BAKER CORRIDOR
PLANNING STUDY

Baker Corridor Planning Study

December 2015

Prepared for:

Montana Department of Transportation

MONTANA
MDT
DEPARTMENT OF TRANSPORTATION

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Abbreviations and Acronyms

AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
ACS	American Community Survey
ADA	Americans with Disability Act
ADT	Average Daily Traffic
CAPS	Crucial Areas Planning System
CMAQ	Congestion Mitigation and Air Quality
DEQ	Montana Department of Environmental Quality
EO	Executive Order
ESA	Endangered Species Act
FFY	Federal Fiscal Year
FHWA	Federal Highway Administration
FWP	Montana Department of Fish, Wildlife, and Parks
GIS	Geographic Information System
GO	General Obligation
HSIP	Highway Safety Improvement Program
HSSR	Highway State Special Revenue
HV	Heavy Vehicle
LOS	Level of Service
LUST	Leaking Underground Storage Tank
MBTA	Migratory Bird Treaty Act
MCA	Montana Code Annotated
MDT	Montana Department of Transportation
MEPA	Montana Environmental Policy Act
MNHP	Montana Natural Heritage Program
mph	Miles per Hour
MT 7	Montana Highway 7
NEPA	National Environmental Policy Act
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
OPI	Overall Performance Index
PAIP	Public and Agency Involvement Plan
PEL	Planning and Environmental Linkages
PRO	Property Rights Organization, LLC
PvMS	Pavement Management System
Quantm	Quantm Alignment Planning System
REMI	Regional Economic Models, Inc.
RM	Reference Marker
ROW	Right-of-Way
S-493	Secondary Highway 493
SID	Special Improvement District
SOC	Species of Concern
STIP	Statewide Transportation Improvement Program
STP	Surface Transportation Program
STPB	Surface Transportation Program – Bridge Program
STPP	Surface Transportation Program – Primary Highways
STPS	Surface Transportation Program – Secondary Highways
TA	Transportation Alternatives

T&E	Threatened and Endangered
TMDL	Total Maximum Daily Load
USACE	United States Army Corps of Engineers
USC	United States Code
USFWS	United States Fish and Wildlife Service
UST	Underground Storage Tank
US 12	U.S. Highway 12
WB	Wheelbase

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Executive Summary

The Montana Department of Transportation (MDT), in partnership with the Federal Highway Administration and in coordination with Fallon County and the City of Baker, is developing a corridor planning study that includes the City of Baker and surrounding vicinity. Figure 1 provides an overview of the study area.

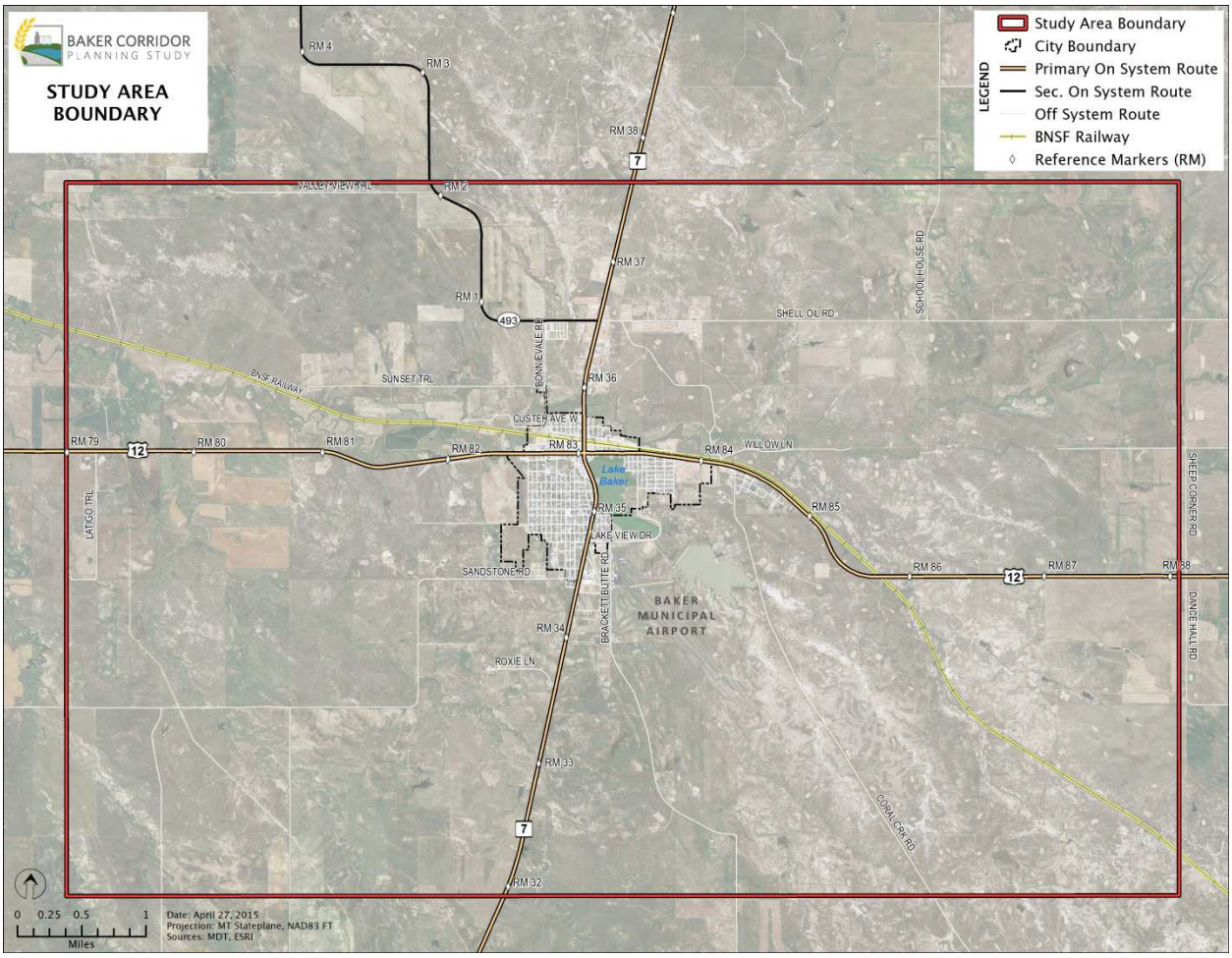

Figure ES-1: *Baker Corridor Planning Study* Area

The *Baker Corridor Planning Study* is considered a pre-National Environmental Policy Act (NEPA)/Montana Environmental Policy Act (MEPA) process that will develop needs and objectives, identify and analyze improvement options, eliminate non-feasible options, and identify potential environmental impacts and constraints through public, resource agency, and stakeholder input.

ES.1. Existing and Projected Conditions

An existing conditions review was conducted that examined roadway as-built drawings, various MDT and public databases, and the environmental setting within the study area. Information was also gathered through public and stakeholder input. Areas of consideration were identified through this review process and are listed below.

Transportation System

- The main intersection of U.S. Highway 12 (US 12) and Montana Highway 7 (MT 7) has an insufficient geometric layout to accommodate trucks with a 50-foot wheelbase (WB-50) and larger design vehicles. WB-50 and larger vehicles encroach into the opposing lane when making turning movements at this intersection.
- Based on low-growth traffic projections (forecast year 2034), the intersection of US 12 and MT 7 will operate at a failing level of service (LOS F) and the MT 7/S-493/Shell Oil Road intersection will operate at a LOS D.
- One horizontal curve located on S-493 does not meet the current minimum radius per MDT design standards for level terrain. Ten horizontal curves failed to meet current design standards for horizontal stopping sight distances.
- One vertical curve located north of Baker at Reference Marker (RM) 37.10 does not meet current MDT design standards for level terrain. Three vertical curves located between RM 37.10 and RM 37.83 failed to meet current design standards for vertical stopping sight distances.
- The drainage structure on US 12 at RM 86.18 does not meet current MDT design standards for clear zone distances.
- A high density of access points exists within Baker city limits, primarily along US 12 through the city.
- The wooden bridge located just north of Baker on MT 7 at RM 35.86 spanning Sandstone Creek (P00027035+08231) has been categorized as Functionally Obsolete.

Environmental Considerations

- Natural Resources Conservation Council soil surveys indicate the presence of farmland of state or local importance, or prime farmland if irrigated within the study area.
- Sandstone Creek is identified on the Montana Department of Environmental Quality's 303(d) list for impaired water bodies, with agriculture as a probable cause for impairment.
- The City of Baker has five public water supply wells and three potable water storage tanks located within the study area.
- The study area contains many potential wetland areas, primarily along Sandstone Creek and areas surrounding Lake Baker. An MDT wetland mitigation site exists south of Baker along MT 7.
- Regulated floodplains exist on and along Sandstone Creek within the study area.
- Twenty-six individual petroleum underground storage tanks were identified within the study area. Six active and 10 inactive leaking underground storage tank sites were identified within the study area, most of which are within city limits.
- Hundreds of oil and gas wells exist in the study area. One crude oil pipeline was identified in the northwest corner of the study area.
- One candidate species for federal listing on the threatened and endangered species list has documented occurrences within the study area.
- Four species of concern and four potential species of concern have the potential to occur in the study area. Core habitat for the greater sage-grouse exists within the study area.

- There were multiple possible Section 4(f) and three Section 6(f) properties located within the study area at the time the environmental scan was completed.
- Approximately 25 historic or archaeological properties are located within the study area, including historic buildings, bridges, the BNSF Railway, pre-contact buried campsites, and lithic scatters. The Water Resources Survey map indicates the presence of one historical private irrigation system and ditch within the study area.

ES.2. Corridor Needs and Objectives

The needs and objectives for the *Baker Corridor Planning Study* have been developed based on the existing and projected conditions analysis, as well as input received from the public, local government, and resource agencies. The needs, objectives, and other considerations listed below are in no specific order.

Need 1: Improve operations and safety of US 12 and MT 7 within the study area to the extent practicable.

OBJECTIVES

1.a. Improve the operation of the US 12/MT 7 intersection to accommodate an acceptable level of service (LOS C).

1.b. Improve the operation of the US 12/MT 7 intersection to accommodate all design vehicles.

1.c. Improve roadway elements to meet current MDT design criteria.

Need 2: Improve mobility on US 12 and MT 7 for people and freight within the study area to the extent practicable.

OBJECTIVES

2.a. Reduce delay due to at-grade railroad crossing closures.

2.b. Accommodate existing and future capacity demands within the corridor.

2.c. Preserve and maintain roadway surfacing and bridges on US 12 and MT 7 to accommodate future transportation demands.

Other considerations to the extent practicable

- Minimize the resource impacts of improvement options.
- Minimize impacts during construction.
- Consider construction feasibility of improvement options.
- Maintain consistency with local plans.

ES.3. Improvement Options

A range of improvement options that may be considered for future implementation was developed to address the identified transportation needs and areas of consideration within the study area. The improvement options were grouped into the following categories:

- Corridor Planning
- Geometric and Pavement Condition Improvements
- Intersection Improvements
- Bridge Improvements
- Alternative Truck Routes on Existing Routes
- Alternative Truck Routes on New Alignment

The improvement options are displayed on Figure ES-2. Table ES-1 lists each improvement option developed for this study, including the description, location, implementation timeframe, potential funding source, agency responsibility, and cost estimate. Refer to **Appendix C** for the planning-level cost estimates.

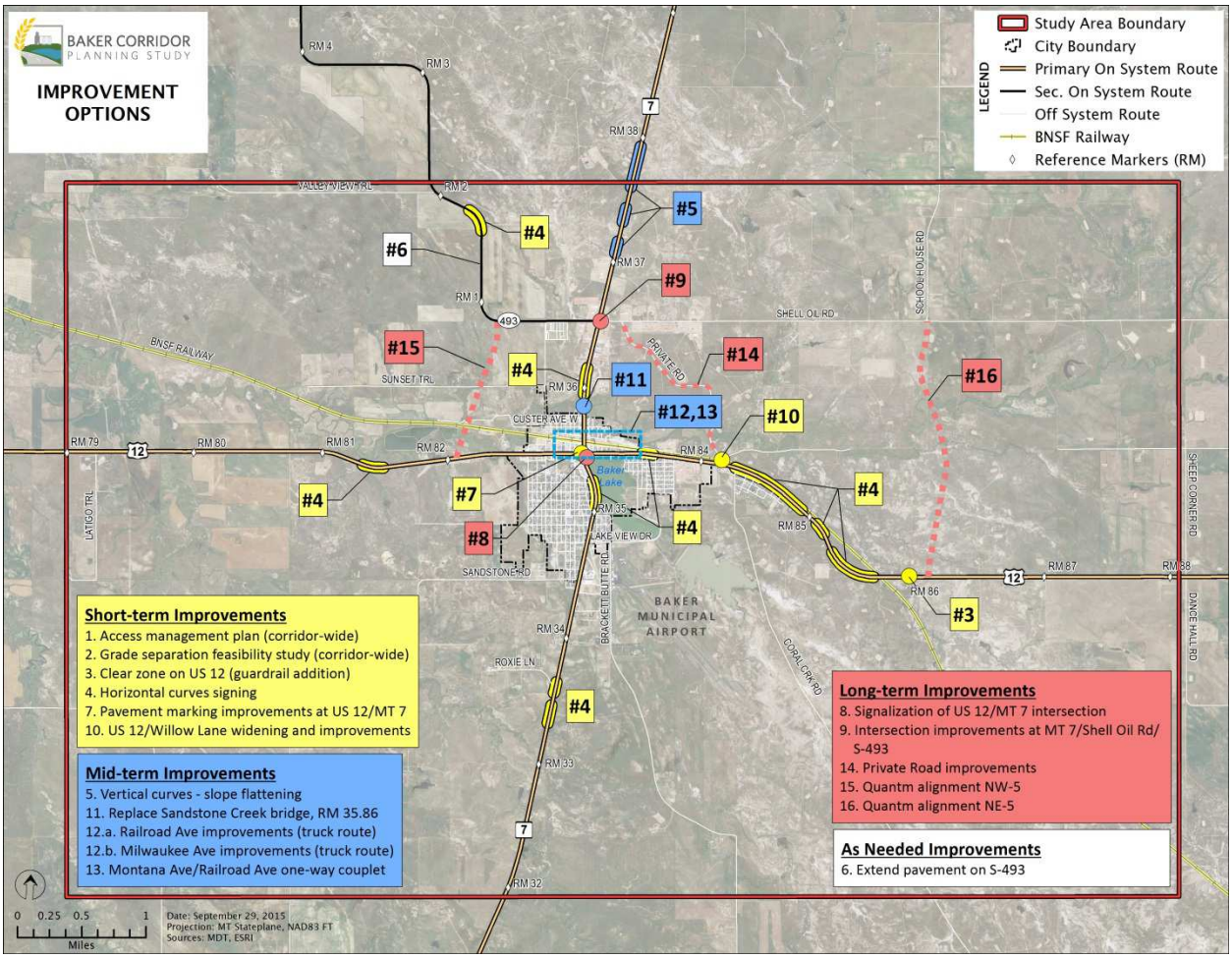

Figure ES-2: Study Area Improvement Options

Table ES-1: Improvement Options Summary

Improvement Option		Location	Description	Timeframe	Potential Funding Source[a]	Agency Responsibility	Cost Estimate[b]
CORRIDOR PLANNING							
1	Access Management Plan	Corridor-wide	Develop an *Access Management Plan* for the corridor	Short-term	STPP, Local	MDT Local	$100k to $150k
2	Grade Separation Feasibility Study	Corridor-wide	Conduct grade separation study within city limits; preliminary engineering	Short-term	STPP, Local	MDT Local	$100k to $125k
GEOMETRIC AND PAVEMENT CONDITION IMPROVEMENTS							
3	Clear Zone on US 12 near RM 86.18	US 12, RM 86.18	Extend the existing guardrail or place a new guardrail section at this location	Short-term	STPP, HSIP	MDT	$40k to $42k
4	Horizontal Curve Warning Signs	US 12, RM 81.4, 83.51, 84.65, 85.32, 85.72; MT 7, RM 33.41, 33.55, 35.15, 36.03; S-493, RM 1.65	Update signing at these locations to provide advanced curve warning signs	Short-term	STPP, HSIP	MDT	$11k to $12k
5	Vertical Curves	MT 7, between RM 37.10 and 37.83	Improve length of the vertical curves and stopping sight distance	Mid-term	STPP, HSIP	MDT	$1.5M to $1.7M
6	Extend Pavement on S-493 (Pennel Rd.)	S-493, RM 1.0 and beyond	Increase limits of paved roadway along S-493	As needed	STPS, Local	MDT Local	$1.7M to $1.8M per mile
INTERSECTION IMPROVEMENTS							
7	Pavement Marking Improvements at US 12/MT 7 Intersection	US 12/MT 7 Intersection	▪ Add a narrow striped median at all approaches ▪ Relocate the stop bar farther back from the intersection at all approaches ▪ Remove on-street parking near the intersection	Short-term	STPP, HSIP, CMAQ,TA	MDT	$10k to $11k
8	Future Signalization of US 12/MT 7	US 12/MT 7 Intersection	▪ Add left-turn lanes on all approach legs ▪ Signalize the intersection ▪ Remove adjacent on-street parking per MDT design standards	Long-term	STPP, HSIP, CMAQ,TA	MDT	$600k to $650k
9	Intersection Improvements at MT 7/Shell Oil Rd./S-493	MT 7/Shell Oil Rd./S-493 intersection	▪ Signalization: Add left-turn lane on northbound approach on MT 7, signalize the intersection ▪ Roundabout: Single-lane roundabout	Long-term	STPP, HSIP, CMAQ	MDT	$600k to $625k (Signal); $3.2M to $3.3M (Roundabout)
10	US 12/Willow Lane Turn Lane Queuing and Railroad Crossing Improvements	US 12/Willow Lane intersection, RM 84.1	▪ Widen shoulder along US 12 to provide vehicle queuing ▪ Improve approaches of Willow Lane at-grade railroad crossing ▪ Widen road approach to a minimum of 32 ft.	Short-term	STPP Local	MDT Local	$550k to $600k
BRIDGE IMPROVEMENTS							
11	Replace Bridge on MT 7, RM 35.86 (Sandstone Creek)	MT 7, RM 35.86	Replace bridge on MT 7 at RM 35.86	Mid-term	STPB	MDT	$850k to $900k

Improvement Option		Location	Description	Timeframe	Potential Funding Source[a]	Agency Responsibility	Cost Estimate[b]
ALTERNATIVE TRUCK ROUTES ON EXISTING ROUTES							
12.a	Railroad Ave. Improvements	Railroad Ave. between US 12 and MT 7	▪ Pave Railroad Ave. east of S. 3rd St. E to its intersection with US 12 ▪ Include signage indicating a truck route on US 12 and MT 7 ▪ Intersection improvements at US 12/MT 7, Railroad Ave./3rd St. E, and Railroad Ave./US 12	Mid-term	Local	Local	$300k to $325k
12.b	Milwaukee Ave./3rd St. SW Improvements	Milwaukee Ave. W/3rd St. SW	▪ Pave 3rd St. railroad crossing between Milwaukee Ave. and Railroad Ave. ▪ Include signage indicating a truck route on US 12 and MT 7 ▪ Intersection improvements at Milwaukee Ave./MT 7 and Milwaukee Ave./US 12	Mid-term	Local	Local	$120k to $130k
13	Montana Ave. (US 12) and Railroad Ave. One-way Couplet	US12 and Railroad Ave.	▪ Intersection signals at US 12/MT 7 and MT 7/Railroad Ave. ▪ Update signing and striping for one-way traffic within couplet limits ▪ Pave Railroad Ave. east of S. 3rd St. E to its intersection with US 12	Mid-term	STPP Local	MDT Local	$1.6M to $1.7M
14	Private Oil Field Road Improvements	Private Road between US 12 and Shell Oil Rd.	▪ Widen road, straighten curves, paving, signing	Long-term	Local	Local	NA
ALTERNATIVE TRUCK ROUTES ON NEW ALIGNMENT							
15	Quantm Alignment NW-5	Between US 12, RM 82.1 and S-493, RM 0.8	▪ Construct new alignment including a grade-separated crossing of the railroad ▪ Widen S-493 from RM 0.8 to MT 7 to 32 ft.; intersection improvements at alignment termini	Long-term	STPP Local	MDT Local	$17M to $17.5M
16	Quantm Alignment NE-5	Between US 12, RM 86.2 and Shell Oil Rd.	▪ Construct a new alignment between US 12 and Shell Oil Rd. ▪ Surfacing improvements and widen Shell Oil Rd. to 32 ft. from School House Rd. to MT 7; intersection improvements at alignment termini	Long-term	STPP Local	MDT Local	$16.3M to $16.8M

[a] STPP = Surface Transportation Program – Primary; STPS = Surface Transportation Program – Secondary; STPB = Surface Transportation Program – Bridge Program; HSIP = Highway Safety Improvement Program; CMAQ = Congestion Mitigation and Air Quality; TA = Transportation Alternatives. Table lists potential federal and state funding sources. Local funding sources include multiple potential city/county sources. All improvements could potentially be funded through a public/private partnership.

[b] Planning-level cost estimates are for all phase costs and use 2015 dollars as a base. The cost estimates include preliminary and construction engineering, indirect costs, right-of-way and utilities (where appropriate), contingency, and inflation based on the associated project timeframe and are rounded for planning purposes. Refer to **Appendix C** for cost estimate spreadsheets.

ES.4. Conclusion

The *Baker Corridor Planning Study* identified a range of improvement options that may be implemented to improve the transportation system within the study area. Project development and implementation of any of the improvement options depends ultimately on funding availability, right-of-way needs, and other system priorities within the MDT Glendive District. Implementation of improvement options located off system (i.e., not on an MDT-maintained route) would be a local government responsibility and would need to follow the local procedures to move projects forward, and may include coordination with the MDT Glendive District or the Transportation Commission to identify a funding source.

At this time, funding is not available to implement any of the improvement options identified by this study. Federal funding allocations for the MDT Glendive District, the MDT Bridge Bureau, and the MDT Traffic Safety Section are committed through federal fiscal year 2019, with additional unfunded projects extending beyond 2019. Future project (or projects) development and implementation will require the following steps:

- Identify and secure a funding source(s).
- For MDT-led projects, follow MDT processes for project nomination and development, including a public involvement process and environmental documentation.
- For projects that are developed by others and may impact MDT routes, coordinate with MDT via the System Impact Action Process.

Any project or combination of projects resulting from this corridor planning study will be required to comply with NEPA if federal funds or a federal action is involved and with MEPA if state funds or a state action is involved. The purpose and need statement for any future project should be consistent with the needs and objectives for this study as identified in Section ES.2 and Chapter 4. This corridor planning study will be used as the basis for determining the impacts and subsequent mitigation for the improvement options in future NEPA/MEPA documentation. Any project developed would have to comply with the Code of Federal Regulations Title 23 Part 771 and Associated Rules of Montana 18, subchapter 2, which set forth the requirements for documenting environmental impacts on highway projects.

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1. Introduction

The Montana Department of Transportation (MDT), in partnership with the Federal Highway Administration (FHWA) and in coordination with Fallon County and the City of Baker, initiated a corridor planning study that includes the City of Baker and surrounding vicinity. The study area is southwest of the Bakken oil field, which is experiencing a boom in oil production and related development. Effects from the Bakken region, as well as an increasing amount of local oil and gas development, have resulted in population increases and associated growth in Fallon County and the City of Baker. A need has been identified to examine freight traffic through the downtown area, as well as the internal transportation network, highway issues, and other transportation needs.

The study area includes a 9.1-mile segment of U.S. Highway 12 (US 12) approximately between Reference Marker (RM) 79 and RM 88.1, a 5.7-mile segment of Montana Highway 7 (MT 7) approximately between RM 31.9 and RM 37.6, and a 2.1-mile segment of Secondary Highway 493 (S-493) between RM 0 and RM 2.1. The study area includes the City of Baker and the Baker Municipal Airport. The BNSF Railway traverses the study area in a northwest-southeast direction. Within the Baker city limits, the railroad is located immediately north of US 12. Figure 1 provides an overview of the study area.

1.1 Corridor Planning Process

The *Baker Corridor Planning Study* is considered a pre-National Environmental Policy Act (NEPA)/Montana Environmental Policy Act (MEPA) study that provides for early planning-level coordination with the community, local government, resource agencies, and other stakeholders to identify issues and potential transportation improvement options within the study area. Also known as Planning and Environmental Linkages (PEL), the process represents a collaborative and integrated approach to transportation decision-making through early consideration of environmental, community, and economic goals. The *Baker Corridor Planning Study* follows the 2009 *Montana Business Process to Link Planning and National and Montana Environmental Policy Act (NEPA/MEPA) Reviews*. The process develops needs and objectives, identifies and analyzes improvement options, eliminates non-feasible options, and identifies potential environmental impacts and constraints through a thorough and transparent public process. The process is intended to streamline subsequent project development and environmental reviews through early identification of potential environmental, social, cultural, and economic resource impacts.

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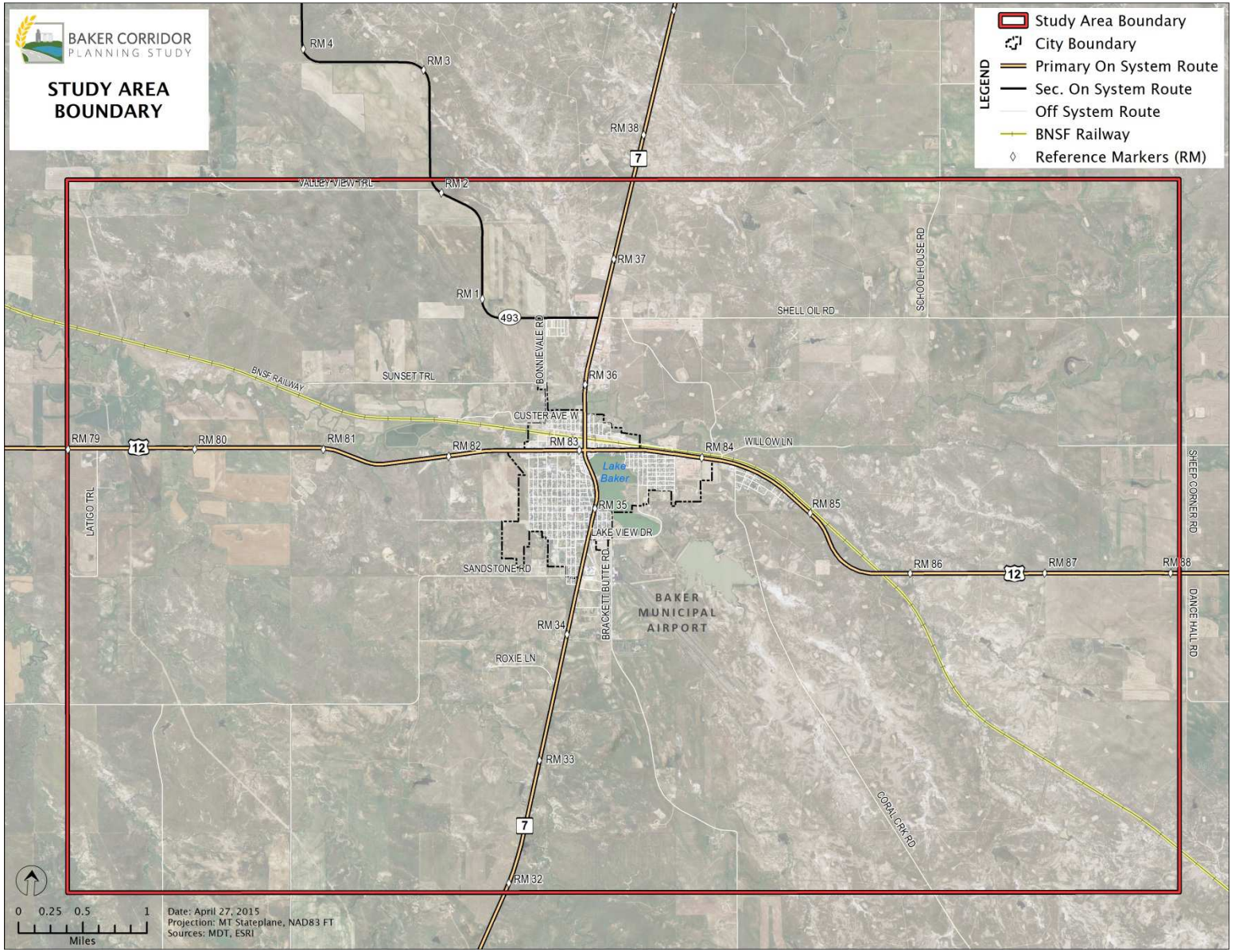

Figure 1: *Baker Corridor Planning Study* Area

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2. Public and Agency Outreach

The *Baker Corridor Planning Study* included development of a *Public and Agency Involvement Plan* (PAIP) at an early stage in the planning study. The PAIP is an important initial document that outlined informational outreach efforts and communication protocols to be followed throughout the planning study process. The PAIP provided members of the public, stakeholders, and resource agency representatives with opportunities for involvement and input throughout the planning study process. Specific public outreach activities conducted during the planning study process are described in this chapter. Refer to **Appendix A** for complete documentation on public and agency outreach, including written comments, press releases, newsletters, presentations, meeting summaries, and other related documents.

2.1 Public Involvement

The *Baker Corridor Planning Study* included two informational meetings held in Baker. Press releases were distributed to area media outlets, including the Baker Chamber of Commerce, Miles City Chamber of Commerce, *Fallon County Times*, *Miles City Star*, and several area television and radio stations. The meetings were advertised in the *Fallon County Times* and *Miles City Star* twice (at 1- and 2-week intervals) prior to the meetings. The advertisements announced the meeting location, time and date, purpose of the meeting, and project team contact information.

Informational Meeting #1

The first informational meeting was held on March 5, 2015, at the Fallon County Fairgrounds Exhibit Hall, located at 3440 Montana 7, Baker, MT. The purpose of the meeting was to inform the public about the scope and purpose of the planning study, present information about existing and projected conditions, and request feedback about opportunities and constraints affecting potential transportation improvement options within the study area.

Eleven community members, including two county commissioners, signed the meeting attendance form. Several individuals present did not sign in; the estimated total number of people in attendance was approximately 20. The meeting included a presentation, followed by a question-and-answer period. Significant topics discussed at the meeting are summarized below.

- Local truck traffic seems to have increased in recent years, particularly following the reconstruction of Highway 323 south of Baker.
- Large loads traveling north on MT 7 can create conflicts.
- Oil and gas development will be avoided to the greatest extent when running the Quantm alignment planning software.
- Greater sage-grouse habitat is present within the study area.
- Stakeholder outreach could include safety representatives of the oil companies and the newly formed Property Rights Organization, LLC (PRO).
- The city has recently annexed an area in the southwest corner of the city boundary that includes a planned subdivision.

One written comment was received at the informational meeting, and one comment was received following the meeting. The written comment topics included a suggested location for a

truck route, concern over the economic effects of a "by-pass," suggested additional stakeholders, and recommendations for future advertisements.

Informational Meeting #2

A second informational meeting was held in Baker on October 20, 2015, following publication of the draft *Baker Corridor Planning Study*. The purpose of the meeting was to describe the planning study process, present the draft report, and discuss the improvement options with the community. The public and project stakeholders were encouraged to attend the meeting and provide written comments on the draft planning study.

Nineteen community members, including two county commissioners, signed the meeting attendance form. The meeting included a presentation followed by a question-and-answer period. Significant topics discussed at the meeting are summarized below.

- Signalization of the US 12/MT 7 intersection was discussed. The addition of left-turn lanes requires removing some on-street parking near the intersection.
- The conceptual roundabout at MT 7/Shell Oil Road/S-493 was discussed. Concerns were related to accommodating heavy loads and the appropriateness of a roundabout at this location.
- The US 12/Willow Lane intersection improvements were well received; this intersection has high truck volume movements and an accident history.
- Support was voiced for the Railroad Avenue and Milwaukee Avenue Truck Route options.
- Multiple attendees expressed concerns about local traffic delays and emergency service access caused by the railroad being blocked.
    - The question was raised regarding the state's ability to prohibit BNSF from parking trains on the tracks. MDT responded that they lack the authority to do this.
    - Members of the public brought up the concept that has previously been discussed with the BNSF Railway of relocating the siding switch at the 3rd Street at-grade crossing to the east side of the crossing. The study team clarified that improvement options regarding moving or relocating railroad tracks and/or siding switches is not within MDT jurisdiction, and authority to do so rests solely with BNSF Railway.
- New Quantm alignments: It was clarified that the NW-5 alignment includes a grade separation of the railroad (i.e., a highway bridge over the railroad). The study team noted that new alignments could be constructed in phases depending on available funding.

Five written comments were received following the public informational meeting. Refer to **Appendix A** for more information.

Other Public Outreach Efforts

A project website (http://www.mdt.mt.gov/pubinvolve/baker/) was established to provide current information regarding the planning study and process, as well as an opportunity for the public to submit comments electronically. Draft documents were posted to the website for public review throughout the planning study process. As the study is completed, draft documents will made

final and final documents will be published on the website. The project website will also include a link to the draft and final versions of the *Baker Corridor Planning Study*.

Two newsletters were published during the study process in advance of the informational meetings. The newsletters described the planning study and process, key findings, preliminary improvement options, and other information, and announced the location, time and date, and purpose of the informational meetings. The newsletters were distributed to local government and stakeholders, and were posted on the project website.

2.2 Resource Agency Meeting

A resource agency meeting was held on Monday, March 9, 2015, at the MDT Planning Division office in Helena, MT. The purpose of the meeting was to discuss environmental resources located within the study area and confirm the content and accuracy of the *Environmental Scan* report (**Appendix B**). Resource agencies invited to participate were mailed an informational packet that included an invitation letter, draft *Environmental Scan* report, meeting agenda, and study area map for review prior to the meeting. The meeting began with a presentation introducing the study and process and included a summary of the environmental setting as described in the *Environmental Scan* report. The following agencies were invited to participate; those noted in bold attended the meeting:

- Fallon County Floodplain Administrator
- **Montana Department of Environmental Quality**
- **Montana Department of Transportation**
- **Montana Fish, Wildlife & Parks**
- Montana State Historic Preservation Office
- **United States Army Corps of Engineers (USACE)**
- United States Bureau of Land Management
- United States Environmental Protection Agency
- United States Fish and Wildlife Service (USFWS)

The USFWS, although not in attendance, submitted written comments. All resource agency meeting materials are provided in **Appendix A**.

2.3 Advisory Committee

The *Baker Corridor Planning Study* was guided by a project Advisory Committee that met monthly throughout the 12-month study. The Advisory Committee was comprised of representatives from MDT, FHWA, Fallon County, and the City of Baker. The purpose of the Advisory Committee was to track progress, ensure that the corridor planning process was followed, address issues identified through the study process, and review study deliverables.

2.4 Public and Agency Review Period

The public and resource agencies were encouraged to review the draft planning study and provide written comments. The public review period extended from October 7, 2015, to November 6, 2015. Written comments and responses received during the comment period are included in **Appendix A**.

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3. Existing and Projected Conditions

The information in this chapter provides a planning-level assessment of the existing transportation system, projected traffic conditions, and an overview of the physical and environmental setting for the study area. The information and analysis are based on a variety of sources, including current and historic traffic counts; roadway as-built drawings; MDT asset management databases; 2014 aerial imagery and Geographic Information System (GIS) data; field reconnaissance and measurements; and other publicly available environmental and demographic databases. This chapter summarizes key information and findings from the *Environmental Scan* and the *Existing and Projected Conditions Report,* which can be found in **Appendix B** and **Appendix C**, respectively.

3.1 Planning Within the Study Area

Fallon County Growth Policy

In 2012, Fallon County updated their Growth Policy to include goals, objectives, and policies to facilitate decision-making related to future growth. The *Fallon County Growth Policy* includes a list of community goals and objectives on a variety of topics that collectively shares their values and concerns over existing conditions and future development within the community. Specific to transportation, the 2012 *Fallon County Growth Policy* provides the following specific goals and objectives:

Goals

- Reduce truck traffic levels in the City of Baker
- Maintain safe streets and roads
- Minimize disruption of traffic circulation caused by barriers such as the railroad
- Plan for street and road extensions and preserve adequate right-of-way (ROW) for such extensions
- Protect Baker Municipal Airport's air space

Objectives

- Improve traffic safety and maintain existing streets and roads
- Reduce disruptions to traffic circulation resulting from railroad operations
- Identify and secure sand and gravel resources for future maintenance of county roads
- Plan for new streets and roads in future growth areas by preserving ROW for street and road extensions
- Maintain existing and future operations at the Baker Municipal Airport

The *Fallon County Growth Policy* addresses needed infrastructure improvements to provide services to the west of the city to accommodate the planned Keystone XL Pipeline crew camp facility. The *Fallon County Growth Policy* recommends further evaluations to quantify infrastructure requirements and develop design requirements and access management strategies along the US 12 corridor west of Baker.

Projects Occurring in the Study Area

Several projects planned within the study area have been identified, some of which have the potential to increase the demands on Baker's existing transportation system.

NORTH BAKER DRAINAGE PROJECT

The North Baker Drainage Project is a proposed drainage improvement project located north of Baker, centered on the MT 7/S-493/Shell Oil Road intersection. Preliminary plans indicate this project includes roadside ditch improvements and modifications of several approaches to install new culverts and modify existing ones. If improvement options are forwarded from the study in the location of this intersection, consideration and/or coordination of these planned improvements should occur.

BAKER SUBDIVISIONS

Two subdivisions planned within the study area were identified during development of the study. One subdivision is located west of Baker on the south side of US 12 and west of Coral Creek Road. Information is not currently available on the anticipated number of homes to be constructed at this location. This subdivision may create additional traffic on the west side of Baker. A second planned subdivision is located within an area recently annexed by the City of Baker in the southwest corner of the city limits. If improvement options in the location of this planned subdivision are forwarded from the study, consideration of these planned improvements should occur.

KEYSTONE XL PIPELINE DEVELOPMENT

The proposed Keystone XL Pipeline alignment passes through the western portion of the study area in a northwest-southeast direction, crosses US 12 between RM 80 and 81, and continues southeast across MT 7 and outside the study area. Figure 2 shows the approximate Keystone XL pipeline alignment and associated facilities. In addition to the pipeline, construction of the Bakken Marketlink Project is being proposed, which would consist of piping, booster pumps, meter manifolds, and a tank terminal. It is estimated that the Bakken Marketlink Project could include transport of approximately 65,000 to 100,000 barrels per day to the Keystone XL Pipeline. The proposal includes a 5-mile pipeline connecting the Baker Tank Farm to the Keystone XL Pipeline via the pump station and an on-ramp facility on S-493/Pennel Road. Based on this proposal, crude oil would be delivered via trucks to collection tank facilities both at the Baker Tank Farm located at approximately RM 74 on US 12 and at the proposed tank facility located on S-493/Pennel Road. If built, the planned pipeline improvements could generate substantial traffic due to construction and ongoing use of the facilities.

On November 6, 2015, the Obama Administration rejected issuance of the U.S. Department of State Presidential Permit required to authorize construction, maintenance, and operation of the pipeline facilities at the United States and Canada border. The status of the pipeline project and associated activities will need to be evaluated if a project moves forward from this study.

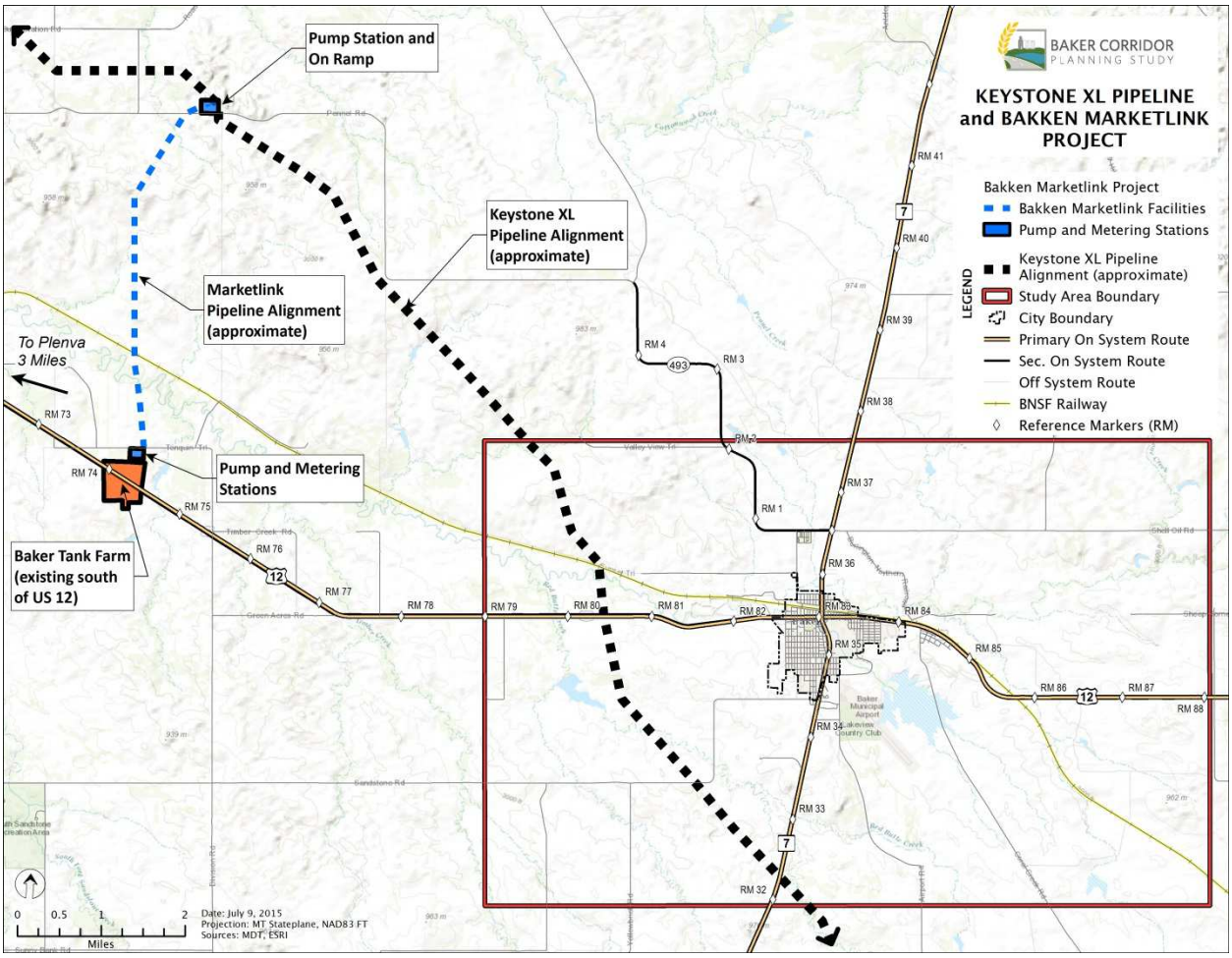

Figure 2: Proposed Keystone XL Pipeline and Bakken Marketlink Project

In anticipation of construction, a workforce camp area (crew camp) and contractor yard is being planned west of Baker immediately south of US 12 from the lagoons to provide a temporary location for housing while workers construct the pipeline. Once construction begins, the crew camp is expected to have a peak population of between 995 and 1,165 workers. Using peak residency numbers, a traffic analysis was conducted that estimated 360 vehicles would be entering/exiting the crew camp onto US 12 during morning/evening shifts on a daily basis. To offset impacts to the transportation system, MDT is requiring that a warning sign be placed near the east/west entrances to the camp on US 12, as well as that the centerline be painted into a double yellow no-passing zone with additional “no-passing zone” signage.

Construction of the proposed Keystone XL Pipeline crew camp facility would increase the current demand for water and wastewater service. As specified in the *Fallon County Growth Policy*, the City of Baker is in negotiations with Keystone XL Pipeline representatives for funds to offset infrastructure impacts generated by the crew camp.

MDT Highway Projects

According to the MDT 2015 *Statewide Transportation Improvement Program* (STIP), which identifies improvements to the state’s transportation system for the period of 2015 to 2019, no

projects are planned within the study area. The Baker - West project (UPN 7948) located on US 12 is a 5.42-mile pavement overlay project beginning at RM 77.2 that was identified in the 2014 STIP and has been constructed.

3.2 Transportation System

The following sections provide a description of the physical and geometric characteristics, the existing and projected traffic conditions, and a crash history for the study area transportation system.

Physical Characteristics

FUNCTIONAL CLASSIFICATION AND ROADWAY NETWORK

US 12 and MT 7 within the study area are both functionally classified as rural minor arterial routes on the Primary Highway System, and S-493 is classified as a major collector route on the Secondary Highway System. Refer to Figure 3 for a functional classification map of study area roadways. US 12 provides Baker an east-west linkage to Interstate 94, approximately 80 miles to the west at Miles City, and to North Dakota, approximately 13 miles to the east. Through the study area, US 12 is a two-lane highway that has varying shoulder widths and, where it passes through Baker city limits, has interspersed areas of parallel parking and sidewalks. MT 7 links Baker to Interstate 94 approximately 45 miles to the north at the town of Wibaux. Within the study area, MT 7 is a two-lane highway that has intermittent areas of parallel parking and sidewalks outside the immediate downtown area. Within the downtown area, MT 7 has on-street angled parking one block before and after its intersection with US 12.

Within the Baker city limits, US 12 is named Montana Avenue, and MT 7 is named Lake Street south of US 12 and Main Street north of the US 12 intersection. S-493, also known as Pennel Road, intersects MT 7 approximately 1 mile north of downtown Baker. S-493 is a two-lane road that is paved for the first mile, after which it is a gravel-surface roadway. Where available, data for S-493 are included in the existing roadway conditions analysis.

RIGHT-OF-WAY

Highway ROW along the US 12 and MT 7 corridors as well as the paved portion of S-493 is maintained by the State of Montana. As-built construction drawings were reviewed to document existing ROW widths on either side of the roadway centerline for the segments of US 12, MT 7, and S-493 located within the study area. ROW widths along US 12 vary from 31 feet to 130 feet on each side of centerline, with the narrower widths occurring within Baker city limits. MT 7 ROW widths range from 20 feet to 177 feet from centerline. Similar to US 12, the narrower widths on MT 7 occur within Baker city limits. The existing ROW width along S-493 within the study area varies from 50 feet to 100 feet from centerline.

HYDRAULICS

As-built drawings were reviewed to develop an inventory of culverts located along US 12, MT 7, and S-493. In total, 79 structures were inventoried that ranged in diameter from less than 2 feet to greater than 16 feet. **Appendix C** provides the culvert inventory within the study area, including their approximate location, diameter, length, and, where applicable, the stream or drainage crossed.

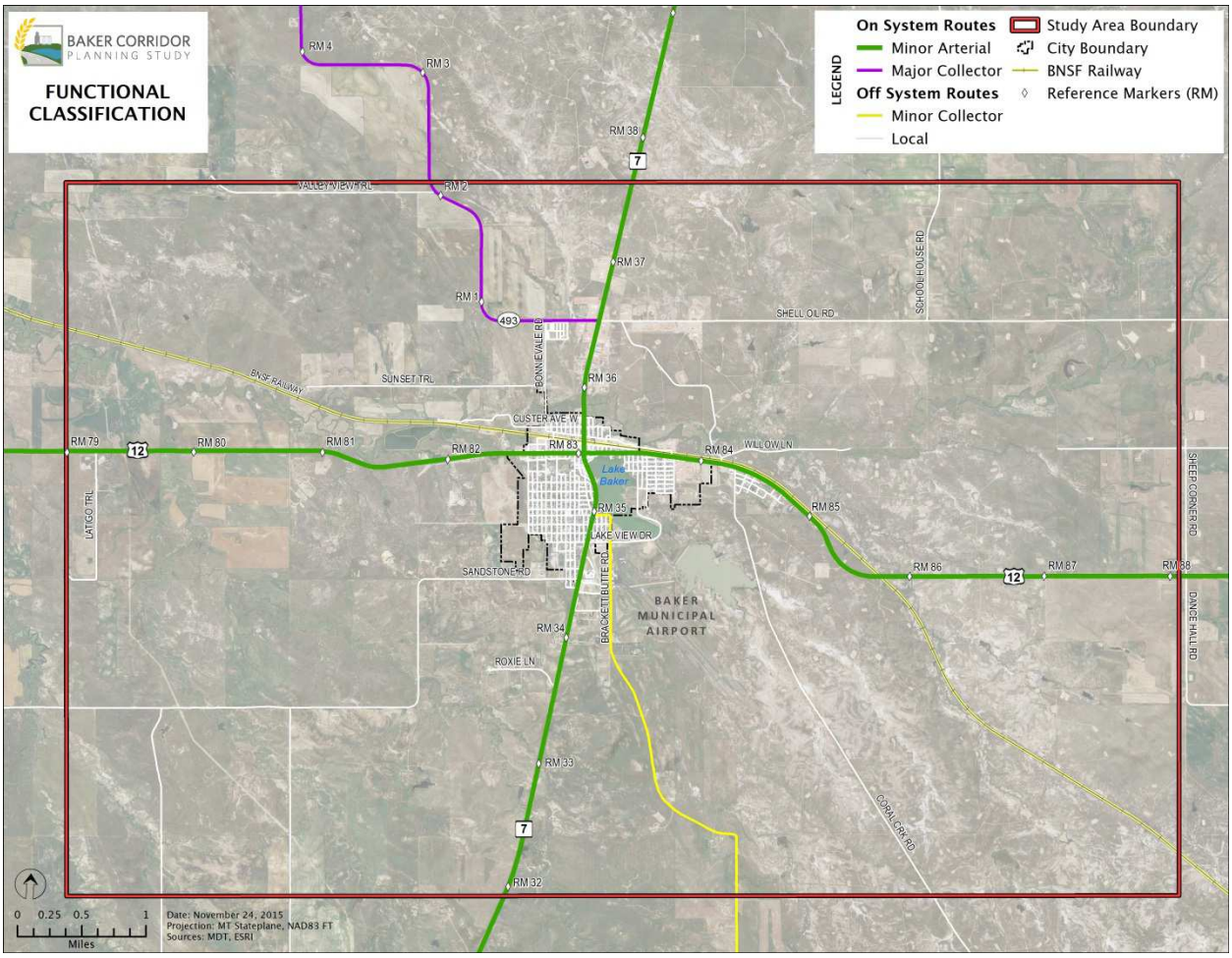

Figure 3: Functional Classification of Study Area Roadways

BRIDGES

There are seven (7) bridges or structures located within the study area, according to the MDT *Bridge Management System*. Table 1 provides a brief summary of the bridges, including their general location, features intersected, year built, and conditions.

Table 1: Bridges within the Study Area

Location	Feature Intersect	Year Built	Width (ft)	Length (ft)	Structure Condition[a]	Deck Condition
US 12, RM 82.46	Drainage	1998	36	64	Good	Good
US 12, RM 85.75	BNSF Railway	1968	30	214	Very Good	Good
MT 7, RM 35.23	Lake Baker Overflow	2009	42	35	N/A	N/A
MT 7, RM 35.86	Sandstone Creek	1941	25	65	Satisfactory	Fair
Bonnievale Rd.	Sandstone Creek	1955	23	33	Satisfactory	Good
Custer Ave.	Sandstone Creek	2012	N/A	29	N/A	N/A
Ag Lane, near RM 82.5 on US 12[b]	Sandstone Creek	2003	24	30	Good	Good

Source: MDT Bridge Management System, 2014.

[a] Structure condition based on superstructure rating.

[b] Bridge replaced with a box culvert in 2015. Table records do not reflect current conditions.

The MDT Bridge Bureau regularly inspects and rates the bridges and structures located on the transportation system. Information available from the MDT *Bridge Management System* provides metrics on the condition of the structures based on the most current site inspection results. The bridge located just north of Baker on MT 7 at RM 35.86 spanning Sandstone Creek could be eligible for rehabilitation. Built in 1941, this bridge contains three spans, with a wood/timber deck structure and bituminous deck surface type. The bridge located on Ag Lane near RM 82.5 of US 12, also spanning Sandstone Creek, has recently been replaced by a large box culvert structure. Updated information for this structure is currently unavailable in the MDT *Bridge Management System*.

PAVEMENT CONDITIONS

Pavement conditions within the study area are monitored annually by MDT through their Pavement Management System (PvMS). Information collected is translated into several metrics to identify the degree of cracking, rutting, and road smoothness, which is used to prioritize maintenance to extend pavement life. The performance index scale used by the PvMS includes the following ratings: 80 to 100 is considered "good," 60 to 79.9 is considered "fair," and 0 to 59.9 is considered "poor."

The Overall Performance Index (OPI) includes a combination of all performance indices and provides the most comprehensive index of the pavement condition. The OPI for the segment of US 12 from RM 77.2 to 83.75 is in "poor" condition based on the performance index scale. Pavement conditions elsewhere on US 12 and MT 7 all rate as "fair." A 5.42-mile pavement preservation project on US 12 that begins west of the study area boundary at approximately RM 77.2 and continues to approximately RM 82.6 was completed in 2014. The segment on US 12 from RM 82.6 to 83.75 may require resurfacing in the near future.

RAILROAD

The BNSF Railway intersects the study area in an east-west direction. There are four BNSF Railway-operated at-grade rail crossings located throughout the study area and one grade-separated crossing on US 12 east of Baker at approximately RM 85.8. Within city limits there is an approximately 2-mile stretch of double track railroad siding, which crosses all four at-grade crossings. The two at-grade crossings near downtown (MT 7 and North 3rd St.) are crossed by three tracks, the mainline and two sidings. Table 2 provides information on the five railroad crossings located within the study area.

Table 2: Railroad Crossings within the Study Area

Location	AADT	Warning Device / Crossing Type	Trains Per Day	# of Tracks	Train Switching	Speed Over Crossing
Baker, E 1.6 mi on US 12	990	RR Underpass, grade separated	5	0	0	40
Baker, E 0.2 mi (Willow Lane)	110	Cross bucks, at-grade	5	2	0	40
Berwald Rd.	102	Cross bucks, at-grade	5	2	0	40
Main St. (MT 7)	4509	Gates, at-grade	5	3	0	40
N 3rd St. W	402	Gates, at-grade	5	3	0	40

Source: MDT 2014.
AADT = Annual Average Daily Traffic.

The crossing described as “Baker, E 0.2 mi” is located on Willow Lane immediately adjacent to US 12. This crossing has been identified by the community as having steeper grades, particularly on the north approach. A steep at-grade crossing can be problematic for some trucks, such as lowboy trailer truckers, because it may cause the trucks to become high centered while crossing, rendering this crossing unusable for some trucks. This conflict then requires the trucks to use the crossing on MT 7 just north of downtown, thus adding additional heavy vehicular traffic to downtown streets.

TRANSIT

The Fallon County Transportation System provides local service within Baker Monday-Saturday between the hours of 8 AM and 4 PM. It is a demand-response service, providing primarily transport within Baker city limits. It also provides service to Miles City on the first Wednesday of each month and to Dickinson, North Dakota, on the third Wednesday of each month. The Fallon County Transportation System provides occasional service to Plevna as requested. No other transit operations are known to operate within the study area.

BICYCLES AND PEDESTRIANS

One separated path exists adjacent to Lake Baker that begins at Triangle Park, located on Lakeview Drive, and wraps around the southern end of the lake. The path is located outside of MDT ROW and is locally maintained. Sidewalks exist adjacent to US 12 and MT 7 in the immediate downtown area and intermittently throughout the rest of the study area.

AIR SERVICE

Baker Municipal Airport is located 1 mile southeast of Baker. The airport is owned by the City of Baker and Fallon County, and offers regional air service. The airport covers an area of 193 acres and includes one 4,898-foot-long runway. On average, the airport has approximately 19 aircraft operations per day. The Baker Municipal Airport represents a major constraint for potential improvement options in the study area southeast of Baker.

UTILITIES

The study area includes many utilities, both along the primary highways of US 12 and MT 7 and throughout the urban area of Baker. Utilities include power, telephone, fiber optic, gas, and water/sewer. Outside city limits, utilities include interspersed overhead power and telephone lines that either parallel or cross the highways and appear to supply services to oil and gas development as well as to rural properties.

Information regarding Baker’s water and wastewater systems was obtained from the *Fallon County Growth Policy*. The City of Baker’s potable water system includes five city wells, water distribution lines throughout the city, and three buried concrete tanks on an elevated site on the east side of the city.

The City of Baker wastewater system includes several wastewater treatment lagoons, an irrigation water holding pond, a lift station located near the lagoons, and wastewater collection lines throughout the city. The collection lines connect Baker residences to a main wastewater pipe running east-west along US 12 out to the wastewater lagoons. Wastewater flow from the North Baker Sewer and Water District north of the city along MT 7 also contributes to the

wastewater system. An irrigation pipe extends from the westernmost lagoon in a southeasterly direction to Sandstone Road, then travels east over to the golf course.

Geometric Characteristics

ROADWAY DESIGN CRITERIA

Operational characteristics of a roadway are governed by general design principles and controls as specified in the MDT *Road Design Manual*. The roadway design standards for US 12 and MT 7 within the study area are based on the current MDT design criteria for rural and urban minor arterials for level terrain. MDT urban design criteria apply to sections of US 12 and MT 7 located within Baker city limits. The roadway design standards for S-493 are based on the design criteria for rural collector roads. Design speeds used for analysis of US 12 and MT 7 were 35 miles per hour (mph) within Baker city limits and 60 mph outside of city limits. A design speed of 50 mph was used to analyze S-493. The posted speed limits for US 12 and MT 7 throughout the study area vary from 25 mph within downtown to 70 mph on the highways outside of town.

ROADWAY GEOMETRICS

Current as-built drawings for the highways within the study area were reviewed to identify areas of potential concern that fail to meet current MDT design standards. The findings of the existing roadway geometrics within the study area are discussed in greater detail in the following sections. Areas not meeting current design standards are shown in Figure 4.

Roadway Width

The MDT *Montana Road Log* was reviewed to obtain current roadway widths of US 12, MT 7, and S-493. Based on results provided in 2014, one section on US 12, from RM 76.95 to 82.19, does not meet the current MDT standard for minimum pavement width for rural minor arterials. The recent pavement project included this segment and involved minor widening to meet standards.

Horizontal Alignment

Horizontal alignment is a measure of the degree of turns and bends in the road. The horizontal alignments of the highways within the study area greatly affect the vehicular operations and safety of the overall roadway. The horizontal alignment design elements comply with specific limiting criteria, including minimum radii, superelevation rates, and stopping and passing sight distances. Stopping sight distance is defined as the sum of the distance traveled during a driver's perception/reaction or brake reaction time and the distance traveled while braking to a stop.

Based on review of available information, one curve located at RM 0.86 on S-493 does not meet current minimum MDT design standards for level terrain. Ten curves (five on US 12, four on MT 7, and one on S-493) failed to meet design standards for horizontal stopping sight distances. Stopping sight distance issues were noted on US 12 east and west of Baker. Stopping sight distance issues on MT 7 occur on the hill near RM 33.5 and immediately north of Baker at RM 35.15 and RM 36.03.

Vertical Alignment

The vertical alignment relates to the variance in elevation of the roadway. The MDT *Road Design Manual* contains guidelines for the maximum grades on rural and urban minor arterials

based on the terrain of the roadway. The maximum grade recommendations for rural level and rural rolling terrain are 3 percent and 4 percent, respectively. The maximum grade recommendations for urban level and urban rolling terrain are 6 percent and 7 percent, respectively. Other vertical alignment design criteria relate to the rate of vertical curvature (K-Value) and stopping sight distance. The K-Value is a measure of the horizontal distance required to produce a 1-percent change in gradient.

The terrain varies slightly throughout the study area. Alignment grades through the city limits of Baker are generally flat and meet the maximum grade design standards for urban minor arterials. Review of the as-built plans indicates that there is one curve on MT 7 that does not meet current MDT standards for level terrain. The existing vertical grade exceeds the allowed maximum at approximately RM 37.1, north of Baker. There are also three vertical curves located between RM 37.1 and RM 37.71 that failed to meet current design standards for vertical stopping sight distance.

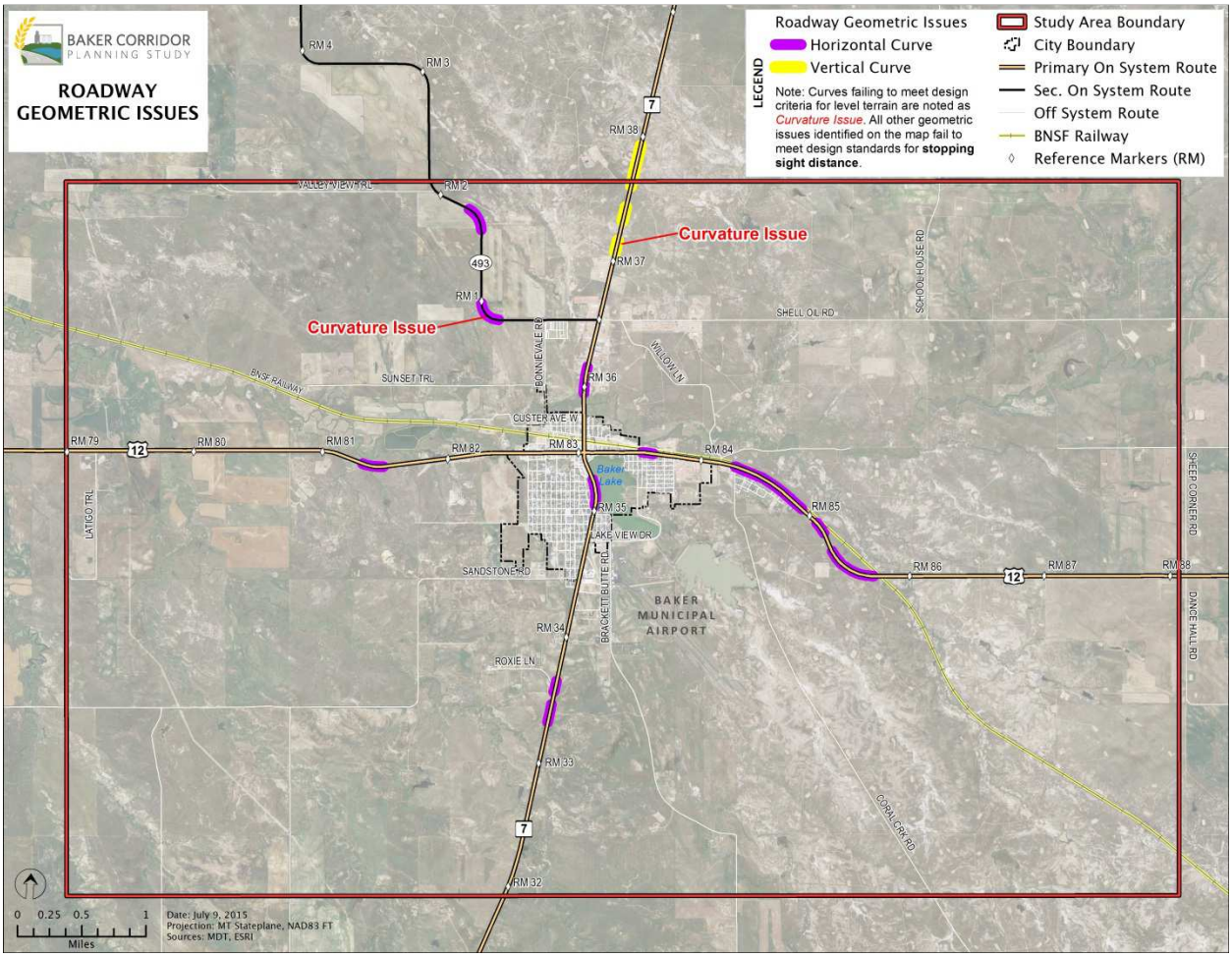

Figure 4: Roadway Geometric Issues

US 12/MT 7 Intersection

The intersection of US 12 and MT 7 was analyzed to determine whether the existing geometric design layout is sufficient to accommodate proper turning movements for larger design vehicles.

Anecdotal information suggests that semi-trailers commonly have difficulty making turning movements at this intersection and can conflict with either the opposing lane of traffic or vehicles parked in the angled parking along MT 7. Three design templates were used in analyzing the intersection: a WB-40, WB-50, and WB-67. A WB-40 is the smallest truck available (typically used for local delivery for restaurants and small retail) and has a 40-foot wheelbase (WB) as measured from the foremost axle to the rearmost axle. A WB-50 vehicle is an intermediate-sized semitrailer with a 50-foot WB. A WB-67 is a standard-sized semitrailer with a 67-foot WB and is the typical design vehicle state routes.

The analysis determined that the existing geometry of the US 12/MT 7 intersection is insufficient to accommodate left-turn movements of a WB-50 design vehicle. Figure 5 illustrates the left-turn movement from US 12 onto MT 7. For both left-turn movements from US 12 onto MT 7, the inside wheel path conflicts with a stopped vehicle (shown as red in Figure 5) on MT 7. For turning movements from MT 7 onto US 12, the wheel path for the northbound to westbound left turn conflicts with the stopped vehicle. All right-turn movements for the WB-50 can be made without conflict.

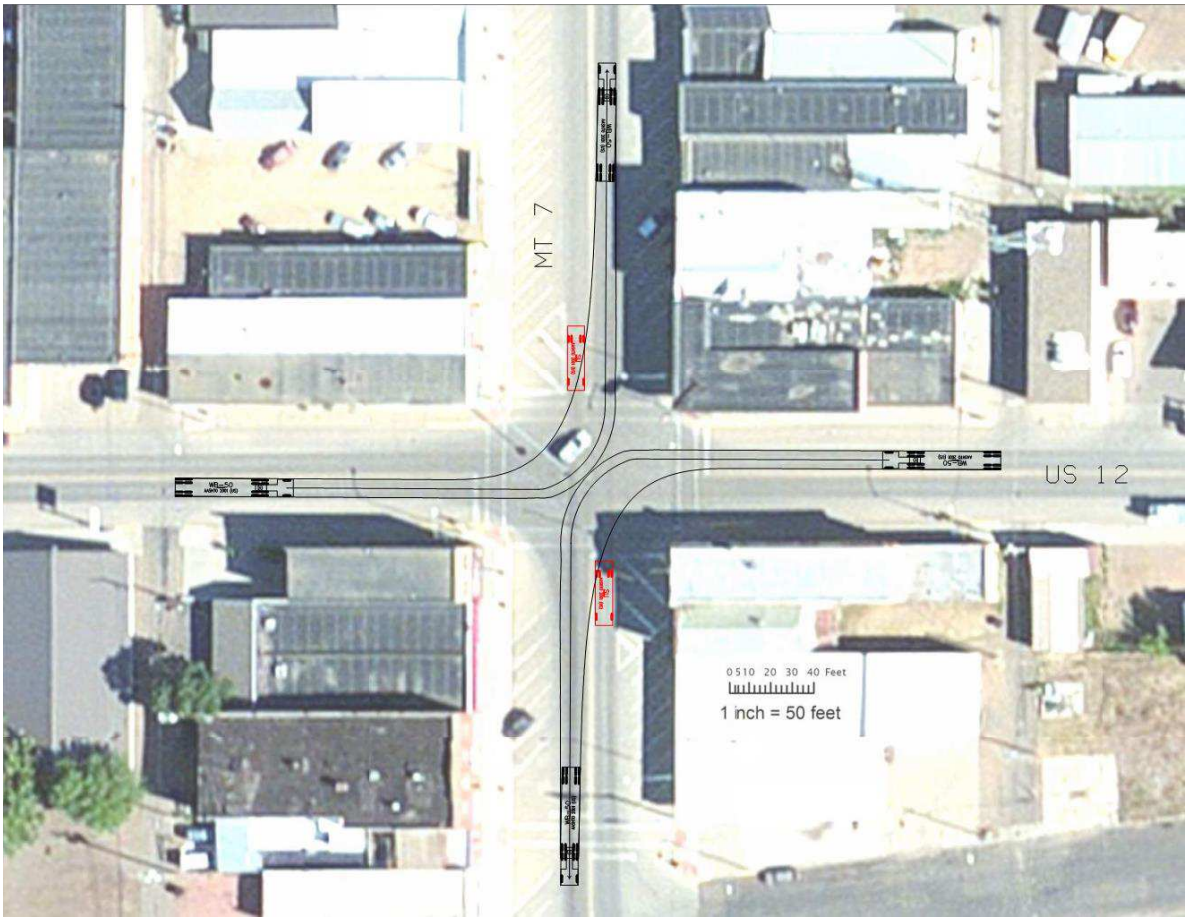

Figure 5: WB-50 Left-turn Movement from US 12 onto MT 7

The WB-67 design vehicle encountered conflicts at all four right-turn movements. Existing corner radii are not sufficient to prevent a truck of this size from rolling over curbing. The inside wheel path for the right-turn movement is extremely close to the existing curb and crosses into

two or three angled parking spaces. Because the shorter WB-50 could not make left-turn movements, it was unnecessary to test for the WB-67.

Roadside Clear Zones

The American Association of State Highway and Transportation Officials (AASHTO) *Roadside Design Guide* defines a clear zone as the total roadside border area, starting at the edge of the traveled way, available for safe use by errant vehicles. This area may consist of a shoulder, a recoverable slope, a non-recoverable slope, and/or a clear run-out area. The desired minimum width is dependent on traffic volumes and speeds, and on the roadside geometry.

Current MDT standards include recommended guidelines for clear zones in rural and urban roadway sections. The roadside clear zones were examined for US 12, MT 7, and S-493 within the study area. Based on this evaluation, one area of concern was identified at RM 86.18 on US 12, on both the north and south sides of the highway. Per the US 12 as-built plans, there is a 16-foot, 6-inch x 11-foot structural steel plate arch pipe culvert at this location to accommodate the existing channel crossing. The drainage structure at this location includes concrete cutoff walls located approximately 32 feet from the edge of travel way, within the existing fill slope. Concrete curb is currently in place at this location on US 12 for drainage purposes. The existing side slopes appear to be 4:1 or steeper. Based on current MDT standards, a clear zone distance of at least 40 feet is required for this section of US 12.

Intersection Sight Distances

The intersections of the highways within the study area were examined for sight distance deficiencies. The intersection of US 12 and MT 7 is an all-way stop with flashing signal. Per the MDT *Traffic Engineering Manual*, intersections with all-way stop control must provide sufficient sight distance so that the first stopped vehicle on each approach is visible to all other approaches. Based on this criterion, there is adequate sight distance at this intersection. The intersection of MT 7 and S-493 was analyzed for both approach and departure sight obstructions. Obstructions were not found within the sight triangles for either case.

Crash Analysis

Crash records spanning the 10-year period of 2004 to 2013 for the study area were examined to identify trends, if any, in the data. Crash records for locations along US 12 and MT 7 immediately adjacent to, but outside of the study area, were also included in the analysis. The crash data were summarized to determine crash rates by roadway segment. Table 3 summarizes the crash statistics for sections of the two main corridors within the study area for all vehicle types (total crashes) and for heavy vehicles (HVs). Each corridor has a crash rate calculated based on the total crashes for the road segment within the city limits of Baker (urban) and for each of the segments outside the city limits (rural).

Table 3: Crash Statistics

	Total Crashes	Heavy Vehicle Crashes	Crash Rate	Severity Index	Severity Rate
US 12 (RM 77–RM 82)	17	0	0.94	2.35	2.22
US 12 (RM 82–RM 83.6)[a]	14	5	0.64	1.14	0.73
US 12 (RM 83.6–RM 89)	13	3	0.72	2.15	1.55
MT 7 (RM 31–RM 34.6)	7	1	0.45	1.57	0.71
MT 7 (RM 34.6–RM 35.8)[a]	9	2	0.59	1.00	0.59
MT 7 (RM 35.8–RM 39)	7	1	0.51	2.00	1.01
Rural Statewide Average[b]	-	-	1.11	2.18	2.41
Urban Statewide Average[b]	-	-	4.51	1.66	7.48

Source: HDR 2015 and MDT Traffic and Data Collection Analysis, 2014.
[a] Road segment located within city limits.
[b] *Source: Statewide Primary Route Crash Statistics: 2008 through 2012 (MDT 2015).*

The crash rates within the study area for the US 12 and MT 7 corridors, both rural and urban road segments, are below the overall statewide average for State Primary Routes. Clear trends and crash clusters were not observed through analysis of the crash data. In general, angle and rear end crashes were common within the Baker city limits. On US 12, 5 of the 14 crashes that occurred within Baker city limits involved HVs, although these crashes were of various types with differing contributing circumstances. A majority of the study area crashes were property-damage-only crashes.

Access Analysis

On highway facilities, the primary purposes of access control include maintaining the flow of traffic and the functional integrity of the highway, as well as enhancing public safety. Within city limits, it is typical to have a higher density of access points due to the higher densities of development and facilities. However, in urbanized areas with higher traffic volumes, high densities of access points have the potential to increase traffic-related accidents along a roadway due to the proximity of vehicles entering or exiting the roadway.

Access points located along US 12 and MT 7 within the study area were counted using 2014 aerial imagery within GIS and verified using Google Street View. Access points included any defined entrance/exit onto the primary on-system routes, such as driveways to agricultural lands, businesses, residences, and private roads; alleyways; and intersections with local streets. US 12 has 155 access points (66 on the north side and 89 on the south side of the highway) within the study area between RM 79 and RM 88.5. MT 7 has 94 access points (49 on the east side and 45 on the west side) between RM 32 and RM 38. The density of access points increases dramatically within the city limits due to the number of residential driveways, alleys, and cross streets. Access densities on US 12 range from a minimum of 0 to 6 access points per mile outside city limits to a maximum of 100 access points per mile within city limits (RM 82.5 to 83). Access densities on MT 7 range from a minimum of 2 access points per mile outside city limits to a maximum of 42 access points per mile within city limits (RM 35.5 to 36).

Traffic Characteristics

The following section summarizes existing traffic conditions and provides a projection of future vehicular volumes and operations based on historic traffic growth rates for the study area. Both Average Daily Traffic (ADT) and turning movement count data within the study area were obtained to determine existing conditions and project future conditions. In addition, historic Annual Average Daily Traffic (AADT) data within the study area were obtained.

TRAFFIC VOLUMES

Historic and current traffic volumes were obtained for locations within and adjacent to the study area. Historic AADT counts for US 12 and MT 7 show volumes are highest at reference markers closest to the City of Baker, but there is additional volume using these corridors to access points outside the study area. To supplement historic traffic data, four locations were selected to collect ADT data within the study area on October 22, 2014. These data included vehicle classifications to determine an HV[1] percent. Since this was a single day of data, an adjustment factor was applied to the single day count to determine an appropriate AADT. This factor was determined using monthly data at a continuous data recorder within the study area, on US 12 at RM 88.5. The continuous data recorder showed that October typically has higher ADT than other months of the year. Table 4 shows the ADT data as well as the adjusted AADT and HV percentage.

Table 4: Average Daily Traffic – October 22, 2014

Corridor	Reference Marker	ADT	AADT	HV
US 12	80	1,467	1,280	14%
US 12	87	1,296	1,130	20%
MT 7	31	834	730	21%
MT 7	37	1,439	1,260	29%

Source: MDT 2014.

INTERSECTION OPERATIONS AND LEVEL OF SERVICE

Turning movement counts were collected at six intersections for a 12-hour period (7 AM through 7 PM) on October 22, 2014, and December 30, 2014. These counts included a breakdown by vehicle class that was used to determine an HV percentage for each intersection's turning movement. The peak period is the 1-hour period throughout the 12-hour study period that has the highest total intersection volume.

Peak-period turning movement counts were used to determine the existing level of service (LOS) within the study area. LOS refers to the degree of congestion on a roadway or at an intersection, measured in average delay, and based on the methodologies provided in the 2010 *Highway Capacity Manual*. LOS A represents free-flow conditions (motorists experience little or no delay and traffic levels are well below roadway capacity), and LOS F represents forced-flow conditions (motorists experience very long delays and traffic volumes exceed roadway

[1] MDT uses standard FHWA vehicle classifications when defining heavy vehicles (HVs). Throughout this document, HVs are any vehicles within classes 5 through 13 of FHWA's 13 Vehicle Classification system. This includes all vehicles that are two-axle, six-tire, single-unit trucks up through multi-axle (seven or more), multi-trailer trucks.

capacity). LOS B to E represents decreasing operational conditions. A traffic analysis program (Synchro Version 8.0) was used to determine intersection delay and LOS for existing conditions. Table 5 shows existing conditions LOS at the six study area intersections. Per the MDT *Traffic Engineering Manual*, a non-National Highway System Primary highway facility has a minimum design criteria LOS C and a desirable LOS B for urban minor arterials.

Table 5: Existing Conditions Level of Service during Peak Hour

Intersection	Peak Hour	Total Peak Hour Vehicles	Peak Hour HV Percentage (%)	LOS (Delay[a])
US 12 & MT 7	5:45 – 6:45 PM	778	7	B (14.4)
US 12 & Willow Lane	5:15 – 6:15 PM	185	24	A (9.6)
US 12 & Pleisner St.	2:45 – 3:45 PM	159	14	A (9.7)
MT 7 & Shell Oil Rd./S-493	7:30 – 8:30 AM	428	9	C (15.2)
MT 7 & Center Ave.	5:00 – 6:00 PM	158	3	A (9.7)
MT 7 & Gregory Ave.	6:00 – 7:00 PM	87	7	A (8.8)

Note: The worst-performing leg LOS is shown for each intersection.
[a] Delay is shown in seconds.

The study area has a high HV percentage, as shown in the data from Table 4. The turning movement data indicate there are higher HV movements between the north and east legs of the intersection of US 12 and MT 7. Larger volumes of HVs make turns from southbound MT 7 to eastbound US 12 and westbound US 12 to northbound MT 7 throughout the day as well as during the peak period.

PROJECTED TRAFFIC CONDITIONS

An average annual growth rate was determined over a 5-year and a 10-year period for each site using historic AADT counts. Projected traffic conditions were analyzed for a 20-year growth period (through year 2034) based on known existing conditions and potential future development likely to occur within the study area and region. Future traffic volumes likely will vary based on the level of future economic development. Additionally, future truck volumes (HVs) may increase more dramatically over standard vehicle volumes, depending on the level of future development. As such, a range of growth rates was estimated to account for low-, medium-, and high-growth scenarios, and includes:

- Low: 2 percent growth rate for all vehicles (passenger and HVs)
- Medium: 5 percent growth rate for all vehicles (passenger and HVs)
- High: 5 percent growth rate for standard vehicles; 10 percent growth rate for HVs

Future ADT volumes were estimated using the three growth-rate scenarios, and the results are shown in Table 6.

Table 6: Projected ADT Traffic Volumes (2034)

Site ID	Route	Reference Marker	Existing ADT[a]	2034		
				Low Growth	Medium Growth	High Growth
13-1-4[b]	US 12	76.13	1,230	1,900	3,400	4,000
13-1-15	US 12	82.09	1,560	2,400	4,300	4,900
13-1-16	US 12	82.60	3,790	5,700	10,600	11,100
13-1-17	US 12	82.65	3,320	5,000	9,200	10,000
13-1-18	US 12	83.07	2,350	3,600	6,500	7,300
13-1-5[b]	US 12	88.12	810	1,200	2,300	3,000
13-2-2[b]	MT 7	29.34	1,030	1,600	2,900	3,400
13-1-19	MT 7	34.32	1,310	2,000	3,600	4,200
13-1-20	MT 7	35.14	2,460	3,700	6,900	7,400
13-1-21	MT 7	35.45	3,730	5,700	10,400	11,000
13-1-22	MT 7	35.52	3,580	5,400	10,000	10,800
13-1-23	MT 7	35.76	2,990	4,500	8,300	9,100
13-1-7	MT 7	36.95	1,320	2,000	3,700	4,500
13-1-12	S-493	1.26	270	400	800	1,100

[a] *Source: MDT 2014.*

[b] Site located outside the study area boundary.

Low Growth = 2% growth rate for all vehicles; Medium Growth = 5% for all vehicles; High Growth = 5% for cars/trucks and 10% for heavy vehicles.

Future turning movements were analyzed at the six study area intersections, and LOS levels were calculated using the three growth scenarios described above for 2034. The future turning movement counts were analyzed for LOS using the existing intersection configurations. Table 7 shows the results of the intersection LOS analysis.

Table 7: Future Conditions (2034) Intersection Level of Service during Peak Hour

Intersection	LOS (Delay[a])			
	Existing Condition (2014)	Low Growth	Medium Growth	High Growth
US 12 & MT 7	B (14.4)	F (71.3)	F (>100)	F (>100)
US 12 & Willow Lane	A (9.6)	B (10.1)	B (11.9)	B (14.1)
US 12 & Pleisner St.	A (9.7)	B (10.4)	B (12.7)	B (14.4)
MT 7 & Shell Oil Rd./S-493	C (15.2)	D (28.2)	F (>100)	F (>100)
MT 7 & Center Ave.	A (9.7)	B (10.3)	B (12.4)	B (12.7)
MT 7 & Gregory Ave.	A (8.8)	A (9.1)	A (9.6)	A (9.9)

Note: The worst-performing leg LOS is shown for each intersection.

[a] Delay is shown in seconds.

Low Growth = 2% growth rate for all vehicles; Medium Growth = 5% for all vehicles; High Growth = 5% for cars/trucks and 10% for heavy vehicles.

As shown in Table 7, assuming existing geometric configurations, the intersection of US 12 and MT 7 will operate at a failing level (LOS F) in the future under all growth scenarios. The MT 7/Shell Oil Road/S-493 intersection is projected to operate at a failing level under the medium- and high-growth scenarios. More information on the LOS analysis can be found in **Appendix C**.

Railroad Crossing Queuing

Anecdotal information suggests that at times, trains can be parked on the railroad siding, thereby blocking all at-grade crossings in the downtown area and resulting in emergency vehicle access limitations and vehicular traffic congestion. There is an at-grade railroad crossing on MT 7 approximately 415 feet north of the intersection with US 12. The intersection of MT 7 and Railroad Avenue is immediately south of the railroad crossing and decreases the amount of vehicle queuing area on northbound MT 7. There is a stop bar located south of the at-grade crossing that allows for approximately 65 feet of queuing area before encroaching into the Railroad Avenue intersection, which does not accommodate a standard WB-67 vehicle. The grade crossing pavement marking begins at the south approach of the Railroad Avenue intersection, marking the beginning of the larger vehicle queuing area. This queuing area for northbound truck traffic on MT 7 is located approximately 115 feet south of the railroad crossing. In total, the approximate vehicle queue area available on MT 7 from Railroad Avenue to US 12 is 300 feet, which is enough to accommodate three semi-trailers (assuming a 100-foot-long WB-67 vehicle) or approximately 12 regular vehicles (assuming 25 feet per vehicle).

3.3 Environmental and Physical Setting

This section provides a summary of the *Environmental Scan* developed by MDT and included as **Appendix B** of this study. The *Environmental Scan* documents resources present within the study area and identifies potential constraints and opportunities for future transportation improvements. Information within this section was obtained from publicly available reports, websites, and other available documentation. This information represents a planning-level investigation and is not a detailed environmental analysis. If improvement options are forwarded from this study into project development, an analysis for compliance with the NEPA and MEPA will be completed as part of the MDT project development process.

Physical Environment

SOIL RESOURCES AND PRIME FARMLAND

Soils information was reviewed to determine the presence of prime and unique farmland in the study area to demonstrate compliance with the Farmland Protection Policy Act. The Natural Resources Conservation Service (NRCS) soil surveys indicate the presence of farmland of state or local importance, or prime farmland if irrigated within the study area. Specifically, areas classified as farmland of state or local importance make up most of the area within 2 square miles surrounding the City of Baker.

Any forwarded improvement options that require ROW within identified farmlands and are supported with federal funds will require a CPA-106 Farmland Conversion Impact Rating Form for Linear Projects completed by MDT and coordinated with NRCS. The NRCS uses information from the impact rating form to keep inventory of the prime and important farmlands within the state.

GEOLOGIC RESOURCES

The dominant geologic feature of the area is the Cedar Creek Anticline, which traverses the study area from north-northeast to south-southwest, passing just east of the City of Baker. The geologic materials within the study area are the Pierre Shale, the Timber Lake, Trail City, and

Colgate members of the Fox Hills Formation, the Hell Creek Formation, and the Ludlow Member of the Fort Union Formation.

The Pierre Shale, Hell Creek Formation, and Fox Hills Formation are Cretaceous-age bedrock consisting of shale, mudstone, siltstone, and sandstone. The Ludlow Member is Paleocene-age bedrock consisting of mudstone, siltstone, and sandstone. The bedrock is generally soft, weathers to bad-land topography, and swelling clays visible at the surface often show a characteristic “popcorn” texture.

These types of soils can create revegetation challenges. The design of future projects forwarded from the study should consider including permanent erosion and sediment control measures to the extent practicable to help the soils stay in place long enough for plants and grasses to take hold and revegetate the project. Improvements brought forward from the study will be subject to more detailed geotechnical analysis, including advance borings to evaluate soil characteristics at exact project locations.

SURFACE WATERS

Topographic maps and GIS data were reviewed to identify the location of surface water bodies such as rivers, streams, lakes, and reservoirs within the study area. The primary water bodies within the study area include:

- Sandstone Creek
- Deep Creek
- Red Butte Creek
- Lake Baker
- Timber Creek

A variety of additional surface waters, including unnamed streams, natural drainages, wetlands, and ponds are present in the study area. Impacts to any of these surface waters could occur from improvements such as culverts under the roadway, placement of fill, or rip rap armoring of banks. The USACE, the Montana Department of Fish, Wildlife, & Parks (FWP), and the Montana Department of Environmental Quality (DEQ) all regulate portions of work within surface waters. Coordination with federal, state, and local agencies would be necessary to determine the appropriate permits based on improvement options forwarded from this study. Impacts should be avoided and minimized to the maximum extent practicable. Stream and wetland impacts may trigger USACE compensatory mitigation requirements. Construction of forwarded improvement options may trigger the need to obtain coverage under the Montana Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity.

Total Maximum Daily Loads

The study area is located in the Lower Yellowstone Watershed (hydrologic unit code 10100005). A search of the DEQ website revealed Sandstone Creek as the only stream on the 303d list within the study area. DEQ lists Sandstone Creek as having impairment in the *Draft 2014 Integrated 303(d)/305(b) Water Quality Report* for Montana. This water body is a Category 5, defined as waters where one or more applicable beneficial uses are impaired or threatened, and

a total maximum daily load (TMDL) is required to address the factors causing the impairment or threat. Sandstone Creek is in the O'Fallon TMDL area, but at this time, the TMDL is not completed. One probable source of impairment is agriculture. The other is municipal point source discharges, which could be a result of release of water from wastewater treatment systems. Additionally, the *Fallon County Growth Policy* notes that water from the sewage treatment plant is used to water the golf course. Highway construction and ongoing transportation corridor use are not likely contributors to nitrogen loading in Sandstone Creek, so the nitrogen impairment is unlikely to trigger design modification for future roadway projects. That said, if improvement options are advanced, it will be necessary to reconsider DEQ TMDL standards and potential impacts to water quality within receiving streams and watersheds in the study area.

Sewage Treatment Ponds

The City of Baker's three-pond wastewater treatment system is located between RM 81 and RM 82 on the north side of US 12. The City of Baker is currently expanding its wastewater treatment system by adding an evaporation pond and possibly expanding the other ponds. Construction is currently underway on those improvements. Impacts to the wastewater treatment system should be avoided, as they will involve extra costs and possible land acquisition to offset associated impacts.

GROUNDWATER

According to the Montana Bureau of Mines and Geology Groundwater Information Center, there are 1,682 wells on record in Fallon County. Some of these wells are located within the study area. The wells in Fallon County have widely varying uses, with stockwater wells being the most common, followed by domestic wells.

The City of Baker has five public water supply wells and three potable water underground storage tanks (USTs) ranging in size from 100,000 gallons to 200,000 gallons. Four of the wells are located on the northwest edge of Baker; the fifth well is on the southwest edge of town, where the three USTs are also located. Public water supply wells have setbacks to ensure the wells are not contaminated. The typical setback is a 100-foot isolation zone, inside which there should be no source of pollutants. The public water supply wells and underground potable water storage tanks are areas to be avoided during future project development.

Impacts to the municipal drinking water system should be avoided, as they will involve extra costs and possible land acquisition to offset associated impacts. Impacts to existing domestic wells will also need to be considered if improvement options from the study are forwarded.

WETLANDS

USFWS National Wetlands Inventory (NWI) mapping data were examined for the study area. Potential wetland areas within the study area are primarily along Sandstone Creek and in the areas surrounding Lake Baker. An MDT wetland mitigation site was created in 2010 and is located along MT 7 south of Baker. The MDT wetland mitigation site is currently not a USACE-approved mitigation bank.

Future wetland delineations would be required if improvement options that could potentially impact wetlands are forwarded from the study. Future projects in the study area would need to

incorporate project design features to avoid and minimize adverse impacts to wetlands to the maximum extent practicable. Unavoidable impacts to wetlands must be compensated through mitigation in accordance with the USACE regulatory requirements and/or requirements of Executive Order (EO) 11990. Work within jurisdictional wetlands would require a Clean Water Act 404 permit from the USACE. If required, mitigation for improvement options forwarded from the study would not be able to use mitigation credits from the MDT wetland mitigation site until approved by the USACE and instead would need to address mitigation separately for each project constructed.

FLOODPLAINS AND FLOODWAYS

Federal Emergency Management Agency-issued flood maps for Fallon County indicate that four floodplain zones exist within the study area. In 1985, the U.S. Department of Agriculture Soil Conservation Service prepared the *Sandstone Creek and Tributaries Flood Plain Management Study*. This report is a detailed study that defined flood elevations of Sandstone Creek through the City of Baker and created the regulated floodplain boundaries currently used by the Fallon County Floodplain Administrator.

Potential roadway improvements or new alignments occurring to the north of Baker have potential to affect the mapped floodplain for Sandstone Creek. Roadway development involving placement of fill within the regulatory floodplain would require a floodplain permit, necessitating coordination with the Fallon County Floodplain Administrator to minimize floodplain impacts and obtain necessary floodplain permits for project construction.

IRRIGATION

Irrigated agriculture land exists in Fallon County within the study area. Improvement options forwarded from this study have the potential to impact irrigation facilities. Impacts to irrigation facilities should be avoided when feasible, due to the additional costs (above typical project costs) associated with the redesign or relocation of the irrigation structure(s). Future modifications to existing irrigation canals, ditches, or pressurized systems could require consultation with the owners to minimize impacts to agricultural operations.

The Water Resources Survey map indicates the presence of one historical private irrigation system and ditch in the study area.

AIR QUALITY

The study area is not located in a non-attainment area for any of the criteria pollutants designated by the U.S. Environmental Protection Agency. Additionally, there are no non-attainment areas nearby. Depending on the scope of improvements considered in the study area, an evaluation of mobile source air toxics may be required.

HAZARDOUS SUBSTANCES

The following is a brief summary of the primary sites within the study area that could impact potential future improvements and may require additional investigation or remediation.

Underground Storage Tanks

Twenty-six individual USTs were identified within the study area. These USTs are registered to various businesses and entities in Baker, including the BNSF Railway, Fueling Facilities, and Baker Municipal Airport. The majority of the active USTs are located within the Baker city limits,

and there are two closed USTs outside the city limits. Additional investigation regarding the precise locations of the USTs may be necessary depending on the improvement options forwarded from this study.

Leaking Underground Storage Tanks

Six active and 10 inactive leaking underground storage tank (LUST) sites were identified within the study area, most of which are within city limits. One inactive LUST site is noted to exist outside of the City of Baker. This location is immediately southwest of RM 37 on MT 7, north of Baker. Many of these LUST sites are Petroleum Tank Release Cleanup Fund sites. Further review or potential soil investigation may be necessary depending on the location and level of ground disturbance for any project forwarded from this study.

Mine Sites

One abandoned mine site is located within the study area southwest of the city. Other abandoned mine sites not identified in public databases may exist within the study area. If improvements are forwarded from the study, an on-the-ground field survey will be required to determine if the listed mine still exists and if other abandoned mines are present in the area of possible projects. If an abandoned mine site is located, additional investigation of the soils in the area may be necessary to determine if contamination exists.

Crude Oil Pipeline

One crude oil pipeline was identified in the northwest corner of the study area; however, information on the pipeline is limited. Considering the amount of oil and gas well development throughout the study area, it is probable that other sections of unmapped pipeline exist connecting the oil and gas wells to storage tanks and other facilities. If improvements are proposed in this area, additional research and coordination will be needed to identify any potential conflicts with the pipeline, and on-the-ground site visits and coordination with oil and gas well owners may be necessary.

Oil and Gas Production Wells

Oil and gas development exists in the study area. Three oil and gas formations (Cedar Creek, Pennel, and Lookout Butte) are oriented slightly northwest-southeast and encompass the entire eastern portion of the study area. These formations contain hundreds of oil and gas wells and associated oil and gas infrastructure. If future improvements occur in the eastern half of the study area, consideration should be given to avoiding oil and gas infrastructure where practicable. If projects brought forward from the study occur in proximity to the oil and gas wells, this would likely warrant additional soil investigations and coordination with oil and gas well owners to determine if contaminated soils are present.

Hazardous Waste Handlers

Three hazardous waste-handling facilities were identified within the study area. It is unlikely that these facilities will impact projects forwarded from the study; however, if construction activities were to occur in proximity to the Nalco Company Baker Warehouse, a soil investigation could be necessary to determine if contaminated soils are present. If contaminated soils are present, a special provision regarding handling contaminated soils would be recommended for inclusion in project documentation.

Biological Resources

VEGETATION

The Montana Natural Heritage Program (MNHP) *Land Cover Report* maps the study area as a combination of Great Plains Mixed-grass Prairie, Cultivated Crops, and Big Sagebrush Steppe habitat. The majority of land coverage within the study area is Great Plains habitat, with a few other land cover types interspersed.

If improvement options are forwarded from the study, practices outlined in MDT standard specifications should be followed to minimize adverse impacts to vegetation and facilitate establishment of final stabilization of disturbed areas. Removal of mature trees and shrubs should be limited to the extent practicable.

Noxious Weeds

The Invaders Database System lists 49 exotic plant species and 17 noxious weed species in Fallon County, some of which may be present in the study area. Fallon County has created a weed control plan that lists 26 noxious weed species as present in Fallon County. Reseeding of disturbed areas with desirable native plant species will help reduce the spread and establishment of noxious weeds and re-establish permanent vegetation. If improvements are forwarded from the study, coordination with the Fallon County Weed Board and field surveys for noxious weeds should take place prior to any ground disturbance activities.

GENERAL WILDLIFE SPECIES

Mammals

The study area is home to a variety of mammal species, including white-tail deer, mule deer, pronghorn antelope, and coyote. Other common mammals potentially occurring in the study area include mountain lion, raccoon, striped skunk, badger, bobcat, red fox, beaver, muskrat, long-tailed weasel, white-tailed jackrabbit, western harvest mouse, deer mouse, and prairie vole. If improvement options are forwarded from the study, the need for and viability of wildlife crossing mitigation measures should be explored during project development.

Amphibians and Reptiles

A review of the MNHP database was conducted for amphibian species known to occur within the study area. Species include, but are not limited to, the following:

- Boreal chorus frog
- Northern leopard frog
- Barred tiger salamander
- Greater short-horned lizard
- Snapping turtle
- Painted turtle
- Gopher snake
- Prairie rattlesnake
- Terrestrial garter snake
- Western hog-nosed snake

Any improvements forwarded from the study should take into consideration and minimize impacts to amphibian and reptile habitat where practicable.

Birds

A review of the MNHP database indicates there are more than 140 documented species of birds with the potential to occur and nest in the study area. These species include representative

songbirds, birds of prey, waterfowl, owls, and shorebirds. No known bald eagle or golden eagle nests have been identified within the study area.

Migratory birds are protected under the Migratory Bird Treaty Act (MBTA), and bald and golden eagles are protected under the MBTA and managed under the Bald and Golden Eagle Protection Act. Any improvements forwarded from this study should consider potential constraints that may result from nesting/breeding periods of migratory birds and the presence of unknown or future bald and golden eagle nests.

Fisheries

Sandstone Creek and Lake Baker are the only two documented fisheries in the study area and both contain numerous fish species.

Fish passage and/or barrier opportunities at affected drainages should be considered if improvements are forwarded from this study. Per FWP recommendation, culverts should be sized to span the bankfull channel width on fish-bearing streams. Culverts should also be embedded a minimum of 20 percent of the culvert rise. Studies have shown that culverts embedded at least 20 percent have less potential to become barriers to fish movements. Permitting from regulatory agencies for any future improvements may also require incorporation of additional design measures to facilitate aquatic species passage.

Crucial Areas Planning System

The FWP Crucial Areas Planning System (CAPS) is a resource intended to provide non-regulatory information during early planning stages of projects, conservation opportunities, and environmental review. CAPS was consulted to provide a general overview of the study area. CAPS provides both general recommendations and those specific to transportation projects for terrestrial and aquatic species and habitat. Recommendations forwarded from the study can have a generic application to potential project locations. Coordination with the FWP wildlife biologist should occur during project development.

THREATENED AND ENDANGERED SPECIES

The USFWS maintains the federal list of threatened and endangered (T&E) species. Species on this list receive protection under the Endangered Species Act (ESA). The USFWS also maintains a list of species that are candidates or proposed for possible addition to the list. According to the USFWS, four threatened, endangered, proposed, or candidate species are listed as occurring in Fallon County (see Table 8).

Table 8: Threatened and Endangered Species in Fallon County

Species	Status
Sprague's Pipit	Candidate
Red Knot	Threatened
Whooping Crane	Endangered
Northern Long-eared Bat	Proposed

Source: USFWS 2015.

On September 22, 2015, the USFWS determined that the protection for the greater sage grouse under the ESA is no longer warranted and is withdrawing the species from the candidate species list. Prior to this date, the greater sage grouse was listed as a candidate species for federal listing. MDT will continue to follow the stipulations for the conservation of the greater sage grouse contained in the State of Montana – Office of the Governor – EO No. 12-2015, "Executive Order Amending and Providing for the implementation of the Montana Sage Grouse Conservation Strategy."

According to the MNHP (report generated August 20, 2014), which records and maps documented observations of species in a known location, only the greater sage grouse and the Sprague's pipit have been recorded within the boundaries of the study area. Therefore, it is reasonable to presume that suitable habitats for these species may be present within the study area. As stated above, the greater sage grouse is no longer afforded protection under the ESA. If improvements are forwarded from the study, an evaluation of potential effects to T&E species will need to be completed during project development. As the federal status of protected species changes over time, reevaluation of the listed status and afforded protection to each species should be completed prior to issuing a determination of effect relative to potential impacts.

SPECIES OF CONCERN

A review of the MNHP species of concern (SOC) database (report generated August 19, 2014) revealed four SOC and four potential SOC in Fallon County (Table 9). These eight species have the potential to occur in the study area based on presence of suitable habitat.

Table 9: Species of Concern Overlapping the Study Area

Animal Subgroup	Common Name	State Rank[a]	Habitat Description
Birds	Greater Sage-grouse	S2	Sagebrush
	Baird's Sparrow	S3B	Grasslands
	Brewer's Sparrow	S3B	Sagebrush
	Chestnut-collared Longspur	S2B	Grasslands
Fish	Brook Stickleback	S4	Small prairie rivers
	Brassy Minnow	S4	Small prairie rivers
	Plains Minnow	S4	Small prairie rivers
	Creek Chub	S4	Small prairie rivers

Source: MNHP 2014.
[a] State rank definitions are located in the *Environmental Scan* in Appendix B.

As noted in the section above, the USFWS has removed the greater sage grouse as a candidate for inclusion on the list of T&E species. The USFWS has a website dedicated solely to the sage grouse.

MDT has obligations with regard to sage grouse conservation under Governor Bullock's EO No. 10-2014 (signed September 9, 2014). The EO delineated sage grouse core areas, connectivity areas, and general habitat in Montana. Both core and general habitat occur in the study area. According to MNHP, a portion of the sage grouse Cedar Creek Core Area extends into the

study area, and there are several sage grouse leks[2] outside of core habitat that surround the study area. When considering future project development, impact avoidance and minimization priority should generally first be directed to core habitat, although other locally important habitats and features warranting prioritization, such as leks, may occur in non-core habitat.

A thorough field investigation for the presence and extent of these species should be conducted if improvement options are forwarded from this study. If they are present, special conditions to the project design or during construction should be considered to avoid or minimize impacts to these species.

Social and Cultural Resources

DEMOGRAPHICS AND ECONOMIC CONDITIONS

Under NEPA and MEPA, as well as associated implementing regulations, state and federal agencies must assess potential social and economic impacts resulting from proposed actions. FHWA guidelines recommend consideration of impacts on neighborhoods and community cohesion, social groups (including minority populations), and local and/or regional economies, as well as growth and development induced by transportation improvements.

Title VI of the U.S. Civil Rights Act of 1964, as amended (United States Code [USC] 2000(d)), and EO 12898 require that no minority or, by extension, low-income person shall be disproportionately adversely impacted by any project receiving federal funds. For transportation projects, this means that no particular minority or low-income person may be disproportionately isolated, displaced, or otherwise subjected to adverse effects. Should a project be forwarded from this study, an Environmental Justice evaluation would be required during project development.

Population and Housing

After the decline following the 1970s oil boom, Fallon County experienced population loss for several decades. Fallon County is now experiencing growth, due in part to recent technological advancements that allow for the extraction of oil and natural gas that was previously inaccessible. As a result, the region has experienced economic growth and activity, which has generated a current increasing trend in the county's population. In 2013, the population of Fallon County was 3,085, with nearly 60 percent of the county's population residing in the City of Baker. A predominant portion of county residents, almost 98 percent, are self-identified as White. The American Indian population is slightly greater than 2 percent, compared with about 8 percent for the state as a whole. The Hispanic population is 0.5 percent, which is less than the state proportion. Table 10 summarizes demographic information for Fallon County.

[2] Traditional display areas on which male sage grouse perform the mating "dance" in or adjacent to breeding habitat.

Table 10: 2013 Census Estimates for Fallon County

Fallon County, Montana		Estimated Number	Percent
Total Population	Fallon County	3,085	100
	Baker	1,812	58.7
	Plevna	111	3.6
Race	White	3,074	97.8
	African American	4	0.1
	American Indian	66	2.1
	Asian	6	0.2
Ethnicity	Hispanic or Latino	15	0.5
Total Housing Units		1,472	100
	Occupied Housing Units	1,199	81.5
	Owner-Occupied	863	
	Renter-Occupied	336	
	Vacant	273	18.5

Source: American Community Survey (ACS) 2009-2013 5-Year Estimates

Population Projection

The Montana Department of Commerce utilizes economic modeling software known as REMI, or Regional Economic Models, Inc., to produce county-level population projections for the state of Montana. Based on the REMI model, Fallon County's population is projected to increase by approximately 1,500 people by the year 2030, and population growth rates greater than 3 percent per year could be expected until 2016. The population would then continue to increase at a slower rate through 2030. This type of growth trend is consistent with many counties in eastern Montana.

Regional Economy and Employment

The American Community Survey (ACS) produced a 5-year estimate (2008-2012) for employment by industry for Fallon County. The industry sector of agriculture, forestry, fishing, and hunting (which includes energy sector jobs) is the top field of employment, comprising 25.7 percent of jobs in Fallon County. The next highest employment sectors include educational services, and healthcare and social assistance (19.7 percent); construction (8.5 percent); and retail trade (7.4 percent).

Unemployment in Fallon County experienced fluctuations similar to statewide rates for the last decade, but has continuously been below the state and national rates. The sustained levels of low unemployment can likely be attributed to the economic boom in the Bakken region. According to the Montana Department of Labor, the estimated unemployment rate in Fallon County for November 2014 was 1.4 percent, which was the lowest level of county unemployment in the state. The unemployment rate in Fallon County is one-third of the statewide rate and approximately one-quarter of the national rate.

The income distribution for Fallon County is noticeably different than for the state and nation. Figure 6 shows the percentage of the population in Fallon County, the state of Montana, and the United States, by income category, from the 2010 Census. Fallon County tends to have a smaller percentage of the population in the lower and higher income categories than the state of Montana and the United States, with the majority of the population falling in the middle of the

distribution. Overall, Fallon County and Baker outperform the rest of Montana in terms of household income.

Figure 6: Income Distribution by Household

Figure 7 shows an estimation of the economic base of Fallon County in 2012 from the University of Montana Bureau of Business and Economic Research. The economic base refers to activities that bring income into an area or the economy that remains in the area. Although the figure considers only Fallon County, it is the best window available into the basic economy of the smaller study area.

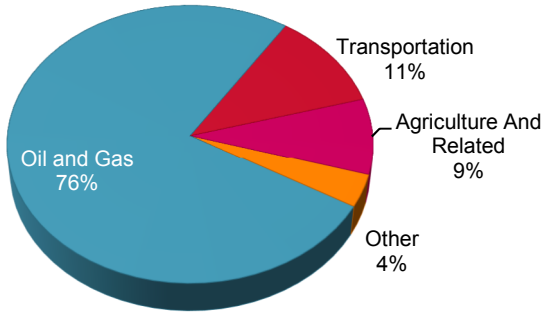

Figure 7: Economic Base of Fallon County, Montana (2012)

By far, the most influential share of the Fallon County economy is the energy industry (76 percent). The next largest portion of the economy is transportation (11 percent), which is likely influenced by the oil and gas industry, as well as by agricultural products that are processed and shipped near and through the area. The remaining 13 percent of the economic base is comprised of agriculture and all other industries. Although Fallon County's economic base is composed largely of oil and gas, this industry may derive economic benefit from a share of the current activity of oil extraction in the Bakken region north and east of the study area.

LAND OWNERSHIP AND LAND USE

Land adjacent to the US 12 and MT 7 corridors within the study area is predominantly privately owned. US 12 has two large adjacent state-owned parcels located at approximately RM 80 (south of highway) and between RM 86 and RM 87 (north of highway). Fallon County owns several large land parcels within the study area. The Bureau of Land Management owns several parcels within the study area, although they are not located on the primary highway system. Land use in the study area is a diverse mix that includes residential, agricultural, oil and gas development, and recreational areas, among others.

RECREATIONAL RESOURCES

Recreation areas within the study area include a collection of city parks within city limits, Fallon County Rifle Range & Trapshoot facility to the southwest of town, and a public golf course. Publicly owned recreational resources identified in the study area include the following:

- Mangold Sports Complex
- Triangle Park
- Iron Horse Park
- Senior Citizens Centennial Park
- Eastside Park
- Fallon County Fairgrounds
- County Golf Course
- Steve McClain Memorial Park
- Lake Baker Recreation Area

These recreational areas may be protected under Section 4(f) of the U.S. Department of Transportation Act of 1966, which was enacted to protect publicly owned parks, recreation areas, wildlife and waterfowl refuges, and public and private historic sites of local, state, and national significance. Federally funded transportation projects cannot impact Section 4(f)-protected properties unless there are no feasible or prudent avoidance alternatives, and all possible planning to minimize harm has occurred. If improvements are forwarded from this study, potential effects on recreational use would need to be considered in accordance with Section 4(f).

According to FWP Land and Water Conservation Fund Act Sites by County, there are three distinct Section 6(f) resources located within the study area: Lake Baker Recreation Area, Baker Pool Improvement, and the Fallon County Rifle Range & Trapshoot facility. Additional coordination with FWP will be necessary if improvements that potentially affect a Section 6(f) resource are forwarded from this study.

CULTURAL RESOURCES

Section 106 of the National Historic Preservation Act requires federal agencies to “take into account the effects of their undertakings on historic properties.” The purpose of the Section 106 process is to identify historic and archaeological properties that could be affected by the undertaking; assess the effects of the project; and investigate methods to avoid, minimize, or mitigate adverse effects on historic properties. These historic resources properties are also generally afforded protection under Section 4(f) of the Transportation Act.

A file search through the Montana State Historic Preservation Office revealed approximately 25 historic or archaeological properties located within the study area. Historic buildings, bridges, the BNSF Railway, pre-contact buried campsites, and lithic scatters are all located in the area. A

review of the Water Resources Survey map indicates the presence of one historical private irrigation system and ditch (Munsell Ditch) in the study area.

If a project is forwarded from this study, a cultural resources investigation and field survey would be necessary to determine National Register of Historic Places eligibility for cultural resources located within the project area of potential effect.

NOISE

Traffic noise may need to be evaluated for any future improvements in the study area. Noise analysis is necessary for "Type I"-classified projects. A Type I project includes a substantial shift in the horizontal or vertical alignments, increasing the number of through lanes, providing passing lanes, or increasing traffic speed and volume. Per FHWA requirements and MDT policy, a Type I project would require a detailed noise analysis to assess potential effects to sensitive noise receivers.

Noise abatement measures would be considered for the project if noise levels approach or substantially exceed the noise abatement criteria. The noise abatement measures must be determined to be reasonable and feasible before implementation.

VISUAL RESOURCES

The visual resources of an area include landforms, vegetation, water features, and physical modifications caused by human activities that give the landscape its visual character and aesthetic qualities. Visual resources are typically assessed based on the landscape character (what is seen), visual sensitivity (human preferences and values regarding what is seen), scenic integrity (degree of intactness and wholeness in landscape character), and landscape visibility (relative distance of seen areas) of a geographically defined view shed.

Baker is on the eastern edge of Montana, and the surrounding area is fields and rolling hills with sandstone outcroppings. There are minimal view-obstructing man-made items other than the City of Baker itself. To the north and east of Baker, oil rigs dot the horizon. As a whole, the landscape in the study area presents itself as a natural prairie/sagebrush environment with scattered agricultural fields and minimal urbanization. If improvement options are forwarded from this study, their potential effects on visual resources would need to be evaluated.

3.4 Summary of Areas of Consideration

The following section provides a summary of the areas of consideration identified within the study area. The areas of consideration were identified through review of as-built drawings, MDT databases, public databases, field review, and other available resources, and are described more thoroughly in the sections above.

Transportation System Areas of Consideration

LEVEL OF SERVICE

Based on a low-growth traffic scenario and existing geometric configurations, the intersection of US 12 and MT 7 will operate at a failing level of service (LOS F) in the future. Also under the low-growth scenario, the intersection of MT 7/S-493/Shell Oil Road will operate at LOS D in the

future. Medium- and high-growth traffic scenarios show that both intersections are predicted to fail under existing geometric configurations.

HORIZONTAL ALIGNMENT

One horizontal curve located on S-493 does not meet the current minimum radius per MDT design standards for level terrain. Ten horizontal curves failed to meet current design standards for horizontal stopping sight distances.

VERTICAL ALIGNMENT

One vertical curve located north of Baker at RM 37.10 does not meet current MDT design standards for level terrain. Three vertical curves located between RM 37.10 and RM 37.83 failed to meet current design standards for vertical stopping sight distances.

CLEAR ZONES

One area of concern was identified on US 12 at RM 86.18 on both the north and south sides of the highway. The drainage structure at this location includes concrete cutoff walls located approximately 32 feet from the edge of travel way, within the existing fill slope. The existing side slopes appear to be 4:1 or steeper. Based on current MDT standards, a clear zone distance of at least 40 feet is required for this area of US 12.

INTERSECTIONS

The main intersection of US 12 and MT 7 has an insufficient geometric layout to accommodate WB-50 and larger design vehicles. Trucks with a 50-foot and larger wheelbase encroach into the opposing lane when making turning movements at this intersection.

ACCESS POINTS

A high density of access points exists within Baker city limits, primarily along US 12 through the city.

BRIDGES

The wooden bridge located just north of Baker on MT 7 at RM 35.86 spanning Sandstone Creek (P00027035+08231) has been categorized as Functionally Obsolete.

Environmental Areas of Consideration

PRIME FARMLAND

NRCS soil surveys indicate the presence of farmland of state or local importance, or prime farmland if irrigated within the study area.

GEOLOGIC RESOURCES

Soil types within the study area can involve revegetation challenges and additional erosion and sedimentation considerations during construction.

SURFACE WATERS

Sandstone Creek is a major drainage that crosses the study area. A variety of other surface waters, including Lake Baker, as well as many unnamed streams, natural drainages, wetlands, and ponds, are present in the study area.

Sandstone Creek is identified on DEQ's 303(d) list for impaired water bodies, with agriculture as a probable cause for impairment.

GROUNDWATER

The City of Baker has five public water supply wells and three potable water underground storage tanks located within the study area.

WETLANDS AND WETLAND MITIGATION SITE

The study area contains many potential wetland areas, primarily along Sandstone Creek and areas surrounding Lake Baker. An MDT wetland mitigation site exists south of Baker along MT 7.

FLOODPLAINS AND FLOODWAYS

Regulated floodplains exist on and along Sandstone Creek within the study area.

HAZARDOUS SUBSTANCES

Twenty-six individual USTs were identified within the study area. Six active and 10 inactive LUST sites were identified within the study area, most of which are within city limits. One abandoned mine site was identified southwest of the intersection of US 12 and MT 7.

OIL AND GAS WELLS AND PIPELINES

Hundreds of oil and gas wells exist in the eastern half of the study area. One crude oil pipeline was identified in the northwest corner of the study area. Considering the amount of oil and gas well development throughout the study area, it is probable that other sections of unmapped pipeline exist that connect the oil and gas wells to storage tanks and other facilities.

WILDLIFE

Four threatened, endangered, proposed, or candidate species are listed as occurring in Fallon County. One candidate species has documented occurrences within the study area.

Four species of concern and four potential species of concern have the potential to occur in the study area. Core habitat for the greater sage grouse exists within the study area.

RECREATIONAL, HISTORICAL, AND CULTURAL RESOURCES

There are multiple potential Section 4(f) and three known Section 6(f) properties located within the study area.

Approximately 25 historic or archaeological properties are located within the study area, including historic buildings, bridges, the BNSF Railway, pre-contact buried campsites, and lithic scatters. The Water Resources Survey map indicates the presence of one historical private irrigation system and ditch within the study area.

4. Corridor Needs and Objectives

The following chapter identifies the needs and objectives for the *Baker Corridor Planning Study*. Needs and objectives are necessary to provide a framework for identifying improvements. The needs and objectives have been developed based on a review of findings from the *Environmental Scan* (refer to **Appendix B**) and *Existing and Projected Conditions Report* (refer to **Appendix C**), as well as input received from the public, local government, and resource agencies. The needs, objectives, and other considerations listed below are in no specific order.

Need 1: Improve operations and safety of US 12 and MT 7 within the study area to the extent practicable.

OBJECTIVES

1.a. Improve the operation of US 12/MT 7 intersection to accommodate an acceptable level of service (LOS C).

1.b. Improve operation of the US 12/MT 7 intersection to accommodate all design vehicles.

1.c. Improve roadway elements to meet current MDT design criteria.

Need 2: Improve mobility on US 12 and MT 7 for people and freight within the study area to the extent practicable.

OBJECTIVES

2.a. Reduce delay due to at-grade railroad crossing closures.

2.b. Accommodate existing and future capacity demands within the corridor.

2.c. Preserve and maintain roadway surfacing and bridges on US 12 and MT 7 to accommodate future transportation demands.

Other considerations to the extent practicable

- Minimize the resource[3] impacts of improvement options.
- Minimize impacts during construction.
- Consider construction feasibility of improvement options.
- Maintain consistency with local plans.

[3] Includes environmental, social, cultural, and economic resources.

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5. Improvement Options

The following chapter identifies a range of improvement options that may be considered for future implementation within the study area. The improvement options have been developed based on the evaluation of the existing and projected conditions within the study area. Roadway issues and areas of consideration were identified based on field review, engineering analysis of as-built drawings, crash data analysis, and information provided by the planning study team.

The improvement options include new alignments developed through the use of Quantm route optimization software. Section 5.7 within this chapter describes the planning-level analysis and results that were conducted through a tiered screening process to evaluate new alignment options against the needs and objectives defined for the study area. The first-level screening process determined the optimal study area quadrant to examine alignment options. The second-level screening process involved a more stringent application of quantitative screening criteria in order to evaluate and rank the preliminary alignments to determine the preferred alignment option(s). Refer to the *New Alignment Identification Using Quantm* report within **Appendix C** for additional detail on the alignment identification and analysis process.

The improvement options were grouped into the following categories:

- Corridor Planning
- Geometric and Pavement Condition Improvements
- Intersection Improvements
- Bridge Improvements
- Alternative Truck Routes on Existing Routes
- Alternative Truck Routes on New Alignment

The information that follows provides descriptions, evaluations, and planning-level cost estimates for the improvement options. Planning-level cost estimates are for all phase costs and use 2015 dollars as a base. The cost estimates also include ROW, utilities, and inflation based on the associated project timeframe.

5.1 Project Implementation Considerations

Project Timeframe

Improvement option implementation depends on several factors, including funding availability, ROW requirements, project complexity, and local priorities, among others. The improvement options have been grouped into general timeframes:

- Short-term Improvements: 0- to 5-year timeframe
- Mid-term Improvements: 5- to 10-year timeframe
- Long-term Improvements: 10- or more year timeframe
- As-needed Improvements: Improvement options would be implemented based on required need and available funding, such as regularly scheduled maintenance and spot treatments

Short-term improvements are generally those that can address an immediate need identified within the study area and can be implemented at a relatively low cost. These may include spot improvements such as installing additional guard rails or improved pavement markings and signing. Mid-term improvements are those that may require additional time for project development or address a need anticipated within the 5- to 10-year timeframe. Long-term improvements are improvements that address areas of concern based on anticipated future conditions or may include improvements that address immediate needs that, due to cost or other concerns, cannot be constructed in the short- to mid-term. Long-term improvements are generally more costly to implement than short- and mid-term improvements. As-needed improvements can be implemented based on observed needs throughout the planning horizon and could include spot treatments or pavement preservation projects.

Estimated Cost
The estimated costs shown for the following alternatives include estimated costs for all project phases, including preliminary engineering, utility relocations, ROW acquisition, and construction cost. Additional information on the cost for each alternative can be found in **Appendix C**.

Potential funding sources for the various improvements are also provided below; however, no funding has been identified for any of the improvement options. Refer to Chapter 6 for more information on potential funding sources.

5.2 Corridor Planning

Improvement Option 1: Access Management Plan
The number and location of access points within the study area is a concern. Too many access points along the highway and access points located too close to an intersection create potentially unsafe conflict points. A high density of access points exists within the Baker city limits, primarily along US 12. Recent growth along MT 7 north of Baker has increased the number of access points to commercial and industrial uses. The *Fallon County Growth Policy* also recommends completing an *Access Management Plan* for improved safety and traffic characteristics and enhancing community character along the highway corridors.

MDT's current approach to regulating driveway access is specified in the Administrative Rules of Montana (ARM 18.5.105) and requires action by the Montana Transportation Commission. An *Access Management Plan* should be developed to address the high density of access points within the US 12 and MT 7 corridors. The plan should explore ways to eliminate, reduce, or combine existing or future accesses to individual properties.

Recommendation:

- Develop an *Access Management Plan* for MT 7 and US 12 within the corridor study area

Project Timeline:

- Short-term

Estimated Cost:

- $100,000 to $150,000

Potential Funding Sources:

- Surface Transportation Program – Primary (STPP), Local

Benefits:

- Improve safety through limiting/consolidating access points on US 12 and MT 7
- Improve traffic and operations along corridor
- Enhance community character through development of consistent control guidelines
- No environmental resource impacts anticipated

Concerns:

- Impact to business and property access

Improvement Option 2: Grade Separation Feasibility Study

A grade separation feasibility study could be conducted in order to examine potential locations within the City of Baker where a grade separation of the BNSF Railway may be constructed. The feasibility study could evaluate in greater depth the anticipated levels of vehicular, rail, and pedestrian and bicycle traffic; conduct a detailed traffic analysis in order to evaluate the effects of the new crossing; and determine ROW requirements and potential impacts to adjacent properties and other resources. This feasibility study could look at a number of crossings within the Baker city limits and include preliminary engineering to determine alternate grade-separated concepts, address storm drainage concerns, and include planning-level cost estimates for each option.

Recommendation:

- Conduct study to examine feasibility of constructing a grade separation within city limits

Project Timeline:

- Short-term

Estimated Cost:

- $100,000 to $125,000

Potential Funding Sources:

- STPP, Local

Benefits:

- Would develop build scenarios and cost estimates
- No environmental resource impacts anticipated

Concerns:

- None identified

5.3 Geometric and Pavement Condition Improvements

Roadway geometrics were compared to current MDT design standards. The analysis identified potential strategies that may help correct some of the identified issues and/or minimize the potential effects. Areas not meeting current MDT design standards do not necessarily represent unsafe conditions or warrant improvements. It may not be cost effective to reconstruct the

roadway to address geometric issues unless there are documented safety issues. Improvement options are discussed further in the following sections.

Improvement Option 3: Clear Zone on US 12 near RM 86.18

The drainage structure on US 12 located at approximately RM 86.18 includes concrete cutoff walls in the existing fill slope, approximately 32 feet from the edge of travel way. Based on current MDT standards and the existing fill slope of approximately 4:1, these cutoff walls are located within the 40-foot clear zone. The recommended clear zone distance discussed in the MDT *Road Design Manual* is to accommodate run-off-road vehicles and provide enough distance to regain control of the vehicle. Since the cutoff walls are located within the recommended clear zone, the cutoff walls could be protected with a roadside barrier or be moved farther from the edge of travel. Extending the drainage structure to relocate the headwalls outside the clear zone could be costly due to the size of the culvert.

Recommendation:

- Extend the existing guardrail or place a new guardrail section at this location in order to provide additional roadside protection from the existing concrete cutoff walls

Project Timeline:

- Short-term

Estimated Cost:

- $40,000 to $42,000

Potential Funding Sources:

- STPP, Highway Safety Improvement Program (HSIP)

Benefits:

- Consistent with current MDT design standards
- Improved safety
- No environmental resource impacts anticipated

Concerns:

- Additional maintenance of guardrail

Improvement Option 4: Horizontal Curve Warning Signs

One horizontal curve on S-493 does not meet current MDT design standards for level terrain, while an additional ten horizontal curves throughout the study area failed to meet current design standards for horizontal stopping sight distance (refer to the table in Section 5.8 for locations). Complete reconstruction of the horizontal curve at RM 0.86 on S-493 would require ROW and potential utility relocations and is not recommended due to the relatively low AADT of the roadway and a lack of documented safety concerns. A feasible improvement option to address horizontal stopping sight distance issues is to provide advanced curve warning signs at these locations.

Recommendation:

- Update signing at the ten horizontal curves (two signs per curve) to provide advanced curve warning signs that meet current MDT and the *Manual on Uniform Traffic Control Devices* standards

Project Timeline:

- Short-term

Estimated Cost:

- $11,000 to $12,000

Potential Funding Sources:

- STPP, HSIP

Benefits:

- Consistent with current MDT design standards
- Increased driver awareness
- Improved safety
- No environmental resource impacts anticipated

Concerns:

- Does not address geometric issues on S-493
- Does not address sight distance concerns at curves

Improvement Option 5: Vertical Curvature Improvements

One sag vertical curve located north of Baker at RM 37.10 on MT 7 does not meet current MDT design standards for the recommended minimum K-value, which is the horizontal distance needed to produce a 1 percent change in gradient. There are also two vertical curves between RM 37.10 (sag vertical curve) and RM 37.83 (crest vertical curve) that fail to meet current design standards for stopping sight distance and maximum grade. While there are currently no documented safety issues, improving sight distance along these sections of roadway would reduce the likelihood of future safety concerns as vehicular and truck traffic increases.

Recommendation:

- Improvements to the roadway grade/slope and length of the vertical curves to meet current MDT vertical curvature standards could be made at these three locations to improve safety through this area of MT 7

Project Timeline:

- Mid-term

Estimated Cost:

- $1,500,000 to $1,700,000

Potential Funding Sources:

- STPP, HSIP

Benefits:

- Consistent with current MDT design standards

- Increased stopping sight distances
- Improved safety

Concerns:

- Potential ROW constraints due to surfacing widening
- Potential wetland areas located adjacent the highway

Improvement Option 6: Extend Pavement on S-493 (Pennel Road)

The existing pavement on S-493 ends and continues with a gravel surfacing 1 mile west of the intersection with MT-7 at approximately RM 1.0. The planned Keystone XL Pipeline pump station and on-ramp is located approximately 10 miles from the study area along Pennel Road. Extending the pavement in this area would provide dust control, which would be beneficial given the anticipated HV traffic along this part of the study area. Improvements to S-493 could be implemented on an as-needed basis, depending on the outcome and anticipated construction schedule of the pipeline project. Existing ROW along this section of S-493 varies from 120 feet to 180 feet wide. Further examination would be required to identify specific ROW constraints within this area and the recommended pavement thickness. If little or no widening is needed and pavement slopes can match existing conditions, ROW concerns would be reduced. The need for this improvement should be confirmed as projects are forwarded from the study, given the uncertainties on the development of the Keystone XL Pipeline and associated growth.

Recommendation:

- Increase paved roadway limits along S-493

Project Timeline:

- As needed

Estimated Cost:

- $1,700,000 to $1,800,000 per mile

Potential Funding Sources:

- Surface Transportation Program – Secondary (STPS), Local

Benefits:

- Improved surfacing condition
- Provides dust control

Concerns:

- Potential impacts to adjacent wetlands and water bodies during construction
- May increase driving speeds, which could affect safety along S-493

5.4 Intersection Improvements

The following improvement options include traffic improvements at two major intersections within the study area: US 12/MT 7 intersection and MT 7/Shell Oil Road/S-493 intersection. The recommendations for these two intersections are based on the 2034 projected traffic conditions for the three growth scenarios examined. The growth scenarios project traffic conditions over the 20-year planning horizon (through 2034) and were estimated to account for low-, medium-, and high-growth rates, which include:

- Low: 2 percent growth rate for all vehicles (passenger and HVs)
- Medium: 5 percent growth rate for all vehicles (passenger and HVs)
- High: 5 percent growth rate for standard vehicles, 10% growth rate for HVs

Additionally, one improvement option is provided for the intersection of Willow Lane with US 12. The intersection improvement options are discussed below.

Improvement Option 7: Pavement Marking Improvements at US 12/MT 7 Intersection
The existing geometric layout at the main intersection of US 12 and MT 7 does not accommodate the turning movements for WB-50 and larger design vehicles. Trucks with 50-foot and larger wheelbases encounter conflicts when making turning movements at this intersection. The location of this intersection is in downtown Baker, with buildings in proximity to the intersection on all four corners. Due to the existing structures and ROW constraints at this intersection, major geometric improvements are not likely. However, pavement marking improvements could be made at this intersection to improve conditions and to meet current MDT design standards to accommodate the WB-67 design vehicle. Improvements are depicted in Figure 8.

Recommendation:

- Add a narrow, striped median at all approaches for additional separation between turning vehicles and stopped vehicles at the intersection.
- Relocate the stop bar farther back from the intersection while maintaining adequate sight distance for stopped vehicles at all approaches.
- Remove on-street parking spaces near the intersection to allow for additional turning space. Parallel parking spaces would be removed from the east approach (north and south side) and west approach (north and south side).

Project Timeline:

- Short-term

Estimated Cost:

- $10,000 to $11,000

Potential Funding Sources:

- STPP, HSIP, Congestion Mitigation and Air Quality (CMAQ), Transportation Alternatives (TA)

Benefits:

- Improved intersection operations
- Improved turning movements because of reduced conflicts with opposing traffic and parked vehicles
- No environmental resource impacts anticipated

Concerns:

- Impacts to available parking near intersection, potentially 12 spaces along MT 7 and 8 spaces along US 12, or an estimated 20 spaces for the intersection
- Revised configuration still presents problems for right-turning WB-67 vehicles and may require curb mounting at the corners

Figure 8: Pavement Marking Improvements at US 12/MT 7 Intersection

Improvement Option 8: Future Signalization of US 12/MT 7

The current configuration of the intersection of US 12/MT 7 will operate at a failing level of service (LOS F) under projected traffic conditions. Geometric improvements such as signalization and left-turn lanes will improve operations under future conditions.

Current traffic patterns show consistent volumes through all movements at this intersection, with volumes utilizing turning movements from all legs. HVs, which make up a large percentage of the vehicles traversing the intersection, require additional time and adequate gaps in oncoming traffic to make turning movements.

Table 11 compares the current configuration (without signalization) to two potential improvements for the projected 2034 traffic levels using the three identified growth scenarios. The first improvement is to use the existing geometric configuration while signalizing the intersection. The second is to reconfigure the approach lanes to include left-turn lanes on all four approaches in addition to signalizing the intersection. Lane reconfigurations are depicted in Figure 9.

Several signal phasing configurations were considered in the analysis, including split-phasing, left-turn protected phasing, and permitted phasing. The results in Table 11 represent the optimized signal phasing and timings for the projected conditions. The left-turn lane configuration scenario used leading left-turn protected phasing. All three of the results shown in

Table 11 assume no other projects or improvements within the study area. As a result, the three growth scenarios represent all projected volumes, including those of HVs. Should any other improvement options be implemented, operations at this intersection may be impacted.

Table 11: Existing Stop-Controlled, Signalized, and Signalized with Left-Turn Lanes LOS Results (2034) for the US 12/MT 7 Intersection

US 12/MT 7 Intersection	LOS (Delay[a])			
	Existing Condition (2014)	Low Growth	Medium Growth	High Growth
Under Existing Geometry (Stop Controlled)	B (14.4)	F (71.3)	F (>100)	F (>100)
With Signalization	-	B (17.9)	F (>100)	F (>100)
With Signalization and Left-Turn Lanes	-	B (10.2)	C (29.7)	D (51.3)

Note: The worst-performing leg LOS is shown under stop-controlled operations.
Low Growth = 2% growth rate for all vehicles; Medium Growth = 5% for all vehicles; High Growth = 5% for cars/trucks and 10% for heavy vehicles.
[a] Delay is shown in seconds.

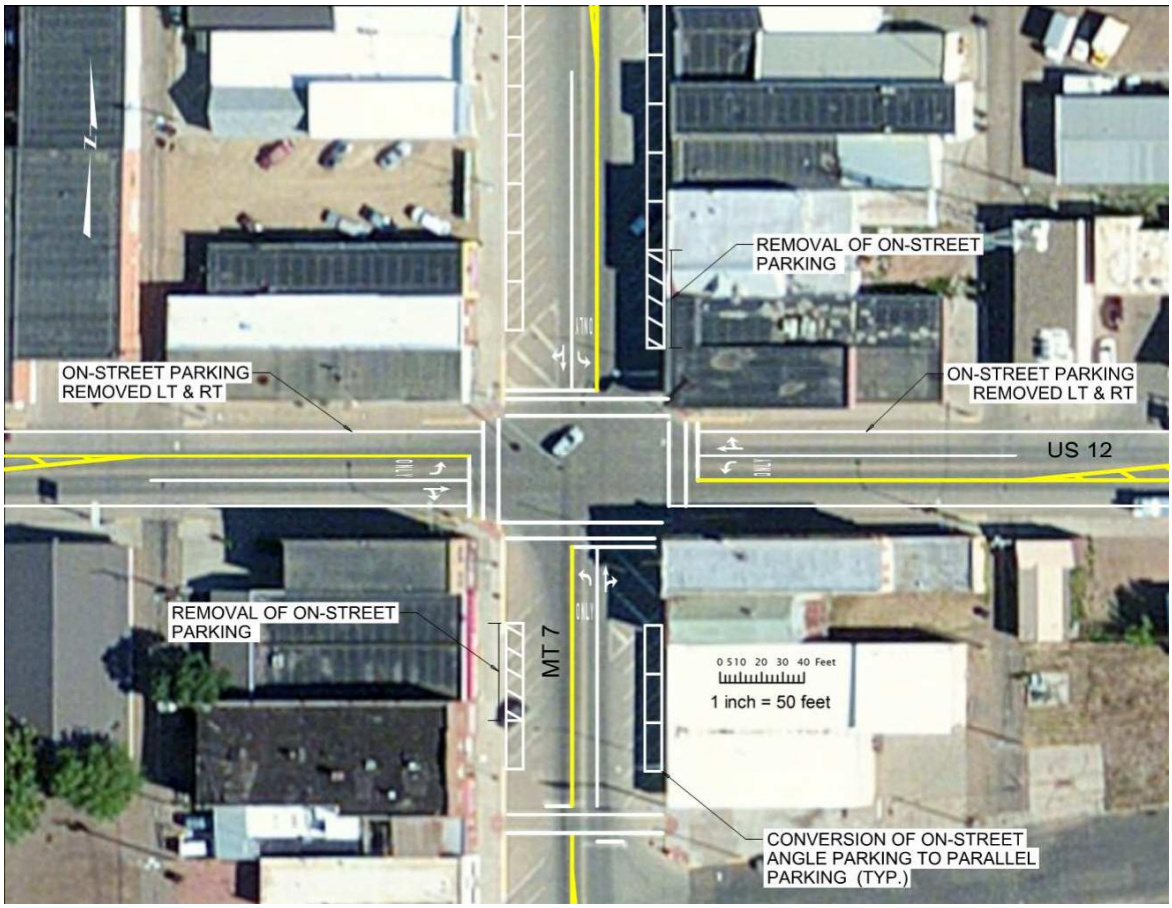

Figure 9: Left-Turn Lane Reconfiguration at US 12/MT 7 Intersection

As can be seen in Table 11, the intersection will continue to operate at failing conditions under the two higher growth scenarios if only signalization is added to the intersection. The addition of left-turn lanes greatly increases operations at the intersection under these growth scenarios.

In addition, should the intersection be signalized, the at-grade railroad crossing on MT 7 within 500 feet north of the intersection with US 12 can be improved. Queuing from crossing events, as well as from the intersection of MT 7 with US 12, can impact operations and create a safety concern within the area. Railroad pre-signals, in addition to crossing gates, can be used to interconnect the rail system to stop vehicles north of the crossing to avoid potential queues backing onto the tracks from the intersection at US 12. A pre-signal adds an additional stop light at or in advance of the crossing gates. Pre-signals would also be effective in clearing vehicles south of the crossing that may be backed onto the tracks as a crossing event is starting.

By adding left-turn lanes at all four approaches, on-street parking is reduced to accommodate the additional lane. When looking at truck-turning movements at this intersection, both the WB-67 and WB-50 will encroach in the neighboring receiving lane when making the left turn. In addition, the right-turn movements at this intersection also require tracking on the sidewalk by the WB-67 and WB-50. In an effort to maximize lane widths along MT 7, the angled parking could be converted to parallel parking on the first block north and south of the intersection. The overall number of parking spaces would be reduced by half on these two approaches, but the through-lane width would increase to approximately 23.5 feet, which would allow for additional turning area for truck clearance.

Signalization of this intersection will be necessary under the medium- and high-growth scenarios, regardless of projected truck use. Operations would improve by simply diverting truck trips from the intersection, but signalization and left-turn lanes would be needed to ensure acceptable operations. As there are geometric design concerns for the implementation of turn lanes at this intersection, it is recommended that alternate truck routes be provided in addition to these improvements.

Recommendation:

- Add left-turn lanes on all approach legs
- Signalize the intersection (signal improvements must meet signal warrants)
- Remove adjacent on-street parking on US 12 and convert angled parking to parallel parking on MT 7 in order to ensure all lanes and movements can be accommodated as per MDT design standards

Project Timeline:

- Long-term

Estimated Cost:

- $600,000 to $650,000

Potential Funding Sources:

- STPP, HSIP, CMAQ, TA

Benefits:

- Improved future year intersection operations
- No environmental resource impacts anticipated

Concerns:

- Conflicting turning movements with large vehicles
- Intersection improvements required in order to accommodate large turning vehicles
- Loss of on-street parking near the US 12/MT 7 intersection (Assuming a storage length of 150 feet, approximately 26 parking spaces would be impacted on the north and south approaches, as well as 20 spaces on the east and west approaches. Estimated total loss of parking is 26 spaces, negatively affecting downtown businesses. This total assumes the angled parking along MT 7 would be converted to parallel parking to minimize on-street parking north and south of the intersection.)

Improvement Option 9: Intersection Improvements at MT 7/Shell Oil Rd/S-493

The current configuration of the intersection of MT 7/Shell Oil Road/S-493 will operate at a failing level of service (LOS F) under projected medium- and high-growth traffic growth scenarios. Geometric improvements such as left-turn lanes and signalization or construction of a roundabout will improve operations under future conditions.

Current traffic patterns show heavy volumes using the northbound to westbound left-turn movement, as well as many HVs making turning movements throughout all four legs. HVs require additional time and adequate gaps in oncoming traffic to make turning movements.

Table 12 compares the current configuration (without signalization) to two potential improvement options for the projected 2034 traffic levels using the three defined growth scenarios. The first improvement option is to add a northbound left-turn lane and signalize the intersection. The second is to reconfigure the intersection as a single-lane roundabout.

Table 12: Existing Non-signalized, Signalized, and Roundabout LOS Results (2034) for the MT 7/Shell Oil Road/S-493 Intersection

MT 7/Shell Oil Road/S-493 Intersection	LOS (Delay[a])			
	Existing Condition (2014)	Low Growth	Medium Growth	High Growth
Under Existing Geometry (Non-Signalized)	C (15.2)	D (28.2)	F (>100)	F (>100)
With Signalization and Left-turn Lane	-	A (6.3)	B (12.1)	C (22.3)
With Single-Lane Roundabout	-	A	C	F

Note: The worst-performing leg LOS is shown under stop-controlled and roundabout operations.
Low Growth = 2% growth rate for all vehicles; Medium Growth = 5% for all vehicles; High Growth = 5% for cars/trucks and 10% for heavy vehicles.
[a] Delay is shown in seconds. Note that the roundabout analysis does not accurately report delay, so is not included here.

With the addition of a traffic signal and a left-turn lane to the northbound approach of MT 7, the future operations of the MT 7/Shell Oil Rd/S-493 intersection will improve from a failing level of service (medium- and high-growth scenarios), as shown in Table 12.

Under a single-lane roundabout scenario (see Figure 10), the intersection will perform at acceptable levels under the low- and medium-growth scenarios but will continue to fail under the high-growth scenario. Although not depicted in Figure 10, the addition of a 50-foot right-turn lane on the south leg for northbound right-turn movements would reduce queuing and improve the LOS from F to C under the high-growth scenario by diverting the northbound to eastbound traffic movement.

The roundabout analysis assumes conservative factors for driver populations. These factors represent how comfortable and knowledgeable the driving population is in navigating roundabouts. As a driver becomes more knowledgeable in the navigation of a roundabout, overall operations will improve as gap acceptance is improved. In addition, as the driver population becomes more knowledgeable of roundabout navigation, these factors would be expected to decrease, creating more favorable LOS results, even without the addition of a dedicated right-turn lane.

Figure 10: Roundabout Concept at MT 7/Shell Oil Road/S-493

Recommendation:

- Signalization:
  - Add a left-turn lane on MT 7 in the northbound direction
  - Signalize the intersection (signal improvements must meet signal warrants)
  - Ensure all lanes and movements can be accommodated as per MDT design standards

- Roundabout:
    - Construct a single-lane roundabout
    - Ensure all lanes and movements can be accommodated as per MDT design standards

Project Timeline:

- Long-term

Estimated Cost:

- Signal: $600,000 to $625,000
- Roundabout: $3,200,000 to $3,300,000

Potential Funding Sources:

- STPP, HSIP, CMAQ

Benefits:

- Improved future-year intersection operations
- Would separate turning vehicles from highway traffic stream
- Roundabout operations typically improve safety at intersections

Concerns:

- Likely ROW requirements for intersection improvements
- Potential wetland areas located adjacent to the highway

Improvement Option 10: US 12/Willow Lane Turn Lane Queuing and Railroad Crossing Improvements

The private oil field road connecting US 12 to Shell Oil Road has been identified within the 2012 *Fallon County Growth Policy* as a potential alternate truck route (refer to Figure 9.2 in the *Fallon County Growth Policy*). Willow Lane has an intersection with US 12 at approximately RM 84.1, then crosses the railroad at an at-grade crossing, at which point Willow Lane splits from the private road and veers east. The private oil field road travels in a north-northeast direction to its intersection with Shell Oil Road. During railroad crossing closures, trucks desiring to utilize this road as an alternate route lack queuing space along the shoulder of US 12 while waiting for trains to clear the crossing. Additional queuing space could be provided by creating a widened shoulder on the north side of US 12 to allow trucks a parking area in which to wait during crossing closures. Providing additional queuing space could result in fewer trucks stacking up at the MT 7 railroad crossing during crossing closures.

The approaches would require widening as well as roadway improvements from US 12 to Willow Lane. The existing approach is approximately 24 feet wide, which limits the allowable usable area for truck turning traffic. If the approach and roadway are widened to a minimum of 32 feet, a WB-67 can navigate the right turn more efficiently and reduce conflicts with oncoming southbound traffic at the crossing.

This option also includes improving the grades to the approaches of the at-grade railroad crossing. This crossing has been identified as having steep approaches, which can make crossing difficult for longer or lowboy-type trucks. The problematic approaches likely discourage

use by some HVs that may otherwise use this route to avoid the US 12/MT 7 intersection. Approaches would be improved on both the north and south side of the railroad crossing to better accommodate trucks attempting to use this alternate route.

The assumed cost for shoulder widening includes 12 feet of widening for a length of 500 feet, which would provide queuing space for approximately six WB-67 trucks.

Recommendation:

- Widen shoulder along US 12 at Willow Lane to provide vehicle queuing space
- Improve grades at the north and south approaches of Willow Lane at-grade railroad crossing
- Widen the private oil road approach and intersecting roadway to a minimum of 32 feet from US 12 to Willow Lane

Project Timeline:

- Short-term

Estimated Cost:

- $550,000 to $600,000

Potential Funding Sources:

- STPP, Local

Benefits:

- May improve operations at US 12/MT 7 intersection by decreasing the number of trucks making turns at the US 12/MT 7 intersection
- Provides alternate route for northbound truck traffic on US 12

Concerns:

- May require additional ROW; existing ROW at this location extends 40 feet north of the centerline, which neighbors railroad ROW
- May increase truck traffic on the private road
- Potential wetland areas located between highway and railroad in this location

5.5 Bridge Improvements

Improvement Option 11: Replace Bridge on MT 7, RM 35.86 (Sandstone Creek)
The bridge located just north of Baker on MT 7 at RM 35.86 spanning Sandstone Creek (P00027035+08231) has substandard roadway clearances between the faces of the guard rail (25 feet, 0 inches). Built in 1941, this bridge is approximately 64.5 feet long and contains three spans. In order to remedy this deficiency, a bridge widening or replacement would need to be undertaken. The bridge is composed of timber components, including a timber deck structure with asphalt surfacing, timber stringers, and timber bents. These items may be able to accommodate a widening; however, a cost-benefit analysis may indicate it is more cost effective to replace the structure. Considering the age of the structure and timber construction, as well as the anticipated increases in AADT and annual average daily truck traffic, a full replacement of the bridge would provide the greatest long-term benefit.

Recommendation:

- Replace bridge on MT 7 at RM 35.86

Project Timeline:

- Mid-term

Estimated Cost:

- $850,000 to $900,000

Potential Funding Source:

- STPB

Benefits:

- Increased structure life and improved structure rating
- Consistent with current MDT design standards

Concerns:

- Potential impacts to Sandstone Creek and adjacent wetlands
- Floodplain modeling and permitting required
- Section 404 permitting requirements and potential mitigation

5.6 Alternative Truck Routes on Existing Routes

The junction of US 12 and MT 7 is Baker's main intersection, which is used by passenger vehicles both traveling through town and for local access, as well as truck traffic traveling to and from oil and gas development and other commercial and agricultural areas in the region. Baker has experienced increased truck traffic through town due to the increasing level of oil and gas development and associated development in and around the study area. Improvement options in this section have the potential to address the study need of improving mobility on US 12 and MT 7 by minimizing truck traffic impacts at the US 12/MT 7 intersection through improvements on existing routes that encourage alternate truck routes in the study area.

Improvement Option 12.a: Railroad Avenue Improvements

Improvement Option 12 includes an "a" and "b" option for a potential alternate truck route. While either option could be implemented as a stand-alone improvement, doing so would only address truck turning movements for one quadrant of the intersection. As such, the "a" and "b" options are recommended to be implemented together to provide the greatest benefit toward reducing truck traffic at the US 12/MT 7 intersection.

Improvement Option 12.a includes improvements to Railroad Avenue and its intersections with US 12 and MT 7 that would provide an alternate route for trucks traveling westbound on US 12 and turning northbound on MT 7 and for southbound traffic on MT 7 turning eastbound on US 12. With an estimated 238 trucks per day, this westbound-to-northbound and southbound-to-eastbound movement represents the most frequently used turning movements at the US 12/MT 7 intersection.

Intersection improvements would be required along Railroad Avenue at US 12, MT 7, and 3rd Street E. Pavement limits would be increased to accommodate truck turning movements onto Railroad Avenue from US 12. The pavement on Railroad Avenue currently terminates at 3rd

Street E, and would require surfacing improvements and minor grading. Refer to Figure 11 for detail.

Recommendation:

- Pave Railroad Avenue east of South 3rd Street E to its intersection with US 12
- Include signage indicating a truck route on US 12 and MT 7
- Intersection improvements at Railroad Avenue /MT 7, Railroad Avenue/3rd Street E, and Railroad Avenue/US 12

Project Timeline:

- Mid-term

Estimated Cost:

- $300,000 to $325,000

Potential Funding Source:

- Local

Benefits:

- May reduce truck volumes at the US 12/MT 7 intersection by providing an alternate route (approximately 238 trucks daily)
- May reduce passenger vehicle volumes at the US 12/MT 7 intersection
- Provides queuing space for northbound trucks during rail crossing closures
- Improves operations at the intersection of US 12/MT 7

Concerns:

- Following a crossing closure, southbound trucks on MT 7 attempting to make the left-hand turn onto Railroad Avenue would be delayed as northbound vehicles along MT 7 proceed through the crossing. This would likely create a queuing of vehicles on MT 7 north of the railroad in the southbound direction.

Improvement Option 12.b: Milwaukee Avenue and 3rd Street SW Improvements

This option would provide for improvements on Milwaukee Avenue and its intersections with US 12 and MT 7, as well as the North 3rd Street W at-grade railroad crossing. This option would provide an alternate route for trucks traveling eastbound on US 12 turning northbound on MT 7 and trucks traveling southbound on MT 7 turning westbound on US 12. Trucks would turn west on Milwaukee Avenue, north of the railroad tracks, and use the 3rd Street at-grade crossing to access US 12. The grain elevator is located along Milwaukee Avenue, and trucks currently access this area and use this alternate route to bypass the US 12/MT 7 intersection. This eastbound-to-northbound and southbound-to-westbound movement represents the second-most frequent turning movements at the US 12/MT 7 intersection and accounts for an estimated 172 trucks per day. As stated previously, this option is recommended to be combined with Option 12.a: Railroad Avenue Improvements to create a truck route to alleviate truck traffic from the main US 12 and MT 7 intersection. See Figure 11 for detail.

Recommendation:

- Pave 3rd Street railroad crossing between Milwaukee Avenue and Railroad Avenue
- Include signage indicating a truck route on US 12 and MT 7

- Intersection improvements at Milwaukee Avenue/MT 7 and Milwaukee Avenue/US 12

Project Timeline:

- Mid-term

Estimated Cost:

- $120,000 to $130,000

Potential Funding Source:

- Local

Benefits:

- Reduces truck volumes at the US 12/MT 7 intersection by providing an alternate route (approximately 172 trucks daily)
- May reduce passenger vehicle volumes at the US 12/MT 7 intersection
- Provides queuing space for southbound trucks during rail crossing closures
- Improves operations at the intersection of US 12/MT 7

Concerns:

- The 3rd Street at-grade railroad crossing does not align with 3rd Street SW, and trucks are required to negotiate two additional turns south of the railroad to access US 12
- Introduction of additional traffic and noise to adjacent residences along Milwaukee Avenue and 3rd Street SW

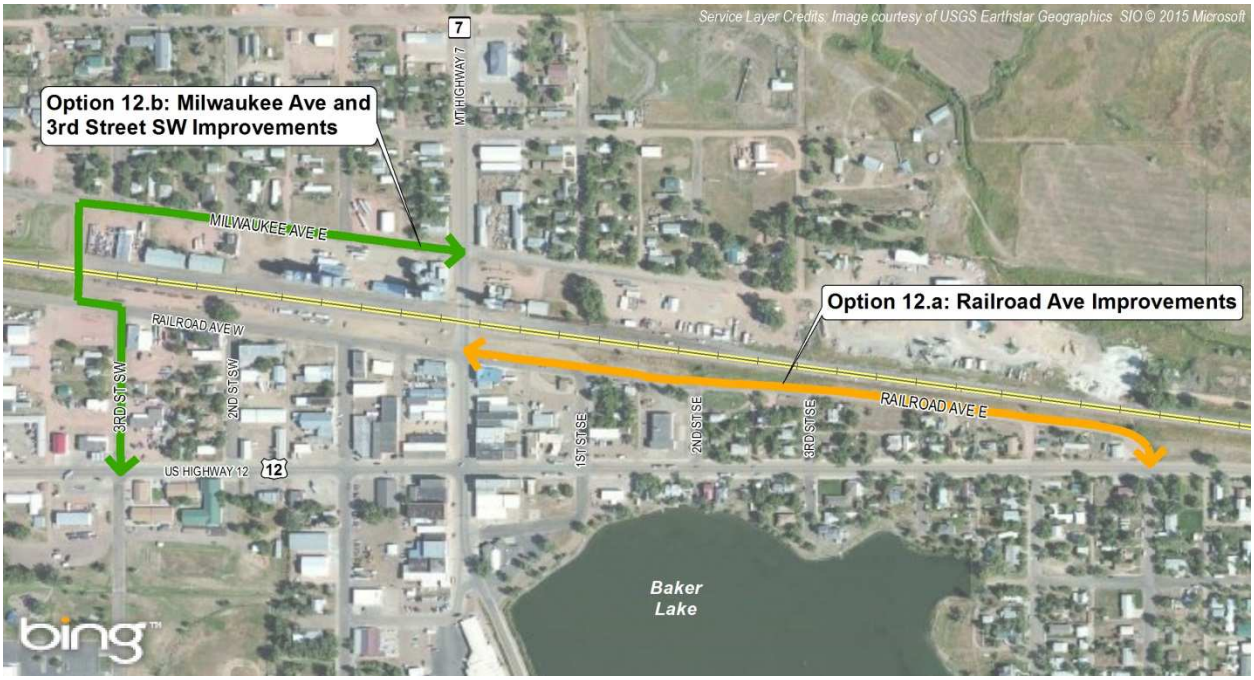

Figure 11: Railroad Avenue (Option 12.a) and Milwaukee Avenue (Option 12.b) Conceptual Truck Routes

Improvement Option 13: Montana Avenue (US 12) and Railroad Avenue One-way Couplet

The improvement option provides an alternative to Option 12 that could also serve to alleviate truck traffic at the US 12/MT 7 intersection. Improvement Option 13 is not intended to be implemented in conjunction with Option 12, but rather is provided as an alternative option for

consideration. Converting Montana Avenue (US 12) and Railroad Avenue to a one-way couplet within the Baker city limits could improve truck circulation through downtown. US 12 between 3rd Street SW and Railroad Avenue would be converted to a two-lane, one-way facility in the eastbound direction. Railroad Avenue from its intersection with US 12 and 3rd Street SW would operate as a two-lane, one-way street in the westbound direction. See Figure 12 for detail.

Should this option be forwarded from this study, additional traffic counts and analysis would be needed. Signalization of the intersections of US 12 and Railroad Avenue with MT 7 would likely be necessary to ensure that operations at both intersections (as well as the at-grade railroad crossing) can occur safely and efficiently given the proximity to the railroad crossing. The potential for improved geometry at the intersections, such as right- or left-turn lanes on US 12 at the intersection with MT 7, could ease traffic delay that would be experienced under the no-build conditions. However, additional delay and degraded LOS may occur at the new intersection of Railroad Avenue with MT 7 as well as the terminus locations of the couplet. The proximity of the at-grade railroad crossing to Railroad Avenue may create queuing, safety, and operational concerns during crossing events. Additional analysis could show the impacts of these concerns and the benefits to truck operations within the couplet.

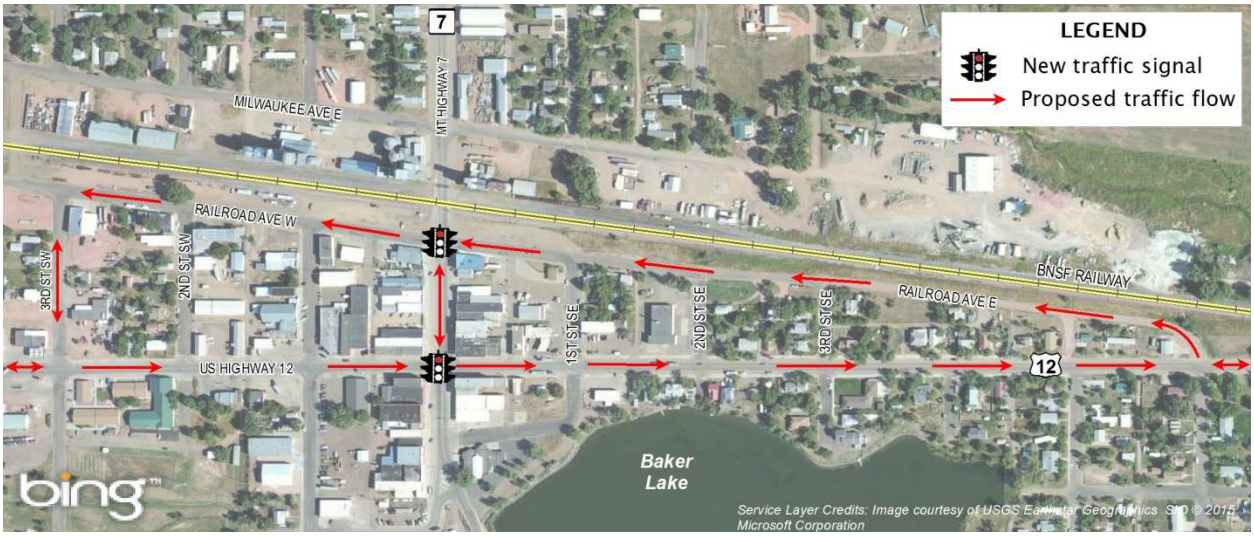

Figure 12: Montana Avenue (US 12) and Railroad Avenue One-way Couplet Concept

Recommendation:

- Add signalization at the following intersections (signal improvements must meet signal warrants):
  - US 12 and MT 7
  - MT 7 and Railroad Avenue
- Update signing and striping for one-way traffic on US 12 and Railroad Avenue within couplet limits
- Pave Railroad Avenue east of South 3rd Street E to its intersection with US 12

Project Timeline:

- Mid-term

Estimated Cost:

- $1,600,000 to $1,700,000

Potential Funding Sources:

- STPP, Local

Benefits:

- Improves operations at the US 12/MT 7 intersection
- Eliminates the volume of truck traffic making turning movements at the US 12/MT intersection for southbound-westbound flows on MT 7 and westbound-northbound flows on US 12
- May reduce passenger vehicle volumes at the US 12/MT 7 intersection

Concerns:

- Likely ROW requirements for intersection improvements at the couplet termini
- Potential decrease in exposure to businesses along US 12 due to one-way traffic flow
- Major traffic pattern adjustment for area residents and other roadway users
- Potential safety and operational concerns during crossing events at the at-grade railroad crossing given the proximity of crossing and turning movements at the newly created Railroad Avenue couplet intersection

Improvement Option 14: Private Oil Field Road Improvements

The private oil field road connecting US 12 to Shell Oil Road was identified within the 2012 *Fallon County Growth Policy* as a potential alternate truck route. Improvements to the private road may serve to alleviate traffic issues, including weight load limits, delays from stopped trains, and congestion of the US 12/MT 7 intersection. Improvements could include a combination of or all of the following: widening of the surface, realignment or reconstruction of the problematic horizontal curves (one 90-degree turn in particular), paving the roadway, and truck route signing.

Because the road is privately owned, the County is not responsible for maintenance or roadway improvements. Transfer of ownership of the road to the County would be required to provide the County with implementation responsibility to seek out local funding options and make any desired improvements. Depending on the implementation of either Option 12 or 13, and should this option be forwarded, additional consideration of the need for this improvement should occur at the local level to determine its benefits toward reducing truck volumes at the US 12/MT 7 intersection.

Recommendation:

- Potential surface widening, realignment, paving, and truck route signing

Project Timeline:

- Long-term

Estimated Cost:

- Unknown; variable depending on level of improvements

Potential Funding Source:

- Local

Benefits:

- May reduce truck volumes at the US 12/MT 7 intersection by providing an alternate route (approximately 238 trucks daily)

Concerns:

- Potential impacts to wetlands and streams, depending on level of improvements
- Potential impacts to existing oil/gas pad access road

5.7 Alternative Truck Routes on New Alignment

This section summarizes the process by which new alternative transportation alignments were developed within the study area. Potential new alternative truck routes were developed to address the study need of improving mobility on US 12 and MT 7 through minimizing the impacts of truck traffic at the US 12/MT 7 intersection.

The identification of new alignments was developed through use of the Quantm Alignment Planning System (i.e., Quantm). The Quantm system is a planning tool that uses computer modeling to automatically generate low-cost planning alignments that satisfy defined constraints and scenarios. The Quantm system generates alignments that balance social and environmental impacts against alignment costs. Quantm incorporates a variety of information into each scenario such as digital terrain model data, linear features (e.g., roads, railroads, and utilities), sensitive zones (e.g., wetlands and cultural areas), geotechnical information, roadway geometric standards, and construction item cost estimates. At the planning level, use of the Quantm system results in significant cost and time savings over traditional highway alignment planning.

First-Level Screening Process for New Alignment Options

This section presents the first-level screening process and results that support the identification of the study area quadrant(s) in which to evaluate alternate alignment options using the Quantm tool.

TRANSPORTATION QUADRANT IDENTIFICATION

US 12 and MT 7 divide the study area into four quadrants that are named by cardinal direction of where alternate alignment options would lie in relation to the City of Baker: northwest, northeast, southeast, and southwest (see Figure 13). In addition to reducing overall truck traffic volumes, alternate alignments developed within the study area quadrants would serve to eliminate a portion of, but not all, right-angle turning movements at the US 12/MT 7 intersection by providing an alternate route for truck traffic. Determining which quadrant(s) could potentially alleviate the greatest volume of truck traffic is necessary to ensure the improvement options' ability to best meet the needs and objectives defined for the project.

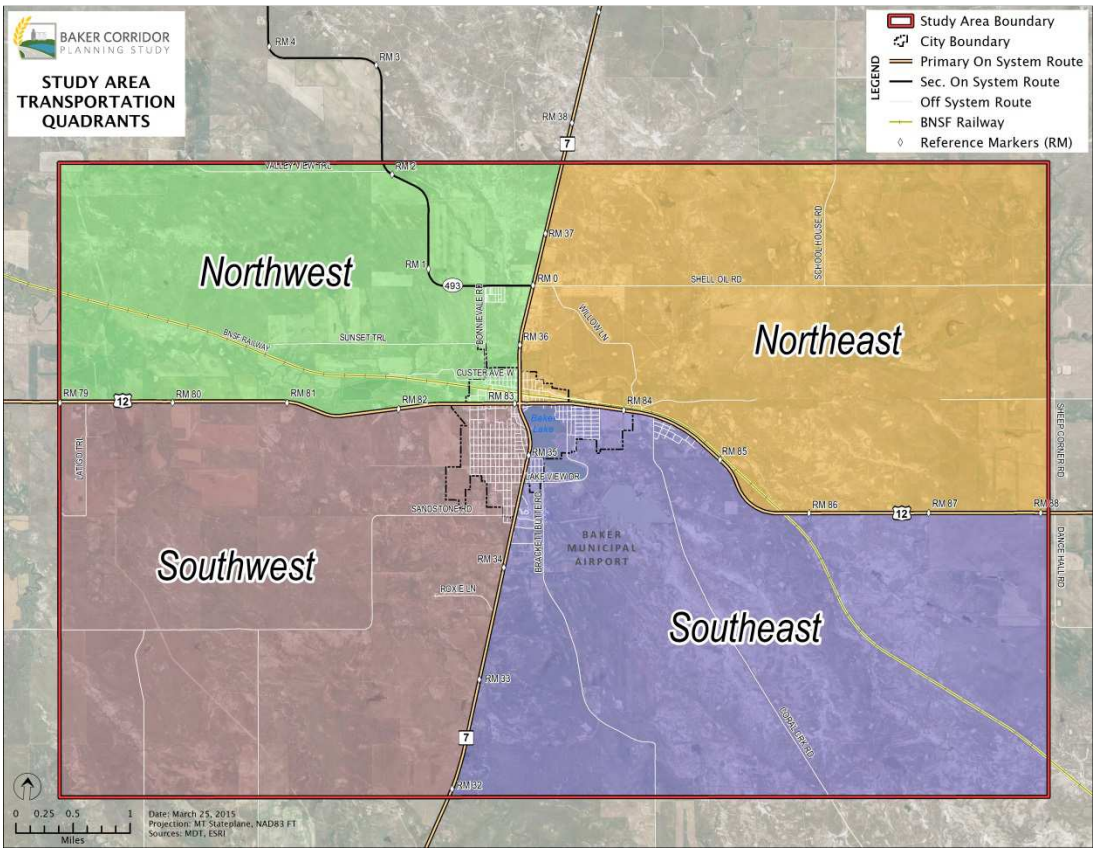

Figure 13: Study Area Transportation Quadrants

TRAFFIC ANALYSIS BY TRANSPORTATION QUADRANT

Existing traffic data were used to calculate the turning level ADT at the main intersection of US 12 with MT 7, as well as to determine the peak hour at this location. Potential traffic improvements at the US 12/MT 7 intersection could be determined through quantifying the percentages of HV traffic utilizing each quadrant. Table 13 shows the total and HV ADT utilizing turning movements that correspond to each quadrant under current conditions.

Table 13: Existing Total and Heavy Vehicle ADT Movements by Transportation Quadrant

Quadrant	Total Vehicles	Heavy Vehicles	Heavy Vehicle %
Northwest	1,560	172	11
Northeast	1,384	238	17
Southeast	1,111	33	3
Southwest	1,089	36	3

The transportation quadrants correspond to the following vehicular movements:

- **Northwest**: Eastbound vehicles on US 12 turning northbound on MT 7 or southbound on MT 7 turning westbound on US 12
- **Northeast**: Westbound vehicles on US 12 turning northbound on MT 7 or southbound on MT 7 turning eastbound on US 12

- **Southeast**: Westbound vehicles US 12 turning southbound on MT 7 or northbound on MT 7 turning eastbound on US 12
- **Southwest**: Eastbound vehicles on US 12 turning southbound on MT 7 or northbound on MT 7 turning westbound on US 12

As seen in Table 13, HVs make up a significant proportion of vehicles that pass through the US 12/MT 7 intersection both during the peak period and throughout the full day, and particularly within the northwest and northeast quadrants. While not all trips for total vehicles making turning movements at this intersection have origins and destinations outside of Baker, these volumes can be used as a rough guide to assess the number of vehicles that move through the four quadrants of the study area. As most HVs traversing the study area have origins and destinations outside the City of Baker, it is safe to assume a majority of the HVs could be redirected to alternate routes around the city.

FIRST-LEVEL SCREENING

The first-level screening process provides a qualitative analysis used to determine the optimal study area quadrant in which to further examine new alignment options. The process is intended to remove from further consideration options, or quadrants, that fail to meet the identified needs and objectives for the project.

The first-level screening criteria relate directly to the study's needs and objectives. Consideration of the study area quadrant was evaluated based on the following screening criteria questions:

1. Would the option improve operations within the corridor? (Need #1)
2. Would the option improve mobility within the corridor? (Need #2)

Study area quadrants were evaluated based on the above two screening criteria questions by allowing for a YES or NO answer, where a YES is "best able to meet the screening criterion" and a NO is "least able to meet the screening criterion." The quadrant(s) passing the first-level screening process was considered for the development of new alignment options.

FIRST-LEVEL SCREENING CRITERIA

Criterion 1: Operation Improvements

Criterion number one was evaluated by determining which quadrant(s) has the greatest ability to improve operations within the corridor. Operation improvements would be best met through reducing the greatest volume of truck traffic at the US 12/MT 7 intersection as determined by the data presented in Table 13. Reducing the truck traffic within city limits will improve operations at the US 12/MT 7 intersection by reducing the overall volume of trucks traveling through the intersection and, more important, the number of trucks making turning movements at the intersection. This criterion is rated as:

- **YES**: The quadrant provides for the greatest reduction in truck traffic making turning movements at the US 12/MT 7 intersection.
- **NO**: The quadrant provides for the least reduction in truck traffic making turning movements at the US 12/MT 7 intersection.

Using the volumes in Table 13, it was determined that more HVs use the US 12/MT 7 intersection to make movements through the northwest and northeast quadrants, with HVs accounting for 11 percent and 17 percent of the daily volumes, respectfully. The southeast and southwest quadrants see fewer HVs on a daily basis, with these vehicles accounting for only 3 percent of the total volume in each quadrant. Of the four quadrants, the largest volume of HVs is shown to use the northeast quadrant movements, with 238 daily HV trips.

A new alignment in either of or both the northwest and northeast quadrants would reduce the total volume of vehicles using the US 12/MT 7 intersection as well as reduce the volume of HVs traveling through Baker, but would not completely eliminate all trips through the intersection. For this reason, the potential impact on traffic operations would be greatest for those movements with the highest volumes of HVs, which would be in the northeast quadrant, followed by the northwest quadrant. While alignments located in the southeast and southwest quadrants would reduce volumes through the main intersection, the improvements would have a minimal impact on operations at the US 12/MT 7 intersection.

Criterion 2: Mobility Improvements

Criterion number two was evaluated through determining which quadrant(s) has the greatest ability to improve mobility within the corridor. Mobility improvements would be best met through accommodating existing and future capacity demands within the corridor as well as reducing delays due to closures at the at-grade railroad crossings within the study area. This criterion is rated as:

- **YES**: The quadrant provides for the greatest improvement to mobility within the study area.
- **NO**: The quadrant provides for the least amount of improvement to mobility within the study area.

The future conditions LOS analysis conducted previously (Table 7) demonstrates that future capacity demands will be greatest at the US 12/MT 7 intersection and along MT 7, north of downtown, at the MT 7/Shell Oil Rd/S-493 intersection. Total ADT by quadrant (Table 13) supports this conclusion, with higher total vehicular volumes utilizing the northwest and northeast quadrants. The higher vehicular volumes and the significantly higher HV volumes within these quadrants suggest that alignments within the northwest and northeast quadrants would provide a greater benefit to mobility within the corridor.

Mobility concerns relating to railroad crossing closures is a concern primarily for access from the downtown area to north of the railroad tracks. The BNSF Railway bisects the City of Baker and, during crossing closures, affects access to development north of the railroad. Emergency vehicle access to areas north of the railroad tracks is also affected during crossing closures. All at-grade railroad crossings within the study area cross two tracks, the mainline and a siding track. In addition to temporary crossing closures for passing trains, the crossings can also all be blocked simultaneously if a stationary train is located on the rail siding. New alignments located in both the southeast and southwest quadrants would not improve mobility because emergency vehicle access to areas south of US 12 is not affected by railroad closures. As such, alignments within the northwest and northeast quadrants that provide access to areas north of the railroad

would provide the greatest benefit to mobility within the corridor. Emergency vehicle access improvements would be most benefited by alignments that provide the shortest unobstructed route to developments north of the railroad tracks.

FIRST-LEVEL SCREENING RESULTS

Table 14 shows the results of the first-level screening. When evaluated based on the first-level screening criteria questions, the northwest and northeast quadrants both pass due to their ability to best meet the needs and objectives defined for the study. For this reason, it is recommended that alignment options within both quadrants be explored.

Table 14: First Level Screening Results

Quadrant	Screening Criteria		Quadrant Advanced?
	1. Would the option improve operations within the corridor?	2. Would the option improve mobility within the corridor?	
Northwest	YES	YES	**YES**
Northeast	YES	YES	**YES**
Southeast	NO	NO	NO
Southwest	NO	NO	NO

Preliminary Alignment Identification

Having passed the first-level screening, the northwest and northeast quadrants were then examined to determine general corridors for which to begin running the Quantm alignment analysis. An important initial step in using Quantm is to identify study area constraints and input the spatial data into the model to inform the alignment identification process. This process included identifying avoidance areas that Quantm then recognizes when creating alignments and attempts to route around these features whenever possible. Avoidance areas include features such as potential Section 4(f) resources, Section 6(f) resources, oil/gas wells, city lagoons, and existing structures.

DESIGN CRITERIA

New alignments developed with the Quantm tool used the minimum geometric design criteria for rural minor arterials as specified in MDT's *Road Design Manual*. The alignments were developed using the following major design criteria:

- Maximum vertical grade: 3% (Level Terrain)
- Minimum horizontal radius: 1,200 feet
- Paved surface width: 32 feet (includes two 12-foot travel lanes and 4-foot shoulders)

Figure 14 shows a typical section for the new alignment options.

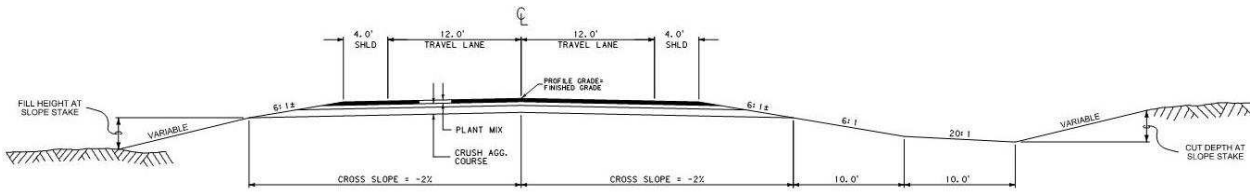

Figure 14: Typical Section for New Alignment Options

Improvements to either Shell Oil Road or S-493 would be required for several of the alignment options tying into these facilities. A conceptual footprint width of 70 feet (35 feet either side of centerline) was assumed for the road sections requiring widening. The total roadway footprint width was developed using the following assumptions:

- Paved surface width: 32 feet (includes two 12-foot travel lanes and 4-foot shoulders)
- Fill slope width (due to widening): 18 feet–20 feet
    - Average fill slope: 4:1
    - Fill slope height: 4 feet–5 feet

ALIGNMENT TERMINI

An initial step in developing general corridors involves determining the alignment start/end points, or alignment termini. General alignment termini locations were identified using existing constraints mapping, input from the planning team, and professional judgment. Constraints considered in locating general alignment termini included the avoidance areas described above, as well as other considerations such as land ownership and the BNSF Railway. Figure 15 and Figure 16 show the general termini for the northwest and northeast alignments, respectively.

Northwest Quadrant Alignment Termini

Alignment options within the northwest quadrant had start points at three locations along US 12 and two end points at approximately RM 0.8 on S-493 and RM 37.6 on MT 7 near the northern edge of the study area boundary. The general termini include:

- **Terminus 1a**: US 12 RM 82.1±
- **Terminus 1b**: US 12 RM 80.6±
- **Terminus 1c**: US 12 RM 80.0±
- **Terminus 2a**: S-493 at RM 0.8±
- **Terminus 2b**: MT 7 at RM 37.6± near the north study area boundary

Northeast Quadrant Alignment Termini

Alignment options within the northeast quadrant had start points at two locations along US 12 and end points at four locations, three of which were located along Shell Oil Road and one that was located on MT 7 near the northern edge of the study area boundary. The general termini include:

- **Terminus 1a**: US 12 RM 86.4± (1450± feet east of west edge of state-owned section)
- **Terminus 1b**: US 12 RM 86.2± (west edge of state-owned section)
- **Terminus 2a**: Intersection of School House Road and Shell Oil Road
- **Terminus 2b**: Shell Oil Road, approximately 4000 feet west of School House Road

- **Terminus 2c**: MT 7 RM 37.6± near north study area boundary
- **Terminus 2d**: Shell Oil Road, approximately 950 feet east of MT 7

PRELIMINARY ALIGNMENTS

Multiple alignment scenarios within Quantm were developed using different combinations of the northwest and northeast quadrant alignment termini. As described previously, the general alignment termini and corridors were located as to avoid and minimize impacts to existing development and mapped resources within the study area. Impacts to existing structures are not anticipated for the alignments developed.

Preliminary Northwest Quadrant Alignments

Preliminary alignment options for the northwest quadrant are depicted in Figure 15. The northwest quadrant alignments all require crossing the BNSF Railway to access MT 7 to the north. The northwest quadrant alignments were developed as grade-separated crossings only. No at-grade railroad crossings were explored through the Quantm system within this quadrant. This decision was supported by the need identified to improve mobility by reducing delays caused by railroad crossing closures. This decision also addresses community concerns with emergency vehicle access by improving access north of the railroad.

The alignments shown represent the preferred option under each scenario in terms of least impact and lowest cost. Alignments NW-1a and NW-1b and Alignments NW-3a and NW-3b include the two lowest-cost alignments within these scenarios. The “a” and “b” options are provided for these scenarios because, although the overall cost variance is not significant, the alignment location and associated impacts vary widely between alignments generated under the same scenario. As stated previously, all alignments include a grade separation of the BNSF Railway utilizing the design standard for a rural minor arterial. The one exception is Alignment NW-5. In order to accommodate a grade-separated crossing, the maximum vertical grade was increased to 4 percent, which is the standard for rolling terrain. By utilizing a 4-percent maximum grade at this location, the alignment could provide the adequate vertical clearance for a new grade-separated crossing.

Under alignments ending at Terminus 2a (NW-2, NW-5, and NW-5), widening of S-493 between the alignment terminus and MT 7 would be required to meet the design criteria established for the new alignments.

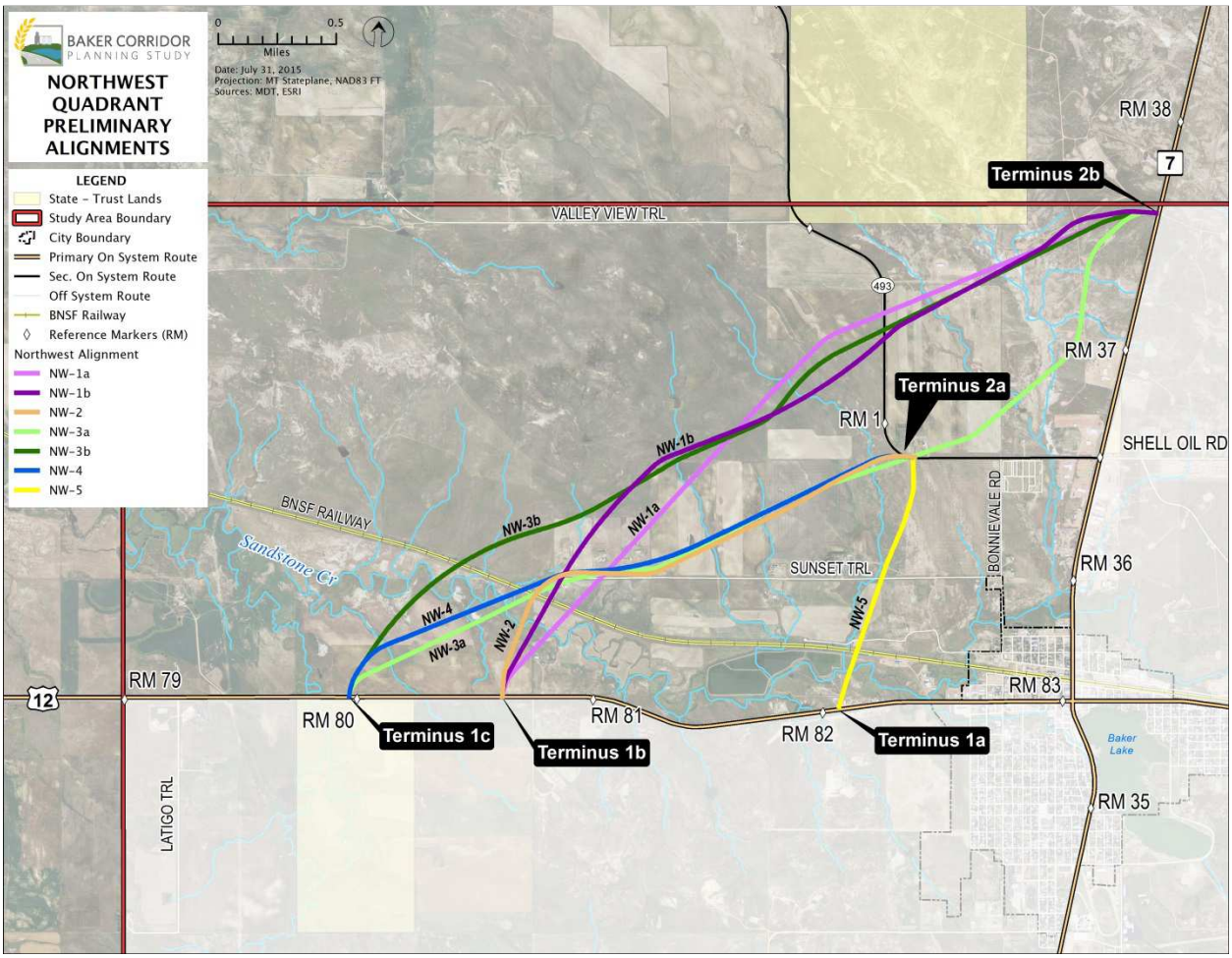

Figure 15: Northwest Quadrant Preliminary Alignment Options

Preliminary Northeast Quadrant Alignments

Preliminary alignment options for the northeast quadrant are depicted in Figure 16. All northeast quadrant alignment options were developed with termini departing from US 12 located east of the existing railroad overpass. A grade separation of the railroad west of the existing overpass was determined as infeasible due to insufficient separation between US 12 and the railroad to reach vertical grades that meet standard railroad clearances. Moreover, alignments with an at-grade railroad crossing would not substantially improve operations or mobility within this quadrant and therefore do not meet the needs and objectives defined for the study.

Under alignments ending at Terminus 2a, 2b, and 2d, widening of Shell Oil Road between the alignment terminus and MT 7 would be required to meet the design criteria established for the new alignments.

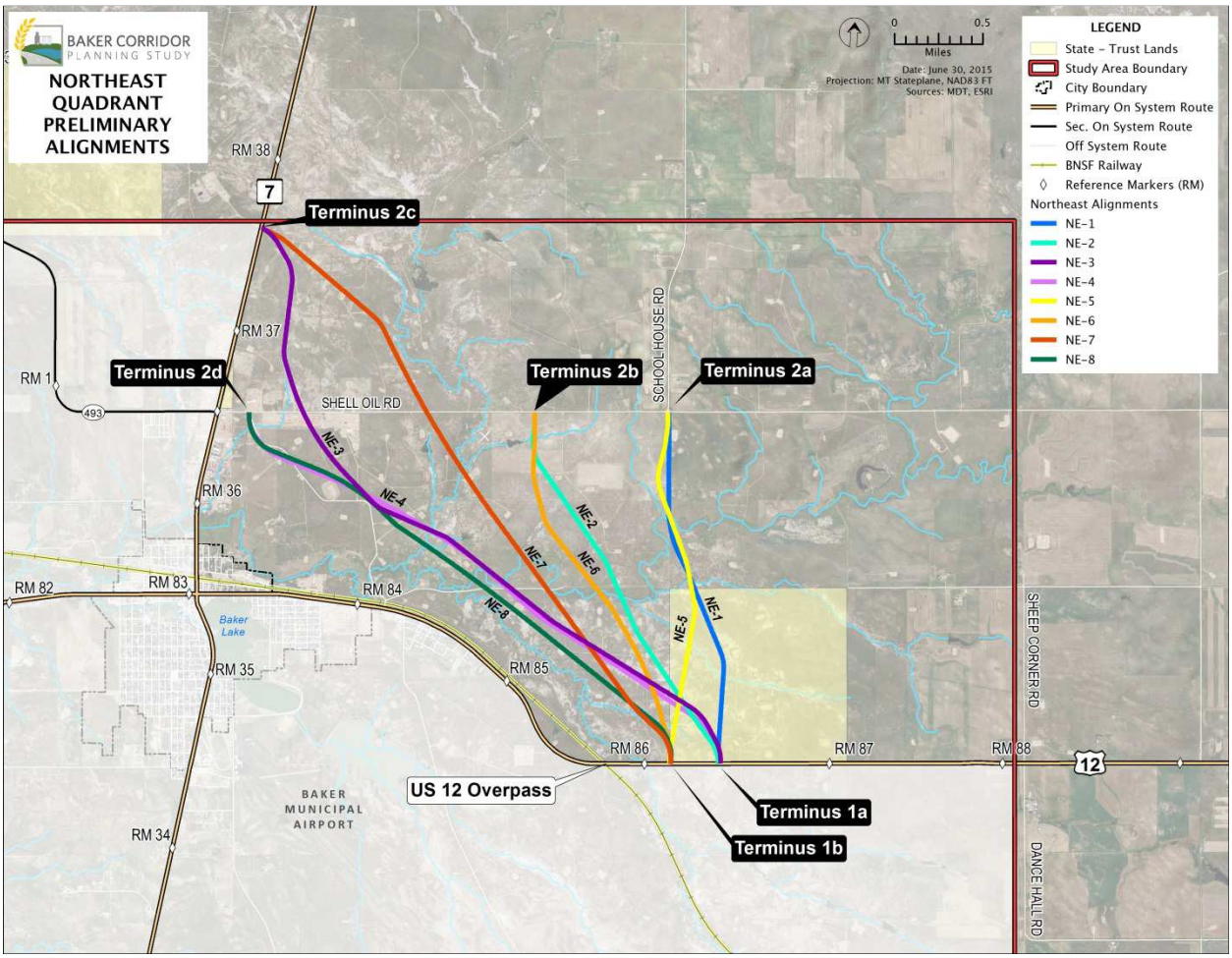

Figure 16: Northeast Quadrant Preliminary Alignment Options

Second-Level Screening

The preliminary alignments were screened through a second level of criteria to determine the preferred alignment(s). Alignments within the northwest and northeast quadrants were screened separately as a means to identify feasible options within both quadrants. Multiple screening criteria representing environmental resource and social impacts, as well as cost, were considered. The screening process included evaluating the alternate alignments using the following criteria:

- Environmental Resource Impacts: Environmental resources evaluated included the following resource categories:
  - *Wetlands and Water Bodies*
  - *Floodplains*
  - *Prime Farmland*
- Private Property Impacts: ROW requirements of private property were estimated using the Fallon County cadastral data.

- Road Crossings: The total number of public and private road crossings was evaluated for each alternate alignment. Private roads evaluated include oil/gas access roads and residential driveways.
- Planning-level Cost Estimates: Estimated alignment costs were developed and used in the evaluation process.

IMPACTS RATING

Potential impacted acreage for wetlands and water bodies, floodplains, farmlands of statewide importance, and private ROW requirements were estimated for each alternate alignment developed. Resource impacts were calculated using GIS for the new alignments as well as for the improvements required for either Shell Oil Road or S-493 for the applicable alignments that tie into these existing roads. Environmental resource impacts were estimated using the conceptual construction footprint generated within the Quantm system. Private ROW impacts were estimated based on an assumed ROW width of 160 feet (80 feet either side of centerline) consistent with MDT's *Right-of-Way Manual for a Primary Highway*.

Planning-level costs were developed by taking the Quantm cost estimate, which includes construction costs, ROW, and wetland mitigation costs (if applicable), and then combining costs associated with new intersections, traffic control, mobilization, preliminary and construction engineering, indirect costs, miscellaneous items, inflation, and a contingency percentage. For alignment options that tie into either Shell Oil Road or S-493, the estimates include costs associated with surfacing and widening improvements to the existing roadways. Planning-level costs estimates for all alignments are provided in **Appendix C**.

Note that no impacts to sensitive wildlife habitat (particularly greater sage grouse) resulted from the alternatives developed. Impacts to potential Section 4(f) and known Section 6(f) resources were avoided for all alignments developed.

For each criterion evaluated, the alternatives within each quadrant were given a numerical rating based on the number of alignments being evaluated, with a value of one (1) denoting the best option. The northwest quadrant includes seven individual alternatives, resulting in a numerical rating of 1 through 7. The northeast quadrant includes eight alternatives, for a numerical rating of 1 through 8. All criteria ratings were totaled into a composite rating, which was then calculated as an overall rating. The comparative impact analysis and second-level screening evaluation results are presented in Table 15.

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Table 15: Alignment Impacts Rating

Alignment (Map ID)	Wetland and Water Body Impacts[a] (acres)	Rating	Floodplain Impacts (acres)	Rating	Prime Farmland Impacts (acres)	Rating	Private Property Impacts (acres)[b]	Rating	Total Road Crossings[c]	Rating	Planning-level Cost Estimate[d]	Rating	Composite Rating	**Overall Rating**
Northwest Quadrant Alignments														
NW-1a	0.06	1	0.43	4	22.34	2	89.10	4	5	6	$40.03M	5	22	**3**
NW-1b	0.68	7	0.00	1	25.53	5	96.72	5	4	5	$37.09M	4	27	**6**
NW-2	0.16	2	0.70	5	23.92	3	51.21	2	3	1	$21.78M	2	15	**2**
NW-3a	0.21	4	0.00	1	38.67	7	115.13	7	11	7	$44.99M	6	32	**7**
NW-3b	0.46	6	0.00	1	24.49	4	108.95	6	3	1	$45.39M	7	25	**5**
NW-4	0.33	5	0.70	5	27.84	6	59.77	3	3	1	$25.23M	3	23	**4**
NW-5	0.19	3	3.73	7	15.48	1	27.13	1	3	1	$17.13M	1	14	**1**
Northeast Quadrant Alignments														
NE-1	0.07	1	2.68	3	5.68	4	47.95	1	1	2	$16.19M	5	16	**1**
NE-2	0.19	5	2.71	4	4.93	2	53.46	3	4	3	$15.59M	4	21	**3**
NE-3	0.15	3	3.73	6	16.35	8	73.41	7	14	8	$17.20M	8	40	**8**
NE-4	0.22	6	4.97	7	14.42	7	59.10	4	10	6	$14.67M	2	32	**5**
NE-5	0.07	2	2.26	2	5.14	3	49.27	2	0	1	$16.66M	6	16	**1**
NE-6	0.18	4	3.09	5	4.24	1	61.30	5	6	4	$15.31M	3	22	**4**
NE-7	0.32	8	1.96	1	9.01	5	74.03	8	9	5	$17.10M	7	34	**6**
NE-8	0.29	7	6.73	8	10.62	6	62.63	6	11	7	$14.53M	1	35	**7**

[a] Wetland and water body impacts can include multiple water crossings along the alignments and are approximate. Wetland delineations would be required during project development. Impacts exceeding 0.5-ac. at a single crossing would need to demonstrate a Least Environmentally Damaging Preferred Alternative, or LEDPA, to obtain a USACE Section 404 permit. Alignment NW-1b is the only alignment with a single crossing exceeding the 0.5-ac. threshold.
[b] Impacts were measured using an assumed 160-foot-wide ROW. For alignments NW-1 through NW-4, the modeled construction footprint extends beyond a 160-foot-wide ROW template. Impacts for these alignments include a minimum 160-foot-wide ROW width as well as the construction footprint extending beyond the 160-foot ROW boundary.
[c] Includes public roads and private access roads (oil/gas pad access roads and residential driveways).
[d] Cost estimates include construction costs provided by Quantm as well as costs associated with new intersections, traffic control, mobilization, preliminary and construction engineering, indirect costs, miscellaneous items, inflation, and a contingency percentage. The estimate includes improvements to the existing Shell Oil Road or S-493 where applicable.

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Quantm Recommended Alignments

The results of the second-level screening showed alignment NW-5 as receiving the lowest overall numerical rating (i.e., most favorable alignment option) within the northwest quadrant and alignments NE-1 and NE-5 as receiving the lowest overall numerical rating within the northeast quadrant. Between alignments NE-1 and NE-5, NE-5 is recommended to be carried forward as the preferred alignment within the northeast quadrant because it minimizes impacts to the state-owned parcel located along US 12. NE-5 is located nearer to the section line and would leave a larger useable area east of the alignment for state use as compared to NE-1.

Alignments NW-5 and NE-5 are recommended to be carried forward as potential new alignment options to address the study need of improving operations and mobility on US 12 and MT 7 through minimizing the impacts of truck traffic at the US 12/MT 7 intersection. These alignments provide for an alternative route within both the northwest and northeast quadrants. Overall, ADT and total HV turning movements are substantial within both of these quadrants, and providing a new alignment within both quadrants would provide the greatest benefit addressing the study needs. The recommended alignments utilize the existing intersection of MT 7/Shell Oil Road/S-493, providing the potential for through trips on US 12 to easily utilize both the northwest and northeast alignments through the study area. In addition, the impact from the terminal intersections would be minimized by having both at the same location on MT 7. The recommended alignment options are shown in Figure 17 and are described in greater detail below.

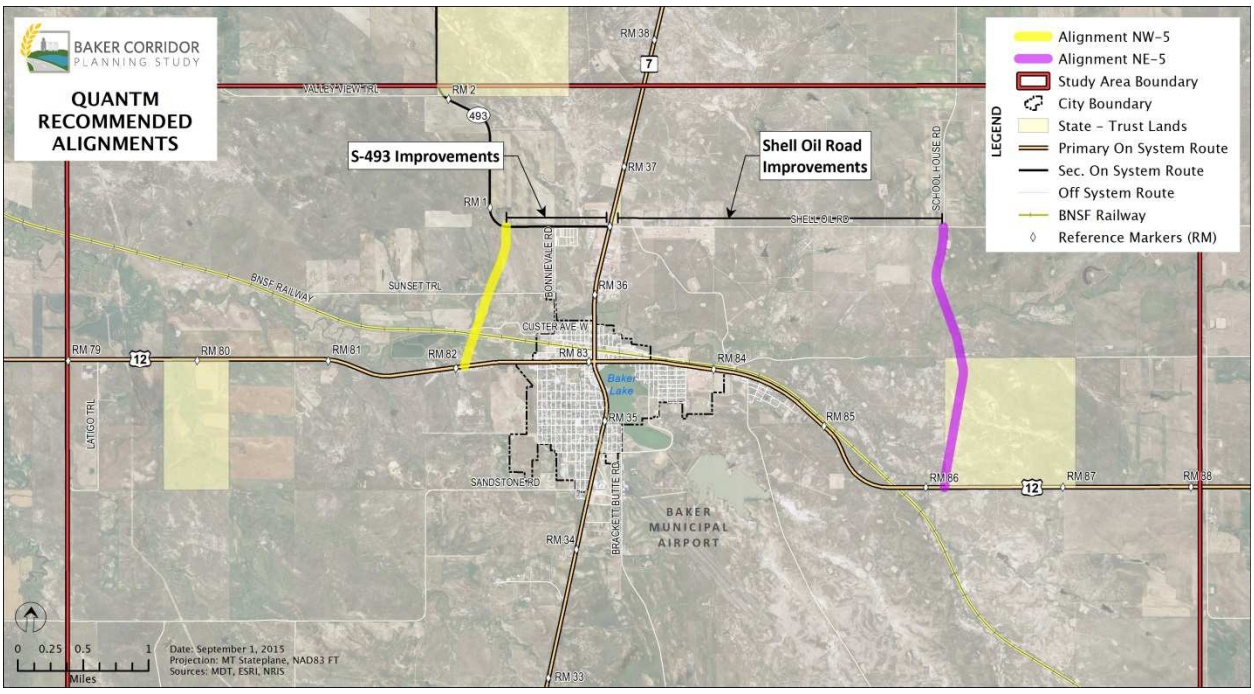

Figure 17: Quantm Recommended Alignments

Improvement Option 15: Quantm Alignment NW-5

Alignment NW-5 provides for an alternative route in the northwest quadrant between US 12 and MT 7 via S-493. The alignment departs US 12 at approximately RM 82.1, includes an overpass

over the BNSF Railway, and then joins S-493 at RM 0.8. The alignment intersects two public roads north of the railroad: Prairie View Drive and Sunset Trail. S-493 would require additional improvements from the junction of the new alignment to the intersection at MT 7, including surfacing improvements and widening to a 32-foot roadway, as well as intersection improvements at the south terminus with US 12 and the north terminus with S-493.

Recommendation:

- Construct new alignment between US 12 and S-493, including a grade-separated crossing of the railroad
- Make additional improvements to S-493 to include surfacing improvements and widening to a 32-foot roadway, as well as intersection improvements

Project Timeline:

- Long-term

Estimated Cost:

- $17,000,000 to $17,500,000

Potential Funding Sources:

- STPP, Local

Benefits:

- May reduce truck volumes at the US 12/MT 7 intersection by providing an alternate route (approximately 172 trucks daily)
- Would provide a grade-separated railroad crossing within 1 mile of downtown, which would improve emergency vehicle access north of the railroad and reduce delays experienced during crossing closures

Concerns:

- Potential impacts to wetlands, streams, floodplains, and farmland
- Requires ROW acquisition

Improvement Option 16: Quantm Alignment NE-5

Alignment NE-5 provides for an alternative route in the northeast quadrant between US 12 and MT 7 via Shell Oil Road. This alignment departs US 12 at RM 86.2 at the west edge of a state-owned section and connects to Shell Oil Road to the north at its junction with School House Road. Shell Oil Road would require additional improvements from the junction of the new alignment and School House Road to the intersection at MT 7 to meet minimum design criteria for rural minor arterials. Additional improvements to Shell Oil Road include surfacing improvements and widening to a 32-foot roadway, as well as intersection improvements at the south terminus with US 12 and the north terminus with Shell Oil Road.

The conceptual terminus of Alignment NE-5 with US 12 (at RM 86.2±) is located approximately 2,000 feet east of the existing highway overpass. Based on NE-5 being a stop-controlled intersection and current AASHTO design standards, adequate sight distance exists for vehicles making the southbound left-turn or southbound right-turn movement from the new alignment onto US 12. Additionally, a preliminary evaluation of an eastbound left-turn lane on US 12 indicates that design standards can be met without affecting the highway overpass. Should

Alignment NE-5 be forwarded from this study, evaluation of the need for a left-turn lane at this location would be necessary. If necessary, and depending on the required turn-bay length on US 12, there is potential that the existing drainage structure located east of the overpass would need to be extended. Additional consideration during the design phase would be required to minimize or avoid impacts to the drainage structure, which could be accomplished by shifting the alignment terminus to the east.

Recommendation:

- Construct a new alignment between US 12 and Shell Oil Road
- Make additional improvements to Shell Oil Road to include surfacing improvements and widening to a 32-foot roadway, as well as intersection improvements

Project Timeline:

- Long-term

Estimated Cost:

- $16,300,000 to $16,800,000

Potential Funding Sources:

- STPP, Local

Benefits:

- May reduce truck volumes at the US 12/MT 7 intersection by providing an alternate route (approximately 238 trucks daily)
- Potential for reduced travel times (depending on vehicle movements)

Concerns:

- Potential impacts to wetlands, streams, floodplains, and farmland
- Requires ROW acquisition

Operational Analysis of New Alignments

Potential new alignments will impact traffic operations through Baker and at the intersection of US 12 with MT 7, as well as at the terminus locations of the new alignments with the existing roadway network. Additional traffic analysis was conducted to examine how the new alignments, in combination with other improvement options for the US 12/MT 7 and MT 7/Shell Oil Road/S-493 intersections, would affect operations at these two intersections. Traffic redistribution from existing corridors assumed conservative estimates for the amount of potential diversion of traffic. The analysis assumed most trucks would utilize the new facilities, and a smaller proportion of regular traffic would also take advantage of the new facility. Trips that make turning movements between US 12 and MT 7 within the northwest and northeast quadrants were redistributed from the main intersection to the new route at a rate of 90 percent of HV traffic and 30 percent of all other traffic. For example, reassigned trips from building the northwest alignment included those trips making left turns from US 12 eastbound to MT 7 northbound and right turns from MT 7 southbound to US 12 westbound. Table 16 shows the intersection LOS results of potential new northwest and northeast alignments in combination with recommended traffic control from earlier improvement options.

Table 16: Intersection LOS Results (2034) with New Alignments

Intersection	LOS (Delay[a])		
	Low Growth	Medium Growth	High Growth
US 12/MT 7 Signalized with Left-turn Lanes (Option 8) No Alternative Route	B (10.2)	C (29.7)	D (51.3)
US 12/MT 7 Signalized with Left-turn Lanes (Option 8) With Alternative Routes	B (10.4)	B (19.4)	C (23.5)
MT 7/Shell Oil Road/S-493 Signalized with Left-turn Lane (Option 9) No Alternative Route	A (6.3)	B (12.1)	C (22.3)
MT 7/Shell Oil Road/S-493 Signalized with Left-turn Lane (Option 9) With Alternative Routes	A (5.5)	A (9.5)	C (21.1)
MT 7/Shell Oil Road/S-493 with Single-lane Roundabout (Option 9) No Alternative Route	A	C	F
MT 7/Shell Oil Road/S-493 with Single-lane Roundabout (Option 9) With Alternative Routes	A	C	E

Note: The worst-performing leg LOS is shown under stop-controlled and roundabout operations.
Low Growth = 2% growth rate for all vehicles; Medium Growth = 5% for all vehicles; High Growth = 5% for cars/trucks and 10% for heavy vehicles
[a] Delay is shown in seconds. Note the roundabout analysis does not accurately report delay, so it is not included here.

When coupled with other intersection improvements (i.e., Options 8 and 9), new alignments in the northwest and northeast quadrants will ease traffic congestion at the US 12/MT 7 and MT 7/Shell Oil Road/S-493 intersections. Under the new alignment scenarios examined, traffic volumes would increase at the MT 7/Shell Oil Road/S-493 intersection, with a corresponding decrease in traffic at the US 12/MT 7 intersection. Benefits to traffic operations are greatest for the mid- to high-growth traffic scenarios. When the improvement options under Option 9 are taken in consideration, the new alignments will more evenly distribute volumes through the four legs of the MT 7/Shell Oil Road/S-493 intersection, maintaining or improving operations at the intersection relative to the no-build conditions.

Construction Phasing

No funding source has been identified to fund implementation of either of the new alignment options. Should a project be forwarded from this study, however, phasing of construction may be possible to maximize the limited funds available for transportation improvements. For example, both recommended alignments connect with existing routes. The proposed improvements along existing S-493 and Shell Oil Road could be constructed at a later date in order to minimize the initial project costs. Another option would be to construct the new alignment as a 32-foot-wide gravel road and plan for final grading and surfacing to be phased in at a later time. Also, if there are certain segments of the new alignment that would improve current conditions and mobility, these sections could be separated out into a standalone project to help address more immediate corridor needs. An example of this would be widening and/or paving 1- to 2-mile segments of Shell Oil Road for Alignment NE-5 or constructing the segment of NW-5 between Sunset Trail and S-493.

New Alignment Implementation

It is possible that funding limitations may dictate selection of a single new alignment option. Both alignments have benefits. Future development and growth has the potential to affect traffic conditions and HV origins and destinations throughout the study area. Should a project be forwarded from this study, further consideration would be necessary during project development to re-evaluate existing conditions to determine which quadrant alignment would best meet the needs and objectives of this study. As presented in Table 13 above, current traffic movements show that a new alignment within the northeast quadrant would provide for the greatest reduction in truck turning movements at the US 12/MT 7 intersection. While Alignment NE-5 would benefit projected conditions at the US 12/MT 7 intersection, access to this alignment from US 12, which is located more than 3 miles east of the US 12/MT 7 intersection, would provide little benefit to local mobility. Access to Alignment NW-5 from US 12, however, is located less than 1 mile west of the US 12/MT 7 intersection and would provide a greater benefit in terms of improving both emergency vehicle access north of the railroad and overall local mobility. Future implementation of either recommended new alignment option depends on community preference, funding availability, constructability, and other project delivery elements.

5.8 Other Considerations

Anecdotal information provided to the planning study team suggests past incidences when trains have been parked on the siding track for unspecified lengths of time, preventing use of all four at-grade railroad crossings in the Baker area. As reported by the *Fallon County Times*, on September 29, 2013, a train blockage of the railroad crossings in Baker prevented a fire truck from responding to a home fire north of the railroad tracks, and subsequently the home was destroyed. This apparently prompted a community meeting held on November 12, 2013, with BNSF and the Baker Police and Fire departments.

As discussed at the meeting, a solution was proposed for the North 3rd Street W public at-grade railroad crossing to include shifting the railroad switch that moves trains from the siding to the mainline from its current location on the west side of the crossing to the east side. This improvement would remove the siding track (and industry spur track) at this crossing. The proposed improvement would preclude parked trains from blocking this crossing as the main line would experience only moving trains.

Moving the west end Baker Siding turnout involves not only shortening the siding by relocating its connection with the main line track east of the North 3rd Street W at-grade crossing, but also reconfiguring how the industry track ties into the existing siding west of the North 3rd Street W crossing to maintain its railroad serviceability. The industry track is currently used by BNSF Railway customers for shipping loads from Baker. Further discussions are necessary between the City of Baker and BNSF Railway to determine the feasibility of this potential improvement or other improvement options that do not require a grade separation.

5.9 Summary

This report identifies improvement options that have been developed for the US 12, MT 7, and S-493 corridors as well as off-system improvements within the study area. The improvement

options have been developed based on evaluation of the existing conditions within the study area and ability to address needs previously identified during development of the study.

The improvement options are displayed on Figure 18 and presented in tabular form in Table 17.

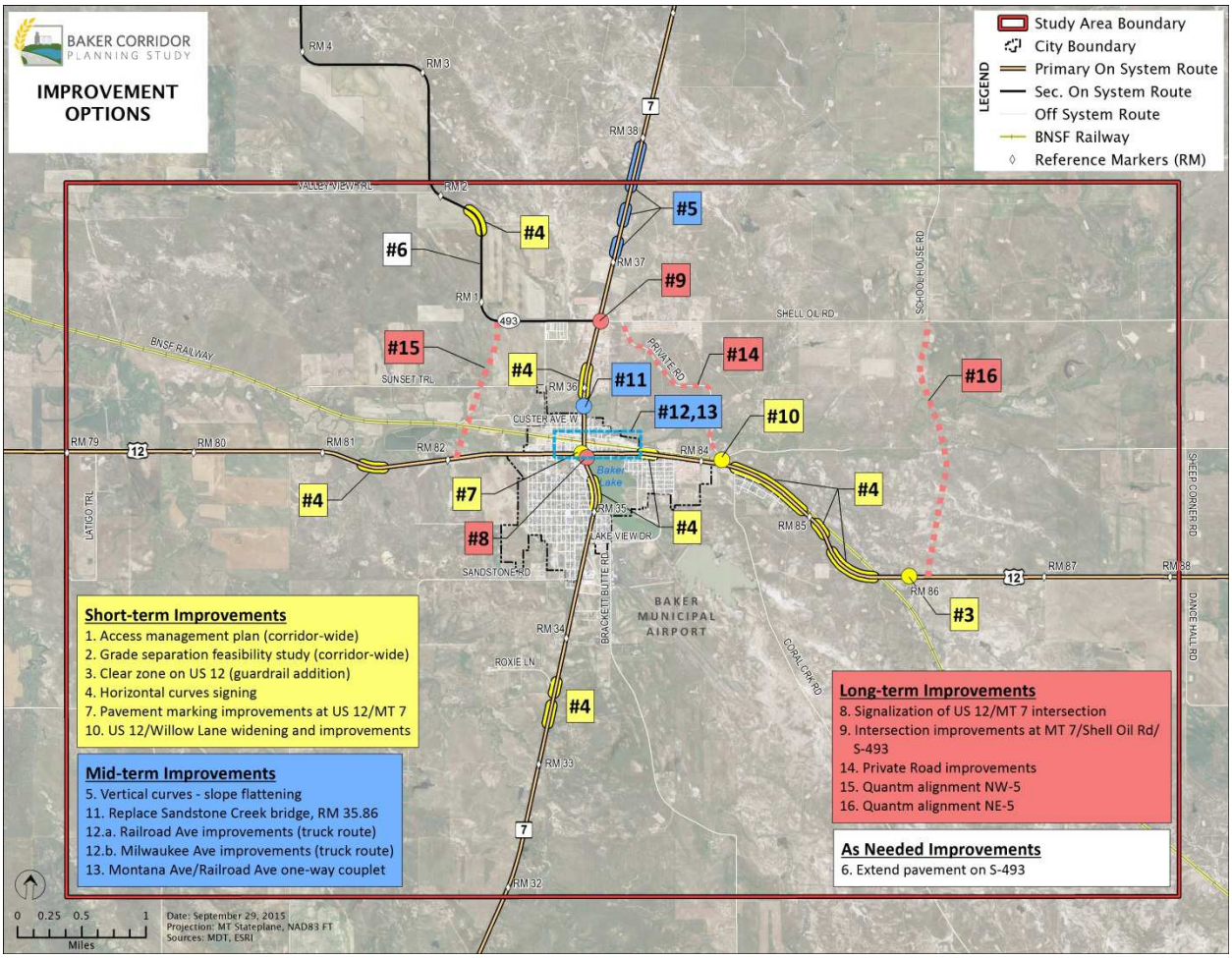

Figure 18: Study Area Improvement Options

Table 17: Improvement Options Summary

Improvement Option		Location	Description	Timeframe	Potential Funding Source[a]	Agency Responsibility	Cost Estimate[b]
CORRIDOR PLANNING							
1	Access Management Plan	Corridor-wide	Develop an *Access Management Plan* for the corridor	Short-term	STPP, Local	MDT Local	$100k to $150k
2	Grade Separation Feasibility Study	Corridor-wide	Conduct grade separation study within city limits; preliminary engineering	Short-term	STPP, Local	MDT Local	$100k to $125k
GEOMETRIC AND PAVEMENT CONDITIONS IMPROVEMENTS							
3	Clear Zone on US 12 near RM 86.18	US 12, RM 86.18	Extend the existing guardrail or place a new guardrail section at this location	Short-term	STPP, HSIP	MDT	$40k to $42k
4	Horizontal Curve Warning Signs	US 12, RM 81.4, 83.51, 84.65, 85.32, 85.72; MT 7, RM 33.41, 33.55, 35.15, 36.03; S-493, RM 1.65	Update signing at these locations to provide advanced curve warning signs	Short-term	STPP, HSIP	MDT	$11k to $12k
5	Vertical Curves	MT 7, between RM 37.10 and 37.83	Improve length of the vertical curves and stopping sight distance	Mid-term	STPP, HSIP	MDT	$1.5M to $1.7M
6	Extend Pavement on S-493 (Pennel Rd.)	S-493, RM 1.0 and beyond	Increase limits of paved roadway along S-493	As needed	STPS, Local	MDT Local	$1.7M to $1.8M per mile
INTERSECTION IMPROVEMENTS							
7	Pavement Marking Improvements at US 12/MT 7 Intersection	US 12/MT 7 Intersection	▪ Add a narrow striped median at all approaches ▪ Relocate the stop bar farther back from the intersection at all approaches ▪ Remove on-street parking near the intersection	Short-term	STPP, HSIP, CMAQ,TA	MDT	$10k to $11k
8	Future Signalization of US 12/MT 7	US 12/MT 7 Intersection	▪ Add left-turn lanes on all approach legs ▪ Signalize the intersection ▪ Remove adjacent on-street parking per MDT design standards	Long-term	STPP, HSIP, CMAQ, TA	MDT	$600k to $650k
9	Intersection Improvements at MT 7/Shell Oil Rd./S-493	MT 7/Shell Oil Rd./S-493 intersection	▪ Signalization: Add left-turn lane on northbound approach on MT 7, signalize the intersection ▪ Roundabout: Single-lane roundabout	Long-term	STPP, HSIP, CMAQ	MDT	$600k to $625k (Signal); $3.2M to $3.3M (Roundabout)
10	US 12/Willow Lane Turn Lane Queuing and Railroad Crossing Improvements	US 12/Willow Lane intersection, RM 84.1	▪ Widen shoulder along US 12 to provide vehicle queuing ▪ Improve approaches of Willow Lane at-grade railroad crossing ▪ Widen road approach to a minimum of 32 ft.	Short-term	STPP Local	MDT Local	$550k to $600k
BRIDGE IMPROVEMENTS							
11	Replace Bridge on MT 7, RM 35.86 (Sandstone Creek)	MT 7, RM 35.86	Replace bridge on MT 7 at RM 35.86	Mid-term	STPB	MDT	$850k to $900k

Improvement Option		Location	Description	Timeframe	Potential Funding Source[a]	Agency Responsibility	Cost Estimate[b]
ALTERNATIVE TRUCK ROUTES ON EXISTING ROUTES							
12.a	Railroad Ave. Improvements	Railroad Ave. between US 12 and MT 7	▪ Pave Railroad Ave. east of S. 3rd St. E to its intersection with US 12 ▪ Include signage indicating a truck route on US 12 and MT 7 ▪ Intersection improvements at US 12/MT 7, Railroad Ave./3rd St. E, and Railroad Ave./US 12	Mid-term	Local	Local	$300k to $325k
12.b	Milwaukee Ave./3rd St. SW Improvements	Milwaukee Ave. W/3rd St. SW	▪ Pave 3rd St. railroad crossing between Milwaukee Ave. and Railroad Ave. ▪ Include signage indicating a truck route on US 12 and MT 7 ▪ Intersection improvements at Milwaukee Ave./MT 7 and Milwaukee Ave./US 12	Mid-term	Local	Local	$120k to $130k
13	Montana Ave. (US 12) and Railroad Ave. One-way Couplet	US12 and Railroad Ave.	▪ Intersection signals at US 12/MT 7 and MT 7/Railroad Ave. ▪ Update signing and striping for one-way traffic within couplet limits ▪ Pave Railroad Ave. east of S. 3rd St. E to its intersection with US 12	Mid-term	STPP Local	MDT Local	$1.6M to $1.7M
14	Private Oil Field Road Improvements	Private Road between US 12 and Shell Oil Rd.	▪ Widen road, straighten curves, paving, signing	Long-term	Local	Local	NA
ALTERNATIVE TRUCK ROUTES ON NEW ALIGNMENT							
15	Quantm Alignment NW-5	Between US 12, RM 82.1 and S-493, RM 0.8	▪ Construct new alignment including a grade separated crossing of the railroad ▪ Widen S-493 from RM 0.8 to MT 7 to 32 ft.; intersection improvements at alignment termini	Long-term	STPP Local	MDT Local	$17M to $17.5M
16	Quantm Alignment NE-5	Between US 12, RM 86.2 and Shell Oil Rd.	▪ Construct a new alignment between US 12 and Shell Oil Rd. ▪ Surfacing improvements and widen Shell Oil Rd. to 32 ft. from School House Rd. to MT 7; intersection improvements at alignment termini	Long-term	STPP Local	MDT Local	$16.3M to $16.8M

[a] STPP = Surface Transportation Program – Primary; STPS = Surface Transportation Program – Secondary; STPB = Surface Transportation Program – Bridge Program; HSIP = Highway Safety Improvement Program; CMAQ = Congestion Mitigation and Air Quality; TA = Transportation Alternatives. Table lists potential federal and state funding sources. Local funding sources include multiple potential city/county sources. All improvements could potentially be funded through a public/private partnership.

[b] Planning-level cost estimates are for all phase costs and use 2015 dollars as a base. The cost estimates include preliminary and construction engineering, indirect costs, ROW and utilities (where appropriate), contingency, and inflation based on the associated project timeframe and are rounded for planning purposes. Refer to **Appendix C** for cost estimate spreadsheets.

6. Potential Funding Sources

This chapter identifies potential funding sources potentially available to fund improvements within the study area. MDT administers numerous programs that are funded from state and federal sources. Each year, in accordance with Montana Code Annotated (MCA) 60-2-127, the Montana Transportation Commission allocates a portion of available Federal-aid highway funds for construction purposes and for projects located on the various systems in the state as described throughout this chapter. This includes federal funds the state receives under the Moving Ahead for Progress in the 21st Century Act.

Funding sources discussed in this chapter include local funding sources available through the city and county, as well as potential private sources. Additional funding sources may be available; however, those discussed in this chapter reflect the most probable sources currently available. A narrative description of each potential funding source is provided and, where applicable, includes the source of revenue, required match, purpose for which funds are intended, means by which the funds are distributed, and the agency or jurisdiction responsible for establishing priorities for use of the funds.

Presently, none of the improvement options identified in this study have a dedicated funding source. Considering current funding limitations and the cost of improvement options to the corridor, additional funding from alternative sources would likely be required to meet the transportation needs of the study area over the planning horizon.

6.1 Federal Funding Sources

Surface Transportation Program

Surface Transportation Program (STP)[4] funds are federally apportioned to Montana and allocated by the Montana Transportation Commission to various programs including the Surface Transportation Program Primary Highways (STPP), Surface Transportation Program Secondary Highways (STPS), the Surface Transportation Program Urban Highways, and the Surface Transportation Program – Bridge Program (STPB).

SURFACE TRANSPORTATION PROGRAM – PRIMARY HIGHWAYS

Federal and state funds available under this program are used to finance transportation projects to preserve, restore, or reconstruct highways and bridges on the state-designated Primary Highway System. The Primary Highway System includes highways that have been functionally classified by the MDT as either principal or minor arterials and that have been selected by the Transportation Commission to be placed on the Primary Highway System (MCA 60-2-125(3)).

Primary funds are distributed statewide (MCA 60-3-205) to each of MDT's five financial districts based on the land area, population, road mileage, and bridge square footage within the district. The Transportation Commission distributes STPP funding based on system performance. The federal share for STPP projects is 86.58 percent, with the 13.42 percent non-federal share typically funded through Highway State Special Revenue (HSSR). Eligible activities include

[4] State funding programs developed to distribute federal funding within Montana.

construction, reconstruction, rehabilitation, resurfacing, restoration and operational improvements. The Transportation Commission establishes priorities for the use of Primary funds and projects are let through a competitive bidding process.

The Glendive District receives approximately $21.6M annually through the STPP program federal apportionment allocation. Eligible STPP funding is currently committed through federal fiscal year (FFY) 2019 as documented in the 2015 STIP. Unfunded projects (beyond 2019) total approximately $50.2M. Additional STPP improvement projects are anticipated beginning in 2021 and extending through 2025.

SURFACE TRANSPORTATION PROGRAM – SECONDARY HIGHWAYS

Federal and state funds available under this program are used to finance transportation projects on the state-designated Secondary Highway System. The Secondary Highway System highways have been functionally classified by the MDT as either rural minor arterials or rural major collectors and that have been selected by the Transportation Commission to be placed on the Secondary Highway System (MCA 60-2-125(4)).

Secondary funds are distributed statewide (MCA 60-3-206) to each of the five financial districts based on the same formula as Primary funds. The federal share for STPS projects is 86.58 percent, with the 13.42 percent non-federal share typically funded through HSSR. Eligible activities for the use of Secondary funds include three major types of improvements: reconstruction, rehabilitation, and pavement preservation. The reconstruction and rehabilitation categories are allocated a minimum of 65 percent of the program funds, with the remaining 35 percent dedicated to pavement preservation. Secondary funds can also be used for any project that is eligible for STP under Title 23 USC.

MDT and county commissions determine Secondary capital construction priorities for each district, with final project approval made by the Transportation Commission. State law requires the individual counties in a district and the state to vote on Secondary funding priorities presented to the Transportation Commission. The counties and MDT take the input from citizens, small cities, and tribal governments during the annual priorities process. Secondary funds and projects are let through a competitive bidding process.

SURFACE TRANSPORTATION PROGRAM – BRIDGE PROGRAM

The federal and state funds available under this program are used to finance bridge projects for on-system and off-system routes in Montana. Title 23 USC requires that a minimum amount (equal to 15 percent of Montana's 2009 federal Bridge Program apportionment) be set aside for off-system bridge projects. The remainder of the Bridge Program funding is established at the discretion of the state. Bridge Program funds are used primarily for bridge rehabilitation or reconstruction activities on Primary, Secondary, Urban, or off-system routes. Projects are identified based on bridge condition and performance metrics.

STPB funds are distributed at a statewide level through MDT's Bridge Bureau based on bridge condition and performance rules. Current Glendive District priorities under development through 2019 total an estimated construction cost of $4.8M, while unfunded projects (beyond 2019) total

approximately $9.7M. STPB funding availability beyond 2019 is dependent upon competing needs throughout the state.

Highway Safety Improvement Program
HSIP funds are federally apportioned to Montana for allocation to safety improvement projects as approved by the Transportation Commission. Projects described in the state *Strategic Highway Safety Plan* must correct or improve a hazardous road location or feature, or address a highway safety problem. The Transportation Commission approves and awards the projects, which are let through a competitive bidding process. Generally, the federal share for the HSIP projects is 91.24 percent, with the non-federal 8.76 percent typically funded through the HSSR account.

HSIP funds are distributed at a statewide level through MDT's Traffic Safety Section as needs and improvements are identified. This is unlike other federal funding sources, from which an annual allocation is distributed for each district to prioritize. Current Glendive District HSIP priorities under development through 2019 total an estimated construction cost of approximately $4.7M. HSIP funding availability beyond 2019 depends on competing safety needs and trends throughout the state.

Congestion Mitigation and Air Quality Improvement Program
Federal funds available under this program are used to finance transportation projects and programs to help improve air quality and meet the requirements of the Clean Air Act. Montana's air pollution problems are attributed to CO and particulate matter (PM10 and PM2.5).

CMAQ funds are federally apportioned to Montana and allocated to various eligible programs by formula and by the Transportation Commission. As a minimum apportionment state, a federally required distribution of CMAQ funds goes to projects in Missoula since it was Montana's only designated and classified air quality non-attainment area. The remaining, non-formula funds, referred to as "flexible CMAQ," are directed primarily to areas of the state with emerging air quality issues through various state programs. The Transportation Commission approves and awards both formula and non-formula projects on MDT right-of-way. Infrastructure and capital equipment projects are let through a competitive bidding process. Of the total funding received, 86.58 percent is federal, and 13.42 percent is non-federal match that the state provides for projects on state highways and local governments for local projects.

In general, eligible activities include transit improvements, traffic signal synchronization, bicycle pedestrian projects, intersection improvements, travel demand management strategies, traffic flow improvements, air-quality equipment purchases, and public fleet conversions to cleaner fuels. At the project level, the use of CMAQ funds is not constrained to a particular system (i.e., primary, urban, and National Highway System). A requirement for the use of these funds is the estimation of the reduction in pollutants resulting from implementing the program/project. These estimates are reported yearly to FHWA.

Transportation Alternatives Program
The TA Program requires MDT to obligate 50 percent of the funds within the state based on population, using a competitive process, while the other 50 percent may be obligated in any

area of the state. The federal share for these projects is 86.58 percent, with the non-federal share funded by the project sponsor through the HSSR. Funds may be obligated for projects submitted by:

- Local governments;
- Transit agencies;
- Natural resource or public land agencies;
- School district, schools, or local education authority;
- Tribal governments; or
- Other local government entities with responsibility for recreational trails for eligible use of these funds.

Eligible categories include:

- On-road and off-road trail facilities for pedestrians and bicyclists, including Americans with Disabilities Act (ADA) improvements;
- Historic preservation and rehabilitation of transportation facilities;
- Archeological activities relating to impacts for a transportation project;
- Any environmental mitigation activity, including prevention and abatement to address highway-related stormwater runoff and to reduce vehicle/animal collisions, including habitat connectivity;
- Turnouts, overlooks, and viewing areas;
- Conversion/use of abandoned railroad corridors for trails for non-motorized users;
- Inventory, control, and removal of outdoor advertising;
- Vegetation management in transportation ROW for safety, erosion control, and controlling invasive species;
- Construction, maintenance, and restoration of trails and development and rehabilitation of trailside and trailhead facilities;
- Development and dissemination of publications and operation of trail safety and trail environmental protection programs;
- Education funds for publications, monitoring, and patrol programs, and for trail-related training;
- Planning, design, and construction of projects that will substantially improve the ability of students to walk and bicycle to school; and
- Non-infrastructure-related activities to encourage walking and bicycling to school, including public awareness campaigns, outreach to press and community leaders, traffic education and enforcement school vicinities, student sessions on bicycle and pedestrian safety, health, and environment, and funding for training.

The state and any metropolitan planning organizations required to obligate TA funds must develop a competitive process to allow eligible applicants an opportunity to submit projects for funding. MDT's process emphasizes safety, ADA, relationships to state and community planning efforts, existing community facilities, and project readiness.

Congressionally Directed or Discretionary Funds
Congressionally directed funds may be received through either highway program authorization or annual appropriations processes. These funds are generally described as "demonstration" or "earmark" funds. Discretionary funds are typically awarded through a federal application process or Congressional direction. If a local sponsored project receives these types of funds, MDT will administer the funds in accordance with the Montana Transportation Commission Policy #5 – *"Policy resolution regarding Congressionally directed funding: including Demonstration Projects, High Priority Projects, and Project Earmarks."*

6.2 State Funding Sources

State Fuel Tax
The state of Montana assesses a tax of $0.2775 per gallon on gasoline and diesel fuel used for transportation purposes. According to state law, each incorporated city and town within the state receives an allocation of the total tax funds based upon the following:

1. The ratio of the population within each city and town to the total population in all cities and towns in the state
2. The ratio of the street mileage within each city and town to the total street mileage in all incorporated cities and towns in the state (street mileage is exclusive of the Federal-aid Interstate and Primary Systems)

State law also establishes that each county be allocated a percentage of the total tax funds based upon the following:

1. The ratio of the rural population of each county to the total rural population in the state, excluding the population of all incorporated cities or towns within the county and state
2. The ratio of the rural road mileage in each county to the total rural road mileage in the state, less the certified mileage of all cities or towns within the county and state
3. The ratio of the land area in each county to the total land area of the state

For State Fiscal Year 2015, the city of Baker will receive $48,703.24, and Fallon County will receive $49,574.52 in state fuel tax funds. The amount varies annually, but the current level provides a reasonable base for projection throughout the planning period.

All fuel tax funds allocated to city and county governments must be used for the construction, reconstruction, maintenance, or repair of rural roads or city streets and alleys. The funds may also be used for the share that the city or county might otherwise expend for proportionate matching of federal funds allocated for the construction of roads or streets that are part of the primary, secondary, or urban system. Priorities for the use of these funds are established by each recipient jurisdiction.

6.3 Local Funding Sources

Local governments generate revenue through a variety of funding sources. Typically, several local programs exist for budgeting and dispersing revenues related to transportation. These

programs are intended to fulfill specific transportation functions or provide particular services. The following section summarizes programs that are currently used or could be used to finance transportation improvements by Fallon County and the City of Baker.

County Funding Sources

COUNTY ROAD FUND

The County Road Fund provides for the construction, maintenance, and repair of county roads outside the corporate limits of cities and towns in Fallon County. Revenue for these funds comes from intergovernmental transfers (i.e., state gas tax apportionment and motor vehicle taxes) and a mill levy assessed against county residents living outside cities and towns. County Road Fund monies are used primarily for maintenance, with little allocated for new road construction. The study area contains only a small percentage of the total miles on the county road system for Fallon County. Projects eligible for financing through this fund would compete for available revenues on a countywide basis.

COUNTY BRIDGE FUND

The County Bridge Fund provides financing for engineering services, capital outlays, and necessary maintenance for bridges on off-system and secondary routes within Fallon County. These monies are generated through intergovernmental fund transfers (i.e., vehicle licenses and fees) and a countywide mill levy.

CAPITAL IMPROVEMENT FUNDS

Counties may use capital improvement funds to finance major capital improvements to county infrastructure (MCA 7-6-616). Revenues are generated by loans from other county funds and must be repaid within 10 years. A capital improvement fund must be formally adopted by the governing body. Major road construction projects are generally eligible for this type of funding.

RURAL SPECIAL IMPROVEMENT DISTRICT

Counties may establish a Rural Special Improvement District to administer and distribute funds for specified projects (MCA 7-12-2102). Bonds may be issued by local government to cover the cost of a proposed transportation improvement. Revenue to pay for the bonds may be raised through assessments against property owners in the designated district.

SPECIAL BOND FUNDS

A special bond fund may be established by counties on an as-needed basis for a particularly expensive project. Voters must approve a special bond fund.

City Funding Sources

GENERAL FUND

This fund provides revenue for most major city function like the administration of local government, and the departments of public services, including police, fire, and parks. Revenues for the fund are generated through the general fund mill levy on real and personal property and motor vehicles, licenses and permits, state and federal intergovernmental revenues; intergovernmental fund transfers, and charges for services.

Several transportation services are supported by this fund, including public services (engineering and streets). Highway-designated monies are typically oriented toward maintenance activities; however, some new construction and street-widening projects may be financed through the General Fund. This revenue source has been used in conjunction with other resources to finance local street and highway projects.

SPECIAL REVENUE FUNDS

These funds are used to budget and distribute revenues that are legally restricted for a specific purpose. There are several special revenue funds that benefit the transportation system.

SPECIAL IMPROVEMENT DISTRICT REVOLVING FUND

This fund provides financing to satisfy bond payments for special improvement districts (SIDs) in need of additional funds. The city can establish street SIDs with bond repayment to be made by the adjoining landowners receiving the benefit of the improvement.

TAX INCREMENT FINANCING

The funds generated from a new tax increment financing district could be used to finance projects, including street and parking improvements and other streetscape beautification projects.

6.4 Private Funding Sources

Private financing of roadway improvements, in the form of ROW donations and cash contributions, has been successful for many years. In recent years, the private sector has recognized that better access and improved facilities can be profitable due to increases in land values and commercial development possibilities. Several forms of private financing for transportation improvements used in other parts of the United States are described in this section.

Cost Sharing

The private sector pays some of the operating and capital costs for constructing transportation facilities required by development actions.

Transportation Corporations

These private entities are non-profit, tax-exempt organizations under the control of state or local government. They are created to stimulate private financing of highway improvements.

Road Districts

These are areas created by a petition of affected landowners, which enables issuance of bonds for financing local transportation projects.

Private Donations

The private donation of money, property, or services to mitigate identified development impacts is the most common type of private transportation funding. Private donations are effective in areas where financial conditions do not permit a local government to implement a transportation improvement itself.

Private Ownership
This method of financing is an arrangement in which a private enterprise constructs and maintains a transportation facility, and the government agrees to pay for public use of the facility. Payment for public use of the facility is often accomplished through leasing agreements (wherein the facility is rented from the owner), or through access fees whereby the owner is paid a specified sum depending on the level of public use.

Privatization
Privatization is either the temporary or long-term transfer of a public property or publicly owned rights belonging to a transportation agency to a private business. This transfer is made in return for a payment that can be applied toward construction or maintenance of transportation facilities.

General Obligation Bonds
The sale of General Obligation (GO) bonds can be used to finance a specific set of major highway improvements. A GO bond sale is subject to voter approval and could provide the financing initially required for major improvements to the transportation system. The advantage of this funding method is that when the bond is retired, the obligation of the taxpaying public is also retired. State statutes limiting the level of bonded indebtedness for cities and counties restrict the use of GO bonds.

Local Improvement District
This funding option is applicable only to counties wishing to establish a local improvement district for road improvements. While similar to a SID, this funding option has the benefit of allowing counties to initiate a local improvement district through a more streamlined process than that associated with the development of a SID.

Impact Fees
Local governments may impose impact fees as part of the private development approval process to fund public infrastructure improvements required to serve new developments (MCA 7-6-1601). Impact fees can be used to fund additional service capacity for transportation facilities, including roads, streets, bridges, ROW, traffic signals, and landscaping. The amount of the impact fee must be reasonably related to the development's share of the cost of infrastructure improvements made necessary by the new development.

Multi-Jurisdictional Special District
This funding option was authorized by the State Legislature in 1985. This process requires the establishment of a special district, somewhat like an SID, but which has the flexibility to extend across city and county boundaries. Through this funding mechanism, an urban transportation district could be established to fund a specific highway improvement that crosses municipal boundaries. This type of fund is structured similarly to an SID and uses bonds backed by local government that are issued to cover the cost of a proposed improvement. Revenue to pay for the bonds would be raised through assessments against property owners in the service district.

7. Conclusions and Next Steps

MDT initiated this pre-NEPA/MEPA transportation study in partnership with FHWA, and in coordination with Fallon County and the City of Baker, to better understand the study area's needs, objectives, constraints, and opportunities. The study examined roadway geometrics, crash statistics, land use and development patterns, physical and environmental constraints, and existing and projected operational characteristics for the study area.

The analyses and results achieved were based on the best information available to the planning team. Through evaluation of the existing and projected conditions within the study area, a package of improvement options was identified that provides a "road map" to plan for long-term transportation improvements within the study area. The improvement options include short- to long-term recommendations that address anticipated transportation needs of the study area over the 20-year planning horizon (2034). As projects are forwarded from the study, traffic conditions and anticipated transportation needs should be confirmed given the uncertainties of oil and gas development and associated growth within the study area.

7.1 Next Steps

Project development and implementation of any of the improvement options depends ultimately on funding availability, ROW needs, and other transportation priorities within the MDT Glendive District. Implementation of improvement options located off system (i.e., not on an MDT-maintained route) would be a local government responsibility and would need to follow the local procedures to move projects forward, and may include coordination with the MDT Glendive District or the Transportation Commission to identify a funding source. At this time, funding is not available to implement any of the improvement options identified by this study. Federal funding allocations for the MDT Glendive District, the MDT Bridge Bureau, and the MDT Traffic Safety Section are committed through FFY 2019, with additional unfunded projects extending beyond 2019. Future project (or projects) development and implementation will require the following steps:

- Identify and secure a funding source(s)
- For MDT-led projects, follow MDT processes for project nomination and development, including a public involvement process and environmental documentation
- For projects that are developed by others and may impact MDT routes, coordinate with MDT via the System Impact Action Process

Any project or combination of projects resulting from this corridor planning study will be required to comply with NEPA if federal funds or a federal action is involved and MEPA if state funds or a state action is involved. The purpose and need statement for any future project should be consistent with the needs and objectives for this study as identified in Section ES.2 and Chapter 4. This corridor planning study will be used as the basis for determining the impacts and subsequent mitigation for the improvement options in future NEPA/MEPA documentation. Any project developed would have to comply with the Code of Federal Regulations Title 23 Part 771 and Associated Rules of Montana 18, subchapter 2, which set forth the requirements for documenting environmental impacts on highway projects.

As discussed in Section 5.8, the City of Baker has identified potential improvements that could be made to the North 3rd St. W at-grade railroad crossing to address emergency vehicle access concerns. Continued coordination between the City of Baker and BNSF Railway would be required to further develop potential improvements involving railroad modifications to existing off-system at-grade crossings.