Roadway System Performance | Policy Paper

TranPlan 21

Amended in 2007

State of Montana
Department of Transportation

TRANPLAN 21

Montana Department of Transportation

Roadway System Performance Policy Paper

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I. Background–Roadway System Performance in Montana

This paper is the MDT's *TranPlan 21* policy goals and actions for roadway system performance. These policy goals and actions reflect changes made in the 2002 update and 2007 amendment of *TranPlan 21*. An overview of Montana's roadway system, key issues affecting current and future system performance and strategies to address these issues are provided in the following sections.

A. The Extent of Montana's Highway System

Montana is one of the most rural states in the nation, covering a large, sparsely populated land area. The highway system plays a central role in allowing the State to function politically, economically, and socially. Three-quarters of all miles traveled in Montana are outside of the State's urban areas. Montana's highway system connects small communities to regional service centers and the major cities to one another and the rest of the nation. In addition, Montana's highway system plays a key role in the National Highway System providing important interstate and international transportation corridors.

The extent of Montana's highway system is summarized in Exhibit I-1 below. There are about 70,000 centerline miles and 130,000 lane-miles on the State's highway system. The transportation system represents the largest single capital investment in the State of Montana. The challenge for Montana is to identify the most effective strategies for preserving and maintaining this system. Using existing resources most cost effectively is a key objective for MDT because the amount of funding per mile of roadway in Montana will always be relatively low compared to other states. This is because Montana has a large highway system relative to its population.

Although Montana has a relatively high gas tax of 27 cents per gallon, the State ranks 47th in the nation in terms of revenue-dollars per mile of roadway. The State's limited population restricts the potential for generating additional funds. A particular challenge for Montana is funding maintenance activities that are ineligible for Federal funds and ensuring that there are sufficient state revenues to meet the match requirements for Federal funding.

Exhibit I-1: Montana's Highway System Miles by Functional Classification, 2005

System Classification	Centerline Miles	Total Lane Miles
Interstate	**1,191**	**4,766**
Rural:		
Principal Arterial	3,747	10,014
Minor Arterial	2,989	6,046
Major Collector	7,064	14,059
Minor Collector	8,983	17,715
Local Road	43,802	75,821
Subtotal	**66,585**	**123,655**
Urban:		
Principal Arterial	244	814
Minor Arterial	248	526
Collector	321	649
Local Street	1940	3,831
Subtotal	**2,753**	**5,820**
Total	**69,338**	**129,475**

Source: Montana Department of Transportation, 2007.

The exhibit illustrates the extent to which Montana is a rural state; over 90 percent of the State's roadway capacity is in jurisdictions that are designated as rural. Increases in lane miles will affect future maintenance planning by State and local officials. The State must plan for the current and future availability of resources to maintain the existing system and any increase in the number of lane-miles.

1. Current Roadway Conditions

Although a low population generally translates to low traffic volumes, deterioration of the highway infrastructure is not proportionately distributed. The key factors influencing pavement deterioration include truck traffic, time, and weather. These factors are also the primary causes for deterioration of bridges, culverts, signs, guardrails, etc. Delaying preservation escalates the overall costs for the maintenance and replacement of infrastructure. Montana's highway users pay for preserving and maintaining the roadway network. It is important to note that many maintenance activities are not eligible for Federal cost sharing.

With a few notable exceptions, there is adequate capacity to meet current travel demands. Maintaining and preserving the current performance level of the system is an important planning and management challenge for the State.

Montana has seen pavement condition improvements over the past 10 years; however, there are many miles with poor structural conditions and a short remaining life. The

development of the MDT's pavement management system has provided much needed information about the extent of pavement preservation needs.

2. Pavement Conditions

Pavement conditions are monitored through MDT's Pavement Management System. Several performance measures are used to track pavement conditions, including:

- Ride Index (IRI) – Determined by using an internationally applied roughness index in inches per mile, and converting to a 0 to 100 scale.
- Rut Index (RI) – Calculated by converting rut depth to a 0 to 100 scale. Rut measurements are taken approximately every foot and averaged into one-tenth mile reported depths.
- Alligator Crack Index (ACI) – Measured by combining all load associated cracking, and converting the index into a 0 to 100 scale.
- Miscellaneous Cracking Index (MCI) – Calculated by combining all nonload associated cracking, and converting the index into a 0 to 100 scale.
- Overall Performance Index (OPI) – Determined by combining and placing various weighting factors on the IRI, RI, ACI, and MCI figures, and converting the index to a 0 to 100 scale. The OPI is calculated to provide a single index describing the current general health of a particular route or system.

Exhibit I-2: Interstate Non-Interstate NHS, and Primary Roadway Condition Indices, 2001 – 2005

	2001	2002	2003	2004	2005	Percent Change (2001 – 2005)
Interstate						
Ride Index	80	80	81	79	82	3%
Rut Index	67	76	76	82	74	10%
Alligator Crack Index	94	95	96	96	96	2%
Misc. Cracking Index	87	89	92	93	91	4%
Overall Performance Index	**67**	**70**	**74**	**76**	**73**	**8%**
Non-Interstate NHS						
Ride Index	77	77	74	74	78	2%
Rut Index	63	67	69	73	67	5%
Alligator Crack Index	97	97	97	97	96	-1%
Misc. Cracking Index	88	90	92	93	88	0%
Overall Performance Index	**63**	**65**	**66**	**68**	**65**	**3%**
Primary						
Ride Index	74	74	72	72	76	2%
Rut Index	64	68	70	75	68	5%
Alligator Crack Index	96	97	96	97	95	-1%
Misc. Cracking Index	89	90	93	91	87	-3%
Overall Performance Index	**63**	**64**	**65**	**67**	**64**	**2%**

Source: Montana Department of Transportation, 2007.

Note: Index descriptions presented in the text.

Exhibit I-2 presents these measured indices for Interstate, and non-Interstate NHS, and Primary roadways in Montana for the last five years.

- The overall condition of Interstate and Primary roadways in the State has improved over the last five years.
- The recent improvements in pavement condition are the result of MDT's heavy investment in preventive maintenance.

3. Roadway Congestion

MDT measures the congestion on the State's roads using congestion indices and a measure of the level of service of roadway segments. On the rural highway corridors, congestion indices consist of point values ranging from 0 to 100, and are a numerical representation of the Levels of Service (LOS) A through F.

Congestion Index Range	LOS
85 - 100	A
70 - 84	B
55 - 69	C
40 - 54	D
25 - 39	E
0 - 24	F

On the Interstate System in Montana, any segment with a LOS below B is considered congested. On the Non-Interstate NHS, Primary, and Secondary Systems, a LOS of C or below is considered congested.

The 2005 statewide Congestion Index rating for Montana's rural highway system is as follows:

System	Congestion Index	LOS
Interstate	93	A
Non-Interstate NHS	75	B
Primary	79	B
Secondary	91	A

Measurements of the congestion index indicate that, over the last several years, rural roads have remained relatively free of traffic congestion compared to urban roadways. Between 1996 and 1998, the congestion indices for statewide, rural NHS roads, and the statewide, rural primary and secondary roadways remained constant. Local congestion hotspots have been identified throughout the State, and projects are underway to alleviate and reduce congestion where possible. Currently, MDT does not consistently measure congestion in the urban areas on a statewide basis. However, MDT has work underway to monitor urban area congestion.

4. Bridge Conditions

Bridges are a critical part of the State's roadway infrastructure. The temporary closing of these structures reduces capacity on, or can shut down, transportation corridors, pushing traffic volumes onto other roadways less capable to handle the traffic and increasing travel times for system users. In general, MDT inspects each bridge for damage or deterioration at least once every two years. The Department uses the following definitions for identifying bridges requiring attention:

- **Structurally Deficient** – Restricted to light vehicles only, or is closed and requires rehabilitation to re-open.
- **Functionally Obsolete** – Vehicle operations are restricted based upon Federal standards that look at a variety of criteria (deck geometry, approach road alignment, etc.).

Exhibit I-3 presents the number and condition of roadway bridges located in Montana.

Exhibit I-3: Change in Condition of Roadway Bridges in Montana, 2000-2005

Highway System	Bridges		Structurally Deficient			Functionally Obsolete		
	2000	2005	2000	2005	Percent Change	2000	2005	Percent Change
Interstate	844	847	0	8	n/a	209	159	-23.9%
NI-NHS	510	472	11	10	-9.1%	31	28	-9.7%
Primary	609	567	21	17	-19.0%	41	41	0.0%
Secondary	541	535	23	16	-30.4%	47	37	-21.3%
Urban	58	68	6	4	-33.3%	19	14	-26.3%
Local On-System	266	262	20	22	10.0%	11	11	0.0%
Local Off-System	1,859	1,787	259	230	-11.2%	308	273	-11.4%
Total	**4,687**	**4,538**	**340**	**307**	**-9.7%**	**666**	**563**	**-15.5%**

Source: Montana Department of Transportation, 2007.

Note: This exhibit excludes bridge structures under Federal jurisdiction, such as BIA, USFS, BLM, and railroad bridges.

The exhibit illustrates the following key trends:

- Since 2000, the State has reduced the number of bridges either structurally deficient or functionally obsolete by 10 to 15 percent. However, the majority of these bridges are maintained by local agencies with assistance by the State.
- While local authorities have focused on fixing functionally obsolete bridges (insufficient capacity, etc.), the MDT has devoted more effort to refurbishing or replacing structurally deficient bridges.

About 12 percent of the bridges are functionally obsolete. Addressing these deficiencies requires a considerable expenditure of funds. Bridge projects tend to be costly. First steps include a review of these bridges and prioritizing them for refurbishment or replacement. MDT also assists local transportation agencies review their functionally obsolete bridges.

5. Overall Use of Montana Roadways

The general characteristics of roadway use in Montana are measured in terms of:

- Daily vehicle miles traveled.
- Daily commercial vehicle miles traveled.
- Number of vehicles registered in Montana.
- Number of vehicles crossing the Montana-Canada border.

6. Daily Vehicle Miles Traveled

Daily vehicle miles traveled (DVMT), calculated from measured traffic counts over road segments throughout the State, provides an indicator of the amount of traffic using the State's on-system road network. Overall, Montana's on-system routes handle the vast majority of all passenger and freight-miles of transportation activities for the State.

Exhibit	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**Average Annual Change**
Missoula	6.545	6.576	7.089	7.313	7.402	7.302	2.3%
Butte	4.410	4.473	4.863	4.981	5.087	5.176	3.3%
Great Falls	3.566	3.586	3.747	3.731	3.804	3.791	1.2%
Glendive	2.153	2.178	2.305	2.379	2.484	2.549	3.4%
Billings	4.262	4.411	4.686	4.760	4.885	4.951	3.1%
Total	**20.935**	**21.224**	**22.690**	**23.164**	**23.662**	**23.769**	**2.6%**

Source: Montana Department of Transportation, 2007.

Exhibit I-4 illustrates that overall traffic volumes on Montana's on-system roadways have increased by about two percent per year between 2000 and 2005. Throughout this time period, the on-system daily VMT was highest in the Missoula District. However, the largest percent changes in on-system daily VMT over the 2000 to 2005 time period occurred in the Glendive, Butte, and Billings Districts. In the Butte and Billings Districts, this is due to population growth in the Bozeman and Billings areas. The growth in traffic volumes in some urban areas has required the State to fund and deliver transportation projects to increase roadway capacity, as well as increase maintenance of some corridors.

As shown in Exhibit I-4, between 2000 and 2005 the change in daily VMT in each district was fairly consistent from year to year. Exhibit I-5 shows the percent change in daily VMT from 1990 to 2005. The rate of growth in daily VMT between 1995 and 2000 was lower than from 1990 to 1995; the daily VMT in the Glendive District decreased from 1995 to 2000. From 2000 to 2005, statewide daily VMT increased by 13%.

Exhibit I-5: Change in on-system Daily VMT, 1990-2005
(in Millions)

District	DVMT (millions)				Percent Change		
	1990	1995	2000	2005	90-95	95-00	00-05
Missoula	4.941	6.208	6.545	7.302	25.6%	5.4%	11.6%
Butte	3.362	3.924	4.410	5.176	16.7%	12.4%	17.4%
Great Falls	2.994	3.411	3.566	3.791	13.9%	4.5%	6.3%
Glendive	1.974	2.190	2.153	2.549	10.9%	-1.7%	18.4%
Billings	3.579	4.214	4.262	4.951	17.7%	1.1%	16.2%
Total DVMT	**16.851**	**19.947**	**20.935**	**23.769**	**18.7%**	**5.0%**	**13.0%**

Source: Montana Department of Transportation, 2007.

From a regional perspective, Exhibits I-4 and I-5 show that western and south central Montana had the highest daily VMT from 2000 to 2005. While daily VMT in the eastern, more rural parts of Montana remained low in comparison with the rest of the State, the rate of growth in DVMT in the Glendive District increased during this time period.

Exhibit I-6 illustrates the split between rural and urban DVMT. Approximately 80 percent of the daily VMT occurred in rural areas, although the growth rate in DVMT in urban areas has historically been slightly higher than in rural area.

Exhibit I-6: Urban/Rural Daily Vehicle Miles Traveled Split, 1990–2005
(in Millions)

	1990	1995	2000	2005	Percent Change	
					1995-2000	2000-2005
Rural DVMT	13.4	15.7	16.5	18.6	5%	13%
Urban DVMT	3.5	4.2	4.5	5.2	6%	16%
Total	**16.9**	**19.9**	**20.9**	**23.8**	**5%**	**14%**
Rural Percentage	79%	79%	79%	78%	–	–
Urban Percentage	21%	21%	21%	22%	–	–

Source: Montana Department of Transportation, 2007.

7. Daily Commercial Vehicle Miles Traveled

Another example of trends in traffic volumes is illustrated by the amount of commercial traffic moving through the State. MDT reports commercial daily vehicle miles traveled statistics on rural Interstate, non-Interstate National Highway System, and Primary System routes. Exhibit I-7 indicates that the growth in daily commercial vehicle miles traveled has been moderate, about 1.7 percent per year.

Exhibit I-7: Statewide Rural Daily Commercial VMT, 2000–2005 (in Millions)

System	2000	2001	2002	2003	2004	2005	Average Annual Change
Interstate	1.376	1.363	1.421	1.408	1.462	1.456	1.2%
Non-Interstate NHS	0.617	0.615	0.604	0.593	0.613	0.623	0.2%
Primary System	0.263	0.252	0.262	0.258	0.261	0.266	0.3%
Total	**2.257**	**2.23**	**2.287**	**2.259**	**2.336**	**2.345**	**1.7%**

Source: Montana Department of Transportation, 2007.

The following trends are highlighted:

- Interstate routes experienced the greatest increase in daily commercial VMT.
- Overall, 2005 daily commercial VMT total about 10 percent of all vehicle miles traveled when compared to data presented in Exhibit I-4.

Exhibit I-8 shows an increase in the growth rate of commercial daily VMT from 2000 to 2005 when compared to the 1995 to 2000 time period.

Exhibit I-8: Change in Daily Commercial VMT, 1995 – 2005

System	CDVMT (in Millions)			Average Annual Change	
	1995	2000	2005	1995-2000	2000-2005
Interstate	1.168	1.376	1.456	3.3%	1.2%
Non-Interstate NHS	0.624	0.617	0.623	-0.2%	0.2%
Primary System	0.271	0.263	0.266	-0.6%	0.2%
Total	**2.062**	**2.257**	**2.345**	**0.8%**	**0.5%**

Source: Montana Department of Transportation, 2007.

Commercial VMT increases are attributed to:

- The expansion of the State and national economy.
- Changes in the rail industry and the development of larger unit trains, requiring greater reliance on truck transportation for carrying goods to markets and to intermodal transfer points.
- The passage of the North American Free Trade Agreement.

8. Roadway Safety

Exhibit I-9 presents a few key trends in traveler safety in Montana: accidents, fatalities, and injuries. Over 22,000 accidents were reported in 2000, with just over half occurring in rural areas. Reported accidents increased by 10 percent over the last five years.

Exhibit I-9: Vehicular Fatalities and Injuries on Montana Public Roadways, 1995 – 2005

				Percent Change		
	1995	2000	2005	1995-2000	2000-2005	1995- 2005
Accidents*	**21,903**	**22,350**	**22,376**	**2.0%**	**0.1%**	**2.2%**
Urban	11,679	10,664	11,440	-8.7%	7.3%	-2.0%
Rural	10,224	11,686	10,936	14.3%	-6.4%	7.0%
Fatalities	**215**	**237**	**251**	**10.2%**	**5.9%**	**16.7%**
Urban	30	18	33	-40.0%	83.3%	10.0%
Rural	185	219	218	18.4%	-0.5%	17.8%
Injuries	**8,013**	**8,135**	**9,211**	**1.5%**	**13.2%**	**15.0%**
Urban	4,204	4,272	4,033	1.6%	-5.6%	-4.1%
Rural	5,964	6,531	5,178	9.5%	-20.7%	-13.2%
Annual VMT†	**9,339**	**9,882**	**11,127**	**4.9%**	**12.6%**	**19.1%**
Fatality Rate‡	**2.3**	**2.4**	**2.3**	**4.2%**	**-6.0%**	**-1.9%**
Injury Rate‡	**108.88**	**109.32**	**82.8**	**0.4%**	**-24.3%**	**-24.0%**

Source: MDT Planning Division, Traffic Safety Section, Dye Management Group, Inc. analysis.

*Reported accidents. Data is not easily comparable from year to year due to changes in reporting procedures by local authorities.

†In millions. ‡Per 100 million miles traveled.

The following trends highlight traffic and accident statistics over the last 10 years:

- Accidents in urban areas have decreased slightly; however, in both five-year periods 1990-1995 and 1995-2000, the number of accidents in rural areas has increased.
- Between 1990 and 2000, fatalities increased almost 12 percent, while traffic volume (measured in vehicle miles traveled) increased almost 25 percent. The fatality rate declined by nearly six percent over the same period.
- Fatality rates increased over the five-year period 1995-2000 compared to the 1990-1995 period, from 2.30 to 2.40 fatalities per 100 million miles traveled. The fatality rate increased in line with the volume of traffic (4.2 and 4.9 percent, respectively).

9. Future Traffic Volumes

As indicated above, Montana has a highway system that is in good condition and meets today's demands from its users. However, the challenge for Montana is to ensure that the system can meet the demands of the 21st century.

Sustaining existing performance levels to meet tomorrow's demands will be a challenge. Montana's population, economy, and associated travel demands are changing. There has been a large growth in vehicle miles traveled in Montana over

the past decade. This growth has varied considerably between the different regions of the State. These growth rates are particularly pronounced in the faster growing areas of the State. The growth rates are due to the overall increase in population and employment in the State, increased visits to the State for tourism, a growth in bridge traffic through the State, and an overall growth in the number of miles driven by each Montanan.

A 20-year forecast for each of four roadway types: Interstate, Non-Interstate NHS, Primary, Secondary, and Urban roadways, is presented in Exhibit I-10 below. The forecast is based on individual system roadways measured and calculated volume statistics for the last 10 years.

Exhibit I-10: 20-Year Forecast of Daily VMT by Roadway System

System	2005	2015	2025	2030	Percent Change 2005-2025	Percent Change 2005- 2030
Interstate	7,710,000	9,646,000	12,120,000	13,607,000	57%	76%
NI-NHS	7,623,000	9,799,000	12,703,000	14,508,000	67%	90%
Primary	3,758,000	4,811,000	6,178,000	7,009,000	64%	87%
Secondary	2,127,000	2,398,000	2,708,000	2,882,000	27%	35%
Urban	2,557,000	3,108,000	3,823,000	4,263,000	50%	67%
Total	23,775,000	29,762,000	37,532,000	42,269,000	58%	78%

Source: Montana Department of Transportation, 2007.

Exhibit I-11 shows the forecast increase in DVMT by MDT district between 2005 and 2030.

Exhibit I-11: 20-Year Forecast of Daily VMT by MDT District

District	2005	2015	2025	2030	Percent Change		Percent Total	
					2005-2025	2005-2030	2025	2030
Missoula	7,303,000	9,085,000	11,328,000	12,660,000	55%	73%	30%	30%
Butte	5,177,000	6,819,000	9,066,000	10,493,000	75%	103%	24%	25%
Great Falls	3,792,000	4,303,000	4,900,000	5,234,000	29%	38%	13%	12%
Glendive	2,551,000	3,173,000	3,963,000	4,439,000	55%	74%	11%	11%
Billings	4,952,000	6,382,000	8,275,000	9,443,000	67%	91%	22%	22%
Total	**23,775,000**	**29,762,000**	**37,532,000**	**42,269,000**	**58%**	**78%**	**100%**	**100%**

Source: Montana Department of Transportation, 2007.

Exhibit I-12: 20-Year Forecast of Daily Vehicle Miles Traveled by MDT District and Roadway System

District and System	2005	2015	2025	2030	Percent Change	
					2005-2025	2005-2030
Missoula						
Interstate	1,759,000	2,035,000	2,355,000	2,533,000	34%	44%
NI-NHS	3,073,000	3,930,000	5,026,000	5,683,000	64%	85%
Primary	1,237,000	1,596,000	2,059,000	2,339,000	66%	89%
Secondary	622,000	723,000	839,000	905,000	35%	45%
Urban	612,000	801,000	1,049,000	1,200,000	*71%*	96%
Subtotal	*7,303,000*	*9,085,000*	*11,328,000*	*12,660,000*	55%	73%
Butte						
Interstate	2,295,000	2,784,000	3,377,000	3,719,000	47%	62%
NI-NHS	853,000	1,317,000	2,034,000	2,527,000	138%	196%
Primary	1,151,000	1,567,000	2,132,000	2,487,000	85%	116%
Secondary	393,000	455,000	526,000	566,000	34%	44%
Urban	485,000	696,000	997,000	1,194,000	*106%*	146%
Subtotal	*5,177,000*	*6,819,000*	*9,066,000*	*10,493,000*	75%	103%
Great Falls						
Interstate	925,000	1,140,000	1,405,000	1,559,000	52%	69%
NI-NHS	1,493,000	1,657,000	1,840,000	1,939,000	23%	30%
Primary	346,000	403,000	469,000	506,000	36%	46%
Secondary	444,000	457,000	471,000	477,000	6%	7%
Urban	584,000	646,000	715,000	753,000	*22%*	29%
Subtotal	*3,792,000*	*4,303,000*	*4,900,000*	*5,234,000*	29%	38%
Glendive						
Interstate	615,000	773,000	971,000	1,089,000	58%	77%
NI-NHS	1,005,000	1,339,000	1,784,000	2,059,000	78%	105%
Primary	580,000	673,000	780,000	840,000	34%	45%
Secondary	331,000	366,000	404,000	425,000	*22%*	28%
Urban	20,000	22,000	24,000	26,000	20%	30%
Subtotal	*2,551,000*	*3,173,000*	*3,963,000*	*4,439,000*	*55%*	74%
Billings						
Interstate	2,116,000	2,914,000	4,012,000	4,707,000	90%	122%
NI-NHS	1,199,000	1,556,000	2,019,000	2,300,000	68%	92%
Primary	444,000	572,000	738,000	837,000	66%	89%
Secondary	337,000	397,000	468,000	509,000	39%	51%
Urban	856,000	943,000	1,038,000	1,090,000	21%	27%
Subtotal	*4,952,000*	*6,382,000*	*8,275,000*	*9,443,000*	*67%*	91%
Total	**23,775,000**	**29,762,000**	**37,532,000**	**42,269,000**	**58%**	**78%**

Source: Montana Department of Transportation, 2007.

Note: Totals may not add due to rounding

The forecast indicates that daily roadway utilization will grow the most in MDT's Missoula and Butte districts, driven by the anticipated population growth in Gallatin, Flathead, and Missoula counties. Statewide, daily VMT on highways are forecast to increase by over 50 percent from 2005 to 2025. DVMT forecasts for the Butte and Missoula districts indicate that:

- Daily VMT on the Non-Interstate NHS, Primary, and Urban Highways in the Butte District will more than double from 2005 to 2030.
- Daily VMT on the Interstate Highways in Butte will increase by over 50 percent from 2005 to 2030.
- Daily VMT on the Non-Interstate NHS, Primary, and Urban Highways in the Missoula District will increase by over 50 percent from 2005 to 2030.
- Total Daily VMT in the Missoula District will increase by almost 75 percent from 2005 to 2030.

II. Key Roadway Performance Issues

A. Issues Raised by Citizens and Industry Representatives

In the 1995 *TranPlan 21* edition, citizens and industry representatives identified a number of issues concerning the current and future performance of Montana's highway system. The issues were described in detail in the 1995 *TranPlan 21* edition of *Issue Identification Results*.

The overall public sentiment identified in 1995 was that Montana has an excellent highway system given the State's size, population density, and resources. Public sentiment indicated that the highway system is essentially complete and that the MDT should focus its efforts on preservation and maintenance. The 2002 TranPlan Update public involvement found a continuation of these views; however, MDT's customers and partners also raised a number of issues relating to how MDT can best preserve mobility in faster growing parts of the State.

The general issues identified in 1995 were as follows:

- **Recognition that improvements will be needed in response to growth.** There was recognition that traffic growth is creating the need for improvements in certain corridors and at some intersections. Most frequently noted was U.S. Highway 93 between Kalispell and Missoula. However, there was no consensus about the extent to which Montanans wish to choose between adding capacity and managing with a lower level of service.
- **Concern about improvements on low volume roads.** Concern was expressed about the inability to fund improvements on low volume roads, especially those that are gravel. Paving gravel roads remains an issue. Many users of these roads would prefer them to be paved; however, the cost of paving and then maintaining them can be high if the roads are lightly used.
- **Need for access management. Montanans recognized the benefits to system performance of better access management and control in major corridors.** However, participants cautioned against a statewide approach that does not take regional differences into consideration. (This issue area and related land use planning issues are addressed in the "Access Management and Land Use Planning Policy Paper)."
- **Prevention of billboard proliferation.** There was a substantial amount of concern about billboard proliferation, especially along scenic corridors.
- **Desire for the highway system to meet the needs of tourism and other growth industries.** The important role that highways play in Montana's growing tourist industry and in interstate and international commerce was acknowledged. There is a belief that it is the MDT's responsibility to address this through planning and project

development. (This issue area is addressed in the "Economic Development Policy Paper)."

- **Expressed concern for the impact on pavement conditions parallel to abandoned rail lines.** There was concern about the impacts to pavements on the Secondary system and some county roads from rail branch line abandonment.

Generally, the *TranPlan 21* issue analysis was consistent with these perspectives. The following general conclusions regarding roadway system performance were drawn from the *TranPlan 21* issue identification:

- **Montanans are Generally Satisfied with the State's Transportation System and MDT's Overall Planning Direction.** The different input mechanisms consistently indicate that MDT's overall policy direction and performance addresses Montanans' priorities. Surveys completed by public meeting attendees and planning newsletter recipients revealed that almost 90 percent of respondents agreed with MDT's overall policy direction: first preserve and maintain the system, with safety improvements, and then expand capacity. Survey respondents would distribute resources in the same priority as MDT does currently: first preservation, with safety, and then expansion.
- **MDT Should Address Economic Development.** Specific issues raised included highway expansion to accommodate growth, high expansion to promote economic development, developer impact fees, improvements to better accommodate tourism, and freight-related needs. This issue area is addressed in detail in the *TranPlan 21* as Amended in 2007 "Economic Development Policy Paper."
- **Roadway Safety is a Statewide Concern.** Roadway safety issues are a concern across the State. In particular, bicycle and pedestrian safety, motorcycle safety, and increased roadway signage were concerns. This issue area is addressed in detail in the *TranPlan 21* as amended in 2007 "Traveler Safety Policy Paper."
- **MDT Should Continue to Improve Communication with Customers.** MDT customers acknowledge that MDT has improved communication but want to see a continuation of this trend. The interest is for more information on highway improvement plans, programs, and project delivery status.
- **The State's Rest Areas Need Improvement.** Rest area level of service was identified at every public meeting as an issue that needs to be addressed in the *TranPlan 21*. The 2003-2007 Tourism and Recreation Industry Strategic Plan public meetings echoed those concerns.
- **Trends in the State's Agricultural Industry Are Impacting Roadway System Performance.** Public meeting participants noted that consolidation in the State's agricultural industry has led to increased truck traffic, and consequent wear, on the State's roadways. The 2000 Montana Rail Plan noted that grain dealers and railroads have been building 110-car loading facilities in order to reduce their costs.
- **Montanans Are Concerned About Future Funding For Highway Improvements.** The State's ability to meet matching requirements to obtain future Federal funding

was an issue raised at several public meetings. MDT management also expressed concern with MDT's ability to fund the State's portion of federally funded projects.

- **Context Sensitive Design is an Important Issue in Some Regions and Needs to be Consistently Employed.** Public meeting participants in Missoula and Great Falls stated that transportation design should be better integrated with communities.
- **MDT Should Continue to Coordinate with Neighboring States and Provinces.** According to the Vision 2005 Task Force on Agriculture, highway transportation regulations among Montana's neighboring states and provinces are inconsistent. Negotiating among states and provinces to standardize regulations should improve the hauling of Montana products. MDT District Administrators also expressed a desire to coordinate planning with neighboring states and provinces.

The financial benefits of Corridor Preservation and advance acquisition of right-of-way were emphasized. Stakeholders and public meeting participants stressed the importance of the advance acquisition of right-of-way in key corridors. An example provided is the Great Falls bypass. Benefits due to reduced costs of right of way and faster project delivery were expressed. In addition, MDT stakeholders believe that MDT should be trying to coordinate with local jurisdictions' development review processes to preserve mobility through corridor management.

B. Continued Need to Set Informed Priorities for Roadway System Performance

Montana has an extensive highway system that MDT must operate, maintain, preserve, and further develop to meet its customers many needs. These many and diverse needs exceed available funding. One of MDT's important management activities is the allocation of funds between different categories of need to ensure that the roadway system's performance meets the priorities of the system users.

The 1995 *TranPlan 21* recognized that the ongoing planning process should provide the mechanism through which competing needs are addressed and performance objectives set for the transportation system. With needs exceeding resources, *TranPlan 21* committed MDT to establishing a process for setting overall priorities for resource allocation. This process is called Performance Programming Process (P^3), which represents a big step towards balancing resource allocation between different categories of need based upon the system performance benefits that Montana will gain. The technical analysis of the process relies on using the best available conditions data and trade-off analysis to ensure that dollars are allocated based on MDT's customers' priorities, those projects that will yield the biggest benefits to the users of the highway system are prioritized.

Through P^3, MDT makes investment decisions based on public input, available resources, and system performance levels versus stated goals. A funding plan for each district is based on predicted system performance, anticipated funding, and a specific program mix (such as reconstruction, rehabilitation, and resurfacing).

Montana's highway users have competing and conflicting priorities. No matter how well MDT manages the highway program, the performance of the system over the next 20 years

will depend upon the ability and willingness of Montanans to pay for it. To set informed priorities, it is important that Montanans understand the financial constraints affecting the preservation and development of the system. There are frequent demands for improvements that arguably will facilitate economic development; however, if funded, they would come at the cost of other improvements. Many jurisdictions and transportation interests have their own priorities and agendas for projects that they would like funded. These cannot all be met and they do not necessarily reflect the general interest of the State.

TranPlan 21 is used to set the overall system-level policy priorities for addressing road system needs. The 1995 *TranPlan 21* placed emphasis on prioritizing pavement preservation. The resulting benefits have been seen in terms of improved pavement conditions. As MDT continues to refine P^3, some of the issues to address will be at what level to preserve the system and how to balance preservation with new capacity needs. The policy goals in the 2002 plan update and this amendment will assist decision-makers in establishing this balance.

C. Continued Importance of Pavement Preservation

Pavement performance is derived from measuring and tracking pavement conditions annually, including cracking, rutting, and ride quality. MDT's pavement management system (PvMS) is used to analyze the actual performance of the pavement after investments are implemented.

MDT's performance objective for pavement is to preserve the pavement conditions on Interstate, NHS, and Primary Systems at existing or higher levels. The ride index, a measure of the quality (smoothness) of the ride as perceived by the highway user, is the primary measure for attaining the performance objective. For each of the highway systems, a performance target has been set:

- Interstate: Average ride desirable or superior, and less than 3 percent of the interstate miles are below desirable levels.
- NHS: Average ride desirable or superior, and less than 3 percent of the NHS miles are below desirable levels.
- Primary: Average ride desirable or superior, and less than 3 percent of the Primary miles are below desirable levels.

The following pavement preservation issues arise from the evaluation of recent trends, existing conditions, and practices as part of the *TranPlan 21* technical work.

From the long-range planning perspective, the key issues for pavement preservation are addressed through P^3. These ensure that, at the system level, there is the most effective allocation of available resources to maximize pavement performance. However, at the project programming and development level, it is important that the right types of treatment are performed in the right places. This means that there is a good tie between the allocation of resources and the high priority projects.

D. Paving Gravel Roads on the Secondary Highway System

Almost all the roads on the Secondary Highway System are functionally classified as rural major collectors. In 2000, through Senate Bill 3**,** MDT became responsible for the maintenance of all paved Secondary Highways. To ensure good pavement maintenance, MDT has worked to extend the pavement management system to these roadways, and continues to improve its maintenance management practices.

MDT can face considerable pressure from users to pave low volume gravel roads on the Secondary Highway System. In many cases, such routes have average daily traffic under 250 vehicles. Given the resources available, there are often other projects in each district that are a higher priority for Secondary Highway System funds. This pressure is now compounded by the fact that, once paved, the roads become MDT's maintenance responsibility. For many counties with extremely limited road maintenance funds, this is an attractive outcome. However, it is not in Montana's highway users' overall interests to pave these roads ahead of other projects. Despite these constraints, as resources allow, roads are paved through Secondary Highway System projects. Well-defined prioritization guidelines are used in each district to rank Secondary projects that are nominated by the counties.

E. Existing Reconstruction Practices

MDT's Geometric Design Standards (approved December 4, 1992) set design standards for highway reconstruction and construction projects. These standards guide the modernization and addition of capacity that occurs as part of reconstruction. Projects are planned and programmed as reconstruction or reconstruction with capacity.

However, many roads are in need of work to meet Montana's design goals. They cannot all be improved immediately and many will not be funded over the next 20 years. Therefore, to use funds effectively, two key issues arise:

- The need to strengthen nomination guidelines to trigger improvements with precisely defined criteria.
- The need to further tie capacity improvements to future traffic volumes.

1. Need to Strengthen Nomination Guidelines to Trigger Improvements

The MDT's geometric design standards recognize that it is not cost effective to spend money evenly over the entire State's system. MDT has further recognized that, to most effectively manage its program, it is necessary to establish nomination guidelines for prioritizing highway projects. These nominating guidelines can be thought of as minimum tolerable conditions. These guidelines determine whether a project is eligible for prioritization for inclusion in the program. If conditions deteriorate below the nominating guidelines, the guidelines can be used to trigger needed improvements and an improvement project can be considered for inclusion in the program. The improvement is planned to the design standards that reflect the optimum condition of the roadways in each system.

MDT can further refine these guidelines to ensure that funds are allocated in the most effective way to accomplish roadway system performance objectives established through P^3. The guidelines for mobility or capacity can be based upon general roadway characteristic's that are unknown to reduce the free flow of traffic. These can include narrow lanes and shoulders, steep and rolling terrain, sharp curves, truck and recreational vehicle volumes, and general traffic volumes. These conditions will differ depending upon the functional role or system. For example, congestion may be more tolerable on the urban system than the interstate or primary system.

2. Need to Consider Tying Mobility Improvements to Future Traffic Volumes

Capacity additions to address mobility not only require an initial investment for construction, but also add to all future maintenance costs by increasing the inventory of lane miles that must be maintained. To avoid adding capacity where additional traffic does not justify it, there is a need to tie capacity improvements to expected traffic growth and modernization needs.

As discussed above, nomination guidelines can provide the basis for identifying projects to address mobility needs. Among the factors that could be included is whether or not the segment or corridor is forecast to exceed a certain traffic volume within the next 20 years. The Congestion Management System has developed a series of performance measures incorporating current and future traffic volumes as well as roadway geometrics to track and project this type of information.

In addition, there are other factors such as safety that are extremely important in considering capacity-related improvements. In fact, many projects that result in increased capacity are primarily intended to modernize unsafe, outdated roads rather than add capacity.

3. Need to Explore Ways to More Efficiently Develop Major Reconstruction Projects

In the last few years, MDT has initiated several long corridor-level environmental impact studies (EIS). These studies tend to be long and costly. Further, it is not clear that MDT will be able to fund in the near term all the improvements arising from these EISs. With preconstruction costs rising, there is a need to consider more efficient ways to determine corridor-level needs. MDT has recently initiated a pre-NEPA corridor planning process on high capacity or environmentally sensitive corridors to help identify corridor level needs and constraining issues more efficiently. Key regulatory agencies have voiced support of this approach.

F. Issues Arising From Trends Analysis

The *TranPlan 21* analyzed the travel demand trends affecting Montana and the future conditions affecting roadway system performance. These are summarized below.

- **Travel demand growth will be most heavily concentrated in Missoula, Flathead, and Gallatin counties.**

The economy and population in these counties are forecast to grow at a much faster rate than elsewhere in the State. Analysis conducted and documented in the "Economic Development Policy Paper" is reproduced in Exhibit II–1. The analysis indicates that the Flathead and Gallatin Counties experienced strong urbanization growth trends, nearly twice the state average.

Exhibit II–1: Population Changes in Urban Counties and Statewide, 1990 to 2000

	Flathead and Gallatin	Lewis & Clark and Yellowstone	Silver Bow and Cascade	Statewide
Population, 2000	142,302	185,100	115,000	902,200
Percent Change from 1990	30%	15%	3%	13%

Source: NPA Data Services.

This means that MDT needs to plan ahead to preserve mobility in the corridors in and through these counties. The existing system will need to accommodate more traffic. This will be important for both the regional and statewide economy.

- **MDT will have to balance resources between where travel demand is growing versus where it is stable or declining.**

  Montana has a large transportation system for MDT to preserve and maintain. Performing the most cost-effective highway preservation and maintenance practices on the entire system limits the resources available to meet system expansion needs. MDT will need to continue to use P^3 to determine at what performance level the system will be preserved and to balance resources between systems and types of need.

- **Maximizing the productivity of the existing system will be critical given the type and location of expected travel demand growth and MDT fiscal constraints.**

  Montana's growth trends will increase travel demand on the corridors into and through the urban centers in Flathead, Gallatin, and Missoula Counties. In Yellowstone County and other urban counties that will grow more slowly, business and development tends to relocate slowly along the arterials into the urban centers. As shown in the "Economic Development Policy Paper," MDT will need to target capacity improvements or system expansion to address these demand trends. However, MDT has a large statewide system to maintain and preserve. Therefore, it will become increasingly important for MDT to plan ahead to address operational issues such as signal control and other traffic management functions that can increase the productivity of Montana's infrastructure. MDT will need to ensure that it is doing the preparatory work including planning and construction to be positioned to implement the types of ITS applications in these corridors that will maximize their productivity.

- **Coordinated investment and planning with local jurisdictions will be of strategic importance for Montana.**

MDT's success in maintaining mobility and achieving economic development and quality of life objectives is increasingly dependent upon coordinated investment and planning with local jurisdictions. This is a strategic issue for Montana because without effective coordination it will become increasingly costly and take longer to maintain the transportation system. Montana's geography limits the opportunity for new alignments. Coordinated multijurisdictional planning is necessary to accommodate future growth effectively so that city streets, new development, and site planning are coordinated with arterial planning and management. While this coordination is now taking place, it is important to note that in the future it will need to take place with jurisdictions that do not currently have much capacity and for whom many of the issues and implementing actions open to them are new. This means that MDT needs to work with local jurisdictions and through the urban area transportation planning processes, to jointly preserve Montana's transportation corridors and plan to maintain mobility.

- **The nature of farm-to-market travel demands is changing.**

  The "Economic Development Policy Paper" notes the trends in the delivery of freight rail services in Montana and the consolidation of grain elevators. The continuation of these trends will result in new farm-to-market travel demands that MDT will need to consider. Some of these trends include longer hauls of grain to rail-head elevators and larger commercial trucks on major collector highways.

III. Policy Goals and Actions

This section outlines the policy goals and actions for addressing roadway system performance issues adopted by the *TranPlan 21* Steering Committee.

POLICY GOAL A. – Establish explicit priorities for roadway improvements.

- First Priority – Preservation of Montana's Existing Highway System
- Second Priority – Capacity Expansion and Mobility Improvement
- Third Priority – Other Improvements

This policy goal implemented through the Performance Programming Process (P^3) provides an explicit framework for prioritizing projects and developing the Statewide Transportation Improvement Program. The intent of the policy is not to use all funds solely for preservation projects but to establish the MDT's overall priorities. In implementing *TranPlan 21*, P^3 establishes a balance between funding these different priorities for roadway improvements using the pavement, bridge, and congestion management systems. Safety improvements are not noted specifically within the priority list, simply because safety is not prioritized before or after other activities. Safety is addressed by MDT in all activities, and therefore is not established within a particular priority. In addition, there is a separate policy paper specifically addressing traveler safety. The following lists the overall roadway priorities established by *TranPlan 21*:

First Priority - Preservation of Montana's Existing Highway System

The first priority is treatments that reduce the lifecycle cost of Montana roadways because roads that are not preserved in this way will result in:

- Large increases in repair costs.
- Operating cost increases for road users.
- Increases in accident rates.
- Increases in environmental damage.
- Increases in travel delays.

MDT's overall goal is to preserve Interstate, Non-Interstate, and Primary Highway System pavements at desirable or better conditions as defined by P^3, and establish goals for improving Secondary Highway System pavement conditions.

It should be noted that reconstruction projects have many of the same benefits as preservation treatments, including decreased maintenance costs and decreased repair and operating costs.

Second Priority - Capacity Expansion and Mobility Improvement

Maintaining mobility through capacity expansion and operational improvements is needed in certain corridors to manage congestion and maintain levels of service. Capacity needs are typically addressed as part of major reconstruction projects. The *TranPlan 21 2002 Update* shows that MDT will have capacity needs to address in its most urban counties over the next 20 years. The "Economic Development Policy Paper" identifies capacity needs through urban areas as a key part of MDT's plan to maintain system reliability and support economic development. To maintain mobility in Montana's growing corridors over the next 20 years will require a combination of capacity improvement, corridor management, enhanced traffic operations, and increased use of multimodal solutions.

Third Priority – Other Improvements

These include a number of other types of projects such as traffic signals and rest area improvements.

ACTION A.1. Enhance the Performance Programming Process (P^3) to strengthen the link between policy and planning goals and project selection.

MDT established P^3 as an ongoing mechanism to link policy and planning goals to project selection. This action recognizes that this is an ongoing process and that MDT continues to improve it through each cycle of updates to the construction program, the STIP, and MDT's management systems. The intent of the action is to enhance P^3 to help MDT establish the relative priority at the system level between categories of need such as mobility, preservation, and safety. Through this action, MDT will enhance the process used to assess the impact on different types of system performance depending on the allocation of resources between categories of need. In this way, P^3, which is used to provide information to help allocate resources between different categories of need, will be enhanced.

ACTION A.2. Provide and disseminate transportation system performance information.

This action involves MDT maintaining an ongoing communications program to educate and inform its customers, partners, and stakeholders regarding its accomplishments in meeting performance objectives. P^3 provides a mechanism for doing this and the maintenance quality assurance program now being implemented will provide valuable information in this regard. MDT is frequently under public pressure to make investments that would not be good management decisions, whether to "do the worst first" in the areas of pavement preservation or to provide highway capacity improvements that are not justified based on project traffic levels. The action will provide information about the relationship between system-level investment decisions and system-level performance, which will link investment decisions with performance outcomes.

MDT maintains a GIS database of roadway systems information and will, upon request, provide data and support to the efforts of other agencies. Shared data provided to MDT directly or through NRIS provides a means for consideration of other agency issues through the planning process. In turn, MDT provision of its resources supports and reciprocates these efforts. MDT will continue to make this data available to other agencies for their consideration.

A continuous communications program that educates the public and transportation stakeholders about needs as well as improvements and successes of the transportation program will help build credibility and cooperation for system-wide strategies. The maintenance quality assurance program that MDT is now implementing can provide a state-of-the-art example of this type of approach and show the relationship between funding levels for maintenance and maintenance levels of service.

ACTION A.3. Regularly update the cost allocation study to ensure equity in user fees and include analysis of Secondary Highway System use.

This action involves updating the cost allocation study to ensure equitable fees for highway use. Future updates will address Secondary Highway System use.

ACTION A.4. Assist local jurisdictions to improve their pavement management practices and to support their use of pavement management systems.

MDT is working with local governments to improve the collection of data and to support their use of contemporary pavement management practices. The action will help local governments to make better decisions in selecting Urban Highway System preservation projects and in spending their funds off-system.

ACTION A.5. Investigate the potential use of advanced mitigation opportunities such as applying already committed MDT mitigation funds as Federal matching funds for Fish, Wildlife, and Parks.

This action involves MDT investigation of alternative mitigation opportunities. One such example is the possibility of applying funds spent by MDT for mitigation efforts as Federal matching funds.

POLICY GOAL B. – Preserve mobility for people and industry in Montana within available resources.

This policy goal recognizes that to maintain the quality of life and to support a productive economy Montana needs to maintain mobility. The intent of the policy is to provide a goal to guide MDT's planning, investment, and operating decisions. It is recognized that financial resources need to be targeted to where they are most cost-effective. At the statewide level that involves considering both the role of a highway in the overall transportation system and the use of that highway by people and industry.

ACTION B.1. Establish criteria (goals and guidelines) to determine when to add capacity as part of reconstruction projects.

Applying such criteria will help the MDT use technical data and expertise to justify widening rather than other means of maintaining mobility that are less dependable. In some cases, widening will be justifiable based upon safety alone or safety combined with traffic volumes. The specific criteria can be used to provide guidelines for categorizing projects in the project selection process.

ACTION B.2. Establish and prototype a process and guidelines for developing corridor-level strategies that address reconstruction needs.

This action addresses major reconstruction projects needed to rebuild highways that can no longer be cost-effectively preserved through pavement preservation projects and/or needed to improve capacity to accommodate increased travel demands or address safety problems. In both cases, the highway is rebuilt to MDT's current geometric design standards. Regardless of whether the primary driver for the project is reconstruction or mobility, MDT has been initiating long corridor-level environmental impact studies (EIS). These studies tend to be long and costly. Further, it is not clear that MDT will be able to fund in the near term all the improvements arising from these EISs. The intent of this action is to establish a more effective process for determining, prioritizing, and staging reconstruction projects primarily driven by the need to rebuild old highways.

The action will involve convening a working group composed of representatives from MDT Districts, the Engineering Division, FHWA, and the Planning Division to develop an improved process and methodology for determining corridor-level reconstruction needs and advance planning strategies such as access management, advance acquisition of right-of-way, and short term operational improvements. The intent of the action is to prototype a corridor strategy as a "proof of concept." The lessons learned would then be used to develop guidelines for application statewide.

ACTION B.3. Establish and implement proactive corridor preservation in corridors forecast to have capacity constraints over the next 20 years.

This action will enable MDT to maximize the productivity of the State's existing highway system and reduce the cost of future highway improvements. The action will also reduce the time it takes to develop and build projects. To implement the action, it will be necessary to evaluate the tools that are available for corridor preservation. These include a variety of right-of-way actions in addition to outright fee simple acquisition, access management, encouragement of local jurisdictions to enact setback ordinances, and other corridor management approaches.

ACTION B.4. Inform local planning and development officials of the State's desire to preserve key transportation corridors, encourage and assist local jurisdictions to address right-of-way preservation in local land use plans and

access management programs, and support MDT objectives for these transportation corridors.

This action involves working with local jurisdictions to ensure that their decisions do not impact corridor right-of-way preservation and to establish a coordinated approach to supporting the future development of Montana's major transportation corridors. Through this action, MDT will provide technical assistance and advocacy to local jurisdictions to encourage them to become active partners in corridor preservation.

ACTION B.5. Pursue advanced acquisition of right-of-way (fee simple or less than fee simple) on highways that are currently congested and forecasts indicate will be congested in the next 20 years.

While it is difficult to set aside funding for right-of-way acquisition, particularly in the face of critical needs for preserving the physical infrastructure, the life-cycle cost will be less because the right-of-way will be acquired at lower cost than it would be after development is allowed to occur. In addition, acquisition costs in high growth areas will increase dramatically.

ACTION B.6. Develop a Context Sensitive Design toolkit to support project development.

This action would involve developing a series of conceptual design or illustrations of design solutions that address parking, community character, pedestrian accommodation, bicycle facilities, wild life crossing and traffic calming that are applicable to Montana's different environments. These would be tools to aid dialogue and discussion during project scoping and the early stages of design. The intent of the action is to provide real world examples of context sensitive design applications that have been used in Montana and comparable situations with beneficial outcomes. MDT will use this toolkit to guide incorporation of Context Sensitive Design elements into projects, as appropriate.

ACTION B.7. Continue to use the corridor planning process to consult with resource agencies in identification of environmental sensitivities, avoidance areas, or potential mitigation measures.

This action involves continued implementation of the corridor planning process which has proved effective as a form of consultation with resource agencies in the pre-NEPA/MEPA process identification of environmental sensitivities, avoidance areas, or potential mitigation measures. Discussions with resource agencies demonstrated that the corridor-level, rather than the policy or project level, is most appropriate for environmental mitigation discussions and analysis. The corridor planning process currently in place provides a way for resource agencies to assist in the scoping process for projects to advance from corridor studies to the NEPA/MEPA process.

POLICY GOAL C. Improve the productivity of the roadway system.

This policy goal is intended to maximize the productivity of Montana's transportation system. This can be accomplished by increasing the numbers of people and the value of commodities that can travel through the existing or the improved system. The intent is to design, manage, and operate the transportation system so that the maximum return in terms of throughput of people or goods is realized in the major corridors. This puts Montana's capital investment in roadways to its most productive use. The actions that address this policy include ensuring that roadways can effectively accommodate public transportation, using ITS to improve productivity, and increasing MDT's traffic operations capacity.

ACTION C.1. Include consideration of public transit needs in updates to the Geometric Design Standards and identify criteria and locations for transit supportive design.

The technical analysis undertaken as part of *TranPlan 21* indicates that current public transportation is not likely to change the need for capacity improvements. In some parts of the State, population growth and the related increase in travel demand will result in needs for capacity improvements over the next 20 years. Rising population will increase the demand for transit and automobile use and will create more potential for modal trade-offs. This action establishes options for including consideration of how to accommodate public transportation most effectively on Montana's highways as demand for it increases and how to provide infrastructure that supports modal trade-offs and an increase in ride sharing.

To identify criteria and locations for transit supportive design, future transit use of the highway system must be anticipated in the criteria and guidelines for project development. This will require working with transit system operators to identify any high volume locations where bus turnouts or other transit supportive design features are justified. This will also include locating park-and-ride or park-and-pool lots to help reduce vehicular volumes on routes that are forecast to carry high peak hour, single occupant vehicle volumes.

ACTION C.2. Identify and deploy cost-effective Intelligent Transportation Systems applications to improve safety and system productivity.

In considering this policy goal, it is important to note that *TranPlan 21* is a 20-year plan. In this time frame, intelligent transportation system applications will continue to be developed, tested, and deployed nationally. MDT has a number of ITS applications in place and under development that positively affect travelers and the transportation system. Some commercial vehicle weigh stations are equipped with weigh-in-motion devices and pre-clearance equipment allowing trucks to bypass the stations, thereby enhancing the efficient movement of goods and the enforcement officer's abilities to quickly and accurately assess the safety and credentials of each truck. Traveler information is provided through the Department's web page, toll-free phone number, highway advisory radio, and roadside variable message signs. Such information provides advanced warning of hazards and delays, reducing the impact of weather, construction, and highway incidents. MDT and

Glacier National Park are currently working together to maintain a comprehensive 511-service for travelers. When appropriate, MDT will continue to seek and pursue opportunities to work with other agencies to further ITS applications.

While many of the intelligent transportation system solutions may not appear applicable to Montana today, ITS can reduce construction costs and improve the productivity of the transportation system. For example, a number of existing, current, and emerging technologies offer potential benefits by either enhancing existing applications or deploying of new ones. Urban signalization can be improved to increase the flow of vehicular traffic, automated de-icing systems can be used to de-ice bridges, and rural transit providers can use scheduling software to automate scheduling and billing. This action directs MDT to make better use of advances in technology to improve the productivity and safety of the transportation system.

ACTION C.3. Encourage the metropolitan planning organization areas to include enhanced traffic control and management systems in their long-range plans.

This action is intended to encourage metropolitan planning organizations to address traffic operations and management in their planning. This is an area where closer coordination between jurisdictions can significantly improve the operation of the roadway system.

ACTION C.4. Strengthen MDT's traffic operations capability to reduce delay and improve travel times through better traffic management.

This action recognizes that in Montana's most heavily traveled, non-Interstate corridors travel volumes will grow and there will be an acute need to install, manage, and maintain advanced traffic management and control technologies. Currently, MDT has very limited capability to ensure that its many traffic signals have optimal timing and coordinate with city operated signals. The number of signals, their technical complexity, and the potential to use these technologies to improve traffic operations, and hence system productivity, will increase considerably. This action recognizes that building this capability at MDT will represent a cost-effective approach to maintaining mobility and addressing travel demand growth.

ACTION C.5. Promote efficient system management and operations, and emphasize the preservation of the existing transportation system by implementing strategies that manage travel demand, enhance mobility, and extend the service life of the system.

This action encourages maximum utilization of Montana's existing transportation system. Traffic volumes and congestion on existing facilities are projected to increase. Strategies promoting preservation and efficient use of the transportation system are alternatives to construction of new infrastructure to meet this increased demand. Constraints such as right-of-way, environmental impacts, community concerns, and funding limitations can inhibit the construction of new infrastructure. Implementation of travel demand

management and system preservation strategies can increase capacity without the same opposition and limitations. MDT will consider such means in its planning and programming process as viable options to effectively and efficiently develop its transportation system to meet future demand.

ACTION C.6. Utilize P^3 to establish objectives and performance levels for preserving the condition of the existing system and addressing growing congestion.

MDT has developed an asset management system, the Performance Programming Process (P^3), that is used to assess alternative investments and strategies to ensure highway investments contribute to system performance goals. P^3 uses output from MDT's pavement, bridge, and congestion management systems. P^3 allocates resources to systems, districts, and types of work to ensure all parts meet or exceed performance goals. This action incorporates use of P^3 into the planning process, ensuring that valuable information is made available during the assessment of alternative investments. It also provides that P^3 will be used to address additional asset classes as supported by management system data.

ACTION C.7. Conduct pre-NEPA/MEPA corridor studies to analyze the improvement needs, at various levels, including low-cost, corridor management and operations strategies along with consideration of available funding.

MDT has established a corridor–level planning process to study the need for reconstruction or other cost-effective/low-cost strategies such as TDM, incident management, access management, and intersection improvements. This action allows for early involvement of regulatory agencies and environmental interests as well as saves time and money.

ACTION C.8. MDT will continue to use and refine the Highway Economic Analysis Tool (HEAT) to support ongoing planning and policy analysis including the benefits and costs of alternative investments to the state transportation system.

HEAT was developed by MDT to assess the impact of future transportation investments on economic growth. HEAT can also be used to evaluate operational strategies as well as capacity improvements including strategies to reduce travel delay and improve system reliability. This action is intended to encourage the continued consideration of the linkage between economic growth and the transportation system.