EXISTING AND PROJECTED CONDITIONS

TONGUE RIVER ROAD (S-332) – Corridor Planning Study

FINAL

MONTANA MDT DEPARTMENT OF TRANSPORTATION

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ABBREVIATIONS / ACRONYMS

AADT	Average Annual Daily Traffic
ADT	Average Daily Traffic
BLM	Bureau of Land Management
DEQ	Department of Environmental Quality
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FWP	Fish, Wildlife, and Parks
GIS	Geographic Information Systems
LUST	Leaking Underground Storage Tank
LWQD	Local Water Quality District
MDT	Montana Department of Transportation
MSAT	Mobile Source Air Toxics
NAAQS	National Ambient Air Quality Standards
NAC	Noise Ambient Criteria
NAICS	North American Industry Classification System
NPL	National Priority List
NPS	National Park Service
NRCS	Natural Resource Conservation Service
NRIS	Natural Resource Information Systems
RP	Reference Post
TMDL	Total Maximum Daily Loads
USACOE	US Army Corps of Engineers
USFWS	US Fish and Wildlife Service
UST	Underground Storage Tank
VPD	Vehicles per Day

EXISTING AND PROJECTED CONDITIONS

1.0 INTRODUCTION

The Secondary Highway 332 (S-332) corridor provides a link between Montana Highway 59 (MT-59) south of Miles City and Secondary Highway 447 (S-447) north of Ashland, Montana. S-332, locally known as "Tongue River Road", is approximately 50.4 miles in length. The corridor roughly parallels the Tongue River and traverses through level and rolling terrain that consists of mostly farm and ranch land.

The intent of this report is to identify the existing and projected roadway conditions and social, economic and environmental factors for S-332. The analysis includes an examination of the corridor utilizing technical and environmental factors such that known issues and/or areas of concern may be identified through a high-level planning analysis.

1.1. Study Area

The study area for the *Tongue River Road Corridor Planning Study* includes a half-mile buffer on each side of S-332. The study area begins at the junction of MT-59 (Reference Post (RP) 0.0), approximately 11 miles south of Miles City, and ends at the junction of S-447 (RP 50.4), approximately nine miles north of Ashland. The study area boundary is shown in **Figure 1**.

S-332 is currently classified as a rural collector and is an integral part of the regional rural transportation network connecting local population and commerce to the National Highway System. The land use within the study area is predominantly for agricultural and ranch purposes. The majority of the land within the corridor is undeveloped.

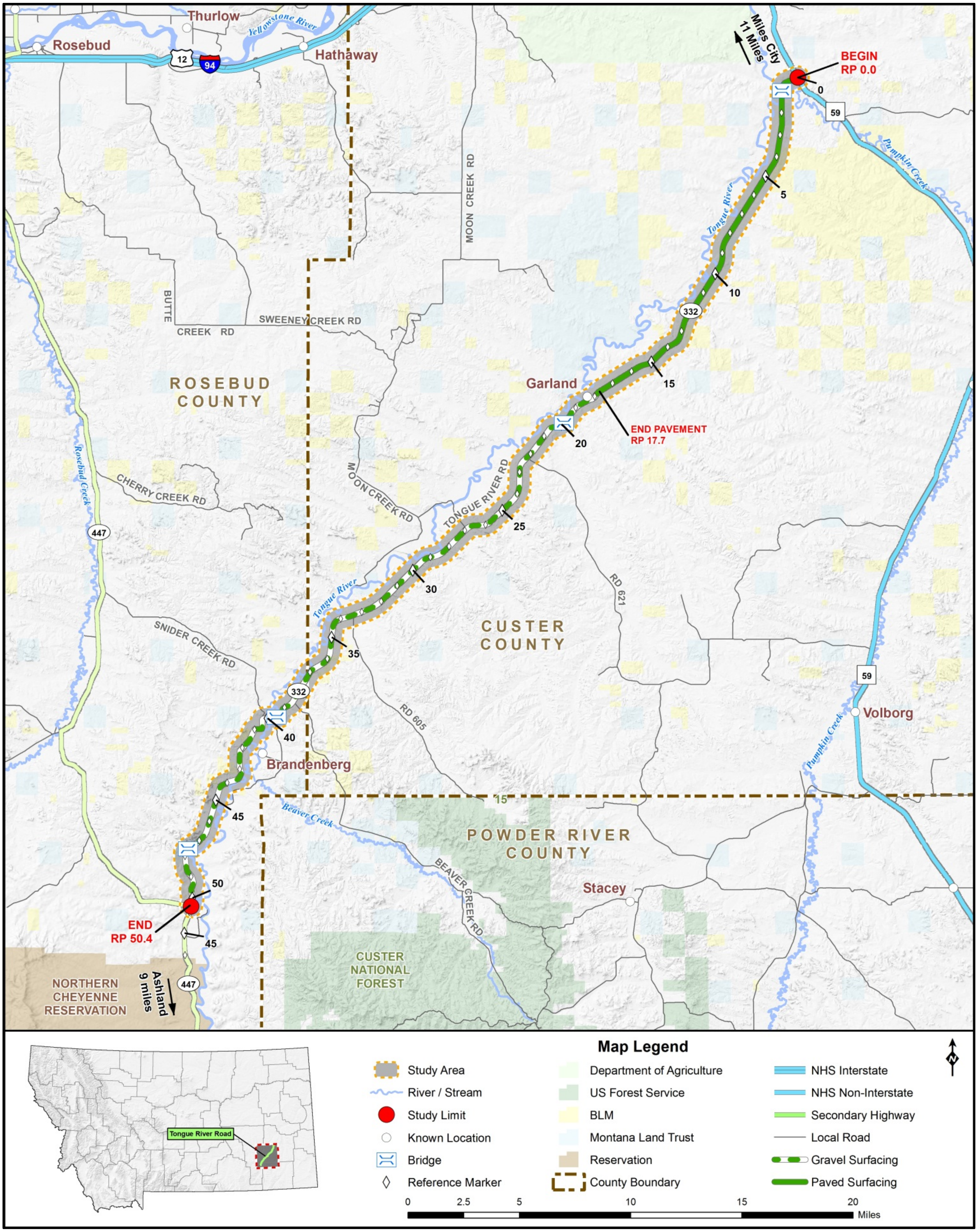

Figure 1: Study Area Boundary

2.0 DEMOGRAPHICS

There is a direct correlation between motor vehicle travel and socio-economics. Historic and recent trends in area demographics help define existing conditions and aid traffic forecasting techniques. This section provides an overview of social and economic characteristics for the region surrounding the study area.

Socio-economic data sources often lag considerably behind the current year. Also, economic data are often limited in rural counties. This analysis presents the most recent socio-economic statistics available and describes recent and potential future changes in the area.

2.1. Population Characteristics

A review of demographics within the study area is appropriate to gain an understanding of historical trends in population, age, race and ethnicity. Understanding the composition of the population is necessary, as the data may influence the types of improvements that are identified. For example, an aging population may indicate a need for specific types of transportation improvements such as transit services and/or non-motorized infrastructure improvements. Additionally, the presence of a disadvantaged population may warrant other consideration.

Over the last decade, the population growth in Custer County has remained flat with no measurable growth. In Rosebud County, the population has actually decreased by 1.6 percent. This is in contrast to the 9.7 percent growth experienced over the last decade in the State of Montana and the entire United States. According to the 2010 Census, Custer County has a population density of 3.1 persons per square mile, while Rosebud County has a density of 1.8 persons per square mile. Both of these densities are much less than the population density for the State of Montana and the United States. This population data is shown in **Table 1**.

Table 1: Population Growth & Density

Area	Population (2000)	Population (2010)	Percent Growth	Persons per Square Mile (2010)
Custer County	11,696	11,699	0.0%	3.1
Rosebud County	9,383	9,233	-1.6%	1.8
State of Montana	902,195	989,415	9.7%	6.8
United States	281,421,906	308,745,538	9.7%	87.4

Source: US Bureau of the Census, Census of the Population

Table 2 depicts the race and ethnicity characteristics in Custer County, Rosebud County, the State of Montana, and the United States during 2010. Of note is that Rosebud County has a much higher percentage of "American Indians and Alaska Natives" than Custer County and the State of Montana.

Between 1980 and 2010, the number of residents in both counties has decreased. County residents in the "less than 18 years old" and "between 18 and 64 years old" categories have decreased during the time period. The age group that has increased in both counties is the "65 and older" category. This points to the aging of the population, and follows similar trends within Montana and the United States. **Table 3** depicts the change in age composition for Custer County and Rosebud County.

Table 2: Population Race and Ethnicity Data (2010)

Area	Custer County		Rosebud County		State of Montana		United States	
Total Population	11,699		9,233		989,415		308,745,538	
White	11,174	95.5%	5,664	61.3%	884,961	89.4%	223,553,265	72.4%
Black or African American	34	0.3%	25	0.3%	4,027	0.4%	38,929,319	12.6%
American Indian and Alaska Native	196	1.7%	3,202	34.7%	62,555	6.3%	2,932,248	0.9%
Asian	37	0.3%	42	0.5%	6,253	0.6%	14,674,252	4.8%
Native Hawaiian and Other Pacific Islander	9	0.1%	3	0.0%	668	0.1%	540,013	0.2%
Some Other Race	64	0.5%	42	0.5%	5,975	0.6%	19,107,368	6.2%
Two or More Races	185	1.6%	255	2.8%	24,976	2.5%	9,009,073	2.9%
Hispanic or Latino (of any race)	263	2.2%	313	3.4%	28,565	2.9%	50,477,594	16.3%

Source: US Bureau of the Census, Census of the Population

Table 3: Age Distribution (1980 – 2010)

Year	<18		18-64		65+		Total
Custer County							
1980	3,869	29.5%	7,506	57.3%	1,734	13.2%	13,109
1990	3,334	28.5%	6,375	54.5%	1,988	17.0%	11,697
2000	2,939	25.1%	6,758	57.8%	1,999	17.1%	11,696
2010	2,657	22.7%	6,998	59.8%	2,044	17.5%	11,699
Change (1980 – 2010)	-1,212		-508		310		-1,410
Rosebud County							
1980	3,674	37.1%	5,657	57.1%	586	5.9%	9,899
1990	3,821	36.4%	5,963	56.8%	721	6.9%	10,505
2000	3,143	33.5%	5,407	57.6%	833	8.9%	9,383
2010	2,732	29.6%	5,433	58.8%	1,058	11.5%	9,233
Change (1980 – 2010)	-942		-224		472		-666

Source: US Bureau of the Census, Census of the Population

2.2. Employment and Income Characteristics

Employment by economic sector for Custer County and Rosebud County is represented in **Table 4**. The data includes the years 1970, 1980, 1990 and 2000. Of note is that for Custer County, total employment between years 1970 and 2000 increased by 1,498 jobs. More recent data shows that Custer County employment was recorded at 6,927 total jobs in year 2001 and 7,279 jobs in year 2009[1].

For Rosebud County, total employment between years 1970 and 2000 increased by 3,187 jobs. Year 2001 employment for Rosebud County was recorded at 5,831 jobs and year 2009 employment was recorded at 5,932 jobs.

[1] US Department of Commerce Bureau of Economic Analysis

Table 4: Employment Trends by Economic Sector (1970 – 2000)

Economic Sector	1970	1980	1990	2000	Change (1970 - 2000)
Custer County					
Farm	615	514	559	533	-82
Agricultural Services & Forestry	87	72	91	110	23
Mining	79	21	11	(L)	N/A
Construction	365	679	257	339	-26
Manufacturing	130	156	132	187	57
Transportation & Public Utilities	410	430	377	378	-32
Wholesale Trade	202	301	300	192	-10
Retail Trade	1,144	1,427	1,242	1,522	378
Finance, Insurance & Real Estate	310	374	343	500	190
Services	1,103	1,636	1,671	2,024	921
Federal & Civilian Government	304	479	408	264	-40
Military	95	78	90	61	-34
State & Local Government	636	921	943	861	225
Total Employment	5,480	7,088	6,424	6,978	1498
Rosebud County					
Farm	722	521	539	529	-193
Agricultural Services & Forestry	24	46	60	(D)	N/A
Mining	53	451	528	511	458
Construction	62	865	273	105	43
Manufacturing	226	155	167	(D)	N/A
Transportation & Public Utilities	(D)	(D)	897	795	N/A
Wholesale Trade	21	33	42	(D)	N/A
Retail Trade	313	583	601	665	352
Finance, Insurance & Real Estate	46	108	110	119	73
Services	(D)	(D)	986	999	N/A
Federal & Civilian Government	111	154	181	218	107
Military	46	60	137	49	3
State & Local Government	479	1,072	1,237	1,604	1125
Total Employment	2,649	5,101	5,758	5,836	3187

Source: US Department of Commerce Bureau of Economic Analysis – Table CA25.
(L) Indicates less than ten jobs, but the estimates are included in the totals.
(D) Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.
(N/A) Indicates change in this sector not calculated due to lack of available data.

Unemployment rates are represented in **Table 5** and are current as of January 2012. The data depicts an unemployment rate for Custer County lower than the State of Montana (4.2% versus 7.4%). For Rosebud County, the rate is higher than the State of Montana rate (8.2% versus 7.4%). All are lower, though, than the United States unemployment rate of 8.8 percent.

Table 5: Employment Statistics (2011)

Area	Total Labor Force	Employed	Unemployed	Unemployment Rate
Custer County	6,351	6,083	268	4.2%
Rosebud County	4,274	3,924	350	8.2%
State of Montana	500,189	463,045	37,144	7.4%
United States	153,485,000	139,944,000	13,541,000	8.8%

Source: MT Department of Labor and Industry, Research and Analysis Bureau – Labor Force Statistics, January 2012 (data is not seasonally adjusted).

Median household income between 1990 and 2010 is represented in **Table 6**. Custer County's year 2010 median household income of $39,469 is lower than the State of Montana's at $42,303. Rosebud County's median household income of $44,683 is higher than the State of Montana's. The median household income for both Custer County and Rosebud County is lower than the median household income for the United States, which is listed at $50,046.

Table 6: Median Household Income (1990 – 2010)

Area	1990	2000	2010	Change (1990 - 2010)
Custer County	$21,348	$31,361	$39,469	$18,121
Rosebud County	$27,192	$36,980	$44,683	$17,491
State of Montana	$23,375	$32,777	$42,303	$18,928
United States	$29,943	$41,990	$50,046	$20,103

Source: MT Department of Labor and Industry, Research and Analysis Bureau – Income Data Analysis (accessed March 2012).

2.3. Economic Development

The linkage of local economies to national and global conditions, particularly in natural resource-based rural regions like this one, can be direct and immediate. Industry and transportation changes far beyond the control of local people and governments can affect huge shifts in local investment and income. This region is a case in point.

Arch Coal is proposing a coal development that the firm estimates would add about 300 permanent jobs in coal mining in the state. The Montana Department of Transportation (MDT) estimated the economic impacts of such a development[2]. The following conclusions apply to all counties in eastern Montana.

- Otter Creek coal tracts are expected to generate $35 million more income per year in eastern Montana in the year it opens. That amount rises to $119 million per year after twenty years, in constant 2010 dollars.
- Counting the direct, indirect, and induced employment, the total employment impact is estimated at 590 in the first year, and 745 in the 20th.
- Total population increases are expected to be 222 in the first year of operations, and 1,865 by the 20th. Population growth will allow the region to capture earnings from increased spending on retail, housing, wholesale business, and direct suppliers to the area.
- Mining is the primary affected sector. Job growth in this region is also expected in the following industrial sectors: retail trade, construction, health care and social assistance, other services, and accommodations and food services. These sectors constitute over 90 percent of projected private sector employment impacts.

[2] MDT Transportation Planning, *Social and Economic Conditions*, 2012

- Job and population growth in the region would have effects on the communities that attract spending on housing and industrial activity. Community economic impacts include increased public sector demands such as children needing education, retirees needing services, etc.

Observation of recent mining developments suggests that the location of household settlement is influenced by basic family needs such as schools, shopping, services, and other jobs.

3.0 EXISTING TRANSPORTATION CONDITIONS

S-332 was initially constructed as a gravel road in the 1930's and placed on Montana's Secondary Highway System in 1945. The study corridor is functionally classified as a Rural Major Collector highway. The first approximately 17.7 miles of S-332 (RP 0.0 to RP 17.7) are paved and are maintained by MDT. The remaining portion of the corridor is maintained by the counties and has gravel surfacing.

3.1. Existing Roadway Users

Primary users of the roadway consist of local residents, commuters between Ashland and Miles City, recreationalists, and commercial users. The study area primarily consists of ranch and farmland. Intermittent Bureau of Land Management (BLM) and Montana State Trust Land properties also exist within the study area. Noted recreational areas within the study area include the 12-Mile Dam Fishing Access Site (S-332, RP 1.0) and the Pumpkin Creek Recreational Area (S-332, RP 4.1).

3.2. Traffic Data

Historic traffic data was provided by MDT for the study area. **Table 7** shows the most recent 20 years of traffic data. The Average Annual Daily Traffic (AADT) for S-332 ranges from approximately 280 vehicles per day (vpd) on the northern end near MT-59, to 50 vpd on the southern end near the intersection with S-447.

Table 7: Average Annual Daily Traffic Data

Site	Location	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
9-2-9	RP 1.0	190	170	180	260	180	140	270	250	180	190
9-4-3	RP 11.0	140	150	90	80	80	160	180	90	110	130
9-4-4	RP 26.5	70	90	(a)	(a)	80	210	100	110	90	110
44-7-5	RP 39.5	100	100	70	90	(a)	90	40	10	(a)	(a)
44-8-4	RP 49.5	60	100	60	60	(a)	60	90	40	(a)	40

Site	Location	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
9-2-9	RP 1.0	190	290	220	(a)	220	230	220	220	280	(a)
9-4-3	RP 11.0	160	210	150	150	120	100	100	100	100	100
9-4-4	RP 26.5	100	140	100	130	90	70	70	70	70	80
44-7-5	RP 39.5	20	20	30	(a)	80	70	70	70	50	(a)
44-8-4	RP 49.5	70	30	90	(a)	60	60	60	60	50	(a)

Source: MDT Data and Statistics Bureau, Traffic Data Collection Section, 2012
(a) Data unavailable

The traffic data in **Table 7** is representative of yearly average traffic volumes. It is likely that seasonal peaks in traffic volumes occur due to recreational and agricultural use in the area. Vehicles traveling along the corridor currently do not experience vehicle delay or congestion. Trucks and agricultural equipment are common throughout the study area.

3.3. Right-of-Way and Jurisdiction

The existing road is predominately located adjacent to private property, with intermittent BLM and Montana State Land Trust lands. Exact right-of-way widths are unknown for the corridor. During the field review it was noted that right-of-way widths appear to be wider along the northern portion of S-332. Along the southern portion in Rosebud County, right-of-way widths appear to generally decrease.

Of particular concern would be between approximately RP 40.0 to RP 41.0 where multiple horizontal curves do not meet current standards. Pivot irrigation facilities currently exist adjacent to the substandard horizontal curves. Changes to the horizontal alignment may result in impacts to the existing pivot irrigation systems.

3.4. Crash Analysis

The MDT Traffic and Safety Bureau provided ten years of crash data for S-332 between January 1, 2001 and December 31, 2010. There were a total of 18 crashes reported along S-332 for the ten-year crash analysis period. One fatality, zero incapacitating injuries, two non-incapacitating injuries, and four other injuries resulted from the 18 reported crashes. An incapacitating injury is defined as an injury, other than a fatality, which prevents the injured person from walking, driving, or normally continuing the activities they were capable of performing before the injury.

All 18 reported crashes were single-vehicle crashes. Alcohol was listed as a contributing circumstance in two crashes. Six crashes involved either a wild or domestic animal. The majority of crashes involved driver error, either driving too fast for conditions or careless driving. There are no identifiable crash clusters during the analysis period.

A comparison of the crashes along S-332 to the statewide crashes along rural secondary highways was made based on crash rate, crash severity index, and crash severity rate. Crash rates are defined as the number of crashes per million vehicle miles of travel. For S-332, the crash rate is 0.86 crashes per million vehicle miles travelled between 2001 and 2010. By comparison, the statewide crash rate for a rural secondary highway is 1.40 crashes per million vehicle miles.

The crash severity index is the ratio of the sum of the level of crash degree to the total number of crashes. A crash severity index of 1.94 was calculated for S-332 versus the statewide rural secondary highway crash severity index of 2.25.

Crash severity rate is determined by multiplying the crash rate by the crash severity index. S-332 has a crash severity rate of 1.67; the statewide rural secondary rate is 3.17. **Table 8** shows the crash data metrics compared to the statewide rural secondary highway rates. A percent difference between the statewide and S-332 rates was calculated for comparison purposes. All three crash metrics are below statewide rates for similar roads.

Table 8: Crash Data Analysis

Crash Data	Crash Rate	Crash Severity Index	Crash Severity Rate
S-332 [a]	0.86	1.94	1.67
Statewide Secondary – Rural [b]	1.40	2.25	3.17
Percent Difference	-38.6%	-13.8%	-47.3%

Source: MDT Traffic and Safety Bureau, 2012
[a] Based on crashes occurring between 2001 and 2010
[b] Provided by MDT Traffic – Safety Management, 2011

3.5. Design Standards

The MDT *Road Design Manual* specifies general design principles and controls which determine the overall operational characteristics of the roadway and enhance the aesthetic appearance of the roadway. The geometric design criteria for the study corridor are based on the current MDT design criteria for a "Rural Collector Secondary Highway". The function of collector routes is to provide for both access and mobility. Rural collectors serve regional needs and provide connections to the arterial system. **Table 9** lists the current design standards for rural collectors according to MDT design criteria.

The design speed for a rural collector roadway ranges between 45 mph and 60 mph depending on terrain. MDT's *Road Design Manual* contains the following definitions for each terrain type:

- Level Terrain – The available stopping sight distances are generally long or can be made to be so without construction difficulty or major expense.
- Rolling Terrain – The natural slopes consistently fall below and rise above the roadway and occasional steep slopes offer some restriction to horizontal and vertical alignment.
- Mountainous Terrain – Longitudinal and traverse changes in elevation are abrupt and extensive grading is frequently needed to obtain acceptable alignments.

Based on these definitions, the majority of the study area appears to be level terrain (60 mph design speed) with some areas of rolling terrain (50 mph design speed). A determination of terrain type (i.e. level or rolling) has not been made for the study corridor, however. For the purposes of this study, areas that do not meet MDT's minimum design standards for level terrain were considered "areas of concern".

It is important to note there is a difference between a facility's design speed and its operating speed. The design speed is a selected speed used to determine the various geometric design features of the roadway. The operating speed is the highest overall speed at which a driver can travel on a given section of roadway under favorable weather conditions and under prevailing traffic conditions without at any time exceeding the safe speed as determined by the design speed. Posting of speed limits is typically accomplished by measuring the speeds at which 85 percent of the drivers are travelling at or below, and signing for that speed within 5 mph of the result. This is typically referred to as the 85th percentile speed.

Table 9: Geometric Design Criteria

	Design Element		Design Criteria				
Design Controls	Design Forecast Year (Geometrics)		20 Years				
	Design Speed (a)	Level	60 mph				
		Rolling	50 mph				
		Mountainous	45 mph				
	Level of Service		Desirable: B Minimum: C				
Roadway Elements	TRAFFIC	Current AADT	0-299	300-999	1000-1999	2000-3000	> 3000
		DHV	50-99	100-199	200-299	300-400	>400
	Roadway Width (Travel Lanes & Shoulders) (a)		24'	28'	32'	36'	40'
	Cross Slope	Travel Lane (a)	2%				
		Shoulder	2%				
	Median Width		Varies				
Earth Cut Sections	Ditch	Inslope	DHV ≥ 200 - 6:1 (Width: 10') DHV < 200 - 4:1 (Width: 6')				
		Width	10' Min.				
		Slope	20:1 towards back slope				
	Back Slope; Cut Depth at Slope Stake	0' - 5'	5:1				
		5' - 10'	Level/Rolling: 4:1; Mountainous: 3:1				
		10' - 15'	Level/Rolling: 3:1; Mountainous: 2:1				
		15' - 20'	Level/Rolling: 2:1; Mountainous: 1.5:1				
		> 20'	1.5:1				
Earth Fill Slopes	Fill Height at Slope Stake	0' - 10'	DHV ≥ 200 - 6:1 DHV < 200 - 4:1				
		10' - 20'	DHV ≥ 200 - 4:1 DHV < 200 - 3:1				
		20' - 30'	3:1				
		> 30'	2:1				
Alignment Elements	DESIGN SPEED		45 mph	50 mph	60 mph		
	Stopping Sight Distance (a)		360'	425	570'		
	Passing Sight Distance		1625'	1835	2135'		
	Minimum Radius (e=8.0%) (a)		590'	760	1200'		
	Superelevation Rate (a)		e_{max} = 8.0%				
	Vertical Curvature (K-value) (a)	Crest	61	84	151		
		Sag	79	96	136		
	Maximum Grade (a)	Level	5%				
		Rolling	7%				
		Mountainous	10%				
	Minimum Vertical Clearance (a)		16.5				

Source: MDT Road Design Manual, Chapter 12, Figure 12-5, "Geometric Design Criteria for Rural Collector Roads (Secondary System)", 2008
(a) Controlling design criteria (see Section 8.8 of the MDT Road Design Manual)

3.1. Roadway Geometrics

Existing roadway geometrics were evaluated and compared to current MDT standards. The analysis was conducted based on a review of public information, MDT as-built drawings, Geographic Information Systems (GIS) data, and field observations. As-built drawings were not available for the entire length of the study corridor. As such, a field review of the study corridor was conducted in March 2012 to confirm and supplement information contained in as-built drawings as well as to identify additional areas of concern within the study area. **Appendix A** provides a log of photos taken during the field review. **Appendix B** contains summary tables of data from available as-builts.

3.1.1. Horizontal Alignment

Elements comprising horizontal alignment include curvature, superelevation (i.e. the "bank" on the road), and sight distance. These horizontal alignment elements influence traffic operation and safety and are directly related to the design speed of the corridor. MDT's standards for horizontal curves are defined in terms of curve radius and vary based on design speed. For a 60 mph design speed (level terrain) the maximum recommended radius is 1,200 feet. The maximum recommended radius for a 50 mph design speed (rolling terrain) is 760 feet.

Horizontal curve radius was determined based either on as-built drawings, or for areas where as-built drawings were unavailable, estimates were made based on field review and aerial photography. Seven horizontal curves were identified that do not meet current MDT standards based on level terrain standards. **Table 10** provides a summary of the seven substandard horizontal curves.

Table 10: Substandard Horizontal Curves (Based on Level Terrain Standards)

RP	Element	Value (ft)
39.52	Radius	955
40.23	Radius	350 [a]
40.66	Radius	300 [a]
40.98	Radius	350 [a]
42.21	Radius	500 [a]
42.97	Radius	500 [a]
44.37	Radius	1,000 [a]

[a] *Estimated based on field review and aerial photography.*

3.1.2. Vertical Alignment

Vertical alignment is a measure of elevation change of a roadway. The length and steepness of grades directly affects the operational characteristics of the roadway. The MDT *Road Design Manual* lists recommendations for vertical alignment elements such as grade, rate of vertical curvature (K-value), and stopping sight distance. Recommendations are made based on roadway classification and terrain type.

According to the *Road Design Manual*, the maximum allowable grades are 5 percent for level terrain and 7 percent for rolling terrain. For vertical curves, stopping sight distance and K-values are controlling design criteria. K-values are defined as a function of the length of the curve compared to the algebraic change in grade which comprises either a sag or a crest vertical curve. **Table 11** provides a list of substandard vertical alignment areas based on level terrain standards.

Table 11: Substandard Vertical Alignment Areas (Based on Level Terrain Standards)

RP	Element	Value
3.06	Vertical Curvature	137.3
	Stopping Sight Distance	544.3'
3.20	Vertical Curvature	95.2
3.42	Vertical Curvature	150.9
3.42 - 3.66	Grade	-5.01%
3.66	Vertical Curvature	87.1
3.66 - 3.97	Grade	6.47%
17.82	Vertical Curvature	51.9
	Stopping Sight Distance	334.8'
17.82 - 17.97	Grade	5.93%
17.97	Vertical Curvature	69.4
18.84	Vertical Curvature	140.4
20.28	Vertical Curvature	99.5
23.86	Vertical Curvature	109.3
24.01	Vertical Curvature	117.6
	Stopping Sight Distance	503.9'
24.50	Vertical Curvature	67.6
	Stopping Sight Distance	381.9'
24.73	Vertical Curvature	67.8
24.40	Vertical Curvature	89.6
	Stopping Sight Distance	441.7'
25.53	Vertical Curvature	129.0
	Stopping Sight Distance	548.1'
25.89	Vertical Curvature	53.5
	Stopping Sight Distance	339.9'
26.04	Vertical Curvature	83.3
26.53	Vertical Curvature	125.0
	Stopping Sight Distance	519.4'
26.53 - 26.72	Grade	-6.96%
26.72	Vertical Curvature	54.3
27.09	Vertical Curvature	95.4
	Stopping Sight Distance	457.4'
27.27	Vertical Curvature	96.9
27.95	Vertical Curvature	122.0
28.05	Vertical Curvature	61.6
	Stopping Sight Distance	364.7'
28.05 - 28.16	Grade	-5.13%
28.16	Vertical Curvature	56.1
28.26	Vertical Curvature	75.6
	Stopping Sight Distance	404.0'
28.58	Vertical Curvature	79.7
28.78	Vertical Curvature	100.3
29.03	Vertical Curvature	106.1
	Stopping Sight Distance	478.5'
29.24	Vertical Curvature	100.0
29.60	Vertical Curvature	90.9
31.54 - 31.76	Grade	-5.99%
31.76	Vertical Curvature	115.1
31.96 - 32.41	Grade	5.76%
32.41	Vertical Curvature	144.2
	Stopping Sight Distance	557.9'
33.76	Vertical Curvature	91.4
38.77	Vertical Curvature	117.5
39.35	Vertical Curvature	134.5
41.44	Stopping Sight Distance (a)	< 570'
41.56	Stopping Sight Distance (a)	< 570'
42.07	Stopping Sight Distance (a)	< 570'
42.45	Stopping Sight Distance (a)	< 570'
43.04	Stopping Sight Distance (a)	< 570'
43.27	Stopping Sight Distance (a)	< 570'
43.36	Stopping Sight Distance (a)	< 570'
45.46 - 45.69	Grade (a)	> 7.00%
46.46	Stopping Sight Distance (a)	< 570'
48.48	Stopping Sight Distance (a)	< 570'
49.69	Stopping Sight Distance (a)	< 570'
49.84	Stopping Sight Distance (a)	< 570'
50.03	Stopping Sight Distance (a)	< 570'
50.17 - 50.27	Grade (a)	> 7.00%

(a) *Estimated based on field review.*

3.1.3. Roadside Clear Zone

The roadside clear zone, starting at the edge of the traveled way, is the total roadside border area available for safe use by errant vehicles. This area may consist of a shoulder, a recoverable slope, a non-recoverable slope, and/or recovery area. The desired clear zone width varies depending on traffic volumes, speeds, and roadside geometry. Clear zones are evaluated individually based on the roadside cross section. According to MDT, clear zone should be attained by removing or shielding obstacles if costs are reasonable.

In certain instances within the study area, it may be impractical to protect or remove certain obstacles within the clear zone. As improvement options develop, roadside clear zones should be designated, to a practical extent, to meet current MDT design standards.

A list of roadside clear zone areas of concern was developed based on information obtained during field reviews. Features looked at during the field reviews were sight distances, side slopes, and roadside hazards. A table of roadside clear zone observations is presented in **Table 12**.

Table 12: Roadside Clear Zone Areas of Concern

RP	Comments
3.74	Slide Area
4.20	Slide Area
4.45	Slide Area
4.65	Slide Area
4.90	Steep Fill Slope
5.10	Steep Fill Slope
22.00	Steep Fill Slope
23.80	Steep Fill Slope
24.10	Steep Fill Slope
24.70	Steep Fill Slope
26.22	Slide Area
26.70	Steep Fill Slope
27.90	Slide Area
31.30	Steep Fill Slope
31.70	Steep Fill Slope
36.30	Slide Area
36.60	Steep Fill Slope
37.50	Steep Fill Slope
39.00	Steep Fill Slope
43.30	Steep Fill Slope
48.10	Steep Fill Slope
50.40	S-332 / S-447 Intersection

[a] *Estimated based on field review.*

Example of slide area - note abrupt pavement edge

Example of steep fill slope

3.2. Roadway Surfacing

Existing roadway surfacing characteristics were determined from MDT's 2011 *Montana Road Log* and on-site field review. The *Road Log* contains information for surface width, lane width, shoulder width, surfacing thickness, and base thickness. This information was supplemented through field data collection efforts. **Table 13** shows the existing roadway width and surfacing type.

The MDT *Road Design Manual* requires a minimum travel lane width of 12 feet. A surface width of 24 feet is recommended for a rural collector road with an AADT less than 300 vpd. For a rural collector road with an AADT between 300 vpd and 999 vpd, a minimum surface width of 28 feet is recommended. Note that the MDT Road Width Committee would ultimately determine the appropriate width during future project development.

S-332 is currently paved from RP 0.00 to RP 17.7; gravel surfacing exists from RP 17.7 to RP 50.4. Based on the road widths identified in the *Road Log* and current traffic volumes, S-332 currently meets minimum road width standards as defined by the *Road Design Manual*.

Table 13: Existing Roadway Surfacing

Begin RP	End RP	Lanes	Width			Surfacing
			Surface	Lane	Shoulder	
0.0	5.7	2	26	12	1	Asphalt
5.7	12.2	2	32	12	4	Asphalt
12.2	17.7	2	24	12	0	Asphalt
17.7	20.0	2	28	10	4	Gravel
39.6	41.0	2	32	12	4	Gravel
41.0	44.7	2	26	9	4	Gravel
44.7	50.4	2	28	10	4	Gravel

Source: MDT Road Log, 2011

3.3. Access Points

Access points were identified through a review of available GIS data and aerial photography. Based on this review, there are approximately 147 access points along S-332. The vast majority of the access points are private / farm field approaches. There are a total of 10 public approaches within the study area.

The angle of approach is the angle at which the approaching road intersects the major road. Desirably, approaching roadways should intersect at or as close to 90° as practical. Intersection skews greater than 30° from perpendicular are undesirable as the driver's line of sight for one of the sight triangles becomes restricted. Accordingly, based on MDT standards[3], the approach angle should be between 60° and 120°. **Table 14** provides a summary of access points grouped in incremental segments along the study area. The number of public approaches and approaches with substandard angles are noted.

Table 14: Access Points

Begin RP	End RP	Length (mi)	Access Points	Density (Access / mi)	< 60° Angle	Public Approach		Comments
						Access Points	< 60° Angle	
0.0	6.0	6.0	27	4.5	1	3	0	
6.0	12.0	6.0	26	4.3	1	0	0	
12.0	17.7	5.7	15	2.6	0	0	0	End of Pavement
17.7	24.0	6.3	20	3.2	3	1	1	
24.0	31.0	7.0	7	1.0	0	1	0	
31.0	37.2	6.2	20	3.2	2	1	0	County Boundary
37.2	44.0	6.8	21	3.1	5	3	2	
44.0	50.4	6.4	11	1.7	0	1	0	End of S-332
Total		**50.4**	**147**	**2.9**	**12**	**10**	**3**	

[3] Montana Department of Transportation, *Approach Standards for Montana Highways*, 1983

3.4. Hydraulics

3.4.1. Slides

2011 was a historic year for flooding in eastern Montana. Due to severe flooding, a number of slides occurred along S-332. Evidence of recent slides was noted at the following approximate locations along S-332 during the field review:

- RP 3.26
- RP 3.74
- RP 4.20
- RP 4.45
- RP 4.65
- RP 26.22
- RP 27.90
- RP 36.30
- RP 43.50

The majority of the identified slide locations received minor repair work intended as temporary mitigation. Evidence of continued subsurface failure was noted at some of these locations.

3.4.2. Bridges

Four bridge crossings are located within the study area. All four have recent inspection reports available listing review parameters for the bridges, including weight limits (see **Appendix C**). **Table 15** shows the location, date of most recent inspection, type, size, year constructed (or reconstructed), and waterbody crossed. **Table 16** depicts both the operating and inventory rating load for each of the structures, correlated to different truck sizes. The operating rating is the capacity rating that defines the absolute maximum permissible load level to which the structure may be subjected for the vehicle type used in the rating. It represents the total mass of the entire vehicle measured in metric tons (mton). The inventory rating is the capacity rating that defines the load level which can safely utilize an existing structure for an indefinite period of time. The three rating vehicles include Type 3 (single truck), Type 3-S3 (semi-truck and trailer) and Type 3-3 (truck and "pup"). Design loads are expressed in metric tons (mton), while ratings are expressed in tons, which is more common for posting.

Table 15: Bridge Locations and Type

Number	RP	Date of Last Inspection	Type of Bridge (Dimensions)	Year Constructed (Reconstructed)	Waterbody Traversed
S00332000+09001	1.02	4/13/2011	3-span concrete structure (27.17' wide x 139.21' long)	1959 (1973)	Pumpkin Creek
S00332019+08751	19.87	10/19/2010	2-span wood structure (26.02' wide x 38.00' long)	1953 (N/A)	Foster Creek
S00332039+06161	39.61	7/28/2010	4-span concrete structure (27.17' wide x 215.49' long)	1963 (N/A)	Tongue River
S00332047+08001	47.80	10/19/2010	1-span concrete structure (28.48' wide x 24.02' long)	1986 (N/A)	Roe and Cooper Creek

Source: MDT Bridge Management System, 2012

Table 16: Bridge Operating and Inventory Design Loads and Ratings

Rating / Truck Type	Bridge at RP 1.02	Bridge at RP 19.87	Bridge at RP 39.61	Bridge at RP 47.80
Operating Load (Design)	**(36.2 mton)**	**(35.2 mton)**	**(28.1 mton)**	**(32.6 mton)**
Truck 1 Type 3 Rating	*35 ton*	*32 ton*	[a]	[a]
Truck 2 Type 3-S3 Rating	*57 ton*	*50 ton*	[a]	[a]
Truck 3 Type 3-3 Rating	*71 ton*	*62 ton*	*51 ton*	*40 ton*
Inventory Load (Design)	**(24.4 mton)**	**(25.1 mton)**	**(24.4 mton)**	**(32.6 mton)**
Truck 1 Type 3 Rating	[a]	*23 ton*	[a]	[a]
Truck 2 Type 3-S3 Rating	[a]	*36 ton*	[a]	[a]
Truck 3 Type 3-3 Rating	[a]	*44 ton*	[a]	[a]

Source: MDT Bridge Management System, 2012
[a] *Data unavailable*

An important consideration in the evaluation of roadway bridge structures is its sufficiency rating. The sufficiency rating formula is a method of evaluating highway bridge data to obtain a numeric value indicating the sufficiency of the bridge to remain in service. The result of this method is the percentage in which 100 is an entirely sufficient bridge and 0 is an entirely deficient bridge. Structures with a sufficiency rating of 0 to 49.9 are eligible for replacement, and structures at 50 to 80 are eligible for rehabilitation unless otherwise approved by the Federal Highway Administration (FHWA). In order to receive funding through the Highway Bridge Replacement and Rehabilitation Program, structures must be "Structurally Deficient" or "Functionally Obsolete", and have a sufficiency rating of 80 or below.

Bridges are considered structurally deficient if significant load carrying elements are found to be in poor condition due to deterioration or the adequacy of the waterway opening provided by the bridge is determined to be extremely insufficient to point of causing intolerable traffic interruptions. The fact that a bridge is classified under the federal definition as "structurally deficient" does not imply that it is unsafe. A structurally deficient bridge, when left open to traffic, typically requires significant maintenance and repair to remain in service and eventual rehabilitation or replacement to address deficiencies. To remain in service, structurally deficient bridges are often posted with weight limits to restrict the gross weight of vehicles using the bridges to less than the maximum weight typically allowed by statute.

A functionally obsolete bridge is one that was built to standards that are not used today. These bridges are not automatically rated as structurally deficient, nor are they inherently unsafe. Functionally obsolete bridges are those that do not have adequate lane widths, shoulder widths, or vertical clearances to serve current traffic demand, or those that may be occasionally flooded. The following criteria determine whether or not a structure is deemed structurally deficient or functionally obsolete:

Structurally Deficient:

A condition of 4 or less for any of the following:

- Deck Rating
- Superstructure Rating
- Substructure Rating

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

- Structure Rating
- Waterway Adequacy

Functionally Obsolete:

An appraisal of 3 or less for the following:

- Deck Geometry
- Under Clearance
- Approach Roadway Alignment

Or, an appraisal of 3 for the following:

- Structure Rating
- Waterway Adequacy

All four bridges within the study area were determined to be not structurally deficient and not functionally obsolete at the present time. The design loadings meet current MDT standards[4]. **Table 17** shows the sufficiency ratings of the four bridge crossings. For the “Under Clearance” criteria, a notation of “N” means that the structure does not pass over a highway or railroad and is not relevant to the functionally obsolete sufficiency rating criteria.

Table 17: Bridge Sufficiency Rating

Criteria		Bridge at RP 1.02	Bridge at RP 19.87	Bridge at RP 39.61	Bridge at RP 47.80
Structurally Deficiency Sufficiency Rating					
Deck Rating	≤ 4	7	6	7	6
Superstructure Rating	≤ 4	5	6	8	7
Substructure Rating	≤ 4	7	6	7	6
Structure Rating	≤ 2	5	6	6	6
Waterway Adequacy	≤ 2	8	8	8	8
Functionally Obsolete Sufficiency Rating					
Structure Rating	3	5	6	6	6
Deck Geometry	≤ 3	5	5	6	7
Under Clearance	≤ 3	N	N	N	N
Waterway Adequacy	3	8	8	8	8
Approach Roadway Alignment	≤ 3	8	8	6	6
Design Loading		3 MS 13.5 (HS 15)	2 M 13.5 (H 15)	3 MS 13.5 (HS 15)	5 MS 18 (HS 20)
Sufficiency Rating		68	90.1	91.3	97.7
Structure Status		**Not Deficient**	**Not Deficient**	**Not Deficient**	**Not Deficient**

Source: MDT Bridge Management System, 2012

3.5. Other Transportation Modes

Frank Wiley Field Airport is located in Miles City and serves an average of 31 aircraft per day. Service consists of transient general aviation (43%), local general aviation (29%), and air taxi (29%). The St. Labre Mission Airport, located in Ashland, serves an average of 50 aircraft per month. Transient general aviation consists of 83% of aircraft operations, with the remaining 17% categorized as air taxi.[5]

[4] Montana Department of Transportation, *Bridge Design Standards*
[5] AirNav, LLC., 2012, www.airnav.com

Some minor freight activity currently occurs within the study area. Most notably, freight trucks associated with agriculture and farming, as well as some mining trucks, currently use S-332. Horse and buggy were also noted means of transportation near the Amish community just south of S-332. There are currently no rail lines or transit services within the study area.

3.6. Utilities

Electric power is provided by the Tongue River Electric Cooperative. Overhead power lines are present intermittently within the study area. Range Telephone Cooperative provides telecommunications services to the area. Williston Basin Interstate Pipeline Company controls a natural gas line that is located within the study area. Water and sewer service is provided to individuals by wells and septic tanks, respectively.

4.0 PROJECTED TRANSPORTATION CONDITIONS

Projected transportation conditions were analyzed to estimate how traffic volumes and characteristics of the corridor may change compared to existing conditions. The analysis was based on known existing conditions and projected out 20 years to the year 2032.

4.1. Traffic Growth Rates

Historic traffic data was analyzed to determine traffic growth patterns along S-332. Average annual growth rates were calculated at each traffic count location during multiple time periods. Weighted average annual growth rates were calculated based on 2010 AADT. The weighted average annual growth rates provide a representative picture of traffic growth within the study area.

Traffic volumes have fluctuated throughout the study area and have resulted in both positive and negative growth rates as shown in **Table 18**. For the purposes of projecting traffic growth, a weighted average annual growth rate of 0.24% was calculated based on the most recent 20 years of traffic data. This growth rate was used to forecast ambient background traffic growth for S-332. Ambient background traffic growth accounts for general growth characteristics such as population growth, general economic expansion, and increased recreational activities.

Table 18: Average Annual Growth Rate

			Average Annual Growth Rate			
Site	Location	2010 AADT	1992 - 2011	1992 - 1999	2000 - 2011	2005 - 2011
9-2-9	RP 1.0	280	1.57%	3.77%	2.55%	4.48%
9-4-3	RP 11.0	100	-0.41%	-0.54%	-4.06%	-5.49%
9-4-4	RP 26.5	70	-1.49%	7.47%	-4.36%	-6.76%
44-7-5	RP 39.5	50	-2.07%	-21.67%	17.64%	-8.97%
44-8-4	RP 49.5	50	-1.15%	-3.87%	2.00%	-3.58%
Average		**110**	**0.24%**	**0.45%**	**1.79%**	**-0.72%**

[a] *MDT Data and Statistics Bureau, Traffic Data Collection Section, 2012*

4.2. Future Development

The southeastern region of Montana contains considerable mineral deposits with existing and projected mining developments. The most prevalent mining activity near the corridor is coal mining. Existing coal mines operate in the region, and the Tongue River Road is currently used to transport some coal by semi-truck. Most influential in terms of transporting coal within the area is the potential Otter Creek coal tracts development, located approximately 10 miles southeast of Ashland. The State of Montana awarded a bid to lease the Otter Creek coal tracts to Ark Land Company, a subsidiary of Arch Coal of St. Louis Missouri, on March 18, 2010. Coupled with the Otter Creek coal tracts are additional tracts owned by Great Northern Properties. These additional tracts create a checkerboard land pattern with the State land. Great Northern Properties have also agreed to lease their tracts to Arch Coal for development. All told, the potential exists for 40 years of coal mining at the location with an estimated production of 10 million tons per year[6].

4.2.1. Mine Traffic Generation

It is anticipated that additional traffic would be generated by the Otter Creek coal tracts due to employees, general services, deliveries, and various other factors. In order to estimate trip generation from the coal tracts, data from the Absaloka Mine in Sarpy Creek, MT was looked at to approximate the amount of local traffic generated by a representative coal mine. The Absaloka Mine is accessed by Sarpy Basin Road, which intersects Secondary Highway 384 (S-384).

For the Absaloka Mine comparative analysis, it was assumed that traffic generated by the mine would come from Hardin, MT which is located west of Sarpy Basin Road. Traffic volumes along S-384 west of Sarpy Basin Road were assumed to include traffic generated by the mine in addition to local traffic. Traffic volumes along S-384 east of Sarpy Basin Road were assumed to include local traffic only. The difference in traffic volumes between the two locations along S-384 (i.e. east and west of Sarpy Basin Road) was assumed to account for the estimated traffic generated by the Absaloka Mine.

An estimate of trips generated per million tons of coal by the Absaloka Mine was then calculated based on historic coal production rates[7]. The traffic data and coal production rates were averaged for the most recent five years of available data to account for yearly variations. As shown in **Table 19**, the average trip generation rate for the Absaloka Mine was estimated to be 50.0 vehicles per million tons of coal. Based on these values, it is estimated that the Otter Creek coal tracts could generate approximately 500 general trips per day.

Table 19: Estimated Traffic Generated by Absaloka Mine

Site	Location			2003	2004	2006	2008	2009	Average
2-2-4 [a]	S-384	RP 23	NE of Sarpy Basin Rd	70	90	150	140	150	120
2-2-3 [a]	S-384	RP 24	1.5 mi W of Sarpy Basin Rd	200	220	440	430	720	402
Net Difference in AADT				130	130	290	290	570	282
Absaloka Mine Production - Million Tons of Coal [b]				5.975	6.474	6.807	6.391	4.738	6.077
Vehicles per Million Tons of Coal				21.8	20.1	42.6	45.4	120.3	50.0

[a] MDT Data and Statistics Bureau, Traffic Data Collection Section, 2012
[b] Absaloka mine production from Coal Driver, http://coaldiver.org/mine/ABSALOKA-MINE

4.2.2. Tongue River Railroad

Portions of the Tongue River Railroad (TRR) have been proposed for construction since 1983. There are three distinct segments that have been planned and approved over the past three decades by the U.S. Surface Transportation Board (STB) and its predecessor, the Interstate Commerce Commission. The first segment was approved in 1985 and connects Ashland to Miles City with an approximately 85 mile long new rail line. In 1991, the second segment was planned, and in 1996 approved, that connects Ashland with Decker to the south, resulting in approximately 41 miles of new track. Lastly, a third request for new rail was made in 1997 that modified the southern end of the second segment. Commonly referred to as the western alignment, it was approved in 2007.

[6] Norwest Corporation, *Otter Creek Property Summary Report – Volume I*, 2006
[7] Coal Diver, *Absaloka Mine*, 2012, http://coaldiver.org/mine/ABSALOKA-MINE

In June of 2012, however, the STB ruled that the TRR must reapply for a permit to carry coal from the Otter Creek coal tracts southeast of Ashland via a new rail line. This ruling was made in part because the Ninth Circuit U.S. Court of Appeals ruled in December of 2011 that the TRR's environmental impact statement was insufficient, and that due to the changes in the TRR's proposals, a new environmental impact statement and corresponding permit would be necessary. Refer to **Figure 2** for a graphical representation of the various segments.

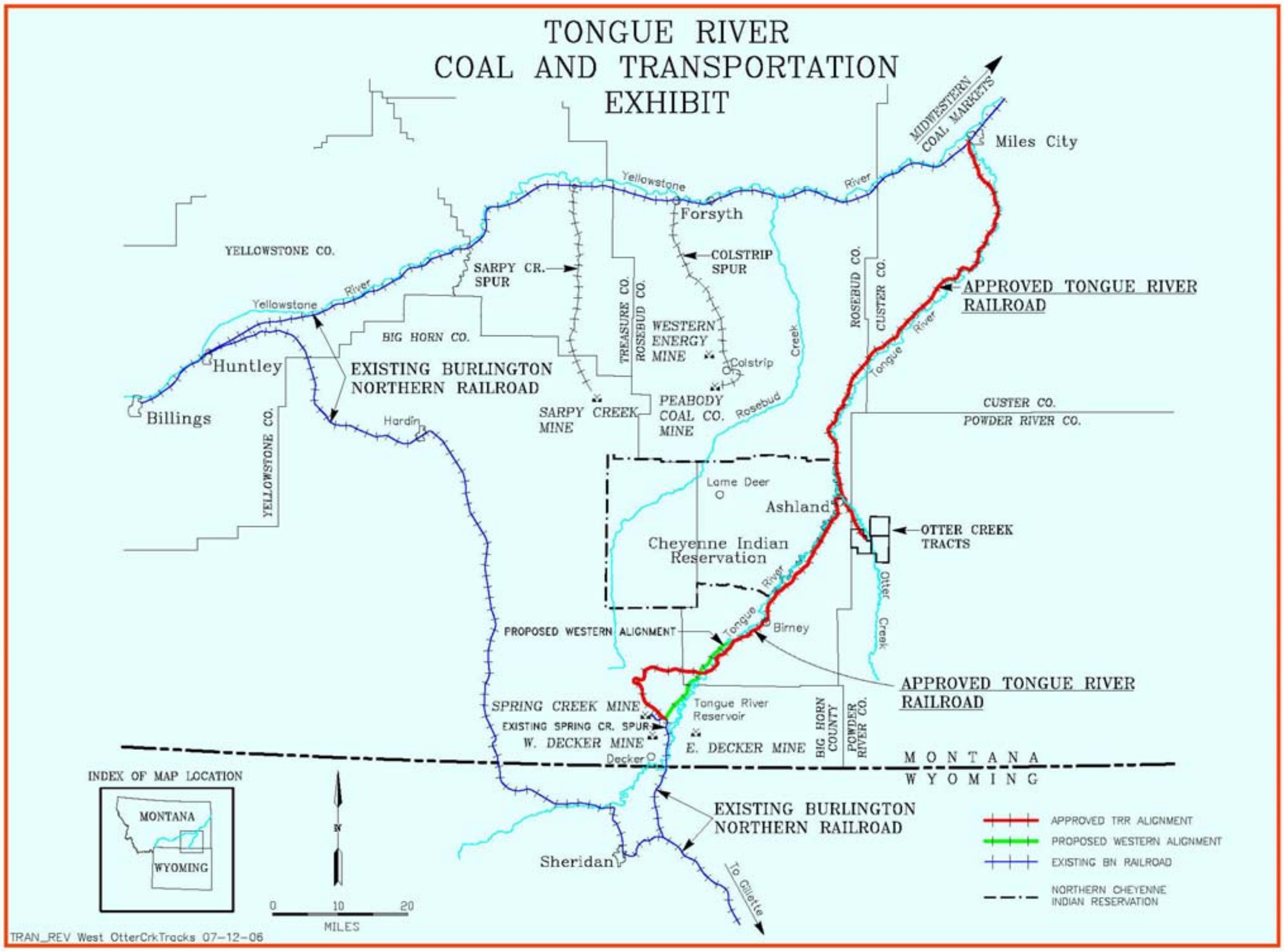

Figure 2: Tongue River Railroad Segments

Source: Montana DNRC Website, http://dnrc.mt.gov/Trust/MMB/OtterCreek/6TongueRiverRailroad/TRRCMapRailandOCTracts.pdf

4.2.3. Truck Traffic

The *Otter Creek Property Summary Report* contains data pertinent to the combined coal mining operations of the Otter Creek coal tracts and the Great Northern Properties tracts. Relative to conventional truck transportation, the report identifies certain parameters to arrive at a theoretical trucking scenario. It was estimated that 10 million tons per year of coal transported solely by trucks would result in the potential for 30 loaded trucks per hour. This is based on an assumed work schedule of 350 working days per year and 24 hours per day. The report goes on to state that this is the equivalent to one loaded truck every two minutes. In addition, an empty truck would pass by in the opposite direction every two minutes. In all, a total of 1,440 truck trips per day would be needed to haul the estimated coal production.

4.3. Future Traffic Projections

Since it is unknown what the future holds for development in the area, multiple growth scenarios were looked at relative to the Otter Creek coal tracts:

- **Baseline Traffic** accounts for existing traffic along S-332 projected out to the year 2032. As discussed previously, an average annual growth rate of 0.24 percent was used to forecast ambient background traffic.

- **Scenario 1: Base Traffic Generation** assumes that 100 percent of the base traffic generation resulting from the Otter Creek coal tracts discussed previously would utilize S-332 (i.e. 500 vpd). The base traffic generation is in addition to the baseline traffic forecasts. This scenario also assumes that the proposed Tongue River Railroad would be constructed and that coal produced from the Otter Creek coal tracts would be shipped by rail.

- **Scenario 2: Base Traffic Generation + Mining Truck Traffic** assumes that all coal produced from the Otter Creek coal tracts would be shipped via trucks along S-332. In addition, baseline traffic forecasts and base traffic generation from the mine were included.

- **Scenario 3: Base Traffic Generation + Percent Mining Truck Distribution** assumes that coal produced from the Otter Creek coal tracts would be shipped to both Colstrip and Miles City by trucks. Under this scenario, 25 percent of the truck traffic was applied to S-332. The remaining truck traffic would travel to Colstrip under this scenario. In addition, baseline traffic forecasts and base traffic generation from the mine were included.

Table 20 shows the future projected traffic values for the year 2032 under the previously discussed scenarios. Of note is that average future traffic projections range between 116 vpd to 2,056 vpd for S-332.

Table 20: Future Projected Traffic Data – Year 2032

Site	Location	Existing - 2010	Baseline	Scenario 1	Scenario 2	Scenario 3
9-2-9	RP 1.0	280	295	795	2,235	1,155
9-4-3	RP 11.0	100	105	605	2,045	965
9-4-4	RP 26.5	70	74	574	2,014	934
44-7-5	RP 39.5	50	53	553	1,993	913
44-8-4	RP 49.5	50	53	553	1,993	913
Average		**110**	**116**	**616**	**2,056**	**976**

[(a)] *Baseline projection was based on an average annual growth rate of 0.24%.*

5.0 ENVIRONMENTAL SETTING

This section provides a summary of the *Environmental Scan* developed by MDT[8]. The primary objective of the *Environmental Scan* is to determine the potential constraints and opportunities within the study area boundary. As a planning level scan, the information is obtained from various reports, websites and other documentation. This scan is not a detailed environmental investigation. Refer to the MDT *Environmental Scan* for more detailed information.

[8] MDT Environmental, *Environmental Scan – Tongue River Road*, 2012

5.1. Physical Resources

5.1.1. Land Ownership

GIS-based information was reviewed to assess the amount of public versus privately owned land in the study area. The land within the study area is predominantly agricultural and ranch land. Areas owned by BLM and Montana State Land Trust also exist intermittently throughout the study area.

5.1.2. Prime Farmland

Information regarding areas of prime farmland in the corridor area was compiled from the US Department of Agriculture, Natural Resource Conservation Service (NRCS).

The Farmland Protection Policy Act of 1981 (Title 7 United States Code, Chapter 73, Sections 4201-4209) has as its purpose "to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses, and to assure that federal programs are administered in a manner that, to the extent practicable, will be compatible with State, unit of local government, and private programs and policies to protect farmland."

Farmland is defined by the act in Section 4201 as including prime farmland, unique farmland, and farmland, other than prime or unique farmland, that is of statewide or local importance.

Prime farmland soils are those that have the best combination of physical and chemical characteristics for producing food, feed, and forage; the area must also be available for these uses. Prime farmland can be either non-irrigated or lands that would be considered prime if irrigated. Farmland of statewide importance is land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oilseed crops.

The CPA-106 Farmland Conversion Impact Rating Form for Linear Projects is a way for the NRCS to keep inventory of the Prime and Important farmlands within the state. Soil map units found within the project area have been classified as prime and important farmlands. Project activities associated with the construction of the Tongue River Road Corridor will likely create impacts to the soil map units with prime and important farmland status, thus it is likely that a completed CPA-106 Farmland Conversion Impact Rating Form for Linear Projects will be required. The process for completing this form requires mapping of the prime and important farmlands to be converted to non-farmable land, coordination with the NRCS, and final completion of the conversion form.

5.1.3. Geologic Resources

Information was obtained on geology in the study area. This geologic information may help determine any potential design and construction issues related to embankments and road design.

S-332 traverses the alluvial terraces of the Tongue River, occasionally climbing onto exposed area of the Fort Union Formation. Locally, the Fort Union consists of the Tongue River Member and is described as sandstone with thin interbeds of siltstone, mudstone, and clay. In some areas the rock has been metamorphosed into clinker by the natural burning of coal. The Alluvial Terrace Deposits typically consist of gravel, sand, silt, and clay.

5.1.4. Water Resources

5.1.4.1. Surface Water

Maps and GIS data were reviewed to identify the location of surface water bodies within the study area, including rivers, streams, lakes, or reservoirs.

S-332 travels through the Middle Yellowstone Watershed District. Information on the Tongue River and its tributaries within the study area was obtained from Montana Department of Environmental Quality's (DEQ) website. Section 303, subsection "d" of the Clean Water Act requires the State of Montana to develop a list, subject to US Environmental Protection Agency (EPA) approval, of water bodies that do not meet water quality standards. When water quality fails to meet state water quality standards, MDEQ determines the causes and sources of pollutants in a sub-basin assessment and sets maximum pollutant levels, called total maximum daily loads (TMDL).

A TMDL sets maximum pollutant levels in a watershed. The TMDLs become the basis for implementation plans to restore the water quality to a level that supports its designated beneficial uses. The implementation plans identify and describe pollutant controls and management measures to be undertaken (such as best management practices), the mechanisms by which the selected measures would be put into action, and the individuals and entities responsible for implementation projects.

Tongue River is listed as the only 303(d) water body within the study area. Probable causes of impairment are listed as cadmium, copper, iron, lead, low flow alterations, nickel, salinity, solids, and sulfates. Probable sources of impairment include irrigated crop production, dam construction, and stream bank modifications / destabilization.

5.1.4.2. Groundwater

Custer County and Rosebud County have not developed Local Water Quality District's (LWQD). LWQD's are established to protect, preserve, and improve the quality of surface water and groundwater within the district. Currently there are four in Montana. MDEQ provides support to LWQD programs, but does not have an active management role in their activities. LWQD serve as local government districts with a governing board of directors, and funding obtained from fees collected annually with county taxes. A significant component of selected district programs is the ability to participate in the enforcement of the Montana Water Quality Act and related rules.

If a LWQD is developed for Custer County or Rosebud County, water quality protection measures may have to be addressed at the local level, in addition to the federal level and state level.

5.1.4.3. Irrigation

Irrigated farmland exists in Custer County and Rosebud County within the study area. Impacts to irrigation facilities should be avoided to the greatest extent practicable. However, depending on recommended improvement option(s), there is a potential to impact lateral and longitudinal irrigation facilities. Operators of irrigation facilities would need to be contacted for flow requirements during project development to minimize impacts to farming operations.

Any potential impacts to irrigation facilities will need to be examined to determine if the irrigation facilities are considered waters of the U.S. and subject to jurisdiction by the U.S. Army Corps of Engineers (USACOE) and if other permits or authorizations are necessary such as SPA or 318.

5.1.4.4. Other Drainage Considerations

There are four existing bridges within the study corridor. Should a project be identified and advanced, it will be necessary to consider the potential impacts resulting from drainage off the existing or new bridge decks. MDEQ's 401 certification of the general conditions of the USACOE 404 permits requires that bridge deck drainage be directed to the ends of the bridge, rather than directly into the State water they span. Where practicable, this drainage needs to be directed to a detention/retention basin instead of directly discharging into State water.

MDEQ has stated that this same principle is desirable for roadside ditch drainage (.e. that roadside drainage that is directed to State waters should also be directed to a detention/retention basin prior to discharge into the State water.

Pertinent to drainage culverts, MDEQ and MFWP have both stated that culverts would need to be designed to provide both fish passage and aquatic organism passage (AOP). This would not only be applicable to perennial streams, but also some intermittent streams that may provide only seasonal flows yet still have a benefit for the fisheries system.

Lastly, both MDEQ and MFWP reiterated that culverts cannot be sized smaller to their current size, and that culverts should be sized to at least the appropriate "site specific" bankfull dimension.

5.1.5. Wetlands (EO 11988)

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

The study area encompasses portions of the Tongue River, and associated drainages, which have wetland areas associated with them. Formal wetland delineations will need to be conducted according to standard USACOE defined procedures if a project is developed. Wetland jurisdictional determinations will also need to be done during the project development process.

Wetland impacts should be avoided to the greatest extent practicable. All unavoidable wetland impacts will be mitigated as required by the USACOE.

5.1.6. Wild and Scenic Rivers

The Wild and Scenic Rivers Act, created by Congress in 1968, provided for the protection of certain selected rivers, and their immediate environments, that possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values. The U.S. National Park Service (NPS) website was accessed for information on river segments that may be located within the study area with wild and scenic designation. There are no wild or scenic rivers in the study area.

5.1.7. Floodplains (EO 11988) and Floodways

Executive Order (EO) 11988, Floodplain Management, requires federal agencies to avoid direct or indirect support of floodplain development whenever a practicable alternative exists. EO 11988 and 23 CFR 650 Part A requires an evaluation of project alternatives to determine the extent of any encroachment into the base floodplain. The base flood (100-year flood) is the regulatory standard used by federal agencies and most states to administer floodplain management programs. A "floodplain" is defined as lowland and relatively flat areas adjoining inland and coastal waters, including flood-prone areas of offshore islands, with a one percent or greater chance of flooding in a given year. As described in Federal Highway Administration's (FHWA) floodplain regulation (23 CFR 650 Part A), floodplains provide natural and beneficial values serving as areas for fish, wildlife, plants, open space, natural flood moderation, water quality maintenance, and groundwater recharge.

5.1.8. Hazardous Substances

The Montana Natural Resource Information System (NRIS) database was searched for underground storage tank (UST) sites, leaking underground storage tank (LUST) sites, abandoned mine sites, remediation response sites, landfills, National Priority List (NPL) sites, hazardous waste, crude oil pipelines, and toxic release inventory sites in the study area.

There were no UST sites, LUST sites, remediation response sites, landfills, or NPL sites identified in the study area. There were four abandoned mine sites located south of Brandenberg and one abandoned mine site located south of Garland. All five of these abandoned mine sites appear to be minor coal prospects/explorations. Further evaluations would be needed to determine if any of these abandoned mine sites pose an environmental concern.

Further evaluation may also be needed at specific sites to determine if contamination will be encountered during any future construction. This may include reviewing MDEQ files and conducting subsurface investigation activities to determine soil and groundwater contamination. If contaminated soils or groundwater is encountered during construction, handling and disposing of the contaminated material will be conducted in accordance with State, Federal, and local laws and rules.

5.1.9. Air Quality

EPA designates communities that do not meet National Ambient Air Quality Standards (NAAQS) as "non-attainment areas." States are then required to develop a plan to control source emissions and ensure future attainment of NAAQS. S-332 is not located in a non-attainment area for PM-2.5, PM-10, or carbon monoxide.

An evaluation of mobile source air toxics (MSATs) may be required. MSATs are compounds emitted from highway vehicles and off-road equipment which are known or suspected to cause cancer or other serious health and environmental effects.

5.1.10. Noise

The majority of S-332 passes through farm and ranch land, therefore it appears unlikely that improving this road would cause any traffic noise impacts. However, a traffic noise study will need to be evaluated for any planned improvements to S-332.

If improvements are developed for S-332 that include a significant shift in the horizontal or vertical alignments or increasing the traffic speed and volume then the project would be considered a Type I project. A detailed noise analysis would be required if any future project is considered a Type I project. A detailed noise analysis includes measuring ambient noise levels at selected receivers and modeling design year noise levels using projected traffic volumes. Noise abatement measures would be considered for the project if noise levels approach or substantially exceed the noise abatement criteria (NAC) listed in MDT's Noise Policy.

If traffic noise impacts are shown to exist on the project, a number of possible abatement measures may be considered, including but not limited to the following:

- Altering the horizontal or vertical alignments;
- Constructing noise barriers such as sound walls or earthen berms; and/or

- Decreasing traffic speeds.

Any future construction activities along S-332 may cause localized, short-duration noise impacts. These impacts need to be minimized in accordance with MDT's standard specifications for the control of equipment noise during construction.

5.2. Visual Resources

Visual resources refer to 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. The landscape throughout the study corridor contains an array of biological, scientific, historic, wildlife, ecological, and cultural resources mixed with a remote location.

There are no properties or corridors within the study area listed on the Department of Interior's National Landscape Monument System.

5.3. Biological Resources

Biological resources in the study area were identified using maps, aerial photographs, the endangered, threatened, proposed, and candidate species list for Montana counties (May 2009) from the US Fish and Wildlife Service (USFWS), Montana Natural Heritage Program data, and windshield surveys of the project site. This limited survey is in no way intended to be a complete and accurate biological survey of the study area. If a project is forwarded from the improvement option(s), consultations with MFWP and USFWS field biologists on techniques to perpetuate the riparian corridor, promote fish passage, and accommodate wildlife movement and connectivity will occur, and a complete biological survey of the study area will need to be completed. Due to potentially extensive mitigation measures, project costs may be higher than typically expected and should be budgeted for in the planning process.

5.3.1. Fish and Wildlife

General fish and wildlife resources in the study area will need to be surveyed during any future project development process. Montana Fish, Wildlife, and Parks (FWP) should be contacted during the project development process for local expertise of the study area. Riparian and river, stream or creek habitats should be avoided to the greatest extent practicable, including but not limited to, the Tongue River riparian and river habitat. Fish and wildlife species use waterway corridors during all life stages. Encroachment into the wetted width and waterway and the associated riparian habitat should be avoided, or minimized, to the maximum extent practicable. It is recommended that a riparian corridor remain on both sides of waterways to facilitate wildlife movement along the river corridor.

5.3.1.1. Threatened and Endangered Species

The federal list of endangered and threatened species is maintained by the USFWS. Species on this list receive protection under the Endangered Species Act (ESA). An 'endangered' species is one that is in danger of extinction throughout all or a significant portion of its range. A 'threatened' species is one that is likely to become endangered in the foreseeable future. The USFWS also maintains a list of species that are candidates or proposed for possible addition to the federal list.

The endangered, threatened, proposed, and candidate species list for Montana counties (August 2011) was obtained from the USFWS website. This list generally identifies the counties where one would reasonably expect the species to occur, not necessarily every county where the species is listed.

There are seven endangered, threatened, proposed, or candidate animal species listed for Custer and Rosebud Counties:

1. Black-footed Ferret (Listed Endangered – LE)
2. Pallid Sturgeon (Listed Endangered – LE)
3. Piping Plover (Listed Threatened, Critical Habitat – LT, CH)
4. Interior Least Tern (Listed Endangered – LE)
5. Whooping Crane (Listed Endangered – LE)
6. Greater Sage Grouse (Candidate – C)
7. Sprague's Pipit (Candidate – C)

Although the Pallid Sturgeon has not been recorded in the Tongue River in the Study corridor, junior Pallid Sturgeon do use the Tongue River near Miles City, and the Tongue River was historically used by adult Pallid Sturgeons. An evaluation of potential impacts to all endangered, threatened, proposed, or candidate species will need to be completed during the project development process.

5.3.1.2. Species of Concern

Montana Species of Concern are native animals breeding in the state that are considered to be "at risk" due to declining population trends, threats to their habitats, and/or restricted distribution. Designation of a species as a Montana Animal Species of Concern is not a statutory or regulatory classification. Instead, these designations provide a basis for resource managers and decision-makers to direct limited resources to priority data collection needs and address conservation needs proactively. Each species is assigned a state rank that ranges from S1 (greatest concern) to S5 (least concern). Other state ranks include SU (unrankable due to insufficient information), SH (historically occurred), and SX (believed to be extinct). State ranks may be followed by modifiers, such as B (breeding) or N (non-breeding).

A search of the Montana Heritage Program was conducted for Custer and Rosebud counties. A total of 39 species of concern for Custer County and 47 species of concern Rosebud County were listed. The results of a data search by the Montana Natural Heritage Program reflect the current status of their data collection efforts. These results are not intended as a final statement on sensitive species within a given area, or as a substitute for on-site surveys. If a project is forwarded from the improvement option(s), on-site surveys will need to be completed during the project development process.

5.3.1.3. Crucial Areas Planning System (CAPS) Report

The MFWP recently implemented a web-based tool to help identify and evaluate the fish, wildlife and recreational resources of Montana. The Crucial Areas Planning System (CAPS) is a mapping service intended to provide useful and non-regulatory information about highly valued fish and wildlife resources and recreation areas during the early planning stages of projects. The CAPS can provide information for specific areas of interest. The CAPS Report concludes that the study area yields high-quality wildlife and fisheries habitat and diversity, and suggests that due to this diversity project sponsors commit to working with the appropriate agencies if a project is forwarded from the improvement options(s) to identify and mitigate potential impacts directly attributable to the project.

5.3.1.4. Wildlife and Traffic Concerns

During the project development process, wildlife crossings and/or wildlife accident cluster areas along the corridor may need to be addressed. It is likely that most wildlife/vehicle collisions are unreported within the Study corridor.

5.3.1.5. Tongue River Fisheries Information

Due to recent habitat and conveyance improvements to the Tongue River, all Yellowstone River fish species have the potential to utilize the entire Tongue River and tributaries within the corridor study area. With the construction of the Muggli Bypass in 2007, and removal of SH Dam in 2008, Yellowstone River fish can now migrate upstream into the Tongue River. Prior to the bypass construction, Yellowstone River fish could not migrate upstream of T&Y Dam since its construction in 1886. Multiple fish species not documented upstream of T&Y Dam prior to bypass construction have now been documented upstream of the Muggli Bypass since 2007. These species are: goldeye, western silvery minnow, freshwater drum, bigmouth buffalo, smallmouth buffalo, and sturgeon chub. Over time it is likely that additional species will find their way upstream of T&Y Dam. Other species already present upstream of T&Y Dam have also been documented using the bypass and are adding to the overall numbers of fish utilizing the Tongue River in the corridor study area. Many of these species are cyprinids and suckers which are forage species for many of the larger predatory and game species in the Tongue and Yellowstone Rivers.

The increased fish usage upstream of T&Y Dam increases the need to maintain connectivity to all of the tributaries. Because of the close proximity of road crossings on tributaries to the Tongue River, adequately sized bridges or culverts will likely be required with future projects to allow for stream flow and function and provide for fish passage. Following are lists of tributaries and their potential for fish usage:

- Perennial tributaries with documented fish usage: Pumpkin Creek and Foster Creek.
- Large perennial tributaries capable of fish usage but not documented: Ash Creek and Liscom Creek.
- Intermittent and ephemeral creeks with strong potential for fish usage during flash rain/runoff events: Dry Creek, Prat Creek, Nelson Creek, Dry Creek, Jack Creek, Brown Creek, Haddow Creek, Cheever Creek, Sand Creek, Stony Creek, Elk Creek, Coon Creek, Garden Creek, Big John Creek, Freda Creek, Goodale Creek, Joe Leg Creek, Hammond Creek, and Lay Creek.

5.3.2. Vegetation

Native vegetation in the study area generally consists of wetland and riparian areas along the Tongue River and sagebrush/grasslands in the upland areas. The remaining vegetation consists of cultivated crop land.

5.3.2.1. Threatened and Endangered Plant Species

The federal list of threatened endangered and threatened species is maintained by the USFWS. Species on this list receive protection under the ESA. An 'endangered' species is one that is in danger of extinction throughout all or a significant portion of its range. A 'threatened' species is one that is likely to become endangered in the foreseeable future. The USFWS also maintains a list of species that are candidates or proposed for possible addition to the federal list.

Information regarding endangered, threatened, proposed, and candidate species list for Montana counties (August 2011) was obtained from the USFWS website. This list identifies the counties where one would reasonably expect the species to occur, not necessarily every county where the species is listed.

This list identified no endangered, threatened, proposed, or candidate plant species listed for Custer or Rosebud Counties, and none are currently expected to occur in the study area. An evaluation of all endangered, threatened, proposed, or candidate species will need be done during the project development process.

5.3.2.2. Species of Concern

Montana Species of Concern are native plants in the state that are considered to be “at risk” due to declining population trends, threats to their habitats, and/or restricted distribution. Designation of a species as a Montana Plant Species of Concern is not a statutory or regulatory classification. Instead, these designations provide a basis for resource managers and decision-makers to direct limited resources to priority data collection needs and address conservation needs proactively. Each species is assigned a state rank that ranges from S1 (greatest concern) to S5 (least concern). Other state ranks include SU (unrankable due to insufficient information), SH (historically occurred), and SX (believed to be extinct). State ranks may be followed by modifiers, such as B (breeding) or N (non-breeding).

The Montana Heritage Program lists nine plant species of concern in Custer County and eleven in Rosebud County. Two (2) of these plant species occur in both counties. The results of a data search by the Montana Natural Heritage Program reflect the current status of their data collection efforts. These results are not intended as a final statement on sensitive species within a given area, or as a substitute for on-site surveys. On-site surveys will need to be completed during the project development process.

5.3.2.3. Noxious Weeds

Noxious weeds degrade habitat, choke streams, crowd native plants, create fire hazards, poison and injure livestock and humans, and foul recreation sites. Areas with a history of disturbance are at particular risk of weed encroachment. There are 32 noxious weeds in Montana, as designated by the Montana Statewide Noxious Weed List (effective April 15, 2008). The study area will need be surveyed for noxious weeds. County Weed Control Supervisors should be contacted regarding specific measures for weed control during project development.

5.4. Cultural and Archaeological Resources

If a project is developed and is federally-funded, a cultural resource survey of the Area of Potential Effect for this project as specified in Section 106 of the National Historic Preservation Act (36 CFR 800) would need to be conducted. Section 106 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 properties that could be affected by the undertaking, assess the effects of the project and investigate methods to avoid, minimize or mitigate any adverse effects on historic properties. Special protections to these properties are recognized under Section 4(f) of the Transportation Act.

The Tongue River drains a vast area of north central Wyoming and Southeastern Montana. In the relatively dry grasslands of southeastern Montana the river has always acted as a focus of human activities. The Tongue River Valley and its surrounding breaks have a rich history from early pre-contact times through the 19th century Indian Wars. The 20th century brought mining, cattle and horse ranching.

A search of existing (known) cultural resources, both archaeological sites and historic properties, was conducted for the full, one mile wide study area. The study area is approximately 33,000 acres in size and within that area 97 separate cultural resources are known to exist. These resources include historic irrigation ditches, residences, and trash deposits, as well as stratified archaeological sites, lithic scatters, lithic quarries, cribbed log structures, stone cairns and rock art. Bison kills, tipi rings and human burials are very likely present in the study area as well.

The Tongue River drainage is full of high quality raw material (known as porcellanite) suitable for making stone tools. For that reason pre-contact lithic scatters are very common in the area. Lithic scatters may account for most of the known sites in the study corridor. Although S-332 does bisect some cultivated ground used for hay production, the vast majority of the land on either side of the existing road is native range. The high concentration of porcellanite lithic scatters coupled with the fact that most of the study corridor has never been subjected to plowing means that there are undoubtedly many hundreds of unidentified and undisturbed lithic scatters in the corridor.

Based on a review of prior cultural resource inventories we know that approximately 7 percent of the study area has had some past cultural resource survey. Some of these surveys date back to the 1970's when methods and expectations were not what they are today. On the other hand, many of the previous surveys in the study area date from the 2000's and meet present day cultural resource management methods. Approximately 75 percent of the previous cultural resource inventories in the corridor have been conducted on public land, mostly administered by the Bureau of Land Management. Based on existing data we can estimate that there are well over a thousand cultural resources in the study area. Since the majority of these resources are pre-contact archaeological sites (lithic scatters), archaeological testing may be a key component and expense of projects developed within the study area.

Compliance with applicable laws such as Section 106 of the National Historic Preservation Act, the Native American Graves Protection and Repatriation Act, the Montana State Burial Law, etc. will be required if a project is forwarded. Additionally, tribal consultation will be required at an early stage of project development.

5.4.1. 4(f) and 6(f) Resources

Reviews were also conducted to determine the presence of Section 4(f) and Section 6(f) properties along the corridor. Section 4(f) refers to the original section within the Department of Transportation Act of 1966 (49 U.S.C. 303), which set the requirement for consideration of park and recreational lands, wildlife and waterfowl refuges, and historic sites in transportation project development. Prior to approving a project that "uses" a Section 4(f) resource, FHWA must find that there is no prudent or feasible alternative that completely avoids 4(f) resources. "Use" can occur when land is permanently incorporated into a transportation facility or when there is a temporary occupancy of the land that is adverse to a 4(f) resource. Constructive "use" can also occur when a project's proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under 4(f) are "substantially impacted". Section 4(f) resource information was gathered by field observation and review of the National Register of Historic Places (NRHP) list for Custer County and Rosebud County.

There are three NRHP 4(f) / 6(f) resources within the study area:

1. Twelve Mile Dam Fishing Access – 4(f) and 6(f)
2. Pumpkin Creek Ranch Recreational Area – 4(f)
3. Tongue / Yellowstone River Irrigation District Canal – 4(f)

Subsequent to completion of the study's Environmental Scan (document dated June 28, 2012), two additional 4(f) resources were identified by MFWP. These resources are conservation easements in place for the Bice Ranch and the Hirsch Ranch.

6.0 AREAS OF CONCERN AND CONSIDERATION SUMMARY

This section provides a list and description of areas of concern and consideration within the study area. These areas were identified through review of as-built drawings, field review, public databases, and other resources. More discussion has been provided in the previous sections, and it is reiterated here as appropriate.

6.1. Transportation System

The following transportation system areas of concern were noted:

Surfacing

- Longitudinal and transverse cracking in the asphalt surfacing.
- Evidence of asphalt failure due to recent slides.
- Gravel surfacing from RP 17.7 to RP 50.4.
- Presence of road generated dust inhibiting driver sight lines.

Drainage

- Nine locations with evidence of recent slides.

Horizontal Alignment

- Seven horizontal curves do not meet current standards.

Vertical Alignment

- 34 vertical curves do not meet current standards.
- 12 vertical curves were estimated to not meet current standards based on field review.
- Seven locations have grades that do not meet current standards.
- Two locations were estimated to have grades that do not meet current standards based on field review.

Clear Zones

- 22 locations were estimated to have clear zones that do not meet current standards based on field review.

Access Points

- Three public approaches do not meet current standards based on intersection angles.
- Nine private approaches do not meet current standards based on intersection angles.

Cost

- Due to potentially extensive mitigation measures, project costs may be higher than typically expected and should be budgeted for in the planning process.

6.2. Environmental Considerations

The following environmental considerations were noted:

Prime Farmland

- Areas of prime farmland are located within the study area.

Water Resources

- Tongue River is located within the study area and is listed as a 303(d) waterbody.

- Irrigated farmland exists within the study area.

Wetlands

- Wetlands are located within the study area.

Hazardous Substances

- There are five abandoned mine sites within the study area.

Fish and Wildlife

- Seven endangered, threatened, proposed, or candidate species are listed for Custer and Rosebud Counties.
- 39 species of concern for Custer County and 47 species of concern for Rosebud County were listed.

Vegetation

- No endangered, threatened, proposed, or candidate plant species are expected to occur within the study area.
- Nine plant species of concern for Custer County and eleven for Rosebud County were listed.

Cultural and Archaeological Resources

- 97 separate cultural resources are known to exist within the study area.
- Three 4(f) and one 6(f) resources are located within the study area.