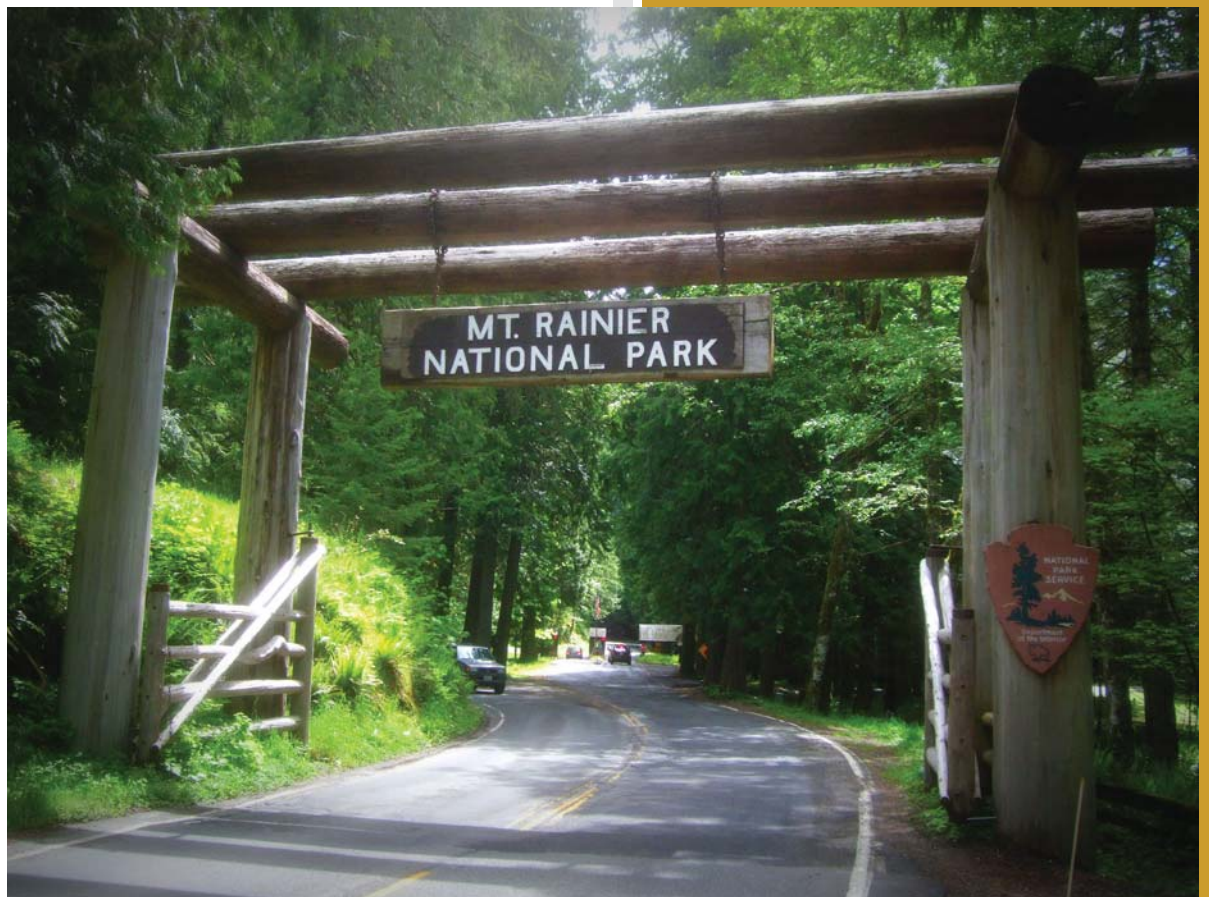


MORA

GIP Report

**NPS Guardwall/Rail Inventory Program
Mount Rainier National Park**



**Federal Lands Highway
Road Inventory Program**

Prepared By:

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

**Data Collection Date: October 2009
Report Date: December 2015**

Mount Rainier National Park in Washington



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
Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors



Table of Contents

SECTION	PAGE NO.
1. INTRODUCTION	1 - 1
2. PARK BARRIER LOCATION MAPS Retaining Barrier Location Maps	2 - 1
3. TIER 1 - PARK BARRIER OVERVIEW	3 - 1
4. TIER 2 - ROUTE BARRIER OVERVIEW	4 - 1
5. TIER 3 - BARRIER DETAILS	5 - 1
6. APPENDIX A - SUMMARY OF GIP DEFINITIONS	A - 1

Introduction



Mount Rainier National Park



**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



Mount Rainier National Park

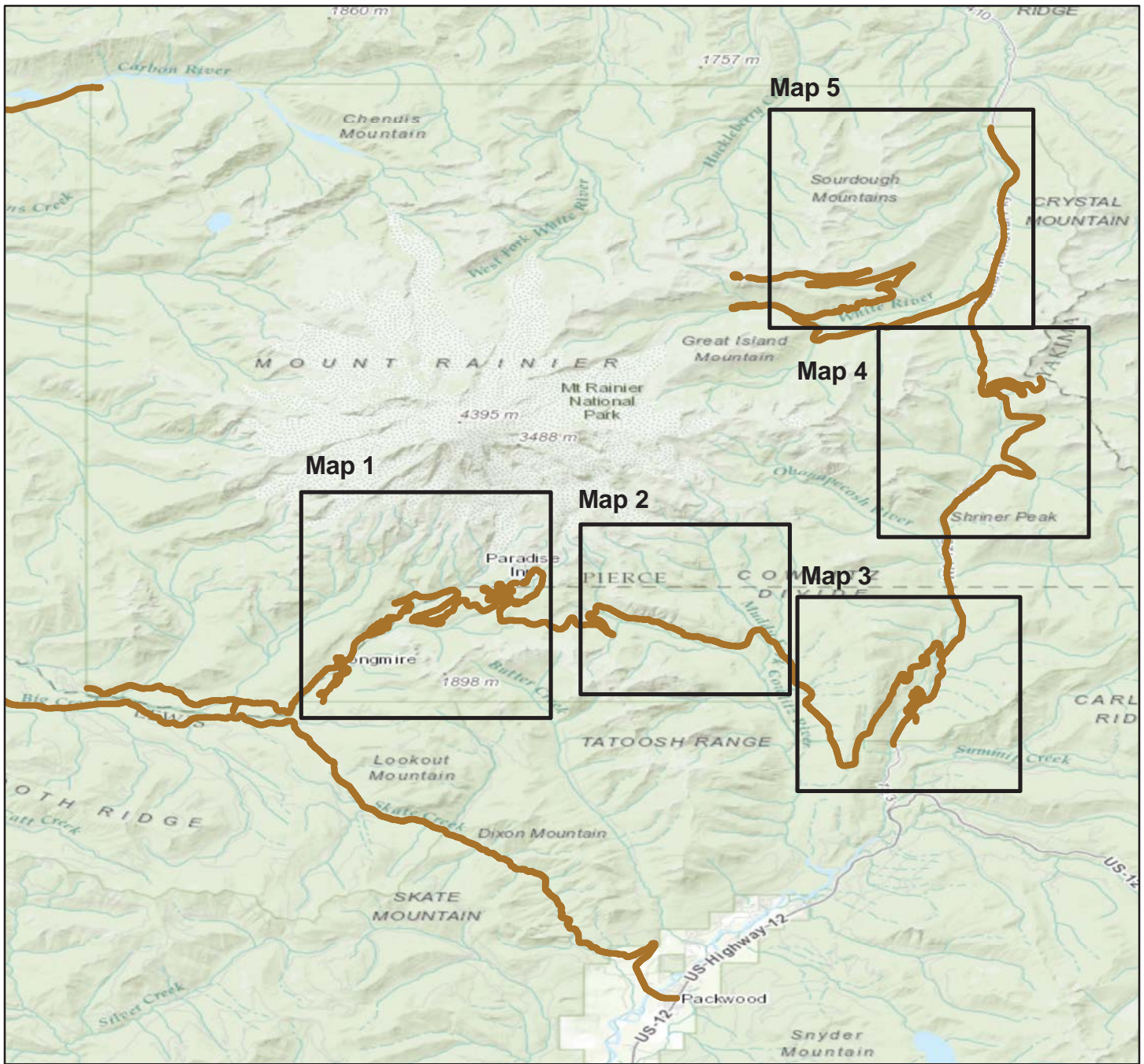


**Federal Lands Highway
Road Inventory Program**

Mount Rainier National Park

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

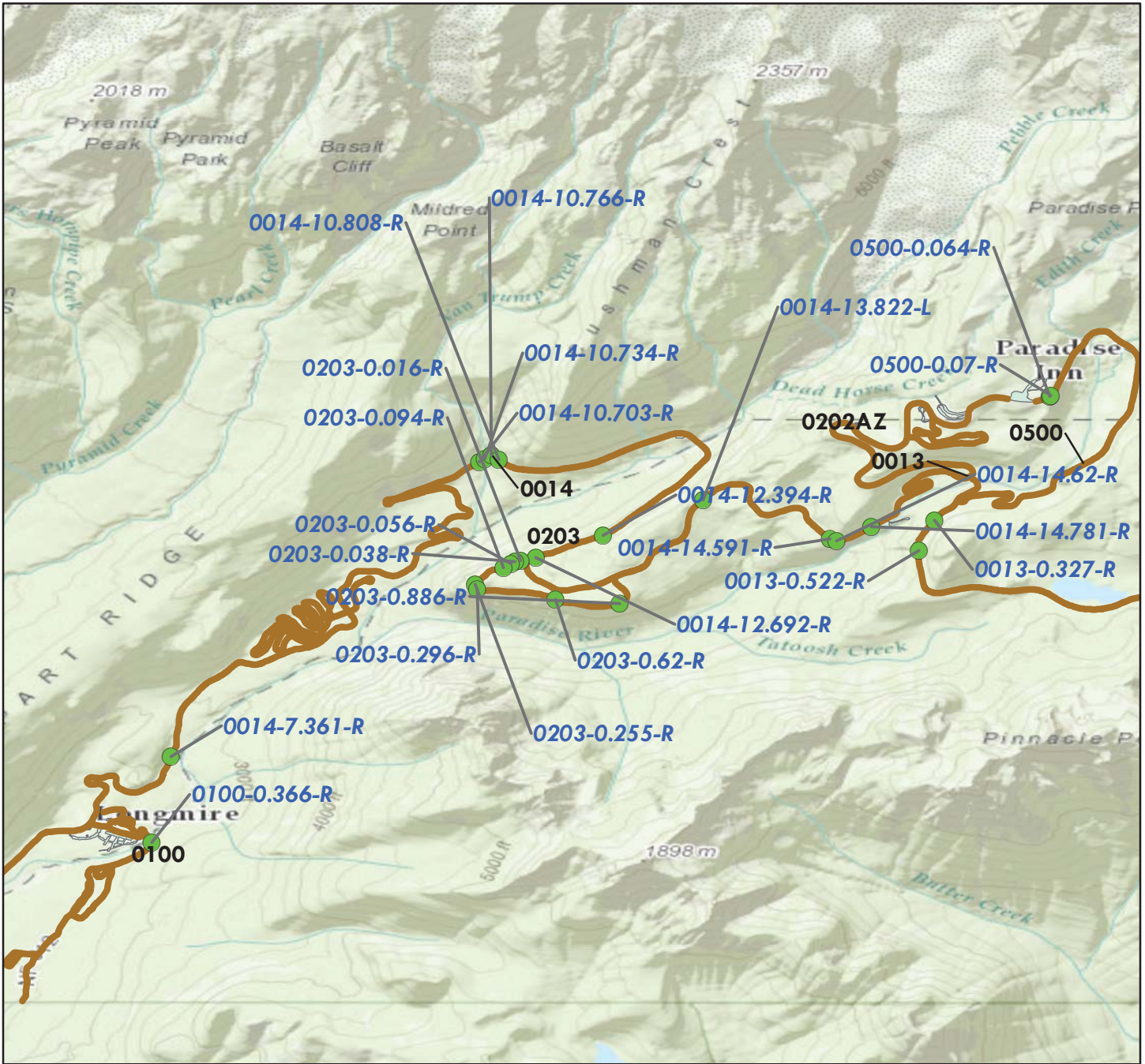
 RIP Collected Routes



Mount Rainier National Park

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

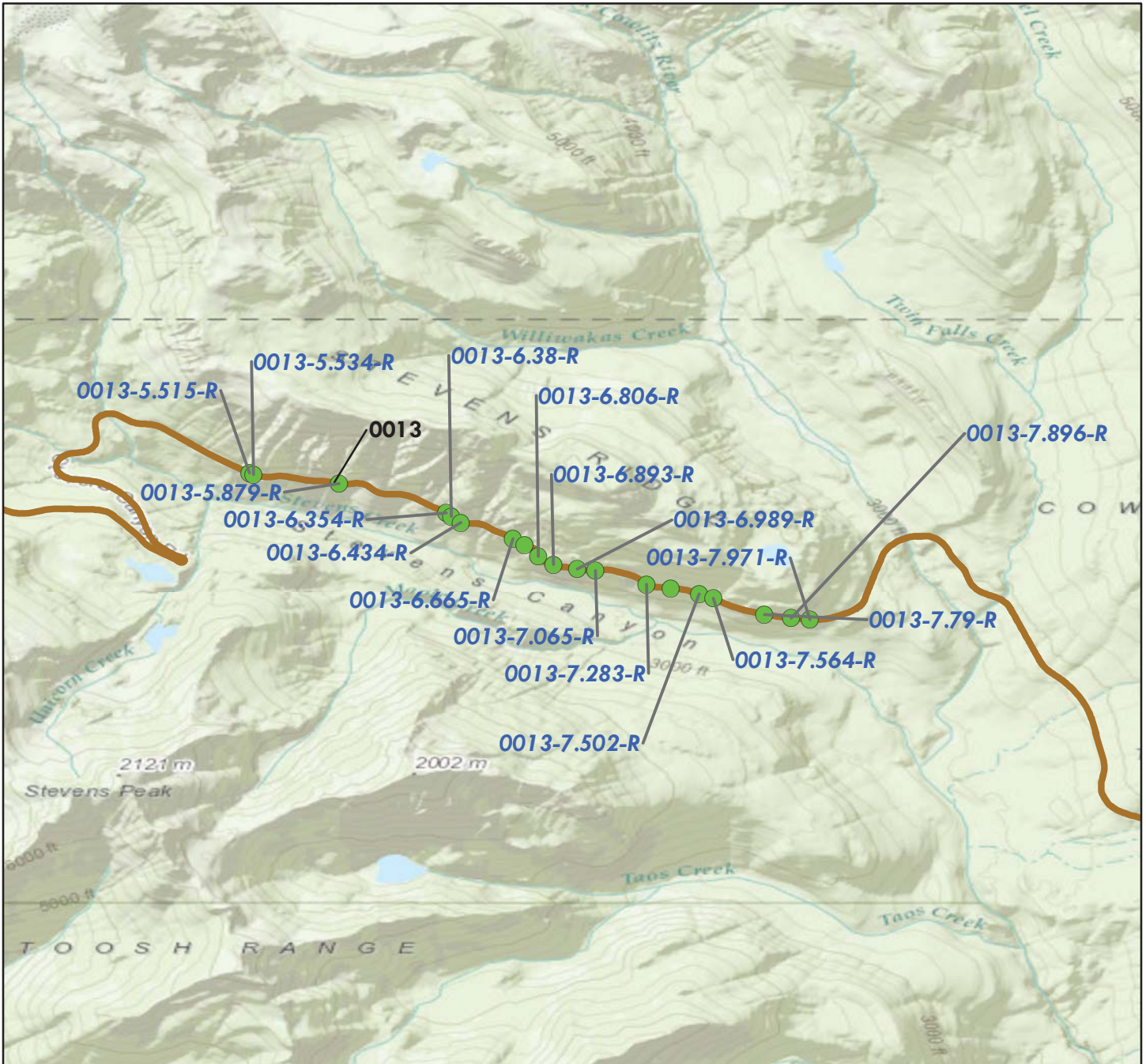
— RIP Collected Routes



Mount Rainier National Park

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**

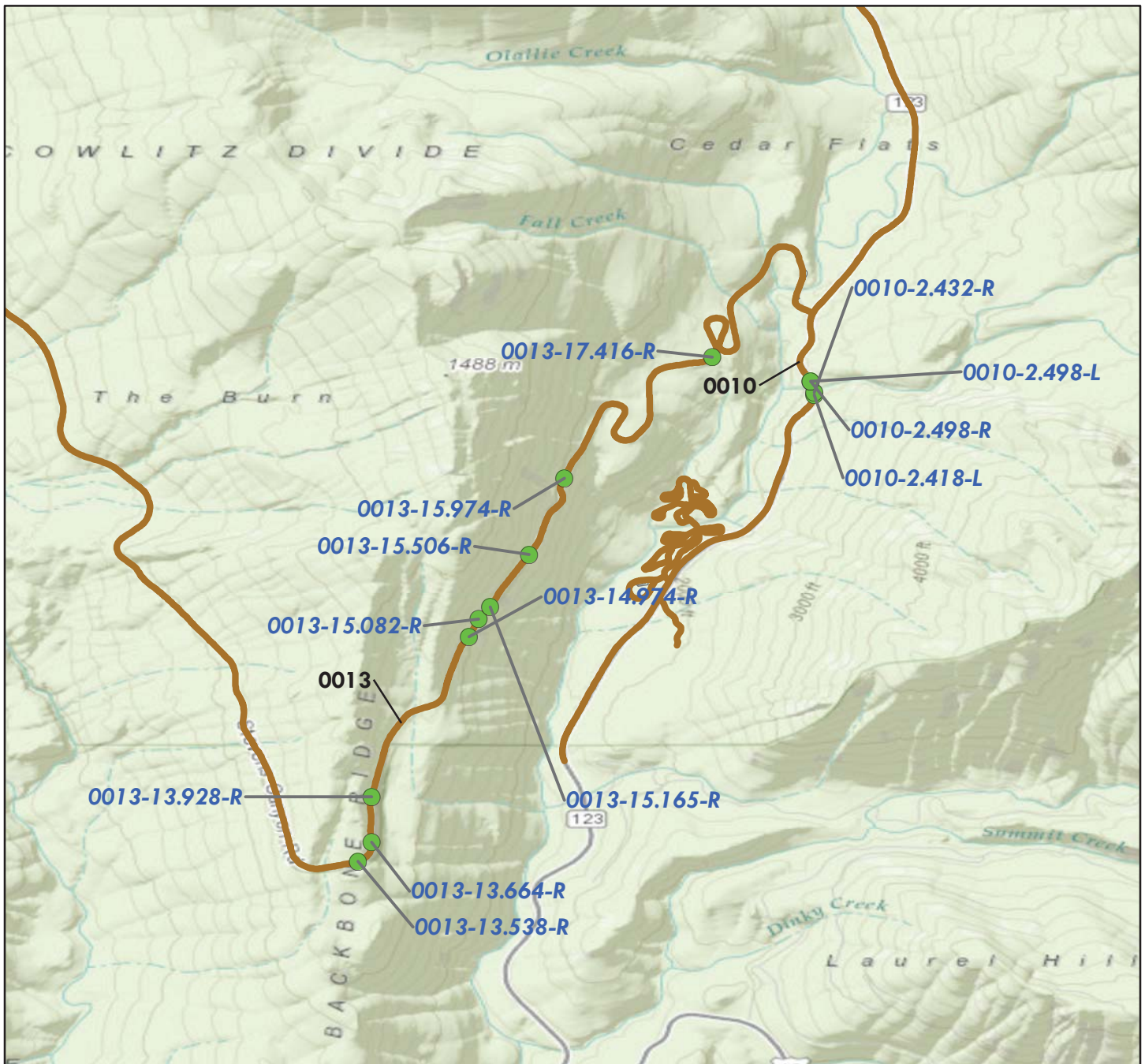
 **RIP Collected Routes**



Mount Rainier National Park

BARRIER LOCATION MAP

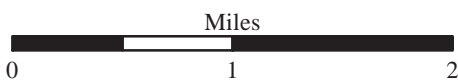
Map 3



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

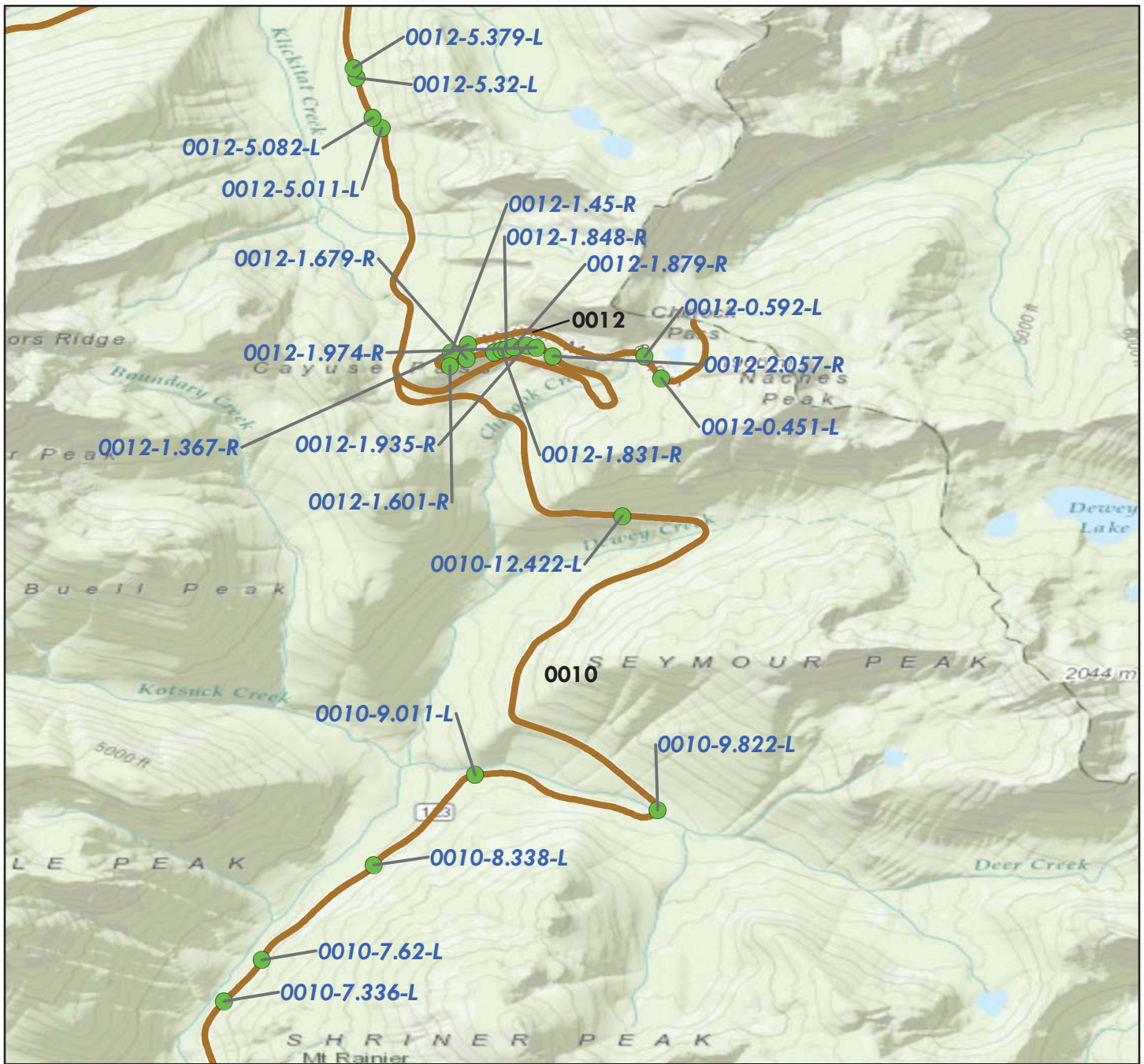
— RIP Collected Routes



Mount Rainier National Park

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

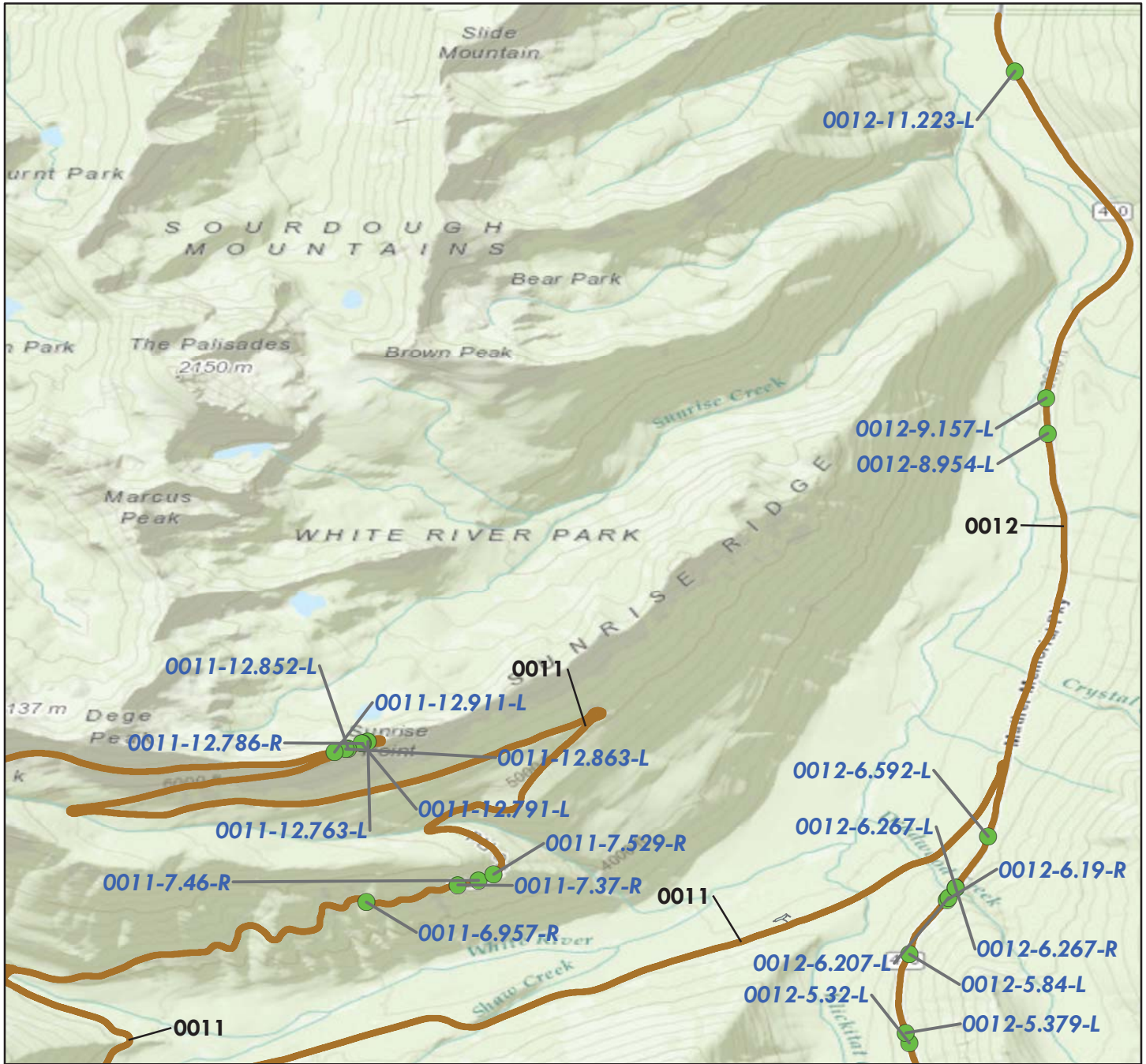
— RIP Collected Routes



Mount Rainier National Park

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



Mount Rainier National Park



**Federal Lands Highway
Road Inventory Program**

Parkwide Summary: Mount Rainier National Park

Initial barrier inspections were conducted at Mount Rainier National Park in 2009, and encompassed all known barriers associated with Park roadways. In general, walls are not included in this assessment, but were inspected for Mount Rainier National Park in 2007 under a separate effort as part of the Retaining Wall Inventory Program (WIP). A report for WIP is available under separate cover.

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, 99 barriers were inventoried on the routes listed below.

Table 1: Number of Barriers by Route

Route Number	Route Name	No. of Barriers
0010	STATE ROUTE 123 (EAST SIDE HIGHWAY)	10
0011	SUNRISE ROAD	10
0012	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)	26
0013	STEVENS CANYON ROAD	30
0014	STATE ROUTE 706 (NISQUALLY ROAD)	11
0100	LONGMIRE SOUTH BACK GATE ROAD	1
0203	MILLER CUT OFF / RICKSECKER POINT LOOP ROAD	8
0207	MOWICH ROAD	1
0500	VALLEY 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
NON-TRAFFIC	17
TRAFFIC	82

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
W-Beam Strong Post	2
Stone Masonry Crenellated Without Core Wall	30
Concrete With Simulated Stone Face	9
Other: Timber Rail On Concrete Posts	5
Stone Masonry With Concrete Core Wall	17
Stone Masonry Without Concrete Core Wall	32
Concrete Barrier	1
Steel-Backed Timber With Blockout	3

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	43
Monitor	\$0	1
Repair	\$3,189,185	50
Replace	\$455,455	5
Totals	\$3,644,640	99

*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	44
\$1 - \$25,000	37
\$25,001 - \$50,000	4
\$50,001 - \$100,000	4
\$100,001 - \$250,000	5
\$250,001 - \$500,000	4
\$500,001 - \$1,000,000	1
\$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	99

*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 4 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



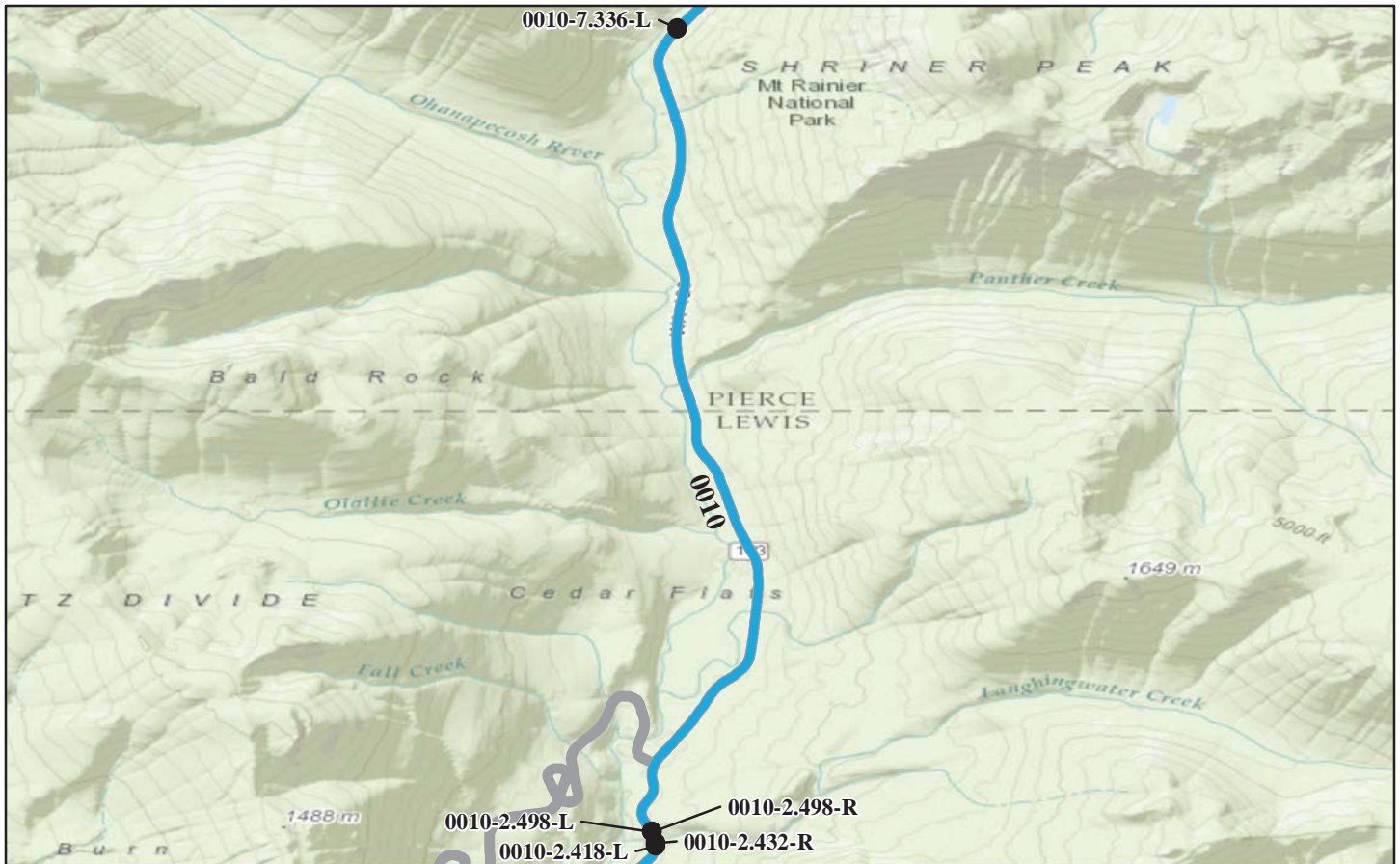
Mount Rainier National Park



**Federal Lands Highway
Road Inventory Program**

Mount Rainier National Park

ROUTE 0010: STATE ROUTE 123 (EAST SIDE HIGHWAY)



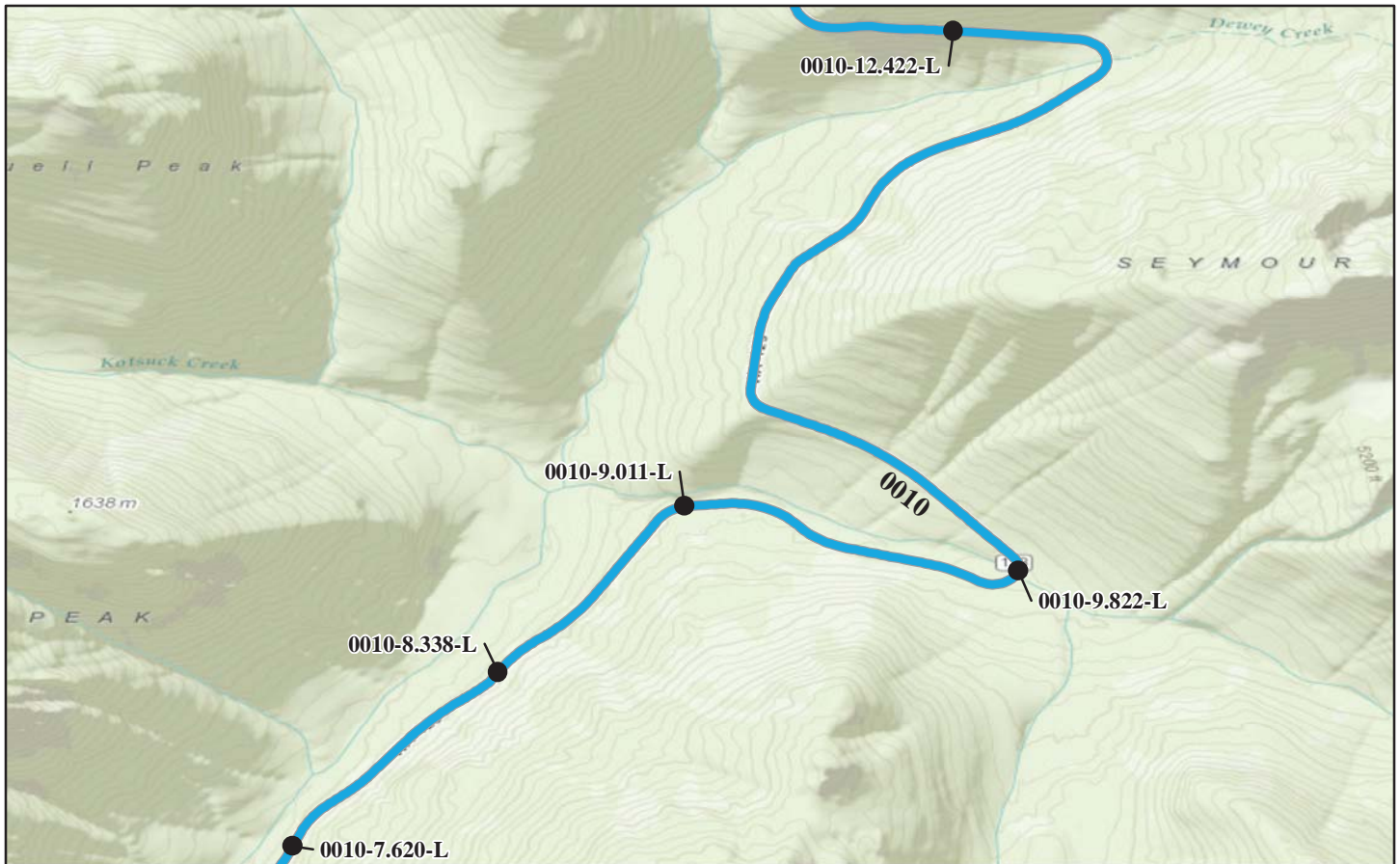
Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
MORA-0010-2.418-L 10/19/2009	130	CONCRETE WITH SIMULATED STONE FACE	NONE	NONE	\$0.00
MORA-0010-2.432-R 10/19/2009	57	CONCRETE WITH SIMULATED STONE FACE	NONE	NONE	\$0.00
MORA-0010-2.498-L 10/19/2009	133	CONCRETE WITH SIMULATED STONE FACE	NONE	NONE	\$0.00
MORA-0010-2.498-R 10/19/2009	62	CONCRETE WITH SIMULATED STONE FACE	NONE	NONE	\$0.00
MORA-0010-7.336-L 10/19/2009	93	STEEL-BACKED TIMBER WITH BLOCKOUT	NONE	NONE	\$3,119.00

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

Mount Rainier National Park

ROUTE 0010: STATE ROUTE 123 (EAST SIDE HIGHWAY)



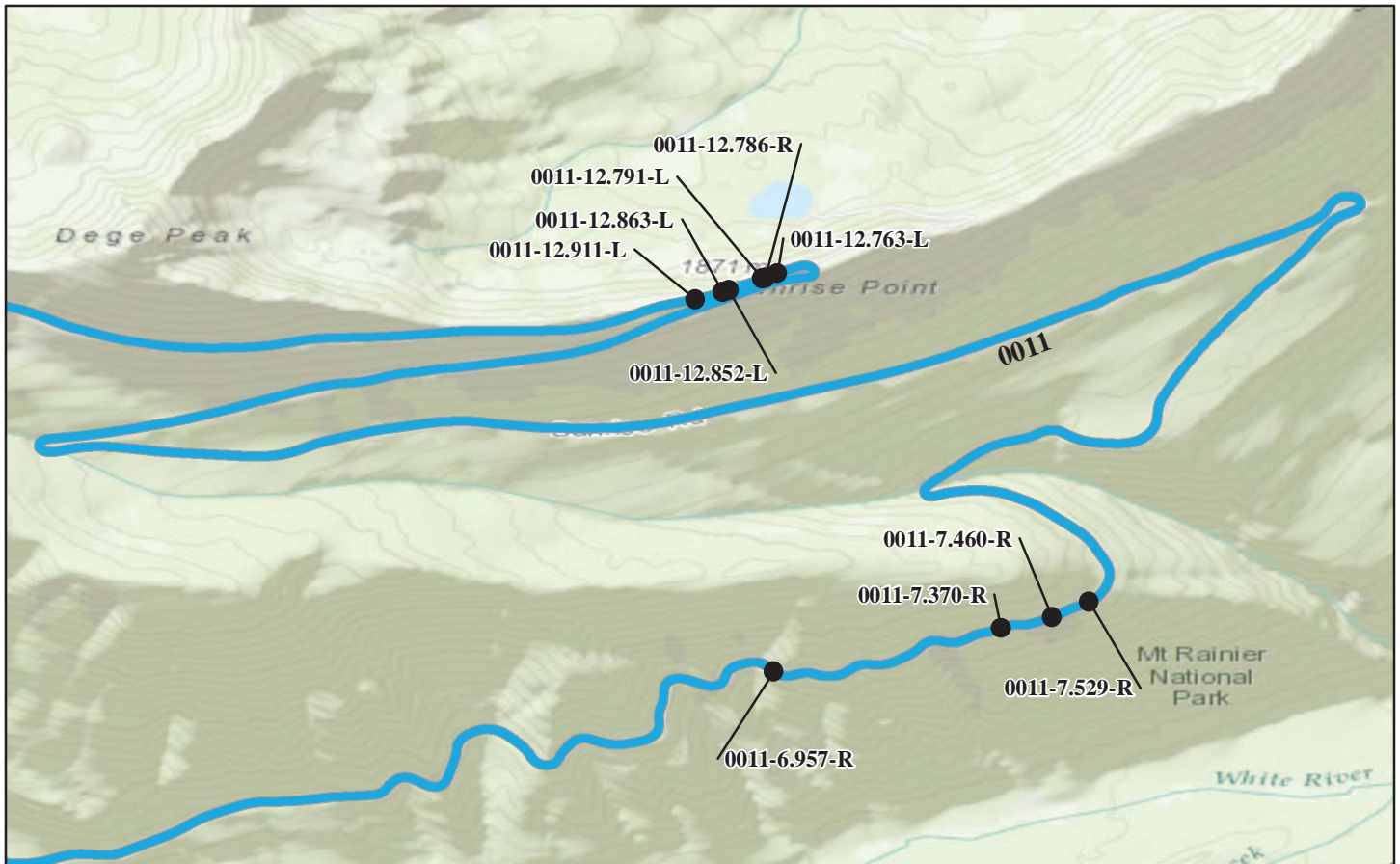
Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
MORA-0010-7.620-L 10/19/2009	540	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$15,417.00
MORA-0010-8.338-L 10/19/2009	581	STEEL-BACKED TIMBER WITH BLOCKOUT	NONE	NONE	\$3,823.00
MORA-0010-9.011-L 10/19/2009	234	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$0.00
MORA-0010-9.822-L 10/19/2009	71	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$0.00
MORA-0010-12.422-L 10/19/2009	1530	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$0.00

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

Mount Rainier National Park

ROUTE 0011: SUNRISE ROAD



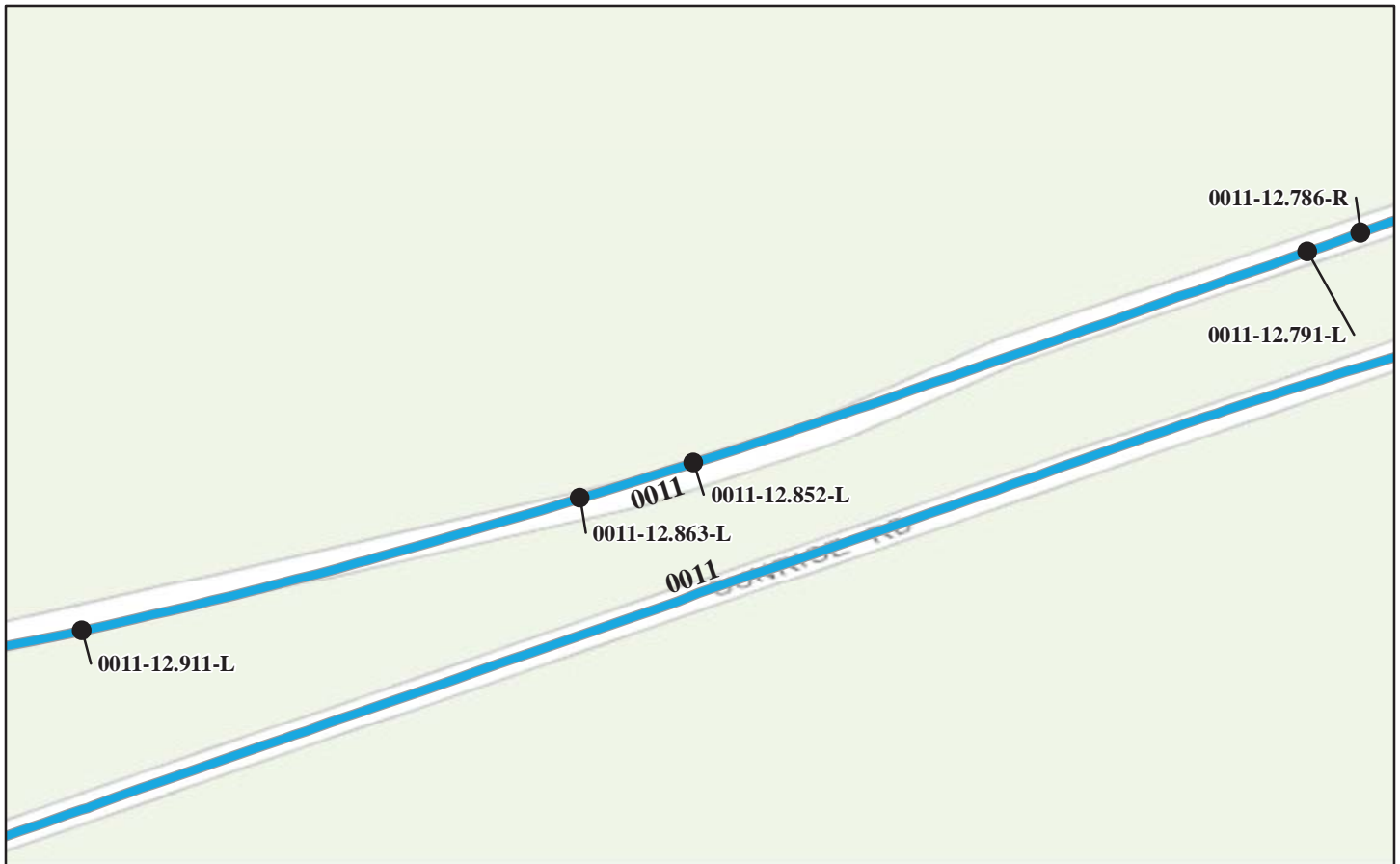
Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
MORA-0011-6.957-R 10/18/2009	103	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$2,415.00
MORA-0011-7.370-R 10/18/2009	262	CONCRETE WITH SIMULATED STONE FACE	NONE	NONE	\$0.00
MORA-0011-7.460-R 10/18/2009	139	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$0.00
MORA-0011-7.529-R 10/18/2009	627	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$154,204.00
MORA-0011-12.763-L 10/18/2009	118	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$0.00

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

Mount Rainier National Park

ROUTE 0011: SUNRISE ROAD



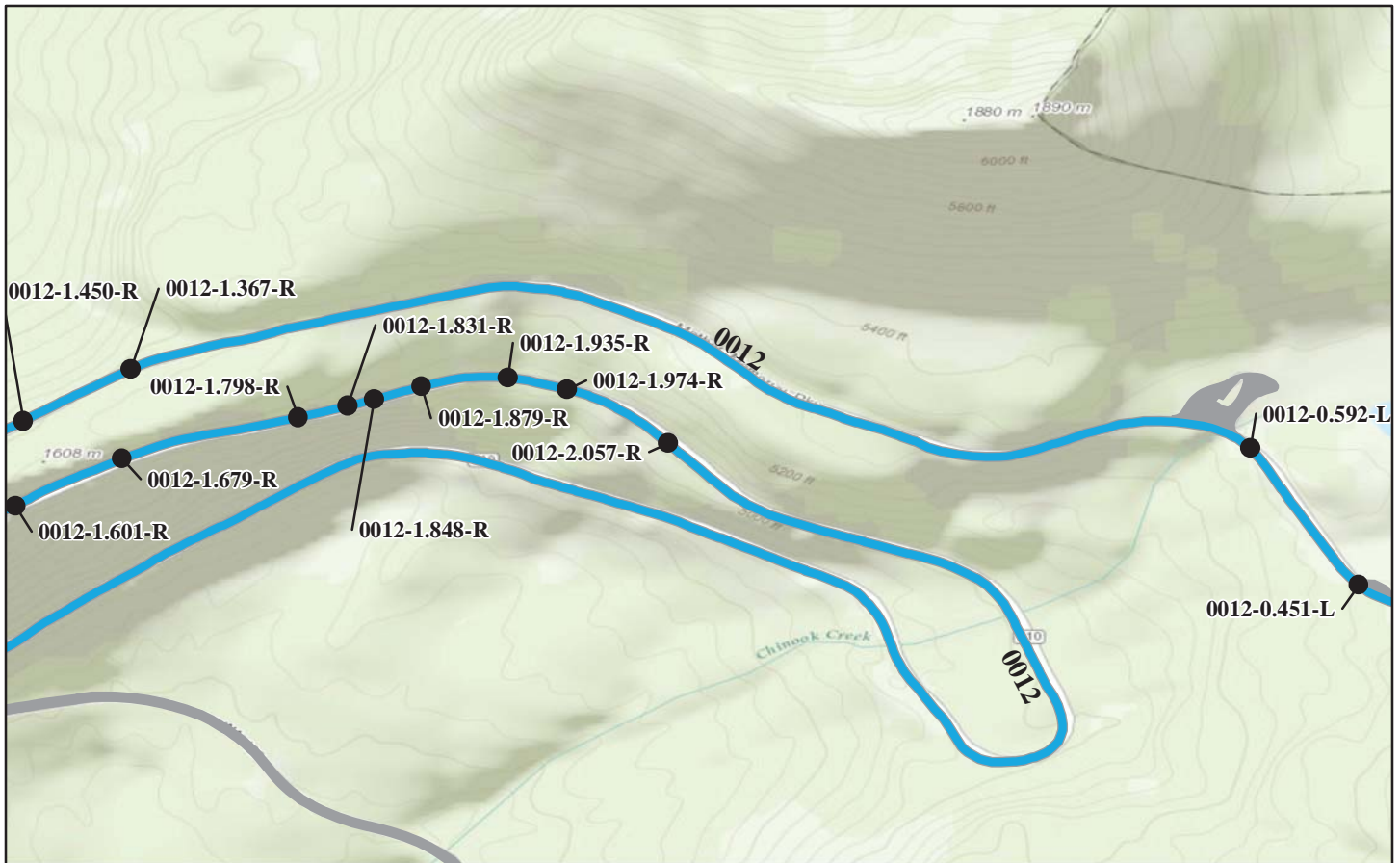
Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
MORA-0011-12.786-R 10/18/2009	145	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$0.00
MORA-0011-12.791-L 10/18/2009	185	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$0.00
MORA-0011-12.852-L 10/18/2009	26	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$0.00
MORA-0011-12.863-L 10/18/2009	228	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$0.00
MORA-0011-12.911-L 10/18/2009	23	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$0.00

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

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)



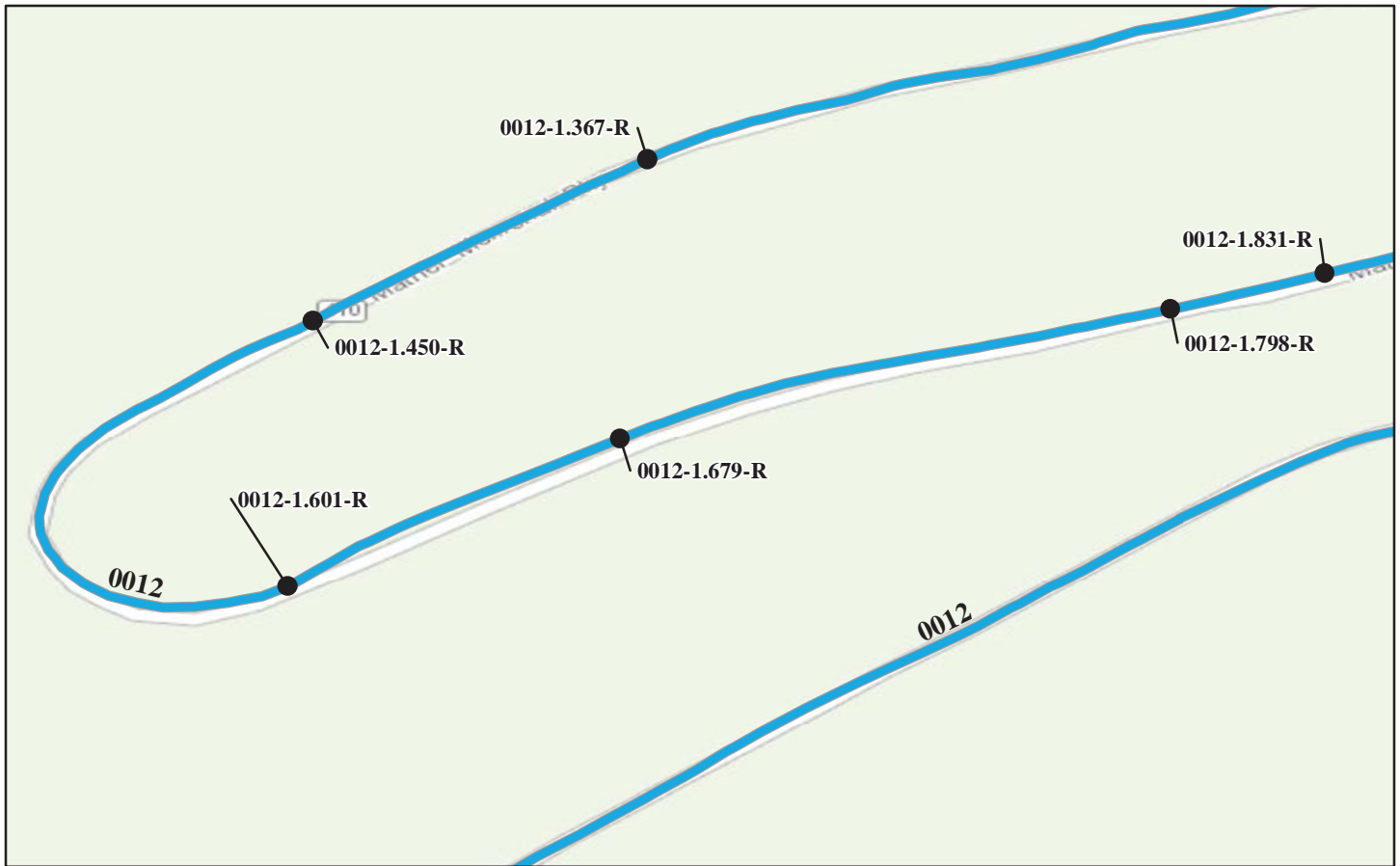
Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
MORA-0012-0.451-L 10/18/2009	401	STONE MASONRY WITH CONCRETE CORE WALL	NONE	NONE	\$4,087.00
MORA-0012-0.592-L 10/18/2009	1106	STONE MASONRY WITH CONCRETE CORE WALL	NONE	NONE	\$17,980.00
MORA-0012-1.367-R 10/18/2009	375	STONE MASONRY WITH CONCRETE CORE WALL	NONE	NONE	\$2,877.00

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

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)



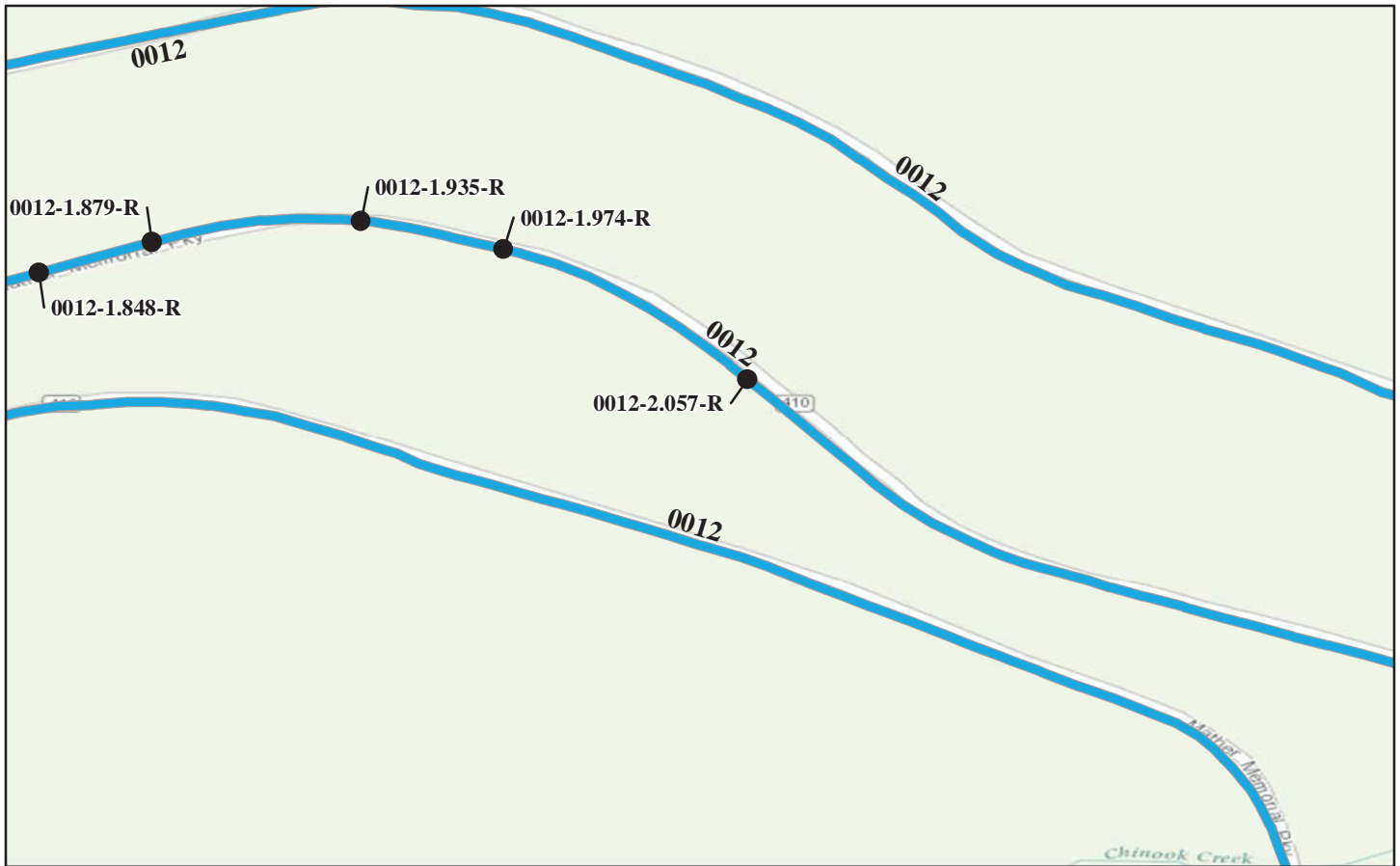
Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
MORA-0012-1.450-R 10/18/2009	426	STONE MASONRY WITH CONCRETE CORE WALL	NONE	NONE	\$4,406.00
MORA-0012-1.601-R 10/18/2009	236	STONE MASONRY WITH CONCRETE CORE WALL	NONE	NONE	\$2,327.00
MORA-0012-1.679-R 10/18/2009	604	STONE MASONRY WITH CONCRETE CORE WALL	NONE	NONE	\$5,209.00
MORA-0012-1.798-R 10/18/2009	129	STONE MASONRY WITH CONCRETE CORE WALL	NONE	NONE	\$0.00
MORA-0012-1.831-R 10/18/2009	30	STONE MASONRY WITH CONCRETE CORE WALL	NONE	NONE	\$2,173.00

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

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)



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	
MORA-0012-1.848-R 10/18/2009	78	STONE MASONRY WITH CONCRETE CORE WALL	NONE	NONE	\$0.00
MORA-0012-1.879-R 10/18/2009	233	STONE MASONRY WITH CONCRETE CORE WALL	NONE	NONE	\$1,777.00
MORA-0012-1.935-R 10/18/2009	84	STONE MASONRY WITH CONCRETE CORE WALL	NONE	NONE	\$0.00
MORA-0012-1.974-R 10/18/2009	136	STONE MASONRY WITH CONCRETE CORE WALL	NONE	NONE	\$2,723.00
MORA-0012-2.057-R 10/18/2009	1011	STONE MASONRY WITH CONCRETE CORE WALL	NONE	NONE	\$2,327.00

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

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)



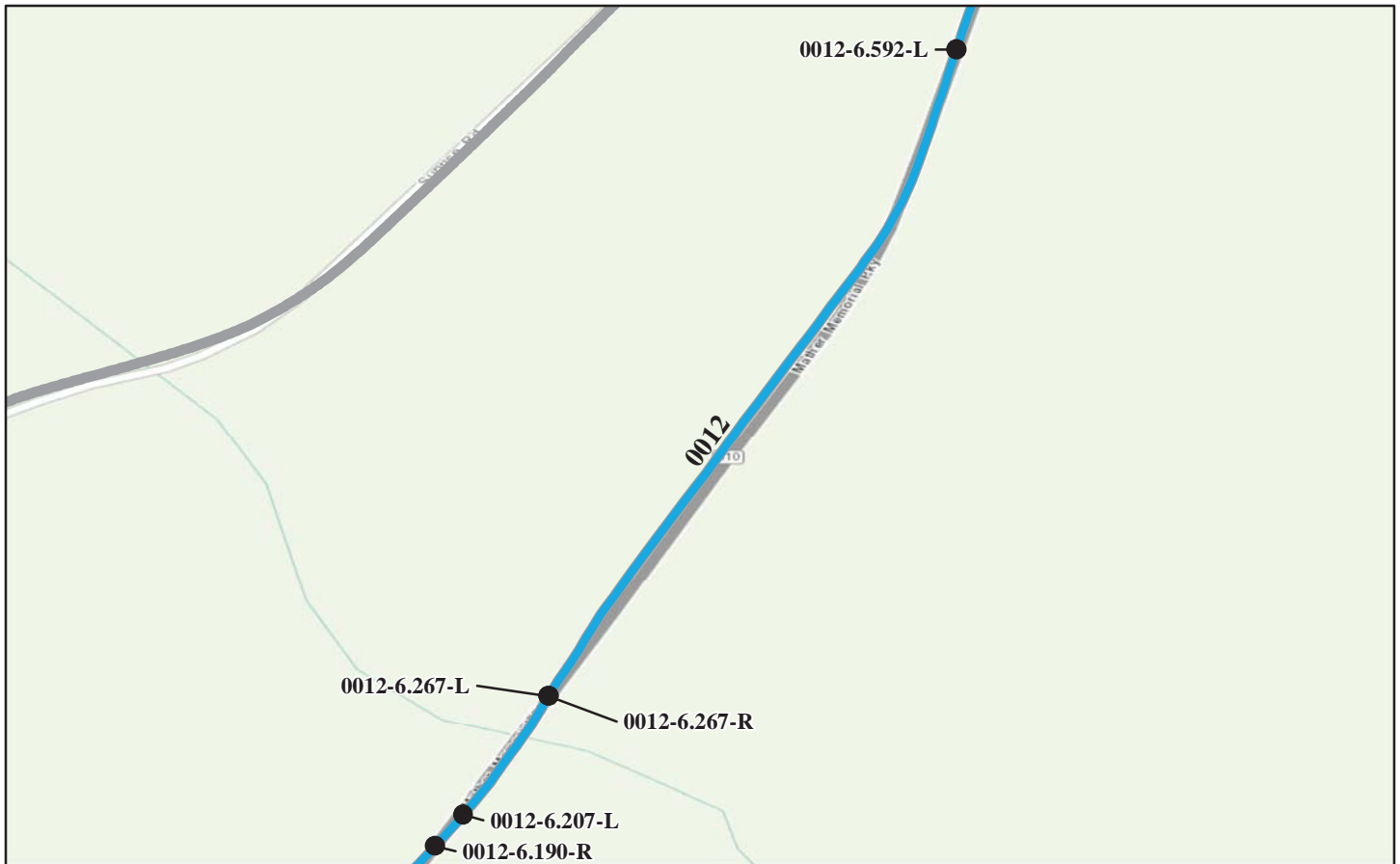
Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
MORA-0012-5.011-L 10/18/2009	204	OTHER: TIMBER RAIL ON CONCRETE POSTS	NONE	NONE	\$24,409.00
MORA-0012-5.082-L 10/18/2009	1167	OTHER: TIMBER RAIL ON CONCRETE POSTS	NONE	NONE	\$100,947.00
MORA-0012-5.320-L 10/18/2009	259	OTHER: TIMBER RAIL ON CONCRETE POSTS	NONE	NONE	\$28,039.00
MORA-0012-5.379-L 10/18/2009	1938	OTHER: TIMBER RAIL ON CONCRETE POSTS	NONE	NONE	\$197,857.00
MORA-0012-5.840-L 10/19/2009	1223	OTHER: TIMBER RAIL ON CONCRETE POSTS	NONE	NONE	\$104,203.00

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

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)



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	
MORA-0012-6.190-R 10/18/2009	152	CONCRETE WITH SIMULATED STONE FACE	NONE	NONE	\$0.00
MORA-0012-6.207-L 10/18/2009	52	CONCRETE WITH SIMULATED STONE FACE	NONE	NONE	\$0.00
MORA-0012-6.267-L 10/18/2009	50	CONCRETE WITH SIMULATED STONE FACE	NONE	NONE	\$0.00
MORA-0012-6.267-R 10/18/2009	162	CONCRETE WITH SIMULATED STONE FACE	NONE	NONE	\$0.00
MORA-0012-6.592-L 10/18/2009	57	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$9,246.00

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

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)



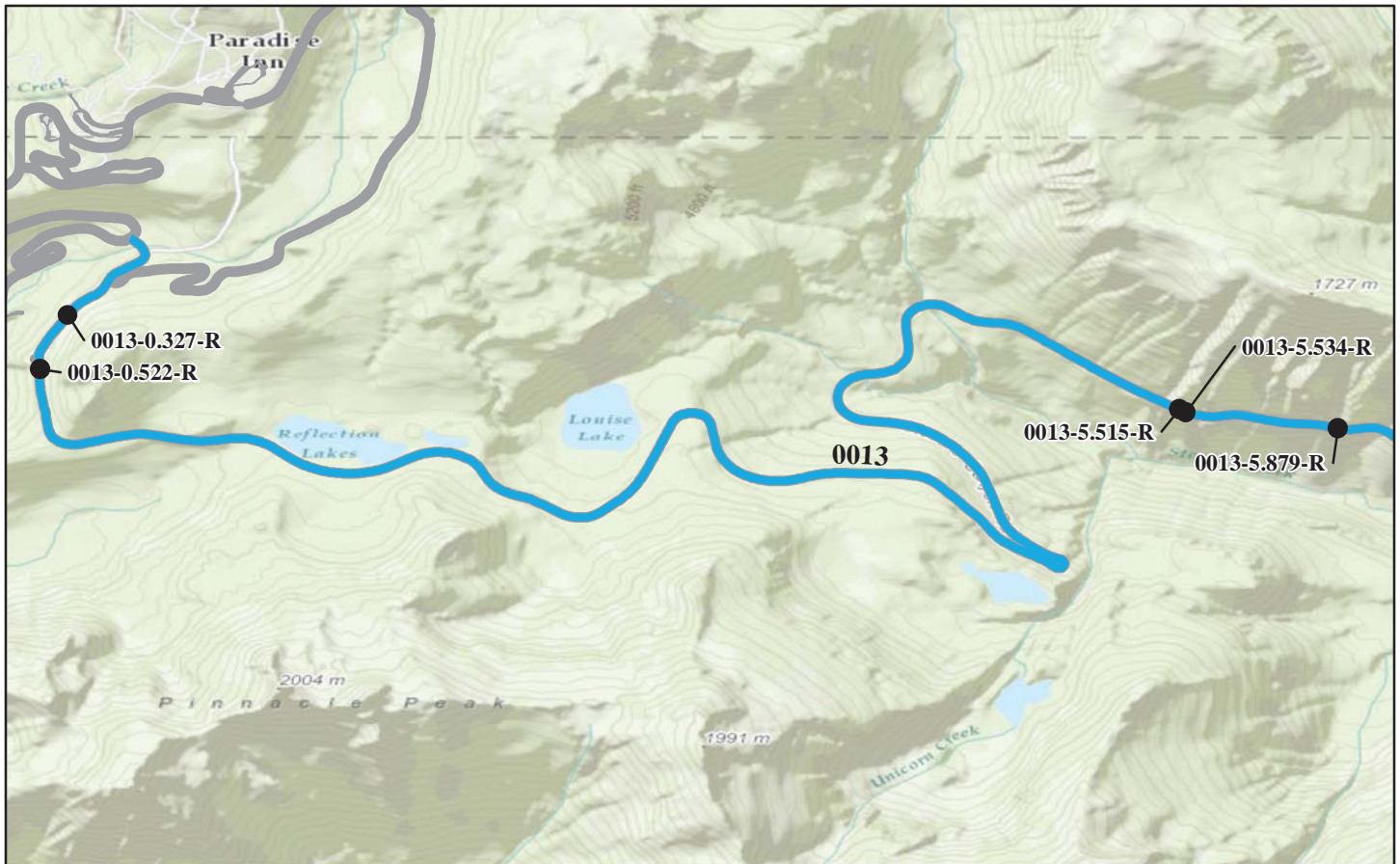
Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
MORA-0012-8.954-L 10/19/2009	44	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$44,468.00
MORA-0012-9.157-L 10/19/2009	23	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$21,945.00
MORA-0012-11.223-L 10/19/2009	245	CONCRETE BARRIER	NONE	NONE	\$0.00

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

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD



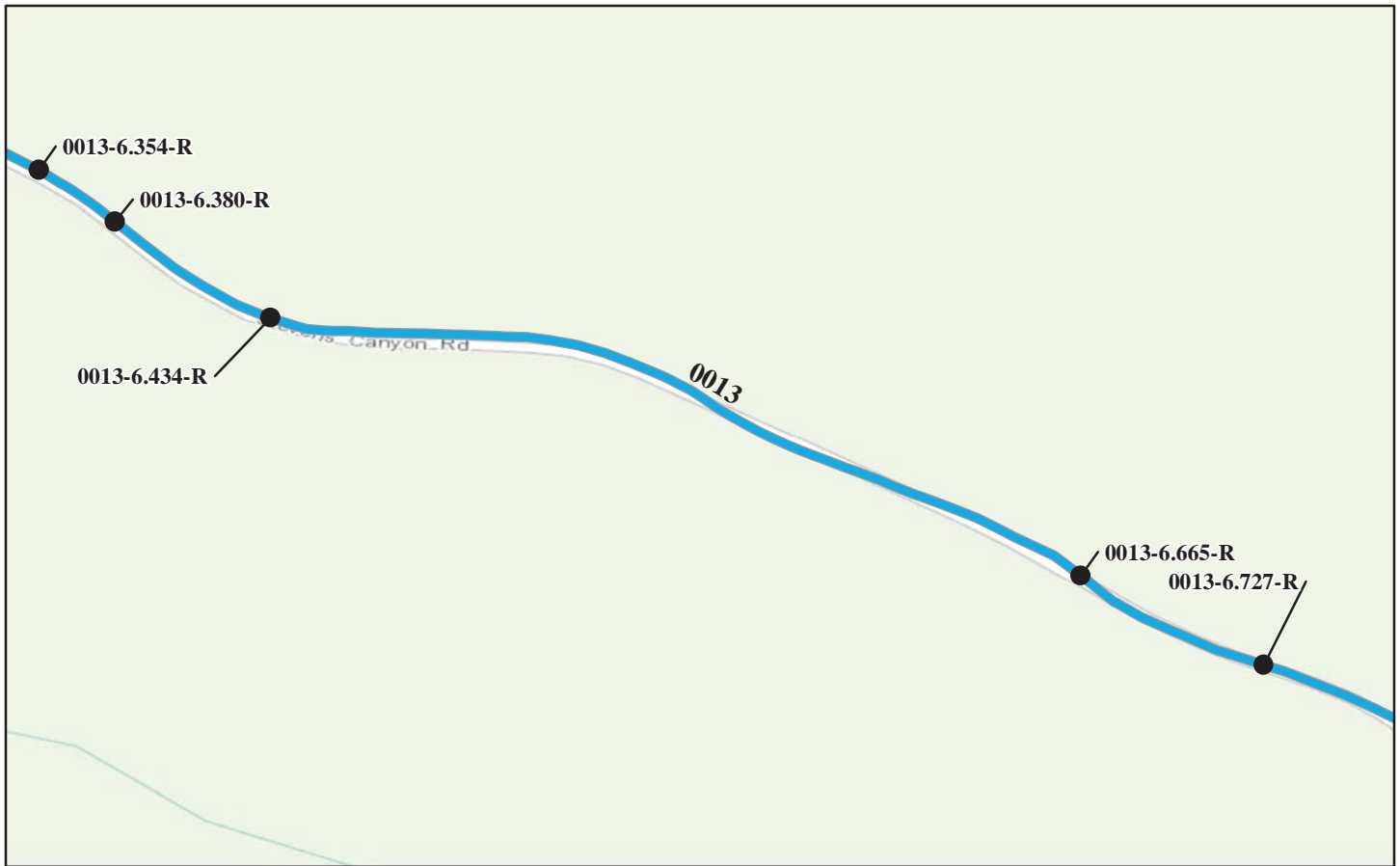
Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
MORA-0013-0.327-R 10/20/2009	754	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$250,239.00
MORA-0013-0.522-R 10/20/2009	876	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$0.00
MORA-0013-5.515-R 10/20/2009	115	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$0.00
MORA-0013-5.534-R 10/20/2009	95	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$0.00
MORA-0013-5.879-R 10/20/2009	276	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$0.00

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

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON 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	
MORA-0013-6.354-R 10/20/2009	74	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$0.00
MORA-0013-6.380-R 10/20/2009	105	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$0.00
MORA-0013-6.434-R 10/20/2009	108	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$0.00
MORA-0013-6.665-R 10/20/2009	209	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$1,931.00
MORA-0013-6.727-R 10/20/2009	144	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$0.00

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

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON 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	
MORA-0013-6.806-R 10/20/2009	270	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$0.00
MORA-0013-6.893-R 10/20/2009	220	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$1,777.00
MORA-0013-6.989-R 10/20/2009	138	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$0.00
MORA-0013-7.065-R 10/20/2009	1002	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$3,009.00
MORA-0013-7.283-R 10/20/2009	493	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$0.00

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

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON 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	
MORA-0013-7.386-R 10/20/2009	460	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$0.00
MORA-0013-7.502-R 10/20/2009	330	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$0.00
MORA-0013-7.564-R 10/20/2009	185	STONE MASONRY WITH CONCRETE CORE WALL	NONE	NONE	\$45,458.00
MORA-0013-7.790-R 10/20/2009	145	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$1,777.00
MORA-0013-7.896-R 10/20/2009	268	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$1,777.00

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

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON 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	
MORA-0013-7.971-R 10/20/2009	304	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$0.00
MORA-0013-13.538-R 10/20/2009	370	STONE MASONRY WITH CONCRETE CORE WALL	NONE	NONE	\$0.00
MORA-0013-13.664-R 10/20/2009	600	STONE MASONRY WITH CONCRETE CORE WALL	NONE	NONE	\$0.00
MORA-0013-13.928-R 10/20/2009	329	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$0.00
MORA-0013-14.974-R 10/20/2009	329	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$1,777.00

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

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD



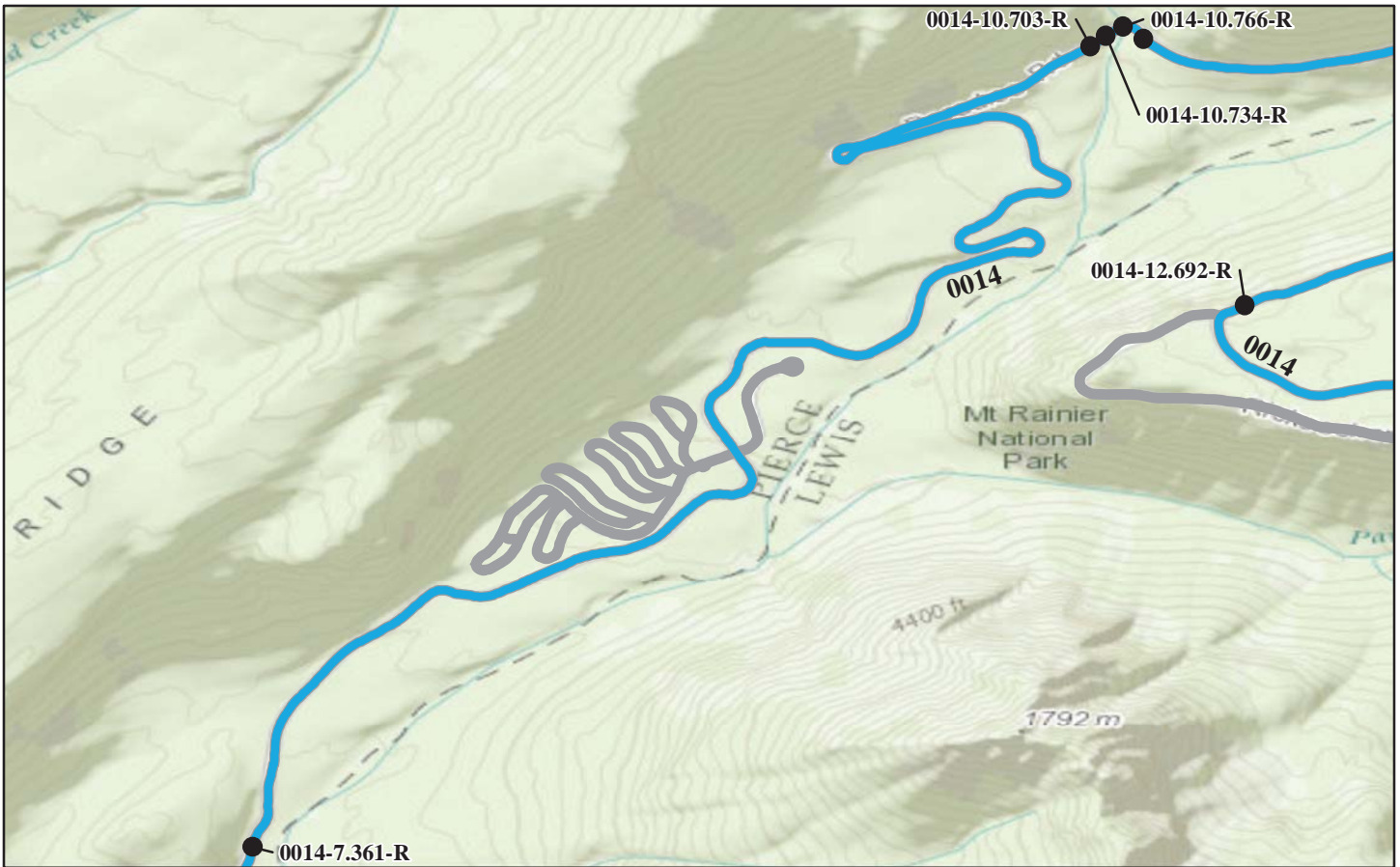
Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
MORA-0013-15.082-R 10/20/2009	228	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$1,777.00
MORA-0013-15.165-R 10/20/2009	226	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$7,332.00
MORA-0013-15.506-R 10/19/2009	2224	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$439,918.00
MORA-0013-15.974-R 10/19/2009	254	STEEL-BACKED TIMBER WITH BLOCKOUT	NONE	NONE	\$4,417.00
MORA-0013-17.416-R 10/19/2009	375	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$1,931.00

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

Mount Rainier National Park

ROUTE 0014: STATE ROUTE 706 (NISQUALLY ROAD)



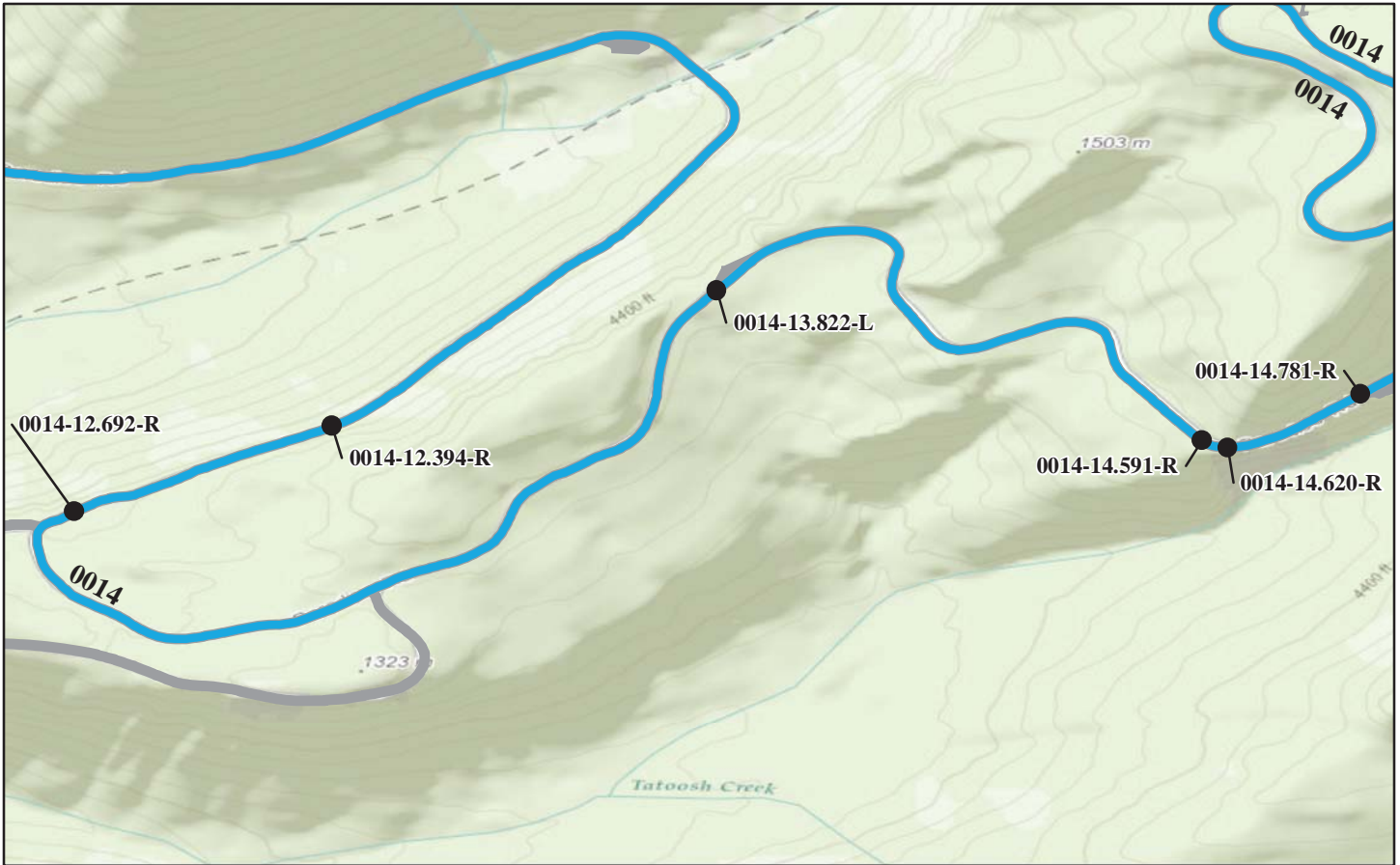
Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
MORA-0014-7.361-R 10/21/2009	50	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$1,931.00
MORA-0014-10.703-R 10/21/2009	162	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$102,905.00
MORA-0014-10.734-R 10/21/2009	98	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$0.00
MORA-0014-10.766-R 10/21/2009	116	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$0.00
MORA-0014-10.808-R 10/21/2009	19	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$1,777.00

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

Mount Rainier National Park

ROUTE 0014: STATE ROUTE 706 (NISQUALLY ROAD)



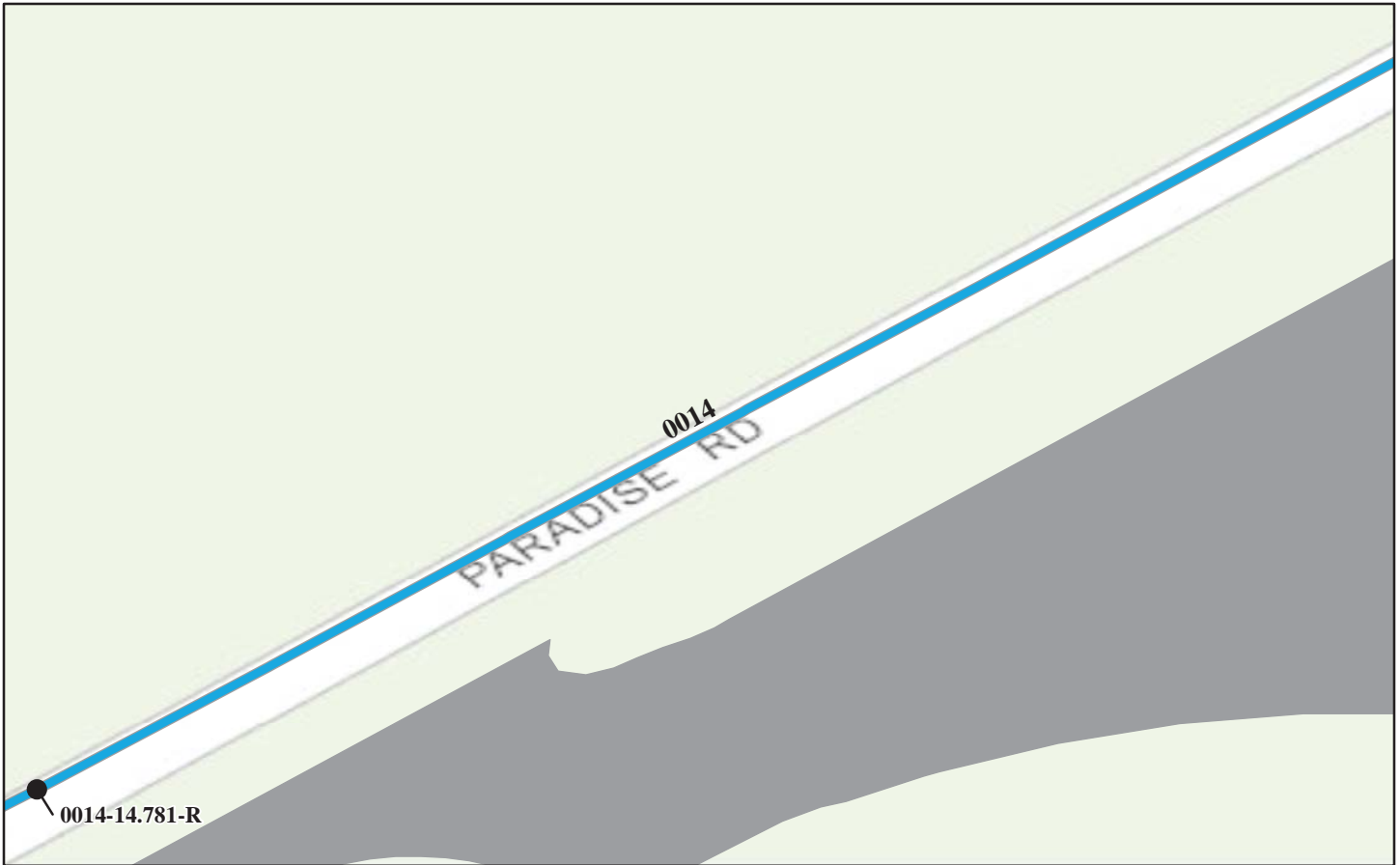
Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
MORA-0014-12.394-R 10/21/2009	1,573	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$1,931.00
MORA-0014-12.692-R 10/21/2009	336	STONE MASONRY WITH CONCRETE CORE WALL	NONE	NONE	\$1,931.00
MORA-0014-13.822-L 10/21/2009	357	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$340,753.00
MORA-0014-14.591-R 10/21/2009	206	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$94,188.00
MORA-0014-14.620-R 10/20/2009	850	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$883,317.00

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

Mount Rainier National Park

ROUTE 0014: STATE ROUTE 706 (NISQUALLY ROAD)



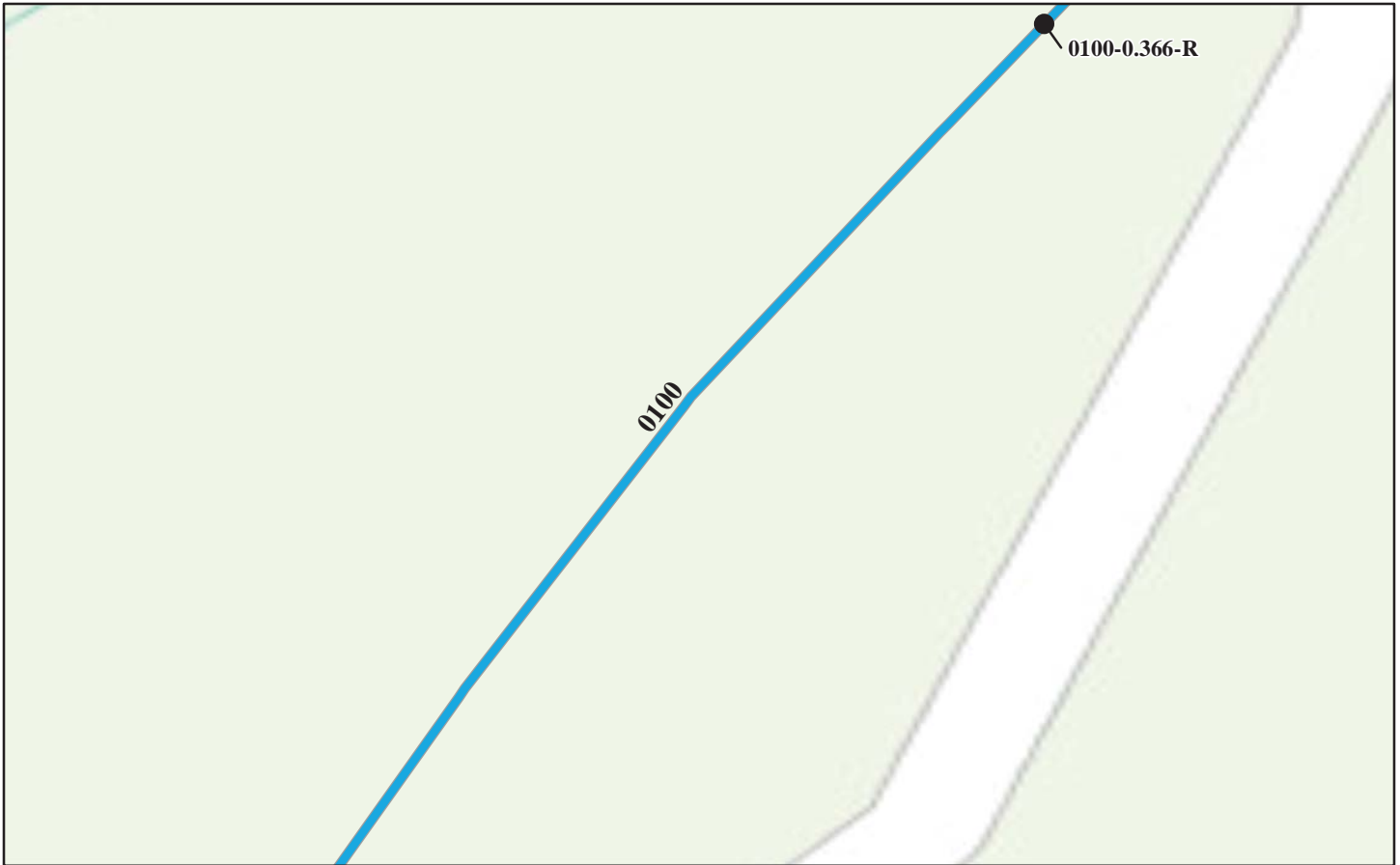
Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
MORA-0014-14.781-R 10/21/2009	289	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$2,327.00

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

Mount Rainier National Park

ROUTE 0100: LONGMIRE SOUTH BACK GATE 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	
MORA-0100-0.366-R 10/21/2009	151	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$9,658.00

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

Mount Rainier National Park

ROUTE 0203: MILLER CUT OFF / RICKSECKER POINT LOOP ROAD



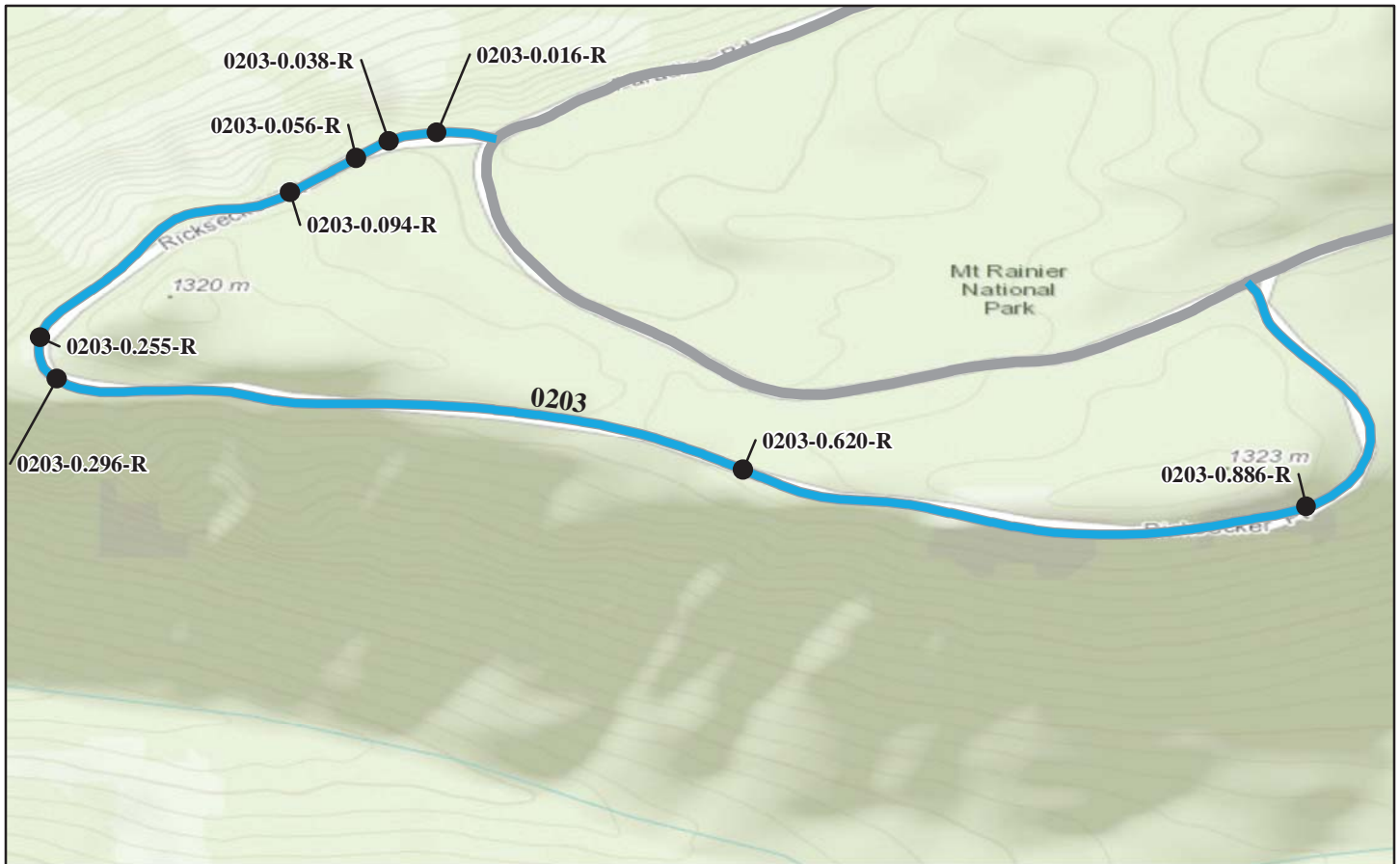
Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
MORA-0203-0.016-R 10/20/2009	135	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$50,094.00
MORA-0203-0.038-R 10/21/2009	129	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$0.00
MORA-0203-0.056-R 10/21/2009	205	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$1,931.00
MORA-0203-0.094-R 10/21/2009	861	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$74,773.00

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

Mount Rainier National Park

ROUTE 0203: MILLER CUT OFF / RICKSECKER POINT LOOP 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	
MORA-0203-0.255-R 10/21/2009	400	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$1,777.00
MORA-0203-0.296-R 10/21/2009	621	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$1,931.00
MORA-0203-0.620-R 10/20/2009	1417	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$37,593.00
MORA-0203-0.886-R 10/21/2009	182	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$66,660.00

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

Mount Rainier National Park

ROUTE 0207: MOWICH ROAD

Barrier location is unknown.

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	
MORA-0207-1.580-R 10/21/2009	95	STONE MASONRY CRENELLATED WITHOUT CORE WALL	NONE	NONE	\$0.00

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

Mount Rainier National Park

ROUTE 0500: VALLEY 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	
MORA-0500-0.064-R 10/20/2009	100	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$21,945.00
MORA-0500-0.070-R 10/20/2009	422	STONE MASONRY WITHOUT CONCRETE CORE WALL	NONE	NONE	\$428,120.00

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

Tier 3 Barrier Details



Mount Rainier National Park



Federal Lands Highway
Road Inventory Program

Barrier ID:	MORA-0010-2.418-L				
Route Name:	STATE ROUTE 123 (EAST SIDE HIGHWAY)				
Inspection Date:	10/19/2009	Barrier Rating:	26.60		
Barrier Description					
Type:	CONCRETE WITH SIMULATED STONE FACE	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	130		
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-3	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.):	27.0	Post Spacing (In.):	0.0
Height (In.):	27.0	Lateral Offset (In.):	25.7	Road Grade (%):	2.20
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 27-in design height.			
	Breaking and Cracking:	No breaking or cracking observed.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	Minimal corrosion/weathering. Some moss growth.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0010-2.418-L		
Route Name:	STATE ROUTE 123 (EAST SIDE HIGHWAY)		
Inspection Date:	10/19/2009	Barrier Rating:	26.60

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.

Mount Rainier National Park
ROUTE 0010: STATE ROUTE 123 (EAST SIDE HIGHWAY)

Barrier Condition Photos



MORA_0010_2.418_L_1.jpg

Barrier ID:	MORA-0010-2.432-R				
Route Name:	STATE ROUTE 123 (EAST SIDE HIGHWAY)				
Inspection Date:	10/19/2009	Barrier Rating:	29.70		
Barrier Description					
Type:	CONCRETE WITH SIMULATED STONE FACE	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	57		
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-3	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.):	27.0	Post Spacing (In.):	0.0
Height (In.):	30.0	Lateral Offset (In.):	24.5	Road Grade (%):	2.10
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was 0-5-in above the 27-in design height.			
	Breaking and Cracking:	No breaking or cracking observed.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0010-2.432-R		
Route Name:	STATE ROUTE 123 (EAST SIDE HIGHWAY)		
Inspection Date:	10/19/2009	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.

Mount Rainier National Park
ROUTE 0010: STATE ROUTE 123 (EAST SIDE HIGHWAY)

Barrier Condition Photos



MORA_0010_2.432_R_1.jpg

Barrier ID:	MORA-0010-2.498-L				
Route Name:	STATE ROUTE 123 (EAST SIDE HIGHWAY)				
Inspection Date:	10/19/2009	Barrier Rating:	25.60		
Barrier Description					
Type:	CONCRETE WITH SIMULATED STONE FACE	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	133		
Speed Limit (MPH):	45	Placement with Respect to Road:	INSIDE 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:	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.):	27.0	Post Spacing (In.):	0.0
Height (In.):	27.2	Lateral Offset (In.):	43.2	Road Grade (%):	3.00
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 27-in design height.			
	Breaking and Cracking:	No breaking or cracking.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	No corrosion/weathering or erosion.			
End Treatments	Alignment and Height:	Alignment acceptable. Height within 3-in of 27-in design height.			
	Breaking and Cracking:	No breaking or cracking			
	Missing Elements:	No missing elements			
	Corrosion and Weathering:	No corrosion/weathering or erosion			

Barrier ID:	MORA-0010-2.498-L		
Route Name:	STATE ROUTE 123 (EAST SIDE HIGHWAY)		
Inspection Date:	10/19/2009	Barrier Rating:	25.60

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.

Mount Rainier National Park
ROUTE 0010: STATE ROUTE 123 (EAST SIDE HIGHWAY)

Barrier Condition Photos



MORA_0010_2.498_L_1.jpg

Barrier ID:	MORA-0010-2.498-R				
Route Name:	STATE ROUTE 123 (EAST SIDE HIGHWAY)				
Inspection Date:	10/19/2009	Barrier Rating:	19.70		
Barrier Description					
Type:	CONCRETE WITH SIMULATED STONE FACE	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	62		
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-3	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.):	27.0	Post Spacing (In.):	0.0
Height (In.):	30.0	Lateral Offset (In.):	64.6	Road Grade (%):	2.40
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was 0-5-in above the 27-in design height.			
	Breaking and Cracking:	No breaking or cracking observed.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	Slight corrosion weathering and moss growth.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0010-2.498-R		
Route Name:	STATE ROUTE 123 (EAST SIDE HIGHWAY)		
Inspection Date:	10/19/2009	Barrier Rating:	19.70

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.

Mount Rainier National Park
ROUTE 0010: STATE ROUTE 123 (EAST SIDE HIGHWAY)

Barrier Condition Photos



MORA_0010_2.498_R_1.jpg

Barrier ID:	MORA-0010-7.336-L				
Route Name:	STATE ROUTE 123 (EAST SIDE HIGHWAY)				
Inspection Date:	10/19/2009	Barrier Rating:	58.00		
Barrier Description					
Type:	STEEL-BACKED TIMBER WITH BLOCKOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STEEL-BACKED TIMBER/LOG	Post Material:	WOOD		
Blockout Type:	WOOD	Length (ft.):	93		
Speed Limit (MPH):	45	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	EXTREME				
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:	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.):	120.0
Height (In.):	19.7	Lateral Offset (In.):	14.6	Road Grade (%):	5.90
Physical Condition					
Barrier	Alignment and Height:	Alignment is off by 6-in. Rail is rotated towards road most of barrier length. Entire barrier is 6-9in. below 27-in design height.			
	Breaking and Cracking:	One rail is splintered. 7 blockouts separated from posts.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	Erosion around 10 posts causing rotated posts. 1 post had settled.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0010-7.336-L		
Route Name:	STATE ROUTE 123 (EAST SIDE HIGHWAY)		
Inspection Date:	10/19/2009	Barrier Rating:	58.00

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$3119
Brief Workorder:	Raise 93-ft of barrier up to 27-in design height. Tighten/adjust hardware to repair rotated rail & separated blocks. Replace one 10-ft. rail.				
Workorder:	Adjust Guardrail at \$10- per -Lin. Ft. for 93 LF = \$930. Raise 93-ft of barrier up to 27-in design height. Replace rail at \$25- per -Lin. Ft. for 10 LF = \$250. Replace 10 ft. of timber rail. Labor at \$60- per -Hour for 3 Hrs = \$180. Realign rotated blocks and tighten. 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.

Mount Rainier National Park
ROUTE 0010: STATE ROUTE 123 (EAST SIDE HIGHWAY)

Barrier Condition Photos



MORA_0010_7.336_L_1.jpg

Barrier ID:	MORA-0010-7.620-L				
Route Name:	STATE ROUTE 123 (EAST SIDE HIGHWAY)				
Inspection Date:	10/19/2009	Barrier Rating:	55.70		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	540		
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:	NCW	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.):	18	Width (In.):	18.0	Post Spacing (In.):	0.0
Height (In.):	20.2	Lateral Offset (In.):	16.0	Road Grade (%):	6.10
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was 0 to 6-in above the 18-in/24-in crenellated design height.			
	Breaking and Cracking:	Cracking greater than 1/2 in along 140-ft of barrier. One location with a crack the entire length of one stone 1/2in in width and another location where a crack the entire width of the stone was approx. 1" wide.			
	Missing Elements:	Two missing stones.			
	Corrosion and Weathering:	Very minor weathering/corrosion and no erosion.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0010-7.620-L		
Route Name:	STATE ROUTE 123 (EAST SIDE HIGHWAY)		
Inspection Date:	10/19/2009	Barrier Rating:	55.70

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$15417
Brief Workorder:	Replace 2 stones and repoint 86 SY of barrier.				
Workorder:	Re-point masonry barrier at \$140- per -Sq. Yd. for 86 SY = \$12040. $[(2ft)+(2ft)+(1.5ft)] \times (140ft) / 9 = 85.5 SY$. Replace Stones at \$250- per -Each for 2 Unit(s) = \$500. Replace 2 missing stones. 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.

Mount Rainier National Park
ROUTE 0010: STATE ROUTE 123 (EAST SIDE HIGHWAY)

Barrier Condition Photos



MORA_0010_7.620_L_1.jpg

Barrier ID:	MORA-0010-8.338-L				
Route Name:	STATE ROUTE 123 (EAST SIDE HIGHWAY)				
Inspection Date:	10/19/2009	Barrier Rating:	43.00		
Barrier Description					
Type:	STEEL-BACKED TIMBER WITH BLOCKOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STEEL-BACKED TIMBER/LOG	Post Material:	WOOD		
Blockout Type:	WOOD	Length (ft.):	581		
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-3	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.):	120.0
Height (In.):	25.0	Lateral Offset (In.):	32.0	Road Grade (%):	5.90
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. 100-ft was between 1 and 3-in below the 27-in design height and 100-ft was more than 3-in below the design height.			
	Breaking and Cracking:	No breaking or cracking from impacts.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	Loss of 5% of less of cross section.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0010-8.338-L		
Route Name:	STATE ROUTE 123 (EAST SIDE HIGHWAY)		
Inspection Date:	10/19/2009	Barrier Rating:	43.00

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$3823
Brief Workorder:	Raise 200-ft of barrier up to 27-in design height.				
Workorder:	Adjust Guardrail at \$10- per -Lin. Ft. for 200 LF = \$2000. Raise 200-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.

Mount Rainier National Park
ROUTE 0010: STATE ROUTE 123 (EAST SIDE HIGHWAY)

Barrier Condition Photos



MORA_0010_8.338_L_1.jpg

Barrier ID:	MORA-0010-9.011-L				
Route Name:	STATE ROUTE 123 (EAST SIDE HIGHWAY)				
Inspection Date:	10/19/2009	Barrier Rating:	61.50		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	234		
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:	NCW	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.):	18	Width (In.):	20.2	Post Spacing (In.):	0.0
Height (In.):	18.7	Lateral Offset (In.):	22.2	Road Grade (%):	4.30
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height between 2-in below to 4 in above the 18-in/24-in crenellated design height.			
	Breaking and Cracking:	1 crack 3 ft. long < 1/4 in. wide.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	Mortar covered in moss.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0010-9.011-L		
Route Name:	STATE ROUTE 123 (EAST SIDE HIGHWAY)		
Inspection Date:	10/19/2009	Barrier Rating:	61.50

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.

Mount Rainier National Park
ROUTE 0010: STATE ROUTE 123 (EAST SIDE HIGHWAY)

Barrier Condition Photos



MORA_0010_9.011_L_1.jpg

Barrier ID:	MORA-0010-9.822-L				
Route Name:	STATE ROUTE 123 (EAST SIDE HIGHWAY)				
Inspection Date:	10/19/2009	Barrier Rating:	21.50		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	NON-TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	71		
Speed Limit (MPH):	45	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.):	18	Width (In.):	26.5	Post Spacing (In.):	0.0
Height (In.):	19.7	Lateral Offset (In.):	0.0	Road Grade (%):	0.00
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was between 1 to 2-in above the 18-in/24-in crenellated design height.			
	Breaking and Cracking:	No breaking or cracking except for one 2 ft long and 1/4 in wide crack in the ending end.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	No corrosion/weathering or erosion.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0010-9.822-L		
Route Name:	STATE ROUTE 123 (EAST SIDE HIGHWAY)		
Inspection Date:	10/19/2009	Barrier Rating:	21.50

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.

Mount Rainier National Park
ROUTE 0010: STATE ROUTE 123 (EAST SIDE HIGHWAY)

Barrier Condition Photos



MORA_0010_9.822_L_1.jpg

Barrier ID:	MORA-0010-12.422-L				
Route Name:	STATE ROUTE 123 (EAST SIDE HIGHWAY)				
Inspection Date:	10/19/2009	Barrier Rating:	64.40		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	1530		
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:	NCW	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.):	18	Width (In.):	18.8	Post Spacing (In.):	0.0
Height (In.):	19.7	Lateral Offset (In.):	24.1	Road Grade (%):	5.80
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was between 6-in below to 3-in above the 18-in/24-in crenellated design height.			
	Breaking and Cracking:	Several sections have been redone with newer stone or simulated stone. Minor cracks less than 1/4in.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	No corrosion. Slight weathering 1/4in or less cracks.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0010-12.422-L		
Route Name:	STATE ROUTE 123 (EAST SIDE HIGHWAY)		
Inspection Date:	10/19/2009	Barrier Rating:	64.40

Repair Recommendations

Repair Action:	MONITOR	FMSS Work Type:	N/A	Repair Cost:	\$0
Brief Workorder:	Monitor grout.				
Workorder:					

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

Mount Rainier National Park
ROUTE 0010: STATE ROUTE 123 (EAST SIDE HIGHWAY)

Barrier Condition Photos



MORA_0010_12.422_L_1.jpg

Barrier ID:	MORA-0011-6.957-R				
Route Name:	SUNRISE ROAD				
Inspection Date:	10/18/2009	Barrier Rating:	24.00		
Barrier Description					
Type:	W-BEAM STRONG POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	WOOD	Length (ft.):	103		
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-3	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	W-BEAM BCT	Is Beg. End Trtmt Crashworthy?:	NO	Approach Transition Type:	NONE
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.):	75.6
Height (In.):	26.0	Lateral Offset (In.):	101.3	Road Grade (%):	3.80
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. 72-ft was between 1 and 3-in below the 27-in design height.			
	Breaking and Cracking:	1 block rotated. 3 posts minor cracking less than 1/4 in. 1 rail minor dent less than 1/2 inch deep.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	Progressive erosion currently 2 ft. behind 1 post may impact barrier in future.			
End Treatments	Alignment and Height:	Alignment acceptable. Height within 1-in of 27-in design height.			
	Breaking and Cracking:	No breaking or cracking observed.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			

Barrier ID:	MORA-0011-6.957-R		
Route Name:	SUNRISE ROAD		
Inspection Date:	10/18/2009	Barrier Rating:	24.00

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$2415
Brief Workorder:	Raise 72-ft of barrier up to 27-in design height.				
Workorder:	Adjust Guardrail at \$10- per -Lin. Ft. for 72 LF = \$720. Raise 72-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.

Mount Rainier National Park

ROUTE 0011: SUNRISE ROAD

Barrier Condition Photos



MORA_0011_6.957_R_1.JPG

Barrier ID:	MORA-0011-7.370-R				
Route Name:	SUNRISE ROAD				
Inspection Date:	10/18/2009	Barrier Rating:	22.80		
Barrier Description					
Type:	CONCRETE WITH SIMULATED STONE FACE	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	262		
Speed Limit (MPH):	35	Placement with Respect to Road:	INSIDE 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:	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.):	25.0	Post Spacing (In.):	0.0
Height (In.):	27.0	Lateral Offset (In.):	108.0	Road Grade (%):	4.80
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 27-in design height.			
	Breaking and Cracking:	Slight cracking at joints face chipped in two places.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No weathering of concrete or simulated stone.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0011-7.370-R				
Route Name:	SUNRISE ROAD				
Inspection Date:	10/18/2009	Barrier Rating:		22.80	
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.

Mount Rainier National Park

ROUTE 0011: SUNRISE ROAD

Barrier Condition Photos



MORA_0011_7.370_R_1.JPG

Barrier ID:	MORA-0011-7.460-R				
Route Name:	SUNRISE ROAD				
Inspection Date:	10/18/2009	Barrier Rating:	40.20		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	139		
Speed Limit (MPH):	35	Placement with Respect to Road:	BOTH INSIDE AND OUTSIDE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	NCW	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.):	18	Width (In.):	16.7	Post Spacing (In.):	0.0
Height (In.):	16.7	Lateral Offset (In.):	60.2	Road Grade (%):	3.90
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was 3-6in below the 18-in design height for 50-ft and 6-12in below for 89-ft.			
	Breaking and Cracking:	Cracks more than 1/2in. Loose mortar.			
	Missing Elements:	1 stone missing from one of the crenellations.			
	Corrosion and Weathering:	On backside of wall there are some spots with 100% undermining. Moss covering most of mortar on wall.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0011-7.460-R		
Route Name:	SUNRISE ROAD		
Inspection Date:	10/18/2009	Barrier Rating:	40.20

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.

Mount Rainier National Park

ROUTE 0011: SUNRISE ROAD

Barrier Condition Photos



MORA_0011_7.460_R_1.JPG



MORA_0011_7.460_R_2.JPG

Barrier ID:	MORA-0011-7.529-R				
Route Name:	SUNRISE ROAD				
Inspection Date:	10/18/2009	Barrier Rating:	63.00		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	627		
Speed Limit (MPH):	35	Placement with Respect to Road:	BOTH INSIDE AND OUTSIDE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	NCW	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.):	24	Width (In.):	16.0	Post Spacing (In.):	0.0
Height (In.):	18.0	Lateral Offset (In.):	43.0	Road Grade (%):	5.70
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. 251-ft was 3-6in below the 24-in design height and 376-ft was 7-9in below.			
	Breaking and Cracking:	12 cracks in mortar or stones that are > 0.25 in.. Additional 30ft. of mortar is broken or missing.			
	Missing Elements:	3 missing stones.			
	Corrosion and Weathering:	Undercutting beneath barrier 13in wide for 6ft. Mortar is covered with moss moderately corroded everywhere.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0011-7.529-R		
Route Name:	SUNRISE ROAD		
Inspection Date:	10/18/2009	Barrier Rating:	63.00

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$154204
Brief Workorder:	Raise guardwall 3-in. Remove and reset 376-ft of stone masonry guardwall on 1 row of new stone to raise barrier to the adjacent 18-in height.				
Workorder:	<p>Remove & Reset Stone Masonry Guardwall at \$250- per -Cu. Ft. for 245 CF = \$61250. [(1.3ft)(0.5ft)(376ft)] = 244.4 CF.</p> <p>Remove top layer of stones in barrier for 392 feet.</p> <p>Re-Point Masonry Barrier at \$140- per -Sq. Yd. for 1 SY = \$140. Re-point mortar in several locations to fill cracks.</p> <p>Select borrow at \$50- per -Cu. Yd. for 1 CY = \$50. Add fill in area where barrier is undercut by erosion for 6 feet.</p> <p>Backhoe at \$125- per -Hour for 1 Hrs = \$125. To add fill in area where barrier is undercut by erosion.</p> <p>Labor at \$60- per -Hour for 2 Hrs = \$120. Compact fill in area where barrier is undercut by erosion.</p> <p>Replace Stones at \$250- per -Each for 196 Unit(s) = \$49000. [(376ft) x (2ft/stone)] x 1 row = 188 stones. Insert new stones on retaining wall to increase barrier height then reset top layer of barrier.</p> <p>Low Speed Traffic Control at \$1475- per -Day for 20 Day(s) = \$29500. 4 days removal 16 days installation.</p>				

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

Mount Rainier National Park

ROUTE 0011: SUNRISE ROAD

Barrier Condition Photos

Condition photos are not available for MORA-0011-7.529-R.

Barrier ID:	MORA-0011-12.763-L				
Route Name:	SUNRISE ROAD				
Inspection Date:	10/18/2009	Barrier Rating:	8.50		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	NON-TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	118		
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.):	19.0	Post Spacing (In.):	0.0
Height (In.):	27.0	Lateral Offset (In.):	0.0	Road Grade (%):	0.00
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 24-in design height.			
	Breaking and Cracking:	There is minor cracking of less than 1/4in throughout the entire length of the barrier.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	No weathering or corrosion and no apparent erosion at the base of the fting.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0011-12.763-L				
Route Name:	SUNRISE ROAD				
Inspection Date:	10/18/2009	Barrier Rating:		8.50	
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.

Mount Rainier National Park

ROUTE 0011: SUNRISE ROAD

Barrier Condition Photos

Condition photos are not available for MORA-0011-12.763-L.

Barrier ID:	MORA-0011-12.786-R				
Route Name:	SUNRISE ROAD				
Inspection Date:	10/18/2009	Barrier Rating:	28.50		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	145		
Speed Limit (MPH):	35	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	NCW	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.):	24	Width (In.):	17.2	Post Spacing (In.):	0.0
Height (In.):	25.2	Lateral Offset (In.):	20.5	Road Grade (%):	0.40
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 24-in design height.			
	Breaking and Cracking:	No breaking or cracking observed.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	No notable weathering/corrosion or erosion.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0011-12.786-R				
Route Name:	SUNRISE ROAD				
Inspection Date:	10/18/2009	Barrier Rating:		28.50	
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.

Mount Rainier National Park

ROUTE 0011: SUNRISE ROAD

Barrier Condition Photos

Condition photos are not available for MORA-0011-12.786-R.

Barrier ID:	MORA-0011-12.791-L				
Route Name:	SUNRISE ROAD				
Inspection Date:	10/18/2009	Barrier Rating:	8.50		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	NON-TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	185		
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.):	18.7	Post Spacing (In.):	0.0
Height (In.):	29.0	Lateral Offset (In.):	0.0	Road Grade (%):	0.00
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was 0–8in above the 24-in design height.			
	Breaking and Cracking:	There is minor cracking and breaking of less than a 1/4in throughout the entire length of the barrier.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	No corrosion and weathering. No erosion at the barrier foundation.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0011-12.791-L				
Route Name:	SUNRISE ROAD				
Inspection Date:	10/18/2009	Barrier Rating:		8.50	
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.

Mount Rainier National Park

ROUTE 0011: SUNRISE ROAD

Barrier Condition Photos

Condition photos are not available for MORA-0011-12.791-L.

Barrier ID:	MORA-0011-12.852-L				
Route Name:	SUNRISE ROAD				
Inspection Date:	10/18/2009	Barrier Rating:	8.50		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	NON-TRAFFIC		
Barrier Material:	STONE	Post Material:	WOOD		
Blockout Type:	N/A	Length (ft.):	26		
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.):	18.7	Post Spacing (In.):	0.0
Height (In.):	29.5	Lateral Offset (In.):	0.0	Road Grade (%):	0.00
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was 5–6in above the 24-in design height.			
	Breaking and Cracking:	Cracking of less than 1/4 in throughout.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	No weathering/corrosion or erosion.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0011-12.852-L				
Route Name:	SUNRISE ROAD				
Inspection Date:	10/18/2009	Barrier Rating:		8.50	
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.

Mount Rainier National Park

ROUTE 0011: SUNRISE ROAD

Barrier Condition Photos

Condition photos are not available for MORA-0011-12.852-L.

Barrier ID:	MORA-0011-12.863-L				
Route Name:	SUNRISE ROAD				
Inspection Date:	10/18/2009	Barrier Rating:	8.50		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	NON-TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	228		
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.):	18.2	Post Spacing (In.):	0.0
Height (In.):	24.7	Lateral Offset (In.):	0.0	Road Grade (%):	0.00
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 24-in design height.			
	Breaking and Cracking:	There is cracking less than 1/4 of an in and no breaking.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	There is 5 percent corrosion and weathering throughout the barrier length and no erosion at the barrier foundation.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0011-12.863-L				
Route Name:	SUNRISE ROAD				
Inspection Date:	10/18/2009	Barrier Rating:		8.50	
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.

Mount Rainier National Park

ROUTE 0011: SUNRISE ROAD

Barrier Condition Photos

Condition photos are not available for MORA-0011-12.863-L.

Barrier ID:	MORA-0011-12.911-L				
Route Name:	SUNRISE ROAD				
Inspection Date:	10/18/2009	Barrier Rating:	8.50		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	NON-TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	23		
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.):	19.0	Post Spacing (In.):	0.0
Height (In.):	26.2	Lateral Offset (In.):	0.0	Road Grade (%):	0.00
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 24-in design height.			
	Breaking and Cracking:	One stone cracked less than 1/4 in width of the barrier.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	No weathering/corrosion or erosion.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0011-12.911-L				
Route Name:	SUNRISE ROAD				
Inspection Date:	10/18/2009	Barrier Rating:		8.50	
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.

Mount Rainier National Park

ROUTE 0011: SUNRISE ROAD

Barrier Condition Photos

Condition photos are not available for MORA-0011-12.911-L.

Barrier ID:	MORA-0012-0.451-L				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/18/2009	Barrier Rating:	35.50		
Barrier Description					
Type:	STONE MASONRY WITH CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	401		
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-3	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.):	20.0	Post Spacing (In.):	0.0
Height (In.):	29.2	Lateral Offset (In.):	18.0	Road Grade (%):	3.00
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 27-in design height.			
	Breaking and Cracking:	Broken rocks along a 15 ft. long section where impacted.			
	Missing Elements:	Missing rocks and mortar at impact location (15 ft long) and in 2 crenellations.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0012-0.451-L		
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)		
Inspection Date:	10/18/2009	Barrier Rating:	35.50

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$4087
Brief Workorder:	Repoint 16 SY and replace missing stones in stone masonry concrete core wall barrier.				
Workorder:	Re-point masonry barrier at \$140- per -Sq. Yd. for 16 SY = \$2240. $[(21ft)(2.4 ft + 1.7 ft+ 2.4t)] /9 = 15.2 SY$. 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.

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)

Barrier Condition Photos



MORA_0012_0.451_L_1.JPG

Barrier ID:	MORA-0012-0.592-L				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/18/2009	Barrier Rating:	33.70		
Barrier Description					
Type:	STONE MASONRY WITH CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	1106		
Speed Limit (MPH):	35	Placement with Respect to Road:	BOTH INSIDE AND OUTSIDE		
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:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	19.7	Post Spacing (In.):	0.0
Height (In.):	28.1	Lateral Offset (In.):	24.2	Road Grade (%):	0.60
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 27-in design height.			
	Breaking and Cracking:	22 total ft throughout barrier was broken with stones displaced more than 1/3 width of barrier due to impact.			
	Missing Elements:	Missing stones on top and back of barrier for 22ft.			
	Corrosion and Weathering:	No corrosion or weathering.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0012-0.592-L		
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)		
Inspection Date:	10/18/2009	Barrier Rating:	33.70

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$17980
Brief Workorder:	Repoint 8 SY of stone masonry and replace 55 missing stones.				
Workorder:	Re-point masonry barrier at \$140- per -Sq. Yd. for 6 SY = \$840. $[(12ft) \times (2.25ft + 1.75ft)] / 9 = 5.3 SY$. Re-point masonry barrier at \$140- per -Sq. Yd. for 2 SY = \$280. $[(10ft)(1.75ft)] / 9 = 1.9 SY$. Replace Stones at \$250- per -Each for 55 Unit(s) = \$13750. Replace 55 missing stones. 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.

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)

Barrier Condition Photos



MORA_0012_0.592_L_1.JPG



MORA_0012_0.592_L_2.JPG

Barrier ID:	MORA-0012-1.367-R				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/18/2009	Barrier Rating:	38.70		
Barrier Description					
Type:	STONE MASONRY WITH CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	375		
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-3	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.):	21.0	Post Spacing (In.):	0.0
Height (In.):	26.7	Lateral Offset (In.):	33.7	Road Grade (%):	5.10
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 27-in design height.			
	Breaking and Cracking:	1 area with cracked mortar and 4 missing stones.			
	Missing Elements:	4 missing stones.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0012-1.367-R		
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)		
Inspection Date:	10/18/2009	Barrier Rating:	38.70

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$2877
Brief Workorder:	Re-point 1 SY of masonry barrier and replace 4 missing stones.				
Workorder:	Re-point masonry barrier at \$140- per -Sq. Yd. for 1 SY = \$140. [(3ft)(2ft)] /9 = 0.67 SY. Replace Stones at \$250- per -Each for 4 Unit(s) = \$1000. Replace 4 missing stones. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475. 1 day traffic control required.				

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

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)

Barrier Condition Photos



MORA_0012_1.367_R_1.JPG

Barrier ID:	MORA-0012-1.450-R				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/18/2009	Barrier Rating:	38.70		
Barrier Description					
Type:	STONE MASONRY WITH CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	426		
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-3	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.):	21.2	Post Spacing (In.):	0.0
Height (In.):	27.7	Lateral Offset (In.):	35.0	Road Grade (%):	3.60
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 27-in design height.			
	Breaking and Cracking:	No breaking or cracking observed.			
	Missing Elements:	Missing individual stones from wall 9 total.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0012-1.450-R		
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)		
Inspection Date:	10/18/2009	Barrier Rating:	38.70

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$4406
Brief Workorder:	Repoint 2 SY of barrier and replace 9 stones.				
Workorder:	Re-point masonry barrier at \$140- per -Sq. Yd. for 2 SY = \$280. Replace Stones at \$250- per -Each for 9 Unit(s) = \$2250. 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.

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)

Barrier Condition Photos



MORA_0012_1.450_R_1.JPG

Barrier ID:	MORA-0012-1.601-R				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/18/2009	Barrier Rating:	28.60		
Barrier Description					
Type:	STONE MASONRY WITH CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	236		
Speed Limit (MPH):	35	Placement with Respect to Road:	INSIDE 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:	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.):	21.0	Post Spacing (In.):	0.0
Height (In.):	27.2	Lateral Offset (In.):	15.6	Road Grade (%):	2.80
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 27-in design height.			
	Breaking and Cracking:	2 missing stones in 2 different places on barrier.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0012-1.601-R		
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)		
Inspection Date:	10/18/2009	Barrier Rating:	28.60

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$2327
Brief Workorder:	Repoint 1 SY of masonry barrier and replace 2 missing stones.				
Workorder:	Re-point masonry barrier at \$140- per -Sq. Yd. for 1 SY = \$140. [(2ft)(2ft)] /9 = 0.4 SY. Replace Stones at \$250- per -Each for 2 Unit(s) = \$500. Replace 2 missing stones. 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.

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)

Barrier Condition Photos



MORA_0012_1.601_R_1.JPG

Barrier ID:	MORA-0012-1.679-R				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/18/2009	Barrier Rating:	35.70		
Barrier Description					
Type:	STONE MASONRY WITH CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	604		
Speed Limit (MPH):	35	Placement with Respect to Road:	INSIDE 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:	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.):	21.6	Post Spacing (In.):	0.0
Height (In.):	27.7	Lateral Offset (In.):	22.7	Road Grade (%):	3.70
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 27-in design height.			
	Breaking and Cracking:	1 expansion joint has foam missing. 2 cracks 2 l.f. each. 1 loose stone.			
	Missing Elements:	2 sections missing stones total 6 ft. long.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0012-1.679-R		
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)		
Inspection Date:	10/18/2009	Barrier Rating:	35.70

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$5209
Brief Workorder:	Replace 12 missing stones and repoint 1 SY of masonry barrier.				
Workorder:	Re-point masonry barrier at \$140- per -Sq. Yd. for 1 SY = \$140. Re-point masonry in cracks and missing stone areas. [(2ft) (4ft)] /9 = 0.4 SY. Labor at \$60- per -Hour for 2 Hrs = \$120. Replace foam in expansion joint. Replace Stones at \$250- per -Each for 12 Unit(s) = \$3000. Replace 12 stones. 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.

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)

Barrier Condition Photos



MORA_0012_1.679_R_1.JPG

Barrier ID:	MORA-0012-1.798-R				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/18/2009	Barrier Rating:	25.70		
Barrier Description					
Type:	STONE MASONRY WITH CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	129		
Speed Limit (MPH):	35	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	EXTREME				
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:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	20.2	Post Spacing (In.):	0.0
Height (In.):	29.2	Lateral Offset (In.):	20.7	Road Grade (%):	2.30
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 27-in design height.			
	Breaking and Cracking:	No breaking or cracking observed.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0012-1.798-R		
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)		
Inspection Date:	10/18/2009	Barrier Rating:	25.70

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.

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)

Barrier Condition Photos



MORA_0012_1.798_R_1.JPG

Barrier ID:	MORA-0012-1.831-R				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/18/2009	Barrier Rating:	25.70		
Barrier Description					
Type:	STONE MASONRY WITH CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	30		
Speed Limit (MPH):	35	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	EXTREME				
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:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	21.0	Post Spacing (In.):	0.0
Height (In.):	28.0	Lateral Offset (In.):	23.0	Road Grade (%):	2.10
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 27-in design height.			
	Breaking and Cracking:	No breaking or cracking observed.			
	Missing Elements:	Two missing stones.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0012-1.831-R		
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)		
Inspection Date:	10/18/2009	Barrier Rating:	25.70

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$2173
Brief Workorder:	Replace 2 missing stones.				
Workorder:	Replace Stones at \$250- per -Each for 2 Unit(s) = \$500. Replace 2 missing stones. 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.

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)

Barrier Condition Photos



MORA_0012_1.831_R_1.JPG

Barrier ID:	MORA-0012-1.848-R				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/18/2009	Barrier Rating:	22.80		
Barrier Description					
Type:	STONE MASONRY WITH CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	78		
Speed Limit (MPH):	35	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	EXTREME				
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:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	20.7	Post Spacing (In.):	0.0
Height (In.):	29.7	Lateral Offset (In.):	28.2	Road Grade (%):	2.90
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 27-in design height.			
	Breaking and Cracking:	No breaking or cracking observed.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0012-1.848-R		
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)		
Inspection Date:	10/18/2009	Barrier Rating:	22.80

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.

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)

Barrier Condition Photos



MORA_0012_1.848_R_1.JPG

Barrier ID:	MORA-0012-1.879-R				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/18/2009	Barrier Rating:	32.90		
Barrier Description					
Type:	STONE MASONRY WITH CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	233		
Speed Limit (MPH):	35	Placement with Respect to Road:	INSIDE 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:	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.):	20.2	Post Spacing (In.):	0.0
Height (In.):	29.7	Lateral Offset (In.):	22.0	Road Grade (%):	4.30
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 27-in design height.			
	Breaking and Cracking:	1 loose rock.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0012-1.879-R		
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)		
Inspection Date:	10/18/2009	Barrier Rating:	32.90

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$1777
Brief Workorder:	Repoint masonry around 1 loose stone.				
Workorder:	Re-point masonry barrier at \$140- per -Sq. Yd. for 1 SY = \$140. Re-point masonry around 1 loose stone. 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.

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)

Barrier Condition Photos



MORA_0012_1.879_R_1.JPG

Barrier ID:	MORA-0012-1.935-R				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/18/2009	Barrier Rating:	31.00		
Barrier Description					
Type:	STONE MASONRY WITH CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	84		
Speed Limit (MPH):	35	Placement with Respect to Road:	INSIDE OF CURVE		
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:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	20.0	Post Spacing (In.):	0.0
Height (In.):	25.0	Lateral Offset (In.):	27.0	Road Grade (%):	5.40
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 27-in design height.			
	Breaking and Cracking:	No breaking or cracking observed.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0012-1.935-R				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/18/2009	Barrier Rating:		31.00	
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.

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)

Barrier Condition Photos



MORA_0012_1.935_R_1.JPG

Barrier ID:	MORA-0012-1.974-R				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/18/2009	Barrier Rating:	35.50		
Barrier Description					
Type:	STONE MASONRY WITH CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	136		
Speed Limit (MPH):	35	Placement with Respect to Road:	INSIDE 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:	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.):	20.7	Post Spacing (In.):	0.0
Height (In.):	25.0	Lateral Offset (In.):	21.7	Road Grade (%):	5.40
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 27-in design height.			
	Breaking and Cracking:	Minor cracking and missing 4 stones in 2 places. 4 sq ft total of missing stones.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0012-1.974-R		
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)		
Inspection Date:	10/18/2009	Barrier Rating:	35.50

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$2723
Brief Workorder:	Replace 4 missing stones.				
Workorder:	Replace Stones at \$250- per -Each for 4 Unit(s) = \$1000. Replace 4 missing stones. 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.

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)

Barrier Condition Photos



MORA_0012_1.974_R_1.JPG

Barrier ID:	MORA-0012-2.057-R				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/18/2009	Barrier Rating:	41.50		
Barrier Description					
Type:	STONE MASONRY WITH CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	1011		
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-3	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.):	20.7	Post Spacing (In.):	0.0
Height (In.):	29.2	Lateral Offset (In.):	25.2	Road Grade (%):	4.90
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was 1-5-in above the 27-in design height.			
	Breaking and Cracking:	Mortar broken around individual stones total less than 1 sq. yd.			
	Missing Elements:	Missing stones total less than 1 sq. yd.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0012-2.057-R		
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)		
Inspection Date:	10/18/2009	Barrier Rating:	41.50

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$2327
Brief Workorder:	Repoint 1 SY of barrier and replace 2 missing stones.				
Workorder:	Re-point masonry barrier at \$140- per -Sq. Yd. for 1 SY = \$140. Replace Stones at \$250- per -Each for 2 Unit(s) = \$500. Replace 2 missing stones. 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.

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)

Barrier Condition Photos



MORA_0012_2.057_R_1.JPG

Barrier ID:	MORA-0012-5.011-L				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/18/2009	Barrier Rating:	47.20		
Barrier Description					
Type:	OTHER: TIMBER RAIL ON CONCRETE POSTS	Barrier Function:	TRAFFIC		
Barrier Material:	LOG/TIMBER/WOOD	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	204		
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:	NCW	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.):	20	Width (In.):	12.3	Post Spacing (In.):	120.6
Height (In.):	18.0	Lateral Offset (In.):	88.6	Road Grade (%):	4.30
Physical Condition					
Barrier	Alignment and Height:	Alignment is off between 6in and 12". Height was between 5-in below to 1-in above the 20-in design height.			
	Breaking and Cracking:	Major cracking of an 1in or more throughout the entire rail and should be replaced.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	Major corrosion of wood rail entire length of the wood rail is rotten and there is more than 8in of erosion around 2 1/2 he pylon posts.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0012-5.011-L		
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)		
Inspection Date:	10/18/2009	Barrier Rating:	47.20

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$24409
Brief Workorder:	Replace log on concrete post barrier with Steel-Backed Timber with Blockout barrier and 2 flared end treatments.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 204 LF = \$2040. Steel-Backed Timber w/ Blockout at \$50- per -Lin. Ft. for 144 LF = \$7200. SBT / Log Flared at \$5000- per -Each for 2 Unit(s) = \$10000. 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.

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)

Barrier Condition Photos



MORA_0012_5.011_L_1.jpg

Barrier ID:	MORA-0012-5.082-L				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/18/2009	Barrier Rating:	65.80		
Barrier Description					
Type:	OTHER: TIMBER RAIL ON CONCRETE POSTS	Barrier Function:	TRAFFIC		
Barrier Material:	LOG/TIMBER/WOOD	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	1167		
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:	NCW	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.):	20	Width (In.):	11.8	Post Spacing (In.):	121.8
Height (In.):	15.3	Lateral Offset (In.):	65.0	Road Grade (%):	5.80
Physical Condition					
Barrier	Alignment and Height:	Alignment off by 6in-12" for various significant lengths. Height was between 1-9in below the 20-in design height.			
	Breaking and Cracking:	Four completely broken rails and cracking of 1in or more throughout barrier.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	Erosion of 8in or more around most posts and log rails appear to be rotten.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0012-5.082-L		
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)		
Inspection Date:	10/18/2009	Barrier Rating:	65.80

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$100947
Brief Workorder:	Replace log on concrete post barrier with Steel-Backed Timber with Blockout barrier and 2 flared end treatments.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 1167 LF = \$11670. Steel-Backed Timber w/ Blockout at \$50- per -Lin. Ft. for 1107 LF = \$55350. SBT / Log Flared at \$5000- per -Each for 2 Unit(s) = \$10000. Low Speed Traffic Control at \$1475- per -Day for 10 Day(s) = \$14750. 5 days removal 5 days installation.				

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

Mount Rainier National Park
ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)

Barrier Condition Photos



MORA_0012_5.082_L_1.jpg



MORA_0012_5.082_L_2.jpg

Barrier ID:	MORA-0012-5.320-L				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/18/2009	Barrier Rating:	41.50		
Barrier Description					
Type:	OTHER: TIMBER RAIL ON CONCRETE POSTS	Barrier Function:	TRAFFIC		
Barrier Material:	LOG/TIMBER/WOOD	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	259		
Speed Limit (MPH):	45	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	NCW	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.):	20	Width (In.):	12.3	Post Spacing (In.):	118.0
Height (In.):	18.2	Lateral Offset (In.):	63.2	Road Grade (%):	5.70
Physical Condition					
Barrier	Alignment and Height:	Alignment off by more than 6in to 12" for entire length. Height was between 0-4in below the 20-in design height.			
	Breaking and Cracking:	Breaking and cracking of more than 1in throughout entire length of barrier.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	Erosion of 8in or more for the entire section of barrier. The timber logs are rotten throughout the entire length of the barrier.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0012-5.320-L		
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)		
Inspection Date:	10/18/2009	Barrier Rating:	41.50

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$28039
Brief Workorder:	Replace log on concrete post barrier with Steel-Backed Timber with Blockout barrier and 2 flared end treatments.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 259 LF = \$2590. Steel-Backed Timber w/ Blockout at \$50- per -Lin. Ft. for 199 LF = \$9950. SBT / Log Flared at \$5000- per -Each for 2 Unit(s) = \$10000. 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.

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)

Barrier Condition Photos



MORA_0012_5.320_L_1.jpg



MORA_0012_5.320_L_2.jpg

Barrier ID:	MORA-0012-5.379-L				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/18/2009	Barrier Rating:	65.80		
Barrier Description					
Type:	OTHER: TIMBER RAIL ON CONCRETE POSTS	Barrier Function:	TRAFFIC		
Barrier Material:	LOG/TIMBER/WOOD	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	1938		
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:	NCW	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.):	20	Width (In.):	11.8	Post Spacing (In.):	120.1
Height (In.):	15.1	Lateral Offset (In.):	57.0	Road Grade (%):	5.50
Physical Condition					
Barrier	Alignment and Height:	Alignment is off by more than 12in in numerous locations. Height was between 1-8in below the 20-in design height. At one time barrier appears to have been connected to barriers at milepoints 5.588 5.650 5.741 and 5.760.			
	Breaking and Cracking:	Numerous locations were impacted and has completely broken rails.			
	Missing Elements:	25 totally missing sections or rail that are approx. 10' in length.			
	Corrosion and Weathering:	8% or more erosion exists around most of the posts and rails are rotten.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0012-5.379-L		
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)		
Inspection Date:	10/18/2009	Barrier Rating:	65.80

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$197857
Brief Workorder:	Replace barriers with Steel-Backed Timber with Blockout barrier and 2 flared end treatments.				
Workorder:	<p>Remove Guardrail at \$10- per -Lin. Ft. for 2246 LF = \$22460. Remove 2246-ft of timber on concrete post guardrail.</p> <p>Remove Guardrail at \$10- per -Lin. Ft. for 101 LF = \$1010. Remove 101-ft of W-beam barrier.</p> <p>Steel-Backed Timber w/ Blockout at \$50- per -Lin. Ft. for 2338 LF = \$116900. Install Steel-Backed Timber w/ Blockout barrier.</p> <p>SBT / Log Flared at \$5000- per -Each for 2 Unit(s) = \$10000. Install two Steel-Backed Timber flared end treatments.</p> <p>Low Speed Traffic Control at \$1475- per -Day for 20 Day(s) = \$29500. 10 days removal 10 days installation.</p>				

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

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)

Barrier Condition Photos



MORA_0012_5.379_L_1.jpg



MORA_0012_5.379_L_2.jpg

Barrier ID:	MORA-0012-5.840-L				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/19/2009	Barrier Rating:	60.00		
Barrier Description					
Type:	OTHER: TIMBER RAIL ON CONCRETE POSTS	Barrier Function:	TRAFFIC		
Barrier Material:	LOG/TIMBER/WOOD	Post Material:	OTHER: CONCRETE		
Blockout Type:	N/A	Length (ft.):	1223		
Speed Limit (MPH):	45	Placement with Respect to Road:	INSIDE OF CURVE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	NCW	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.):	20	Width (In.):	11.8	Post Spacing (In.):	116.6
Height (In.):	14.3	Lateral Offset (In.):	75.0	Road Grade (%):	1.00
Physical Condition					
Barrier	Alignment and Height:	Pylon and log rotate off roadway and falling down hill. Height was between 3-8in below the 20-in design height. At one time this barrier appears to have been joined with barriers MORA-0012-5.959-L and MORA-0012-5.965-L.			
	Breaking and Cracking:	Splitting logs. Cracking and spalling of concrete.			
	Missing Elements:	Log and pylon off side of road and fallen. Concrete barrier chained to log as adjunct barrier.			
	Corrosion and Weathering:	Wood rotting and bolts/nuts rusted.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0012-5.840-L		
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)		
Inspection Date:	10/19/2009	Barrier Rating:	60.00

Repair Recommendations

Repair Action:	REPLACE	FMSS Work Type:	CAPITAL IMPROVEMENT	Repair Cost:	\$104203
Brief Workorder:	Replace barriers with Steel-Backed Timber with Blockout barrier and 2 flared end treatments.				
Workorder:	Remove Guardrail at \$10- per -Lin. Ft. for 1163 LF = \$11630. Remove 1163ft of timber on concrete post guardrail Remove Concrete Barrier at \$50- per -Lin. Ft. for 32 LF = \$1600. Remove 32ft of Jersey barrier. Steel-Backed Timber w/ Blockout at \$50- per -Lin. Ft. for 1135 LF = \$56750. SBT / Log Flared at \$5000- per -Each for 2 Unit(s) = \$10000. Low Speed Traffic Control at \$1475- per -Day for 10 Day(s) = \$14750. 5 days removal 5 days installation.				

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

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)

Barrier Condition Photos



MORA_0012_5.840_L_1.JPG



MORA_0012_5.840_L_2.JPG

Barrier ID:	MORA-0012-6.190-R				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/18/2009	Barrier Rating:	25.50		
Barrier Description					
Type:	CONCRETE WITH SIMULATED STONE FACE	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	152		
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:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	24.0	Post Spacing (In.):	0.0
Height (In.):	28.5	Lateral Offset (In.):	34.2	Road Grade (%):	3.40
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 27-in design height.			
	Breaking and Cracking:	No breaking or cracking throughout the length of the barrier.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	No corrosion or weathering throughout the length of the barrier. No erosion at the barrier fling.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0012-6.190-R				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/18/2009	Barrier Rating:		25.50	
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.

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)

Barrier Condition Photos



MORA_0012_6.190_R_1.jpg

Barrier ID:	MORA-0012-6.207-L				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/18/2009	Barrier Rating:	21.20		
Barrier Description					
Type:	CONCRETE WITH SIMULATED STONE FACE	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	52		
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:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	23.2	Post Spacing (In.):	0.0
Height (In.):	28.0	Lateral Offset (In.):	44.7	Road Grade (%):	2.90
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 27-in design height.			
	Breaking and Cracking:	No breaking or cracking for the entire length of the barrier.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	No corrosion or weathering for the entire length of the barrier. No erosion at the foundation of the barrier.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0012-6.207-L		
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)		
Inspection Date:	10/18/2009	Barrier Rating:	21.20

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.

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)

Barrier Condition Photos



MORA_0012_6.207_L_1.jpg

Barrier ID:	MORA-0012-6.267-L				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/18/2009	Barrier Rating:	16.60		
Barrier Description					
Type:	CONCRETE WITH SIMULATED STONE FACE	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	50		
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:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	24.0	Post Spacing (In.):	0.0
Height (In.):	27.2	Lateral Offset (In.):	46.7	Road Grade (%):	5.20
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 27-in design height.			
	Breaking and Cracking:	No breaking or cracking.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	No corrosion/weathering or erosion.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0012-6.267-L		
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)		
Inspection Date:	10/18/2009	Barrier Rating:	16.60

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.

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)

Barrier Condition Photos



MORA_0012_6.267_L_1.jpg

Barrier ID:	MORA-0012-6.267-R				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/18/2009	Barrier Rating:	18.30		
Barrier Description					
Type:	CONCRETE WITH SIMULATED STONE FACE	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	162		
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:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	23.2	Post Spacing (In.):	0.0
Height (In.):	28.0	Lateral Offset (In.):	32.7	Road Grade (%):	5.90
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 27-in design height.			
	Breaking and Cracking:	No breaking or cracking.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	No corrosion/weathering or erosion.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0012-6.267-R		
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)		
Inspection Date:	10/18/2009	Barrier Rating:	18.30

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.

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)

Barrier Condition Photos



MORA_0012_6.267_R_1.jpg

Barrier ID:	MORA-0012-6.592-L				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/18/2009	Barrier Rating:	8.60		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	NON-TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	57		
Speed Limit (MPH):	45	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.):	19.0	Post Spacing (In.):	0.0
Height (In.):	27.0	Lateral Offset (In.):	0.0	Road Grade (%):	0.00
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 24-in design height.			
	Breaking and Cracking:	Three ft of the barrier is broken while another five ft has major mortar cracking.			
	Missing Elements:	Two missing log rails.			
	Corrosion and Weathering:	No notable corrosion/weathering or erosion.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0012-6.592-L		
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)		
Inspection Date:	10/18/2009	Barrier Rating:	8.60

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$9246
Brief Workorder:	Remove and reset 3 feet of damaged stone barrier and replace 2 log rails.				
Workorder:	Remove & Reset Stone Masonry Guardwall at \$250- per -Cu. Ft. for 12 CF = \$3000. [(3ft)(2.25ft)(1.75ft) = 11.8 CF. Replace rail at \$25- per -Lin. Ft. for 28 LF = \$700. Replace missing log rails. Re-point masonry barrier at \$140- per -Sq. Yd. for 2 SY = \$280. [(5ft)(2.25ft)] /9 = 1.25 SY. Low Speed Traffic Control at \$1475- per -Day for 3 Day(s) = \$4425. 1 day removal 2 days installation and repointing.				

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

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)

Barrier Condition Photos



MORA_0012_6.592_L_1.jpg



MORA_0012_6.592_L_2.jpg

Barrier ID:	MORA-0012-8.954-L				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/19/2009	Barrier Rating:	56.70		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	44		
Speed Limit (MPH):	45	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	NCW	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.):	24	Width (In.):	17.2	Post Spacing (In.):	0.0
Height (In.):	13.1	Lateral Offset (In.):	28.5	Road Grade (%):	1.70
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was 9–13in below the 24-in design height.			
	Breaking and Cracking:	4 ft of broken masonry. There is 6 in of cracking throughout the entire length of the wall.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	4 ft of erosion on the end of barrier which has undercut the foundation. The top 6 in of the wall has minimal cracking. Weathering exists throughout the entire length of the wall.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0012-8.954-L		
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)		
Inspection Date:	10/19/2009	Barrier Rating:	56.70

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$44468
Brief Workorder:	Raise guardwall 9-in. Remove and reset 44-ft of stone masonry guardwall to raise barrier to the 24-in design height.				
Workorder:	Remove & Reset Stone Masonry Guardwall at \$250- per -Cu. Ft. for 132 CF = \$33000. [(2ft)(1.5ft)(44ft)] = 132 CF. Structural Concrete at \$1000- per -Cu. Yd. for 3 CY = \$3000. [(1.5ft)(0.9ft)(44ft)] /27 = 2.2 CY. Low Speed Traffic Control at \$1475- per -Day for 3 Day(s) = \$4425. 1 day removal 2 days installation.				

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

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)

Barrier Condition Photos



MORA_0012_8.954_L_1.JPG

Barrier ID:	MORA-0012-9.157-L				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/19/2009	Barrier Rating:	60.90		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	23		
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:	NCW	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.):	24	Width (In.):	16.0	Post Spacing (In.):	0.0
Height (In.):	12.5	Lateral Offset (In.):	38.7	Road Grade (%):	0.10
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was 11–12in below the 24-in design height.			
	Breaking and Cracking:	There is cracking of less than 1/4in for the barrier length. There is no breaking within the barrier length.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	Corrosion and weathering is less than 5 percent of the barrier length. No erosion at the barrier foundation.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0012-9.157-L		
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)		
Inspection Date:	10/19/2009	Barrier Rating:	60.90

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$21945
Brief Workorder:	Raise guardwall 12-in. Remove and reset 23-ft of stone masonry guardwall on concrete footer to design height of 24-in.				
Workorder:	Remove & Reset Stone Masonry Guardwall at \$250- per -Cu. Ft. for 60 CF = \$15000. [(2ft)(1.3ft)(23ft)] = 59.8 CF. Structural Concrete at \$1000- per -Cu. Yd. for 2 CY = \$2000. [(1.3ft)(1ft)(23ft)] /27 = 1.1 CY. 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.

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)

Barrier Condition Photos



MORA_0012_9.157_L_1.JPG

Barrier ID:	MORA-0012-11.223-L				
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)				
Inspection Date:	10/19/2009	Barrier Rating:	14.10		
Barrier Description					
Type:	CONCRETE BARRIER	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	245		
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:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	32	Width (In.):	0.0	Post Spacing (In.):	0.0
Height (In.):	30.7	Lateral Offset (In.):	39.0	Road Grade (%):	1.97
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was 1-in below 32-in design height. This is a type 4 barrier which protects vehicles from entering the washed out stream.			
	Breaking and Cracking:	Minor breaking and cracking on the top of the barrier adjacent to the set pins.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	No corrosion or weathering. No erosion at the base of the barrier.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0012-11.223-L		
Route Name:	STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)		
Inspection Date:	10/19/2009	Barrier Rating:	14.10

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.

Mount Rainier National Park

ROUTE 0012: STATE ROUTE 410 (MATHER MEMORIAL PARKWAY)

Barrier Condition Photos



MORA_0012_11.223_L_1.JPG

Barrier ID:	MORA-0013-0.327-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	55.90		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	754		
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:	NCW	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.):	18	Width (In.):	19.0	Post Spacing (In.):	0.0
Height (In.):	15.5	Lateral Offset (In.):	30.2	Road Grade (%):	0.40
Physical Condition					
Barrier	Alignment and Height:	Alignment for the first 230' is tilted out 12in or more. The height was between 0-in to 10-in below the 18-in/24-in crenellated design height with 230-ft being 6-in to 10-in below.			
	Breaking and Cracking:	No breaking and minimal cracking.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	Major corrosion/weathering of the asphalt in front of the barrier that could be contributing to the height and alignment problems.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-0.327-R		
Route Name:	STEVENS CANYON ROAD		
Inspection Date:	10/20/2009	Barrier Rating:	55.90

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$250239
Brief Workorder:	Raise guardwall 10-in. Remove and reset 230-ft of stone masonry guardwall on concrete footer to adjacent 12-in height and repair asphalt.				
Workorder:	<p>Remove asphalt at \$10- per -Sq. Yd. for 64 = \$640. (230 ft X 2.5 ft)/9 = 64 sq yd</p> <p>Remove & Reset Stone Masonry Guardwall at \$250- per -Cu. Ft. for 736 CF = \$184000. [(2ft)(1.6ft)(230ft)] = 736 CF.</p> <p>Asphalt patch at \$175- per -Sq. Yd. for 64 SY = \$11200. (230 ft x 2.5 ft)/9 = 64 sq yds</p> <p>Structural Concrete at \$1000- per -Cu. Yd. for 11 CY = \$11000. [(1.6ft)(0.8ft)(230ft)] /27 = CY.</p> <p>Low Speed Traffic Control at \$1475- per -Day for 14 Day(s) = \$20650. 3 days removal 10 days installation 1 day asphalt work.</p>				

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

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_0.327_R_1.jpg

Barrier ID:	MORA-0013-0.522-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	60.20		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	876		
Speed Limit (MPH):	35	Placement with Respect to Road:	BOTH INSIDE AND OUTSIDE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	NCW	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.):	18	Width (In.):	18.6	Post Spacing (In.):	0.0
Height (In.):	17.3	Lateral Offset (In.):	31.2	Road Grade (%):	3.10
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was within 3-in of the 18-in/24-in crenellated design height.			
	Breaking and Cracking:	No breaking or cracking.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No notable corrosion/weathering or erosion.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-0.522-R		
Route Name:	STEVENS CANYON ROAD		
Inspection Date:	10/20/2009	Barrier Rating:	60.20

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.

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_0.522_R_1.jpg

Barrier ID:	MORA-0013-5.515-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	41.50		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	115		
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:	NCW	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.):	18	Width (In.):	18.7	Post Spacing (In.):	0.0
Height (In.):	24.7	Lateral Offset (In.):	39.7	Road Grade (%):	5.70
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was between 5-in to 8-in above the 18-in/24-in crenellated design height.			
	Breaking and Cracking:	Minor breaking and cracking less than 1/4in throughout the barrier.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	Minor corrosion and weathering no erosion.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-5.515-R		
Route Name:	STEVENS CANYON ROAD		
Inspection Date:	10/20/2009	Barrier Rating:	41.50

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.

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_5.515_R_1.jpg

Barrier ID:	MORA-0013-5.534-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	17.20		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	NON-TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	95		
Speed Limit (MPH):	35	Placement with Respect to Road:	NON-TRAFFIC BARRIER		
Hazard Behind Barrier:	EXTREME				
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.):	18	Width (In.):	18.7	Post Spacing (In.):	0.0
Height (In.):	22.2	Lateral Offset (In.):	0.0	Road Grade (%):	0.00
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was between 6-in to 7-in above the 18-in/24-in crenellated design height.			
	Breaking and Cracking:	Minor breaking/cracking <1/4in for entire barrier.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	Minor corrosion/weathering no erosion.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-5.534-R		
Route Name:	STEVENS CANYON ROAD		
Inspection Date:	10/20/2009	Barrier Rating:	17.20

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.

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos

Condition photos are not available for MORA-0013-5.534-R.

Barrier ID:	MORA-0013-5.879-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	41.50		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	276		
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:	NCW	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.):	24	Width (In.):	18.7	Post Spacing (In.):	0.0
Height (In.):	31.2	Lateral Offset (In.):	57.7	Road Grade (%):	4.80
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was 2-11 in above the 24-in design height.			
	Breaking and Cracking:	Minor breaking/cracking in mortar. Less than 1/4in.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	Minor corrosion/ weathering.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-5.879-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:		41.50	
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.

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_5.879_R_1.jpg

Barrier ID:	MORA-0013-6.354-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	37.20		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	74		
Speed Limit (MPH):	35	Placement with Respect to Road:	INSIDE OF CURVE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	NCW	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.):	24	Width (In.):	19.2	Post Spacing (In.):	0.0
Height (In.):	28.0	Lateral Offset (In.):	63.2	Road Grade (%):	6.20
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was 3–5in above the 24-in design height.			
	Breaking and Cracking:	No breaking or cracking.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	No notable corrosion/weathering or erosion.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-6.354-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:		37.20	
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.

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_6.354_R_1.jpg

Barrier ID:	MORA-0013-6.380-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	29.70		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	105		
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:	NCW	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.):	24	Width (In.):	18.2	Post Spacing (In.):	0.0
Height (In.):	29.0	Lateral Offset (In.):	54.2	Road Grade (%):	5.50
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was 4–6in above the 24-in design height.			
	Breaking and Cracking:	No breaking or cracking.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	No notable weathering/corrosion or erosion.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-6.380-R		
Route Name:	STEVENS CANYON ROAD		
Inspection Date:	10/20/2009	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.

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_6.380_R_1.jpg

Barrier ID:	MORA-0013-6.434-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	29.70		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	108		
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:	NCW	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.):	24	Width (In.):	18.7	Post Spacing (In.):	0.0
Height (In.):	33.0	Lateral Offset (In.):	64.3	Road Grade (%):	5.50
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was 8-11 in above the 24-in design height.			
	Breaking and Cracking:	Minor cracking of less than 1/4in in spots of barrier and no breaking.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	No notable corrosion/weathering or erosion.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-6.434-R		
Route Name:	STEVENS CANYON ROAD		
Inspection Date:	10/20/2009	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.

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_6.434_R_1.jpg

Barrier ID:	MORA-0013-6.665-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	38.50		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	209		
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:	NCW	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.):	24	Width (In.):	19.2	Post Spacing (In.):	0.0
Height (In.):	25.7	Lateral Offset (In.):	52.2	Road Grade (%):	4.90
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was between 1-in below to 7-in above the 24-in design height. At one end barrier is 23in tall and then transitions into 31" tall.			
	Breaking and Cracking:	Some breaking/cracking in mortar up to 1/2in.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	Minor corrosion/weathering. Loss of less than 5% of cross section.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-6.665-R		
Route Name:	STEVENS CANYON ROAD		
Inspection Date:	10/20/2009	Barrier Rating:	38.50

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$1931
Brief Workorder:	Repoint 2 SY of masonry barrier in various locations.				
Workorder:	Re-point masonry barrier at \$140- per -Sq. Yd. for 2 SY = \$280. [(4ft)(4ft)] /9 = 1.8 SY. 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.

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_6.665_R_1.jpg

Barrier ID:	MORA-0013-6.727-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	32.90		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	144		
Speed Limit (MPH):	35	Placement with Respect to Road:	INSIDE OF CURVE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	NCW	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.):	24	Width (In.):	19.7	Post Spacing (In.):	0.0
Height (In.):	24.2	Lateral Offset (In.):	49.5	Road Grade (%):	5.70
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 24-in design height. The last 41 ft of barrier (end section) was rebuilt.			
	Breaking and Cracking:	Areas have been re-pointed throughout the barrier length and the cracking is less than 1/4in for the barrier length.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	Moss is growing on approximately 5 percent of the barrier surface and the corrosion and weathering is less than 5 percent of the barrier length. There is no erosion at the foundation of the barrier length.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-6.727-R		
Route Name:	STEVENS CANYON ROAD		
Inspection Date:	10/20/2009	Barrier Rating:	32.90

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.

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_6.727_R_1.jpg

Barrier ID:	MORA-0013-6.806-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	41.50		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	270		
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:	NCW	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.):	24	Width (In.):	19.0	Post Spacing (In.):	0.0
Height (In.):	27.0	Lateral Offset (In.):	83.0	Road Grade (%):	4.60
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 24-in design height.			
	Breaking and Cracking:	One stone in top section with minor cracking between 1/4in and 1/2" and no breaking any where.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	No notable weathering or corrosion near barrier.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-6.806-R		
Route Name:	STEVENS CANYON ROAD		
Inspection Date:	10/20/2009	Barrier Rating:	41.50

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.

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_6.806_R_1.jpg

Barrier ID:	MORA-0013-6.893-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	30.00		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	220		
Speed Limit (MPH):	35	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	NCW	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.):	24	Width (In.):	18.7	Post Spacing (In.):	0.0
Height (In.):	26.7	Lateral Offset (In.):	70.5	Road Grade (%):	4.80
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 24-in design height.			
	Breaking and Cracking:	Minor cracking of mortar loose mortar missing mortar joints, at individual locations.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-6.893-R		
Route Name:	STEVENS CANYON ROAD		
Inspection Date:	10/20/2009	Barrier Rating:	30.00

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$1777
Brief Workorder:	Repoint 1 SY of stone masonry barrier.				
Workorder:	Re-point masonry barrier at \$140- per -Sq. Yd. for 1 SY = \$140. 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.

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_6.893_R_1.JPG

Barrier ID:	MORA-0013-6.989-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	38.50		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	138		
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:	NCW	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.):	18	Width (In.):	20.0	Post Spacing (In.):	0.0
Height (In.):	21.2	Lateral Offset (In.):	55.0	Road Grade (%):	4.50
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was between 2-in to 5-in above the 18-in/24-in crenellated design height.			
	Breaking and Cracking:	No breaking or cracking observed.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	Moss is covering about 80% of mortar.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-6.989-R		
Route Name:	STEVENS CANYON ROAD		
Inspection Date:	10/20/2009	Barrier Rating:	38.50

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.

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_6.989_R_1.JPG

Barrier ID:	MORA-0013-7.065-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	47.20		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	1002		
Speed Limit (MPH):	35	Placement with Respect to Road:	INSIDE OF CURVE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	NCW	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.):	18	Width (In.):	19.3	Post Spacing (In.):	0.0
Height (In.):	21.3	Lateral Offset (In.):	58.7	Road Grade (%):	7.70
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was between 4-in below to 9-in above the 18-in/24-in crenellated design height.			
	Breaking and Cracking:	Minor cracking of mortar (<0.5in wide) about 20 ft. Road and barrier undercut and eroding (20 + 5 ft) in two locations.			
	Missing Elements:	Retaining wall under barrier gone/missing in two locations. Barrier starting to lose stones.			
	Corrosion and Weathering:	Severe undermining of barrier and roadway in two locations.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-7.065-R		
Route Name:	STEVENS CANYON ROAD		
Inspection Date:	10/20/2009	Barrier Rating:	47.20

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$3009
Brief Workorder:	Repoint 9 SY of barrier.				
Workorder:	Re-Point Masonry Barrier at \$140- per -Sq. Yd. for 9 SY = \$1260. [(20 ft) (4 ft)]/9 = 8.9 SY 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.

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_7.065_R_1.JPG

Barrier ID:	MORA-0013-7.283-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	41.50		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	493		
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:	NCW	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.):	18	Width (In.):	19.0	Post Spacing (In.):	0.0
Height (In.):	21.7	Lateral Offset (In.):	49.2	Road Grade (%):	5.10
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was between 1-in below to 9-in above the 18-in/24-in crenellated design height.			
	Breaking and Cracking:	Minor cracking less than 1/4 in.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-7.283-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:		41.50	
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.

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_7.283_R_1.JPG

Barrier ID:	MORA-0013-7.386-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	51.50		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	460		
Speed Limit (MPH):	35	Placement with Respect to Road:	INSIDE OF CURVE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	NCW	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.):	18	Width (In.):	18.7	Post Spacing (In.):	0.0
Height (In.):	18.2	Lateral Offset (In.):	44.7	Road Grade (%):	5.60
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was within 3-in of the 18-in/24-in crenellated design height.			
	Breaking and Cracking:	Minor cracking less than 1/4 in.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-7.386-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:		51.50	
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.

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_7.386_R_1.JPG

Barrier ID:	MORA-0013-7.502-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	37.20		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	330		
Speed Limit (MPH):	35	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	NCW	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.):	18	Width (In.):	18.7	Post Spacing (In.):	0.0
Height (In.):	22.0	Lateral Offset (In.):	65.6	Road Grade (%):	6.20
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was between 2-in to 6-in above the 18-in/24-in crenellated design height.			
	Breaking and Cracking:	Minor cracking of grout less than 0.25 in wide.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-7.502-R		
Route Name:	STEVENS CANYON ROAD		
Inspection Date:	10/20/2009	Barrier Rating:	37.20

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.

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_7.502_R_1.JPG

Barrier ID:	MORA-0013-7.564-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	41.50		
Barrier Description					
Type:	STONE MASONRY WITH CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	185		
Speed Limit (MPH):	35	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	EXTREME				
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:	NONE
Ending End Trtmt Type:	NONE	Ending End Trtmt Crashworthy?:	N/A		
Average Measurements					
Design Height (In.):	27	Width (In.):	8.0	Post Spacing (In.):	0.0
Height (In.):	22.5	Lateral Offset (In.):	58.7	Road Grade (%):	5.80
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 24-in design height.			
	Breaking and Cracking:	Minor cracking at beginning.			
	Missing Elements:	Entire stone face missing.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-7.564-R		
Route Name:	STEVENS CANYON ROAD		
Inspection Date:	10/20/2009	Barrier Rating:	41.50

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$45458
Brief Workorder:	Install 96 SY of stone masonry face on concrete core wall.				
Workorder:	Add stone facing to bare concrete core barrier at \$200- per -Sq. Yd. for 96 SY = \$19200. $[(2 \text{ ft} + 0.75\text{ft} + 2 \text{ ft})(864 \text{ ft})]/9 = 96$ SY Low Speed Traffic Control at \$1475- per -Day for 15 Day(s) = \$22125.				

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

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_7.564_R_1.JPG

Barrier ID:	MORA-0013-7.790-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	38.50		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	145		
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:	NCW	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.):	24	Width (In.):	19.0	Post Spacing (In.):	0.0
Height (In.):	26.7	Lateral Offset (In.):	79.0	Road Grade (%):	5.30
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 24-in design height.			
	Breaking and Cracking:	Mortar missing in 5 locations 1 sq. yd. total.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	Moss covering 90% of mortar.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-7.790-R		
Route Name:	STEVENS CANYON ROAD		
Inspection Date:	10/20/2009	Barrier Rating:	38.50

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$1777
Brief Workorder:	Re-point 1 SY of masonry barrier in 5 locations where mortar is missing.				
Workorder:	Re-point masonry barrier at \$140- per -Sq. Yd. for 1 SY = \$140. Re-point mortar in 5 locations where missing. 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.

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_7.790_R_1.JPG

Barrier ID:	MORA-0013-7.896-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	32.90		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	268		
Speed Limit (MPH):	35	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	NCW	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.):	24	Width (In.):	19.7	Post Spacing (In.):	0.0
Height (In.):	26.0	Lateral Offset (In.):	53.7	Road Grade (%):	5.40
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 24-in design height.			
	Breaking and Cracking:	Minor mortar cracking/missing up to 1/2-in wide drilled hole through mortar.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-7.896-R		
Route Name:	STEVENS CANYON ROAD		
Inspection Date:	10/20/2009	Barrier Rating:	32.90

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$1777
Brief Workorder:	Repoint 1 SY of barrier.				
Workorder:	Re-point masonry barrier at \$140- per -Sq. Yd. for 1 SY = \$140. [(2ft)(3ft)] /9 = .67 SY. Repoint small cracks and area with hole drilled through mortar. 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.

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_7.896_R_1.JPG

Barrier ID:	MORA-0013-7.971-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	44.40		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	304		
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:	NCW	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.):	24	Width (In.):	19.7	Post Spacing (In.):	0.0
Height (In.):	30.0	Lateral Offset (In.):	46.0	Road Grade (%):	5.40
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was 4– 8in above the 24-in design height.			
	Breaking and Cracking:	Minor cracking less than 1/4 in. wide.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	Moss covering 90% of mortar.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-7.971-R		
Route Name:	STEVENS CANYON ROAD		
Inspection Date:	10/20/2009	Barrier Rating:	44.40

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.

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_7.971_R_1.JPG

Barrier ID:	MORA-0013-13.538-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	35.70		
Barrier Description					
Type:	STONE MASONRY WITH CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	370		
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-3	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.):	18.0	Post Spacing (In.):	0.0
Height (In.):	27.7	Lateral Offset (In.):	60.0	Road Grade (%):	4.70
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 27-in design height.			
	Breaking and Cracking:	No breaking or cracking observed.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-13.538-R		
Route Name:	STEVENS CANYON ROAD		
Inspection Date:	10/20/2009	Barrier Rating:	35.70

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.

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_13.538_R_1.JPG

Barrier ID:	MORA-0013-13.664-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	28.70		
Barrier Description					
Type:	STONE MASONRY WITH CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	600		
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-3	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.):	18.0	Post Spacing (In.):	0.0
Height (In.):	27.7	Lateral Offset (In.):	55.7	Road Grade (%):	5.20
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 27-in design height.			
	Breaking and Cracking:	No breaking or cracking observed.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-13.664-R		
Route Name:	STEVENS CANYON ROAD		
Inspection Date:	10/20/2009	Barrier Rating:	28.70

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.

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_13.664_R_1.JPG

Barrier ID:	MORA-0013-13.928-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	34.00		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	329		
Speed Limit (MPH):	35	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	NCW	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.):	18	Width (In.):	18.7	Post Spacing (In.):	0.0
Height (In.):	22.2	Lateral Offset (In.):	46.2	Road Grade (%):	5.00
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was between 4-in to 11-in above the 18-in/24-in crenellated design height.			
	Breaking and Cracking:	Minor cracking mortar on road side less than 1/4 in wide. Cracking and spalling 0.25 to 0.5in wide on retaining wall side, for 120 linear ft.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-13.928-R		
Route Name:	STEVENS CANYON ROAD		
Inspection Date:	10/20/2009	Barrier Rating:	34.00

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.

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_13.928_R_1.JPG

Barrier ID:	MORA-0013-14.974-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	44.40		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	329		
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:	NCW	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.):	18	Width (In.):	19.7	Post Spacing (In.):	0.0
Height (In.):	24.7	Lateral Offset (In.):	28.0	Road Grade (%):	4.50
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was between 2-in below to 5-in above the 18-in design height.			
	Breaking and Cracking:	Minor cracking less than 1/4 in. Mortar gone in one location.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-14.974-R		
Route Name:	STEVENS CANYON ROAD		
Inspection Date:	10/20/2009	Barrier Rating:	44.40

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$1777
Brief Workorder:	Re-point 1 SY of masonry barrier in one location.				
Workorder:	Re-point masonry barrier at \$140- per -Sq. Yd. for 1 SY = \$140. Repoint 1 SY of mortar. 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.

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_14.974_R_1.JPG

Barrier ID:	MORA-0013-15.082-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	41.50		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	228		
Speed Limit (MPH):	35	Placement with Respect to Road:	BOTH INSIDE AND OUTSIDE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	NCW	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.):	18	Width (In.):	19.7	Post Spacing (In.):	0.0
Height (In.):	16.2	Lateral Offset (In.):	29.0	Road Grade (%):	1.10
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was between 3-in to 4-in below the 18-in/24-in crenellated design height.			
	Breaking and Cracking:	Minor cracking less than 1/4 in. 1 stone broken part way off. Mortar gone in 1 location.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-15.082-R		
Route Name:	STEVENS CANYON ROAD		
Inspection Date:	10/20/2009	Barrier Rating:	41.50

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$1777
Brief Workorder:	Re-point 1 SY of mortar in one location.				
Workorder:	Re-point masonry barrier at \$140- per -Sq. Yd. for 1 SY = \$140. 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.

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_15.082_R_1.JPG

Barrier ID:	MORA-0013-15.165-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	50.20		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	226		
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:	NCW	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.):	18	Width (In.):	19.0	Post Spacing (In.):	0.0
Height (In.):	14.3	Lateral Offset (In.):	30.0	Road Grade (%):	0.60
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was between 1-in to 6-in below the 18-in/24-in crenellated design height.			
	Breaking and Cracking:	Minor mortar cracking along 46 ft <0.5 in wide.			
	Missing Elements:	Some mortar missing.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-15.165-R		
Route Name:	STEVENS CANYON ROAD		
Inspection Date:	10/20/2009	Barrier Rating:	50.20

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$7332
Brief Workorder:	Repoint 16 SY of stone masonry barrier.				
Workorder:	Re-point masonry barrier at \$140- per -Sq. Yd. for 16 SY = \$2240. [(46ft)(3ft)] /9 = 15.3 SY. Low Speed Traffic Control at \$1475- per -Day for 3 Day(s) = \$4425.				

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

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_15.165_R_1.JPG

Barrier ID:	MORA-0013-15.506-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/19/2009	Barrier Rating:	60.00		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	2224		
Speed Limit (MPH):	35	Placement with Respect to Road:	BOTH INSIDE AND OUTSIDE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	NCW	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.):	18	Width (In.):	18.7	Post Spacing (In.):	0.0
Height (In.):	20.2	Lateral Offset (In.):	37.2	Road Grade (%):	5.70
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height ranged between 11-in below to 13-in above 18-in/24-in crenellated design height with 441-ft being 6-in to 11-in below.			
	Breaking and Cracking:	There are minor cracks less than 1/4in for the barrier length and no breaking for the barrier length.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	No corrosion or weathering for the barrier length. There is no erosion at the barrier foundation.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-15.506-R		
Route Name:	STEVENS CANYON ROAD		
Inspection Date:	10/19/2009	Barrier Rating:	60.00

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$439918
Brief Workorder:	Raise guardwall 5-in. Remove and reset 411-ft of stone masonry guardwall on concrete footer to adjacent 12-in height.				
Workorder:	Remove & Reset Stone Masonry Guardwall at \$250- per -Cu. Ft. for 1412 CF = \$353000. [(2ft)(1.6ft)(411ft)] = 1411.2 CF. Structural Concrete at \$1000- per -Cu. Yd. for 13 CY = \$13000. [(1.6ft)(0.5ft)(411ft)] /27 = 12.2 CY. Low Speed Traffic Control at \$1475- per -Day for 23 Day(s) = \$33925. 5 days removal 18 days installation.				

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

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_15.506_R_1.JPG

Barrier ID:	MORA-0013-15.974-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/19/2009	Barrier Rating:	27.30		
Barrier Description					
Type:	STEEL-BACKED TIMBER WITH BLOCKOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STEEL-BACKED TIMBER/LOG	Post Material:	WOOD		
Blockout Type:	WOOD	Length (ft.):	254		
Speed Limit (MPH):	35	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	EXTREME				
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:	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.):	108.0
Height (In.):	24.7	Lateral Offset (In.):	35.7	Road Grade (%):	4.50
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. 254-ft was between 1 and 3-in below the 27-in design height.			
	Breaking and Cracking:	No breaking or cracking observed.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-15.974-R		
Route Name:	STEVENS CANYON ROAD		
Inspection Date:	10/19/2009	Barrier Rating:	27.30

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$4417
Brief Workorder:	Raise 254 feet of barrier up to 27-in design height.				
Workorder:	Adjust Guardrail at \$10- per -Lin. Ft. for 254 LF = \$2540. Raise 254ft 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.

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_15.974_R_1.JPG

Barrier ID:	MORA-0013-17.416-R				
Route Name:	STEVENS CANYON ROAD				
Inspection Date:	10/19/2009	Barrier Rating:	44.40		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	375		
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:	NCW	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.):	18	Width (In.):	19.2	Post Spacing (In.):	0.0
Height (In.):	25.7	Lateral Offset (In.):	31.7	Road Grade (%):	3.60
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was between 4-in to 10-in above the 18-in/24-in crenellated design height.			
	Breaking and Cracking:	Slight cracking of mortar on a crenellation 6 ft.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	Small erosion holes through pavement next to wall.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0013-17.416-R		
Route Name:	STEVENS CANYON ROAD		
Inspection Date:	10/19/2009	Barrier Rating:	44.40

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$1931
Brief Workorder:	Repoint 2 SY of mortar on crenellation.				
Workorder:	Re-point masonry barrier at \$140- per -Sq. Yd. for 2 SY = \$280. [(2ft)(6ft)] /9 = 1.3 SY. 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.

Mount Rainier National Park

ROUTE 0013: STEVENS CANYON ROAD

Barrier Condition Photos



MORA_0013_17.416_R_1.JPG

Barrier ID:	MORA-0014-7.361-R				
Route Name:	STATE ROUTE 706 (NISQUALLY ROAD)				
Inspection Date:	10/21/2009	Barrier Rating:	48.40		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	50		
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:	NCW	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.):	24	Width (In.):	12.6	Post Spacing (In.):	0.0
Height (In.):	18.0	Lateral Offset (In.):	27.0	Road Grade (%):	3.40
Physical Condition					
Barrier	Alignment and Height:	Alignment is off by less than 6in. Height is 3.1 to 6" lower than 24-in design height.			
	Breaking and Cracking:	3-ft piece on end that has separated from rest of barrier has a 2in wide crack in the mortar joint. 1 stone is broken off on other end.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0014-7.361-R		
Route Name:	STATE ROUTE 706 (NISQUALLY ROAD)		
Inspection Date:	10/21/2009	Barrier Rating:	48.40

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$1931
Brief Workorder:	Repoint 2 SY of stone masonry barrier.				
Workorder:	Re-point masonry barrier at \$140- per -Sq. Yd. for 2 SY = \$280. Fix the crack and replace the broken stone. [(3ft) x (1.5ft + 1.5ft + 1ft)] /9 = 1.3 SY. 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.

Mount Rainier National Park
ROUTE 0014: STATE ROUTE 706 (NISQUALLY ROAD)

Barrier Condition Photos



MORA_0014_7.361_R_1.JPG

Barrier ID:	MORA-0014-10.703-R				
Route Name:	STATE ROUTE 706 (NISQUALLY ROAD)				
Inspection Date:	10/21/2009	Barrier Rating:	28.30		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	162		
Speed Limit (MPH):	35	Placement with Respect to Road:	TANGENT		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	NCW	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.):	24	Width (In.):	25.2	Post Spacing (In.):	0.0
Height (In.):	26.0	Lateral Offset (In.):	72.5	Road Grade (%):	3.80
Physical Condition					
Barrier	Alignment and Height:	Beginning end dropping because of landslide entire section moving/sinking/out of alignment 55ft.			
	Breaking and Cracking:	Mortar cracking and eroding in places.			
	Missing Elements:	Individual missing stones.			
	Corrosion and Weathering:	Soil eroded from beneath slide area 10ft (100% gone at beginning end).			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0014-10.703-R		
Route Name:	STATE ROUTE 706 (NISQUALLY ROAD)		
Inspection Date:	10/21/2009	Barrier Rating:	28.30

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$102905
Brief Workorder:	Remove and reset 80-ft of stone masonry guardwall to design height of 24-in. Repoint 5 SY of barrier.				
Workorder:	Remove & Reset Stone Masonry Guardwall at \$250- per -Cu. Ft. for 336 CF = \$84000. [(2ft)(2.1ft)(80ft)] = 336 CF. Re-Point Masonry Barrier at \$140- per -Sq. Yd. for 5 SY = \$700. Repoint 5 SY of barrier. Low Speed Traffic Control at \$1475- per -Day for 6 Day(s) = \$8850. 1 day removal 4 days installation 1 day repointing.				

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

Mount Rainier National Park
ROUTE 0014: STATE ROUTE 706 (NISQUALLY ROAD)

Barrier Condition Photos



MORA_0014_10.703_R_1.JPG

Barrier ID:	MORA-0014-10.734-R				
Route Name:	STATE ROUTE 706 (NISQUALLY ROAD)				
Inspection Date:	10/21/2009	Barrier Rating:	4.30		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	NON-TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	98		
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.):	24.2	Post Spacing (In.):	0.0
Height (In.):	33.0	Lateral Offset (In.):	0.0	Road Grade (%):	0.00
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was 7–13in above the 24-in design height.			
	Breaking and Cracking:	Minor cracking less than 1/4 in.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0014-10.734-R		
Route Name:	STATE ROUTE 706 (NISQUALLY ROAD)		
Inspection Date:	10/21/2009	Barrier Rating:	4.30

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.

Mount Rainier National Park
ROUTE 0014: STATE ROUTE 706 (NISQUALLY ROAD)

Barrier Condition Photos



MORA_0014_10.734_R_1.JPG

Barrier ID:	MORA-0014-10.766-R				
Route Name:	STATE ROUTE 706 (NISQUALLY ROAD)				
Inspection Date:	10/21/2009	Barrier Rating:	24.30		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	116		
Speed Limit (MPH):	35	Placement with Respect to Road:	INSIDE OF CURVE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	NCW	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.):	24	Width (In.):	24.7	Post Spacing (In.):	0.0
Height (In.):	24.2	Lateral Offset (In.):	32.7	Road Grade (%):	1.90
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 24-in design height.			
	Breaking and Cracking:	Cracks less than 1/4in were present.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0014-10.766-R		
Route Name:	STATE ROUTE 706 (NISQUALLY ROAD)		
Inspection Date:	10/21/2009	Barrier Rating:	24.30

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.

Mount Rainier National Park
ROUTE 0014: STATE ROUTE 706 (NISQUALLY ROAD)

Barrier Condition Photos



MORA_0014_10.766_R_1.JPG

Barrier ID:	MORA-0014-10.808-R				
Route Name:	STATE ROUTE 706 (NISQUALLY ROAD)				
Inspection Date:	10/21/2009	Barrier Rating:	15.60		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	NON-TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	19		
Speed Limit (MPH):	35	Placement with Respect to Road:	NON-TRAFFIC BARRIER		
Hazard Behind Barrier:	HIGH				
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.):	20.0	Post Spacing (In.):	0.0
Height (In.):	22.7	Lateral Offset (In.):	0.0	Road Grade (%):	0.00
Physical Condition					
Barrier	Alignment and Height:	Alignment is less than 6in off. Height is 0 to 3-in below 24-in design height.			
	Breaking and Cracking:	Cracks less than 1/4in in mortar.			
	Missing Elements:	No missing elements observed. Some small piece of mortar missing in one spot.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0014-10.808-R		
Route Name:	STATE ROUTE 706 (NISQUALLY ROAD)		
Inspection Date:	10/21/2009	Barrier Rating:	15.60

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$1777
Brief Workorder:	Repoint 1 SY of masonry barrier.				
Workorder:	Re-Point Masonry Barrier at \$140- per -Sq. Yd. for 1 SY = \$140. 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.

Mount Rainier National Park
ROUTE 0014: STATE ROUTE 706 (NISQUALLY ROAD)

Barrier Condition Photos



MORA_0014_10.808_R_1.JPG

Barrier ID:	MORA-0014-12.394-R				
Route Name:	STATE ROUTE 706 (NISQUALLY ROAD)				
Inspection Date:	10/21/2009	Barrier Rating:	52.90		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	1573		
Speed Limit (MPH):	35	Placement with Respect to Road:	INSIDE OF CURVE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	NCW	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.):	18	Width (In.):	18.6	Post Spacing (In.):	0.0
Height (In.):	17.2	Lateral Offset (In.):	19.0	Road Grade (%):	4.10
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was between 3-in below to 2-in above the 18-in/24-in crenellated design height.			
	Breaking and Cracking:	Minor breaking of mortar and cracking <0.5 in wide cracks.			
	Missing Elements:	Individual missing stones less than 10.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0014-12.394-R		
Route Name:	STATE ROUTE 706 (NISQUALLY ROAD)		
Inspection Date:	10/21/2009	Barrier Rating:	52.90

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$1931
Brief Workorder:	Repoint 2 SY of loose masonry and replace missing rocks.				
Workorder:	Re-point masonry barrier at \$140- per -Sq. Yd. for 2 SY = \$280. Replace loose/missing rocks. 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.

Mount Rainier National Park
ROUTE 0014: STATE ROUTE 706 (NISQUALLY ROAD)

Barrier Condition Photos



MORA_0014_12.394_R_1.JPG

Barrier ID:	MORA-0014-12.692-R				
Route Name:	STATE ROUTE 706 (NISQUALLY ROAD)				
Inspection Date:	10/21/2009	Barrier Rating:	31.70		
Barrier Description					
Type:	STONE MASONRY WITH CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	CONCRETE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	336		
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-3	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.):	17.7	Post Spacing (In.):	0.0
Height (In.):	24.7	Lateral Offset (In.):	33.2	Road Grade (%):	5.50
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 3-in of 27-in design height.			
	Breaking and Cracking:	Missing stone on 11 square ft of the barrier in various places.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	Erosion behind barrier within 5' and drops off more than 1000 ft cliff.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0014-12.692-R		
Route Name:	STATE ROUTE 706 (NISQUALLY ROAD)		
Inspection Date:	10/21/2009	Barrier Rating:	31.70

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$1931
Brief Workorder:	Repoint 2 SY of stone masonry barrier.				
Workorder:	Re-point masonry barrier at \$140- per -Sq. Yd. for 2 SY = \$280. Repoint and replace missing stones. 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.

Mount Rainier National Park
ROUTE 0014: STATE ROUTE 706 (NISQUALLY ROAD)

Barrier Condition Photos



MORA_0014_12.692_R_1.JPG

Barrier ID:	MORA-0014-13.822-L				
Route Name:	STATE ROUTE 706 (NISQUALLY ROAD)				
Inspection Date:	10/21/2009	Barrier Rating:	37.20		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	NON-TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	357		
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.):	18	Width (In.):	17.7	Post Spacing (In.):	0.0
Height (In.):	10.6	Lateral Offset (In.):	0.0	Road Grade (%):	0.00
Physical Condition					
Barrier	Alignment and Height:	Rotating failure of wall falling off edge of parking lot for 50 ft. Height was 9-in to 6-in below the 18-in/24-in crenellated design height.			
	Breaking and Cracking:	Minor mortar cracking <0.5 in cracks.			
	Missing Elements:	Missing 3 ft of wall fallen away.			
	Corrosion and Weathering:	Some erosion of fter 4 ft.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0014-13.822-L		
Route Name:	STATE ROUTE 706 (NISQUALLY ROAD)		
Inspection Date:	10/21/2009	Barrier Rating:	37.20

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$340753
Brief Workorder:	Raise guardwall 8-in. Remove and reset 357-ft of stone masonry guardwall on concrete footer to crenellated 18-in/24-in height.				
Workorder:	Remove & Reset Stone Masonry Guardwall at \$250- per -Cu. Ft. for 1071 CF = \$267750. [(2ft)(1.5ft)(357ft)] = 1071 CF. Structural Concrete at \$1000- per -Cu. Yd. for 14 CY = \$14000. [(1.5ft)(0.67ft)(357ft)] /27 = 13.3 CY Low Speed Traffic Control at \$1475- per -Day for 19 Day(s) = \$28025. 4 days removal 15 days installation.				

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

Mount Rainier National Park
ROUTE 0014: STATE ROUTE 706 (NISQUALLY ROAD)

Barrier Condition Photos



MORA_0014_13.822_L_1.JPG

Barrier ID:	MORA-0014-14.591-R				
Route Name:	STATE ROUTE 706 (NISQUALLY ROAD)				
Inspection Date:	10/21/2009	Barrier Rating:	43.00		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	NON-TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	206		
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.):	19.2	Post Spacing (In.):	0.0
Height (In.):	17.5	Lateral Offset (In.):	0.0	Road Grade (%):	0.00
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was 4–10in below the 24-in design height.			
	Breaking and Cracking:	No breaking or cracking.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	No corrosion/weathering or erosion.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0014-14.591-R		
Route Name:	STATE ROUTE 706 (NISQUALLY ROAD)		
Inspection Date:	10/21/2009	Barrier Rating:	43.00

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$94188
Brief Workorder:	Raise guardwall 4-in. Remove and reset 94-ft of stone masonry guardwall on concrete footer to adjacent 18-in height.				
Workorder:	Remove & reset stone masonry guardwall at \$250- per -Cu. Ft. for 301 CF = \$75250. [(2ft)(1.6ft)(94ft)] = 301 CF. Structural Concrete at \$1000- per -Cu. Yd. for 3 CY = \$3000. [(1.6ft)(0.5ft)(94ft)] /27 = 2.8 CF. Low Speed Traffic Control at \$1475- per -Day for 5 Day(s) = \$7375. 1 day removal 4 days installation.				

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

Mount Rainier National Park
ROUTE 0014: STATE ROUTE 706 (NISQUALLY ROAD)

Barrier Condition Photos



MORA_0014_14.591_R_1.jpg

Barrier ID:	MORA-0014-14.620-R				
Route Name:	STATE ROUTE 706 (NISQUALLY ROAD)				
Inspection Date:	10/20/2009	Barrier Rating:	79.50		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	850		
Speed Limit (MPH):	35	Placement with Respect to Road:	BOTH INSIDE AND OUTSIDE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-2	Barrier Test Level:	NCW	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.):	24	Width (In.):	19.0	Post Spacing (In.):	0.0
Height (In.):	13.8	Lateral Offset (In.):	14.0	Road Grade (%):	2.00
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was 9–12in below the 24-in design height.			
	Breaking and Cracking:	There is less than 10 percent of the total barrier length which is cracked or broken.			
	Missing Elements:	No missing elements.			
	Corrosion and Weathering:	There is less than 5 percent of the barrier length which is corroding or cracking. There is approximately a 50 by 10 ft section (ending RIP mile direction) where the asphalt has collapsed and erosion is significant.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0014-14.620-R		
Route Name:	STATE ROUTE 706 (NISQUALLY ROAD)		
Inspection Date:	10/20/2009	Barrier Rating:	79.50

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$883317
Brief Workorder:	Raise guardwall 11-in. Remove and reset 850-ft of stone masonry guardwall on concrete footer to design height of 24-in. Replace 56-sy of asphalt.				
Workorder:	Remove asphalt pavement at \$10- per -Sq. Yd. for 56 SY = \$840. Removal of asphalt 10ft*50ft equals 500 sq ft/9 equals 56 sq yds Asphalt patch at \$175- per -Sq. Yd. for 56 SY = \$9800. Asphalt patching 10ft*50ft equals 500 sq ft/9 equals 56 sq yds Remove & Reset Stone Masonry Guardwall at \$250- per -Cu. Ft. for 2720 CF = \$680000. [(2ft)(1.6ft)(850ft)] = 2720 CF. Structural Concrete at \$1000- per -Cu. Yd. for 46 CY = \$46000. [(1.6ft)(0.9ft)(850ft)] /27 = 45.3 CY. Low Speed Traffic Control at \$1475- per -Day for 45 Day(s) = \$66375. 9 days removal 34 days installation 2 days asphalt.				

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

Mount Rainier National Park
ROUTE 0014: STATE ROUTE 706 (NISQUALLY ROAD)

Barrier Condition Photos



MORA_0014_14.620_R_1.jpg

Barrier ID:	MORA-0014-14.781-R				
Route Name:	STATE ROUTE 706 (NISQUALLY ROAD)				
Inspection Date:	10/21/2009	Barrier Rating:	11.60		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	NON-TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	289		
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.):	18.0	Post Spacing (In.):	0.0
Height (In.):	20.0	Lateral Offset (In.):	0.0	Road Grade (%):	0.00
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height between 3 and 6-in below 24-in design height.			
	Breaking and Cracking:	Minor cracking 1/4 to 1/2 in. Large hole through barrier weep hole has been eroded up into the mortar above original hole.			
	Missing Elements:	2 missing stones.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0014-14.781-R		
Route Name:	STATE ROUTE 706 (NISQUALLY ROAD)		
Inspection Date:	10/21/2009	Barrier Rating:	11.60

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$2327
Brief Workorder:	Replace 2 stones and re-point 1 SY of mortar.				
Workorder:	Re-point masonry barrier at \$140- per -Sq. Yd. for 1 SY = \$140. Re-point 1 sq. yd. of mortar. Replace Stones at \$250- per -Each for 2 Unit(s) = \$500. Replace 2 missing stones. 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.

Mount Rainier National Park
ROUTE 0014: STATE ROUTE 706 (NISQUALLY ROAD)

Barrier Condition Photos



MORA_0014_14.781_R_1.jpg

Barrier ID:	MORA-0100-0.366-R				
Route Name:	LONGMIRE SOUTH BACK GATE ROAD				
Inspection Date:	10/21/2009	Barrier Rating:	22.80		
Barrier Description					
Type:	W-BEAM STRONG POST	Barrier Function:	TRAFFIC		
Barrier Material:	WEATHERING STEEL/CORTEN	Post Material:	WOOD		
Blockout Type:	WOOD	Length (ft.):	151		
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-3	Is Barrier Crashworthy?:	YES
Beg. End Trtmt Type:	W-BEAM BCT	Is Beg. End Trtmt Crashworthy?:	NO	Approach Transition Type:	NONE
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.):	74.6
Height (In.):	27.0	Lateral Offset (In.):	14.6	Road Grade (%):	2.20
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height within 1-in of 27-in design height.			
	Breaking and Cracking:	1 blockout is in poor condition with deformed cracked cross section. Metal has minor twisting bending but no tears or cracking.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	Erosion more than 8in of post exposed below ground level on posts.			
End Treatments	Alignment and Height:	Alignment acceptable. Height within 1-in of 27-in design height.			
	Breaking and Cracking:	2 posts have deformed cross section due to cracks.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	Loss of 5% or less of cross section. Erosion less than 8in of post exposed below ground.			

Barrier ID:	MORA-0100-0.366-R		
Route Name:	LONGMIRE SOUTH BACK GATE ROAD		
Inspection Date:	10/21/2009	Barrier Rating:	22.80

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$9658
Brief Workorder:	Replace blocks and posts and structural backfill on W-beam.				
Workorder:	Replace post at \$100- per -Each for 2 Post(s) = \$200. 1 on each end terminal. Replace block at \$30- per -Each for 1 Block(s) = \$30. 1 on barrier. Structural backfill at \$50- per -Cu. Yd. for 80 CY = \$5600. Erosion area behind and around posts of barrier. [(36ft)(6ft)(10ft)]/27 = 80 CY. 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.

Mount Rainier National Park
ROUTE 0100: LONGMIRE SOUTH BACK GATE ROAD

Barrier Condition Photos



MORA_0100_0.366_R_1.JPG



MORA_0100_0.366_R_2.JPG

Barrier ID:	MORA-0203-0.016-R				
Route Name:	MILLER CUT OFF / RICKSECKER POINT LOOP ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	43.00		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	135		
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:	NCW	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.):	18	Width (In.):	18.0	Post Spacing (In.):	0.0
Height (In.):	14.0	Lateral Offset (In.):	33.0	Road Grade (%):	5.20
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. 15-ft was 3-6-in below the 18-in/24-in crenellated design height and 50-ft was 6-14-in below.			
	Breaking and Cracking:	Minor cracking less than 1/4 in. 2 loose stones.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0203-0.016-R		
Route Name:	MILLER CUT OFF / RICKSECKER POINT LOOP ROAD		
Inspection Date:	10/20/2009	Barrier Rating:	43.00

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$50094
Brief Workorder:	Raise guardwall 6-in. Remove and reset 50-ft of stone masonry guardwall on concrete footer to adjacent 12-in height.				
Workorder:	Re-point masonry barrier at \$140- per -Sq. Yd. for 1 SY = \$140. Re-point mortar to secure 2 loose stones. Remove & Reset Stone Masonry Guardwall at \$250- per -Cu. Ft. for 150 CF = \$37500. $[(2ft)(1.5ft)(50ft)] = 150 CF$. Structural Concrete at \$1000- per -Cu. Yd. for 2 CY = \$2000. $[(1.5ft)(0.5ft)(50ft)] / 27 = 1.4 CY$. Low Speed Traffic Control at \$1475- per -Day for 4 Day(s) = \$5900. 1 day for repointing 3 days installation.				

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

Mount Rainier National Park

ROUTE 0203: MILLER CUT OFF / RICKSECKER POINT LOOP ROAD

Barrier Condition Photos



MORA_0203_0.016_R_1.JPG

Barrier ID:	MORA-0203-0.038-R				
Route Name:	MILLER CUT OFF / RICKSECKER POINT LOOP ROAD				
Inspection Date:	10/21/2009	Barrier Rating:	0.00		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	NON-TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	129		
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.):	18	Width (In.):	19.0	Post Spacing (In.):	0.0
Height (In.):	23.0	Lateral Offset (In.):	0.0	Road Grade (%):	0.00
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was 4-in to 6-in above the 18-in/24-in crenellated design height.			
	Breaking and Cracking:	No breaking or cracking observed.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	Moss covering 60% of mortar.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0203-0.038-R		
Route Name:	MILLER CUT OFF / RICKSECKER POINT LOOP ROAD		
Inspection Date:	10/21/2009	Barrier Rating:	0.00

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.

Mount Rainier National Park

ROUTE 0203: MILLER CUT OFF / RICKSECKER POINT LOOP ROAD

Barrier Condition Photos



MORA_0203_0.038_R_1.jpg

Barrier ID:	MORA-0203-0.056-R				
Route Name:	MILLER CUT OFF / RICKSECKER POINT LOOP ROAD				
Inspection Date:	10/21/2009	Barrier Rating:	41.50		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	205		
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:	NCW	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.):	18	Width (In.):	19.2	Post Spacing (In.):	0.0
Height (In.):	17.0	Lateral Offset (In.):	22.7	Road Grade (%):	5.00
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was within 3-in of the 18-in/24-in crenellated design height.			
	Breaking and Cracking:	Cracking of less than 1/4in in a few locations and a couple of those locations the cracking was through the entire barrier.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No notable corrosion/weathering or erosion.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0203-0.056-R		
Route Name:	MILLER CUT OFF / RICKSECKER POINT LOOP ROAD		
Inspection Date:	10/21/2009	Barrier Rating:	41.50

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$1931
Brief Workorder:	Repoint 2 SY of masonry barrier.				
Workorder:	Re-Point Masonry Barrier at \$140- per -Sq. Yd. for 2 SY = \$280. 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.

Mount Rainier National Park

ROUTE 0203: MILLER CUT OFF / RICKSECKER POINT LOOP ROAD

Barrier Condition Photos



MORA_0203_0.056_R_1.jpg

Barrier ID:	MORA-0203-0.094-R				
Route Name:	MILLER CUT OFF / RICKSECKER POINT LOOP ROAD				
Inspection Date:	10/21/2009	Barrier Rating:	43.00		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	861		
Speed Limit (MPH):	25	Placement with Respect to Road:	INSIDE OF CURVE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	NCW	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.):	24	Width (In.):	19.0	Post Spacing (In.):	0.0
Height (In.):	18.3	Lateral Offset (In.):	29.6	Road Grade (%):	2.90
Physical Condition					
Barrier	Alignment and Height:	Height is within 3 in of 18-in design height for approximately 765-ft of barrier and the barrier is missing for 99-ft (due to possible mud slide).			
	Breaking and Cracking:	Approximately 10 percent of the barrier total has minor cracking of less than 1/4in. 5 stones are chipped and less than 5 percent of the barrier is breaking.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	Corrosion and weathering is less than 5 percent. Erosion at the barrier foundation is less than 5 percent.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0203-0.094-R		
Route Name:	MILLER CUT OFF / RICKSECKER POINT LOOP ROAD		
Inspection Date:	10/21/2009	Barrier Rating:	43.00

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$74773
Brief Workorder:	Replace 99 feet of stone masonry barrier to 24-inch design height and repair adjacent asphalt.				
Workorder:	<p>Stone Masonry with Concrete Core at \$500- per -Lin. Ft. for 99 LF = \$49500. Asphalt patch at \$175- per -Sq. Yd. for 55 SY = \$9625. $[(99\text{ft})(5\text{ft})]/9 = 55 \text{ SY}$. Low Speed Traffic Control at \$1475- per -Day for 6 Day(s) = \$8850. 1 day removal 1 day asphalt work 4 days installation.</p>				

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

Mount Rainier National Park

ROUTE 0203: MILLER CUT OFF / RICKSECKER POINT LOOP ROAD

Barrier Condition Photos



MORA_0203_0.094_R_1.jpg



MORA_0203_0.094_R_2.jpg

Barrier ID:	MORA-0203-0.255-R				
Route Name:	MILLER CUT OFF / RICKSECKER POINT LOOP ROAD				
Inspection Date:	10/21/2009	Barrier Rating:	7.30		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	NON-TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	400		
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.):	18	Width (In.):	20.2	Post Spacing (In.):	0.0
Height (In.):	20.2	Lateral Offset (In.):	0.0	Road Grade (%):	0.00
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was between 1-in to 4-in above the 18-in/24-in crenellated design height.			
	Breaking and Cracking:	Minor cracking less than 1/4 in. One crack in mortar 1/4in to 1/2", 1 ft. long.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0203-0.255-R		
Route Name:	MILLER CUT OFF / RICKSECKER POINT LOOP ROAD		
Inspection Date:	10/21/2009	Barrier Rating:	7.30

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$1777
Brief Workorder:	Re-point 1 SY of mortar.				
Workorder:	Re-point masonry barrier at \$140- per -Sq. Yd. for 1 SY = \$140. 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.

Mount Rainier National Park

ROUTE 0203: MILLER CUT OFF / RICKSECKER POINT LOOP ROAD

Barrier Condition Photos



MORA_0203_0.255_R_1.jpg

Barrier ID:	MORA-0203-0.296-R				
Route Name:	MILLER CUT OFF / RICKSECKER POINT LOOP ROAD				
Inspection Date:	10/21/2009	Barrier Rating:	37.00		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	621		
Speed Limit (MPH):	25	Placement with Respect to Road:	BOTH INSIDE AND OUTSIDE		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	NCW	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.):	18	Width (In.):	19.5	Post Spacing (In.):	0.0
Height (In.):	18.3	Lateral Offset (In.):	81.3	Road Grade (%):	1.70
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was within 3-in of the 18-in/24-in crenellated design height.			
	Breaking and Cracking:	Cracking of less than 1/4in exists in less than 5% of barrier.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No notable corrosion/weathering or erosion.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0203-0.296-R		
Route Name:	MILLER CUT OFF / RICKSECKER POINT LOOP ROAD		
Inspection Date:	10/21/2009	Barrier Rating:	37.00

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$1931
Brief Workorder:	Repoint 2 SY of stone masonry barrier.				
Workorder:	Re-Point Masonry Barrier at \$140- per -Sq. Yd. for 2 SY = \$280. 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.

Mount Rainier National Park

ROUTE 0203: MILLER CUT OFF / RICKSECKER POINT LOOP ROAD

Barrier Condition Photos



MORA_0203_0.296_R_1.jpg

Barrier ID:	MORA-0203-0.620-R				
Route Name:	MILLER CUT OFF / RICKSECKER POINT LOOP ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	45.70		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	1417		
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:	NCW	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.):	18	Width (In.):	19.0	Post Spacing (In.):	0.0
Height (In.):	19.3	Lateral Offset (In.):	68.0	Road Grade (%):	2.80
Physical Condition					
Barrier	Alignment and Height:	Alignment is off by 8in for a 37 section of barrier. Height was within 3 in of 18-in/24-in crenellated design height for the barrier length.			
	Breaking and Cracking:	The cracking is less than 1/4 of an in for the barrier length. There are no broken stones for the barrier length.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	Corrosion and weathering is less than 5 percent for the barrier length. There is 10 percent erosion at the barrier base for the length of the barrier.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0203-0.620-R		
Route Name:	MILLER CUT OFF / RICKSECKER POINT LOOP ROAD		
Inspection Date:	10/20/2009	Barrier Rating:	45.70

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$37593
Brief Workorder:	Remove and reset 37 feet of leaning stone masonry barrier.				
Workorder:	Remove & reset stone masonry guardwall at \$250- per -Cu. Ft. for 119 CF = \$29750. [(2ft)(1.6ft)(37ft)] = 118.4 CF. Low Speed Traffic Control at \$1475- per -Day for 3 Day(s) = \$4425. 1 day removal 2 days installation.				

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

Mount Rainier National Park

ROUTE 0203: MILLER CUT OFF / RICKSECKER POINT LOOP ROAD

Barrier Condition Photos



MORA_0203_0.620_R_1.jpg

Barrier ID:	MORA-0203-0.886-R				
Route Name:	MILLER CUT OFF / RICKSECKER POINT LOOP ROAD				
Inspection Date:	10/21/2009	Barrier Rating:	25.80		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	NON-TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	182		
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.):	18	Width (In.):	18.7	Post Spacing (In.):	0.0
Height (In.):	11.0	Lateral Offset (In.):	0.0	Road Grade (%):	0.00
Physical Condition					
Barrier	Alignment and Height:	Barrier is rotated by about 20 degrees from vertical for 60 linear ft. Height was between 9-in to 6-in below the 18-in/24-in crenellated design height for 81-ft and 3-6 in below design height for 101-ft.			
	Breaking and Cracking:	Minor cracking less than 1/4 in. Five cracks 1/2-in to 1.5-in wide, 6-in to 1-ft long, total 1 sq. yd.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0203-0.886-R		
Route Name:	MILLER CUT OFF / RICKSECKER POINT LOOP ROAD		
Inspection Date:	10/21/2009	Barrier Rating:	25.80

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$66660
Brief Workorder:	Raise guardwall 3-in. Remove and reset 81-ft of stone masonry guardwall on concrete footer to adjacent crenellated 12-in/18-in height.				
Workorder:	Remove & reset stone masonry guardwall at \$250- per -Cu. Ft. for 195 CF = \$48750. [(1.5ft)(1.6ft)(81ft)] = 194.4 CF. Structural Concrete at \$1000- per -Cu. Yd. for 3 CY = \$3000. [(1.6ft)(0.5ft)(81ft)] /27 = 2.4 CY. Low Speed Traffic Control at \$1475- per -Day for 6 Day(s) = \$8850. 1 day removal 1 day to repoint 4 days installation.				

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

Mount Rainier National Park

ROUTE 0203: MILLER CUT OFF / RICKSECKER POINT LOOP ROAD

Barrier Condition Photos



MORA_0203_0.886_R_1.jpg

Barrier ID:	MORA-0207-1.580-R				
Route Name:	MOWICH ROAD				
Inspection Date:	10/21/2009	Barrier Rating:	25.50		
Barrier Description					
Type:	STONE MASONRY CRENELLATED WITHOUT	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	95		
Speed Limit (MPH):	30	Placement with Respect to Road:	OUTSIDE OF CURVE		
Hazard Behind Barrier:	HIGH				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	NCW	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.):	18	Width (In.):	19.7	Post Spacing (In.):	0.0
Height (In.):	36.0	Lateral Offset (In.):	79.6	Road Grade (%):	6.20
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was 16–19in above the 18-in/24-in crenellated design height.			
	Breaking and Cracking:	Minor cracks less than 1/4 in.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0207-1.580-R				
Route Name:	MOWICH ROAD				
Inspection Date:	10/21/2009	Barrier Rating:		25.50	
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.

Mount Rainier National Park

ROUTE 0207: MOWICH ROAD

Barrier Condition Photos



MORA_0207_1.580_R_1.JPG

Barrier ID:	MORA-0500-0.064-R				
Route Name:	VALLEY ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	30.10		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	NON-TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	100		
Speed Limit (MPH):	20	Placement with Respect to Road:	NON-TRAFFIC BARRIER		
Hazard Behind Barrier:	EXTREME				
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.):	24	Width (In.):	19.0	Post Spacing (In.):	0.0
Height (In.):	19.7	Lateral Offset (In.):	0.0	Road Grade (%):	0.00
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was 2-7in below the 24-in design height. 20-ft of barrier was more than 6in. below the design height.			
	Breaking and Cracking:	No breaking/cracking observed.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0500-0.064-R		
Route Name:	VALLEY ROAD		
Inspection Date:	10/20/2009	Barrier Rating:	30.10

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$21945
Brief Workorder:	Raise guardwall 1-in. Remove and reset 20-ft of stone masonry guardwall on concrete footer to adjacent 18-in height.				
Workorder:	Remove & reset stone masonry guardwall at \$250- per -Cu. Ft. for 64 CF = \$16000. [(2ft)(1.6ft)(20ft)] = 64 CF. Structural Concrete at \$1000- per -Cu. Yd. for 1 CY = \$1000. [(1.6ft)(0.5ft)(20ft)] /27 = 0.6 CY. 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.

Mount Rainier National Park

ROUTE 0500: VALLEY ROAD

Barrier Condition Photos



MORA_0500_0.064_R_1.jpg

Barrier ID:	MORA-0500-0.070-R				
Route Name:	VALLEY ROAD				
Inspection Date:	10/20/2009	Barrier Rating:	62.40		
Barrier Description					
Type:	STONE MASONRY WITHOUT CONCRETE CORE WALL	Barrier Function:	TRAFFIC		
Barrier Material:	STONE	Post Material:	N/A		
Blockout Type:	N/A	Length (ft.):	422		
Speed Limit (MPH):	20	Placement with Respect to Road:	OUTSIDE OF CURVE		
Hazard Behind Barrier:	EXTREME				
Barrier Crashworthiness					
Appropriate Test Level:	TL-1	Barrier Test Level:	NCW	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.):	24	Width (In.):	18.7	Post Spacing (In.):	0.0
Height (In.):	15.0	Lateral Offset (In.):	54.0	Road Grade (%):	4.70
Physical Condition					
Barrier	Alignment and Height:	Alignment acceptable. Height was 8–10in below the 24-in design height.			
	Breaking and Cracking:	No breaking/cracking observed.			
	Missing Elements:	No missing elements observed.			
	Corrosion and Weathering:	No corrosion or weathering observed.			
End Treatments	Alignment and Height:				
	Breaking and Cracking:				
	Missing Elements:				
	Corrosion and Weathering:				

Barrier ID:	MORA-0500-0.070-R		
Route Name:	VALLEY ROAD		
Inspection Date:	10/20/2009	Barrier Rating:	62.40

Repair Recommendations

Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$428120
Brief Workorder:	Raise guardwall 9-in. Remove and reset 422-ft of stone masonry guardwall on concrete footer to design height of 24-in.				
Workorder:	Remove & reset stone masonry guardwall at \$250- per -Cu. Ft. for 1351 CF = \$337750. [(2ft)(1.6ft)(422ft)] = 1350.4 CF. Structural Concrete at \$1000- per -Cu. Yd. for 19 CY = \$19000. [(1.6ft)(0.75ft)(422ft)] /27 = 18.8 CY. Low Speed Traffic Control at \$1475- per -Day for 22 Day(s) = \$32450. 5 days removal 17 days installation.				

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

Mount Rainier National Park

ROUTE 0500: VALLEY ROAD

Barrier Condition Photos



MORA_0500_0.070_R_1.jpg

Appendix A

Summary of GIP Definitions and Assessment



Mount Rainier National Park



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 <i>design height</i> 	<ul style="list-style-type: none"> Between 3.1 - 6" lower than <i>design height</i> 	<ul style="list-style-type: none"> Greater than 6.1" 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"> 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.