

WYDOT/Rick Carpent

FRAMEWORK

LONG RANGE TRANSPORTATION PLAN

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CORRIDOR 13 PLAN

MAY 2013







The Integrated Planning Framework describes the planning process in detail, including the linkage between

strategic goals and project programming - and all the steps in between.

The Long Range Transportation Plan evaluates the state transportation needs from a

systems level, describes the issues and problems facing the State including future revenue and programming, and presents options for future investments, all within the context of the Integrated Planning Framework.

Corridor Visions are created for each State Significant Corridor (SSC) as a supplement to the LRTP. These define long term goals and objectives for each corridor based on the strategic goals of the Department, the investment goals of the LRTP, and the specific context of each corridor. The SSC system represents high volume routes in the state that connect major activity centers to each other and to points external to Wyoming. Urban areas are also evaluated as a group.

Corridor Plans build on the Corridor Visions by providing a more detailed look at specific needs and locationbased solutions. The plans identify a set of solutions and a recommended program of improvements to be implemented over time that address specific, documented needs.

CORRIDOR PLAN PURPOSE

This Corridor Plan is part of a set of documents created through a comprehensive planning process entitled Wyoming Connects. This set of documents captures consistent, transparent, and repeatable planning steps, analysis, and results designed to provide information to guide project selection and programming decision makers. Each document is designed to build upon prior documents and cascade the Strategic Goals of WYDOT forward from the overarching Strategic Plan to the system wide Long Range Transportation Plan, applied in the development of Corridor Visions, and the definition of Needs and potential Solutions to achieve the vision in Corridor Plans.

PERFORMANCE BASED NEEDS

The Corridor Plan utilizes a performance based approach to needs definition. A system of performance measures is used to evaluate the corridor. The architecture of this tiered system is focused on the three Investment Categories identified in the Long Range Transportation Plan: System Preservation, Safety, and Mobility. Performance measures include both absolute and comparative targets. Absolute measures gauge progress towards long term goals, while comparative measures between corridor and system performance provide information to assist in prioritization.

A need is defined as a deviation between these targets and measured performance. The first tier of the system allows for rapid identification of need in each of the Investment Categories through a Performance Indicator. The second tier provides additional information to qualify potential causes through a set of Performance Qualifiers. GIS based Mapping Analysis tools provide for a spatial analysis of these measurements to further investigate causes and identify overlapping needs.

TIERED APPROACH:

A method to evaluate performance goals at a general level and then advance through the system/hierarchy to filter data and define needs.



NEEDS DRIVEN SOLUTIONS:

Performance based needs are captured and documented. These needs remain until the performance is changed. This approach also separates the discussion of need from the discussion of projects, which enhances the transparency of prioritization.

From WYDOT's list of preferred remedies to specific problems, preliminary solutions sets are developed for the identified needs. These sets may be tailored by the specific context of the corridor. For each of the three funding scenarios of the long range plan, the solutions to be considered may vary and the size of the program change. A recommended program can be selected based on anticipated funding levels.



SSC 13 - SHERIDAN TO SUNDANCE - I-90 **CORRIDOR PLAN**

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CORRIDOR 1

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STATE SIGNIFICANT CORRIDOR 13 - DESCRIPTION Ι. CORRIDOR DESCRIPTION

State Significant Corridor (SSC) 13, includes Interstate 90 (I-90) from the Montana/ Wyoming border, north of Sheridan to the Wyoming/South Dakota border east of Sundance. It is 207 miles long and used for both inter- and intra-state travel. I-90 crosses five counties and is located in WYDOT District 4. SSC 13 passes through two urban areas, Sheridan and Gillette, where it also serves an important regional and local function. Three smaller towns - Buffalo, Moorcroft, and Sundance - are also on the route.

SSC 13 crosses a diverse geographic range, including mountains, canyons and grasslands. The rangeland includes private ranches and Bureau of Land Management lands. Thunder Basin National Grassland lies to the north and south of Gillette. The Grassland provides wide-ranging opportunities for recreation, including hiking, sightseeing, hunting, and fishing.

SSC 13 passes through energy-rich Campbell County, with its extensive coal, oil, natural gas, and methane reserves. The area also has several large wind turbine fields and coal-fired power plants, including the Wyodak plant east of Gillette. The Powder River Basin supplies a significant percentage of the nation's coal. I-90 is a critical transportation route for energy-related transportation. Overweight and over height loads associated with coalbed methane and wind energy production are common.

The City of Sheridan has a population of approximately 17,000 and attracts thousands of tourists, particularly in the summer. Sheridan and surrounding communities are growing at significant rates. The other major urban area along SSC 13 is Gillette. Its nearby mines, power stations, and other activities associated with energy contribute to traffic on I-90 and connecting regional and local routes. These roadways are critical to the energy business, one of the most important economic generators in the state. Buffalo is a small town in Johnson County with an agricultural

Additional information including environmental context, key issues, and emerging trends is provided in the Corridor Visions and LRTP phases of Wyoming Connects. This Corridor Plan focuses on the identification of the corridor needs through the analysis of corridor performance.

CORRIDOR SEGMENTS

SSC 13 has been divided into 9 planning segments. Planning segments identify generally consistent sections of the corridor for planning level analysis. The planning segments vary in length depending on the context of the corridor. The corridor was segmented at all urban areas and at the intersection of other SSCs. Other context changes may include: roadway typical section (through lanes, shoulders, etc.), average daily traffic, intersecting routes, and terrain. Each segment break or endpoint was assigned as closely as possible to the nearest maintenance section endpoint; segments generally encompass multiple maintenance sections. The planning segments allow for an appropriate analysis and evaluation of corridor needs at a planning level while still providing geographic reference.

Table 1 and the accompanying map on the next page describe general characteristics of each corridor segment.



Bridge on WY 338 over the Tongue River









Table 1 - Segments for State Significant Corridor 13

			-			
		ML				
	Segment	Route	Begin	End	Length	Description
	13.01	90	0.00	9.90	9.90	State line to Ranchester. Features: Divided interstate cross section with 2 interchanges; segment terminates at interchange with SSC 6 (US 14); road close tourism and recreation; ranching and agriculture; flat to rolling terrain.
	13.02	90	9.90	21.50	11.60	SSC 6 (US 14) to Sheridan. Features: Divided interstate cross section with 3 interchanges; intersects Local Routes WYO 345, 349, I-90 B; road close gates; Tongue River, Big Goose Creek; intercity bus route; major commercial transportation route; tourism and recreation; ranching and agriculture; flat terrain.
	13.03	90	21.50	28.21	6.71	Sheridan Urban Area (pop. 17,461). Features: Divided interstate cross section with 3 interchanges; intersects Regional Route US 14 B and Local Route WY Center and Rest Area; intercity bus route and station; major commercial transportation route; tourism and recreation; ranching and agricultural center; PM10
13	13.04	90	28.21	56.40	28.19	Sheridan to Buffalo (pop. 4,832). Features: Divided interstate cross section with 7 interchanges; intersects Local Route WYO 342 and terminates at Region Creek, Piney Creek (2); Lake DeSmet Ditch, Shell Creek, M. Fork Shell Creek; intercity bus route; major commercial transportation route; tourism and recrea
Corridor	13.05	90	56.40	121.27	64.87	Buffalo (pop. 4,832) to Gillette. Features: Divided interstate cross section with 12 interchanges; intersects SSC 12 (I-25), SSC 9 US (16) and Local Route I Negro Creek, E. Fork Dry Creek, Crazy Woman Creek, Powder River (2), Dead Horse Creek, W. Fork Wild Horse Creek, E. Fork Wild Horse Creek; intercity transportation route; tourism and recreation; ranching and agriculture; area monitored for PM10 due to high wind events; urban terrain.
	13.06	90	121.27	129.60	8.33	Gillette Urban Area (pop. 29,087). Features: Divided interstate cross section with 5 interchanges; intersects SSC 14 (WYO 59), Regional Route US 14/16, a Gillette-Campbell county Airport; intercity bus route and station; Northern Tier East-West Bicycle Route; energy industry center; major commercial transportat
	13.07	90	129.60	155.10	25.50	Gillette to Moorcroft. Features: Divided interstate cross section with 5 interchanges; intersects Local Route I-90 B; road close gate; BNSF Railway parallel t draw, Well Creek, Donkey Creek, Bell Fourche River; intercity bus route; energy production; major commercial transportation route; ranching and agriculture;
	13.08	90	155.10	185.70	30.60	Moorcroft to Sundance. Features: Divided interstate cross section with 4 interchanges; segment terminates at Regional Route US 14; road close gate; Wine Creek, Houston Creek, Beaver Creek, Cundy Creek, unnamed draw; intercity bus route; energy production; major commercial transportation route; tourism; r and rolling terrain.
	13.09	90	185.70	207.14	21.44	Sundance to State Line. Features: Divided interstate cross section with 6 interchanges; intersects Regional Route 14 and Local Routes WYO 585, WYO 11 Hills Welcome Center; Sand Creek; intercity bus route; major commercial transportation route; Black Hills tourism destination; access to Black Hills National I

Source: URS Windshield Survey June 2012; Maintenance Section Reference Book 2012; Wyoming Connects: LRTP and Corridor Visions. Note: Descriptions of beginning and endpoints are approximate.

CORRIDOR 13

gates; intercity bus route; major commercial transportation route;

; BNSF Railway grade separation (2); Sheridan Port of Entry;

YO 336; BNSF Railway grade separation; Sheridan Information non-attainment area (moderate); flat and urban terrain.

nal Route US 16/87 B; road close gate; Meade Creek, Pompey tion; ranching and agriculture; Lake DeSmet; rolling to flat terrain.

I-90 B; road close gate; Powder River Rest Area; Clear Creek, bus route and station; energy production; major commercial

and Local Route WYO 50; road close gates; Stone Pile Creek; tion route; ranching and agriculture; urban terrain.

to highway with 1 grade separation; Moorcroft Rest Area; unnamed ; flat terrain.

d Creek, Mule Creek, Tom Cat Creek, Arch Creek, Inyan Kara ranching and agriculture; Keyhole State Park and Reservoir; flat

11; road close gate; Sundance Rest Area and Port of Entry; Black Forest; flat terrain.

II. EVALUATION OF CORRIDOR PERFORMANCE

This section describes the evaluation of specific corridor needs based on the performance based process defined in the IPF. The Performance Based Needs Process, shown below, illustrates the steps followed for this corridor plan. Indicative Performance measures based on existing or simply defined index measurements for each investment category of System Preservation, Safety, and Mobility were evaluated to preliminarily identify need relative to long term goals. Qualifying performance measures were evaluated to better assess contributing factors to the primary need indicators. The indicators and qualifiers were evaluated and analyzed relative to system averages and, when available, previously specified performance targets. This gap analysis identifies locations where needs exist, qualifies the nature of the need, and provides information on the priority relative to the system of SSCs and available funding.

Many of the measures were established as comparisons to the system average, therefore good performance indicates performance better than the system average. The reverse is also true, poor performance indicates that performance is below the average or rated as poor for a particular indicator or qualifier. As additional corridors are evaluated, specific performance targets may be set to measure absolute performance. The IPF process recommends a mix of absolute measures to evaluate true need relative to long term goals and comparative measures to assist in determining priority.





STEP 1: SUMMARY OF INDICATOR AND OUALIFIER PERFORMANCE MEASURES

This corridor plan evaluates System Preservation, Safety, and Mobility performance using the process described in the Integrated Planning Framework, published separately. The plan analyzes the performance of planning segments described in Table 1 as compared to system averages. It identifies good, fair, poor or less, average, more performance for each segment in an overall index and for each contributing qualifier measurement.

the system average.

Table 2 summarizes the results for each performance index and qualifier for each planning segment on the corridor.

Table 2 - Indicator and Qualifier Performance of SSC 13

		SYSTE	VI PRESERV	VATION			SAFETY				MOBILITY								
Segment	System Preservation Index	Rutting	Pavement Maint. Requirement	Pavement Variance Rating	Bridge Variance Rating	Safety Index	Weather Related Crashes	Wildlife Related Crashes	Alcohol Related Crashes	Non-use of Safety Restraints	Horizontal Geometric Insufficiency	Vertical Geometric Insufficiency	Crash Concen- trations	Mobility Index	Volume to Capacity Rating	Pavement Variance Rating (L/R)	Traffic Growth	Truck Traffic Growth	Bridge Variance (L/R)
13.01	Worse	Fair	More	Fair	Less	Good	More	Average	Less	Average	Less	Less	Poor	Better	Good	Fair	More	More	Less
13.02	Worse	Fair	Average	Fair	Average	Fair	Average	More	Less	Average	Less	More	Good	Better	Good	Good	Average	More	Less
13.03	Average	Fair	Less	Good	Average	Fair	Average	More	Average	Average	Less	Less	Good	Worse	Good	Fair	Average	More	Average
13.04	Average	Good	Average	Good	Average	Fair	More	Average	Less	Average	Average	Average	Fair	Average	Good	Good	More	More	More
13.05	Average	Good	Average	Good	Average	Good	Average	More	Less	Less	Average	Average	Good	Average	Good	Good	More	More	Average
13.06	Average	Fair	More	Good	Average	Fair	More	Average	Average	Average	Average	Average	Fair	Worse	Good	Fair	More	More	Average
13.07	Average	Fair	More	Good	Less	Fair	Average	Average	Average	Average	Less	Average	Poor	Average	Good	Fair	Average	Average	Average
13.08	Average	Fair	More	Good	Less	Fair	More	Average	Average	Average	Average	Average	Poor	Better	Good	Good	More	More	Less
13.09	Average	Good	Less	Good	Average	Fair	Average	Average	Less	Average	Less	Average	Good	Average	Good	Good	More	More	Less









SYSTEM PRESERVATION - INDEX

STEP 2: ANALYSIS OF INVESTMENT CATEGORY NEEDS - SYSTEM PRESERVATION



Performance Index

The System Preservation Index is average or better, with the exception of segment 13.01 and 13.02, which is worse than average.

Performance qualifiers with a negative effect on the System Preservation Index:

• The Pavement Maintenance Requirement on segments 13.01, 13.06, 13.07, and 13.08 is more than average.

Refer to the sections below for more information.

		SYSTEM PRESERVATION								
Segment	System Preservation Rutting Index		Pavement Maint. Requirement	Pavement Variance Rating	Bridge Variance Rating					
13.01	Worse	Fair	More	Fair	Less					
13.02	Worse	Fair	Average	Fair	Average					
13.03	Average	Fair	Less	Good	Average					
13.04	Average	Good	Average	Good	Average					
13.05	Average	Good	Average	Good	Average					
13.06	Average	Fair	More	Good	Average					
13.07	Average	Fair	More	Good	Less					
13.08	Average	Fair	More	Good	Less					
13.09	Average	Good	Less	Good	Average					

Performance Qualifiers

Rutting

There are three locations where rutting falls within the poor category along ML 90: 3 miles between route marker (RM) 93 and 96 in segment 13.05, 6 miles between 107 and 113 in segment 13.05, and 9 miles between RM 168 and 177 in segment 13.08.

Pavement Maintenance Requirements

The pavement maintenance sections that were recommended by the Pavement Management System (Agile Assets) and not yet selected to receive funding within the STIP will continue to decline. If not treated fairly soon, the treatments will become more costly as conditions deteriorate.

Approximately 22% of Corridor 13 has been identified as having a 1S need. This represents 46 miles of pavement. Segments 13.02, 13.03, 13.05, and 13.08 have 1S treatments recommended by the Pavement Management System. Based upon current available funding, only four projects, representing 22 miles of pavement, have been selected to be completed within the next several years.

Approximately 19% of Corridor 13 has been identified as having a 2S need. This represents 40 miles of pavement. Segments 13.05, 13.07, and 13.09 have 2S treatment recommended by the Pavement Management System. Based upon current available funding, only four projects, representing 23 miles of pavement, have been selected to be completed within the next several years.

Pavement Variance Rating

Bridge Variance Rating

NOTE: See Appendix for maps documenting each performance qualifier.



Table 3 - STIP by Year and Corridor Segment

Approximately 59% has been identified as having a 3S need. This represents 122 miles of pavement. Segments 13.01, 13.02, 13.03, 13.04, 13.05, 13.06, 13.07, and 13.08 have 3S treatment recommended by the Pavement Management System. Based upon current available funding only one project, representing seven miles of pavement, has been selected to be completed within the next several years.

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The Pavement Variance Rating is fair or better for the entire corridor. Pavement hotspots, identified by length and severity, occurs in Segment 13.02 (least severe).

The Bridge Variance Rating for most of the corridor is average or better than the system average. All segments have at least one bridge. There are 55 structurally deficient bridges along SSC 13, all with bridge decks under 15,000 ft². The structurally deficient bridges are in Segments 13.01 (1), 13.02 (5), 13.03 (3), 13.04 (6), 13.05 (27), 13.06 (5), 13.07 (2), 13.08 (1), and 13.09 (5), resulting in Bridge Variance Ratings of average when compared to the system average.

55	160	165	170	175	180	185	190	195	200	207	
			13.0	08				1	3.09		
	*******	000000						-			
-		mentititi									
	Year 2010, 1S I904134 Microsurfacing						Year 2015, 1S 1904137 Slab Replacements				
	Year 20 1904136 Mill & C)15, 2S 3)verlav									





SAFETY – INDEX

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STEP 2: ANALYSIS OF INVESTMENT CATEGORY NEEDS - SAFETY



Performance Index

The Safety Performance Index ranges from good to fair across the corridor.

Performance qualifiers with poor performance include:

- Weather Related Crashes are more than the average on segments 13.01, 13.04, 13.06, and 13.08.
- Wildlife Related Crashes are more than the average on segments 13.02, 13.03, and 13.05.
- Crashes on Vertical Geometric Insufficient Curves are more than the average on segment 13.02.
- Crash Concentrations are rated poor on segments 13.01, 13.07, and 13.08.

Refer to the sections below for more information.

				SAF	ETY			
Segment	Safety Index	Weather Related Crashes	Wildlife Related Crashes	Alcohol Related Crashes	Non-use of Safety Restraints	Horizontal Geometric Insufficiency	Vertical Geometric Insufficiency	Crash Concen- trations
13.01	Good	More	Average	Less	Average	Less	Less	Poor
13.02	Fair	Average	More	Less	Average	Less	More	Good
13.03	Fair	Average	More	Average	Average	Less	Less	Good
13.04	Fair	More	Average	Less	Average	Average	Average	Fair
13.05	Good	Average	More	Less	Less	Average	Average	Good
13.06	Fair	More	Average	Average	Average	Average	Average	Fair
13.07	Fair	Average	Average	Average	Average	Less	Average	Poor
13.08	Fair	More	Average	Average	Average	Average	Average	Poor
13.09	Fair	Average	Average	Less	Average	Less	Average	Good

Performance Qualifiers

Weather Related Crashes

With the exception of two segments, the ratio of weather related crashes to total in this corridor was above the system average. The highest percentage of weather related crashes occurred in Segments 13.01, 13.04, 13.06, 13.08, and 13.09, all in the range of 35.2% - 39.8% of total crashes. Snow, blowing snow, and blizzard were the most frequently identified weather condition.

Wildlife Related Crashes

Corridor 13 has a consistently high rate of accidents that involve wildlife. Segment 13.06 (24%) has the lowest rate of accidents involving wildlife; all other segments range from 37% to 58%.

Segment 13.05 is most of the portion of I-90 between Buffalo and Gillette. There are wildlife crashes along the entire segment, most involving deer and occurring during darkness. The highest number of wildlife collisions occurred near RM 58, 91, 101, and 102. There are nine rivers or creeks in segment 13.05, as well as migration routes documented by the Wyoming Game and Fish Department.

Alcohol Related Crashes

The percentage of alcohol related crashes is at or below the system average with the exception of one segment in the Gillette area of urban influence. Segment 13.06, an 8.3 mile segment, had an alcohol related crash rating above the system average. The crash locations were not concentrated in any particular area.

Non-use of Safety Restraint

The ratio of crashes in which a restraint device was not worn to total crashes is at or below the system average. Every segment within SSC 13 is within the 48.6% to 63.5% range. The system average is 63.07%.

Horizontal Geometry Insufficiency

Several horizontal alignments were found to be insufficient based on the associated posted speed and an assumed emax of 8%. Segments 13.04, 13.05, 13.06 and 13.08 has the most insufficient horizontal alignments within the segment. Further study will need to take place to determine specific needs of each alignment and the constraints to which it was designed and built.

Following is a summary of locations where a horizontal insufficiency corresponded to a crash. The data is not clear if the crash was directly related to geometry. However, locations with several accidents should be further studied. Table 4 summarizes locations of insufficient curves with more than one crash in near vicinity within the 5 year accident analysis period.

Table 4 - Horizontal Geometry Insufficiency

Segment	ML Route	Route Marker	# of Crashes
13.04	ML90D	30.51	5
13.04	ML901	30.50	2
13.05	ML901	56.78	4
13.06	ML90D	128.52	5
13.06	ML901	128.52	5
13.08	ML90D	172.13	17
13.08	ML90D	185.06	19
13.08	ML901	172.13	10
13.08	ML901	185.06	3

Vertical Geometry Insufficiency

Several vertical alignments were found to be insufficient based on the associated posted speed and the length of the curve for stopping sight distance. Segment 13.02 has the most insufficient vertical alignments within the corridor. Further study will need to take place to determine specific needs of each alignment and the constraints to which it was designed and built.

Table 5 summarizes locations where a vertical profile corresponded to a crash. The data is not clear if the crash was directly related to the geometry. However, locations with several crashes should be further studied. The table summarizes locations of insufficient profiles with more than one crash in the near vicinity within the 5 year crash analysis.

Table F. Vartical Coomatry Incufficiana

Table 5 - Vertica	i Geometry insumci	ency		
Segment	ML Route	Route Marker	Curve Type	# of Crashe
13.02	ML90D	11.24	CREST	2
13.02	ML90D	15.15	SAG	4
13.02	ML90I	11.26	CREST	7
13.02	ML901	15.15	SAG	4
13.02	ML901	15.37	CREST	4
13.05	ML90D	73.08	SAG	4
13.05	ML90D	99.03	SAG	2
13.05	ML90D	101.98	SAG	4
13.05	ML90D	119.15	SAG	2
13.05	ML90I	73.07	SAG	6
13.05	ML90I	117.97	SAG	3
13.07	ML90D	135.52	CREST	2
13.07	ML90D	146.96	CREST	2
13.07	ML90I	152.32	SAG	2
13.08	ML90D	155.94	SAG	3
13.08	ML90I	155.94	SAG	4
13.09	ML90D	193.17	CREST	3
13.09	ML90D	198.15	CREST	2
13.09	ML901	198.15	CREST	3

Crash Concentrations

Crash concentrations are identified by locating spatially significant clusters of individual crash events that are of a similar severity level. The concentrations fall into one of two severity types: Critical, which consists of only "Critical" level crashes; and Other, which consists of "Severe" and "Damage" level crashes.

There are eight Critical concentrations on Corridor 13, which are listed in Table 6. Additionally, there is one Other type concentration. Segments 13.01, 13.07 and 13.08 exhibit the most crash concentrations with 6 Critical concentrations, which occur between RM 1.1 and 1.6, RM 8.8 and 9, RM 147.4 and 147.7, RM 149 and 149.3, RM 156.7 and 157, RM 178.7 and 179.3, respectfully. Segment 13.03 has one Other type concentrations between, resulting primarily from Damage level crashes.

Table 6 - Critical Crash Concentrations

Sogmont	ML Pouto	Route	Marker
Segment		From	То
13.01	ML90	1.1	1.6
13.01	ML90	8.8	9
13.04	ML90	46.2	46.7
13.06	ML90	126.7	127
13.07	ML90	147.4	147.7
13.07	ML90	149	149.3
13.08	ML90	156.7	157
13.08	MI 90	178 7	179.3



NOTE: See Appendix for maps documenting each performance qualifier.





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STEP 2: ANALYSIS OF INVESTMENT CATEGORY NEEDS - MOBILITY



Performance Index

The Mobility Performance Index for SSC 13 ranges from better than average to worse than average. Segments rated worse than average include 13.03 and 13.06.

	MOBILITY								
Segment	Mobility Index	Volume to Capacity Rating	Pavement Variance Rating (L/R)	Traffic Growth	Truck Traffic Growth	Bridge Variance (L/R)			
13.01	Better	Good	Fair	More	More	Less			
13.02	Better	Good	Good	Average	More	Less			
13.03	Worse	Good	Fair	Average	More	Average			
13.04	Average	Good	Good	More	More	More			
13.05	Average	Good	Good	More	More	Average			
13.06	Worse	Good	Fair	More	More	Average			
13.07	Average	Good	Fair	Average	Average	Average			
13.08	Better	Good	Good	More	More	Less			
13.09	Average	Good	Good	More	More	Less			

Three regional routes connect to SSC 13. The condition of each local and regional route is associated with a planning segment and directly influences the mobility of that segment. The condition of several connecting local and regional routes is poor. There are currently 13 structurally deficient bridges on the local and regional routes.

Interstate 90 (SSC 13) is a high speed, multilane transportation facility and part of the interstate system critical to the delivery of goods and services. Shoulder widths are typically 10' with some rumble strips. Most of this corridor has moderate to high volumes.

Table 7 - Major Traffic Generators

Major Traffic Generators
Interstate commercial trucks
Employment centers - Sheridan, Buffalo, Gillette
Energy industry truck traffic - gas/oil/wind
Energy industry center - Gillette
Power plants - Powder River Basin
Agricultural center - Buffalo
Tourism destinations - Sheridan, Buffalo, Devil's Tower National Monument (Sundance), Keyhole State Park & Reservoir (Moorcroft), Deadwood/Black Hills (South Dakota)
Dispersed local/regional recreation on public lands (Bighorn National Forest)

Performance Oualifiers

Volume to Capacity Rating

Volume to Capacity Ratio (V/C) is a measure that reflects mobility and quality of travel of a corridor or section of a corridor. It compares roadway demand (vehicle volumes) with roadway supply (carrying capacity). The volume to capacity rating for the entire SSC 13 is good.

Traffic Growth

The average traffic growth within the SSC System is 1.42%. All segments within Corridor 13 are above this average. Segment 13.08 has the highest average annual traffic growth rate. This segment connects Moorcroft to the western limits of Sundance on ML90.

Table 8 - Traffic Growth

Segment	AADT 2010	Average 20 Year Growth
13.01	3,819	1.95%
13.02	7,261	1.84%
13.03	8,080	1.86%
13.04	7,079	1.88%
13.05	3,838	2.28%
13.06	7,425	2.02%
13.07	7,548	1.76%
13.08	4,058	2.37%
13.09	5,252	2.13%

Truck Traffic Growth

The average truck traffic growth within the SSC System is 1.34%. All segments of SSC 13 are above this average. The majority of the corridor is a inter-rural roadway classification. Segment 13.05 has the highest average annual truck growth rate. This segment is from Buffalo via ML 90 east of Gillette.

Table 9 - Truck Traffic Growth

Segment	AADTT 2010	% Trucks 2010	Truck Traffic Growth
13.01	945	24.78%	2.57%
13.02	1,129	15.60%	2.28%
13.03	1,326	16.75%	2.18%
13.04	1,268	17.89%	2.36%
13.05	697	18.15%	2.62%
13.06	823	11.32%	2.23%
13.07	1,003	13.11%	1.79%
13.08	792	19.52%	2.55%
13.09	872	16.60%	2.16%

Local and Regional Roads

Local and Regional Routes that connect to the SSC affect the Mobility Performance Indicator. These routes serve the important function of connecting rural areas to the primary routes. While traffic volumes are typically low on these secondary routes, maintaining them in acceptable condition is important to general mobility for the state. This analysis includes pavement and bridge condition as qualifiers.

Local and Regional Roads Impacting Pavement Variance Rating (L/R)

The Mobility Index may be affected by local and regional routes that have poor pavement condition as reflected by the Pavement Variance Rating (PVR). The PVR is the product of Pavement Sufficiency Rating (PSR) calculated as the deviation from the system average. Poor PSR is reported on local/regional routes associated with segment 13.07. Table 10 lists the local/regional routes with poor PSR.

Table 10 - Local/Regional Routes with Poor PSR

	Segment Average PVR	ML Douto	Route Marker		Average DSD	
		Average FVIX	ML Route	Begin	End	Average FSR
	13.07	1.01	ML113	10.00	15.59	2.24
	13.07	0.84	ML303	126.25	152.88	2.43
	13.07	1.43	ML602	0.00	0.59	1.82

Bridge Variance Rating (L/R)

The bridge variance rating for local and regional routes on SSC 13 shows 14 structurally deficient bridges. The locations of the bridges are shown in the table below.

Table 11 - SSC 13 Strue

Segment	ML Route	Route Marker
13.03	ML60	24.31
13.03	ML60	29.68
13.03	ML302	69.58
13.03	ML302	80.04
13.03	ML302	88.03
13.03	ML302	96.14
13.03	ML302	100.4
13.04	ML1003	99.65
13.04	ML1003	100.13
13.05	ML59	300.42
13.06	ML43	123.87
13.06	ML43	150.89
13.07	ML303	136.4
13.07	ML303	142.29

NOTE: See Appendix for maps documenting each performance qualifier.





cturally Deficient	Bridges on	Local/Regional	Routes
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Environmental Overview

The Wyoming Interagency Spatial Database and Online Management System (WISDOM) was queried to identify natural resources that could be impacted by transportation projects. The following summary lists the general type of potentially impacted resources. The project development phase should investigate these resources in more detail to determine if mitigation activities are required. Please see Appendix and http://wisdom.wygisc.org/ for detailed information.

There are nine different terrestrial habitat types located throughout the eight special management areas within SSC 13. Three federally listed species within the corridor fall into one of three categories, candidate, endangered, and threatened. Three big game species and seventeen raptor species are found in SSC 13. There are three different categories that fall under the aquatic habitat. There are eighteen watersheds, four aquatic crucial priority areas, and two aquatic enhancement priority areas. See Table 12 for general locations.

Table 12 - Environmental Considerations

Category	WEST (North State Line - Buffalo)	CENTRAL (Buffalo - Gillette)	EAST (Gillette - East State Line)
Big Game Crucial Range	na	na	White-tailed Deer
Big Game Migration Route	Pronghorn Antelope	Pronghorn Antelope	Elk White-tailed Deer
WGFD Aquatic Crucial Priority Areas SHP	Foothills to Prairie Stream & Riparian Corridors Prairie Stream & Riparian Corridors	Foothills to Prairie Stream & Riparian Corridors Prairie Stream & Riparian Corridors	Black Hills Aspen & Riparian Corridors Class 1 High Productivity Sport Fisheries
WGFD Terrestrial Crucial Priority Areas SHP	Deciduous Woodlands in the Sheridan Area & along the Little Missouri River Powder-Tongue Rivers & Tributaries Cottonwood- Willow Riparian Ecosystem	Powder-Tongue Rivers & Tributaries Cottonwood- Willow Riparian Ecosystem Sagebrush-Mixed Grass Habitats within Major Sage-Grouse Complexes	North Black Hills Sagebrush-Mixed Grass Habitats within Major Sage- Grouse Complexes South Black Hills
WGFD Combined Crucial Priority Areas SHP	na	na	na
Occurrence & Distribution (Federally Listed Species)	Greater Sage Grouse Yellow-billed Cuckoo	Gray Wolf Greater Sage Grouse Yellow-billed Cuckoo	Greater Sage Grouse Yellow-billed Cuckoo



Summary of Needs

This section summarizes needs by planning segment for each of the three performance indicators and the supporting performance qualifiers. The summary identifies overlapping needs, which provides guidance in the efficient prioritization of projects to best address deficiencies. The practice of completing projects that simultaneously address multiple needs may present cost savings as well as being most effective in improving performance indexes across the system. The summary also lists other needs in each of the three performance measurement areas. For more information about needs at the corridor level, see the maps in the appendix which compare both system level and corridor level needs.

SSC 13 needs occur in all three Performance Indexes. Within System Preservation, four segments are reported with pavement needs, 55 structurally deficient bridges, many of which are minor structures. Within Safety, weather and wildlife related crashes are prevalent. Eight areas of critical crash concentrations occur on the corridor. Within Mobility, traffic and truck traffic growth are characteristic, along with 14 structurally deficient bridges on local/regional routes.

Several big game migration routes for Mule Deer, Elk, and Pronghorn Antelope intersect parts of the corridor and should be investigated for concurrence with wildlife related crashes. The Wyoming Game and Fish Department documents several Terrestrial and Aquatic Crucial Priority Areas along the corridor. Several federally listed endangered species are found in the corridor and should be considered in all project planning.

Based on the needs identified in this analysis and the recommended strategies and solution sets, this plan does not identify specific needs to preserve or acquire additional rights of way to accommodate improvements. WYDOT owns sufficient right of way for the Interstate highway mainline for the foreseeable future. However, due to increasing traffic and truck volumes, interchange improvements or additions could be required in some locations. This plan does not identify specific future interchange locations. However, if such projects are planned, additional right of way may be required in some cases. Interchange locations in the cities along the route would need to be coordinated with local planning processes.

Overlapping Needs

Overlapping needs are identified on all segments:

- 1 13.01 SYSTEM PRESERVATION/SAFETY/MOBILITY: Pavement Maintenance Requirement, Bridge Variance Rating, Weather Related Crashes, Crash Concentrations, Traffic Growth, Truck Traffic Growth
- (2) 13.02 SYSTEM PRESERVATION/SAFETY/MOBILITY: Pavement Hotspot, Bridge Variance Rating, Wildlife Related Crashes, Crashes on Deficient Curves, Truck Traffic Growth
- 3 13.03 - SAFETY/MOBILITY: Wildlife Related Crashes, Truck Traffic Growth
- 13.04 SAFETY/MOBILITY: Weather Related Crashes, Crash Concentrations, 4 Traffic Growth, Truck Traffic Growth
- **5** 13.05 SYSTEM PRESERVATION/SAFETY/MOBILITY: Bridge Variance Rating, Weather Related Crashes, Crash Concentrations, Traffic Growth, Truck Traffic Growth
- 6 13.06 SYSTEM PRESERVATION/SAFETY/MOBILITY: Pavement Maintenance Requirement, Bridge Variance Rating, Weather Related Crashes, Crash Concentrations, Traffic Growth, Truck Traffic Growth
- **13.07 SYSTEM PRESERVATION/SAFETY:** Pavement Maintenance Requirement, Bridge Variance Rating, Crash Concentrations
- (8) 13.08 SYSTEM PRESERVATION/SAFETY/MOBILITY: Pavement Maintenance Requirement, Bridge Variance Rating, Weather Related Crashes, Crash Concentrations, Traffic Growth, Truck Traffic Growth
- 9 13.09 SYSTEM PRESERVATION/MOBILITY: Bridge Variance Rating, Weather Related Crashes, Traffic Growth, Truck Traffic Growth

Other Performance Index Needs

System Preservation

- 10 13.03 Bridge Variance Rating/Structurally Deficient Bridge
- 11 13.04 Bridge Variance Rating/Structurally Deficient Bridge

Mobility

- 12 13.03 - Bridge Variance Rating/Structurally Deficient Bridge (L/R)
- 13 13.04 Bridge Variance Rating/Structurally Deficient Bridge (L/R)
- 14 13.05 Bridge Variance Rating/Structurally Deficient Bridge (L/R)
- 15 13.06 Bridge Variance Rating/Structurally Deficient Bridge (L/R)
- 16 13.07 - Bridge Variance Rating/Structurally Deficient Bridge (L/R)

III. SOLUTION SETS

A solutions menu was created to address the needs identified in the previous sections. This menu identifies potential solution strategies grouped by performance measure categories. The strategies are a preliminary list based on industry accepted approaches and the efforts to date of WYDOT programs to document preferred approaches. This list is not intended to be all-inclusive, but represents types of improvements that may be employed to address documented needs.

Section IV recommends how the solution sets may be efficiently grouped depending on funding availability.

Table 13 - Recommended Solution Sets to Improve Performance in Each Index

System Preservation	Safety		
 Pavement Maintenance Requirement & Pavement Variance Rating Rutting Mill Mill and overlay 1S Treatments Mill and overlay Seal Coat Cleaning and sealing joints Patching pavement Micro surfacing 2S Treatments Roadway Restoration 3S Treatments Reconstruct Roadway Roadway widening Upgrade geometric design Bridge Variance Rating Bridge Replacement Channel reconstruction Cleaning and sealing bridge members Lower weight limits Restore drainage systems Scour countermeasures 	Weather Related Signage Automated anti-icing systems Grooved pavement ITS Larger signs Snow berms/grading Snow fencing Warning beacons Wildlife Related Animal detection systems Animal jump-out or one-way gates ITS Remove brush from ROW Signage Warning beacons Wildlife bridge/underpass Wildlife fencing Alcohol Related Centerline rumble strips ITS Law Enforcement Media campaign Shoulder rumble strips	Horizontal Geometry Centerline rumble strips Dynamic curve warning system Guardrail Improve/restore superelevation Lighting Oversize/length restrictions Reconstruction/realignment Reduce posted speed Reflectors Shoulder rumble strips Signage Warning beacons <i>Vertical Geometry</i> Larger signs Reconstruction/realignment Reduce posted speed Reflectors Signage Warning beacons <i>Safety Restraints</i> ITS Law Enforcement Media campaign	Volume to of Traffic Grow Accelera Capacity Decelera Increase Intersect improver Multimoo Passing Shoulder Through Turn land Bridge Vari Bridge R Channel Cleaning membera Lower al bridge Restore Scour co

CORRIDOR 13

Mobility

Capacity Rating & wth / Truck Traffic Growth ation lane y improvements ation lane e lane width tion/interchange ments dal improvements lanes r widening lanes

iance (L/R) Replacement I reconstruction g and sealing bridge 's Ilowable weight limits on

drainage systems ountermeasures Pavement Variance Rating (L/R)

Rutting Mill Mill and overlay

1S Treatments Cleaning and sealing joints Micro surfacing Mill and overlay Patching pavement Seal Coat

2S Treatments Roadway Restoration

3S Treatments Reconstruct Roadway Roadway widening Upgrade geometric design SOLUTION SETS

IV. RECOMMENDATIONS

This section describes recommendations for strategies and priorities to address corridor needs. The selected strategies address the needs described in previous sections and are organized by the three strategic performance areas: System Preservation, Safety, and Mobility. These recommendations provide information and guidance consistent with the Strategic and Long Range Plans to help WYDOT select projects in coordination with the STIP process.

The recommended strategies have been packaged into solution sets that recognize the inherent overlap that investments may have across performance areas. For example, an intersection improvement may simultaneously improve traffic flow (Mobility) and reduce crashes (Safety).

The solution sets are tiered to the three Funding Scenarios identified in the Long Range Transportation Plan. The funding scenarios describe a progressively increasing budget, with generally defined allocations to System Preservation, Safety, and Mobility. With each succeeding level of investment, additional funding is allocated to address shortfalls in performance-based goals.

- Funding Scenario 1 The continuation of program funding at current levels. Most funding is directed to System Preservation needs. System characteristics are expected to decline with inflation and increasing construction costs over time. Few major projects to address Safety, other than with specially restricted and allocated funds, or Mobility would be implemented.
- Funding Scenario 2 Funding over and above the base level would allow additional investments in pavement and bridge projects to meet WYDOT goals.
- Funding Scenario 3 Additional funding over and above Scenario 2 would allow WYDOT to maintain and improve existing conditions, achieve pavement and bridge condition goals, plus invest in major projects to improve Mobility.

Funding Scenario 1

Funding Scenario 1, defined as the continuation of current program funding, is focused primarily on addressing System Preservation needs through preventive maintenance efforts. For this corridor, the plan recommends that these funds remain allocated to preventive maintenance, along with reserving a portion to address identified safety needs. The growing traffic and truck traffic volumes, while not generally requiring capacity improvements, do require systematic pavement treatments in order to stay ahead of the pavement lifecycle curve. Less expensive treatments on a regular schedule, delay the need indefinitely for more expensive reconstruction. The corridor also has significant needs in the bridge area. Bridge maintenance or rehabilitation should be timed to coincide with pavement treatments, to the extent possible.

Safety needs are most apparent in the category of weather and wildlife related crashes. Eight specific areas of crash concentrations are also observed and may be treated in conjunction with weather and wildlife crash types. WYDOT should consider a targeted effort such as a media campaign and expanded ITS-related information systems to address these issues.

These needs may be only partially met under current funding. Additional needs that cannot be met under Scenario 1 may be delayed pending additional funds under Scenarios 2 or 3.

- Surface treatments on the SSC mainline, including mill and overlay.
- Bridge rehabilitation and replacement of structurally deficient bridges on the SSC mainline.

for Long Range Plan Funding Scenarios **Funding Scenario 3** Improve the System **Funding Scenario 2** Preserve the Investment **Funding Scenario 1** Bridge Rehab/Reconstruction Pavement Rehabilitation (2S) Current Trend (SSC) 12678 1256789 Preventative Maintenance (1S) 12678 Preventive Maintenance (1S) Geometric Curve Deficiency Pavement Rehabilitation (2S) 12678 Signage 2 12678 Lighting

12345689

Weather and Wildlife

Media Campaigns

Related Crashes

Pavement Rehab

(L/R) (2S) (4)

Signage

 Safety campaign to reduce number of weather-related crashes and increase the use of safety restraints.

Funding Scenario 2

Table 14 - SSC 13 Recommended Strategies

Bridge Rehab/Replacement (SSC)

Weather and Wildlife Related Crashes

12345689

1256789

Media Campaigns

Pavement Maintenance (L/R)

Bridge Maintenance (L/R)

10 11 12 13 14 15 16

Signage

If sufficient funds to preserve the system in at least its current operational form are made available, WYDOT will direct funding to strengthen pavement and bridge conditions across the system, including on local and regional routes. The corridor has significant bridge rehabilitation needs on local and regional routes. This scenario would allow investments to fully achieve WYDOT goals in the System Preservation investment category. Expansion of safety programs to reduce the number and severity of crashes related to weather and wildlife should be considered, especially in areas of crash concentrations as identified in this corridor plan.

- Preventive maintenance could be deferred and/or advanced. depending on life cycle, as recommended by the Pavement Management System.
- Reconstruction (2S) to address geometric insufficiencies on the SSC mainline.
- Improvement of pavement condition of Local and Regional Routes, to include preventive maintenance or mill and overlay.
- Bridge rehabilitation on local and regional routes.
- · Safety program expansion to address weather wildlife related crashes.

construction.

4 10 11 12 13 14 15 16

12456789

Crash Concentrations

Reflectors/Signage

Warning Beacons

Reconstruction (L/R)

Bridge Rehab/

Reduce Posted Speeds

LEGEND

Funding Scenario 3

If additional funds are made available to WYDOT under Funding Scenario 3, opportunities would be created to address all three investment categories, thus preserving the investment and improving the overall "health" of the system. Additional funds allow project selection to address overlapping needs, therefore investing funds most effectively. The additional funds would expand to include other items to improve performance in the Mobility Index.

- deficiencies.

Performance Measurement over Time

As these performance measures are continually monitored over time it will become evident how the recommended solution strategies and the selected projects address the needs of the corridor and the overall system. Addressing deficiencies documented in the corridor plan will effectively improve the System Preservation, Safety, and Mobility indexes at both the corridor and system level.

Ongoing performance measure documentation is critical to identify trends, capture the existing health of the system, and allowing an accurate forecast of the future health of Wyoming's Transportation system. The need for additional funding and/or more aggressive solutions will become evident if performance measures fail to meet WYDOT goals.



• Projects to reduce the number of crashes at curves with a geometric deficiency, not involving major

Roadway reconstruction (3S) to meet long term goals, including correction of geometric

 Interchange improvements to improve safety and traffic flow in high volume areas. Improvement of pavement condition of Local and Regional Routes, to include reconstruction (3S).

REALIZING THE CORRIDOR VISION

As part of the statewide Wyoming Connects and Long Range Transportation Plan, the Corridor Vision for SSC 13 - and all SSCs - focuses on the identification of overall system performance aggregated from the evaluations of each individual corridor's "health" relative to WYDOT's long-term Strategic Goals. The identified types of investment needs (system preservation, safety, and mobility) expressed in the Corridor Vision are reflected in the three primary need indicators of this Corridor Plan. The analysis of each investment type generated goals representing corridor health issues as communicated by the planning and public process used in development of the Vision. See *Wyoming Connects: Corridor Visions* for more information.

Corridor Vision Goals

The Sheridan to Sundance Corridor Vision captured Key Issues and Emerging Trends of critical importance and how SSC 13 could best serve the communities it connects over the long term. While issues were identified relative to each investment type, the Primary Investment Type is Mobility, Safety, and System Preservation:



Needs on this corridor include all types – mobility, safety, and system preservation. Safety conditions, roadway geometries, shoulders, sight distances, auxiliary lanes, and pavement conditions should be further analyzed to determine where and what investments are appropriate. Other mobility improvements, including ITS applications and public transportation or TDM strategies could help improve the corridor Plans should include the rehabilitation and replacement of deficient bridges.

Additional goals which reflect the full context, character, and issues of SSC 13 were set as high priority goals as indicated in Table 15. A review of these Vision Goals compared to the findings of this Corridor Plan provides for a conformance check and identifies additional issues to be considered when evaluating potential projects and implementation plans. Table 15 - Review of Corridor Vision Goals and Other Considerations

	Corridor Visions		
Investment Category	Goal	High Priority	
	Accommodate growth in truck freight transport	~	High truck growth rate weather information sy
System Preservation	Preserve the existing transportation system		On-going pavement tre traffic and truck traffic rehabilitation.
	Promote intergovernmental coordination		Communities along the
Safety	Reduce fatalities, injuries, and property damage crash rates	~	Corridor Plan identifies corridor, along with se
	Maintain statewide transportation connections	~	I-90 is a key interstate Operating conditions of
Mobility	Ensure airport facilities meets existing and future demands		Primary airports in She connections to regiona
	Improve public transportation opportunities		Local transit improvem for local residents. I-25

CORRIDOR PERFORMANCE

Table 16 shows SSC 13 corridor performance compared to the system. The center of each chart indicates the value of the performance index, with each section indicating the performance qualifier for each measure.

Table 16 - Corridor Performance



Coordination with System Priorities

The corridor comparison can be used to help assign a priority level to entire corridors, if conditions warrant. The Corridor Plans – Executive Summary is published under separate cover and provides an overview of corridor comparisons. The summary identifies areas of greatest need within all performance indexes and for performance qualifiers across the state system. By addressing these areas of greatest need, whether by program, corridor, or corridor segment WYDOT will ensure positive changes in reported conditions throughout Wyoming.

Dashboard from Corridor Visions





THE

CORRIDOR

VISION

Other Considerations

s indicate the need to support the industry, especially with respect to ystems.

eatments required to maintain conditions resulting from growing volumes. Several structurally deficient bridges identified for

e corridor depend on I-90 as a principal intra-regional route.

s weather and wildlife related crashes as problematic throughout the veral specific geometric deficiencies.

connection between I-25, I-80, to Montana and South Dakota. on interstate highways are expected to be superior.

eridan and Gillette provide assistance to local business and al airports.

nents in Sheridan, Buffalo, and Gillette would help improve mobility 5 is a key intercity bus route.