

# Montana Department of Transportation



## Executive Summary



**Final**

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## EXECUTIVE SUMMARY

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### BACKGROUND

The United States Congress designated the Theodore Roosevelt Expressway as a high priority corridor on the National Highway System in 2005 with the passage of the Safe, Accountable, & Flexible Transportation Equity Act-A Legacy for Users (SAFETEA-LU). The Theodore Roosevelt Expressway extends from the Port of Raymond, Montana at the Saskatchewan border in the north to Rapid City, South Dakota in the south. This corridor further connects to the Heartland Expressway that links Rapid City to Denver. The Heartland Expressway then links to the Ports to Plains Trade Corridor, which connects Denver, Colorado to Laredo, Texas. In total, the combination of all three of these designated corridors creates the Great Plains International Trade Corridor.

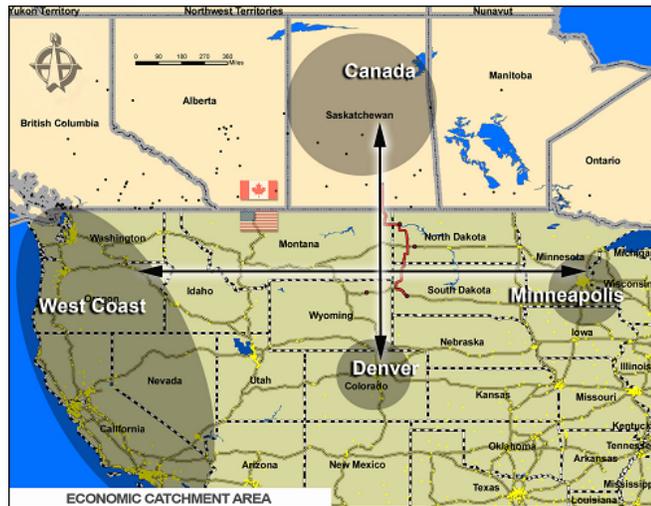
The portion of the Theodore Roosevelt Expressway that lies within the State of Montana, which is the focus of this study, consists of MT 16 from the Port of Raymond at the Saskatchewan border to Culbertson and US 2 from Culbertson to the North Dakota border. Given its strategic location, this corridor has received special attention at various levels in Montana, especially from those who view the US 2 segment of the corridor as a key segment in a new east-west corridor between Duluth, Minnesota and the west coast. However, previous efforts failed to justify a four-lane expansion of rural segments of US 2 in Montana but these efforts were based primarily on existing and future traffic and congestion levels and therefore could not demonstrate the necessary justification for anything other than an improved two-lane with passing lanes configuration.



It was within this context that this study was carried out. The study aimed at identifying economic, regulatory, or operational changes that would result in traffic and safety conditions which in its turn would warrant building a four-lane highway on the Montana portion of the Theodore Roosevelt Expressway.

## PURPOSE OF THE STUDY

The primary purpose of the US 2/MT 16 TRED Study is to identify what economic, regulatory, or operational changes would result in traffic and safety conditions that would warrant building a four-lane roadway on the Theodore Roosevelt Expressway in Montana. Since this study recognizes that the corridor functions both as a freight corridor and as a local roadway, the study assesses current and future economic development potential at the local, regional, and national levels



This study is not a typical cost benefit analysis. Instead, this study presents quantitative and qualitative assessment of future conditions, traffic volumes, and safety performance along the study corridor that will assist Federal and State transportation planners in their decisions about future highway improvements along the corridor.

## METHODOLOGY AND FRAMEWORK

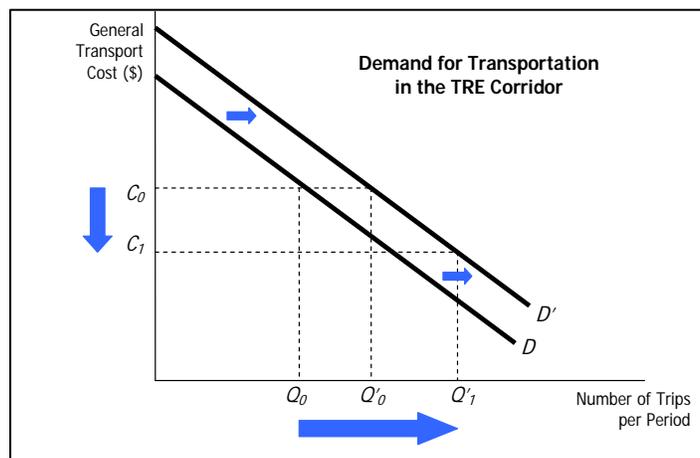
The study uses sound economic theory to assess present and future traffic conditions in the corridor based on an analysis of sector level data, trade forecasts, and future planning at the local and regional levels. In particular, to provide a comprehensive assessment of the regional economy and the implications of the study corridor, this study relies on the following:

1. A detailed analysis of various demographic, socioeconomic, sectors level (agriculture, energy, tourism, etc.), and trade data at the local, regional, and national level;
2. Interviews of representatives of over 120 key agencies, corporations, and institutions in the region;
3. Interviews of key transportation planning agencies from neighboring states and provinces;

4. A methodology that considers growth *incrementally* by estimating the growth under existing infrastructure conditions and then assessing additional growth that can be attributable to capacity expansion;
5. A probabilistic expression of all assumptions to account for uncertainty;
6. Involvement of the public, resource agencies, and local communities; and
7. Continuous involvement of a panel of experts and stakeholders to provide transparency and credibility to the process.

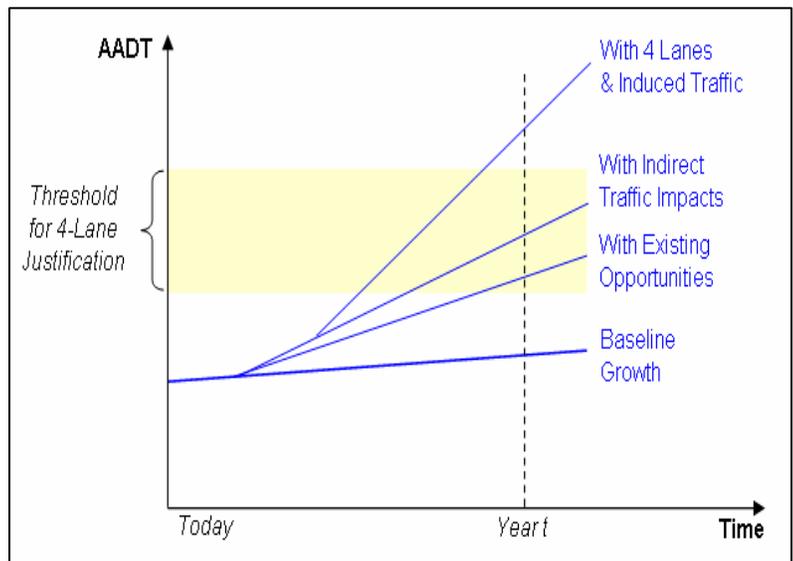
The study framework includes a two-step assessment, as illustrated in the exhibit below:

- Impact of current development opportunities on the demand for transport: This leads to higher demand with no changes in cost (shift in the demand curve from  $D$  to  $D'$ )
- Impact of future infrastructure improvements: reduction in the general cost of transport ( $C_0$  to  $C_1$ ) resulting in higher number of trips ( $Q'_1$ ).



The approach therefore ensures incrementality by isolating economic development potential from four-lane expansion by taking into account various opportunities that may be realized under current infrastructure conditions. The exhibit on the right illustrates the process to isolate the impact of four-lane expansion on traffic levels while taking into account a sequence of impacts, namely:

- Baseline historical traffic counts



- Baseline forecasts (assuming continuation of historical growth rates)
- Changes in traffic from various itemized economic opportunities
- Indirect traffic impacts of existing opportunities
- Induced demand resulting from four-lane expansion

## DATA GATHERING & DUE DILIGENCE

The study effort included a comprehensive data gathering and analysis process to assess current and future opportunities for the region:

- Review of all existing studies, documentations, surveys, and forecast;
- Interviews of over 120 government officials, economic development experts, academic experts, private business leaders, and other stakeholders in the region to inform a forecast of future highway demands;
- Survey of ten transportation departments about their future capacity expansion plans (Colorado, Idaho, Minnesota, Nebraska, North Dakota, Oklahoma, Saskatchewan, South Dakota, Texas, and Washington);
- Accounting for uncertainty of projected demand by using risk analysis when forecasting traffic under various scenarios;
- Several meetings with an expert panel to provide input and validation for key variables and assumptions; and
- Gathering additional information and comments through local public meetings and communication with resource agencies.



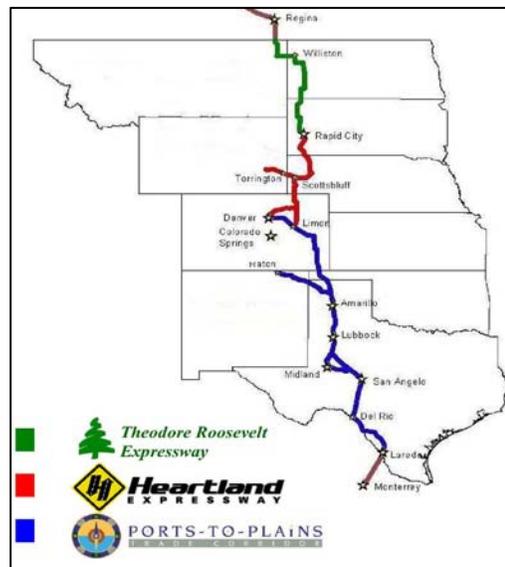
## KEY FINDINGS

The study results can be categorized into three key findings related to the study corridor's function as part of the Theodore Roosevelt Expressway.

1. Ensuring continuity of design of the study corridor with adjoining segments of the Theodore Roosevelt Expressway is important for future development of the corridor and its surrounding area.
2. The corridor is increasingly becoming and will continue to be a significant freight corridor with a high percentage of truck traffic that must move at a slower speed than other traffic. A four-lane configuration is expected to provide a safer corridor than two-lane configurations, especially during high traffic periods. While considerable, these positive safety effects are not alone sufficient to warrant a four lane design.
3. While traffic is not expected to increase significantly, the region is expected to experience strong growth in the energy, agriculture, and tourism sectors. These opportunities will have a higher likelihood of materializing under four-lane conditions than under two-lane conditions. While considerable, these positive traffic effects are not alone sufficient to warrant a four lane design.

### ***Four Lane Continuity and Regional Interconnectivity***

The study findings revealed that the area shares many similarities with adjacent states and provinces that extend beyond political borders. The broader region is largely comprised of a comparable agriculture-based economy that is experiencing rapid expansion in the energy sector, and shares similar historical and cultural heritage. Owing to the rural character of the region and lack of larger trade centers in it, regional consumer trade and work-related traffic appears to flow quite readily across boundaries. Williston, North Dakota (pop. 12,200) is the nearest higher-order trade center to this part of Montana. Residents commonly travel interstate for consumer purchasing. Professional and financial services, too, are relatively concentrated in Williston, suggesting its central function for these services. Among major-order trade centers, Regina, Saskatchewan is by far the closest to the study region. If travel conditions improve, travel across the state and international borders can be expected to grow. The study survey also found that some neighboring states, including North Dakota, are progressing toward four-lane expansion of portions of the Theodore Roosevelt Expressway. In particular, NDDOT indicated that, while not having current plans relating to the US 85 segment of the TRE, NDDOT would advance to developing a project for a four lane road to the state border if Montana does so. Moreover, NDDOT and MDT are mutually disposed to coordinate efforts

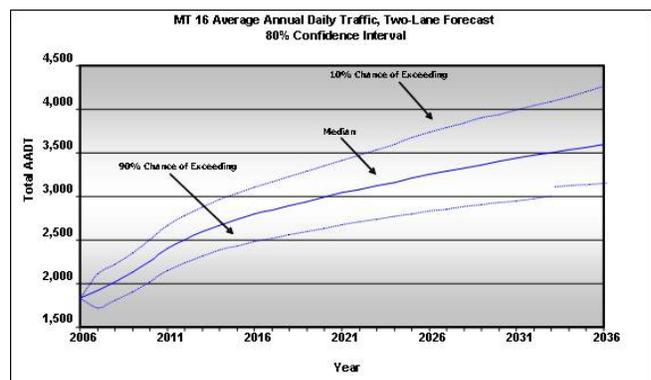


on future phases of improvements to the TRE corridor. Based on qualitative interviews the study also found that transportation system continuity is critical from four main perspectives:

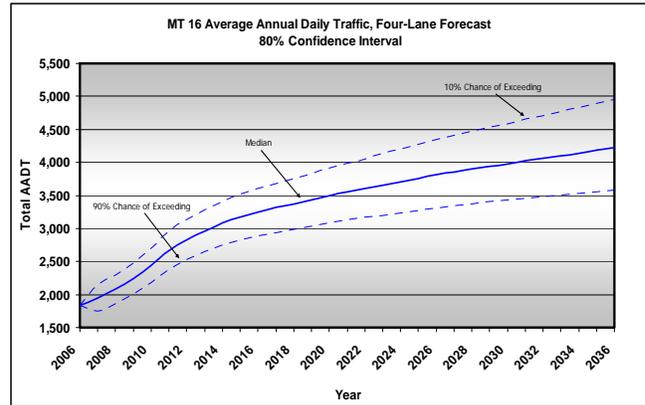
- **Strategic:** Four-lane continuity ensures speed, safety, and consistent design through the northern TRE corridor by linking to a planned four-lane extension of US 2, west of Williston, ND to the Montana border. When completed, a four-lane US 2 will extend to Williston, then east through North Dakota and into Minnesota. Given unused capacity at the Port of Raymond and the growth of the region, four-lane continuity would strategically position the TRE corridor as a freight corridor and as a NAFTA corridor that handles long term growth.
- **Competitiveness:** Four-lane continuity positions the corridor as a true alternative, and therefore a competitor, to other highways in the region. The competitiveness of the corridor will be reflected in induced traffic demand and eventually increasing economic development. Furthermore, the analysis found that the level of service in the corridor will continue to be good, making it an increasingly attractive alternative as other highways and ports, such as the Port of Portal, experience more congestion. This increased competitiveness can allow the corridor to function both as a north-south segment and as a link between east and west regions.
- **User Perception:** Four-lane continuity would play a significant role in driver perceptions. Research in road pricing showed that a driver's choice of a route is based more on the perceived level of service rather than the actual level of service. Accordingly, through stakeholder interviews, the study found that many perceived the existing roadway as less safe than the data shows and that they think a four-lane roadway would provide safer travel and a better level of service for both personal vehicles and truck traffic. This perception should lead truck dispatchers as well as logistics and supply chain managers to make an improved corridor the route of choice for their long-haul trucks in the region.
- **Design Continuity:** Four-lane continuity will also ensure design continuity and therefore a synergistic effect on traffic and freight growth along the corridor.

### ***Traffic Conditions and Level of Service***

The study relied on a bottom-up approach to assess traffic conditions and the level of service estimated in terms of congestion related to roadway capacity. The assessment included both current conditions and any future opportunities or threats in the region.

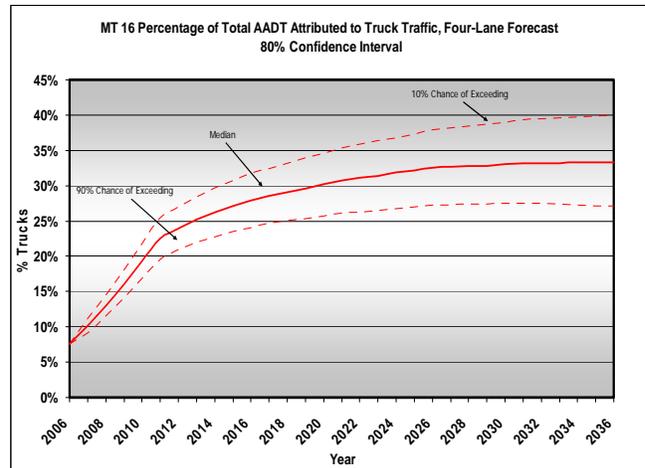


The analysis included a survey of representatives of industries in the region as well as the involvement of experts to validate the likelihood and effects of short term and long term plans in the region under various infrastructure scenarios. The analysis also incorporated risk analysis to account for uncertainty in key assumptions given various market conditions and their impact on the region.



For the analysis of level of service conditions on the study corridor, the corridor was divided into three segments: MT 16 from the Port of Raymond to Plentywood, MT 16 from Plentywood to Culbertson, and US 2 from Culbertson to the North Dakota State line.

The analysis was conducted on both the existing conditions and four-lane. While the future forecast traffic volumes were not large enough on their own to justify four-lane configurations, the analysis revealed that some opportunities are more likely to be realized under the four-lane scenario than the two-lane scenario which would result in higher traffic volumes. The figures on the right show the MT 16 segment under the two scenarios. The other two segments of the study corridor follow the same pattern.



The analysis summarized in the table to the right shows that each segment of the study corridor would meet the guidelines of LOS “B” for this type of facility with a two-lane configuration. The forecasted change from LOS A to LOS B means the time spent following trucks and other vehicles is expected to increase by up to 15% which could decrease travel speeds by 5 miles per hour on average.

Segment	MDT LOS Guidelines	2007 LOS	2037 LOS
MT 16 from Port of Raymond to Plentywood	B	A	B
MT 16 from Plentywood to Culbertson	B	A	B
US 2 from Culbertson to the ND State line	B	A	B

### ***Safety Conditions***

The study findings indicate that while the average daily traffic on the MT 16 and US 2 sections of the corridor are projected to double over the next 30 years with the existing infrastructure, the percentage of trucks in the overall traffic is expected to increase from under 10 percent today to approximately 30 percent. This percentage is slightly higher under the four-lane scenario.

The study included an extensive investigation of the safety benefits of a rural four-lane roadway versus a rural two-lane roadway. While no directly comparable routes were found, studies from other states showed the safety performance of two-lane segments tends to improve when expanded to four-lanes. Other studies also show that two-lane roadways with a higher percentage of truck traffic in rural areas exhibit a poorer safety performance than four-lane roadways.

Roadway Segment	Description	Segment AADT	Percent Trucks	Overall Crash Rate	Truck Crash Rate	Overall Severity Rate
N-1 (US 2)	Culbertson to North Dakota Border	1184	10.60%	1.52	1.14	3.6
N-34 (MT 16)	Saskatchewan Border to Plentywood	736	12.60%	0.24	0.78	0.77
N-22 (MT 16)	Plentywood to Culbertson	1093	13.50%	0.9	0.93	1.92
N-1 (US 2)	US-2 Havre to Fort Belknap	2727	8.70%	1.27	1.13	2.54
N-62 (MT 16)	Culbertson to Sidney	1142	12.10%	0.91	1	1.56
N-1 (US 2)	West of Shelby to Culbertson	1724	9.60%	1.06	0.85	2.3
N-53 (MT 3)	Billings to Lavina	2181	13.00%	0.69	0.76	1.42
N-14 (MT 3)	Harlowton to Lavina	1554	19.10%	0.95	0.55	1.86
N-8 (US 12) 4 lane	Helena to bottom of MacDonald Pass	3944	9.00%	2.07	0.93	2.75
N-14 (MT 3) 4-lane w/ TWLTL	Great Falls to Jct. S227/S228	6202	9.40%	1.34	0.9	3.77

The MT 16 and US 2 sections of the study corridor within Montana are governed by dual statutory speed limits; one limit for large trucks and a 10 mph higher limit for passenger vehicles. Some stakeholders interviewed for this study view this disparity in speed limits as an inherent unsafe driving environment which may be exacerbated by increasing truck traffic on the corridor.

The study included an analysis of Montana crash data for the MT 16 and US 2 sections of the study corridor and other comparable rural two-lane roadways with similar traffic volumes and a large percentage of trucks. This analysis found the highest crash and severity rates on US 2 between Culbertson and the North Dakota state line.

### ***Environmental Impacts***

This study includes an analysis of environmental issues in the study area that could influence future highway improvements. This analysis, as documented in the “Environmental Scan”, identified relatively few potential environmental issues along the corridor. However, based on a review of aerial photographs of communities along the corridor, there would be some impacts to commercial and

residential properties with four-lane undivided improvement configurations. These impacts would have to be addressed in the development of future projects.

## CONCLUSIONS

- Economic development may increase incrementally if the highway infrastructure in the study corridor expands from a two-lane to four-lane facility.
- Opportunities related to the agriculture and energy sectors in the region have a higher likelihood of being realized with four-lane configurations than with two-lane configurations.
- An improved two-lane configuration would provide a reasonably adequate future level of service but would not address system continuity issues.
- Four-lane continuity with adjoining segments of the Theodore Roosevelt Expressway would provide regional interconnectivity by better positioning the corridor from the strategic, competitive, user expectation, and design continuity perspectives.
- With the estimated future 30% in truck traffic and associated speed differential, a four-lane facility will help address passing conflicts on the study corridor.
- US 2 from Culbertson to the North Dakota state line has crash and severity rates that exceed statewide averages. Although improved two-lane improvements would improve safety, four-lane improvements would provide additional incremental benefits.
- As the corridor approaches the design year, the existing two-lane configuration will approach Level of Service “C” conditions. Four-lane configurations would maintain a higher Level of Service for a longer period.

## **Potential Next Steps: Preliminary MDT Assessment**

Decisions about the scope of future highway improvements to the study corridor are the responsibility of the Montana Department of Transportation with approvals necessary from the Federal Highway Administration and Federal and State resource agencies. Based on the draft results of the US 2/MT 16 TRED Study, the following could provide the basis for decisions regarding the purpose and need and lane configurations for future improvements to the corridor.

Primary purposes for future improvements:

- Provide system continuity and roadway consistency with adjoining segments of the Theodore Roosevelt Expressway.
- Enhance the function of US 2 and MT 16 as part of a high priority corridor by improving travel conditions for long distance interstate and intrastate and international freight movement.
- Support economic growth in the multi-jurisdictional area.
- Improve the safety of the corridor.
- Address roadway design deficiencies to meet current MDT standards.

Following is an evaluation of potential highway improvement alternatives for the study corridor based on their relationship to the above purposes:

- **Improved Two-Lane Highway** - Two travel 12 foot travel lanes with eight foot shoulders (in urban areas curb, gutter and sidewalk would be provided)
- **Improved Two-Lane with Passing Lanes Highway** – Two travel 12 foot travel lanes with eight foot shoulders (in urban areas curb, gutter and sidewalk would be provided). In passing lane areas an additional 12 foot travel lane would be provided.
- **Four-Lane Undivided Highway** – Four 12 foot travel lanes with eight foot shoulders (in urban areas curb, gutter and sidewalk would be provided).
- **Four-Lane Divided Highway** – Four 12 foot travel lanes, eight foot shoulders and a 35 foot median (in urban areas the median would be eliminated and curb, gutter and sidewalk would be provided)

*Note: All alternatives assume use of the existing highway alignment including through communities due to Montana law that prohibits MDT from bypassing incorporated cities without the approval of the local government.*

In the following table, improvement alternatives were evaluated against the improvement purposes. As shown, only the four-lane alternatives meet all of the improvement purposes. The improvement of the Theodore Roosevelt Expressway corridor in Montana to four-lane divided standards would address the maximum number of improvement purposes and the improved two-lane alternative would address the minimum number of improvement purposes.

**US 2/MT 16 TRED Corridor Improvement Alternative Evaluation Summary**

Improvement Purpose	Improvement Alternatives			
	Improved Two-Lane	Improved Two-Lane with Passing Lanes	Four-Lane Undivided	Four-Lane Divided
Provide system continuity and roadway consistency with adjoining segments of the Theodore Roosevelt Expressway.			√	√+
Enhance the function of US 2 and MT 16 as part of a high priority corridor by improving travel conditions for long distance interstate and intrastate and international freight movement.	√	√	√+	√+
Support economic growth in the multi-jurisdictional area.	√	√	√+	√+
Improve the safety of the corridor	√	√+	√+	√++
Address roadway design deficiencies to meet current MDT standards.	√	√	√	√

***Cost Estimates and Financial Considerations***

As shown in Appendix A of Summary & Conclusions, construction cost estimates for two-lane and four-lane design configurations for the study corridor range from \$179 million to \$319 million. MDT has reserved \$2 million from a SAFETEA-LU earmark to move forward into next steps on US 2 if the US 2/MT 16 TRED Study justifies reconsideration of planned improvements on the Theodore Roosevelt Expressway corridor. If reconsideration is justified, the non-federal match is approximately \$310,000. MDT review of project design and planning workloads concludes that the project would not jeopardize any future highway project.