

“Rightsizing” the Forest Service Road System

Part 1: Road Trend Analysis

March 22, 2007

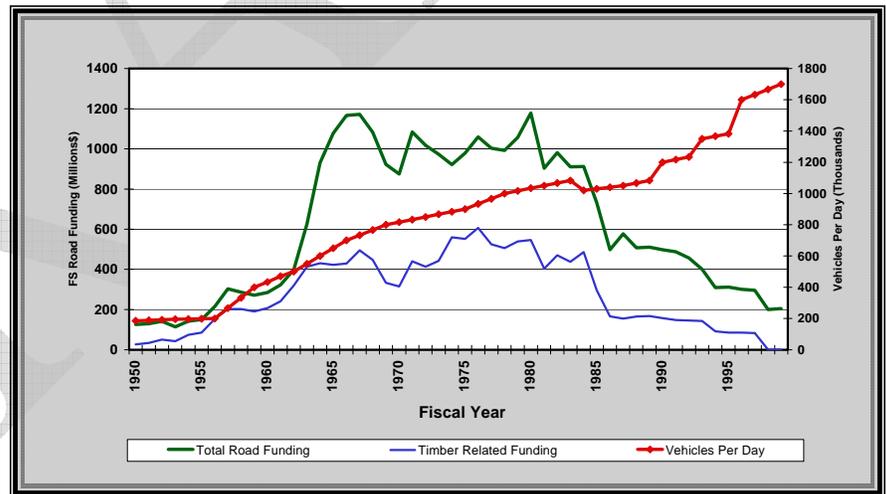
The Problem

Prolonged under-funding of the Forest Service Road System has resulted in dramatically reduced road conditions across the country resulting in loss of passenger car access, rougher roads in general, increased potential safety problems and accelerated damage to adjacent resources especially in terms of sediment production. The limited funding received is usually applied to roads in a manner to maintain the present level of access by the various vehicle types. Therefore, funding is “spread out” in a manner to get the most for the money in order to maintain present levels of access by the various vehicle types. This “triage” approach to maintenance of the road system, although temporarily preserving present access levels, has exasperated and even prolonged the problem until future years. As a result, the entire road system is in a massive state of deterioration requiring that the agency take action in resolving this difficult and complex problem.



Historical Perspective

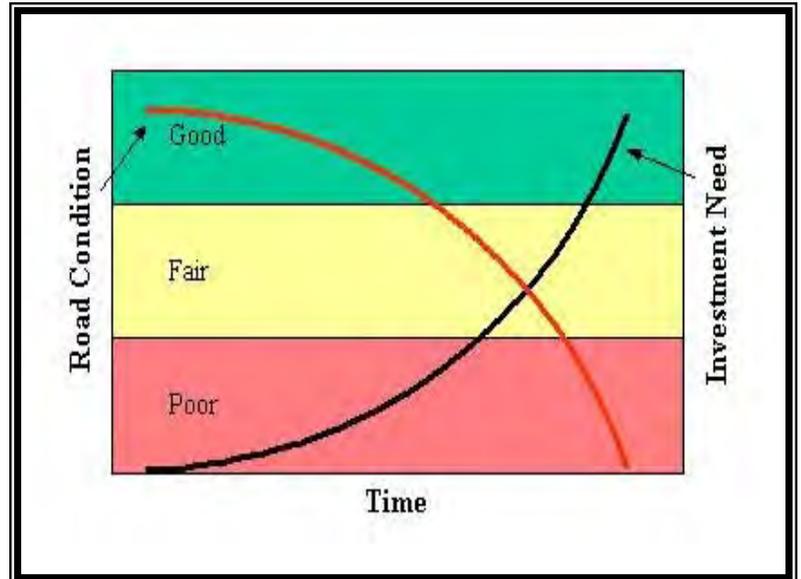
Through the 70s and 80s road funding levels approached \$1.2 billion annually, much of it from timber harvest related activities. As timber harvest targets declined in the late 80s and 90s, overall funding levels dropped. Simultaneously, public use of the national forests, primarily from recreation travel, increased substantially resulting in rapid and noticeable deterioration of roads across the country. The adjacent figure describes the funding situation to the year 2000. For the last seven years, road related funding has stabilized while recreational travel has continued to increase.



These changes have caused a loss in the number of roads open and available for passenger cars. The adjacent graph identifies the actual loss in primary access. Since 1991, there has been a loss of passenger car traffic of 23,690 miles, a 25% reduction. The rate of this reduction has been somewhat moderate due to a unique deterioration process of transportation structures in general.

How Roads Deteriorate – “A Peculiar Process”

Although funding dropped dramatically in the recent past, the condition of the overall road system has only recently experienced the effect of this loss of funds. The reason is due to the peculiar method in which roads typically deteriorate. Typical road deterioration follows a parabolic relationship (Figure XX from resource paper). Road that are well maintained do not usually show signs of deterioration until the reduced funding continues over an extended period of time. At a specific point, usually after 5-7 years of reduced maintenance, road systems rapidly deteriorate following a declining exponential curve. Roads that are beyond this inflection point will require very large investments to rehabilitate them back to their original condition. If reduced annual maintenance funding levels continue, the entire road structure is lost requiring complete reconstruction of the facility, permanent reduced serviceability by the public or, in extreme cases, complete disposal.

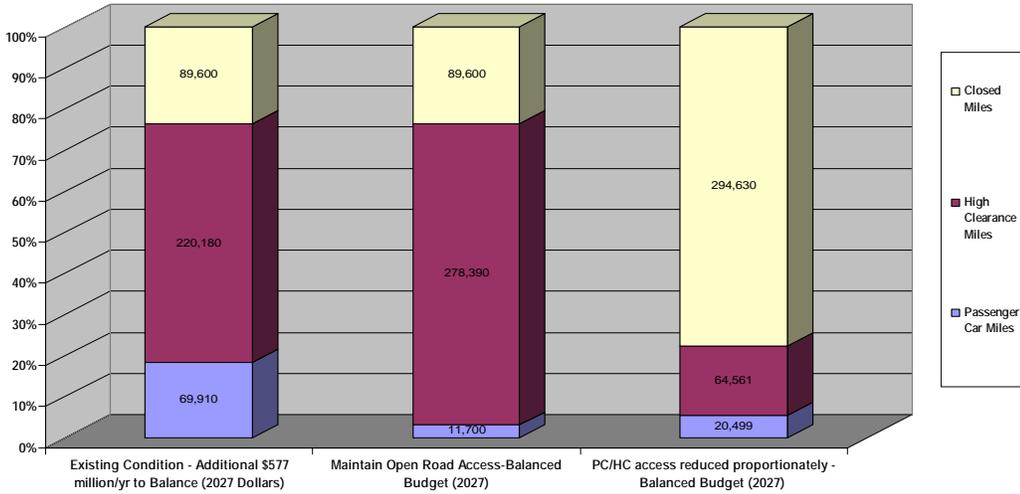


National Road Trend Analysis & General Strategies

Many analyses have been performed in the past to predict the future state of the Forest Service road system based upon funding levels alone. This analysis uses information from prior reports along with updated funding and construction costs to predict the overall trend in access changes needed to ensure that anticipated future funding levels are balanced with priority annual maintenance needs. Three strategies were developed to provide a range of possible yet realistic alternatives for access changes on a national basis. Three different funding/cost scenarios were also portrayed that included a “Best Scenario” involving no loss in purchasing power, a “Most Likely Scenario” assuming a 2% loss in purchasing power and a “Worst Case” scenario depicting a 6% loss in purchasing power. The three primary strategies include:

- **Existing Condition (Unsustainable)** – Road access remains the same assuming no change in roads open to passenger cars and high clearance vehicles. This strategy is “Unsustainable” and requires an additional budget of \$306 million annually to implement.
- **Maintain Open Road Access (Balanced Budget)** – This strategy assumes a balanced budget (i.e. expected future funding is equal to the cost to maintain the system) with no reduction in overall open road access relative to current conditions.
- **Passenger Car & High Clearance Access reduced proportionately (Balanced Budget)** – This strategy reduces passenger car access and high clearance vehicle access proportionately to balanced budget conditions. This strategy anticipates significant increases in roads to be closed with corresponding reductions in roads as available by passenger cars and for high clearance vehicles.

Road Access Strategies (Most Likely Scenario- 2% Loss in Purchasing Power)



“Most Likely Scenario”

Future annual road funding increases fail to keep up with annual construction cost increases by 2%/yr.

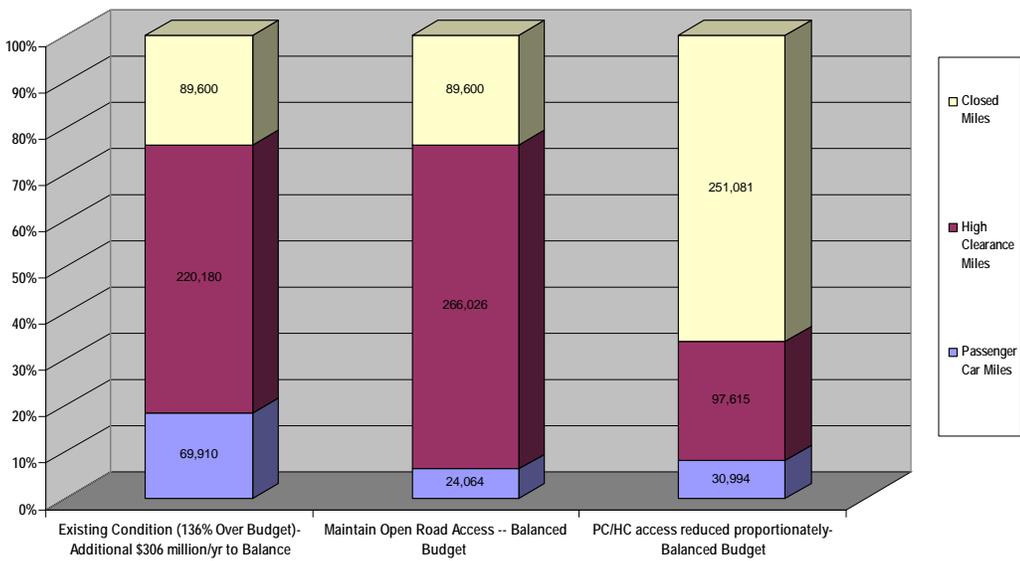
Maintain Open Roads

PC Access = 17% of present
 HC Access = 126% of present
 Open Road Access = No change

PC/HC Reduced Equally

PC Access = 29% of present
 HC Access = 29% of present
 Open Road Access=29% of present

Road Access Strategies (Best Scenario - No Loss in Purchasing Power)



“Best Scenario”

Future funding levels just keep up with increased construction costs.

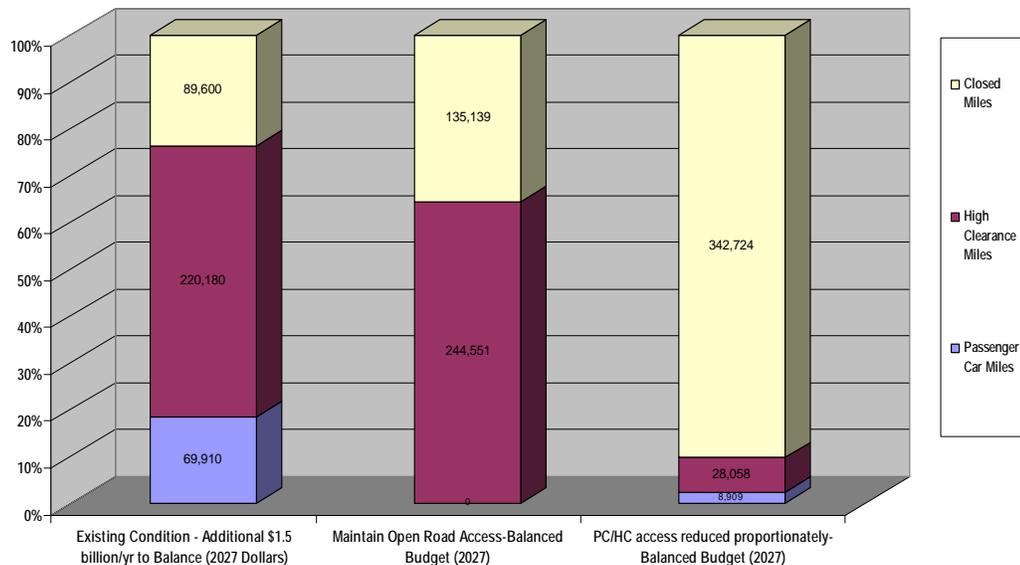
Maintain Open Roads

PC Access = 34% of present
 HC Access = 121% of present
 Open Road Access = No change

PC/HC Reduced Equally

PC Access = 44% of present
 HC Access = 44% of present
 Open Road Access = 44% of present

Road Access Strategies (Worst Case Scenario- 6% Loss in Purchasing Power)



“Worst Case Scenario”

Future annual road funding increases fail to keep up with annual construction cost increases by 6%/yr.

Maintain Open Roads

PC Access = 0% of present
 HC Access = 111% of present
 Open Road Access = 84% of present

PC/HC Reduced Equally

PC Access = 13% of present
 HC Access = 13% of present
 Open Road Access = 13% of present

PC = Passenger Car
 HC= High Clearance

The assumptions for conducting this analysis include:

- **Considers Affordability Alone** – The analysis only predicts road access levels based upon expected future funding relative to costs to maintain the roads. No consideration was given to address resource needs, Forest Plan targets, or other mission related effects that will have a significant factor in addressing the ultimate road miles to be supported in the future.
- **Based on Critical Annual Maintenance Costs** – Only critical annual maintenance costs were considered for high clearance and closed roads to ensure these roads would be safe and protect resource values of a critical nature. Costs for passenger car access were sufficient to ensure safe, efficient access while reducing adverse resource impacts such as sediment production. Costs not considered include; deferred maintenance costs, expected routine investment costs (i.e surfacing) annual maintenance costs to protect resources or costs to meet mission requirements.

What Does this Mean?

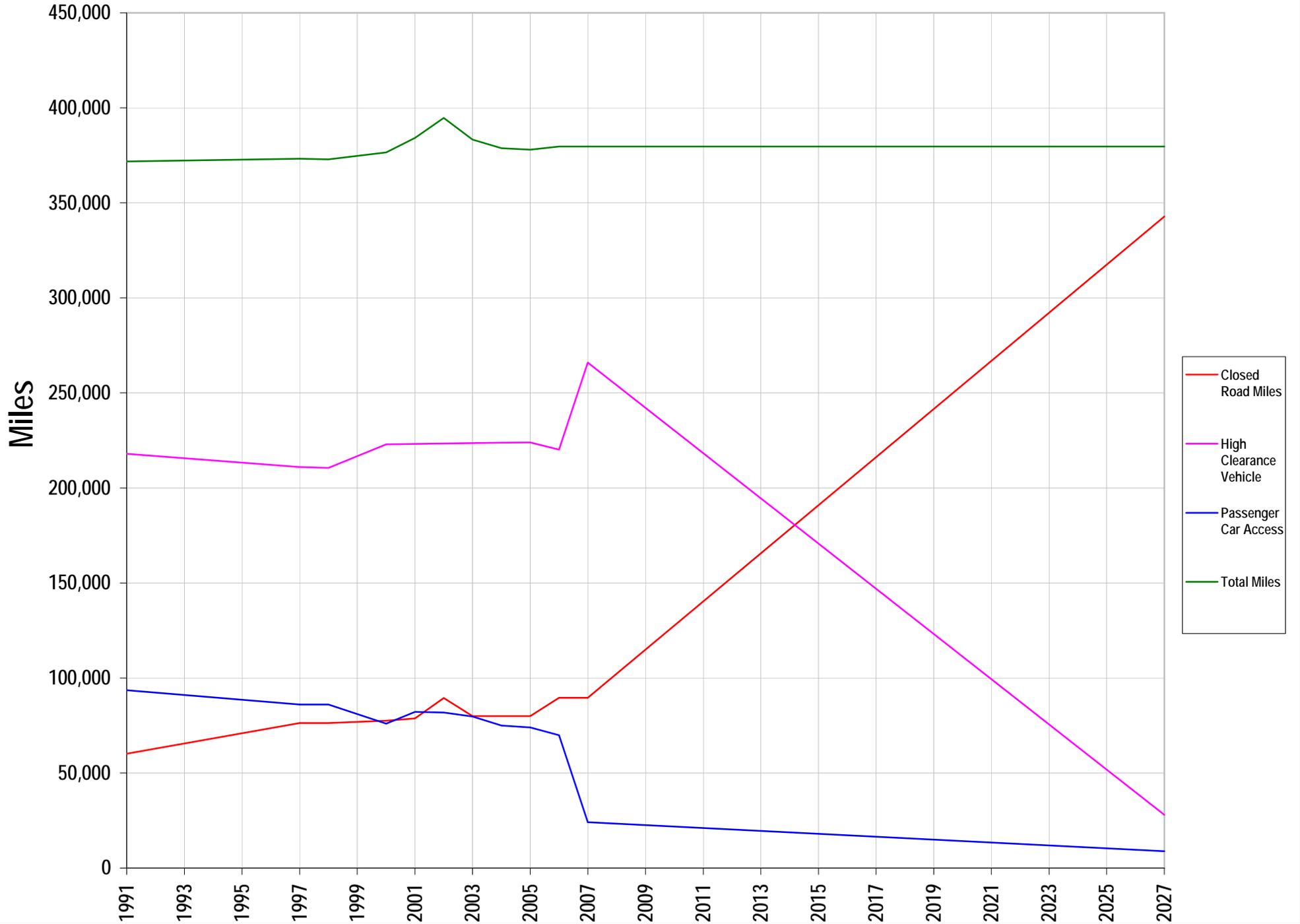
The Forest Service road system cannot continue providing the current level of access to passenger cars and high clearance vehicles without significant loss of the physical road structure and possibly irreparable damage to adjacent resources. At current funding levels, the national road system will decline much more rapidly in the next 10 years than in the previous 10 years. This is due to the peculiar mechanisms inherent to how roads deteriorate combined with the increasing costs of road maintenance in excess of the consumer price index.

To keep the road system continuing at present access levels, there will need to be an immediate increase in the roads budget by \$300 million annually. In lieu of an increase in funding, major adjustments to current access levels will need to occur beginning immediately. Under the most likely scenario, roads currently providing access to passenger car travel will need to drop from the current 69,900 miles to 11,700 miles, a reduction to 17% of current levels. Most of mileage retained for passenger car use will be our higher standard and asphalt paved roads. Correspondingly, an increase of access available for high clearance vehicles could occur from currently 220,200 miles to 278,400 miles allowing greater opportunity for off highway vehicles.

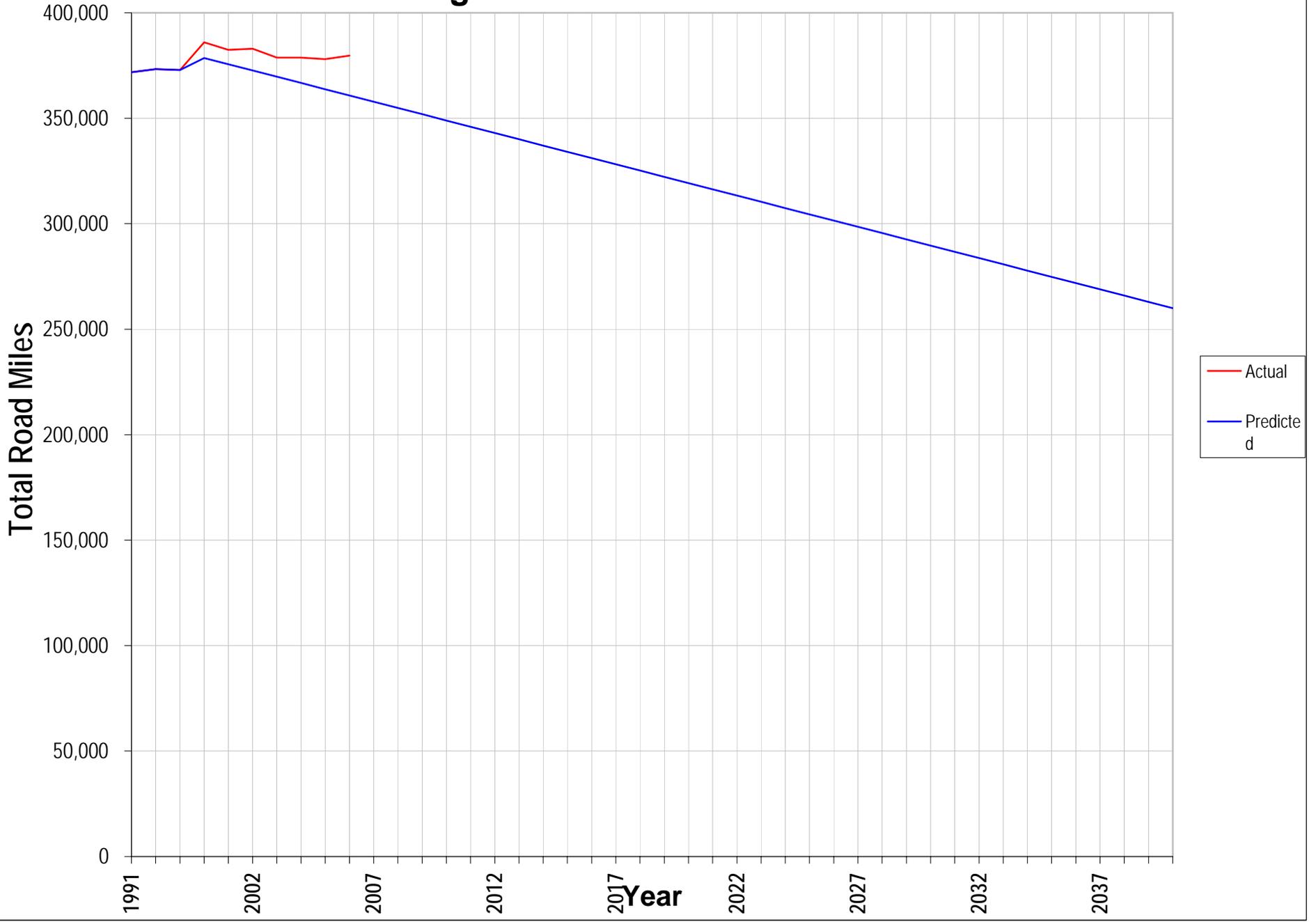
								ACTUAL Miles(6% interest)					
	1991	1997	1998	2000	2001	2002	2003	2004	2005	2006	2007	2027	
Closed Road Miles	60200	76300	76348	77565	78782	89434	80000	80000	80000	89600	89600	342848	
High Clearance Vehicle	218000	211000	210535	223000	223200	223400	223600	223800	224000	220180	266026	27963	
Passenger Car Access	93600	86000	86022	76000	82163	81871	79763	75000	74000	69910	24064	8879	
Total Miles	371800	373300	372905	376565	384145	394705	383363	378800	378000	379690	379690	379690	
Open Road Miles	311600	297000	296557	299000	305363	305271	303363	298800	298000	290090			
Closed Road Miles	60200	76300	76348	87000	109209	116107	114670	80000	80000	89600			
Percent Roads Closed	16%	20%	20%	23%	28%	29%	30%	21%	21%	24%			
Percent Roads Open	84%	80%	80%	79%	79%	77%	79%	79%	79%	76%			
Percent Total Road Mileage	0%	0%	0%	1%	3%	6%	3%	2%	2%	2%			
								ACTUAL Miles(2% interest)					
	1991	1997	1998	2000	2001	2002	2003	2004	2005	2006	2007	2027	
Closed Road Miles	60200	76300	76348	77565	78782	89434	80000	80000	80000	89600	89600	330251	
High Clearance Vehicle	218000	211000	210535	223000	223200	223400	223600	223800	224000	220180	266026	41046	
Passenger Car Access	93600	86000	86022	76000	82163	81871	79763	75000	74000	69910	24064	8393	
Total Miles	371800	373300	372905	376565	384145	394705	383363	378800	378000	379690	379690	379690	
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Closed Road Miles	60200	76300	76348	87000	109209	116107	114670	80000	80000	89600			
Percent Roads Closed	16%	20%	20%	23%	28%	29%	30%	21%	21%	24%			
Percent Roads Open	84%	80%	80%	79%	79%	77%	79%	79%	79%	76%			
Percent Total Road Mileage	0%	0%	0%	1%	3%	6%	3%	2%	2%	2%			
								ACTUAL Miles(0% interest)					
	1991	1997	1998	2000	2001	2002	2003	2004	2005	2006	2007	2027	
Closed Road Miles	60200	76300	76348	77565	78782	89434	80000	80000	80000	89600	89600	89600	
High Clearance Vehicle	218000	211000	210535	223000	223200	223400	223600	223800	224000	220180	266026	266026	
Passenger Car Access	93600	86000	86022	76000	82163	81871	79763	75000	74000	69910	24064	24064	
Total Miles	371800	373300	372905	376565	384145	394705	383363	378800	378000	379690	379690	379690	
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Percent Roads Closed	16%	20%	20%	23%	28%	29%	30%	21%	21%	24%			
Percent Roads Open	84%	80%	80%	79%	79%	77%	79%	79%	79%	76%			
Percent Total Road Mileage	0%	0%	0%	1%	3%	6%	3%	2%	2%	2%			

								"76% Open Access" Alternative			Assume: Immediate Implementation			
	1991	1997	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2017	2027
Closed Road Miles	60200	76300	76348	77565	78782	89434	80000	80000	80000	89600	89600	89600	286408	330251
High Clearance Vehicle Passenger Car Access	218000	211000	210535	223000	223200	223400	223600	223800	224000	220180	220180	266026	77445	41046
Total Miles	371800	373300	372905	376565	384145	394705	383363	378800	378000	379690	379690	379690	379690	379691
Open Road Miles	311600	297000	296557	299000	305363	305271	303363	298800	298000	290090				
Closed Road Miles	60200	76300	76348	87000	109209	116107	114670	80000	80000	89600				
Percent Roads Closed	16%	20%	20%	23%	28%	29%	30%	21%	21%	24%				
Percent Roads Open	84%	80%	80%	79%	79%	77%	79%	79%	79%	76%				
Percent Total Road Mileage	0%	0%	0%	1%	3%	6%	3%	2%	2%	2%				

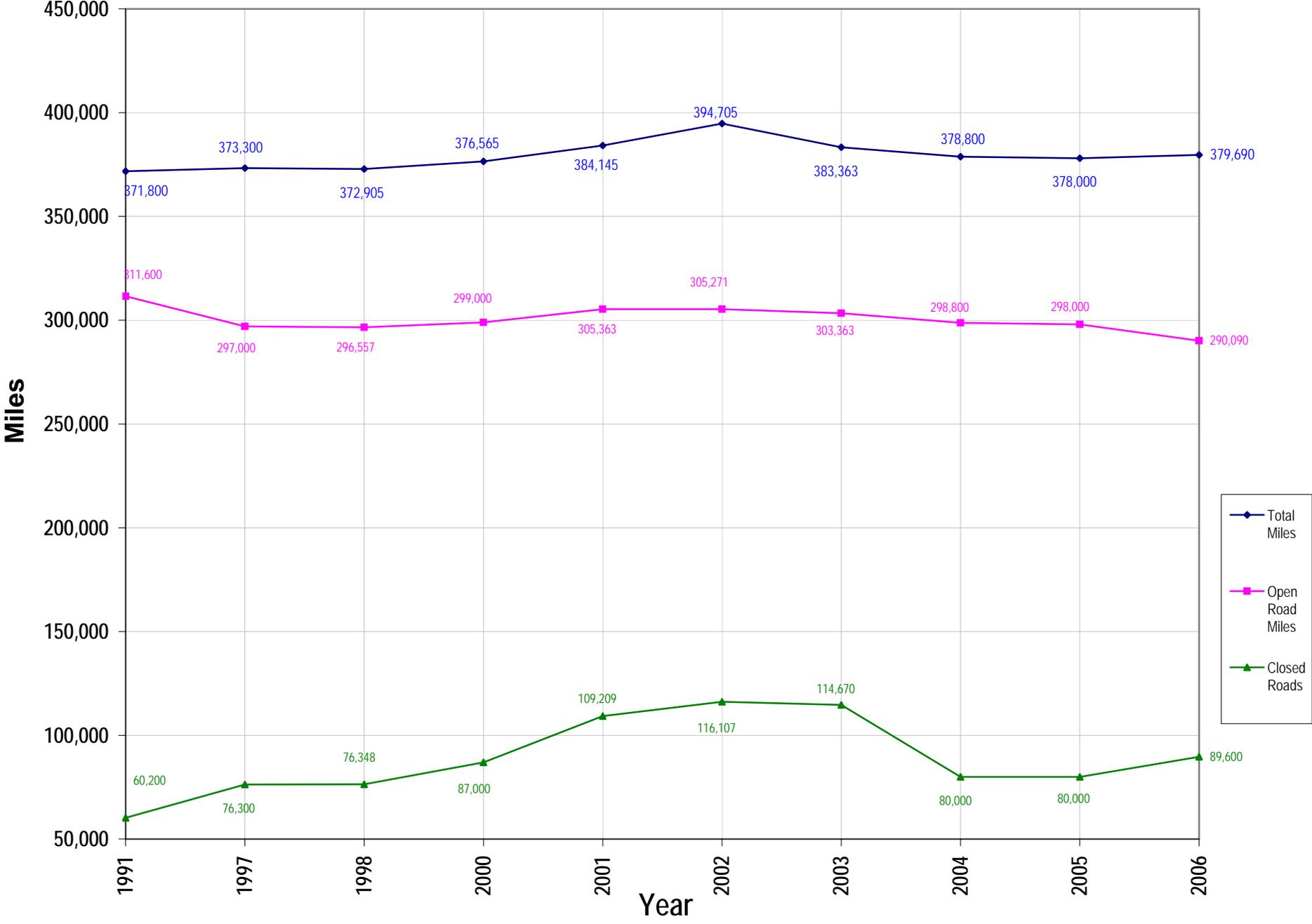
Road Access Trend



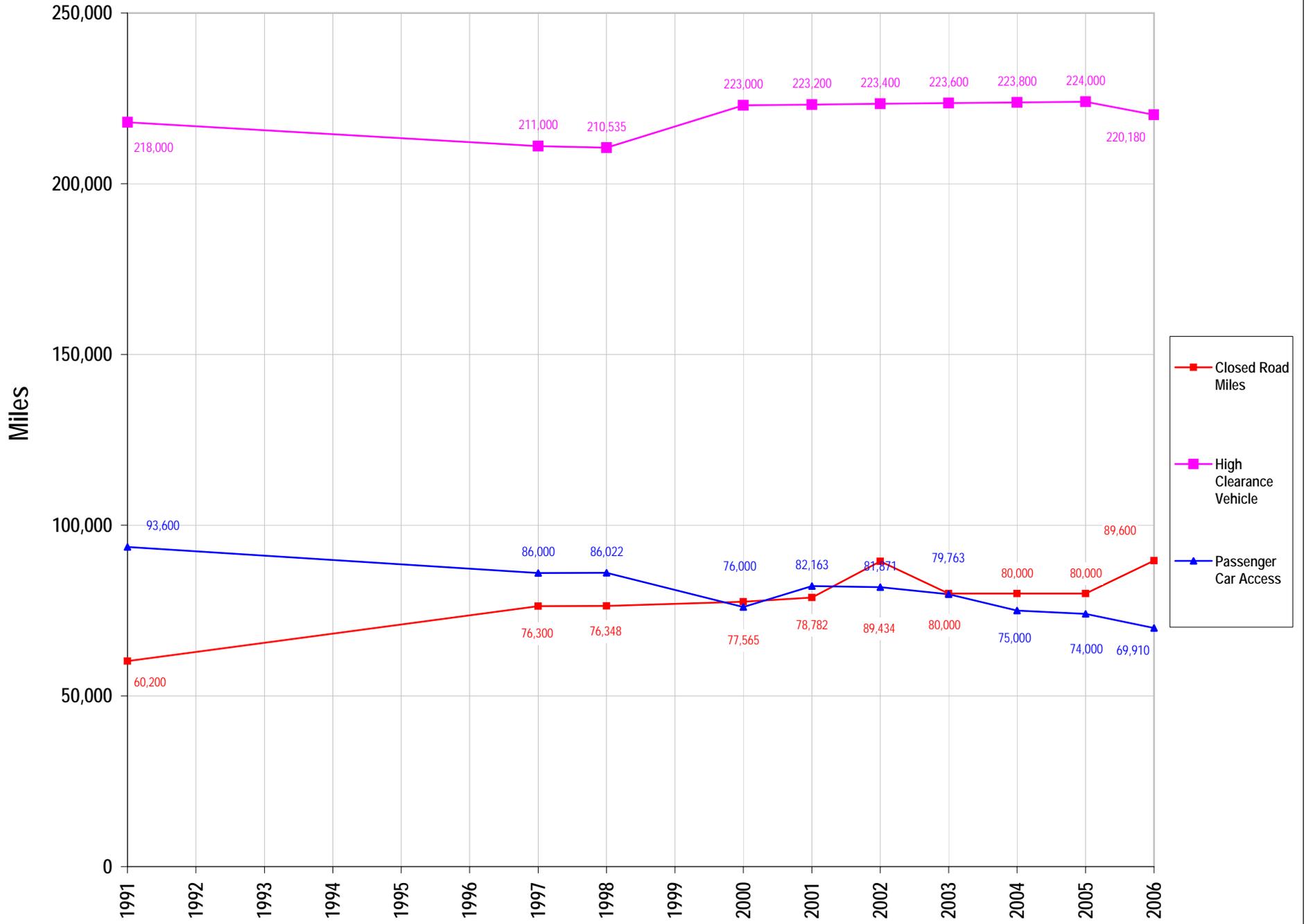
Existing vs Predicted Total Road Miles



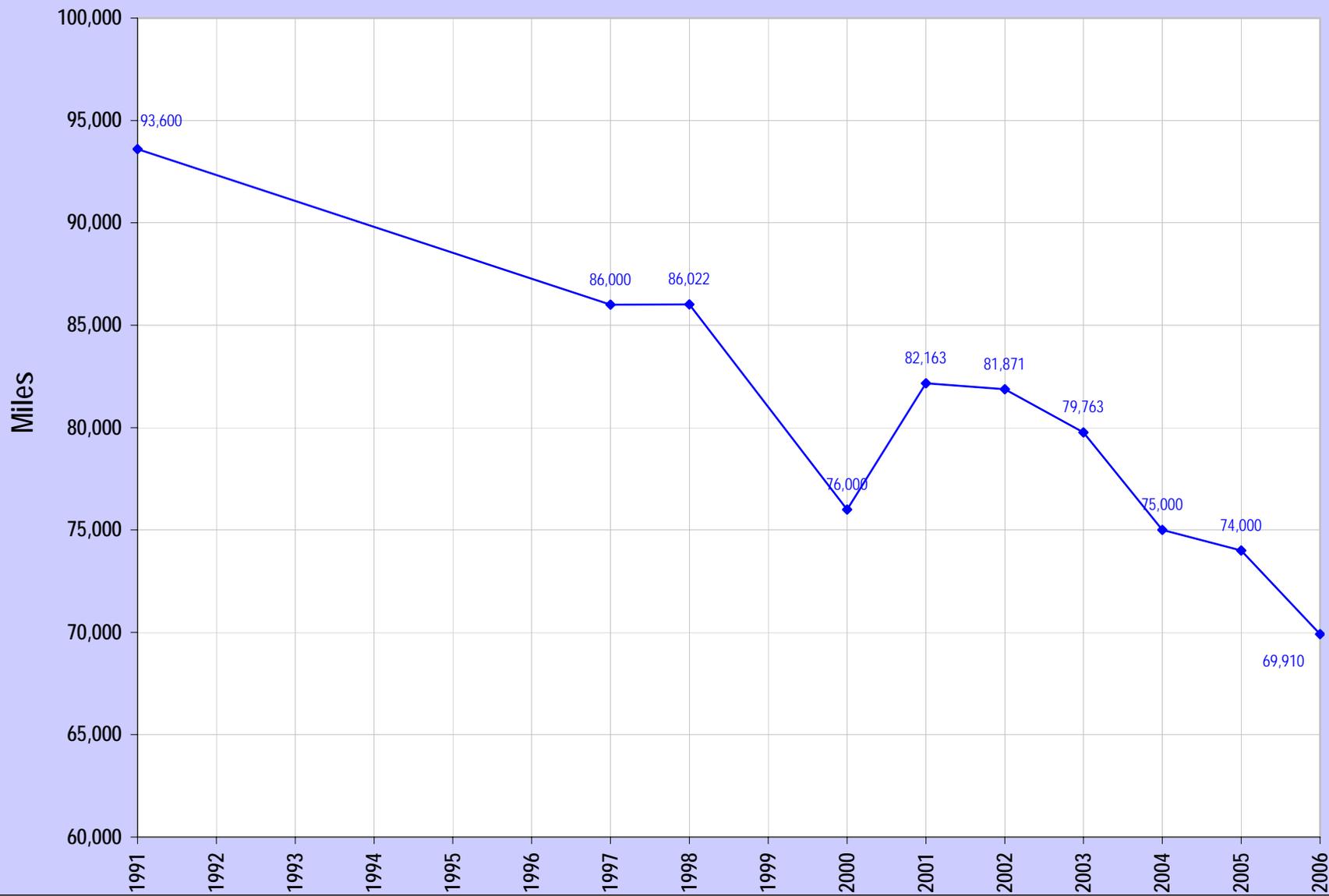
Open/Closed Access (1991-2006)



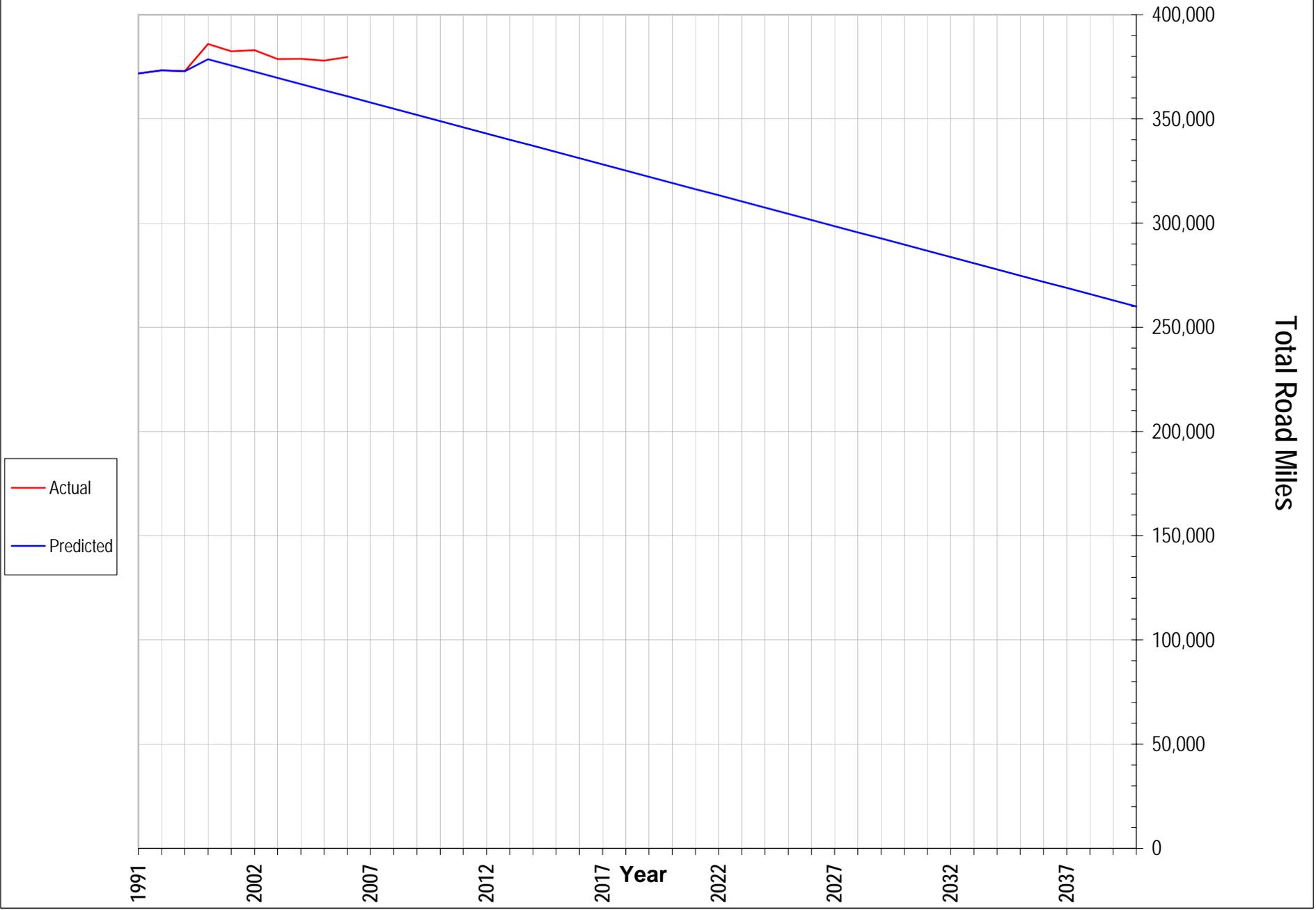
Road Access Trend (1991-2006)



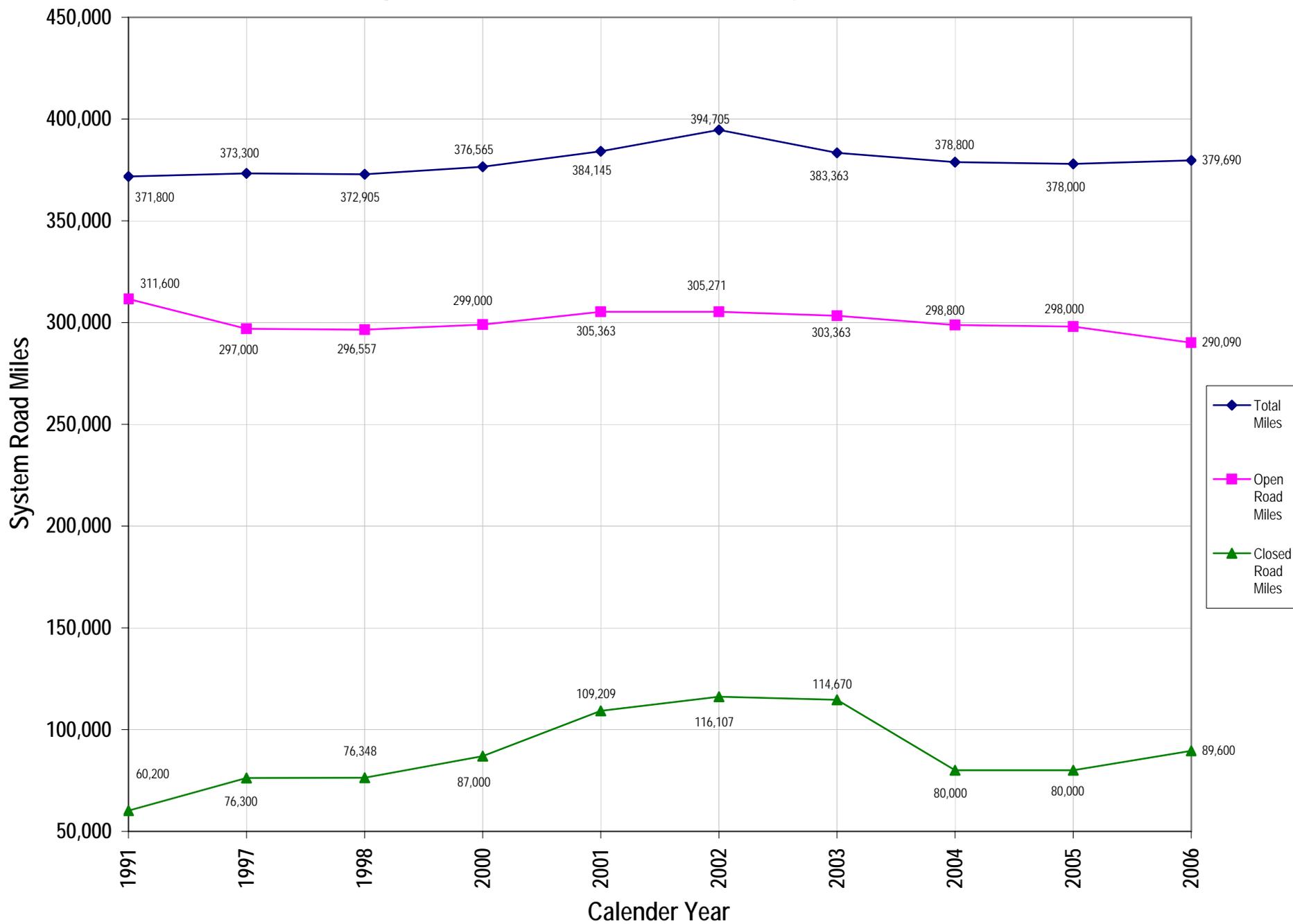
Loss in Passenger Car Access



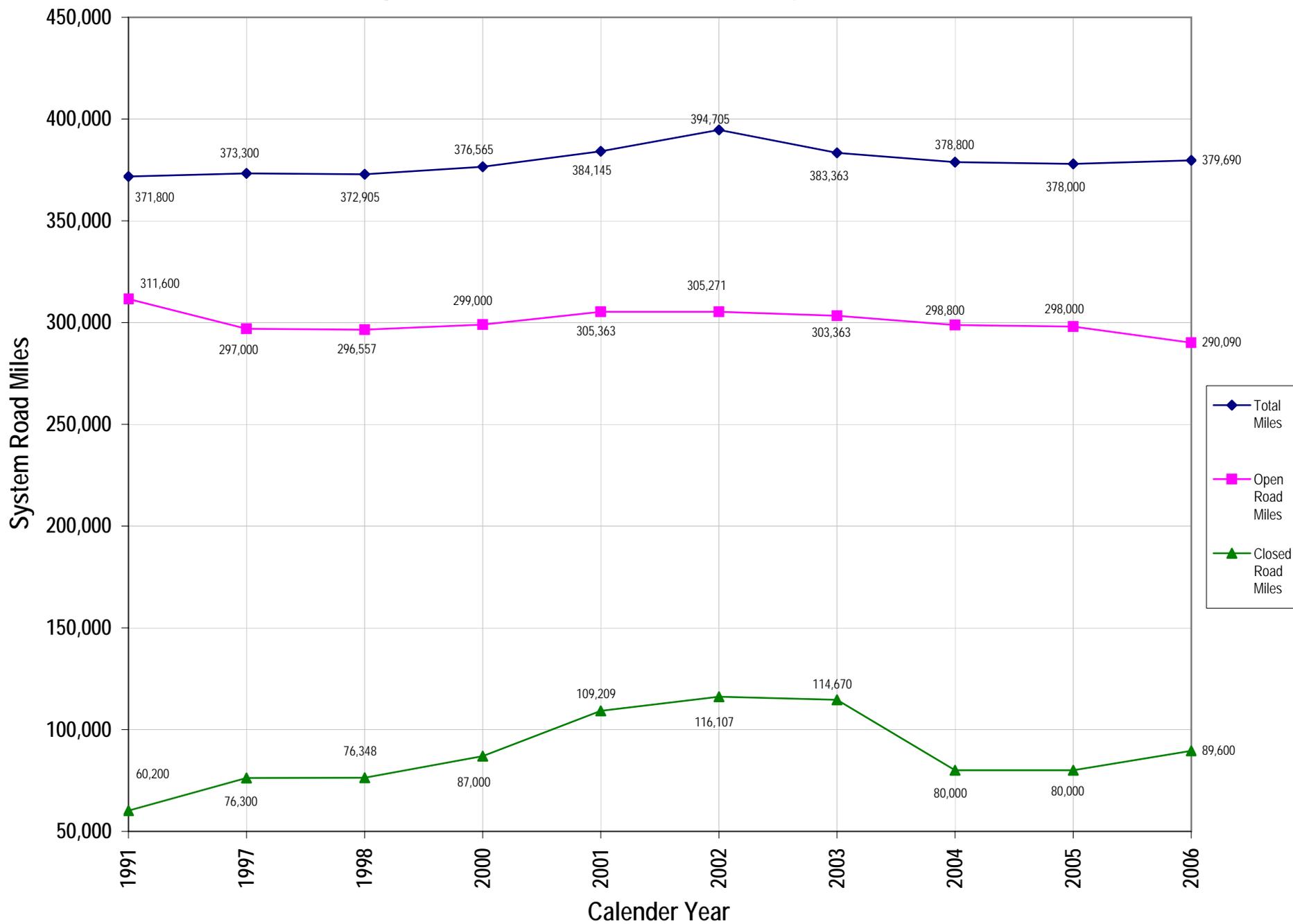
Future Road Miles (Source: Roadless Team)



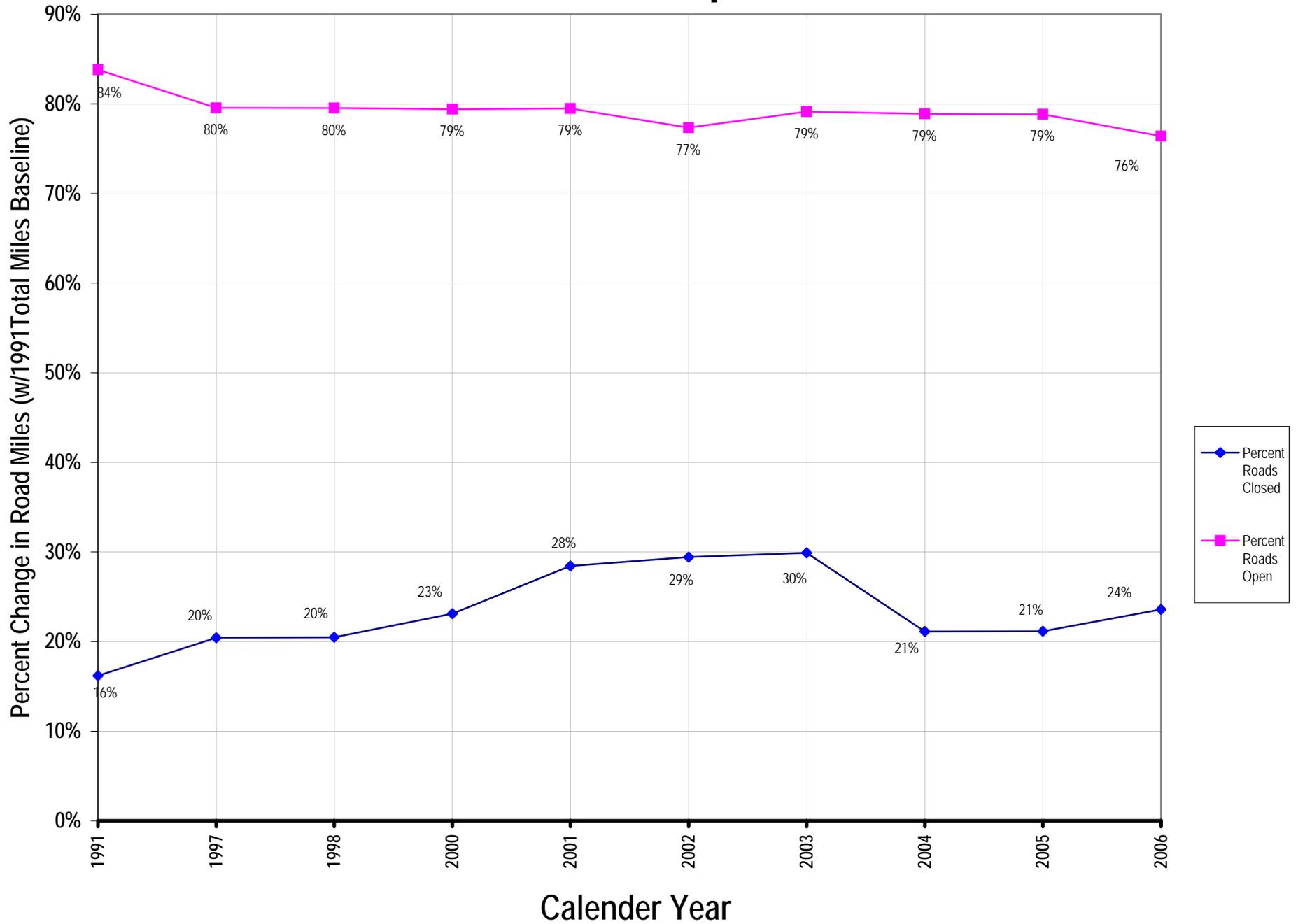
System Road Mile Statistics (Total, Open & Closed)



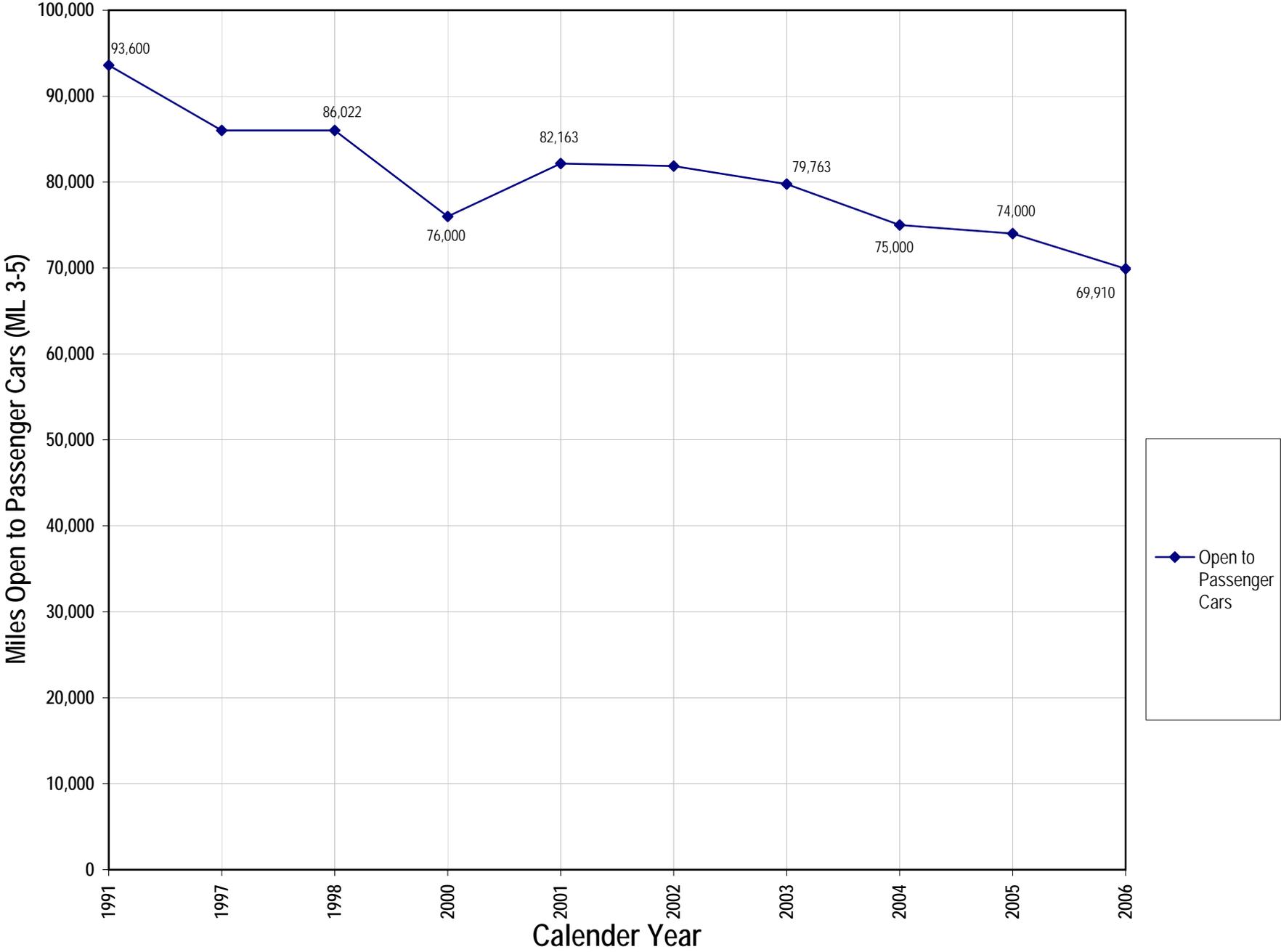
System Road Mile Statistics (Total, Open & Closed)



Percent Roads Open/Closed



Change in Road Miles Open to Passenger Cars



Region 6															
Gifford Pinchot NF															
Current Situation				Scenario 1											
Maintenance Levels	Cost/Mile	Miles	Total Cost	Maintenance Levels	Cost/Mile	Miles	Total Cost								
ML 1	\$90	673	\$60,570	ML 1	\$90	673	\$60,570								
ML 2	\$170	2,178	\$370,260	ML 2	\$170	2,704	\$459,680								
ML 3	\$1,000	517	\$517,000	ML 3	\$1,000	200	\$200,000								
ML 4	\$2,600	188	\$488,800	ML 4	\$2,600	22	\$57,200								
ML 5	\$3,300	113	\$372,900	ML 5	\$3,300	70	\$231,000								
Total		3,669	\$1,809,530	Total		3,669	\$1,008,450								
Annual Budget			\$660,000	Annual Budget			\$660,000								
Total Needed			\$1,809,530	Total Needed			\$1,008,450								
Difference			(\$1,149,530)	Difference			(\$348,450)								
National Road System															
Current Situation				Closing & 70% Reduction of H.S.A. Roads				Current Situation							
Maintenance Levels	Cost/Mile	Miles	Total Cost	Maintenance Levels	Cost/Mile	Miles	Total Cost	Maintenance Levels	Cost/Mile	Miles	Total Cost				
ML 1	\$50	89,600	\$4,480,000	ML 1	\$50	270,000	\$13,500,000	ML 1	\$50	270,000	\$13,500,000				
ML 2	\$500	220,180	\$110,090,000	ML 2	\$500	90,000	\$45,000,000	ML 2	\$500	90,000	\$45,000,000				
ML 3-5	\$5,000	69,910	\$349,550,000	ML 3-5	\$5,000	15,000	\$75,000,000	ML 3-5	\$5,000	15,000	\$75,000,000				
Total		379,690	\$464,120,000	Total		375,000	\$133,500,000	Total		375,000	\$133,500,000				
Annual Budget			\$135,000,000	Annual Budget			\$135,000,000	Annual Budget			\$135,000,000				
Total Needed			\$464,120,000	Total Needed			\$133,500,000	Total Needed			\$133,500,000				
Difference			(\$329,120,000)	Difference			\$1,500,000	Difference			\$1,500,000				
Region 6															
Mt Baker-Snoqualmie															
Current Situation				Scenario 1				Scenario 2				Scenario 3			
				Move SL ML 4 Agg to ML 3				Scen 1 & Move ML3 SL Agg to ML2				50% of ML 3 to ML2			
Maintenance Levels	Cost/Mile	Miles	Total Cost	Maintenance Levels	Cost/Mile	Miles	Total Cost	Maintenance Levels	Cost/Mile	Miles	Total Cost	Maintenance Levels	Cost/Mile	Miles	Total Cost
ML 1	\$15	538	\$8,070	ML 1	\$15	538	\$8,070	ML 1	\$15	538	\$8,070	ML 1	\$15	538	\$8,070
ML 2	\$75	907	\$68,025	ML 2	\$75	907	\$68,025	ML 2	\$75	1,855	\$139,125	ML 2	\$75	1,412	\$105,900
ML 3	\$1,000	1,009	\$1,009,000	ML 3	\$1,000	1,048	\$1,048,000	ML 3	\$1,000	100	\$100,000	ML 3	\$1,000	469	\$469,000
ML 4	\$2,600	75	\$195,000	ML 4	\$2,600	36	\$93,600	ML 4	\$2,600	36	\$93,600	ML 4	\$2,600	75	\$195,000
ML 5	\$3,300	46	\$151,800	ML 5	\$3,300	46	\$151,800	ML 5	\$3,300	46	\$151,800	ML 5	\$3,300	46	\$151,800
Total		2,575	\$1,431,895	Total		2,575	\$1,369,495	Total		2,575	\$492,595	Total		2,540	\$929,770
Annual Budget			\$961,000	Annual Budget			\$961,000	Annual Budget			\$961,000	Annual Budget			\$961,000
Total Needed			\$1,431,895	Total Needed			\$1,369,495	Total Needed			\$492,595	Total Needed			\$929,770
Difference			(\$470,895)	Difference			(\$408,495)	Difference			\$468,405	Difference			\$31,230
Strategy 1- Maintain H.S.A.															
Current Situation				Strategy 1- Maintain H.S.A.				Strategy 2- Maintain Access				Strategy 3 - Lower H.S.A., Raise Closed			
Maintenance Levels	Cost/Mile	Miles	Total Cost	Maintenance Levels	Cost/Mile	Miles	Total Cost	Maintenance Levels	Cost/Mile	Miles	Total Cost	Maintenance Levels	Cost/Mile	Miles	Total Cost
ML 1	\$50	89,600	\$4,480,000	ML 1	\$50	0	\$0	ML 1	\$50	89,600	\$4,480,000	ML 1	\$50	89,600	\$4,480,000
ML 2	\$500	220,180	\$110,090,000	ML 2	\$500	0	\$0	ML 2	\$500	260,180	\$130,090,000	ML 2	\$500	260,180	\$130,090,000
ML 3-5	\$5,000	69,910	\$349,550,000	ML 3-5	\$5,000	69,910	\$349,550,000	ML 3-5	\$5,000	40,000	\$200,000,000	ML 3-5	\$5,000	40,000	\$200,000,000
Total		379,690	\$464,120,000	Total		69,910	\$349,550,000	Total		389,780	\$334,570,000	Total		389,780	\$334,570,000
Annual Budget			\$135,000,000	Annual Budget			\$135,000,000	Annual Budget			\$135,000,000	Annual Budget			\$135,000,000
Total Needed			\$464,120,000	Total Needed			\$349,550,000	Total Needed			\$334,570,000	Total Needed			\$334,570,000
Difference			(\$329,120,000)	Difference			(\$214,550,000)	Difference			(\$199,570,000)	Difference			(\$199,570,000)

Road Trend Analysis - What Can the Agency Afford Today?

Road Trend Analysis - What Can the Agency Afford Today?													
Assumptions:	Only critical annual maintenance performed (lowest expenses possible) 10% of funding used for Capital improvement.												
	ML 1 - \$5/Mi												
	ML 2 - \$68/mi												
	ML 3-5 - \$1,536/mi												
	National Budget - \$55.5 m	Assume: ML 1-2 Roads - Only critical maintenance performed.											
Strategy Name	Strategy Description	Passenger Car Miles	High Clearance Miles	Closed Miles	Total Miles	Total Cost	Net Change	% System Funded	% Open	% Closed	% Passenger Cars	% HC Vehicles	Additional Funds Needed
Existing Condition (136% Over Budget)- Additional \$306 million/yr to Balance	Continue Maintenance at Current level	69,910	220,180	89,600	379,690	\$122,802,000	(\$67,302,000)	45%	76%	24%	18%	58%	\$305,918,182
Maintain Open Road Access -- Balanced Budget	Maintain same level of PC & HC road access -- Balance Budget	24,064	266,026	89,600	379,690	\$55,500,001	(\$1)	100%	76%	24%	6%	70%	\$6
PC/HC access reduced proportionately- Balanced Budget	Balanced Budget - Proportional reduction of open roads	30,994	97,615	251,081	379,690	\$55,499,999	\$1	100%	34%	66%	8%	26%	(\$4)

0

Year 2027 Interest=2%

Strategy Name	Strategy Description	High				Total Cost	Net Change	% System Funded	% Open	% Closed	% Passenger		Additional Funds Needed
		Car Miles	Clearance Miles	Closed Miles	Total Miles						Cars	HC Vehicles	
Existing Condition - Additional \$577 million/yr to Balance (2027 Dollars)	Continue Maintenance at Current level	69,910	220,180	89,600	379,690	\$182,477,312	(\$126,977,312)	30%	76%	24%	18%	58%	\$577,169,601
Maintain Open Road Access-Balanced Budget (2027)	Existing open roads to remain open and useable. PC Roads reduced by 50%; HC roads increased.	11,700	278,390	89,600	379,690	\$55,500,019	(\$19)	100%	76%	24%	3%	73%	\$88
PC/HC access reduced proportionately - Balanced Budget (2027)	Balanced Budget - Proportional reduction of open roads	20,499	64,561	294,630	379,690	\$55,500,001	(\$1)	100%	10%	90%	2%	7%	\$6

Year 2027 Interest=6%													
Strategy Name	Strategy Description	Passenger Car Miles	High Clearance Miles	Closed Miles	Total Miles	Total Cost	Net Change	% System Funded	% Open	% Closed	% Passenger Cars	% HC Vehicles	Additional Funds Needed
Existing Condition - Additional \$1.5 billion/yr to Balance (2027 Dollars)	Continue Maintenance at Current level	69,910	220,180	89,600	379,690	\$393,842,650	(\$338,342,650)	14%	76%	24%	18%	58%	\$1,537,921,138
Maintain Open Road Access-Balanced Budget (2027)	Existing open roads to remain open and useable. PC Roads reduced by 50%; HC roads increased.	0	244,551	135,139	379,690	\$55,499,987	\$13	100%	64%	36%	0%	64%	(\$59)
PC/HC access reduced proportionately-Balanced Budget (2027)	Balanced Budget - Proportional reduction of open roads	8,909	28,058	342,724	379,690	\$55,500,087	(\$87)	100%	10%	90%	2%	7%	\$394

From R-6 Analysis

	CMRD	CWFS	CWK2	Total
Revenue - FY 2007 Best Estimate	\$20,379	\$3,000	\$1,600	\$24,979
Total Avail	\$ 20,379	\$ 1,500		\$ 21,879
Expenses at Regional Level:				
Regional CIP (10% of CMRD)	\$2,038			\$2,038
Contingency	\$102			\$102
OWCP/UCI	\$853	\$77		\$930
Regional Oversight	\$1,228			\$1,228
Program Delivery	\$1,741	\$66		\$1,807
Special Projects	\$146			\$146
	<u>\$6,108</u>	<u>\$143</u>	<u>\$0</u>	<u>\$6,251</u>

Forest Level:

Available for Forest Distribution:	\$14,271	\$2,857	\$1,600	\$18,728	
Percent Available to Road Mtce	40%	80%	100%		
Net Available for Road Mtce	\$5,708	\$2,286	\$1,600	<u>\$9,594</u>	38%
Total Avail from Region	\$5,708	\$1,140		\$6,848	31%

Assume:

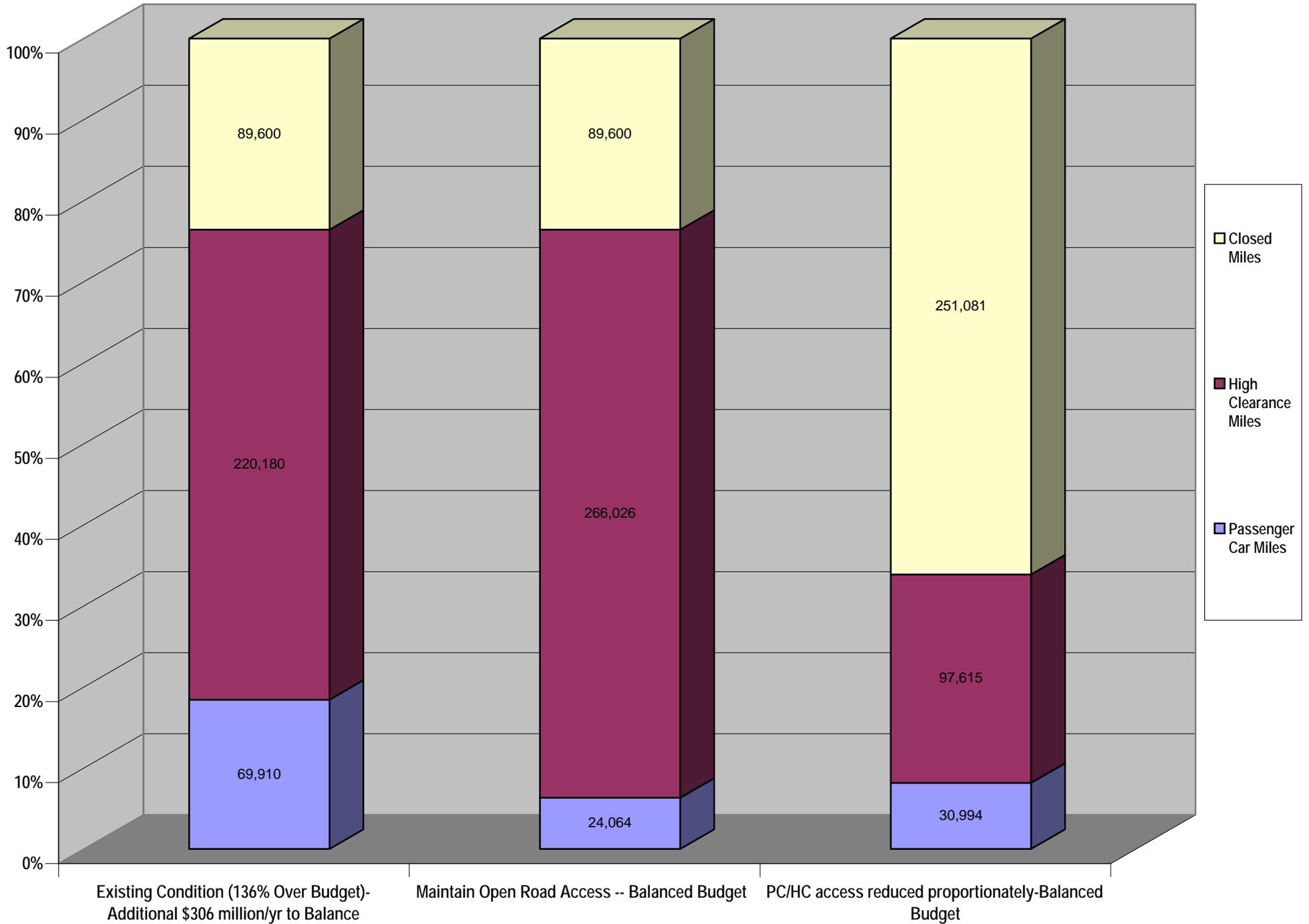
National CMRD Budget 2006 =	\$225,000,000	
National CWFS Budget 2006 =	\$27,000,000	\$28,000,000
Total Available=	\$252,000,000	
Indirect Costs are 29% =	\$73,000,000	
Available to RSA =	\$179,000,000	
Available for Annual Road Maint	\$55,490,000	22% of Total

Assume: 50% of CWFS \$ used for annual maintenance.
10% of budget used for capital improvement

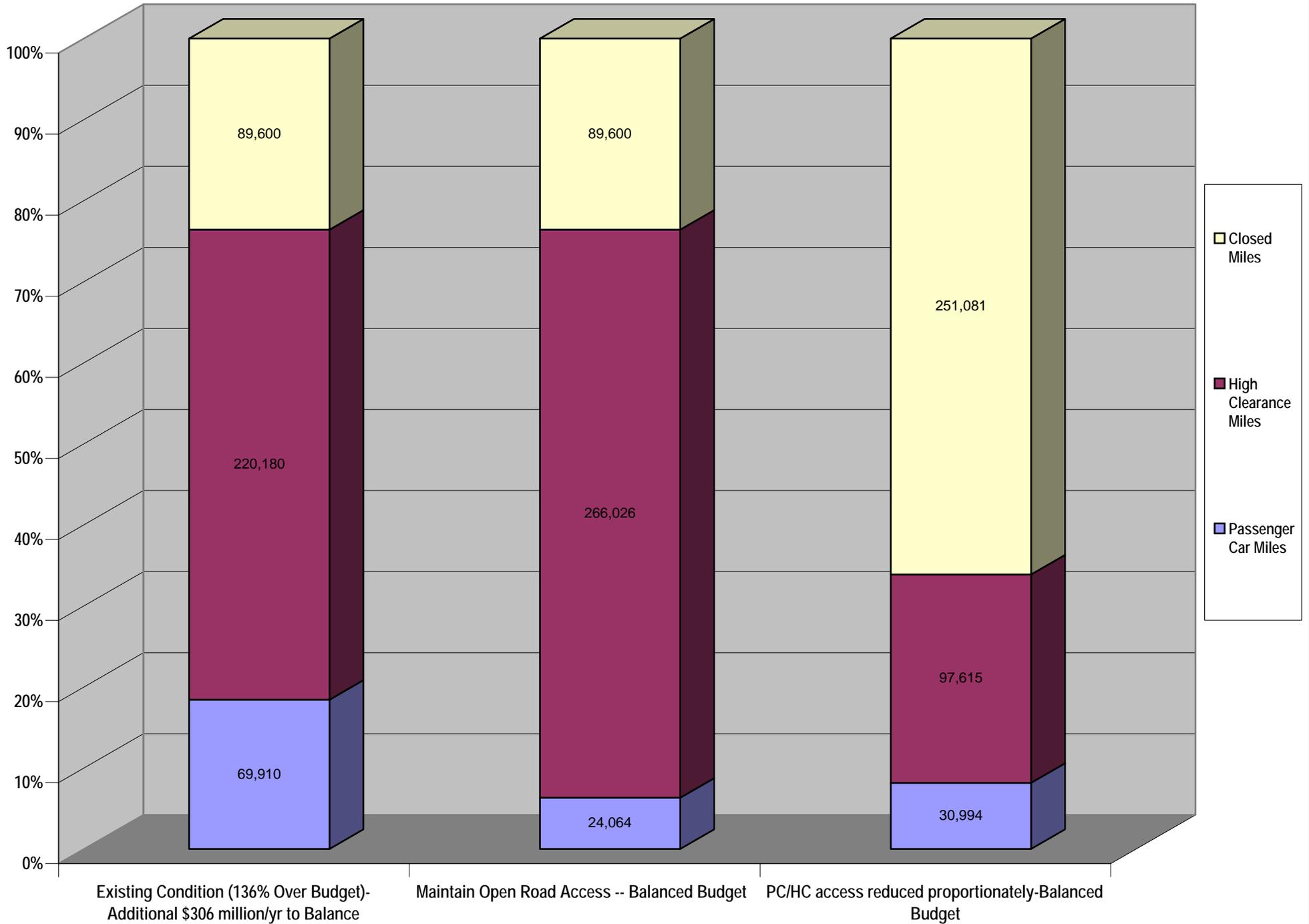
Notes:

- 1.) Expenses taken from FY 2007 Tentative Distribution
- 2.) Engineering Support for Timber Sales, Stewardship, Planning, Operations is estimated at 60% of CMRD (Range was from 50 - 86%)
- 3.) Engineering Support could be much higher in FY 07 due to increased veg targets and decreased CMRD funding
- 4.) CWK2 Funding may go away after FY 2007
- 5.) CWFS based on actual collections from close of FY 2006. Note Total Account value = \$12,541 M but collections only \$3,030 M,
- 6.) Revenue does not include PayCo (Payments to States/County) dollars that have been available for routine road maintenance as program

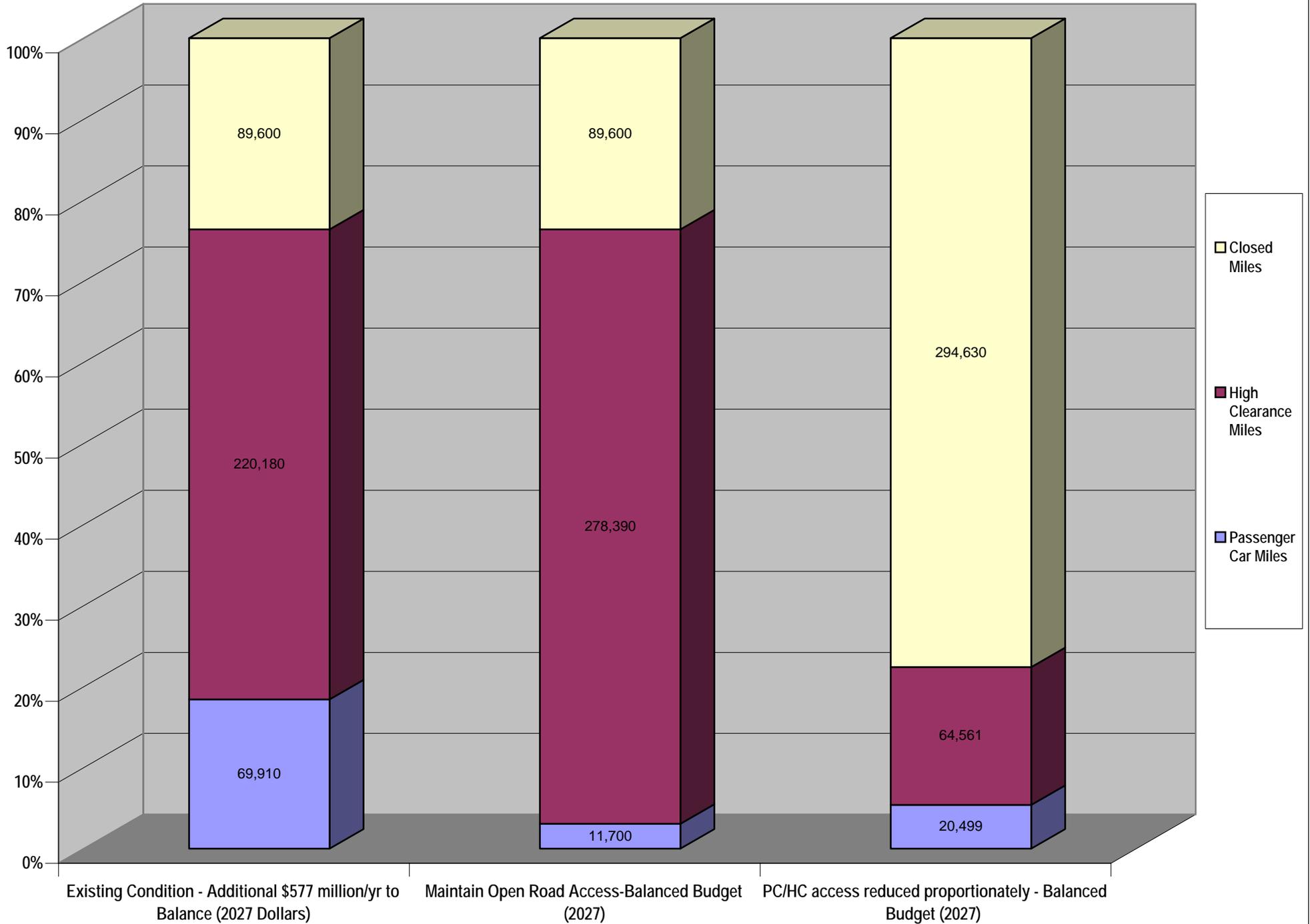
Road Access Strategies (Best Scenario - No Loss in Purchasing Power)



Road Access Strategies (Best Scenario - No Loss in Purchasing Power)



Road Access Strategies (Most Likely Scenario- 2% Loss in Purchasing Power)



Road Access Strategies (Worst Case Scenario- 6% Loss in Purchasing Power)

