Wyoming Department of

Transportation



Risk and Resiliency Plan for Critical Tourism Transportation Assets



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Wyoming Department of Transportation Risk and Resilience Plan for Tourism

Wyoming Department of Transportation Risk and Resiliency Plan for Tourism

The Federal Highway Administration (FHWA) requires risk and resiliency planning for all State Transportation Asset Management Plans (TAMP). They require only pavement and bridge analyses, leaving states to decide which other assets and performance areas to assess. This document provides an overview of risk and resilience for the highest use tourism routes on Wyoming Department of Transportation (WYDOT) roads.

In the past, risk and resiliency were informally addressed on WYDOT roads. The process usually depended on staffs' knowledge of the condition of roads and the history of extreme events to assess the level of risk and determine the most suitable solutions. This method doesn't formally address potentially lower cost, more effective proactive measures, and relied on the memory of staff that often retired, thus losing that all important information.

Figure 1 outlines the WYDOT Tourism Risk and Resiliency Plan. It provides the analytical steps and processes to establish critical infrastructure, identify the highest potential risks on critical facilities, estimate the potential cost of each risk, develop prospective mitigation actions, identify processes to create resiliency associated with each risk, and determine future actions to improve the process. WYDOT has not applied all the steps in the process, but is currently enacting an interim process using most of these steps.

The "Discrete Options for Resiliency" portion of Figure 1 is derived from the "Resilience in Transportation Planning, Engineering, Management, Policy, and Administration", NCHRP Project 20-05, Synthesis Topic 48-13 report written by The National Academies Press and was obtained from the US Department of Homeland Security.





¹ Description available in Table 1: Resiliency Activity Options

² Description available in Table 2: Q & A for Each Resiliency Activity Option

How WYDOT Establishes Critical Tourism Infrastructure

WYDOT's first step in performing resiliency analysis on the State's tourism routes is to identify all critical tourism infrastructure owned by the State. While not all tourism infrastructure is owned and/or under control of the State, there is still value in being aware of its potential risks of disruption to WYDOT assets. WYDOT assesses infrastructure that is not under WYDOT control only to the level necessary to determine its potential effects on WYDOT owned infrastructure if disruptions were to occur on such facilities.

Tourism Infrastructure Types

WYDOT evaluates highways, and air service to a lesser extent, in its tourism resiliency planning. Critical portions of the system and individual assets are identified to reduce the process to manageable levels and focus on facilities where the consequences of failure are most extreme. WYDOT incorporates the condition and performance of assets in its decisions to determine the assets' criticality since a facility in poor condition generally has a much higher chance of failure than a facility in good condition. WYDOT will re-analyze the criticality of these infrastructure assets on a fairly regular basis since infrastructure and performance conditions can change over time.

Lower rated assets are removed from further analysis to reduce the list to the most serious potential problem areas and make the risk and resilience analysis process more manageable. Given the variability of potential risks and the unlikely chance that quantifiable data is available for each, qualitative- and quantitative-based criticality ratings are applied.

This report applies quantifiable measures when readily available and qualitative methods where adequate data is not available to establish asset criticality. The following criteria are used in the analysis to establish these "critical facilities":

- What is the approximate annual tourism dollars received in the county that that can be attributed to the facility?
- How many jobs does tourism provide to the county that that can be attributed to the facility?
- Is the facility on the National Highway System?

Table 1 shows each of the applied criteria along with weightings and the methods used to determine the value of each when applied to specific tourism assets. The resulting criticality index for each facility is a weighted calculation on a scale of 1 to 10. Their weightings are based on their estimated contribution to the overall criticality on significant tourism routes.

Primary Facility Criterion	Scoring Method	Weighting
What are the approximate annual tourism	Percentage of the facility's AADT to all NHS AADT in	10
dollars received in the county that that can be	the county times the annual tourism dollars	10
attributed to the facility?	received by the county.	
How many jobs does tourism provide to the	Percentage of the facility's AADT to all NHS AADT in	10
county that that can be attributed to the	the county times the annual tourism jobs in the	10
facility?	county.	
Is the facility on the National Highway System?	Yes: the facility is included in the analysis	
	No: the facility is removed from the analysis	

 Table 1: Scoring and Weighting Methods for Primary Critical Assets

Tourism dollars and jobs are from "Wyoming Travel Impacts: 2004 - 2017", Wyoming Office of Tourism,

 $\underline{https://www.travelwyoming.com/sites/default/files/uploads/industry/State\%20and\%20County\%20Economic\%20Impact\%20Report\%202017.pdf$

A limited number of all the analyzed facilities within WYDOT's control are deemed critical facilities and are forwarded for risk analysis. Alternate routes are assessed for their ability to provide relief in the event of a disruption and determine the intensity of the disruption. Facilities with no or poorly performing alternate routes should receive a higher risk rating than those that have better alternate routes.

A written discussion regarding the scoring, issues, and other comments is captured for each of the selected critical facilities that exhibit high risk factors. These discussions serve as potential guidance when disruptions occur and will be used to revised future updates to these analysis procedures.

How WYDOT Identifies High Risk Critical Tourism Infrastructure in Wyoming

The risk analysis estimates the probability and likely impact of the occurrence of the identified risk. WYDOT eliminates lower risk critical assets from further analysis to reduce their numbers to manageable levels. Risk analysis provides the necessary information to make the needed reductions.

Potentially high risk assets are more easily recognized and analyzed by grouping them into mode and geographical extent categories. Risks at state-wide and regional levels are often a different priority and a different nature than at a localized level. For example, a bridge may be at high risk for flood damage, but at a system-wide level the average risk of flood damage may be negligible. There would be little value to prioritize all bridges in the state as high priority because only one location is at high risk.

Each critical tourism facility that is under WYDOT control is assessed for probability and consequence of potential risks. WYDOT may use the following potential disrupting events in the risk analysis:

1. Funding shortfalls reducing WYDOT budget

- 2. Unexpected rapid construction and maintenance cost increases
- 3. Disruption in construction material supplies
- 4. Sudden deterioration of assets
- 5. Shift in internal or external regulations, policies or priorities
- 6. Severe winter weather
- 7. Severe flooding
- 8. Regionalized wildfires
- 9. Technology failures
- 10. Acts of terror
- 11. Shifts in the economic trends within the State
- 12. Sudden increase demand exceeding roadway capacity
- 13. Seismic activity
- 14. Crashes, bridge strikes, damage to infrastructure
- 15. Significant project delays
- 16. Environmental issues
- 17. Utility caused disruptions
- 18. Events that attract inordinate traffic volumes

Some of the potential risks identified above do not reach the high risk level to be further analyzed. Also, WYDOT may not have enough data to adequately evaluate some of these risks.

The Risk Analysis Process

WYDOT compares the list of potential risks to each facility to see if the risk is applicable and is significant enough to assume the possibility that such events might occur on that facility in the future. Only "High" risks are analyzed.

After risks are established for each facility, WYDOT collects any applicable data to analyze the risks for the normal and forecast conditions associated with the disruptions they may cause. One or more levels of disruption per risk type may be assessed for a single facility and the facility may therefore receive multiple risk ratings. Table 2 shows the measures, risk criteria, and risk scoring measures used in the analysis.

Measure	Probability Criteria	Consequence	Measure Scoring	Risk Measures
		Criteria		
Bridge Strikes	Bridge strikes since 1994	AADT on the route carried by the bridge(s)	NA	Probability and consequence use a range of 1 to 5 based on percentile ranking.
Flood Damage to Bridges	 Flood event capacity Streamflow variability Scour critical PM2 condition score County flood frequency score 	 County flood consequence score Detour delay score Deck area score 	Weightings 1) Flood event capacity: 10 2) Streamflow variability: 5 3) Scour: 10 4) PM2 score: 3 5) County flood frequency: 4 6) County flood consequence: 3 7) Detour delay: 10 8) Deck Area: 3	Probability and consequence use a range of 1 to 5 based on percentile ranking.
Winter Weather	 Closure frequency Non-closure winter weather delay (from travel time data) converted to frequency equivalent 	 Closure duration Non-closure delay costs (derived from travel time data) 	Probability measures for non-closure delay were converted to equivalent hours of closure and summed with hours of closure. Consequence measures were converted to costs of traffic delay and summed.	Probability and consequence use a range of 1 to 5 based on percentile ranking.
Non- attainment Area Creation Risk by County	WY DEQ monitoring data for: 1) PM 10 2) PM 2.5 3) Nitrous oxide 4) Ozone	1) County population	For probability calculated the most current level of pollutants compared to exceedance levels using the highest readings of each site within the county.	Probability and consequence use a range of 1 to 5 based on percentile ranking
Non- attainment Area Creation Risk by Critical Road Segments	 Average pollutant level (see above) for each pollutant. Maximum pollutant level (see above) for each pollutant. Total delay for each road segment (see "Winter Weather" section). 	1) County population	 For probability: calculated the percentile ranking for each measure into percentages. averaged the pollutant level percentiles then averaged the result with the delay measure percentiles. 	Probability and consequence use a range of 1 to 5 based on percentile ranking

Table 2: Risk And	alysis Scoring	Schema for	Establishing Risk	"Probability"	and "Consequence"
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The probability of a disruptive event may be based upon its type, the temporal nature of the event, the location of the affected facility, and a variety of other potential conditions. The probability of a future disruptive event may best be approximated using the history of such events. WYDOT uses this history to apply a probability of the event reoccurring. A value of 1 to 5 is assigned to the facility based on the event type's frequency.

The consequence and probability scores are compared to the matrix in Table 3 to determine whether the risk is low, moderate or high. High risk, critical facilities are forwarded for the development of various resiliency improvement proposals.

Table 3: Risk Determination Matrix

		Consequence								
		1	4	5						
	1	L	L	L	L	М				
ility	2	L	L	М	М	М				
bab	3	L	М	М	H	H				
Prol	4	L	М	н	н	н				
	5	М	М	H	H	H				

Prioritized Critical Highway Tourism Facilities

WYDOT prioritizes each critical asset based on its criticality rating, condition/performance and risk analysis results for inclusion in resiliency planning. WYDOT applies a more thorough and comprehensive resiliency analysis to higher priority assets. The prioritization process combines the risk results, asset condition, and the facilities' criticality ratings. In this case, each variable is equally weighted to calculate a composite priority grade and score. The high ("H") priority locations are more thoroughly assessed in the resiliency analysis.

WYDOT assesses each high priority critical asset for its connectivity to other facilities, its adequacy to provide the desired relief from the extreme event's effects, and its resistance to cascading issues over a wider cross-section of the system. This may include determining whether transferring traffic to another mode is reasonable, improving the facility is cost-effective, and/or establishing operational plans for action during the disrupting event.

The "Discrete Options for Resiliency" table in Figure 1 organizes resiliency processes into resiliency response types or goals, and temporal performance of the processes (event cycle). WYDOT categorizes each goal/event cycle into the potential resiliency improvement types. Descriptions of those resiliency improvement types are shown in Table 4. For each high priority critical asset, each of these improvement types is assessed for applicability as a proposed solution type and against each corresponding question in Table 5.

Resiliency Activity	Description
Harden the System	Improve the condition and resiliency of the asset or corridor to withstand more severe events.
Create Redundancy	Identify or build flexible alternative routes and/or modes.
Operational Solutions	Repair and/or mitigate the undesirable conditions during and after the extreme event.
Planning	Establish advanced decisions and processes to effectively address future risk events. Assess and revise past activities as needed.

Table 4: Resiliency Activity Options

Table 5: Q & A for Each Resiliency Activity Option

Harden System	Create Redundancy	Operational	Planning
		Solutions	
 Where are the weakest points in the facility? What improvements can be made to the facility to resist deterioration during extreme events? How much better will the facility perform during extreme events if the improvement is implemented? Will the improvement last through the life- cycle of the asset? What are the costs and life-cycle costs of the proposed 	 What potential redundant facilities exist? Do we have proper approvals to use the redundant facilities? What event duration is expected? Does the redundant facility provide adequate temporary capacity? Are the redundant facilities structurally capable to handle the proposed traffic for the duration of the event and subsequent remediation? Are there proper plans and infrastructure in place to efficiently use the redundant facility such as communication to users and operators, other agencies, communication to landowners along the route, etc.? Are the proper plans in place to return traffic to the affected facility? Will the use of the redundant 	 Solutions Who should be involved in the operational activities? Who should take the lead? What resources are needed? What event duration is expected? What conditions define "back to normal"? How effectively and efficiently will the operational solution improve conditions during and after the event? Can ITS or other technological solutions be 	 Who should be involved in the planning and decisions associated with the remediation of the event? Who should take the lead? What resources are there available? Which solutions provide the best performance outcome and which provide the most cost-effective outcome? What are the benefits versus costs of each proposed solution? What are the social, economic, and environmental outcomes of each solution? How does each proposed solution compare to all the other solutions? Which solutions provide expected consistency to users? Who should be involved in the
improvement?	facility be overly costly to WYDOT or others?	applied?	planning processes? 11. What criteria should define success or failure?
1. How many people v	vill be affected by the extreme event?	1	1
2. How many and white	ch users will be affected by the extreme e	vent?	
3. What is the history	of this extreme event in this area?		

4. What are social and economic implications of the resiliency decision?

Some of the questions in Table 5 are applicable to more than one resiliency activity option and should therefore be considered for each option.

WYDOT rates multiple proposed solutions for each high risk facility to estimate their comparative performance. Various analysis methods relevant to the risk type are created and performed as part of the process. The highest performing solutions are captured in the resiliency plan. The results of each highest rated solution is combined to assess the estimated cumulative effect of the plan and used to establish improvements to future risk and resilience plan revisions and expansions. Expansion may require seeking out third party data sources and/or developing additional knowledge, information and data in-house.

Resiliency recommendations are provided to project development decision-makers to be included in project development and project selection process. Each potential project is assessed for asset conditions, user needs and resiliency potential.

Critical Highway Tourism Corridors

The corridors shown in Table 6 were selected for criticality analysis based on their estimated contribution to providing tourism dollars and jobs created within their respective counties. Only NHS routes were considered in the analyses.

				Approximate Annual	Approximate Annual
				Tourism Contribution	Number of Tourism
Facility	From RM	To RM	AADT	(million)	Jobs Contributed
Casper Bypass	0	2.9	12,300	\$73.48	660
Greeley Hwy	3.538	8.472	11,576	\$107.07	918
I-25	0	47.153	11,103	\$102.70	881
I-25	47.153	120.814	7,780	\$28.69	296
I-25	120.814	175.11	9,211	\$36.90	378
I-25	175.11	234.85	5,339	\$31.89	286
I-25	234.85	300.261	1,844	\$12.30	146
I-80	0	57.04	12,381	\$91.80	950
I-80	57.04	199.05	13,642	\$114.45	1,078
I-80	199.05	280.9	11,685	\$110.91	995
I-80	280.9	336.61	12,556	\$108.62	1,125
I-80	336.61	402.78	12,388	\$114.58	982
I-90	0	41.96	6,901	\$91.74	888
I-90	41.96	96.02	4,725	\$31.52	373
I-90	96.02	147.45	5,970	\$52.64	502
I-90	147.45	207.14	4,988	\$31.90	360
US 20-26	0	0.087	5,000	\$29.87	268
US 20-26	0.087	2.34	10,623	\$63.46	570
US 20-26	4.518	11.733	8,209	\$49.04	440
US-14	0	37.98	058	\$4.88	55
US-14	37.98	89.95	261	\$16.76	162
US-14/16/20	0	77.74	2,249	\$112.29	1,184

Table 6: Corridors Evaluated for Potential Critical Tourism Corridors

US-14/16/20	77.74	100.75	1,328	\$6.12	70
US-14A	0	33.71	3,023	\$150.93	1,592
US-14A	33.71	43.52	2,171	\$10.01	114
US-16	0	52.47	1,160	\$8.00	86
US-16	52.47	92.12	1,286	\$8.58	102
US-16	200	259.08	1,795	\$9.98	85
US-18/20	0.103	17.4	2,112	\$8.46	87
US-18/20	17.4	40.88	2,081	\$5.19	66
US-191	0	51.62	3,303	\$27.71	261
US-191	51.62	110	2,730	\$24.76	204
US-191	110	154.83	1,812	\$16.44	136
US-191	154.83	163.67	2,300	\$261.73	1,949
US-20	41.39	63.24	646	\$1.61	21
US-20/US-26	0	68.43	3,551	\$21.21	190
US-20/US-26	68.43	100	2,315	\$17.66	191
US-20/WY-789	100	117.28	1,257	\$9.59	103
US-20/WY-789	117.28	147.85	1,294	\$12.77	145
US-20/WY-789	147.85	176.71	1,812	\$12.50	134
US-20/WY-789	176.71	257.026	2,123	\$9.79	111
US-26	0	20.01	2,200	\$8.11	84
US-26	20.01	38.42	2,096	\$5.84	59
US-26	48.3	56.26	5,806	\$16.19	164
US-26/287	0	26.838	1,285	\$146.23	1,089
US-26/287	26.838	133.705	1,770	\$13.50	146
US-26/WY-789	104	127	4,139	\$31.58	341
US-287	0	44	2,789	\$26.47	237
US-287	0	31.6	2,745	\$20.94	226
US-287	0	81.05	1,132	\$8.64	93
US-287	81.05	104	3,892	\$29.69	320
US-30	0	89.31	1,744	\$19.95	184
US-30	89.31	99.672	1,780	\$14.93	141
US-30	235.23	278.98	710	\$6.74	60
US-30	278.98	327.37	799	\$6.91	72
US-30	327.37	425.41	4,943	\$42.76	443
US-85	17.29	56.64	2,384	\$22.05	189
US-85	56.64	139	2,032	\$5.67	57
US-85	139	205.04	2,284	\$5.70	73
US-85	205.04	256.56	1,372	\$7.62	65
US-89	54.93	132.62	3,930	\$44.95	416
US-89	132.62	184.572	6,707	\$763.24	5,683
WY-114	29.57	40.62	1,448	\$72.30	762
WY-120	0	43.1	1,209	\$11.93	135
WY-120	43.1	81.21	1,656	\$82.68	872
WY-220	0	44	2,789	\$26.47	237
WY-220	44	117	4,010	\$23.95	215
WY-59	0	56.51	2,083	\$8.34	85
WY-59	56.51	112.147	6,268	\$55.26	528

WYDOT scored critical tourism corridors using the schema in Table 1. The weightings were set based on the perceived impact of each criterion on the importance of the route.

WYDOT selected the highest scoring 25% of all assessed corridors for risk analysis. These roads consist of just over 750 miles of the NHS in Wyoming. They are shown in Table 7.

Rank	Facility	LRS ID	From RM	To RM	Miles	Score
1	US-89	ML10B	132.62	184.572	51.952	10
2	US-191	ML13B	154.83	163.67	8.84	9.85
3	US-14A	ML29B	0	33.71	33.71	9.7
4	US-26/287	ML30B	0	26.838	26.838	9.405
5	US-14/16/20	ML31B	0	77.74	77.74	9.33
6	I-80	ML80B	57.04	199.05	142.01	9.185
7	I-80	ML80B	280.9	336.61	55.71	9.115
7	I-80	ML80B	336.61	402.78	66.17	9.115
9	I-80	ML80B	199.05	280.9	81.85	8.97
10	Greeley Hwy	ML180B	3.538	8.472	4.934	8.595
11	I-80	ML80B	0	57.04	57.04	8.525
12	I-25	ML25B	0	47.153	47.153	8.375
13	I-90	ML90B	0	41.96	41.96	8.305
14	WY-120	ML33B	43.1	81.21	38.11	8.08
15	WY-114	ML32B	29.57	40.62	11.05	7.865
15	Casper Bypass	ML47B	0	2.9	2.9	7.865
17	US 20-26	ML34B	0.087	2.34	2.253	7.64

 Table 7: The Highest 25% of Critical Tourism Corridors

Risk Analysis and Resiliency Action Plans

The risk analysis estimates the risks to assets based on the probability of a disrupting event and the consequence of the hazard. This process uses the matrix in Table 3 to assign high, medium or low risk levels.

WYDOT created resiliency action plans to prioritize high risk locations. The resiliency action proposals fit into three temporal categories; 1) before the event, 2) during the event, and 3) after the event. They include the activity types shown in Table 4.

Bridge Flooding Resiliency

Bridge Flood Risks

WYDOT performed bridge flooding risk analyses over regional and individual asset scales. Flood risks were estimated using flood histories by county, and were obtained from the *"Wyoming Multi-Hazard Mitigation Plan"* Wyoming Office of Homeland Security, June 2011. WYDOT calculated probability scores using the number of flooding events on the applicable stream since the last dam was built. Consequence scores were estimated per event based on the descriptions of the past flood events. Figure 2 shows a flood risk map created from that analysis.

Figure 2: Map of County Flood Risks



Daily peak stream flows and flood event levels were gathered for individual bridges on the critical tourism routes where adequate USGS stream flow data were available. Annual peak flows were extracted for each bridge location and graphed into flood return interval hydrographs using the Gumbel Distribution method (see <u>https://serc.carleton.edu/hydromodules/steps/166250.html).</u> Flood risks were assessed for the bridges in Table 8.

Table 8: Flood Return Interval and Stream Flow Variability for Significant Bridges on the CriticalTourism Corridors

					Flood Event											
Stream Name	Facility	RM	Bridge ID 1	Bridge ID 2	10-yr	20-yr	30-yr	40-yr	50-yr	60-yr	70-yr	80-yr	90-yr	100-yr	200-yr	% Stream Flow Variability
Crow Creek	I-25	10.37	AAZ	AAY	289	383	438	477	508	532	553	571	587	602	696	108%
Bear River	I-80	5.91	АММ	AML	2753	3291	3606	3829	4003	4144	4264	4368	4459	4541	5079	65%
Blacks Fork	I-80	44.85	ANV	ANU	1199	1496	1670	1794	1890	1968	2034	2091	2142	2187	2485	82%
Blacks Fork	I-80	77.48	AOS	AOR	5084	6389	7152	7694	8114	8457	8748	8999	9221	9419	10724	85%
Green River	I-80	86.38	APA	AOZ	12163	15119	16848	18075	19026	19804	20461	21031	21533	21982	24938	81%
N. Platte	I-80	229	LCQ	AUK	11737	14210	15657	16684	17480	18131	18681	19157	19578	19954	22427	70%
Rock Creek	I-80	258.95	AVD	AVC	1377	1618	1759	1859	1936	1999	2053	2099	2140	2177	2418	58%
Rock Creek	I-80	272.5	AVR	AVQ	1377	1618	1759	1859	1936	1999	2053	2099	2140	2177	2418	58%
Laramie River	I-80	312.44	AXK	AXJ	1757	2165	2405	2574	2706	2814	2904	2983	3053	3115	3524	77%
Crow Creek	I-80	363.87	DCA	DBZ	273	362	415	452	480	504	523	541	556	569	658	108%
Tongue River	I-90	15.01	BBA	BAZ	3293	4075	4532	4856	5108	5313	5487	5637	5770	5889	6670	79%
Goose Creek	I-90	20.59	BBK	BBJ	2094	2587	2876	3081	3240	3370	3480	3575	3659	3734	4228	78%
N Fork Shoshone River	US-14/16/20	2.26	JIM		8535	9868	10648	11202	11631	11981	12278	12535	12761	12964	14297	52%
N Fork Shoshone River	US-14/16/20	15.68	КТВ		8535	9868	10648	11202	11631	11981	12278	12535	12761	12964	14297	52%
N Fork Shoshone River	US-14/16/20	15.83	ктс		8535	9868	10648	11202	11631	11981	12278	12535	12761	12964	14297	52%
N Fork Shoshone River	US-14/16/20	20.31	JJJ		8535	9868	10648	11202	11631	11981	12278	12535	12761	12964	14297	52%
N Fork Shoshone River	US-14/16/20	32	DZU		8535	9868	10648	11202	11631	11981	12278	12535	12761	12964	14297	52%
Shoshone River	US-14/16/20	46.69	BZT		10452	12951	14413	15450	16255	16912	17468	17950	18374	18754	21253	79%
Shoshone River	US-14A	6.52	CAE		8841	10919	12135	12998	13667	14214	14676	15076	15430	15746	17824	78%
Buffalo Fork Creek	US-26/287	3.59	LWC		5385	6327	6879	7270	7574	7822	8031	8213	8373	8516	9459	58%
Snake River	US-89	141.3	MGH		22029	25575	27649	29121	30262	31195	31983	32666	33269	33808	37353	53%
Snake River	US-89	142	BOL		22029	25575	27649	29121	30262	31195	31983	32666	33269	33808	37353	53%
Flat Creek	US-89	146	BON		283	325	349	366	380	391	400	408	415	421	463	49%
Snake River	US-89	146.09	вом		22029	25575	27649	29121	30262	31195	31983	32666	33269	33808	37353	53%
Flat Creek	US-89	152.16	BOO		283	325	349	366	380	391	400	408	415	421	463	49%
Flat Creek	US-89	153.98	BOP		283	325	349	366	380	391	400	408	415	421	463	49%
Flat Creek	US-89	155.12	FFG		283	325	349	366	380	391	400	408	415	421	463	49%
Greybull River	WY-120	51.73	LBB		4097	5059	5622	6021	6331	6584	6798	6983	7147	7293	8255	78%

WYDOT plotted a best-fit logarithmic trend and the resulting trend line equation for each graph. The equation was used to estimate various flood events. The Figure 3 graph is an example of the return interval hydrographs.



Figure 3: Figure 3: Example of a Return Interval Hydrograph

Each variable was weighted according to its assumed potential to measure forecast bridge damage during a flood. Table 9 shows the weightings.

Table 9: Weighting Factors for Bridge Flood Risk Variables

	Probability	Consequence
Designed Bridge Capacity	10	
Stream Flow Variability	5	
Scour Critical Rating	10	
Bridge Condition	3	
County Flood Analysis Probability Rating	4	
Delay on Nearest Detour		10
Bridge Deck Area		3
County Flood Analysis Consequence Rating		3

The following are descriptions of the columns provided in Table 9 (Table 10 shows the comparable scores):

Probability Ratings

- Designed Bridge Capacity: A weighting given to the bridge's design to withstand certain flood events. For example, "the bridge is designed to withstand a 25-year flood event".
- Stream Flow Variability: A percentage measuring how inconsistent the flows of the stream the bridge spans. Typical stream flow data were taken from the time the last upstream dam was built.
- Scour Critical Rating: A weighting value based on its NBI Scour Critical Rating.

- Bridge Condition: A weighting value given to the bridge measure based on the FHWA PM2 performance measure for the condition of the bridge.
- County Flood Analysis Probability Rating: A weighting based on the historical frequency of flooding in the county it is located.

Consequence Ratings

- Delay on the Nearest Detour: A weighting based on the detour length and number of vehicles detoured if the bridge were to fail from flooding. This measure assumes the flooding will also cause the closure of nearby parallel bridges on the same stream.
- Bridge Deck Area: A weighting based on the size of the bridge. The measure assumes that larger bridges will take longer to repair than shorter bridges.
- County Flood Analysis Consequence Rating: A weighting based on the historical damage from flooding in the county it is located.

WYDOT categorized bridge flood risks into **H**igh, **M**edium or **L**ow for each bridge. Only "High" risk bridges were forwarded for further resiliency planning. Table 10 shows the results of the bridge flood risk analysis.

Stream Name	Facility	RM	Bridge ID	Capacity Score	Variability Score	Scour Score	Condition Score	County Probability	County Consequence	Detour Delay Score	Deck Area Score	Probability Score	Consequence Score	Probability	Consequence	Risk Rating
Blacks Fork	I-80	77.48	AOS	59	45	20	24	24	6	70	15	172	91	4	4	Н
Blacks Fork	I-80	77.48	AOR	59	45	20	27	24	6	70	15	175	91	4	4	Н
Green River	I-80	86.38	APA	59	40	20	24	24	6	60	21	167	87	3	4	Н
Green River	I-80	86.38	AOZ	59	40	20	24	24	6	60	21	167	87	3	4	Н
Tongue River	I-90	15.01	BBA	59	35	20	24	32	30	70	18	170	118	3	5	Н
Tongue River	I-90	15.01	BAZ	59	35	20	24	32	30	70	24	170	124	3	5	Н
N Fork Shoshone River	US-14/ 16/20	15.83	ктс	100	5	20	24	32	24	30	27	181	81	4	3	Н
N Fork Shoshone River	US-14/ 16/20	20.31	JJJ	100	5	20	24	32	24	30	24	181	78	4	3	н
N Fork Shoshone River	US-14/ 16/20	32	DZU	100	5	20	27	32	24	40	21	184	85	5	3	Н
Shoshone River	US-14/ 16/20	46.69	BZT	100	35	20	27	32	24	50	27	214	101	5	4	Н
Buffalo Fork Creek	US- 26/287	3.59	LWC	100	20	20	24	8	12	50	24	172	86	4	3	Н
Snake River	US-89	142	BOL	100	10	20	24	8	12	80	27	162	119	3	5	Н
Snake River	US-89	146.09	BOM	100	10	20	24	8	12	90	21	162	123	3	5	Н
Flat Creek	US-89	152.16	BOO	100	5	20	27	8	12	100	0	160	112	3	5	Н
Flat Creek	US-89	153.98	BOP	100	5	20	27	8	12	90	0	160	102	3	4	Н

Table 10: Risk Results for Bridge Flood Locations

Crow Creek	I-25	10.37	AAZ	59	45	20	24	40	30	20	3	188	53	5	2	М
Crow Creek	I-25	10.37	AAY	59	45	20	27	40	30	20	3	191	53	5	2	М
Blacks Fork	I-80	44.85	ANV	59	40	20	24	8	18	50	9	151	77	2	3	М
Blacks Fork	I-80	44.85	ANU	59	40	20	24	8	18	50	9	151	77	2	3	М
N. Platte River	I-80	229	AUK	59	25	20	24	16	6	80	18	144	104	2	4	М
Crow Creek	I-80	363.87	DCA	59	50	20	24	40	30	10	9	193	49	5	1	М
Crow Creek	I-80	363.87	DBZ	59	50	20	24	40	30	10	9	193	49	5	1	М
N Fork Shoshone River	US-14/ 16/20	2.26	JIM	100	5	20	24	32	24	30	18	181	72	4	2	м
N Fork	US-14/	15.60	ИТР	100	5	20	24	20	24	20	15	101	60	4	2	м
	US-	15.00	NID	100	5	20	24	52	24	30	15	101	09	4	2	
Shoshone River	14A	6.52	CAE	100	30	20	24	32	24	10	30	206	64	5	2	М
Snake River	US-89	141.3	MGH	100	10	20	3	8	12	80	30	141	122	2	5	М
Flat Creek	US-89	146	BON	100	5	20	24	8	12	90	0	157	102	2	4	М
Flat Creek	US-89	155.12	FFG	100	5	20	3	8	12	90	6	136	108	1	5	М
Greybull River	WY- 120	51.73	LBB	100	30	20	24	32	24	30	15	206	69	5	2	М
Bear River	I-80	5.91	AMM	59	20	20	30	8	18	20	27	137	65	1	2	L
Bear River	I-80	5.91	AML	59	20	20	30	8	18	20	24	137	62	1	2	L
N. Platte River	I-80	229	LCQ	59	25	20	3	16	6	80	18	123	104	1	4	L
Rock Creek	I-80	258.95	AVD	59	15	20	24	16	6	60	6	134	72	1	2	L
Rock Creek	I-80	258.95	AVC	59	15	20	24	16	6	60	6	134	72	1	2	L
Rock Creek	I-80	272.5	AVR	59	15	20	3	16	6	40	6	113	52	1	1	L
Rock Creek	I-80	272.5	AVQ	59	15	20	24	16	6	40	3	134	49	1	1	L
Laramie River	I-80	312.44	AXK	59	25	20	24	24	12	0	12	152	24	2	1	L
Laramie River	I-80	312.44	AXJ	59	25	20	24	24	12	0	12	152	24	2	1	L
Goose Creek	I-90	20.59	BBK	59	30	20	3	32	30	10	12	144	52	2	1	L
Goose Creek	I-90	20.59	BBJ	59	30	20	24	32	30	10	12	165	52	3	1	L

Table 11 shows the results of prioritizing all the high risk rated bridges. WYDOT prioritized these bridges by their risk ratings, bridge conditions and critical tourism corridor rank. While resiliency analysis is performed and action plans created for all the bridges listed in Table 11, those with the "H" priority rating are proposed for more thorough mitigation action development and resiliency planning than are lower rated bridges.

Stream Name	Facility	RM	Bridge ID	Risk Score	Condition Score	Criticality Ranking	Risk Grade	Condition Grade	Criticality Grade	Composite Grade	Priority Score	Priority Rating
Blacks Fork	I-80	77.5	AOR	16	27	3	4	4	5	4.3	1	Н
Shoshone River	US-14/16/20	46.7	BZT	20	27	11	5	4	2	3.7	2	Н
Blacks Fork	I-80	77.5	AOS	16	24	2	4	1	5	3.3	3	Н
N Fork Shoshone River	US-14/16/20	32.0	DZU	15	27	10	3	4	3	3.3	3	Н
Tongue River	I-90	15.0	BBA	15	24	6	3	1	4	2.7	5	Н
Tongue River	I-90	15.0	BAZ	15	24	7	3	1	4	2.7	5	Н
Flat Creek	US-89	152.2	BOO	15	27	15	3	4	1	2.7	5	Н
Green River	I-80	86.4	APA	12	24	4	1	1	4	2.0	8	М
Green River	I-80	86.4	AOZ	12	24	5	1	1	4	2.0	8	М
Snake River	US-89	142.0	BOL	15	24	13	3	1	2	2.0	8	М
Snake River	US-89	146.1	BOM	15	24	14	3	1	2	2.0	8	М
Flat Creek	US-89	154.0	BOP	12	27	16	1	4	1	2.0	8	М
N Fork Shoshone River	US-14/16/20	15.8	ктс	12	24	8	1	1	3	1.7	13	L
N Fork Shoshone River	US-14/16/20	20.3	JJJ	12	24	9	1	1	3	1.7	13	L
Buffalo Fork Creek	US-26/287	3.6	LWC	12	24	12	1	1	2	1.3	15	L

Table 11: Prioritized List of "High" Flood Risk Rated Bridges

Bridge Flood Action Plans

Action plans were created for each high risk bridge on the critical tourism network (see Appendix A for the action plan reports). Table 12 shows the potential actions to mitigate each bridge flood risk and the priority for each action.

Bridge ID	Stream Name	Facility Carried	RM	Priority Rating	Potential Actions	Action Priority	Comments
AOR, AOS	Blacks Fork River	I-80	77.5	Н	Replace with higher capacity bridges. Upgrade approaches accordingly.	3	Too expensive. Wait until bridge conditions warrant replacement.
					Upgrade scour prone attributes of the bridges.	2	Scour Critical = 8. No significant issue with scour protection.
					Repair the bridges following each incident. Establish and enact reroute procedures in the event the bridges are closed.	1	Appears to be the most cost-effective solution. Should plan alternative routing.
BZT	Shoshone River	US- 14/	46.7	Н	Replace with higher capacity bridge. Upgrade approaches accordingly.	3	Too expensive. Wait until bridge conditions warrant replacement.
		16/20			Upgrade scour prone attributes of the bridge.	2	Scour Critical = 8. No significant issue with scour protection.
					Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridges is closed.	1	Appears to be the most cost-effective solution. Should plan alternative routing.
DZU	N Fork Shoshone	US- 14/	32	Н	Replace with higher capacity bridge. Upgrade approaches accordingly.	3	Too expensive. Wait until bridge conditions warrant replacement.

 Table 12: Action Plan Summary for "High" Flood Risk Rated Bridges

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	River	16/20			Upgrade scour prone attributes of the bridge.	2	Scour Critical = 8. No significant issue with scour protection.
					Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridges is closed.	1	Appears to be the most cost-effective solution. Should plan alternative routing.
BAZ, BBA.	Tongue River	1-90	15	Н	Replace with higher capacity bridges. Upgrade approaches accordingly.	3	Too expensive. Wait until bridge conditions warrant replacement.
					Upgrade scour prone attributes of the bridges.	2	Scour Critical = 8. No significant issue with scour protection.
					Repair the bridges following each incident. Establish and enact reroute procedures in the event the bridges are closed.	1	Appears to be the most cost-effective solution. Should plan alternative routing.
BOO	Flat Creek	US- 89	152.2	Н	Replace with higher capacity bridge. Upgrade approaches accordingly.	3	Too expensive. Wait until bridge conditions warrant replacement.
					Upgrade scour prone attributes of the bridge.	2	Scour Critical = 8. No significant issue with scour protection.
					Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridges is closed.	1	Appears to be the most cost-effective solution. Should plan alternative routing.
AOZ, APA	Green River	I-80	86.4	М	Upgrade scour prone attributes of the bridges.	2	Scour Critical = 8. No significant issue with scour protection.
					Repair the bridges following each incident. Establish and enact reroute procedures in the event the bridges are closed.	1	Appears to be the most cost-effective solution. Should plan alternative routing.
BOL	Snake River	US- 89	142	М	Upgrade scour prone attributes of the bridge.	2	Scour Critical = 8. No significant issue with scour protection.
					Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridges is closed.	1	Appears to be the most cost-effective solution. Should plan alternative routing.
BOM	Snake River	US- 89	146.1	М	Upgrade scour prone attributes of the bridge.	2	Scour Critical = 8. No significant issue with scour protection.
					Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridges is closed.	1	Appears to be the most cost-effective solution. Should plan alternative routing.
BOP	Flat Creek	US- 89	154	М	Upgrade scour prone attributes of the bridge.	2	Scour Critical = 8. No significant issue with scour protection.
					Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridges is closed.	1	Appears to be the most cost-effective solution. Should plan alternative routing.
KTC	N Fork Shoshone River	US- 14/ 16/20	15.8	L	Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridges is closed.	1	Appears to be the most cost-effective solution. Should plan alternative routing.
JJJ	N Fork Shoshone River	US- 14/ 16/20	20.3	L	Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridges is closed.	1	Appears to be the most cost-effective solution. Should plan alternative routing.
LWC	Buffalo Fork Creek	US- 26/ 287	3.6	L	Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridges is closed.	1	Appears to be the most cost-effective solution. Should plan alternative routing.

Bridge Strike Resiliency

Bridge Strike Risks

Bridge strikes (collisions with bridges from over-height loads) do not typically create a need for lengthy detouring of traffic when they occur on bridges crossing <u>over</u> the critical facility. In this case, WYDOT will often close the bridge until repairs are made. Bridge strikes to bridges that <u>carry</u> the critical facility can

create significant delays to traffic particularly when no parallel facility is available. WYDOT assessed only those bridges that carry the critical routes for resiliency planning.

WYDOT collected bridge strike records for the years 1994 through 2017 or beginning from when the bridge was built if after 1994. The number of bridge strikes represents the probability, and traffic volumes for the potential consequence of future bridge strikes. Paired bridges on Interstate highways were treated as a single bridge for the analysis since the second bridge usually poses the same hazard as the struck bridge. Table 13 shows the forecast risks of bridge strikes on the critical corridors. The bridges are paired on Interstate and adjacent parallel routes carrying the same crossing facility.

Bridges	LRS ID	Route	RM	Bridge Strikes	AADT	Probability	Consequence	Risk
AMT, AMS	ML80	I-80	12.65	2	6190	4	4	н
ANH	ML80	I-80	23.91	2	6190	4	4	н
AOQ	ML80	I-80	77.34	3	6821	5	5	н
AOY, AOX	ML80	I-80	85.7	3	6821	5	5	н
AQZ	ML80	I-80	130.84	3	6821	5	5	н
ARN	ML80	I-80	146.85	2	6821	4	5	н
LZW	ML80	I-80	173.89	3	6821	5	5	н
ASP, ASQ	ML80	I-80	187.2	4	6821	5	5	н
ASV	ML80	I-80	196.16	2	6821	4	5	н
ATO	ML80	I-80	210.98	3	5842	5	3	н
KJA, KHZ	ML80	I-80	219.59	3	5842	5	3	н
AUR	ML80	I-80	235.28	2	5842	4	3	н
AVG	ML80	I-80	260.23	2	5842	4	3	н
LBN, LBO	ML80	I-80	313.19	4	6278	5	5	н
AYR, AYS	ML80	I-80	357.68	2	6194	4	4	н
AZW	ML80	I-80	383.36	3	6194	5	4	н
AAR, AAS	ML25	I-25	8.84	3	5552	5	2	М
ABC	ML25	I-25	10.59	3	5552	5	2	М
МСК, МСЈ	ML25	I-25	11.24	2	5552	4	2	М
FDH	ML25	I-25	188.6	4	2670	5	1	М
DEN	ML34	US-20/26	2.09	2	3551	4	2	м
AOJ	ML80	I-80	61.59	1	6821	1	5	М
LEV	ML80	I-80	91.53	1	6821	1	5	М
LRY	ML80	I-80	104.67	1	6821	1	5	М
LYD	ML80	I-80	106.7	1	6821	1	5	М
ARC	ML80	I-80	135.05	1	6821	1	5	М
ARQ	ML80	I-80	150.81	1	6821	1	5	М
ARY	ML80	I-80	165.58	1	6821	1	5	М

Table 13: Risk Results for Bridge Strikes

ASE	MI 80	1-80	172.36	1	6821	1	5	м
LZT	ML80	1-80	173.41	1	6821	1	5	м
ASO	ML80	1-80	184.29	1	6821	1	5	м
АХВ	ML80	I-80	308.65	1	6278	1	5	м
AXU	ML80	I-80	326.6	1	6278	1	5	м
AXW	ML80	I-80	329.32	1	6278	1	5	м
BCE, BCD	ML90	I-90	33.6	2	3450	4	2	М
AAA	ML25	I-25	0.39	1	5552	1	2	L
ААН	ML25	I-25	2.66	1	5552	1	2	L
AAI	ML25	I-25	3.29	1	5552	1	2	L
AAV	ML25	I-25	9.14	1	5552	1	2	L
ACN	ML25	I-25	39.24	1	5552	1	2	L
DCV	ML25	I-25	46.15	1	5552	1	2	L
AMF	ML80	I-80	3.45	1	6190	1	4	L
AMU	ML80	I-80	13.86	1	6190	1	4	L
AMX	ML80	I-80	15.64	1	6190	1	4	L
ANK	ML80	I-80	30.4	1	6190	1	4	L
ANP	ML80	I-80	37.02	1	6190	1	4	L
ANT	ML80	I-80	41.99	1	6190	1	4	L
ATI	ML80	I-80	206.18	1	5842	1	3	L
ATM	ML80	I-80	209.46	1	5842	1	3	L
ATS	ML80	I-80	212.74	1	5842	1	3	L
ATW	ML80	I-80	215.19	1	5842	1	3	L
AUP	ML80	I-80	234.58	1	5842	1	3	L
AVK	ML80	I-80	267.19	1	5842	1	3	L
AVP	ML80	I-80	271.06	1	5842	1	3	L
AYE	ML80	I-80	340.65	1	6194	1	4	L
AYG	ML80	I-80	342.56	1	6194	1	4	L
AYO	ML80	I-80	354	1	6194	1	4	L
AZG	ML80	I-80	361.79	1	6194	1	4	L
AZI	ML80	I-80	362.04	1	6194	1	4	L
AZI	ML80	I-80	362.04	1	6194	1	4	L
DBO	ML80	I-80	364.9	1	6194	1	4	L
DBO	ML80	I-80	365	1	6194	1	4	L
DBR	ML80	I-80	367.42	1	6194	1	4	L
DBR	ML80	I-80	367.42	1	6194	1	4	L
AZR	ML80	I-80	377.3	1	6194	1	4	L
AZR	ML80	I-80	377.35	1	6194	1	4	L
BAE	ML80	I-80	391.39	1	6194	1	4	L
BAE	ML80	I-80	391.39	1	6194	1	4	L
BAJ	ML80	I-80	401.13	1	6194	1	4	L

MUQ	ML80	I-80	401.16	1	6194	1	4	L
MUR	ML80	I-80	401.45	1	6194	1	4	L
BAM	ML80	I-80	401.456	1	6194	1	4	L
DZY	ML90	I-90	9.8	1	3450	1	2	L
DZY	ML90	I-90	9.88	1	3450	1	2	L
DZZ	ML90	I-90	11.01	1	3450	1	2	L
DZZ	ML90	I-90	11.01	1	3450	1	2	L
BAY	ML90	I-90	14.89	1	3450	1	2	L
EAF	ML90	I-90	14.9	1	3450	1	2	L
BBM	ML90	I-90	20.92	1	3450	1	2	L
BBM	ML90	I-90	20.92	1	3450	1	2	L
ККҮ	ML90	I-90	23.15	1	3450	1	2	L
ККҮ	ML90	I-90	23.16	1	3450	1	2	L
BCE	ML90	I-90	33	1	3450	1	2	L
BCD	ML90	I-90	34.23	1	3450	1	2	L

WYDOT prioritized the high risk bridge strike locations based on their risk, bridge condition, and their location on the critical tourism network within the State. Table 14 shows those results.

Bridges	Route	RM	Strikes	AADT	Probability	Consequence	Risk Score	Condition Score	Criticality Ranking	Risk Grade	Condition Grade	Criticality Grade	Composite Grade	Priority Score	Priority Rating
AOY, AOX	I-80	85.7	3	6821	5	5	25	5	6	4	5	5	4.67	1	н
AQZ	I-80	130.8	3	6821	5	5	25	5	6	4	5	5	4.67	1	н
ARN	I-80	146.9	2	6821	4	5	20	5	6	3	5	5	4.33	3	н
AOQ	I-80	77.34	3	6821	5	5	25	6	6	4	3	5	4.00	4	н
ASV	I-80	196.2	2	6821	4	5	20	6	6	3	3	5	3.67	5	н
LBN, LBO	I-80	313.2	4	6278	5	5	25	6	7	4	3	3	3.33	6	м
ASP, ASQ	I-80	187.2	4	6821	5	5	25	7	6	4	0	5	3.00	7	м
LZW	I-80	173.9	3	6821	5	5	25	7	6	4	0	5	3.00	7	м
AZW	I-80	383.4	3	6194	5	4	20	6	8	3	3	3	3.00	8	м
AYR, AYS	I-80	357.7	2	6194	4	4	16	6	8	2	3	3	2.67	10	м
AMT, AMS	I-80	12.65	2	6190	4	4	16	5	11	2	5	1	2.67	11	L
ANH	I-80	23.91	2	6190	4	4	16	5	11	2	5	1	2.67	11	L
ATO	I-80	211	3	5842	5	3	15	6	7	2	3	3	2.67	13	L
AUR	I-80	235.3	2	5842	4	3	12	5	9	1	5	2	2.67	14	L
AVG	I-80	260.2	2	5842	4	3	12	5	9	1	5	2	2.67	14	L
KJA, KHZ	I-80	219.6	3	5842	5	3	15	6	9	2	3	2	2.33	16	L

Table 14: Prioritized List of "High" Risk Bridge Strikes

Bridge Strike Action Plans

Action plans were created for each high risk bridge on the critical tourism network (see Appendix B for the full action plans). Table 15 shows the potential actions to mitigate each bridge strike risk and the priority for each action.

Bridge ID	Facility Carried	RM	Crossing Feature	Priority Rating	Potential Actions	Action Priority	Comments
AOX, AOY	I-80	85.7	County Rd 59	Н	Replace with a higher clearance bridge. Upgrade approaches accordingly.	4	Very costly. WYDOT should monitor before taking such a stringent action.
					Increase warning signage.	1	Very low volume road crossing under the bridge. Parallel bridge available if this bridge is damaged.
					Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	2	Parallel bridge available if this bridge is damaged.
					Lower the grade under the bridge.	3	Fairly costly with a few potential additional issues created if implemented including drainage and ramp grade changes.
AQZ	I-80	130.84	WY-377	Н	Replace with a higher clearance bridge. Upgrade approaches accordingly.	4	Very costly. WYDOT should monitor before taking such a stringent action.
					Increase warning signage.	1	Fairly low volume road crossing under the bridge. Parallel bridge available if this bridge is damaged.
					Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	2	Parallel bridge available if this bridge is damaged.
					Lower the grade under the bridge.	3	Fairly costly with a few potential additional issues created if implemented including drainage and ramp grade changes.
ARN	I-80	146.85	Patrick Draw	Н	Replace with a higher clearance bridge. Upgrade approaches accordingly.	4	Very costly. WYDOT should monitor before taking such a stringent action.
					Increase warning signage.	1	Very low volume road crossing under the bridge. Parallel bridge available if this bridge is damaged.
					Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	2	Parallel bridge available if this bridge is damaged.
					Lower the grade under the bridge.	3	Fairly costly with a few potential additional issues created if implemented including drainage and ramp grade changes.
AOQ	I-80	77.34	Machinery Pass	Н	Replace with a higher clearance bridge. Upgrade approaches accordingly.	4	Very costly. WYDOT should monitor before taking such a stringent action.

Table 15: Action Plan Summary for "High" Bridge Strike Rated Bridges

					Increase warning signage.	1	Very low volume road crossing under the bridge. Parallel bridge available if this bridge is damaged.
					Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	2	Parallel bridge available if this bridge is damaged.
					Lower the grade under the bridge.	3	Fairly costly with a few potential additional issues created if implemented.
ASV	I-80	196.16	County Road 47	Н	Replace with a higher clearance bridge. Upgrade approaches accordingly.	4	Very costly. WYDOT should monitor before taking such a stringent action.
					Increase warning signage.	1	Very low volume road crossing under the bridge. Parallel bridge available if this bridge is damaged.
					Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	2	Parallel bridge available if this bridge is damaged.
					Lower the grade under the bridge.	3	Fairly costly with a few potential additional issues created if implemented.
LBN, LBO	I-80	313.19	US-287	М	Replace with a higher clearance bridge. Upgrade approaches accordingly.	3	Very costly. WYDOT should monitor before taking such a stringent action.
					Increase warning signage.	1	Fairly high volume road crossing under the bridge. Parallel bridge available if this bridge is damaged.
					Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	2	Fairly high volume road crossing under the bridge. Parallel bridge available if this bridge is damaged.
ASP, ASQ	I-80	187.2	WY-789	М	Increase warning signage.	1	Parallel bridge available if this bridge is damaged.
					Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	2	Parallel bridge available if this bridge is damaged.
					Lower the grade under the bridge.	3	Fairly costly with a few potential additional issues created if implemented.
LZW	I-80	173.89	County Road 23	М	Increase warning signage.	1	Very low volume road crossing under the bridge. Parallel bridge available if this bridge is damaged.
					Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	2	Parallel bridge available if this bridge is damaged.
					Lower the grade under the bridge.	3	Fairly costly with a few potential additional issues created if implemented.
AZW	I-80	383.36	County Road 146- 1	М	Increase warning signage.	1	Very low volume road crossing under the bridge. Parallel bridge available if this bridge is damaged.
					Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	2	Parallel bridge available if this bridge is damaged.

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					Lower the grade under the bridge.	3	Fairly costly with a few potential additional issues created if implemented including drainage and ramp grade changes.
AYR, AYS	I-80	357.68	WY-222	М	Increase warning signage.	1	Moderate volume road crossing under the bridge. Parallel bridge available if this bridge is damaged.
					Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	2	Moderate volume road crossing under the bridge. High truck volumes pass under bridges to access Wal Mart Distribution Center. Parallel bridge available if this bridge is damaged.
					Lower the grade under the bridge.	3	Fairly costly with a few potential additional issues created if implemented including drainage and ramp grade changes.
AMT, AMS	I-80	12.65	Machinery Pass	L	Increase warning signage.	1	Very low volume road crossing under the bridge. Parallel bridge available if this bridge is damaged.
					Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	2	Parallel bridge available if this bridge is damaged.
ANH	I-80	23.91	County Road 141	L	Increase warning signage.	1	Low volume road crossing under the bridge. Parallel bridge available if this bridge is damaged.
					Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	2	Low volume road crossing under the bridge. Parallel bridge available if this bridge is damaged.
ATO	I-80	210.98	Two Mile Draw	L	Increase warning signage.	1	Low volume road crossing under the bridge. Parallel bridge available if this bridge is damaged.
					Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	2	Low volume road crossing under the bridge. Parallel bridge available if this bridge is damaged.
AUR	I-80	235.28	US-30/WY- 130	L	Increase warning signage.	1	Moderate traffic volume crossing under the bridge. Parallel bridge available if this bridge is damaged.
					Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	2	Moderate traffic volume crossing under the bridge. Parallel bridge available if this bridge is damaged.
AVG	I-80	260.23	County Rd 3	L	Increase warning signage.	1	Low volume road crossing under the bridge. Parallel bridge available if this bridge is damaged.
					Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	2	Low volume road crossing under the bridge. Parallel bridge available if this bridge is damaged.
KJA, KHZ	I-80	219.59	WY-76	L	Increase warning signage.	1	Fairly low volume road crossing under the bridge. Parallel bridge available if this bridge is damaged.
					Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	2	Fairly low volume road crossing under the bridge. Parallel bridge available if this bridge is damaged.

Winter Weather Closure and Delay Resiliency

Winter Weather Closure and Delay Risks

Winter weather road closures and weather-related delay were analyzed for risks to the traveling public and to WYDOT. Road closure durations were derived from road closure information provided by WYDOT ITS from the years 2005 through 2014. Figure 4 shows the road closures for this time period for all NHS roads in the State. Approximate annual hours and costs of weather-related delay per mile were calculated from NPMRDS travel time data for the Critical Tourism routes. Those results are shown in Figures 5 and 6, respectively. Only winter months (November through April) were applied to remove the effects of construction-related delay. The total hours of delay are used to calculate the "probability" risk score for winter weather and the costs of those delays for the "consequence" risk score.

Winter weather risk levels were determined for each road segment based on the risk matrix in Table 3. Risk scores were calculated by multiplying the 1 through 5 frequency rating by the 1 through 5 consequence rating. The risk scores were then prioritized from the highest to the lowest to estimate and extract the highest risk facilities. The results can be seen in the Table 16. The higher priority road segments have more thorough resiliency planning applied.



Figure 4: Annual Hours of Winter Weather-Related Road Closures



Figure 5: Annual Hours of Weather-Related Delay per Mile on Critical Tourism Corridors

Figure 6: Annual Cost of Weather-Related Delay per Mile on Critical Tourism Corridors



Facility	LRS ID	From RM	To RM	Total Annual Weather-Related Delay Hours per Mile	Total Annual Weather-Related Delay Cost per Mile	Probability	Consequence	Risk Rating
US-89	ML10B	151.918	154.848	115*	\$2,094,574*	5	5	н
I-25	ML25B	7.85	8.845	69	\$1,520,490	4	5	н
I-80	ML80B	322.741	334.86	64	\$1,509,300	4	5	н
I-80	ML80B	316.48	322.741	61	\$1,459,874	4	5	н
US-89	ML10B	148.704	151.918	103*	\$1,334,191*	5	5	н
I-80	ML80B	255.269	272.13	49	\$1,036,660	3	5	н
I-80	ML80B	6.033	18.098	46	\$1,022,033	3	5	н
I-25	ML25B	10.586	12.697	59	\$1,020,707	4	5	н
US-89	ML10B	154.848	164.926	146*	\$958,324*	5	4	н
I-80	ML80B	3.235	6.033	39	\$950,157	3	4	н
US-14/16/20	ML31B	49.87	54.587	102*	\$913,768*	5	4	н
I-25	ML25B	8.845	10.586	52	\$863,586	3	4	н
I-80	ML80B	334.86	359.195	36	\$845,149	3	4	н
I-80	ML80B	234.786	255.269	35	\$746,889	3	4	н
I-80	ML80B	272.13	310.12	35	\$712,979	3	4	н
US-89	ML10B	141.222	148.704	72*	\$702,445*	4	4	н
US 20-26	ML34B	0.087	2.34	67*	\$644,365*	4	3	н
Greeley Hwy	ML180B	3.538	8.472	72*	\$516,709*	4	3	н
US-14A	ML29B	2.695	22.837	111	\$493,827	5	3	н
I-80	ML80B	211.28	215.304	31	\$750,894	2	4	М
I-80	ML80B	89.13	91.475	31	\$747,001	2	4	М
I-80	ML80B	310.12	311.367	34	\$746,944	2	4	М
I-80	ML80B	219.12	221.493	31	\$742,538	2	4	М
I-80	ML80B	209.19	211.28	31	\$736,012	2	4	М
I-80	ML80B	18.098	34.428	33	\$701,677	2	4	М
I-25	ML25B	0	2.662	30	\$687,060	2	3	М
I-80	ML80B	0	3.235	30	\$672,059	2	3	М
I-25	ML25B	2.662	7.85	29	\$656,660	2	3	М
I-80	ML80B	34.428	39.612	29	\$587,487	2	3	М
US-14A	ML29B	22.837	25.85	124	\$474,316	5	2	М
Casper Bypass	ML47B	0	2.9	38	\$447,890	3	2	М
US-14A	ML29B	25.85	29.522	123	\$375,474	5	2	М
I-25	ML25B	25.442	34.45	35	\$324,270	3	2	М
US-14/16/20	ML31B	27	45.323	103	\$208,844	5	1	М
I-80	ML80B	311.367	313.32	27	\$714,617	1	4	L
I-80	ML80B	98.787	104.774	23	\$671,370	1	3	L

 Table 16: Winter Weather Risk Evaluation for Critical Tourism Corridors

I-80	ML80B	313.32	316.48	27	\$643,722	1	3	L
I-80	ML80B	104.774	110.913	25	\$637,686	1	3	L
I-80	ML80B	359.195	361.64	23	\$585,481	1	3	L
I-80	ML80B	91.475	98.787	22	\$568,569	1	3	L
I-80	ML80B	215.304	219.12	23	\$566,162	1	3	L
I-80	ML80B	82.608	89.13	23	\$556,668	1	3	L
I-80	ML80B	221.493	234.786	24	\$553,426	1	3	L
I-80	ML80B	122.049	142.006	21	\$487,053	1	2	L
I-80	ML80B	47.962	65.537	21	\$450,221	1	2	L
I-80	ML80B	174.066	209.19	19	\$444,068	1	2	L
I-80	ML80B	39.612	47.962	22	\$443,273	1	2	L
I-25	ML25B	12.697	17.042	30	\$436,429	2	2	L
I-80	ML80B	110.913	122.049	18	\$425,205	1	2	L
I-80	ML80B	361.64	363.617	17	\$419,795	1	2	L
I-80	ML80B	142.006	174.066	18	\$407,074	1	2	L
I-80	ML80B	65.537	82.608	17	\$404,452	1	2	L
I-80	ML80B	363.617	370.083	18	\$367,624	1	2	L
I-80	ML80B	401.2	402.78	29	\$291,201	2	2	L
I-80	ML80B	370.083	386.067	17	\$287,473	1	1	L
I-90	ML90B	20.634	22.902	37	\$278,024	3	1	L
US-89	ML10B	132.62	141.222	57	\$261,274	4	1	L
I-90	ML90B	22.902	24.961	29	\$257,712	2	1	L
I-25	ML25B	17.042	25.442	24	\$241,886	1	1	L
I-90	ML90B	33.334	41.96	34	\$235,123	3	1	L
I-90	ML90B	24.961	33.334	34	\$230,805	2	1	L
US-89	ML10B	164.926	184.572	51	\$226,344	3	1	L
I-25	ML25B	34.45	47.153	25	\$223,998	1	1	L
I-80	ML80B	386.067	401.2	13	\$220,574	1	1	L
US-14/16/20	ML31B	45.323	49.87	86	\$219,721	4	1	L
US-14/16/20	ML31B	54.587	57.362	94	\$193,723	4	1	L
I-90	ML90B	9.485	20.634	28	\$190,083	2	1	L
US-14A	ML29B	29.522	33.71	56	\$149,785	4	1	L
I-90	ML90B	0	9.485	27	\$129,331	1	1	L
US-191	ML13B	154.83	163.67	62	\$112,584	4	1	L
WY-120	ML33B	43.1	51.76	67	\$93,389	4	1	L
WY-114	ML32B	29.57	40.62	56	\$91,107	4	1	L
US-26/287	ML30B	0	26.838	79	\$85,430	4	1	L
WY-120	ML33B	51.76	81.21	43	\$80,085	3	1	L
US-14/16/20	ML31B	0	27	55	\$79,492	3	1	L
US-14/16/20	ML31B	57.362	77.74	43	\$61,215	3	1	L

*Most of the identified delay is from traffic congestion in urban (mostly tourism) areas and is not winter weather related.

WYDOT prioritized the high risk winter weather locations from Table 16 based on their risk, condition measure ("Total Annual Weather-Related Delay Hours per Mile"), and their location on the critical tourism network within the State. Table 17 shows those results.

Facility	LRS ID	From RM	To RM	Risk Score	Condition Score	Criticality Ranking	Risk Grade	Condition Grade	Criticality Grade	Composite Grade	Priority Score	Priority Rating
US-89	ML10B	151.918	154.848	25	115	1	5	5	5	5.0	1	Н*
US-89	ML10B	148.704	151.918	25	103	1	5	4	5	4.7	2	Н*
US-89	ML10B	154.848	164.926	20	146	1	3	5	5	4.3	3	H*
US-89	ML10B	141.222	148.704	16	72	1	3	4	5	4.0	4	H*
US-14A	ML29B	2.695	22.837	15	111	3	3	5	4	4.0	4	Н
US-14/16/20	ML31B	49.87	54.587	20	102	5	3	4	4	3.7	6	H*
I-80	ML80B	322.741	334.86	20	64	7	3	3	4	3.3	7	Н
I-80	ML80B	316.48	322.741	20	61	7	3	3	4	3.3	7	Н
I-25	ML25B	7.85	8.845	20	69	12	3	3	2	2.7	9	м
I-25	ML25B	10.586	12.697	20	59	12	3	3	2	2.7	9	М
I-80	ML80B	255.269	272.13	15	49	9	3	2	3	2.7	9	м
I-80	ML80B	6.033	18.098	15	46	11	3	2	2	2.3	12	м
Greeley Hwy	ML180B	3.538	8.472	12	72	10	1	4	2	2.3	12	M*
I-80	ML80B	272.13	310.12	12	35	7	1	1	4	2.0	14	м
US 20-26	ML34B	0.087	2.34	12	67	17	1	3	1	1.7	15	L*
I-25	ML25B	8.845	10.586	12	52	12	1	2	2	1.7	15	L
I-80	ML80B	3.235	6.033	12	39	11	1	2	2	1.7	15	L
I-80	ML80B	334.86	359.195	12	36	8	1	1	3	1.7	15	L
1-80	MI 80B	234,786	255,269	12	35	9	1	1	3	1.7	15	I

Table 17: Prioritization of High Risk Winter Weather Critical Tourism Corridors

*Most of the identified delay is from traffic congestion in urban (mostly tourism) areas and is not winter weather related.

Winter Weather Action Plans

Action plans were created for each high risk, winter weather impacted road segment on the critical tourism network (see Appendix C for the full action plans). Table 18 shows the potential actions to mitigate each high risk, winter weather location and the priority for each action.

Table 18: Action Plan Summary for "High" Risk Winter Weather Critical Tourism Roads

Facility Name	LRS ID	From RM	To RM	Priority Rating	Potential Actions	Action Priority	Comments
US-89	ML10B	152	155	Η	Assess and modify current snow removal and roadway management procedures as needed.	4	Lowest cost, though much is already done.
					Build snow fences	7	Urban area makes snow fence locations limited.

					Assess and modify traffic signals and controls to minimize congestion.	1	Very low cost. Likely to have minimal effect.
					Implement Connected Vehicle technology.	6	May be expensive. Technology may not be up to standards yet. Potentially could significantly improve traffic movement.
					Add additional lanes.	5	Very expensive. Jackson likely to resist.
					Establish existing alternative routes and procedures to implement during extreme weather events and relieve congestion related delays.	2	Limited alternatives exist.
					Build alternative routes to relieve traffic congestion.	3	Very expensive. Jackson likely to resist.
US-89	ML10B	149	152	Н	Assess and modify current snow removal and roadway management procedures as needed.	4	Lowest cost, though much is already done.
					Build snow fences	5	Snow fence coverage on this road is already extensive.
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	6	Likely to be expensive. May not have enough effect to be cost-effective.
					Implement Connected Vehicle technology.	1	May be expensive. Technology may not be up to standards yet. Potentially could significantly improve traffic movement.
					Add additional lanes.	2	Very expensive. Jackson likely to resist.
					Establish existing alternative routes and procedures to implement during extreme weather events and relieve congestion related delays.	3	Limited alternatives exist.
					Build alternative routes to relieve traffic congestion.	7	Very expensive. Jackson likely to resist.
US-89	ML10B	155	165	165 H	Assess and modify current snow removal and roadway management procedures as needed.	4	Lowest cost, though much is already done.
					Build snow fences	5	Snow fence coverage on this road is already extensive.
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	6	Likely to be expensive. May not have enough effect to be cost-effective.
					Implement Connected Vehicle technology.	1	May be expensive. Technology may not be up to standards yet. Potentially could significantly improve traffic movement.
					Add additional lanes.	2	Very expensive. Jackson likely to resist.
					Establish existing alternative routes and procedures to implement during extreme weather events and relieve congestion related delays.	3	Limited alternatives exist.
					Build alternative routes to relieve traffic congestion.	7	Very expensive. Jackson likely to resist.
US-89	ML10B	141	149	Н	Assess and modify current snow removal and roadway management procedures as needed.	4	Lowest cost, though much is already done.
					Build snow fences	5	Snow fence coverage on this road is already extensive.

					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	6	Likely to be expensive. May not have enough effect to be cost-effective.
					Implement Connected Vehicle technology.	1	May be expensive. Technology may not be up to standards yet. Potentially could significantly improve traffic movement.
					Add additional lanes.	2	Very expensive. Jackson likely to resist.
					Establish existing alternative routes and procedures to implement during extreme weather events and relieve congestion related delays.	3	Limited alternatives exist.
					Build alternative routes to relieve traffic congestion.	7	Very expensive. Jackson likely to resist.
US-14A	ML29B	3	23	Н	Assess and modify current snow removal and roadway management procedures as needed.	1	Lowest cost, though much is already done.
					Build snow fences	2	Need to investigate potential snow fence areas.
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	4	Likely to be expensive. May not have enough effect to be cost-effective.
					Implement Connected Vehicle technology.	3	May be expensive. Technology may not be up to standards yet. Potentially could significantly improve traffic movement.
				Establish alternative routing procedures to implement during extreme weather events.	5	Currently being applied by default. Districts typically know conditions and issues associated with rerouting traffic. Some negative side-effects may occur on alternative routes.	
US- 14/16/20	ML31B	50	55	Н	Assess and modify current snow removal and roadway management procedures as needed.	5	Lowest cost, though much is already done.
					Build snow fences	7	Need to investigate potential snow fence areas.
					Assess and modify traffic signals and controls to minimize congestion.	1	Very low cost. Likely to have minimal effect.
					Implement Connected Vehicle technology.	6	May be expensive. Technology may not be up to standards yet. Potentially could significantly improve traffic movement.
					Add additional lanes.	4	Very expensive.
					Establish existing alternative routes and procedures to implement during extreme weather events and relieve congestion related delays.	2	Limited alternatives exist.
					Build alternative routes to relieve traffic congestion.	3	Very expensive. Limited viable options.
1-80	ML80B	323	335	Н	Assess and modify current snow removal and roadway management procedures as needed.	1	Lowest cost, though much is already done.
					Build snow fences	4	Need to investigate potential snow fence areas.
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	6	Likely to be expensive. May not have enough effect to be cost-effective.

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					Implement vehicle to vehicle and vehicle to infrastructure Connected Vehicle technology.	3	May be expensive. Technology may not be up to standards yet. Potentially could significantly improve traffic movement.
					Implement Connected Vehicle roadway condition communication technology.	2	Much of infrastructure is in place. Need buy-in from travelers. CV Pilot Project not complete.
					Establish alternative routing procedures to implement during extreme weather events.	5	Currently being applied by default. Districts typically know conditions and issues associated with rerouting traffic. Some negative side-effects may occur on alternative routes.
1-80	ML80B	316	323	Н	Assess and modify current snow removal and roadway management procedures as needed.	1	Lowest cost, though much is already done.
					Build snow fences	4	Need to investigate potential snow fence areas.
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	6	Likely to be expensive. May not have enough effect to be cost-effective.
					Implement vehicle to vehicle and vehicle to infrastructure Connected Vehicle technology.	3	May be expensive. Technology may not be up to standards yet. Potentially could significantly improve traffic movement.
					Implement Connected Vehicle roadway condition communication technology.	2	Much of infrastructure is in place. Need buy-in from travelers. CV Pilot Project not complete.
				Establish alternative routing procedures to implement during extreme weather events.	5	Currently being applied by default. Districts typically know conditions and issues associated with rerouting traffic. Some negative side-effects may occur on alternative routes.	
1-25	ML25B	8	9	M	Assess and modify current snow removal and roadway management procedures as needed.	1	Lowest cost, though much is already done.
					Build snow fences	5	Need to investigate potential snow fence areas.
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	6	Likely to be expensive. May not have enough effect to be cost-effective.
					Implement vehicle to vehicle and vehicle to infrastructure Connected Vehicle technology.	3	May be expensive. Technology may not be up to standards yet. Potentially could significantly improve traffic movement.
					Implement Connected Vehicle roadway condition communication technology.	2	Much of infrastructure is in place. Need buy-in from travelers. CV Pilot Project not complete.
					Establish alternative routing procedures to implement during extreme weather events.	4	Currently being applied by default. Districts typically know conditions and issues associated with rerouting traffic. Some negative side-effects may occur on alternative routes.
1-25	ML25B	11	13	М	Assess and modify current snow removal and roadway management procedures as needed.	1	Lowest cost, though much is already done.
					Build snow fences	5	Need to investigate potential snow fence areas.
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	6	Likely to be expensive. May not have enough effect to be cost-effective.
					Implement vehicle to vehicle and vehicle to infrastructure Connected Vehicle technology.	3	May be expensive. Technology may not be up to standards yet. Potentially could significantly improve traffic movement.
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					Implement Connected Vehicle roadway condition communication technology.	2	Much of infrastructure is in place. Need buy-in from travelers. CV Pilot Project not complete.
					Establish alternative routing procedures to implement during extreme weather events.	4	Currently being applied by default. Districts typically know conditions and issues associated with rerouting traffic. Some negative side-effects may occur on alternative routes.
I-80	ML80B	255	272	М	Assess and modify current snow removal and roadway management procedures as needed.	1	Lowest cost, though much is already done.
					Build snow fences	4	Snow fence coverage on this road is already extensive.
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	6	Likely to be expensive. May not have enough effect to be cost-effective.
					Implement vehicle to vehicle and vehicle to infrastructure Connected Vehicle technology.	3	May be expensive. Technology may not be up to standards yet. Potentially could significantly improve traffic movement.
					Implement Connected Vehicle roadway condition communication technology.	2	Much of infrastructure is in place. Need buy-in from travelers. CV Pilot Project not complete.
					Establish alternative routing procedures to implement during extreme weather events.	5	Currently being applied by default. Districts typically know conditions and issues associated with rerouting traffic. Some negative side-effects may occur on alternative routes.
1-80	ML80B	6	18	М	Assess and modify current snow removal and roadway management procedures as needed.	1	Lowest cost, though much is already done.
					Build snow fences	4	Snow fence coverage on this road is already extensive.
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	6	Likely to be expensive. May not have enough effect to be cost-effective.
					Implement vehicle to vehicle and vehicle to infrastructure Connected Vehicle technology.	3	May be expensive. Technology may not be up to standards yet. Potentially could significantly improve traffic movement.
					Implement Connected Vehicle roadway condition communication technology.	2	Much of infrastructure is in place. Need buy-in from travelers. CV Pilot Project not complete.
					Establish alternative routing procedures to implement during extreme weather events.	5	Currently being applied by default. Districts typically know conditions and issues associated with rerouting traffic. Some negative side-effects may occur on alternative routes.
US-85	ML180B	4	8	М	Assess and modify current snow removal and roadway management procedures as needed.	4	Lowest cost, though much is already done.
					Build snow fences	5	Need to investigate potential snow fence areas.
					Assess and modify traffic signals and controls to minimize congestion.	1	Very low cost. Likely to have minimal effect.

					Implement Connected Vehicle technology.	7	May be expensive. Technology may not be up to standards yet. Potentially could significantly improve traffic movement.
					Add additional lanes.	6	Very expensive.
					Establish existing alternative routes and procedures to implement during extreme weather events and relieve congestion related delays.	2	
					Build alternative routes to relieve traffic congestion.	3	Very expensive.
I-80	ML80B	272	310	М	Assess and modify current snow removal and roadway management procedures as needed.	1	Lowest cost, though much is already done.
					Build snow fences	4	Snow fence coverage on this road is already extensive.
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	6	Likely to be expensive. May not have enough effect to be cost-effective.
					Implement vehicle to vehicle and vehicle to infrastructure Connected Vehicle technology.	3	May be expensive. Technology may not be up to standards yet. Potentially could significantly improve traffic movement.
					Implement Connected Vehicle roadway condition communication technology.	2	Much of infrastructure is in place. Need buy-in from travelers. CV Pilot Project not complete.
					Establish alternative routing procedures to implement during extreme weather events.	5	Currently being applied by default. Districts typically know conditions and issues associated with rerouting traffic. Some negative side-effects may occur on alternative routes.
US-20/26	ML34B	0	2	L	Assess and modify current snow removal and roadway management procedures as needed.	3	Lowest cost, though much is already done.
					Build snow fences	4	Urban area makes snow fence locations limited.
					Assess and modify traffic signals and controls to minimize congestion.	1	Very low cost. Likely to have minimal effect.
					Implement Connected Vehicle technology.	7	May be expensive. Technology may not be up to standards yet. Potentially could significantly improve traffic movement.
					Add additional lanes.	6	Very expensive.
					Establish existing alternative routes and procedures to implement during extreme weather events and relieve congestion related delays.	2	
					Build alternative routes to relieve traffic congestion.	5	Very expensive.
1-25	ML25B	9	11	L	Assess and modify current snow removal and roadway management procedures as needed.	1	Lowest cost, though much is already done.
					Build snow fences	5	Possible snow fence locations are limited.
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	6	Likely to be expensive. May not have enough effect to be cost-effective.

					Implement vehicle to vehicle and vehicle to infrastructure Connected Vehicle technology.	3	May be expensive. Technology may not be up to standards yet. Potentially could significantly improve traffic movement.
					Implement Connected Vehicle roadway condition communication technology.	2	Much of infrastructure is in place. Need buy-in from travelers. CV Pilot Project not complete.
					Establish alternative routing procedures to implement during extreme weather events.	4	Currently being applied by default. Districts typically know conditions and issues associated with rerouting traffic. Some negative side-effects may occur on alternative routes.
1-80	ML80B	3	6	L	Assess and modify current snow removal and roadway management procedures as needed.	1	Lowest cost, though much is already done.
					Build snow fences	3	Snow fence coverage on this road is already extensive. Urban location may limit installation in some areas.
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting or vehicle skid.	4	Likely to be expensive. May not have enough effect to be cost-effective.
					Implement vehicle to vehicle and vehicle to infrastructure Connected Vehicle technology.	2	May be expensive. Technology may not be up to standards yet. Potentially could significantly improve traffic movement.
					Implement Connected Vehicle roadway condition communication technology.	5	Much of infrastructure is in place. Need buy-in from travelers. CV Pilot Project not complete.
					Establish alternative routing procedures to implement during extreme weather events.	6	Currently being applied by default. Districts typically know conditions and issues associated with rerouting traffic. Some negative side-effects may occur on alternative routes.
1-80	ML80B	335	359	L	Assess and modify current snow removal and roadway management procedures as needed.	1	Lowest cost, though much is already done.
					Build snow fences	4	Snow fence coverage on this road is already extensive.
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	6	Likely to be expensive. May not have enough effect to be cost-effective.
					Implement vehicle to vehicle and vehicle to infrastructure Connected Vehicle technology.	3	May be expensive. Technology may not be up to standards yet. Potentially could significantly improve traffic movement.
					Implement Connected Vehicle roadway condition communication technology.	2	Much of infrastructure is in place. Need buy-in from travelers. CV Pilot Project not complete.
					Establish alternative routing procedures to implement during extreme weather events.	5	Currently being applied by default. Districts typically know conditions and issues associated with rerouting traffic. Some negative side-effects may occur on alternative routes.
1-80	ML80B	235	255	L	Assess and modify current snow removal and roadway management procedures as needed.	1	Lowest cost, though much is already done.
					Build snow fences	4	Snow fence coverage on this road is already extensive.

Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	6	Likely to be expensive. May not have enough effect to be cost-effective.
Implement vehicle to vehicle and vehicle to infrastructure Connected Vehicle technology.	3	May be expensive. Technology may not be up to standards yet. Potentially could significantly improve traffic movement.
Implement Connected Vehicle roadway condition communication technology.	2	Much of infrastructure is in place. Need buy-in from travelers. CV Pilot Project not complete.
Establish alternative routing procedures to implement during extreme weather events.	5	Currently being applied by default. Districts typically know conditions and issues associated with rerouting traffic. Some negative side-effects may occur on alternative routes.

Environmental Resiliency

Environmental Risks

WYDOT assessed the environmental risks of the creation of nonattainment areas within the State. Pollutant levels were obtained from Wyoming DEQ's Air Quality Monitoring Network, *Wyoming Ambient Air Monitoring Annual Network Plan* 2016

(http://deq.wyoming.gov/media/attachments/Air%20Quality/Monitoring/Annual%20Network%20Plans /Annual-Network-Plan_2016-Final.pdf). Staff calculated the percentages attained toward exceedance levels for each pollutant type by county then averaged the values for a "Nonattainment Score". WYDOT applied only the percentage for highest level pollutant to each county and to all critical tourism corridors within each county.

In addition to the pollutant levels, WYDOT incorporated the annual delay per mile on each road segment to the probability side of the risk analysis. The delay values were taken from the results of the winter weather risk analysis described earlier in this document. WYDOT assumes that traffic delay is a significant contributor to pollutant emissions and therefore is a reasonable predictor of potential pollutant increases.

WYDOT applied the population of each county as its consequence measure of risk, because WYDOT assumes that the people living within the county are the most negatively affected by pollutants. Table 19 shows the results of the environmental risk analysis.

LRS ID	Facility	From RM	To RM	Population	Annual Delay Hours per Mile	PM10 (24-hr)	PM2.5 (24-hr)	NOX	Ozone	Nonattain Score	Delay Score	Probability Score	Probability	Consequence	Risk
ML25B	1-25	7.85	8.845	101,650	65,348	78%	43%	60%	90%	79%	99%	89%	5	5	н
ML25B	1-25	10.586	12.697	101,650	52,950	78%	43%	60%	90%	79%	96%	87%	5	5	Н
ML31B	US-14/16/20	49.87	54.587	29,960	44,392	30%	66%	0%	0%	45%	93%	69%	4	3	Н
ML25B	I-25	8.845	10.586	101,650	43,434	78%	43%	60%	90%	79%	92%	85%	5	5	н
ML80B	I-80	322.741	334.86	39,290	36,067	65%	38%	40%	87%	72%	91%	81%	5	4	н
ML80B	I-80	316.48	322.741	39,290	35,431	65%	38%	40%	87%	72%	89%	81%	5	4	Н
ML34B	US-20/US-26	0.087	2.34	83,130	31,295	51%	47%	44%	90%	74%	87%	80%	5	5	Н
ML180B	US-87	3.538	8.472	101,650	28,657	78%	43%	60%	90%	79%	85%	82%	5	5	н
ML29B	US-14A	2.695	22.837	29,960	28,106	30%	66%	0%	0%	45%	84%	64%	4	3	Н
ML29B	US-14A	22.837	25.85	29,960	27,144	30%	66%	0%	0%	45%	83%	64%	4	3	Н
ML25B	I-25	0	2.662	101,650	26,592	78%	43%	60%	90%	79%	81%	80%	5	5	н
ML25B	I-25	2.662	7.85	101,650	24,884	78%	43%	60%	90%	79%	77%	78%	5	5	н
ML80B	I-80	98.787	104.774	43,860	21,480	63%	54%	32%	96%	78%	76%	77%	5	4	н
ML80B	I-80	334.86	359.195	101,650	20,524	78%	43%	60%	90%	79%	72%	75%	5	5	н
ML80B	I-80	311.367	313.32	39,290	19,236	65%	38%	40%	87%	72%	71%	71%	5	4	Н
ML80B	I-80	89.13	91.475	43,860	18,837	63%	54%	32%	96%	78%	68%	73%	5	4	н
ML47B	Casper Bypass	0	2.9	83,130	18,618	51%	47%	44%	90%	74%	67%	70%	4	5	н
ML80B	I-80	359.195	361.64	101,650	17,342	78%	43%	60%	90%	79%	65%	72%	5	5	н
ML80B	I-80	310.12	311.367	39,290	17,201	65%	38%	40%	87%	72%	63%	67%	4	4	н
ML80B	I-80	104.774	110.913	43,860	16,782	63%	54%	32%	96%	78%	61%	70%	4	4	н
ML80B	I-80	313.32	316.48	39,290	16,207	65%	38%	40%	87%	72%	60%	66%	4	4	н
ML25B	I-25	12.697	17.042	101,650	15,655	78%	43%	60%	90%	79%	56%	67%	4	5	н
ML80B	I-80	272.13	310.12	39,290	15,481	65%	38%	40%	87%	72%	53%	63%	3	4	н
ML80B	I-80	91.475	98.787	43,860	13,975	63%	54%	32%	96%	78%	51%	65%	4	4	н
ML80B	I-80	82.608	89.13	43,860	12,951	63%	54%	32%	96%	78%	48%	63%	3	4	н
ML90B	1-90	20.634	22.902	31,090	12,721	65%	99%	35%	80%	84%	45%	65%	4	3	н
ML80B	I-80	361.64	363.617	101,650	12,656	78%	43%	60%	90%	79%	44%	61%	3	5	Н
ML90B	1-90	22.902	24.961	31,090	12,615	65%	99%	35%	80%	84%	43%	63%	4	3	н
ML80B	I-80	122.049	142.006	43,860	11,127	63%	54%	32%	96%	78%	40%	59%	3	4	Н
ML25B	I-25	25.442	34.45	101,650	10,949	78%	43%	60%	90%	79%	37%	58%	3	5	Н
ML10B	US-89	151.918	154.848	24,330	89,657	22%	43%	0%	0%	30%	100	65%	4	2	М

Table 19: Risk Results for Nonattainment Area Creation

	1														
ML10B	US-89	148.704	151.918	24,330	58,089	22%	43%	0%	0%	30%	97%	63%	4	2	М
ML10B	US-89	154.848	164.926	24,330	46,382	22%	43%	0%	0%	30%	95%	62%	3	2	М
ML10B	US-89	141.222	148.704	24,330	32,973	22%	43%	0%	0%	30%	88%	59%	3	2	М
ML80B	I-80	3.235	6.033	20,610	25,504	34%	0%	13%	89%	61%	80%	71%	5	2	М
ML80B	I-80	6.033	18.098	20,610	25,118	34%	0%	13%	89%	61%	79%	70%	4	2	М
ML29B	US-14A	25.85	29.522	29,960	20,735	30%	66%	0%	0%	45%	73%	59%	3	3	М
ML80B	I-80	18.098	34.428	20,610	16,190	34%	0%	13%	89%	61%	59%	60%	3	2	М
ML80B	I-80	0	3.235	20,610	15,531	34%	0%	13%	89%	61%	55%	58%	3	2	М
ML80B	I-80	401.2	402.78	101,650	10,711	78%	43%	60%	90%	79%	35%	57%	2	5	М
ML90B	I-90	33.334	41.96	31,090	10,186	65%	99%	35%	80%	84%	33%	59%	3	3	М
ML80B	I-80	110.913	122.049	43,860	10,041	63%	54%	32%	96%	78%	31%	55%	2	4	М
ML90B	I-90	24.961	33.334	31,090	9,975	65%	99%	35%	80%	84%	29%	57%	3	3	М
ML80B	I-80	65.537	82.608	43,860	9,654	63%	54%	32%	96%	78%	25%	52%	2	4	М
ML80B	I-80	142.006	174.066	43,860	8,881	63%	54%	32%	96%	78%	20%	49%	2	4	М
ML80B	I-80	363.617	370.083	101,650	8,817	78%	43%	60%	90%	79%	19%	49%	2	5	М
ML25B	I-25	17.042	25.442	101,650	8,700	78%	43%	60%	90%	79%	17%	48%	2	5	М
ML90B	I-90	9.485	20.634	31,090	8,288	65%	99%	35%	80%	84%	16%	50%	2	3	М
ML25B	I-25	34.45	47.153	101,650	7,845	78%	43%	60%	90%	79%	13%	46%	2	5	М
ML80B	I-80	370.083	386.067	101,650	7,062	78%	43%	60%	90%	79%	12%	45%	2	5	М
ML80B	I-80	386.067	401.2	101,650	5,148	78%	43%	60%	90%	79%	9%	44%	1	5	М
ML90B	I-90	0	9.485	31,090	4,507	65%	99%	35%	80%	84%	8%	46%	2	3	М
ML80B	I-80	255.269	272.13	15,870	21,406	18%	49%	57%	67%	57%	75%	66%	4	1	L
ML80B	I-80	219.12	221.493	15,870	19,164	18%	49%	57%	67%	57%	69%	63%	3	1	L
ML80B	I-80	211.28	215.304	15,870	17,253	18%	49%	57%	67%	57%	64%	61%	3	1	L
ML80B	I-80	209.19	211.28	15,870	16,048	18%	49%	57%	67%	57%	57%	57%	3	1	L
ML80B	I-80	234.786	255.269	15,870	15,457	18%	49%	57%	67%	57%	52%	55%	2	1	L
ML80B	I-80	215.304	219.12	15,870	13,494	18%	49%	57%	67%	57%	49%	53%	2	1	L
ML80B	I-80	34.428	39.612	20,610	12,727	34%	0%	13%	89%	61%	47%	54%	2	2	L
ML80B	I-80	221.493	234.786	15,870	12,535	18%	49%	57%	67%	57%	41%	49%	2	1	L
ML31B	US-14/16/20	45.323	49.87	29,960	11,034	30%	66%	0%	0%	45%	39%	42%	1	3	L
ML10B	US-89	132.62	141.222	24,330	10,944	22%	43%	0%	0%	30%	36%	33%	1	2	L
ML80B	I-80	47.962	65.537	20,610	10,107	34%	0%	13%	89%	61%	32%	47%	2	2	L
ML80B	I-80	174.066	209.19	15,870	9,902	18%	49%	57%	67%	57%	28%	43%	1	1	L
ML10B	US-89	164.926	184.572	24,330	9,822	22%	43%	0%	0%	30%	27%	28%	1	2	L
ML80B	I-80	39.612	47.962	20,610	9,653	34%	0%	13%	89%	61%	24%	43%	1	2	L
ML31B	US-14/16/20	54.587	57.362	29,960	9,486	30%	66%	0%	0%	45%	23%	34%	1	3	L
ML31B	US-14/16/20	27	45.323	29,960	9,361	30%	66%	0%	0%	45%	21%	33%	1	3	L
ML29B	US-14A	29.522	33.71	29,960	8,162	30%	66%	0%	0%	45%	15%	30%	1	3	L

ML13B	US-191	154.83	163.67	24,330	5,412	22%	43%	0%	0%	30%	11%	20%	1	2	L
ML30B	US-26/287	0	26.838	24,330	4,074	22%	43%	0%	0%	30%	7%	18%	0	2	L
ML33B	WY-120	43.1	51.76	29,960	3,926	30%	66%	0%	0%	45%	5%	25%	1	3	L
ML32B	WY-114	29.57	40.62	29,960	3,827	30%	66%	0%	0%	45%	4%	24%	1	3	L
ML33B	WY-120	51.76	81.21	29,960	3,374	30%	66%	0%	0%	45%	3%	24%	1	3	L
ML31B	US-14/16/20	0	27	29,960	3,336	30%	66%	0%	0%	45%	1%	23%	1	3	L
ML31B	US-14/16/20	57.362	77.74	29,960	2,695	30%	66%	0%	0%	45%	0%	22%	1	3	L

WYDOT prioritized the high risk environmental roads based on their risk, condition measure (averaged pollutant levels in relation to exceedance levels for the four pollutants analyzed), and their priority on the critical tourism network. Table 20 shows those results.

LRS ID	Facility	From RM	To RM	Risk Grade	Condition Grade	Criticality Grade	Composite Grade	Priority Score	Priority Rating
ML80B	I-80	89.13	91.475	4	3	5	4.00	1	н
ML80B	I-80	98.787	104.774	4	3	5	4.00	1	н
ML180B	US-87	3.538	8.472	5	3	3	3.67	3	н
ML80B	I-80	334.86	359.195	5	3	3	3.67	3	н
ML80B	I-80	359.195	361.64	5	3	3	3.67	3	н
ML80B	I-80	91.475	98.787	3	3	5	3.67	3	н
ML80B	I-80	104.774	110.913	3	3	5	3.67	3	н
ML25B	I-25	0	2.662	5	3	2	3.33	8	н
ML25B	I-25	2.662	7.85	5	3	2	3.33	8	н
ML25B	I-25	7.85	8.845	5	3	2	3.33	8	н
ML25B	I-25	8.845	10.586	5	3	2	3.33	8	м
ML25B	I-25	10.586	12.697	5	3	2	3.33	8	м
ML80B	I-80	311.367	313.32	4	1	4	3.00	13	м
ML80B	I-80	316.48	322.741	4	1	4	3.00	13	м
ML80B	I-80	322.741	334.86	4	1	4	3.00	13	м
ML25B	I-25	12.697	17.042	4	3	2	3.00	13	м
ML80B	I-80	82.608	89.13	1	3	5	3.00	13	м
ML80B	I-80	122.049	142.006	1	3	5	3.00	13	м
ML34B	US-20/US-26	0.087	2.34	5	2	1	2.67	19	м
ML80B	I-80	310.12	311.367	3	1	4	2.67	19	м
ML80B	I-80	313.32	316.48	3	1	4	2.67	19	L

Table 20: Prioritized Nonattainment Area Creation Roads

ML80B	I-80	361.64	363.617	2	3	3	2.67	19	L
ML47B	Casper Bypass	0	2.9	4	2	1	2.33	23	L
ML25B	I-25	25.442	34.45	2	3	2	2.33	23	L
ML29B	US-14A	2.695	22.837	1	1	5	2.33	23	L
ML29B	US-14A	22.837	25.85	1	1	5	2.33	23	L
ML31B	US-14/16/20	49.87	54.587	1	1	5	2.33	23	L
ML90B	I-90	20.634	22.902	1	5	1	2.33	23	L
ML90B	I-90	22.902	24.961	1	5	1	2.33	23	L
ML80B	I-80	272.13	310.12	1	1	4	2.00	30	L

Environmental – Nonattainment Area Creation Action Plan

WYDOT formed action plans for each road segment with a high potential to cause the inadvertent creation of nonattainment areas in Wyoming (see Appendix D for the full action plans). Table 21 shows the potential actions to mitigate each high risk road and the priority for each action.

Table 21: Action Plan Summary for High Risk Environmental – Nonattainment Area Creation Roads

LRS ID	From RM	To RM	Facility Name	Priority Rating	Potential Actions	Action Priority	Comments
ML80B	122	142	I-80	Η	Assess and modify current snow removal and roadway management procedures as needed.	3	Lowest cost, though much is already done. Not effective in summer months.
					Build snow fences	4	Snow fence coverage on this road is near maximum. Not effective in summer months.
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	6	Likely to be expensive. May not have enough effect to be cost- effective. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve vehicle movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide diesel retrofit incentives to the trucking industry.	5	Year round improvement. Could be very costly and may require future investments as truck fleets get replaced.
					Provide electrified truck parking areas to reduce truck idling.	1	Provides emission reductions and improved safety. Mostly effective in winter months. Requires buy-in from truckers.
ML80B	142	174	I-80	Η	Assess and modify current snow removal and roadway management procedures as needed.	3	Lowest cost, though much is already done. Not effective in summer months.
					Build snow fences	4	Snow fence coverage on this road is near maximum. Not effective in summer months.
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	6	Likely to be expensive. May not have enough effect to be cost- effective. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide diesel retrofit incentives to the trucking industry.	5	Year round improvement. Could be very costly and may require future investments as truck fleets get replaced.

					Provide electrified truck parking areas to reduce truck idling.	1	Provides emission reductions and improved safety. Mostly effective in winter months. Requires buy-in from truckers.
ML80B	335	359	I-80	Н	Assess and modify current snow removal and roadway management	3	Lowest cost, though much is already done. Not effective in summer months.
					Build snow fences	4	Snow fence coverage on this road is near maximum. Not effective in summer months
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	6	Likely to be expensive. May not have enough effect to be cost- effective. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide diesel retrofit incentives to the trucking industry.	5	Year round improvement. Could be very costly and may require future investments as truck fleets get replaced.
					Provide electrified truck parking areas to reduce truck idling.	1	Provides emission reductions and improved safety. Mostly effective in winter months. Requires buy-in from truckers.
ML25B	0	3	I-25	Н	Assess and modify current snow removal and roadway management procedures as needed.	4	Lowest cost, though much is already done. Not effective in summer months.
					Build snow fences	5	Snow fence coverage on this road is near maximum. Not effective in summer months.
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	7	Likely to be expensive. May not have enough effect to be cost- effective. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	3	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide diesel retrofit incentives to the trucking industry.	6	Year round improvement. Could be very costly and may require future investments as truck fleets get replaced.
					Provide electrified truck parking areas to reduce truck idling.	1	Very low cost. Requires trucker buy-in.
					Incentivize PrePass for trucks at the port-of-entry.	2	Very low cost. Requires trucker buy-in.
ML25B	3	8	I-25	Η	Assess and modify current snow removal and roadway management procedures as needed.	3	Lowest cost, though much is already done. Not effective in summer months.
					Build snow fences	4	Snow fence coverage on this road is near maximum. Not effective in summer months.
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	6	Likely to be expensive. May not have enough effect to be cost- effective. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide diesel retrofit incentives to the trucking industry.	5	Year round improvement. Could be very costly and may require future investments as truck fleets get replaced.
					Provide electrified truck parking areas to reduce truck idling.	1	Provides emission reductions and improved safety. Mostly effective in winter months. Requires buy-in from truckers.
ML25B	11	13	I-25	Н	Assess and modify current snow removal and roadway management procedures as needed.	3	Lowest cost, though much is already done. Not effective in summer months.
					Build snow fences	6	Urban area limits available snow fence sites.
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	5	Likely to be expensive. May not have enough effect to be cost- effective. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.

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					Provide diesel retrofit incentives to the trucking industry.	4	Year round improvement. Could be very costly and may require future investments as truck fleets get replaced
					Provide electrified truck parking areas	1	Provides emission reductions and improved safety. Mostly effective in winter months. Requires buy-in from truckers
MI 25B	13	17	1-25	H	Assess and modify current snow	3	Lowest cost, though much is already done. Not effective in
			•		removal and roadway management procedures as needed.	·	summer months.
					Build snow fences	6	Urban area limits available snow fence sites.
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	5	Likely to be expensive. May not have enough effect to be cost- effective. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide diesel retrofit incentives to the trucking industry.	4	Year round improvement. Could be very costly and may require future investments as truck fleets get replaced.
					Provide electrified truck parking areas	1	Provides emission reductions and improved safety. Mostly
		_			to reduce truck idling.		effective in winter months. Requires buy-in from truckers.
ML25B	17	25	I-25	Н	Assess and modify current snow removal and roadway management procedures as needed	3	Lowest cost, though much is already done. Not effective in summer months.
					Build snow fences	4	Snow fence coverage on this road is near maximum. Not effective in summer months.
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	6	Likely to be expensive. May not have enough effect to be cost- effective. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide diesel retrofit incentives to the trucking industry.	5	Year round improvement. Could be very costly and may require future investments as truck fleets get replaced.
					Provide electrified truck parking areas to reduce truck idling.	1	Provides emission reductions and improved safety. Mostly effective in winter months. Requires buy-in from truckers.
ML25B	25	34	I-25	Н	Assess and modify current snow removal and roadway management procedures as needed.	3	Lowest cost, though much is already done. Not effective in summer months.
					Build snow fences	4	Snow fence coverage on this road is near maximum. Not effective in summer months.
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	6	Likely to be expensive. May not have enough effect to be cost- effective. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide diesel retrofit incentives to the trucking industry.	5	Year round improvement. Could be very costly and may require future investments as truck fleets get replaced.
					Provide electrified truck parking areas to reduce truck idling.	1	Provides emission reductions and improved safety. Mostly effective in winter months. Requires buy-in from truckers.
ML80B	83	89	I-80	Η	Assess and modify current snow removal and roadway management procedures as needed.	3	Lowest cost, though much is already done. Not effective in summer months.
					Build snow fences	4	Snow fence coverage on this road is near maximum. Not effective in summer months.
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	6	Likely to be expensive. May not have enough effect to be cost- effective. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.

					Provide diesel retrofit incentives to the trucking industry.	5	Year round improvement. Could be very costly and may require future investments as truck fleets get replaced.
					Provide electrified truck parking areas to reduce truck idling.	1	Provides emission reductions and improved safety. Mostly effective in winter months. Requires buy-in from truckers.
ML80B	99	105	I-80	Н	Assess and modify current snow removal and roadway management procedures as needed	3	Lowest cost, though much is already done. Not effective in summer months.
					Build snow fences	6	Urban area limits available snow fence sites.
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	5	Likely to be expensive. May not have enough effect to be cost- effective. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide diesel retrofit incentives to the trucking industry.	4	Year round improvement. Could be very costly and may require future investments as truck fleets get replaced.
					Provide electrified truck parking areas	1	Provides emission reductions and improved safety. Mostly
MI 80B	105	111	1.80	<u> </u>	to reduce truck idling.		effective in winter months. Requires buy-in from truckers.
MEOOD	100		1-00		removal and roadway management procedures as needed.	J	summer months.
					Build snow fences	4	Snow fence coverage on this road is near maximum. Not effective in summer months.
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	6	Likely to be expensive. May not have enough effect to be cost- effective. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide diesel retrofit incentives to the trucking industry.	5	Year round improvement. Could be very costly and may require future investments as truck fleets get replaced.
					Provide electrified truck parking areas	1	Provides emission reductions and improved safety. Mostly
MI 80B	111	122	I-80	н	Assess and modify current snow	3	Lowest cost, though much is already done. Not effective in
					removal and roadway management procedures as needed.	Ū	summer months.
					Build snow fences	4	Snow fence coverage on this road is near maximum. Not effective in summer months.
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	6	Likely to be expensive. May not have enough effect to be cost- effective. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide diesel retrofit incentives to the trucking industry.	5	Year round improvement. Could be very costly and may require future investments as truck fleets get replaced.
					Provide electrified truck parking areas to reduce truck idling.	1	Provides emission reductions and improved safety. Mostly effective in winter months. Requires buy-in from truckers.
ML80B	370	386	I-80	H	Assess and modify current snow removal and roadway management procedures as needed.	3	Lowest cost, though much is already done. Not effective in summer months.
					Build snow fences	4	Snow fence coverage on this road is near maximum. Not effective in summer months.
					Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	6	Likely to be expensive. May not have enough effect to be cost- effective. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.

					Provide diesel retrofit incentives to the trucking industry	5	Year round improvement. Could be very costly and may require future investments as truck fleets get replaced
					Provide electrified truck parking areas	1	Provides emission reductions and improved safety. Mostly
MI 25B	8	a	L-25		Assess and modify current snow		Lowest cost though much is already done. Not effective in
WL20D	U	5	1-20	IVI	removal and roadway management procedures as needed.	J	summer months.
					Build snow fences	4	Snow fence coverage on this road is near maximum. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide electrified truck parking areas to reduce truck idling.	1	Provides emission reductions and improved safety. Mostly effective in winter months. Requires buy-in from truckers.
ML25B	9	11	I-25	М	Assess and modify current snow	3	Lowest cost, though much is already done. Not effective in
					removal and roadway management procedures as needed.		summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide diesel retrofit incentives to the trucking industry.	4	Year round improvement. Could be very costly and may require future investments as truck fleets get replaced.
					Provide electrified truck parking areas to reduce truck idling.	1	Provides emission reductions and improved safety. Mostly effective in winter months. Requires buy-in from truckers.
ML25B	34	47	I-25	М	Assess and modify current snow removal and roadway management	3	Lowest cost, though much is already done. Not effective in summer months.
					procedures as needed.		
					Build snow fences	4	Snow fence coverage on this road is near maximum. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide electrified truck parking areas to reduce truck idling.	1	Provides emission reductions and improved safety. Mostly effective in winter months. Requires buy-in from truckers.
ML80B	272	310	I-80	М	Assess and modify current snow removal and roadway management procedures as needed.	3	Lowest cost, though much is already done. Not effective in summer months.
					Build snow fences	4	Snow fence coverage on this road is near maximum. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide electrified truck parking areas to reduce truck idling.	1	Provides emission reductions and improved safety. Mostly effective in winter months. Requires buy-in from truckers.
ML80B	316	323	I-80	М	Assess and modify current snow removal and roadway management procedures as needed.	3	Lowest cost, though much is already done. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide diesel retrofit incentives to the trucking industry.	4	Year round improvement. Could be very costly and may require future investments as truck fleets get replaced.
					Provide electrified truck parking areas to reduce truck idling.	1	Provides emission reductions and improved safety. Mostly effective in winter months. Requires buy-in from truckers.
ML80B	323	335	I-80	М	Assess and modify current snow removal and roadway management	3	Lowest cost, though much is already done. Not effective in summer months.
					procedures as needed.	ļ	
					Build snow fences	4	Snow tence coverage on this road is near maximum. Not effective in summer months.

					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide electrified truck parking areas to reduce truck idling.	1	Provides emission reductions and improved safety. Mostly effective in winter months. Requires buy-in from truckers.
ML80B	359	362	I-80	М	Assess and modify current snow removal and roadway management procedures as needed.	3	Lowest cost, though much is already done. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide diesel retrofit incentives to	4	Year round improvement. Could be very costly and may
					Provide electrified truck parking areas to reduce truck idling.	1	Provides emission reductions and improved safety. Mostly effective in winter months. Requires buy-in from truckers.
ML80B	364	370	I-80	М	Assess and modify current snow removal and roadway management procedures as needed.	3	Lowest cost, though much is already done. Not effective in summer months.
					Build snow fences	4	Snow fence coverage on this road is near maximum. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide electrified truck parking areas to reduce truck idling.	1	Provides emission reductions and improved safety. Mostly effective in winter months. Requires buy-in from truckers.
ML80B	386	401	I-80	М	Assess and modify current snow removal and roadway management procedures as needed.	3	Lowest cost, though much is already done. Not effective in summer months.
					Build snow fences	4	Snow fence coverage on this road is near maximum. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide electrified truck parking areas to reduce truck idling.	1	Provides emission reductions and improved safety. Mostly effective in winter months. Requires buy-in from truckers.
ML90B	25	33	I-90	М	Assess and modify current snow removal and roadway management procedures as needed.	3	Lowest cost, though much is already done. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide diesel retrofit incentives to the trucking industry.	4	Year round improvement. Could be very costly and may require future investments as truck fleets get replaced.
					Provide electrified truck parking areas to reduce truck idling.	1	Provides emission reductions and improved safety. Mostly effective in winter months. Requires buy-in from truckers.
ML90B	33	42	1-90	М	Assess and modify current snow removal and roadway management procedures as needed.	3	Lowest cost, though much is already done. Not effective in summer months.
					Build snow fences	4	Snow fence coverage on this road is near maximum. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide electrified truck parking areas to reduce truck idling.	1	Provides emission reductions and improved safety. Mostly effective in winter months. Requires buy-in from truckers.
ML80B	66	83	I-80	L	Assess and modify current snow removal and roadway management procedures as needed.	3	Lowest cost, though much is already done. Not effective in summer months.

					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide electrified truck parking areas to reduce truck idling.	1	Provides emission reductions and improved safety. Mostly effective in winter months. Requires buy-in from truckers.
ML80B	89	91	I-80	L	Assess and modify current snow removal and roadway management procedures as needed.	3	Lowest cost, though much is already done. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide electrified truck parking areas to reduce truck idling.	1	Provides emission reductions and improved safety. Mostly effective in winter months. Requires buy-in from truckers.
ML80B	91	99	I-80	L	Assess and modify current snow removal and roadway management procedures as needed.	3	Lowest cost, though much is already done. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide electrified truck parking areas to reduce truck idling.	1	Provides emission reductions and improved safety. Mostly effective in winter months. Requires buy-in from truckers.
ML90B	9	21	I-90	H	Assess and modify current snow removal and roadway management procedures as needed.	4	Lowest cost, though much is already done. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	3	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide electrified truck parking areas to reduce truck idling.	1	Very low cost. Requires trucker buy-in.
					Incentivize PrePass for trucks at the port-of-entry.	2	Very low cost. Requires trucker buy-in.
ML80B	311	313	I-80	L	Assess and modify current snow removal and roadway management procedures as needed.	3	Lowest cost, though much is already done. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide electrified truck parking areas to reduce truck idling.	1	Provides emission reductions and improved safety. Mostly effective in winter months. Requires buy-in from truckers.
ML80B	313	316	I-80	L	Assess and modify current snow removal and roadway management procedures as needed.	3	Lowest cost, though much is already done. Not effective in summer months.
					Implement Connected Vehicle technology on the road.	2	May be expensive. Technology may not be up to standards yet. Could significantly improve traffic movement. Some of infrastructure is in place. Need buy-in from drivers.
					Provide electrified truck parking areas to reduce truck idling.	1	Provides emission reductions and improved safety. Mostly effective in winter months. Requires buy-in from truckers

Figure 7 shows the locations for high risk tourism assets. Most risks are concentrated along I-80 and I-25 in southeast Wyoming.



Figure 7: High Risk Highway Tourism Locations Map

Merged Tourism Resiliency Action Plans

WYDOT merged the tourism action plans to better identify, consolidate and revise propose action priorities. The plans were merged based on overlapping locations with location termini set based on changes in the combined risks. Table 22 shows consolidated road and bridge sections from the action plans.

Table 22:	Risks at	Consolidated	Locations
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<u>Roadways</u>							Bridges	
				Ris	sks		Ri	sks
Facility Name	LRS ID	From RM	To RM	Weather	Environmental	Bridge RM	Bridge Flood	Bridge Strike
Casper Bypass	ML47B	0	3		х			
I-25	ML25B	0	8		Х			
I-25	ML25B	8	13	Х	Х			
I-25	ML25B	13	17		Х			
I-25	ML25B	25	34		Х			
I-80	ML80B	3	18	Х		12.65		Х
I-80	ML80B	23.91	23.91			23.91		Х
I-80	ML80B	77.34	77.34			77.34		Х
I-80	ML80B	77.5	77.5			77.5	Х	
I-80	ML80B	83	111		Х	85.7 86.4	х	Х
I-80	ML80B	122	142		Х	130.84		Х
I-80	ML80B	146.85	146.85			146.85		Х
I-80	ML80B	173.89	173.89			173.89		Х
I-80	ML80B	187.2	187.2			187.2		Х
I-80	ML80B	196.16	196.16			196.16		Х
I-80	ML80B	210.98	210.98			210.98		Х
I-80	ML80B	219.59	219.59			219.59		Х
I-80	ML80B	235	272	Х		235.28 260.23		X X
I-80	ML80B	272	310	Х	Х			
I-80	ML80B	310	316		Х	313.19		Х
I-80	ML80B	316	359	Х	Х	357.68		Х
I-80	ML80B	359	364		Х			
I-80	ML80B	383.36	383.36			383.36		X
I-90	ML90B	15	15			15	Х	
1-90	ML90B	21	25		Х			
US-14/ 16/20 US-14/	ML31B	15.8	15.8			15.8	х	
16/20	ML31B	20.3	20.3			20.3	Х	
US-14/ 16/20 US-14/	ML31B	32	32			32	х	
16/20	ML31B	46.7	46.7			46.7	Х	
US- 14/16/20	ML31B	50	55	Х	Х			

US-14A	ML29B	3	23	Х	Х			
US-14A	ML29B	23	26		Х			
US-20/26	ML34B	0	2	Х	Х			
US-26/ 287	ML30B	3.6	3.6			3.6	х	
US-85	ML180B	4	8	Х	Х			
US-89	ML10B	141	165	Х				
US-89	ML10B	142	142			142	х	
US-89	ML10B	146.1	146.1			146.1	х	
US-89	ML10B	152.2	152.2			152.2	х	
US-89	ML10B	154	154			154	Х	

Resiliency Task Plans

WYDOT merged the action plans according to common risk factors, prioritized each, and created a series of potential resiliency tasks. WYDOT prioritized the resiliency plans according to the weighting values shown in Table 23. The weighting values were established according to the perceived level of disruption that each risk poses to the movement of vehicles on critical tourism corridors. The tasks were assessed from highest to lowest priority, keeping only the highest priority tasks for the lower priority road sections. Multiple tasks are proposed for most locations based on the number and intensity of the risks. WYDOT does not intend for each task to be implemented, but to provide WYDOT engineers, maintenance personnel and planners a potential list of tasks to evaluate for feasibility. Other reasonable task development is encouraged to supplement or replace the tasks listed.

Risk	Weight
Winter Weather	10
Environmental	3
Bridge Flood	7
Bridge Strike	5

$- 10010 \times 23$, $V \cup 10110110 + 00000 \oplus 00000 \oplus 0000000 \oplus 0000000000$	Table 23: Weighting	Factors Used	to Estimate R	isk Location	Priorities
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US 89 - RM 141 to RM 165

Priority: 1

This highway section exhibits high risks for winter weather and bridge flooding at RM 142, 146.1, 152.2 and 154 (bridges BOL, BOM, BDO and BOP). These bridges carry US-89 and could lead to significant issues if a flood were to damage one of the bridges and close US-89 leading into Jackson. Daily traffic volumes are nearly 11,000 while estimated delay cost approximately \$1,069,000 per mile per year. Much of the delay is likely from traffic congestion in the area. The following are recommended actions to mitigate the identified risks:

- 1. WYDOT should assess and modify traffic signals and controls to minimize congestion.
- 2. WYDOT should evaluate adding lanes and establishing alternative routes.
- 3. WYDOT should continue to assess and modify their snow removal and winter weather management procedures to reduce the length of closures and decrease delay conditions
- 4. WYDOT should research and develop "Connected Vehicle" communication, vehicle to vehicle, and vehicle to infrastructure technology for winter weather issues.
- 5. WYDOT should investigate building snow fences to reduce snow drifting.
- 6. Alternate routing procedures should be established for US-89 in the event the bridges identified as high risk for flooding are flood damaged and closed. WYDOT should establish alternate routing procedures that convey to drivers the alternate route, oversize/overweight limitations, available services, and truck parking availability along the route. Alternate routes may include rerouting to parallel lanes or routing to highways in adjacent states. This process might also be conveyed through "Connected Vehicle" communication technology if available in the area. WYDOT should develop individual task plans assigning specific tasks to accomplish the smooth transition to and from the alternate route(s).
- 7. WYDOT should assess whether additional scour protection would reduce the risk at the bridges.

Interstate 80 – RM 83 to RM 111

Priority: 2

This roadway section exhibits high risks for air quality issues, bridge strikes at RM 85.7 (bridges AOX and AOY) and bridge flooding at RM 86.4 (bridges AOZ and APA). These bridges carry I-80 and could lead to significant issues if a bridge strike or flood were to close I-80. Daily traffic volumes are approximately 18,700. Estimated delay is approximately 16,400 hours per mile per year. The following are recommended actions to mitigate the identified risks:

- 1. To reduce tailpipe emissions, WYDOT should create or incentivize the electrification of truck parking areas.
- 2. WYDOT should research and develop "Connected Vehicle" communication, vehicle to vehicle and vehicle to infrastructure technology for tailpipe emission reductions.
- 3. WYDOT should continue to assess and modify their snow removal and winter weather management procedures to reduce the length of closures, decrease delay conditions, and reduce tailpipe emissions from vehicle idling and acceleration-deceleration cycles.

- 4. WYDOT should investigate the need for more advanced warning and better height limit warning signage for the high strike risk bridges identified above. If the investigations show that improved signage won't likely decrease bridge strikes, then alternative routing procedures should be established for I-80 in the event of a bridge strike closure. The procedures should include developing individual task plans assigning specific tasks to individuals to accomplish the smooth transitions to and from the alternate route(s).
- 5. WYDOT should establish alternative routing procedures in the event of serious flooding at the bridges identified above. The procedures should include developing individual task plans assigning specific tasks to individuals to accomplish the smooth transitions to and from the alternate route(s).
- 6. WYDOT should assess the feasibility of increasing bridge scour protection for the flood prone bridges identified above. WYDOT should also consider a redesign to increase streamflow capacity for the bridges at RM 86.4 in the event it is seriously damaged in a flood.
- 7. Other lower priority potential mitigation efforts might include building snow fences to reduce snow drifting, provide or incentivize diesel retrofits to reduce emissions, modify road geometrics and safety barriers to reduce snow drifting, or lower the grade under high strike potential bridges.

Interstate 80 - RM 316 to RM 359

Priority: 3

This roadway section exhibits high risks for winter weather, air quality issues and bridge strikes at RM 357.68 (bridges AYR and AYS). These bridges carry I-80 and could lead to significant issues if a bridge strike were to close I-80. Daily traffic volumes are approximately 13,700 while estimated delay costs are approximately \$1,124,000 per mile per year. The following are recommended actions to mitigate the identified risks:

- 1. WYDOT should continue to assess and modify their snow removal and winter weather management procedures to reduce the length of closures, decrease delay conditions, and reduce tailpipe emissions from vehicle idling and acceleration-deceleration cycles.
- 2. To reduce tailpipe emissions, WYDOT should create or incentivize the electrification of truck parking areas.
- 3. WYDOT should research and develop "Connected Vehicle" vehicle to vehicle, vehicle to infrastructure and communication technology for winter weather delay and tailpipe emission mitigation issues.
- 4. WYDOT should investigate the need for more advanced warning and better height limit warning signage for the bridges identified above for bridge strike risk. If the investigations show that improved signage won't likely decrease bridge strikes, then alternative routing procedures should be established for I-80 in the event of a bridge strike closure. The procedures should include developing individual task plans assigning specific tasks to individuals to accomplish the smooth transitions to and from the alternate route(s).
- 5. Other lower priority potential mitigation efforts might include building snow fences to reduce snow drifting, provide or incentivize diesel retrofits to reduce emissions, modify road geometrics and safety barriers to reduce snow drifting, or lower the grade under bridges.

US 14/16/20 - RM 50 to RM 55

Priority: 4

This urban roadway section exhibits high risks for winter weather and air quality issues Daily traffic volumes are approximately 10,500 while estimated delay costs are approximately \$914,000 per mile per year. Much of the delay is likely from summertime traffic congestion in the area. The following are recommended actions to mitigate the identified risks:

- 1. WYDOT should assess and modify traffic signals and controls to minimize congestion.
- 2. WYDOT should evaluate adding lanes and establishing alternative routes.
- 3. WYDOT should establish alternative routing procedures in the event of serious weather. The procedures should include developing individual task plans assigning specific tasks to individuals to accomplish the smooth transitions to and from the alternate route(s).
- 4. WYDOT should continue to assess and modify their snow removal and winter weather management procedures to reduce the length of closures, decrease delay conditions, and reduce tailpipe emissions from vehicle idling and acceleration-deceleration cycles.
- 5. To reduce tailpipe emissions, WYDOT should create or incentivize the electrification of truck parking areas.
- 6. WYDOT should research and develop "Connected Vehicle" vehicle to vehicle, vehicle to infrastructure and communication technology for winter weather delay and tailpipe emission mitigation issues.
- 7. WYDOT might try providing or incentivizing diesel retrofits to reduce emissions.

US 14A - RM 3 to RM 23

Priority: 5

This roadway section exhibits high risks for winter weather and air quality issues Daily traffic volumes are approximately 6,100 while estimated delay costs are approximately \$494,000 per mile per year. Some of the delay may be from summertime traffic congestion in the area. The following are recommended actions to mitigate the identified risks:

- 1. WYDOT should evaluate adding lanes.
- 2. WYDOT should evaluate locations for snow fence installations.
- 3. WYDOT should continue to assess and modify their snow removal and winter weather management procedures to reduce the length of closures, decrease delay conditions, and reduce tailpipe emissions from vehicle idling and acceleration-deceleration cycles.
- 4. WYDOT should establish alternative routing procedures in the event of serious weather. The procedures should include developing individual task plans assigning specific tasks to individuals to accomplish the smooth transitions to and from the alternate route(s).
- 5. To reduce tailpipe emissions, WYDOT should create or incentivize the electrification of truck parking areas.
- 6. WYDOT should research and develop "Connected Vehicle" vehicle to vehicle, vehicle to infrastructure and communication technology for winter weather delay and tailpipe emission mitigation issues.

Interstate 80 - RM 272 to RM 310

Priority: 6

This road section exhibits high risks for winter weather and air quality issues. Estimated traffic delays are 750 hours per mile per year. Daily traffic volumes are over 13,600 and daily truck volumes are over 5,600. Estimated delay costs are approximately \$713,000 per mile per year. The following are recommended actions to mitigate the identified risks:

- 1. To reduce tailpipe emissions, WYDOT should create or incentivize the electrification of truck parking areas.
- 2. WYDOT should continue to assess and modify their snow removal and winter weather management procedures to reduce the length of closures, decrease delay conditions, and reduce tailpipe emissions from vehicle idling and acceleration-deceleration cycles.
- 3. WYDOT should research the needs for Connected Vehicle technology in this area and implement CV technology if feasible.
- 4. WYDOT should assess the feasibility of snow fence installation and construct snow fence where reasonable.
- 5. Other lower priority potential mitigation efforts might include modifying road geometrics and safety barriers to reduce snow drifting.

Interstate 80 - RM 3 to RM 18

Priority: 7

This highway section exhibits high risks for winter weather and bridge strikes at RM 12.65 (bridges AMT and AMS). Each of these bridges carries I-80 and could lead to significant issues if a bridge strike were to close I-80. Daily traffic volumes are nearly 12,000. Estimated delay costs exceed \$1,000,000 per mile per year. The following are recommended actions to mitigate the identified risks:

- 1. WYDOT should continue to assess and modify their snow removal and winter weather management procedures to try to reduce the length of closures and decrease delay conditions.
- 2. WYDOT should research and develop "Connected Vehicle" communication, vehicle to vehicle, and vehicle to infrastructure technology for winter weather delay mitigation.
- 3. WYDOT should assess the feasibility of snow fence installation and construct snow fence where reasonable.
- 4. WYDOT should investigate the need for more advanced warning and better height limit warning signage for the bridges identified as high risk for bridge strikes. If the investigations show that improved signage won't likely decrease bridge strikes, then alternate routing procedures should be established for I-80 in the event of a bridge strike closure. WYDOT should establish alternate routing procedures that convey to drivers the alternate route, available services along the alternate route, oversize/overweight limitations, and truck parking availability. Alternate routes may include rerouting to parallel lanes or routing to highways in adjacent states. This process might also be conveyed through "Connected Vehicle" communication technology if available in the area. WYDOT should develop individual task plans assigning specific tasks to accomplish the smooth transition to and from the alternate route(s).

Interstate 25 - RM 8 to RM 13

Priority: 8

This urban highway section exhibits high risks for winter weather delay and air quality. Daily traffic volumes average over 20,800. Estimated delay costs are about \$950,000 per mile per year. The following are recommended actions to mitigate the identified risks:

- 1. WYDOT should continue to assess and modify their snow removal and winter weather management procedures to try to reduce the length of closures, decrease delay conditions, and reduce tailpipe emissions from vehicle idling and acceleration-deceleration cycles.
- 2. WYDOT should research and develop "Connected Vehicle" communication, vehicle to vehicle, and vehicle to infrastructure technology for winter weather and tailpipe emission mitigation.
- 3. Alternate routing procedures should be established for I-25 North of Cheyenne in the event of significant weather-related closures. WYDOT should establish alternate routing procedures that convey to drivers the alternate route, oversize/overweight limitations, available services, and truck parking availability along the route in the event of bridge closure. Alternate routes may include rerouting to highways in adjacent states. This process might also be conveyed through "Connected Vehicle" communication technology if available in the area. WYDOT should develop individual task plans assigning specific tasks to accomplish the smooth transition to and from the alternate route(s).
- 4. WYDOT should create or incentivize the electrification of truck parking areas.
- 5. WYDOT should provide or incentivize diesel retrofits to reduce emissions.
- 6. WYDOT might modify road geometrics and safety barriers to reduce snow drifting.

Interstate 80 – RM 122 to RM 142

Priority: 9

This roadway section exhibits high risks for air quality issues and bridge strikes at RM 130.84 (bridge AQZ). This bridge carries I-80 and could lead to significant issues if it were struck and cause the closure of I-80. Daily traffic volumes are approximately 12,100. Estimated delay is approximately 11,100 hours per mile per year. The following are recommended actions to mitigate the identified risks:

- 1. To reduce tailpipe emissions, WYDOT should create or incentivize the electrification of truck parking areas.
- 2. WYDOT should research and develop "Connected Vehicle" communication, vehicle to vehicle and vehicle to infrastructure technology for tailpipe emission reductions.
- 3. WYDOT should continue to assess and modify their snow removal and winter weather management procedures to reduce the length of closures, decrease delay conditions, and reduce tailpipe emissions from vehicle idling and acceleration-deceleration cycles.
- 4. WYDOT should assess the feasibility of snow fence installation and construct snow fence where reasonable.
- 5. WYDOT should investigate the need for more advanced warning and better height limit warning signage for the high strike risk bridge identified above. If the investigations show that improved signage won't likely decrease bridge strikes, then alternative routing procedures should be established for I-80 in the event of a bridge strike closure. The procedures should include

developing individual task plans assigning specific tasks to individuals to accomplish the smooth transitions to and from the alternate route(s).

- 6. WYDOT should establish alternative routing procedures in the event of serious flooding at the bridges identified above. The procedures should include developing individual task plans assigning specific tasks to individuals to accomplish the smooth transitions to and from the alternate route(s).
- 7. WYDOT should assess the feasibility of lowering the grade under the bridge.

Interstate 80 – at RM 77.5

Priority: 10

This roadway section exhibits high risks for bridge flooding at RM 77.5 (bridges AOR and AOS). These bridges carry I-80 and could lead to significant issues if one of the bridges were flood damaged and caused the closure of I-80. Daily traffic volumes are approximately 14,100. The following are recommended actions to mitigate the identified risks:

- 1. WYDOT should establish alternative routing procedures in the event of serious flooding at the bridges identified above. The procedures should include developing individual task plans assigning specific tasks to individuals to accomplish the smooth transitions to and from the alternate route(s).
- 2. WYDOT should assess the feasibility of increasing bridge scour protection.
- 3. WYDOT should consider a redesigning the bridge for increased streamflow capacity in the event it is seriously damaged in a flood.

Interstate 90 – at RM 15

Priority: 11

This roadway section exhibits high risks for bridge flooding at RM 15 (bridges BAZ and BBA). These bridges carry I-90 and could lead to significant issues if the bridge were flood damaged and caused the closure of I-90. Daily traffic volumes are approximately 6,900. The following are recommended actions to mitigate the identified risks:

- 1. WYDOT should establish alternative routing procedures in the event of serious flooding at the bridges identified above. The procedures should include developing individual task plans assigning specific tasks to individuals to accomplish the smooth transitions to and from the alternate route(s).
- 2. WYDOT should assess the feasibility of increasing bridge scour protection.
- 3. WYDOT should consider a redesigning the bridge for increased streamflow capacity in the event it is seriously damaged in a flood.

US 14/16/20 - at RM 32

Priority: 12

This roadway section exhibits high risks for bridge flooding at RM 32 (bridge DZU). This bridge carries US 14/16/20 and could lead to significant issues if the bridge were flood damaged and caused the closure of the road. Daily traffic volumes are approximately 2,300. The following are recommended actions to mitigate the identified risks:

- 1. WYDOT should establish alternative routing procedures in the event of serious flooding at the bridges identified above. The procedures should include developing individual task plans assigning specific tasks to individuals to accomplish the smooth transitions to and from the alternate route(s).
- 2. WYDOT should assess the feasibility of increasing bridge scour protection.
- 3. WYDOT should consider a redesigning the bridge for increased streamflow capacity in the event it is seriously damaged in a flood.

US 14/16/20 - at RM 46.7

Priority: 13

This roadway section exhibits high risks for bridge flooding at RM 46.7 (bridge BZT). This bridge carries US 14/16/20 and could lead to significant issues if the bridge were flood damaged and caused the closure of the road. Daily traffic volumes are approximately 2,300. The following are recommended actions to mitigate the identified risks:

- 1. WYDOT should establish alternative routing procedures in the event of serious flooding at the bridges identified above. The procedures should include developing individual task plans assigning specific tasks to individuals to accomplish the smooth transitions to and from the alternate route(s).
- 2. WYDOT should assess the feasibility of increasing bridge scour protection.
- 3. WYDOT should consider a redesigning the bridge for increased streamflow capacity in the event it is seriously damaged in a flood.

US 85 (Greeley Hwy) – RM 4 to RM 8

Priority: 14

This urban roadway section exhibits high risks for winter weather and air quality issues Daily traffic volumes are approximately 9,500 while estimated delay costs are approximately \$517,000 per mile per year. Some of the delay may be from urban traffic congestion in the area. The following are recommended actions to mitigate the identified risks:

- 1. WYDOT should assess and modify traffic signals and controls to minimize congestion.
- 2. WYDOT should evaluate adding lanes and establishing alternative routes.
- 3. WYDOT should evaluate locations for snow fence installation.
- 4. WYDOT should continue to assess and modify their snow removal and winter weather management procedures to reduce the length of closures, decrease delay conditions, and reduce tailpipe emissions from vehicle idling and acceleration-deceleration cycles.

- 5. WYDOT should encourage and incentivize the use of PrePass at the port-of-entry to reduce truck tailpipe emissions.
- 6. To reduce tailpipe emissions, WYDOT should create or incentivize the electrification of truck parking areas.
- 7. WYDOT should research and develop "Connected Vehicle" vehicle to vehicle, vehicle to infrastructure and communication technology for winter weather delay and tailpipe emission mitigation issues.
- 8. WYDOT should provide or incentivize diesel retrofits to reduce emissions.

Interstate 80 – RM 235 to RM 272

Priority: 15

This highway section exhibits high risks for winter weather and bridge strikes at RM 235.28 and 260.23 (bridges AUR and AVG). These bridges carry I-80 and could lead to significant issues if a bridge strike were to close I-80. Daily traffic volumes are over 10,500. Estimated delay costs are approximately \$781,000 per mile per year. The following are recommended actions to mitigate the identified risks:

- 1. WYDOT should continue to assess and modify their snow removal and winter weather management procedures to decrease delay conditions.
- 2. WYDOT should research and develop "Connected Vehicle" communication, vehicle to vehicle, and vehicle to infrastructure technology to reduce winter weather delay issues.
- 3. WYDOT should evaluate locations for snow fence installation.
- 4. WYDOT should investigate the need for more advanced warning and better height limit warning signage for the bridges identified above for bridge strike risk. If the investigations show that improved signage won't likely decrease bridge strikes, then alternative routing procedures should be established for I-80 in the event of a bridge strike closure. The procedures should develop individual task plans assigning specific tasks to individuals to accomplish the smooth transitions to and from the alternate route(s).

US 20/26 - RM 0 to RM 2

Priority: 16

This urban roadway section exhibits high risks for winter weather and air quality issues Daily traffic volumes are approximately 11,200 while estimated delay costs are approximately \$644,000 per mile per year. Most of the delay is likely from urban traffic congestion in the area. The following are recommended actions to mitigate the identified risks:

- 1. WYDOT should assess and modify traffic signals and controls to minimize congestion.
- 2. WYDOT should evaluate adding lanes and establishing alternative routes.
- 3. WYDOT should continue to assess and modify their snow removal and winter weather management procedures to reduce the length of closures, decrease delay conditions, and reduce tailpipe emissions from vehicle idling and acceleration-deceleration cycles.
- 4. To reduce tailpipe emissions, WYDOT should create or incentivize the electrification of truck parking areas.

- 5. WYDOT should research and develop "Connected Vehicle" vehicle to vehicle, vehicle to infrastructure and communication technology for winter weather delay and tailpipe emission mitigation issues.
- 6. WYDOT should provide or incentivize diesel retrofits to reduce emissions.

Interstate 80 - at RM 77.34

Priority: 17

This roadway section exhibits high risks for bridge strikes at RM 77.34 (bridge AOQ). This bridge carries I-80 and could lead to significant issues if it were struck and damaged causing the closure of the road. Daily traffic volumes are approximately 14,000. The following are recommended actions to mitigate the identified risks:

- WYDOT should investigate the need for more advanced warning and better height limit warning signage for the high strike risk bridge identified above. If the investigations show that improved signage won't likely decrease bridge strikes, then alternative routing procedures should be established for I-80 in the event of a bridge strike closure. The procedures should include developing individual task plans assigning specific tasks to individuals to accomplish the smooth transitions to and from the alternate route(s).
- 2. WYDOT should assess the feasibility of lowering the grade under the bridge.

Interstate 80 – at RM 146.85

Priority: 18

This roadway section exhibits high risks for bridge strikes at RM 146.85 (bridge ARN). This bridge carries I-80 and could lead to significant issues if it were struck and damaged causing the closure of the road. Daily traffic volumes are approximately 13,600. The following are recommended actions to mitigate the identified risks:

- WYDOT should investigate the need for more advanced warning and better height limit warning signage for the high strike risk bridge identified above. If the investigations show that improved signage won't likely decrease bridge strikes, then alternative routing procedures should be established for I-80 in the event of a bridge strike closure. The procedures should include developing individual task plans assigning specific tasks to individuals to accomplish the smooth transitions to and from the alternate route(s).
- 2. WYDOT should assess the feasibility of lowering the grade under the bridge.

Interstate 80 – at RM 196.16

Priority: 19

This roadway section exhibits high risks for bridge strikes at RM 196.16 (bridge ASV). This bridge carries I-80 and could lead to significant issues if it were struck and damaged causing the closure of the road.

Daily traffic volumes are approximately 12,300. The following are recommended actions to mitigate the identified risks:

- WYDOT should investigate the need for more advanced warning and better height limit warning signage for the high strike risk bridge identified above. If the investigations show that improved signage won't likely decrease bridge strikes, then alternative routing procedures should be established for I-80 in the event of a bridge strike closure. The procedures should include developing individual task plans assigning specific tasks to individuals to accomplish the smooth transitions to and from the alternate route(s).
- 2. WYDOT should assess the feasibility of lowering the grade under the bridge.

Interstate 80 - RM 310 to RM 316

Priority: 20

This urban roadway section exhibits high risks for air quality issues and bridge strikes at RM 313.19 (bridges LBN and LBO). These bridges carry I-80 and could lead to significant issues if a bridge strike were to close I-80. Daily traffic volumes are approximately 12,500. Estimated delay is approximately 19,200 per mile per year. The following are recommended actions to mitigate the identified risks:

- 1. To reduce tailpipe emissions, WYDOT should create or incentivize the electrification of truck parking areas.
- WYDOT should research and develop "Connected Vehicle" vehicle to vehicle, vehicle to infrastructure and communication technology reduce delay and tailpipe emission mitigation issues.
- 3. WYDOT should continue to assess and modify their snow removal and winter weather management procedures to reduce the length of closures, decrease delay conditions, and reduce tailpipe emissions from vehicle idling and acceleration-deceleration cycles.
- 4. WYDOT should investigate the need for more advanced warning and better height limit warning signage for the bridges identified above for bridge strike risk. If the investigations show that improved signage won't likely decrease bridge strikes, then alternative routing procedures should be established for I-80 in the event of a bridge strike closure. The procedures should develop individual task plans assigning specific tasks to individuals to accomplish the smooth transitions to and from the alternate route(s).
- 5. WYDOT should assess the feasibility of lowering the grade under the bridge.

Interstate 80 – at RM 173.89

Priority: 21

This roadway section exhibits high risks for bridge strikes at RM 173.89 (bridge LZW). This bridge carries I-80 and could lead to significant issues if it were struck and damaged causing the closure of the road. Daily traffic volumes are approximately 12,100. The following are recommended actions to mitigate the identified risks:

- 1. WYDOT should investigate the need for more advanced warning and better height limit warning signage for the high strike risk bridge identified above. If the investigations show that improved signage won't likely decrease bridge strikes, then alternative routing procedures should be established for I-80 in the event of a bridge strike closure. The procedures should include developing individual task plans assigning specific tasks to individuals to accomplish the smooth transitions to and from the alternate route(s).
- 2. WYDOT should assess the feasibility of lowering the grade under the bridge.

Interstate 80 – at RM 187.2

Priority: 22

This roadway section exhibits high risks for bridge strikes at RM 187.2 (bridges ASP and ASQ). These bridges carry I-80 and could lead to significant issues if one were struck and damaged causing the closure of the road. Daily traffic volumes are approximately 12,300. The following are recommended actions to mitigate the identified risks:

- WYDOT should investigate the need for more advanced warning and better height limit warning signage for the high strike risk bridge identified above. If the investigations show that improved signage won't likely decrease bridge strikes, then alternative routing procedures should be established for I-80 in the event of a bridge strike closure. The procedures should include developing individual task plans assigning specific tasks to individuals to accomplish the smooth transitions to and from the alternate route(s).
- 2. WYDOT should assess the feasibility of lowering the grade under the bridges.

Interstate 80 – at RM 383.36

Priority: 23

This roadway section exhibits high risks for bridge strikes at RM 383.36 (bridge AZW). This bridge carries I-80 and could lead to significant issues if it were struck and damaged causing the closure of the road. Daily traffic volumes are approximately 10,600. The following are recommended actions to mitigate the identified risks:

- WYDOT should investigate the need for more advanced warning and better height limit warning signage for the high strike risk bridge identified above. If the investigations show that improved signage won't likely decrease bridge strikes, then alternative routing procedures should be established for I-80 in the event of a bridge strike closure. The procedures should include developing individual task plans assigning specific tasks to individuals to accomplish the smooth transitions to and from the alternate route(s).
- 2. WYDOT should assess the feasibility of lowering the grade under the bridge.

Interstate 25 – RM 0 to RM 8

Priority: 24

This highway section exhibits high risks for air quality. Daily traffic volumes average over 22,100. Estimated delays are estimate at about 25,500 hours per mile per year. The following are recommended actions to mitigate the identified risks:

- 1. WYDOT should create or incentivize the electrification of truck parking areas.
- 2. WYDOT should encourage and incentivize the use of PrePass at the port-of-entry to reduce truck tailpipe emissions.
- 3. WYDOT should research and develop "Connected Vehicle" communication, vehicle to vehicle, and vehicle to infrastructure technology for winter weather and tailpipe emission mitigation.
- 4. WYDOT should continue to assess and modify their snow removal and winter weather management procedures to try to reduce the length of closures, decrease delay conditions, and reduce tailpipe emissions from vehicle idling and acceleration-deceleration cycles.
- 5. WYDOT should provide or incentivize diesel retrofits to reduce emissions.
- 6. WYDOT should evaluate locations for snow fence installation.

US 14/16/20 - at RM 15.8

Priority: 25

This roadway section exhibits high risks for bridge flooding at RM 15.8 (bridge KTC). This bridge carries US 14/16/20 and could lead to significant issues if the bridge were flood damaged and caused the closure of the road. Daily traffic volumes are approximately 1,500. The following are recommended actions to mitigate the identified risks:

- 1. WYDOT should establish alternative routing procedures in the event of serious flooding at the bridges identified above. The procedures should include developing individual task plans assigning specific tasks to individuals to accomplish the smooth transitions to and from the alternate route(s).
- 2. WYDOT should assess the feasibility of increasing bridge scour protection.
- 3. WYDOT should consider a redesigning the bridge for increased streamflow capacity in the event it is seriously damaged in a flood.

US 14/16/20 - at RM 20.3

Priority: 26

This roadway section exhibits high risks for bridge flooding at RM 20.3 (bridge JJJ). This bridge carries US 14/16/20 and could lead to significant issues if the bridge were flood damaged and caused the closure of the road. Daily traffic volumes are approximately 1,500. The following are recommended actions to mitigate the identified risks:

- 1. WYDOT should establish alternative routing procedures in the event of serious flooding at the bridges identified above. The procedures should include developing individual task plans assigning specific tasks to individuals to accomplish the smooth transitions to and from the alternate route(s).
- 2. WYDOT should assess the feasibility of increasing bridge scour protection.

3. WYDOT should consider a redesigning the bridge for increased streamflow capacity in the event it is seriously damaged in a flood.

US 26/287 – at RM 3.6

Priority: 26

This roadway section exhibits high risks for bridge flooding at RM 3.6 (bridge JJJ). This bridge carries US 26/287 and could lead to significant issues if the bridge were flood damaged and caused the closure of the road. Daily traffic volumes are approximately 1,300. The following are recommended actions to mitigate the identified risks:

- 1. WYDOT should establish alternative routing procedures in the event of serious flooding at the bridges identified above. The procedures should include developing individual task plans assigning specific tasks to individuals to accomplish the smooth transitions to and from the alternate route(s).
- 2. WYDOT should assess the feasibility of increasing bridge scour protection.
- 3. WYDOT should consider a redesigning the bridge for increased streamflow capacity in the event it is seriously damaged in a flood.

Interstate 80 – RM 359 to RM 364

Priority: 28

This highway section exhibits high risks for air quality. Daily traffic volumes are over 18,000. Estimated traffic delays are approximately 15,200 hours per mile per year. The following are recommended actions to mitigate the identified risks:

- 1. To reduce tailpipe emissions, WYDOT should create or incentivize the electrification of truck parking areas.
- 2. WYDOT should research and develop "Connected Vehicle" technology for tailpipe emission mitigation.
- 3. WYDOT should continue to assess and modify their snow removal and winter weather management procedures to reduce the length of closures, decrease delay conditions, and reduce tailpipe emissions from vehicle idling and acceleration-deceleration cycles.
- 4. Another lower priority potential mitigation effort might include incentivizing diesel retrofits.

Interstate 25 – RM 13 to RM 17

Priority: 29

This highway section exhibits high risks for air quality. Daily traffic volumes are over 11,800. Estimated traffic delays are approximately 15,700 hours per mile per year. The following are recommended actions to mitigate the identified risks:

- 1. To reduce tailpipe emissions, WYDOT should create or incentivize the electrification of truck parking areas.
- 2. WYDOT should research and develop "Connected Vehicle" technology for tailpipe emission mitigation.
- 3. WYDOT should continue to assess and modify their snow removal and winter weather management procedures to reduce the length of closures, decrease delay conditions, and reduce tailpipe emissions from vehicle idling and acceleration-deceleration cycles.
- 4. WYDOT should incentivize diesel retrofits.

Interstate 80 - at RM 23.91

Priority: 30

This roadway section exhibits high risks for bridge strikes at RM 23.91 (bridge ANH). This bridge carries I-80 and could lead to significant issues if it were struck and damaged causing the closure of the road. Daily traffic volumes are approximately 12,000. The following are recommended actions to mitigate the identified risks:

- WYDOT should investigate the need for more advanced warning and better height limit warning signage for the high strike risk bridge identified above. If the investigations show that improved signage won't likely decrease bridge strikes, then alternative routing procedures should be established for I-80 in the event of a bridge strike closure. The procedures should include developing individual task plans assigning specific tasks to individuals to accomplish the smooth transitions to and from the alternate route(s).
- 2. WYDOT should assess the feasibility of lowering the grade under the bridge.

Interstate 80 – at RM 210.98

Priority: 31

This roadway section exhibits high risks for bridge strikes at RM 210.98 (bridge ATO). This bridge carries I-80 and could lead to significant issues if it were struck and damaged causing the closure of the road. Daily traffic volumes are approximately 13,500. The following are recommended actions to mitigate the identified risks:

- WYDOT should investigate the need for more advanced warning and better height limit warning signage for the high strike risk bridge identified above. If the investigations show that improved signage won't likely decrease bridge strikes, then alternative routing procedures should be established for I-80 in the event of a bridge strike closure. The procedures should include developing individual task plans assigning specific tasks to individuals to accomplish the smooth transitions to and from the alternate route(s).
- 2. WYDOT should assess the feasibility of lowering the grade under the bridge.

Interstate 80 - at RM 219.59

Priority: 32

This roadway section exhibits high risks for bridge strikes at RM 219.59 (bridges KJA and KHZ). These bridges carry I-80 and could lead to significant issues if one were struck and damaged causing the closure of the road. Daily traffic volumes are approximately 13,000. The following are recommended actions to mitigate the identified risks:

- WYDOT should investigate the need for more advanced warning and better height limit warning signage for the high strike risk bridge identified above. If the investigations show that improved signage won't likely decrease bridge strikes, then alternative routing procedures should be established for I-80 in the event of a bridge strike closure. The procedures should include developing individual task plans assigning specific tasks to individuals to accomplish the smooth transitions to and from the alternate route(s).
- 2. WYDOT should assess the feasibility of lowering the grade under the bridge.

Interstate 25 – RM 25 to RM 34

Priority: 33

This highway section exhibits high risks for air quality. Daily traffic volumes average over 7,900. Estimated delays are estimated at about 12,600 hours per mile per year. The following are recommended actions to mitigate the identified risks:

- 1. WYDOT should create or incentivize the electrification of truck parking areas.
- 2. WYDOT should research and develop "Connected Vehicle" communication, vehicle to vehicle, and vehicle to infrastructure technology for winter weather and tailpipe emission mitigation.
- 3. WYDOT should continue to assess and modify their snow removal, winter weather management procedures and build snow fences to try to reduce the length of closures, decrease delay conditions, and reduce tailpipe emissions from vehicle idling and acceleration-deceleration cycles.
- 4. WYDOT should provide or incentivize diesel retrofits to reduce emissions.

Interstate 90 - RM 21 to RM 25

Priority: 34

This urban highway section exhibits high risks for air quality. Daily traffic volumes are nearly 8,800. Estimated delays are approximately 12,600 hours per mile per year. The following are recommended actions to mitigate the identified risks:

1. WYDOT should continue to assess and modify their snow removal and winter weather management procedures to reduce the length of closures, decrease delay conditions, and reduce tailpipe emissions from vehicle idling and acceleration-deceleration cycles.

- 2. To reduce tailpipe emissions, WYDOT should create or incentivize the electrification of truck parking areas.
- 3. WYDOT should research and develop "Connected Vehicle" vehicle to vehicle, vehicle to infrastructure and communication technology for tailpipe emission mitigation issues.
- 4. WYDOT should provide or incentivize diesel retrofits to reduce emissions.

US 14A - RM 23 to RM 26

Priority: 35

This highway section exhibits high risks for air quality. Daily traffic volumes are approximately 12,800. Estimated delays are approximately 18,600 hours per mile per year. The following are recommended actions to mitigate the identified risks:

- 1. WYDOT should continue to assess and modify their snow removal and winter weather management procedures to reduce the length of closures, decrease delay conditions, and reduce tailpipe emissions from vehicle idling and acceleration-deceleration cycles.
- 2. WYDOT should research and develop "Connected Vehicle" vehicle to vehicle, vehicle to infrastructure and communication technology for tailpipe emission mitigation issues.
- 3. WYDOT should assess construction of new snow fences to reduce snow drifting and therefore reduce acceleration/deceleration cycles of vehicles that increase pollution emissions.
- 4. WYDOT should provide or incentivize diesel retrofits to reduce emissions.

Casper Bypass (US 20/26 I 25 Connector) – RM 0 to RM 3

Priority: 35

This highway section exhibits high risks for air quality. Daily traffic volumes are approximately 1,500. Estimated delays are approximately 27,100 hours per mile per year. The following are recommended actions to mitigate the identified risks:

- 1. To reduce tailpipe emissions, WYDOT should create or incentivize the electrification of truck parking areas.
- 2. WYDOT should continue to assess and modify their snow removal and winter weather management procedures to reduce the length of closures, decrease delay conditions, and reduce tailpipe emissions from vehicle idling and acceleration-deceleration cycles.
- 3. WYDOT should research and develop "Connected Vehicle" vehicle to vehicle, vehicle to infrastructure and communication technology for tailpipe emission mitigation issues.
- 4. WYDOT should assess construction of new snow fences to reduce snow drifting and therefore reduce acceleration/deceleration cycles of vehicles that increase pollution emissions.
- 5. WYDOT should provide or incentivize diesel retrofits to reduce emissions.

Appendix A

Bridge Flooding Action Plans

Wyoming Department of Transportation Tourism Resilience Action Plans - Bridge Flooding

Analysis Year:		2018							
Asset / Location:		-80 at Blacks Fork River, ML80 at 77.5, Bridge IDs = AOS and AOR							
Ownership: WYDOT		WYDOT		Criticality Rank:	6 of 70				
Risk Probability	Rtg:	4		Risk Consequence Rtg:	4				
Priority Rtg:		High		Issue Type:	Infrastructural				
Issues:		High traffic. A fairly long detour may b	be required if both bridges are damaged. The bridges are	required if both bridges are damaged. The bridges are in fair condition. High stream flow variability.					
Vulnerabilities			Strengths	Objectives					
Possible long d	etour		Paired bridges may provide a redundant route if not	Return I-80 traffic to normal conditions as quickly as	possible.				
The only Interst	ate route for the	e area	damaged also	Minimize user, agency and societal costs.					
Bridges carry 14,054 vehicles per day.			Scour Rating = 8.	Minimize delays.					
<u>Perform</u> <u>Action B</u> efore, <u>D</u> uring or <u>A</u> fter	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational,	Actions	Dree	Cono	Potential Tasks Involving				
the Event	<u>P</u> lan	Actions	Pros	Cons	Stakenoiders				
В	Н	Replace with higher capacity bridges. Upgrade approaches accordingly.	1. Permanent fix. Shouldn't have to address later.	 Expensive. Requires temporary rerouting solution. May create long-term hardships for users, businesses and residents. 	1. Inform WTA and municipalities in the area.				
В	Н	Upgrade scour prone attributes of the bridges.	 Lower cost than full replacement. Scour protection upgrades will protect both bridges. 	 May be expensive. May not provide adequate protection for large floods. Bridges already have good scour rating. 					
D, A	R, O	Repair the bridges following each incident. Establish and enact reroute procedures in the event the bridges are closed.	 Fast recovery of facility function. Short-term lower agency cost compared to bridge replacement. Fairly low user cost during repair. 	 Multiple closures may be cumbersome to users, businesses and residents. Damage may be extensive requiring bridge replacement(s). 	 Establish procedures with WHP and local transportation departments along the redundant route. Inform WTA. 				

Wyoming Department of Transportation Tourism Resilience Action Plans - Bridge Flooding

Analysis Year: 2018		2018							
Asset / Location:		US-14/16/20 at Shoshone River, ML31 at 46.7, Bridge ID(s) = BZT							
Ownership: WYDOT				Criticality Rank:	5 of 70				
Risk Probability	Rtg:	5		Risk Consequence Rtg:	4				
Priority Rtg:		High		Issue Type:	Infrastructural				
		A fairly long detour may be required i	f bridge is damaged. The bridge is in fair condition. Fairl	y high stream flow variability. Redundant routes would	have to be through Yellowstone				
Issues:		Park.							
Vulnerabilities			Strengths	Objectives					
Possible long, p	problematic dete	our.	Scour Rating = 8.	Return traffic to normal conditions as quickly as poss	sible.				
Limited roadway alternatives in the area		n the area.		Minimize user, agency and societal costs.					
Bridge carries 2	523 vehicles p	er day.		Minimize closure length.					
<u>Perform</u> <u>Action B</u> efore, <u>D</u> uring or <u>A</u> fter	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational,			_	Potential Tasks Involving				
the Event	<u>P</u> lan	Actions	Pros	Cons	Stakeholders				
В	Н	Replace with higher capacity bridge. Upgrade approaches accordingly.	1. Permanent fix. Shouldn't have to address later.	 Expensive. Requires temporary rerouting solution. May create long-term hardships for users, businesses and residents. 	1. Inform National Parks Service (NPS) and municipalities in the area.				
В	Н	Upgrade scour prone attributes of the bridge.	 Lower cost than full replacement. Scour protection upgrades will protect both bridges. 	 May be expensive. May not provide adequate protection for large floods. Bridge already has good scour rating. 					
D, A	R, 0	Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridges is closed.	 Fast recovery of facility function. Short-term lower agency cost compared to bridge replacement. Fairly low user cost during repair. 	 Multiple closures may be cumbersome to users, businesses and residents. Damage may be extensive requiring bridge replacement(s). 	 Establish procedures with WHP and local transportation departments along the redundant route. Inform NPS. 				
Analysis Year: 2018		2018							
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Asset / Location: US-14/16/20 at N Fork Shoshone R		US-14/16/20 at N Fork Shoshone Riv	er, ML31 at 32, Bridge ID(s) = DZU						
Ownership:		WYDOT		Criticality Rank:	5 of 70				
Risk Probability	/ Rtg:	5		Risk Consequence Rtg:	3				
Priority Rtg:		High		Issue Type:	Infrastructural				
loouoo:		A fairly long detour may be required in	f bridge is damaged. The bridge is in fair condition. Fairl	y high stream flow variability. Redundant routes would	have to go through Yellowstone				
Vulnorabilition		rain.	Strongths	Objectives					
Descible long	arablamatia dat	our.	Socur Dating = 9	Objectives	aible				
Limited readwa	v alternativos ir	our.	Scoul Rating – 6.	Minimize user, agency and societal costs	SIDIE.				
Bridge corrige	2250 vohiolos n	or day		Minimize user, agency and societal costs.					
Perform	2209 veriicies p	ei uay.							
<u>Action B</u> efore, <u>D</u> uring or <u>A</u> fter the Event	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational, Plan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders				
В	Н	Replace with higher capacity bridge. Upgrade approaches accordingly.	1. Permanent fix. Shouldn't have to address later.	 Expensive. Requires temporary rerouting solution. May create long-term hardships for users, businesses and residents. 	 Inform National Parks Service (NPS) and municipalities in the area. 				
В	Н	Upgrade scour prone attributes of the bridge.	 Lower cost than full replacement. Scour protection upgrades will protect both bridges. 	 May be expensive. May not provide adequate protection for large floods. Bridge already has good scour rating. 					
D, A	R, O	Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridges is closed.	 Fast recovery of facility function. Short-term lower agency cost compared to bridge replacement. Fairly low user cost during repair. 	 Multiple closures may be cumbersome to users, businesses and residents. Damage may be extensive requiring bridge replacement(s). 	 Establish procedures with WHP and local transportation departments along the redundant route. Inform NPS. 				

Analysis Year:		2018						
Asset / Location	ו:	I-90 at Tongue River, ML90 at 15, Bri	at Tongue River, ML90 at 15, Bridge IDs = BAZ and BBA.					
Ownership:		WYDOT		Criticality Rank:	13 of 70			
Risk Probability	Rtg:	3		Risk Consequence Rtg:	5			
Priority Rtg:		High		Issue Type:	Infrastructural			
Issues:		Fairly high traffic. A long detour may	be required if both bridges are damaged. The bridges a	re in fair condition. High stream flow variability.				
Vulnerabilities			Strengths	Objectives				
Possible long d	etour		Paired bridges may provide a redundant route if not	Return I-90 traffic to normal conditions as quickly as	possible.			
The only Interst	ate route for th	e area	damaged also	Minimize user, agency and societal costs.				
Bridges carry 6	,945 vehicles p	er day.	Scour Rating = 8.	Minimize delays.				
<u>Perform</u> <u>Action B</u> efore, During or <u>A</u> fter the Event	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational, Plan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders			
В	Н	Replace with higher capacity bridges. Upgrade approaches accordingly.	1. Permanent fix. Shouldn't have to address later.	 Expensive. Requires temporary rerouting solution. May create long-term hardships for users, businesses and residents. 	1. Inform WTA and municipalities in the area.			
В	Н	Upgrade scour prone attributes of the bridges.	 Lower cost than full replacement. Scour protection upgrades will protect both bridges. 	 May be expensive. May not provide adequate protection for large floods. Bridges already have good scour rating. 				
D, A	R, O	Repair the bridges following each incident. Establish and enact reroute procedures in the event the bridges are closed.	 Fast recovery of facility function. Short-term lower agency cost compared to bridge replacement. Fairly low user cost during repair. 	 Multiple closures may be cumbersome to users, businesses and residents. Damage may be extensive requiring bridge replacement(s). 	 Establish procedures with WHP and local transportation departments along the redundant route. Inform WTA. 			

Analysis Year:		2018						
Asset / Location:		US-89 at Flat Creek, ML10 at 152.2,	JS-89 at Flat Creek, ML10 at 152.2, Bridge ID(s) = BOO					
Ownership:		WYDOT		Criticality Rank:	1 of 70			
Risk Probability	/ Rtg:	3		Risk Consequence Rtg:	5			
Priority Rtg:		High		Issue Type:	Infrastructural			
Issues:		Very high traffic volumes. A very long	detour may be required if bridge is damaged. The bridge	ge is in fair condition.				
Vulnerabilities			Strengths	Objectives				
Possible long d	etour.		Scour Rating = 8.	Return traffic to normal conditions as quickly as post	sible.			
Limited roadwa	y alternatives ir	n the area.	Low stream flow variability.	Minimize user, agency and societal costs.				
Bridge carries 3	33,632 vehicles	per day.		Minimize closure length.				
Perform Action Before, During or After	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational,	Actions	Brog	Cana	Potential Tasks Involving			
the Event	<u>P</u> lan	Actions	PIOS	Cons	Stakeholders			
В	Н	Replace with higher capacity bridge. Upgrade approaches accordingly.	1. Permanent fix. Shouldn't have to address later.	 Expensive. Requires temporary rerouting solution. May create long-term hardships for users, businesses and residents. 	1. Inform municipalities in the area.			
В	Н	Upgrade scour prone attributes of the bridge.	 Lower cost than full replacement. Scour protection upgrades will protect both bridges. 	 May be expensive. May not provide adequate protection for large floods. Bridge already has good scour rating. 				
D, A	R, O	Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridges is closed.	 Fast recovery of facility function. Short-term lower agency cost compared to bridge replacement. Fairly low user cost during repair. 	 Multiple closures may be cumbersome to users, businesses and residents. Damage may be extensive requiring bridge replacement(s). 	1. Establish procedures with WHP and local transportation departments along the redundant route.			

Analysis Year:		2018						
Asset / Location	ו:	I-80 at Green River, ML80 at 86.4, Br	0 at Green River, ML80 at 86.4, Bridge IDs = AOZ and APA					
Ownership:		WYDOT		Criticality Rank:	6 of 70			
Risk Probability	Rtg:	3		Risk Consequence Rtg:	4			
Priority Rtg:		Medium		Issue Type:	Infrastructural			
Issues:		High traffic. A long detour may be rec	uired if both bridges are damaged. The bridges are in fa	air condition. High stream flow variability.				
Vulnerabilities			Strengths	Objectives				
Possible long de	etour		Paired bridges may provide a redundant route if not	Return I-80 traffic to normal conditions as quickly as	possible.			
The only Interst	ate route for th	e area	damaged also	Minimize user, agency and societal costs.				
Bridges carry 1	5,175 vehicles	per day.	Scour Rating = 8.	Minimize delays.				
<u>Perform</u> <u>Action B</u> efore, <u>D</u> uring or <u>A</u> fter the Event	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational, Plan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders			
В	Н	Replace with higher capacity bridges. Upgrade approaches accordingly.	1. Permanent fix. Shouldn't have to address later.	 Expensive. Requires temporary rerouting solution. May create long-term hardships for users, businesses and residents. 	1. Inform WTA and municipalities in the area.			
В	Н	Upgrade scour prone attributes of the bridges.	 Lower cost than full replacement. Scour protection upgrades will protect both bridges. 	 May be expensive. May not provide adequate protection for large floods. Bridges already have good scour rating. 				
D, A	R, O	Repair the bridges following each incident. Establish and enact reroute procedures in the event the bridges are closed.	 Fast recovery of facility function. Short-term lower agency cost compared to bridge replacement. Fairly low user cost during repair. 	 Multiple closures may be cumbersome to users, businesses and residents. Damage may be extensive requiring bridge replacement(s). 	 Establish procedures with WHP and local transportation departments along the redundant route. Inform WTA. 			

Analysis Year:		2018						
Asset / Location	1:	US-89 at Snake River, ML10 at 142,	IS-89 at Snake River, ML10 at 142, Bridge ID(s) = BOL					
Ownership:		WYDOT		Criticality Rank:	1 of 70			
Risk Probability	Rtg:	3		Risk Consequence Rtg:	5			
Priority Rtg:		Medium		Issue Type:	Infrastructural			
Issues:		High traffic volumes. A very long deto	our may be required if bridge is damaged. The bridge is	in fair condition.				
Vulnerabilities			Strengths	Objectives				
Possible long de	etour.		Scour Rating = 8.	Return traffic to normal conditions as quickly as poss	sible.			
Limited roadway	y alternatives ir	n the area.	Low streamflow variability.	Minimize user, agency and societal costs.				
Bridge carries 8	,500 vehicles p	ber day.		Minimize closure length.				
<u>Perform</u> <u>Action B</u> efore, <u>D</u> uring or <u>A</u> fter	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational,		_		Potential Tasks Involving			
the Event	<u>P</u> lan	Actions	Pros	Cons	Stakeholders			
В	Н	Replace with higher capacity bridge. Upgrade approaches accordingly.	1. Permanent fix. Shouldn't have to address later.	 Expensive. Requires temporary rerouting solution. May create long-term hardships for users, businesses and residents. 	1. Inform municipalities in the area.			
В	Н	Upgrade scour prone attributes of the bridge.	 Lower cost than full replacement. Scour protection upgrades will protect both bridges. 	 May be expensive. May not provide adequate protection for large floods. Bridge already has good scour rating. 				
D, A	R, 0	Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridges is closed.	 Fast recovery of facility function. Short-term lower agency cost compared to bridge replacement. Fairly low user cost during repair. 	 Multiple closures may be cumbersome to users, businesses and residents. Damage may be extensive requiring bridge replacement(s). 	 Establish procedures with WHP and local transportation departments along the redundant route. 			

Wyoming Department of	Transportation	Tourism Resilience	Action Plans	Bridge Flooding
wyoning Department of	Transportation	I ourisin Resilience	ACTION FIGHTS	· Driuge Floouing

Analysis Year:		2018					
Asset / Location:		US-89 at Snake River, ML10 at 146.1, Bridge ID(s) = BOM					
Ownership:		WYDOT		Criticality Rank:	1 of 70		
Risk Probability	y Rtg:	2		Risk Consequence Rtg:	4		
Priority Rtg:		Medium		Issue Type:	Infrastructural		
Issues:		High traffic volumes. A very long deto	our may be required if bridge is damaged. The bridge is	in fair condition.			
Vulnerabilities			Strengths	Objectives			
Possible long of	detour.		Scour Rating = 8.	Return traffic to normal conditions as quickly as pos	sible.		
Limited roadwa	ay alternatives i	n the area.	Low streamflow variability.	Minimize user, agency and societal costs.			
Bridge carries	9,566 vehicles	per day.		Minimize closure length.			
<u>Perform</u> <u>Action B</u> efore, <u>D</u> uring or <u>A</u> fter the Event	<u>H</u> arden, <u>R</u> edundant, Operational, Plan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders		
В	н	Replace with higher capacity bridge. Upgrade approaches accordingly.	1. Permanent fix. Shouldn't have to address later.	 Expensive. Requires temporary rerouting solution. May create long-term hardships for users, businesses and residents. 	1. Inform municipalities in the area.		
В	н	Upgrade scour prone attributes of the bridge.	 Lower cost than full replacement. Scour protection upgrades will protect both bridges. 	 May be expensive. May not provide adequate protection for large floods. Bridge already has good scour rating. 			
D, A	R, O	Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridges is closed.	 Fast recovery of facility function. Short-term lower agency cost compared to bridge replacement. Fairly low user cost during repair. 	 Multiple closures may be cumbersome to users, businesses and residents. Damage may be extensive requiring bridge replacement(s). 	1. Establish procedures with WHP and local transportation departments along the redundant route.		

Analysis Year:		2018						
Asset / Location	1:	US-89 at Flat Creek, ML10 at 154, Br	·S-89 at Flat Creek, ML10 at 154, Bridge ID(s) = BOP					
Ownership:		WYDOT		Criticality Rank:	1 of 70			
Risk Probability	Rtg:	3		Risk Consequence Rtg:	4			
Priority Rtg:		Medium		Issue Type:	Infrastructural			
Issues:		Very high traffic volumes. A very long	detour may be required if bridge is damaged. The bridge	ge is in fair condition.				
Vulnerabilities			Strengths	Objectives				
Possible long de	etour.		Scour Rating = 8.	Return traffic to normal conditions as quickly as poss	sible.			
Limited roadway	y alternatives ir	n the area.	Low stream flow variability.	Minimize user, agency and societal costs.				
Bridge carries 8	,868 vehicles p	ber day.		Minimize closure length.				
<u>Perform</u> <u>Action B</u> efore, <u>D</u> uring or <u>A</u> fter	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational,	Actions	Dree	0	Potential Tasks Involving			
the Event	<u>P</u> lan	Actions	Pros	Cons	Stakeholders			
В	Н	Replace with higher capacity bridge. Upgrade approaches accordingly.	1. Permanent fix. Shouldn't have to address later.	 Expensive. Requires temporary rerouting solution. May create long-term hardships for users, businesses and residents. 	1. Inform municipalities in the area.			
В	Н	Upgrade scour prone attributes of the bridge.	 Lower cost than full replacement. Scour protection upgrades will protect both bridges. 	 May be expensive. May not provide adequate protection for large floods. Bridge already has good scour rating. 				
D, A	R, 0	Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridges is closed.	 Fast recovery of facility function. Short-term lower agency cost compared to bridge replacement. Fairly low user cost during repair. 	 Multiple closures may be cumbersome to users, businesses and residents. Damage may be extensive requiring bridge replacement(s). 	1. Establish procedures with WHP and local transportation departments along the redundant route.			

Analysis Year: 2018		2018			
Asset / Location: US-14/16/20 at N Fork Shoshone Ri		US-14/16/20 at N Fork Shoshone Riv	er, ML31 at 15.8, Bridge ID(s) = KTC		
Ownership:		WYDOT		Criticality Rank:	5 of 70
Risk Probability	Rtg:	4		Risk Consequence Rtg:	3
Priority Rtg:		Low		Issue Type:	Infrastructural
Issues:		A fairly long detour may be required i	f bridge is damaged. The bridge is in fair condition. Red	undant routes would have to go through Yellowstone F	Park.
Vulnerabilities			Strengths	Objectives	
Possible long, p	problematic det	our.	Scour Rating = 8.	Return traffic to normal conditions as quickly as post	sible.
Limited roadway	y alternatives ir	n the area.		Minimize user, agency and societal costs.	
Bridge carries 1	509 vehicles p	er day.		Minimize closure length.	
Perform <u>Action B</u> efore, During or <u>A</u> fter the Event	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational, Plan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
	<u>r</u> ian		1100		
В	Н	Replace with higher capacity bridge. Upgrade approaches accordingly.	1. Permanent fix. Shouldn't have to address later.	 Expensive. Requires temporary rerouting solution. May create long-term hardships for users, businesses and residents. 	 Inform National Parks Service (NPS) and municipalities in the area.
В	Н	Upgrade scour prone attributes of the bridge.	 Lower cost than full replacement. Scour protection upgrades will protect both bridges. 	 May be expensive. May not provide adequate protection for large floods. Bridge already has good scour rating. 	
D, A	R, 0	Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridges is closed.	 Fast recovery of facility function. Short-term lower agency cost compared to bridge replacement. Fairly low user cost during repair. 	 Multiple closures may be cumbersome to users, businesses and residents. Damage may be extensive requiring bridge replacement(s). 	 Establish procedures with WHP and local transportation departments along the redundant route. Inform NPS.

Analysis Year: 201		.018				
Asset / Location	1:	US-14/16/20 at N Fork Shoshone Riv	er, ML31 at 20.3, Bridge ID(s) = JJJ			
Ownership:		WYDOT		Criticality Rank:	5 of 70	
Risk Probability	Rtg:	4		Risk Consequence Rtg:	3	
Priority Rtg:		Low		Issue Type:	Infrastructural	
Issues:		A fairly long detour may be required it	f bridge is damaged. The bridge is in fair condition. Red	undant routes would have to go through Yellowstone F	Park.	
Vulnerabilities			Strengths	Objectives		
Possible long, p	oroblematic det	our.	Scour Rating = 8.	Return traffic to normal conditions as quickly as poss	sible.	
Limited roadway	y alternatives ir	n the area.		Minimize user, agency and societal costs.		
Bridge carries 1	509 vehicles p	er day.		Minimize closure length.		
<u>Perform</u> <u>Action B</u> efore, <u>D</u> uring or <u>A</u> fter	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational,			_	Potential Tasks Involving	
the Event	<u>P</u> lan	Actions	Pros	Cons	Stakeholders	
В	Н	Replace with higher capacity bridge. Upgrade approaches accordingly.	1. Permanent fix. Shouldn't have to address later.	 Expensive. Requires temporary rerouting solution. May create long-term hardships for users, businesses and residents. 	 Inform National Parks Service (NPS) and municipalities in the area. 	
В	Н	Upgrade scour prone attributes of the bridge.	 Lower cost than full replacement. Scour protection upgrades will protect both bridges. 	 May be expensive. May not provide adequate protection for large floods. Bridge already has good scour rating. 		
D, A	R, O	Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridges is closed.	 Fast recovery of facility function. Short-term lower agency cost compared to bridge replacement. Fairly low user cost during repair. 	 Multiple closures may be cumbersome to users, businesses and residents. Damage may be extensive requiring bridge replacement(s). 	 Establish procedures with WHP and local transportation departments along the redundant route. Inform NPS. 	

Analysis Year: 2018		2018			
Asset / Location	ו:	US-26/287 at Buffalo Fork Creek, ML	30 at 154, Bridge ID(s) = LWC		
Ownership:		WYDOT		Criticality Rank:	4 of 70
Risk Probability	Rtg:	4		Risk Consequence Rtg:	3
Priority Rtg:		Low		Issue Type:	Infrastructural
Issues:		A very long detour may be required if	bridge is damaged. The bridge is in fair condition.		
Vulnerabilities			Strengths	Objectives	
Possible long de	etour.		Scour Rating = 8.	Return traffic to normal conditions as quickly as poss	sible.
Limited roadway	y alternatives ir	the area.		Minimize user, agency and societal costs.	
Bridge carries 1	,252 vehicles p	er day.		Minimize closure length.	
<u>Perform</u> <u>Action B</u> efore, <u>D</u> uring or <u>A</u> fter	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational,	A	Dest	0	Potential Tasks Involving
the Event	<u>P</u> lan	Actions	Pros	Cons	Stakeholders
В	Н	Replace with higher capacity bridge. Upgrade approaches accordingly.	1. Permanent fix. Shouldn't have to address later.	 Expensive. Requires temporary rerouting solution. May create long-term hardships for users, businesses and residents. 	1. Inform municipalities in the area.
В	Н	Upgrade scour prone attributes of the bridge.	 Lower cost than full replacement. Scour protection upgrades will protect both bridges. 	 May be expensive. May not provide adequate protection for large floods. Bridge already has good scour rating. 	
D, A	R, 0	Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridges is closed.	 Fast recovery of facility function. Short-term lower agency cost compared to bridge replacement. Fairly low user cost during repair. 	 Multiple closures may be cumbersome to users, businesses and residents. Damage may be extensive requiring bridge replacement(s). 	1. Establish procedures with WHP and local transportation departments along the redundant route.

Appendix B

Bridge Strike Action Plans

Wyoming Department of	Transportation	Tourism Resilience	Action Plans	- Bridge Strike
	mansportation	rounsin aconchee	Action i lans	Dridge Strike

Analysis Year:		2018		-	
Asset / Locatior	ı:	I-80 at County Rd 59, ML80 at 85.7, E	Bridge ID = AOX, AOY		
Ownership:		WYDOT		Criticality Rank:	6 of 70
Risk Probability	Rtg:	5		Risk Consequence Rtg:	5
Priority Rtg:	0	High		Issue Type:	Infrastructural
Issues:		Underclearance is 17.59 ft Verv high	n traffic. 3 bridge strikes since 1994 (AOX hit twice).	,, ,,	
Vulnerabilities			Strengths	Objectives	
Possible long de	etour if both bri	dges damaged (unkikely).	Parallel bridge is available if not damaged also.	Return I-80 traffic to normal conditions as guickly as	possible.
The only Interst	ate route for the	e area.	5	Minimize user, agency and societal costs.	
Bridge carries 6	.821 vehicles p	per dav per bridge.		Minimize delays.	
	.,			Maintain safety and mobility in the region.	
Perform Action Before,	<u>H</u> arden, R edundant.				
During or After	On continued				Potential Tasks Involving
<u>D</u> uring or <u>A</u> fter the Event	<u>O</u> perational, <u>P</u> lan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
During or After the Event	<u>o</u> perational, <u>Plan</u> H	Actions Replace with a higher clearance bridge. Upgrade approaches accordingly.	Pros 1. Permanent fix. Shouldn't have to address later.	Cons 1. Expensive. 2. Requires temporary rerouting solution. 3. May create long-term hardships for users, businesses and residents.	Potential Tasks Involving Stakeholders
During or After the Event B B	<u>o</u> perational, <u>Plan</u> H H	Actions Replace with a higher clearance bridge. Upgrade approaches accordingly. Increase warning signage.	Pros 1. Permanent fix. Shouldn't have to address later. 1. Lowest cost alternative.	Cons 1. Expensive. 2. Requires temporary rerouting solution. 3. May create long-term hardships for users, businesses and residents. 1. May not be adequate to stop bridge strikes.	Potential Tasks Involving Stakeholders
During or After the Event B B	<u>o</u> perational, <u>Plan</u> H H	Actions Replace with a higher clearance bridge. Upgrade approaches accordingly. Increase warning signage. Repair the bridge following each incident. Establish and enact reroute procedures in the event the	Pros 1. Permanent fix. Shouldn't have to address later. 1. Lowest cost alternative. 1. Fast recovery of facility function. 2. Short-term lower agency cost compared to bridge replacement.	Cons 1. Expensive. 2. Requires temporary rerouting solution. 3. May create long-term hardships for users, businesses and residents. 1. May not be adequate to stop bridge strikes. 1. Multiple closures may be cumbersome to users, businesses and residents. 2. Damage may be extensive requiring bridge	Potential Tasks Involving Stakeholders 1. Establish procedures with WHP and local transportation departments along the redundant route.
During or After the Event B B D, A	<u>o</u> perational, <u>Plan</u> H H R, O	Actions Replace with a higher clearance bridge. Upgrade approaches accordingly. Increase warning signage. Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	Pros 1. Permanent fix. Shouldn't have to address later. 1. Lowest cost alternative. 1. Fast recovery of facility function. 2. Short-term lower agency cost compared to bridge replacement. 3. Fairly low user cost during repair.	Cons 1. Expensive. 2. Requires temporary rerouting solution. 3. May create long-term hardships for users, businesses and residents. 1. May not be adequate to stop bridge strikes. 1. Multiple closures may be cumbersome to users, businesses and residents. 2. Damage may be extensive requiring bridge replacement.	Potential Tasks Involving Stakeholders 1. Establish procedures with WHP and local transportation departments along the redundant route. 2. Inform WTA.
During or After the Event B B D, A	<u>O</u> perational, <u>Plan</u> H H R, O	Actions Replace with a higher clearance bridge. Upgrade approaches accordingly. Increase warning signage. Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	 Permanent fix. Shouldn't have to address later. Lowest cost alternative. Fast recovery of facility function. Short-term lower agency cost compared to bridge replacement. Fairly low user cost during repair. Likely to be a lower cost than bridge 	Cons 1. Expensive. 2. Requires temporary rerouting solution. 3. May create long-term hardships for users, businesses and residents. 1. May not be adequate to stop bridge strikes. 1. Multiple closures may be cumbersome to users, businesses and residents. 2. Damage may be extensive requiring bridge replacement. 1. May not be feasible given the current conditions. 2. May be drainage issues.	Potential Tasks Involving Stakeholders 1. Establish procedures with WHP and local transportation departments along the redundant route. 2. Inform WTA.

Analysis Year:		2018			
Asset / Location	า:	I-80 at WY-377, ML80 at 130.84, Brid	ige ID = AQZ		
Ownership:		WYDOT		Criticality Rank:	6 of 70
Risk Probability	/ Rtg:	5		Risk Consequence Rtg:	5
Priority Rtg:		High		Issue Type:	Infrastructural
Issues:		Underclearance is 14.5 ft. The bridge	is in moderate condition (NHPP rating of 5). Very high t	traffic. 3 strikes since 1994.	
Vulnerabilities			Strengths	Objectives	
Possible long d (unkikely).	etour if both bri	dges (AQZ & AQY) damaged	Parallel bridge is available if not damaged also.	Return I-80 traffic to normal conditions as quickly as	possible.
The only Interst	ate route for the	e area.		Minimize user, agency and societal costs.	
Bridge carries 6	3821 vehicles p	er day.		Minimize delays.	
				Maintain safety and mobility in the region.	
Perform Action Before,	<u>H</u> arden, <u>R</u> edundant,				Detential Teaks Involving
the Event	<u>O</u> perational, <u>P</u> lan	Actions	Pros	Cons	Stakeholders
During of Arter the Event	Operational, Plan	Actions Replace with a higher clearance bridge. Upgrade approaches accordingly.	Pros 1. Permanent fix. Shouldn't have to address later.	Cons 1. Expensive. 2. Requires temporary rerouting solution. 3. May create long-term hardships for users, businesses and residents.	Stakeholders
B B	Operational, Plan H H	Actions Replace with a higher clearance bridge. Upgrade approaches accordingly. Increase warning signage.	Pros 1. Permanent fix. Shouldn't have to address later. 1. Lowest cost alternative.	Cons 1. Expensive. 2. Requires temporary rerouting solution. 3. May create long-term hardships for users, businesses and residents. 1. May not be adequate to stop bridge strikes.	Stakeholders
B B D, A	Operational, Plan H H R, O	Actions Replace with a higher clearance bridge. Upgrade approaches accordingly. Increase warning signage. Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	Pros 1. Permanent fix. Shouldn't have to address later. 1. Lowest cost alternative. 1. Fast recovery of facility function. 2. Short-term lower agency cost compared to bridge replacement. 3. Fairly low user cost during repair.	Cons 1. Expensive. 2. Requires temporary rerouting solution. 3. May create long-term hardships for users, businesses and residents. 1. May not be adequate to stop bridge strikes. 1. Multiple closures may be cumbersome to users, businesses and residents. 2. Damage may be extensive requiring bridge replacement.	1. Establish procedures with WHP and local transportation departments along the redundant route. 2. Inform WTA.

Analysis Year:		2018			
Asset / Location: I-80 at Patrick Draw, ML80 at 146.85			, Bridge ID = ARN		
Ownership:		WYDOT		Criticality Rank:	6 of 70
Risk Probability	Rtg:	4		Risk Consequence Rtg:	5
Priority Rtg:		High		Issue Type:	Infrastructural
Issues:		Underclearance is 15.16 ft. The bridg	es are in moderate condition (NHPP rating of 5). Very h	nigh traffic. 2 bridge strikes since 1994.	
Vulnerabilities			Strengths	Objectives	
Possible long d (unkikely). The only Interst	etour if both bri ate route for the	dges (ARN & ARM) damaged e area.	Parallel bridge is available if not damaged also.	Return I-80 traffic to normal conditions as quickly as Minimize user, agency and societal costs.	possible.
Bridge carries 6	6.821 vehicles p	per day.		Minimize delays.	
0	, i	,		Maintain safety and mobility in the region.	
Perform Action Before,	<u>H</u> arden, Redundant			· · · ·	
<u>D</u> uring or <u>A</u> fter the Event	Operational,	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
<u>D</u> uring or <u>A</u> fter the Event	<u>O</u> perational, <u>P</u> lan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
During or After the Event	<u>O</u> perational, <u>Plan</u>	Actions Replace with a higher clearance bridge. Upgrade approaches accordingly.	Pros 1. Permanent fix. Shouldn't have to address later.	Cons 1. Expensive. 2. Requires temporary rerouting solution. 3. May create long-term hardships for users, businesses and residents.	Potential Tasks Involving Stakeholders
During or After the Event B B	Operational, Plan H	Actions Replace with a higher clearance bridge. Upgrade approaches accordingly. Increase warning signage.	Pros 1. Permanent fix. Shouldn't have to address later. 1. Lowest cost alternative.	Cons 1. Expensive. 2. Requires temporary rerouting solution. 3. May create long-term hardships for users, businesses and residents. 1. May not be adequate to stop bridge strikes.	Potential Tasks Involving Stakeholders
During or After the Event B B D, A	Operational, Plan H H R, O	Actions Replace with a higher clearance bridge. Upgrade approaches accordingly. Increase warning signage. Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	Pros 1. Permanent fix. Shouldn't have to address later. 1. Lowest cost alternative. 1. Fast recovery of facility function. 2. Short-term lower agency cost compared to bridge replacement. 3. Fairly low user cost during repair.	Cons 1. Expensive. 2. Requires temporary rerouting solution. 3. May create long-term hardships for users, businesses and residents. 1. May not be adequate to stop bridge strikes. 1. Multiple closures may be cumbersome to users, businesses and residents. 2. Damage may be extensive requiring bridge replacement.	Potential Tasks Involving Stakeholders 1. Establish procedures with WHP and local transportation departments along the redundant route. 2. Inform WTA.
During or After the Event B B D, A	Operational, Plan H H R, O	Actions Replace with a higher clearance bridge. Upgrade approaches accordingly. Increase warning signage. Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	Pros 1. Permanent fix. Shouldn't have to address later. 1. Lowest cost alternative. 1. Fast recovery of facility function. 2. Short-term lower agency cost compared to bridge replacement. 3. Fairly low user cost during repair. 1. Likely to be a lower cost than bridge	Cons 1. Expensive. 2. Requires temporary rerouting solution. 3. May create long-term hardships for users, businesses and residents. 1. May not be adequate to stop bridge strikes. 1. Multiple closures may be cumbersome to users, businesses and residents. 2. Damage may be extensive requiring bridge replacement. 1. May not be feasible given the current conditions. 2. May be drainage issues.	Potential Tasks Involving Stakeholders 1. Establish procedures with WHP and local transportation departments along the redundant route. 2. Inform WTA.

Analysis Year:		2018			
Asset / Location: I-80 at Machinery Pass, ML80 at 77		I-80 at Machinery Pass, ML80 at 77.3	31, Bridge ID = AOQ		
Ownership:		WYDOT		Criticality Rank:	6 of 70
Risk Probability	v Rtg:	5		Risk Consequence Rtg:	5
Priority Rtg:		High		Issue Type:	Infrastructural
Issues:		Underclearance is 14.24 ft. The bridg	e is in moderate condition (NHPP rating of 6). Very high	n traffic. 3 bridge strikes since 1994.	
Vulnerabilities			Strengths	Objectives	
Possible long d (unkikely).	etour if both bri	dges (AOP & AOQ) damaged	Parallel bridge is available if not damaged also.	Return I-80 traffic to normal conditions as quickly as	possible.
The only Interst	tate route for th	e area.		Minimize user, agency and societal costs.	
Bridge carries 6	5,821 vehicles p	ber day.		Minimize delays.	
				Maintain safety and mobility in the region.	
Perform Action Before,	<u>H</u> arden, R edundant.				
During or After	Operational.				Potential Tasks Involving
<u>D</u> uring or <u>A</u> fter the Event	<u>O</u> perational, <u>P</u> lan	Actions	Pros	Cons	Potential Lasks Involving Stakeholders
During or After the Event	Operational, Plan	Actions Replace with a higher clearance bridge. Upgrade approaches accordingly.	Pros 1. Permanent fix. Shouldn't have to address later.	Cons 1. Expensive. 2. Requires temporary rerouting solution. 3. May create long-term hardships for users, businesses and residents.	Potential Tasks Involving Stakeholders
During or After the Event	Operational, Plan H H	Actions Replace with a higher clearance bridge. Upgrade approaches accordingly. Increase warning signage.	Pros 1. Permanent fix. Shouldn't have to address later. 1. Lowest cost alternative.	Cons 1. Expensive. 2. Requires temporary rerouting solution. 3. May create long-term hardships for users, businesses and residents. 1. May not be adequate to stop bridge strikes.	Potential Tasks Involving Stakeholders
During or After the Event B B D, A	Operational, Plan H H R, O	Actions Replace with a higher clearance bridge. Upgrade approaches accordingly. Increase warning signage. Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	Pros 1. Permanent fix. Shouldn't have to address later. 1. Lowest cost alternative. 1. Fast recovery of facility function. 2. Short-term lower agency cost compared to bridge replacement. 3. Fairly low user cost during repair.	Cons 1. Expensive. 2. Requires temporary rerouting solution. 3. May create long-term hardships for users, businesses and residents. 1. May not be adequate to stop bridge strikes. 1. Multiple closures may be cumbersome to users, businesses and residents. 2. Damage may be extensive requiring bridge replacement.	Potential Tasks Involving Stakeholders 1. Establish procedures with WHP and local transportation departments along the redundant route. 2. Inform WTA.
During or After the Event B B D, A	Operational, Plan H H R, O	Actions Replace with a higher clearance bridge. Upgrade approaches accordingly. Increase warning signage. Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	 Permanent fix. Shouldn't have to address later. Lowest cost alternative. Fast recovery of facility function. Short-term lower agency cost compared to bridge replacement. Fairly low user cost during repair. 	Cons 1. Expensive. 2. Requires temporary rerouting solution. 3. May create long-term hardships for users, businesses and residents. 1. May not be adequate to stop bridge strikes. 1. Multiple closures may be cumbersome to users, businesses and residents. 2. Damage may be extensive requiring bridge replacement. 1. May not be feasible given the current conditions. 2. May be drainage issues	Potential Tasks Involving Stakeholders 1. Establish procedures with WHP and local transportation departments along the redundant route. 2. Inform WTA.

Analysis Year:		2018			
Asset / Location: I-80 at County Road 47, ML80 at 196.16, Bridge ID = ASV					
Ownership:		WYDOT		Criticality Rank:	6 of 70
Risk Probability	Rtg:	4		Risk Consequence Rtg:	5
Priority Rtg:		High		Issue Type:	Infrastructural
Issues:		Underclearance is 14.24 ft. The bridg	e is in fair condition (NHPP rating of 6). Very high traffic	c. 2 strikes since 1994.	
Vulnerabilities			Strengths	Objectives	
Possible long de (unkikely).	etour if both bri	dges (ASV & ASW) damaged	Parallel bridge is available if not damaged also.	Return I-80 traffic to normal conditions as quickly as	possible.
The only Intersta	ate route for the	e area.		Minimize user, agency and societal costs.	
Bridge carries 6	,821 vehicles p	per day.		Minimize delays.	
				Maintain safety and mobility in the region.	
Perform Action Before, During or After	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational,	Actions	Pros	Cons	Potential Tasks Involving
	<u>P</u> lan		1105		
В	Н	Replace with a higher clearance bridge. Upgrade approaches accordingly.	1. Permanent fix. Shouldn't have to address later.	 Expensive. Requires temporary rerouting solution. May create long-term hardships for users, businesses and residents. 	
В	Н	Increase warning signage.	1. Lowest cost alternative.	1. May not be adequate to stop bridge strikes.	
D.A.	RO	Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed	 Fast recovery of facility function. Short-term lower agency cost compared to bridge replacement. Fairly low user cost during repair. 	 Multiple closures may be cumbersome to users, businesses and residents. Damage may be extensive requiring bridge replacement 	1. Establish procedures with WHP and local transportation departments along the redundant route. 2. Inform WTA
,	, e		1 Likely to be a lower cost than bridge	1. May not be feasible given the current conditions. 2 May be drainage issues	
		I see a the second second sector the second second		2. May are sta warting aight increas	

Analysis Year:	2018			
Asset / Location:	I-80 at US-287, ML80 at 313.19, Bridg	ge ID = LBN and LBO		
Ownership:	WYDOT		Criticality Rank:	7 of 70
Risk Probability Rtg:	5		Risk Consequence Rtg:	5
Priority Rtg:	Medium		Issue Type:	Infrastructural
Issues:	Underclearance is 18.57 ft. for LBN. V	/ery high traffic. 4 bridge strikes since 1994 (2 per bridge	e).	
Vulnerabilities		Strengths	Objectives	
The only Interstate route for the	e area.	Parallel bridge is available if not damaged also.	Return I-80 traffic to normal conditions as quickly as	possible.
Bridge carries 6,278 vehicles p	er day per bridge.	Fairly short detour, but through Laramie.	Minimize user, agency and societal costs.	
The only Interstate route for the area.			Minimize delays.	
			Maintain safety and mobility in the region.	
Perform Harden,				

Action Before, During or After the Event	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational, <u>P</u> lan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
В	Н	Replace with a higher clearance bridge. Upgrade approaches accordingly.	1. Permanent fix. Shouldn't have to address later.	 Expensive. Requires temporary rerouting solution. May create long-term hardships for users, businesses and residents. 	
В	Н	Increase warning signage.	1. Lowest cost alternative.	1. May not be adequate to stop bridge strikes.	
D, A	R, O	Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	 Fast recovery of facility function. Short-term lower agency cost compared to bridge replacement. Fairly low user cost during repair. 	 Multiple closures may be cumbersome to users, businesses and residents. Damage may be extensive requiring bridge replacement. 	 Establish procedures with WHP and local transportation departments along the redundant route. Inform WTA.
В	Н	Lower the grade under the bridge.	1. Likely to be a lower cost than bridge replacement.	 May not be feasible given the current conditions. May be drainage issues. May create vertical sight issues. 	

Analysis Year:		2018			
Asset / Location: I-80 at WY-789, ML80 at 187.2, Bridge ID = ASP & ASQ			je ID = ASP & ASQ		
Ownership:		WYDOT		Criticality Rank:	6 of 70
Risk Probability	Rtg:	5		Risk Consequence Rtg:	5
Priority Rtg:		Medium		Issue Type:	Infrastructural
Issues:		Underclearance is 15.49 and 15.16 ft	Very high traffic. 4 bridge strikes since 1994 (2 per br	ridge).	
Vulnerabilities			Strengths	Objectives	
Possible long d	etour if both bri	dges damaged (unkikely).	Parallel bridge is available if not damaged also.	Return I-80 traffic to normal conditions as quickly as	possible.
The only Interst	ate route for the	e area.		Minimize user, agency and societal costs.	
Bridge carries 6	6,821 vehicles p	ber day per bridge.		Minimize delays.	
				Maintain safety and mobility in the region.	
Perform Action Before,	<u>H</u> arden, <u>R</u> edundant,				Potential Tasks Involving
During or After	<u>O</u> perational,	Actions	Droo	Cono	Steleholdere
the Event	<u>O</u> perational, <u>P</u> lan	Actions	Pros	Cons	Stakeholders
During or Arter the Event	<u>O</u> perational, <u>P</u> lan H	Actions Replace with a higher clearance bridge. Upgrade approaches accordingly.	Pros 1. Permanent fix. Shouldn't have to address later.	Cons 1. Expensive. 2. Requires temporary rerouting solution. 3. May create long-term hardships for users, businesses and residents.	Stakeholders
During or After the Event B B	Operational, Plan H H	Actions Replace with a higher clearance bridge. Upgrade approaches accordingly. Increase warning signage.	Pros 1. Permanent fix. Shouldn't have to address later. 1. Lowest cost alternative.	Cons 1. Expensive. 2. Requires temporary rerouting solution. 3. May create long-term hardships for users, businesses and residents. 1. May not be adequate to stop bridge strikes.	Stakeholders
During or After the Event B B D, A	Operational, Plan H H R, O	Actions Replace with a higher clearance bridge. Upgrade approaches accordingly. Increase warning signage. Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	Pros 1. Permanent fix. Shouldn't have to address later. 1. Lowest cost alternative. 1. Fast recovery of facility function. 2. Short-term lower agency cost compared to bridge replacement. 3. Fairly low user cost during repair.	Cons 1. Expensive. 2. Requires temporary rerouting solution. 3. May create long-term hardships for users, businesses and residents. 1. May not be adequate to stop bridge strikes. 1. Multiple closures may be cumbersome to users, businesses and residents. 2. Damage may be extensive requiring bridge replacement.	Stakeholders Stakeholders 1. Establish procedures with WHP and local transportation departments along the redundant route. 2. Inform WTA.
B B D, A	Operational, Plan H H R, O	Actions Replace with a higher clearance bridge. Upgrade approaches accordingly. Increase warning signage. Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	Pros Pros Pros Pros Pros Pros Pros Pros I. Permanent fix. Shouldn't have to address later. I. Lowest cost alternative. I. Fast recovery of facility function. Short-term lower agency cost compared to bridge replacement. S. Fairly low user cost during repair. I. Likely to be a lower cost than bridge	Cons 1. Expensive. 2. Requires temporary rerouting solution. 3. May create long-term hardships for users, businesses and residents. 1. May not be adequate to stop bridge strikes. 1. Multiple closures may be cumbersome to users, businesses and residents. 2. Damage may be extensive requiring bridge replacement. 1. May not be feasible given the current conditions. 2. Nay we drainage issues	Stakeholders Stakeholders 1. Establish procedures with WHP and local transportation departments along the redundant route. 2. Inform WTA.

Analysis Year:		2018			
Asset / Location: I-80 at County Road 23, ML80 at 17		I-80 at County Road 23, ML80 at 173	.89, Bridge ID = LZW		
Ownership:		WYDOT		Criticality Rank:	6 of 70
Risk Probability	v Rtg:	5		Risk Consequence Rtg:	5
Priority Rtg:		Medium		Issue Type:	Infrastructural
Issues:		Underclearance is 16.01 ft. Very high	traffic. 3 bridge strikes since 1994.		
Vulnerabilities			Strengths	Objectives	
Possible long d (unkikely).	etour if both bri	dges (LZV & LZW) damaged	Parallel bridge is available if not damaged also.	Return I-80 traffic to normal conditions as quickly as	possible.
The only Interst	tate route for th	e area.		Minimize user, agency and societal costs.	
Bridge carries 6	5,821 vehicles	ber day.		Minimize delays.	
				Maintain safety and mobility in the region.	
Perform <u>Action B</u> efore, During or <u>A</u> fter the Event	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational, Plan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
			1100		
В	Н	Replace with a higher clearance bridge. Upgrade approaches accordingly.	1. Permanent fix. Shouldn't have to address later.	 Expensive. Requires temporary rerouting solution. May create long-term hardships for users, businesses and residents. 	
В	Н	Increase warning signage.	1. Lowest cost alternative.	1. May not be adequate to stop bridge strikes.	
D, A	R, O	Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	 Fast recovery of facility function. Short-term lower agency cost compared to bridge replacement. Fairly low user cost during repair. 	 Multiple closures may be cumbersome to users, businesses and residents. Damage may be extensive requiring bridge replacement. 	 Establish procedures with WHP and local transportation departments along the redundant route. Inform WTA.
В	Н	Lower the grade under the bridge.	1. Likely to be a lower cost than bridge replacement.	 May not be feasible given the current conditions. May be drainage issues. May create vertical sight issues. 	

Analysis Year:		2018			
Asset / Location: I-80 at County Road 146-1, ML80 at 383.36, Bridge ID =			383.36, Bridge ID =AZW		
Ownership:		WYDOT		Criticality Rank:	8 of 70
Risk Probability	Rtg:	5		Risk Consequence Rtg:	4
Priority Rtg:		Medium		Issue Type:	Infrastructural
Issues:		Underclearance is 14.57 ft. Very high	traffic. 3 bridge strikes since 1994.		
Vulnerabilities			Strengths	Objectives	
Possible long de (unkikely). The only Interst	etour if both bri ate route for th	dges (AZW & AZV) damaged e area.	Parallel bridge is available if not damaged also.	Return I-80 traffic to normal conditions as quickly as Minimize user, agency and societal costs.	possible.
Bridge carries 6	,194 vehicles p	per day.		Minimize delays.	
				Maintain safety and mobility in the region.	
<u>Perform</u> <u>Action B</u> efore, <u>D</u> uring or <u>A</u> fter the Event	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational, <u>P</u> lan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
В	Н	Replace with a higher clearance bridge. Upgrade approaches accordingly.	1. Permanent fix. Shouldn't have to address later.	 Expensive. Requires temporary rerouting solution. May create long-term hardships for users, businesses and residents. 	
В	Н	Increase warning signage.	1. Lowest cost alternative.	1. May not be adequate to stop bridge strikes.	
D, A	R, 0	Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	 Fast recovery of facility function. Short-term lower agency cost compared to bridge replacement. Fairly low user cost during repair. 	 Multiple closures may be cumbersome to users, businesses and residents. Damage may be extensive requiring bridge replacement. 	 Establish procedures with WHP and local transportation departments along the redundant route. Inform WTA.
				1. May not be feasible given the current conditions.	

Analysis Year:	2018			
Asset / Location:	I-80 at WY-222, ML80 at 357.68,	Bridge ID = AYR & AYS		
Ownership:	WYDOT		Criticality Rank:	8 of 70
Risk Probability Rtg:	4		Risk Consequence Rtg:	5
Priority Rtg:	Medium		Issue Type:	Infrastructural
Issues:	Underclearance is 16.08 ft. High t traffic. 1 strike on each bridge sind	ruck volumes pass under bridges to access Wal ce 1994.	Mart Distribution Center. The bridges are in	moderate condition (NHPP rating of 6). Very high
Vulnerabilities		Strengths	Objectives	
Possible long detour if both br The only Interstate route for th Bridge carries 6,194 vehicles	ridges (AYR & AYS) damaged (unkikely). he area. per day per bridge.	Parallel bridge is available if not damaged also.	Return I-80 traffic to normal conditions a Minimize user, agency and societal cos Minimize delays. Maintain safety and mobility in the regio	as quickly as possible. ts.

Perform Action Before, During or After the Event	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational, <u>P</u> lan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
В	Н	Replace with a higher clearance bridge. Upgrade approaches accordingly.	1. Permanent fix. Shouldn't have to address later.	 Expensive. Requires temporary rerouting solution. May create long-term hardships for users, businesses and residents. Significant rerouting of trucks on WY-222 may be needed. 	
В	Н	Increase warning signage.	1. Lowest cost alternative.	1. May not be adequate to stop bridge strikes.	
D, A	R, O	Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	 Fast recovery of facility function. Short-term lower agency cost compared to bridge replacement. Fairly low user cost during repair. 	 Multiple closures may be cumbersome to users, businesses and residents. Damage may be extensive requiring bridge replacement. 	 Establish procedures with WHP and local transportation departments along the redundant route. Inform WTA.
В	Н	Lower the grade under the bridge.	1. Likely to be a lower cost than bridge replacement.	 May not be feasible given the current conditions. May be drainage issues. May create vertical sight issues. Significant rerouting of trucks on WY-222 would be needed. 	1. High truck volumes pass under bridges to access Wal Mart Distribution Center. Would require rerouting these trucks during construction.

Analysis Year:		2018						
Asset / Location:		I-80 at Machinery Pass, ML80 at 1	-80 at Machinery Pass, ML80 at 12.65, Bridge ID = AMS & AMT					
Ownership:		WYDOT		Criticality Rank:	11 of 70			
Risk Probability Rtg	:	4		Risk Consequence Rtg:	4			
Priority Rtg:		Low		Issue Type:	Infrastructural			
Issues:		Underclearance is unknown. The b	oridges are in moderate condition (NHPP rating of	f 5). Very high traffic. 1 strike on each bridge since 1994				
Vulnerabilities			Strengths	Objectives				
			Parallel bridge is available if not damaged					
Possible long detou	r if both bridges (<i>i</i>	AMS & AMT) damaged (unkikely).	also.	Return I-80 traffic to normal conditions as quickly as p	possible.			
The only Interstate r	oute for the area.			Minimize user, agency and societal costs.				
Bridge carries 6,190	vehicles per day	per bridge.		Minimize delays.				
				Maintain safety and mobility in the region.				
Daufaum Astian								
Before, During or	<u>H</u> arden, R edundant				Potential Tasks Involving			
After the Event	Operational, Plan	Actions	Pros	Cons	Stakeholders			
				1. Expensive.				
		Deplese with a higher electrones		2. Requires temporary rerouting solution.				
		bridge Upgrade approaches	1 Permanent fix Shouldn't have to address	5. May create long-term hardships for users, businesses and residents. Significant rerouting of				
В	Н	accordingly.	later.	trucks on WY-222 may be needed.				
В	Н	Increase warning signage.	1. Lowest cost alternative.	1. May not be adequate to stop bridge strikes.				
				Managara (1997)	1. Establish procedures with WHP			
		Repair the bridge following each	1. Fast recovery of facility function.	1. Multiple closures may be cumbersome to users,	and local transportation			
		incident. Establish and enact	2. Short-term lower agency cost compared to	businesses and residents.	departments along the redundant			
ПА	РO	the bridge is closed	bridge replacement.	2. Damage may be extensive requiring bridge	route.			
D, A	Ν, Ο				2. 11101111 WTA.			
				1. May not be fassible given the surrent conditions	1 High truck volumes pass under			
				2. May be drainage issues.	bridges to access Wal Mart			
				3. May create vertical sight issues.	Distribution Center. Would require			
		Lower the grade under the	1. Likely to be a lower cost than bridge	4. Significant rerouting of trucks on WY-222 would	rerouting these trucks during			
В	Н	bridge.	replacement.	be needed.	construction.			

Analysis Year:		2018			
Asset / Location: I-80 at County Road 141, ML80 a		23.91, Bridge ID = ANH			
Ownership: WYDOT			Criticality Rank:	11 of 70	
Risk Probability Rtg: 4			Risk Consequence Rtg:	4	
Priority Rtg: Low		Low		Issue Type:	Infrastructural
Issues:		Underclearance is 14.17 ft. The bi	idge is in moderate condition (NHPP rating of 5).	Very high traffic. 2 strikes since 1994.	
Vulnerabilities			Strengths	Objectives	
Possible long detour if both bridges (ANH & ANK) damaged (unkikely). The only Interstate route for the area. Bridge carries 6,190 vehicles per day.		Parallel bridge is available if not damaged also.	d Return I-80 traffic to normal conditions as quickly as possible. Minimize user, agency and societal costs. Minimize delays. Maintain safety and mobility in the region.		
<u>Perform Action</u> <u>B</u> efore, <u>D</u> uring or <u>A</u> fter the Event	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational, <u>P</u> lan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
В	н	Replace with a higher clearance bridge. Upgrade approaches accordingly.	1. Permanent fix. Shouldn't have to address later.	 Expensive. Requires temporary rerouting solution. May create long-term hardships for users, businesses and residents. 	
В	Н	Increase warning signage.	1. Lowest cost alternative.	1. May not be adequate to stop bridge strikes.	
D, A	R, O	Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	 Fast recovery of facility function. Short-term lower agency cost compared to bridge replacement. Fairly low user cost during repair. 	 Multiple closures may be cumbersome to users, businesses and residents. Damage may be extensive requiring bridge replacement. 	 Establish procedures with WHP and local transportation departments along the redundant route. Inform WTA.
В	н	Lower the grade under the bridge.	1. Likely to be a lower cost than bridge replacement.	 May not be feasible given the current conditions. May be drainage issues. May create vertical sight issues. 	

Analysis Year:		2018			
Asset / Location:		I-80 at Two Mile Draw, ML80 at 21	0.98, Bridge ID = ATO		
Ownership:		WYDOT		Criticality Rank:	7 of 70
Risk Probability Rtg: 5			Risk Consequence Rtg:	3	
Priority Rtg:		Low		Issue Type:	Infrastructural
Issues:		Underclearance is 14.17 ft. The bri	idges are in moderate condition (NHPP rating of 6	6). Very high traffic. 3 strikes since 1994.	
Vulnerabilities			Strengths	Objectives	
D "1 1 1 1 1			Parallel bridge is available if not damaged		
Possible long detour	r if both bridges a	re damaged (unkikely).	also.	Return I-80 traffic to normal conditions as quickly as	DOSSIBLE.
The only Interstate r	oute for the area.			Minimize user, agency and societal costs.	
Bridge carries 5,842	vehicles per day			Minimize delays.	
				Maintain safety and mobility in the region.	
Perform Action Before, During or	<u>H</u> arden, R edundant.				Potential Tasks Involving
After the Event	Operational, Plan	Actions	Pros	Cons	Stakeholders
В	Н	Replace with a higher clearance bridge. Upgrade approaches accordingly.	1. Permanent fix. Shouldn't have to address later.	 Expensive. Requires temporary rerouting solution. May create long-term hardships for users, businesses and residents. 	
В	Н	Increase warning signage.	1. Lowest cost alternative.	1. May not be adequate to stop bridge strikes.	
D, A	R, 0	Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	 Fast recovery of facility function. Short-term lower agency cost compared to bridge replacement. Fairly low user cost during repair. 	 Multiple closures may be cumbersome to users, businesses and residents. Damage may be extensive requiring bridge replacement. 	 Establish procedures with WHP and local transportation departments along the redundant route. Inform WTA.
В	Н	Lower the grade under the bridge.	1. Likely to be a lower cost than bridge replacement.	 May not be feasible given the current conditions. May be drainage issues. May create vertical sight issues. 	

Analysis Year:		2018			
Asset / Location: I-80 at US-30/WY-130, ML80 at 2		35.28, Bridge ID =AUR			
Ownership: WYDOT			Criticality Rank:	9 of 70	
Risk Probability Rtg: 4			Risk Consequence Rtg:	3	
Priority Rtg: Low			Issue Type:	Infrastructural	
Issues:		Underclearance is 164 ft. Very hi	gh traffic. 2 bridge strikes since 1994.		
Vulnerabilities			Strengths	Objectives	
Possible long detour if both bridges (AUR & AUQ) damaged (unkikely). The only Interstate route for the area. Bridge carries 5,842 vehicles per day.		Parallel bridge is available if not damaged also.	ged Return I-80 traffic to normal conditions as quickly as possible. Minimize user, agency and societal costs. Minimize delays. Maintain safety and mobility in the region.		
Perform Action Before, During or After the Event	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational, <u>P</u> lan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
В	н	Replace with a higher clearance bridge. Upgrade approaches accordingly.	1. Permanent fix. Shouldn't have to address later.	 Expensive. Requires temporary rerouting solution. May create long-term hardships for users, businesses and residents. 	
В	Н	Increase warning signage.	1. Lowest cost alternative.	1. May not be adequate to stop bridge strikes.	
D, A	R, 0	Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	 Fast recovery of facility function. Short-term lower agency cost compared to bridge replacement. Fairly low user cost during repair. 	 Multiple closures may be cumbersome to users, businesses and residents. Damage may be extensive requiring bridge replacement. 	 Establish procedures with WHP and local transportation departments along the redundant route. Inform WTA.
В	н	Lower the grade under the bridge.	1. Likely to be a lower cost than bridge replacement.	 May not be feasible given the current conditions. May be drainage issues. May create vertical sight issues. 	

Analysis Year:		2018					
Asset / Location: I-80 at Cou		I-80 at County Rd 3, ML80 at 260.	I-80 at County Rd 3, ML80 at 260.23, Bridge ID = AVG				
Ownership: WYDOT		WYDOT		Criticality Rank:	9 of 70		
Risk Probability Rtg	j :	4		Risk Consequence Rtg:	3		
Priority Rtg:	Priority Rtg: Low			Issue Type:	Infrastructural		
Issues: Underclearance is 17.32 ft. The		Underclearance is 17.32 ft. The br	idges are in moderate condition (NHPP rating of §	5). Very high traffic. 2 strikes since 1994.			
Vulnerabilities			Strengths	Objectives			
Possible long detour if both bridges (AVH & AVG) damaged (unkikely). The only Interstate route for the area. Bridge carries 5,842 vehicles per day.		AVH & AVG) damaged (unkikely). /.	Parallel bridge is available if not damaged also.	Return I-80 traffic to normal conditions as quickly as Minimize user, agency and societal costs. Minimize delays. Maintain safety and mobility in the region.	possible.		
Perform Action Before, During or After the Event	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational, <u>P</u> lan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders		
В	н	Replace with a higher clearance bridge. Upgrade approaches accordingly.	1. Permanent fix. Shouldn't have to address later.	 Expensive. Requires temporary rerouting solution. May create long-term hardships for users, businesses and residents. 			
В	Н	Increase warning signage.	1. Lowest cost alternative	1. May not be adequate to stop bridge strikes.			
D, A	 R, O	Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	 Fast recovery of facility function. Short-term lower agency cost compared to bridge replacement. Fairly low user cost during repair. 	 Multiple closures may be cumbersome to users, businesses and residents. Damage may be extensive requiring bridge replacement. 	 Establish procedures with WHP and local transportation departments along the redundant route. Inform WTA. 		
В	н	Lower the grade under the bridge.	1. Likely to be a lower cost than bridge replacement.	 May not be feasible given the current conditions. May be drainage issues. May create vertical sight issues. 			

Analysis Year:	2018			
Asset / Location:	I-80 at WY-76, ML80 at 219.59, E	Bridge ID = KJA & KHZ		
Ownership:	WYDOT		Criticality Rank:	9 of 70
Risk Probability Rtg:	5		Risk Consequence Rtg:	3
Priority Rtg:	Low		Issue Type:	Infrastructural
Issues:	Underclearance is 19.91 ft. The b	ridges are in moderate condition (NHPP rating of 6). Very high traffic. 3 strikes since 1994.	
Vulnerabilities		Strengths	Objectives	
		Parallel bridge is available if not damaged		
Possible long detour if both bridges a	are damaged (unkikely).	also.	Return I-80 traffic to normal conditions as quickly as	possible.
The only Interstate route for the area			Minimize user, agency and societal costs.	
Bridge carries 5,842 vehicles per day	/ per bridge.		Minimize delays.	
			Maintain safety and mobility in the region.	

<u>Perform Action</u> <u>B</u> efore, <u>D</u> uring or <u>A</u> fter the Event	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational, <u>P</u> lan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
В	Н	Replace with a higher clearance bridge. Upgrade approaches accordingly.	1. Permanent fix. Shouldn't have to address later.	 Expensive. Requires temporary rerouting solution. May create long-term hardships for users, businesses and residents. 	
В	Н	Increase warning signage.	1. Lowest cost alternative.	1. May not be adequate to stop bridge strikes.	
 D, A	R, O	Repair the bridge following each incident. Establish and enact reroute procedures in the event the bridge is closed.	 Fast recovery of facility function. Short-term lower agency cost compared to bridge replacement. Fairly low user cost during repair. 	 Multiple closures may be cumbersome to users, businesses and residents. Damage may be extensive requiring bridge replacement. 	 Establish procedures with WHP and local transportation departments along the redundant route. Inform WTA.
В	Н	Lower the grade under the bridge.	1. Likely to be a lower cost than bridge replacement.	 May not be feasible given the current conditions. May be drainage issues. May create vertical sight issues. 	

Appendix C

Winter Weather Closure and Delay Action Plans

Analysis Year:	2	018			
Asset / Location	n: U	JS-89 Through Jackson, ML10B from 15	1.918 to 154.848		
Ownership:	١	VYDOT		Criticality Rank:	1 of 76
Risk Probability	Rtg: 5	i		Risk Consequence Rtg:	5
Priority Rtg:	ŀ	ligh		ssue Type:	Performance
Issues:	١	/ery high traffic, 18,760 vehicles per day.	Estimated delay cost is approximately \$2,095,000 per	mile per year. Most of the delay is likely congestion caused	
Vulnerabilities			Strengths	Objectives	
Route carries 18	8,760 vehicles p	er day of which 2,738 are trucks.		Return US-89 traffic to normal conditions as quickly as possi	ble.
High elevation r	oute causes wo	rse weather.		Minimize user, agency and societal costs.	
In narrow vallev	which offers fev	v alternative routes.		Maintain safety and mobility in the region.	
Perform Action	<u>H</u> arden,				Detential Teaks Involving
<u>B</u> efore, <u>D</u> uring or After the Event	<u>R</u> edundant, Operational, Plan	Actions	Pros	Cons	Stakeholders
		Assess and modify current snow	1. Fairly low cost fix.	1. Most delays are probably not winter weather related.	1. Work with local
		removal and roadway management	2. WYDOT already has much of this implemented	2. Probably little improvement remaining to be gained since	government to coordinate
D	0	procedures as needed.	and likely would not require many changes.	WYDOT is already assessing and improving procedures.	snow removal activities.
			1. Fairly low cost alternative which reduces		
			operational costs.		1. Work with local
Р	ц	Duild anour fanana	2. Can improve visibility along with minimizing	1. Most delays are probably not winter weather related.	government to incorporate
D	П	Build show lences			1 Work with local
		Assess and modify traffic signals		1 May have a limited effect since most traffic controls are	a work with local
В	н	and controls to minimize congestion.	1. Low cost.	typically optimized by WYDOT.	adjustments.
			1. CV technology promises a new method to	1. May have minimal effect in an urban area.	
			mitigate delays and crashes.	2. The technology is new and not fully tested. Issues may	1. Work with local
			2. Technology can reduce risk taking behaviors.	arise.	government to advertise and
		Implement Connected Vehicle	3. Can better saturate the drivers with important	Implementation costs may be fairly high.	encourage use of the
В	Н	technology.	information compared to prior methods.	4. Requires cooperation and acceptance from motorists.	technology.
					1. Work with local
Р	Ц	Add additional lance	1. Very effective at reducing congestion leading to	1. Urban area limits widening without very high costs.	government to incorporate
D	Π	Establish existing alternative routes		2. Jackson has been resistant to widening of roads.	1 Organiza winter weather
		and procedures to implement during		veather conditions	emergency routing
		extreme weather events and relieve	1 Low agency cost	2 Requires buy-in from Jackson Jackson doesn't want	procedures with local
B.D	R.O	congestion related delays.	2. Can be fairly easily implemented.	potential income to be lost from bypassing traffic.	jurisdictions.
,	, -				1. Organize winter weather
			1. Can be fairly effective relieving congestion.	1. Can be very costly	emergency routing
		Build alternative routes to relieve	2. Separates pass-through traffic from tourism	2. Requires buy-in from Jackson. Jackson doesn't want	procedures with local
B,D	R,O	traffic congestion.	traffic.	potential income to be lost from bypassing traffic.	jurisdictions.

Analysis Year:		2018			
Asset / Locatior	ו:	JS-89 South of Jackson, ML10B from 14	8.704 to 151.918		
Ownership:		WYDOT	С	riticality Rank:	1 of 76
Risk Probability	Rtg:	5	R	lisk Consequence Rtg:	5
Priority Rtg:	Ŭ	High	ls	ssue Type:	Performance
Issues:	,	Very high traffic, 13,509 vehicles per day.	Estimated delay cost is approximately \$1,334,000 per r	nile per year. Most of the delay is likely congestion caused.	
Vulnerabilities			Strengths	Objectives	
Route carries 1	3,509 vehicles p	er day of which 1,874 are trucks.		Return US-89 traffic to normal conditions as quickly as possi	ble.
High elevation r	route causes wo	rse weather.		Minimize user, agency and societal costs.	
In narrow valley	which offers fe	w alternative routes.		Maintain safety and mobility in the region.	
Perform Action	Harden				
Before, During or	<u>R</u> edundant,	A 11			Potential Tasks Involving
After the Event	Operational, Plan	Actions	Pros	Cons	Stakeholders
		Assess and modify current snow	1. Fairly low cost fix.	1. Most delays are probably not winter weather related.	
D	0	removal and roadway management	2. WFDOT already has much or this implemented	2. Probably little improvement remaining to be gained since	
U	0		1 Early low cost alternative which reduces		
			operational costs		
			2 Can improve visibility along with minimizing snow		
В	н	Build snow fences	accumulation on the road.	1. Most delays are probably not winter weather related.	
		Assess and modify safety barriers,			
		cuts, slopes and other geometrics	1. Very few modifications may be easily	1. Can be very expensive.	
В	H	that cause snow drifting.	accomplished at low cost.	Safety issues need to be carefully assessed.	
			1. CV technology promises a new method to		
			mitigate delays and crashes.	1. The technology is new and not fully tested. Issues may	1. Work with local
			2. Technology can reduce risk taking behaviors.	arise.	government to advertise and
-		Implement Connected Vehicle	3. Can better saturate the drivers with important	2. Implementation costs may be fairly high.	encourage use of the
В	H	technology.	information compared to prior methods.	3. Requires cooperation and acceptance from motorists.	technology.
			1. Vany offective at reducing consection leading to	1 Widening may be difficult in environmentally consitive	1. Work with local
D	<u> </u>	Add additional lance	reduced deleve		government to incorporate
D		Establish existing alternative routes		1 Existing alternative routes would not likely handle the	1 Organize winter weather
		and procedures to implement during		traffic	amergency routing
		extreme weather events and relieve	1 Low agency cost	2 Requires buy-in from Jackson Jackson doesn't want	procedures with local
B.D	R.O	congestion related delays.	2. Can be fairly easily implemented.	potential income to be lost from bypassing traffic.	iurisdictions
,					1. Organize winter weather
				1. Can be very costly	emergency routing
		Build alternative routes to relieve	1. Can be fairly effective relieving congestion.	2. Requires buy-in from Jackson. Jackson doesn't want	procedures with local
B,D	R,O	traffic congestion.	2. Separates pass-through traffic from tourism traffic.	potential income to be lost from bypassing traffic.	jurisdictions.

Analysis Year:	2	018			
Asset / Locatior	ocation: US-89 North of Jackson, ML10B from 154.848 to 164.926				
Ownership:	V	VYDOT	Crit	icality Rank: 1	of 76
Risk Probability	Rtg: 5		Ris	k Consequence Rtg: 4	
Priority Rtg:	ŀ	ligh	lssi	ие Туре: F	erformance
Issues:	F	ligh traffic, 7,814 vehicles per day on this	2-lane section. Estimated delay cost is approximately \$9	58,000 per mile per year. Most of the delay is likely congest	ion caused.
Vulnerabilities			Strengths	Objectives	
Route carries 7	,814 vehicles pe	day of which 734 are trucks.		Return US-89 traffic to normal conditions as quickly as poss	ible.
High elevation r	route causes wor	se weather.		Minimize user, agency and societal costs.	
In narrow valley	which offers fev	valternative routes.		Maintain safety and mobility in the region.	
Perform Action Before During or	<u>H</u> arden, B edundant				Potential Tasks Involving
After the Event	<u>Operational</u> , <u>Plan</u>	Actions	Pros	Cons	Stakeholders
		Assess and modify current snow	1. Fairly low cost fix.	1. Most delays are probably not winter weather related.	
D	0	removal and roadway management	2. WYDOT already has much of this implemented and likely would not require many changes	2. Probably little improvement remaining to be gained since	
		procedures as needed.	1. Fairly low cost alternative which reduces	with othis already assessing and improving procedures.	
			operational costs.		
5			2. Can improve visibility along with minimizing snow		
В	H	Build snow tences	accumulation on the road.	1. Most delays are probably not winter weather related.	
		cuts slopes and other geometrics	1 Very few modifications may be easily accomplished	1 Can be very expensive	
В	Н	that cause snow drifting.	at low cost.	2. Safety issues need to be carefully assessed.	
			1. CV technology promises a new method to mitigate		
			delays and crashes.	1. The technology is new and not fully tested. Issues may	1. Work with local
		Implement Connected Vehicle	2. Technology can reduce risk taking behaviors.	arise. 2 Implementation costs may be fairly high	government to advertise and
В	Н	technology.	information compared to prior methods.	3. Requires cooperation and acceptance from motorists.	technology.
					1. Work with local
			1. Very effective at reducing congestion leading to	1. Widening may be difficult in environmentally sensitive	government to incorporate
В	H	Add additional lanes.	reduced delays.	area.	Improvements.
		and procedures to implement during		1 Existing alternative routes are very limited	emergency routing
		extreme weather events and relieve	1. Low agency cost.	2. Requires buy-in from Jackson. Jackson doesn't want	procedures with local
B,D	R,O	congestion related delays.	2. Can be fairly easily implemented.	potential income to be lost from bypassing traffic.	jurisdictions.
					1. Organize winter weather
		Puild alternative routes to reliave	1. Can be fairly affective relieving congestion	1. Can be very costly 2. Requires huw in from lookeen, lookeen decar't want	emergency routing
B.D	R.0	traffic congestion.	2. Separates pass-through traffic from tourism traffic.	potential income to be lost from bypassing traffic.	jurisdictions.

Analysis Year:	2	018			
Asset / Locatior	n: L	JS-89 Hoback Jct to South of Jackson, M	IL10B from 141.222 to 148.704		
Ownership:	V	VYDOT	Cri	ticality Rank:	l of 76
Risk Probability	Rtg: 4		Ris	k Consequence Rtg:	1
Priority Rtg:	ŀ	ligh	lss	ue Type:	Performance
Issues:	Ň	/ery high traffic, 11,037 vehicles per day.	Estimated delay cost is approximately \$702,000 per mile	per year. Most of the delay is likely congestion caused.	
Vulnerabilities			Strengths	Objectives	
Route carries 1	1,037 vehicles p	er day of which 1,194 are trucks.		Return US-89 traffic to normal conditions as quickly as po	ssible.
High elevation r	route causes wor	se weather.		Minimize user, agency and societal costs.	
In narrow valley	which offers few	v alternative routes.		Maintain safety and mobility in the region.	
Perform Action	<u>H</u> arden,				Potential Tasks Involving
<u>Before</u> , <u>During</u> or <u>A</u> fter the Event	<u>R</u> edundant, Operational, <u>P</u> lan	Actions	Pros	Cons	Stakeholders
		Assess and modify current snow	1. Fairly low cost fix.	1. Most delays are probably not winter weather related.	
-		removal and roadway management	2. WYDOT already has much of this implemented and	2. Probably little improvement remaining to be gained since	e
D	0	procedures as needed.	likely would not require many changes.	WYDOT is already assessing and improving procedures.	
			1. Fairly low cost alternative which reduces operationa		
			2 Can improve visibility along with minimizing snow		
В	н	Build snow fences	accumulation on the road.	1. Most delays are probably not winter weather related.	
	1	Assess and modify safety barriers,			
		cuts, slopes and other geometrics	1. Very few modifications may be easily accomplished	1. Can be very expensive.	
В	Н	that cause snow drifting.	at low cost.	2. Safety issues need to be carefully assessed.	
			1. CV technology promises a new method to mitigate	1. The technology is new and not fully tested leaves may	1 Mark with local
			2 Technology can reduce risk taking behaviors	T. The technology is new and not fully tested. Issues may	1. WORK WITH IOCAL
		Implement Connected Vehicle	3 Can better saturate the drivers with important	2 Implementation costs may be fairly high	encourage use of the
В	н	technology.	information compared to prior methods.	3. Requires cooperation and acceptance from motorists.	technology.
	Ì				1. Work with local
			1. Very effective at reducing congestion leading to	1. Widening may be difficult in environmentall sensitive	government to incorporate
В	Н	Add additional lanes.	reduced delays.	area	improvements.
		Establish existing alternative routes		1. Existing alternative routes would not likely handle the	1. Organize winter weather
		and procedures to implement during	A 1	traffic	emergency routing
R D	PO	extreme weather events and relieve	1. Low agency cost.	2. Requires buy-in from Jackson. Jackson doesn't want	procedures with local
ש,ם	<u>п,</u> 0				1 Organize winter weather
				1. Can be very costly	emergency routing
		Build alternative routes to relieve	1. Can be fairly effective relieving congestion.	2. Requires buy-in from Jackson. Jackson doesn't want	procedures with local
B,D	R,O	traffic congestion.	2. Separates pass-through traffic from tourism traffic.	potential income to be lost from bypassing traffic.	jurisdictions.

Analysis Year:	:	2018			
Asset / Location: US-14A from Cody to Powell, ML29B from 2.695 to 22.837		n 2.695 to 22.837			
Ownership:	١	WYDOT	Critica	lity Rank: 3 c	.f 76
Risk Probability	/ Rtg:	5	Risk C	Consequence Rtg: 3	
Priority Rtg:	-	digh	Issue ⁻	Туре: Ре	rformance
Issues:	١	√ery high traffic, 6,099 vehicles per day. E	Estimated delay cost is approximately \$494,000 per mile per	year. Some of the delay is likely congestion caused.	
Vulnerabilities			Strengths	Objectives	
Route carries 6	,099 vehicles pe	r day of which 242 are trucks.		Return US-14A traffic to normal conditions as quickly as po	ssible.
Alternative rout	es add significa	nt mileage.		Minimize user, agency and societal costs.	
	· ·	-		Maintain safety and mobility in the region.	
Perform Action	<u>H</u> arden,				Potential Tasks Involving
Before, During or After the Event	<u>R</u> edundant, <u>O</u> perational, <u>P</u> lan	Actions	Pros	Cons	Stakeholders
		Assess and modify current snow	1. Fairly low cost fix.	1. Some delays are probably not winter weather related.	
5		removal and roadway management	2. WYDOT already has much of this implemented and	2. Probably little improvement remaining to be gained since	<u>ب</u>
D	0	procedures as needed.	likely would not require many changes.	WYDOT is already assessing and improving procedures.	
			costs		
			2. Can improve visibility along with minimizing snow		
В	Н	Build snow fences	accumulation on the road.	1. Some delays are probably not winter weather related.	
		Assess and modify safety barriers,			
D	L	cuts, slopes and other geometrics	1. Very few modifications may be easily accomplished at	1. Can be very expensive.	
D	11		1 CV technology promises a new method to mitigate	2. Salety issues need to be carefully assessed.	
			delays and crashes.	1. The technology is new and not fully tested. Issues may	1. Work with local
			2. Technology can reduce risk taking behaviors.	arise.	government to advertise
_		Implement Connected Vehicle	3. Can better saturate the drivers with important	2. Implementation costs may be fairly high.	and encourage use of the
В	H	technology.	information compared to prior methods.	3. Requires cooperation and acceptance from motorists.	technology.
				1. Alternative routes are distant and may also be	
				2. WYDOT maintenance personnel have already addresse	d
				most alternative routing procedures (may not be fully	
				assessed and formalized).	
				3. Some WYDOT Districts report that detouring trucks	1. Organize winter weather
		Establish alternative routing		during weather-related crash closures often result in	emergency routing
ВD	RO	procedures to implement during	1. LOW agency cost.	crashes on the detour route, causing emergency services t	b procedures with local iurisdictions
0.0	11.0				

Analysis Year:	2018			
Asset / Location:	US-14/16/20 Through Cody, ML31B from 49.87 to 54.587			
Ownership:	WYDOT	Criticality Rank:		
Risk Probability Rtg:	5	Risk Consequence Rtg:	4	
Priority Rtg:	High	Issue Type:	Performance	
Issues:	Very high traffic, 10,476 vehicles per day. Estimated delay cost is approximately \$914,000 per mile per year. Most of the delay is likely congestion caused.			
Vulnerabilities	Strengths	Objectives		
Route carries 10,476 vehicles per day of which 995 are trucks.		Return US-14/16/20 traffic to normal conditions as quickly as possible.		
Alternative routes are long and thru Yellowstone National Park.		Minimize user, agency and societal costs.	Minimize user, agency and societal costs.	

Perform Action	<u>H</u> arden,				Potential Tasks Involving
After the Event	<u>R</u> edundant, Operational, Plan	Actions	Pros	Cons	Stakeholders
		Assess and modify current snow	1. Fairly low cost fix.	1. Most delays are probably not winter weather related.	1. Work with local
		removal and roadway management	2. WYDOT already has much of this implemented and	2. Probably little improvement remaining to be gained since	government to coordinate
D	0	procedures as needed.	likely would not require many changes.	WYDOT is already assessing and improving procedures.	snow removal activities.
			1. Fairly low cost alternative which reduces operational		
			costs.		1. Work with local
			2. Can improve visibility along with minimizing snow	 Most delays are probably no winter weather related. 	government to incorporate
В	Н	Build snow fences	accumulation on the road.	2. Urban area allows for few snow fence locations.	improvements.
					1. Work with local
		Assess and modify traffic signals		1. May have a limited effect since most traffic controls are	government to make
В	H	and controls to minimize congestion.	1. Low cost.	typically optimized by WYDOT.	needed adjustments.
			1. CV technology promises a new method to mitigate	1. May have minimal effect in an urban area.	
			delays and crashes.	2. The technology is new and not fully tested. Issues may	1. Work with local
			2. Technology can reduce risk taking behaviors.	arise.	government to advertise
		Implement Connected Venicle	3. Can better saturate the drivers with important	3. Implementation costs may be fairly high.	and encourage use of the
В	П	technology.	information compared to prior methods.	4. Requires cooperation and acceptance from motorists.	technology.
			1. Very effective at reducing congration loading to		1. WORK WITH IOCAI
Б	L L	Add additional lange	I. Very effective at reducing congestion leading to	1. Urban area limita widaning without yony high agata	government to incorporate
D	Π			1. Orban area minis widening without very high costs.	improvements.
		Establish existing alternative routes		routing through VNP	1 Organize winter weather
		and procedures to implement during		2 Alternative routes may also be experiencing similar	emergency routing
		extreme weather events and relieve	1 Low agency cost	weather conditions	procedures with local
ВD	RO	congestion related delays	2 Can be fairly easily implemented	3 Requires buy-in from Cody	iurisdictions
_,0				1. Can be very costly	1. Organize winter weather
				2. Requires buy-in from Cody.	emergency routing
		Build alternative routes to relieve	1. Can be fairly effective relieving congestion.	3. There are significant impediments to building alternative	procedures with local
B.D	R.O	traffic congestion.	2. Separates pass-through traffic from tourism traffic.	routes.	jurisdictions.

Maintain safety and mobility in the region.

Analysis Year:	20	018				
Asset / Location	n: I-8	80 from Happy Jack Rd to Buford, ML80	from 322.741 to 334.86			
Ownership:	W	YDOT	Criticality	/ Rank: 7 of 70	6	
Risk Probability	/ Rtg: 4		Risk Cor	isequence Rtg: 5		
Priority Rtg:	Н	igh	Issue Ty	pe: Perfor	mance	
Issues:	V	ery high traffic, 13,441 vehicles per day.	Estimated delay cost is approximately \$1,509,000 per mile pe	year.		
Vulnerabilities			Strengths	Objectives		
Very limited ser	rvices available or	n the stretch of road.		Return I-80 traffic to normal conditions as quickly as possible.		
Viable alternativ	ve routes are fairly	y distant.		Minimize user, agency and societal costs.		
Route carries 1	3,441 vehicles pe	r day of which 5,990 are trucks.		Maintain safety and mobility in the region.		
High elevation	route causes wors	se weather.				
Perform Action Before During or	<u>H</u> arden, R edundant				Potential Tasks Involving	
After the Event	Operational, Plan	Actions	Pros	Cons	Stakeholders	
		Assess and modify current snow	1. Fairly low cost fix.	1. Probably little improvement remaining to be gained		
		removal and roadway management	2. WYDOT already has much of this implemented and likely	since WYDOT is already assessing and improving		
D	0	procedures as needed.	would not require many changes.	procedures.		
			1. Fairly low cost alternative which reduces operational			
			costs.			
_			2. Can improve visibility along with minimizing snow	1. WYDOT is nearing effective saturation of snow fences		
В	H	Build snow fences	accumulation on the road.	along Interstate highways, especially I-80.		
		Assess and modify safety barriers,				
		cuts, slopes and other geometrics	1. A very few modifications may be easily accomplished at	1. Can be very expensive.		
В	H	that cause snow drifting.	IOW COST.	2. Satety issues need to be carefully assessed.		
			I. UV technology promises a new method to mitigate	1. The technology is new and not fully tested. Issues may	1 Contact chipporp and	
		Implement vehicle to vehicle and	2. Technology can reduce risk taking behaviors	allse.	1. Contact shippers and	
		vohicle to infractructure Connected	2. Technology can reduce fisk taking behaviors.	2. Implementation costs may be fainy high.	opeourage use of the	
в	н	Vehicle to initiastructure Connected	information compared to prior methods	industry	technology	
D	11	venicie teennology.	1 CV technology promises a new method to mitigate		teermology.	
			trucking delays and crashes	1 Requires cooperation and acceptance from the trucking	1 Contact shippers and	
		Implement Connected Vehicle	2 Technology can reduce some risk taking behaviors	industry	WTA to advertise and	
		roadway condition communication	3. Can better saturate the trucking industry with important	2. Judgment of information received by individual truckers	encourage use of the	
В	Н	technology.	information compared to prior methods.	may be inconsistent.	technology.	
				1. Alternative routes may also be experiencing similar		
				weather conditions. Only one nearby alternative route.		
				2. WYDOT maintenance personnel have already		
				addressed most alternative routing procedures (may not		
				be fully assessed and formalized).		
				3. Some WYDOT Districts report that detouring trucks	1. Organize winter weather	
		Establish alternative routing		during weather-related crash closures often result in	emergency routing	
		procedures to implement during	1. Low agency cost.	crashes on the detour route, causing emergency services	procedures with local	
B,D	R,O	extreme weather events.	2. Fairly easily implemented.	to be split.	jurisdictions.	

Analysis Year:	2	2018			
Asset / Location: I-80 from Laramie to Happy Jack Rd, MI		-80 from Laramie to Happy Jack Rd, ML8	30 from 316.48 to 322.741		
Ownershin: WYDOT		WYDOT	Critic	ality Rank: 7	of 76
Risk Probability Rtg: 4		-	Risk	Consequence Rta: 5	
Driority Dta:		liah	Issue	a Type: Pr	erformance
leques:	1	/env high traffic, 13,040 vehicles per day	Estimated delay cost is approximately \$1,460,000 per mile per v	rest is approximately \$1.460.000 per mile per year	
Vulnerabilities	```	rery high traine, 10,040 venicles per day.	Estimated delay cost is approximately \$1,400,000 per mile per y		
Viable alternativ	ve routes are fair	ly distant	Strengths Objectives Return L80 traffic to normal conditions as quickly as possible		٩
Route carries 1	3.940 vehicles p	er dav of which 5.990 are trucks.	Minimize user, agency and societal costs.		
High elevation	oute with long, s	steep grade.		Maintain safety and mobility in the region.	
Perform Action Before During or	<u>H</u> arden, Rodundant				Potential Tasks Involving
After the Event	<u>Operational</u> , <u>Plan</u>	Actions	Pros	Cons	Stakeholders
		Assess and modify current snow	1. Fairly low cost fix.	1. Probably little improvement remaining to be gained	
D	0	removal and roadway management	2. WYDOT already has much of this implemented and likely	since WYDOT is already assessing and improving	
D	0	procedures as needed.	1 Eairly low cost alternative which reduces operational	procedures.	
			costs.		
			2. Can improve visibility along with minimizing snow	1. WYDOT is nearing effective saturation of snow fences	
В	Н	Build snow fences	accumulation on the road.	along Interstate highways, especially I-80.	
		Assess and modify safety barriers,			
P	Ц	cuts, slopes and other geometrics	1. A very few modifications may be easily accomplished at	1. Can be very expensive.	
D	11		1 CV technology promises a new method to mitigate	1 The technology is new and not fully tested issues may	
			trucking delays and crashes.	arise.	1. Contact shippers and
		Implement vehicle to vehicle and	2. Technology can reduce risk taking behaviors.	2. Implementation costs may be fairly high.	WTA to advertise and
		vehicle to infrastructure Connected	3. Can better saturate the trucking industry with important	3. Requires cooperation and acceptance from the trucking	encourage use of the
В	H	Vehicle technology.	information compared to prior methods.	industry.	technology.
			1. CV technology promises a new method to mitigate	1. Poquiros cooporation and accontance from the trucking	1 Contact chippors and
		Implement Connected Vehicle	2 Technology can reduce some risk taking behaviors	industry	WTA to advertise and
		roadway condition communication	3. Can better saturate the trucking industry with important	2. Judgment of information received by individual truckers	encourage use of the
В	Н	technology.	information compared to prior methods.	may be inconsistent.	technology.
				1. Alternative routes may also be experiencing similar	
				weather conditions. Only one nearby alternative route.	
				2. WYDOT maintenance personnel have already	
				be fully assessed and formalized)	
				3. Some WYDOT Districts report that detouring trucks	1. Organize winter weather
		Establish alternative routing		during weather-related crash closures often result in	emergency routing
		procedures to implement during	1. Low agency cost.	crashes on the detour route, causing emergency services	procedures with local
B,D	R,O	extreme weather events.	2. Fairly easily implemented.	to be split.	jurisdictions.
Analysis Year:		2018			
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Asset / Location	ו:	I-25 from College Dr to I-80, ML25 from 7	.85 to 8.845		
Ownership:		WYDOT	Criticality I	Rank: 12 o	76
Risk Probability	Rtg:	4	Risk Cons	equence Rtg: 5	
Priority Rtg:		Medium	Issue Type	e: Perfe	ormance
Issues:		High traffic, 22,664 vehicles per day. Esti	nated delay cost approximately \$1,520,000 per mile per year.		
Vulnerabilities			Strengths	Objectives	
Route carries 2	2,664 vehicles p	per day of which 3,871 are trucks.	Multiple nearby services available.	Return I-25 traffic to normal conditions as quickly as po Minimize user, agency and societal costs. Maintain safety and mobility in the region.	ssible.
Perform Action Before, During or After the Event	<u>H</u> arden, <u>R</u> edundant, O perational, P lan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
D	0	Assess and modify current snow removal and roadway management procedures as needed.	1. Fairly low cost fix. 2. WYDOT already has much of this implemented and likely would not require many changes.	 Probably little improvement remaining to be gained since WYDOT is already assessing and improving procedures. 	
В	Н	Build snow fences	 Fairly low cost alternative which reduces operational costs. Can improve visibility along with minimizing snow accumulation on the road. 	 WYDOT already has much snow fence along I-25. Urban location limits snow available fence placemen 	l.
В	Н	Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	1. A very few modifications may be easily accomplished at low cost.	 Can be very expensive. Safety issues need to be carefully assessed. 	
В	Н	Implement vehicle to vehicle and vehicle to infrastructure Connected Vehicle technology.	 CV technology promises a new method to mitigate trucking delays and crashes. Technology can reduce risk taking behaviors. Can better saturate the trucking industry with important information compared to prior methods. 	 The technology is new and not fully tested. Issues may arise. Implementation costs may be fairly high. Requires cooperation and acceptance from the trucking industry. 	1. Contact shippers and WTA to advertise and encourage use of the technology.
В	Н	Implement Connected Vehicle roadway condition communication technology.	 CV technology promises a new method to mitigate trucking delays and crashes. Technology can reduce some risk taking behaviors. Can better saturate the trucking industry with important information compared to prior methods. 	 Requires cooperation and acceptance from the trucking industry. Judgment of information received by individual truckers may be inconsistent. 	1. Contact shippers and WTA to advertise and encourage use of the technology.
B.D	R.O	Establish alternative routing procedures to implement during extreme weather events.	1. Low agency cost. 2. Fairly easily implemented.	 Alternative routes may also be experiencing similar weather conditions. Only one nearby alternative route that doesn't detour entire problem section. Other routes are fairly distant. WYDOT maintenance personnel have already addressed most alternative routing procedures (may no be fully assessed and formalized). Some WYDOT Districts report that detouring trucks during weather-related crash closures often result in crashes on the detour route, causing emergency services to be split. 	t 1. Organize winter weather emergency routing procedures with local jurisdictions.

Asset / Location: I-25 from Missle Dr to Central Ave, ML25 from 10.586 to 12.697 Ownership: WYDOT Risk Probability Rtg: 4	
Ownership: WYDOT Criticality Rank: 12 of 76 Risk Probability Rtg: 4 Risk Consequence Rtg: 5	
Risk Probability Rtg: 4 Risk Consequence Rtg: 5	
Priority Rtg: Medium Issue Type: Performance	
Issues: High traffic, 21,430 vehicles per day. Estimated delay cost approximately \$1,021,000 per mile per year.	
Vulnerabilities Strengths Objectives	
Route carries 21,430 vehicles per day of which 3,034 are trucks. Multiple nearby available services Return I-25 traffic to normal conditions as quickly as possible.	
Minimize user, agency and societal costs. Maintain safety and mobility in the region.	
Perform Action Before, Harden, Potential Task	Involvina
During or After Redundant, the Event Operational, Plan Actions Pros Cons Stakeholders	involving
Assess and modify current snow 1. Fairly low cost fix. 1. Probably little improvement remaining to be gained	
removal and roadway management 2. WYDOT already has much of this implemented and likely since WYDOT is already assessing and improving	
D O procedures as needed. would not require many changes. procedures.	
2 Can improve visibility along with minimizing snow 1 WYDOT already has much snow fence along L-25	
B H Build snow fences accumulation on the road.	
Assess and modify safety barriers,	
cuts, slopes and other geometrics 1. A very few modifications may be easily accomplished at low 1. Can be very expensive.	
B H that cause snow drifting. cost. 2. Safety issues need to be carefully assessed.	
1. Ov technology promises a new method to mitigate trucking 1. The technology is new and not fully tested. Issues	here and
Implement vehicle to vehicle and 2. Technology can reduce risk taking behaviors. 2. Implementation costs may be fairly high. WTA to advert	e and
vehicle to infrastructure Connected 3. Can better saturate the trucking industry with important 3. Requires cooperation and acceptance from the encourage use	of the
B H Vehicle technology. information compared to prior methods. trucking industry. technology.	
1. CV technology promises a new method to mitigate trucking	
Implement Connected Vehicle 2 Technology can reduce some risk taking behaviors frucking industry WTA to advert	ers and
roadway condition communication 3. Can better saturate the trucking industry with important 2. Judgment of information received by individual encourage use	of the
B H technology. information compared to prior methods. truckers may be inconsistent. technology.	
1. Alternative routes may also be experiencing similar	
weather conditions. Only one nearby alternative route	
that doesn't detour entire problem section. Other routes	
2. WYDOT maintenance personnel have already	
addressed most alternative routing procedures (may not	
be fully assessed and formalized).	
3. Some WYDOT Districts report that detouring trucks 1. Organize wi	ter
Establish alternative routing during weather-related crash closures often result in weather emerging crashes on the detour route, caucing crashes on the detour route, caucing crashes on the detour route, caucing crashes on the detour route.	ency
B.D R.O extreme weather events. 2. Fairly easily implemented. services to be split.	S.

Analysis Year:	2	018			
Asset / Location	n: I-	80 from Elk Mountain to Arlington, ML8	0 from 255.269 to 272.13		
Ownership:	V	/YDOT	Cr	ticality Rank:) of 76
Risk Probability	Rtg: 3		Ris	sk Consequence Rtg:	5
Priority Rtg:	Ŭ N	ledium	lss	ue Type:	Performance
Issues:	V	ery high traffic, 10,463 vehicles per day	. Estimated delay cost is approximately \$823,000 per mile per y	ear.	
Vulnerabilities			Strengths	Objectives	
Viable alternativ	e routes are fair	y distant.		Return I-80 traffic to normal conditions as quickly as pos	sible.
Route carries 1	0,463 vehicles pe	er day of which 6,584 are trucks.		Minimize user, agency and societal costs.	
High elevation r	oute with steep g	jrades.		Maintain safety and mobility in the region.	
Perform Action	<u>H</u> arden,				Potential Tasks Involving
Before, During or After the Event	Redundant, Operational, Plan	Actions	Pros	Cons	Stakeholders
		Assess and modify current snow			
		removal and roadway	1. Fairly low cost fix.	1. Probably little improvement remaining to be gained	
		management procedures as	2. WYDOT already has much of this implemented and likely	since WYDOT is already assessing and improving	
D	0	needed.	would not require many changes.	procedures.	
			1. Fairly low cost alternative which reduces operational costs.		
-			2. Can improve visibility along with minimizing snow	1. WYDOT is nearing effective saturation of snow fences	
В	Н	Build snow fences	accumulation on the road.	along Interstate highways, especially I-80.	
		Assess and modify safety barriers,			
_		cuts, slopes and other geometrics	1. A very few modifications may be easily accomplished at low	1. Can be very expensive.	
В	H	that cause snow drifting.	cost.	2. Safety issues need to be carefully assessed.	
			 CV technology promises a new method to mitigate trucking 	1. The technology is new and not fully tested. Issues ma	4
			delays and crashes.	arise.	1. Contact shippers and
		Implement vehicle to vehicle and	2. Technology can reduce risk taking behaviors.	2. Implementation costs may be fairly high.	WTA to advertise and
_		vehicle to infrastructure Connected	3. Can better saturate the trucking industry with important	3. Requires cooperation and acceptance from the	encourage use of the
В	H	Vehicle technology.	information compared to prior methods.	trucking industry.	technology.
			 CV technology promises a new method to mitigate trucking 		
			delays and crashes.	1. Requires cooperation and acceptance from the	1. Contact shippers and
		Implement Connected Vehicle	2. Technology can reduce some risk taking behaviors.	trucking industry.	WTA to advertise and
		roadway condition communication	3. Can better saturate the trucking industry with important	Judgment of information received by individual	encourage use of the
В	Н	technology.	information compared to prior methods.	truckers may be inconsistent.	technology.
				1. Alternative routes may also be experiencing similar	
				weather conditions. Only one nearby alternative route.	
				2. WYDOT maintenance personnel have already	
				addressed most alternative routing procedures (may not	
				be fully assessed and formalized).	
				Some WYDOT Districts report that detouring trucks	1. Organize winter
		Establish alternative routing		during weather-related crash closures often result in	weather emergency
		procedures to implement during	1. Low agency cost.	crashes on the detour route, causing emergency	routing procedures with
B,D	R,O	extreme weather events.	2. Fairly easily implemented.	services to be split.	local jurisdictions.

Analysis Year:	20	018				
Asset / Location	n: I-8	80 from Evanston to US-189, ML80 fror	n 6.033 to 18.098			
Ownership:	W	YDOT	Cri	ticality Rank:	11 of 76	
Risk Probability	Rtg: 3		Ris	sk Consequence Rtg:	5	
Priority Rtg:	М	edium	lss	ue Type:	Performa	nce
Issues:	V	ery high traffic, 13,191 vehicles per day	 Estimated delay cost over \$1,022,000 per mile per year 	·		
Vulnerabilities			Strengths	Objectives		
Very steep grad	les on most of se	ction.		Return I-80 traffic to	normal conditions as quickly as possib	le.
Route carries 13	3,191 vehicles pe	er day of which 6,111 are trucks.		Minimize user, agen	cy and societal costs.	
Nearest alternat	tive route is very	distant.		Maintain safety and	mobility in the region.	
Perform Action Before During or	<u>H</u> arden, Bodundant					Potential Tasks Involving
After the Event	Operational, Plan	Actions	Pros	Cons		Stakeholders
		Assess and modify current snow				
		removal and roadway	1. Fairly low cost fix.	1. Probably little imp	provement remaining to be gained	
		management procedures as	2. WYDOT already has much of this implemented and	likely since WYDOT is alre	eady assessing and improving	
D	0	needed.	would not require many changes.	procedures.		
			1. Fairly low cost alternative which reduces operational	costs.		
			2. Can improve visibility along with minimizing snow	1. WYDOT is nearing	g effective saturation of snow fences	
В	Н	Build snow fences	accumulation on the road.	along Interstate high	ways, especially I-80.	
		Assess and modify safety barriers,				
		cuts, slopes and other geometrics	1. A very few modifications may be easily accomplishe	d at low 1. Can be very expe	nsive.	
В	Н	that cause snow drifting.	cost.	2. Safety issues nee	ed to be carefully assessed.	
			1. CV technology promises a new method to mitigate tr	ucking 1. The technology is	new and not fully tested. Issues may	
			delays and crashes.	arise.		1. Contact shippers and
		Implement vehicle to vehicle and	2. Technology can reduce risk taking behaviors.	2. Implementation co	osts may be fairly high.	WTA to advertise and
		vehicle to infrastructure Connected	3. Can better saturate the trucking industry with importa	ant 3. Requires coopera	tion and acceptance from the	encourage use of the
В	Н	Vehicle technology.	information compared to prior methods.	trucking industry.		technology.
			1. CV technology promises a new method to mitigate tr	ucking		
			delays and crashes.	1. Requires coopera	tion and acceptance from the	1. Contact shippers and
		Implement Connected Vehicle	2. Technology can reduce some risk taking behaviors.	trucking industry.		WTA to advertise and
		roadway condition communication	3. Can better saturate the trucking industry with importa	ant 2. Judgment of infor	mation received by individual	encourage use of the
В	Н	technology.	information compared to prior methods.	truckers may be inco	onsistent.	technology.
				1. Alternative routes	may also be experiencing similar	
				weather conditions.	Only one nearby alternative route	
				that doesn't detour e	entire problem section. Other routes	
				are fairly distant.		
				2. WYDOT maintena	ance personnel have already	
				addressed most alte	rnative routing procedures (may not	
				be fully assessed an	nd formalized).	
				3. Some WYDOT Di	stricts report that detouring trucks	1. Organize winter
		Establish alternative routing		during weather-relat	ed crash closures often result in	weather emergency
		procedures to implement during	1. Low agency cost.	crashes on the detor	ur route, causing emergency	routing procedures with
B,D	R,O	extreme weather events.	2. Fairly easily implemented.	services to be split.		local jurisdictions.

Analysis Year: Asset / Locatio	n: 1	2018 JS-85 Terrv Ranch Rd to I-80. ML180B	from 3.538 to 8.472		
Ownership:	١	WYDOT	Criticality	Rank: 10 of 76	
Risk Probability	y Rtg: ∠	l .	Risk Con	sequence Rtg: 3	
Priority Rtg:	ſ	Medium	Issue Typ	pe: Performa	ance
Issues:	ŀ	High traffic, 9,526 vehicles per day. Estir	mated delay cost is approximately \$517,000 per mile per year.	Nost of the delay is likely congestion caused.	
Vulnerabilities			Strengths	Objectives	
Route carries 9	9,526 vehicles pe	r day of which 498 are trucks.		Return US-85 traffic to normal conditions as quickly as po Minimize user, agency and societal costs.	ssible.
Porform Action	Hardon			Maintain safety and mobility in the region.	
Before, During or	Redundant,				Potential Tasks Involving
After the Event	Operational, Plan	Actions	Pros	Cons	Stakeholders
		Assess and modify current snow		1. Most delays are probably not winter weather related.	1. Work with local
		removal and roadway	1. Fairly low cost fix.	2. Probably little improvement remaining to be gained	government to
-		management procedures as	2. WYDOT already has much of this implemented and likely	since WYDOT is already assessing and improving	coordinate snow removal
D	0	needed.	would not require many changes.	procedures.	activities.
					1. Work with local
			1. Fairly low cost alternative which reduces operational costs.		government to
р	ц	Duild anour fanada	2. Can improve visibility along with minimizing snow	1. Most delays are probably not winter weather related.	Incorporate
D	П	Build Show lences			1 Work with loop
		Assess and moonly trainic signals		1. May have a limited affect since most traffic controls	1. WORK WITH IOCAL
R	Ц	condestion	1 Low cost	are typically optimized by WYDOT	government to make
D	11		1. CV technology promises a new method to mitigate delays	1 May have minimal effect in an urban area	
			and crashes	2 The technology is new and not fully tested issues may	1 Work with local
			2 Technology can reduce risk taking behaviors	arise	government to advertise
		Implement Connected Vehicle	3 Can better saturate the drivers with important information	3 Implementation costs may be fairly high	and encourage use of
В	н	technology	compared to prior methods.	4. Requires cooperation and acceptance from motorists.	the technology.
2	··				1. Work with local
					government to
			1. Very effective at reducing congestion leading to reduced		incorporate
В	Н	Add additional lanes.	delays.	1. Urban area limits widening without very high costs.	improvements.
		Establish existing alternative	**************************************	······································	
		routes and procedures to			1. Organize winter
		implement during extreme weather		1. Alternative routes may also be experiencing similar	weather emergency
		events and relieve congestion	1. Low agency cost.	weather or congestion conditions.	routing procedures with
B,D	R,O	related delays.	2. Can be fairly easily implemented.	2. Requires buy-in from Cheyenne	local jurisdictions.
					1. Organize winter
					weather emergency
		Build alternative routes to relieve	1. Can be fairly effective relieving congestion.	1. Can be very costly	routing procedures with
B,D	R,0	traffic congestion.	2. Separates pass-through traffic from tourism traffic.	2. Requires buy-in from Cheyenne.	local jurisdictions.

Analysis Year:	:	2018			
Asset / Location	n: l	-80 from Arlington to Laramie, ML80 from	m 272.13 to 310.12		
Ownership:	,	WYDOT	Critic	ality Rank:	7 of 70
Risk Probability	Rtg:	3	Risk	Consequence Rtg:	4
Priority Rtg:		Medium	Issue	e Type:	Performance
Issues:	,	/erv high traffic, 10.707 vehicles per day	. Estimated delay cost approximately \$713.000 per mile per year.		
Vulnerabilities			Strengths	Objectives	
Very limited ser	rvices available (on the stretch of road.	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Return I-80 traffic to normal conditions as guickly as pos	sible.
Nearest alterna	tive route becon	nes congested with I-80 closure traffic.		Minimize user, agency and societal costs.	
Route carries 1	0.707 vehicles p	er dav of which 6.154 are trucks.		Maintain safety and mobility in the region.	
Perform Action	Harden,				Potential Tasks Involving
<u>Before</u> , <u>D</u> uring or <u>A</u> fter the Event	<u>R</u> edundant, <u>O</u> perational, <u>P</u> lan	Actions	Pros	Cons	Stakeholders
		Assess and modify current snow			
		removal and roadway	1. Fairly low cost fix.	1. Probably little improvement remaining to be gained	
D	0	needed.	would not require many changes.	procedures.	
			1. Fairly low cost alternative which reduces operational costs.		
			2. Can improve visibility along with minimizing snow	1. WYDOT is nearing effective saturation of snow fences	6
В	H	Build snow fences	accumulation on the road.	along Interstate highways, particularly I-80.	
		Assess and modify safety barriers,	1. A very few modifications may be easily accomplished at low	1 Can be very expensive	
В	Н	that cause snow drifting.	cost.	2. Safety issues need to be carefully assessed.	
			1. CV technology promises a new method to mitigate trucking	1. The technology is new and not fully tested. Issues ma	у
			delays and crashes.	arise.	1. Contact shippers and
		Implement vehicle to vehicle and	2. Lechnology can reduce risk taking behaviors.	2. Implementation costs may be fairly high.	WIA to advertise and
В	н	Vehicle technology	information compared to prior methods	5. Requires cooperation and acceptance from the trucking industry	technology
	··		1. CV technology promises a new method to mitigate trucking		
			delays and crashes.	1. Requires cooperation and acceptance from the	1. Contact shippers and
		Implement Connected Vehicle	2. Technology can reduce some risk taking behaviors.	trucking industry.	WTA to advertise and
в	н	roadway condition communication	3. Can better saturate the trucking industry with important information compared to prior methods	2. Judgment of information received by individual truckers may be inconsistent	encourage use of the technology
5				1. Alternative routes may also be experiencing similar	technology.
				weather conditions.	
				2. WYDOT maintenance personnel have already	
				addressed most alternative routing procedures (may not	
				be fully assessed and formalized).	1 Organiza wintar
		Establish alternative routing		during weather-related crash closures often result in	weather emergency
		procedures to implement during	1. Low agency cost.	crashes on the detour route, causing emergency	routing procedures with
B,D	R,O	extreme weather events.	2. Fairly easily implemented.	services to be split.	local jurisdictions.

Analysis Year:		2018			
Asset / Location	ו:	US-20/26 in Casper, ML34B from 0.087	to 2.34		
Ownership:		WYDOT	Criticality Ra	ank: 11 of 76	
Risk Probability	Rtg:	4	Risk Consec	guence Rtg: 3	
Priority Rtg:	·	Low	Issue Type:	Performa	nce
Issues:		High traffic. 11.210 vehicles per day. Est	imated delay cost is approximately \$644.000 per mile per vear.	ost of the delay is likely congestion caused.	
Vulnerabilities			Strengths	Objectives	
Route carries 1	1,210 vehicles	per day of which 1,066 are trucks.		Return US-20/26 traffic to normal conditions as quickly as	possible.
				Minimize user, agency and societal costs. Maintain safety and mobility in the region.	
Perform Action Before, During or After the Event	<u>H</u> arden, <u>R</u> edundant, Operational Plar	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
D		Assess and modify current snow removal and roadway management procedures as needed.	 Fairly low cost fix. WYDOT already has much of this implemented and likely would not require many changes. 	 Most delays are probably not winter weather related. Probably little improvement remaining to be gained since WYDOT is already assessing and improving procedures. 	1. Work with local government to coordinate snow removal activities.
В	Н	Build snow fences	 Fairly low cost alternative which reduces operational costs. Can improve visibility along with minimizing snow accumulation on the road. 	 Most delays are probably not winter weather related. Urban area alows for few snow fence locations. 	1. Work with local government to incorporate improvements.
В	Н	Assess and modify traffic signals and controls to minimize congestion.	1. Low cost.	1. May have a limited effect since most traffic controls are typically optimized by WYDOT.	1. Work with local government to make needed adjustments.
В	Н	Implement Connected Vehicle technology.	 CV technology promises a new method to mitigate delays and crashes. Technology can reduce risk taking behaviors. Can better saturate the drivers with important information compared to prior methods. 	 May have minimal effect in an urban area. The technology is new and not fully tested. Issues may arise. Implementation costs may be fairly high. Requires cooperation and acceptance from motorists. 	1. Work with local government to advertise and encourage use of the technology.
В	Н	Add additional lanes.	 Very effective at reducing congestion leading to reduced delays. 	1. Urban area limits widening without very high costs.	1. Work with local government to incorporate improvements.
B,D	R,O	Establish existing alternative routes and procedures to implement during extreme weather events and relieve congestion related delays.	 Low agency cost. Can be fairly easily implemented. 	 Alternative routes may also be experiencing similar weather or congestion conditions. Requires buy-in from Cheyenne 	1. Organize winter weather emergency routing procedures with local jurisdictions.
B,D	R,O	Build alternative routes to relieve traffic congestion.	 Can be fairly effective relieving congestion. Separates pass-through traffic from tourism traffic. 	 Can be very costly Requires buy-in from Cheyenne. 	1. Organize winter weather emergency routing procedures with local jurisdictions.

Analysis Year:	20)18				
Asset / Locatior	n: I-2	25 from I-80 to Missile Dr, ML25 from 8	.845 to 10.586			
Ownership:	W	YDOT		Criticality Ran	k: 12 of	76
Risk Probability	Rtg: 3			Risk Consequ	ence Rtg: 4	
Priority Rtg:	Lo	W W		Issue Type:	Perfo	rmance
Issues:	Hi	igh traffic, 20,085 vehicles per day. Est	mated delay cost approximately \$864,000 per mile pe	er year.		
Vulnerabilities			Strengths		Objectives	
Route carries 2	0,085 vehicles pe	r day of which 3,193 are trucks.	Multiple nearby services available.		Return I-25 traffic to normal conditions as quickly as p	ossible.
					Minimize user, agency and societal costs.	
	<u>.</u>				Maintain safety and mobility in the region.	
Perform Action Before During or	<u>H</u> arden, Redundant					Potential Tasks Involving
After the Event	Operational, Plan	Actions	Pros		Cons	Stakeholders
		Assess and modify current snow				
		removal and roadway	1. Fairly low cost fix.		1. Probably little improvement remaining to be gained	
		management procedures as	WYDOT already has much of this implemented and	nd likely	since WYDOT is already assessing and improving	
D	0	needed.	would not require many changes.		procedures.	
			 Fairly low cost alternative which reduces operatio 	nal costs.		
			Can improve visibility along with minimizing snow		1. WYDOT already has much snow fence along I-25.	
В	Н	Build snow fences	accumulation on the road.		Urban location limits snow available fence placeme	nt.
		Assess and modify safety barriers,				
		cuts, slopes and other geometrics	 A very few modifications may be easily accomplis 	shed at low	1. Can be very expensive.	
В	H	that cause snow drifting.	cost.		Safety issues need to be carefully assessed.	
			 CV technology promises a new method to mitigat 	e trucking	 The technology is new and not fully tested. Issues r 	nay
			delays and crashes.		arise.	1. Contact shippers and
		Implement vehicle to vehicle and	2. Technology can reduce risk taking behaviors.		Implementation costs may be fairly high.	WTA to advertise and
		vehicle to infrastructure Connected	Can better saturate the trucking industry with imp	ortant	3. Requires cooperation and acceptance from the	encourage use of the
В	H	Vehicle technology.	information compared to prior methods.		trucking industry.	technology.
			 CV technology promises a new method to mitigate 	e trucking		
			delays and crashes.		1. Requires cooperation and acceptance from the	1. Contact shippers and
		Implement Connected Vehicle	Technology can reduce some risk taking behavior	rs.	trucking industry.	WTA to advertise and
		roadway condition communication	Can better saturate the trucking industry with imp	ortant	2. Judgment of information received by individual	encourage use of the
В	ļ Η	technology.	information compared to prior methods.		truckers may be inconsistent.	technology.
					 Alternative routes may also be experiencing similar 	
					weather conditions. Only one nearby alternative route	
					that doesn't detour entire problem section. Other route	S
					are fairly distant.	
					2. WYDOT maintenance personnel have already	
					addressed most alternative routing procedures (may r	ot
					be fully assessed and formalized).	
					Some WYDOT Districts report that detouring trucks	1. Organize winter
		Establish alternative routing			during weather-related crash closures often result in	weather emergency
		procedures to implement during	1. Low agency cost.		crashes on the detour route, causing emergency	routing procedures with
B,D	R,0	extreme weather events.	2. Fairly easily implemented.		services to be split.	local jurisdictions.

Analysis Year: Asset / Locatior	2 1: I-	018 80 Evanston Marginal, ML80 from 3.23	5 to 6.033		
Ownership: Risk Probability Priority Rtg:	Rtg: 3 L	VYDOT ow	Criticality F Risk Conse Issue Type / Estimated delay, cost over \$950,000 per mile per year	Rank: 11 of 76 equence Rtg: 4 : Performance	
Vulporabilitios	v	ery high traile, 13,373 vehicles per day	Strongths	Objectives	
Fairly sharp cur Route carries 1	ves in an urban s 5,575 vehicles po	section. er day of which 5,989 are trucks.	Multiple nearby services available.	Return I-80 traffic to normal conditions as quickly as possible. Minimize user, agency and societal costs. Maintain safety and mobility in the region.	
<u>Perform Action</u> <u>B</u> efore, <u>D</u> uring or <u>A</u> fter the Event	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational, <u>P</u> lan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
D	0	Assess and modify current snow removal and roadway management procedures as needed.	 Fairly low cost fix. WYDOT already has much of this implemented and likely would not require many changes. 	 Probably little improvement remaining to be gained since WYDOT is already assessing and improving procedures. 	
В	Н	Build snow fences	 Fairly low cost alternative which reduces operational costs. Can improve visibility along with minimizing snow accumulation on the road. 	 WYDOT is nearing effective saturation of snow fences along Interstate highways, especially I-80. Urban location limits snow available fence placement. 	
В	н	Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting or vehicle skid.	1. A very few modifications may be easily accomplished at low cost.	 Can be very expensive. Safety issues need to be carefully assessed. 	
В	Н	Implement vehicle to vehicle and vehicle to infrastructure Connected Vehicle technology.	 CV technology promises a new method to mitigate trucking delays and crashes. Technology can reduce risk taking behaviors. Can better saturate the trucking industry with important information compared to prior methods. 	 The technology is new and not fully tested. Issues may arise. Implementation costs may be fairly high. Requires cooperation and acceptance from the trucking industry. 	1. Contact shippers and WTA to advertise and encourage use of the technology.
В	Н	Implement Connected Vehicle roadway condition communication technology.	 CV technology promises a new method to mitigate trucking delays and crashes. Technology can reduce some risk taking behaviors. Can better saturate the trucking industry with important information compared to prior methods. 	 Requires cooperation and acceptance from the trucking industry. Judgment of information received by individual truckers may be inconsistent. 	1. Contact shippers and WTA to advertise and encourage use of the technology.
B,D	R.O	Establish alternative routing procedures to implement during extreme weather events.	1. Low agency cost. 2. Fairly easily implemented.	 Alternative routes may also be experiencing similar weather conditions. Only one nearby alternative route that doesn't detour entire problem section. Other routes are fairly distant. WYDOT maintenance personnel have already addressed most alternative routing procedures (may not be fully assessed and formalized). Some WYDOT Districts report that detouring trucks during weather-related crash closures often result in crashes on the detour route, causing emergency services to be split. 	1. Organize winter weather emergency routing procedures with local jurisdictions.

Analysis Year:		018			
Asset / Location: I-80 from Buford to Cheyenne, ML80 from		-80 from Buford to Cheyenne, ML80 fror	n 334.86 to 359.195		
Ownership:	١	VYDOT	Criticality R	ank: 8 of 76	
Risk Probability	Rtg:	1	Risk Conse	quence Rtg: 4	
Priority Rtg:	l	OW	Issue Type:	Performa	nce
Issues:	١	/ery high traffic, 13,721 vehicles per day	. Estimated delay cost is approximately \$845,000 per mile per yea	ar.	
Vulnerabilities			Strengths	Objectives	
Very limited ser Viable alternativ Route carries 13 High elevation r	vices available o ve routes are fair 3,721 vehicles p route causes wo	n the stretch of road. ly distant. er day of which 5,984 are trucks. rse weather.		Return I-80 traffic to normal conditions as quickly as possibl Minimize user, agency and societal costs. Maintain safety and mobility in the region.	<u>).</u>
Perform Action Before, During or After the Event	<u>H</u> arden, <u>R</u> edundant, Operational, P lan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
D	0	Assess and modify current snow removal and roadway management procedures as needed.	 Fairly low cost fix. WYDOT already has much of this implemented and likely would not require many changes. 	 Probably little improvement remaining to be gained since WYDOT is already assessing and improving procedures. 	
В	Н	Build snow fences	 Fairly low cost alternative which reduces operational costs. Can improve visibility along with minimizing snow accumulation on the road. 	1. WYDOT is nearing effective saturation of snow fences ald Interstate highways, especially I-80.	ng
В	Н	Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	1. A very few modifications may be easily accomplished at low cost.	 Can be very expensive. Safety issues need to be carefully assessed. 	
В	Н	Implement vehicle to vehicle and vehicle to infrastructure Connected Vehicle technology.	 CV technology promises a new method to mitigate trucking delays and crashes. Technology can reduce risk taking behaviors. Can better saturate the trucking industry with important information compared to prior methods. 	 The technology is new and not fully tested. Issues may arise. Implementation costs may be fairly high. Requires cooperation and acceptance from the trucking industry. 	1. Contact shippers and WTA to advertise and encourage use of the technology.
В	н	Implement Connected Vehicle roadway condition communication technology.	 CV technology promises a new method to mitigate trucking delays and crashes. Technology can reduce some risk taking behaviors. Can better saturate the trucking industry with important information compared to prior methods. 	 Requires cooperation and acceptance from the trucking industry. Judgment of information received by individual truckers m be inconsistent. 	1. Contact shippers and WTA to advertise and encourage use of the technology.
B,D	R,O	Establish alternative routing procedures to implement during extreme weather events.	1. Low agency cost. 2. Fairly easily implemented.	 Alternative routes may also be experiencing similar weath conditions. Only one nearby alternative route. WYDOT maintenance personnel have already addressed most alternative routing procedures (may not be fully assess and formalized). Some WYDOT Districts report that detouring trucks during weather-related crash closures often result in crashes on the detour route, causing emergency services to be split. 	ed 1. Organize winter weather emergency routing procedures with local jurisdictions.

Analysis Year:	2018				
Asset / Location:	I-80 f	rom Walcott Jct to Elk Mountain, ML80 fro	m 234.786 to 255.269		
Ownership:	WYD	ОТ	Critic	ality Rank:	9 of 76
Risk Probability Rt	g: 3		Risk	Consequence Rtg:	4
Priority Rtg:	Low		Issue	e Type:	Performance
Issues:	Verv	high traffic, 10,599 vehicles per day. Estim	nated delay cost is approximately \$747,000 per mile per year.		
Vulnerabilities			Strengths	Objectives	
Nearest alternative	e route has limited v	iability during storm events.		Return I-80 traffic to normal conditions as quickly as possible.	
Route carries 10,5	99 vehicles per day	of which 6,584 are trucks.		Minimize user, agency and societal costs.	
High elevation rout	te with steep grades	3.		Maintain safety and mobility in the region.	
<u>Before</u> , <u>D</u> uring or <u>After the Event</u>	<u>R</u> edundant, <u>O</u> perational, <u>P</u> lan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
	0	Assess and modify current snow removal and roadway management procedures as	 Fairly low cost fix. WYDOT already has much of this implemented and likely would not require many changes. 	1. Probably little improvement remaining to be gained sin	nce
В	Н	Build snow fences	 Fairly low cost alternative which reduces operational costs. Can improve visibility along with minimizing snow accumulation on the road. 	1. WYDOT is nearing effective saturation of snow fences Interstate highways, especially I-80.	s along
В	Н	Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	 A very few modifications may be easily accomplished at low cost. 	 Can be very expensive. Safety issues need to be carefully assessed. 	
В	Н	Implement vehicle to vehicle and vehicle to infrastructure Connected Vehicle technology.	 CV technology promises a new method to mitigate trucking delays and crashes. Technology can reduce risk taking behaviors. Can better saturate the trucking industry with important information compared to prior methods. 	 The technology is new and not fully tested. Issues ma arise. Implementation costs may be fairly high. Requires cooperation and acceptance from the truckir industry. 	y 1. Contact shippers and WTA to advertise and encourage use of the technology.
В	Н	Implement Connected Vehicle roadway condition communication technology.	 CV technology promises a new method to mitigate trucking delays and crashes. Technology can reduce some risk taking behaviors. Can better saturate the trucking industry with important information compared to prior methods. 	 Requires cooperation and acceptance from the truckir industry. Judgment of information received by individual trucker be inconsistent. 	I. Contact shippers and WTA to advertise and encourage use of the technology.
B,D	R,O	Establish alternative routing procedures to implement during extreme weather events.	1. Low agency cost. 2. Fairly easily implemented.	 Alternative routes may also be experiencing similar we conditions. Only one nearby alternative route. WYDOT maintenance personnel have already addres most alternative routing procedures (may not be fully as and formalized). Some WYDOT Districts report that detouring trucks do weather-related crash closures often result in crashes or detour route, causing emergency services to be split. 	eather sed sessed 1. Organize winter weather emergency routing procedures with local jurisdictions.

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Appendix D

Environmental – Nonattainment Area Creation Risk Action Plans

Analysis Year:		2018			
Asset / Location: I-80 from W Green River Interchange to E		I-80 from W Green River Interchange	to E Green River Interchange, ML80 from 89.13 to 91.475		
Ownership:		WYDOT	-	Criticality Rank:	6 of 76
Risk Probabilitv	Rta:	5		Risk Consequence Rtg:	4
Priority Rta:	-5	High		Issue Type:	Environmental
lssues.		Ozone level is about 96% of exceedar			
Vulnerabilities			Strengths	Objectives	
About 44 000 p	opulation affect	ad in Swaatwater County	Suenguis	Beduce delays and subsequent pollutant emissions	
About 44,000 p	opulation allect	ed in Sweetwater County.		Reduce delays and subsequent politican emissions.	
Annual venicle	delay approxim	ately 18,800 hours per mile.			
Perform Action	Harden			Provide incentives for lower emissions vehicles.	
Before, During or	<u>R</u> edundant,	Astists	Date	0	Potential Tasks Involving
After the Event	Operational, Plan	Actions	Pros 1 Fairly low cost fix	Cons	Stakeholders
		Assess and modify current	2. WYDOT already has much of this implemented and		
		snow removal and roadway	likely would not require many changes.	1. Probably little improvement remaining to be gained since	
		management procedures as	3. Could reduce inefficient slowing of vehicles thereby	WYDOT is already assessing and improving procedures.	
D	0	needed.	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
			1. Fairly low cost and reduces operational costs.		
			2. Can improve visibility and minimize snow	1 WVDOT is paging affective acturation of anow fances	
			3 Could reduce inefficient slowing of vehicles thereby	along Interstate highways	
В	н	Build snow fences	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
		Assess and modify safety	1. Could reduce inefficient slowing of vehicles thereby	1. Can be very expensive.	
		barriers, cuts, slopes and other	improving emissions reductions.	2. Safety issues need to be carefully assessed.	
_		geometrics that cause snow	2. A very few modifications may be easily accomplished	3. Limited improvement locations limit emission reductions.	
В	H	drifting.	at low cost.	4. Not effective at reducing pollutants in summer months.	
			1. CV technology promises a new method to mitigate		1. Contact automotive
			2 Technology can reduce risk taking behaviors	1 The technology is new and not fully tested. Issues may	shippers and WTA to
			3. Can optimize vehicle movement efficiencies and	arise.	advertise and
		Implement Connected Vehicle	dissuade drivers from approaching conditions that	2. Implementation costs may be fairly high.	encourage use of the
В	Н	technology on the road.	create increased vehicle emissions.	3. Requires cooperation and acceptance from vehicle owners	. technology.
				1. Could become very expensive.	
				2. Most of the trucks on I-80 are from out of state likely	1. Or a track in the second
				causing the effectiveness of retrofits to be minimal. It would	1. Contact snippers
		Provide diesel retrofit incentives	1 Reduces emissions	significant results	and encourage
В	Н	to the trucking industry.	2. Effective year round rather than just in winter months	 3. As trucking fleet is replaced action will loses effectiveness. 	. retrofitting their trucks.
			1. Reduces truck idling during winter weather events	1. Requires trucks to be equipped with applicable equipment	1. Inform shippers and
		Provide electrified truck parking	thus reducing emissions.	to be able to shut down their diesel engines.	WTA of electrification
В	H	areas to reduce truck idling.	2. Provides additional safety features to the road.	2. Less effective at reducing pollutants in summer months.	availability.

Analysis Year:	2018		
Asset / Location:	I-80 from WY-372 to W. Green River, ML80	om 98.787 to 104.774	
Ownership:	WYDOT	Criticality Rank:	6 of 76
Risk Probability Rtg:	5	Risk Consequence Rtg:	4
Priority Rtg:	High	Issue Type:	Environmental
Issues:	Ozone level is about 96% of exceedance lev	l	
Vulnerabilities	Stree	gths Objectives	
About 44,000 population affected in Sweetwater County.		Reduce delays and subsequent pollu Provide alternatives to vehicle idling	tant emissions.
Annual venicle delay app	Toximately 21,000 hours per mile.	Provide incentives for lower emission	s vehicles.

Perform Action Before, During or After the Event	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational, <u>P</u> lan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
			1. Fairly low cost fix.		
		Assess and modify current	2. WYDOT already has much of this implemented and		
		snow removal and roadway	likely would not require many changes.	1. Probably little improvement remaining to be gained since	
	-	management procedures as	3. Could reduce inefficient slowing of vehicles thereby	WYDOT is already assessing and improving procedures.	
D	0	needed.	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
			1. Fairly low cost and reduces operational costs.		
			2. Can improve visibility and minimize snow		
			accumulation on the road.	1. WYDOT is nearing effective saturation of snow fences along	
_			3. Could reduce inefficient slowing of vehicles thereby	Interstate highways.	
В	H	Build snow fences	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
		Assess and modify safety	1. Could reduce inefficient slowing of vehicles thereby	1. Can be very expensive.	
		barriers, cuts, slopes and other	improving emissions reductions.	2. Safety issues need to be carefully assessed.	
-		geometrics that cause snow	2. A very few modifications may be easily accomplished	3. Limited improvement locations limit emission reductions.	
В	H	drifting.	at low cost.	4. Not effective at reducing pollutants in summer months.	
			1. CV technology promises a new method to mitigate		1. Contact automotive
			delays and crashes.		organizations,
			2. Lechnology can reduce risk taking behaviors.	1. The technology is new and not fully tested. Issues may	shippers and WIA to
			3. Can optimize vehicle movement efficiencies and	arise.	advertise and
		Implement Connected Vehicle	dissuade drivers from approaching conditions that	2. Implementation costs may be fairly high.	encourage use of the
В	Н	technology on the road.	create increased venicle emissions.	3. Requires cooperation and acceptance from vehicle owners.	technology.
				1. Could become very expensive.	
				2. Most of the trucks on I-80 are from out of state likely	1 Ocatestalian and
			1 Deduces emissions	causing the effectiveness of retroits to be minimal. It would	1. Contact snippers
		Drevide diseal retrafit in centives	1. Reduces emissions.	require retrontting a very large number of trucks to see	and with to advertise
Р	Ц	to the trucking inductor	2. Effective year round rather than just in winter	Significant results.	and encourage
В	П		1 Deduces to chilling during winter weather events	3. As trucking fleet is replaced action will loses effectiveness.	1 leform objection and
		Dravida algorithm truck parking	thus reducing aminorians	I. Requires trucks to be equipped with applicable equipment	1. Inform snippers and
Р	L	aroon to reduce truck idling	2. Drovideo additional asfaty factures to the road	2 Loss effective at reducing pollutants in summer menths	wirk of electrification
В	; П	areas to reduce truck idling.	2. Provides additional safety reatures to the road.	2. Less enective at reducing pollutants in summer months.	availability.

Issues:	Ozone level is about 90% of exceedance level. Most of delay is congestion related.		
Priority Rtg:	High	Issue Type:	Environmental
Risk Probability Rtg:	5	Risk Consequence Rtg:	5
Ownership:	WYDOT	Criticality Rank:	6 of 76
Asset / Location:	I-180 from Terry Ranch Rd to I-80, ML180 from 3.538 to 104.774		
Analysis Year:	2018		

Vulnerabilities	Strengths	Objectives
Over 100,000 population affected in Laramie County.		Reduce delays and subsequent pollutant emissions.
Annual vehicle delay approximately 28,700 hours per mile.		Provide alternatives to vehicle idling.
		Provide incentives for lower emissions vehicles.

Perform Action Before, During or After the Event	<u>H</u> arden, <u>R</u> edundant, Operational Plan	Actions	Pros	Cons	Potential Tasks Involving
Aller the Lyent			1 Fairly low cost fix		
		Assess and modify current	2 WYDOT already has much of this implemented and		
		snow removal and roadway	likely would not require many changes.	1. Probably little improvement remaining to be gained since	
		management procedures as	3. Could reduce inefficient slowing of vehicles thereby	WYDOT is already assessing and improving procedures.	
D	0	needed.	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
			1. Fairly low cost and reduces operational costs.		
			2. Can improve visibility and minimize snow		
			accumulation on the road.		
			3. Could reduce inefficient slowing of vehicles thereby	1. Urban area limits snow fence placement.	
В	H.	Build snow fences	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
		Assess and modify safety	1. Could reduce inefficient slowing of vehicles thereby	1. Can be very expensive.	
		barriers, cuts, slopes and other	improving emissions reductions.	2. Safety issues need to be carefully assessed.	
_		geometrics that cause snow	2. A very few modifications may be easily accomplished	3. Limited improvement locations limit emission reductions.	
В	H	drifting.	at low cost.	4. Not effective at reducing pollutants in summer months.	
			1. CV technology promises a new method to mitigate		1. Contact automotive
			delays and crashes.		organizations,
			2. Technology can reduce risk taking behaviors.	1. The technology is new and not fully tested. Issues may	snippers and WIA to
		Implement Connected Vabials	3. Can optimize venicle movement efficiencies and	arise.	advertise and
Р	L L	technology on the read	dissuade drivers from approaching conditions that create	2. Implementation costs may be fainy high.	encourage use of the
D	П	technology on the road.		3. Requires cooperation and acceptance from vehicle owners.	technology.
				2. Most of the trucks on L80 are from out of state likely	
				causing the effectiveness of retrofits to be minimal. It would	1 Contact shippers
		Provide diesel retrofit		require retrofitting a very large number of trucks to see	and WTA to advertise
		incentives to the trucking	1. Reduces emissions.	significant results.	and encourage
В	Н	industry.	2. Effective year round rather than just in winter months.	3. As trucking fleet is replaced action will loses effectiveness.	retrofitting their trucks.
		Provide electrified truck	1. Reduces truck idling during winter weather events	1. Requires trucks to be equipped with applicable equipment	1. Inform shippers and
		parking areas to reduce truck	thus reducing emissions.	to be able to shut down their diesel engines.	WTA of electrification
В	H	idling.	2. Provides additional safety features to the road.	2. Less effective at reducing pollutants in summer months.	availability.
				1. There may not be enough trucks to qualify.	
		Incentivize PrePass for trucks		2. Nearly all trucks are from out-of-state so Incentives may be	1. Inform shippers and
В	H	at the port-of-entry.	1. Reduces truck slowing and idling.	ineffectively distributed.	WTA of incentives.

Analysis Year:	2	2018			
Asset / Locatior	n: l·	-80 Buford to Cheyenne, ML80 from	334.86 to 359.195		
Ownership:	V	WYDOT		Criticality Rank:	8 of 76
Risk Probability	Rta: 5			Risk Consequence Rta:	5
Priority Rta		liah			Environmental
leques:	ſ	Tope level is about 90% of exceeds	ance level and PM10 is at 78%		Environmental
Vulnerabilition				Objectives	
		d in Laramia County	Stienguis	Beduce delays and subsequent pollutant emissions	
Annual vehicle	delay approxima	itely 20 500 hours per mile		Provide alternatives to vehicle idling	
Affects the high	lest population c	oncentration in the State.		Provide incentives for lower emissions vehicles.	
Perform Action	<u>H</u> arden,				Potential Tasks Involving
After the Event	<u>R</u> edundant, Operational, Plan	Actions	Pros	Cons	Stakeholders
			1. Fairly low cost fix.		
		Assess and modify current	2. WYDOT already has much of this implemented and		
		snow removal and roadway	likely would not require many changes.	1. Probably little improvement remaining to be gained since	
П	0	management procedures as	3. Could reduce inefficient slowing of venicles thereby	2 Not effective at reducing pollutants in summer months	
			1. Fairly low cost and reduces operational costs		
			2. Can improve visibility and minimize snow		
			accumulation on the road.	1. WYDOT is nearing effective saturation of snow fences alon	g
			3. Could reduce inefficient slowing of vehicles thereby	Interstate highways.	
В	H	Build snow fences	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
		Assess and modify safety	1. Could reduce inefficient slowing of vehicles thereby	1. Can be very expensive.	
		barriers, cuts, slopes and other	Improving emissions reductions.	2. Safety issues need to be carefully assessed.	
в	н	drifting	at low cost	4. Not effective at reducing pollutants in summer months	
D		Ginang.	1. CV technology promises a new method to mitigate		1. Contact automotive
			delays and crashes.		organizations,
			2. Technology can reduce risk taking behaviors.	1. The technology is new and not fully tested. Issues may	shippers and WTA to
			3. Can optimize vehicle movement efficiencies and	arise.	advertise and
		Implement Connected Vehicle	dissuade drivers from approaching conditions that create	2. Implementation costs may be fairly high.	encourage use of the
В	H	technology on the road.	increased venicle emissions.	3. Requires cooperation and acceptance from vehicle owners	technology.
				 Could become very expensive. Most of the trucks on L80 are from out of state likely. 	
				causing the effectiveness of retrofits to be minimal. It would	1 Contact shippers
		Provide diesel retrofit		require retrofitting a very large number of trucks to see	and WTA to advertise
		incentives to the trucking	1. Reduces emissions.	significant results.	and encourage
В	Н	industry.	2. Effective year round rather than just in winter months.	3. As trucking fleet is replaced action will loses effectiveness.	retrofitting their trucks.
		Provide electrified truck	1. Reduces truck idling during winter weather events	1. Requires trucks to be equipped with applicable equipment	1. Inform shippers and
		parking areas to reduce truck	thus reducing emissions.	to be able to shut down their diesel engines.	WTA of electrification
В	i H	idling.	2. Provides additional satety features to the road.	Less effective at reducing pollutants in summer months.	availability.

Analysis Year:		2018			
Asset / Location: I-80 from I-25 to Greeley Hwy, ML80 from 359.195		from 359.195 to 361.64			
Ownership:	١	WYDOT		Criticality Rank:	8 of 76
Risk Probability	Rta:	5		Risk Consequence Rta:	5
Priority Rta		High		Issue Tyne:	Environmental
leques:		Trans level is about 90% of exceeds	ance level and PM10 is at 78%		Linnonia
Vulnorabilition	,		Strongtho	Objectives	
Over 100 000 p	opulation affecte	ed in Laramie County	Stieligtis	Reduce delays and subsequent pollutant emissions	
Annual vehicle	delav approxima	tely 17 300 hours per mile		Provide alternatives to vehicle idling	
Affects the high	lest population c	oncentration in the State.		Provide incentives for lower emissions vehicles.	
Perform Action	<u>H</u> arden,				Potential Tasks Involving
Before, During or After the Event	Redundant, Operational, Plan	Actions	Pros	Cons	Stakeholders
			1. Fairly low cost fix.		
		Assess and modify current	2. WYDOT already has much of this implemented and		
		snow removal and roadway	likely would not require many changes.	1. Probably little improvement remaining to be gained since	
П	0	nanagement procedures as	5. Could reduce memcient slowing of vehicles thereby	2 Not effective at reducing pollutants in summer months	
			1 Fairly low cost and reduces operational costs	2. Not ellective at reducing polititants in summer months.	
			2. Can improve visibility and minimize snow	1. WYDOT is nearing effective saturation of snow fences alone	a
			accumulation on the road.	Interstate highways.	
			3. Could reduce inefficient slowing of vehicles thereby	2. Not effective at reducing pollutants in summer months.	
В	H	Build snow fences	improving emissions reductions.	3. Urban area limits snow fence placement.	
		Assess and modify safety	1. Could reduce inefficient slowing of vehicles thereby	1. Can be very expensive.	
		barriers, cuts, slopes and other	Improving emissions reductions.	2. Safety issues need to be carefully assessed.	
в	н	drifting	2. A very lew modifications may be easily accomplished	3. Limited improvement locations limit emission reductions.	
	11	dinung.	1. CV technology promises a new method to mitigate		1. Contact automotive
			delays and crashes.		organizations,
			2. Technology can reduce risk taking behaviors.	1. The technology is new and not fully tested. Issues may	shippers and WTA to
			3. Can optimize vehicle movement efficiencies and	arise.	advertise and
		Implement Connected Vehicle	dissuade drivers from approaching conditions that create	2. Implementation costs may be fairly high.	encourage use of the
В	H	technology on the road.	increased venicle emissions.	3. Requires cooperation and acceptance from vehicle owners.	technology.
				2. Most of the trucks on L-80 are from out of state likely	
				causing the effectiveness of retrofits to be minimal. It would	1. Contact shippers
		Provide diesel retrofit		require retrofitting a very large number of trucks to see	and WTA to advertise
		incentives to the trucking	1. Reduces emissions.	significant results.	and encourage
В	H	industry.	2. Effective year round rather than just in winter months.	3. As trucking fleet is replaced action will loses effectiveness	retrofitting their trucks.
		Provide electrified truck	1. Reduces truck idling during winter weather events	1. Requires trucks to be equipped with applicable equipment	1. Inform shippers and
		parking areas to reduce truck	thus reducing emissions.	to be able to shut down their diesel engines.	WIA of electrification
В	i H	i aling.	2. Provides additional safety features to the road.	2. Less effective at reducing pollutants in summer months.	availability.

Vulnorobilition	Ctranetha	Objectives	
Issues:	Ozone level is about 96% of exceedance level.		
Priority Rtg:	High	Issue Type:	Environmental
Risk Probability Rtg:	4	Risk Consequence Rtg:	4
Ownership:	WYDOT	Criticality Rank:	6 of 76
Asset / Location:	I-80 from E Green River Interchange to E Flaming Gorge Rd, ML80 fro	om 91.475 to 98.787	
Analysis Year:	2018		

Vulnerabilities	Strengths	Objectives
About 44,000 population affected in Sweetwater County.		Reduce delays and subsequent pollutant emissions.
Annual vehicle delay approximately 14,000 hours per mile.		Provide alternatives to vehicle idling.
		Provide incentives for lower emissions vehicles.

Perform Action Before, During or After the Event	<u>H</u> arden, <u>R</u> edundant, Operational, Plan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
			1. Fairly low cost fix.		
		Assess and modify current	2. WYDOT already has much of this implemented and		
		snow removal and roadway	likely would not require many changes.	1. Probably little improvement remaining to be gained since	
		management procedures as	3. Could reduce inefficient slowing of vehicles thereby	WYDOT is already assessing and improving procedures.	
D	0	needed.	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
			 Fairly low cost and reduces operational costs. 		
			2. Can improve visibility and minimize snow		
			accumulation on the road.	1. WYDOT is nearing effective saturation of snow fences along	
_			3. Could reduce inefficient slowing of vehicles thereby	Interstate highways.	
В	H	Build snow fences	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
		Assess and modify safety	1. Could reduce inefficient slowing of vehicles thereby	1. Can be very expensive.	
		barriers, cuts, slopes and other	improving emissions reductions.	2. Safety issues need to be carefully assessed.	
_		geometrics that cause snow	2. A very few modifications may be easily accomplished	3. Limited improvement locations limit emission reductions.	
В	H	drifting.	at low cost.	4. Not effective at reducing pollutants in summer months.	
			1. CV technology promises a new method to mitigate		1. Contact automotive
			delays and crashes.	4. The task along is a set of the task of large same	organizations,
			2. Technology can reduce risk taking benaviors.	1. The technology is new and not fully tested. Issues may	snippers and wild to
		Implement Connected Vahiala	3. Can optimize venicle movement efficiencies and	Arise.	advertise and
р		technology on the read	increased webiele emissions	2. Implementation costs may be fainy high.	encourage use of the
D	П	technology on the road.		Could become your expensive	lechnology.
				2. Most of the trucks on L80 are from out of state likely	
				causing the effectiveness of retrofits to be minimal. It would	1 Contact chinners
		Provide diesel retrofit		require retrofitting a very large number of trucks to see	and WTA to advertise
		incentives to the trucking	1 Reduces emissions	significant results	and encourage
В	н	industry	2 Effective year round rather than just in winter months	3 As trucking fleet is replaced action will loses effectiveness	retrofitting their trucks
		Provide electrified truck	1 Reduces truck idling during winter weather events	1. Requires trucks to be equipped with applicable equipment	1 Inform shippers and
		parking areas to reduce truck	thus reducing emissions.	to be able to shut down their diesel engines.	WTA of electrification
В	Н	idling.	2. Provides additional safety features to the road.	2. Less effective at reducing pollutants in summer months.	availability.

Analysis Year:	2018			
Asset / Location:	I-80 from Rock Springs to Baxter Rd, ML80 from 104.774 to 110.913			
Ownership:	WYDOT	Criticality Rank:	6 of 76	
Risk Probability Rtg:	4	Risk Consequence Rtg:	4	
Priority Rtg:	High	Issue Type:	Environmental	
Issues:	Ozone level is about 96% of exceedance level.			
Vulnerabilities	Strengths	Objectives		
About 44,000 population a	affected in Sweetwater County.	Reduce delays and subsequent pollutant	emissions.	

About 44,000 population affected in Sweetwater County. Annual vehicle delay approximately 16,800 hours per mile.

				Provide incentives for lower emissions vehicles.	
Perform Action Before, During or After the Event	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational, <u>P</u> lan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
D	0	Assess and modify current snow removal and roadway management procedures as needed.	 Fairly low cost fix. WYDOT already has much of this implemented and likely would not require many changes. Could reduce inefficient slowing of vehicles thereby improving emissions reductions. 	 Probably little improvement remaining to be gained since WYDOT is already assessing and improving procedures. Not effective at reducing pollutants in summer months. 	
В	Н	Build snow fences	 Fairly low cost and reduces operational costs. Can improve visibility and minimize snow accumulation on the road. Could reduce inefficient slowing of vehicles thereby improving emissions reductions. 	 WYDOT is nearing effective saturation of snow fences along Interstate highways. Not effective at reducing pollutants in summer months. 	
В	Н	Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	 Could reduce inefficient slowing of vehicles thereby improving emissions reductions. A very few modifications may be easily accomplished at low cost. 	 Can be very expensive. Safety issues need to be carefully assessed. Limited improvement locations limit emission reductions. Not effective at reducing pollutants in summer months. 	
В	Н	Implement Connected Vehicle technology on the road.	 CV technology promises a new method to mitigate delays and crashes. Technology can reduce risk taking behaviors. Can optimize vehicle movement efficiencies and dissuade drivers from approaching conditions that create increased vehicle emissions. 	 The technology is new and not fully tested. Issues may arise. Implementation costs may be fairly high. Requires cooperation and acceptance from vehicle owners. 	1. Contact automotive organizations, shippers and WTA to advertise and encourage use of the technology.
В	Н	Provide diesel retrofit incentives to the trucking industry.	 Reduces emissions. Effective year round rather than just in winter months. 	 Could become very expensive. Most of the trucks on I-80 are from out of state likely causing the effectiveness of retrofits to be minimal. It would require retrofitting a very large number of trucks to see significant results. As trucking fleet is replaced action will loses effectiveness. 	1. Contact shippers and WTA to advertise and encourage retrofitting their trucks.
В	Н	Provide electrified truck parking areas to reduce truck idling.	 Reduces truck idling during winter weather events thus reducing emissions. Provides additional safety features to the road. 	 Requires trucks to be equipped with applicable equipment to be able to shut down their diesel engines. Less effective at reducing pollutants in summer months. 	1. Inform shippers and WTA of electrification availability.

Provide alternatives to vehicle idling.

Analysis Year:	Analysis Year: 2018				
Asset / Location: I-25 Colorado State Line North, ML25 from 0 to 2.662		5 from 0 to 2.662			
Ownership:	V	/YDOT		Criticality Rank:	12 of 76
Risk Probability	Rtg: 5			Risk Consequence Rtg:	5
Priority Rtg:	Н	igh		Issue Type:	Environmental
Issues:	C	zone level is about 90% of exceeda	ance level and PM10 is at 78%.		
Vulnerabilities			Strengths	Objectives	
Over 100,000 p	opulation affecte	d in Laramie County.		Reduce delays and subsequent pollutant emissions.	
Annual vehicle of	delay approximat	ely 26,600 hours per mile.		Provide alternatives to vehicle idling.	
Affects the high	est population co	ncentration in the State.		Provide incentives for lower emissions vehicles.	
Perform Action	<u>H</u> arden, Redundent				Potential Tasks Involving
After the Event	Operational, Plan	Actions	Pros	Cons	Stakeholders
	, <u></u>		1. Fairly low cost fix.		
		Assess and modify current	2. WYDOT already has much of this implemented and		
		snow removal and roadway	likely would not require many changes.	1. Probably little improvement remaining to be gained since	
		management procedures as	3. Could reduce inefficient slowing of vehicles thereby	WYDOT is already assessing and improving procedures.	
D	0	needed.	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
			1. Fairly low cost and reduces operational costs.		
			2. Can improve visibility and minimize snow		
			accumulation on the road.	1. WYDOT is nearing effective saturation of snow fences along	
			3. Could reduce inefficient slowing of vehicles thereby	Interstate highways.	
В	Н	Build snow fences	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
		Assess and modify safety	1. Could reduce inefficient slowing of vehicles thereby	1. Can be very expensive.	
		barriers, cuts, slopes and other	improving emissions reductions.	Safety issues need to be carefully assessed.	
		geometrics that cause snow	2. A very few modifications may be easily accomplished	3. Limited improvement locations limit emission reductions.	
В	Н	drifting.	at low cost.	Not effective at reducing pollutants in summer months.	
			1. CV technology promises a new method to mitigate		1. Contact automotive
			delays and crashes.		organizations,
			Technology can reduce risk taking behaviors.	 The technology is new and not fully tested. Issues may 	shippers and WTA to
			3. Can optimize vehicle movement efficiencies and	arise.	advertise and
_		Implement Connected Vehicle	dissuade drivers from approaching conditions that create	e 2. Implementation costs may be fairly high.	encourage use of the
В	Н	technology on the road.	increased vehicle emissions.	3. Requires cooperation and acceptance from vehicle owners.	technology.
				1. Could become very expensive.	
				2. Many of the trucks are from out of state likely causing the	
				effectiveness of retrofits to be minimal. It would require	1. Contact shippers
		Provide diesel retrofit		retrofitting a very large number of trucks to see significant	and WIA to advertise
		incentives to the trucking	1. Reduces emissions.	results.	and encourage
В	H	industry.	2. Effective year round rather than just in winter months.	3. As trucking fleet is replaced action will loses effectiveness.	retrofitting their trucks.
		Provide electrified truck	1. Reduces truck idling during winter weather events	1. Requires trucks to be equipped with applicable equipment	1. Inform shippers and
_		parking areas to reduce truck	thus reducing emissions.	to be able to shut down their diesel engines.	WTA of electrification
В	Н	idling.	2. Provides additional safety features to the road.	2. Less effective at reducing pollutants in summer months.	availability.
				1. There may not be enough trucks to qualify.	
_		Incentivize PrePass for trucks		2. Nearly all trucks are from out-of-state so Incentives may be	1. Inform shippers and
В	Н	at the port-of-entry.	1. Reduces truck slowing and idling.	ineffectively distributed.	WIA of incentives.

Analysis Year:	lysis Year: 2018				
Asset / Locatior	Asset / Location: I-25 Terry Ranch Rd to College Dr, ML25 from 2.662 to 7.85				
Ownership:	V	VYDOT		Criticality Rank:	12 of 78
Risk Probabilitv	Rta: 5	0		Risk Consequence Rta:	5
Priority Rta:	-5 H	liah		Issue Type:	Environmental
leques.)zone level is about 90% of exceeds	ance level and PM10 is at 78%		
Vulnerabilities			Strengths	Objectives	
Over 100 000 p	opulation affecte	ad in Laramie County	Ottengtila	Reduce delays and subsequent pollutant emissions	
Annual vehicle	delav annroxima	itely 24 900 hours per mile		Provide alternatives to vehicle idling	
Affects the high	est population c	oncentration in the State.		Provide incentives for lower emissions vehicles.	
Perform Action	Harden,				Potential Tasks Involving
<u>Before</u> , <u>D</u> uring or After the Event	<u>R</u> edundant, Operational, Plan	Actions	Pros	Cons	Stakeholders
			1. Fairly low cost fix.		
		Assess and modify current	2. WYDOT already has much of this implemented and		
		snow removal and roadway	likely would not require many changes.	1. Probably little improvement remaining to be gained since	
П	0	management procedures as	5. Could reduce memcient slowing of vehicles thereby	2 Not effective at reducing pollutants in summer months	
	0		1 Fairly low cost and reduces operational costs		
			2. Can improve visibility and minimize snow		
			accumulation on the road.	1. WYDOT is nearing effective saturation of snow fences alon	g
			3. Could reduce inefficient slowing of vehicles thereby	Interstate highways.	
В	Н	Build snow fences	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
		Assess and modify safety	1. Could reduce inefficient slowing of vehicles thereby	1. Can be very expensive.	
		barriers, cuts, slopes and other	Improving emissions reductions.	2. Safety issues need to be carefully assessed.	
в	н	drifting	2. A very lew modifications may be easily accomplished	3. Limited improvement locations limit emission reductions.	
D	11	dinting.	1 CV technology promises a new method to mitigate		1 Contact automotive
			delays and crashes.		organizations.
			2. Technology can reduce risk taking behaviors.	1. The technology is new and not fully tested. Issues may	shippers and WTA to
			3. Can optimize vehicle movement efficiencies and	arise.	advertise and
		Implement Connected Vehicle	dissuade drivers from approaching conditions that create	2. Implementation costs may be fairly high.	encourage use of the
В	Н	technology on the road.	increased vehicle emissions.	 Requires cooperation and acceptance from vehicle owners. 	technology.
				1. Could become very expensive.	
				2. Many of the trucks are from out of state likely causing the	1 Contact shippers
		Provide diesel retrofit		retrofitting a very large number of trucks to see significant	and WTA to advertise
		incentives to the trucking	1. Reduces emissions.	results.	and encourage
В	Н	industry.	2. Effective year round rather than just in winter months.	3. As trucking fleet is replaced action will loses effectiveness	retrofitting their trucks.
		Provide electrified truck	1. Reduces truck idling during winter weather events	1. Requires trucks to be equipped with applicable equipment	1. Inform shippers and
		parking areas to reduce truck	thus reducing emissions.	to be able to shut down their diesel engines.	WTA of electrification
В	Н	idling.	Provides additional safety features to the road.	2. Less effective at reducing pollutants in summer months.	availability.

Analysis Year:	2	2018			
Asset / Location	Location: I-25 College Dr to I-80, ML25 from 7.85 to 8.845				
Ownership:	١	WYDOT		Criticality Rank:	12 of 76
Risk Probability	Rta: 5	5		Risk Consequence Rta:	5
Priority Rta:		High			Environmental
loouoo:	1	Drong lovel is shout 00% of evened	analoval and DM10 is at 70%	issue rype.	Environmentar
		Szone level is about 90 % of exceeda		Objections	
Over 100 000 n	opulation affecte	ad in Laramie County	Strengths	Deluce delays and subsequent pollutant emissions	
Annual vehicle	delay approxima	ately 65 300 hours per mile		Provide alternatives to vehicle idling	
Affects the high	lest population c	oncentration in the State.		Provide incentives for lower emissions vehicles.	
Perform Action	Harden,				Potential Tasks Involving
<u>Before</u> , <u>D</u> uring or After the Event	Redundant, Operational, Plan	Actions	Pros	Cons	Stakeholders
			1. Fairly low cost fix.		
		Assess and modify current	2. WYDOT already has much of this implemented and		
		snow removal and roadway	likely would not require many changes.	1. Probably little improvement remaining to be gained since	
_		management procedures as	3. Could reduce inefficient slowing of vehicles thereby	WYDOT is already assessing and improving procedures.	
D	0	needed.	Improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
			1. Fairly low cost and reduces operational costs.	1 MMDOT is positing effective acturation of anow fances alon	
			2. Can improve visibility and minimize show	I. WIDOT IS hearing effective saturation of show fences along	
			3 Could reduce inefficient slowing of vehicles thereby	2 Not effective at reducing pollutants in summer months	
В	н	Build snow fences	improving emissions reductions	3 Urban area limits snow fence placement	
		Assess and modify safety	1. Could reduce inefficient slowing of vehicles thereby	1. Can be very expensive.	
		barriers, cuts, slopes and other	improving emissions reductions.	2. Safety issues need to be carefully assessed.	
		geometrics that cause snow	2. A very few modifications may be easily accomplished	3. Limited improvement locations limit emission reductions.	
В	Н	drifting.	at low cost.	Not effective at reducing pollutants in summer months.	
			1. CV technology promises a new method to mitigate		1. Contact automotive
			delays and crashes.		organizations,
			2. Technology can reduce risk taking behaviors.	1. The technology is new and not fully tested. Issues may	shippers and WIA to
		Implement Connected Vehicle	3. Can optimize venicle movement efficiencies and discussed drivers from approaching conditions that create	Arise.	advertise and
в	н	technology on the road	increased vehicle emissions	 Implementation costs may be fainy high. Requires cooperation and acceptance from vehicle owners. 	technology
D	11	technology on the load.		1 Could become very expensive	teermology.
				2. Most of the trucks are from out of state likely causing the	
				effectiveness of retrofits to be minimal. It would require	1. Contact shippers
		Provide diesel retrofit		retrofitting a very large number of trucks to see significant	and WTA to advertise
		incentives to the trucking	1. Reduces emissions.	results.	and encourage
В	H	industry.	2. Effective year round rather than just in winter months.	3. As trucking fleet is replaced action will loses effectiveness	retrofitting their trucks.
		Provide electrified truck	1. Reduces truck idling during winter weather events	1. Requires trucks to be equipped with applicable equipment	1. Inform shippers and
		parking areas to reduce truck	thus reducing emissions.	to be able to shut down their diesel engines.	WTA of electrification
B	H	idling.	2. Provides additional safety features to the road.	Less effective at reducing pollutants in summer months.	availability.

Analysis Year:	Year: 2018				
Asset / Location: I-25 from I-80 to Missle Dr, ML25 from 8.845 to 10.586					
Ownership:	,	NYDOT		Criticality Rank:	12 of 76
Risk Probability	/ Rta:	5		Risk Consequence Rta:	5
Priority Rta:		Medium		Issue Type:	Environmental
lssues.		Trans level is about 90% of exceeds	ance level and PM10 is at 78%		
Vulnerabilities			Strengths	Objectives	
Over 100 000 n	onulation affect	ed in Laramie County	Stongtho	Reduce delays and subsequent pollutant emissions	
	delay approxim	ately 13 100 hours per mile		Provide alternatives to vehicle idling	
Affects the high		anontration in the State		Provide incentives for lower emissions vehicles	
Perform Action	Harden.	oncentration in the State.		Provide incentives for lower emissions vehicles.	
Before, During or	Redundant,	Actions	Pros	Cone	Potential Tasks Involving
After the Event	Operational, Plan	Actions	1 Fairly low cost fix		Stakenoluers
		Assess and modify current	2. WYDOT already has much of this implemented and		
		snow removal and roadway	likely would not require many changes.	1. Probably little improvement remaining to be gained since	
		management procedures as	3. Could reduce inefficient slowing of vehicles thereby	WYDOT is already assessing and improving procedures.	
D	0	needed.	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
			 Fairly low cost and reduces operational costs. 		
			2. Can improve visibility and minimize snow	1. WYDOT is nearing effective saturation of snow fences along	3
			accumulation on the road.	Interstate highways.	
Р	11	Duild an au fan an	3. Could reduce inefficient slowing of vehicles thereby	2. Not effective at reducing pollutants in summer months.	
В	П	Build snow rences	Improving emissions reductions.	3. Orban area limits snow tence placement.	
		harriers cuts slopes and other	improving emissions reductions	2. Safety issues need to be carefully assessed	
		deometrics that cause snow	2 A very few modifications may be easily accomplished	3. Limited improvement locations limit emission reductions	
В	Н	drifting	at low cost.	4. Not effective at reducing pollutants in summer months.	
	· · · · · · · · · · · · · · · · · · ·	g	1. CV technology promises a new method to mitigate	91	1. Contact automotive
			delays and crashes.		organizations,
			2. Technology can reduce risk taking behaviors.	1. The technology is new and not fully tested. Issues may	shippers and WTA to
			3. Can optimize vehicle movement efficiencies and	arise.	advertise and
		Implement Connected Vehicle	dissuade drivers from approaching conditions that create	2. Implementation costs may be fairly high.	encourage use of the
В	H	technology on the road.	increased venicie emissions.	3. Requires cooperation and acceptance from venicle owners.	technology.
				 Could become very expensive. Most of the trucks are from out of state likely causing the 	
				effectiveness of retrofits to be minimal. It would require	1 Contact shippers
		Provide diesel retrofit		retrofitting a very large number of trucks to see significant	and WTA to advertise
		incentives to the trucking	1. Reduces emissions.	results.	and encourage
В	Н	industry.	2. Effective year round rather than just in winter months.	3. As trucking fleet is replaced action will loses effectiveness.	retrofitting their trucks.
		Provide electrified truck	1. Reduces truck idling during winter weather events	1. Requires trucks to be equipped with applicable equipment	1. Inform shippers and
		parking areas to reduce truck	thus reducing emissions.	to be able to shut down their diesel engines.	WTA of electrification
В	H	idling.	2. Provides additional safety features to the road.	2. Less effective at reducing pollutants in summer months.	availability.

Analysis Year:	:	2018			
Asset / Location: I-25 Missle Dr to Central Ave, ML25 from 10.586 to 12.697					
Ownership:	,	WYDOT		Criticality Rank:	12 of 76
Risk Probability	Rta:	5		Risk Consequence Rta:	5
Priority Rta:		Medium			Environmental
loovoo			analous and DM10 is at 70%	issue Type.	Linnonnentai
ISSUES.		Ozone level is about 90 % of exceeda			
Vulnerabilities			Strengths	Objectives	
Over 100,000 p	opulation affect	ed in Laramie County.		Reduce delays and subsequent pollutant emissions.	
Affects the high	ueray approximation of	concentration in the State		Provide allematives to vehicle failing.	
Perform Action	Harden,				
Before, During or	Redundant,	Actions	Pros	Cons	Potential Tasks Involving
<u>A</u> iter the Event			1 Fairly low cost fix		Stakenolders
		Assess and modify current	2. WYDOT already has much of this implemented and		
		snow removal and roadway	likely would not require many changes.	1. Probably little improvement remaining to be gained since	
		management procedures as	3. Could reduce inefficient slowing of vehicles thereby	WYDOT is already assessing and improving procedures.	
D	0	needed.	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
			 Fairly low cost and reduces operational costs. 		
			2. Can improve visibility and minimize snow		
			accumulation on the road.	1. WYDOT is nearing effective saturation of snow fences along]
Р		Duild enous fenere	3. Could reduce inefficient slowing of vehicles thereby	Interstate highways.	
В	П	Build show tences	Improving emissions reductions.	2. Not effective at reducing poliutants in summer months.	
		harriers cuts slopes and other	improving emissions reductions	2. Safety issues need to be carefully assessed	
		deometrics that cause snow	2 A very few modifications may be easily accomplished	3. Limited improvement locations limit emission reductions	
В	н	drifting.	at low cost.	4. Not effective at reducing pollutants in summer months.	
			1. CV technology promises a new method to mitigate		1. Contact automotive
			delays and crashes.		organizations,
			2. Technology can reduce risk taking behaviors.	1. The technology is new and not fully tested. Issues may	shippers and WTA to
			3. Can optimize vehicle movement efficiencies and	arise.	advertise and
_		Implement Connected Vehicle	dissuade drivers from approaching conditions that create	2. Implementation costs may be fairly high.	encourage use of the
В	H	technology on the road.	increased vehicle emissions.	3. Requires cooperation and acceptance from vehicle owners.	technology.
				1. Could become very expensive.	
				2. Many of the trucks are from out of state likely causing the	1 Contact chinners
		Provide diesel retrofit		retrofitting a very large number of trucks to see significant	and WTA to advertise
		incentives to the trucking	1 Reduces emissions		and encourage
В	н	industry.	2. Effective year round rather than just in winter months.	3. As trucking fleet is replaced action will loses effectiveness.	retrofitting their trucks.
_		Provide electrified truck	1. Reduces truck idling during winter weather events	1. Requires trucks to be equipped with applicable equipment	1. Inform shippers and
		parking areas to reduce truck	thus reducing emissions.	to be able to shut down their diesel engines.	WTA of electrification
В	Н	idling.	2. Provides additional safety features to the road.	2. Less effective at reducing pollutants in summer months.	availability.

Analysis Year:		2018			
Asset / Location	n:	-80 from Snowy Range Rd to US-28	7, ML80 from 311.367 to 313.32		
Ownership:		WYDOT		Criticality Rank:	7 of 76
Risk Probability	Rtg:	5		Risk Consequence Rtg:	4
Priority Rtg:		Medium		Issue Type:	Environmental
Issues:		Ozone level is about 87% of exceeda	ance level.		
Vulnerabilities			Strengths	Objectives	
Over 39,000 po Annual vehicle	pulation affecte delay approxim	d in Albany County. ately 19,200 hours per mile.		Reduce delays and subsequent pollutant emissions. Provide alternatives to vehicle idling. Provide incentives for lower emissions vehicles.	
Perform Action Before, During or After the Event	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational, <u>P</u> lan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
D	0	Assess and modify current snow removal and roadway management procedures as needed.	 Fairly low cost fix. WYDOT already has much of this implemented and likely would not require many changes. Could reduce inefficient slowing of vehicles thereby improving emissions reductions. 	 Probably little improvement remaining to be gained since WYDOT is already assessing and improving procedures. Not effective at reducing pollutants in summer months. 	
В	Н	Build snow fences	 Fairly low cost and reduces operational costs. Can improve visibility and minimize snow accumulation on the road. Could reduce inefficient slowing of vehicles thereby improving emissions reductions. 	 WYDOT is nearing effective saturation of snow fences along Interstate highways. Not effective at reducing pollutants in summer months. Urban area limits snow fence placement. 	3
		Assess and modify safety	1. Could reduce inefficient slowing of vehicles thereby	1. Can be very expensive.	

			3. Could reduce inefficient slowing of vehicles thereby	2. Not effective at reducing pollutants in summer months.	
В	μ Η	Build snow fences	improving emissions reductions.	3. Urban area limits snow fence placement.	
		Assess and modify safety	1. Could reduce inefficient slowing of vehicles thereby	1. Can be very expensive.	
		barriers, cuts, slopes and other	improving emissions reductions.	Safety issues need to be carefully assessed.	
		geometrics that cause snow	2. A very few modifications may be easily accomplished	3. Limited improvement locations limit emission reductions.	
В	Н	drifting.	at low cost.	Not effective at reducing pollutants in summer months.	
			1. CV technology promises a new method to mitigate		1. Contact automotive
			delays and crashes.		organizations,
			Technology can reduce risk taking behaviors.	1. The technology is new and not fully tested. Issues may	shippers and WTA to
			Can optimize vehicle movement efficiencies and	arise.	advertise and
		Implement Connected Vehicle	dissuade drivers from approaching conditions that create	Implementation costs may be fairly high.	encourage use of the
В	H	technology on the road.	increased vehicle emissions.	3. Requires cooperation and acceptance from vehicle owners.	technology.
				1. Could become very expensive.	
				2. Most of the trucks on I-80 are from out of state likely	
				causing the effectiveness of retrofits to be minimal. It would	1. Contact shippers
		Provide diesel retrofit		require retrofitting a very large number of trucks to see	and WTA to advertise
		incentives to the trucking	1. Reduces emissions.	significant results.	and encourage
В	Н	industry.	2. Effective year round rather than just in winter months.	3. As trucking fleet is replaced action will loses effectiveness	retrofitting their trucks.
		Provide electrified truck	1. Reduces truck idling during winter weather events	1. Requires trucks to be equipped with applicable equipment	1. Inform shippers and
		parking areas to reduce truck	thus reducing emissions.	to be able to shut down their diesel engines.	WTA of electrification
В	Н	idling.	Provides additional safety features to the road.	2. Less effective at reducing pollutants in summer months.	availability.

Vulnorabilition	Ctrongtha	Objectives	
Issues:	Ozone level is about 87% of exceedance level.		
Priority Rtg:	Medium	Issue Type:	Environmental
Risk Probability Rtg:	5	Risk Consequence Rtg:	4
Ownership:	WYDOT	Criticality Rank:	7 of 76
Asset / Location:	I-80 from Grand Ave to Happy Jack Rd, ML80 from 316.48 to 322.741		
Analysis Year:	2018		

vuinerabilities	Strengths	Objectives
Over 39,000 population affected in Albany County.		Reduce delays and subsequent pollutant emissions.
Annual vehicle delay approximately 35,400 hours per mile.		Provide alternatives to vehicle idling.
		Provide incentives for lower emissions vehicles.

<u>Before</u> , <u>D</u> uring or After the Event	<u>H</u> aroen, <u>R</u> edundant, Operational Plan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
			1. Fairly low cost fix		
		Assess and modify current	2. WYDOT already has much of this implemented and		
		snow removal and roadway	likely would not require many changes.	1. Probably little improvement remaining to be gained since	
		management procedures as	3. Could reduce inefficient slowing of vehicles thereby	WYDOT is already assessing and improving procedures.	
D	0	needed.	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
			1. Fairly low cost and reduces operational costs.	1. WYDOT is nearing effective saturation of snow fences along	
			2. Can improve visibility and minimize snow	Interstate highways.	
			accumulation on the road.	2. Not effective at reducing pollutants in summer months.	
			3. Could reduce inefficient slowing of vehicles thereby	Most of section in canyon which limits snow fence	
В	H	Build snow fences	improving emissions reductions.	placement.	
		Assess and modify safety	1. Could reduce inefficient slowing of vehicles thereby	1. Can be very expensive.	
		barriers, cuts, slopes and other	improving emissions reductions.	Safety issues need to be carefully assessed.	
		geometrics that cause snow	2. A very few modifications may be easily accomplished	3. Limited improvement locations limit emission reductions.	
В	H	drifting.	at low cost.	4. Not effective at reducing pollutants in summer months.	
			1. CV technology promises a new method to mitigate		1. Contact automotive
			delays and crashes.		organizations,
			2. Technology can reduce risk taking behaviors.	1. The technology is new and not fully tested. Issues may	shippers and WIA to
		Implement Connected Mahiele	3. Can optimize vehicle movement efficiencies and	arise.	advertise and
р		Implement Connected Venicle	dissuade drivers from approaching conditions that create	2. Implementation costs may be fairly high.	encourage use of the
D	П	technology on the road.		Requires cooperation and acceptance from vehicle owners.	technology.
				Could become very expensive. A Most of the trucks on L80 are from out of state likely.	
				2. Most of the effectiveness of retrofits to be minimal. It would	1 Contact chinners
		Provide diesel retrofit		require retrofitting a very large number of trucks to see	and WTA to advertise
		incentives to the trucking	1 Reduces emissions	significant results	and encourage
В	Н	industry.	2. Effective year round rather than just in winter months.	3. As trucking fleet is replaced action will loses effectiveness.	retrofitting their trucks.
_		Provide electrified truck	1. Reduces truck idling during winter weather events	1. Requires trucks to be equipped with applicable equipment	1. Inform shippers and
		parking areas to reduce truck	thus reducing emissions.	to be able to shut down their diesel engines.	WTA of electrification
В	Н	idling.	2. Provides additional safety features to the road.	2. Less effective at reducing pollutants in summer months.	availability.

Vulperabilities	Ctrongtha	Objectives	
Issues:	Ozone level is about 87% of exceedance level.		
Priority Rtg:	Medium	Issue Type:	Environmental
Risk Probability Rtg:	5	Risk Consequence Rtg:	4
Ownership:	WYDOT	Criticality Rank:	7 of 76
Asset / Location:	I-80 from Happy Jack Rd to Buford, ML80 from 322.741 to 334.86		
Analysis Year:	2018		

Vulnerabilities	Strengths	Objectives
Over 39,000 population affected in Albany County.		Reduce delays and subsequent pollutant emissions.
Annual vehicle delay approximately 36,000 hours per mile.		Provide alternatives to vehicle idling.
		Provide incentives for lower emissions vehicles.

Before, During or	<u>H</u> arden, <u>R</u> edundant, Operational Plan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
And the Event			1 Fairly low cost fix		
		Assess and modify current	2 WYDOT already has much of this implemented and		
		snow removal and roadway	likely would not require many changes.	1. Probably little improvement remaining to be gained since	
		management procedures as	3. Could reduce inefficient slowing of vehicles thereby	WYDOT is already assessing and improving procedures.	
D	0	needed.	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
			1. Fairly low cost and reduces operational costs.	M	
			2. Can improve visibility and minimize snow		
			accumulation on the road.	1. WYDOT is nearing effective saturation of snow fences along	
			3. Could reduce inefficient slowing of vehicles thereby	Interstate highways.	
В	Н	Build snow fences	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
		Assess and modify safety	1. Could reduce inefficient slowing of vehicles thereby	1. Can be very expensive.	
		barriers, cuts, slopes and other	improving emissions reductions.	Safety issues need to be carefully assessed.	
		geometrics that cause snow	2. A very few modifications may be easily accomplished	3. Limited improvement locations limit emission reductions.	
В	H	drifting.	at low cost.	Not effective at reducing pollutants in summer months.	
			1. CV technology promises a new method to mitigate		1. Contact automotive
			delays and crashes.		organizations,
			Technology can reduce risk taking behaviors.	1. The technology is new and not fully tested. Issues may	shippers and WTA to
			3. Can optimize vehicle movement efficiencies and	arise.	advertise and
		Implement Connected Vehicle	dissuade drivers from approaching conditions that create	2. Implementation costs may be fairly high.	encourage use of the
В	H	technology on the road.	increased vehicle emissions.	3. Requires cooperation and acceptance from vehicle owners.	technology.
				1. Could become very expensive.	
				2. Most of the trucks on I-80 are from out of state likely	
				causing the effectiveness of retrofits to be minimal. It would	1. Contact shippers
		Provide diesel retrofit		require retrofitting a very large number of trucks to see	and WIA to advertise
_		incentives to the trucking	1. Reduces emissions.	significant results.	and encourage
В	H	Industry.	2. Effective year round rather than just in winter months.	3. As trucking fleet is replaced action will loses effectiveness.	retrofitting their trucks.
		Provide electrified truck	1. Reduces truck idling during winter weather events	1. Requires trucks to be equipped with applicable equipment	1. Inform shippers and
		parking areas to reduce truck	thus reducing emissions.	to be able to shut down their diesel engines.	WIA of electrification
В	I H	idling.	2. Provides additional safety features to the road.	2. Less effective at reducing pollutants in summer months.	availability.

Analysis Year:	2	018			
Asset / Location:	ocation: I-25 Central Ave to US-85, ML25 from 1		n 12.697 to 17.042		
Ownership: WYDOT		/YDOT		Criticality Rank:	12 of 70
Risk Probability F	Rtg: 4			Risk Consequence Rtg:	5
Priority Rtg:	Ň	ledium		Issue Type:	Environmental
Issues:	0	zone level is about 90% of exceeda	ance level and PM10 is at 78%.	<i>,</i> ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
Vulnerabilities			Strengths	Objectives	
Over 100 000 por	pulation affecte	d in Laramie County	0.00.9.00	Reduce delays and subsequent pollutant emissions	
Annual vehicle de	elav approximat	tely 15 700 hours per mile		Provide alternatives to vehicle idling	
Affects the higher	st population co	incentration in the State.		Provide incentives for lower emissions vehicles.	
Perform Action	Harden,				
Before, During or	Redundant,	Antiona	Dree	0	Potential Tasks Involving
After the Event	<u>O</u> perational, <u>P</u> lan	Actions	Pros	Cons	Stakeholders
			1. Fairly low cost fix.		
		Assess and modify current	2. WYDO1 already has much of this implemented and		
		snow removal and roadway	likely would not require many changes.	1. Probably little improvement remaining to be gained since	
		management procedures as	3. Could reduce inefficient slowing of vehicles thereby	WYDOT is already assessing and improving procedures.	
D	0	needed.	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
			1. Fairly low cost and reduces operational costs.		
			Can improve visibility and minimize snow		
			accumulation on the road.	 WYDOT is nearing effective saturation of snow fences along 	3
			3. Could reduce inefficient slowing of vehicles thereby	Interstate highways.	
В	H	Build snow fences	improving emissions reductions.	Not effective at reducing pollutants in summer months.	
		Assess and modify safety	1. Could reduce inefficient slowing of vehicles thereby	1. Can be very expensive.	
		barriers, cuts, slopes and other	improving emissions reductions.	Safety issues need to be carefully assessed.	
		geometrics that cause snow	2. A very few modifications may be easily accomplished	Limited improvement locations limit emission reductions.	
В	Н	drifting.	at low cost.	Not effective at reducing pollutants in summer months.	
			1. CV technology promises a new method to mitigate		1. Contact automotive
			delays and crashes.		organizations,
			2. Technology can reduce risk taking behaviors.	1. The technology is new and not fully tested. Issues may	shippers and WTA to
			3. Can optimize vehicle movement efficiencies and	arise.	advertise and
		Implement Connected Vehicle	dissuade drivers from approaching conditions that create	e 2. Implementation costs may be fairly high.	encourage use of the
В	Н	technology on the road.	increased vehicle emissions.	3. Requires cooperation and acceptance from vehicle owners.	technology.
				1. Could become very expensive.	
				2. Many of the trucks are from out of state likely causing the	
				effectiveness of retrofits to be minimal. It would require	1. Contact shippers
		Provide diesel retrofit		retrofitting a very large number of trucks to see significant	and WTA to advertise
		incentives to the trucking	1. Reduces emissions.	results.	and encourage
В	Н	industry.	2. Effective year round rather than just in winter months.	3. As trucking fleet is replaced action will loses effectiveness.	retrofitting their trucks.
		Provide electrified truck	1. Reduces truck idling during winter weather events	1. Requires trucks to be equipped with applicable equipment	1. Inform shippers and
		parking areas to reduce truck	thus reducing emissions.	to be able to shut down their diesel engines.	WTA of electrification
В	Н	idlina.	2. Provides additional safety features to the road.	2. Less effective at reducing pollutants in summer months.	availability.

Analysis Year:	2018						
Asset / Location:	I-80 from WY-372 to W. Green River, ML80 from 82.608 to 89.13	30 from WY-372 to W. Green River, ML80 from 82.608 to 89.13					
Ownership:	WYDOT	Criticality Rank:	6 of 76				
Risk Probability Rtg:	3	Risk Consequence Rtg:	4				
Priority Rtg:	Medium	Issue Type:	Environmental				
Issues:	Ozone level is about 96% of exceedance level.						
Vulnerabilities	Strengths	Objectives					
About 44,000 population a	affected in Sweetwater County.	Reduce delays and subsequent pollutant e	missions.				
Annual vehicle delay appr	roximately 13,000 hours per mile.	Provide alternatives to vehicle idling.					
		Provide incentives for lower emissions vehi	icles.				

Perform Action Before, During or After the Event	<u>H</u> arden, <u>R</u> edundant, Operational P lan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
Alter the Lyent			1 Eairly low cost fix		Oldifoldero
		Assess and modify current	2 WYDOT already has much of this implemented and		
		snow removal and roadway	likely would not require many changes	1 Probably little improvement remaining to be gained since	
		management procedures as	3 Could reduce inefficient slowing of vehicles thereby	WYDOT is already assessing and improving procedures	
D	0	needed	improving emissions reductions	2 Not effective at reducing pollutants in summer months	
5	Ŭ		1 Fairly low cost and reduces operational costs		
			2 Can improve visibility and minimize snow		
			accumulation on the road.	1. WYDOT is nearing effective saturation of snow fences along	
			3. Could reduce inefficient slowing of vehicles thereby	Interstate highways.	
В	Н	Build snow fences	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
		Assess and modify safety	1. Could reduce inefficient slowing of vehicles thereby	1. Can be verv expensive.	
		barriers, cuts, slopes and other	improving emissions reductions.	2. Safety issues need to be carefully assessed.	
		geometrics that cause snow	2. A very few modifications may be easily accomplished	3. Limited improvement locations limit emission reductions.	
В	Н	drifting.	at low cost.	4. Not effective at reducing pollutants in summer months.	
			1. CV technology promises a new method to mitigate		1. Contact automotive
			delays and crashes.		organizations,
			Technology can reduce risk taking behaviors.	1. The technology is new and not fully tested. Issues may	shippers and WTA to
			3. Can optimize vehicle movement efficiencies and	arise.	advertise and
		Implement Connected Vehicle	dissuade drivers from approaching conditions that create	Implementation costs may be fairly high.	encourage use of the
В	H	technology on the road.	increased vehicle emissions.	3. Requires cooperation and acceptance from vehicle owners.	technology.
				1. Could become very expensive.	
				2. Most of the trucks on I-80 are from out of state likely	
				causing the effectiveness of retrofits to be minimal. It would	1. Contact shippers
		Provide diesel retrofit		require retrofitting a very large number of trucks to see	and WTA to advertise
_		incentives to the trucking	1. Reduces emissions.	significant results.	and encourage
В	H	industry.	2. Effective year round rather than just in winter months.	3. As trucking fleet is replaced action will loses effectiveness.	retrofitting their trucks.
		Provide electrified truck	1. Reduces truck idling during winter weather events	1. Requires trucks to be equipped with applicable equipment	1. Inform shippers and
_		parking areas to reduce truck	thus reducing emissions.	to be able to shut down their diesel engines.	WTA of electrification
В	i H	idling.	2. Provides additional safety features to the road.	2. Less effective at reducing pollutants in summer months.	availability.

Made and States	Other worth a	Objections.	
Issues:	Ozone level is about 96% of exceedance level.		
Priority Rtg:	Medium	Issue Type:	Environmental
Risk Probability Rtg:	3	Risk Consequence Rtg:	4
Ownership:	WYDOT	Criticality Rank:	6 of 76
Asset / Location:	I-80 Superior to Bitter Creek, ML80 from 122.049 to 142.006		
Analysis Year:	2018		

Vulnerabilities	Strengths	Objectives
About 44,000 population affected in Sweetwater County.		Reduce delays and subsequent pollutant emissions.
Annual vehicle delay approximately 11,100 hours per mile.		Provide alternatives to vehicle idling.
		Provide incentives for lower emissions vehicles.

Perform Action Before, During or After the Event	<u>H</u> arden, <u>R</u> edundant, Operational Plan	Actions	Pros	Cons	Potential Tasks Involving
			1 Fairly low cost fix		Claricitorio
		Assess and modify current	2. WYDOT already has much of this implemented and		
		snow removal and roadway	likely would not require many changes.	1. Probably little improvement remaining to be gained since	
		management procedures as	3. Could reduce inefficient slowing of vehicles thereby	WYDOT is already assessing and improving procedures.	
D	0	needed.	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
			1. Fairly low cost and reduces operational costs.	-	
			2. Can improve visibility and minimize snow		
			accumulation on the road.	1. WYDOT is nearing effective saturation of snow fences along	
			3. Could reduce inefficient slowing of vehicles thereby	Interstate highways.	
В	H	Build snow fences	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
		Assess and modify safety	1. Could reduce inefficient slowing of vehicles thereby	1. Can be very expensive.	
		barriers, cuts, slopes and other	improving emissions reductions.	2. Safety issues need to be carefully assessed.	
_		geometrics that cause snow	2. A very few modifications may be easily accomplished	3. Limited improvement locations limit emission reductions.	
В	H	drifting.	at low cost.	4. Not effective at reducing pollutants in summer months.	
			1. CV technology promises a new method to mitigate		1. Contact automotive
			delays and crasnes.	1. The technology is now and not fully tested, leaves may	organizations,
			2. Technology can reduce lisk taking behaviors.	r. The technology is new and not fully tested. Issues may	shippers and with to
		Implement Connected Vehicle	dissuade drivers from approaching conditions that create	2 Implementation costs may be fairly high	auverlise and
в	н	technology on the road	increased vehicle emissions	3. Requires cooperation and accentance from vehicle owners	technology
D	11	teenhology on the load.		1 Could become very expensive	teermology.
				2 Most of the trucks on I-80 are from out of state likely	
				causing the effectiveness of retrofits to be minimal. It would	1. Contact shippers
		Provide diesel retrofit		require retrofitting a very large number of trucks to see	and WTA to advertise
		incentives to the trucking	1. Reduces emissions.	significant results.	and encourage
В	Н	industry.	2. Effective year round rather than just in winter months.	3. As trucking fleet is replaced action will loses effectiveness.	retrofitting their trucks.
		Provide electrified truck	1. Reduces truck idling during winter weather events	1. Requires trucks to be equipped with applicable equipment	1. Inform shippers and
		parking areas to reduce truck	thus reducing emissions.	to be able to shut down their diesel engines.	WTA of electrification
В	H H	idling.	2. Provides additional safety features to the road.	2. Less effective at reducing pollutants in summer months.	availability.

Analysis Year:		2018			
Asset / Locatior	Location: US-20/26 in Casper, ML34 from 0.087 to 2.34		37 to 2.34		
Ownership:		WYDOT		Criticality Rank:	17 of 76
Risk Probability	Rtg:	5		Risk Consequence Rtg:	5
Priority Rtg:		Medium		Issue Type:	Environmental
Issues:		Ozone level is about 90% of exceeda	ance level.		
Vulnerabilities			Strengths	Objectives	
About 83,000 p Annual vehicle	opulation affect delay approxim	ed in Natrona County. ately 31,300 hours per mile.		Reduce delays and subsequent pollutant emissions. Provide alternatives to vehicle idling. Provide incentives for lower emissions vehicles.	
<u>Perform Action</u> <u>B</u> efore, <u>D</u> uring or <u>A</u> fter the Event	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational, <u>P</u> lar	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
D	0	Assess and modify current snow removal and roadway management procedures as needed.	 Fairly low cost fix. WYDOT already has much of this implemented and likely would not require many changes. Could reduce inefficient slowing of vehicles thereby improving emissions reductions. 	 Probably little improvement remaining to be gained since WYDOT is already assessing and improving procedures. Not effective at reducing pollutants in summer months. 	
В	Н	Build snow fences	 Fairly low cost and reduces operational costs. Can improve visibility and minimize snow accumulation on the road. Could reduce inefficient slowing of vehicles thereby improving emissions reductions. 	 WYDOT is nearing effective saturation of snow fences along Interstate highways. Not effective at reducing pollutants in summer months. Urban area provides no snow fence placement. 	
В	Н	Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	 Could reduce inefficient slowing of vehicles thereby improving emissions reductions. A very few modifications may be easily accomplished at low cost. 	 Can be very expensive. Safety issues need to be carefully assessed. Limited improvement locations limit emission reductions. Not effective at reducing pollutants in summer months. 	
В	н	Implement Connected Vehicle technology on the road.	 CV technology promises a new method to mitigate delays and crashes. Technology can reduce risk taking behaviors. Can optimize vehicle movement efficiencies and dissuade drivers from approaching conditions that create increased vehicle emissions. 	 The technology is new and not fully tested. Issues may arise. Implementation costs may be fairly high. Requires cooperation and acceptance from vehicle owners. 	1. Contact automotive organizations, shippers and WTA to advertise and encourage use of the technology.
В	н	Provide diesel retrofit incentives to the trucking industry.	 Reduces emissions. Effective year round rather than just in winter months. 	 Could become very expensive. Most of the trucks on I-80 are from out of state likely causing the effectiveness of retrofits to be minimal. It would require retrofitting a very large number of trucks to see significant results. As trucking fleet is replaced action will loses effectiveness. 	1. Contact shippers and WTA to advertise and encourage retrofitting their trucks.
В	Н	Provide electrified truck parking areas to reduce truck idling.	 Reduces truck idling during winter weather events thus reducing emissions. Provides additional safety features to the road. 	 Requires trucks to be equipped with applicable equipment to be able to shut down their diesel engines. Less effective at reducing pollutants in summer months. 	1. Inform shippers and WTA of electrification availability.

Analysis Year:		2018			
Asset / Location: I-80 from Curtis St to WY-130, ML80 fr		-80 from Curtis St to WY-130, ML80	from 310.12 to 311.367		
Ownership:	١	NYDOT		Criticality Rank:	7 of 76
Risk Probability	Rtg: 4	ļ		Risk Consequence Rtg:	4
Priority Rtg:	Ŭ	Medium		Issue Type:	Environmental
Issues:	(Dzone level is about 87% of exceeda	ince level.	<i>.</i>	
Vulnerabilities			Strengths	Objectives	
Over 39,000 po Annual vehicle	pulation affected delay approxima	t in Albany County. ttely 17,200 hours per mile.		Reduce delays and subsequent pollutant emissions. Provide alternatives to vehicle idling. Provide incentives for lower emissions vehicles.	
Perform Action Before, During or After the Event	<u>H</u> arden, <u>R</u> edundant, Operational. Plan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
D	O H	Assess and modify current snow removal and roadway management procedures as needed. Build snow fences Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow	 Fairly low cost fix. WYDOT already has much of this implemented and likely would not require many changes. Could reduce inefficient slowing of vehicles thereby improving emissions reductions. Fairly low cost and reduces operational costs. Can improve visibility and minimize snow accumulation on the road. Could reduce inefficient slowing of vehicles thereby improving emissions reductions. Could reduce inefficient slowing of vehicles thereby improving emissions reductions. Could reduce inefficient slowing of vehicles thereby improving emissions reductions. A very few modifications may be easily accomplished at low cost 	 Probably little improvement remaining to be gained since WYDOT is already assessing and improving procedures. Not effective at reducing pollutants in summer months. WYDOT is nearing effective saturation of snow fences along Interstate highways. Not effective at reducing pollutants in summer months. Urban area limits snow fence placement. Can be very expensive. Safety issues need to be carefully assessed. Limited improvement locations limit emission reductions. 	
B	H	Implement Connected Vehicle technology on the road.	 CV technology promises a new method to mitigate delays and crashes. Technology can reduce risk taking behaviors. Can optimize vehicle movement efficiencies and dissuade drivers from approaching conditions that create increased vehicle emissions. 	 The technology is new and not fully tested. Issues may arise. Implementation costs may be fairly high. Requires cooperation and acceptance from vehicle owners. Could become very expensive. Most of the trucks on I-80 are from out of state likely causing the effectiveness of retrofits to be minimal. It would require retrofiting a very large number of trucks to see 	 Contact automotive organizations, shippers and WTA to advertise and encourage use of the technology. Contact shippers and WTA to advertise
В	Н	incentives to the trucking industry.	 Reduces emissions. Effective year round rather than just in winter months. 	3. As trucking fleet is replaced action will loses effectiveness.	and encourage retrofitting their trucks.

1. Requires trucks to be equipped with applicable equipment

2. Less effective at reducing pollutants in summer months.

to be able to shut down their diesel engines.

1. Reduces truck idling during winter weather events

2. Provides additional safety features to the road.

thus reducing emissions.

Provide electrified truck

idling.

В

Н

parking areas to reduce truck

1. Inform shippers and

WTA of electrification

availability.

Analysis Year:		2018			
Asset / Location	ו:	I-80 from US-287 to Grand Ave, ML8	0 from 313.32 to 316.48		
Ownership:		WYDOT		Criticality Rank:	7 of 76
Risk Probability	Rtg:	4		Risk Consequence Rtg:	4
Priority Rtg:		Low		Issue Type:	Environmental
Issues:		Ozone level is about 87% of exceeda	ance level.		
Vulnerabilities			Strengths	Objectives	
Over 39,000 po Annual vehicle	pulation affecte delay approxim	d in Albany County. ately 16,200 hours per mile.		Reduce delays and subsequent pollutant emissions. Provide alternatives to vehicle idling. Provide incentives for lower emissions vehicles.	
Perform Action Before, During or After the Event	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational, <u>P</u> lar	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
D	0	Assess and modify current snow removal and roadway management procedures as needed.	 Fairly low cost fix. WYDOT already has much of this implemented and likely would not require many changes. Could reduce inefficient slowing of vehicles thereby improving emissions reductions. 	 Probably little improvement remaining to be gained since WYDOT is already assessing and improving procedures. Not effective at reducing pollutants in summer months. 	
В	Н	Build snow fences	 Fairly low cost and reduces operational costs. Can improve visibility and minimize snow accumulation on the road. Could reduce inefficient slowing of vehicles thereby improving emissions reductions. 	 WYDOT is nearing effective saturation of snow fences along Interstate highways. Not effective at reducing pollutants in summer months. Urban area limits snow fence placement. 	1
В	Н	Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	 Could reduce inefficient slowing of vehicles thereby improving emissions reductions. A very few modifications may be easily accomplished at low cost. 	 Can be very expensive. Safety issues need to be carefully assessed. Limited improvement locations limit emission reductions. Not effective at reducing pollutants in summer months. 	
В	н	Implement Connected Vehicle technology on the road.	 CV technology promises a new method to mitigate delays and crashes. Technology can reduce risk taking behaviors. Can optimize vehicle movement efficiencies and dissuade drivers from approaching conditions that create increased vehicle emissions. 	 The technology is new and not fully tested. Issues may arise. Implementation costs may be fairly high. Requires cooperation and acceptance from vehicle owners. 	1. Contact automotive organizations, shippers and WTA to advertise and encourage use of the technology.
В	Н	Provide diesel retrofit incentives to the trucking industry.	 Reduces emissions. Effective year round rather than just in winter months. 	 Could become very expensive. Most of the trucks on I-80 are from out of state likely causing the effectiveness of retrofits to be minimal. It would require retrofitting a very large number of trucks to see significant results. As trucking fleet is replaced action will loses effectiveness. 	1. Contact shippers and WTA to advertise and encourage retrofitting their trucks.
В	н	Provide electrified truck parking areas to reduce truck idling.	 Reduces truck idling during winter weather events thus reducing emissions. Provides additional safety features to the road. 	 Requires trucks to be equipped with applicable equipment to be able to shut down their diesel engines. Less effective at reducing pollutants in summer months. 	1. Inform shippers and WTA of electrification availability.

Analysis Year:		2018			
Asset / Location: I-80 from Greeley Hwy to College D		-80 from Greeley Hwy to College Dr.	ML80 from 361.64 to 363.617		
Ownership:	١	WYDOT		Criticality Rank:	8 of 76
Risk Probability	/ Rta:	3		Risk Consequence Rta:	5
Priority Pta:	i tug.	0.14			C Environmental
FIIOTILY RUY.	L			issue Type.	Environmental
Issues:		Jzone level is about 90% of exceeda	ance level and PIVITU IS at 78%.		
Vulnerabilities			Strengths	Objectives	
Over 100,000 p	opulation affecte	ed in Laramie County.		Reduce delays and subsequent pollutant emissions.	
Annual vehicle	delay approxima	ately 12,700 hours per mile.		Provide alternatives to vehicle idling.	
Perform Action	Harden.			Provide incentives for lower emissions vehicles.	
Before, During or	Redundant,	Actions	Droo	Capa	Potential Tasks Involving
After the Event	Operational, Plan	Actions	1 Eairly low cost fix	Cons	Stakenolders
		Assess and modify current	2 WYDOT already has much of this implemented and		
		snow removal and roadway	likely would not require many changes.	1. Probably little improvement remaining to be gained since	
		management procedures as	3. Could reduce inefficient slowing of vehicles thereby	WYDOT is already assessing and improving procedures.	
D	0	needed.	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
			 Fairly low cost and reduces operational costs. 		
			2. Can improve visibility and minimize snow		
			accumulation on the road.	1. WYDOT is nearing effective saturation of snow fences alon	g
Р	ц	Duild anour fanaga	3. Could reduce inefficient slowing of vehicles thereby	Interstate highways.	
D	П	Access and modify safety	1. Could reduce inefficient clowing of vehicles thereby	2. Not ellective at reducing pollutarits in summer months.	
		harriers cuts slopes and other	improving emissions reductions	 Call be very expensive. Safety issues need to be carefully assessed 	
		geometrics that cause snow	2 A very few modifications may be easily accomplished	3. Limited improvement locations limit emission reductions	
В	н	drifting.	at low cost.	4. Not effective at reducing pollutants in summer months.	
			1. CV technology promises a new method to mitigate		1. Contact automotive
			delays and crashes.		organizations,
			Technology can reduce risk taking behaviors.	1. The technology is new and not fully tested. Issues may	shippers and WTA to
			3. Can optimize vehicle movement efficiencies and	arise.	advertise and
		Implement Connected Vehicle	dissuade drivers from approaching conditions that create	2. Implementation costs may be fairly high.	encourage use of the
В	H	technology on the road.	increased vehicle emissions.	3. Requires cooperation and acceptance from vehicle owners	technology.
				 Could become very expensive. Most of the trucks on L 80 are from out of state likely. 	
				2. Most of the effectiveness of retrofits to be minimal. It would	1 Contact shinners
		Provide diesel retrofit		require retrofitting a very large number of trucks to see	and WTA to advertise
		incentives to the trucking	1. Reduces emissions.	significant results.	and encourage
В	Н	industry.	2. Effective year round rather than just in winter months.	3. As trucking fleet is replaced action will loses effectiveness.	retrofitting their trucks.
		Provide electrified truck	1. Reduces truck idling during winter weather events	1. Requires trucks to be equipped with applicable equipment	1. Inform shippers and
		parking areas to reduce truck	thus reducing emissions.	to be able to shut down their diesel engines.	WTA of electrification
В	Н	idling.	2. Provides additional safety features to the road.	2. Less effective at reducing pollutants in summer months.	availability.

Analysis Year: 20		2018			
Asset / Location: Casper Bypass from I-25 to US-20/26, ML47 from 0		6, ML47 from 0 to 2.9			
Ownership:	١	VYDOT	C	riticality Rank:	16 of 76
Risk Probability	Rtg: 4	ļ	R	lisk Consequence Rtg:	5
Priority Rta:	L	-OW	ls	ssue Type:	Environmental
Issues:	(Dzone level is about 90% of exceeda	ance level. Some of the delay is likely caused by urban traffic	controls	
Vulnerabilities			Strenaths	Objectives	
Over 83,000 po	pulation affected	I in Natrona County.		Reduce delays and subsequent pollutant emissions.	
Annual vehicle	delay approxima	tely 18,600 hours per mile.		Provide alternatives to vehicle idling.	
Affects the high	est population c	oncentration in the State.		Provide incentives for lower emissions vehicles.	
Perform Action Before, During or	<u>H</u> arden, <u>R</u> edundant,			_	Potential Tasks Involving
After the Event	Operational, Plan	Actions	Pros	Cons	Stakeholders
		Assess and modify current	 1. Fairly low cost fix. 2. WXDOT already has much of this implemented and 		
		snow removal and roadway	likely would not require many changes	1 Probably little improvement remaining to be gained since	
		management procedures as	3. Could reduce inefficient slowing of vehicles thereby	WYDOT is already assessing and improving procedures.	
D	0	needed.	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
			1. Fairly low cost and reduces operational costs.		
			2. Can improve visibility and minimize snow		
			accumulation on the road.		
в	н	Build snow fences	improving emissions reductions	1 Not effective at reducing pollutants in summer months	
5		Assess and modify safety	1. Could reduce inefficient slowing of vehicles thereby	1. Can be very expensive.	
		barriers, cuts, slopes and other	improving emissions reductions.	2. Safety issues need to be carefully assessed.	
		geometrics that cause snow	2. A very few modifications may be easily accomplished	3. Limited improvement locations limit emission reductions.	
В	Н	drifting.	at low cost.	4. Not effective at reducing pollutants in summer months.	
			1. CV technology promises a new method to mitigate		1. Contact automotive
			delays and crashes.	A The task along is new and as the last state last second	organizations,
			2. Lechnology can reduce risk taking benaviors.	1. The technology is new and not fully tested. Issues may	snippers and wirA to
		Implement Connected Vehicle	dissuade drivers from approaching conditions that create	2 Implementation costs may be fairly high	encourage use of the
В	н	technology on the road.	increased vehicle emissions.	3. Requires cooperation and acceptance from vehicle owners	technology.
				1. Could become very expensive.	×.*
				2. Most of the trucks on I-80 are from out of state likely	
				causing the effectiveness of retrofits to be minimal. It would	1. Contact shippers
		Provide diesel retrofit	1 Daduara amiasiana	require retrofitting a very large number of trucks to see	and WIA to advertise
в	Ц ц	incentives to the trucking	Reduces emissions. Effective year round rather than just in winter months	Significant results.	and encourage
D	11	Provide electrified truck	2. Enective year round ratiler than just in willer months 1. Reduces truck idling during winter weather events	1 Requires trucks to be equipped with applicable equipment	1 Inform shippers and
		parking areas to reduce truck	thus reducing emissions.	to be able to shut down their diesel engines.	WTA of electrification
В	Н_	idling.	2. Provides additional safety features to the road.	2. Less effective at reducing pollutants in summer months.	availability.
Analysis Year:		2018			
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Asset / Location: I-25 from Exit 25 to Nimmo Rd, ML2		-25 from Exit 25 to Nimmo Rd, ML25	5 from 25.442 to 34.45		
Ownership:	١	WYDOT		Criticality Rank:	12 of 76
Risk Probability	Rta:	3		Risk Consequence Rta:	5
Priority Rta:		0.14			Environmental
loouoo		_ow	analous and DM10 is at 70%	issue Type.	LIMIOIIIIentai
issues.	(Jzone level is about 90% of exceeda			
Vulnerabilities			Strengths	Objectives	
Over 100,000 p	opulation affected	ed in Laramie County.		Reduce delays and subsequent pollutant emissions.	
Affects the high	est nonulation c	oncentration in the State		Provide incentives for lower emissions vehicles	
Perform Action	<u>Harden</u> ,				
Before, During or	Redundant,	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
Aller the Lvent			1 Fairly low cost fix		Otakcholders
		Assess and modify current	2. WYDOT already has much of this implemented and		
		snow removal and roadway	likely would not require many changes.	1. Probably little improvement remaining to be gained since	
		management procedures as	3. Could reduce inefficient slowing of vehicles thereby	WYDOT is already assessing and improving procedures.	
D	0	needed.	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
			1. Fairly low cost and reduces operational costs.		
			2. Can improve visibility and minimize snow	1 MN/DOT is preside effective acturation of anomy forecas along	
			accumulation on the road.	1. WYDUT is nearing effective saturation of show tences along	3
в	н	Build snow fences	improving emissions reductions	2 Not effective at reducing pollutants in summer months	
D	11	Assess and modify safety	1 Could reduce inefficient slowing of vehicles thereby	1 Can be very expensive	
		barriers, cuts, slopes and other	improving emissions reductions.	2. Safety issues need to be carefully assessed.	
		geometrics that cause snow	2. A very few modifications may be easily accomplished	3. Limited improvement locations limit emission reductions.	
В	Н	drifting.	at low cost.	4. Not effective at reducing pollutants in summer months.	
			1. CV technology promises a new method to mitigate		1. Contact automotive
			delays and crashes.		organizations,
			2. Technology can reduce risk taking behaviors.	1. The technology is new and not fully tested. Issues may	shippers and WTA to
		Implement Connected Vehicle	3. Can optimize vehicle movement efficiencies and	arise.	advertise and
в	н	technology on the road	increased vehicle emissions	2. Implementation costs may be fainy high. 3. Requires cooperation and acceptance from vehicle owners.	technology
D				1 Could become very expensive	teermology.
				2. Many of the trucks are from out of state likely causing the	
				effectiveness of retrofits to be minimal. It would require	1. Contact shippers
		Provide diesel retrofit		retrofitting a very large number of trucks to see significant	and WTA to advertise
		incentives to the trucking	1. Reduces emissions.	results.	and encourage
В	Н	industry.	2. Effective year round rather than just in winter months.	3. As trucking fleet is replaced action will loses effectiveness.	retrofitting their trucks.
		Provide electrified truck	1. Reduces truck idling during winter weather events	1. Requires trucks to be equipped with applicable equipment	1. Inform shippers and
_		parking areas to reduce truck	thus reducing emissions.	to be able to shut down their diesel engines.	WTA of electrification
В	i H	idling.	2. Provides additional safety features to the road.	Less effective at reducing pollutants in summer months.	availability.

Analysis Year:		2018					
Asset / Location: US-14A from Cody to Powell, ML29		JS-14A from Cody to Powell, ML29 I	rom 2.695 to 22.837				
Ownership:	V	VYDOT		Criticality Rank:	3 of 76		
Risk Probability	Rta: 4	1		Risk Consequence Rta:	3		
Priority Rta:		OW			Environmental		
loovoo		W2 E lovel is shout 66% of eveneds		issue Type.	Limionnenta		
ISSUES.	Г	miz.5 level is about 66% of exceeda					
Vulnerabilities	1.1: 55 1		Strengths	Objectives			
Over 30,000 po	pulation affected	I IN Park County.		Reduce delays and subsequent pollutant emissions.			
Affects the high	est nonulation of	oncentration in the State		Provide incentives for lower emissions vehicles			
Perform Action	<u>Harden</u> ,						
Before, During or	Redundant,	Actions	Pros	Cons	Potential Tasks Involving Stakeholders		
			1. Fairly low cost fix.				
		Assess and modify current	2. WYDOT already has much of this implemented and				
		snow removal and roadway	likely would not require many changes.	1. Probably little improvement remaining to be gained since			
		management procedures as	3. Could reduce inefficient slowing of vehicles thereby	WYDOT is already assessing and improving procedures.			
D	0	needed.	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.			
			1. Fairly low cost and reduces operational costs.				
			2. Can improve visibility and minimize snow				
			accumulation on the road.				
В	н	Build snow fences	improving emissions reductions	1 Not effective at reducing pollutants in summer months			
		Assess and modify safety	1. Could reduce inefficient slowing of vehicles thereby	1. Can be very expensive.			
		barriers, cuts, slopes and other	improving emissions reductions.	2. Safety issues need to be carefully assessed.			
		geometrics that cause snow	2. A very few modifications may be easily accomplished	3. Limited improvement locations limit emission reductions.			
В	Н	drifting.	at low cost.	4. Not effective at reducing pollutants in summer months.			
			1. CV technology promises a new method to mitigate		1. Contact automotive		
			delays and crashes.		organizations,		
			2. Technology can reduce risk taking behaviors.	1. The technology is new and not fully tested. Issues may	shippers and WIA to		
		Implement Connected Vahiala	5. Can optimize vehicle movement emiciencies and	allse.	adventise and		
В	Н	technology on the road.	increased vehicle emissions.	3. Requires cooperation and acceptance from vehicle owners	technology.		
				1. Could become very expensive.			
				2. Most of the trucks on I-80 are from out of state likely			
				causing the effectiveness of retrofits to be minimal. It would	1. Contact shippers		
		Provide diesel retrofit		require retrofitting a very large number of trucks to see	and WTA to advertise		
_		incentives to the trucking	1. Reduces emissions.	significant results.	and encourage		
В	Н	industry.	2. Effective year round rather than just in winter months.	3. As trucking fleet is replaced action will loses effectiveness.	retrofitting their trucks.		
		Provide electrified truck	1. Reduces truck idling during winter weather events	1. Requires trucks to be equipped with applicable equipment	1. Inform shippers and		
		parking areas to reduce truck	thus reducing emissions.	to be able to shut down their diesel engines.	WIA of electrification		
В	i H	laling.	2. Provides additional safety features to the road.	2. Less effective at reducing pollutants in summer months.	avallability.		

Analysis Year:		2018					
Asset / Locatio	n: L	US-14A from Powell to Byron, ML29 from 22.837 to 25.85					
Ownership:	V	WYDOT		Criticality Rank:	3 of 76		
Risk Probability	v Rta: 4	Į.		Risk Consequence Rtg:	3		
Priority Rta:	, s I	OW		Issue Type:	Environmental		
leques:	-	PM2.5 level is about 66% of exceeda	ance level				
Vulnerabilities			Strengths	Objectives			
Over 30,000 pc	opulation affected	t in Park County	Caongalo	Reduce delays and subsequent pollutant emissions.			
Annual vehicle	delay approxima	ately 27,100 hours per mile.		Provide alternatives to vehicle idling.			
Affects the high	nest population c	oncentration in the State.		Provide incentives for lower emissions vehicles.			
Perform Action Before During or	<u>H</u> arden, R edundant				Potential Tasks Involving		
After the Event	Operational, Plan	Actions	Pros	Cons	Stakeholders		
			1. Fairly low cost fix.				
		Assess and modify current	2. WYDOT already has much of this implemented and likely would not require many changes	1. Drobably little improvement remaining to be gained since			
		show removal and roadway	3 Could reduce inefficient slowing of vehicles thereby	WYDOT is already assessing and improving procedures			
D	0	needed	improving emissions reductions	2 Not effective at reducing pollutants in summer months			
2	1		1. Fairly low cost and reduces operational costs.				
			2. Can improve visibility and minimize snow				
			accumulation on the road.				
			3. Could reduce inefficient slowing of vehicles thereby				
В	H	Build snow fences	improving emissions reductions.	1. Not effective at reducing pollutants in summer months.			
		Assess and modify safety	1. Could reduce inefficient slowing of vehicles thereby	1. Can be very expensive.			
		barriers, cuts, slopes and other	improving emissions reductions.	2. Safety issues need to be carefully assessed.			
Р		geometrics that cause show	2. A very few modifications may be easily accomplished	 Limited improvement locations limit emission reductions. Not effective at reducing pollutants in summer menths. 			
D		dillung.	a low cost.	4. Not enective at reducing pollutarits in summer months.	1 Contact automativa		
			delays and crashes		organizations		
			2 Technology can reduce risk taking behaviors	1 The technology is new and not fully tested. Issues may	shippers and WTA to		
			3. Can optimize vehicle movement efficiencies and	arise.	advertise and		
		Implement Connected Vehicle	dissuade drivers from approaching conditions that create	e 2. Implementation costs may be fairly high.	encourage use of the		
В	Н	technology on the road.	increased vehicle emissions.	3. Requires cooperation and acceptance from vehicle owners	. technology.		
				1. Could become very expensive.			
				2. Most of the trucks on I-80 are from out of state likely			
				causing the effectiveness of retrofits to be minimal. It would	1. Contact shippers		
		Provide diesel retrofit	1 Deduces emissions	require retrotitting a very large number of trucks to see	and WIA to advertise		
Р	<u>ц</u>	incentives to the trucking	Reduces emissions. Effective year round rather than just in winter months	significant results.	and encourage		
D	Π	Provide electrified truck	2. Enective year round rather than just in writer months. 1. Reduces truck idling during winter weather events	3. As trucking need is replaced action will loses effectiveness. 1. Pequires trucks to be equipped with applicable equipment	1 Inform chippore and		
		narking areas to reduce truck	thus reducing emissions	to be able to shut down their diesel engines	WTA of electrification		
1	1	parting arous to readed thusit					

Analysis Year: 2018		2018			
Asset / Location	n: I	JS-14/16/20 in Cody, ML31 from 49.	87 to 54.587		
Ownership: WYDOT		WYDOT		Criticality Rank:	5 of 76
Risk Probability	Rta:	4		Risk Consequence Rta:	3
Priority Rta	1	QW/		Issue Type:	Environmental
leeuee		-011 PM2.5 level is about 66% of exceeds	ance level Most delay is caused by urban congestion		Environmental
Vulnerabilities			Strengths	Objectives	
Over 30 000 pc	nulation affected	d in Park County	Ouenguis	Reduce delays and subsequent pollutant emissions	
Annual vehicle	delay approxim:	ately 44 400 hours per mile		Provide alternatives to vehicle idling	
Affects the high	lest population of	oncentration in the State.		Provide incentives for lower emissions vehicles.	
Perform Action	<u>H</u> arden,				Detential Teaks Involving
<u>Before</u> , <u>D</u> uring or After the Event	<u>R</u> edundant, Operational, Plan	Actions	Pros	Cons	Stakeholders
			1. Fairly low cost fix.		
		Assess and modify current	2. WYDOT already has much of this implemented and		
		snow removal and roadway	likely would not require many changes.	1. Probably little improvement remaining to be gained since	
D	0	management procedures as	3. Could reduce inefficient slowing of vehicles thereby	WYDOT is already assessing and improving procedures.	
D	0		1. Eairly low cost and reduces operational costs		
			2 Can improve visibility and minimize snow		
			accumulation on the road.		
			3. Could reduce inefficient slowing of vehicles thereby	1. Not effective at reducing pollutants in summer months.	
В	H	Build snow fences	improving emissions reductions.	2. Urban area restricts snow fence installation significantly.	
		Assess and modify safety	1. Could reduce inefficient slowing of vehicles thereby	1. Can be very expensive.	
		barriers, cuts, slopes and other	improving emissions reductions.	2. Safety issues need to be carefully assessed.	
D		geometrics that cause snow	2. A very few modifications may be easily accomplished	3. Limited improvement locations limit emission reductions.	
В	Н	antting.	at Iow cost.	4. Not effective at reducing pollutants in summer months.	1 Contact automotivo
			delays and crashes		organizations
			2. Technology can reduce risk taking behaviors.	1. The technology is new and not fully tested. Issues may	shippers and WTA to
			3. Can optimize vehicle movement efficiencies and	arise.	advertise and
		Implement Connected Vehicle	dissuade drivers from approaching conditions that create	2. Implementation costs may be fairly high.	encourage use of the
В	Н	technology on the road.	increased vehicle emissions.	3. Requires cooperation and acceptance from vehicle owners	. technology.
				1. Could become very expensive.	
				2. Most of the trucks on I-80 are from out of state likely	1 Contact chinners
		Provide diesel retrofit		causing the effectiveness of retroits to be minimal. It would require retrofitting a very large number of trucks to see	and WTA to advertise
		incentives to the trucking	1. Reduces emissions.	significant results.	and encourage
В	н	industry.	2. Effective year round rather than just in winter months.	3. As trucking fleet is replaced action will loses effectiveness.	retrofitting their trucks.
		Provide electrified truck	1. Reduces truck idling during winter weather events	1. Requires trucks to be equipped with applicable equipment	1. Inform shippers and
		parking areas to reduce truck	thus reducing emissions.	to be able to shut down their diesel engines.	WTA of electrification
В	H	idling.	2. Provides additional safety features to the road.	2. Less effective at reducing pollutants in summer months.	availability.

Issues:	High PM2.5 and Ozone levels		
Priority Rtg:	Low	Issue Type:	Environmental
Risk Probability Rtg:	4	Risk Consequence Rtg:	3
Ownership:	WYDOT	Criticality Rank:	13 of 76
Asset / Location:	I-90 from N Sheridan Interchange to WY-336, ML90 from 20.634 to 22.902		
Analysis Year:	2018		

Vulnerabilities	Strengths	Objectives
Over 31,000 population affected in Sheridan County.		Reduce delays and subsequent pollutant emissions.
Annual vehicle delay approximately 12,700 hours per mile.		Provide alternatives to vehicle idling.
		Provide incentives for lower emissions vehicles

Perform Action Before, During or After the Event	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational, <u>P</u> lan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
			1. Fairly low cost fix.		
		Assess and modify current	2. WYDOT already has much of this implemented and		
		snow removal and roadway	likely would not require many changes.	1. Probably little improvement remaining to be gained since	
		management procedures as	3. Could reduce inefficient slowing of vehicles thereby	WYDOT is already assessing and improving procedures.	
D	0	needed.	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
			1. Fairly low cost and reduces operational costs.		
			Can improve visibility and minimize snow	1. WYDOT is nearing effective saturation of snow fences along	
			accumulation on the road.	Interstate highways.	
			3. Could reduce inefficient slowing of vehicles thereby	2. Not effective at reducing pollutants in summer months.	
В	Н	Build snow fences	improving emissions reductions.	3. Urban area limits snow fence placement.	
		Assess and modify safety	1. Could reduce inefficient slowing of vehicles thereby	1. Can be very expensive.	
		barriers, cuts, slopes and other	improving emissions reductions.	Safety issues need to be carefully assessed.	
		geometrics that cause snow	2. A very few modifications may be easily accomplished	3. Limited improvement locations limit emission reductions.	
В	Н	drifting.	at low cost.	Not effective at reducing pollutants in summer months.	
			1. CV technology promises a new method to mitigate		1. Contact automotive
			delays and crashes.		organizations,
			Technology can reduce risk taking behaviors.	1. The technology is new and not fully tested. Issues may	shippers and WTA to
			3. Can optimize vehicle movement efficiencies and	arise.	advertise and
_		Implement Connected Vehicle	dissuade drivers from approaching conditions that create	2. Implementation costs may be fairly high.	encourage use of the
В	Н	technology on the road.	increased vehicle emissions.	3. Requires cooperation and acceptance from vehicle owners.	technology.
				1. Could become very expensive.	
				2. Many of the trucks are from out of state likely causing the	
				effectiveness of retrofits to be minimal. It would require	1. Contact shippers
		Provide diesel retrofit		retrofitting a very large number of trucks to see significant	and WIA to advertise
		incentives to the trucking	1. Reduces emissions.	results.	and encourage
В	Н	industry.	2. Επεстіve year round rather than just in winter months.	3. As trucking fleet is replaced action will loses effectiveness	retrotitting their trucks.
		Provide electrified truck	1. Reduces truck idling during winter weather events	1. Requires trucks to be equipped with applicable equipment	1. Inform shippers and
		parking areas to reduce truck	thus reducing emissions.	to be able to shut down their diesel engines.	WIA of electrification
В	i H	idling.	2. Provides additional safety features to the road.	2. Less effective at reducing pollutants in summer months.	availability.

Issues:	High PM2.5 and Ozone levels		
Priority Rtg:	Low	Issue Type:	Environmental
Risk Probability Rtg:	4	Risk Consequence Rtg:	3
Ownership:	WYDOT	Criticality Rank:	13 of 76
Asset / Location:	I-90 from WY-336 to US-14, ML90 from 22.902 to 24.961		
Analysis Year:	2018		

Vulnerabilities	Strengths	Objectives
Over 31,000 population affected in Sheridan County.		Reduce delays and subsequent pollutant emissions.
Annual vehicle delay approximately 12,600 hours per mile.		Provide alternatives to vehicle idling.
		Provide incentives for lower emissions vehicles.

<u>Perform Action</u> <u>B</u> efore, <u>D</u> uring or <u>A</u> fter the Event	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational, <u>P</u> lan	Actions	Pros	Cons	Potential Tasks Involving Stakeholders
			1. Fairly low cost fix.		
		Assess and modify current	2. WYDOT already has much of this implemented and		
		snow removal and roadway	likely would not require many changes.	1. Probably little improvement remaining to be gained since	
		management procedures as	3. Could reduce inefficient slowing of vehicles thereby	WYDOT is already assessing and improving procedures.	
D	0	needed.	improving emissions reductions.	2. Not effective at reducing pollutants in summer months.	
			 Fairly low cost and reduces operational costs. 		
			Can improve visibility and minimize snow	1. WYDOT is nearing effective saturation of snow fences along	
			accumulation on the road.	Interstate highways.	
			3. Could reduce inefficient slowing of vehicles thereby	2. Not effective at reducing pollutants in summer months.	
В	Н	Build snow fences	improving emissions reductions.	3. Urban area limits snow fence placement.	
		Assess and modify safety	1. Could reduce inefficient slowing of vehicles thereby	1. Can be very expensive.	
		barriers, cuts, slopes and other	improving emissions reductions.	Safety issues need to be carefully assessed.	
		geometrics that cause snow	2. A very few modifications may be easily accomplished	3. Limited improvement locations limit emission reductions.	
В	Н	drifting.	at low cost.	Not effective at reducing pollutants in summer months.	
			1. CV technology promises a new method to mitigate		1. Contact automotive
			delays and crashes.		organizations,
			Technology can reduce risk taking behaviors.	1. The technology is new and not fully tested. Issues may	shippers and WTA to
			3. Can optimize vehicle movement efficiencies and	arise.	advertise and
		Implement Connected Vehicle	dissuade drivers from approaching conditions that create	2. Implementation costs may be fairly high.	encourage use of the
В	Н	technology on the road.	increased vehicle emissions.	3. Requires cooperation and acceptance from vehicle owners.	technology.
				1. Could become very expensive.	
				2. Many of the trucks are from out of state likely causing the	
				effectiveness of retrofits to be minimal. It would require	1. Contact shippers
		Provide diesel retrofit		retrofitting a very large number of trucks to see significant	and WTA to advertise
		incentives to the trucking	1. Reduces emissions.	results.	and encourage
В	Н	industry.	2. Effective year round rather than just in winter months.	3. As trucking fleet is replaced action will loses effectiveness	retrofitting their trucks.
		Provide electrified truck	1. Reduces truck idling during winter weather events	1. Requires trucks to be equipped with applicable equipment	1. Inform shippers and
		parking areas to reduce truck	thus reducing emissions.	to be able to shut down their diesel engines.	WTA of electrification
В	Н	idling.	2. Provides additional safety features to the road.	2. Less effective at reducing pollutants in summer months.	availability.

Analysis Year:		2018			
Asset / Location	ו:	I-80 from Arlington to Curtis St, ML80) from 272.13 to 310.12		
Ownership: WY		WYDOT		Criticality Rank:	7 of 76
Risk Probability	Rtg:	3		Risk Consequence Rtg:	4
Priority Rtg:	·	Low		Issue Type:	Environmental
Issues:		Ozone level is about 87% of exceeda	ance level.		
Vulnerabilities			Strengths	Objectives	
Over 39,000 po Annual vehicle	pulation affected delay approxim	ed in Albany County. hately 15,500 hours per mile.		Reduce delays and subsequent pollutant emissions. Provide alternatives to vehicle idling. Provide incentives for lower emissions vehicles.	
<u>Perform Action</u> <u>B</u> efore, <u>D</u> uring or <u>A</u> fter the Event	<u>H</u> arden, <u>R</u> edundant, <u>O</u> perational, <u>P</u> la	n Actions	Pros	Cons	Potential Tasks Involving Stakeholders
D	0	Assess and modify current snow removal and roadway management procedures as needed.	 Fairly low cost fix. WYDOT already has much of this implemented and likely would not require many changes. Could reduce inefficient slowing of vehicles thereby improving emissions reductions. 	 Probably little improvement remaining to be gained since WYDOT is already assessing and improving procedures. Not effective at reducing pollutants in summer months. 	
В	Н	Build snow fences	 Fairly low cost and reduces operational costs. Can improve visibility and minimize snow accumulation on the road. Could reduce inefficient slowing of vehicles thereby improving emissions reductions. 	 WYDOT is nearing effective saturation of snow fences along Interstate highways. Not effective at reducing pollutants in summer months. 	1
В	Н	Assess and modify safety barriers, cuts, slopes and other geometrics that cause snow drifting.	 Could reduce inefficient slowing of vehicles thereby improving emissions reductions. A very few modifications may be easily accomplished at low cost. 	 Can be very expensive. Safety issues need to be carefully assessed. Limited improvement locations limit emission reductions. Not effective at reducing pollutants in summer months. 	
В	Н	Implement Connected Vehicle technology on the road.	 CV technology promises a new method to mitigate delays and crashes. Technology can reduce risk taking behaviors. Can optimize vehicle movement efficiencies and dissuade drivers from approaching conditions that create increased vehicle emissions. 	 The technology is new and not fully tested. Issues may arise. Implementation costs may be fairly high. Requires cooperation and acceptance from vehicle owners. 	1. Contact automotive organizations, shippers and WTA to advertise and encourage use of the technology.
В	Н	Provide diesel retrofit incentives to the trucking industry.	 Reduces emissions. Effective year round rather than just in winter months. 	 Could become very expensive. Most of the trucks on I-80 are from out of state likely causing the effectiveness of retrofits to be minimal. It would require retrofitting a very large number of trucks to see significant results. As trucking fleet is replaced action will loses effectiveness. 	1. Contact shippers and WTA to advertise and encourage retrofitting their trucks.
В	Н	Provide electrified truck parking areas to reduce truck idling.	 Reduces truck idling during winter weather events thus reducing emissions. Provides additional safety features to the road. 	 Requires trucks to be equipped with applicable equipment to be able to shut down their diesel engines. Less effective at reducing pollutants in summer months. 	1. Inform shippers and WTA of electrification availability.