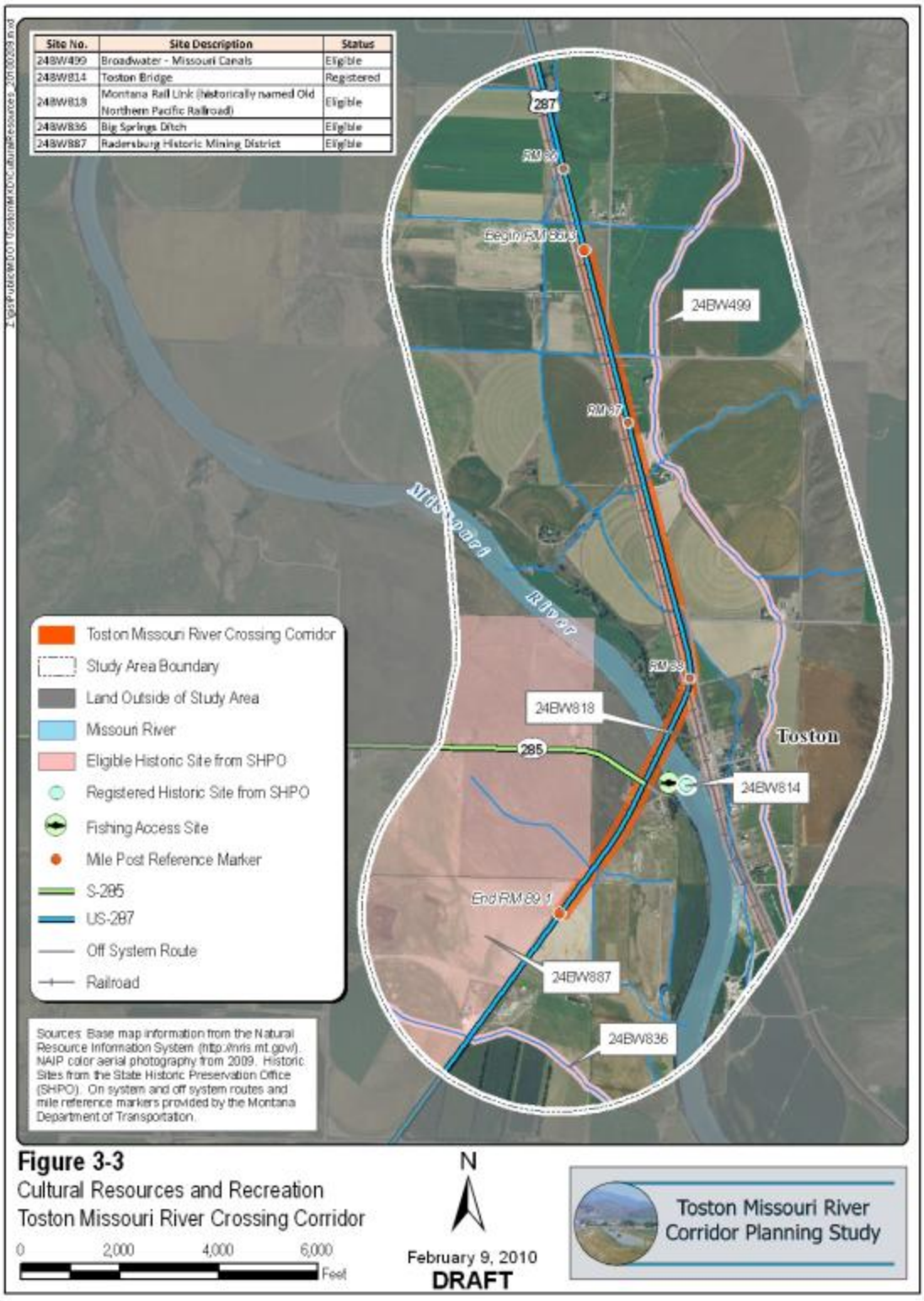


Figure 3-3
Cultural Resources and Recreation
Toston Missouri River Crossing Corridor

3.7 General Vegetation

According to a vegetation classification system developed by Payne (1973), the study area occurs within *intermountain valley grassland and meadow*, much of which has been converted to agriculture (pasture, crop and hay land). The study area encompasses agricultural lands as described above, rural residential, light commercial/industrial, and river bottom/floodplain communities.

Upland vegetation communities within the study area are currently subjected to various sources of disturbance including residential, commercial, railroad, highway, agricultural and recreational activities, in addition to the presence of ornamental, agricultural, exotic, invasive and noxious floral species. Consequently, the potentially affected general vegetation community is considered to be of moderate to low overall quality. Comparatively, the riparian vegetation community associated with the river, and any wetland vegetation communities present in the study area would be considered of higher quality and importance due to their diversity, proximate distribution, and unique functions and value.

3.8 Wildlife

Wildlife species inhabiting or traversing the study area are typical of those that occur in intermountain valley grasslands, cultivated lands, and riparian areas of central Montana. Figure 3-4 shows the location of wildlife habitat within the corridor. Common larger mammals found within the study area are identified in Table 3.8.

Table 3.8 Wildlife within the Corridor

Common Name	Scientific Name
Pronghorn Antelope	Antilocarpa americana
White-tail Deer	Odocoileus virginianus
Mule Deer	Odocoileu hemionus
Black Bear	Ursus americanus
Elk	Cervus Canadensis
Mountain Lion	Puma concolor

Source: Montana National Heritage Program

Other common mammals potentially occurring in the study area include but are not limited to the porcupine, raccoon, striped skunk, badger, bobcat, coyote, red fox, muskrat, Richardson's ground squirrel, deer mouse, and meadow vole.

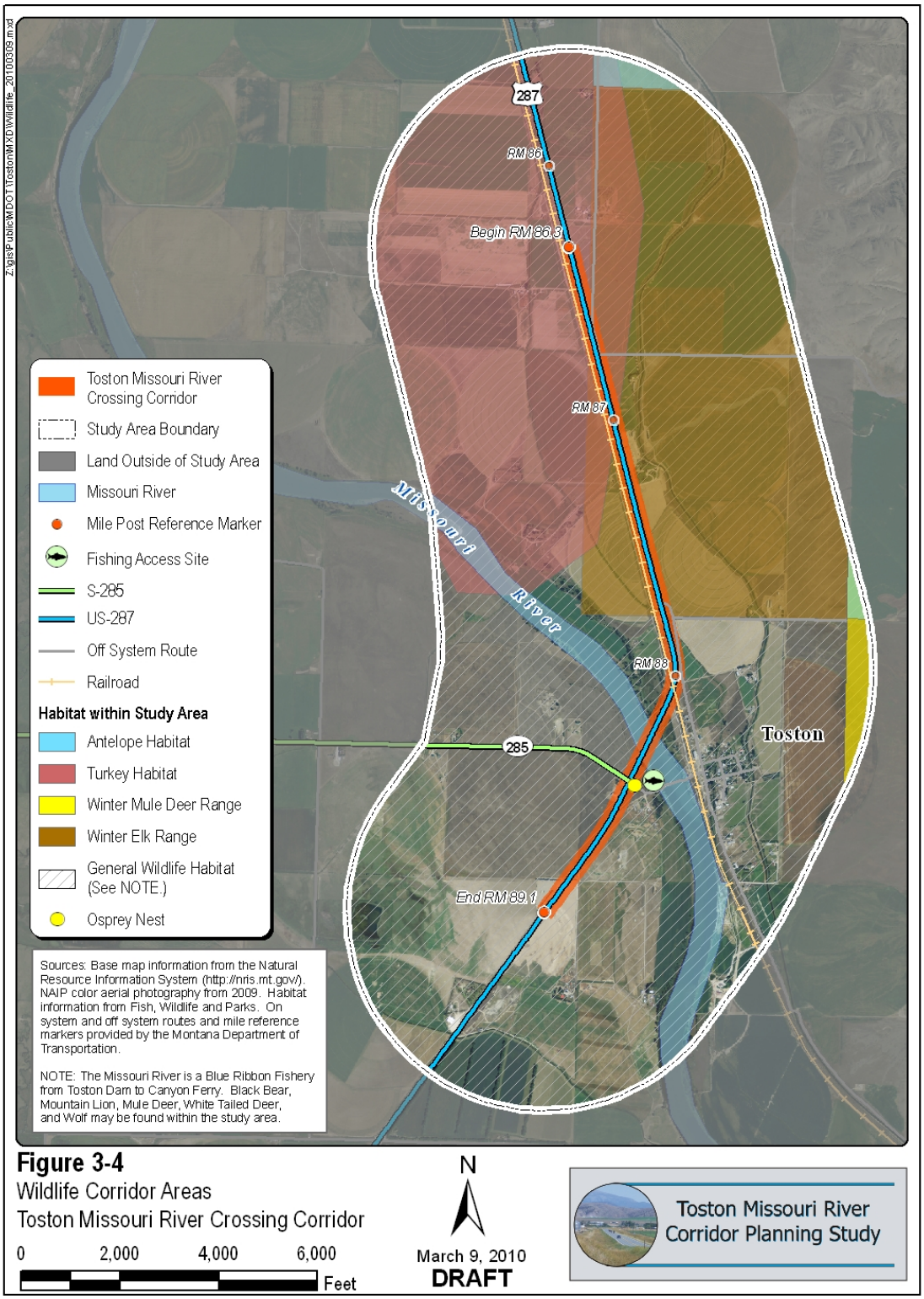
According to the Montana Natural Heritage Program's 2009 Natural Heritage Tracker database, which records and maps documented observations of species in a known location, there are recognized amphibian and reptilian species that occur within the study area. Depending on the presence of reptiles or amphibians in the study area, the timing of ground disturbing activities should be examined with regard to potential impacts to various susceptible life-cycle stages of these species, especially breeding/rearing or hibernation.

According to the MNHP, there are almost 300 different species of birds documented in Broadwater County, with the potential to occur in the study area. These species include representative songbirds, birds of prey, waterfowl, and shorebirds, including several state species of concern. There is an active artificial osprey nest platform located on the east side of the highway just north of the Radersburg Road turn-off, and three other nest platforms within or in proximity to the study area showing evidence of recent use. There are a few Great Blue Heron rookeries located in the tall cottonwood galleries along the Missouri River north of the study area, and in wetland complexes west of the study area. Swainson's Hawk is listed as a potential species of concern occurring within the study area. Bald eagles have been observed nesting, foraging and roosting along the Missouri River throughout the highway corridor, and two active nest sites are documented just west of the northern portion of the study area. In addition, there is a staging area for Sandhill Cranes northwest of the study area at the Stanfield Slough, which is outside the study area west of the Missouri River. There is also a feeding area for the cranes in a field located west of US 287 and east of the Missouri River, and within the study area. The cranes travel east from the staging area to the feeding area by crossing the river. Wintering waterfowl are also observed within the study area, and MFWP conducts mid-winter waterfowl surveys in the area.

Migratory birds are protected under the Migratory Bird Treaty Act. The Migratory Bird Treaty Act is a strict liability law that provides it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product, manufactured or not. Direct disturbance of an occupied (with birds or eggs) nest is prohibited under the law. The destruction of unoccupied nests of eagles; colonial nesters such as cormorants, herons, and pelicans; and some ground/cavity nesters such as burrowing owls or bank swallows may be prohibited under the Migratory Bird Treaty Act.

Depending on the presence of migratory bird nests on structures or within vegetation potentially affected by the study, certain activities which have the potential to directly affect an occupied nest, especially structure and vegetation (trees and shrubs) removal, may be subject to restriction between the dates of May 1st and August 15th.

If a project is forwarded from this study, recommendations for facilitation of wildlife movement and minimization of habitat disturbance through the study corridor will need to be considered during project development.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287
RM 86
Begin RM 86.3
RM 87
Missouri River
RM 88
Toston
285
End RM 89.1
Toston Missouri River Crossing Corridor
Study Area Boundary
Land Outside of Study Area
Missouri River
Mile Post Reference Marker
Fishing Access Site
S-285
US-287
Off System Route
Railroad
Habitat within Study Area
Antelope Habitat
Turkey Habitat
Winter Mule Deer Range
Winter Elk Range
General Wildlife Habitat (See NOTE.)
Osprey Nest
Sources: Base map information from the Natural Resource Information System (http://nris.mt.gov/). NAIP color aerial photography from 2009. Habitat information from Fish, Wildlife and Parks. On system and off system routes and mile reference markers provided by the Montana Department of Transportation.
NOTE: The Missouri River is a Blue Ribbon Fishery from Toston Dam to Canyon Ferry. Black Bear, Mountain Lion, Mule Deer, White Tailed Deer, and Wolf may be found within the study area.
Figure 3-4
Wildlife Corridor Areas
Toston Missouri River Crossing Corridor
0 2,000 4,000 6,000
Feet
N
March 9, 2010
DRAFT
Toston Missouri River Corridor Planning Study

3.9 Threatened & Endangered Species and Species of Concern

The federal list of endangered and threatened species is maintained by the U.S. Fish & Wildlife Service (USFWS). Species on this list receive protection under the Endangered Species Act (ESA). An 'endangered' species is one that is in danger of extinction throughout all or a large portion of its range. A 'threatened' species is one that is likely to become endangered in the foreseeable future. The USFWS also maintains a list of species that are candidates or proposed for possible addition to the federal list. According to the USFWS, only one threatened and endangered species is listed as occurring in Broadwater County. The Ute Ladies Tress is a small orchid that is known from only a handful of occurrences in southwest and south central Montana. Suitable habitat exists within the corridor for threatened and/or endangered species, and should be further investigated prior to construction activities.

Montana Species of Concern are native animals breeding in the state that are considered to be "at risk" due to declining population trends, threats to their habitats, and/or restricted distribution. Designation of a species as a Montana Species of Concern is not a statutory or regulatory classification. Instead, these designations provide a basis for resource managers and decision-makers to direct limited resources to priority data collection needs and address conservation needs proactively.

A search of the Montana Natural Heritage Program species of special concern database revealed one mammal species (gray wolf), two bird species including two occurrences of the bald eagle and one bobolink occurrence, one amphibian (plains spadefoot), and one vascular plant (Annual Indian paintbrush) with occupied ranges within or overlapping the study area. The Swainson's Hawk is listed as a potential species of concern. As mentioned in the sections above, there are other sensitive species not listed here that also have the potential to occur within the study area. A thorough field investigation for the presence and extent of these species should be conducted during the project design phase. If present, special conditions to the design or construction should be considered to avoid or minimize impacts to these species. Figure 3-5 displays the location of sensitive species that exist within the corridor. Table 3.9 lists the Species of Concern identified within the corridor.

Table 3.9 Species of Concern

Common Name	Scientific Name	Species Status
Gray Wolf	Canis lupus	Animal Species of Concern
Great Blue Heron	Ardea herodias	Animal Species of Concern
Bobolink	Dolichonyx oryzivorus	Animal Species of Concern
Bald Eagle	Haliaeetus leucocephalus	Animal Species of Concern
Plains Spadefoot	Spea bombifrons	Animal Species of Concern
Swainson's Hawk	Buteo swainsoni	Animal Potential Species of Concern
Annual Indian Paintbrush	Castilleja exilis	Plant Species of Concern

Source: Montana National Heritage Program (Last updated February 2, 2010)

Bald and golden eagles are protected by the Migratory Birds Treaty Act and managed under the Bald and Golden Eagle Protection Act. The Bald and Golden Eagle Protection Act prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The Act provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle or golden eagle, alive or dead, or any part, nest, or egg thereof." The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." If a project is forwarded, a further review of the project area must be completed during the environmental review process under NEPA/MEPA to determine if Species of Concern are present within the area. Appropriate conservation measures for the conservation of sensitive species will be considered during the project development.

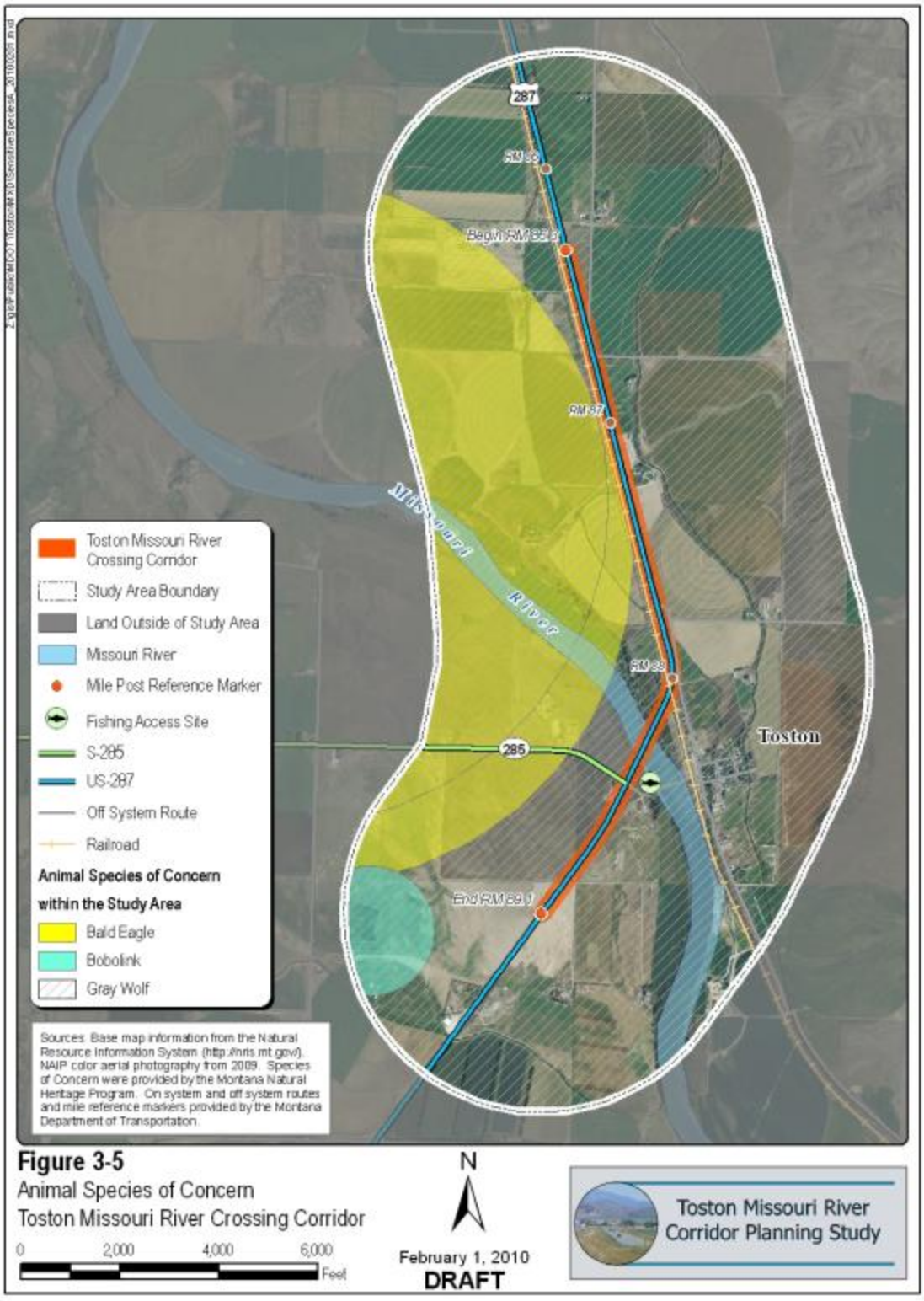


Figure 3-5
Animal Species of Concern
Toston Missouri River Crossing Corridor

3.10 Aquatic Resources

According to the Montana Fish, Wildlife & Parks Fisheries Information System (MFISH) database (2010), fish species abundantly/commonly occurring within river miles 2280 through 2290 of the Missouri River are shown in Table 3.10.

Table 3.10 Aquatic Resources

Common Name	Scientific Name	Species Status
Brown Trout	Salmo trutta	ENN
Common Carp	Cyprinus carpio	ENN
Longnose Dace	Thinichthys cataractae	-
Longnose Sucker	Catostomus catostomus	-
Mottle Sculpin	Cottus bairdi	-
Rainbow Trout	Onchorynchus mykiss	-
White Sucker	Catostomus commersoni	-
Mountain Whitefish	Prosopium williamsoni	-
Walleye	Sander vitreus	ENN
Burbot	Lota lota	SOC
Largemouth Bass	Micropterus salmoides	ENN
Mountain Sucker	Catostomus platyrhynchus	-
Northern Pike	Esox lucius	-
Redside Shiner	Richarsonius balteatus	-

ENN = Exotic Species, not native to Montana

SOC = Species of Concern

Source: Montana Fish, Wildlife & Parks Fisheries Information System (MFISH), 2010.

This section of river is used heavily for recreation including fishing and floating. This stretch of river, between river miles 2280 and 2290, is designated by MFWP as an outstanding fishing resource. There is a MFWP operated Fishing Access Site east of the highway just north of the Radersburg turn-off. Recreationists who put in at this location must quickly navigate the instream piers of the existing structure. Ease and safety of floater access should be considered when choosing the number and structure of piers. Direct impacts to the Fishing Access Site should be avoided. Montana Stream Protection Act (SPA 124 Permit) protects and preserves fish and wildlife resources as well as maintaining the natural state of streams and rivers. Any project that affects the bed or banks of a stream, including the construction or modification of a facility affecting the natural existing shape of any stream or its banks, requires a SPA 124 Permit through MFWP.

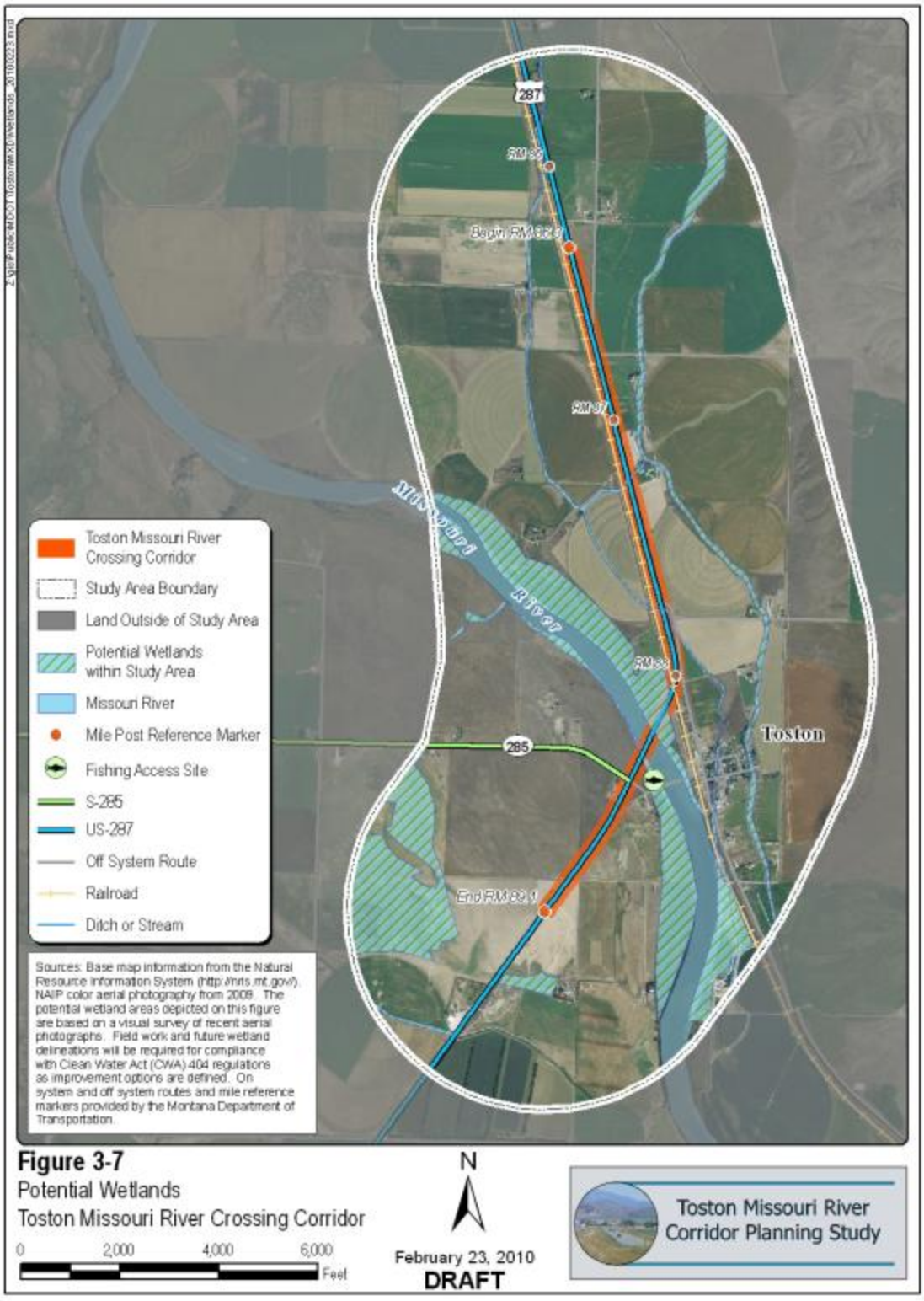
3.11 Wetlands

The USACE defines wetlands as those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

National Wetland Inventory (NWI) Mapping data is not available for this area. NWI maps are generated by the USFWS, and are based on the USFWS definition of wetlands, which does not follow the ACOE definition that MDT uses in wetland determination and delineation. NWI maps are typically generated based on aerial and satellite imagery, and are not accurate or detailed enough for MDT wetland determination and/or delineation.

Figure 3-7 shows locations of potential wetlands within the study area. The potential wetland areas are based on a visual survey of current aerial photographs. Field work and future wetland delineations will be required for compliance with Clean Water Act (CWA) 404 regulations if improvement options are forwarded into project design. Impacts to wetland areas should be avoided and minimized through improvement options. Any unavoidable wetland impacts must be quantified and compensated for through mitigation in accordance with USACE regulatory requirements. If improvement options are forwarded from the study, permits will be required for any wetland impacts from the USACE. If wetlands are impacted, mitigation will be required.

The wetland located in the southwest region of the study area (i.e. south of Secondary Route 285 on Figure 3-7 and down gradient of the Broadwater-Missouri Canal) has preliminarily been identified as a prior wetland mitigation site.


287
Begin FM 37.1
FM 37
Missouri River
FM 33
285
Toston
End FM 33.1
Toston Missouri River Crossing Corridor
Study Area Boundary
Land Outside of Study Area
Potential Wetlands within Study Area
Missouri River
Mile Post Reference Marker
Fishing Access Site
S-285
US-287
Off System Route
Railroad
Ditch or Stream
Sources: Base map information from the Natural Resource Information System (http://nris.mt.gov). NAIP color aerial photography from 2009. The potential wetland areas depicted on this figure are based on a visual survey of recent aerial photographs. Field work and future wetland delineations will be required for compliance with Clean Water Act (CWA) 404 regulations as improvement options are defined. On system and off system routes and mile reference markers provided by the Montana Department of Transportation.
Figure 3-7
Potential Wetlands
Toston Missouri River Crossing Corridor
0 2,000 4,000 6,000
Feet
N
February 23, 2010
DRAFT
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3.12 Air Quality

The Clean Air Act of 1970, as amended in 1990, is a federal law requiring the U.S. Environmental Protection Agency (EPA) to develop and enforce regulations in order to reduce air pollution and protect air quality. The EPA has established attainment and non-attainment zones throughout the state. The state must establish a State Implementation Plan (SIP), outlining the control of air pollution, for any zones designated as non-attainment areas. The study area is outside any non-attainment air quality zones.

3.13 Historic Properties

Historic properties are those included in the National Register of Historic Places (NRHP). According to Section 3.6, the Toston Bridge is the only registered historic place within the corridor. In addition, there are four places that are eligible for historic registration. Figure 3-3 shows the location of the cultural resources within the study area.

Section 106 of the National Historic Preservation Act requires agencies to comply with federal guidelines if improvement options may adversely affect historic properties. A cultural resource survey would need to be conducted within the study area in concurrence with the Montana State Historic Preservation Office to determine eligibility of additional historic properties. Impacts to historic properties should be avoided if practicable and feasible, or if avoidance is not possible, adverse affects would require mitigation. Any impacts to historic properties also influence Section 4(f) analysis.

3.14 Noise

Based on the rural environment of the corridor, noise contours would be evaluated on a case-by-case basis. If improvement options are forwarded from the study the study area should be evaluated for impact to nearby residential properties. A noise analysis was not conducted for this study.

3.15 Land Use

According to the National Resource Information System (NRIS), the corridor study area has been classified into 10 different categories of land use. Figure 3-8 shows the different land uses within the study area. As shown, the predominant corridor land use is farming and agricultural.

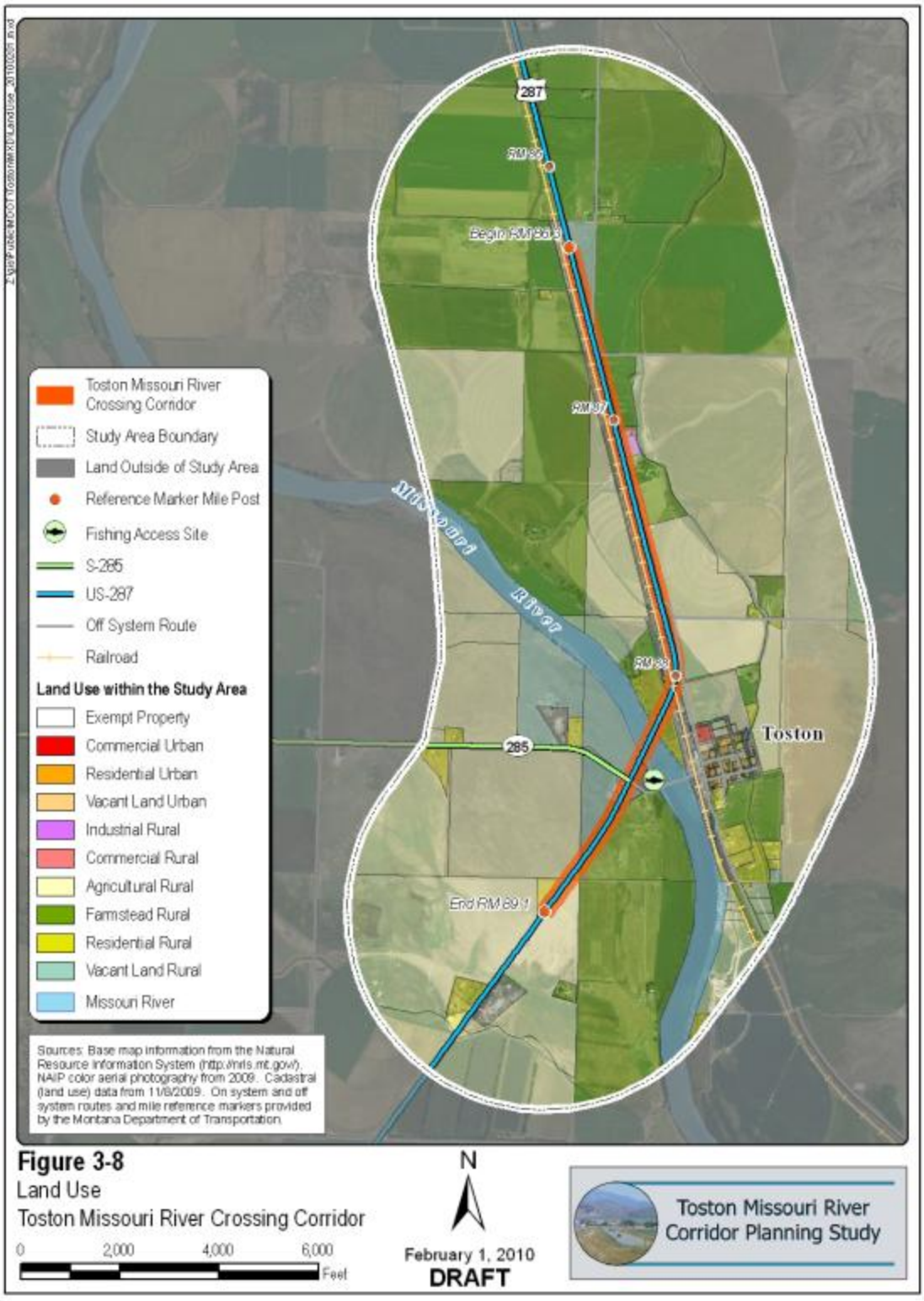


Figure 3-8
Land Use
Toston Missouri River Crossing Corridor

3.16 Section 4(f) and 6 (f)

Section 4(f) of the 1966 Department of Transportation Act (49 USC 303) applies if FHWA funds are used on a project and provides for the protection of publicly owned parks, recreation lands, historic sites, wildlife or waterfowl refuges, and any historic site of national, state, or local significance. Presented in Table 3.8 are six potential Section 4(f) sites. It should be noted there may be additional Section 4(f) sites located within the study area after a cultural resource survey has been completed. If Section 4(f) properties are impacted, a Nationwide Programmatic Section 4(f) evaluation form would be completed to demonstrate compliance. Table 3.11 lists the Section 4(f) resources identified within the corridor.

Table 3.11 Section 4(f) Resources

Name	Type of 4(f) Resource
Broadwater - Missouri Canals	Eligible for Historic Register
Toston Bridge	Registered Historic Place
Montana Rail Link (historically *Old Northern Pacific Railroad*)	Eligible for Historic Register
Big Springs Ditch	Eligible for Historic Register
Radersburg Historic Mining District	Eligible for Historic Register
Toston Fishing Access Site	Recreational Site

The National Land and Water Conservation Fund Act, Section 6(f), is intended to preserve, develop, and assure the quality and quantity of outdoor recreation resources. According to Montana Department of Fish, Wildlife, and Parks Land and Water Conservation Fund list, Section 6(f) properties do not exist within the study area.

3.17 Floodplain

Based on a review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps for Broadwater County, a delineated 100-year floodplain (Zone A) is located along the Missouri River throughout the corridor. The delineated floodplain is shown in Figure 3-1. Executive Order 11988, Floodplain Management, requires federal agencies to avoid direct or indirect support of floodplain development whenever an improvement option is developed. EO 11988 and 23 CFR 650 Part A requires an evaluation of improvement options to determine the extent of any encroachment into the base floodplain. The Broadwater County Floodplain Administrator is responsible for administering and enforcing the floodplain management requirements. As improvement options are developed, consideration will be given to minimize the fill footprint within the floodplain as much as practicable.

3.18 Hazardous Material

According to the DEQ, several hazardous material sites exist throughout the corridor. Figure 3-9 shows the location of hazardous material sites including underground storage tanks, remediation response, septic application, and an abandoned mine (reclaimed in 2009).

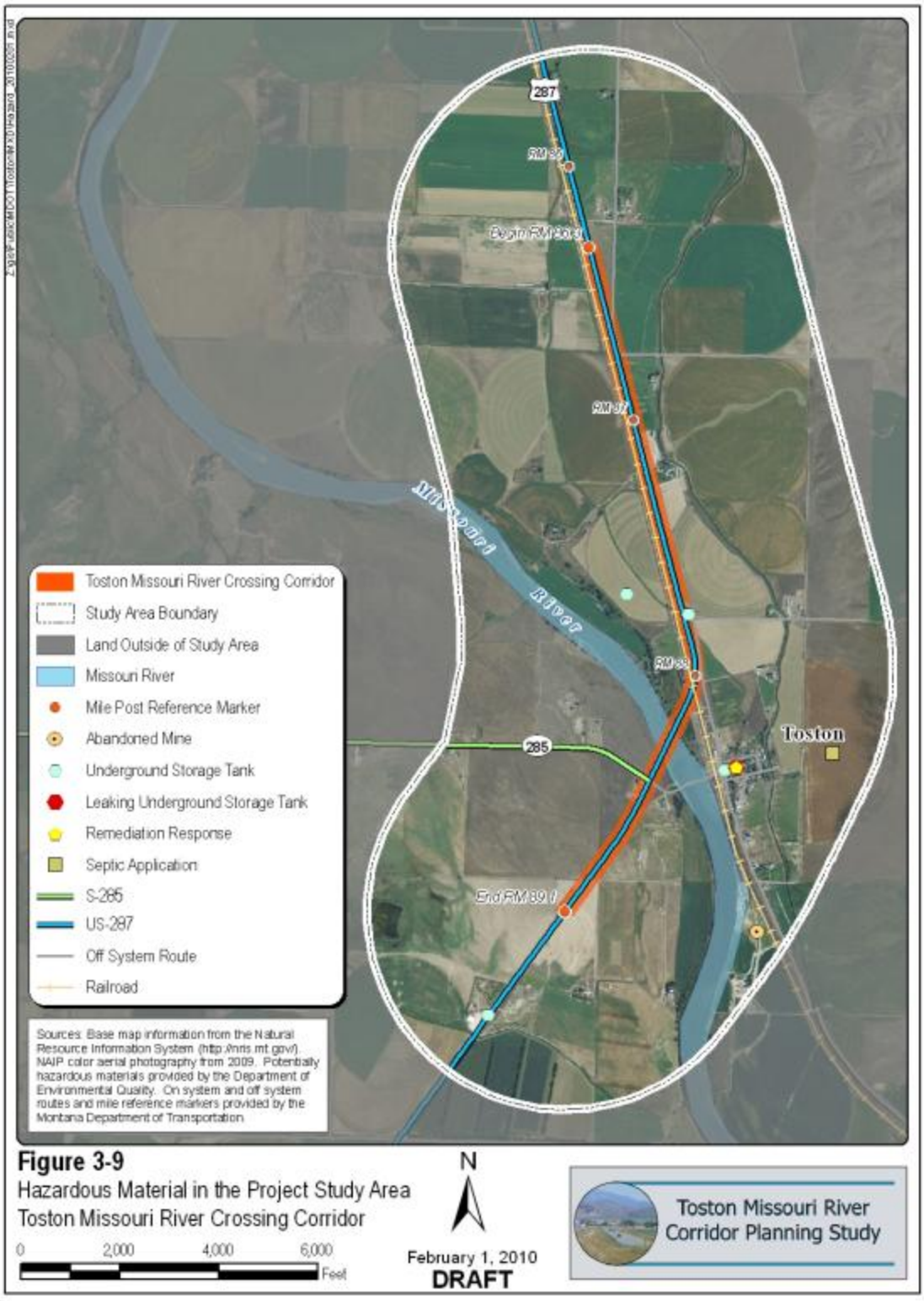


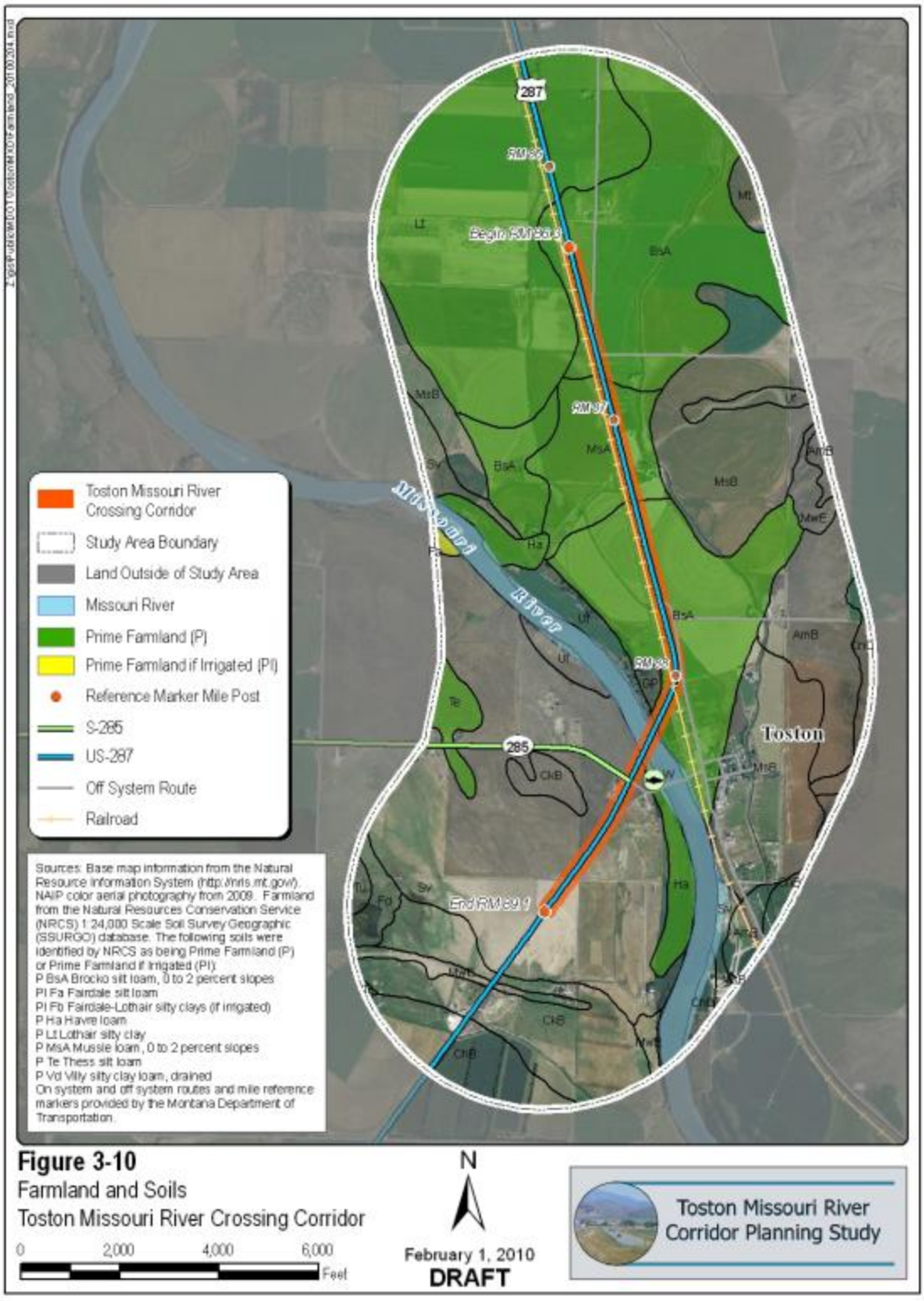
Figure 3-9
Hazardous Material in the Project Study Area
Toston Missouri River Crossing Corridor

3.19 Soils

The corridor is predominately agricultural and farm land. This is verified by the National Resources Conservation Service (NRCS) soil classification. The soil classification indicates the soil suitability for prime farmland. The area north of the Missouri River is largely prime farmland with a few sections south of the Missouri River as being prime farmland.

The Farmland Protection Policy Act of 1981 was established to minimize the impact federal actions have on any unnecessary and irreversible conversion of farmland to nonagricultural uses and the compatibility with policies to protect farmland. Figure 3-10 shows the designated and classified areas of farmland within the study area according to the U.S. Department of Agriculture, Natural Resource Conservation Service (NRCS). Farmlands are classified as prime or prime if irrigated based on soil classifications. The northern portion of the corridor is predominately prime farmland.

Due to the large capacity of prime farmland within the corridor, there is potential for farmlands to be impacted as improvement options further develop. The NRCS has established form AD-1006, Farmland Conversion Impact Rating which evaluates the potential impact on agricultural land if converted to non-farm use. If a project is forwarded from this study the assessment form would be required in the environmental review process.


287
RM 39
Begin RM 39.1
RM 37
RM 33
End RM 29.1
265
Toston
Missouri River
Toston Missouri River Crossing Corridor
Study Area Boundary
Land Outside of Study Area
Missouri River
Prime Farmland (P)
Prime Farmland if Irrigated (PI)
Reference Marker Mile Post
S-265
US-287
Off System Route
Railroad
Sources: Base map information from the Natural Resource Information System (http://nris.mt.gov/). NAIP color aerial photography from 2009. Farmland from the Natural Resources Conservation Service (NRCS) 1:24,000 Scale Soil Survey Geographic (SSURGO) database. The following soils were identified by NRCS as being Prime Farmland (P) or Prime Farmland if Irrigated (PI):
P BsA Brocko silt loam, 0 to 2 percent slopes
PI Fa Fairdale silt loam
PI Fb Fairdale-Lothair silty clays (if irrigated)
P Ha Havre loam
P Lt Lothair silty clay
P MsA Mussle loam, 0 to 2 percent slopes
P Te Thess silt loam
P Vd Villy silty clay loam, drained
On system and off system routes and mile reference markers provided by the Montana Department of Transportation.
Figure 3-10
Farmland and Soils
Toston Missouri River Crossing Corridor
0 2,000 4,000 6,000 Feet
N
February 1, 2010
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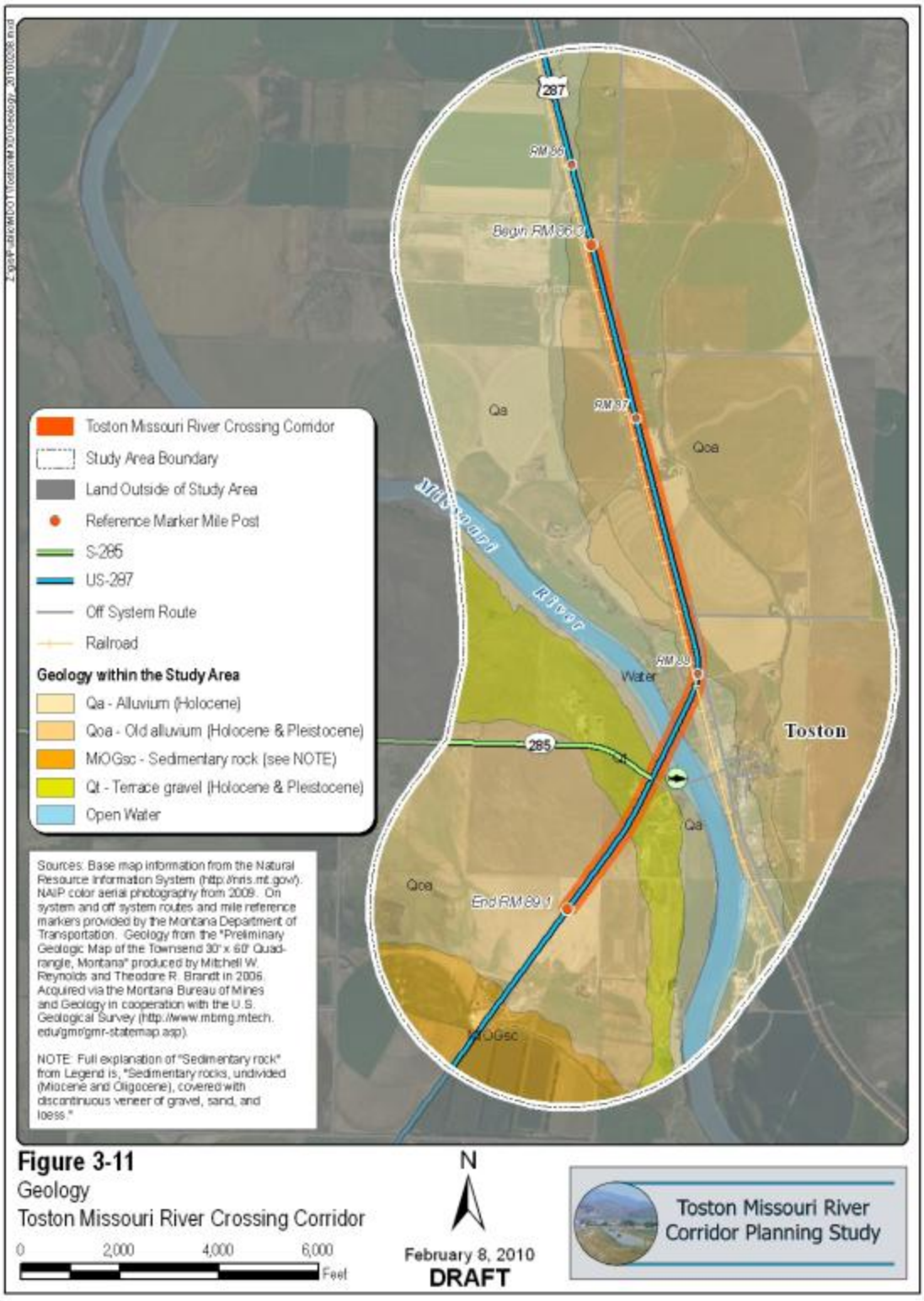
3.20 Geology

The Montana Bureau of Mines and Geology, in cooperation with the U.S. Geological Survey, has provided geological and soil information for the corridor study area. Figure 3-11 shows the geology classification. The primary presence of alluvium contributes to the predominant use of farmland.


287
RM 86
Begin RM 86.1
RM 87
Qa
Qoa
Missouri River
RM 89
Water
Toston
285
Qa
Qoa
End RM 89.1
MiOGsc
Toston Missouri River Crossing Corridor
Study Area Boundary
Land Outside of Study Area
Reference Marker Mile Post
S-285
US-287
Off System Route
Railroad
Geology within the Study Area
Qa - Alluvium (Holocene)
Qoa - Old alluvium (Holocene & Pleistocene)
MiOGsc - Sedimentary rock (see NOTE)
Qt - Terrace gravel (Holocene & Pleistocene)
Open Water
Sources: Base map information from the Natural Resource Information System (http://nris.mt.gov/). NAIP color aerial photography from 2009. On system and off system routes and mile reference markers provided by the Montana Department of Transportation. Geology from the "Preliminary Geologic Map of the Townsend 30' x 60' Quadrangle, Montana" produced by Mitchell W. Reynolds and Theodore R. Brandt in 2006. Acquired via the Montana Bureau of Mines and Geology in cooperation with the U.S. Geological Survey (http://www.mbmg.mtech.edu/gmr/gmr-statemap.asp).
NOTE: Full explanation of "Sedimentary rock" from Legend is, "Sedimentary rocks, undivided (Miocene and Oligocene), covered with discontinuous veneer of gravel, sand, and loess."
Figure 3-11
Geology
Toston Missouri River Crossing Corridor
0 2,000 4,000 6,000 Feet
N
February 8, 2010
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Toston Missouri River Corridor Planning Study

3.21 Noxious Weeds

Noxious weeds degrade native vegetative communities, choke streams, compete with native plants, create fire hazards, degrade agricultural and recreational lands, and pose threats to the viability of livestock, humans and wildlife. Areas with a history of disturbance, like highway rights-of-way, are at particular risk of weed encroachment. There are noxious weed species within the right-of-way along US 287 between RP 80 and RP 90.

Table 3.12 Noxious Weed Species

Common Name	Scientific Name
Canada Thistle	Cirsium arvense
Whitetop	Cardaria draba
Leafy Spurge	Euphorbia esula
Dalmation Toadflax	Linaria dalmatica

If improvement options are forwarded into project development the improvement options must adhere to all relevant federal, state, and local noxious weed laws and policies. Coordination with the Broadwater County Weed Supervisor should commence during project development and at the time of construction to establish specific guidance for noxious weed control relative to this project.

4.0 References

Department of Environmental Quality, Clean Water Act Information Center – website

Biological Resources Report – CN 1420 Townsend-South

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Montana State Historic Preservation Office. File Search via Damon Murdo, January 28, 2010

Montana Natural Heritage Program, Natural Heritage Tracker (Broadwater county). Website.

Foresman, K.R. 2001. The Wild Mammals of Montana. Special Publication 12, The American Society of Mammalogists. Lawrence, Kansas: Allen Press

Montana Department of Transportation – Maintenance Animal Incident Reporting Database, 1998-2009

Montana Fish, Wildlife & Parks – Wildlife Management Areas GIS layers
Montana Natural Heritage Program, Natural Heritage Tracker (Elemental Occurrences database). Website.

Montana Fish, Wildlife & Parks – Montana Fisheries Information System (MFISH) Data (River Miles 2280-2290). Website.

Natural Resource Inventory System, National Wetland Inventory mapping. Website.

Natural Resource Inventory System, SSURGO soil mapping units. Website.

Natural Resources Conservation Service, web soil survey – website

U.S. Environmental Protection Agency, Air Data. Website.

National Resources Conservation Service, Farmland Protection Policy Act. Website.

Water Resources Survey Book for Broadwater County, pg. 52.

University of Montana, Invaders Database System – website

MDT and Broadwater County – weed mapping project

U.S. Census Bureau, Broadwater County, Montana. Website.

Montana Department of Transportation, Road Design Manual, December 2004.

Montana Department of Transportation, Bridge Design Standards

Montana Structures Manual

BNSF Railway – Union Pacific Railroad Guidelines for Railroad Grade Separation Projects, Jan. 2007.

Appendix A
Photos of Corridor

Looking north at US 287 (left) and Flynn Lane (right).

Looking west at US 287, Montana Rail Link, and adjacent lands from Flynn Lane.

Looking north at Flynn Lane and adjacent lands.

Looking south at Flynn Lane (left) and US 287 (right).

Looking northeast at Missouri River.

Looking northeast at MRL Bridge and Missouri River Bridge.

Looking northeast at Missouri River Bridge.

Looking northeast at Historic Toston Bridge.

Looking north at US 287 and adjacent lands.

Looking east at railway, MRL Bridge, and adjacent lands.

Looking northwest at MRL and adjacent lands.

Looking southeast at MRL Bridge and access road.

Looking south at US 287.

Looking northeast at US 287 and adjacent lands.

Looking southeast at MRL Bridge crossing.

Looking north at US 287 and adjacent lands.

Looking southeast at MRL crossing and town of Toston.

Looking south at US 287 bridge crossings.

Toston Missouri River Crossing Corridor Planning Study

Corridor Needs and Objectives

Prepared For:

Montana Department of Transportation

Prepared By:

Camp Dresser & McKee Inc.

Helena, Montana

May 25, 2010

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1.0 Corridor Needs and Objectives

Based on analysis of existing data and plans, public comments received, and Resource Agency and stakeholder coordination, needs and objectives within the US 287 corridor have been identified. Corridor needs and objectives will be given consideration in developing improvement options, along with developing the purpose for the corridor. An important need for the corridor is to improve safety and operational characteristics by bringing the facility up to current design standards, while mitigating environmental impacts and maintaining adjacent land access for the rural community within the corridor. The following items are needs and objectives identified for the corridor.

1.1 Needs

Need No. 1

Improve safety by reducing traffic conflicts and addressing crash trends within the US 287 corridor study area.

Objectives

- Upgrade the sub-standard horizontal and vertical alignments to meet current MDT design standards to the extent practicable.
- Provide adequate clear zones by upgrading shoulder widths and cut and fill slopes to meet current MDT design standards to the extent practicable.
- Improve vehicle turning movements at public access points and private approaches by providing appropriate features commensurate with the types and volumes of traffic encountered at specific access locations to the extent practicable.

Need No. 2

Improve operation and functionality of the roadway.

Objectives

- Improve the surfacing width for consistency with other segments of US 287 and to meet current MDT design standards to the extent practicable.
- Provide a roadway that accommodates existing and future capacity demands to the extent practicable.
- Provide modifications to the roadway horizontal alignment and vertical profile to meet current MDT design standards to the extent practicable.

- Meet design and construction criteria relative to horizontal and vertical clearances from railroad service and track infrastructure.
- Consider non-motorized needs within the corridor.

Other Objectives

- Minimize the environmental resource impacts of improvement options.
- Recognize and accommodate the diverse nature of corridor "thru" traffic such as recreational vehicles, passenger cars and semi-truck/trailers.
- Provide reasonable access to the town of Toston, Secondary Route 285, and other public and private approaches.
- Maintain traffic and access within the corridor to the extent practicable during construction.
- Accommodate agricultural and other unique vehicle movements during construction.

Toston Missouri River Crossing Corridor Planning Study

Suitability Analysis

Prepared For:

Montana Department of Transportation

Prepared By:

Camp Dresser & McKee Inc.

Helena, Montana

July 8, 2010

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7.0 Suitability Analysis

Figures

Tables

7.0 Suitability Analysis

The process utilized to determine potential alignments for the US 287 corridor consisted of two specific steps. The first step – completion of a "suitability analysis" using the ArcGIS Spatial Analyst Extension – is described herein. The second step is described later in this corridor report and includes the utilization of the Microstation/GeoPak software platform to develop specific alignment options in accordance with FHWA and MDT design criteria.

The purpose of the suitability analysis is to create a broad view assessment of areas within the corridor study area boundary that may be most suitable for potential roadway re-alignment associated with the US 287 corridor. Previous work completed for the corridor study consisted of the identification of several resources and "areas of concern". These most notably included the resources identified in Table 7-1 and as documented in the *Environmental Scan* and the *Existing and Projected Conditions Report* previously prepared for the Study. Note that of the physical characteristics and environmental resources noted below, not all lend themselves for inclusion in the suitability analysis using ArcGIS Spatial Analyst Extension. Those resources that have been incorporated into the suitability analysis in some fashion are highlighted in light green in Table 7-1.

Table 7-1
Physical Characteristics & Environmental Resources Considered in Suitability Analysis

Physical Characteristics	Environmental Resources
Existing Roadway Users	Demographics
Existing Traffic Volumes	Development
Right-of-Way and Jurisdictions	Land Ownership
Physical Characteristics	Surface Waters
Design Standards	Irrigation
Roadway Deficiencies	Recreation
Pavement Width	Cultural Resources & Tribes
Geotechnical	General Vegetation
Drainage	Wildlife
Hydraulic Structures	Sensitive Species
Missouri River Bridge	Aquatic Resources
Montana Rail Link Bridge	Wetlands

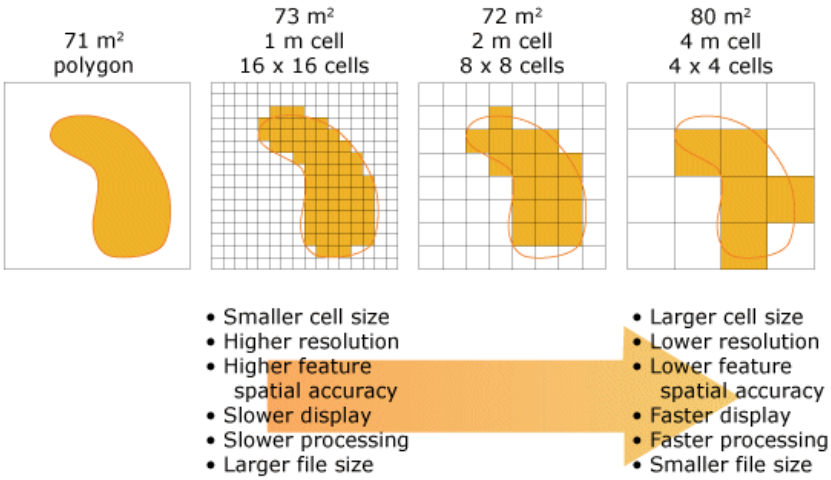
Crash Analysis	Air Quality
Railroad	Historic Properties
Utilities	Noise
Access Points	Land Use
	Section 4(f) and 6(f)
	Agricultural Properties
	Floodplain
	Hazardous Material
	Geology and Soils
	Noxious Weeds

The ArcGIS Spatial Analyst Extension was used as a tool to portray suitable areas for a potentially relocated US Highway 287 corridor. The Spatial Analyst Extension relies on source data sets previously defined through the corridor study development in a GIS platform. Since all of the data sets are not of the same type and function, they inherently have different value scales. To make the suitability analysis meaningful and to a unified scale for executing the model, a weighted overlay process is utilized. In this process, scale values are created to define the "class of suitability", with a 1 being most suitable and 10 being least suitable. For areas that must be avoided (i.e. total avoid), the class of suitability is defined as "RESTRICTED" and given a rating of zero (0). In addition to assigning the class of suitability for the individual data sets, it is also necessary to assign the percent importance to the overall data set in relation to other data sets.

The suitability analysis relied on the ratings and percent influence developed by the Planning Team and defined later in this section. A weighted overlay graphic was prepared that took into account all the inputs made into the model. From the weighted overlay graphic, a "hill shade" graphic was produced to portray model results by using "relief" and "shades" in an effort to identify potential areas that are more suitable for corridor locations than other. The "hill shade" graphic is contained in Figure 7-1 (aerial background) and Figure 7-2 (no aerial background).

The hill shade graphic allows a visual analysis to determine areas that are more suitable than others for potential roadway corridor relocation. In the graphic, flat areas are most suitable, while elevated/shaded areas are least suitable. The results of this exercise allow for identification of areas for further detailed analysis of potential roadway corridor locations using the Microstation/GeoPak software platforms.

An important concept to be noted pertinent to the suitability analysis is the concept of raster resolution. The choice of resolution is important because the level of detail for the various features, represented by a raster, is often dependent on the cell size of the raster. The cell must be small enough to capture the required detail, but large enough so computer storage and analysis can be performed efficiently. More features, smaller features, or a greater detail in the extents of features can be represented by a raster with a smaller cell size. However, more is not often better. Smaller cell sizes result in larger raster datasets to represent an entire surface; therefore, there is a need for greater storage space, which often results in longer processing time. This discussion is related to the Toston suitability analysis in that the cell size selected for the various raster sets was based on an 8 x 8 cell size which results in a larger cell size, lower resolution, faster display, and faster processing, as depicted in the schematic below.



The above following data sets were utilized in the Spatial Analyst Extension model execution:

7.1 NRHP Registered Property

The Old Toston Bridge is registered on the National Register of Historic Places (NRHP) as NRHP site number 24BW814. It was previously determined by the Planning Team that this bridge is a total avoid feature within the corridor. Accordingly, it was given a value of "RESTRICTED" which means it is off limits in the ArcGIS Spatial Analyst modeling routine. As a total avoid area, it was not assigned a percent influence so as not to overweight the suitability analysis.

Table 7-2
NRHP Registered Property

Raster	% Influence	Scale Values
NRHP Registered Property	0 percent	
Old Toston Bridge		*RESTRICTED (0)*

7.2 Previously Mitigated Wetlands

A wetland exists in the southwestern portion of the corridor study area that has previously been identified as a mitigation site. It was determined by the Planning Team that this wetland mitigation site is a total avoid feature within the corridor. It was given a value of "RESTRICTED" which means it is off limits in the ArcGIS Spatial Analyst modeling routine. As a total avoid area, it was not assigned a percent influence so as not to overweight the suitability analysis.

Table 7-3
Previously Mitigated Wetlands

Raster	% Influence	Scale Values
Previously Mitigated Wetlands	0 percent	
Previously Mitigated Wetlands		*RESTRICTED (0)*

7.3 Section 4(f) Property

The Toston Fishing Access Site has previously been identified as a section 4(f) property. It was determined by the Planning Team that this section 4(f) recreational site is a total avoid feature within the corridor. It was given a value of "RESTRICTED" which means it is off limits in the ArcGIS Spatial Analyst modeling routine. As a total avoid area, it was not assigned a percent influence so as not to overweight the suitability analysis.

Table 7-4
Section 4(f) Property

Raster	% Influence	Scale Values
Section 4(f) Property	0 percent	
Fishing Access Site		*RESTRICTED (0)*

7.4 Old Toston Town Site

The Old Toston Town Site was previously identified through the publically available databases, and generally includes all areas commonly known as Toston. It was determined by the Planning Team that the majority of the Old Toston Town Site located east of the Missouri River is a total avoid feature within the corridor. It was given a value of "RESTRICTED" which means it is off limits in the ArcGIS Spatial Analyst modeling routine. As a total avoid area, it was not assigned a percent influence so as not to overweight the suitability analysis.

Table 7-5
Old Toston Town Site

Raster	% Influence	Scale Values
Old Toston Town Site	0 percent	
Old Toston Town Site		*RESTRICTED (0)*

7.5 Farmland

Three categories of farmland have previously been identified and shown on corridor study graphics. These categories are *Prime Farmland*, *Prime Farmland if Irrigated*, and *Not Prime Farmland*. A scaled value of 1 is given to the *Not Prime Farmland* category, a scaled value of 6 for the *Prime Farmland if Irrigated* category, and a scaled value of 8 for the *Prime Farmland* category. The percent influence of farmland is relatively minor, since any potential improvement options will likely impact at least one of the three categories. Because of this, it is given a percent influence value of 5 percent.

Table 7-6
Farmland

Raster	% Influence	Scale Values
Farmland	5 percent	
Not Prime Farmland		*1*
Prime Farmland if Irrigated		*6*
Prime Farmland		*8*

7.6 Wildlife – Osprey Nest

An existing Osprey Nest was previously identified on the Toston Fishing Access Site property. For purposes of the Spatial Analyst model, a graduated scaled value has been assigned based on the distances radiating outward from the existing Osprey Nest. A scaled value of 9 is given to areas within 660 feet (1/8 mile) of the Osprey Nest which indicates a least suitable area, and a scaled value of 1 is given to areas greater than 3,961 (3/4 mile) from the Osprey Nest, indicating greatest suitability. In the weighted overlay analysis the Osprey Nest is given a percent influence value of 5 percent.

Table 7-7
Wildlife – Osprey Nest

Raster	% Influence	Scale Values
Osprey Nest	5 percent	
0-660 feet (1/8 mile)		*9*
661-1,320 feet (1/4 mile)		*7*
1,321-2,640 feet (1/2 mile)		*5*
2,640-3,960 feet (3/4 mile)		*3*
Greater Than 3,961 feet		*1*

7.7 Potential Wetlands

Potential wetland areas were previously identified within the corridor study area based on a review of aerial photographs. For purposes of the Spatial Analyst model, a graduated scaled value has been assigned based on the distances radiating outward from the potential wetland areas. A scaled value of 10 is given to areas encroaching on the wetland, a scaled value of 6 within 0 to 100 feet of the wetland, and a scaled value of 1 for areas greater than 100 feet. In the weighted overlay analysis the proximity to Potential Wetlands is given a percent influence value of 12 percent.

Table 7-8
Potential Wetlands

Raster	% Influence	Scale Values
Potential Wetlands	12 percent	
Within the Wetland		*10*
Within 0 and 100 feet		*6*
Greater than 100 feet		*1*

7.8 Wildlife – Bobolink

An existing Bobolink occurrence was previously identified in the southwestern portion of the corridor study area. The radius of the potential Bobolink habitat occurrence is approximately 1,250 feet. For purposes of the Spatial Analyst model, a scaled value has been assigned based on being within the habitat (least desirable) or outside the habitat (most desirable). In the weighted overlay analysis the Bobolink habitat area is given a percent influence value of 6 percent.

Table 7-9
Wildlife - Bobolink

Raster	% Influence	Scale Values
Bobolink	6 percent	
0-1,250 feet		*10*
Greater than 1,250 feet		*1*

7.9 Wildlife – Bald Eagle

Two (2) existing Bald Eagle nesting sites were previously identified within the corridor study area. For purposes of the Spatial Analyst model, a scaled value of 9 is given to areas within 660 feet (1/8 mile) of the Bald Eagle nesting site, which indicates a least suitable area, and a scaled value of 1 is given to areas greater than 3,961 (3/4 mile) from the Bald Eagle nesting site, indicating greatest suitability. In the weighted overlay analysis the Bald Eagle habitat area is given a percent influence value of 10 percent.

Table 7-10
Wildlife – Bald Eagle

Raster	% Influence	Scale Values
Bald Eagle	10 percent	
0-660 feet (1/8 mile)		*9*
661-1,320 feet (1/4 mile)		*7*
1,321-2,640 feet (1/2 mile)		*5*
2,640-3,960 feet (3/4 mile)		*3*
Greater Than 3,961 feet		*1*

7.10 NRHP Eligible Property

Some features within the corridor are not registered with the NRHP, however they are eligible for registration. For purposes of the Spatial Analyst model, ratings were assigned for suitability based on NRHP eligibility. All NRHP eligible properties were given a rating of 6, with the exception of the Old Northern Pacific Railroad, which was rated an 8. This latter rating indicates that potential impacts to the Old Northern Pacific Railroad carry greater weight in the model than the other eligible properties. In the weighted overlay analysis the NRHP Eligible Property is given a percent influence value of 5 percent.

Table 7-11
NRHP Eligible Property

Raster	% Influence	Scale Values
NRHP Eligible Property	5 percent	
Broadwater – Missouri Canals		*6*
Old Northern Pacific Railroad		*8*
Big Springs Ditch		*6*
Radarsburg Historic Mining District		*6*
Non NRHP Eligible Property		*1*

7.11 Montana Rail Link (MRL) Track

The MRL infrastructure is a historic feature that parallels much of the existing roadway. For purposes of the Spatial Analyst model, a scaled value of 10 is given to areas less than 165 feet from a potential road corridor centerline. A scaled value of 1 is given to areas greater than 165 feet from a potential road centerline, indicating greatest suitability. The 165 feet threshold was chosen for these purposes due to the minimum railroad right-of-way from the centerline of the tracks equating to 75 feet, plus the minimum roadway right of way of 180 feet divided by 2 equal to 90 feet. In the weighted overlay analysis the proximity to MRL track is given a percent influence value of 15 percent.

Table 7-12
Montana Rail Link (MRL) Track

Raster	% Influence	Scale Values
MRL Track	15 percent	
More than 165'		*1*
Less than 165'		*10*

7.12 Land Use within the Study Area

Existing land uses were obtained from the State of Montana based on taxable property status. For purposes of the Spatial Analyst model, ratings were assigned for suitability based on the classified land use. A rating of 1 indicates the most suitable type of land use for potential corridor development. For example, vacant land would have the greatest suitability. A rating of 10 indicates the least suitable area and correlates to residential properties with dwellings on the parcel. In the weighted overlay analysis the scaled values relative to land uses within the corridor is given a percent influence value of 17 percent, reflective of the overall importance of land use and existing buildings within individual properties. Of particular note is that parcels classified as "exempt" were reviewed individually and assigned to other, more appropriate land use categories for this analysis. In addition, properties classified as "farmstead rural" were individually reviewed. In cases where buildings and homes were found on these parcels, they were "clipped" out and placed into the residential rural category.

Table 7-13
Land Use within the Study Area

Raster	% Influence	Scale Values
Land Use Within the Study Area	17 percent	
Commercial Urban		*10*
Residential Urban		*10*
Vacant Land Urban		*1*
Industrial Rural		*8*
Commercial Rural (Bunkhouse Bar)		*10*
Agricultural Rural		*5*
Farmstead Rural		*5*
Residential Rural		*10*
Vacant Land Rural		*1*

7.13 Hazardous Material Sites

Several types of hazardous features are found within the corridor study area. Some features carry more responsibility relative to clean up if impacted during project development and/or construction. For example, impacting and mitigating an abandoned mine with roadway construction may be more involved than mitigating an underground storage tank. For purposes of the Spatial Analyst model,

ratings were assigned for suitability based on potential impacts to hazardous features. In the weighted overlay analysis the Hazardous Material Sites are given a percent influence value of 5 percent.

Table 7-14
Hazardous Material Sites

Raster	% Influence	Scale Values
Hazardous Material Sites	5 percent	
Abandoned Mines		*9*
Underground Storage Tank		*5*
Leaking Underground Storage Tank		*7*
Remediation Response		*10*
Septic Application		*9*

7.14 Perpendicular Crossing Distance of Missouri River (Bank to Bank Width)

This feature was utilized to capture the potential crossing distances of a new route across the Missouri River by focusing on the perpendicular width at various locations along the river within the study area boundary. The minimum perpendicular crossing distance measured was 300 feet, which is considered good, and the widest perpendicular crossing distance of the river measured was found to be 500 feet. In the weighted overlay analysis the perpendicular crossing distance measurements are given a percent influence value of 20 percent.

Table 7-15
Perpendicular Crossing Distance of Missouri River

Raster	% Influence	Scale Values
Perpendicular Crossing Distance of Missouri River (Bank to Bank Width)	20 percent	
Less than or equal to 300 feet		*1*
Between 300 feet and 500 feet		*6*
Greater than 500 feet		*10*

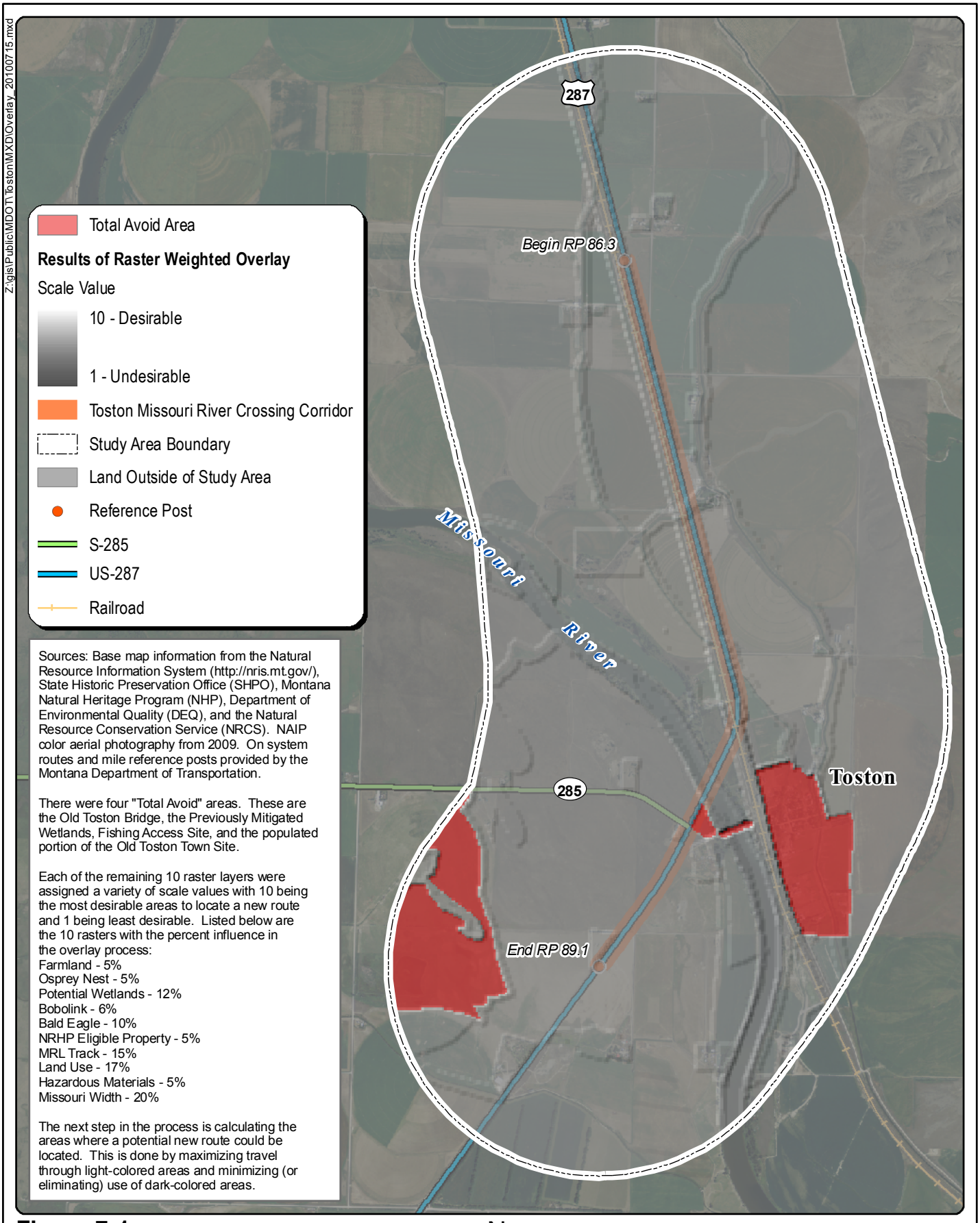


Figure 7-1
Weighted Overlay in the Project Study Area
Toston Missouri River Crossing Corridor

Toston Missouri River Corridor Planning Study

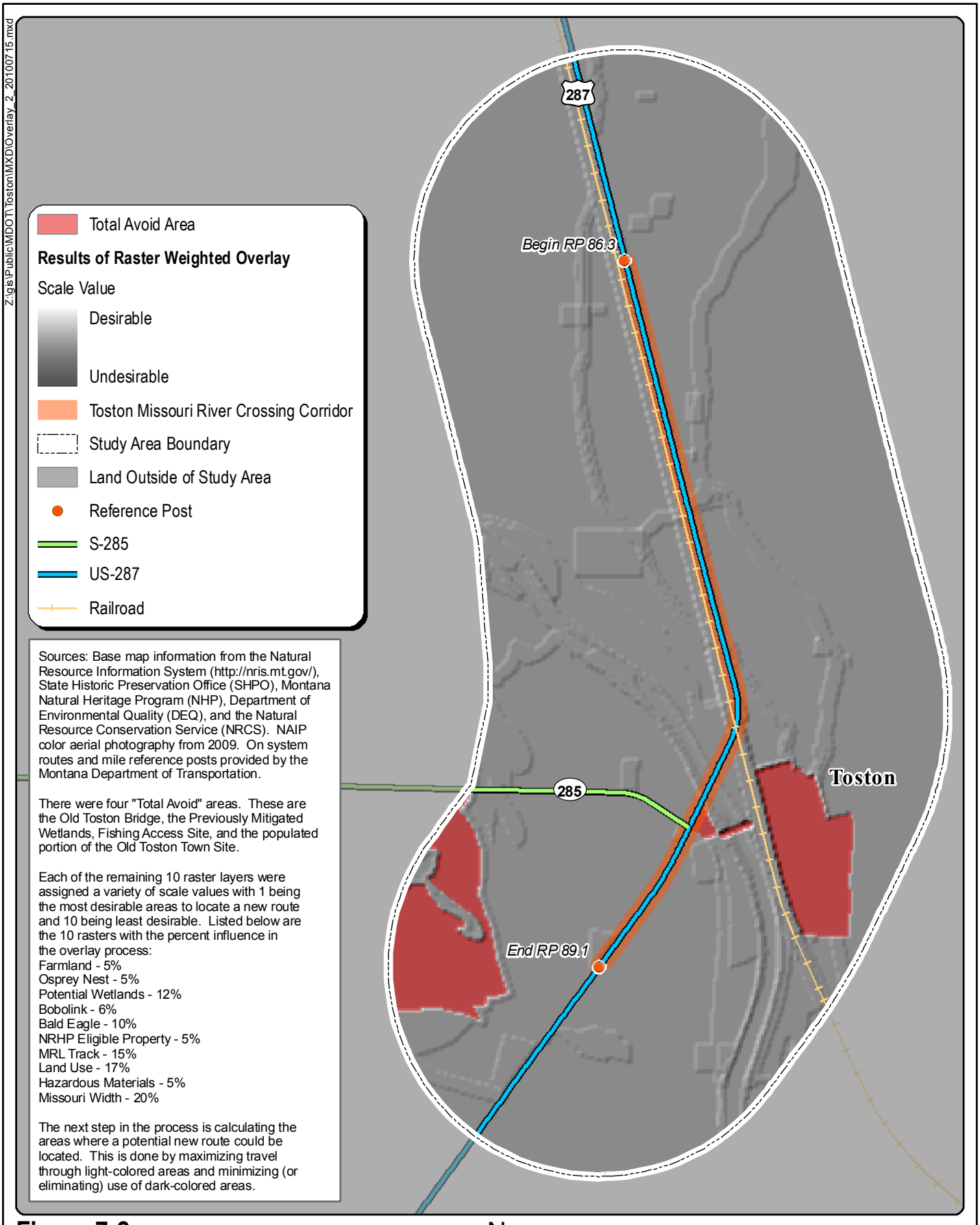


Figure 7-2
Weighted Overlay (without aerial photo)
Toston Missouri River Crossing Corridor

Toston Missouri River Crossing Corridor Planning Study

Screening Process

Prepared For:

Montana Department of Transportation

Prepared By:

Camp Dresser & McKee Inc.

Helena, Montana

December 23, 2010

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6.3 Improvement Option Screening Process

Tables

6.3 Improvement Option Screening Process

Screening criteria were developed to assist in the evaluation of the ten (10) potential alignments of US 287 between RP 86.3 and RP 89.1. Screening criteria provide a means of reducing the range of potential alignments for consideration by comparing them both quantitatively and qualitatively with a set of specific measures. The screening process consisted of two screening steps: the "first level" screening was a high level screen that was utilized to identify improvement options that could be dropped from consideration. The "second level" screening criteria was more detailed and resulted in the selection of two general corridor "areas" to move forward as a project is developed.

The criteria outlined below is the "first level" screening that was utilized to determine if an improvement option(s) was practicable, feasible and should be carried forward for consideration in the second level of screening. The screening system described in section 6.3 illustrates how each improvement options' ability to meet the screening criteria was scored.

6.3.1 First Level Screening Criteria

The screening criteria were developed based on input by the planning team. The first level of screening evaluates 10 alignment options against three (3) broad criteria. Each option is evaluated by the following:

1. Planning level cost estimate (construction cost only)
2. Potential impacts via suitability analysis (weighted overlay results)
3. Public preference

The options were then compared to one another to identify which options were most practicable to be carried forward to the second level of screening.

Table 6.1 Initial Screening Criteria Rating Factors

○	◐	●
Low Cost Low Impact High Public Preference	Medium Cost Medium Impact Medium Public Preference	High Cost High Impact Low Public Preference

6.3.1.1 Planning Level Cost Estimate (Construction Cost Only)

High level planning cost estimates were prepared for each of the ten potential alignments that were considered. The planning level cost estimates were for construction costs only (i.e. did not include right-of-way costs, project development costs, inflation, etc.). To develop the planning level cost estimates, a "per mile" roadway cost of $2.5 million dollars was utilized. In addition, new bridge construction costs were varied and ranged from $150 per square foot of bridge (for simple perpendicular crossings) to $300 per square foot of bridge (for complex, highly skewed crossings). The results of the planning level cost estimates are shown in Table 6.2. The rating factors were measured against costs according to the following thresholds, which were developed based on the low and high cost of the ten alignments, with ranges calculated for the three possible ratings:

Range of Planning Level Costs	Rating Factor
Less than $16,000,000	○
Between $16,000,000 and $19,000,000	◐
Greater than $19,000,000	●

Table 6.2 Planning Level Cost Estimates (Construction Cost Only)

Alignment ID	Total Planning Level Cost	Rating
Alignment A	$25,000,000	●
Alignment B	$29,900,000	●
Alignment C	$19,700,000	●
Alignment D	$18,500,000	◐
Alignment E	$18,700,000	◐
Alignment F	$18,500,000	◐
Alignment G	$18,600,000	◐
Alignment H	$18,700,000	◐
Alignment I	$15,200,000	○
Alignment J	$15,600,000	○

6.3.1.2 Potential Impacts via Suitability Analysis (Weighted Overlay Results)

The suitability analysis that was previously described in Chapter 5 was utilized to quantify potential resource impacts for each of the alignments. The suitability analysis noted resource areas within the corridor study area as documented in the Environmental Scan (Appendix B). The planning team assigned various resource areas point values and gave a "percent importance" to arrive at a composite rating system known as the "weighted overlay score". The results of the weighted overlay score were reviewed, and a suitability analysis score was developed based on the value assigned to each cell along an alignment. In this analysis, the total score along an alignment is the product of each individual cells value added cumulatively along the entire alignment length. For each individual cell, the value ranges from a value of 1 (low resource impact) to a value of 9 (high resource impact). To make this comparison relative to a common unit, the final suitability analysis score was divided by the total alignment length, in miles, to obtain a suitability analysis score per mile. Table 6.3 shows the results of this analysis, along with the assigned rating factor. Figure 5-3 located in Chapter 5 shows a graphic of each alignment color coded for impacts along each alignment. The rating factors were measured against this score according to the following thresholds, which were developed based on the low and high score (per mile) with ranges calculated for the three factors as noted:

Range of Suitability Analysis Scores	Rating Factor
Less than 435	○
Between 435 - 550	◐
Greater than 550	●

Table 6.3 Suitability Analysis Results – Weighted Overlay Score

Alignment ID	Approximate Length (miles)	Suitability Analysis Score	Suitability Analysis Score (per mile)	Rating
Alignment A	2.61	1283	491.57	◐
Alignment B	2.67	1602	600.00	●
Alignment C	2.73	1598	585.35	●
Alignment D	2.75	1664	605.09	●
Alignment E	2.82	1342	475.88	◐

Alignment F	2.76	1437	520.65	◐
Alignment G	2.78	1513	544.24	◐
Alignment H	2.81	1584	563.70	●
Alignment I	3.34	1265	378.74	○
Alignment J	3.51	1392	396.58	○

6.3.1.3 Public Preference

The final criteria considered in the first level screening process was whether the alignment had the support of the public. Public preference is an important screening criteria because if the public does not support an alternative early in the planning process there is a likelihood that the alignment will not be supported as a project moves forward. Public preference was solicited on general corridor areas via a corridor survey. The survey asked the public to check a box that delineated their preference for a west area, central area, or east area. The general areas are shown on Figure 6-2. Table 6.4 shows the results of this analysis. From a public preference perspective, the rating factors are measured against the corridor survey results and public comments received as follows:

Range of Public Preference	Rating Factor
High Public Preference	○
Medium Public Preference	◐
Low Public Preference	●

Table 6.4 Public Preference

Alignment ID	Rating
Alignment A	●
Alignment B	●
Alignment C	◐
Alignment D	◐
Alignment E	●
Alignment F	○
Alignment G	○
Alignment H	○
Alignment I	●
Alignment J	●

6.3.1.4 First Level Screening Results

The results of the first level screening are found in Table 6.5. The table uses the three initial screening criteria to arrive at a numerical value (higher numerical score the lower the rating) for each alignment such that potential options were reduced to a manageable number. The numerical values assigned to the rating factors are as listed below:

Numerical Value	Rating Factor
0.00	○
0.50	◐
1.00	●

Table 6.5 First Level Screening Criteria Results

	Alignment Designation (see Figure 7-5)									
	WEST		CENTRAL						EAST	
	A	B	C	D	E	F	G	H	I	J
Planning Level Cost Estimate	●	●	●	◐	◐	◐	◐	◐	○	○
Potential Impacts via Suitability Analysis (Weighted Overlay Analysis)	◐	●	●	●	◐	◐	◐	●	○	○
Public Preference	●	●	◐	◐	●	○	○	○	●	●
Total	2.50	3.00	2.50	2.00	2.00	1.00	1.00	1.5	1.00	1.00

Based on the results shown in Table 6.5, alignments F, G and H were carried forward for further consideration. Also, based on the rankings of alignments I and J, they also were carried forward as a combined, hybrid alignment referred to as alignment K (see Figure 6-3). Thus, four alignments were identified to be carried forward to the next level of screening. Alignments C, D and E, located within the central corridor, were screened out to due to their composite rankings in Table 6.5 and potential constructability issues during construction relative to maintaining traffic on the existing bridge and providing access to area residents and emergency response vehicles.

Alignment A and B in the western corridor area were not carried forward due to their poor rating during the first level of screening as shown in Table 6.5, their overall higher dollar cost to develop, the public opposition to the visual impacts of the westerly corridor, and the constructability issues associated with carrying the roadway over the railroad grades on a very high skew. The identification of constructability issues related to the development of the roadway over the rail infrastructure was deemed to be a major influence in the decision to drop these alignments.

6.3.2 Second Level Screening Criteria

The second level of screening built upon the first level and was more detailed and specific to the four (4) alignments identified for further consideration. This second level screening evaluated whether or not the alignments met the needs and objectives for the corridor that were identified in this study. Additionally, costs and impacts to resources and individual parcels were evaluated to arrive at the recommended corridor(s). The second level screening was measured against the following factors, with results and analyses presented in Table 6.6:

1. Does the alignment meet the corridor needs and objectives?
2. Environmental / Resource Impacts
3. Construction / ROW Costs (in 2010 dollars)
4. ROW Impacts
5. Constructability
6. Length of the alignment
7. Public preference

6.3.2.1 Does the Alignment Meet the Corridor Needs & Objectives?

Table 6.6 shows whether or not the alignments satisfied the needs and objectives previously defined for the corridor. In general terms, all four alignments satisfy the needs and objectives for the corridor of improving safety, improving operation and functionality, and other objectives. Alignment K differs somewhat from alignments F, G and H in that the alignment is longer in length than the other alignments (0.59 miles longer than the existing US 287 route from RP 86.3 to RP 89.1), also introduces horizontal curves that are necessary to route the roadway east of the Toston townsite, and has a shorter bridge. Note that all four (4) alignments show improvement over the existing alignment for US 287.

Table 6.6 Second Level Screening Criteria Factors

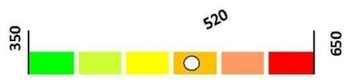
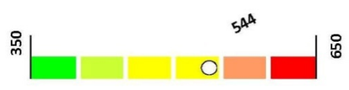
Screening Factors	Central Corridor Area			Eastern Corridor Area
	Alignment F	Alignment G	Alignment H	Alignment K
Does the alignment meet the corridor needs and objectives? (YES or NO)				
Improve safety by reducing traffic conflicts and potential crashes within the US 287 corridor study area	YES	YES	YES	YES
Improve operation and functionality of the roadway	YES	YES	YES	YES
Other				
Recognize and accommodate the diverse nature of corridor "thru" traffic such as recreational vehicles, farm equipment and semi-truck/trailers	YES	YES	YES	YES
Provide reasonable access to the town of Toston, Secondary Route 285, and other public and private approaches	YES	YES	YES	YES
Accommodate agricultural and other unique vehicle movements during construction	YES	YES	YES	YES
Environmental / Resource Impacts				
1. Suitability Analysis Results (per mile) *(NOTE: Lower value equates to lower overall environmental / resource impacts. Bar scale limits of 350 (Low) and 650 (High) based on previous analysis of ten alignments.)*	520 	544 	564 	390 
4(f) Impacts? *(NOTE: All alignments have some level of environmental resource impact, but impacts to 4(f) property differ among alignments.)*	YES (0.98 acres in the northwest corner of the 4(f) fishing access site property is impacted. The total acreage of the property is 4.24 acres.)	YES (1.94 acres in the western half of the 4(f) fishing access site property is impacted. The total acreage of the property is 4.24 acres.)	YES (1.98 acres in the western half of the 4(f) fishing access site property is impacted. The total acreage of the property is 4.24 acres.)	NO
Construction/ROW Cost (in 2010 dollars)				
1. Roadway *(Includes, road construction costs per mile, ROW costs per acre for irrigated farmland and rural pasture land.)*	$6.6 Million	$6.7 Million	$6.8 Million	$8.0 Million
2. Bridges *(Bridge construction costs for second level of screening based on $150/SF. Bridge costs based on two bridge width scenarios: 3 travel lanes resulting in 52 feet total width and 5 travel lanes resulting in 76 feet total width.)*	$11.2 Million (w/three-lane bridges) $16.3 Million (w/five-lane bridges)	$10.6 Million (w/three-lane bridges) $15.5 Million (w/five-lane bridges)	$10.1 Million (w/three-lane bridges) $14.7 Million (w/five-lane bridges)	$8.5 Million (w/three-lane bridges) $12.5 Million (w/five-lane bridges)

Table 6.6 Second Level Screening Criteria Factors

Screening Factors	Central Corridor Area			Eastern Corridor Area
	Alignment F	Alignment G	Alignment H	Alignment K
3. Total Cost	$17.8 Million (w/three-lane bridges) $22.9 Million (w/five-lane bridges)	$17.3 Million (w/three-lane bridges) $22.2 Million (w/five-lane bridges)	$16.9 Million (w/three-lane bridges) $21.5 Million (w/five-lane bridges)	$16.5 Million (w/three-lane bridges) $20.5 Million (w/five-lane bridges)
RANGE OF COSTS FOR PLANNING PURPOSE *(Range of costs for each alignment developed by adding a 20 percent contingency to calculated "total costs")*	$18 - $22 Million (w/three-lane bridges) $23 - $28 Million (w/five-lane bridges)	$17 - $21 Million (w/three-lane bridges) $22 - $27 Million (w/five-lane bridges)	$17 - $21 Million (w/three-lane bridges) $22 - $26 Million (w/five-lane bridges)	$16 - $20 Million (w/three-lane bridges) $21 - $25 Million (w/five-lane bridges)
Potential ROW Impacts				
1. Number of Privately Owned Parcels Impacted?	3	6	7	10
2. Number of Structures Impacted?	0	0	0	1 (Potential impact to outbuilding)
3. Irrigation Facilities Impacted?	Yes (Crosses irrigation ditch once and impacts a single irrigation pivot)	Yes (Crosses irrigation ditch once and impacts a single irrigation pivot)	Yes (Crosses irrigation ditch once and impacts a single irrigation pivot)	Yes (Crosses irrigation ditch three times and impacts a two irrigation pivots)
Big Springs Ditch *(NOTE: Length is affected length of irrigation crossing within the new right-of-way that will need to be piped or bridged – i.e. ROW to ROW along the canal centerline.)*	Crosses the Big Springs Ditch in one location (250 feet in length)	Crosses the Big Springs Ditch in one location (233 feet in length)	Crosses the Big Springs Ditch in one location (190 feet in length)	Crosses the Big Springs Ditch in one location, and the crossing would be underneath the proposed bridge crossing (164 feet in length)
Broadwater-Missouri Canal *(NOTE: Length is affected length of irrigation crossing within the new right-of-way that will need to be piped or bridged – i.e. ROW to ROW along the canal centerline.)*	No impact	No impact	No impact	Crosses the canal in two locations (245 feet and 193 feet in length)
Irrigation Pivots	Impacts the outer edge of an irrigation pivot. Modification to pivot possible	Impacts the outer edge of an irrigation pivot. Modification to pivot possible	Impact to irrigation pivot. Takes cropland out of production.	Impacts to irrigation pivot. Takes cropland out of production

Table 6.6 Second Level Screening Criteria Factors				
Screening Factors	**Central Corridor Area**			**Eastern Corridor Area**
	Alignment F	**Alignment G**	**Alignment H**	**Alignment K**
Constructability				
1. Bridges	Skewed crossing (Higher bridge construction costs and more complex construction requirements)	Skewed crossing (Higher bridge construction costs and more complex construction requirements)	Skewed crossing (Higher bridge construction costs and more complex construction requirements)	Perpendicular crossing
2. Roadway	No Issues identified	No issues identified	No issues identified	No issues identified
Does the length of the alignment result in additional maintenance needs compared to other options?				
1. Additional maintenance needs (~length) compared to other options	.01 miles	.03 miles	.06 miles	.59 miles
How well is the alignment accepted by the public? (HIGH, MODERATE, LOW)				
1. Public preference based on comments received	HIGH (All alignments in the central corridor were favorably received by the public)	HIGH (All alignments in the central corridor were favorably received by the public)	HIGH (All alignments in the central corridor were favorably received by the public)	LOW (Eastern corridor alignments were not well received by the public)
RECOMMENDATION				
	CARRY FORWARD *Positives:* ▪ Public preference ▪ Close to existing PTW ▪ Least impact to irrigated farmland ▪ Improves over existing conditions ▪ Least (23.1%) impact to 4(f) fishing access site of central options This should be moved to a negative, it may be the least impact but it is an impact. *Negatives:* ▪ Longest bridge length of four alignments ▪ Highest cost of four alignments under consideration ($18 - $22 Million / $23 - $28 Million)	**CARRY FORWARD** *Positives:* ▪ Public preference ▪ Close to existing PTW ▪ Least impact to irrigated farmland ▪ Improves over existing conditions *Negatives:* ▪ 45.7% impact to 4(f) fishing access site ▪ Cost slightly less than Alignment F ($17 - $21 Million / $22 - $27 Million)	**SCREEN OUT** *Positives:* ▪ Improves over existing conditions ▪ Gentler horizontal alignment with larger curves *Negatives:* ▪ Removes adjacent irrigated cropland from production ▪ 46.7% impact to 4(f) fishing access site ▪ Cost slightly less than Alignment F and G ($17 - $21 Million / $22 - $26 Million)	**CARRY FORWARD** *Positives:* ▪ Improves over existing conditions ▪ Lowest cost of all alignments ($16 - $20 Million / $21 - $25 Million) ▪ Lowest suitability analysis score ▪ Shortest bridge lengths of four alignments *Negatives:* ▪ Affects two irrigation pivots and associated cropland. ▪ Public opposition ▪ Lengthens route by 0.59 miles compared to existing

6.3.2.2 Environmental / Resource Impacts

The suitability analysis that was described earlier in Chapter 5 resulted in an "impact score per mile" that quantified each alignment's relative impact to environmental and other resources. This impact is quantifiable through the usage of the ArcGIS software platform. In addition to the suitability impact results that are shown in Table 6.6, three of the four alignments have a varying potential ROW impact to the 4(f) property in the study area and have been quantified in Table 6.6. Alignment K has no impact to the section 4(f) site.

6.3.2.3 Construction / ROW Cost (in 2010 dollars)

The costs presented in Table 6.6 are more refined than those developed for the first level screening. The costs reflect the planning level roadway costs (based on $2.5 million per mile) and a planning level bridge construction cost (based on $150 per square foot of bridge deck area) to arrive at the planning level cost estimates for each alignment. Note that for bridge costs, two different bridge width scenarios were calculated for costs: a 3-lane section (52 feet in bridge deck width) and a 5-lane section (76 feet in bridge deck width). The area between the Missouri River Bridge and the Montana Rail Link Bridge is assumed to be a roadway section approximately 800 feet in length.

A range of planning level costs, for both a 3-lane bridge and a 5-lane bridge, was calculated by taking the computed planning level construction costs and inflating the value by a 20 percent contingency factor.

6.3.2.4 ROW Impacts

Right-of-way impacts were evaluated based on the potential new ROW needed for each of the four alignments. The ROW impacts during design are based on the actual touch-down points of the roadway prism (i.e. the construction limits). For purposes of this study, ROW impacts are based on the ROW widths typically required for this type of roadway facility (80 feet each side of centerline). ROW impacts were broken down by the number of parcels impacted and approximate acreage, the number of structures impacted, and the number of irrigation facilities impacted. For irrigation facility impacts, the length of the irrigation ditch impact was computed based on the portion of affected ditch found within the right-of-way limits. In practice, the width of the roadway and the height of the fill over the crossing are needed to accurately calculate the length of ditch affected.

6.3.2.5 Constructability

An additional consideration in the second level screening was to determine whether there would be any constructability issues. Bridge crossings with alignments F, G and H are on skews to the river and railroad tracks which have an inherent amount of increased complexity when compared to the perpendicular bridge crossing associated with alignment K. With the skewed nature of the crossings over the MRL tracks and the criteria in place for pier placement, the length of this free span over the tracks will be approaching 160 feet, which is the maximum length of the economically preferred free span pre-stressed concrete beam. This points to potential constructability issues with alignments F, G and H relevant to the bridge crossings when compared to alignment K.

6.3.2.6 Length of Alignment

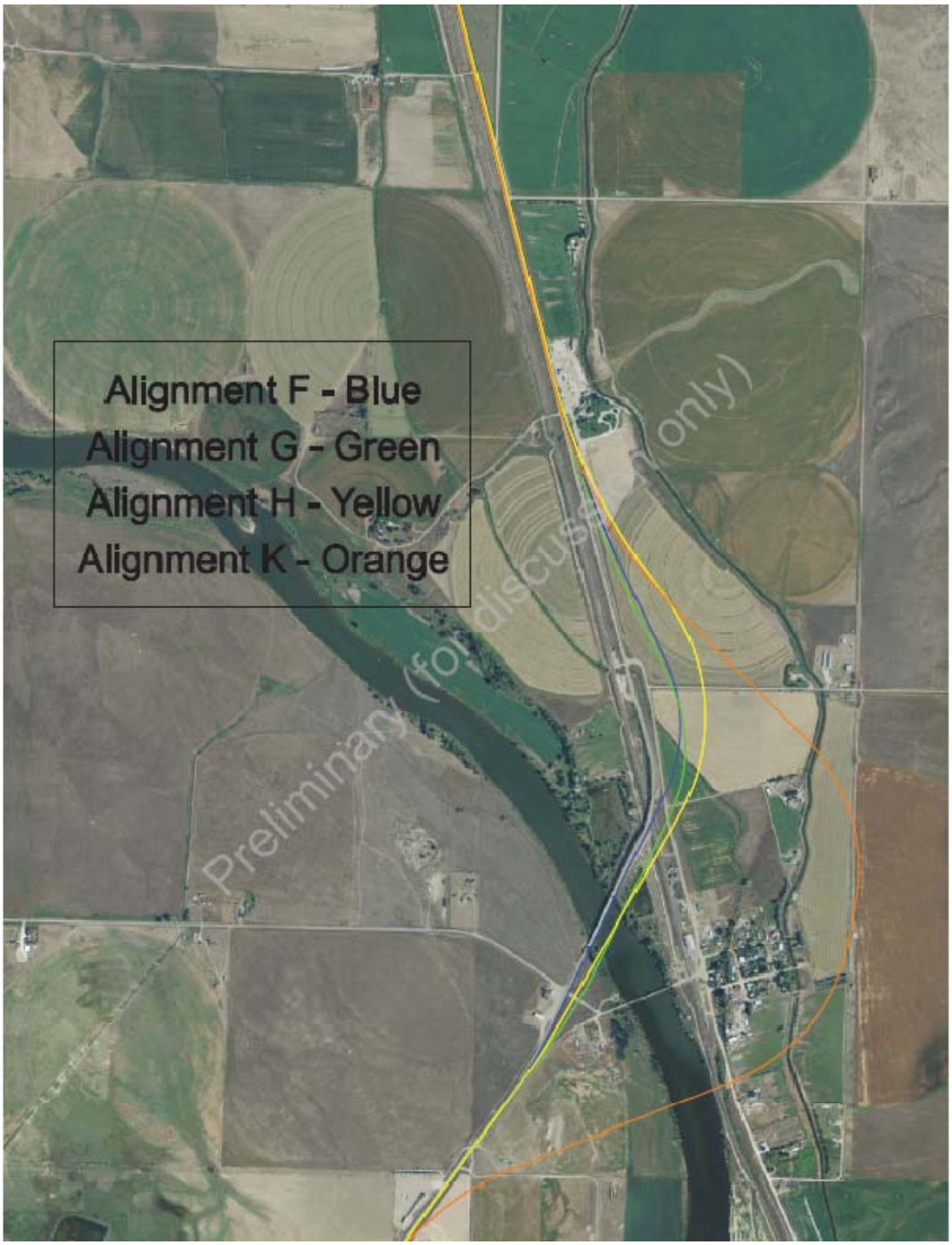
All alignment options include additional lane-miles of roadway that will result in additional long-term maintenance cost and responsibility. Alignment K results in added length to US 287 of 0.59 miles over the current roadway. This is viewed as a disadvantage from a maintenance / cost perspective, and also vehicle travel times (i.e. longer length equals longer travel time). Alignments F, G and H result in additional lengths of 0.01 miles, 0.03 miles, and 0.06 miles, respectively, compared to the current US 287 alignment.

6.3.2.7 Public Preference

Public preference was gauged through evaluation of the corridor survey distributed to all the landowners in the study area and available on the project website, and comments received. Alignments within the central corridor (i.e. alignments F, G and H) had a higher public preference, while alignments in the eastern corridor had a lower public preference. Over 50 corridor surveys were returned, and 98 percent of the survey respondents preferred development of a realigned US 287 corridor within the central corridor area.

6.3.3 Recommendation for Alignments to Carry Forward

After review and analysis of all the information, it is recommended to carry forward two alignment options for further consideration as a project moves forward. Alignments F and G make up the central alignment area and alignment K makes up the eastern alignment area for future consideration. The eastern area, although having low public preference, is the least environmentally damaging practicable alternative with no 4(f) impacts and thus will be considered further as a project moves forward from this study.


Alignment F - Blue
Alignment G - Green
Alignment H - Yellow
Alignment K - Orange
Preliminary (for discussion only)

Toston Missouri River Corridor Planning Study

Second Level Screening Matrix - PLANNING LEVEL COSTS (3-lane bridges)

December 20, 2010

Roadway Construction Costs

	Total Roadway Length (ft)	Missouri River Bridge Length (ft)	MRL Bridge Length (ft)	Actual Roadway Length (ft)	Actual Roadway Length (miles)	Cost Per Mile	Cost of Actual Roadway		Length
Alignment Option F	15422	1005	427	13989	2.65	$2,500,000.00	$6,623,526.99		2.92
Alignment Option G	15537	968	393	14176	2.68	$2,500,000.00	$6,712,051.14		2.94
Alignment Option H	15701	832	458	14411	2.73	$2,500,000.00	$6,823,181.34		2.97
Alignment Option K	17900	742	353	16805	3.18	$2,500,000.00	$7,957,074.81		3.39

Bridge Construction Costs

	Missouri River Bridge Length (ft)	MRL Bridge Length (ft)	Total Bridge Length (ft)	Total Bridge Area* (ft^2)	Cost per Ft^2	Cost of Bridge	
Alignment Option F	1005	427	1433	74497	$ 150	$ 11,174,537	
Alignment Option G	968	393	1361	70775	$ 150	$ 10,616,315	
Alignment Option H	832	458	1290	67087	$ 150	$ 10,063,123	
Alignment Option K	742	353	1094	56909	$ 150	$ 8,536,367	

**Bridge surface width is assumed to be 52 feet to accommodate potential center turn lane.*

Right-of-Way Costs

	# Privately Owned Parcels Impacted	# Structures Impacted	Irrigation Facilities Impacted		Fishing Access Impact (ac)	Rural Pasture Land			Irrigated Farm Land			Bridge ROW				Total Roadway ROW Cost	
			Big Springs Ditch (ft)	Broadwater-Missouri Canals (ft)		Area of Impact (ft^2)	Acreage* of Impact (ac)	Cost of Rural Pasture Land at $X/ac	Area of Impact (ft^2)	Acreage* of Impact (ac)	Cost of Irrigated Farm Land at $X/ac	Area of Impact (ft^2)	Area of Impact (ac)	Total Bridge ROW Cost			
Alignment Option F	3	0	250	0	0.98	77421.497	1.78	$2,000	567215.6962	13.02	$3,600	322830.5564	7.41	$14,822.34		$50,432.04	
Alignment Option G	6	0	233	0	1.94	687017.6074	15.77	$2,000	644435.1899	14.79	$3,600	313774.39	7.20	$14,406.54		$70,396.08	
Alignment Option H	7	0	190	0	1.98	601242.5937	13.80	$2,000	689002.8981	15.82	$3,600	302423.1762	6.94	$13,885.36		$70,662.29	
Alignment Option K	10	1	164	438	0.00	1033153.819	23.72	$2,000	1092082.429	25.07	$3,600	175113.1715	4.02	$8,040.09		$129,650.55	

**Assuming 80' of ROW on both sides of centerline (includes construction limits).*

Total Cost		w/20% Cont.	RANGE OF PLANNING COSTS
Alignment F	$17,863,318.76	$21,435,982.52	$18 - $22 Million
Alignment G	$17,413,168.55	$20,895,802.26	$17 - $21 Million
Alignment H	$16,970,852.19	$20,365,022.63	$17 - $20 Million
Alignment K	$16,631,132.25	$19,957,358.70	$17 - $20 Million

Toston Missouri River Corridor Planning Study

Second Level Screening Matrix - PLANNING LEVEL COSTS

January 6, 2011

Roadway Construction Costs

	Total Roadway Length (ft)	Missouri River Bridge Length (ft)	MRL Bridge Length (ft)	Actual Roadway Length (ft)	Actual Roadway Length (miles)	Cost Per Mile	Cost of Actual Roadway	
Alignment Option F	15422	1005	427	13989	2.65	$2,500,000.00	$6,623,526.99	
Alignment Option G	15537	968	393	14176	2.68	$2,500,000.00	$6,712,051.14	
Alignment Option H	15701	832	458	14411	2.73	$2,500,000.00	$6,823,181.34	
Alignment Option K	17900	742	353	16805	3.18	$2,500,000.00	$7,957,074.81	

	Length
	2.92
	2.94
	2.97
	3.39

Bridge Construction Costs

	Missouri River Bridge Length (ft)	MRL Bridge Length (ft)	Total Bridge Length (ft)	Total Bridge Area* (ft^2)	Cost per Ft^2	Cost of Bridge	
Alignment Option F	1005	427	1433	108880	$ 250	$ 27,220,027	
Alignment Option G	968	393	1361	103441	$ 250	$ 25,860,254	
Alignment Option H	832	458	1290	98051	$ 250	$ 24,512,736	
Alignment Option K	742	353	1094	83175	$ 150	$ 12,476,228	

**Bridge surface width is assumed to be 76 feet to accommodate potential center turn lane.*

Right-of-Way Costs

	# Privately Owned Parcels Impacted	# Structures Impacted	Irrigation Facilities Impacted		Fishing Access Impact (ac)	Rural Pasture Land			Irrigated Farm Land			Bridge ROW		Total Bridge ROW Cost		Total Roadway ROW Cost	
			Big Springs Ditch (ft)	Broadwater-Missouri Canals (ft)		Area of Impact (ft^2)	Acreage* of Impact (ac)	Cost of Rural Pasture Land at $X/ac	Area of Impact (ft^2)	Acreage* of Impact (ac)	Cost of Irrigated Farm Land at $X/ac	Area of Impact (ft^2)	Area of Impact (ac)				
Alignment Option F	3	0	250	0	0.98	77421.497	1.78	$2,000	567215.6962	13.02	$3,600	322830.5564	7.41	$14,822.34		$50,432.04	
Alignment Option G	6	0	233	0	1.94	687017.6074	15.77	$2,000	644435.1899	14.79	$3,600	313774.39	7.20	$14,406.54		$70,396.08	
Alignment Option H	7	0	190	0	1.98	601242.5937	13.80	$2,000	689002.8981	15.82	$3,600	302423.1762	6.94	$13,885.36		$70,662.29	
Alignment Option K	10	1	164	438	0.00	1033153.819	23.72	$2,000	1092082.429	25.07	$3,600	175113.1715	4.02	$8,040.09		$129,650.55	

**Assuming 80' of ROW on both sides of centerline (includes construction limits).*

Total Cost		w/20% Cont.	RANGE OF PLANNING COSTS
Alignment F	$33,908,808.36	$40,690,570.04	$34 - $41 Million
Alignment G	$32,657,107.75	$39,188,529.30	$33 - $39 Million
Alignment H	$31,420,464.99	$37,704,557.99	$31 - $38 Million
Alignment K	$20,570,993.85	$24,685,192.62	$21 - $25 Million