

BICA

GIP Report

**NPS Guardwall/Rail Inventory Program
Bighorn Canyon National Recreation Area**



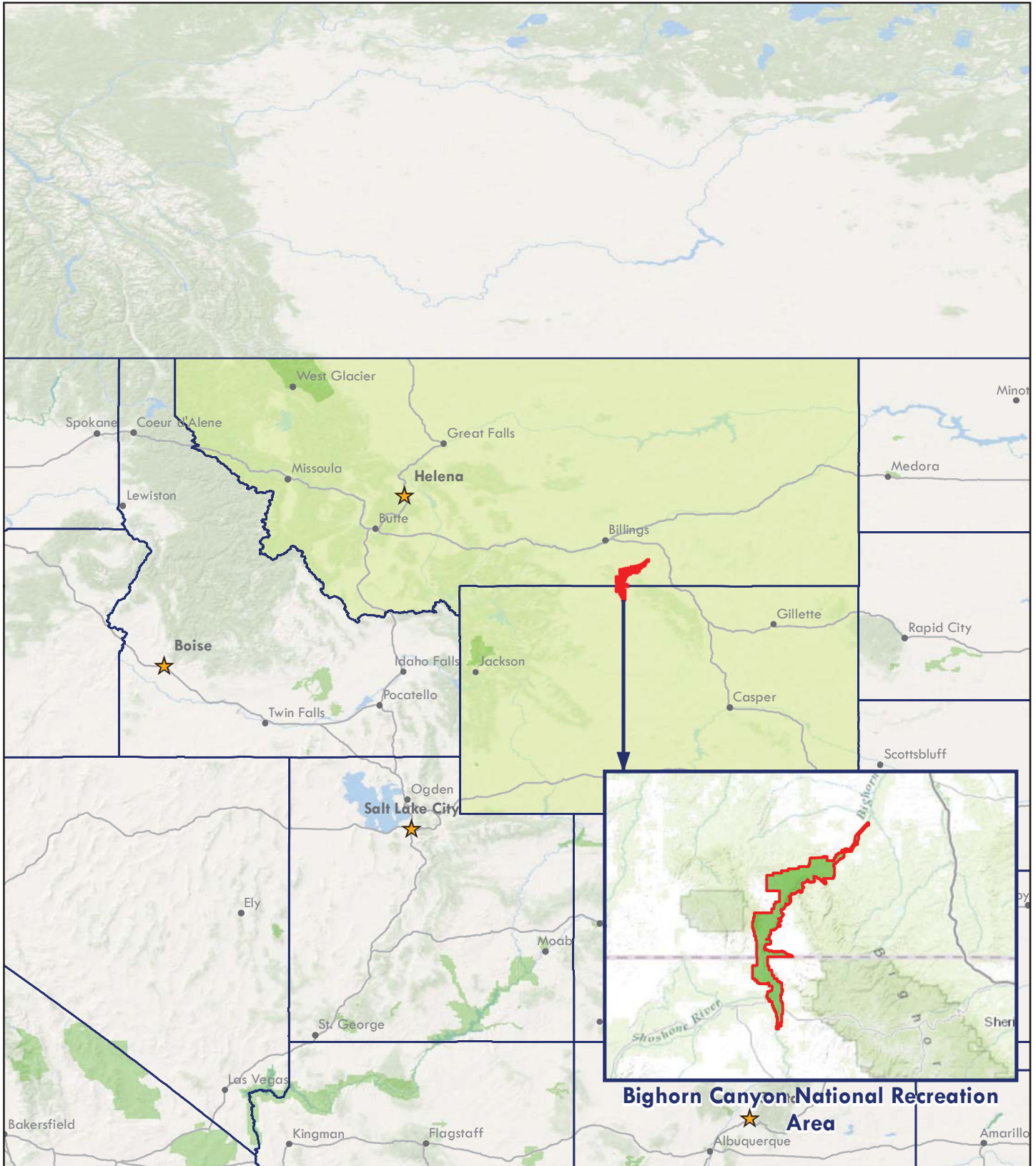
**Federal Lands Highway
Road Inventory Program**

Prepared By:

**Federal Highway Administration
Eastern Federal Lands Highway Division
Road Inventory Program (RIP)**

**Data Collection Date: August 2010
Report Date: December 2015**

Bighorn Canyon National Recreation Area in Montana and Wyoming



Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
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Introduction



Bighorn Canyon National Recreation Area



**Federal Lands Highway
Road Inventory Program**

Introduction

In support of the NPS Facility Management Software System (FMSS) asset management program, FHWA- contracted staff completed the Guardwall/Rail Inventory Program (GIP) inspections within selected National Park Service (NPS) units between 2010 and 2011. This inventory provides static information to FMSS regarding barrier characteristics such as height, length and location, as well as dynamic information about the condition of the barrier. In addition, when barrier deficiencies were identified, repair recommendations and estimated costs, suitable for use as FMSS work orders, were generated to bring the barrier back to its "new" condition.

In over 30 parks, numerous crashworthy barriers inspected maybe in poor condition by simply applying a new overlay of asphalt without milling previous layers. In instances such as this, basically the critical element of barrier height decreased as the elevation of the roadway increased. Resulting work orders were drafted to raise w-beam barriers or to remove and reset stone masonry barriers to their original design height.

This inventory provides static information and a condition assessment of each barrier inventoried. In addition, when barrier deficiencies were identified, repair recommendations and estimated costs were drafted to bring the barrier back to its "new" condition.

Drafted work orders have been classified as being either deferred maintenance or capital improvement. This classification is based on the type of work recommended, as defined below.

- *Deferred Maintenance* can be classified as repair or replace in kind. Work done to the barrier does not include any upgrading.
- *Capital Improvement* can be classified as upgrading part of or the entire existing barrier. Typically the upgrade will be from a non-crashworthy to a crashworthy device. Other examples of capital improvements would be the addition of a curb to improve drainage.

Care was taken to maintain the cultural significance of historic barriers located in the NPS. While historic traffic barriers likely would not withstand current crashworthiness performance criteria, they are considered by the NPS to be important resources for the historic and/or cultural value. Historic barriers may be "character defining features" that contribute to the cultural significance of historic roadways. As such, these barriers have resource value in and of themselves which may be somewhat independent from their functionality as barriers as previously defined. The consideration of both the crashworthiness and resource value of historic barriers was a significant challenge for the NPS and the FHWA when designing the GIP, to the point that for historic stone masonry barriers, the barrier height had to be more than 6-in below its design height before any work would be considered to deal with height issues. To preserve historic stone masonry barriers, typical drafted work orders for historic barriers were to remove and reset the barrier to the barrier's original design height on a concrete footer, as compared to replacing it with a similar crashworthy barrier.

This report is organized in a tiered approach from the broad park overview perspective (Tier 1) to a route overview perspective (Tier 2), then down to the details of each barrier (Tier 3). Tier 1 presents park barrier location maps and an overall park-specific summary narrative of the results of the guardwall/rail inventory program. Tier 2 presents route overview maps with associated barrier summary information. Tier 3 presents individual barrier information in a one-page detailed format, including a photograph of each barrier. Appendix A provides a condensed summary of guardwall/rail inventory definitions and assessment categories to assist in reading this report.

Park Barrier Location Maps



Bighorn Canyon National Recreation Area

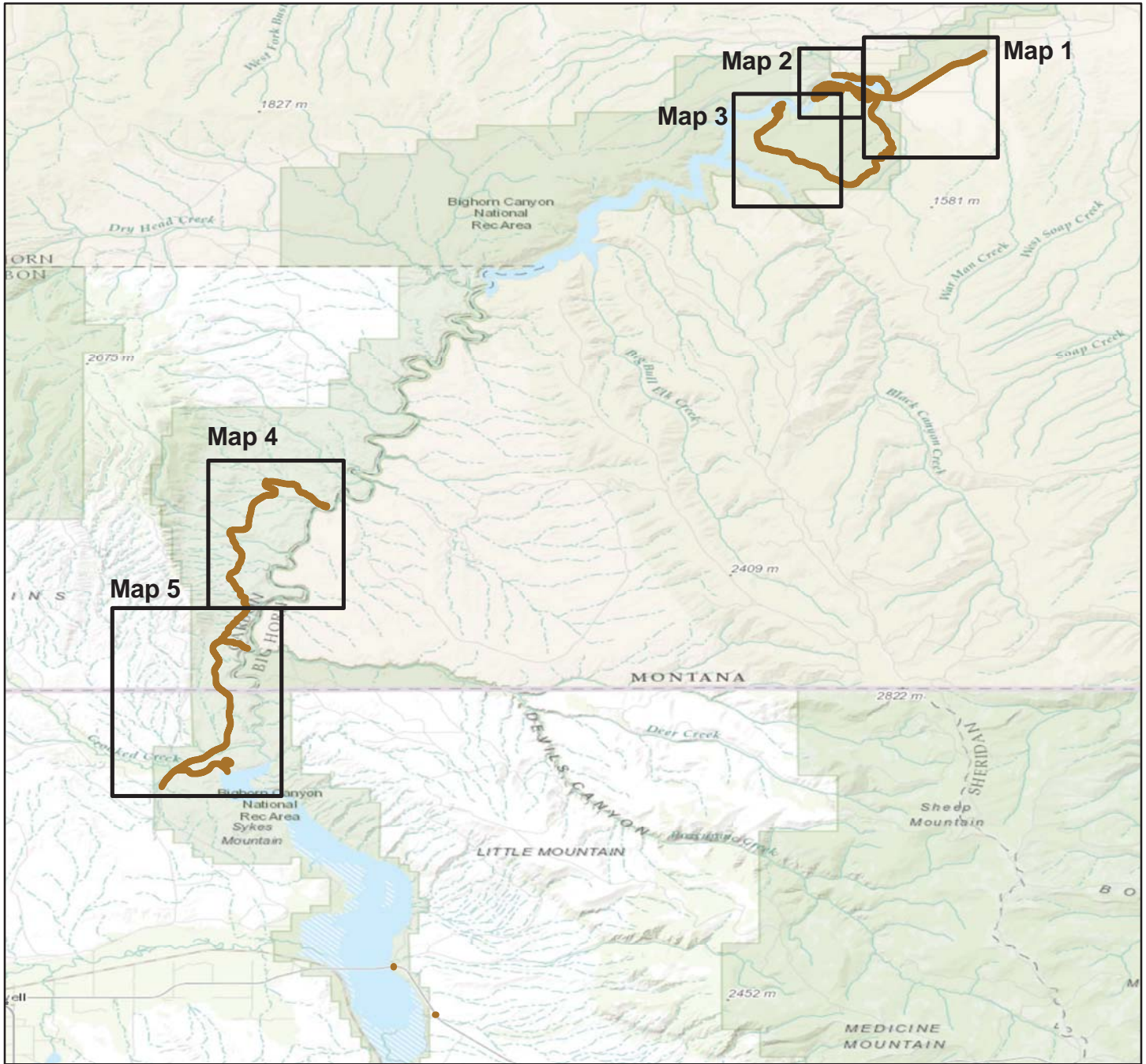


**Federal Lands Highway
Road Inventory Program**

Big Horn Canyon National Recreation Area

BARRIER LOCATION MAP

Key Map



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

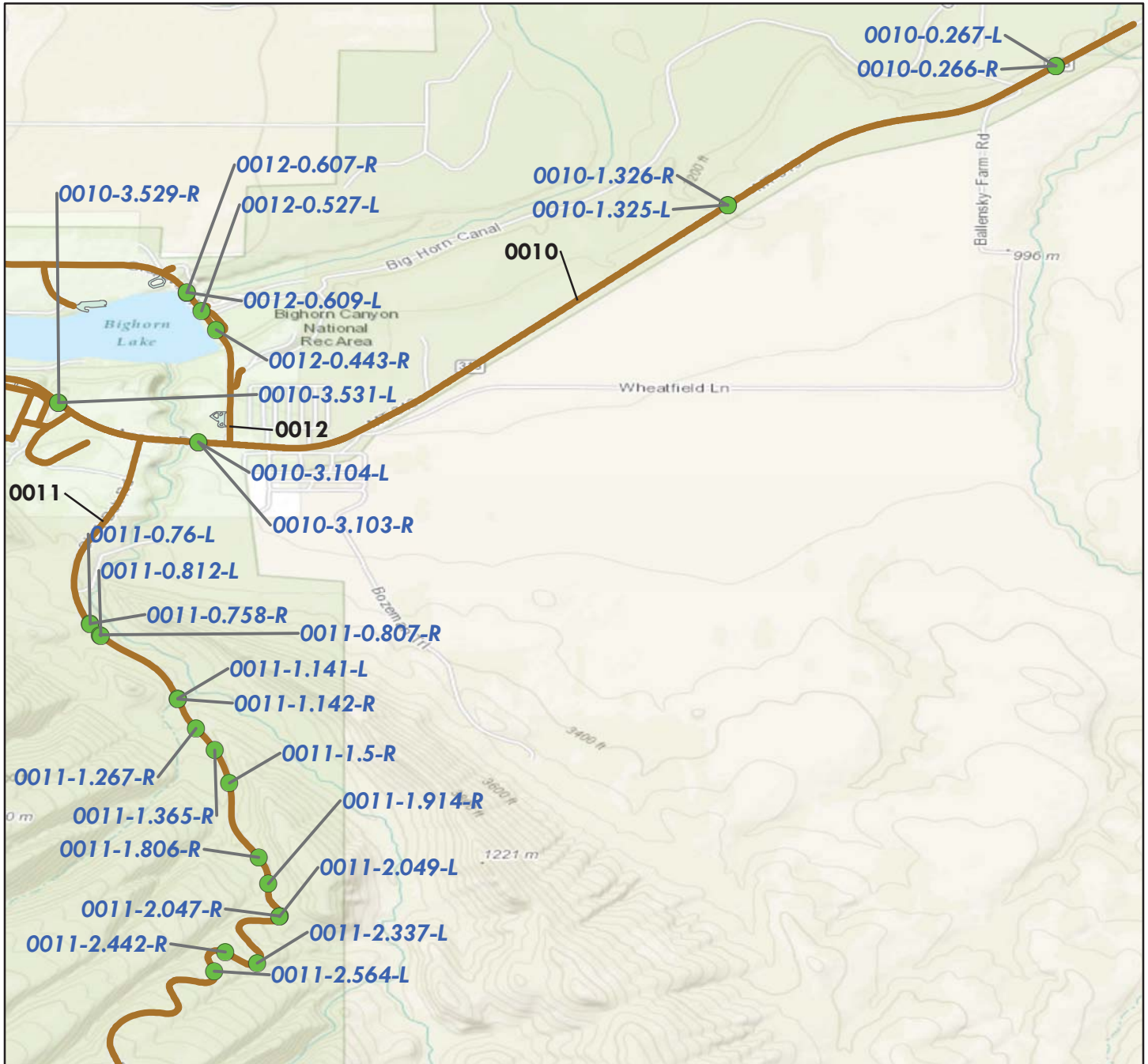
 RIP Collected Routes



Big Horn Canyon National Recreation Area

BARRIER LOCATION MAP

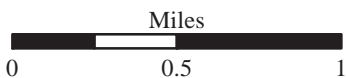
Map 1



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

● Barrier Locations

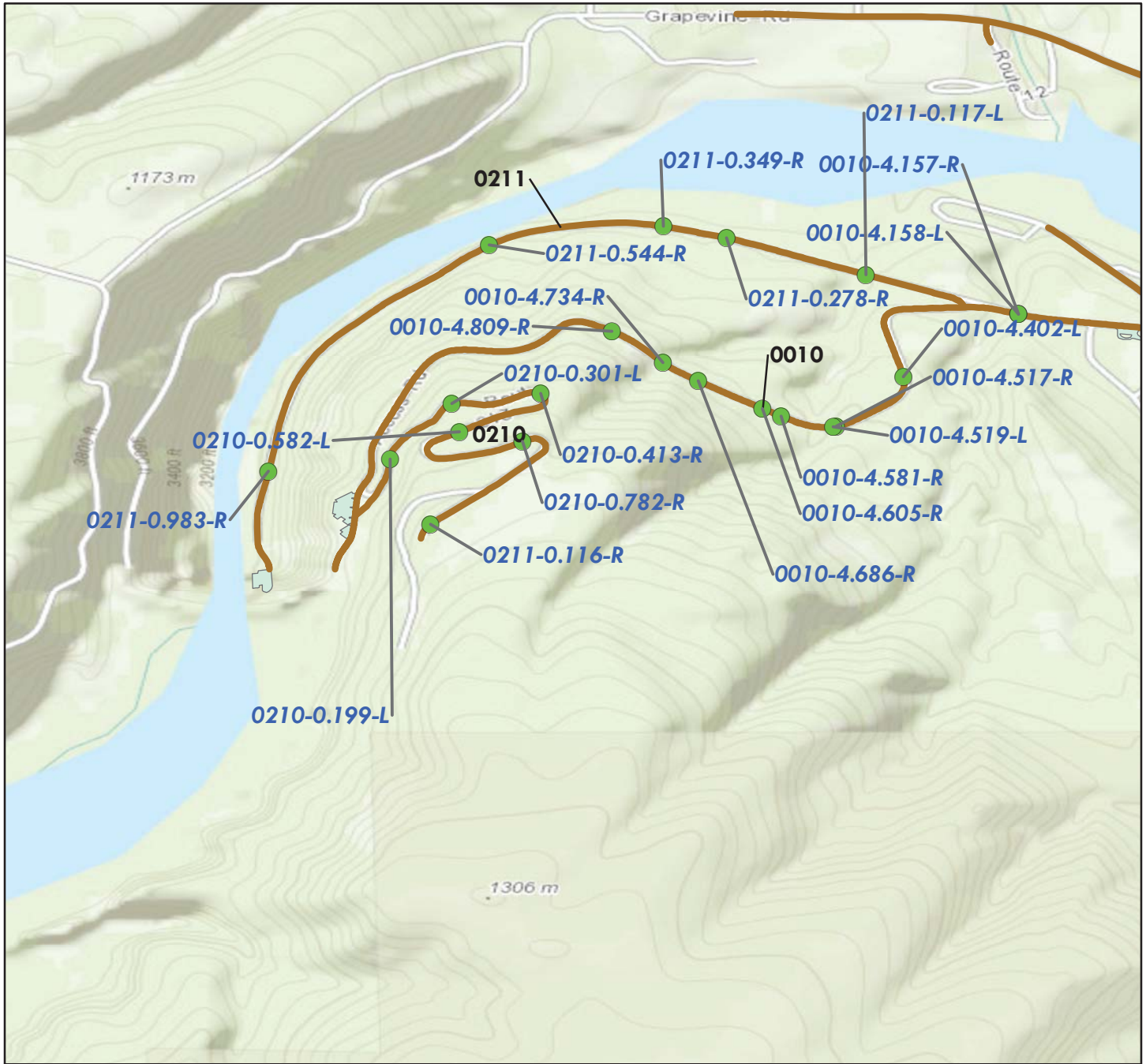
— RIP Collected Routes



Big Horn Canyon National Recreation Area

BARRIER LOCATION MAP

Map 2



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

● **Barrier Locations**

— **RIP Collected Routes**



Big Horn Canyon National Recreation Area

BARRIER LOCATION MAP

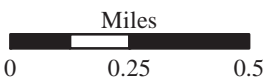
Map 3



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

● **Barrier Locations**

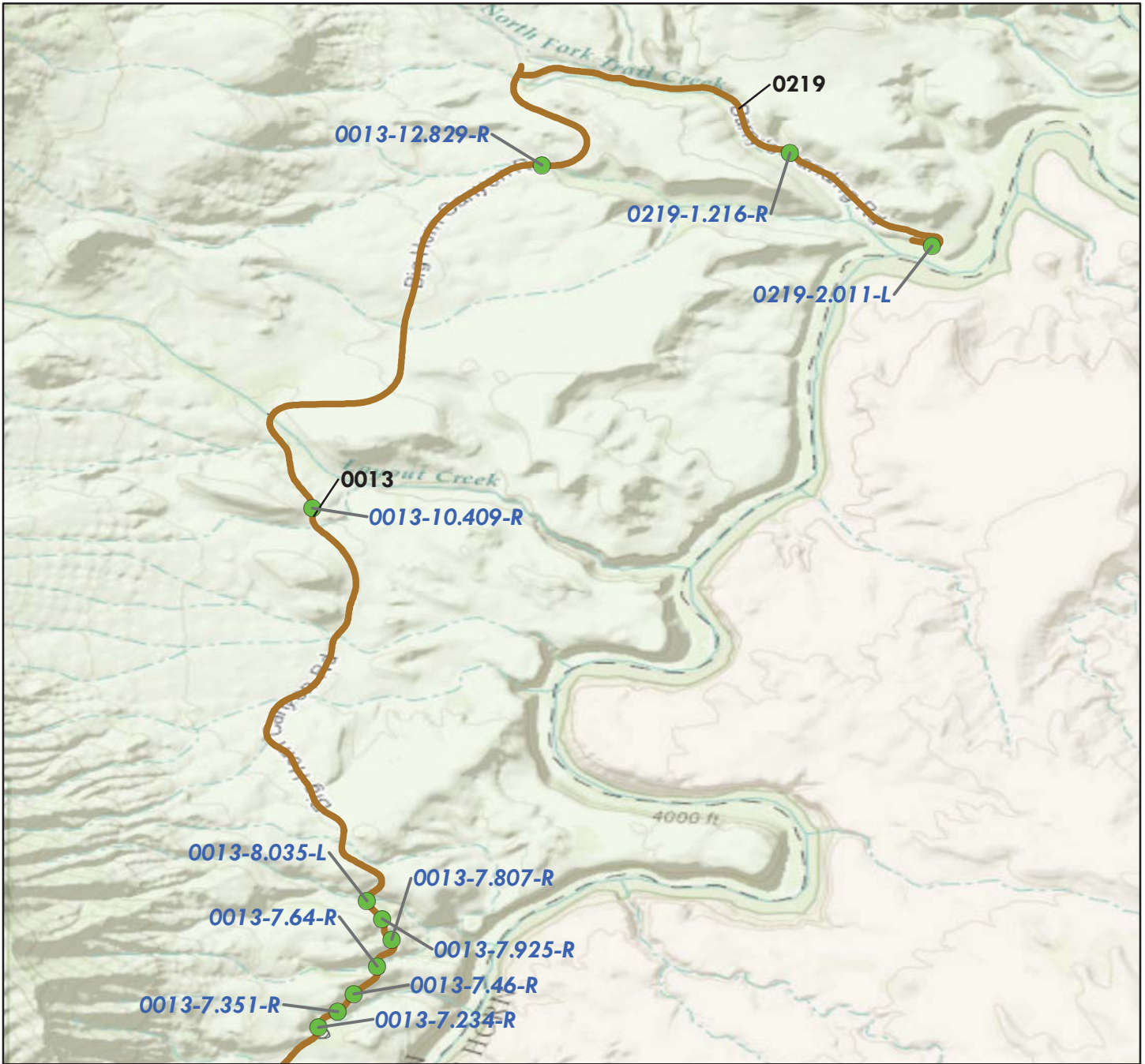
— **RIP Collected Routes**



Big Horn Canyon National Recreation Area

BARRIER LOCATION MAP

Map 4



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

● Barrier Locations

— RIP Collected Routes



Big Horn Canyon National Recreation Area

BARRIER LOCATION MAP

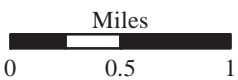
Map 5



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

● Barrier Locations

— RIP Collected Routes



Tier 1 Park Barrier Overview



Bighorn Canyon National Recreation Area



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Parkwide Summary: Bighorn Canyon National Recreation Area

Initial barrier inspections were conducted at Bighorn Canyon National Recreation Area in 2010, and encompassed all known barriers associated with Park roadways. In general, walls are not included in this assessment, but were inspected under a separate effort as part of the Retaining Wall Inventory Program (WIP).

All paved roadways and parking areas listed in the RIP Route Identification Report were inspected for barriers.

The following tables provide an overview of the findings of this inspection and assessment effort. In all, 81 barriers were inventoried on the routes listed below.

Table 1: Number of Barriers by Route

Route Number	Route Name	No. of Barriers
0010	FORT SMITH ACCESS ROAD	21
0011	OK-A-BEH ROAD	26
0012	AFTERBAY ROAD	4
0013	BAD PASS ROAD	15
0204	DEVIL'S CANYON OVERLOOK ROAD	1
0210	WAPPA UPPER SWITCHYARD ROAD	6
0211	YELLOWTAIL POWER PLANT ROAD	6
0219	BARRY'S LANDING BOAT RAMP ROAD	2

Due to the different GIP assessment criteria of barriers based on their intended use, barriers were classified as being either traffic barriers or non-traffic barriers.

- *Traffic* barriers are physical devices intended to keep vehicles or people from straying into dangerous or off-limits areas. For the purpose of this inventory, a traffic barrier is categorized as roadside hardware placed longitudinally, excluding pedestrian railing and fencing.
- *Non-traffic* barriers provide a physical delineation between public access areas and restricted or protected areas in locations such as a parking lot, viewpoint or turnout. **Non-traffic barriers which inhibit access of vehicles are included in this report; non-traffic barriers which only inhibit access of pedestrians or bicyclists are not included. For the purpose of this inventory, non-traffic barriers are guidewalls and guiderails. Note: rocks, stones, boulders, fences or curbs were excluded from this inventory.**

There are instances in parks where a single barrier can switch between being classified as a traffic barrier and a non-traffic barrier. Such instances typically occur at pullouts, where a traffic barrier along the road will continue through the pullout without interruption. In such instances, the traffic barrier and non-traffic barrier were assessed using different criteria. Due to the different criteria, the GIP database was designed to record the traffic barrier and non-traffic barrier as multiple distinct barriers, even though to the eye, they appear as one barrier. Other instances where a single barrier is split into multiple barriers would be when the barrier is placed continuously along two legs of an intersection, so that one portion of the barrier may be on one road and the remaining portion of the barrier is on a different road.

Table 2: Number of Barriers by Function

Barrier Function	No. of Barriers
TRAFFIC	76
NON-TRAFFIC	5

The following table shows the barrier types that were inventoried and assessed.

Table 3: Number of Barriers by Type

Primary Barrier Type	No. of Barriers
Other: Cmu/Split Face Cinder Block	1
W-Beam Weak Post	59
W-Beam Strong Post	21

The following table shows the number of barriers by one of four categories of recommended action along with associated work order costs and the number of barriers that are in each recommended action. All work order information is presented for individual barriers, even though some work orders were not accepted by the Park. Some work orders were later combined to simplify route deferred maintenance requests.

Table 4: Number of Barriers by Recommended Action and Associated 2008 Cost

Recommended Action	Repair Costs*	No. of Barriers
No Action	\$0	7
Monitor	\$0	2
Repair	\$134,572	36
Replace	\$1,130,600	36
Totals	\$1,265,172	81

*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

The following table categorizes the number of barriers that fall into one of ten cost ranges, based on the prepared work orders. The locations, work descriptions, and cost of the recommended repairs for these barriers are listed by individual barrier in Tier 3 of this report.

Table 5: Number of Barriers Grouped by Associated 2008 Cost

Cost Range*	No. of Barriers
\$0	9
\$1 - \$25,000	55
\$25,001 - \$50,000	13
\$50,001 - \$100,000	3
\$100,001 - \$250,000	1
\$250,001 - \$500,000	0
\$500,001 - \$1,000,000	0
\$1,000,001 - \$2,000,000	0
\$2,000,001 - \$3,000,000	0
\$3,000,001 - \$4,000,000	0
Total Number of Barriers	81

*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Data for end terminals was collected on the GIP data collection form and indicates if an end terminal meets current crashworthiness standards. End terminals are specially designed barrier ends that attenuate impacts to the ends of barriers. This is supplemental information that WASO designed into the inventory program.

A total of 32 end terminals were found on barriers at the Park. There are generally a greater number of end treatments than actual barriers because end treatments are located at both the beginning and end of each barrier.

Tier 2 Route Barrier Overview



Bighorn Canyon National Recreation Area



**Federal Lands Highway
Road Inventory Program**

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ROUTE 0010: FORT SMITH ACCESS ROAD



Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
BICA-0010-0.266-R 8/2/2010	830	W-BEAM WEAK POST	NONE	NONE	\$67,155.00
BICA-0010-0.267-L 8/2/2010	617	W-BEAM WEAK POST	NONE	NONE	\$45,667.00
BICA-0010-1.325-L 8/2/2010	255	W-BEAM WEAK POST	NONE	NONE	\$23,183.00
BICA-0010-1.326-R 8/2/2010	255	W-BEAM WEAK POST	NONE	NONE	\$23,183.00
BICA-0010-3.103-R 8/2/2010	430	W-BEAM WEAK POST	NONE	NONE	\$33,165.00

*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0010: FORT SMITH ACCESS ROAD



Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
BICA-0010-3.104-L 8/2/2010	431	W-BEAM WEAK POST	NONE	NONE	\$33,215.00
BICA-0010-3.529-R 8/2/2010	504	W-BEAM WEAK POST	NONE	NONE	\$38,825.00
BICA-0010-3.531-L 8/2/2010	130	W-BEAM WEAK POST	NONE	NONE	\$15,070.00
BICA-0010-3.881-R 8/2/2010	174	W-BEAM WEAK POST	NONE	NONE	\$14,553.00
BICA-0010-3.882-L 8/2/2010	242	W-BEAM WEAK POST	NONE	NONE	\$22,721.00

*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0010: FORT SMITH ACCESS ROAD



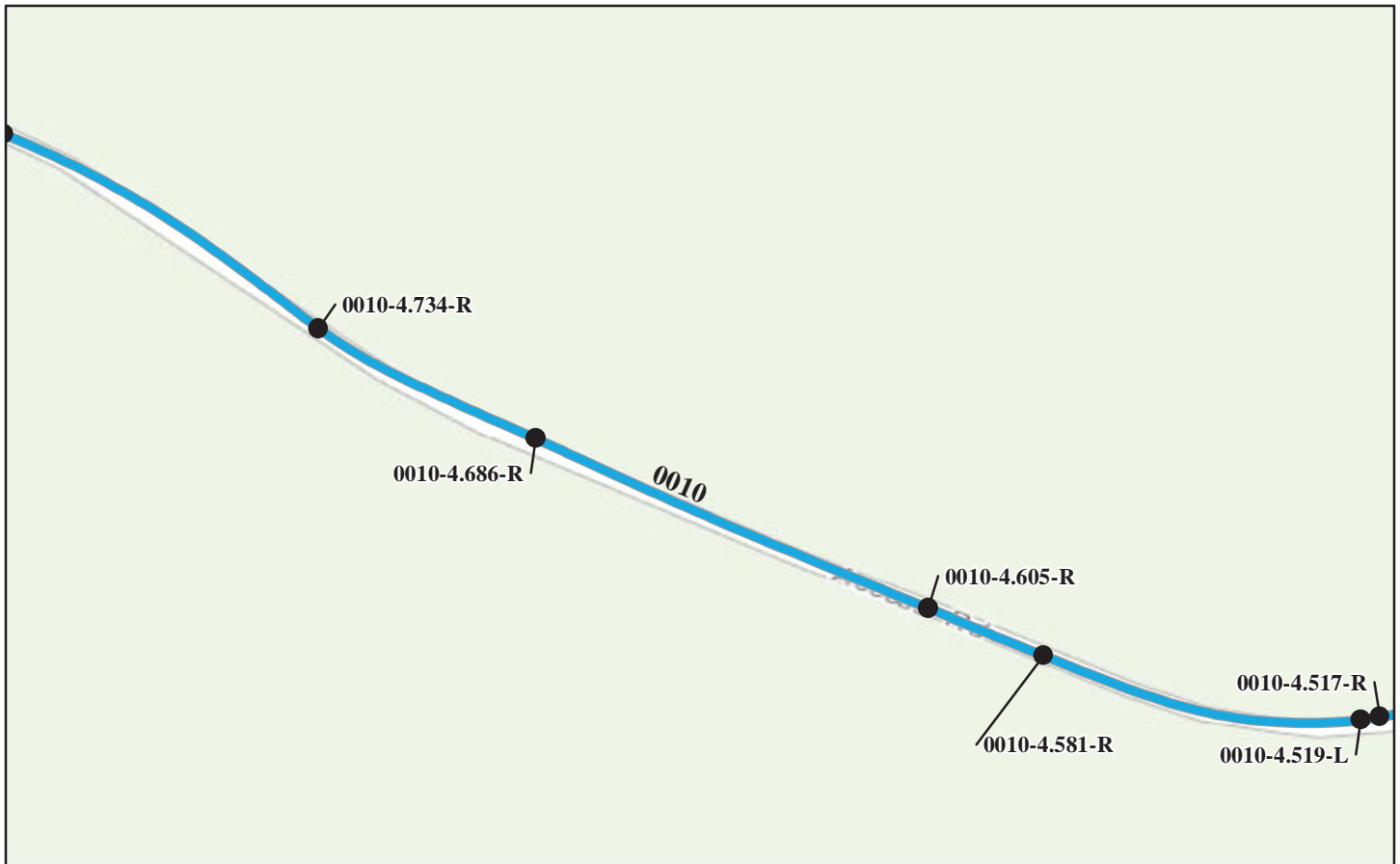
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Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
BICA-0010-3.909-R 8/2/2010	346	W-BEAM WEAK POST	NONE	NONE	\$26,312.00
BICA-0010-4.157-R 8/2/2010	306	W-BEAM WEAK POST	NONE	NONE	\$27,027.00
BICA-0010-4.158-L 8/2/2010	256	W-BEAM WEAK POST	NONE	NONE	\$21,307.00
BICA-0010-4.402-L 8/2/2010	315	W-BEAM WEAK POST	NONE	NONE	\$27,473.00
BICA-0010-4.517-R 8/2/2010	209	W-BEAM WEAK POST	NONE	NONE	\$18,981.00

*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0010: FORT SMITH ACCESS ROAD



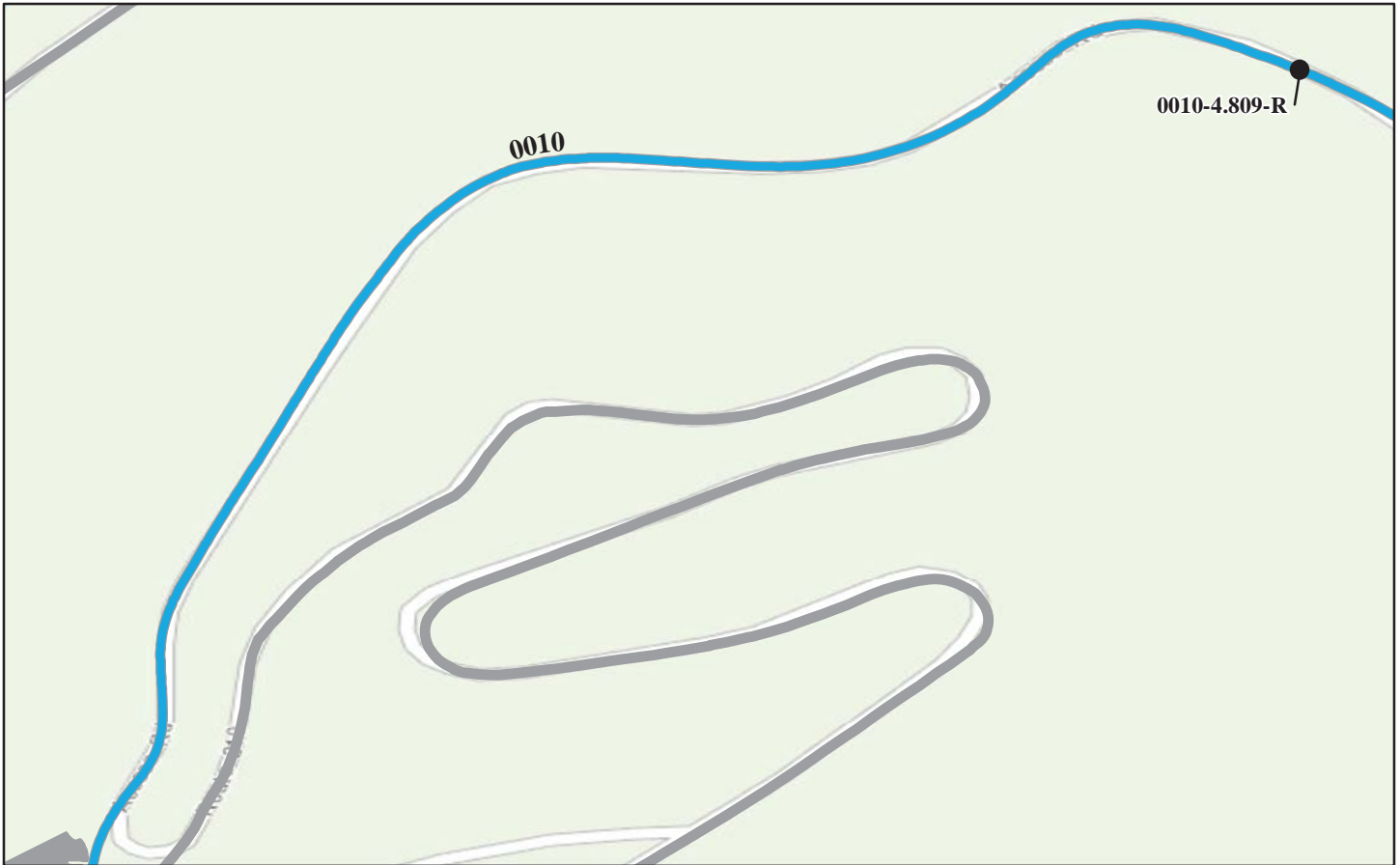
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Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
BICA-0010-4.519-L 8/2/2010	228	W-BEAM WEAK POST	NONE	NONE	\$19,921.00
BICA-0010-4.581-R 8/3/2010	159	W-BEAM WEAK POST	NONE	NONE	\$13,811.00
BICA-0010-4.605-R 8/3/2010	461	W-BEAM WEAK POST	NONE	NONE	\$29,310.00
BICA-0010-4.686-R 8/3/2010	316	W-BEAM WEAK POST	NONE	NONE	\$22,132.00
BICA-0010-4.734-R 8/3/2010	357	W-BEAM WEAK POST	NONE	NONE	\$24,162.00

*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0010: FORT SMITH ACCESS ROAD



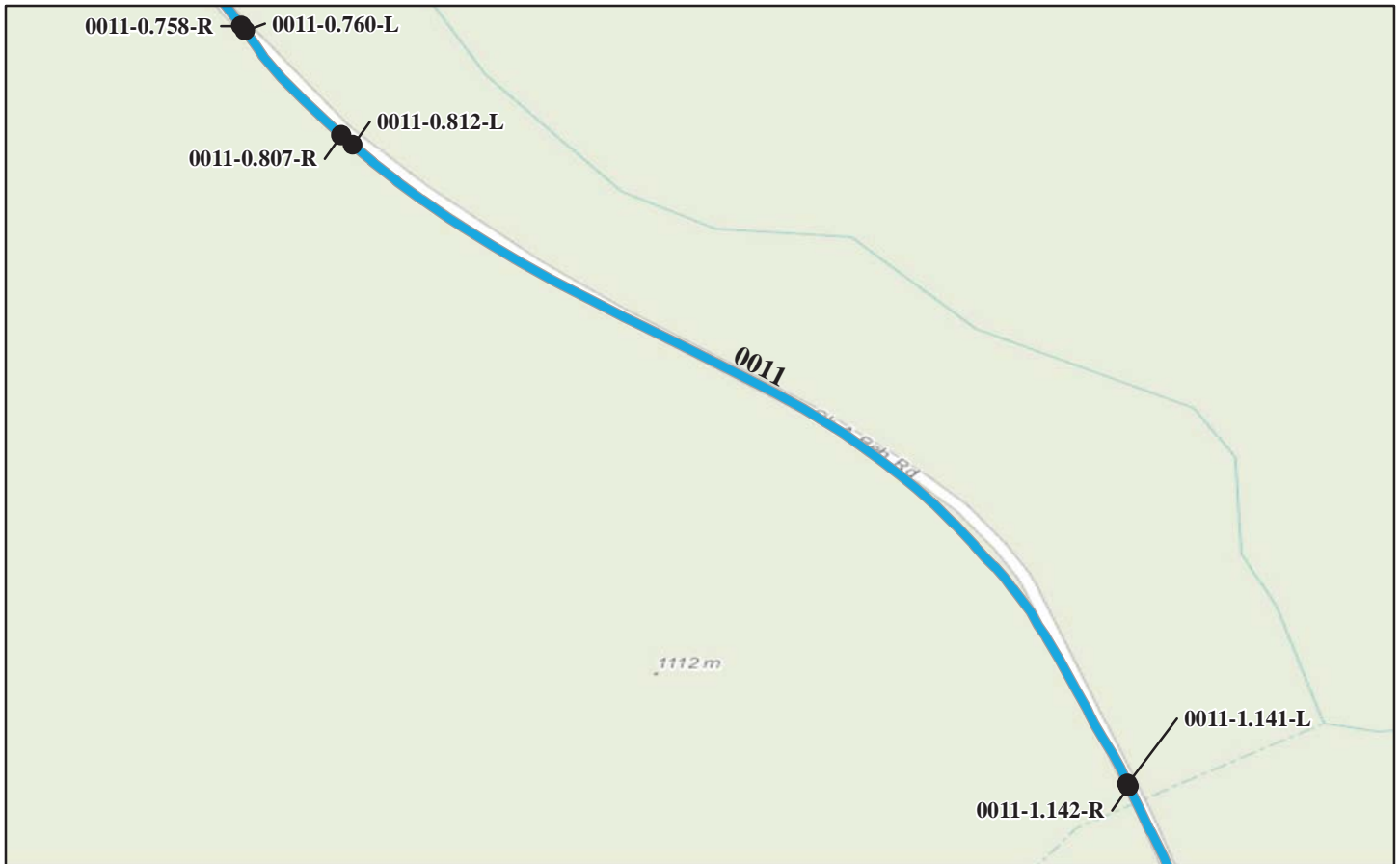
Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
BICA-0010-4.809-R 8/3/2010	2,420	W-BEAM WEAK POST	NONE	NONE	\$154,935.00

*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD



Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
BICA-0011-0.758-R 8/4/2010	106	W-BEAM WEAK POST	NONE	NONE	\$2,789.00
BICA-0011-0.760-L 8/4/2010	53	W-BEAM WEAK POST	NONE	NONE	\$1,898.00
BICA-0011-0.807-R 8/4/2010	54	W-BEAM WEAK POST	NONE	NONE	\$2,217.00
BICA-0011-0.812-L 8/4/2010	105	W-BEAM WEAK POST	NONE	NONE	\$2,888.00
BICA-0011-1.141-L 8/4/2010	130	W-BEAM WEAK POST	NONE	NONE	\$3,339.00

*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD



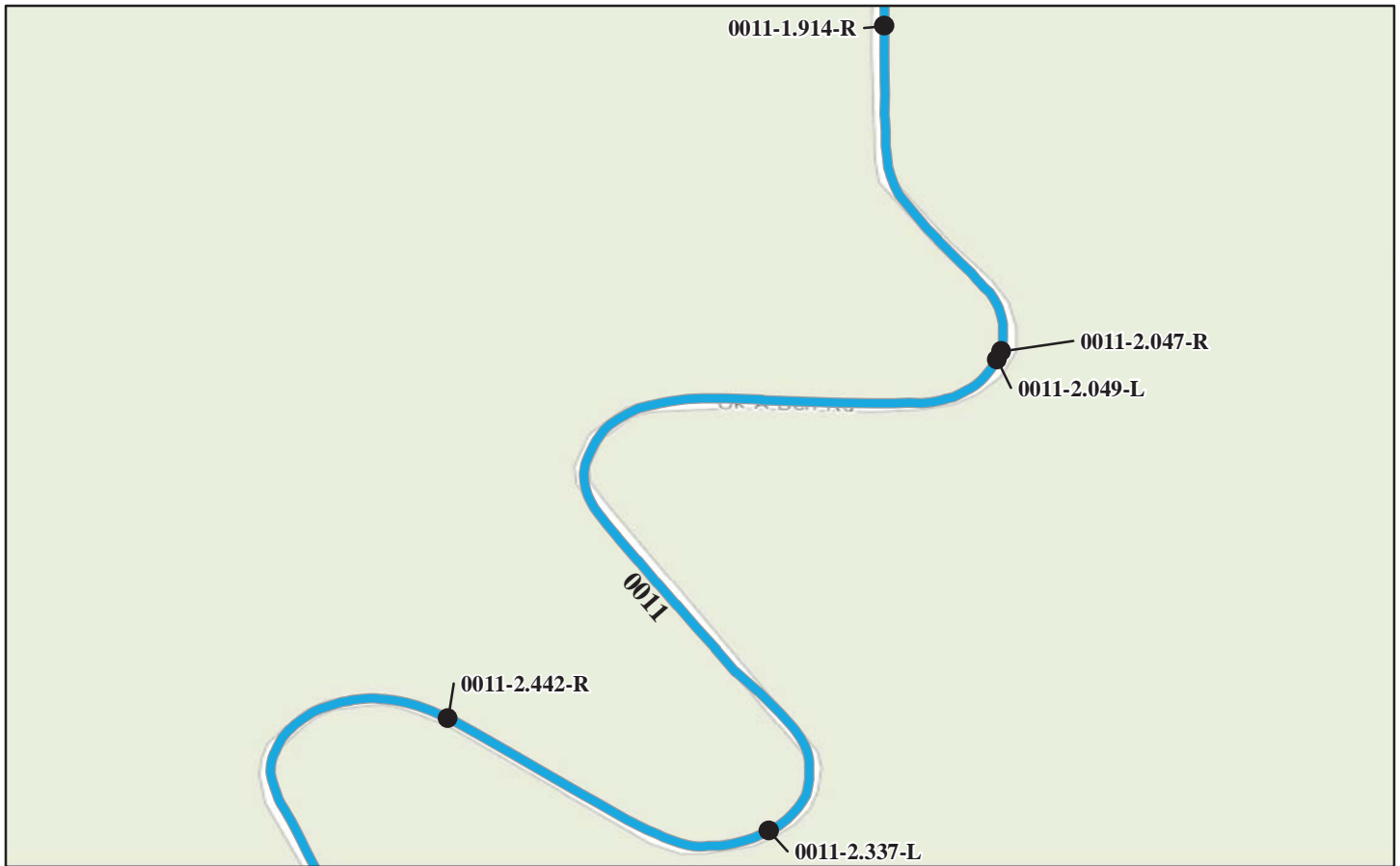
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
BICA-0011-1.142-R 8/4/2010	183	W-BEAM WEAK POST	NONE	NONE	\$3,306.00
BICA-0011-1.267-R 8/4/2010	157	W-BEAM WEAK POST	NONE	NONE	\$3,416.00
BICA-0011-1.365-R 8/4/2010	257	W-BEAM WEAK POST	NONE	NONE	\$6,512.00
BICA-0011-1.500-R 8/4/2010	130	W-BEAM WEAK POST	NONE	NONE	\$3,053.00
BICA-0011-1.806-R 8/4/2010	196	W-BEAM WEAK POST	NONE	NONE	\$4,175.00

*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD



Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
BICA-0011-1.914-R 8/4/2010	231	W-BEAM WEAK POST	NONE	NONE	\$4,560.00
BICA-0011-2.047-R 8/4/2010	362	W-BEAM WEAK POST	NONE	NONE	\$6,985.00
BICA-0011-2.049-L 8/4/2010	177	W-BEAM WEAK POST	NONE	NONE	\$4,285.00
BICA-0011-2.337-L 8/4/2010	115	W-BEAM WEAK POST	NONE	NONE	\$2,558.00
BICA-0011-2.442-R 8/4/2010	77	W-BEAM WEAK POST	NONE	NONE	\$1,898.00

*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD



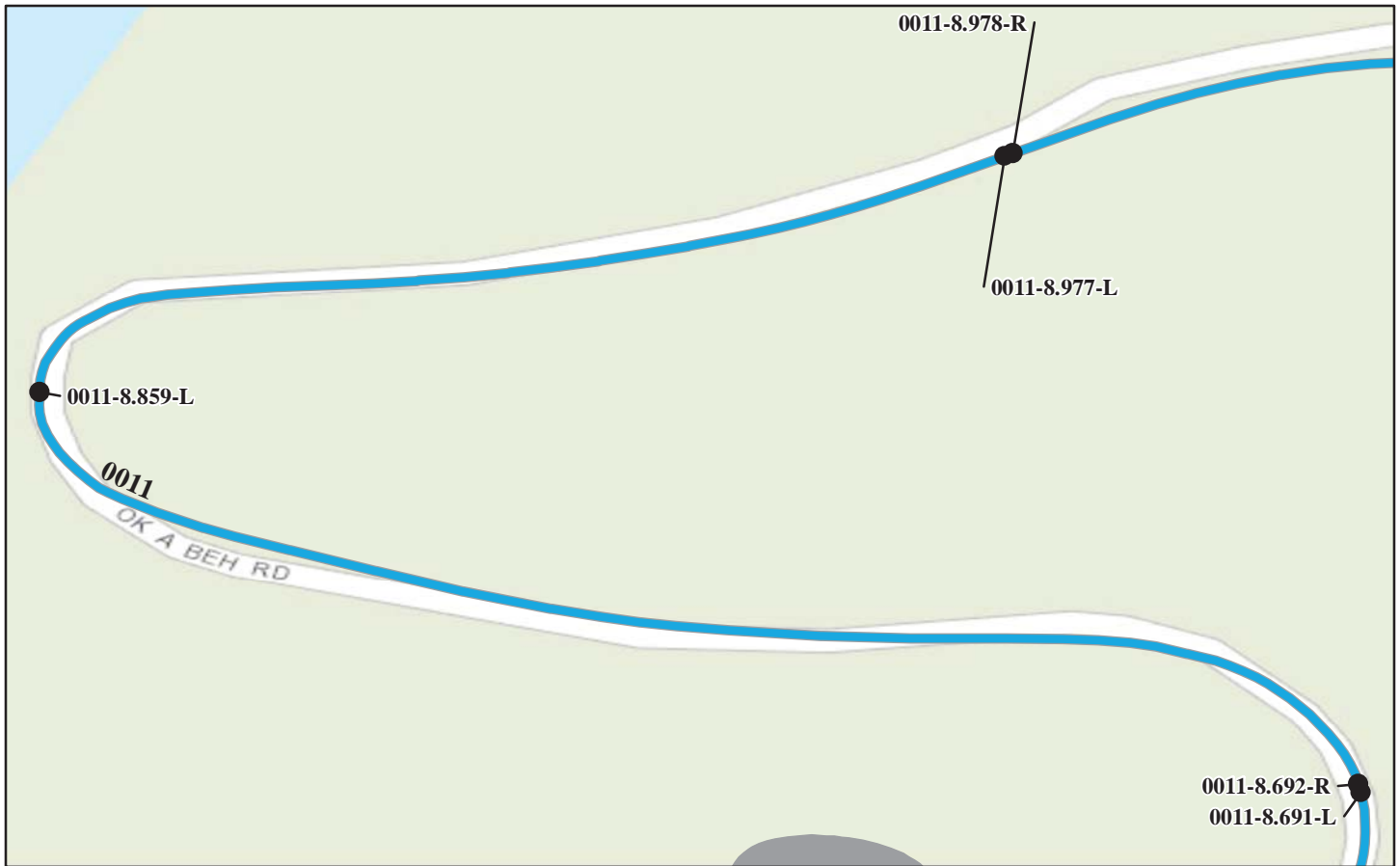
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Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
BICA-0011-2.564-L 8/4/2010	116	W-BEAM WEAK POST	NONE	NONE	\$14,377.00
BICA-0011-4.796-L 8/4/2010	179	W-BEAM WEAK POST	NONE	NONE	\$17,496.00
BICA-0011-4.798-R 8/4/2010	193	W-BEAM WEAK POST	NONE	NONE	\$18,189.00
BICA-0011-8.277-R 8/3/2010	936	W-BEAM WEAK POST	NONE	NONE	\$16,027.00
BICA-0011-8.389-L 8/3/2010	182	W-BEAM WEAK POST	NONE	NONE	\$0.00

*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD



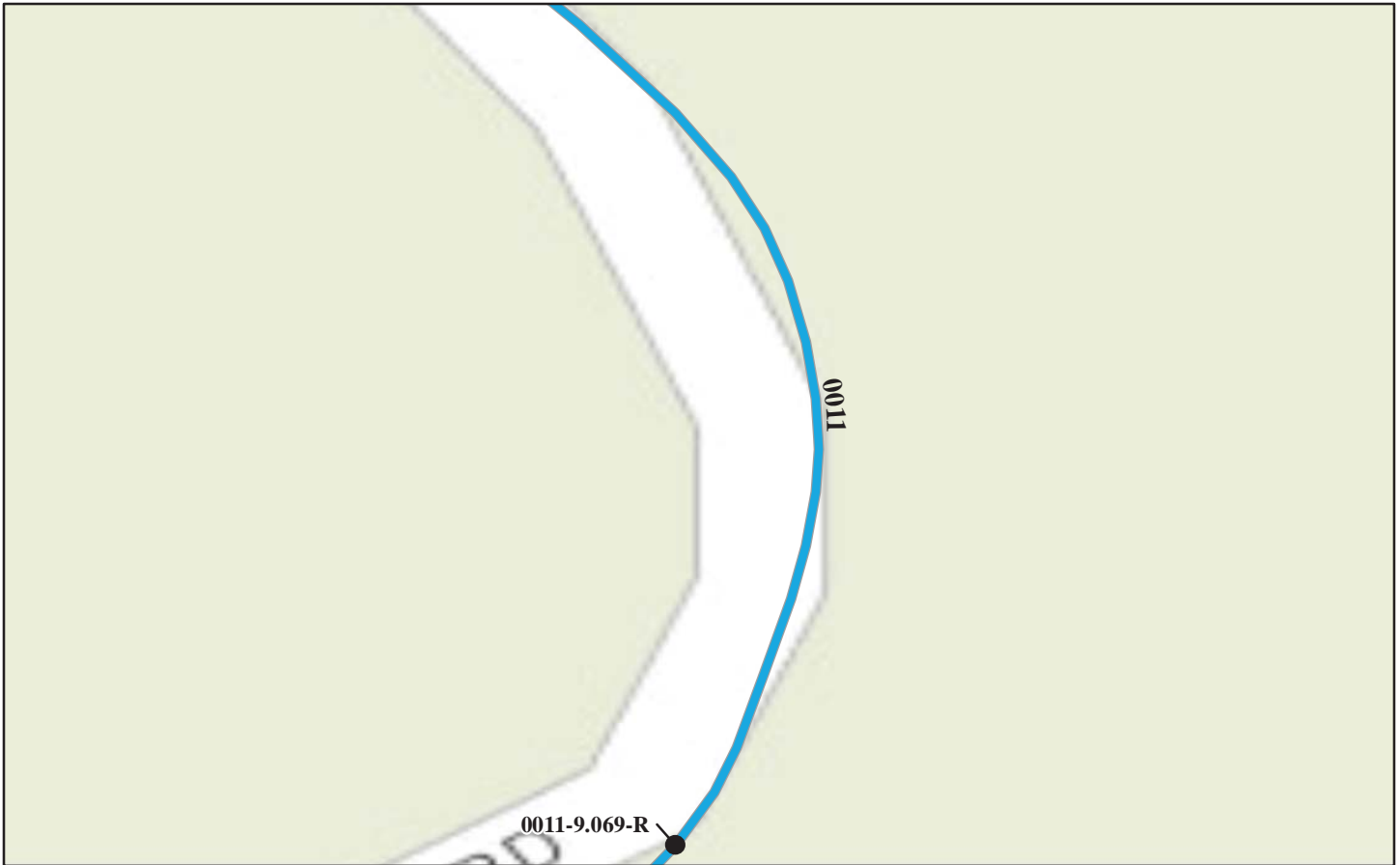
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			Begin	End	
BICA-0011-8.691-L 8/3/2010	263	W-BEAM WEAK POST	NONE	NONE	\$6,138.00
BICA-0011-8.692-R 8/3/2010	455	W-BEAM WEAK POST	NONE	NONE	\$8,228.00
BICA-0011-8.859-L 8/3/2010	137	W-BEAM WEAK POST	NONE	NONE	\$3,394.00
BICA-0011-8.977-L 8/3/2010	153	W-BEAM WEAK POST	NONE	NONE	\$3,306.00
BICA-0011-8.978-R 8/3/2010	158	W-BEAM WEAK POST	NONE	NONE	\$3,361.00

*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD



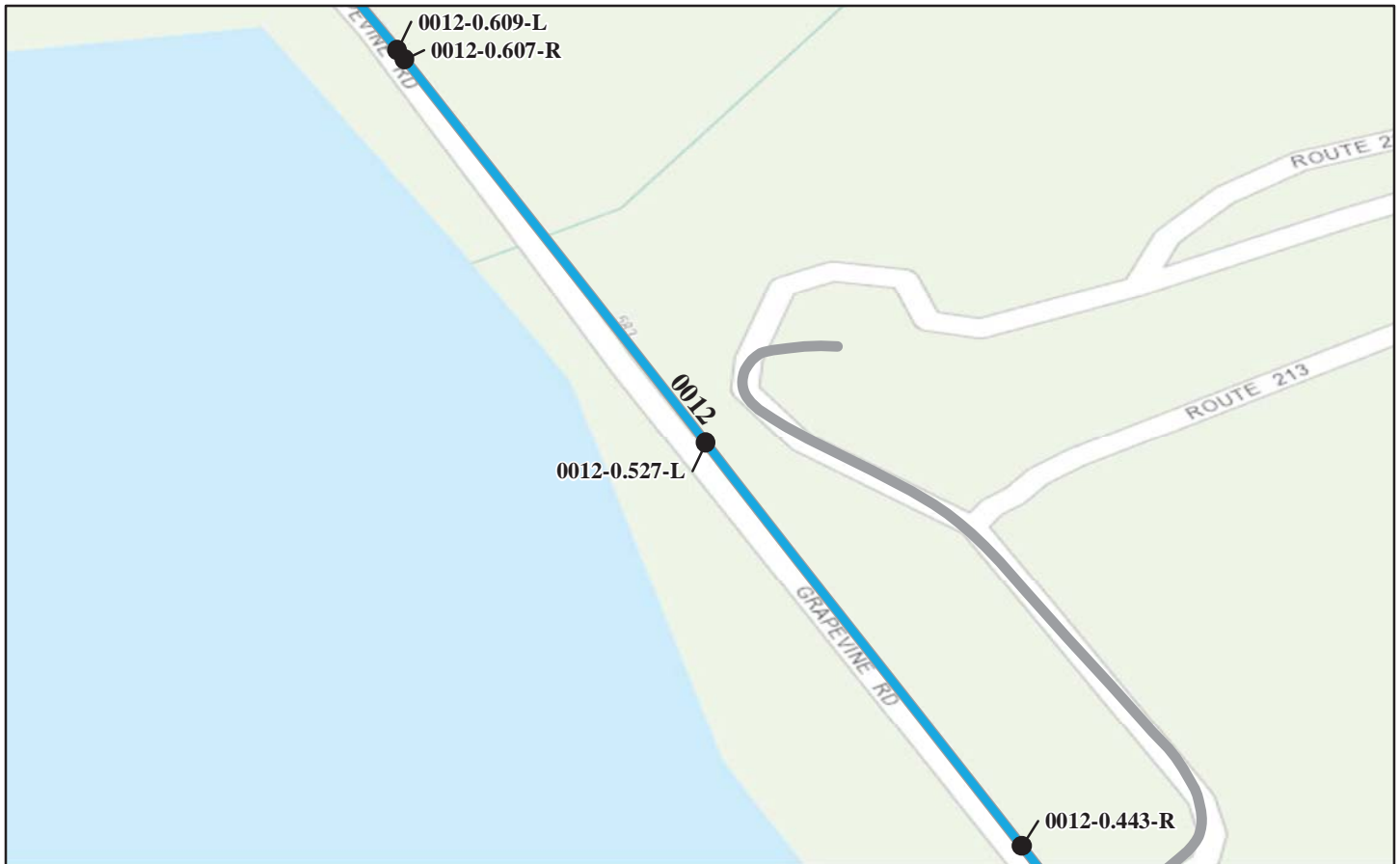
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Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
BICA-0011-9.069-R 8/3/2010	150	W-BEAM WEAK POST	NONE	NONE	\$3,449.00

*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0012: AFTERBAY ROAD



Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
BICA-0012-0.443-R 8/2/2010	503	W-BEAM STRONG POST	W-BEAM BCT	NONE	\$1,689.00
BICA-0012-0.527-L 8/2/2010	78	W-BEAM STRONG POST	NONE	W-BEAM BCT	\$2,481.00
BICA-0012-0.607-R 8/2/2010	228	W-BEAM STRONG POST	NONE	W-BEAM BURIED END	\$1,953.00
BICA-0012-0.609-L 8/2/2010	27	W-BEAM STRONG POST	W-BEAM BCT	NONE	\$1,997.00

*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0013: BAD PASS ROAD



Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
BICA-0013-0.786-R 8/6/2010	66	W-BEAM STRONG POST	W-BEAM TURN DOWN	NONE	\$2,217.00
BICA-0013-0.791-L 8/6/2010	53	W-BEAM STRONG POST	NONE	W-BEAM TURN DOWN	\$1,876.00
BICA-0013-0.802-R 8/6/2010	54	W-BEAM STRONG POST	NONE	W-BEAM TURN DOWN	\$1,887.00
BICA-0013-0.808-L 8/6/2010	67	W-BEAM STRONG POST	W-BEAM TURN DOWN	NONE	\$2,030.00
BICA-0013-6.411-L 8/6/2010	961	W-BEAM STRONG POST	W-BEAM FLARED 350 COMPLIANT	W-BEAM FLARED 350 COMPLIANT	\$1,722.00

*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0013: BAD PASS ROAD



Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
BICA-0013-6.524-R 8/6/2010	500	W-BEAM STRONG POST	W-BEAM FLARED 350 COMPLIANT	W-BEAM FLARED 350 COMPLIANT	\$0.00
BICA-0013-7.234-R 8/6/2010	285	W-BEAM STRONG POST	W-BEAM FLARED 350 COMPLIANT	W-BEAM FLARED 350 COMPLIANT	\$1,733.00
BICA-0013-7.351-R 8/6/2010	430	W-BEAM STRONG POST	W-BEAM FLARED 350 COMPLIANT	W-BEAM FLARED 350 COMPLIANT	\$0.00
BICA-0013-7.460-R 8/6/2010	668	W-BEAM STRONG POST	W-BEAM FLARED 350 COMPLIANT	W-BEAM FLARED 350 COMPLIANT	\$0.00
BICA-0013-7.640-R 8/6/2010	570	W-BEAM STRONG POST	W-BEAM FLARED 350 COMPLIANT	W-BEAM FLARED 350 COMPLIANT	\$4,983.00

*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0013: BAD PASS ROAD



Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
BICA-0013-7.807-R 8/6/2010	321	W-BEAM STRONG POST	W-BEAM FLARED 350 COMPLIANT	W-BEAM FLARED 350 COMPLIANT	\$0.00
BICA-0013-7.925-R 8/6/2010	950	W-BEAM STRONG POST	W-BEAM FLARED 350 COMPLIANT	W-BEAM FLARED 350 COMPLIANT	\$0.00
BICA-0013-8.035-L 8/6/2010	316	W-BEAM STRONG POST	W-BEAM FLARED 350 COMPLIANT	W-BEAM FLARED 350 COMPLIANT	\$0.00
BICA-0013-10.409-R 8/5/2010	715	W-BEAM STRONG POST	W-BEAM FLARED 350 COMPLIANT	W-BEAM FLARED 350 COMPLIANT	\$0.00
BICA-0013-12.829-R 8/5/2010	358	W-BEAM STRONG POST	W-BEAM FLARED 350 COMPLIANT	W-BEAM FLARED 350 COMPLIANT	\$1,887.00

*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0204: DEVIL'S CANYON OVERLOOK ROAD



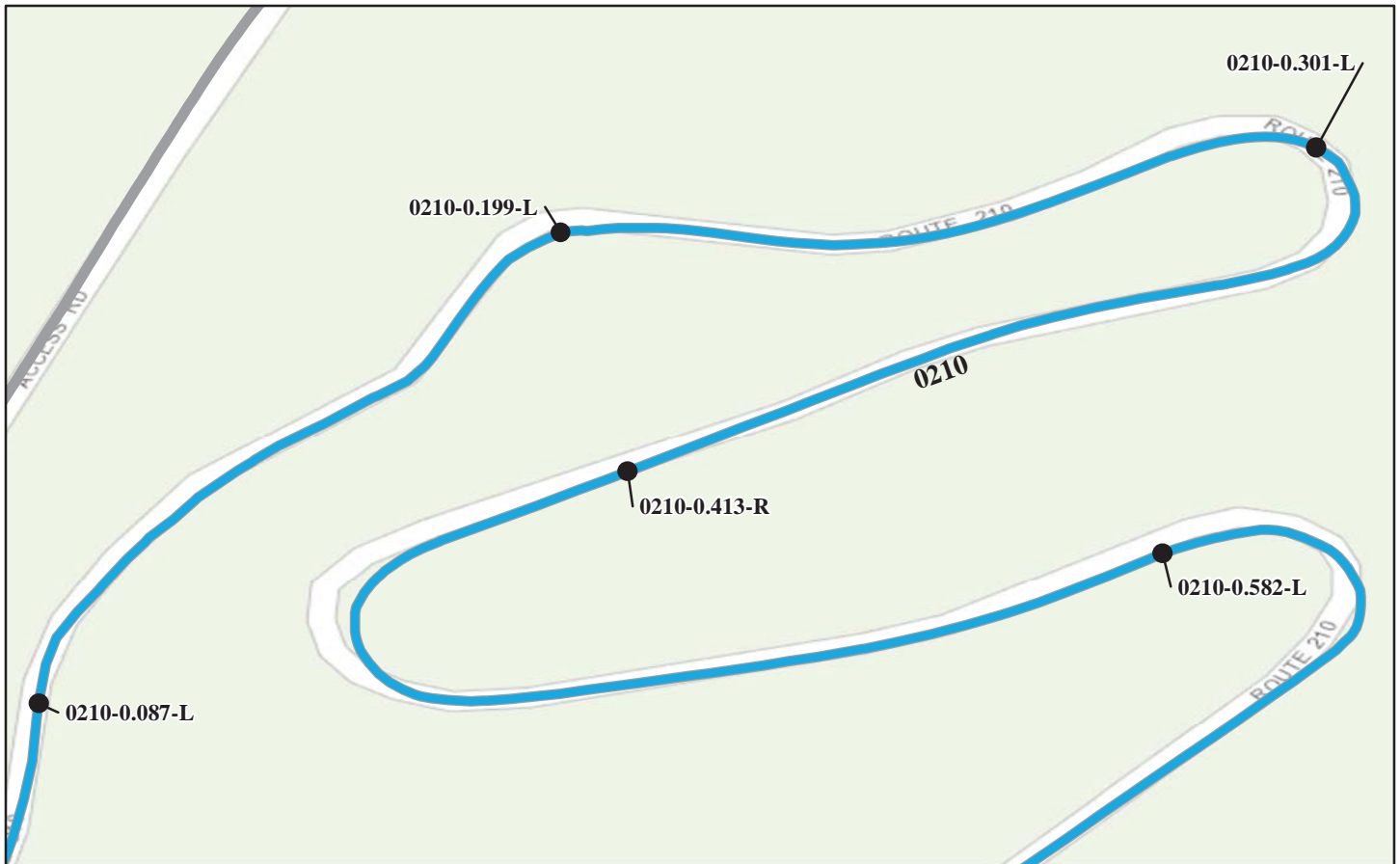
Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
BICA-0204-0.050-L 8/5/2010	135	OTHER: CMU/SPLIT FACE CINDER BLOCK	NONE	NONE	\$0.00

*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0210: WAPPA UPPER SWITCHYARD ROAD



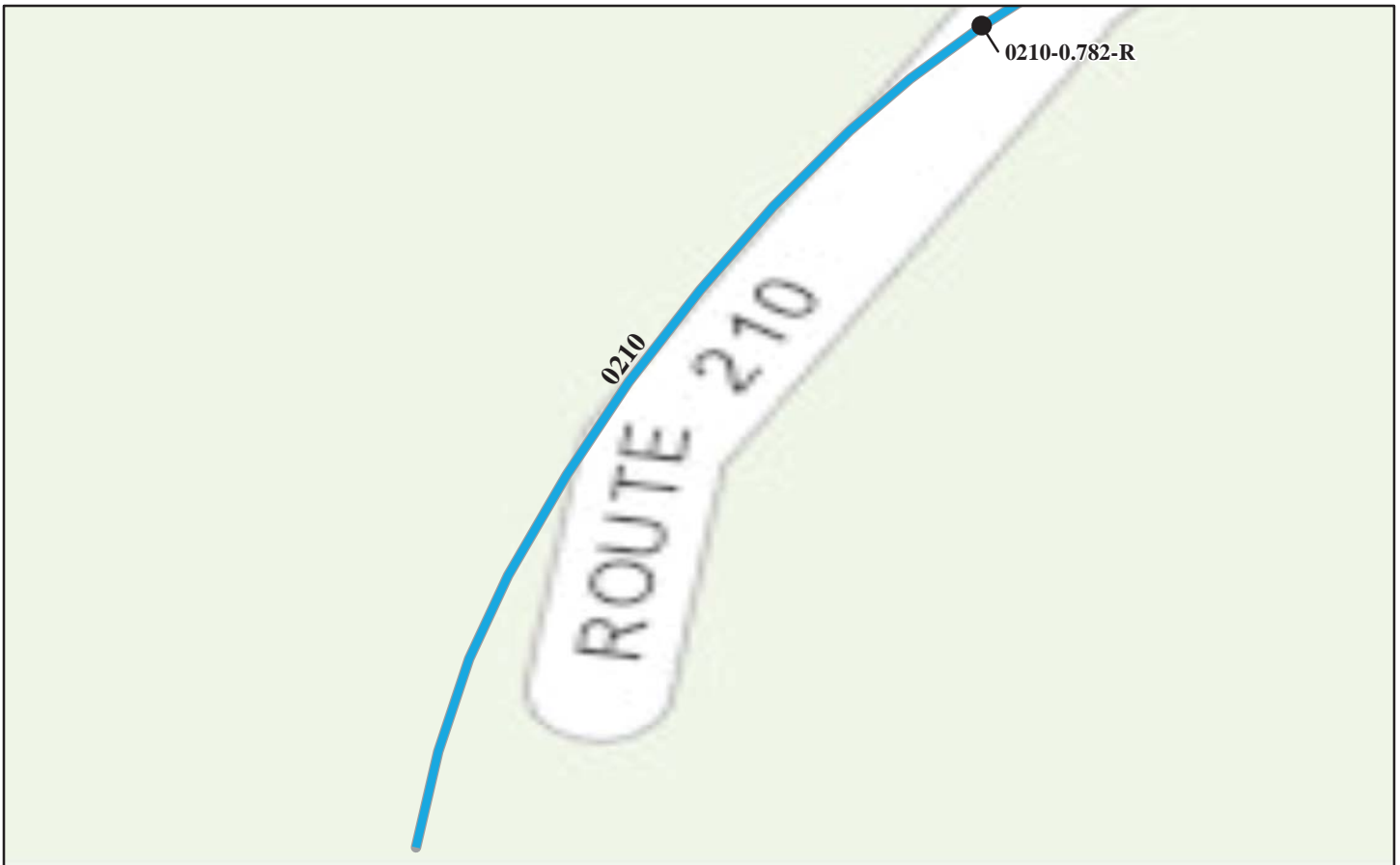
Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
BICA-0210-0.087-L 8/3/2010	440	W-BEAM WEAK POST	NONE	NONE	\$33,660.00
BICA-0210-0.199-L 8/3/2010	536	W-BEAM STRONG POST	NONE	NONE	\$38,962.00
BICA-0210-0.301-L 8/3/2010	370	W-BEAM WEAK POST	NONE	NONE	\$24,805.00
BICA-0210-0.413-R 8/3/2010	325	W-BEAM WEAK POST	NONE	NONE	\$27,968.00
BICA-0210-0.582-L 8/3/2010	337	W-BEAM WEAK POST	NONE	NONE	\$28,562.00

*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0210: WAPPA UPPER SWITCHYARD ROAD



Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
BICA-0210-0.782-R 8/3/2010	213	W-BEAM WEAK POST	NONE	NONE	\$19,179.00

*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0211: YELLOWTAIL POWER PLANT ROAD



Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
BICA-0211-0.116-R 8/2/2010	156	W-BEAM WEAK POST	NONE	NONE	\$16,357.00
BICA-0211-0.117-L 8/2/2010	154	W-BEAM WEAK POST	NONE	NONE	\$16,258.00
BICA-0211-0.278-R 8/2/2010	204	W-BEAM WEAK POST	NONE	NONE	\$18,733.00
BICA-0211-0.349-R 8/3/2010	791	W-BEAM WEAK POST	NONE	NONE	\$57,525.00
BICA-0211-0.544-R 8/3/2010	418	W-BEAM WEAK POST	NONE	NONE	\$32,571.00

*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0211: YELLOWTAIL POWER PLANT ROAD



Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
BICA-0211-0.983-R 8/3/2010	833	W-BEAM WEAK POST	NONE	NONE	\$63,850.00

*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0219: BARRY'S LANDING BOAT RAMP ROAD



Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
BICA-0219-1.216-R 8/5/2010	1,350	W-BEAM STRONG POST	W-BEAM FLARED 350 COMPLIANT	W-BEAM FLARED 350 COMPLIANT	\$1,887.00
BICA-0219-2.011-L 8/5/2010	438	W-BEAM WEAK POST	NONE	NONE	\$8,448.00

*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Tier 3 Barrier Details



Bighorn Canyon National Recreation Area



**Federal Lands Highway
Road Inventory Program**

Barrier ID:	BICA-0010-0.266-R				
Route Name:	FORT SMITH ACCESS ROAD				
Inspection Date:	02/08/2010	Barrier Rating:	71.10		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	830		
Speed Limit (MPH):	55	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-3	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	NO
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	21.2	Lateral Offset (In.):	22.2	Road Grade (%):	2.30
Physical Condition					
Barrier	Alignment and Height:	The barrier alignment is off by more than 6 in for 48 ft. Entire barrier is between 4-8in. below the 27-in design height.			
	Breaking and Cracking:	No breaking or cracking of barrier.			
	Missing Elements:	No missing barrier items.			
	Corrosion and Weathering:	No major weathering of barrier.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0010-0.266-R		
Route Name:	FORT SMITH ACCESS ROAD		
Inspection Date:	02/08/2010	Barrier Rating:	71.10

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$67155
Brief Workorder:	Replace barrier with W-beam strong post guardrail and two W-beam tangent end treatments.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 830-ft = \$8300. Remove 830-ft guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 770-ft = \$26950. Install 770-ft of W-beam strong post. W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install 2 W-beam tangent end treatments. High Speed Traffic Control at \$2350- per -Day for 8 Day(s) = \$18800. 4 days removal 4 days installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0010: FORT SMITH ACCESS ROAD

Barrier Condition Photos



BICA_0010_0.266_R_1.JPG

Barrier ID:	BICA-0010-0.267-L				
Route Name:	FORT SMITH ACCESS ROAD				
Inspection Date:	02/08/2010	Barrier Rating:	59.40		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	617		
Speed Limit (MPH):	55	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-3	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	NO
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	20.0	Lateral Offset (In.):	28.7	Road Grade (%):	2.60
Physical Condition					
Barrier	Alignment and Height:	Alignment of barrier is acceptable except for one 13 ft segment of impacted rail. Entire barrier is between 6-9in. below the 27-in design height.			
	Breaking and Cracking:	Bent spoon on approach end and trailing end of barrier. 3 broken posts. 41 ft of bent rail. One loose bolt.			
	Missing Elements:	5 missing bolts on trailing end of barrier.			
	Corrosion and Weathering:	Concrete posts are spalling on top ends. No corrosion of galvanized rails on barrier. Moderate erosion of soil around posts at 100 ft from approach end due to roadway runoff.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0010-0.267-L		
Route Name:	FORT SMITH ACCESS ROAD		
Inspection Date:	02/08/2010	Barrier Rating:	59.40

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$45667
Brief Workorder:	Replace barrier with W-beam Strong Post guardrail and 2 W-beam Tangent/non-flared end treatments.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 617 LF = \$6170. Remove 617 feet of W-beam guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 557 LF = \$19495. Install 557 feet of W-beam strong post guardrail. W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install 2 W-beam tangent 350 compliant end treatments. Low Speed Traffic Control at \$1475- per -Day for 6 Day(s) = \$8850. 3 days removal 3 days installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0010: FORT SMITH ACCESS ROAD

Barrier Condition Photos



BICA_0010_0.267_L_1.JPG

Barrier ID:	BICA-0010-1.325-L				
Route Name:	FORT SMITH ACCESS ROAD				
Inspection Date:	02/08/2010	Barrier Rating:	52.70		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	255		
Speed Limit (MPH):	55	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-3	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	NO
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.6
Height (In.):	21.7	Lateral Offset (In.):	30.0	Road Grade (%):	0.80
Physical Condition					
Barrier	Alignment and Height:	Impact zone for about 80 lf along middle of barrier - rails in good condition but alignment is 6 in to 12 in off. Height of barrier is 5 to 6 ins below the 27 in design height throughout.			
	Breaking and Cracking:	Minor spalling of concrete posts. No cracked or broken barrier elements.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No corrosion of rails. Moderate weathering of barrier posts (spalling). Erosion does not compromise barrier posts.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0010-1.325-L		
Route Name:	FORT SMITH ACCESS ROAD		
Inspection Date:	02/08/2010	Barrier Rating:	52.70

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$23183
Brief Workorder:	Replace barrier with W-beam strong post guardrail and two W-beam tangent end treatments.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 255-ft = \$2550. Remove 255-ft guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 195-ft = \$6825. Install 195-ft of W-beam strong post. W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install 2 W-beam tangent end treatments. High Speed Traffic Control at \$2350- per -Day for 2 Day(s) = \$4700. 1 day removal 1 day installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0010: FORT SMITH ACCESS ROAD

Barrier Condition Photos

Condition photos are not available for BICA-0010-1.325-L.

Barrier ID:	BICA-0010-1.326-R				
Route Name:	FORT SMITH ACCESS ROAD				
Inspection Date:	02/08/2010	Barrier Rating:	55.50		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	255		
Speed Limit (MPH):	55	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-3	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	NO
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	21.6	Lateral Offset (In.):	17.2	Road Grade (%):	0.40
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was 5 to 6 in below the 27 in design height throughout.			
	Breaking and Cracking:	There was 28 ft of rail that was bent in from impact.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No major weathering of barrier.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0010-1.326-R		
Route Name:	FORT SMITH ACCESS ROAD		
Inspection Date:	02/08/2010	Barrier Rating:	55.50

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$23183
Brief Workorder:	Replace barrier with W-beam strong post guardrail and two W-beam non-flared/tangent end treatments.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 255-ft = \$2550. Remove 255-ft of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 195-ft = \$6825. Install 195-ft of W-beam strong post. W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install two non-flared end treatments. High Speed Traffic Control at \$2350- per -Day for 2 Day(s) = \$4700. 1 day removal 1 day installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0010: FORT SMITH ACCESS ROAD

Barrier Condition Photos

Condition photos are not available for BICA-0010-1.326-R.

Barrier ID:	BICA-0010-3.103-R				
Route Name:	FORT SMITH ACCESS ROAD				
Inspection Date:	02/08/2010	Barrier Rating:	53.50		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	430		
Speed Limit (MPH):	35	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	151.0
Height (In.):	19.6	Lateral Offset (In.):	34.5	Road Grade (%):	1.90
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was 5 to 10 in below the 27 in design height throughout.			
	Breaking and Cracking:	No major breaking or cracking of the barrier.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No major corrosion or weathering of the barrier.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0010-3.103-R		
Route Name:	FORT SMITH ACCESS ROAD		
Inspection Date:	02/08/2010	Barrier Rating:	53.50

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$33165
Brief Workorder:	Replace barrier with W-beam strong post guardrail and two W-beam non-flared/tangent end treatments.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 430-ft = \$4300. Remove 430-ft of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 370-ft = \$12950. Install 370-ft of W-beam strong post guardrail. W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install two W-beam tangent end terminals. Low Speed Traffic Control at \$1475- per -Day for 4 Day(s) = \$5900. 2 days removal 2 days installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0010: FORT SMITH ACCESS ROAD

Barrier Condition Photos

Condition photos are not available for BICA-0010-3.103-R.

Barrier ID:	BICA-0010-3.104-L				
Route Name:	FORT SMITH ACCESS ROAD				
Inspection Date:	02/08/2010	Barrier Rating:	53.50		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	431		
Speed Limit (MPH):	35	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.3
Height (In.):	19.0	Lateral Offset (In.):	32.0	Road Grade (%):	1.90
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection except for 3 rails that were bent in more than 12 in from impact. Height was 5 to 10 in below 27 in design height throughout.			
	Breaking and Cracking:	Concrete barrier posts are spalling on top. 3 rails and the spoon end piece were bent due to impact.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No corrosion of barrier rails. Moderate weathering of barrier posts (spalling). No erosion to compromise posts.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0010-3.104-L		
Route Name:	FORT SMITH ACCESS ROAD		
Inspection Date:	02/08/2010	Barrier Rating:	53.50

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$33215
Brief Workorder:	Replace barrier with W-beam strong post guardrail and two W-beam non-flared/tangent end treatments.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 431-ft = \$4310. Remove 431-ft of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 371-ft = \$12985. Install 371-ft of W-beam strong post guardrail. W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install two W-beam tangent end terminals. Low Speed Traffic Control at \$1475- per -Day for 4 Day(s) = \$5900. 2 days removal 2 days installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0010: FORT SMITH ACCESS ROAD

Barrier Condition Photos

Condition photos are not available for BICA-0010-3.104-L.

Barrier ID:	BICA-0010-3.529-R				
Route Name:	FORT SMITH ACCESS ROAD				
Inspection Date:	02/08/2010	Barrier Rating:	58.40		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	504		
Speed Limit (MPH):	35	Placement with Respect to Road:	OUTSIDE OF CURVE		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.3
Height (In.):	22.6	Lateral Offset (In.):	21.0	Road Grade (%):	0.50
Physical Condition					
Barrier	Alignment and Height:	The barrier alignment had no deflection and the height was 4 to 6 in below the 27 in design height.			
	Breaking and Cracking:	No major breaking or cracking of the barrier.			
	Missing Elements:	2 missing rail connection bolts in barrier.			
	Corrosion and Weathering:	Minor erosion around barrier posts less than 6 in.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0010-3.529-R		
Route Name:	FORT SMITH ACCESS ROAD		
Inspection Date:	02/08/2010	Barrier Rating:	58.40

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$38825
Brief Workorder:	Replace barrier with W-beam strong post guardrail and two W-beam non-flared/tangent end treatments.				
Workorder:	<p>Remove Guardrail at \$10- per -Lin. Ft. for 504-ft = \$5040. Remove 504-ft of guardrail.</p> <p>W-Beam Strong Post at \$35- per -Lin. Ft. for 444-ft = \$15540. Install 444-ft of W-beam strong post guardrail.</p> <p>W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install two W-beam tangent end terminals.</p> <p>Labor at \$60- per -Hour for 4 Hrs = \$240. Repair erosion.</p> <p>Structural Backfill at \$50- per -Cu. Yd. for 2 CY = \$100. Repair erosion.</p> <p>Low Speed Traffic Control at \$1475- per -Day for 5 Day(s) = \$7375. 1 day to repair erosion 2 days removal 2days installation.</p>				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0010: FORT SMITH ACCESS ROAD

Barrier Condition Photos

Condition photos are not available for BICA-0010-3.529-R.

Barrier ID:	BICA-0010-3.531-L				
Route Name:	FORT SMITH ACCESS ROAD				
Inspection Date:	02/08/2010	Barrier Rating:	33.70		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	130		
Speed Limit (MPH):	35	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.3
Height (In.):	21.0	Lateral Offset (In.):	35.7	Road Grade (%):	0.40
Physical Condition					
Barrier	Alignment and Height:	Minor impact to one rail but overall the alignment had no deflection. The barrier height was 5 to 7 in below the 27 in design height throughout.			
	Breaking and Cracking:	There was one rail that was bent due to impact.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No corrosion of barrier rails. Minimal weathering of barrier posts.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0010-3.531-L		
Route Name:	FORT SMITH ACCESS ROAD		
Inspection Date:	02/08/2010	Barrier Rating:	33.70

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$15070
Brief Workorder:	Replace barrier with W-beam strong post guardrail and two W-beam non-flared/tangent end treatments.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 130-ft = \$1300. Remove 130-ft of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 70-ft = \$2450. Install 70-ft of W-beam strong post guardrail. W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install two W-beam tangent end terminals. Low Speed Traffic Control at \$1475- per -Day for 2 Day(s) = \$2950. 1 day removal 1 day installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0010: FORT SMITH ACCESS ROAD

Barrier Condition Photos

Condition photos are not available for BICA-0010-3.531-L.

Barrier ID:	BICA-0010-3.881-R				
Route Name:	FORT SMITH ACCESS ROAD				
Inspection Date:	02/08/2010	Barrier Rating:	34.00		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	174		
Speed Limit (MPH):	25	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	21.2	Lateral Offset (In.):	20.2	Road Grade (%):	0.60
Physical Condition					
Barrier	Alignment and Height:	Minor impact to two rails but overall the alignment had no deflection. The height was 4 to 7 in below the 27 in design height throughout.			
	Breaking and Cracking:	There were two rails that were bent due to impact.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No corrosion of galvanized rails. Moderate weathering of concrete barrier posts.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0010-3.881-R		
Route Name:	FORT SMITH ACCESS ROAD		
Inspection Date:	02/08/2010	Barrier Rating:	34.00

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$14553
Brief Workorder:	Replace barrier with W-beam strong post guardrail and one W-beam non-flared/tangent end treatment.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 174-ft = \$1740. Remove 174-ft of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 144-ft = \$5040. Install 144-ft of W-beam strong post guardrail. W-beam tangent 350 compliant at \$3500- per -Each for 1 Unit(s) = \$3500. Install one W-beam tangent end terminal. Low Speed Traffic Control at \$1475- per -Day for 2 Day(s) = \$2950. 1 day removal 1 day installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0010: FORT SMITH ACCESS ROAD

Barrier Condition Photos

Condition photos are not available for BICA-0010-3.881-R.

Barrier ID:	BICA-0010-3.882-L				
Route Name:	FORT SMITH ACCESS ROAD				
Inspection Date:	02/08/2010	Barrier Rating:	35.50		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	242		
Speed Limit (MPH):	25	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.3
Height (In.):	21.2	Lateral Offset (In.):	31.0	Road Grade (%):	1.00
Physical Condition					
Barrier	Alignment and Height:	The barrier alignment leaned out between 6 and 12 in for a 62 ft section. The height was between 4 and 7 in below the 27 in design height throughout.			
	Breaking and Cracking:	No major breaking or cracking of the barrier.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No major weathering of the barrier. Severe erosion around 7 posts and slope.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0010-3.882-L		
Route Name:	FORT SMITH ACCESS ROAD		
Inspection Date:	02/08/2010	Barrier Rating:	35.50

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$22721
Brief Workorder:	Replace barrier with W-beam strong post guardrail and two W-beam non-flared/tangent end treatments and repair erosion.				
Workorder:	<p>Remove Guardrail at \$10- per -Lin. Ft. for 242-ft = \$2420. Remove 242-ft of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 182-ft = \$6370. Install 182-ft of W-beam strong post guardrail. W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install two W-beam tangent end terminals. Structural Backfill at \$50- per -Cu. Yd. for 4 CY = \$200. Repair erosion. Labor at \$60- per -Hour for 4 Hrs = \$240. Repair erosion. Low Speed Traffic Control at \$1475- per -Day for 3 Day(s) = \$4425. 1 day erosion control 1 day barrier removal 1 day installation.</p>				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0010: FORT SMITH ACCESS ROAD

Barrier Condition Photos

Condition photos are not available for BICA-0010-3.882-L.

Barrier ID:	BICA-0010-3.909-R				
Route Name:	FORT SMITH ACCESS ROAD				
Inspection Date:	02/08/2010	Barrier Rating:	20.00		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	NON-TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	346		
Speed Limit (MPH):	25	Placement with Respect to Road:	NON-TRAFFIC BARRIER		
Hazard Behind Barrier:	N/A				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	N/A	Is Barrier Crashworthy?:	N/A
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.3
Height (In.):	20.0	Lateral Offset (In.):	0.0	Road Grade (%):	0.00
Physical Condition					
Barrier	Alignment and Height:	The barrier alignment had no deflection and the height was 6 to 8 in below the 27 in design height.			
	Breaking and Cracking:	There was one bent rail due to a minor impact.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No corrosion of galvanized rails. Moderate weathering of concrete posts.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0010-3.909-R		
Route Name:	FORT SMITH ACCESS ROAD		
Inspection Date:	02/08/2010	Barrier Rating:	20.00

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$26312
Brief Workorder:	Replace barrier with W-beam strong post guardrail and one W-beam non-flared/tangent end treatment.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 346-ft = \$3460. Remove 346 feet of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 316-ft = \$11060. Install 316 feet of W-beam strong post. W-beam tangent 350 compliant at \$3500- per -Each for 1 Unit(s) = \$3500. Install one W-beam tangent end terminal. Low Speed Traffic Control at \$1475- per -Day for 4 Day(s) = \$5900. 2 days removal 2 days installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0010: FORT SMITH ACCESS ROAD

Barrier Condition Photos

Condition photos are not available for BICA-0010-3.909-R.

Barrier ID:	BICA-0010-4.157-R				
Route Name:	FORT SMITH ACCESS ROAD				
Inspection Date:	02/08/2010	Barrier Rating:	47.00		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	306		
Speed Limit (MPH):	25	Placement with Respect to Road:	OUTSIDE OF CURVE		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	151.0
Height (In.):	22.0	Lateral Offset (In.):	30.6	Road Grade (%):	0.40
Physical Condition					
Barrier	Alignment and Height:	The barrier alignment had no deflection and the height was 4 to 6 in below the 27 in design height.			
	Breaking and Cracking:	No major breaking or cracking of the barrier.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No major weathering of barrier.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0010-4.157-R		
Route Name:	FORT SMITH ACCESS ROAD		
Inspection Date:	02/08/2010	Barrier Rating:	47.00

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$27027
Brief Workorder:	Replace barrier with W-beam strong post guardrail and two W-beam non-flared/tangent end treatments.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 306-ft = \$3060. Remove 306-ft of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 246-ft = \$8610. Install 246-ft of W-beam strong post guardrail. W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install two W-beam tangent end terminals. Low Speed Traffic Control at \$1475- per -Day for 4 Day(s) = \$5900. 2 days removal 2 days installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0010: FORT SMITH ACCESS ROAD

Barrier Condition Photos

Condition photos are not available for BICA-0010-4.157-R.

Barrier ID:	BICA-0010-4.158-L				
Route Name:	FORT SMITH ACCESS ROAD				
Inspection Date:	02/08/2010	Barrier Rating:	41.20		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	256		
Speed Limit (MPH):	25	Placement with Respect to Road:	INSIDE OF CURVE		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	149.6
Height (In.):	21.2	Lateral Offset (In.):	37.7	Road Grade (%):	0.40
Physical Condition					
Barrier	Alignment and Height:	Besides a minor impact to one rail the alignment had no deflection. The height was 5 to 6 in below the 27 in design height throughout.			
	Breaking and Cracking:	There was a minor impact to one rail and one bolt was loose.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No corrosion of galvanized rails. Minimal weathering of concrete posts.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0010-4.158-L		
Route Name:	FORT SMITH ACCESS ROAD		
Inspection Date:	02/08/2010	Barrier Rating:	41.20

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$21307
Brief Workorder:	Replace barrier with W-beam strong post guardrail and two W-beam non-flared/tangent end treatments.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 256-ft = \$2560. Remove 256-ft of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 196-ft = \$6860. Install 196-ft of W-beam strong post guardrail. W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install two W-beam tangent end terminals. Low Speed Traffic Control at \$1475- per -Day for 2 Day(s) = \$2950. 1 day removal 1 day installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0010: FORT SMITH ACCESS ROAD

Barrier Condition Photos

Condition photos are not available for BICA-0010-4.158-L.

Barrier ID:	BICA-0010-4.402-L				
Route Name:	FORT SMITH ACCESS ROAD				
Inspection Date:	02/08/2010	Barrier Rating:	53.70		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	315		
Speed Limit (MPH):	25	Placement with Respect to Road:	OUTSIDE OF CURVE		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	149.3
Height (In.):	21.7	Lateral Offset (In.):	41.2	Road Grade (%):	6.70
Physical Condition					
Barrier	Alignment and Height:	3 rails and 2 posts were impacted out of alignment while the remaining alignment had no deflection. The height was 5 to 6 in below the 27 in design height.			
	Breaking and Cracking:	There were 3 impacted rails 2 tilted posts and 2 loose bolts.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No corrosion of galvanized rails. Moderate weathering (spalling) of concrete posts.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0010-4.402-L		
Route Name:	FORT SMITH ACCESS ROAD		
Inspection Date:	02/08/2010	Barrier Rating:	53.70

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$27473
Brief Workorder:	Replace barrier with W-beam strong post guardrail and two W-beam non-flared/tangent end treatments.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 315-ft = \$3150. Remove 315-ft of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 255-ft = \$8925. Install 255-ft of W-beam strong post guardrail. W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install two W-beam tangent end terminals. Low Speed Traffic Control at \$1475- per -Day for 4 Day(s) = \$5900. 2 days removal 2 days installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0010: FORT SMITH ACCESS ROAD

Barrier Condition Photos

Condition photos are not available for BICA-0010-4.402-L.

Barrier ID:	BICA-0010-4.517-R				
Route Name:	FORT SMITH ACCESS ROAD				
Inspection Date:	02/08/2010	Barrier Rating:	34.20		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	209		
Speed Limit (MPH):	25	Placement with Respect to Road:	INSIDE OF CURVE		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	149.6
Height (In.):	22.7	Lateral Offset (In.):	44.7	Road Grade (%):	6.70
Physical Condition					
Barrier	Alignment and Height:	The barrier alignment had no deflection and the height is 1-3in. below the 27-in design height for 49 ft and 3-7in. below for 160 ft.			
	Breaking and Cracking:	No cracked or broken barrier elements.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No corrosion of galvanized rails. Moderate weathering of concrete posts (spalling at ends). No erosion.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0010-4.517-R		
Route Name:	FORT SMITH ACCESS ROAD		
Inspection Date:	02/08/2010	Barrier Rating:	34.20

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$18981
Brief Workorder:	Replace barrier with W-beam strong post guardrail and two W-beam non-flared/tangent end treatments.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 209-ft = \$2090. Remove 209-ft of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 149-ft = \$5215. Install 149-ft of W-beam strong post guardrail. W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install two W-beam tangent end terminals. Low Speed Traffic Control at \$1475- per -Day for 2 Day(s) = \$2950. 1 day removal 1 day installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0010: FORT SMITH ACCESS ROAD

Barrier Condition Photos

Condition photos are not available for BICA-0010-4.517-R.

Barrier ID:	BICA-0010-4.519-L				
Route Name:	FORT SMITH ACCESS ROAD				
Inspection Date:	02/08/2010	Barrier Rating:	50.90		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	228		
Speed Limit (MPH):	25	Placement with Respect to Road:	OUTSIDE OF CURVE		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	22.0	Lateral Offset (In.):	32.7	Road Grade (%):	7.00
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was 4 to 6 in below the 27 in design height throughout.			
	Breaking and Cracking:	There were 2 loose bolts. No cracked or broken barrier elements.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No corrosion of galvanized rails. Moderate weathering of concrete posts (some spalling of ends).			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0010-4.519-L		
Route Name:	FORT SMITH ACCESS ROAD		
Inspection Date:	02/08/2010	Barrier Rating:	50.90

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$19921
Brief Workorder:	Replace barrier with W-beam strong post guardrail and two W-beam non-flared/tangent end treatments.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 228-ft = \$2280. Remove 228-ft guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 168-ft = \$5880. Install 168-ft of W-beam strong post guardrail. W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install two W-beam tangent end terminals. Low Speed Traffic Control at \$1475- per -Day for 2 Day(s) = \$2950. 1 day removal 1 day installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0010: FORT SMITH ACCESS ROAD

Barrier Condition Photos

Condition photos are not available for BICA-0010-4.519-L.

Barrier ID:	BICA-0010-4.581-R				
Route Name:	FORT SMITH ACCESS ROAD				
Inspection Date:	03/08/2010	Barrier Rating:	31.20		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	159		
Speed Limit (MPH):	25	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	22.7	Lateral Offset (In.):	44.2	Road Grade (%):	7.50
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was 3 to 6 in below the 27 in design height.			
	Breaking and Cracking:	No cracked or broken barrier elements.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No corrosion of galvanized rails. Moderate weathering of concrete posts (some spalling of ends).			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0010-4.581-R		
Route Name:	FORT SMITH ACCESS ROAD		
Inspection Date:	03/08/2010	Barrier Rating:	31.20

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$13811
Brief Workorder:	Replace barrier with W-beam strong post guardrail and one W-beam non-flared/tangent end terminal.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 159-ft = \$1590. Remove 159-ft of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 129-ft = \$4515. Install 129-ft of W-beam strong post guardrail. W-beam tangent 350 compliant at \$3500- per -Each for 1 Unit(s) = \$3500. Install one W-beam tangent end terminal. Low Speed Traffic Control at \$1475- per -Day for 2 Day(s) = \$2950. 1 day removal 1 day installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0010: FORT SMITH ACCESS ROAD

Barrier Condition Photos

Condition photos are not available for BICA-0010-4.581-R.

Barrier ID:	BICA-0010-4.605-R				
Route Name:	FORT SMITH ACCESS ROAD				
Inspection Date:	03/08/2010	Barrier Rating:	32.90		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	NON-TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	461		
Speed Limit (MPH):	25	Placement with Respect to Road:	NON-TRAFFIC BARRIER		
Hazard Behind Barrier:	N/A				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	N/A	Is Barrier Crashworthy?:	N/A
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	21.2	Lateral Offset (In.):	0.0	Road Grade (%):	0.00
Physical Condition					
Barrier	Alignment and Height:	The barrier alignment had no deflection and the height was 4 to 7 in below the 27 in design height.			
	Breaking and Cracking:	No cracked or broken barrier elements.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No corrosion of galvanized rails. Moderate weathering of concrete posts (some spalling of ends).			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0010-4.605-R		
Route Name:	FORT SMITH ACCESS ROAD		
Inspection Date:	03/08/2010	Barrier Rating:	32.90

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$29310
Brief Workorder:	Replace barrier with W-beam strong post guardrail.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 461-ft = \$4610. Remove 461 feet of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 461-ft = \$16135. Install 461 feet of W-beam strong post guardrail. Low Speed Traffic Control at \$1475- per -Day for 4 Day(s) = \$5900. 1 day removal 1 day installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0010: FORT SMITH ACCESS ROAD

Barrier Condition Photos

Condition photos are not available for BICA-0010-4.605-R.

Barrier ID:	BICA-0010-4.686-R				
Route Name:	FORT SMITH ACCESS ROAD				
Inspection Date:	03/08/2010	Barrier Rating:	47.00		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	316		
Speed Limit (MPH):	25	Placement with Respect to Road:	OUTSIDE OF CURVE		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	20.6	Lateral Offset (In.):	38.2	Road Grade (%):	7.60
Physical Condition					
Barrier	Alignment and Height:	The barrier alignment had no deflection and the height was 6 to 7 in below the 27 in design height.			
	Breaking and Cracking:	No major breaking or cracking of the barrier.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No major weathering of the barrier.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0010-4.686-R		
Route Name:	FORT SMITH ACCESS ROAD		
Inspection Date:	03/08/2010	Barrier Rating:	47.00

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$22132
Brief Workorder:	Replace barrier with W-beam strong post guardrail.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 316 LF = \$3160. Remove 316 feet of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 316 LF = \$11060. Install 316 feet of W-beam strong post guardrail. Low Speed Traffic Control at \$1475- per -Day for 4 Day(s) = \$5900. 2 days removal 2 days installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0010: FORT SMITH ACCESS ROAD

Barrier Condition Photos

Condition photos are not available for BICA-0010-4.686-R.

Barrier ID:	BICA-0010-4.734-R				
Route Name:	FORT SMITH ACCESS ROAD				
Inspection Date:	03/08/2010	Barrier Rating:	28.60		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	NON-TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	357		
Speed Limit (MPH):	25	Placement with Respect to Road:	NON-TRAFFIC BARRIER		
Hazard Behind Barrier:	N/A				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	N/A	Is Barrier Crashworthy?:	N/A
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	0.0
Height (In.):	21.6	Lateral Offset (In.):	0.0	Road Grade (%):	0.00
Physical Condition					
Barrier	Alignment and Height:	The barrier alignment had no deflection and the height was 5 to 6 in below the 27 in design height.			
	Breaking and Cracking:	No major breaking or cracking of the barrier.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No major weathering of the barrier.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0010-4.734-R		
Route Name:	FORT SMITH ACCESS ROAD		
Inspection Date:	03/08/2010	Barrier Rating:	28.60

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$24162
Brief Workorder:	Replace barrier with W-beam strong post guardrail.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 357-ft = \$3570. Remove 357 feet of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 357-ft = \$12495. Install 357 feet of W-beam strong post guardrail. Low Speed Traffic Control at \$1475- per -Day for 4 Day(s) = \$5900. 2 days removal 2 days installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0010: FORT SMITH ACCESS ROAD

Barrier Condition Photos

Condition photos are not available for BICA-0010-4.734-R.

Barrier ID:	BICA-0010-4.809-R				
Route Name:	FORT SMITH ACCESS ROAD				
Inspection Date:	03/08/2010	Barrier Rating:	61.50		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	2420		
Speed Limit (MPH):	25	Placement with Respect to Road:	BOTH INSIDE AND OUTSIDE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.3
Height (In.):	21.1	Lateral Offset (In.):	52.5	Road Grade (%):	6.20
Physical Condition					
Barrier	Alignment and Height:	180 ft of guardrail leaning away from the roadway 6 in or less. The height is within 1 in of 27 in design height for 72 ft between 1 and 3 in below for 118 ft and between 3 and 10 in below for 2230 ft.			
	Breaking and Cracking:	There were 5 rails and 3 posts that had minor impacts and have plow damage. There were also 19 loose bolts.			
	Missing Elements:	10 missing bolts. No other missing barrier elements.			
	Corrosion and Weathering:	No corrosion of galvanized rails. Moderate weathering of concrete posts (some spalling of concrete).			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0010-4.809-R		
Route Name:	FORT SMITH ACCESS ROAD		
Inspection Date:	03/08/2010	Barrier Rating:	61.50

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$154935
Brief Workorder:	Replace barrier with W-beam strong post guardrail and one W-beam non-flared/tangent end treatments.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 2420-ft = \$24200. Remove 2420 feet of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 2390-ft = \$83650. Install 2390 feet of W-beam strong post guardrail. W-beam tangent 350 compliant at \$3500- per -Each for 1 Unit(s) = \$3500. Install 1 W-beam tangent 350 compliant guardrail. Low Speed Traffic Control at \$1475- per -Day for 20 Day(s) = \$29500. 10 days removal 10 days installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0010: FORT SMITH ACCESS ROAD

Barrier Condition Photos

Condition photos are not available for BICA-0010-4.809-R.

Barrier ID:	BICA-0011-0.758-R				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	04/08/2010	Barrier Rating:	29.60		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	106		
Speed Limit (MPH):	45	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.3
Height (In.):	24.0	Lateral Offset (In.):	35.5	Road Grade (%):	2.20
Physical Condition					
Barrier	Alignment and Height:	The barrier alignment had no deflection and the height ranged between 1 and 3 in below the 27 in design height for 77 ft and from 3 to 5 in below for 29 ft.			
	Breaking and Cracking:	There was some insignificant cracking observed on the posts.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	There is major weathering of the barrier posts possible dry rot or bugs at base.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0011-0.758-R		
Route Name:	OK-A-BEH ROAD		
Inspection Date:	04/08/2010	Barrier Rating:	29.60

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$2789
Brief Workorder:	Raise 106-ft of barrier up to 27-in design height.				
Workorder:	Adjust Guardrail at \$10- per -Lin. Ft. for 106-ft = \$1060. Raise 106-ft of barrier up to 27-in design height. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD

Barrier Condition Photos

Condition photos are not available for BICA-0011-0.758-R.

Barrier ID:	BICA-0011-0.760-L				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	04/08/2010	Barrier Rating:	25.20		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	53		
Speed Limit (MPH):	45	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	25.2	Lateral Offset (In.):	33.5	Road Grade (%):	2.00
Physical Condition					
Barrier	Alignment and Height:	The barrier alignment had no deflection and the height was within 1 in of the 27 in design height for 38 ft and was between 1 and 3 in below for 15 ft.			
	Breaking and Cracking:	There is some cracking of the barrier posts. 1 post is broken with possible dry rot or bugs at base.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	There is major weathering of the barrier posts possible dry rot or bugs at base.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0011-0.760-L		
Route Name:	OK-A-BEH ROAD		
Inspection Date:	04/08/2010	Barrier Rating:	25.20

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$1898
Brief Workorder:	Raise 15-ft of barrier up to the 27-in design height and replace 1 post.				
Workorder:	Replace Post at \$100- per -Each for 1 Post(s) = \$100. Broken with dry rot or bugs at base. Adjust Guardrail at \$10- per -Lin. Ft. for 15-ft = \$150. Raise 15-ft of guardrail up to the 27-in design height. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD

Barrier Condition Photos



BICA_0011_0.760_L_1.JPG

Barrier ID:	BICA-0011-0.807-R				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	04/08/2010	Barrier Rating:	33.90		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	54		
Speed Limit (MPH):	45	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.3
Height (In.):	23.0	Lateral Offset (In.):	33.5	Road Grade (%):	3.00
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height ranged from 3 to 5 in below the 27 in design height.			
	Breaking and Cracking:	There was insignificant cracking to the posts.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	There is major weathering of the barrier posts possible dry rot or bugs at base.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0011-0.807-R		
Route Name:	OK-A-BEH ROAD		
Inspection Date:	04/08/2010	Barrier Rating:	33.90

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$2217
Brief Workorder:	Raise 54-ft of barrier up to 27-in design height.				
Workorder:	Adjust Guardrail at \$10- per -Lin. Ft. for 54-ft = \$540. Raise 54-ft of barrier up to 27-in design height. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD

Barrier Condition Photos



BICA_0011_0.807_R_1.JPG

Barrier ID:	BICA-0011-0.812-L				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	04/08/2010	Barrier Rating:	29.60		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	105		
Speed Limit (MPH):	45	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	149.6
Height (In.):	23.0	Lateral Offset (In.):	25.6	Road Grade (%):	2.70
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was 4 in below the 27 in design height throughout.			
	Breaking and Cracking:	There is some cracking of the barrier posts and 1 post is broken.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	There is major weathering of the barrier posts possible dry rot or bugs at base.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0011-0.812-L		
Route Name:	OK-A-BEH ROAD		
Inspection Date:	04/08/2010	Barrier Rating:	29.60

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$2888
Brief Workorder:	Replace broken post. Raise 105-ft of barrier up to 27-in design height.				
Workorder:	Replace Post at \$100- per -Each for 1 Post(s) = \$100. Broken with dry rot or bugs at base. Adjust Guardrail at \$10- per -Lin. Ft. for 105-ft = \$1050. Raise 105-ft of barrier up to 27-in design height. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD

Barrier Condition Photos



BICA_0011_0.812_L_1.JPG

Barrier ID:	BICA-0011-1.141-L				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	04/08/2010	Barrier Rating:	33.90		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	130		
Speed Limit (MPH):	45	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.3
Height (In.):	24.7	Lateral Offset (In.):	30.0	Road Grade (%):	5.50
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height ranged from 1 to 3 in below 27 in design height for 100 ft and from 3 to 4 in below for 30 ft.			
	Breaking and Cracking:	No cracked or broken barrier elements. There were a few loose bolts.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	Minimal corrosion of barrier rails. Moderate weathering of barrier posts. 2 rotten posts. Possible dry rot or bug infestation of wood posts. Erosion at trailing end (minor).			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0011-1.141-L		
Route Name:	OK-A-BEH ROAD		
Inspection Date:	04/08/2010	Barrier Rating:	33.90

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$3339
Brief Workorder:	Raise 130-ft of barrier up to 27-in design height replace 2 posts and tighten loose bolts.				
Workorder:	Replace Post at \$100- per -Each for 2 Post(s) = \$200. Replace 2 posts. Adjust Guardrail at \$10- per -Lin. Ft. for 130-ft = \$1300. Raise 130-ft of guardrail to 27 inch design height. Labor at \$60- per -Hour for 1 Hrs = \$60. 1 hour to tighten bolts. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD

Barrier Condition Photos



BICA_0011_1.141_L_1.JPG

Barrier ID:	BICA-0011-1.142-R				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	04/08/2010	Barrier Rating:	29.60		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	183		
Speed Limit (MPH):	45	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	24.7	Lateral Offset (In.):	31.0	Road Grade (%):	5.90
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was within 1 in of the 27 in design height for 56 ft 1 to 3 in below for 104 ft and more than 3 in below for 23 ft.			
	Breaking and Cracking:	No cracked or broken barrier elements. There were a few loose bolts.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	Minimal corrosion of barrier rails. Moderate weathering of wood posts. 2 rotten posts. Possible dry rot/bug infestation of wood posts.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0011-1.142-R		
Route Name:	OK-A-BEH ROAD		
Inspection Date:	04/08/2010	Barrier Rating:	29.60

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$3306
Brief Workorder:	Replace 2 posts. Raise 127-ft of barrier up to 27-in design height and tighten loose bolts.				
Workorder:	Replace Post at \$100- per -Each for 2 Post(s) = \$200. Replace 2 rotten posts. Adjust Guardrail at \$10- per -Lin. Ft. for 127-ft = \$1270. Raise 127-ft of guard rail to 27 inch design height. Labor at \$60- per -Hour for 1 Hrs = \$60. 1 hr to tighten bolts. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD

Barrier Condition Photos



BICA_0011_1.142_R_1.JPG

Barrier ID:	BICA-0011-1.267-R				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	04/08/2010	Barrier Rating:	41.00		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	157		
Speed Limit (MPH):	45	Placement with Respect to Road:	INSIDE OF CURVE		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	22.7	Lateral Offset (In.):	40.0	Road Grade (%):	4.70
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was 4 to 5 in below the 27 in design height throughout.			
	Breaking and Cracking:	No cracked or broken barrier elements. There were a few loose bolts.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	Minimal corrosion of barrier rails. Moderate weathering of wood posts.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0011-1.267-R		
Route Name:	OK-A-BEH ROAD		
Inspection Date:	04/08/2010	Barrier Rating:	41.00

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$3416
Brief Workorder:	Raise 157-ft of barrier up to 27-in design height and tighten loose bolts.				
Workorder:	Adjust Guardrail at \$10- per -Lin. Ft. for 157-ft = \$1570. Raise 157-ft of guardrail to 27 inch design height. Labor at \$60- per -Hour for 1 Hrs = \$60. 1 hour of labor to tighten bolts. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD

Barrier Condition Photos



BICA_0011_1.267_R_1.JPG

Barrier ID:	BICA-0011-1.365-R				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	04/08/2010	Barrier Rating:	39.50		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	257		
Speed Limit (MPH):	45	Placement with Respect to Road:	INSIDE OF CURVE		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.3
Height (In.):	23.2	Lateral Offset (In.):	42.2	Road Grade (%):	4.00
Physical Condition					
Barrier	Alignment and Height:	The barrier alignment had no deflection and the height ranged from 4 to 6 in below the 27 in design height.			
	Breaking and Cracking:	Some cracking of posts 4 posts broken or rotted at base.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	The barrier posts are badly weathered with dry rot or bugs at base.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0011-1.365-R		
Route Name:	OK-A-BEH ROAD		
Inspection Date:	04/08/2010	Barrier Rating:	39.50

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$6512
Brief Workorder:	Raise 257-ft of barrier up to 27-in design height and replace 4 posts.				
Workorder:	Replace Post at \$100- per -Each for 4 Post(s) = \$400. Broken or rotted off at base. Adjust Guardrail at \$10- per -Lin. Ft. for 257-ft = \$2570. Raise 257-ft of barrier up to 27-in design height. Low Speed Traffic Control at \$1475- per -Day for 2 Day(s) = \$2950.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD

Barrier Condition Photos



BICA_0011_1.365_R_1.JPG

Barrier ID:	BICA-0011-1.500-R				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	04/08/2010	Barrier Rating:	29.60		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	130		
Speed Limit (MPH):	45	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	23.0	Lateral Offset (In.):	34.0	Road Grade (%):	4.10
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was 4 in below the 27 in design height throughout.			
	Breaking and Cracking:	Some cracking of barrier posts.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	All of the barrier posts are badly weathered with dry rot or bugs at base.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0011-1.500-R		
Route Name:	OK-A-BEH ROAD		
Inspection Date:	04/08/2010	Barrier Rating:	29.60

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$3053
Brief Workorder:	Raise 130-ft of barrier up to 27-in design height.				
Workorder:	Adjust Guardrail at \$10- per -Lin. Ft. for 130-ft = \$1300. Raise 130-ft of barrier up to 27-in design height. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD

Barrier Condition Photos



BICA_0011_1.500_R_1.JPG

Barrier ID:	BICA-0011-1.806-R				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	04/08/2010	Barrier Rating:	41.00		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	196		
Speed Limit (MPH):	45	Placement with Respect to Road:	INSIDE OF CURVE		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	22.0	Lateral Offset (In.):	38.5	Road Grade (%):	2.00
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was between 4 to 6 in below the 27 in design height.			
	Breaking and Cracking:	No cracked or broken barrier elements. There were a few loose bolts.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	Minimal corrosion of barrier rails. Moderate weathering of wood posts. There were 3 rotten posts. Possible dry rot/bug infestation.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0011-1.806-R		
Route Name:	OK-A-BEH ROAD		
Inspection Date:	04/08/2010	Barrier Rating:	41.00

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$4175
Brief Workorder:	Raise 196-ft of barrier up to 27-in design height replace 3 posts and tighten loose bolts.				
Workorder:	Replace Post at \$100- per -Each for 3 Post(s) = \$300. Replace 3 posts. Adjust Guardrail at \$10- per -Lin. Ft. for 196-ft = \$1960. Raise 196-ft of guardrail to 27 inch design height. Labor at \$60- per -Hour for 1 Hrs = \$60. 1 hour to tighten bolts. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD

Barrier Condition Photos



BICA_0011_1.806_R_1.JPG

Barrier ID:	BICA-0011-1.914-R				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	04/08/2010	Barrier Rating:	33.70		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	231		
Speed Limit (MPH):	45	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	23.0	Lateral Offset (In.):	46.0	Road Grade (%):	7.30
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was 4 in below the 27 in design height throughout.			
	Breaking and Cracking:	No cracked or broken barrier elements. There were a few loose bolts.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	Minimal corrosion of barrier rails. Moderate weathering of wood posts. 3 rotten posts. Possible dry rot or bug infestation.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0011-1.914-R		
Route Name:	OK-A-BEH ROAD		
Inspection Date:	04/08/2010	Barrier Rating:	33.70

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$4560
Brief Workorder:	Raise 231-ft of barrier to 27 inch design height replace 3 posts and tighten loose bolts.				
Workorder:	Replace Post at \$100- per -Each for 3 Post(s) = \$300. Replace 3 rotten posts. Adjust Guardrail at \$10- per -Lin. Ft. for 231-ft = \$2310. Raise 231-ft of guardrail to 27 inch design height. Labor at \$60- per -Hour for 1 Hrs = \$60. 1 hour to tighten bolts. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD

Barrier Condition Photos



BICA_0011_1.914_R_1.JPG

Barrier ID:	BICA-0011-2.047-R				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	04/08/2010	Barrier Rating:	39.50		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	362		
Speed Limit (MPH):	45	Placement with Respect to Road:	INSIDE OF CURVE		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	23.6	Lateral Offset (In.):	38.2	Road Grade (%):	6.30
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was within 1 in of the 27 in design height for 62 ft and was 3 to 7 in below for 300 ft.			
	Breaking and Cracking:	The barrier posts show cracking 4 posts are broken or cracked.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	All of the posts are badly weathered some cracked or broken with dry rot or bugs at base.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0011-2.047-R		
Route Name:	OK-A-BEH ROAD		
Inspection Date:	04/08/2010	Barrier Rating:	39.50

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$6985
Brief Workorder:	Raise 300-ft of barrier up to 27-in design height and replace 4 broken posts.				
Workorder:	Replace Post at \$100- per -Each for 4 Post(s) = \$400. Dry rot or bugs broken or cracked at base. Adjust Guardrail at \$10- per -Lin. Ft. for 300-ft = \$3000. Raise 300-ft of barrier up to 27-in design height. Low Speed Traffic Control at \$1475- per -Day for 2 Day(s) = \$2950.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD

Barrier Condition Photos



BICA_0011_2.047_R_1.JPG

Barrier ID:	BICA-0011-2.049-L				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	04/08/2010	Barrier Rating:	51.00		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	177		
Speed Limit (MPH):	45	Placement with Respect to Road:	OUTSIDE OF CURVE		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	22.2	Lateral Offset (In.):	31.6	Road Grade (%):	6.00
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection except for 2 impacted rails that were pushed off alignment by 6 to 12 in. The height was 4 to 5 in below the 27 in design height throughout.			
	Breaking and Cracking:	Some cracking of the posts in the barrier bent spoon on beginning end of barrier.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	Some of the barrier posts are badly weathered with dry rot or bugs at base.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0011-2.049-L		
Route Name:	OK-A-BEH ROAD		
Inspection Date:	04/08/2010	Barrier Rating:	51.00

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$4285
Brief Workorder:	Raise 177-ft of barrier up to 27-in design height and replace 26-ft of rail.				
Workorder:	Replace Rail at \$25- per -Lin. Ft. for 26-ft = \$650. Replace rail in impact zones. Adjust Guardrail at \$10- per -Lin. Ft. for 177-ft = \$1770. Raise 177-ft of barrier up to 27-in design height. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD

Barrier Condition Photos



BICA_0011_2.049_L_1.JPG

Barrier ID:	BICA-0011-2.337-L				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	04/08/2010	Barrier Rating:	41.20		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	115		
Speed Limit (MPH):	45	Placement with Respect to Road:	OUTSIDE OF CURVE		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	25.7	Lateral Offset (In.):	83.5	Road Grade (%):	8.40
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was within 1 in of the 27 in design height for 40 ft and was 1 to 3 in below for 75 ft.			
	Breaking and Cracking:	No cracked or broken barrier elements.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	Minimal corrosion of barrier rail. Moderate weathering of wood posts. One post rotten near base. Possible dry rot or bug infestation.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0011-2.337-L		
Route Name:	OK-A-BEH ROAD		
Inspection Date:	04/08/2010	Barrier Rating:	41.20

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$2558
Brief Workorder:	Raise 75-ft of barrier up to 27-in design height and replace 1 post.				
Workorder:	Adjust Guardrail at \$10- per -Lin. Ft. for 75-ft = \$750. Raise 75-ft of guardrail to 27 in design height. Replace Post at \$100- per -Each for 1 Post(s) = \$100. Replace 1 post. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD

Barrier Condition Photos



BICA_0011_2.337_L_1.JPG

Barrier ID:	BICA-0011-2.442-R				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	04/08/2010	Barrier Rating:	30.80		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	77		
Speed Limit (MPH):	45	Placement with Respect to Road:	OUTSIDE OF CURVE		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.3
Height (In.):	25.7	Lateral Offset (In.):	100.0	Road Grade (%):	9.50
Physical Condition					
Barrier	Alignment and Height:	The barrier alignment had no deflection and the height was within 1 in of the 27 in design height for 62 ft and was 1 to 3 in below for 15 ft.			
	Breaking and Cracking:	No cracked or broken barrier elements.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	Minimal corrosion of barrier rails. Moderate weathering of wood posts. One post rotten near base. Possible dry rot or bug infestation.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0011-2.442-R		
Route Name:	OK-A-BEH ROAD		
Inspection Date:	04/08/2010	Barrier Rating:	30.80

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$1898
Brief Workorder:	Raise 15-ft of barrier up to 27-in design height and replace 1 post.				
Workorder:	Adjust Guardrail at \$10- per -Lin. Ft. for 15-ft = \$150. Raise 15-ft of guardrail to 27 in design height. Replace Post at \$100- per -Each for 1 Post(s) = \$100. Replace one broken post. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD

Barrier Condition Photos



BICA_0011_2.442_R_1.JPG

Barrier ID:	BICA-0011-2.564-L				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	04/08/2010	Barrier Rating:	37.00		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	116		
Speed Limit (MPH):	45	Placement with Respect to Road:	OUTSIDE OF CURVE		
Hazard Behind Barrier:	LOW				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.6
Height (In.):	26.2	Lateral Offset (In.):	82.6	Road Grade (%):	8.80
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height ranged from 1 in below the 27 in design height to 2 in above for 46 ft and from 1 to 2 in below for 116 ft.			
	Breaking and Cracking:	No cracked or broken barrier elements.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	Minimal corrosion of barrier rails. Almost all barrier posts are rotten/bug infested near base.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0011-2.564-L		
Route Name:	OK-A-BEH ROAD		
Inspection Date:	04/08/2010	Barrier Rating:	37.00

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$14377
Brief Workorder:	Remove and replace entire barrier with W-beam strong post guardrail and 2 W-beam tangent 350 compliant end treatments.				
Workorder:	<p>Remove Guardrail at \$10- per -Lin. Ft. for 116-ft = \$1160. Remove 116 feet of guardrail.</p> <p>W-Beam Strong Post at \$35- per -Lin. Ft. for 56-ft = \$1960. Install 56 feet of w-beam strong post guardrail with galvanized steel posts.</p> <p>W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install 2 w-beam tangent end treatments.</p> <p>Low Speed Traffic Control at \$1475- per -Day for 2 Day(s) = \$2950. 1 day removal 1 day installation.</p>				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD

Barrier Condition Photos



BICA_0011_2.564_L_1.JPG

Barrier ID:	BICA-0011-4.796-L				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	04/08/2010	Barrier Rating:	22.20		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	179		
Speed Limit (MPH):	45	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	149.3
Height (In.):	27.6	Lateral Offset (In.):	50.0	Road Grade (%):	1.90
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was 0-3in. above the 27 in design height.			
	Breaking and Cracking:	All barrier posts are broken or cracked.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	All barrier posts are badly weathered with dry rot or bugs at base.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0011-4.796-L		
Route Name:	OK-A-BEH ROAD		
Inspection Date:	04/08/2010	Barrier Rating:	22.20

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$17496
Brief Workorder:	Remove and replace entire guardrail with W-beam strong post and 2 W-beam tangent 350 compliant end treatments.				
Workorder:	<p>Remove Guardrail at \$10- per -Lin. Ft. for 179-ft = \$1790. Remove 179 feet of guardrail.</p> <p>W-Beam Strong Post at \$35- per -Lin. Ft. for 119-ft = \$4165. Install 119 feet of w-beam strong post guardrail with galvanized steel posts.</p> <p>W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install 2 w-beam tangent end terminals.</p> <p>Low Speed Traffic Control at \$1475- per -Day for 2 Day(s) = \$2950. 1 day removal 1 day installation.</p>				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD

Barrier Condition Photos



BICA_0011_4.796_L_1.JPG

Barrier ID:	BICA-0011-4.798-R				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	04/08/2010	Barrier Rating:	29.60		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	193		
Speed Limit (MPH):	45	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	23.2	Lateral Offset (In.):	29.2	Road Grade (%):	2.00
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height is 3 to 4 in below the 27 in design height throughout.			
	Breaking and Cracking:	All barrier posts are broken or cracked.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	All barrier posts are badly weathered with dry rot or bugs at base.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0011-4.798-R		
Route Name:	OK-A-BEH ROAD		
Inspection Date:	04/08/2010	Barrier Rating:	29.60

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$18189
Brief Workorder:	Remove and replace entire guardrail with W-beam strong post and 2 W-beam tangent 350 compliant end treatments.				
Workorder:	<p>Remove Guardrail at \$10- per -Lin. Ft. for 193-ft = \$1930. Remove 193 feet of guardrail.</p> <p>W-Beam Strong Post at \$35- per -Lin. Ft. for 133-ft = \$4655. Install 133 feet of w-beam strong post guardrail with galvanized steel posts.</p> <p>W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install 2 w-beam tangent end terminals.</p> <p>Low Speed Traffic Control at \$1475- per -Day for 2 Day(s) = \$2950. 1 day removal 1 day installation.</p>				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD

Barrier Condition Photos



BICA_0011_4.798_R_1.JPG

Barrier ID:	BICA-0011-8.277-R				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	03/08/2010	Barrier Rating:	64.50		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	936		
Speed Limit (MPH):	45	Placement with Respect to Road:	BOTH INSIDE AND OUTSIDE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.1
Height (In.):	23.3	Lateral Offset (In.):	47.7	Road Grade (%):	9.00
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height is within 1 in of the 27 in design height for 75 ft between 1 and 3 in below for 546 ft and between 3 and 7 in below for 315 ft.			
	Breaking and Cracking:	8 loose bolts. Five posts are missing part of their cross-section at the base from snow plows (minor). No cracked or broken barrier elements.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	Minimal corrosion of rails. Moderate weathering of wood posts.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0011-8.277-R		
Route Name:	OK-A-BEH ROAD		
Inspection Date:	03/08/2010	Barrier Rating:	64.50

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$16027
Brief Workorder:	Raise 861-ft of barrier to 27 inch design height and tighten loose bolts.				
Workorder:	Adjust Guardrail at \$10- per -Lin. Ft. for 861-ft = \$8610. Raise 861-ft of guardrail to 27 inch design height. Labor at \$60- per -Hour for 1 Hrs = \$60. 1 hour to tighten bolts. Low Speed Traffic Control at \$1475- per -Day for 4 Day(s) = \$5900.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD

Barrier Condition Photos



BICA_0011_8.277_R_1.JPG

Barrier ID:	BICA-0011-8.389-L				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	03/08/2010	Barrier Rating:	20.70		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	182		
Speed Limit (MPH):	45	Placement with Respect to Road:	INSIDE OF CURVE		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	26.6	Lateral Offset (In.):	66.0	Road Grade (%):	9.50
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was between 1 in above the 27 in design height to 1 in below throughout.			
	Breaking and Cracking:	No major breaking or cracking of the barrier.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No major weathering of the barrier.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0011-8.389-L				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	03/08/2010	Barrier Rating:		20.70	
Repair Recommendations					
Repair Action:	NO ACTION	FMSS Work Type:	N/A	Repair Cost:	\$0
Brief Workorder:	N/A				
Workorder:					

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD

Barrier Condition Photos



BICA_0011_8.389_L_1.JPG

Barrier ID:	BICA-0011-8.691-L				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	03/08/2010	Barrier Rating:	45.90		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	263		
Speed Limit (MPH):	45	Placement with Respect to Road:	OUTSIDE OF CURVE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	23.2	Lateral Offset (In.):	57.2	Road Grade (%):	8.20
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height ranged from 2 to 3 in below the 27 in design height for 20 ft and from 3 to 5 in below for 243 ft.			
	Breaking and Cracking:	Moderate cracking or barrier posts (< 1/4 to 1/2 in). No broken barrier elements.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	Minimal corrosion of rails. Moderate weathering of posts (monitor).			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0011-8.691-L		
Route Name:	OK-A-BEH ROAD		
Inspection Date:	03/08/2010	Barrier Rating:	45.90

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$6138
Brief Workorder:	Raise 263-ft of barrier up to 27-in design height. Monitor condition of the barrier posts.				
Workorder:	Adjust Guardrail at \$10- per -Lin. Ft. for 263-ft = \$2630. Raise 263-ft of guardrail to 27 inch design height. Low Speed Traffic Control at \$1475- per -Day for 2 Day(s) = \$2950.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD

Barrier Condition Photos



BICA_0011_8.691_L_1.JPG

Barrier ID:	BICA-0011-8.692-R				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	03/08/2010	Barrier Rating:	61.20		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	455		
Speed Limit (MPH):	45	Placement with Respect to Road:	OUTSIDE OF CURVE		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	20.5	Lateral Offset (In.):	59.0	Road Grade (%):	8.90
Physical Condition					
Barrier	Alignment and Height:	The barrier alignment had no deflection. The height was within 1 in of the 27 in design height for 42 ft between 1 to 3 in below for 60 ft and 3 to 10 in below for 353 ft.			
	Breaking and Cracking:	The posts show cracking from age 4 exhibit large cracks.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	These barrier posts look very weathered possible dry rotting.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0011-8.692-R		
Route Name:	OK-A-BEH ROAD		
Inspection Date:	03/08/2010	Barrier Rating:	61.20

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$8228
Brief Workorder:	Raise 413-ft of barrier up to 27-in design height and replace 4 posts.				
Workorder:	Replace Post at \$100- per -Each for 4 Post(s) = \$400. Severly cracked and weathered posts. Adjust Guardrail at \$10- per -Lin. Ft. for 413 LF = \$4130. Raise 413-ft of barrier up to 27-in design height. Low Speed Traffic Control at \$1475- per -Day for 2 Day(s) = \$2950.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD

Barrier Condition Photos



BICA_0011_8.692_R_1.JPG

Barrier ID:	BICA-0011-8.859-L				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	03/08/2010	Barrier Rating:	47.20		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	137		
Speed Limit (MPH):	45	Placement with Respect to Road:	OUTSIDE OF CURVE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	149.6
Height (In.):	22.7	Lateral Offset (In.):	72.3	Road Grade (%):	7.10
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was 4 to 5 in below the 27 in design height throughout.			
	Breaking and Cracking:	3 posts missing part of section at base due to grazing from snow plow. Moderate cracking of posts (< 1/4 in).			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	Minimal corrosion of barrier rails. Moderate weathering of posts (monitor). Gravel piled up in front of barrier.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0011-8.859-L		
Route Name:	OK-A-BEH ROAD		
Inspection Date:	03/08/2010	Barrier Rating:	47.20

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$3394
Brief Workorder:	Raise 137-ft of barrier up to 27-in design height and remove the gravel in front of the barrier.				
Workorder:	Labor at \$60- per -Hour for 4 Hrs = \$240. Remove gravel from in front of barrier. Adjust Guardrail at \$10- per -Lin. Ft. for 137 LF = \$1370. Raise 137 lf of guardrail to 27 inch design height. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD

Barrier Condition Photos



BICA_0011_8.859_L_1.JPG

Barrier ID:	BICA-0011-8.977-L				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	03/08/2010	Barrier Rating:	35.20		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	153		
Speed Limit (MPH):	45	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	21.0	Lateral Offset (In.):	48.5	Road Grade (%):	5.50
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was 6 in below the 27 in design height throughout.			
	Breaking and Cracking:	No major breaking or cracking of the barrier.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	There is some weathering of the posts in this barrier.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0011-8.977-L		
Route Name:	OK-A-BEH ROAD		
Inspection Date:	03/08/2010	Barrier Rating:	35.20

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$3306
Brief Workorder:	Raise 153-ft of barrier up to 27-in design height.				
Workorder:	Adjust Guardrail at \$10- per -Lin. Ft. for 153 LF = \$1530. Adjust barrier to design height of 27 inches. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD

Barrier Condition Photos



BICA_0011_8.977_L_1.JPG

Barrier ID:	BICA-0011-8.978-R				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	03/08/2010	Barrier Rating:	44.20		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	158		
Speed Limit (MPH):	45	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	LOW				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.3
Height (In.):	20.0	Lateral Offset (In.):	42.5	Road Grade (%):	6.70
Physical Condition					
Barrier	Alignment and Height:	The alignment has no deflection and the height was 5 to 9 in below the 27 in design height for the entire length.			
	Breaking and Cracking:	No major breaking or cracking of the barrier.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	Some weathering of barrier posts.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0011-8.978-R		
Route Name:	OK-A-BEH ROAD		
Inspection Date:	03/08/2010	Barrier Rating:	44.20

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$3361
Brief Workorder:	Raise 158-ft of barrier up to 27-in design height.				
Workorder:	Adjust Guardrail at \$10- per -Lin. Ft. for 158 LF = \$1580. Adjust barrier to design height of 27 inches. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD

Barrier Condition Photos



BICA_0011_8.978_R_1.JPG

Barrier ID:	BICA-0011-9.069-R				
Route Name:	OK-A-BEH ROAD				
Inspection Date:	03/08/2010	Barrier Rating:	55.90		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	150		
Speed Limit (MPH):	45	Placement with Respect to Road:	OUTSIDE OF CURVE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.3
Height (In.):	22.7	Lateral Offset (In.):	65.3	Road Grade (%):	6.10
Physical Condition					
Barrier	Alignment and Height:	Post at trailing end leaning outward by at least 12 in otherwise alignment had no deflection. The height was 4 to 5 in below the 27 in design height throughout.			
	Breaking and Cracking:	1 cracked post. Moderate cracking of barrier posts (< 1/4 to 1/2 in).			
	Missing Elements:	1 missing bolt. No other missing barrier items.			
	Corrosion and Weathering:	Minimal corrosion of rails. Moderate weathering of barrier posts. Monitor erosion along middle of barrier.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0011-9.069-R		
Route Name:	OK-A-BEH ROAD		
Inspection Date:	03/08/2010	Barrier Rating:	55.90

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$3449
Brief Workorder:	Raise 150-ft of barrier up to 27-in design height and replace 1 post.				
Workorder:	Replace Post at \$100- per -Each for 1 Post(s) = \$100. Replace one cracked post. Adjust Guardrail at \$10- per -Lin. Ft. for 150-ft = \$1500. Raise 150-ft of guardrail to 27 inch design height. Labor at \$60- per -Hour for 1 Hrs = \$60. 1 hour to replace bolts. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0011: OK-A-BEH ROAD

Barrier Condition Photos



BICA_0011_9.069_R_1.JPG

Barrier ID:	BICA-0012-0.443-R				
Route Name:	AFTERBAY ROAD				
Inspection Date:	02/08/2010	Barrier Rating:	14.10		
Barrier Description					
Type:	W-BEAM STRONG POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	WOOD	Length (ft.):	503		
Speed Limit (MPH):	35	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-3	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	W-BEAM BCT	Is Beg. End Trtmt Crashworthy?:	NO	Approach Transition Type:	RIGID W-BEAM - W-BEAM
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	75.0
Height (In.):	26.7	Lateral Offset (In.):	74.6	Road Grade (%):	1.40
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection except for the trailing end treatment which was impacted off alignment by 6 in or less. The height was within 1 in of the 27 in design height.			
	Breaking and Cracking:	2 cracked blocks. No other broken barrier elements.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	Minimal corrosion and weathering of barrier elements.			
End Treatments	Alignment and Height:	Alignment acceptable. Height is within 1-in of 27-in design height.			
	Breaking and Cracking:	Minor impact to beginning end treatment. No cracked or broken end treatment elements.			
	Missing Elements:	No missing end treatment elements.			
	Corrosion and Weathering:	Minimal corrosion and weathering of end treatment elements.			

Barrier ID:	BICA-0012-0.443-R		
Route Name:	AFTERBAY ROAD		
Inspection Date:	02/08/2010	Barrier Rating:	14.10

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$1689
Brief Workorder:	Replace two blocks.				
Workorder:	Replace Block at \$30- per -Each for 2 Block(s) = \$60. Replace 2 cracked blocks. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0012: AFTERBAY ROAD

Barrier Condition Photos



BICA_0012_0.443_R_1.JPG

Barrier ID:	BICA-0012-0.527-L				
Route Name:	AFTERBAY ROAD				
Inspection Date:	02/08/2010	Barrier Rating:	15.60		
Barrier Description					
Type:	W-BEAM STRONG POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	WOOD	Length (ft.):	78		
Speed Limit (MPH):	35	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	LOW				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-3	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	CONC/MASON W-BEAM
Ending End Trtmt Type:	W-BEAM BCT	Ending End Trtmt Crashworthy?:	NO		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	76.0
Height (In.):	24.0	Lateral Offset (In.):	78.3	Road Grade (%):	3.50
Physical Condition					
Barrier	Alignment and Height:	Transition and end treatment only.			
	Breaking and Cracking:	Transition and end treatment only.			
	Missing Elements:	Transition and end treatment only.			
	Corrosion and Weathering:	Transition and end treatment only.			
End Treatments	Alignment and Height:	Alignment has no deflection and height was 3 in below 27 in design height.			
	Breaking and Cracking:	No cracked or broken end treatment elements.			
	Missing Elements:	No missing end treatment elements.			
	Corrosion and Weathering:	Minimal corrosion and weathering of end treatment elements.			

Barrier ID:	BICA-0012-0.527-L		
Route Name:	AFTERBAY ROAD		
Inspection Date:	02/08/2010	Barrier Rating:	15.60

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$2481
Brief Workorder:	Raise 78-ft of barrier to 27 inch design height.				
Workorder:	Adjust Guardrail at \$10- per -Lin. Ft. for 78-ft = \$780. Raise 78-ft of barrier up to 27-in design height. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0012: AFTERBAY ROAD

Barrier Condition Photos



BICA_0012_0.527_L_1.JPG

Barrier ID:	BICA-0012-0.607-R				
Route Name:	AFTERBAY ROAD				
Inspection Date:	02/08/2010	Barrier Rating:	19.80		
Barrier Description					
Type:	W-BEAM STRONG POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	WOOD	Length (ft.):	228		
Speed Limit (MPH):	35	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-3	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	CONC/MASON W-BEAM
Ending End Trtmt Type:	W-BEAM BURIED END	Ending End Trtmt Crashworthy?:	YES		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	75.0
Height (In.):	26.2	Lateral Offset (In.):	88.3	Road Grade (%):	3.70
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was at or 1 in below the 27 in design height except for 30 ft leading into the ending end treatment which was 3 to 6 in below.			
	Breaking and Cracking:	No major breaking or cracking of the barrier.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No major weathering of barrier.			
End Treatments	Alignment and Height:	Alignment had no deflection and height flared into ground as designed.			
	Breaking and Cracking:	No major breaking or cracking of the end treatment.			
	Missing Elements:	No missing end treatment elements.			
	Corrosion and Weathering:	No major weathering of the end treatment.			

Barrier ID:	BICA-0012-0.607-R		
Route Name:	AFTERBAY ROAD		
Inspection Date:	02/08/2010	Barrier Rating:	19.80

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$1953
Brief Workorder:	Raise 30-ft of barrier up to 27-in design height.				
Workorder:	Adjust Guardrail at \$10- per -Lin. Ft. for 30-ft = \$300. Raise 30-ft of barrier up to 27-in design height. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0012: AFTERBAY ROAD

Barrier Condition Photos



BICA_0012_0.607_R_1.JPG

Barrier ID:	BICA-0012-0.609-L				
Route Name:	AFTERBAY ROAD				
Inspection Date:	02/08/2010	Barrier Rating:	15.60		
Barrier Description					
Type:	W-BEAM STRONG POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	WOOD	Length (ft.):	27		
Speed Limit (MPH):	35	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-3	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	W-BEAM BCT	Is Beg. End Trtmt Crashworthy?:	NO	Approach Transition Type:	CONC/MASON W-BEAM
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	38.0
Height (In.):	25.0	Lateral Offset (In.):	75.0	Road Grade (%):	2.60
Physical Condition					
Barrier	Alignment and Height:	End treatment and transition only.			
	Breaking and Cracking:	End treatment and transition only.			
	Missing Elements:	End treatment and transition only.			
	Corrosion and Weathering:	End treatment and transition only.			
End Treatments	Alignment and Height:	The end treatment alignment has no deflection and 10 ft of end treatment was 5 in below 27 in design height.			
	Breaking and Cracking:	No major breaking or cracking of the end treatment.			
	Missing Elements:	No missing end treatment elements.			
	Corrosion and Weathering:	No major weathering of the end treatment.			

Barrier ID:	BICA-0012-0.609-L		
Route Name:	AFTERBAY ROAD		
Inspection Date:	02/08/2010	Barrier Rating:	15.60

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$1997
Brief Workorder:	Raise 10 feet of barrier up to 27 inch design height.				
Workorder:	Adjust Guardrail at \$10- per -Lin. Ft. for 10 LF = \$100. Raise 10-ft of guardrail up to the 27 inch design height. Labor at \$60- per -Hour for 4 Hrs = \$240. 4 hours of labor to remove gravel build-up. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0012: AFTERBAY ROAD

Barrier Condition Photos



BICA_0012_0.609_L_1.JPG

Barrier ID:	BICA-0013-0.786-R				
Route Name:	BAD PASS ROAD				
Inspection Date:	06/08/2010	Barrier Rating:	35.20		
Barrier Description					
Type:	W-BEAM STRONG POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	WOOD	Length (ft.):	66		
Speed Limit (MPH):	45	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-3	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	W-BEAM TURN DOWN	Is Beg. End Trtmt Crashworthy?:	NO	Approach Transition Type:	RIGID W-BEAM - W-BEAM
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	37.0
Height (In.):	22.0	Lateral Offset (In.):	84.3	Road Grade (%):	1.10
Physical Condition					
Barrier	Alignment and Height:	Transition and end treatment only.			
	Breaking and Cracking:	Transition and end treatment only.			
	Missing Elements:	Transition and end treatment only.			
	Corrosion and Weathering:	Transition and end treatment only.			
End Treatments	Alignment and Height:	Alignment had no deflection and intum down" end treatment height as designed.			
	Breaking and Cracking:	No cracked or broken end treatment elements.			
	Missing Elements:	No missing end treatment elements.			
	Corrosion and Weathering:	Minimal corrosion/weathering of end treatment. Gravel is piled in front of end treatment.			

Barrier ID:	BICA-0013-0.786-R		
Route Name:	BAD PASS ROAD		
Inspection Date:	06/08/2010	Barrier Rating:	35.20

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$2217
Brief Workorder:	Raise 30-ft of barrier up to the 27-in design height and remove gravel build-up in front of the barrier.				
Workorder:	Adjust Guardrail at \$10- per -Lin. Ft. for 30 LF = \$300. Raise 30 lf of guardrail to 27 inch design height. Labor at \$60- per -Hour for 4 Hrs = \$240. Remove gravel from face of barrier. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0013: BAD PASS ROAD

Barrier Condition Photos



BICA_0013_0.786_R_1.JPG

Barrier ID:	BICA-0013-0.791-L				
Route Name:	BAD PASS ROAD				
Inspection Date:	06/08/2010	Barrier Rating:	32.70		
Barrier Description					
Type:	W-BEAM STRONG POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	WOOD	Length (ft.):	53		
Speed Limit (MPH):	45	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	LOW				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-3	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	RIGID W-BEAM - W-BEAM
Ending End Trtmt Type:	W-BEAM TURN DOWN	Ending End Trtmt Crashworthy?:	NO		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	47.0
Height (In.):	21.2	Lateral Offset (In.):	125.5	Road Grade (%):	1.10
Physical Condition					
Barrier	Alignment and Height:	End treatment and transition only.			
	Breaking and Cracking:	End treatment and transition only.			
	Missing Elements:	End treatment and transition only.			
	Corrosion and Weathering:	End treatment and transition only.			
End Treatments	Alignment and Height:	End treatment alignment as designed and height 4 in below 27 in design height.			
	Breaking and Cracking:	No breaking minor cracking of end treatment.			
	Missing Elements:	No missing end treatment elements.			
	Corrosion and Weathering:	No major weathering of the end treatment.			

Barrier ID:	BICA-0013-0.791-L		
Route Name:	BAD PASS ROAD		
Inspection Date:	06/08/2010	Barrier Rating:	32.70

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$1876
Brief Workorder:	Raise 23-ft of barrier up to the 27-in design height				
Workorder:	Adjust Guardrail at \$10- per -Lin. Ft. for 23-ft = \$230. Raise 23-ft of barrier up to the 27-in design height Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475. Low speed shoulder work.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0013: BAD PASS ROAD

Barrier Condition Photos



BICA_0013_0.791_L_1.JPG

Barrier ID:	BICA-0013-0.802-R				
Route Name:	BAD PASS ROAD				
Inspection Date:	06/08/2010	Barrier Rating:	30.70		
Barrier Description					
Type:	W-BEAM STRONG POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	WOOD	Length (ft.):	54		
Speed Limit (MPH):	45	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-3	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	RIGID W-BEAM - W-BEAM
Ending End Trtmt Type:	W-BEAM TURN DOWN	Ending End Trtmt Crashworthy?:	NO		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	37.5
Height (In.):	22.2	Lateral Offset (In.):	99.3	Road Grade (%):	1.20
Physical Condition					
Barrier	Alignment and Height:	Transition and end treatment only.			
	Breaking and Cracking:	Transition and end treatment only.			
	Missing Elements:	Transition and end treatment only.			
	Corrosion and Weathering:	Transition and end treatment only.			
End Treatments	Alignment and Height:	Alignment has no deflection and height is 3 to 7 in below the 27 in design height except for the turned down end which is as designed.			
	Breaking and Cracking:	No cracked or broken end treatment elements.			
	Missing Elements:	No missing end treatment elements.			
	Corrosion and Weathering:	Minimal corrosion/weathering of end treatment elements. Gravel piled in front of end treatment.			

Barrier ID:	BICA-0013-0.802-R		
Route Name:	BAD PASS ROAD		
Inspection Date:	06/08/2010	Barrier Rating:	30.70

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$1887
Brief Workorder:	Raise 24 feet of barrier up to the 27 inch design height.				
Workorder:	Adjust Guardrail at \$10- per -Lin. Ft. for 24 LF = \$240. Raise 24 feet of guardrail up to the 27 inch design height. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0013: BAD PASS ROAD

Barrier Condition Photos



BICA_0013_0.802_R_1.JPG

Barrier ID:	BICA-0013-0.808-L				
Route Name:	BAD PASS ROAD				
Inspection Date:	06/08/2010	Barrier Rating:	32.70		
Barrier Description					
Type:	W-BEAM STRONG POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	WOOD	Length (ft.):	67		
Speed Limit (MPH):	45	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	LOW				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-3	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	W-BEAM TURN DOWN	Is Beg. End Trtmt Crashworthy?:	NO	Approach Transition Type:	BRIDGE RAIL W-BEAM
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	47.0
Height (In.):	22.6	Lateral Offset (In.):	125.3	Road Grade (%):	0.60
Physical Condition					
Barrier	Alignment and Height:	End treatment and transition only.			
	Breaking and Cracking:	End treatment and transition only.			
	Missing Elements:	End treatment and transition only.			
	Corrosion and Weathering:	End treatment and transition only.			
End Treatments	Alignment and Height:	End treatment alignment as designed and height for turn down end treatment is as designed.			
	Breaking and Cracking:	No breaking minor cracking of end treatment.			
	Missing Elements:	No missing end treatment elements.			
	Corrosion and Weathering:	No major weathering of the end treatment.			

Barrier ID:	BICA-0013-0.808-L		
Route Name:	BAD PASS ROAD		
Inspection Date:	06/08/2010	Barrier Rating:	32.70

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$2030
Brief Workorder:	Raise 37 feet of barrier up to the 27-in design height.				
Workorder:	Adjust Guardrail at \$10- per -Lin. Ft. for 37 LF = \$370. Raise 37 feet of guardrail up to the 27 inch design height. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0013: BAD PASS ROAD

Barrier Condition Photos



BICA_0013_0.808_L_1.JPG

Barrier ID:	BICA-0013-6.411-L				
Route Name:	BAD PASS ROAD				
Inspection Date:	06/08/2010	Barrier Rating:	29.70		
Barrier Description					
Type:	W-BEAM STRONG POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	WOOD	Length (ft.):	961		
Speed Limit (MPH):	30	Placement with Respect to Road:	BOTH INSIDE AND OUTSIDE		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	TL-3	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	W-BEAM FLARED 350 COMPLIANT	Is Beg. End Trtmt Crashworthy?:	YES	Approach Transition Type:	NONE
Ending End Trtmt Type:	W-BEAM FLARED 350 COMPLIANT	Ending End Trtmt Crashworthy?:	YES		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	75.1
Height (In.):	29.5	Lateral Offset (In.):	70.6	Road Grade (%):	8.30
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height ranged between 1 to 4 in above the 27 in design height.			
	Breaking and Cracking:	1 cracked block. No other cracked or broken barrier elements. There were 2 tilted blocks.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	Minimal corrosion of barrier rails. Moderate weathering of barrier posts. Older posts mixed with newer posts. Older posts exhibit dry rot and/or bug infestation. Erosion around posts about 300 lf from trailing end. Monitor condition of posts			
End Treatments	Alignment and Height:	Alignment acceptable. Height is within 1-in of 27-in design height.			
	Breaking and Cracking:	No cracked or broken end treatment elements.			
	Missing Elements:	No missing end treatment elements.			
	Corrosion and Weathering:	Minimal corrosion and weathering of end treatment elements.			

Barrier ID:	BICA-0013-6.411-L		
Route Name:	BAD PASS ROAD		
Inspection Date:	06/08/2010	Barrier Rating:	29.70

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$1722
Brief Workorder:	Replace 1 block and adjust 2 tilted blocks.				
Workorder:	Replace Block at \$30- per -Each for 1 Block(s) = \$30. Replace cracked block. Labor at \$60- per -Hour for 1 Hrs = \$60. Right tilted blocks. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0013: BAD PASS ROAD

Barrier Condition Photos



BICA_0013_6.411_L_1.JPG

Barrier ID:	BICA-0013-6.524-R				
Route Name:	BAD PASS ROAD				
Inspection Date:	06/08/2010	Barrier Rating:	29.70		
Barrier Description					
Type:	W-BEAM STRONG POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	WOOD	Length (ft.):	500		
Speed Limit (MPH):	30	Placement with Respect to Road:	INSIDE OF CURVE		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	TL-3	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	W-BEAM FLARED 350 COMPLIANT	Is Beg. End Trtmt Crashworthy?:	YES	Approach Transition Type:	NONE
Ending End Trtmt Type:	W-BEAM FLARED 350 COMPLIANT	Ending End Trtmt Crashworthy?:	YES		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	75.3
Height (In.):	30.6	Lateral Offset (In.):	115.3	Road Grade (%):	8.60
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was 3 to 5 in above the 27 in design height.			
	Breaking and Cracking:	Some minor cracking of the barrier posts.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	Some weathering of the barrier possible dry rot or bugs at base of post.			
End Treatments	Alignment and Height:	Alignment acceptable. Height is within 1-in of 27-in design height.			
	Breaking and Cracking:	No breaking or cracking of the end treatments.			
	Missing Elements:	No missing end treatment elements.			
	Corrosion and Weathering:	No weathering of the end treatments.			

Barrier ID:	BICA-0013-6.524-R				
Route Name:	BAD PASS ROAD				
Inspection Date:	06/08/2010	Barrier Rating:		29.70	
Repair Recommendations					
Repair Action:	NO ACTION	FMSS Work Type:	N/A	Repair Cost:	\$0
Brief Workorder:	N/A				
Workorder:					

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0013: BAD PASS ROAD

Barrier Condition Photos



BICA_0013_6.524_R_1.JPG

Barrier ID:	BICA-0013-7.234-R				
Route Name:	BAD PASS ROAD				
Inspection Date:	06/08/2010	Barrier Rating:	25.50		
Barrier Description					
Type:	W-BEAM STRONG POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	WOOD	Length (ft.):	285		
Speed Limit (MPH):	30	Placement with Respect to Road:	INSIDE OF CURVE		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	TL-3	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	W-BEAM FLARED 350 COMPLIANT	Is Beg. End Trtmt Crashworthy?:	YES	Approach Transition Type:	NONE
Ending End Trtmt Type:	W-BEAM FLARED 350 COMPLIANT	Ending End Trtmt Crashworthy?:	YES		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	75.6
Height (In.):	29.2	Lateral Offset (In.):	97.3	Road Grade (%):	5.30
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was 2 to 3 in above the 27 in design height.			
	Breaking and Cracking:	Minor cracking of barrier blocks and posts (< 1/4 to 1/2 in). No broken barrier elements.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	1 rotten post. Moderate weathering of barrier posts. Older posts mixed with new posts. Older posts exhibit dry rot and/or bug infestation. Monitor condition of posts. Minimal corrosion of barrier rails.			
End Treatments	Alignment and Height:	Alignment acceptable. Height is within 1-in of 27-in design height.			
	Breaking and Cracking:	No cracked or broken end treatment elements.			
	Missing Elements:	No missing end treatment elements.			
	Corrosion and Weathering:	Minimal corrosion/weathering of end treatment elements.			

Barrier ID:	BICA-0013-7.234-R		
Route Name:	BAD PASS ROAD		
Inspection Date:	06/08/2010	Barrier Rating:	25.50

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$1733
Brief Workorder:	Replace one post. Monitor condition of barrier posts for dry rot/bugs.				
Workorder:	Replace Post at \$100- per -Each for 1 Post(s) = \$100. Replace one post. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0013: BAD PASS ROAD

Barrier Condition Photos



BICA_0013_7.234_R_1.JPG



BICA_0013_7.234_R_2.JPG

Barrier ID:	BICA-0013-7.351-R				
Route Name:	BAD PASS ROAD				
Inspection Date:	06/08/2010	Barrier Rating:	28.60		
Barrier Description					
Type:	W-BEAM STRONG POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	WOOD	Length (ft.):	430		
Speed Limit (MPH):	30	Placement with Respect to Road:	OUTSIDE OF CURVE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	TL-3	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	W-BEAM FLARED 350 COMPLIANT	Is Beg. End Trtmt Crashworthy?:	YES	Approach Transition Type:	NONE
Ending End Trtmt Type:	W-BEAM FLARED 350 COMPLIANT	Ending End Trtmt Crashworthy?:	YES		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	73.6
Height (In.):	30.2	Lateral Offset (In.):	109.6	Road Grade (%):	2.50
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was 3 to 4 in above the 27 in design height.			
	Breaking and Cracking:	Minor cracking of barrier posts and blocks. No broken barrier elements.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	Minimal corrosion of barrier rails. Moderate weathering of barrier posts. Older posts mixed with new posts. Old posts exhibit dry rot/bug infestation. Monitor condition of barrier posts.			
End Treatments	Alignment and Height:	Alignment acceptable. Height is within 1-in of 27-in design height.			
	Breaking and Cracking:	No cracked or broken end treatment elements.			
	Missing Elements:	No missing end treatment elements.			
	Corrosion and Weathering:	Minimal corrosion/weathering of end treatment elements.			

Barrier ID:	BICA-0013-7.351-R		
Route Name:	BAD PASS ROAD		
Inspection Date:	06/08/2010	Barrier Rating:	28.60

Repair Recommendations

Repair Action:	MONITOR	FMSS Work Type:	N/A	Repair Cost:	\$0
Brief Workorder:	Monitor condition of wood posts for dry rot/bug infestation.				
Workorder:					

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0013: BAD PASS ROAD

Barrier Condition Photos



BICA_0013_7.351_R_1.JPG

Barrier ID:	BICA-0013-7.460-R				
Route Name:	BAD PASS ROAD				
Inspection Date:	06/08/2010	Barrier Rating:	28.60		
Barrier Description					
Type:	W-BEAM STRONG POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	WOOD	Length (ft.):	668		
Speed Limit (MPH):	30	Placement with Respect to Road:	BOTH INSIDE AND OUTSIDE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	TL-3	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	W-BEAM FLARED 350 COMPLIANT	Is Beg. End Trtmt Crashworthy?:	YES	Approach Transition Type:	NONE
Ending End Trtmt Type:	W-BEAM FLARED 350 COMPLIANT	Ending End Trtmt Crashworthy?:	YES		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	75.0
Height (In.):	30.5	Lateral Offset (In.):	102.0	Road Grade (%):	1.20
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was 3 to 4 in above the 27 in design height.			
	Breaking and Cracking:	Some minor cracking of the barrier posts.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	Some minor weathering of the barrier posts possible dry rot or bugs at base of post.			
End Treatments	Alignment and Height:	Alignment acceptable. Height is within 1-in of 27-in design height.			
	Breaking and Cracking:	No breaking or cracking of the end treatments.			
	Missing Elements:	No missing end treatment elements.			
	Corrosion and Weathering:	No weathering of the end treatments.			

Barrier ID:	BICA-0013-7.460-R				
Route Name:	BAD PASS ROAD				
Inspection Date:	06/08/2010	Barrier Rating:		28.60	
Repair Recommendations					
Repair Action:	NO ACTION	FMSS Work Type:	N/A	Repair Cost:	\$0
Brief Workorder:	N/A				
Workorder:					

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0013: BAD PASS ROAD

Barrier Condition Photos



BICA_0013_7.460_R_1.JPG



BICA_0013_7.460_R_2.JPG

Barrier ID:	BICA-0013-7.640-R				
Route Name:	BAD PASS ROAD				
Inspection Date:	06/08/2010	Barrier Rating:	32.90		
Barrier Description					
Type:	W-BEAM STRONG POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	WOOD	Length (ft.):	570		
Speed Limit (MPH):	30	Placement with Respect to Road:	BOTH INSIDE AND OUTSIDE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	TL-3	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	W-BEAM FLARED 350 COMPLIANT	Is Beg. End Trtmt Crashworthy?:	YES	Approach Transition Type:	NONE
Ending End Trtmt Type:	W-BEAM FLARED 350 COMPLIANT	Ending End Trtmt Crashworthy?:	YES		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	75.3
Height (In.):	29.7	Lateral Offset (In.):	103.0	Road Grade (%):	3.40
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was 2 to 3 in below the 27 in design height throughout.			
	Breaking and Cracking:	Minor cracking of barrier posts and blocks (< 1/4 to 1/2 in). No broken barrier elements.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	Minimal corrosion of barrier rails. Moderate weathering of barrier posts. New posts and old posts mixed together. Some old posts exhibit dry rot/bug infestation. From 280 to 310 lf from approach end moderate erosion around barrier posts.			
End Treatments	Alignment and Height:	Alignment acceptable. Height is within 1-in of 27-in design height.			
	Breaking and Cracking:	No cracked or broken end treatment elements.			
	Missing Elements:	No missing end treatment elements.			
	Corrosion and Weathering:	Minimal corrosion/weathering of end treatment elements. Erosion at approach end treatment (minor).			

Barrier ID:	BICA-0013-7.640-R		
Route Name:	BAD PASS ROAD		
Inspection Date:	06/08/2010	Barrier Rating:	32.90

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$4983
Brief Workorder:	Install 50 foot asphalt curb and paved ditch. Monitor erosion at approach end treatment and monitor condition of wood posts.				
Workorder:	Asphalt Curb at \$12- per -Lin. Ft. for 50-ft = \$600. Install 50-ft of asphalt curb. Labor at \$60- per -Hour for 8 Hrs = \$480. 8 hours labor to groom slope for ditch. Slope Paving at \$125- per -Sq. Yd. for 4 SY = \$500. Install 4 sy slope paving for ditch. Low Speed Traffic Control at \$1475- per -Day for 2 Day(s) = \$2950.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0013: BAD PASS ROAD

Barrier Condition Photos



BICA_0013_7.640_R_1.JPG

Barrier ID:	BICA-0013-7.807-R				
Route Name:	BAD PASS ROAD				
Inspection Date:	06/08/2010	Barrier Rating:	27.20		
Barrier Description					
Type:	W-BEAM STRONG POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	WOOD	Length (ft.):	321		
Speed Limit (MPH):	30	Placement with Respect to Road:	INSIDE OF CURVE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	TL-3	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	W-BEAM FLARED 350 COMPLIANT	Is Beg. End Trtmt Crashworthy?:	YES	Approach Transition Type:	NONE
Ending End Trtmt Type:	W-BEAM FLARED 350 COMPLIANT	Ending End Trtmt Crashworthy?:	YES		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	75.0
Height (In.):	29.0	Lateral Offset (In.):	95.0	Road Grade (%):	5.50
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was 2 in above the 27 in design height throughout.			
	Breaking and Cracking:	Some minor cracking of the barrier posts. 4 new posts installed with end treatments.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	Some weathering of the barrier possible dry rot or bugs at base of post.			
End Treatments	Alignment and Height:	Alignment acceptable. Height is within 1-in of 27-in design height.			
	Breaking and Cracking:	No breaking or cracking of the end treatments.			
	Missing Elements:	No missing end treatment elements.			
	Corrosion and Weathering:	No weathering of the end treatments.			

Barrier ID:	BICA-0013-7.807-R				
Route Name:	BAD PASS ROAD				
Inspection Date:	06/08/2010	Barrier Rating:		27.20	
Repair Recommendations					
Repair Action:	NO ACTION	FMSS Work Type:	N/A	Repair Cost:	\$0
Brief Workorder:	N/A				
Workorder:					

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0013: BAD PASS ROAD

Barrier Condition Photos



BICA_0013_7.807_R_1.JPG

Barrier ID:	BICA-0013-7.925-R				
Route Name:	BAD PASS ROAD				
Inspection Date:	06/08/2010	Barrier Rating:	30.00		
Barrier Description					
Type:	W-BEAM STRONG POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	WOOD	Length (ft.):	950		
Speed Limit (MPH):	30	Placement with Respect to Road:	INSIDE OF CURVE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	TL-3	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	W-BEAM FLARED 350 COMPLIANT	Is Beg. End Trtmt Crashworthy?:	YES	Approach Transition Type:	NONE
Ending End Trtmt Type:	W-BEAM FLARED 350 COMPLIANT	Ending End Trtmt Crashworthy?:	YES		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	75.1
Height (In.):	29.6	Lateral Offset (In.):	79.8	Road Grade (%):	3.70
Physical Condition					
Barrier	Alignment and Height:	The alignment was as designed and the height was 2 to 3 in above the 27 in design height.			
	Breaking and Cracking:	Some minor cracking of the older barrier posts. 34 new posts installed with the end treatments.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	Some weathering of the barrier possible dry rot or bugs at base of post.			
End Treatments	Alignment and Height:	Alignment acceptable. Height is within 1-in of 27-in design height.			
	Breaking and Cracking:	No breaking or cracking of the end treatments.			
	Missing Elements:	No missing end treatment elements.			
	Corrosion and Weathering:	No weathering of the end treatments.			

Barrier ID:	BICA-0013-7.925-R				
Route Name:	BAD PASS ROAD				
Inspection Date:	06/08/2010	Barrier Rating:		30.00	
Repair Recommendations					
Repair Action:	NO ACTION	FMSS Work Type:	N/A	Repair Cost:	\$0
Brief Workorder:	N/A				
Workorder:					

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0013: BAD PASS ROAD

Barrier Condition Photos



BICA_0013_7.925_R_1.JPG

Barrier ID:	BICA-0013-8.035-L				
Route Name:	BAD PASS ROAD				
Inspection Date:	06/08/2010	Barrier Rating:	32.90		
Barrier Description					
Type:	W-BEAM STRONG POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	WOOD	Length (ft.):	316		
Speed Limit (MPH):	30	Placement with Respect to Road:	OUTSIDE OF CURVE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	TL-3	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	W-BEAM FLARED 350 COMPLIANT	Is Beg. End Trtmt Crashworthy?:	YES	Approach Transition Type:	NONE
Ending End Trtmt Type:	W-BEAM FLARED 350 COMPLIANT	Ending End Trtmt Crashworthy?:	YES		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	75.6
Height (In.):	30.7	Lateral Offset (In.):	81.3	Road Grade (%):	4.40
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was 2 to 5 in above the 27 in design height.			
	Breaking and Cracking:	Minor cracking of posts and blocks (<1/4 to 1/2 in). No broken barrier elements.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	Minimal corrosion of barrier rails. Moderate weathering of barrier posts. Older and new posts mixed. Old posts exhibit dry rot/bug infestation at base. Monitor future condition of wood posts.			
End Treatments	Alignment and Height:	Alignment acceptable. Height is within 1-in of 27-in design height.			
	Breaking and Cracking:	No cracked or broken end treatment elements.			
	Missing Elements:	No missing end treatment elements.			
	Corrosion and Weathering:	Minimal corrosion/weathering of end treatment elements.			

Barrier ID:	BICA-0013-8.035-L		
Route Name:	BAD PASS ROAD		
Inspection Date:	06/08/2010	Barrier Rating:	32.90

Repair Recommendations

Repair Action:	MONITOR	FMSS Work Type:	N/A	Repair Cost:	\$0
Brief Workorder:	Monitor condition of wood posts for dry rot/bug infestation.				
Workorder:					

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0013: BAD PASS ROAD

Barrier Condition Photos



BICA_0013_8.035_L_1.JPG

Barrier ID:	BICA-0013-10.409-R				
Route Name:	BAD PASS ROAD				
Inspection Date:	05/08/2010	Barrier Rating:	35.50		
Barrier Description					
Type:	W-BEAM STRONG POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	WOOD	Length (ft.):	715		
Speed Limit (MPH):	40	Placement with Respect to Road:	OUTSIDE OF CURVE		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-3	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	W-BEAM FLARED 350 COMPLIANT	Is Beg. End Trtmt Crashworthy?:	YES	Approach Transition Type:	NONE
Ending End Trtmt Type:	W-BEAM FLARED 350 COMPLIANT	Ending End Trtmt Crashworthy?:	YES		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	76.0
Height (In.):	29.0	Lateral Offset (In.):	73.0	Road Grade (%):	7.80
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was 1 to 3 in above the 27 in design height.			
	Breaking and Cracking:	No major breaking or cracking of the barrier.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	There is some weathering of the barrier posts.			
End Treatments	Alignment and Height:	Alignment acceptable. Height is within 1-in of 27-in design height.			
	Breaking and Cracking:	No major breaking or cracking of end treatments.			
	Missing Elements:	No missing End treatment elements.			
	Corrosion and Weathering:	No major weathering of the end treatments.			

Barrier ID:	BICA-0013-10.409-R				
Route Name:	BAD PASS ROAD				
Inspection Date:	05/08/2010	Barrier Rating:		35.50	
Repair Recommendations					
Repair Action:	NO ACTION	FMSS Work Type:	N/A	Repair Cost:	\$0
Brief Workorder:	N/A				
Workorder:					

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0013: BAD PASS ROAD

Barrier Condition Photos



BICA_0013_10.409_R_1.JPG

Barrier ID:	BICA-0013-12.829-R				
Route Name:	BAD PASS ROAD				
Inspection Date:	05/08/2010	Barrier Rating:	28.60		
Barrier Description					
Type:	W-BEAM STRONG POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	WOOD	Length (ft.):	358		
Speed Limit (MPH):	40	Placement with Respect to Road:	OUTSIDE OF CURVE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-3	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	W-BEAM FLARED 350 COMPLIANT	Is Beg. End Trtmt Crashworthy?:	YES	Approach Transition Type:	NONE
Ending End Trtmt Type:	W-BEAM FLARED 350 COMPLIANT	Ending End Trtmt Crashworthy?:	YES		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	74.6
Height (In.):	29.7	Lateral Offset (In.):	95.0	Road Grade (%):	1.30
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was 2 to 3 in above the 27 in design height.			
	Breaking and Cracking:	No cracked or broken barrier elements. There were 11 blocks that were tilted.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	Minimal corrosion of barrier rails. Moderate weathering of some posts. Some older posts mixed with new posts. Older posts showing dry rot/bug infestation at base.			
End Treatments	Alignment and Height:	Alignment acceptable. Height is within 1-in of 27-in design height.			
	Breaking and Cracking:	No cracked or broken end treatment elements.			
	Missing Elements:	No missing end treatment elements.			
	Corrosion and Weathering:	Minimal corrosion/weathering of end treatment elements.			

Barrier ID:	BICA-0013-12.829-R		
Route Name:	BAD PASS ROAD		
Inspection Date:	05/08/2010	Barrier Rating:	28.60

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$1887
Brief Workorder:	Adjust 11 tilted blocks and nail to posts. Monitor condition of wood posts.				
Workorder:	Labor at \$60- per -Hour for 4 Hrs = \$240. Labor to right and nail 11 tilted blocks. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0013: BAD PASS ROAD

Barrier Condition Photos



BICA_0013_12.829_R_1.JPG

Barrier ID:	BICA-0204-0.050-L				
Route Name:	DEVIL'S CANYON OVERLOOK ROAD				
Inspection Date:	05/08/2010	Barrier Rating:	4.30		
Barrier Description					
Type:	OTHER: CMU/SPLIT FACE CINDER BLOCK	Barrier Function:	NON-TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	135		
Speed Limit (MPH):	35	Placement with Respect to Road:	NON-TRAFFIC BARRIER		
Hazard Behind Barrier:	N/A				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	N/A	Is Barrier Crashworthy?:	N/A
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	24	Width (In.):	12.0	Post Spacing (In.):	0.0
Height (In.):	29.0	Lateral Offset (In.):	0.0	Road Grade (%):	0.00
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection; barrier is stepped in design. The height ranged from 1 to 7 in above the 24 in design height.			
	Breaking and Cracking:	No breaking or cracking of barrier.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No weathering of barrier.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0204-0.050-L		
Route Name:	DEVIL'S CANYON OVERLOOK ROAD		
Inspection Date:	05/08/2010	Barrier Rating:	4.30

Repair Recommendations

Repair Action:	NO ACTION	FMSS Work Type:	N/A	Repair Cost:	\$0
Brief Workorder:	N/A				
Workorder:	no work needed.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0204: DEVIL'S CANYON OVERLOOK ROAD

Barrier Condition Photos



BICA_0204_0.050_L_1.JPG

Barrier ID:	BICA-0210-0.087-L				
Route Name:	WAPPA UPPER SWITCHYARD ROAD				
Inspection Date:	03/08/2010	Barrier Rating:	62.40		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	440		
Speed Limit (MPH):	25	Placement with Respect to Road:	BOTH INSIDE AND OUTSIDE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.6
Height (In.):	17.2	Lateral Offset (In.):	23.2	Road Grade (%):	3.40
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was 9 to 11 in below the 27 in design height.			
	Breaking and Cracking:	No major breaking or cracking of the barrier.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No major weathering of the barrier.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0210-0.087-L		
Route Name:	WAPPA UPPER SWITCHYARD ROAD		
Inspection Date:	03/08/2010	Barrier Rating:	62.40

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$33660
Brief Workorder:	Replace barrier with W-beam strong post guardrail and two W-beam non-flared/tangent end treatments.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 440-ft = \$4400. Remove 440-ft of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 380-ft = \$13300. Install 380-ft of W-beam strong post guardrail. W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install two W-beam tangent end terminals. Low Speed Traffic Control at \$1475- per -Day for 4 Day(s) = \$5900. 2 days removal 2 days installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0210: WAPPA UPPER SWITCHYARD ROAD

Barrier Condition Photos



BICA_0210_0.087_L_1.JPG

Barrier ID:	BICA-0210-0.199-L				
Route Name:	WAPPA UPPER SWITCHYARD ROAD				
Inspection Date:	03/08/2010	Barrier Rating:	55.90		
Barrier Description					
Type:	W-BEAM STRONG POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	WOOD	Length (ft.):	536		
Speed Limit (MPH):	25	Placement with Respect to Road:	BOTH INSIDE AND OUTSIDE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.6
Height (In.):	22.2	Lateral Offset (In.):	23.2	Road Grade (%):	3.40
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection except for 1 impacted rail pushed off alignment by 6 in or less. The height was 3 in below 27 in design height for 165 ft and was 4 to 7 in below for 371 ft.			
	Breaking and Cracking:	Wood blocks end (and barrier becomes inweak post") at 336 lf. 3 cracked blocks. Minor cracking of remaining wood blocks (< 1/4 in). There were 3 tilted blocks. There was 1 rail with minor impacts.			
	Missing Elements:	One missing block. No other missing barrier elements.			
	Corrosion and Weathering:	No corrosion of galvanized rails. Minor weathering of concrete posts. Moderate to severe weathering of wood blocks.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0210-0.199-L		
Route Name:	WAPPA UPPER SWITCHYARD ROAD		
Inspection Date:	03/08/2010	Barrier Rating:	55.90

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$38962
Brief Workorder:	Remove and replace the entire guardrail with W-beam strong post installing one W-beam tangent end terminal on the end that's not connected into a non-traffic barrier.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 536-ft = \$5360. Remove 536 feet of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 506-ft = \$17710. Install 506 feet of W-beam strong post guardrail. W-beam tangent 350 compliant at \$3500- per -Each for 1 Unit(s) = \$3500. Install 1 W-beam tangent end terminal. Low Speed Traffic Control at \$1475- per -Day for 6 Day(s) = \$8850. 3 days removal 3 days installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0210: WAPPA UPPER SWITCHYARD ROAD

Barrier Condition Photos



BICA_0210_0.199_L_1.JPG

Barrier ID:	BICA-0210-0.301-L				
Route Name:	WAPPA UPPER SWITCHYARD ROAD				
Inspection Date:	03/08/2010	Barrier Rating:	24.30		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	NON-TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	370		
Speed Limit (MPH):	25	Placement with Respect to Road:	NON-TRAFFIC BARRIER		
Hazard Behind Barrier:	N/A				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	N/A	Is Barrier Crashworthy?:	N/A
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	0.0
Height (In.):	20.5	Lateral Offset (In.):	0.0	Road Grade (%):	0.00
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was 5 to 9 in below the 27 in design height throughout.			
	Breaking and Cracking:	No major breaking or cracking of the barrier.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No major weathering of the barrier.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0210-0.301-L		
Route Name:	WAPPA UPPER SWITCHYARD ROAD		
Inspection Date:	03/08/2010	Barrier Rating:	24.30

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$24805
Brief Workorder:	Remove and replace entire barrier with W-beam strong post guardrail.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 370 LF = \$3700. Remove 370 feet of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 370 LF = \$12950. Install 370 feet of w-beam strongpost guardrail. Low Speed Traffic Control at \$1475- per -Day for 4 Day(s) = \$5900. 2 days removal and 2 days installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0210: WAPPA UPPER SWITCHYARD ROAD

Barrier Condition Photos



BICA_0210_0.301_L_1.JPG

Barrier ID:	BICA-0210-0.413-R				
Route Name:	WAPPA UPPER SWITCHYARD ROAD				
Inspection Date:	03/08/2010	Barrier Rating:	47.20		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	325		
Speed Limit (MPH):	25	Placement with Respect to Road:	OUTSIDE OF CURVE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	21.0	Lateral Offset (In.):	13.6	Road Grade (%):	3.20
Physical Condition					
Barrier	Alignment and Height:	Minor impact to w-beam (snow plow). The overall alignment had no significant deflection and the height was 6 in below the 27 in design height throughout.			
	Breaking and Cracking:	No major breaking or cracking of the barrier.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No major weathering of the barrier.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0210-0.413-R		
Route Name:	WAPPA UPPER SWITCHYARD ROAD		
Inspection Date:	03/08/2010	Barrier Rating:	47.20

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$27968
Brief Workorder:	Replace barrier with W-beam strong post guardrail and two W-beam non-flared/tangent end treatments.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 325-ft = \$3250. Remove 325-ft of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 265-ft = \$9275. Install 265-ft of W-beam strong post guardrail. W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install 2 W-beam tangent end terminals. Low Speed Traffic Control at \$1475- per -Day for 4 Day(s) = \$5900. 2 days removal 2 days installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0210: WAPPA UPPER SWITCHYARD ROAD

Barrier Condition Photos



BICA_0210_0.413_R_1.JPG

Barrier ID:	BICA-0210-0.582-L				
Route Name:	WAPPA UPPER SWITCHYARD ROAD				
Inspection Date:	03/08/2010	Barrier Rating:	51.50		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	337		
Speed Limit (MPH):	25	Placement with Respect to Road:	OUTSIDE OF CURVE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	21.0	Lateral Offset (In.):	13.6	Road Grade (%):	3.20
Physical Condition					
Barrier	Alignment and Height:	There were minor impacts to several rails that pushed the alignment off 6 in or less. The remaining alignment had no deflection. The height was 6 in below the 27 in design height throughout.			
	Breaking and Cracking:	No cracked or broken barrier elements.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No corrosion of galvanized rails. Minor weathering of concrete posts (some spalling).			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0210-0.582-L		
Route Name:	WAPPA UPPER SWITCHYARD ROAD		
Inspection Date:	03/08/2010	Barrier Rating:	51.50

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$28562
Brief Workorder:	Replace barrier with W-beam strong post guardrail and two W-beam non-flared/tangent end treatments.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 337-ft = \$3370. Remove 337-ft of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 277-ft = \$9695. Install 277-ft of W-beam strong post guardrail. W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install 2 W-beam tangent end terminals. Low Speed Traffic Control at \$1475- per -Day for 4 Day(s) = \$5900. 2 days removal 2 days installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0210: WAPPA UPPER SWITCHYARD ROAD

Barrier Condition Photos



BICA_0210_0.582_L_1.JPG

Barrier ID:	BICA-0210-0.782-R				
Route Name:	WAPPA UPPER SWITCHYARD ROAD				
Inspection Date:	03/08/2010	Barrier Rating:	40.20		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	213		
Speed Limit (MPH):	25	Placement with Respect to Road:	OUTSIDE OF CURVE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.6
Height (In.):	22.6	Lateral Offset (In.):	20.0	Road Grade (%):	2.00
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height is 3-5 in below the 27 in design height throughout the barrier.			
	Breaking and Cracking:	No major breaking or cracking of the barrier.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No major weathering of the barrier.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0210-0.782-R		
Route Name:	WAPPA UPPER SWITCHYARD ROAD		
Inspection Date:	03/08/2010	Barrier Rating:	40.20

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$19179
Brief Workorder:	Replace barrier with W-beam strong post guardrail and two W-beam non-flared/tangent end treatments.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 213-ft = \$2130. Remove 213-ft of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 153-ft = \$5355. Install 153-ft of W-beam strong post guardrail. W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install two W-beam tangent end terminals. Low Speed Traffic Control at \$1475- per -Day for 2 Day(s) = \$2950. 1 day removal 1 day installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0210: WAPPA UPPER SWITCHYARD ROAD

Barrier Condition Photos



BICA_0210_0.782_R_1.JPG

Barrier ID:	BICA-0211-0.116-R				
Route Name:	YELLOWTAIL POWER PLANT ROAD				
Inspection Date:	02/08/2010	Barrier Rating:	29.60		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	156		
Speed Limit (MPH):	35	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	21.0	Lateral Offset (In.):	24.0	Road Grade (%):	2.80
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was 5 to 7 in below the 27 in design height.			
	Breaking and Cracking:	No major breaking or cracking of the barrier.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No major weathering of the barrier.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0211-0.116-R		
Route Name:	YELLOWTAIL POWER PLANT ROAD		
Inspection Date:	02/08/2010	Barrier Rating:	29.60

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$16357
Brief Workorder:	Replace barrier with W-beam strong post guardrail and two W-beam non-flared/tangent end treatments.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 156-ft = \$1560. Remove 156-ft of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 96-ft = \$3360. Install 96-ft of W-beam strong post guardrail. W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install two W-beam tangent end terminals. Low Speed Traffic Control at \$1475- per -Day for 2 Day(s) = \$2950. 1 day removal 1 day installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0211: YELLOWTAIL POWER PLANT ROAD

Barrier Condition Photos



BICA_0211_0.116_R_1.JPG

Barrier ID:	BICA-0211-0.117-L				
Route Name:	YELLOWTAIL POWER PLANT ROAD				
Inspection Date:	02/08/2010	Barrier Rating:	32.40		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	154		
Speed Limit (MPH):	35	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.6
Height (In.):	22.6	Lateral Offset (In.):	16.0	Road Grade (%):	2.40
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was 4 to 5 in below the 27 in design height.			
	Breaking and Cracking:	No major breaking or cracking of the barrier.			
	Missing Elements:	No missing barrier elements			
	Corrosion and Weathering:	No major weathering of the barrier			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0211-0.117-L		
Route Name:	YELLOWTAIL POWER PLANT ROAD		
Inspection Date:	02/08/2010	Barrier Rating:	32.40

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$16258
Brief Workorder:	Replace barrier with W-beam strong post guardrail and two W-beam non-flared/tangent end treatments.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 154-ft = \$1540. Remove 154-ft of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 94-ft = \$3290. Install 94-ft of W-beam strong post guardrail. W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install two W-beam tangent end terminals. Low Speed Traffic Control at \$1475- per -Day for 2 Day(s) = \$2950. 1 day removal 1 day installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0211: YELLOWTAIL POWER PLANT ROAD

Barrier Condition Photos



BICA_0211_0.117_L_1.JPG

Barrier ID:	BICA-0211-0.278-R				
Route Name:	YELLOWTAIL POWER PLANT ROAD				
Inspection Date:	02/08/2010	Barrier Rating:	34.20		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	204		
Speed Limit (MPH):	35	Placement with Respect to Road:	OUTSIDE OF CURVE		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	25.0	Lateral Offset (In.):	13.6	Road Grade (%):	1.50
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was at or within 1 in of the 27 in design height for 77 ft between 1 and 3 in below for 100 ft and greater than 3 in below for 27 ft.			
	Breaking and Cracking:	Torn trailing end spoon. No cracked barrier elements. One impacted rail (minor).			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No corrosion of galvanized rails. Moderate weathering of concrete posts (minor spalling of concrete on posts).			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0211-0.278-R		
Route Name:	YELLOWTAIL POWER PLANT ROAD		
Inspection Date:	02/08/2010	Barrier Rating:	34.20

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$18733
Brief Workorder:	Replace barrier with W-beam strong post guardrail and two W-beam non-flared/tangent end treatments.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 204-ft = \$2040. Remove 204-ft of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 144-ft = \$5040. Install 144-ft of W-beam strong post guardrail. W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install two W-beam tangent end terminals. Low Speed Traffic Control at \$1475- per -Day for 2 Day(s) = \$2950. 1 day removal 1 day installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0211: YELLOWTAIL POWER PLANT ROAD

Barrier Condition Photos



BICA_0211_0.278_R_1.JPG

Barrier ID:	BICA-0211-0.349-R				
Route Name:	YELLOWTAIL POWER PLANT ROAD				
Inspection Date:	03/08/2010	Barrier Rating:	61.20		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	791		
Speed Limit (MPH):	35	Placement with Respect to Road:	OUTSIDE OF CURVE		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.6
Height (In.):	21.6	Lateral Offset (In.):	17.0	Road Grade (%):	1.20
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was 2 to 3 in below the 27 in design height for 150 ft and was between 3 to 9 in below for 641 ft.			
	Breaking and Cracking:	No major breaking or cracking of the barrier.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No major weathering of the barrier.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0211-0.349-R		
Route Name:	YELLOWTAIL POWER PLANT ROAD		
Inspection Date:	03/08/2010	Barrier Rating:	61.20

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$57525
Brief Workorder:	Replace barrier with W-beam strong post guardrail and two W-beam non-flared/tangent end treatments.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 791-ft = \$7910. Remove 791-ft of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 731-ft = \$25585. Install 731-ft of W-beam strong post guardrail. W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install W-beam tangent end terminals. Low Speed Traffic Control at \$1475- per -Day for 8 Day(s) = \$11800. 4 days removal 4 days installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0211: YELLOWTAIL POWER PLANT ROAD

Barrier Condition Photos



BICA_0211_0.349_R_1.JPG

Barrier ID:	BICA-0211-0.544-R				
Route Name:	YELLOWTAIL POWER PLANT ROAD				
Inspection Date:	03/08/2010	Barrier Rating:	60.20		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	418		
Speed Limit (MPH):	35	Placement with Respect to Road:	OUTSIDE OF CURVE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.0
Height (In.):	20.6	Lateral Offset (In.):	16.6	Road Grade (%):	4.30
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was 5 to 8 in below the 27 in design height throughout.			
	Breaking and Cracking:	No major breaking or cracking of the barrier.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No major weathering of the barrier.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0211-0.544-R		
Route Name:	YELLOWTAIL POWER PLANT ROAD		
Inspection Date:	03/08/2010	Barrier Rating:	60.20

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$32571
Brief Workorder:	Replace barrier with W-beam strong post guardrail and two W-beam non-flared/tangent end treatments.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 418-ft = \$4180. Remove 418-ft of guardrail. W-Beam Strong Post at \$35- per -Lin. Ft. for 358-ft = \$12530. Install 358-ft of W-beam strong post guardrail. W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install two W-beam tangent end terminals. Low Speed Traffic Control at \$1475- per -Day for 4 Day(s) = \$5900. 2 days removal 2 days installation.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0211: YELLOWTAIL POWER PLANT ROAD

Barrier Condition Photos



BICA_0211_0.544_R_1.JPG

Barrier ID:	BICA-0211-0.983-R				
Route Name:	YELLOWTAIL POWER PLANT ROAD				
Inspection Date:	03/08/2010	Barrier Rating:	69.90		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	833		
Speed Limit (MPH):	35	Placement with Respect to Road:	BOTH INSIDE AND OUTSIDE		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	150.1
Height (In.):	21.2	Lateral Offset (In.):	16.7	Road Grade (%):	3.80
Physical Condition					
Barrier	Alignment and Height:	Alignment of barrier was deflected out by more than 12 in for 3 impacted rail sections and 6 in or less for 5 impacted rail sections. The height is 5 to 6 ins below the 27 in design height.			
	Breaking and Cracking:	There were 8 impacted rails; 5 were minor impacts and 3 were major impacts. There were 4 loose bolts.			
	Missing Elements:	3 missing bolts. No other missing barrier elements.			
	Corrosion and Weathering:	Break in asphalt curb is causing runoff to erode the bank below the guardrail. No corrosion of galvanized rails. Moderate weathering (spalling) of concrete posts.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0211-0.983-R		
Route Name:	YELLOWTAIL POWER PLANT ROAD		
Inspection Date:	03/08/2010	Barrier Rating:	69.90

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$63850
Brief Workorder:	Repair erosion with structural fill install asphalt pavement replace missing asphalt curb replace barrier with W-beam strong post guardrail and two W-beam non-flared/tangent end treatments.				
Workorder:	<p>Remove Guardrail at \$10- per -Lin. Ft. for 833 LF = \$8330. Remove 833 feet of guardrail.</p> <p>W-Beam Strong Post at \$35- per -Lin. Ft. for 773 LF = \$27055. Install 773 feet of W-beam strong post guardrail.</p> <p>W-beam tangent 350 compliant at \$3500- per -Each for 2 Unit(s) = \$7000. Install two W-beam tangent end terminals.</p> <p>Asphalt Curb at \$12- per -Lin. Ft. for 50 LF = \$600. Install 50 feet of asphalt curb for erosion repair.</p> <p>Structural Backfill at \$50- per -Cu. Yd. for 4 CY = \$200. Install 4-CY of structural fill for erosion repair.</p> <p>Minor Asphalt at \$110- per -Ton for 1 Ton(s) = \$110. Install 1 ton asphalt pavement for erosion repair.</p> <p>Low Speed Traffic Control at \$1475- per -Day for 10 Day(s) = \$14750. 4 days removal 4 days installation 2 days for backfill and asphalt repair.</p>				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0211: YELLOWTAIL POWER PLANT ROAD

Barrier Condition Photos



BICA_0211_0.983_R_1.JPG

Barrier ID:	BICA-0219-1.216-R				
Route Name:	BARRY'S LANDING BOAT RAMP ROAD				
Inspection Date:	05/08/2010	Barrier Rating:	26.60		
Barrier Description					
Type:	W-BEAM STRONG POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	WOOD	Length (ft.):	1350		
Speed Limit (MPH):	30	Placement with Respect to Road:	BOTH INSIDE AND OUTSIDE		
Hazard Behind Barrier:	MEDIUM				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	TL-3	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	W-BEAM FLARED 350 COMPLIANT	Is Beg. End Trtmt Crashworthy?:	YES	Approach Transition Type:	NONE
Ending End Trtmt Type:	W-BEAM FLARED 350 COMPLIANT	Ending End Trtmt Crashworthy?:	YES		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	75.0
Height (In.):	28.3	Lateral Offset (In.):	32.5	Road Grade (%):	2.10
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height is 1 to 3 in above the 27 in design height throughout.			
	Breaking and Cracking:	No major breaking or cracking of the barrier.			
	Missing Elements:	No missing barrier elements.			
	Corrosion and Weathering:	No major weathering of the barrier.			
End Treatments	Alignment and Height:	Alignment acceptable. Height is within 1-in of 27-in design height.			
	Breaking and Cracking:	No major breaking or cracking of the end treatment.			
	Missing Elements:	No missing end treatment elements.			
	Corrosion and Weathering:	No major weathering of the end treatment.			

Barrier ID:	BICA-0219-1.216-R		
Route Name:	BARRY'S LANDING BOAT RAMP ROAD		
Inspection Date:	05/08/2010	Barrier Rating:	26.60

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$1887
Brief Workorder:	Adjust the twisted blocks.				
Workorder:	Labor at \$60- per -Hour for 4 Hrs = \$240. Adjust twisted blocks and nail to retain them. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475. Low speed shoulder work.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0219: BARRY'S LANDING BOAT RAMP ROAD

Barrier Condition Photos



BICA_0219_1.216_R_1.JPG

Barrier ID:	BICA-0219-2.011-L				
Route Name:	BARRY'S LANDING BOAT RAMP ROAD				
Inspection Date:	05/08/2010	Barrier Rating:	40.20		
Barrier Description					
Type:	W-BEAM WEAK POST	Barrier Function:	TRAFFIC		
Barrier Material:	GALVANIZED STEEL	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	438		
Speed Limit (MPH):	30	Placement with Respect to Road:	BOTH INSIDE AND OUTSIDE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	TL-2	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	NONE	Is Beg. End Trtmt Crashworthy?:	N/A	Approach Transition Type:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	0.0	Post Spacing (In.):	75.3
Height (In.):	25.7	Lateral Offset (In.):	41.2	Road Grade (%):	11.90
Physical Condition					
Barrier	Alignment and Height:	The alignment had no deflection and the height was above the 27 in design height up to 32 in when barrier was behind the concrete curb for 191 ft and was 4 to 5 in below when there was no curb which was for 247 ft.			
	Breaking and Cracking:	There were 5 damaged rails from impact 4 being more minor. There was 1 cracked post and a couple of loose bolts.			
	Missing Elements:	2 missing bolts. No other missing barrier elements.			
	Corrosion and Weathering:	No corrosion of galvanized rails. Moderate weathering of wood barrier posts. 4 rotten posts down by water's edge.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	BICA-0219-2.011-L		
Route Name:	BARRY'S LANDING BOAT RAMP ROAD		
Inspection Date:	05/08/2010	Barrier Rating:	40.20

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$8448
Brief Workorder:	Raise 247-ft of barrier up to the 27-in design height replace 68 feet of rail 5 posts and tighten loose hardware.				
Workorder:	Replace Rail at \$25- per -Lin. Ft. for 68-ft = \$1700. Replace 5 impacted rails. Replace Post at \$100- per -Each for 5 Post(s) = \$500. Replace 5 wooden posts. Adjust Guardrail at \$10- per -Lin. Ft. for 247-ft = \$2470. Raise 247-ft of guardrail to 27 inch design height. Labor at \$60- per -Hour for 1 Hrs = \$60. 1 hour of labor to tighten/replace bolts. Low Speed Traffic Control at \$1475- per -Day for 2 Day(s) = \$2950.				

2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Bighorn Canyon National Recreation Area

ROUTE 0219: BARRY'S LANDING BOAT RAMP ROAD

Barrier Condition Photos



BICA_0219_2.011_L_1.JPG

Appendix A

Summary of GIP Definitions and Assessment



Bighorn Canyon National Recreation Area



**Federal Lands Highway
Road Inventory Program**

Appendix A:

Guardwall/Rail Inventory Program (GIP)

EXPLANATION OF REPORT TERMS

The Guardwall/rail Inventory Program (GIP) was commissioned by WASO to identify deferred maintenance related to barriers in National Parks that have more than one mile of guardwall or guardrail. GIP was designed jointly by the NPS and FHWA and the inventory process records both static characteristics of the barrier (e.g., length, height, etc.) as well as dynamic information about the condition of the barrier.

Barriers that traverse bridges are not included in this inventory, these barriers are covered in FHWA's Bridge Inventory Program (BIP); however, barriers that are approaches to bridges were part of this inventory.

The following discussion highlights each of the elements found in the reports.

Static Barrier Characteristics

BARRIER TYPE

Refers to both the design and the construction materials used:

- W-Beam, Strong Post
- W-Beam, Weak Post
- Thrie Beam/Modified Thrie Beam
- Box Beam
- Steel-Backed Timber, w/ Blockout
- Steel-Backed Timber, w/o Blockout
- Steel-Backed Log Rail
- High Tension Cable
- Three-Strand Cable
- Stone Masonry, w/o Concrete Core Wall
- Stone Masonry, w/ Concrete Core Wall
- Random Rubble Cavity Wall
- Concrete Barrier
- Concrete, with Simulated Stone Face
- W-Beam (Double Face), Strong Post
- Steel-Backed Timber (Double Face)
- Other: *Completed by field crew*

BARRIER MATERIAL

The type of material of which the barrier is composed:

- Cable
- Concrete
- Galvanized Steel
- Log/Timber/Wood
- Steel-Backed Timber/Log
- Weathering Steel/Corten
- Stone
- Other: *Completed by field crew*

LENGTH

The longitudinal distance between the beginning and end of the barrier. It should include the length of end treatments in the overall length of the barrier. For roadside barriers, this can be calculated from the start and end locations.

BARRIER FUNCTION: Traffic or Non-Traffic Barrier.

Due to the different GIP assessment criteria of barriers based on their intended use, barriers were classified as being either traffic barriers or non-traffic barriers.

Traffic barriers are physical devices intended to keep vehicles or people from straying into dangerous or off-limits areas. For the purpose of this inventory and assessment, a traffic barrier is categorized as roadside hardware placed longitudinally, excluding pedestrian railing and fencing.

Non-traffic barriers provide a physical delineation between public access areas and restricted or protected areas in locations such as a parking lot, viewpoint or turnout. Non-traffic barriers which inhibit access of vehicles are included in this report; non-traffic barriers which only inhibit access of pedestrians or bicyclists are not included. For the purpose of this inventory, non-traffic barriers are guidewalls and guiderails. Note: rocks, stones, boulders, fences or curbs were excluded from this inventory.

There are instances in parks where a single barrier can switch between being classified as a traffic barrier and a non-traffic barrier. Such instances typically occur at pullouts, where a traffic barrier along the road will continue through the pullout without interruption. In such instances, the traffic barrier and non-traffic barrier were assessed using different criteria. Due to the different criteria, the GIP database was designed to record the traffic barrier and non-traffic barrier as two distinct barriers, even though to the eye, they appear as one barrier. Other instances where a single barrier is split into multiple barriers would be when the barrier is placed continuously along two legs of an intersection, so that one portion of the barrier may be on one road and the remaining portion of the barrier is on a different road.

POST MATERIAL

The type or material that the barrier’s supporting posts are made of:

- Galvanized Steel
- Wood
- Corten
- Other: *Completed by field crew*
- N/A

BLOCKOUT TYPE

The type of blockout or of what it is comprised:

- Wood
- Plastic
- Steel
- N/A

BARRIER PLACEMENT WITH RESPECT TO ROADWAY

To identify the roadway alignment the barrier is located upon:

- Tangent
- Inside of Curve
- Both Inside and Outside of Curve
- Outside of Curve

POSTED SPEED LIMIT

The posted speed limit of the roadway section.

HAZARD BEHIND BARRIER

A qualitative description of the severity of the hazard behind the barrier:

- Low
- Medium
- High
- Extreme

APPROPRIATE TEST LEVEL (TL) FOR ROAD

Based on the posted speed limit, the NCHRP 350 Crashworthiness test level appropriate for the roadway.

- TL-1, 30 mph and lower
- TL-2, 35-45 mph
- TL-3, 50 mph and higher

BARRIER TEST LEVEL (TL)

A traffic barrier is crashworthy if it was successfully crash tested under *NCHRP Report 350* at speeds along the park road or parkway or if it was accepted through analysis by FHWA, based on similarity to other crashworthy critical design element features. Non-traffic barriers are classified at N/A.

- TL-1
- TL-2
- TL-3
- No
- N/A – Non-Traffic Barrier

IS BARRIER CRASHWORTHY

This compared the appropriate crashworthy test level required for the posted speed limit to the barrier's test level.

- Yes
- No

BEGINNING END TREATMENT TYPE

An end treatment is safety hardware that mitigates impacts to the ends of a barrier. Most common end treatments are for w-beam systems. Note that stonemasonry barriers typically do not have end treatments.

The beginning end treatment is based on the travel lane closest to the barrier. A vehicle traveling in the lane closest to the barrier will encounter the barrier's beginning end treatment first. It is not based on the RIP primary direction. Identifies the barrier's beginning end treatment type:

- W-Beam Flared 350 Compliant
- W-Beam Tangent 350 Complaint
- W-Beam Buried End
- W-Beam Trailing End/CRG
- W-Beam BCT, Flared
- W-Beam, Turn Down
- SBT/Log, Flared
- SBT/Log, Buried
- Median Treatments
- Box Beam
- Cable
- Crash Cushions/Attenuator
- Other: *Completed by field crew*
- None

IS BEGINNING END TREATMENT CRASHWORTHY

Identifies if the barrier's beginning end treatment (based on direction of travel for the travel lane closest to barrier) is crashworthy, based on NCHRP-350.

- Yes
- No
- N/A

APPROACH TRANSITION TYPE

A transition is safety hardware designed to be placed between two different types of barrier. Most common transition types are between bridge rail and w-beam systems.

This identifies the barrier's transition type:

- Bridge Rail, W-Beam
- Bridge Rail, SBT
- Rigid W-Beam, W-Beam
- Rigid SBT (Wall), SBT
- Concrete/Masonry, W-Beam
- Concrete/Masonry, SBT
- Concrete/Masonry, Thrie Beam
- Other: *Completed by field crew*
- None

ENDING END TREATMENT TYPE

The ending end treatment is based on the travel lane closest to the barrier. A vehicle traveling in the lane closest to the barrier will encounter the barrier's ending end treatment last, after passing the rest of the barrier. It is not based on the RIP primary direction. Identifies the barrier's ending end treatment type:

- W-Beam Flared 350 Compliant
- W-Beam Tangent 350 Complaint
- W-Beam Buried End
- W-Beam Trailing End/CRG
- W-Beam BCT, Flared
- W-Beam, Turn Down
- SBT/Log, Flared
- SBT/Log, Buried
- Median Treatments
- Box Beam
- Cable
- Crash Cushions/Attenuator
- Other: *Completed by field crew*
- None

IS ENDING END TREATMENT CRASHWORTHY

Identifies if the barrier's ending end treatment (based on direction of travel for the travel lane closest to barrier) is crashworthy, based on NCHRP-350.

- Yes
- No
- N/A

BARRIER DESIGN HEIGHT

Identifies the barrier's original "as-built" design height:

- 27-in, W-beam, Steel-Backed Timber, Stone Masonry w/ Concrete Core Wall
- 24-in, Stone Masonry w/o Concrete Core Wall, Log on Log
- 20-in, Timber on Wood Posts, Timber on Concrete Posts, Timber on Granite Posts
- 18/24-in, Crenellated Stone Masonry Barrier
- 18/24-in, Dry Stack Stone Wall
- 31-in, Steel-Backed Log
- 32-in, Jersey Barrier

AVERAGE MEASUREMENTS

Minimum of three measurements taken on each barrier.

First measurement approximately 50-ft from the beginning of the barrier, measured from the extreme ends of the barrier's end treatment/transition. Do not take a measurement along the end treatment
Measure and record measurement every 200-ft thereafter for the run of barrier

Last measurement approximately 50-ft from the end of the barrier. Do not take a measurement along the end treatment

If a barrier is less than 300-ft, even say 45-ft, a minimum of three measurements were still taken.

AVERAGE WIDTH

The width of the barrier. Only recorded for guardwalls; not guardrail.

AVERAGE POST SPACING

The spacing of the barrier's (not the end treatments') posts. Only recorded for guardrails; not guardwalls or non-traffic barriers.

AVERAGE BARRIER HEIGHT

The average barrier height. If the barrier has crenellations, the height is measured in the non-crenellated sections of the barrier. If the average lateral offset is less than or equal to 4-ft, average barrier height is measured from the roadway; if the average lateral offset is greater than 4-ft, average barrier height is measured at the barrier face.

AVERAGE LATERAL OFFSET

Determine the average distance between the barrier and the edge of roadway. If a white edgeline is present on the roadway, average lateral offset is measured from the outside edge of the white line to the barrier face. If no white edgeline is present, average lateral offset is measured from the edge of pavement to the barrier face.

AVERAGE ROAD GRADE and UPHILL OR DOWNHILL

Determine an average roadway grade at each barrier location, based on the direction of travel in the lane closest to the barrier.

DYNAMIC BARRIER CHARACTERISTICS – CONDITION ASSESSMENT NARRATIVES

Field crews were directed to write a narrative of the barrier's physical condition. To keep consistency between field crews, all narratives were based on severity and distress criteria, which were developed jointly by the NPS and FHWA. Condition assessments were based on barrier type and can be found directly after this description of report elements.

BARRIER ALIGNMENT/HEIGHT

Narrative completed by field crew describing the barrier's alignment and height. Height comments are based on the barrier's original "as-built" design height.

BARRIER BREAKING/CRACKING

Narrative completed by field crew describing any barrier breaking or cracking found during the inspection.

BARRIER MISSING ELEMENTS

Narrative completed by field crew describing any barrier missing elements encountered during the inspection.

BARRIER CORROSION/WEATHERING

Narrative completed by field crew describing and corrosion or weathering issues associated with the barrier.

END TREATMENTS ALIGNMENT/HEIGHT

Narrative completed by field crew describing the barrier end treatment's alignment and height, when present. Height comments are based on the end treatment's original "as-built" design height.

END TREATMENTS BREAKING/CRACKING

Narrative completed by field crew describing any barrier end treatment's breaking or cracking found during the inspection.

END TREATMENTS MISSING ELEMENTS

Narrative completed by field crew describing any barrier end treatment missing elements encountered during the inspection.

END TREATMENTS CORROSION/WEATHERING

Narrative completed by field crew describing and corrosion or weathering issues associated with the barrier's end treatments.

BARRIER PHOTOGRAPHS

During the inspection, the field crews photographed the beginning end (based on the closest lane's direction of travel) of each barrier. Additional photographs were taken of any unusual deficiencies encountered. Up to two photographs of the barrier are included in this report.

CONDITION AND SEVERITY DISTRESS TABLES

Due to the extreme number of possible conditions of the barrier, transition and end treatment, the following descriptions and matrices are guidelines created to help classify the condition of the element. While the distinction between good and fair is needed, the distinction between fair and poor is much more important since this is the threshold that defines if the element is slightly compromised or is not functional.

In all likelihood, according to these guidelines different portions of an element (most likely a barrier) may be classified differently; however, a single classification will need to be provided for the element. The survey team will use their professional judgment to determine this single classification. The single classification of each element should be considered an index value that provides a general indicator of overall performance, but not necessarily indicate that a specific treatment is warranted. The specific work order that is prepared based on the observed deficiencies will be a much more definitive indicator of the appropriate treatment based on existing distresses. The overall condition will be used as part of the risk assessment tool to evaluate the risk to driver safety associated with the physical condition of the barrier.

GOOD

The barrier performs as intended. The barrier is in fairly straight alignment but may have some small amount that is slightly out of alignment. While the height of the barrier may vary over its run, the height is relatively consistent and is close to its original “as-built” design height. Minor cracks may be visually observed on some the posts, though these cracks are neither long nor deep and the only hardware missing are isolated nuts and bolts. Minor surface corrosion on small portions of the surface is visible but there is no decay associated with connections.

The end treatment performs as intended. The end treatment is in good alignment and tension is acceptable. While the end treatment may exhibit some dents, there are no cracked rails, posts, blocks or any missing elements. Corrosion and erosion, while present, are at a minimum.

In general, all distresses observed, either in isolation or in combination, do not seriously affect the ability of the element to serve the intended functions of protecting drivers from a roadside hazard and/or contributing to the cultural value of the roadway corridor. Keep in mind that “intended function” is a relative term. In many cases, older designs were “intended” to protect drivers but would not be considered fully functional in that regard by today’s standards.

FAIR

The barrier is slightly compromised. The barrier is noticeably out of alignment and the height along the run of barrier varies considerably. Cracks and broken elements are visible from the roadside. The barrier may be missing elements, such as nuts, bolts, blockouts or even a post. Surface corrosion is visible on a fair amount of the barrier but connections will still provide element interlock. Decay and minor erosion, while not always visible, may begin to reduce element strength and individual post stability.

The end treatment is slightly compromised. The end treatment may be somewhat out of alignment, have low cable anchor tension or isolated broken or cracked rail, posts or blocks. Corrosion and erosion are evident.

In general, the distresses observed, either in isolation or combination, may generate unpredictable outcomes related to the functions of the element stated above.

POOR

The barrier is not functional. The barrier will not function as intended. Any of the following could mean that the barrier is in poor condition: The barrier has fallen out of alignment or its height varies greatly from the designed height. Cracks and broken elements are visible from the roadside. The barrier is missing several elements, such as nuts, bolts, blockouts or consecutive posts. Corrosion, causing structural compromise is significant and obvious. Erosion around posts will reduce the barrier's strength and capacity.

The end treatment is not functional. The end treatment does not function as intended. There is no tension in the cable anchor. A significant portion of the end treatment has broken, cracked or dented elements. Elements are missing and corrosion or erosion is significant.

In general, the distresses observed clearly illustrate the inability of the element to perform the intended functions.

CONDITION AND SEVERITY DISTRESS TABLES – BARRIERS

Condition and Severity Distress Table for Semi-Rigid Barriers (including barriers with posts, rail elements and blocks).

	GOOD	FAIR	POOR
Alignment/Design Height			
	<ul style="list-style-type: none"> Alignment off by less than 6" 	<ul style="list-style-type: none"> Alignment off by 6"-12" 	<ul style="list-style-type: none"> Alignment off by more than 12"
	<ul style="list-style-type: none"> Within 1" of <i>design height</i> 	<ul style="list-style-type: none"> Less than 3" lower than <i>design height</i> 	<ul style="list-style-type: none"> Greater than 3" lower than <i>design height</i>
Breaking/Cracking, an member, post or rail – due to impact loading			
	<ul style="list-style-type: none"> Metal – no twisting/bending, tears or cracking 	<ul style="list-style-type: none"> Metal – no cracking or tearing (but minor twisting/bending is ok) 	<ul style="list-style-type: none"> Metal – any cracks or tears
	<ul style="list-style-type: none"> Wood – no impact related cracking 	<ul style="list-style-type: none"> Wood – maybe cracked but retains original cross section 	<ul style="list-style-type: none"> Wood – cracks or tears that deform original section
	<ul style="list-style-type: none"> Isolated broken blocks 	<ul style="list-style-type: none"> Two Consecutive broken blocks 	<ul style="list-style-type: none"> Consecutive broken blocks (three or more consecutive)
Missing Elements			
	<ul style="list-style-type: none"> No bolts and nuts missing 	<ul style="list-style-type: none"> One or two bolt/nut missing at one rail/rail connection 	<ul style="list-style-type: none"> Three or more bolts/nuts missing at one rail/rail connection
	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> Two consecutive missing blocks 	<ul style="list-style-type: none"> Three or more consecutive missing blocks
	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> One missing rail element or post
Corrosion/Decay/Weathering, all posts, rails and blocks – due to aging			
	<ul style="list-style-type: none"> Loss of 5% or less of cross section 	<ul style="list-style-type: none"> Loss of 5% to 50% of cross section 	<ul style="list-style-type: none"> Loss of 50% or more of cross section
	<ul style="list-style-type: none"> Erosion (less than 8" of post exposed below original groundline) 	<ul style="list-style-type: none"> Erosion around posts (8" or more of post exposed below original groundline) for one 	<ul style="list-style-type: none"> Erosion around consecutive posts (more than 8" of post exposed below original groundline)

Condition and Severity Distress Table for Rigid Concrete Barriers (including pre-cast).

GOOD				FAIR				POOR							
Alignment/Design Height															
				<ul style="list-style-type: none"> Alignment off by less than 6" 				<ul style="list-style-type: none"> Alignment off by 6"-12" 				<ul style="list-style-type: none"> Alignment off by more than 12" 			
				<ul style="list-style-type: none"> Within 1" of <i>design height</i> 				<ul style="list-style-type: none"> Less than 3" lower than <i>design height</i> 				<ul style="list-style-type: none"> Greater than 3" lower than <i>design height</i> 			
Breaking/Cracking– due to impact loading															
				<ul style="list-style-type: none"> Minor cracks (less than ¼") present 				<ul style="list-style-type: none"> Cracking present ¼" or greater but no displacement or discontinuity in face 				<ul style="list-style-type: none"> Barrier displaced and/or discontinuous 			
				<ul style="list-style-type: none"> n/a 				<ul style="list-style-type: none"> Pieces broken from barrier 3" deep or less without exposing rebar 				<ul style="list-style-type: none"> Cracking exposes rebar 			
				<ul style="list-style-type: none"> n/a 				<ul style="list-style-type: none"> n/a 				<ul style="list-style-type: none"> Pieces broken from face greater than 3" deep 			
Missing Elements															
				<ul style="list-style-type: none"> n/a 				<ul style="list-style-type: none"> n/a 				<ul style="list-style-type: none"> n/a 			
Corrosion/Decay/Weathering – due to aging															
				<ul style="list-style-type: none"> Surface corrosion on less than 5% of the run 				<ul style="list-style-type: none"> Surface corrosion on between 5-25% of the run 				<ul style="list-style-type: none"> Surface corrosion on more than 25% of the run 			
				<ul style="list-style-type: none"> n/a 				<ul style="list-style-type: none"> Spalling 3" deep or less without exposing rebar 				<ul style="list-style-type: none"> Spalling greater than 3" deep 			
				<ul style="list-style-type: none"> Erosion (less than 8" below groundline) around base 				<ul style="list-style-type: none"> Erosion (8" or more below groundline) around base 				<ul style="list-style-type: none"> Erosion (8" or more below groundline) 			
				<ul style="list-style-type: none"> n/a 				<ul style="list-style-type: none"> Less than 50% undermined (less than half barrier width) 				<ul style="list-style-type: none"> 50% or more undermined (less than half barrier width) 			

Condition and Severity Distress Table for Rigid Stone/Masonry Barriers (including all types of stone or masonry barriers).

GOOD		FAIR		POOR	
Alignment/Design Height					
	<ul style="list-style-type: none"> Alignment (off by less than 6") 	<ul style="list-style-type: none"> Alignment (off by 6"-12") 	<ul style="list-style-type: none"> Alignment (off by more than 12") 		
	<ul style="list-style-type: none"> Within 3" of <u>design height</u> 	<ul style="list-style-type: none"> Between 3.1 - 6" lower than <u>design height</u> 	<ul style="list-style-type: none"> Greater than 6.1" lower than <u>design height</u> 		
Breaking/Cracking – due to impact loading					
	<ul style="list-style-type: none"> Minor cracks (less than ¼") present 	<ul style="list-style-type: none"> Cracks, less than ½" present 	<ul style="list-style-type: none"> Cracks greater than ½" present 		
		<ul style="list-style-type: none"> Stones broken/displaced extending less than 1/3 of width of barrier 	<ul style="list-style-type: none"> Stones broken/displaced extending 1/3 width or more through the barrier 		
Missing Elements					
	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> n/a 		
Corrosion/Decay/Weathering – due to aging					
	<ul style="list-style-type: none"> Cracks in mortar joints 1/4" or less and/or single loose or missing stones 	<ul style="list-style-type: none"> Mortar joints deteriorated resulting in two - three loose or missing adjacent stones (without impact) 	<ul style="list-style-type: none"> Mortar joints deteriorated resulting in more than three continuous/adjacent loose or missing stones (without impact) 		
	<ul style="list-style-type: none"> Erosion (less than 8" below groundline) around base 	<ul style="list-style-type: none"> Erosion (8" or more below groundline) around base 	<ul style="list-style-type: none"> Erosion (8" or more below groundline) 		
	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> Less than 50% undermined (less than half barrier width) 	<ul style="list-style-type: none"> 50% or more undermined (less than half barrier width) 		

Condition and Severity Distress Table for Flexible Barriers, (including cable barriers and weak-post systems designed without blocks).

	GOOD	FAIR	POOR
Alignment/Tension/Design Height			
	<ul style="list-style-type: none"> No bent posts 	<ul style="list-style-type: none"> Bent posts; one to three consecutive posts 	<ul style="list-style-type: none"> Bent posts; four or more consecutive posts
	<ul style="list-style-type: none"> Cable has tension 	<ul style="list-style-type: none"> Cable under-tensioned/sagging 	<ul style="list-style-type: none"> No cable tension
	<ul style="list-style-type: none"> Less than 1" too low 	<ul style="list-style-type: none"> 1-3" too low 	<ul style="list-style-type: none"> Greater than 3" too low
Breaking/Cracking			
	<ul style="list-style-type: none"> No cracked or broken posts 	<ul style="list-style-type: none"> One to three isolated broken posts 	<ul style="list-style-type: none"> Four or more consecutive broken posts
	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> Cable frayed 	<ul style="list-style-type: none"> Cable broken or severed
Missing Elements			
	<ul style="list-style-type: none"> No bolts and nuts missing at anchors 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> Bolts and nuts missing or loose at anchors
	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> Any missing posts or cable for any length of run
Corrosion/Decay/Weathering – due to aging			
	<ul style="list-style-type: none"> Loss of 5% or less of cable cross section 	<ul style="list-style-type: none"> Loss of 5% to 15% of cable cross section 	<ul style="list-style-type: none"> Loss of 15% or more of cross section
	<ul style="list-style-type: none"> Erosion (less than 8" of post exposed below original groundline) 	<ul style="list-style-type: none"> Erosion around one post (8" or more of post exposed below original groundline) 	<ul style="list-style-type: none"> Erosion around consecutive posts (more than 8" of post exposed below original groundline)

CONDITION AND SEVERITY DISTRESS TABLES – END TREATMENTS

Condition and Severity Distress Table for Flexible End Treatments, (including cable end terminals).

	GOOD	FAIR	POOR
Alignment/Tension			
	<ul style="list-style-type: none"> Alignment off by less than 4" 	<ul style="list-style-type: none"> Alignment off by 4"-8" 	<ul style="list-style-type: none"> Alignment off by more than 8"
	<ul style="list-style-type: none"> Adequate cable tension 	<ul style="list-style-type: none"> Low cable anchor tension 	<ul style="list-style-type: none"> No cable anchor tension
Breaking/Cracking – due to impact loading			
	<ul style="list-style-type: none"> No broken or cracked elements 	<ul style="list-style-type: none"> Minor cable fraying but still with adequate tension 	<ul style="list-style-type: none"> Broken or cracked cables or posts
	<ul style="list-style-type: none"> No damage to posts, cable or anchor 	<ul style="list-style-type: none"> Slight damage to posts without cracking or tearing (<i>but minor twisting/bending on isolated posts is OK</i>) 	<ul style="list-style-type: none"> Cable broken or severed on any cable
Missing Elements			
	<ul style="list-style-type: none"> No bolts and nuts missing at anchors; No missing cables 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> Any missing element (post, cable, bolts, nuts, or anchor)
Corrosion/Decay/Weathering – due to aging			
	<ul style="list-style-type: none"> Loss of 5% or less of cable cross section 	<ul style="list-style-type: none"> Loss of 5% to 15% of cable cross section 	<ul style="list-style-type: none"> Loss of 15% or more of cross section
	<ul style="list-style-type: none"> Connections weathered but still provide element interlock on less than 5% of the end treatment 	<ul style="list-style-type: none"> Connections weathered but still provide element interlock on between 5% to 15% of the end treatment 	<ul style="list-style-type: none"> Connections weathered but still provide element interlock on more than 15% of the end treatment

Condition and Severity Distress Table for Semi-Rigid End Treatments, including Flared and Tangent

				GOOD	FAIR	POOR
Alignment/Tension						
	<ul style="list-style-type: none"> Alignment of flares and offsets off by less than 4” 	<ul style="list-style-type: none"> Alignment of flares and offsets off by 4”-8” 	<ul style="list-style-type: none"> Alignment of flares and offsets off by more than 8” 			
	<ul style="list-style-type: none"> Within 1” of <i>design height</i> 	<ul style="list-style-type: none"> Less than 3” lower than <i>design height</i> 	<ul style="list-style-type: none"> Greater than 3” lower than <i>design height</i> 			
For <i>Aesthetic Barriers</i> (i.e. – SBT and SBL guardrail) that do not have crashworthy terminals:	<ul style="list-style-type: none"> Approach barrier terminals are buried, anchored, and flared away from the travel lane 	<ul style="list-style-type: none"> Approach barrier terminals are buried, anchored, and flared away from the travel lane 	<ul style="list-style-type: none"> Approach barrier ends are NOT buried, anchored, nor flared away from the travel lane 			
Breaking/Cracking – due to impact loading						
	<ul style="list-style-type: none"> Metal – no twisting/bending, tears or cracking 	<ul style="list-style-type: none"> Metal – no cracking or tearing (but minor twisting or bending is ok) 	<ul style="list-style-type: none"> Metal – any cracks or tears 			
	<ul style="list-style-type: none"> Wood – no impact related cracking 	<ul style="list-style-type: none"> Wood – maybe cracked but retains original cross section 	<ul style="list-style-type: none"> Wood – cracks or tears that deform original section 			
	<ul style="list-style-type: none"> No broken blocks 	<ul style="list-style-type: none"> One broken block 	<ul style="list-style-type: none"> Two consecutive broken blocks 			
Missing Elements						
	<ul style="list-style-type: none"> No missing elements, including breakaway cables and struts 	<ul style="list-style-type: none"> Isolated bolts, nuts, or blocks loose on non-consecutive posts 	<ul style="list-style-type: none"> Any missing element, including blocks, rails, posts cables, or struts 			
	<ul style="list-style-type: none"> No bolts, nuts, or blocks missing or loose 	<ul style="list-style-type: none"> Breakaway strut present but vertical height off by more than 2” 	<ul style="list-style-type: none"> Missing nuts / bolts on consecutive posts 			
Corrosion/Decay/Weathering – due to aging						
	<ul style="list-style-type: none"> Surface corrosion / decay / connections weathered with a loss of 5% or less of cross section of interlocking elements 	<ul style="list-style-type: none"> Surface corrosion / decay / connections weathered with between 5-25% loss of cross section along transition interlocking elements 	<ul style="list-style-type: none"> Surface corrosion / decay / connections weathered with more than 25% loss of cross section along transition interlocking elements 			
	<ul style="list-style-type: none"> Erosion (less than 8” of post exposed below original groundline) 	<ul style="list-style-type: none"> Erosion around 1 post (8” or more of post exposed below original groundline) 	<ul style="list-style-type: none"> Erosion around consecutive posts (8” or more of post exposed below original groundline) 			

SPECIFIC RISK ELEMENTS

The potential risk to a motorist after a vehicle impacts a traffic barrier depends on the crashworthiness of the traffic barrier as well as traffic exposure factors. Variables relating to the roadside, the traffic barrier's crashworthiness and traffic data include the following:

ADT. The number of vehicles (in both directions) that travel the roadway on which the traffic barrier is located.

Barrier Crashworthy. A traffic barrier is crashworthy if it was successfully crash tested under NCHRP Report 350 at speeds along the park road or parkway or if it was accepted through analysis by FHWA, based on similarity to other crashworthy critical design element features. If crashworthy, the appropriate test level also needs to be recorded. For crashworthy barriers, the barrier test level will be compared to the test level appropriate for the roadway (based solely on posted speed limit). The intent is to record situations in which a crashworthy barrier of a lower test level is installed on a roadway which should have a barrier of a higher test level.

Barrier Height. Determined from barrier height as collected in the physical condition assessment. The database will compare this value to the NCHRP test level height that is appropriate for the posted speed of the road and barrier type.

End Treatment Crashworthy. An end treatment is crashworthy if it has been successfully crash tested. This is for the approach end treatment, which is defined as the end treatment which a vehicle will first pass when traveling on the same side of the road as the barrier.

Existing Roadway Features. The list of roadway features is limited to the following, all of which have a documented history of reducing the number of crashes, and are found later in the GIP as possible countermeasures.

Centerline pavement markings	Grooved pavement surface
Edgeline pavement markings	Delineators on curve and tangent
Wider centerline	Chevrons
Wider edgeline	Warning sign
Centerline rumble strips	Flashing beacon on warning sign
Shoulder rumble strips	Lighting
Barrier reflectors	Speed feedback sign

Factored Crash Rate. The average annual number of crashes (on the overall road and by barrier segment), over the last 5 years. If the road has an ADT of less than 1000, evaluate a minimum of 7 to 10 years of crash data, if available.

Lateral Offset of Barrier from Edge of Traveled Way. The distance from the edge of traveled way to the face of the barrier is useful for determining impact to asset during different types of construction. Two or three measurements will be taken – beginning, middle and end of barrier run (not including the end treatments) – and the average will be used.

Posted Speed Limit. The posted speed limit(s) of the roadway section.

Roadway Grade and Uphill or Downhill. Is refers to the grade of the roadway, in the direction of travel closest to the barrier.

Severity of the Hazard behind Barrier. A rating system based on photos will be used to rate the severity of the hazard behind the barrier. Choices include:

- Low
- Medium
- High
- Extreme

RISK ASSESSMENT AND RISK SCORE

The following table shows the variables relating to the overall roadway safety in the vicinity of barriers. In addition, the table illustrates the range of values considered for each variable and associated levels of risk. For categorization purposes, variables have been placed into one of three categories: segment, site or barrier variables. The “Associated Risk” column identifies the relative risk posed by each variable. This looks at the relative risk of the each variable itself and is only a cursory evaluation.

A Risk Score or Rating (“Barrier Rating” on Tier 3 Barrier page) was created for each barrier based on the table values. The level of risk tolerated is dependent on the category of road, which will be discussed in subsequent pages.

Once the inventory has been conducted, a total risk value can be assigned to each barrier. A comparison of the relative risk to an acceptable risk threshold will be performed in order to analyze the overall risk of a given barrier.

Variable and Associated Levels of Risk

VARIABLE	RANGE	ASSOCIATED RISK
SEGMENT VARIABLES		
ADT	0 – 1000	0.0
	1001 – 4000	2.9
	4001 – 8000	5.7
	8001 – 20,000	7.1
	20,001 and greater	8.6
Crash Factor	0	0.0
	0.1 – 5.0	4.2
	5.1 – 20.0	8.7
	20.1 – 30.0	17.1
	30.1 – 75.0	25.8
	75.1 and greater	34.2
Posted Speed Limit	15 – 25 mph	0.0
	30 – 40 mph	4.3
	45 and higher	8.6
SITE VARIABLES		
Barrier Placement w/ Respect to Roadway Geometry	Tangent	0.0
	Inside of curve	2.9
	Both inside and outside of curve	8.6
Severity of Hazard behind the Barrier	Outside of curve	8.6
	Low severity	2.6
	Medium severity	5.1
	High severity	6.9
Longitudinal Length of Barrier	Extreme severity	8.6
	1 – 250-ft	0.0
	251 – 750-ft	2.9
	751 – ft and greater	5.7
Lateral Offset of Barrier from Edge of Traveled Way	4.1 – ft and greater	0.0
	2 – 4-ft	2.9
	less than 2-ft	5.7
Roadway Grade	Uphill/level/downgrade less than 3%	0.0
	Mild downgrade (3 – 6%)	4.3
	Steep downgrade (greater than 6%)	8.6
BARRIER VARIABLES		
Actual Barrier Height (compared to test level height)	0 – 1-in lower	0.0
	1.1 – 4-in lower	4.4
	4.1 – 7-in lower	12.9
	7.1 – 12-in lower	19.4
	12.1-in and greater lower	21.5
Dynamic Barrier Condition Rating (based on design height)	0 – 25	0.0
	26 – 200	4.4
	201 – 400	8.6
	401 – 600	12.9
	601 – 800	17.1
	801 and above	21.5
Barrier Conformance with Current Crashworthiness Criteria	Yes	0.0
	No	5.7
Maximum Total Possible Risk Score		100

REPLACEMENT/REPAIR STRATEGIES

Information is integrated by combining static data on barrier type, materials, dimensions, etc. with the condition and risk assessments, and the asset management roadway categories (which include cultural and historic resource considerations) to come up with actionable repair strategies for barriers. In addition, repair costs are accounted for so that estimates can be made for repair actions identified. Costed repair estimates, or work orders, then form the basis for estimating deferred maintenance associated with roadside barriers.

Repair recommendations generated by this assessment are intended to provide an estimated cost of deferred maintenance of barriers. As such, the evaluation is not rigorous and may be changed when a more detailed review and assessment at a project level is completed. In addition, any repairs or replacements that are recommended by this inventory and assessment process must be vetted through a project selection, planning and design process, including compliance with the National Historic Preservation Act (NHPA) and the National Environmental Policy Act (NEPA).

Many park barriers are located in harsh environments where freeze-thaw cycles, avalanche impacts, surface erosion, rockfall and vehicle impacts damage them; consequently, they are showing signs of fatigue, at times serious. Whenever possible, historic barriers are repaired or rehabilitated in place so that the historic significance can be preserved; however, removal or reconstruction, which is typically the least preferred alternative, is at times necessary.

Barrier deficiencies can generally be categorized into one of two categories:

- Barriers that pose an unacceptable risk to the traveling public (as determined by the risk assessment methods described in Chapter Seven and including standards found in NCHRP Report 350), or
- Damaged barriers, due to either crash impacts, other loadings (e.g., snow / avalanche, etc) or deteriorated parts (from age / weathering).

Outside of the national park system, barriers that do not meet NCHRP Report 350 crashworthiness standards are typically removed and a barrier of a crashworthy design is constructed in its place. However given the sensitive natural and cultural environments found within the national park system, deficient barriers not meeting national crashworthiness standards may warrant no action, particularly where risk is low.

The type of repair strategy is often dependent on the barrier deficiency and its cultural context. Typically barriers that do not meet current crashworthiness criteria may be replaced while damaged or deteriorated barriers can be repaired. However, under unique situations found in certain national parks and as evaluated using the risk assessment and asset management roadway categories, some barriers that do not meet current crashworthiness criteria may warrant no action being taken for their replacement or repair.

Risk assessment and asset management roadway categories are integrated in the following table, which establishes different risk thresholds within each roadway category. In essence, a higher level of risk will be tolerated in Asset Management Roadway Category A, as demonstrated by the higher risk threshold (90), while less risk will be tolerated in Roadway Category B (70) and even less risk in Roadway Category C (50).

Asset Management Roadway Categories, Risk Thresholds and Treatment Recommendations.

ASSET MANAGEMENT ROADWAY CATEGORY	RISK THRESHOLD	PROGRAM-LEVEL TREATMENT RECOMMENDATION
A	90-100	1. Identify measures other than barrier replacement that could be taken to reduce risk (including engineering countermeasures). 2. Corrective action (including reconstruct/replacement, if necessary) needed to reduce risk below 90.
	Below 90	1. Identify measures that could be taken to reduce risk (including engineered countermeasures). 2. Identify repairs needed to improve physical condition/maintain historic integrity. 3. When condition is good and risk is acceptable, no action is necessary.
B	70-100	1. Identify measures that could be taken to reduce risk (including engineered countermeasures). 2. Corrective action (including reconstruct/replacement, if necessary) needed to reduce risk below 70.
	Below 70	1. Identify measures that could be taken to reduce risk (including engineered countermeasures). 2. Identify repairs needed to improve physical condition/maintain historic integrity. 3. When condition is good and risk is acceptable, no action is necessary.
C	50-100	1. Identify measures that could be taken to reduce risk (including engineered countermeasures). 2. Corrective action (including reconstruct/replacement, if necessary) needed to reduce risk below 50.
	Below 50	1. Identify measures that could be taken to reduce risk (including engineered countermeasures). 2. Identify repairs needed to improve physical condition/maintain historic integrity. 3. When condition is good and risk is acceptable, no action is necessary.

Fourteen engineering countermeasures have been specifically selected for use with the GIP risk assessment tool, and are show in the next table. This is an all-inclusive list of available countermeasures for the risk assessment toll; countermeasures not on the list should not be considered.

The concept of employing countermeasures is evident with barriers that have a risk score just above the risk threshold. For such barriers, installing countermeasures should reduce the future number of crashes by a given amount, based on the countermeasure. Depending on the factored crash rate, reducing the number of crashes will lower the overall risk score. Thus, barriers that were classified as “reconstruct/replace” may be able to be reclassified as “repair”.

The decision to include any of the engineering countermeasures can be done only when the risk score is over the risk threshold by three points or less. When countermeasures are employed to reduce the risk score, they must be based on engineering judgment. The GIP database will allow the user to select up to three countermeasures to reduce the risk score under the threshold, based on crash reduction factors from the FHWA publication “Desktop Reference for Crash Reduction Factors” FHWA-SA-07-015.

Proposed Countermeasures.

COUNTERMEASURE	CRASH REDUCTION FACTOR
Speed Feedback Signs	0.46
Flashing Beacons On Warning Signs	0.30
Centerline Pavement Marking	0.30
Lighting	0.25
Chevrons	0.20
Warning Signs	0.20
Barrier Reflectors	0.16
Grooved Pavement Surface	0.15
Edgeline Pavement Marking	0.12
Shoulder Rumble Strips	0.12
Delineators on Curve and Tangent	0.05
Centerline Rumble Strips	0.04
Wider Edgeline	0.02
Wider Centerline	0.02

Maintaining Barriers As Is

Individual barrier elements and roadside conditions are interrelated. Sometimes, barrier deficiencies will be obvious and the best course of action is apparent; however, in context sensitive environments barrier deficiencies may be marginal and a decision will be based on judgment.

If risk is low (as determined by the assessment of variables such as traffic speeds, volumes), it may be acceptable for an historical or culturally significant barrier that does not meet current crashworthiness standards to remain until changes in risk factors would require an upgrading.

If the maintaining barrier as is alternative is the preferred choice through this approach, low cost mitigation measures may be considered to improve safety, such as improving roadside delineation (e.g., pavement markings / rumble strip(e)s, etc.), improving visibility (e.g., advance warning signs, increased sign size, etc.), upgrading the roadway shoulder, or improving skid resistance of the road surface. Although these measures will not reduce crash severity of an errant vehicle impact, these improvements have been tried or proven to reduce the frequency or probability of a vehicle striking the barrier.

Barrier Repair

If a barrier has been damaged due to a crash or there are parts that have deteriorated due to age or weathering but the majority of the barrier meets current crashworthiness standards and is functionally sound, repairing the system can be considered a viable option. Examples of these improvements include replacing damaged timber rail, removing a corroded, weathered steel post and replacing with new, upgraded guardrail blockouts to meet standards on high speed facilities or repointing, resetting or replacing loose or missing stones on the concrete corewalls of stone masonry guardwalls. Pursuing a repair approach should be the first consideration for Roadway Category A and B road assets.

For barriers that do not meet crashworthiness criteria but are functionally sound and have been determined good candidates to be maintained as-is based on the risk assessment and application of asset management roadway categories, repair could include measures such as repointing deteriorated masonry, re-setting or replacing loose, broken or missing stones, restoring walls to their original height (by adding a concrete footing, for example), restoring or improving drainage through or under walls or restoring wall foundations. Alterations to improve safety may also be considered, such as adding or changing end treatments or other mitigation measures as mentioned above.

For historic, stone masonry barriers that have a risk score below the threshold, it is possible that portions of the barrier need to be removed and reset in order increase the height of the barrier. The following guidelines are provided to assist in determining when this should be done and to what height the barrier should be rebuilt:

1. If all or a portion of stone masonry guardwall has a deficient height based upon the Severity Description Charts, that is, at worst, within the fair category, do not raise it. (Other work besides raising the barrier can be specified.)
2. If a portion of a stone masonry guardwall has a deficiency in height based upon the Severity Description Charts, considered “poor” (assumed typically to be less than 18-in) write a work order to raise the poor segment to the height of the adjacent barrier with a non-poor height.
3. If the entire stone masonry guardwall is in poor condition due to height based upon the Severity Description Charts– write a work order to raise the entire segment to its design height (assumed typically to be 24-in).

For aesthetic barrier systems used on many park roads and parkways, there is not a sufficient bid history database for estimating costs to repair or replace individual elements of the system, such as posts or rail. Usually repair of an aesthetic barrier system, such as steel-backed timber guardrail consists of removing and resetting the post or rail section or raising the guardrail to meet standard height requirements.

Barrier Replacement/Reconstruction

If the risk analysis, including the application of asset management roadway categories, indicates the barrier poses an unacceptable safety risk, the first step should be an analysis to determine if there are mitigating measures that can be applied to reduce the risk to an acceptable level without the need to reconstruct the barrier. A second step is to determine if the barrier is needed. If it is practical to eliminate the shielded hazard (by removal, relocation or redesign) removal of the barrier should be considered. However, if the shielded hazard cannot be eliminated or if it is determined inappropriate to remove the barrier (e.g., it is historically significant and/or contributes to the historical or aesthetic significance of the associated road, district or landscape), reconstruction or replacement of the barrier to meet current criteria for crashworthiness may be the appropriate recommended treatment.

The typical reconstruction option used by the NPS for stone masonry guardwalls is to document then dismantle the existing barrier, construct a concrete core and build a stone masonry veneer around the concrete core using the original wall materials and using stone masonry designs that are compatible with the historic road, district or landscape. A number of concrete core stone masonry barrier types have been designed for use in national parks, including 18-in, 22-in, 24-in and 27-in barriers; however, not all have been crash tested or otherwise determined to meet current criteria for crashworthiness.

WORK ORDERS

Work order preparation is essentially determining and documenting the repair actions needed to correct the deficiencies observed during the condition assessment. Barriers are relatively simple structures so this determination can be made by trained inspectors. Keep in mind that this is not a design environment and that more rigorous analysis (if needed) may change the work that is actually performed. The intent of this effort is to prepare a credible estimate of deferred maintenance that may or may not be directly actionable. Simple repairs and/or those that require no compliance with environmental policies (which may be a large percentage of the work orders) can probably be executed without modification.

Once a repair strategy is determined, a cost must be developed for the proposed action. Work orders will be classified as being either deferred maintenance or capital improvement. This classification is based on the type of work recommended, as defined below.

Definition: *Deferred Maintenance* can be classified as repair or replace in kind. Work done to the barrier does not include any upgrading.

Definition: *Capital Improvement* can be classified as upgrading existing barrier. Typically the upgrade will be from a non-crashworthy to a crashworthy device. Other examples of capital improvements would be the addition of a curb to improve drainage or the inclusion of any countermeasure.

There are four types of work:

- No Action
- Monitor
- Repair
- Replace

“No Action” – if risk is low (based on the GIP risk score), a barrier that does not meet current crashworthy performance standards may be acceptable to remain until changes in risk factors would require upgrading.

“Monitor” – if risk is low (based on the GIP risk score), a barrier that does not meet current crashworthy performance standards may be acceptable to remain until changes in risk factors would require upgrading, however, if conditions exist that the park should monitor (e.g., erosion), then “monitor” can be selected as a recommended action.

“Repair” – considered when a barrier damaged by impact deteriorated due to age/weathering and the barrier is functionally sound in a low risk environment. The goal is to bring the barrier back to its “new” condition.

“Replacement/Reconstruction” – when a barrier poses an unacceptable safety risk:

1. If the risk score is less than 3 points above the risk threshold, determine if countermeasures can reduce risk so the barrier can be repaired.
2. Determine if the barrier is warranted and either shielded hazard or barrier itself can be removed (only when barrier NOT considered historically/culturally significant)

For all barrier repair/replace/reconstruction recommendations, the NPS will vet the recommendations through a project selection, planning and design process, including compliance with:

National Historic Preservation Act (NHPA)

National Environmental Policy Act (NEPA)

Aesthetic barriers are commensurate with an approved crashworthy design for the specific conditions at the barrier site as the basis for selecting a crashworthy structure. Types of barriers are generally selected based on emulating the existing types of barriers in the park.