

OLYM

## GIP Report

### NPS Guardwall/Rail Inventory Program Olympic National Park



**Federal Lands Highway  
Road Inventory Program**

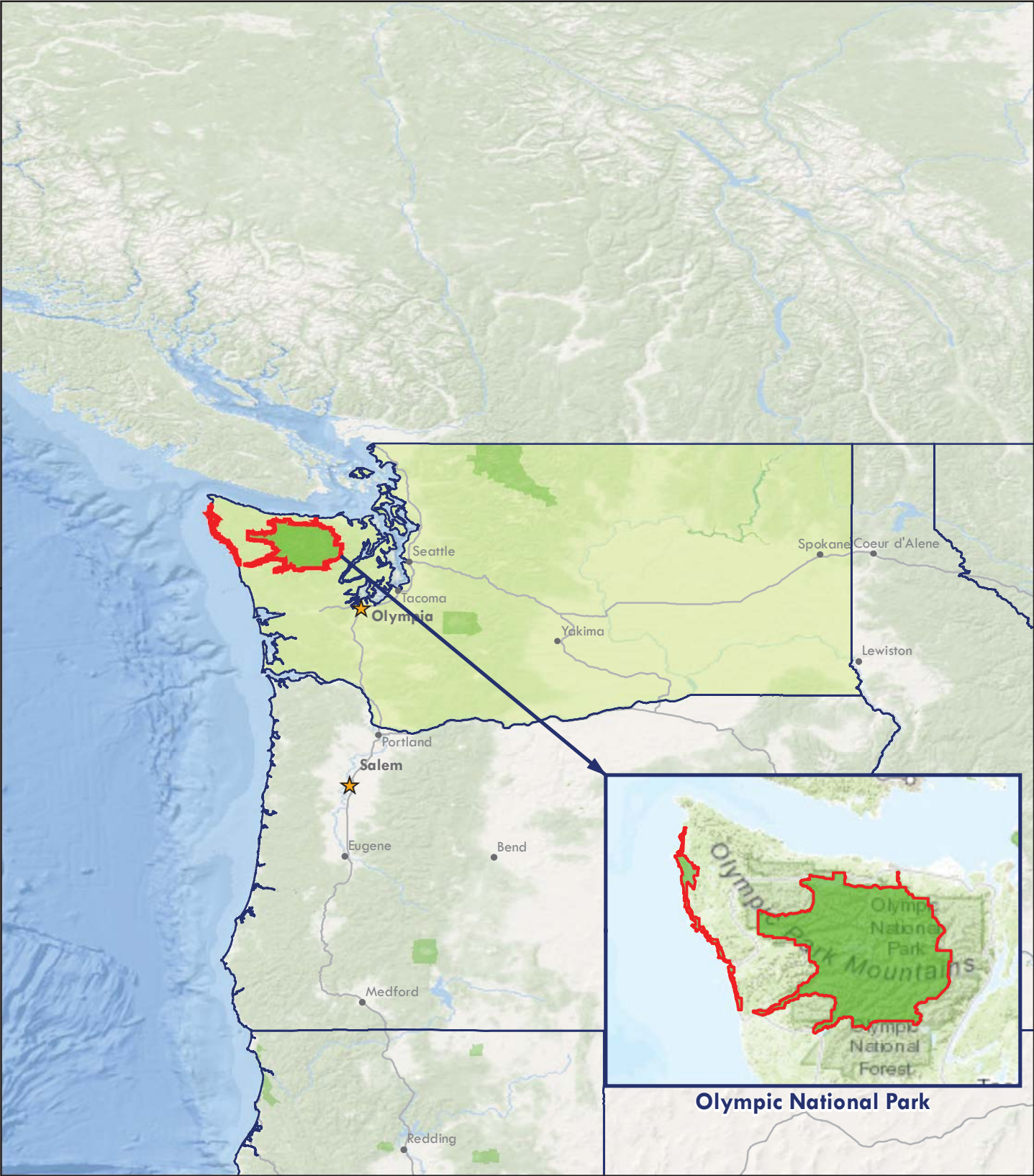
#### Prepared By:

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

Data Collection Date: November 2009  
Report Date: December 2015

# Olympic 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  
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# Introduction



## Olympic 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

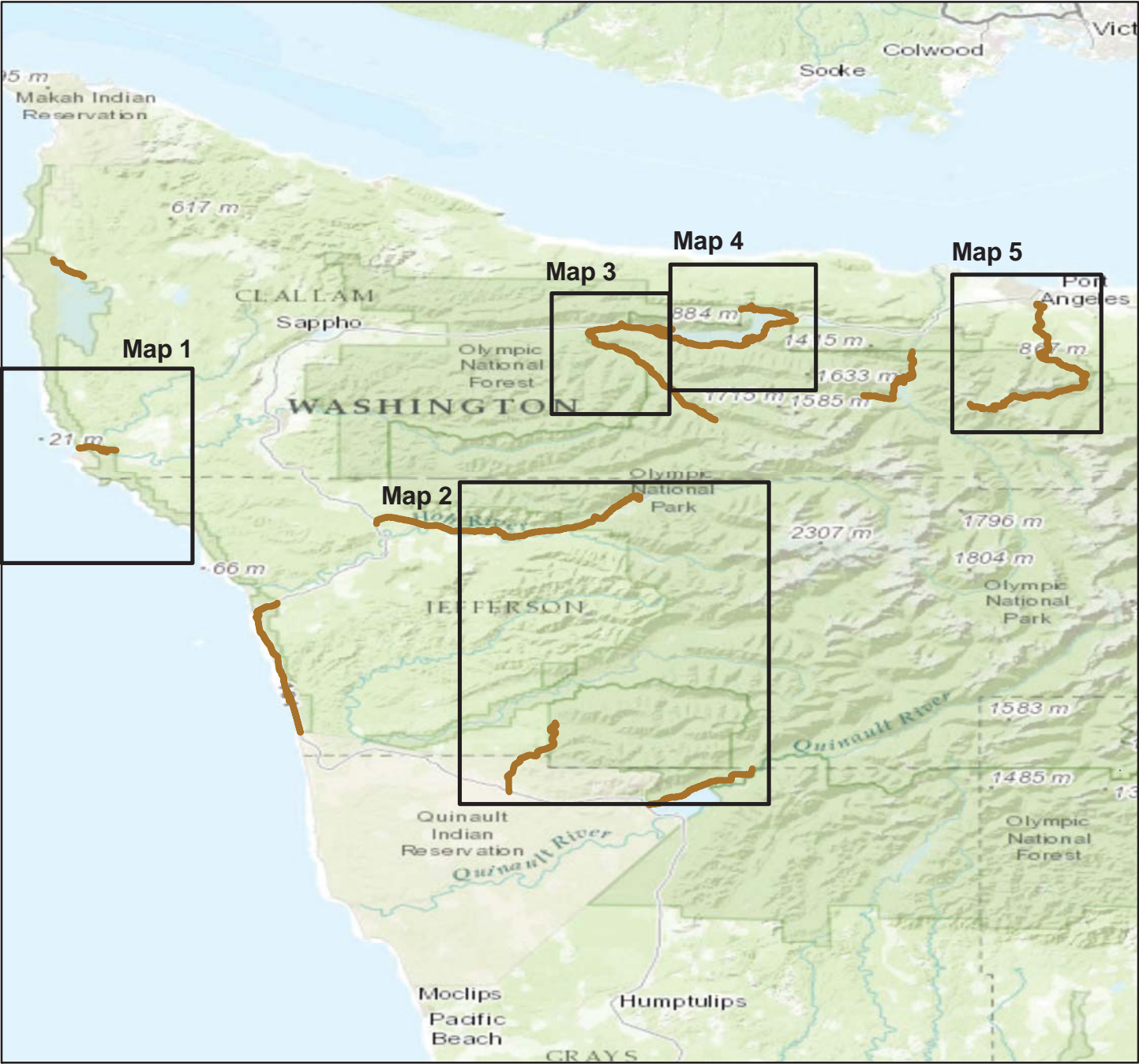


Olympic National Park



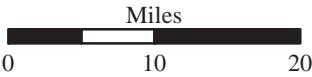
**Federal Lands Highway  
Road Inventory Program**

Olympic National Park  
BARRIER LOCATION MAP  
Key Map



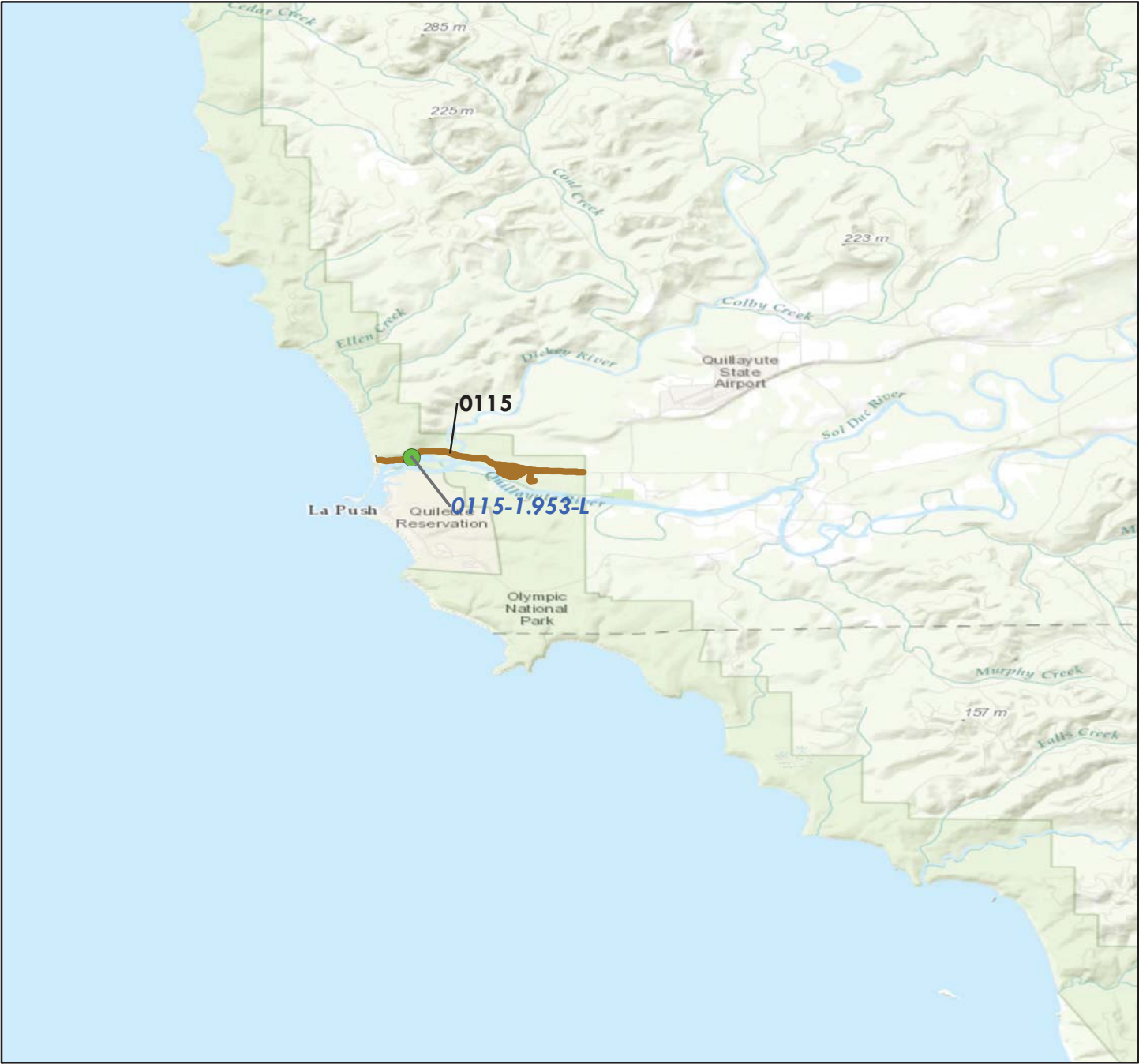
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

 RIP Collected Routes





Olympic National Park  
BARRIER LOCATION MAP  
Map 1

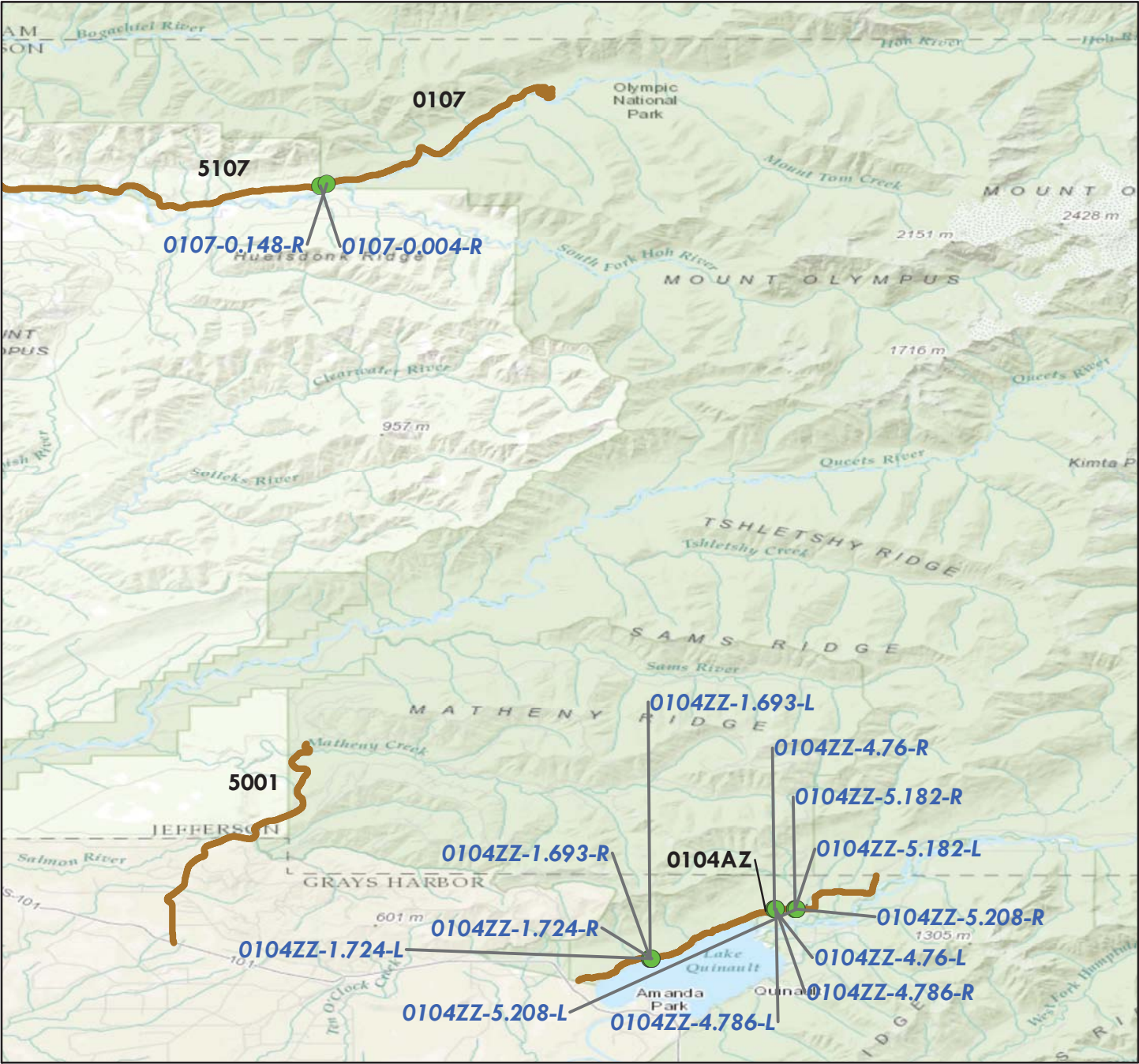


Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

-  **Barrier Locations**
-  **RIP Collected Routes**

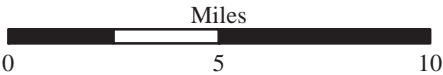


Olympic National Park  
BARRIER LOCATION MAP  
Map 2



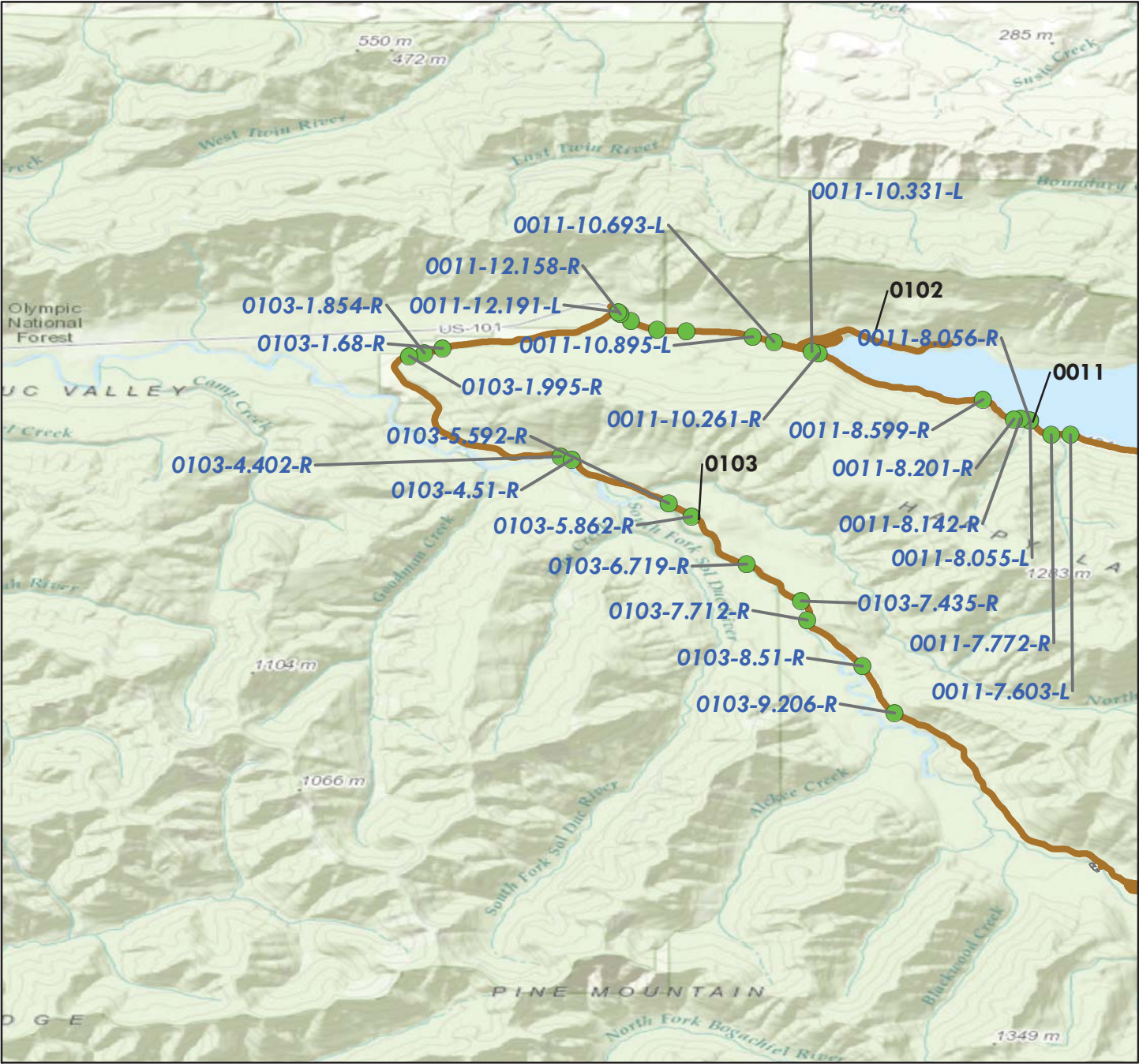
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

- Barrier Locations
- RIP Collected Routes





Olympic National Park  
BARRIER LOCATION MAP  
Map 3



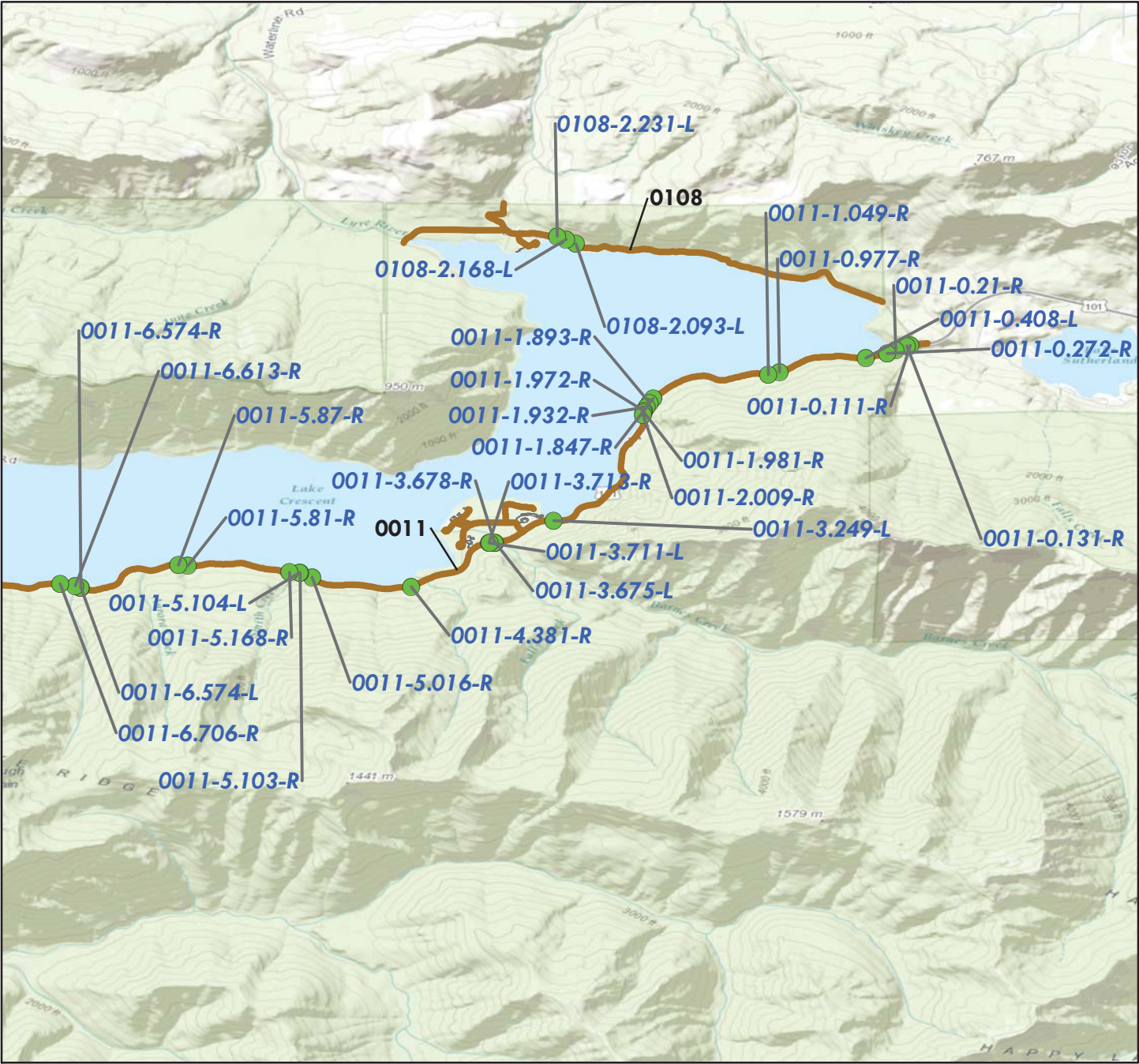
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

- Barrier Locations
- RIP Collected Routes





Olympic National Park  
BARRIER LOCATION MAP  
Map 4

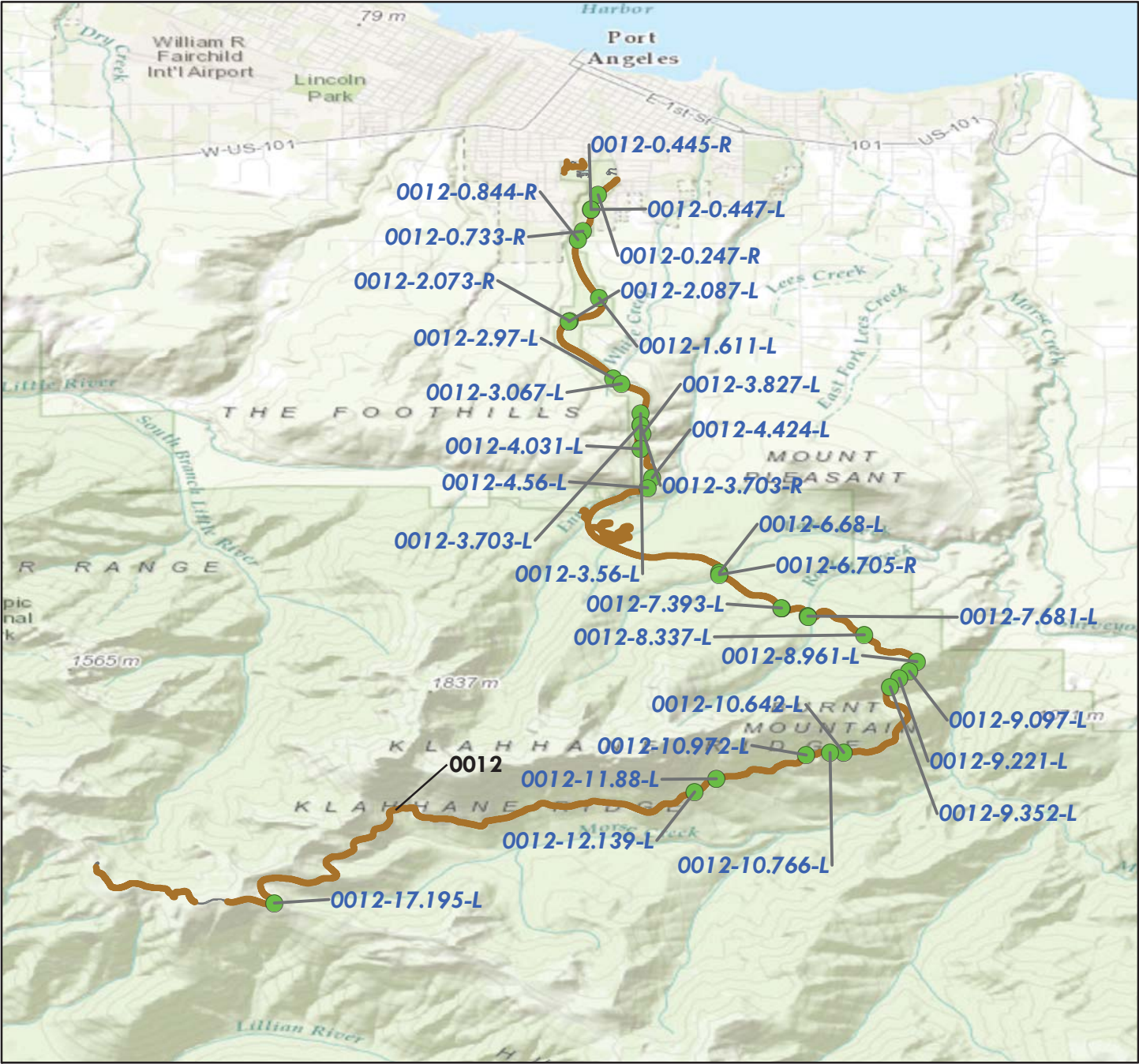


Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

- Barrier Locations (Not all labeled)
- RIP Collected Routes



Olympic National Park  
BARRIER LOCATION MAP  
Map 5



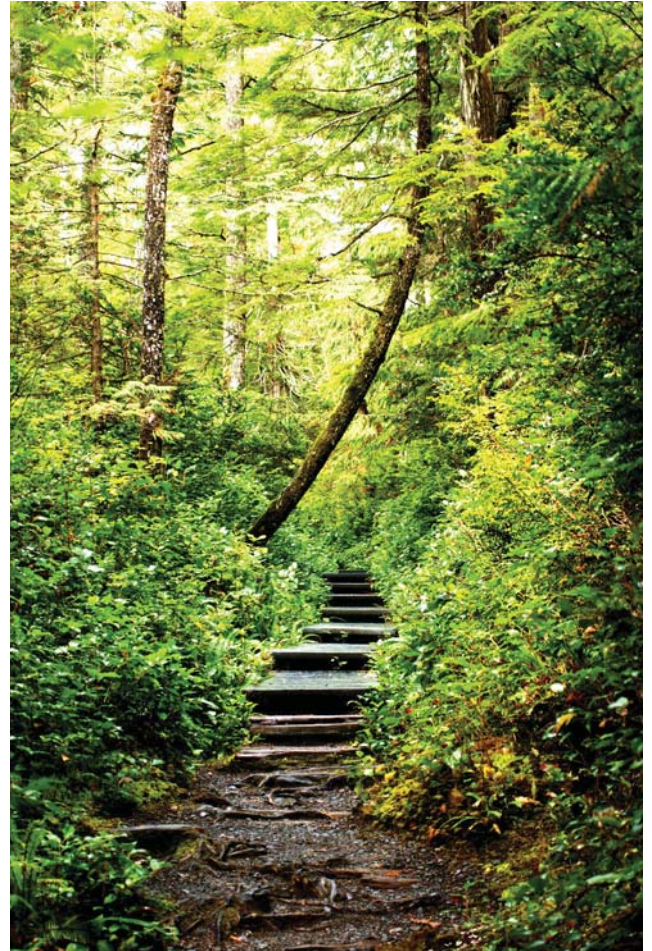
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

- Barrier Locations (Not all labeled)
- RIP Collected Routes





# Tier 1 Park Barrier Overview



Olympic National Park



Federal Lands Highway  
Road Inventory Program



## Parkwide Summary: Olympic National Park

Initial barrier inspections were conducted at Olympic 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 Olympic 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, 113 barriers were inventoried on the routes listed below.

**Table 1: Number of Barriers by Route**

<b>Route Number</b>	<b>Route Name</b>	<b>No. of Barriers</b>
0011	LAKE CRESCENT HIGHWAY (US 101)	45
0012	HURRICANE RIDGE ROAD	34
0103	SOL DUC VALLEY ROAD	12
0104ZZ	QUINULT NORTH SHORE ROADS	14
0105	QUINULT SOUTH SHORE ROAD	1
0107	HOH ROAD	2
0108	EAST BEACH ROAD	3
0115	MORA ROAD	1
0210	GRAVES CREEK ROAD	1

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

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

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

**Table 2: Number of Barriers by Function**

Barrier Function	No. of Barriers
TRAFFIC	103
NON-TRAFFIC	10

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

**Table 3: Number of Barriers by Type**

Primary Barrier Type	No. of Barriers
Other: Plastic Hollow Jersey Barrier	1
Other: Steel Rail Painted	3
W-Beam Strong Post	85
Other: Log Rail On Concrete Posts	7
Other: Timber Rail On Concrete Posts	1
Other: Log Rail On Log Posts	1
Concrete Barrier	5
Steel-Backed Timber With Blockout	10

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**

<b>Recommended Action</b>	<b>Repair Costs*</b>	<b>No. of Barriers</b>
No Action	\$0	27
Monitor	\$0	1
Repair	\$1,224,666	80
Replace	\$52,030	5
<b>Totals</b>	<b>\$1,276,696</b>	<b>113</b>

\*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**

<b>Cost Range*</b>	<b>No. of Barriers</b>
\$0	28
\$1 - \$25,000	75
\$25,001 - \$50,000	4
\$50,001 - \$100,000	3
\$100,001 - \$250,000	3
\$250,001 - \$500,000	0
\$500,001 - \$1,000,000	0
\$1,000,001 - \$2,000,000	0
\$2,000,001 - \$3,000,000	0
\$3,000,001 - \$4,000,000	0
<b>Total Number of Barriers</b>	<b>113</b>

\*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 166 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



Olympic National Park



**Federal Lands Highway  
Road Inventory Program**

# Olympic National Park

## ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)



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	
OLYM-0011-0.111-R 10/28/2009	94	OTHER: LOG RAIL ON CONCRETE POSTS	NONE	NONE	\$0.00
OLYM-0011-0.131-R 10/28/2009	415	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$10,334.00
OLYM-0011-0.210-R 10/28/2009	330	OTHER: LOG RAIL ON CONCRETE POSTS	NONE	NONE	\$0.00
OLYM-0011-0.272-R 10/28/2009	3713	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$85,008.00
OLYM-0011-0.408-L 10/28/2009	171	W-BEAM STRONG POST	W-BEAM BURIED END	W-BEAM BURIED END	\$2,426.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

## ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)



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	
OLYM-0011-0.977-R 10/28/2009	374	OTHER: LOG RAIL ON CONCRETE POSTS	NONE	NONE	\$2,700.00
OLYM-0011-1.049-R 10/28/2009	4213	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$56,077.00
OLYM-0011-1.847-R 10/28/2009	74	OTHER: LOG RAIL ON CONCRETE POSTS	NONE	NONE	\$0.00
OLYM-0011-1.893-R 10/30/2009	60	W-BEAM STRONG POST	W-BEAM BURIED END	NONE	\$0.00
OLYM-0011-1.932-R 10/30/2009	98	W-BEAM STRONG POST	NONE	NONE	\$2,700.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# Olympic National Park

## ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)



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	
OLYM-0011-1.972-R 10/30/2009	45	W-BEAM STRONG POST	NONE	W-BEAM FLARED 350 COMPLIANT	\$2,008.00
OLYM-0011-1.981-R 10/30/2009	155	OTHER: TIMBER RAIL ON CONCRETE POSTS	NONE	NONE	\$2,392.00
OLYM-0011-2.009-R 10/30/2009	6739	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$165,022.00
OLYM-0011-3.249-L 10/30/2009	225	W-BEAM STRONG POST	W-BEAM BURIED END	W-BEAM BURIED END	\$3,338.00
OLYM-0011-3.675-L 10/30/2009	78	W-BEAM STRONG POST	W-BEAM BURIED END	NONE	\$6,688.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

## ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)



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	
OLYM-0011-3.678-R 10/30/2009	61	W-BEAM STRONG POST	W-BEAM BCT	NONE	\$5,472.00
OLYM-0011-3.711-L 10/30/2009	77	W-BEAM STRONG POST	NONE	W-BEAM BURIED END	\$7,370.00
OLYM-0011-3.713-R 10/30/2009	53	W-BEAM STRONG POST	NONE	W-BEAM BCT	\$2,244.00
OLYM-0011-4.381-R 10/31/2009	3332	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$41,382.00
OLYM-0011-5.016-R 10/30/2009	432	OTHER: LOG RAIL ON CONCRETE POSTS	NONE	NONE	\$2,778.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

## ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)



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	
OLYM-0011-5.103-R 10/31/2009	78	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$2,480.00
OLYM-0011-5.104-L 10/31/2009	112	W-BEAM STRONG POST	W-BEAM BURIED END	W-BEAM BURIED END	\$3,184.00
OLYM-0011-5.168-R 10/31/2009	3182	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$36,746.00
OLYM-0011-5.810-R 10/31/2009	363	OTHER: LOG RAIL ON LOG POSTS	NONE	NONE	\$1,732.00
OLYM-0011-5.870-R 10/31/2009	3221	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$59,598.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# Olympic National Park

## ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)



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	
OLYM-0011-6.574-L 10/31/2009	159	W-BEAM STRONG POST	W-BEAM BURIED END	W-BEAM BURIED END	\$3,372.00
OLYM-0011-6.574-R 10/31/2009	204	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$1,930.00
OLYM-0011-6.613-R 10/31/2009	490	OTHER: LOG RAIL ON CONCRETE POSTS	NONE	NONE	\$0.00
OLYM-0011-6.706-R 10/31/2009	4792	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$46,167.00
OLYM-0011-7.603-L 10/31/2009	126	W-BEAM STRONG POST	W-BEAM BURIED END	W-BEAM BURIED END	\$5,709.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

## ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)



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	
OLYM-0011-7.772-R 10/31/2009	1,375	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BURIED END	\$23,672.00
OLYM-0011-8.055-L 10/31/2009	109	W-BEAM STRONG POST	W-BEAM BURIED END	W-BEAM BURIED END	\$3,206.00
OLYM-0011-8.056-R 10/31/2009	456	W-BEAM STRONG POST	W-BEAM BURIED END	W-BEAM BCT	\$3,558.00
OLYM-0011-8.142-R 10/31/2009	312	OTHER: LOG RAIL ON CONCRETE POSTS	NONE	NONE	\$0.00
OLYM-0011-8.201-R 10/31/2009	2112	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$15,917.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

## ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)



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	
OLYM-0011-8.599-R 10/30/2009	8,617	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$133,166.00
OLYM-0011-10.261-R 10/30/2009	426	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BURIED END	\$6,897.00
OLYM-0011-10.331-L 10/30/2009	128	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$3,030.00
OLYM-0011-10.693-L 11/2/2009	520	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$10,109.00
OLYM-0011-10.895-L 11/2/2009	847	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$14,883.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# Olympic National Park

## ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)



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	
OLYM-0011-11.495-R 11/2/2009	1,049	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BURIED END	\$20,416.00
OLYM-0011-11.759-R 11/2/2009	792	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BURIED END	\$16,357.00
OLYM-0011-12.022-R 11/2/2009	448	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$13,332.00
OLYM-0011-12.158-R 11/2/2009	213	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BURIED END	\$4,301.00
OLYM-0011-12.191-L 10/30/2009	102	CONCRETE BARRIER	NONE	NONE	\$0.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

## ROUTE 0012: HURRICANE RIDGE 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
OLYM-0012-0.247-R 10/29/2009	501	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$2,574.00
OLYM-0012-0.445-R 10/29/2009	202	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$1,876.00
OLYM-0012-0.447-L 10/29/2009	227	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$1,980.00
OLYM-0012-0.733-R 10/29/2009	301	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$2,442.00
OLYM-0012-0.844-R 10/29/2009	475	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$9,361.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

## ROUTE 0012: HURRICANE RIDGE 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	
OLYM-0012-1.611-L 10/29/2009	1,172	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BURIED END	\$7,579.00
OLYM-0012-2.073-R 10/29/2009	245	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$2,860.00
OLYM-0012-2.087-L 10/29/2009	163	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$2,172.00
OLYM-0012-2.970-L 10/29/2009	159	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$12,138.00
OLYM-0012-3.067-L 10/29/2009	1027	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$4,284.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# Olympic National Park

## ROUTE 0012: HURRICANE RIDGE 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	
OLYM-0012-3.560-L 10/29/2009	203	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$3,360.00
OLYM-0012-3.703-L 10/29/2009	230	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$11,248.00
OLYM-0012-3.703-R 10/29/2009	186	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$10,373.00
OLYM-0012-3.827-L 10/28/2009	227	W-BEAM STRONG POST	W-BEAM TRAILING END	W-BEAM BCT	\$7,244.00
OLYM-0012-4.031-L 10/28/2009	240	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$8,910.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

## ROUTE 0012: HURRICANE RIDGE ROAD

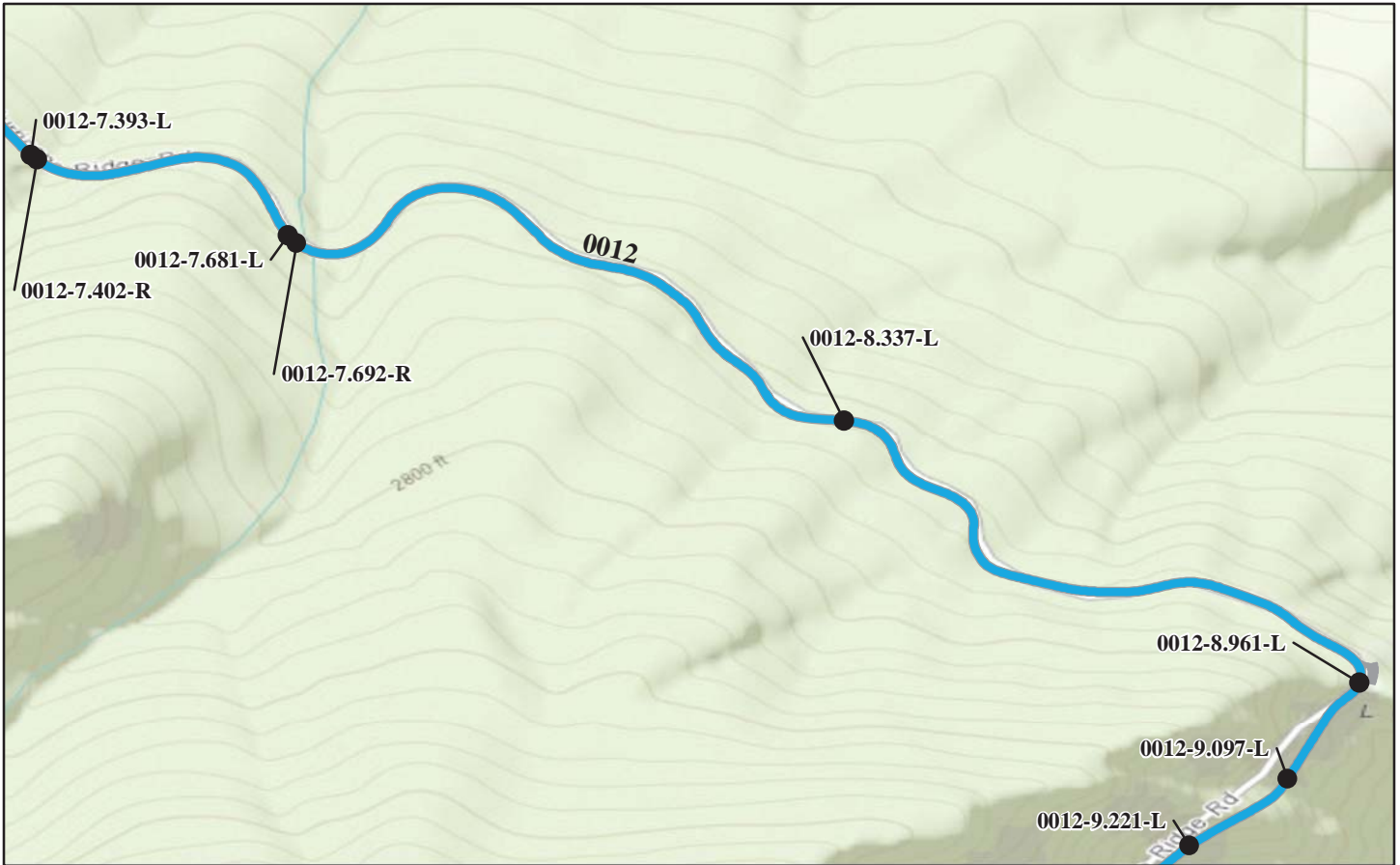


Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
OLYM-0012-4.424-L 10/28/2009	241	W-BEAM STRONG POST	W-BEAM TRAILING END	W-BEAM BCT	\$7,728.00
OLYM-0012-4.560-L 10/28/2009	490	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$2,282.00
OLYM-0012-6.680-L 10/28/2009	432	W-BEAM STRONG POST	W-BEAM TRAILING END	W-BEAM FLARED 350 COMPLIANT	\$0.00
OLYM-0012-6.705-R 10/28/2009	278	W-BEAM STRONG POST	W-BEAM FLARED 350 COMPLIANT	W-BEAM BURIED END	\$0.00
OLYM-0012-7.393-L 10/28/2009	442	W-BEAM STRONG POST	W-BEAM FLARED 350 COMPLIANT	W-BEAM FLARED 350 COMPLIANT	\$0.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

## ROUTE 0012: HURRICANE RIDGE 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	
OLYM-0012-7.402-R 10/28/2009	281	W-BEAM STRONG POST	W-BEAM BURIED END	W-BEAM BCT	\$0.00
OLYM-0012-7.681-L 10/28/2009	471	W-BEAM STRONG POST	W-BEAM TRAILING END	W-BEAM FLARED 350 COMPLIANT	\$4,516.00
OLYM-0012-7.692-R 10/28/2009	395	W-BEAM STRONG POST	W-BEAM BURIED END	W-BEAM TRAILING END	\$2,167.00
OLYM-0012-8.337-L 10/28/2009	202	W-BEAM STRONG POST	W-BEAM TRAILING END	W-BEAM BURIED END	\$0.00
OLYM-0012-8.961-L 10/28/2009	210	CONCRETE BARRIER	NONE	NONE	\$0.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# Olympic National Park

## ROUTE 0012: HURRICANE RIDGE 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	
OLYM-0012-9.097-L 10/28/2009	96	W-BEAM STRONG POST	NONE	W-BEAM TANGENT 350 COMPLIANT	\$6,946.00
OLYM-0012-9.221-L 10/28/2009	56	CONCRETE BARRIER	NONE	NONE	\$3,729.00
OLYM-0012-9.352-L 10/28/2009	214	CONCRETE BARRIER	NONE	NONE	\$14,960.00
OLYM-0012-10.642-L 10/28/2009	143	W-BEAM STRONG POST	W-BEAM TRAILING END	W-BEAM BURIED END	\$0.00
OLYM-0012-10.766-L 10/28/2009	160	W-BEAM STRONG POST	W-BEAM TRAILING END	W-BEAM FLARED 350 COMPLIANT	\$0.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

## ROUTE 0012: HURRICANE RIDGE ROAD

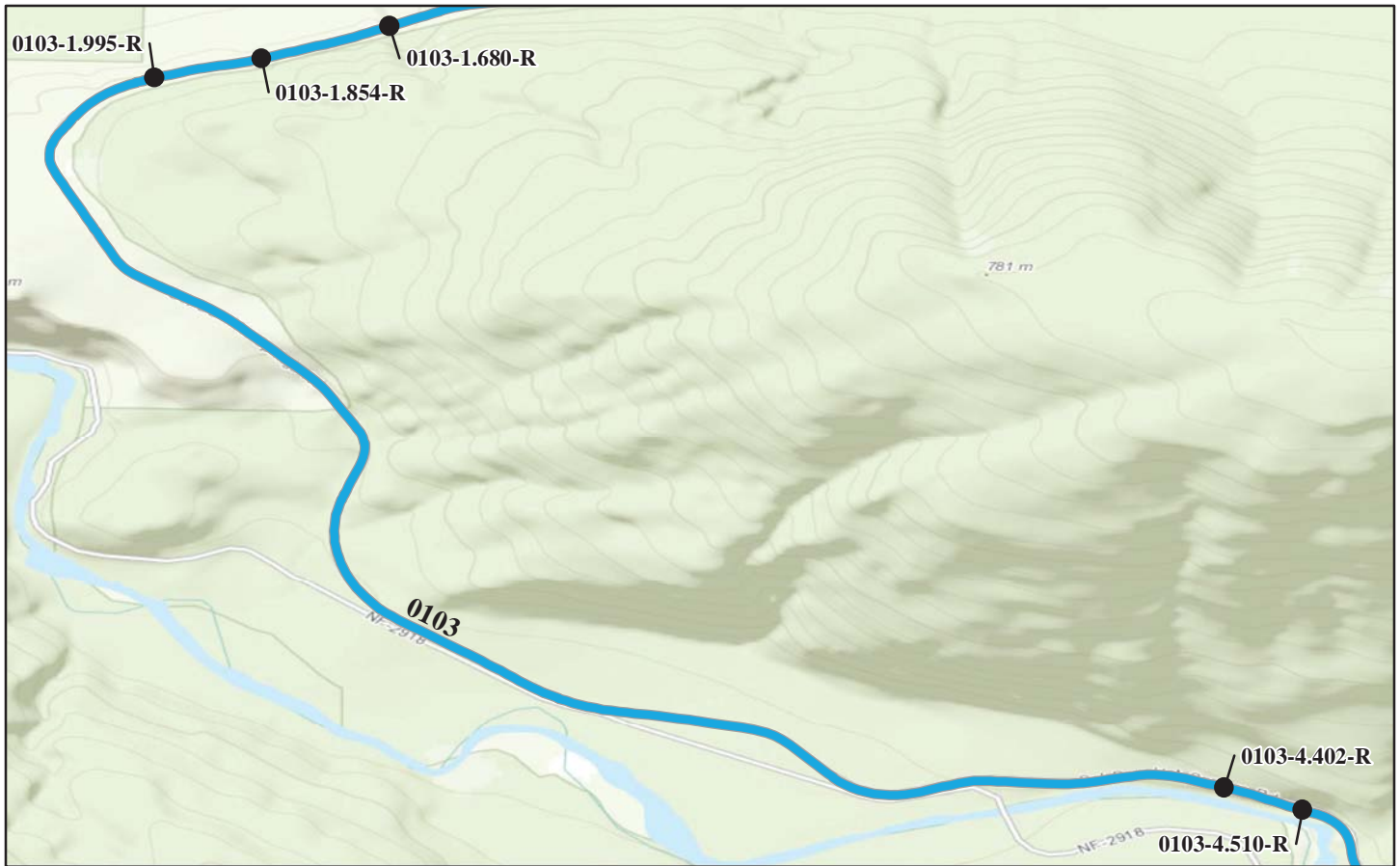


Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
OLYM-0012-10.972-L 10/28/2009	94	CONCRETE BARRIER	NONE	NONE	\$0.00
OLYM-0012-11.880-L 10/28/2009	193	W-BEAM STRONG POST	W-BEAM TRAILING END	W-BEAM TANGENT 350 COMPLIANT	\$0.00
OLYM-0012-12.139-L 10/28/2009	389	W-BEAM STRONG POST	W-BEAM TRAILING END	W-BEAM FLARED 350 COMPLIANT	\$1,688.00
OLYM-0012-17.195-L 10/28/2009	227	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM TANGENT 350 COMPLIANT	\$0.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

## ROUTE 0103: SOL DUC 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	
OLYM-0103-1.680-R 11/1/2009	757	STEEL-BACKED TIMBER WITH BLOCKOUT	SBT/LOG FLARED	SBT/LOG FLARED	\$6,534.00
OLYM-0103-1.854-R 11/1/2009	180	STEEL-BACKED TIMBER WITH BLOCKOUT	SBT/LOG FLARED	SBT/LOG FLARED	\$5,302.00
OLYM-0103-1.995-R 11/1/2009	222	STEEL-BACKED TIMBER WITH BLOCKOUT	SBT/LOG FLARED	SBT/LOG FLARED	\$3,492.00
OLYM-0103-4.402-R 11/1/2009	131	STEEL-BACKED TIMBER WITH BLOCKOUT	SBT/LOG FLARED	SBT/LOG FLARED	\$3,272.00
OLYM-0103-4.510-R 11/1/2009	515	STEEL-BACKED TIMBER WITH BLOCKOUT	SBT/LOG FLARED	SBT/LOG FLARED	\$4,367.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

## ROUTE 0103: SOL DUC VALLEY ROAD



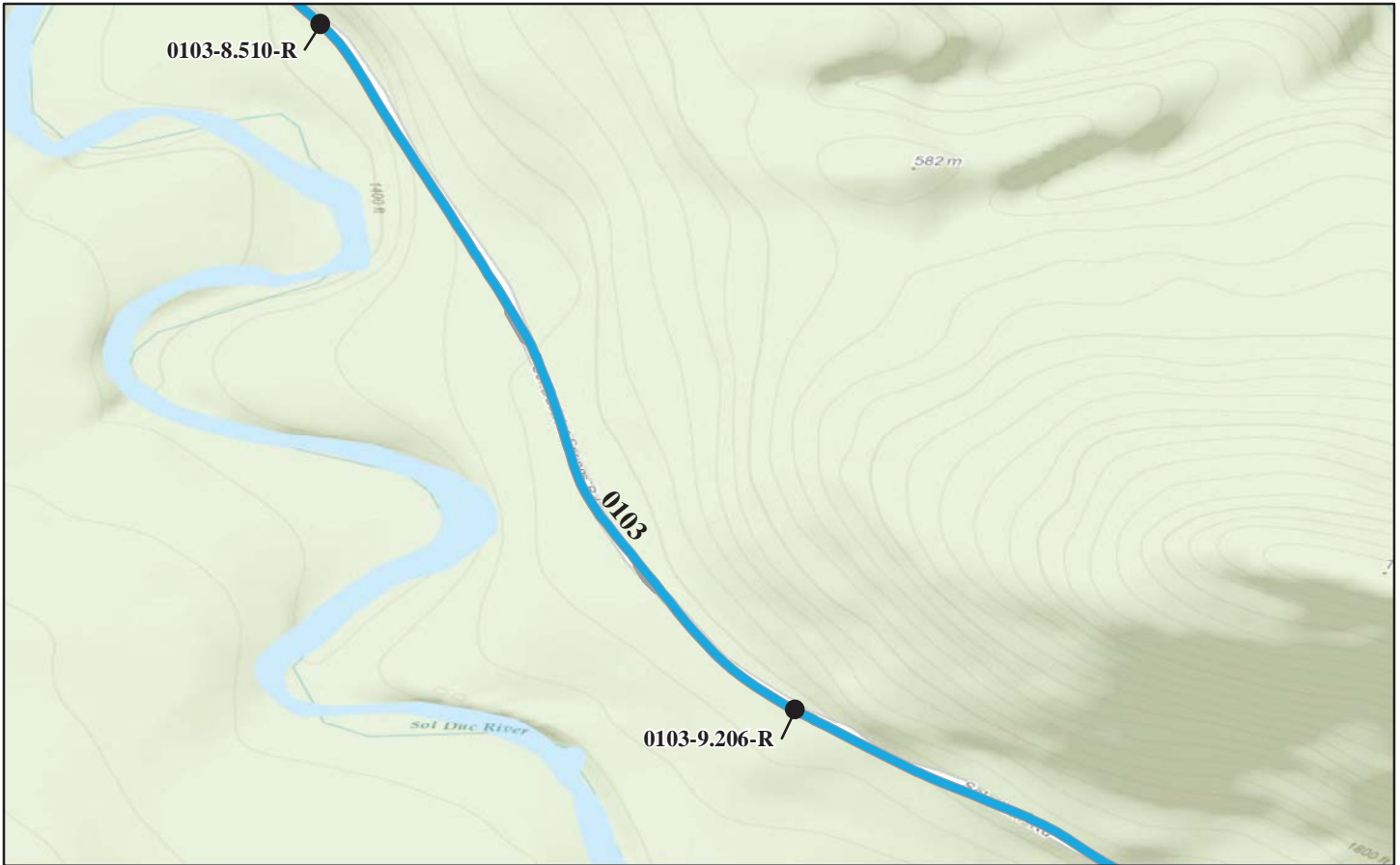
Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
OLYM-0103-5.592-R 11/1/2009	412	STEEL-BACKED TIMBER WITH BLOCKOUT	SBT/LOG FLARED	SBT/LOG FLARED	\$2,172.00
OLYM-0103-5.862-R 11/1/2009	280	STEEL-BACKED TIMBER WITH BLOCKOUT	SBT/LOG FLARED	SBT/LOG FLARED	\$2,536.00
OLYM-0103-6.719-R 11/1/2009	390	W-BEAM STRONG POST	W-BEAM TANGENT 350 COMPLIANT	W-BEAM TANGENT 350 COMPLIANT	\$1,980.00
OLYM-0103-7.435-R 11/1/2009	75	OTHER: PLASTIC HOLLOW JERSEY BARRIER	NONE	NONE	\$0.00
OLYM-0103-7.712-R 11/1/2009	2190	STEEL-BACKED TIMBER WITH BLOCKOUT	SBT/LOG FLARED	SBT/LOG FLARED	\$211,970.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# Olympic National Park

## ROUTE 0103: SOL DUC VALLEY ROAD

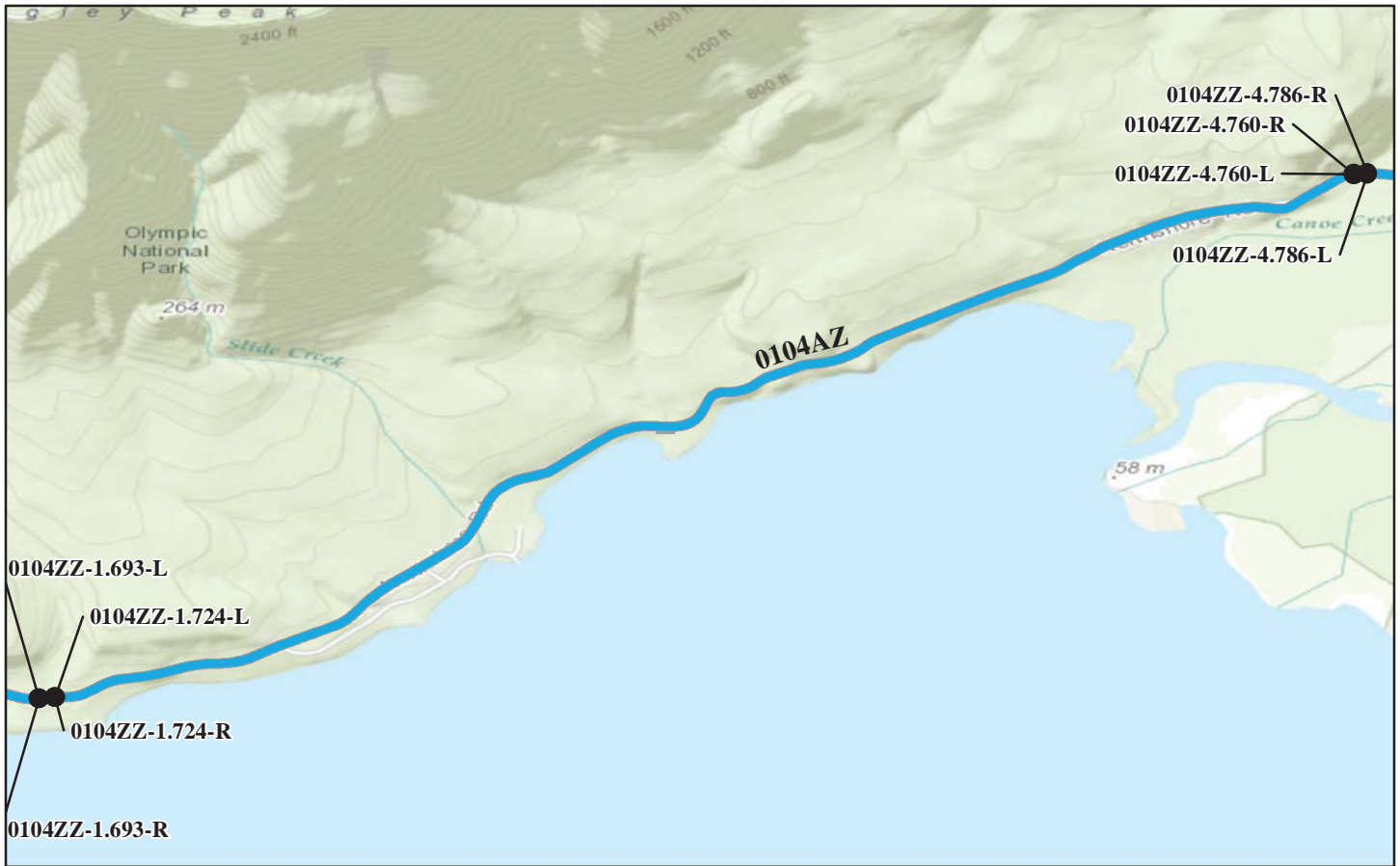


Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
OLYM-0103-8.510-R 11/1/2009	311	STEEL-BACKED TIMBER WITH BLOCKOUT	SBT/LOG FLARED	SBT/LOG FLARED	\$3,196.00
OLYM-0103-9.206-R 11/1/2009	1119	STEEL-BACKED TIMBER WITH BLOCKOUT	SBT/LOG FLARED	SBT/LOG FLARED	\$37,560.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

## ROUTE 0104ZZ: QUINAULT NORTH SHORE ROADS



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	
OLYM-0104ZZ-1.693-L 10/29/2009	53	W-BEAM STRONG POST	W-BEAM BCT	NONE	\$1,754.00
OLYM-0104ZZ-1.693-R 10/29/2009	45	W-BEAM STRONG POST	W-BEAM BCT	NONE	\$2,057.00
OLYM-0104ZZ-1.724-L 10/29/2009	70	W-BEAM STRONG POST	NONE	W-BEAM BCT	\$0.00
OLYM-0104ZZ-1.724-R 10/29/2009	56	W-BEAM STRONG POST	NONE	W-BEAM BCT	\$0.00
OLYM-0104ZZ-4.760-L 10/29/2009	67	W-BEAM STRONG POST	W-BEAM BCT	NONE	\$0.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

## ROUTE 0104ZZ: QUINAULT NORTH SHORE ROADS

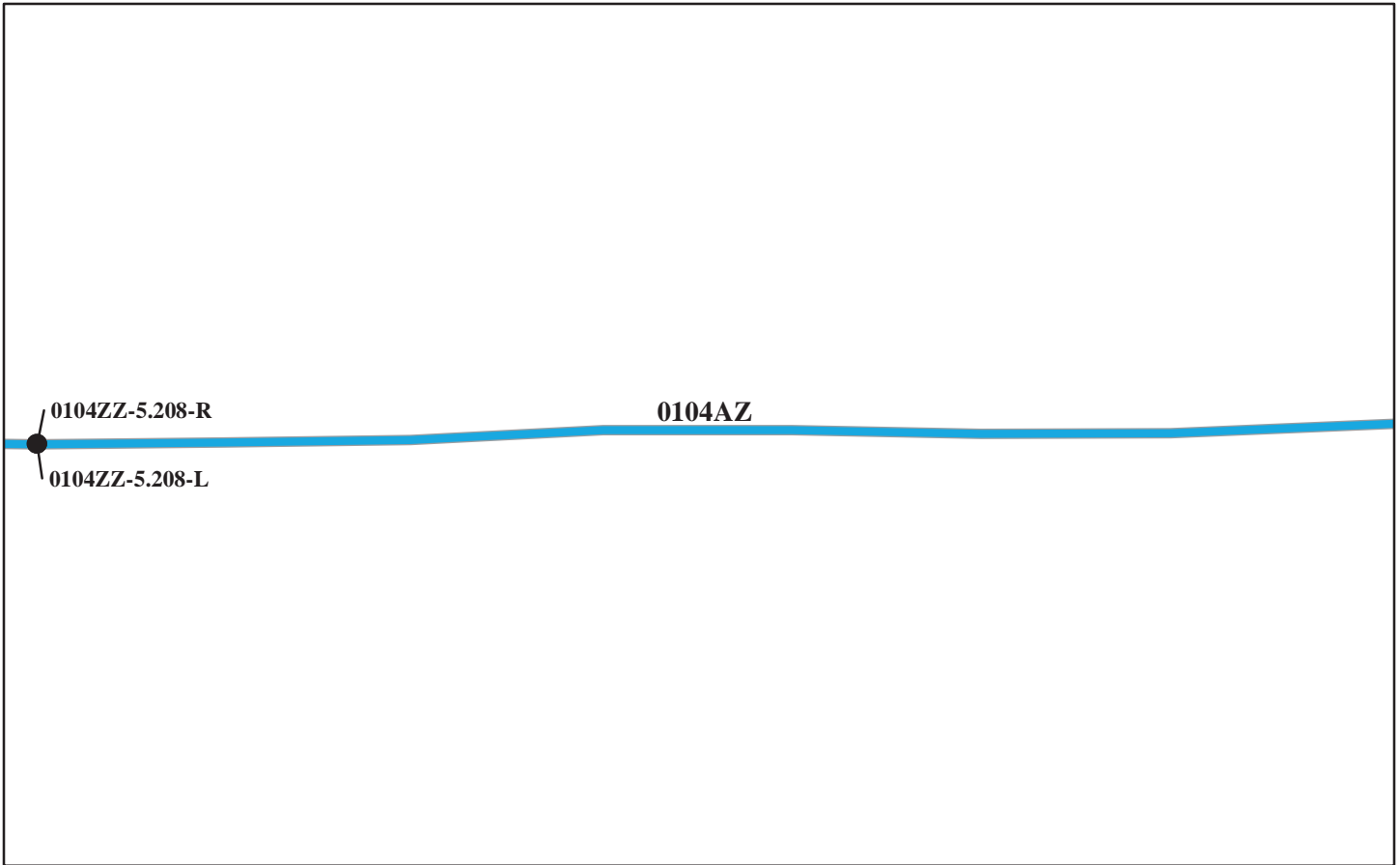


Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barrier ID Inspection Date	Barrier Length (Ft.)	Barrier Type	Barrier End Treatment		*Repair Cost
			Begin	End	
OLYM-0104ZZ-4.760-R 10/29/2009	64	W-BEAM STRONG POST	W-BEAM BCT	NONE	\$2,326.00
OLYM-0104ZZ-4.786-L 10/29/2009	64	W-BEAM STRONG POST	W-BEAM BCT	NONE	\$2,326.00
OLYM-0104ZZ-4.786-R 10/29/2009	65	W-BEAM STRONG POST	NONE	W-BEAM BCT	\$0.00
OLYM-0104ZZ-5.182-L 10/29/2009	64	W-BEAM STRONG POST	W-BEAM BCT	NONE	\$2,426.00
OLYM-0104ZZ-5.182-R 10/29/2009	63	W-BEAM STRONG POST	W-BEAM BCT	NONE	\$2,035.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

## ROUTE 0104ZZ: QUINAULT NORTH SHORE ROADS



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	
OLYM-0104ZZ-5.208-L 10/29/2009	66	W-BEAM STRONG POST	NONE	W-BEAM BCT	\$0.00
OLYM-0104ZZ-5.208-R 10/29/2009	66	W-BEAM STRONG POST	NONE	W-BEAM BCT	\$2,040.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# Olympic National Park

## ROUTE 0104ZZ: QUINAULT NORTH SHORE ROADS

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	
OLYM-0104ZZ-13.918-R 10/29/2009	370	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$3,888.00
OLYM-0104ZZ-13.920-L 10/29/2009	365	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$4,922.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

## ROUTE 0105: QUINAULT SOUTH SHORE 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	
OLYM-0105-0.849-L  10/29/2009	112	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$2,502.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

## ROUTE 0107: HOH 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	
OLYM-0107-0.004-R 11/2/2009	257	W-BEAM STRONG POST	NONE	W-BEAM BCT	\$2,079.00
OLYM-0107-0.148-R 11/2/2009	92	W-BEAM STRONG POST	NONE	NONE	\$2,668.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

## ROUTE 0108: EAST BEACH 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	
OLYM-0108-2.093-L 10/31/2009	25	OTHER: STEEL RAIL PAINTED	NONE	NONE	\$0.00
OLYM-0108-2.168-L 10/31/2009	37	OTHER: STEEL RAIL PAINTED	NONE	NONE	\$0.00
OLYM-0108-2.231-L 10/31/2009	26	OTHER: STEEL RAIL PAINTED	NONE	NONE	\$0.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# Olympic National Park

## ROUTE 0115: MORA 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	
OLYM-0115-1.953-L  10/30/2009	448	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$0.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

**Olympic National Park**  
**ROUTE 0210: GRAVES CREEK 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				
OLYM-0210-0.000-L  10/29/2009	124	W-BEAM STRONG POST	W-BEAM BCT	W-BEAM BCT	\$3,174.00
*2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

## Tier 3 Barrier Details



Olympic National Park



**Federal Lands Highway  
Road Inventory Program**

<b>Barrier ID:</b>	OLYM-0011-0.111-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	20.20		
<b>Barrier Description</b>					
<b>Type:</b>	OTHER: LOG RAIL ON CONCRETE POSTS	<b>Barrier Function:</b>	NON-TRAFFIC		
<b>Barrier Material:</b>	LOG/TIMBER/WOOD	<b>Post Material:</b>	OTHER: CONCRETE		
<b>Blockout Type:</b>	N/A	<b>Length (ft.):</b>	94		
<b>Speed Limit (MPH):</b>	45	<b>Placement with Respect to Road:</b>	NON-TRAFFIC BARRIER		
<b>Hazard Behind Barrier:</b>	N/A				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	N/A	<b>Is Barrier Crashworthy?:</b>	N/A
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	12	<b>Width (In.):</b>	9.0	<b>Post Spacing (In.):</b>	0.0
<b>Height (In.):</b>	12.0	<b>Lateral Offset (In.):</b>	0.0	<b>Road Grade (%):</b>	0.00
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Entire barrier is within 1 in of assumed 12 in design height (non-traffic barrier).			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>				
	<b>Breaking and Cracking:</b>				
	<b>Missing Elements:</b>				
	<b>Corrosion and Weathering:</b>				



<b>Barrier ID:</b>	OLYM-0011-0.111-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		20.20	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# **Olympic National Park**

**ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)**

## **Barrier Condition Photos**



**OLYM\_0011\_0.111\_R\_1.JPG**

<b>Barrier ID:</b>	OLYM-0011-0.131-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	50.20		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	415		
<b>Speed Limit (MPH):</b>	45	<b>Placement with Respect to Road:</b>	INSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.6
<b>Height (In.):</b>	22.7	<b>Lateral Offset (In.):</b>	63.7	<b>Road Grade (%):</b>	2.00
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Barrier is out of alignment by >12in for 35 ft. Another 24 ft. is 6 to 12 in. out of alignment. 5 tilted posts. 4 rotated blocks. 115 ft. of barrier height is >3 in. below 27" design height. 270 ft. of barrier is 1-3 in. below the 27" design height.			
	<b>Breaking and Cracking:</b>	1 post cracked. 36 ft. bent rail.			
	<b>Missing Elements:</b>	1 delineator broken off.			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable; 1-3 in below 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering.			

<b>Barrier ID:</b>	OLYM-0011-0.131-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		50.20	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$10334
<b>Brief Workorder:</b>	Remove and reset 59 ft. of w-beam that is out of alignment; adjust height of 385 ft of w-beam that is more than 1" below 27-in. design height.				
<b>Workorder:</b>	Replace block at \$30- per -Each for 4 Block(s) = \$120. Rotate blocks and replace delineator. Replace post at \$100- per -Each for 1 Post(s) = \$100. Replace damaged posts. Replace rail at \$25- per -Lin. Ft. for 36 LF = \$900. Replace damaged rail. Remove & Reset Guardrail at \$25- per -Lin. Ft. for 59 LF = \$1475. Reset out of alignment rail. Adjust Guardrail at \$10- per -Lin. Ft. for 385 LF = \$3850. Raise 385 feet of barrier to 27-in design height Low Speed Traffic Control at \$1475- per -Day for 2 Day(s) = \$2950.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# **Olympic National Park**

**ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)**

## **Barrier Condition Photos**



**OLYM\_0011\_0.131\_R\_1.JPG**

<b>Barrier ID:</b>	OLYM-0011-0.210-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	23.10		
<b>Barrier Description</b>					
<b>Type:</b>	OTHER: LOG RAIL ON CONCRETE POSTS	<b>Barrier Function:</b>	NON-TRAFFIC		
<b>Barrier Material:</b>	LOG/TIMBER/WOOD	<b>Post Material:</b>	OTHER: CONCRETE		
<b>Blockout Type:</b>	N/A	<b>Length (ft.):</b>	330		
<b>Speed Limit (MPH):</b>	45	<b>Placement with Respect to Road:</b>	NON-TRAFFIC BARRIER		
<b>Hazard Behind Barrier:</b>	N/A				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	N/A	<b>Is Barrier Crashworthy?:</b>	N/A
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	12	<b>Width (In.):</b>	9.6	<b>Post Spacing (In.):</b>	0.0
<b>Height (In.):</b>	9.7	<b>Lateral Offset (In.):</b>	0.0	<b>Road Grade (%):</b>	0.00
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height was 1 to 3-in below the assumed 12-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	1 14-ft. log weathered end deteriorated for 1 ft.			
<b>End Treatments</b>	<b>Alignment and Height:</b>				
	<b>Breaking and Cracking:</b>				
	<b>Missing Elements:</b>				
	<b>Corrosion and Weathering:</b>				

<b>Barrier ID:</b>	OLYM-0011-0.210-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		23.10	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)

## Barrier Condition Photos



OLYM\_0011\_0.210\_R\_1.JPG



<b>Barrier ID:</b>	OLYM-0011-0.272-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	76.10		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	3713		
<b>Speed Limit (MPH):</b>	45	<b>Placement with Respect to Road:</b>	BOTH INSIDE AND OUTSIDE		
<b>Hazard Behind Barrier:</b>	EXTREME				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	74.9
<b>Height (In.):</b>	23.0	<b>Lateral Offset (In.):</b>	40.2	<b>Road Grade (%):</b>	3.90
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height is more than 26-in for 1153 ft. Height is 24-26 in for 1812 ft. Height is less than 24-in for 1030 ft.			
	<b>Breaking and Cracking:</b>	Minor dents in several rails-good not affecting performance. 17 blockouts rotated. 1 blockout cracked through. 7 posts cracked through. 564 lin. Ft. of rail is deformed and needing repair or replacement (47-12 ft sections).			
	<b>Missing Elements:</b>	9 delineators missing			
	<b>Corrosion and Weathering:</b>	Soil severely eroded 3'x3'x4' area around 2 posts. Monitor erosion around 9 posts.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment and height is good for ending end treatmentment; alignment good but height poor (less than 24-in) on beginning end treatmentment.			
	<b>Breaking and Cracking:</b>	No breaking or cracking in end treatments.			
	<b>Missing Elements:</b>	No missing elements in end treatments.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering in end treatments.			

<b>Barrier ID:</b>	OLYM-0011-0.272-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/28/2009		<b>Barrier Rating:</b>	76.10	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$85008
<b>Brief Workorder:</b>	Raise 2842-ft of W-beam to design height of 27-in. Replace 564-ft of rail 7 posts 1 block add 2 cy. of fill and repair one severely eroded area.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 2842 LF = \$28420. Raise 2842-ft of W-beam to design height of 27-in. Replace block at \$30- per -Each for 1 Block(s) = \$30. Replace post at \$100- per -Each for 7 Post(s) = \$700. Replace rail at \$25- per -Lin. Ft. for 564 LF = \$14100. Replace deformed rail (47 12-ft segments) Labor at \$60- per -Hour for 2 Hrs = \$120. Replace 9 delineators attached to posts Backhoe at \$125- per -Hour for 2 Hrs = \$250. Add fill in 1 severely eroded area Select borrow at \$50- per -Cu. Yd. for 2 CY = \$100. Add fill in 1 severely eroded area Labor at \$60- per -Hour for 2 Hrs = \$120. Compact fill in 1 eroded area Labor at \$60- per -Hour for 9 Hrs = \$540. Rotate and nail 17 rotated blocks. High Speed Traffic Control at \$2350- per -Day for 14 Day(s) = \$32900.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# **Olympic National Park**

**ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)**

## **Barrier Condition Photos**



**OLYM\_0011\_0.272\_R\_1.JPG**

<b>Barrier ID:</b>	OLYM-0011-0.408-L				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	33.90		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	171		
<b>Speed Limit (MPH):</b>	45	<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BURIED END	<b>Is Beg. End Trtmt Crashworthy?:</b>	YES	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BURIED END	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.3
<b>Height (In.):</b>	28.0	<b>Lateral Offset (In.):</b>	70.6	<b>Road Grade (%):</b>	4.50
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height is within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	1 post cracked top to bottom; blockout chipped; 24 ft of bent w-beam.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Align and height good for design			
	<b>Breaking and Cracking:</b>	No breaking or cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering			



<b>Barrier ID:</b>	OLYM-0011-0.408-L				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		33.90	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$2426
<b>Brief Workorder:</b>	Replace 1 post and 1 blockout and 24 ft of rail.				
<b>Workorder:</b>	Replace rail at \$25- per -Lin. Ft. for 24 LF = \$600. Replace 24 ft of bent rail Replace post at \$100- per -Each for 1 Post(s) = \$100. Replace broken post Replace block at \$30- per -Each for 1 Block(s) = \$30. Replace chipped block 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.					

# **Olympic National Park**

**ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)**

## **Barrier Condition Photos**



**OLYM\_0011\_0.408\_L\_1.JPG**

<b>Barrier ID:</b>	OLYM-0011-0.977-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	23.10		
<b>Barrier Description</b>					
<b>Type:</b>	OTHER: LOG RAIL ON CONCRETE POSTS	<b>Barrier Function:</b>	NON-TRAFFIC		
<b>Barrier Material:</b>	LOG/TIMBER/WOOD	<b>Post Material:</b>	OTHER: CONCRETE		
<b>Blockout Type:</b>	N/A	<b>Length (ft.):</b>	374		
<b>Speed Limit (MPH):</b>	45	<b>Placement with Respect to Road:</b>	NON-TRAFFIC BARRIER		
<b>Hazard Behind Barrier:</b>	N/A				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	N/A	<b>Is Barrier Crashworthy?:</b>	N/A
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	12	<b>Width (In.):</b>	10.3	<b>Post Spacing (In.):</b>	0.0
<b>Height (In.):</b>	9.0	<b>Lateral Offset (In.):</b>	0.0	<b>Road Grade (%):</b>	0.00
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	1 log and 2 fters are overturned. 2 logs and 4 footers are halfway buried in soil. Height was 1 to 3-in below the assumed 12-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>				
	<b>Breaking and Cracking:</b>				
	<b>Missing Elements:</b>				
	<b>Corrosion and Weathering:</b>				

<b>Barrier ID:</b>	OLYM-0011-0.977-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		23.10	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$2700
<b>Brief Workorder:</b>	Reset overturned log and re-bury 2 concrete footers.				
<b>Workorder:</b>	Labor at \$60- per -Hour for 8 Hrs = \$480. Reset overturned log and re-bury 2 concrete footers Backhoe at \$125- per -Hour for 4 Hrs = \$500. Lift and reset overturned log with concrete footers Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475. Narrow pullout needing some Traffic control.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# **Olympic National Park**

**ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)**

## **Barrier Condition Photos**



**OLYM\_0011\_0.977\_R\_1.JPG**

<b>Barrier ID:</b>	OLYM-0011-1.049-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	63.20		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	4213		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	BOTH INSIDE AND OUTSIDE		
<b>Hazard Behind Barrier:</b>	EXTREME				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	74.9
<b>Height (In.):</b>	26.6	<b>Lateral Offset (In.):</b>	37.5	<b>Road Grade (%):</b>	1.50
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Out of alignment 12in to 24" for 84 ft. Height is >3" lower than 27" design for 815 ft and 1" to 3" lower than 27" design for 1040 ft.			
	<b>Breaking and Cracking:</b>	Damaged 12ft W-beam sections 25 total for 300 ft. Broken posts 6 broken blocks 16, broken delineators 3 total. 20 turned blocks.			
	<b>Missing Elements:</b>	Missing blocks 4 missing delineators 3.			
	<b>Corrosion and Weathering:</b>	Erosion and undercut pavement 3in undercut for 10 ft.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Beginning end treatment is more than 3in below the 27" design height			
	<b>Breaking and Cracking:</b>	Impacted ending end treatment			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering in end treatments			

<b>Barrier ID:</b>	OLYM-0011-1.049-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		63.20	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$56077
<b>Brief Workorder:</b>	Replace end treatment block post and delineators and adjust rail.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 1855 LF = \$18550. Raise 1855-ft of barrier to 27-in design height. Replace rail at \$25- per -Lin. Ft. for 300 LF = \$7500. Replace post at \$100- per -Each for 6 Post(s) = \$600. Replace block at \$30- per -Each for 16 Block(s) = \$480. Delineators on Curve and Tangent at \$100- per -Each for 3 Unit(s) = \$300. Labor at \$60- per -Hour for 4 Hrs = \$240. Turn blocks straighten. W-beam flared 350 compliant at \$3500- per -Each for 1 Unit(s) = \$3500. Must replace with crashworthy end treatment due to impact on current hardware. Remove W-beam and Thrie-beam at \$18 - per - Lin. Ft. for 38 LF = \$684. Low Speed Traffic Control at \$1475- per -Day for 13 Day(s) = \$19175. 11 days to remove install raise barrier; 2 days for blocks posts delineators.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)

## Barrier Condition Photos



OLYM\_0011\_1.049\_R\_1.JPG

<b>Barrier ID:</b>	OLYM-0011-1.847-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	15.80		
<b>Barrier Description</b>					
<b>Type:</b>	OTHER: LOG RAIL ON CONCRETE POSTS	<b>Barrier Function:</b>	NON-TRAFFIC		
<b>Barrier Material:</b>	LOG/TIMBER/WOOD	<b>Post Material:</b>	OTHER: CONCRETE		
<b>Blockout Type:</b>	N/A	<b>Length (ft.):</b>	74		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	NON-TRAFFIC BARRIER		
<b>Hazard Behind Barrier:</b>	N/A				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	N/A	<b>Is Barrier Crashworthy?:</b>	N/A
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	12	<b>Width (In.):</b>	10.6	<b>Post Spacing (In.):</b>	0.0
<b>Height (In.):</b>	12.6	<b>Lateral Offset (In.):</b>	0.0	<b>Road Grade (%):</b>	0.00
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height within 1-in. of assumed design height of 12 in for entire run of barrier.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>				
	<b>Breaking and Cracking:</b>				
	<b>Missing Elements:</b>				
	<b>Corrosion and Weathering:</b>				



<b>Barrier ID:</b>	OLYM-0011-1.847-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		15.80	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# **Olympic National Park**

**ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)**

## **Barrier Condition Photos**



**OLYM\_0011\_1.847\_R\_1.JPG**

<b>Barrier ID:</b>	OLYM-0011-1.893-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>	22.70		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	60		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BURIED END	<b>Is Beg. End Trtmt Crashworthy?:</b>	YES	<b>Approach Transition Type:</b>	BRIDGE RAIL W-BEAM
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.0
<b>Height (In.):</b>	27.7	<b>Lateral Offset (In.):</b>	51.2	<b>Road Grade (%):</b>	0.30
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height is no more than 1-in below design height of 27 in.			
	<b>Breaking and Cracking:</b>	No breaking/cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking/cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering erosion			

<b>Barrier ID:</b>	OLYM-0011-1.893-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>		22.70	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)

## Barrier Condition Photos



OLYM\_0011\_1.893\_R\_1.jpg



OLYM\_0011\_1.893\_R\_2.jpg



<b>Barrier ID:</b>	OLYM-0011-1.932-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>	43.00		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	98		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	BRIDGE RAIL W-BEAM
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	76.0
<b>Height (In.):</b>	22.7	<b>Lateral Offset (In.):</b>	43.7	<b>Road Grade (%):</b>	0.30
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height is greater than 3in below design height of 27" for all 98ft.			
	<b>Breaking and Cracking:</b>	No breaking/cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>				
	<b>Breaking and Cracking:</b>				
	<b>Missing Elements:</b>				
	<b>Corrosion and Weathering:</b>				

<b>Barrier ID:</b>	OLYM-0011-1.932-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>		43.00	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$2700
<b>Brief Workorder:</b>	Raise W-beam transitions and W-beam to 27-in design height.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 98 LF = \$980. Raise 98-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.					

# Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)

## Barrier Condition Photos



OLYM\_0011\_1.932\_R\_1.jpg



OLYM\_0011\_1.932\_R\_2.jpg

<b>Barrier ID:</b>	OLYM-0011-1.972-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>	24.70		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	NON-TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	45		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	NON-TRAFFIC BARRIER		
<b>Hazard Behind Barrier:</b>	N/A				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	N/A	<b>Is Barrier Crashworthy?:</b>	N/A
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	BRIDGE RAIL W-BEAM
<b>Ending End Trtmt Type:</b>	W-BEAM FLARED 350 COMPLIANT	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.0
<b>Height (In.):</b>	23.7	<b>Lateral Offset (In.):</b>	0.0	<b>Road Grade (%):</b>	0.00
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. 35 ft of barrier 3-in or more below 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking/cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering erosion			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment is acceptable.			
	<b>Breaking and Cracking:</b>	No breaking/cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering			

<b>Barrier ID:</b>	OLYM-0011-1.972-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>		24.70	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$2008
<b>Brief Workorder:</b>	Raise 35-ft of barrier up to 27-in design height.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 35 LF = \$350. Raise 35-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.					



# Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)

## Barrier Condition Photos



OLYM\_0011\_1.972\_R\_1.jpg

<b>Barrier ID:</b>	OLYM-0011-1.981-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>	15.80		
<b>Barrier Description</b>					
<b>Type:</b>	OTHER: TIMBER RAIL ON CONCRETE POSTS	<b>Barrier Function:</b>	NON-TRAFFIC		
<b>Barrier Material:</b>	LOG/TIMBER/WOOD	<b>Post Material:</b>	OTHER: CONCRETE		
<b>Blockout Type:</b>	N/A	<b>Length (ft.):</b>	155		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	NON-TRAFFIC BARRIER		
<b>Hazard Behind Barrier:</b>	N/A				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	N/A	<b>Is Barrier Crashworthy?:</b>	N/A
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	12	<b>Width (In.):</b>	9.6	<b>Post Spacing (In.):</b>	0.0
<b>Height (In.):</b>	13.3	<b>Lateral Offset (In.):</b>	0.0	<b>Road Grade (%):</b>	0.00
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Barrier height is no lower than assumed design height of 12-in.			
	<b>Breaking and Cracking:</b>	No breaking or cracking for the barrier length.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering for the barrier length. There is erosion greater than 8 in for two consecutive blocks.			
<b>End Treatments</b>	<b>Alignment and Height:</b>				
	<b>Breaking and Cracking:</b>				
	<b>Missing Elements:</b>				
	<b>Corrosion and Weathering:</b>				

<b>Barrier ID:</b>	OLYM-0011-1.981-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>		15.80	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$2392
<b>Brief Workorder:</b>	Remove log rail and concrete pylons and place structural backfill then reset rail and pylons.				
<b>Workorder:</b>	Structural backfill at \$50- per -Cu. Yd. for 2 CY = \$100. Remove concrete pylons at place structural backfill around two pylons. Labor at \$60- per -Hour for 10 Hrs = \$600. Reset log rail and concrete pylons. 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.					

# Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)

## Barrier Condition Photos



OLYM\_0011\_1.981\_R\_1.jpg

<b>Barrier ID:</b>	OLYM-0011-2.009-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>	61.50		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	6739		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	BOTH INSIDE AND OUTSIDE		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	74.9
<b>Height (In.):</b>	26.1	<b>Lateral Offset (In.):</b>	39.7	<b>Road Grade (%):</b>	0.10
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	455' of barrier is between 6in and 12" out of alignment. Height of barrier is 2"-5" below the 27" design height for 2800 ft.			
	<b>Breaking and Cracking:</b>	Numerous locations with rails blocks and posts either broken, torn, or extremely cracked and either the barrier or one or more of the components needs to be replaced.			
	<b>Missing Elements:</b>	Isolated locations throughout barrier with missing blocks that should be replaced			
	<b>Corrosion and Weathering:</b>	Blocks and posts appear to be in the early stages of rotting which could become a problem and as already consumed a couple of blocks and posts that need to be replaced. There is also a 40' section of barrier that has large erosion problems			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment/height good for both end treatments			
	<b>Breaking and Cracking:</b>	Cracks of less than 1/4in in blocks and posts			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	Blocks and posts appear to be in early stage of rotting due to over exposure to water and should be monitored.			



<b>Barrier ID:</b>	OLYM-0011-2.009-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>		61.50	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$165022
<b>Brief Workorder:</b>	Raise 2800 feet of barrier to 27-in design height replace 1404 ft. of damaged rail; construct retaining wall 40ft W. by 10ft H.				
<b>Workorder:</b>	Replace block at \$30- per -Each for 57 Block(s) = \$1710. Replace 57 turned damaged or rotten blocks. Replace post at \$100- per -Each for 28 Post(s) = \$2800. Replace 28 damaged or rotten posts. Replace rail at \$25- per -Lin. Ft. for 1404 LF = \$35100. Adjust Guardrail at \$10- per -Lin. Ft. for 2800 LF = \$28000. Raise 2800 feet of barrier to 27-in design height. Remove Guardrail at \$10- per -Lin. Ft. for 598 LF = \$5980. Remove 598 ft to be able to install new barrier W-Beam strong post at \$35- per -Lin. Ft. for 598 LF = \$20930. Replace 598 ft of badly damaged barrier Concrete retaining wall at \$250- per -Sq. Ft. for 45 SF = \$11250. Low Speed Traffic Control at \$1475- per -Day for 30 Day(s) = \$44250.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# **Olympic National Park**

**ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)**

## **Barrier Condition Photos**



**OLYM\_0011\_2.009\_R\_1.jpg**

<b>Barrier ID:</b>	OLYM-0011-3.249-L				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>	43.00		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	225		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BURIED END	<b>Is Beg. End Trtmt Crashworthy?:</b>	YES	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BURIED END	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.0
<b>Height (In.):</b>	23.7	<b>Lateral Offset (In.):</b>	25.0	<b>Road Grade (%):</b>	1.40
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height is below the design height of 27 in from 2 to 4 in for 150 ft.			
	<b>Breaking and Cracking:</b>	One block which is cracked. There is no breaking through the barrier length.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering at the length of barrier. No erosion at the barrier foundation.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	At the approach end one block is cracked.			
	<b>Missing Elements:</b>	No missing elements of the end treatments.			
	<b>Corrosion and Weathering:</b>	No corrosion weathering or erosion at the end treatments.			

<b>Barrier ID:</b>	OLYM-0011-3.249-L				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>		43.00	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$3338
<b>Brief Workorder:</b>	Raise 150 lin. ft. of W-beam to 27-in design height and replace two blocks.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 150 LF = \$1500. Raise 150 feet of rail to the 27-in design height. Replace block at \$30- per -Each for 2 Block(s) = \$60. Replace 1 block at the approach end section and 1 block along the W-Beam section. 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.					

# **Olympic National Park**

**ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)**

## **Barrier Condition Photos**



**OLYM\_0011\_3.249\_L\_1.jpg**



<b>Barrier ID:</b>	OLYM-0011-3.675-L				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>	40.00		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	78		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BURIED END	<b>Is Beg. End Trtmt Crashworthy?:</b>	YES	<b>Approach Transition Type:</b>	BRIDGE RAIL W-BEAM
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	74.6
<b>Height (In.):</b>	20.7	<b>Lateral Offset (In.):</b>	90.6	<b>Road Grade (%):</b>	2.20
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. The height is below the design height of 27 in by 4 to 6 in for 60 ft.			
	<b>Breaking and Cracking:</b>	No breaking or cracking at the barrier length.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion weathering or erosion at the barrier length			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking at the end treatment.			
	<b>Missing Elements:</b>	No missing elements at the end section			
	<b>Corrosion and Weathering:</b>	No corrosion weathering or erosion at the end section			

<b>Barrier ID:</b>	OLYM-0011-3.675-L				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>		40.00	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$6688
<b>Brief Workorder:</b>	Remove the W-beam and place structural fill at the backslope then raise the W-beam to the correct design height of 27 inches.				
<b>Workorder:</b>	Remove & Reset Guardrail at \$25- per -Lin. Ft. for 60 LF = \$1500. Remove 60 feet of W-Beam and place structural fill at the backslope then reset the W-Beam Structural backfill at \$50- per -Cu. Yd. for 23 CY = \$1150. $[(30\text{ft})(10\text{ft})(2\text{ft})] / 27 = 22.2 \text{ c.y.}$ Labor at \$60- per -Hour for 8 Hrs = \$480. 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.					

# Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)

## Barrier Condition Photos



OLYM\_0011\_3.675\_L\_1.jpg

<b>Barrier ID:</b>	OLYM-0011-3.678-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>	38.20		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	61		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	BRIDGE RAIL W-BEAM
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.0
<b>Height (In.):</b>	21.0	<b>Lateral Offset (In.):</b>	88.0	<b>Road Grade (%):</b>	1.60
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height is greater than 3in below design of 27" for 50 ft.			
	<b>Breaking and Cracking:</b>	No breaking/cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering erosion			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height is greater than 3in below design height of 27".			
	<b>Breaking and Cracking:</b>	No breaking/cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering. Erosion observed greater than 8-in in depth for 60 L.F.			

<b>Barrier ID:</b>	OLYM-0011-3.678-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>		38.20	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$5472
<b>Brief Workorder:</b>	Raise 50 lin. ft. of barrier to 27-in. design height add 45 c.y. of backfill.				
<b>Workorder:</b>	Structural backfill at \$50- per -Cu. Yd. for 45 CY = \$2250. [(60ft)(10ft)(2ft)] /27 = 44.4 c.y. Remove & Reset Guardrail at \$25- per -Lin. Ft. for 50 LF = \$1250. In section with soft soil getting structural backfill. 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.					



# Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)

## Barrier Condition Photos



OLYM\_0011\_3.678\_R\_1.jpg



OLYM\_0011\_3.678\_R\_2.jpg

<b>Barrier ID:</b>	OLYM-0011-3.711-L				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>	31.60		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	77		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	BRIDGE RAIL W-BEAM
<b>Ending End Trtmt Type:</b>	W-BEAM BURIED END	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	74.6
<b>Height (In.):</b>	23.2	<b>Lateral Offset (In.):</b>	107.6	<b>Road Grade (%):</b>	2.80
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. The height is below the standard design height of 27 in by 4 in for 60 ft.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion breaking or erosion.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking at the end treatment.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion weathering. Erosion observed greater than 8-in in depth for 60 L.F.			

<b>Barrier ID:</b>	OLYM-0011-3.711-L				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>		31.60	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$7370
<b>Brief Workorder:</b>	Remove W-Beam then place structural backfill at the backslope and reset the W-beam.				
<b>Workorder:</b>	Remove & Reset Guardrail at \$25- per -Lin. Ft. for 60 LF = \$1500. Remove W-Beam and place structural backfill at the backslope then reset W-Beam. Structural backfill at \$50- per -Cu. Yd. for 45 CY = \$2250. $[(60\text{ft})(10\text{ft})(2\text{ft})] / 27 = 44.4 \text{ c.y.}$ 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.					



# Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)

## Barrier Condition Photos



OLYM\_0011\_3.711\_L\_1.jpg



OLYM\_0011\_3.711\_L\_2.jpg

<b>Barrier ID:</b>	OLYM-0011-3.713-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>	22.80		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	53		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	LOW				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	BRIDGE RAIL W-BEAM
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.3
<b>Height (In.):</b>	25.2	<b>Lateral Offset (In.):</b>	82.0	<b>Road Grade (%):</b>	1.60
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height is within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking/cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering erosion			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment is good. Height is 2in below 27" design height for 39 ft.			
	<b>Breaking and Cracking:</b>	1 post on very end is broken end piece of rail treatment slightly bent			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering erosion			

<b>Barrier ID:</b>	OLYM-0011-3.713-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>		22.80	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$2244
<b>Brief Workorder:</b>	Replace broken post block and bent rail. Raise W-beam to 27-in. design height.				
<b>Workorder:</b>	Replace post at \$100- per -Each for 1 Post(s) = \$100. Replace one broken post on end treatment. Replace block at \$30- per -Each for 1 Block(s) = \$30. Replace broken block on transition. Adjust Guardrail at \$10- per -Lin. Ft. for 36 LF = \$360. Raise 36-ft of barrier up to 27-in design height. Replace rail at \$25- per -Lin. Ft. for 3 LF = \$75. 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.					



# Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)

## Barrier Condition Photos



OLYM\_0011\_3.713\_R\_1.jpg

<b>Barrier ID:</b>	OLYM-0011-4.381-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>	65.90		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	3332		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	BOTH INSIDE AND OUTSIDE		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.1
<b>Height (In.):</b>	25.2	<b>Lateral Offset (In.):</b>	44.2	<b>Road Grade (%):</b>	0.20
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	The alignment is greater than 6 in off for 150 ft of W-Beam and the rail needs to be replaced in this area. The height varies from 2 to 7 in below the design height of 27 ins.			
	<b>Breaking and Cracking:</b>	There are 15 blocks that are cracked or broken and need to be replaced and 4 posts are split in half and need to be replaced at the rail.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or erosion at the barrier length but the posts and blocks should be monitored for weathering.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	The approach end treatment is 23 in and needs to be adjusted to the correct design height. The alignment is good at both BCT flared end treatments.			
	<b>Breaking and Cracking:</b>	No breaking or cracking of the end treatments.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion or erosion at the end sections but the blocks and posts should be monitored for weathering.			

<b>Barrier ID:</b>	OLYM-0011-4.381-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>		65.90	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$41382
<b>Brief Workorder:</b>	Raise 1662 feet of W-beam to 27-in. design height. Remove and reset 125 feet of w-beam. Replace 15 blocks 4 posts and 150 feet of rail.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 1662 LF = \$16620. Raise 1662-ft of barrier up to 27-in design height. Remove & Reset Guardrail at \$25- per -Lin. Ft. for 125 LF = \$3125. Remove and reset W-Beam which has been impacted and out of alignment. Replace post at \$100- per -Each for 4 Post(s) = \$400. Replace block at \$30- per -Each for 15 Block(s) = \$450. Replace rail at \$25- per -Lin. Ft. for 150 LF = \$3750. Remove and replace 150 linear feet of W-beam rail which has been impacted. Low Speed Traffic Control at \$1475- per -Day for 9 Day(s) = \$13275.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)

## Barrier Condition Photos



OLYM\_0011\_4.381\_R\_1.jpg

<b>Barrier ID:</b>	OLYM-0011-5.016-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>	23.20		
<b>Barrier Description</b>					
<b>Type:</b>	OTHER: LOG RAIL ON CONCRETE POSTS	<b>Barrier Function:</b>	NON-TRAFFIC		
<b>Barrier Material:</b>	LOG/TIMBER/WOOD	<b>Post Material:</b>	OTHER: CONCRETE		
<b>Blockout Type:</b>	N/A	<b>Length (ft.):</b>	432		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	NON-TRAFFIC BARRIER		
<b>Hazard Behind Barrier:</b>	N/A				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	N/A	<b>Is Barrier Crashworthy?:</b>	N/A
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	12	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	0.0
<b>Height (In.):</b>	12.3	<b>Lateral Offset (In.):</b>	0.0	<b>Road Grade (%):</b>	0.00
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment is good except for 28 ft that was shoved over. Height is within 1-in of assumed 12-in design height.			
	<b>Breaking and Cracking:</b>	1 rail (14 ft.) has it's entire end damaged by impact.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable corrosion/weathering or erosion			
<b>End Treatments</b>	<b>Alignment and Height:</b>				
	<b>Breaking and Cracking:</b>				
	<b>Missing Elements:</b>				
	<b>Corrosion and Weathering:</b>				

<b>Barrier ID:</b>	OLYM-0011-5.016-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>		23.20	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$2778
<b>Brief Workorder:</b>	Replace 1 damaged rail section and remove and reset two damaged sections of barrier.				
<b>Workorder:</b>	Replace rail at \$25- per -Lin. Ft. for 14 LF = \$350. Replace 14 ft. of rail that was damaged by impact. Remove & Reset Guardrail at \$25- per -Lin. Ft. for 28 LF = \$700. Repair the rail sections that were displaced. 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.					



# Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)

## Barrier Condition Photos



OLYM\_0011\_5.016\_R\_1.jpg

<b>Barrier ID:</b>	OLYM-0011-5.103-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>	40.20		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	78		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	74.6
<b>Height (In.):</b>	24.0	<b>Lateral Offset (In.):</b>	58.7	<b>Road Grade (%):</b>	1.50
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment is acceptable. Height is greater than 3in below design of 27" for 17ft and is between 1"-3" below design for 61ft.			
	<b>Breaking and Cracking:</b>	No breaking/cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering erosion			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment is good on both ends. Height is 4in lower than 27" design height on beginning end and is at design height of 27" on ending end.			
	<b>Breaking and Cracking:</b>	No breaking/cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering erosion			

<b>Barrier ID:</b>	OLYM-0011-5.103-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>		40.20	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$2480
<b>Brief Workorder:</b>	Raise 78-ft of barrier up to 27-in design height.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 78 LF = \$780. Raise 78-ft of barrier up to 27-in design height. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)

## Barrier Condition Photos



OLYM\_0011\_5.103\_R\_1.jpg

<b>Barrier ID:</b>	OLYM-0011-5.104-L				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009		<b>Barrier Rating:</b>	32.70	
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST		<b>Barrier Function:</b>	TRAFFIC	
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN		<b>Post Material:</b>	WOOD	
<b>Blockout Type:</b>	WOOD		<b>Length (ft.):</b>	112	
<b>Speed Limit (MPH):</b>	35		<b>Placement with Respect to Road:</b>	INSIDE OF CURVE	
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BURIED END	<b>Is Beg. End Trtmt Crashworthy?:</b>	YES	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BURIED END	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	74.0
<b>Height (In.):</b>	24.0	<b>Lateral Offset (In.):</b>	54.2	<b>Road Grade (%):</b>	2.00
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height is greater than 3in below design of 27" for 49ft and 1"-3" below 27" for 63ft.			
	<b>Breaking and Cracking:</b>	1 post is broken.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering erosion			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment is good. Height is 6in below the 27" design height on buried ends.			
	<b>Breaking and Cracking:</b>	2 consecutive posts are broken on beginning end			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering erosion			



<b>Barrier ID:</b>	OLYM-0011-5.104-L				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>		32.70	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$3184
<b>Brief Workorder:</b>	Raise 112-ft of barrier up to 27-in design height replace 3 posts.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 112 = \$1120. Raise 112-ft of barrier up to 27-in design height. Replace post at \$100- per -Each for 3 = \$300. 1 on barrier 2 on beginning end treatment. Low Speed Traffic Control at \$1475- per -Day for 1 day = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)

## Barrier Condition Photos



OLYM\_0011\_5.104\_L\_1.jpg

<b>Barrier ID:</b>	OLYM-0011-5.168-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>	57.00		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	3182		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	BOTH INSIDE AND OUTSIDE		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.0
<b>Height (In.):</b>	26.5	<b>Lateral Offset (In.):</b>	40.0	<b>Road Grade (%):</b>	0.40
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment is off 6 to 12in for 113ft. Height is >3" below design of 27" for 200ft and <3" below design for 500ft			
	<b>Breaking and Cracking:</b>	30 blocks broken 8 posts broken 388ft of rails are bent and/or torn/cracked.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	Several posts and blocks in various places are rotting in the top middle portion. Totals for replacement are noted in the breaking/cracking section			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment is good for both ends. Height is 4-in below design height of 27-in for beginning end and 1-in below design height of 27-in for ending end.			
	<b>Breaking and Cracking:</b>	Beginning end has 1 broken block and post. Totals are noted in the barrier section of breaking/cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering erosion			

<b>Barrier ID:</b>	OLYM-0011-5.168-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>		57.00	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$36746
<b>Brief Workorder:</b>	Raise 700 feet W-beam to 27-in. design height and replace 388 ft. of rail 30 blocks and 8 posts.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 700 LF = \$7000. Raise 700 feet W-beam to 27-in. design height. Remove & Reset Guardrail at \$25- per -Lin. Ft. for 113 LF = \$2825. Adjust Guardrail at \$10- per -Lin. Ft. for 38 LF = \$380. Replace block at \$30- per -Each for 30 Block(s) = \$900. Replace post at \$100- per -Each for 8 Post(s) = \$800. Replace rail at \$25- per -Lin. Ft. for 388 LF = \$9700. Low Speed Traffic Control at \$1475- per -Day for 8 Day(s) = \$11800.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)

## Barrier Condition Photos



OLYM\_0011\_5.168\_R\_1.jpg



<b>Barrier ID:</b>	OLYM-0011-5.810-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>	18.70		
<b>Barrier Description</b>					
<b>Type:</b>	OTHER: LOG RAIL ON LOG POSTS	<b>Barrier Function:</b>	NON-TRAFFIC		
<b>Barrier Material:</b>	LOG/TIMBER/WOOD	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	N/A	<b>Length (ft.):</b>	363		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	NON-TRAFFIC BARRIER		
<b>Hazard Behind Barrier:</b>	N/A				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	N/A	<b>Is Barrier Crashworthy?:</b>	N/A
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	15	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	0.0
<b>Height (In.):</b>	15.3	<b>Lateral Offset (In.):</b>	0.0	<b>Road Grade (%):</b>	0.00
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height is within 1-in of assumed 15- in design height.			
	<b>Breaking and Cracking:</b>	1 post broken.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable corrosion/weathering or erosion			
<b>End Treatments</b>	<b>Alignment and Height:</b>				
	<b>Breaking and Cracking:</b>				
	<b>Missing Elements:</b>				
	<b>Corrosion and Weathering:</b>				

<b>Barrier ID:</b>	OLYM-0011-5.810-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>		18.70	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$1732
<b>Brief Workorder:</b>	Replace one damaged post.				
<b>Workorder:</b>	Replace post at \$100- per -Each for 1 = \$100. Replace 1 broken post. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)

## Barrier Condition Photos



OLYM\_0011\_5.810\_R\_1.jpg

<b>Barrier ID:</b>	OLYM-0011-5.870-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>	65.90		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	3221		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	BOTH INSIDE AND OUTSIDE		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.0
<b>Height (In.):</b>	25.2	<b>Lateral Offset (In.):</b>	38.2	<b>Road Grade (%):</b>	1.00
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	130 ft of barrier is out of alignment by 6in and 12". 1400 ft of rail is between 1" and 7" below the 27" design height.			
	<b>Breaking and Cracking:</b>	Cracking between 1/4in and 1" exist in a large percentage of posts and blocks along the length of the barrier. 575 ft of bent or torn rail sections.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	The onset of rot was very apparent in posts and blocks some of which has resulted in the loss of more than 5% of the cross section.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment good but the height was between 3in and 6" below 27" design height.			
	<b>Breaking and Cracking:</b>	Cracking of less than 1/4in in blocks and posts			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	Onset of rot in blocks and posts due to water exposure.			

<b>Barrier ID:</b>	OLYM-0011-5.870-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>		65.90	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$59598
<b>Brief Workorder:</b>	Replace 34 posts 30 blocks and 575 ft. of rail. Raise 1606 ft. to 27-in. design height.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 1606 LF = \$16060. Raise 1606-ft of barrier up to 27-in design height. Replace rail at \$25- per -Lin. Ft. for 575 LF = \$14375. Replace 575 ft of barrier that is bent or torn. Replace block at \$30- per -Each for 39 Block(s) = \$1170. Replace 39 blocks that were broken turned or rotten. Replace post at \$100- per -Each for 34 Post(s) = \$3400. Replace 34 post that were either broken badly cracked or rotten. Low Speed Traffic Control at \$1475- per -Day for 13 Day(s) = \$19175.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)

## Barrier Condition Photos



OLYM\_0011\_5.870\_R\_1.jpg

<b>Barrier ID:</b>	OLYM-0011-6.574-L				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>	32.70		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	159		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BURIED END	<b>Is Beg. End Trtmt Crashworthy?:</b>	YES	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BURIED END	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.0
<b>Height (In.):</b>	23.0	<b>Lateral Offset (In.):</b>	44.7	<b>Road Grade (%):</b>	1.30
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Barrier 1in to 3" below 27" design ht. for 30 ft and >3" below for 129 ft.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Beginning 1in to 3" below 27" design height End >3" below design height			
	<b>Breaking and Cracking:</b>	No breaking or cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			

<b>Barrier ID:</b>	OLYM-0011-6.574-L				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>		32.70	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$3372
<b>Brief Workorder:</b>	Raise 159 ft of W-beam to 27 inch design height.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 159 LF = \$1590. Adjust the entire barrier 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.					

# **Olympic National Park**

**ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)**

## **Barrier Condition Photos**



**OLYM\_0011\_6.574\_L\_1.JPG**

<b>Barrier ID:</b>	OLYM-0011-6.574-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>	22.70		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	204		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	74.6
<b>Height (In.):</b>	27.2	<b>Lateral Offset (In.):</b>	53.0	<b>Road Grade (%):</b>	0.40
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height is within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	1 rotten post and one rotten block that need to be replaced.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weather			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Barrier >3in below the 27" design height for 15 ft of beginning end treatment			
	<b>Breaking and Cracking:</b>	No breaking or cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			

<b>Barrier ID:</b>	OLYM-0011-6.574-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>		22.70	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$1930
<b>Brief Workorder:</b>	Raise 15 ft of W-beam to 27 inch design height and replace one post and one block.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 15 LF = \$150. Raise 15 ft of W-beam to 27 inch design height. Replace post at \$100- per -Each for 1 Post(s) = \$100. Replace block at \$30- per -Each for 1 Block(s) = \$30. 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.					



# **Olympic National Park**

**ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)**

## **Barrier Condition Photos**



**OLYM\_0011\_6.574\_R\_1.JPG**

<b>Barrier ID:</b>	OLYM-0011-6.613-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>	18.70		
<b>Barrier Description</b>					
<b>Type:</b>	OTHER: LOG RAIL ON CONCRETE POSTS	<b>Barrier Function:</b>	NON-TRAFFIC		
<b>Barrier Material:</b>	LOG/TIMBER/WOOD	<b>Post Material:</b>	OTHER: CONCRETE		
<b>Blockout Type:</b>	N/A	<b>Length (ft.):</b>	490		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	NON-TRAFFIC BARRIER		
<b>Hazard Behind Barrier:</b>	N/A				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	N/A	<b>Is Barrier Crashworthy?:</b>	N/A
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	12	<b>Width (In.):</b>	9.0	<b>Post Spacing (In.):</b>	0.0
<b>Height (In.):</b>	11.6	<b>Lateral Offset (In.):</b>	0.0	<b>Road Grade (%):</b>	0.00
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height is within 1-in of assumed 12-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering.			
<b>End Treatments</b>	<b>Alignment and Height:</b>				
	<b>Breaking and Cracking:</b>				
	<b>Missing Elements:</b>				
	<b>Corrosion and Weathering:</b>				

<b>Barrier ID:</b>	OLYM-0011-6.613-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>		18.70	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)

## Barrier Condition Photos



OLYM\_0011\_6.613\_R\_1.JPG

<b>Barrier ID:</b>	OLYM-0011-6.706-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>	63.20		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	4792		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	BOTH INSIDE AND OUTSIDE		
<b>Hazard Behind Barrier:</b>	EXTREME				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.1
<b>Height (In.):</b>	26.0	<b>Lateral Offset (In.):</b>	45.5	<b>Road Grade (%):</b>	2.00
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	5 turned blocks; 12 ft of rail out of align ~3-in.; 734 ft of barrier >3-in below 27-in design height; 1518 ft of barrier 1-3 in below 27-in design height; remainder of barrier within 1-in. of 27in design height			
	<b>Breaking and Cracking:</b>	Rail bent 6-12 in for 156 ft; 5 broken posts; 5 broken blocks.			
	<b>Missing Elements:</b>	1 block missing			
	<b>Corrosion and Weathering:</b>	Occasional moss on rail posts blocks			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Beginning end treatment ~ 3-in below 27-in design height			
	<b>Breaking and Cracking:</b>	No breaking/cracking in end treatments			
	<b>Missing Elements:</b>	No missing elements in end treatments			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering in end treatments			

<b>Barrier ID:</b>	OLYM-0011-6.706-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>		63.20	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$46167
<b>Brief Workorder:</b>	Raise 2252-ft of barrier up to 27-in design height; adjust 5 turned blocks; replace 6 blocks 5 posts and 156 ft W-beam.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 2252 LF = \$22520. Raise 2252-ft of barrier up to 27-in design height. Replace block at \$30- per -Each for 6 Block(s) = \$180. Replace post at \$100- per -Each for 5 Post(s) = \$500. Replace rail at \$25- per -Lin. Ft. for 156 LF = \$3900. Labor at \$60- per -Hour for 2 Hrs = \$120. Adjust 5 blocks Low Speed Traffic Control at \$1475- per -Day for 10 Day(s) = \$14750.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# **Olympic National Park**

**ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)**

## **Barrier Condition Photos**



**OLYM\_0011\_6.706\_R\_1.JPG**

<b>Barrier ID:</b>	OLYM-0011-7.603-L				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>	37.00		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	126		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	INSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BURIED END	<b>Is Beg. End Trtmt Crashworthy?:</b>	YES	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BURIED END	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	78.3
<b>Height (In.):</b>	25.5	<b>Lateral Offset (In.):</b>	73.0	<b>Road Grade (%):</b>	4.80
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height is 1in-3" below 27" design height for 24 ft. Debris and gravel are piled up against back of barrier causing tilting of 2 posts.			
	<b>Breaking and Cracking:</b>	1 rail is torn. 1 post cracked > 1/2in. Minor denting of rails not affecting performance.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable for both end treatments. Height is more than 3in below design for both end treatments (total of 60 ft.)			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering.			

<b>Barrier ID:</b>	OLYM-0011-7.603-L				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>		37.00	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$5709
<b>Brief Workorder:</b>	Raise 24 linear feet of barrier to 27-in design height. Remove 60 c.f. of debris behind barrier.				
<b>Workorder:</b>	Remove & Reset Guardrail at \$25- per -Lin. Ft. for 12 LF = \$300. Reset 2 tilted posts. Backhoe at \$125- per -Hour for 4 Hrs = \$500. Remove 60 c.f. of debris behind barrier. Loader at \$125- per -Hour for 4 Hrs = \$500. Remove 60 c.f. of debris behind barrier. Adjust Guardrail at \$10- per -Lin. Ft. for 60 LF = \$600. Adjust height of both end treatments to 27 in. design height. Adjust Guardrail at \$10- per -Lin. Ft. for 24 LF = \$240. Raise 24ft of barrier height to 27 in. design height. Replace post at \$100- per -Each for 1 Post(s) = \$100. 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.					

# **Olympic National Park**

**ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)**

## **Barrier Condition Photos**



**OLYM\_0011\_7.603\_L\_1.JPG**

<b>Barrier ID:</b>	OLYM-0011-7.772-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>	67.50		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	1375		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	BOTH INSIDE AND OUTSIDE		
<b>Hazard Behind Barrier:</b>	EXTREME				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BURIED END	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.6
<b>Height (In.):</b>	24.3	<b>Lateral Offset (In.):</b>	45.0	<b>Road Grade (%):</b>	1.30
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment off 1 in to 3" for 40 ft. Barrier 1" to 3" lower than the 27" design height for 390 ft >3" below design height for 735 ft.			
	<b>Breaking and Cracking:</b>	48 ft of damaged W-beam rail 1 broken post 2 broken block, 1 rotated block.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Ending end treatment >3in lower than the 27" design height and the beginning end treatment 1"-3" below the 27 " design height			
	<b>Breaking and Cracking:</b>	No breaking or cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			

<b>Barrier ID:</b>	OLYM-0011-7.772-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>		67.50	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$23672
<b>Brief Workorder:</b>	Raise 1125-ft of barrier up to 27-in design height replace 48ft of rail replace 2 blocks.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 1125 LF = \$11250. Raise 1125-ft of barrier up to 27-in design height. Replace post at \$100- per -Each for 1 Post(s) = \$100. Replace block at \$30- per -Each for 2 Block(s) = \$60. Replace rail at \$25- per -Lin. Ft. for 48 LF = \$1200. Labor at \$60- per -Hour for 1 Hrs = \$60. Rotated block Low Speed Traffic Control at \$1475- per -Day for 6 Day(s) = \$8850.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# **Olympic National Park**

**ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)**

## **Barrier Condition Photos**



**OLYM\_0011\_7.772\_R\_1.JPG**

<b>Barrier ID:</b>	OLYM-0011-8.055-L				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>	32.50		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	109		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	INSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BURIED END	<b>Is Beg. End Trtmt Crashworthy?:</b>	YES	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BURIED END	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.0
<b>Height (In.):</b>	26.7	<b>Lateral Offset (In.):</b>	49.7	<b>Road Grade (%):</b>	3.70
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable; 13 ft of barrier 1in-3" in below the 27" design height; 41 ft of barrier >3" below the 27" design height			
	<b>Breaking and Cracking:</b>	6 posts split or broken; 1-12 ft section rail bent.			
	<b>Missing Elements:</b>	No missing elements on barrier			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering in barrier			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Beginning and ending end treatments >3in below the 27" design height.			
	<b>Breaking and Cracking:</b>	No breaking/cracking on end treatments			
	<b>Missing Elements:</b>	No missing elements on end treatments			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering on end treatments			

<b>Barrier ID:</b>	OLYM-0011-8.055-L				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>		32.50	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$3206
<b>Brief Workorder:</b>	Replace 6 broken posts raise 54 ft of barrier to 27-in design height and replace 12 ft of rail.				
<b>Workorder:</b>	Replace post at \$100- per -Each for 6 Post(s) = \$600. Replace the damaged posts Adjust Guardrail at \$10- per -Lin. Ft. for 54 LF = \$540. Raise 54 ft of rail up to 27-in design height. Replace rail at \$25- per -Lin. Ft. for 12 LF = \$300. Replace 12 ft of bent barrier rail 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.					

# Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)

## Barrier Condition Photos



OLYM\_0011\_8.055\_L\_1.JPG

<b>Barrier ID:</b>	OLYM-0011-8.056-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>	38.70		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	456		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BURIED END	<b>Is Beg. End Trtmt Crashworthy?:</b>	YES	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	74.6
<b>Height (In.):</b>	28.2	<b>Lateral Offset (In.):</b>	82.0	<b>Road Grade (%):</b>	0.60
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Out of alignment 6-12in for 65 ft. Height is within 1" of 27" design height.			
	<b>Breaking and Cracking:</b>	Minor dents in rails not affecting performance. 3 rotten post 2 cracked posts. 6 tilted posts, 3 rotated blockouts.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment is good for both end treatments. Height is more than 3in below 27" design height at beginning end; height of ending end is within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	1 tilted post at beginning end.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering.			

<b>Barrier ID:</b>	OLYM-0011-8.056-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>		38.70	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$3558
<b>Brief Workorder:</b>	Raise 50 lin. ft. of barrier to 27-in design height.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 50 LF = \$500. Raise 50-ft of barrier up to 27-in design height. Replace post at \$100- per -Each for 12 Post(s) = \$1200. Replace the damaged posts. Labor at \$60- per -Hour for 1 Hrs = \$60. Rotate 3 blockouts back to vertical. 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.					



# Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)

## Barrier Condition Photos



OLYM\_0011\_8.056\_R\_1.JPG



OLYM\_0011\_8.056\_R\_2.JPG

<b>Barrier ID:</b>	OLYM-0011-8.142-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>	18.70		
<b>Barrier Description</b>					
<b>Type:</b>	OTHER: LOG RAIL ON CONCRETE POSTS	<b>Barrier Function:</b>	NON-TRAFFIC		
<b>Barrier Material:</b>	LOG/TIMBER/WOOD	<b>Post Material:</b>	OTHER: CONCRETE		
<b>Blockout Type:</b>	N/A	<b>Length (ft.):</b>	312		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	NON-TRAFFIC BARRIER		
<b>Hazard Behind Barrier:</b>	N/A				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	N/A	<b>Is Barrier Crashworthy?:</b>	N/A
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	12	<b>Width (In.):</b>	10.0	<b>Post Spacing (In.):</b>	0.0
<b>Height (In.):</b>	12.6	<b>Lateral Offset (In.):</b>	0.0	<b>Road Grade (%):</b>	0.00
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Barrier at apparent design height of 12 in.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>				
	<b>Breaking and Cracking:</b>				
	<b>Missing Elements:</b>				
	<b>Corrosion and Weathering:</b>				

<b>Barrier ID:</b>	OLYM-0011-8.142-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>		18.70	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# **Olympic National Park**

**ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)**

## **Barrier Condition Photos**



**OLYM\_0011\_8.142\_R\_1.JPG**

<b>Barrier ID:</b>	OLYM-0011-8.201-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009		<b>Barrier Rating:</b>	47.40	
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST		<b>Barrier Function:</b>	TRAFFIC	
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN		<b>Post Material:</b>	WOOD	
<b>Blockout Type:</b>	WOOD		<b>Length (ft.):</b>	2112	
<b>Speed Limit (MPH):</b>	35		<b>Placement with Respect to Road:</b>	BOTH INSIDE AND OUTSIDE	
<b>Hazard Behind Barrier:</b>	EXTREME				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	74.6
<b>Height (In.):</b>	26.1	<b>Lateral Offset (In.):</b>	53.5	<b>Road Grade (%):</b>	0.40
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable; 232 ft of barrier >3in below the 27-in design height; 524 ft of barrier 1in.-3 in. below the 27-in design height.			
	<b>Breaking and Cracking:</b>	5 posts split or broken; 1 broken block; 18-in bend in barrier rail; 3 turned blocks and one unbolted block and post.			
	<b>Missing Elements:</b>	1 bolt missing-pulled through			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering on barrier rail			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Begin end treatment at 27-in design height; ending end treatment is >3-in below the 27-in design height. Alignment acceptable.			
	<b>Breaking and Cracking:</b>	No breaking or cracking in end treatments			
	<b>Missing Elements:</b>	No missing elements in end treatments			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering in end treatments			

<b>Barrier ID:</b>	OLYM-0011-8.201-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>		47.40	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$15917
<b>Brief Workorder:</b>	Raise 756 lin. ft. of W-beam to 27-in design height replace 12 ft rail 5 posts 1 block.				
<b>Workorder:</b>	Replace post at \$100- per -Each for 5 Post(s) = \$500. Replace the damaged posts. Replace block at \$30- per -Each for 1 Block(s) = \$30. Replace the damaged blocks. Adjust Guardrail at \$10- per -Lin. Ft. for 756 LF = \$7560. Raise 756-ft of barrier up to 27-in design height. Replace rail at \$25- per -Lin. Ft. for 12 LF = \$300. Replace 12 ft of damaged rail. Labor at \$60- per -Hour for 3 Hrs = \$180. Rebolt 1 block and reset 3 turned blocks. Low Speed Traffic Control at \$1475- per -Day for 4 Day(s) = \$5900.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)

## Barrier Condition Photos



OLYM\_0011\_8.201\_R\_1.JPG

<b>Barrier ID:</b>	OLYM-0011-8.599-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>	71.90		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	8617		
<b>Speed Limit (MPH):</b>	45	<b>Placement with Respect to Road:</b>	BOTH INSIDE AND OUTSIDE		
<b>Hazard Behind Barrier:</b>	EXTREME				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.0
<b>Height (In.):</b>	25.2	<b>Lateral Offset (In.):</b>	41.7	<b>Road Grade (%):</b>	0.10
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	More than 6in out of alignment for 120 ft. 9 rotated blocks. 6 tilted posts. Height is 1-3" below 27" design height for 2671 ft. Height is more than 3" below design height for 2695 ft.			
	<b>Breaking and Cracking:</b>	4 rails are damaged by impact and need replacement. 25 posts are cracked more than 1/2 in or rotten through & need replacement. 12 blockouts are cracked more than 1/2in or rotten through and need replacement; minor cracking not affecting performance.			
	<b>Missing Elements:</b>	1 missing block at 7850 from beginning end. 50 delineators missing.			
	<b>Corrosion and Weathering:</b>	3 posts in holes too large needing backfill. >8in erosion around 27 posts. Several areas of erosion/slope instability affecting barrier notably at 6490-6540 from beginning end. Barrier is loose and easily moved when bumped, 2080-2240' from begin. End			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment is good at both end treatments. Height is more than 3in below design at beginning end height is 1-3" below design at ending end.			
	<b>Breaking and Cracking:</b>	No breaking or cracking in end treatments			
	<b>Missing Elements:</b>	No missing elements in end treatments.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering at end treatments.			

<b>Barrier ID:</b>	OLYM-0011-8.599-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>		71.90	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$133166
<b>Brief Workorder:</b>	Raise 5366-ft of barrier up to the 27-in design height. Remove & reset barrier for 280 lin. ft. replace 25 posts 13 blockouts and add fill around 3 posts.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 5366 LF = \$53660. Raise 5366 ft. of barrier to 27-in. design height. Remove & Reset Guardrail at \$25- per -Lin. Ft. for 160 LF = \$4000. Remove & Reset Guardrail at \$25- per -Lin. Ft. for 120 LF = \$3000. To repair alignment of barrier. Replace rail at \$25- per -Lin. Ft. for 48 LF = \$1200. Replace 48 feet of rail. Replace post at \$100- per -Each for 25 Post(s) = \$2500. Replace 25 posts. Replace block at \$30- per -Each for 13 Block(s) = \$390. Replace rotten and cracked blockouts. Select borrow at \$50- per -Cu. Yd. for 1 CY = \$50. Add backfill around 3 posts. Backhoe at \$125- per -Hour for 6 Hrs = \$750. For backfill around 3 posts. Labor at \$60- per -Hour for 6 Hrs = \$360. To compact backfill around 3 posts. Post Mounted Delineators at \$100- per -Each for 50 = \$5000. Replace 50 delineators which have broken off. Low Speed Traffic Control at \$1475- per -Day for 34 Day(s) = \$50150.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# **Olympic National Park**

**ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)**

## **Barrier Condition Photos**



**OLYM\_0011\_8.599\_R\_1.JPG**

<b>Barrier ID:</b>	OLYM-0011-10.261-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>	39.90		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	426		
<b>Speed Limit (MPH):</b>	45	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BURIED END	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	74.3
<b>Height (In.):</b>	25.2	<b>Lateral Offset (In.):</b>	44.2	<b>Road Grade (%):</b>	4.10
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Barrier is 1in-3" below the 27" design height for 233 ft and is >3" below 27" design height for 99 ft. Alignment acceptable.			
	<b>Breaking and Cracking:</b>	Few 1-4 in dents in rail; no breaking or cracking in rail.			
	<b>Missing Elements:</b>	No missing elements in rail			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering in rail			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Begin end treatment is >3-in below 27in design height. Alignment acceptable.			
	<b>Breaking and Cracking:</b>	No breaking or cracking in end treatments			
	<b>Missing Elements:</b>	No missing elements in end treatments			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering in end treatments			

<b>Barrier ID:</b>	OLYM-0011-10.261-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>		39.90	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$6897
<b>Brief Workorder:</b>	Raise 332 lin. ft. of W-beam up to 27-in. design height.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 332 LF = \$3320. Raise 332-ft of barrier up to 27-in design height. Low Speed Traffic Control at \$1475- per -Day for 2 Day(s) = \$2950.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)

## Barrier Condition Photos



OLYM\_0011\_10.261\_R\_1.JPG

<b>Barrier ID:</b>	OLYM-0011-10.331-L				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009		<b>Barrier Rating:</b>	47.20	
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST		<b>Barrier Function:</b>	TRAFFIC	
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN		<b>Post Material:</b>	WOOD	
<b>Blockout Type:</b>	WOOD		<b>Length (ft.):</b>	128	
<b>Speed Limit (MPH):</b>	45		<b>Placement with Respect to Road:</b>	INSIDE OF CURVE	
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	74.6
<b>Height (In.):</b>	21.7	<b>Lateral Offset (In.):</b>	148.3	<b>Road Grade (%):</b>	2.20
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Entire barrier is >3in below the 27" design height alignment acceptable.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>	End treatment height is >3in below the 27" design height for both end treatments but the alignment is acceptable.			
	<b>Breaking and Cracking:</b>	No breaking or cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			

<b>Barrier ID:</b>	OLYM-0011-10.331-L				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>		47.20	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$3030
<b>Brief Workorder:</b>	Raise entire barrier to the design height of 27 inches.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 128 LF = \$1280. Raise 128-ft of barrier to the 27" 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.					

# **Olympic National Park**

**ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)**

## **Barrier Condition Photos**



**OLYM\_0011\_10.331\_L\_1.JPG**

<b>Barrier ID:</b>	OLYM-0011-10.693-L				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	11/02/2009		<b>Barrier Rating:</b>	45.50	
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST		<b>Barrier Function:</b>	TRAFFIC	
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN		<b>Post Material:</b>	WOOD	
<b>Blockout Type:</b>	WOOD		<b>Length (ft.):</b>	520	
<b>Speed Limit (MPH):</b>	60		<b>Placement with Respect to Road:</b>	TANGENT	
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-3	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.3
<b>Height (In.):</b>	23.7	<b>Lateral Offset (In.):</b>	186.0	<b>Road Grade (%):</b>	6.00
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable for entire barrier length. Height is 1-3 in below 27in design for 269 ft. Height is below design for more than 3" for 170 ft.			
	<b>Breaking and Cracking:</b>	1 post cracked more than 1/2 in.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable for both end treatments. Height of begin. end too low by more than 3in ending end height was good			
	<b>Breaking and Cracking:</b>	No breaking or cracking in end treatments.			
	<b>Missing Elements:</b>	No missing elements in end treatments.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering in end treatments.			

<b>Barrier ID:</b>	OLYM-0011-10.693-L				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	11/02/2009		<b>Barrier Rating:</b>	45.50	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$10109
<b>Brief Workorder:</b>	Adjust 439 lin. ft. of W-beam to 27-in. design height; replace 1 post.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 439 LF = \$4390. Raise 439-ft of barrier to 27-in. design height. Replace post at \$100- per -Each for 1 Post(s) = \$100. Replace the 1 damaged post. High Speed Traffic Control at \$2350- per -Day for 2 Day(s) = \$4700.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# **Olympic National Park**

**ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)**

## **Barrier Condition Photos**



**OLYM\_0011\_10.693\_L\_1.JPG**

<b>Barrier ID:</b>	OLYM-0011-10.895-L				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	11/02/2009	<b>Barrier Rating:</b>	55.50		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	847		
<b>Speed Limit (MPH):</b>	60	<b>Placement with Respect to Road:</b>	INSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-3	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.0
<b>Height (In.):</b>	24.5	<b>Lateral Offset (In.):</b>	200.0	<b>Road Grade (%):</b>	6.00
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Barrier is 1in to 3" below 27" design height for 95 ft; >3" below 27" design height for 490 ft.			
	<b>Breaking and Cracking:</b>	24 ft of rail impacted 1rotten blockout.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Both end treatments >3in lower than the 27" design height			
	<b>Breaking and Cracking:</b>	No breaking or cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			

<b>Barrier ID:</b>	OLYM-0011-10.895-L				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	11/02/2009		<b>Barrier Rating:</b>	55.50	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$14883
<b>Brief Workorder:</b>	Raise 585 ft of W-beam to the design height of 27-in. Replace 24 ft. of rail and 1 blockout.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 585 LF = \$5850. Raise 585 ft to the 27 inch design height Replace rail at \$25- per -Lin. Ft. for 24 LF = \$600. Replace the 24 ft of impacted rail Replace block at \$30- per -Each for 1 Block(s) = \$30. Replace rotten block High Speed Traffic Control at \$2350- per -Day for 3 Day(s) = \$7050.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# **Olympic National Park**

**ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)**

## **Barrier Condition Photos**



**OLYM\_0011\_10.895\_L\_1.JPG**

<b>Barrier ID:</b>	OLYM-0011-11.495-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	11/02/2009	<b>Barrier Rating:</b>	51.20		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	1049		
<b>Speed Limit (MPH):</b>	60	<b>Placement with Respect to Road:</b>	INSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-3	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BURIED END	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.0
<b>Height (In.):</b>	23.6	<b>Lateral Offset (In.):</b>	178.8	<b>Road Grade (%):</b>	5.20
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	316 ft of barrier 1in-3-in below the 27-in design height;518 ft of barrier >3-in below the 27-in design height. Alignment acceptable.			
	<b>Breaking and Cracking:</b>	1 broken post; 2 split blocks; 24 ft of guardrail bent ~6-12 in.			
	<b>Missing Elements:</b>	1 delineator has missing bolt			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering on barrier			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Beginning end treatment>3-in below 30-in design height; Buried ending end treatment20-in high; design height for buried end treatment is not known; align okay for end treatments			
	<b>Breaking and Cracking:</b>	No breaking/cracking in end treatments			
	<b>Missing Elements:</b>	No missing elements in end treatments			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering in end treatments			

<b>Barrier ID:</b>	OLYM-0011-11.495-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	11/02/2009		<b>Barrier Rating:</b>	51.20	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$20416
<b>Brief Workorder:</b>	Raise 834 ft of barrier to 27-in. design height. Replace 24 ft. of w-beam select blocks and posts.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 834 LF = \$8340. Raise 834-ft of barrier up to 27-in design height. Replace block at \$30- per -Each for 2 Block(s) = \$60. Replace the damaged blocks. Replace post at \$100- per -Each for 1 Post(s) = \$100. Replace the damaged post. Replace rail at \$25- per -Lin. Ft. for 24 LF = \$600. Replace the bent rail sections. Labor at \$60- per -Hour for 1 Hrs = \$60. Rebolt 1 delineator to post. High Speed Traffic Control at \$2350- per -Day for 4 Day(s) = \$9400.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)

## Barrier Condition Photos



OLYM\_0011\_11.495\_R\_1.JPG

<b>Barrier ID:</b>	OLYM-0011-11.759-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	11/02/2009	<b>Barrier Rating:</b>	63.90		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	792		
<b>Speed Limit (MPH):</b>	60	<b>Placement with Respect to Road:</b>	INSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-3	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BURIED END	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.3
<b>Height (In.):</b>	22.2	<b>Lateral Offset (In.):</b>	153.5	<b>Road Grade (%):</b>	6.00
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable but 20' is between 1-3in below the 27" design height and 762' is >3" below the 27" design height			
	<b>Breaking and Cracking:</b>	1 post cracked but the original cross section is in tact and the performance of the post is not affected and 1 turned block.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Ending end treatment is >3in below the 27" design standard			
	<b>Breaking and Cracking:</b>	No breaking or cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			

<b>Barrier ID:</b>	OLYM-0011-11.759-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	11/02/2009	<b>Barrier Rating:</b>		63.90	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$16357
<b>Brief Workorder:</b>	Raise 782 feet of W-beam to 27-in. design height.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 782 LF = \$7820. Raise 782 feet of W-beam to 27-in. design height. High Speed Traffic Control at \$2350- per -Day for 3 Day(s) = \$7050.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)

## Barrier Condition Photos



OLYM\_0011\_11.759\_R\_1.JPG

<b>Barrier ID:</b>	OLYM-0011-12.022-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	11/02/2009	<b>Barrier Rating:</b>	56.90		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	448		
<b>Speed Limit (MPH):</b>	60	<b>Placement with Respect to Road:</b>	INSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-3	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.0
<b>Height (In.):</b>	22.7	<b>Lateral Offset (In.):</b>	121.0	<b>Road Grade (%):</b>	6.10
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment off less than 6 in in 3 locations. Height is more than 3 in below 27in design height for entire length of barrier.			
	<b>Breaking and Cracking:</b>	2 posts cracked more than 1/2 in 1 rail dented less than 6in 1 block cracked more than 1/2 inch.			
	<b>Missing Elements:</b>	1 bolt has ripped through barrier rail..			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height is more than 6 in lower than the design height for both end treatments.			
	<b>Breaking and Cracking:</b>	No breaking or cracking in end treatments.			
	<b>Missing Elements:</b>	No missing elements in end treatments.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering in end treatments.			

Barrier ID:	OLYM-0011-12.022-R				
Route Name:	LAKE CRESCENT HIGHWAY (U.S. 101)				
Inspection Date:	11/02/2009		Barrier Rating:		56.90
Repair Recommendations					
Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$13332
Brief Workorder:	Raise 448 ft. of barrier to the 27-in. design height. Replace miscellaneous hardware and posts.				
Workorder:	Adjust Guardrail at \$10- per -Lin. Ft. for 448 LF = \$4480. Raise 448 ft. of barrier to the 27-in. design height. Replace post at \$100- per -Each for 2 Post(s) = \$200. Replace the damaged posts. Replace block at \$30- per -Each for 1 Block(s) = \$30. Replace the damaged blocks. Replace rail at \$25- per -Lin. Ft. for 12 LF = \$300. Replace 1 12-ft. section of rail due to bolt hole ripped through/too big. Labor at \$60- per -Hour for 1 Hrs = \$60. Re-attach one bolt that has ripped through the hole in the rail. High Speed Traffic Control at \$2350- per -Day for 3 Day(s) = \$7050. 2 days to adjust barrier; 1 day for other repairs.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)

## Barrier Condition Photos



OLYM\_0011\_12.022\_R\_1.JPG

<b>Barrier ID:</b>	OLYM-0011-12.158-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	11/02/2009		<b>Barrier Rating:</b>	34.00	
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST		<b>Barrier Function:</b>	TRAFFIC	
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN		<b>Post Material:</b>	WOOD	
<b>Blockout Type:</b>	WOOD		<b>Length (ft.):</b>	213	
<b>Speed Limit (MPH):</b>	60		<b>Placement with Respect to Road:</b>	TANGENT	
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-3	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BURIED END	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.0
<b>Height (In.):</b>	25.2	<b>Lateral Offset (In.):</b>	61.0	<b>Road Grade (%):</b>	4.50
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. 118 ft of barrier is 1-3-in below the 27-in design height; 38 ft of barrier is >3-in below the 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. Beginning end treatment > 3-in below the 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking in end treatments			
	<b>Missing Elements:</b>	No missing elements in end treatments			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering in end treatments			

<b>Barrier ID:</b>	OLYM-0011-12.158-R				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	11/02/2009		<b>Barrier Rating:</b>	34.00	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$4301
<b>Brief Workorder:</b>	Adjust 156 ft of W-beam up to the design height of 27-in.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 156 LF = \$1560. Raise 156 ft of W-beam up to the design height of 27-in. High Speed Traffic Control at \$2350- per -Day for 1 Day(s) = \$2350.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)

## Barrier Condition Photos



OLYM\_0011\_12.158\_R\_1.JPG

<b>Barrier ID:</b>	OLYM-0011-12.191-L				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>	30.00		
<b>Barrier Description</b>					
<b>Type:</b>	CONCRETE BARRIER	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	CONCRETE	<b>Post Material:</b>	N/A		
<b>Blockout Type:</b>	N/A	<b>Length (ft.):</b>	102		
<b>Speed Limit (MPH):</b>	60	<b>Placement with Respect to Road:</b>	INSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-3	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	32	<b>Width (In.):</b>	6.0	<b>Post Spacing (In.):</b>	0.0
<b>Height (In.):</b>	32.0	<b>Lateral Offset (In.):</b>	59.0	<b>Road Grade (%):</b>	1.80
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height is within 1-in of design height of 32 in.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	Surface corrosion on less than 5% of run and very small chipping of concrete not affecting performance.			
<b>End Treatments</b>	<b>Alignment and Height:</b>				
	<b>Breaking and Cracking:</b>				
	<b>Missing Elements:</b>				
	<b>Corrosion and Weathering:</b>				

<b>Barrier ID:</b>	OLYM-0011-12.191-L				
<b>Route Name:</b>	LAKE CRESCENT HIGHWAY (U.S. 101)				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>		30.00	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	MONITOR	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	Monitor the surface corrosion and small chipping.				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# **Olympic National Park**

**ROUTE 0011: LAKE CRESCENT HIGHWAY (U.S. 101)**

## **Barrier Condition Photos**

**Condition photos are not available for OLYM-0011-12.191-L.**

<b>Barrier ID:</b>	OLYM-0012-0.247-R				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>	32.20		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	501		
<b>Speed Limit (MPH):</b>	45	<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.3
<b>Height (In.):</b>	27.0	<b>Lateral Offset (In.):</b>	25.0	<b>Road Grade (%):</b>	3.80
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height is within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	24ft of bent rail. 3 blocks split 1 post split other cracks in blocks and posts but still original cross section.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	Minimal corrosion/ weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment/height are good.			
	<b>Breaking and Cracking:</b>	Torn end piece on ending end. 3ft. Posts and blocks cracked but retaining cross section.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	Minimal corrosion/ weathering			

<b>Barrier ID:</b>	OLYM-0012-0.247-R				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		32.20	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$2574
<b>Brief Workorder:</b>	Replace 27 feet of rail; replace 1 post 3 blocks.				
<b>Workorder:</b>	Replace rail at \$25- per -Lin. Ft. for 3 = \$75. Replace rail at \$25- per -Lin. Ft. for 24 = \$600. Replace block at \$30- per -Each for 3 = \$90. Replace post at \$100- per -Each for 1 = \$100. Low Speed Traffic Control at \$1475- per -Day for 1 = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_0.247\_R\_1.jpg**

<b>Barrier ID:</b>	OLYM-0012-0.445-R				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/29/2009		<b>Barrier Rating:</b>	25.30	
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST		<b>Barrier Function:</b>	TRAFFIC	
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN		<b>Post Material:</b>	WOOD	
<b>Blockout Type:</b>	WOOD		<b>Length (ft.):</b>	202	
<b>Speed Limit (MPH):</b>	45		<b>Placement with Respect to Road:</b>	TANGENT	
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-1	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.0
<b>Height (In.):</b>	27.0	<b>Lateral Offset (In.):</b>	21.7	<b>Road Grade (%):</b>	3.60
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Barrier within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	2 posts and 1 block broken such that the original cross section has been deformed.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable corrosion/weathering or erosion			
<b>End Treatments</b>	<b>Alignment and Height:</b>	No problems with alignment or height for entire end treatment			
	<b>Breaking and Cracking:</b>	No breaking or cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable corrosion/weathering or erosion			

<b>Barrier ID:</b>	OLYM-0012-0.445-R				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		25.30	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$1876
<b>Brief Workorder:</b>	Replace 2 damaged posts and 1 damaged block.				
<b>Workorder:</b>	Replace post at \$100- per -Each for 2 = \$200. Replace the two damaged posts. Replace block at \$30- per -Each for 1 = \$30. Replace the one badly damaged block. Low Speed Traffic Control at \$1475- per -Day for 1 = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**

**Condition photos are not available for OLYM-0012-0.445-R.**

<b>Barrier ID:</b>	OLYM-0012-0.447-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>	20.70		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	227		
<b>Speed Limit (MPH):</b>	30	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-1	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.0
<b>Height (In.):</b>	27.0	<b>Lateral Offset (In.):</b>	27.2	<b>Road Grade (%):</b>	3.20
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Barrier within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking for the barrier length.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion weathering or erosion at the barrier length			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	13 ft rail bent on approach end.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering at the end treatments. No erosion at the base of the end sections			

<b>Barrier ID:</b>	OLYM-0012-0.447-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>	20.70		
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$1980
<b>Brief Workorder:</b>	Replace 13 feet of rail at the approach end section.				
<b>Workorder:</b>	Replace rail at \$25- per -Lin. Ft. for 13 = \$325. Replace 13 ft of rail at the approach end. Low Speed Traffic Control at \$1475- per -Day for 1 = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**

**Condition photos are not available for OLYM-0012-0.447-L.**

<b>Barrier ID:</b>	OLYM-0012-0.733-R				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>	34.00		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	301		
<b>Speed Limit (MPH):</b>	45	<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.5
<b>Height (In.):</b>	26.0	<b>Lateral Offset (In.):</b>	25.2	<b>Road Grade (%):</b>	6.80
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Barrier within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	25ft of bent rail along barrier. 3 blocks split.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment/height are good at both ends			
	<b>Breaking and Cracking:</b>	1 block is split on ending end			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering			

<b>Barrier ID:</b>	OLYM-0012-0.733-R				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		34.00	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$2442
<b>Brief Workorder:</b>	Replace 25 ft. of rail and 4 blocks.				
<b>Workorder:</b>	Replace block at \$30- per -Each for 4 = \$120. 1 block on ending end 3 blocks along barrier. Replace rail at \$25- per -Lin. Ft. for 25 = \$625. Replace 25 ft of bent section. Low Speed Traffic Control at \$1475- per -Day for 1 = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_0.733\_R\_1.jpg**

<b>Barrier ID:</b>	OLYM-0012-0.844-R				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/29/2009		<b>Barrier Rating:</b>	45.70	
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST		<b>Barrier Function:</b>	TRAFFIC	
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN		<b>Post Material:</b>	WOOD	
<b>Blockout Type:</b>	WOOD		<b>Length (ft.):</b>	475	
<b>Speed Limit (MPH):</b>	45		<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE	
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	74.8
<b>Height (In.):</b>	25.5	<b>Lateral Offset (In.):</b>	22.5	<b>Road Grade (%):</b>	8.00
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. The height is below the design of 27in by 1 to 3 in for 150 ft.			
	<b>Breaking and Cracking:</b>	6 blocks are split in two. There is no breaking or cracking along the rail for the entire barrier length.			
	<b>Missing Elements:</b>	1 block is missing.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering for the barrier length. No erosion at the barrier foundation.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Replace the approach end due to impact. The trailing end section is in good condition			
	<b>Breaking and Cracking:</b>	Replace the approach end due to impact. The trailing end section has no breaking or cracking.			
	<b>Missing Elements:</b>	No missing element			
	<b>Corrosion and Weathering:</b>	No corrosion weathering or erosion at the end sections			

<b>Barrier ID:</b>	OLYM-0012-0.844-R				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		45.70	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPLACE	<b>FMSS Work Type:</b>	CAPITAL IMPROVEMENT	<b>Repair Cost:</b>	\$9361
<b>Brief Workorder:</b>	Replace BCT end treatment and raise 150 lin. ft. of barrier to 27-in. design height.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 150 = \$1500. Raise 150 feet of w-beam to design height of 27 inches. Replace block at \$30- per -Each for 7 = \$210. Replace 7 blocks along W-Beam section. W-beam tangent 350 compliant at \$3500- per -Each for 1 = \$3500. Replace existing damaged BCT with a W-Beam tangent complaint end section. Remove Guardrail at \$10- per -Lin. Ft. for 35 LF = \$350. Remove end treatment. Low Speed Traffic Control at \$1475- per -Day for 2 = \$2950. 1 day to adjust rail and 1 day to replace end section.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_0.844\_R\_1.jpg**

<b>Barrier ID:</b>	OLYM-0012-1.611-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>	52.70		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	1172		
<b>Speed Limit (MPH):</b>	45	<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BURIED END	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.8
<b>Height (In.):</b>	28.5	<b>Lateral Offset (In.):</b>	17.2	<b>Road Grade (%):</b>	8.10
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	36-ft torn and bent rail. One broken/ cracked post 3 cracked/broken blocks.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable corrosion/weathering or erosion			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	Ending end treatment damaged by impact.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable corrosion/weathering or erosion			

<b>Barrier ID:</b>	OLYM-0012-1.611-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		52.70	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$7579
<b>Brief Workorder:</b>	Replace ending end treatment and isolated blocks and post.				
<b>Workorder:</b>	Replace rail at \$25- per -Lin. Ft. for 36 LF = \$900. Replace 36 feet of damaged rail Replace post at \$100- per -Each for 1 Post(s) = \$100. Replace 1 broken/cracked post Replace block at \$30- per -Each for 3 Block(s) = \$90. Replace 3 broken/cracked blocks W-beam Buried End at \$2500- per -Each for 1 Unit(s) = \$2500. Replace ending end treatment that was damaged by impact Remove Guardrail at \$10- per -Lin. Ft. for 35 LF = \$350. Remove end treatment. Low Speed Traffic Control at \$1475- per -Day for 2 Day(s) = \$2950. 1 day to replace end treatment 1 day for remainder of work.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_1.611\_L\_1.jpg**

<b>Barrier ID:</b>	OLYM-0012-2.073-R				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>	41.00		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	245		
<b>Speed Limit (MPH):</b>	45	<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.0
<b>Height (In.):</b>	25.7	<b>Lateral Offset (In.):</b>	18.2	<b>Road Grade (%):</b>	7.70
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	35ft is 2in below design height of 27"			
	<b>Breaking and Cracking:</b>	13ft section is bent from impact. Some cracking in most of posts and blocks but still good cross section.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering. Some moss growing on metal.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	Ending end treatment has torn end piece for 3ft. Beginning end treatment is torn for 15ft.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering			

<b>Barrier ID:</b>	OLYM-0012-2.073-R				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		41.00	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$2860
<b>Brief Workorder:</b>	Adjust 35 lin. ft. of W-beam to the 27-in. design height. Replace 31-ft. of rail.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 35 = \$350. Adjust 35 ft of barrier that was 2 inches below the 27 inch design height. Replace rail at \$25- per -Lin. Ft. for 31 = \$775. 13ft bent section and 18ft of torn end treatments. Low Speed Traffic Control at \$1475- per -Day for 1 = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_2.073\_R\_1.jpg**

<b>Barrier ID:</b>	OLYM-0012-2.087-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>	42.50		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	163		
<b>Speed Limit (MPH):</b>	45	<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	74.3
<b>Height (In.):</b>	26.2	<b>Lateral Offset (In.):</b>	12.6	<b>Road Grade (%):</b>	8.00
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking along the barrier length.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering along the barrier length. No erosion at the barrier foundation			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment is good for each end section but the height is 3 in below the design height of 27 in for both end treatments.			
	<b>Breaking and Cracking:</b>	No breaking or cracking of the end treatments			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion weathering or erosion at the end sections			

<b>Barrier ID:</b>	OLYM-0012-2.087-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		42.50	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$2172
<b>Brief Workorder:</b>	Adjust 50 lin. ft. of W-beam at each BCT tangent end section to the design height of 27 inches.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 50 = \$500. Adjust 25 ft of W-Beam at each end section to the design height of 27 inches. Low Speed Traffic Control at \$1475- per -Day for 1 = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_2.087\_L\_1.jpg**

<b>Barrier ID:</b>	OLYM-0012-2.970-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>	48.50		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	159		
<b>Speed Limit (MPH):</b>	45	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.6
<b>Height (In.):</b>	22.0	<b>Lateral Offset (In.):</b>	27.0	<b>Road Grade (%):</b>	7.70
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment is approx. 6in off for 56'; the entire length of the barrier ranges from 2"- 10" below the 27" design height.			
	<b>Breaking and Cracking:</b>	7 consecutive broken blocks in the first 56' and the rail in the same location is bent and has a badly deformed cross section.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable corrosion/weathering or erosion			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment off by approx. 6in and 2"-10" below the 27-in design height.			
	<b>Breaking and Cracking:</b>	Beginning end has all blocks completely broken and rail is almost at ground level and is badly deformed			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable corrosion/weathering or erosion			

<b>Barrier ID:</b>	OLYM-0012-2.970-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		48.50	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPLACE	<b>FMSS Work Type:</b>	CAPITAL IMPROVEMENT	<b>Repair Cost:</b>	\$12138
<b>Brief Workorder:</b>	Replace end treatment. Raise 90-ft. of barrier to the design height of 27-in..				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 90 LF = \$900. Adjust the 90 ft of the barrier that does not need to be replaced up to 27-in. design height. Remove & Reset Guardrail at \$25- per -Lin. Ft. for 69 LF = \$1725. Remove 69 ft for barrier of which 13 ft is the beginning end treatment W-Beam strong post at \$35- per -Lin. Ft. for 56 LF = \$1960. Replace 56 ft of damaged barrier posts blocks. W-beam tangent 350 compliant at \$3500- per -Each for 1 Unit(s) = \$3500. Replace the damaged end treatment. 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.					

**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_2.970\_L\_1.jpg**

<b>Barrier ID:</b>	OLYM-0012-3.067-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/29/2009		<b>Barrier Rating:</b>	52.70	
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST		<b>Barrier Function:</b>	TRAFFIC	
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN		<b>Post Material:</b>	WOOD	
<b>Blockout Type:</b>	WOOD		<b>Length (ft.):</b>	1027	
<b>Speed Limit (MPH):</b>	45		<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE	
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.1
<b>Height (In.):</b>	27.2	<b>Lateral Offset (In.):</b>	23.0	<b>Road Grade (%):</b>	6.90
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	9 turned blocks in a row along where 60ft is bent and torn rail. Another 26ft is bent.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking/cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering			

<b>Barrier ID:</b>	OLYM-0012-3.067-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		52.70	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$4284
<b>Brief Workorder:</b>	Replace 86-ft. of W-beam rail and 9 blocks.				
<b>Workorder:</b>	Replace rail at \$25- per -Lin. Ft. for 86 = \$2150. Replace 86 ft of bent and torn sections. Replace block at \$30- per -Each for 9 = \$270. Replace the 9 consecutive turned blocks. Low Speed Traffic Control at \$1475- per -Day for 1 = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_3.067\_L\_1.jpg**

<b>Barrier ID:</b>	OLYM-0012-3.560-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>	41.40		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	203		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	INSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	76.3
<b>Height (In.):</b>	25.2	<b>Lateral Offset (In.):</b>	23.0	<b>Road Grade (%):</b>	6.70
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height for 82ft is 3in below design height of 27".			
	<b>Breaking and Cracking:</b>	Minor cracking on posts but still good cross section.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	Minor corrosion/weathering erosion but less than 5% loss of cross section			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Both end treatments are 3in below design height of 27".			
	<b>Breaking and Cracking:</b>	Minor breaking/cracking but good cross section.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering erosion			

<b>Barrier ID:</b>	OLYM-0012-3.560-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		41.40	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$3360
<b>Brief Workorder:</b>	Adjust 158 lin. ft. of W-beam to 27-in. design height.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 158 = \$1580. 76-ft is for both end treatments 82-ft is in the run of barrier. Low Speed Traffic Control at \$1475- per -Day for 1 = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_3.560\_L\_1.jpg**

<b>Barrier ID:</b>	OLYM-0012-3.703-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>	34.20		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	230		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.3
<b>Height (In.):</b>	24.7	<b>Lateral Offset (In.):</b>	21.2	<b>Road Grade (%):</b>	4.80
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. The height is below the design of 27 in by 2 to 2.5 in for 193 linear ft of rail			
	<b>Breaking and Cracking:</b>	No breaking or cracking at rail length.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering at the barrier length. There is no erosion at the barrier foundation.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Approach end treatment has been impacted. The beginning end treatment is more that 6-in below the 27in design height.			
	<b>Breaking and Cracking:</b>	Approach end BCT is crushed due to impact. The BCT on the opposite end is good			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion weathering or erosion at the end treatments			

<b>Barrier ID:</b>	OLYM-0012-3.703-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		34.20	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPLACE	<b>FMSS Work Type:</b>	CAPITAL IMPROVEMENT	<b>Repair Cost:</b>	\$11248
<b>Brief Workorder:</b>	Replace end treatment and raise 193-ft of barrier to 27-in. design height.				
<b>Workorder:</b>	Remove Guardrail at \$10- per -Lin. Ft. for 37 LF = \$370. Remove rail at approach end treatment. Adjust Guardrail at \$10- per -Lin. Ft. for 193 LF = \$1930. Raise 193-ft of barrier to 27-in. design height. W-beam tangent 350 compliant at \$3500- per -Each for 1 Unit(s) = \$3500. Replace end treatment. Low Speed Traffic Control at \$1475- per -Day for 3 Day(s) = \$4425. 1 day to raise barrier; 2 days to install end treatment.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_3.703\_L\_1.jpg**

<b>Barrier ID:</b>	OLYM-0012-3.703-R				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>	29.80		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	186		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	76.0
<b>Height (In.):</b>	25.7	<b>Lateral Offset (In.):</b>	16.7	<b>Road Grade (%):</b>	4.20
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	20' near the ending end treatment was out of alignment by 6in due to impact. The first 60' of the barrier is 2" below the 27" design height			
	<b>Breaking and Cracking:</b>	7-12 ft sections of rail that are badly damaged from impact and 1 block was turned.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable corrosion/weathering or erosion			
<b>End Treatments</b>	<b>Alignment and Height:</b>	The height of the beginning end treatment is 2in lower than the 27" design height; the alignment is 6" off due to impact for the entire ending end treatment.			
	<b>Breaking and Cracking:</b>	Ending end treatment badly damaged and deformed by impact.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable corrosion/weathering or erosion			

<b>Barrier ID:</b>	OLYM-0012-3.703-R				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		29.80	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPLACE	<b>FMSS Work Type:</b>	CAPITAL IMPROVEMENT	<b>Repair Cost:</b>	\$10373
<b>Brief Workorder:</b>	Replace end treatment. Raise 60-ft of barrier to 27-in. design height.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 60 LF = \$600. Raise 60-ft of barrier to 27-in. design height. Replace rail at \$25- per -Lin. Ft. for 84 LF = \$2100. Replace the 7-12ft long sections of rail that were severely damaged and deformed. Replace block at \$30- per -Each for 1 Block(s) = \$30. Replace the 1 turned block. Remove Guardrail at \$10- per -Lin. Ft. for 25 LF = \$250. Remove the damaged ending end treatment in order to install new end treatment. W-beam tangent 350 compliant at \$3500- per -Each for 1 Unit(s) = \$3500. Replace the damaged ending end treatment. 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.					

**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_3.703\_R\_1.jpg**

<b>Barrier ID:</b>	OLYM-0012-3.827-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009		<b>Barrier Rating:</b>	32.50	
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST		<b>Barrier Function:</b>	TRAFFIC	
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN		<b>Post Material:</b>	WOOD	
<b>Blockout Type:</b>	WOOD		<b>Length (ft.):</b>	227	
<b>Speed Limit (MPH):</b>	35		<b>Placement with Respect to Road:</b>	INSIDE OF CURVE	
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM TRAILING END	<b>Is Beg. End Trtmt Crashworthy?:</b>	YES	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.0
<b>Height (In.):</b>	23.2	<b>Lateral Offset (In.):</b>	27.7	<b>Road Grade (%):</b>	3.90
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height is 2in-9" lower than the 27" design height for 175' of barrier.			
	<b>Breaking and Cracking:</b>	2 blocks turned and cracked more than 1/2in badly along with 48' of bent rail due to impact.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	Up to 6in of sediment deposits from plowing.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable but height is 2in-5" below the design height of 27"			
	<b>Breaking and Cracking:</b>	No breaking or cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	6in or more of sediment deposits that should be removed			

<b>Barrier ID:</b>	OLYM-0012-3.827-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		32.50	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$7244
<b>Brief Workorder:</b>	Replace 48-ft. of rail and raise 175-ft. of barrier up to 27-in. design height.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 175 LF = \$1750. Raise 175 ft. of barrier Raise 175 ft. of barrier to 27-in. design height. Replace rail at \$25- per -Lin. Ft. for 48 LF = \$1200. Replace the 48 ft section that was damaged by impact. Replace block at \$30- per -Each for 2 Block(s) = \$60. Replace the 2 blocks that were damaged by the impacts of a vehicle. Loader at \$125- per -Hour for 5 Hrs = \$625. Assume that 5 hrs would be needed to remove all of the sediment deposits. 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.					



**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_3.827\_L\_1.jpg**

<b>Barrier ID:</b>	OLYM-0012-4.031-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	34.20		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	240		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	INSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.0
<b>Height (In.):</b>	24.7	<b>Lateral Offset (In.):</b>	24.2	<b>Road Grade (%):</b>	3.20
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height for 48ft is 2in lower than 27" design height. Height for 36ft is 4" lower than 27" design height.			
	<b>Breaking and Cracking:</b>	12ft section of rail is bent.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	Some sediment starting to build up along front of barrier.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	Beginning end treatment has severe tearing from impact. 1 post and 1 block have broken apart.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	Loss of 5% or less of cross section. Erosion less than 4in of post exposed below ground level			

<b>Barrier ID:</b>	OLYM-0012-4.031-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		34.20	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPLACE	<b>FMSS Work Type:</b>	CAPITAL IMPROVEMENT	<b>Repair Cost:</b>	\$8910
<b>Brief Workorder:</b>	Replace end treatment and raise 84-ft. of barrier to 27-in. design height.				
<b>Workorder:</b>	W-beam tangent 350 compliant at \$3500- per -Each for 1 Unit(s) = \$3500. Replace damaged non crashworthy BCT tangent end treatment. Remove Guardrail at \$10- per -Lin. Ft. for 38 LF = \$380. Remove the damaged BCT tangent end treatment. Replace rail at \$25- per -Lin. Ft. for 12 LF = \$300. Bent section of w-beam. Adjust Guardrail at \$10- per -Lin. Ft. for 84 LF = \$840. Raise 84-ft. of barrier that is more than 1-in. below 27-in. design height to the design height. Replace post at \$100- per -Each for 1 Post(s) = \$100. Replace block at \$30- per -Each for 1 Block(s) = \$30. 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.					

**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_4.031\_L\_1.jpg**

<b>Barrier ID:</b>	OLYM-0012-4.424-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	42.70		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	241		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM TRAILING END	<b>Is Beg. End Trtmt Crashworthy?:</b>	YES	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	74.3
<b>Height (In.):</b>	25.0	<b>Lateral Offset (In.):</b>	18.0	<b>Road Grade (%):</b>	3.60
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment is bent greater than 1 ft for 3 sections of rail (37.5 ft). Height is 2 to 3 in below the design height of 27 in for 120 linear ft of rail.			
	<b>Breaking and Cracking:</b>	1 post damaged.			
	<b>Missing Elements:</b>	1 post missing.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering through rail length. There is no erosion at the W-Beam rail foundation			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Height at the flared BCT ending end treatment is 21 in which is 6 in below the 27 in design height. Sediment is in front of rail.			
	<b>Breaking and Cracking:</b>	No breaking or cracking of the end treatments			
	<b>Missing Elements:</b>	Missing one post at the flared BCT end treatment.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering but there is sediment build up adjacent to the flared BCT end treatment.			

<b>Barrier ID:</b>	OLYM-0012-4.424-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		42.70	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$7728
<b>Brief Workorder:</b>	Replace 38-ft. of rail replace 3 posts raise 120-ft. of barrier to 27-in. design height.				
<b>Workorder:</b>	Replace rail at \$25- per -Lin. Ft. for 38 LF = \$950. Replace 38 feet of damaged rail. Replace post at \$100- per -Each for 3 Post(s) = \$200. Replace post at BCT end section and replace 2 posts at W-Beam section. Adjust Guardrail at \$10- per -Lin. Ft. for 120 LF = \$1200. Raise 120 linear feet of w-beam to 27-in. design height. Loader at \$125- per -Hour for 2 Hrs = \$250. Remove sediment build up adjacent to the BCT end section Low Speed Traffic Control at \$1475- per -Day for 3 Day(s) = \$4425. 1 day remove rail; 1 day adjust rail; 1 day to replace rail and sediment (loader hour).				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**

**Condition photos are not available for OLYM-0012-4.424-L.**

<b>Barrier ID:</b>	OLYM-0012-4.560-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	28.00		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	490		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.0
<b>Height (In.):</b>	28.2	<b>Lateral Offset (In.):</b>	25.0	<b>Road Grade (%):</b>	0.70
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No impact related breaking/cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	Loss of 5% or less of cross section on selected elements.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	24' section on ending end is bent.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	Loss of 5% or less of cross section			

<b>Barrier ID:</b>	OLYM-0012-4.560-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		28.00	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$2282
<b>Brief Workorder:</b>	Replace 24-ft. of bent section of rail on end treatment.				
<b>Workorder:</b>	Replace rail at \$25- per -Lin. Ft. for 24 = \$600. For bent section on ending end treatment. Low Speed Traffic Control at \$1475- per -Day for 1 = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_4.560\_L\_1.jpg**

<b>Barrier ID:</b>	OLYM-0012-6.680-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	28.30		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	432		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	INSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM TRAILING END	<b>Is Beg. End Trtmt Crashworthy?:</b>	YES	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM FLARED 350 COMPLIANT	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	74.0
<b>Height (In.):</b>	26.2	<b>Lateral Offset (In.):</b>	36.7	<b>Road Grade (%):</b>	3.40
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable corrosion/weathering or erosion			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable corrosion/weathering or erosion			

<b>Barrier ID:</b>	OLYM-0012-6.680-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		28.30	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_6.680\_L\_1.jpg**

<b>Barrier ID:</b>	OLYM-0012-6.705-R				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	30.70		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	278		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM FLARED 350 COMPLIANT	<b>Is Beg. End Trtmt Crashworthy?:</b>	YES	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BURIED END	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	74.0
<b>Height (In.):</b>	28.2	<b>Lateral Offset (In.):</b>	20.7	<b>Road Grade (%):</b>	3.40
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking for the barrier length.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering for the barrier length. No erosion at the barrier foundation.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking of the end treatments			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion weathering or erosion at the end treatments.			

<b>Barrier ID:</b>	OLYM-0012-6.705-R				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		30.70	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_6.705\_R\_1.jpg**

<b>Barrier ID:</b>	OLYM-0012-7.393-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	36.90		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	442		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM FLARED 350 COMPLIANT	<b>Is Beg. End Trtmt Crashworthy?:</b>	YES	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM FLARED 350 COMPLIANT	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	74.3
<b>Height (In.):</b>	26.7	<b>Lateral Offset (In.):</b>	21.7	<b>Road Grade (%):</b>	5.20
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering. No erosion at the barrier foundation.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking of the end treatments			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion weathering or erosion at the end sections			

<b>Barrier ID:</b>	OLYM-0012-7.393-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		36.90	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_7.393\_L\_1.jpg**

<b>Barrier ID:</b>	OLYM-0012-7.402-R				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	30.70		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	281		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BURIED END	<b>Is Beg. End Trtmt Crashworthy?:</b>	YES	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.5
<b>Height (In.):</b>	30.0	<b>Lateral Offset (In.):</b>	23.2	<b>Road Grade (%):</b>	5.00
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking/cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering			

<b>Barrier ID:</b>	OLYM-0012-7.402-R				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		30.70	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_7.402\_R\_1.jpg**

<b>Barrier ID:</b>	OLYM-0012-7.681-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	38.50		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	471		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	BOTH INSIDE AND OUTSIDE		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM TRAILING END	<b>Is Beg. End Trtmt Crashworthy?:</b>	YES	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM FLARED 350 COMPLIANT	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.0
<b>Height (In.):</b>	26.2	<b>Lateral Offset (In.):</b>	30.2	<b>Road Grade (%):</b>	4.90
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	36' of barrier is more than 12in out of alignment due to impact. 95' of barrier is 3" lower than the 27" design height.			
	<b>Breaking and Cracking:</b>	36' of rail is bent due to impact. 6 posts and 6 blocks damaged by the same impact.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable corrosion/weathering or erosion			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable corrosion or weathering or erosion			

<b>Barrier ID:</b>	OLYM-0012-7.681-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		38.50	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$4516
<b>Brief Workorder:</b>	Raise 95 ft. of W-beam to 27-In. design height and replace a 36' damaged section.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 95 = \$950. Raise 95-ft of barrier to 27-in. design height. Replace rail at \$25- per -Lin. Ft. for 36 = \$900. Replace the 36 ft of rail was damaged by impact. Replace block at \$30- per -Each for 6 = \$180. Replace blocks in the 36 ft impact area. Replace post at \$100- per -Each for 6 = \$600. Replace the post in 36 ft impact area. Low Speed Traffic Control at \$1475- per -Day for 1 = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_7.681\_L\_1.jpg**



**OLYM\_0012\_7.681\_L\_2.jpg**

<b>Barrier ID:</b>	OLYM-0012-7.692-R				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	28.00		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	395		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BURIED END	<b>Is Beg. End Trtmt Crashworthy?:</b>	YES	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM TRAILING END	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.6
<b>Height (In.):</b>	30.2	<b>Lateral Offset (In.):</b>	26.5	<b>Road Grade (%):</b>	4.10
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment is off by more than 1 ft for a 13 foot section of barrier due to impact. Height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking for the barrier length.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering for barrier length. The 13 section of rail which is out of alignment from an impact has erosion greater than 8 in at each post.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking at each end section			
	<b>Missing Elements:</b>	No missing elements at end sections			
	<b>Corrosion and Weathering:</b>	No corrosion weathering or erosion at the end sections			

<b>Barrier ID:</b>	OLYM-0012-7.692-R				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		28.00	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$2167
<b>Brief Workorder:</b>	Replace a 13 ft section of W-beam rail.				
<b>Workorder:</b>	Replace rail at \$25- per -Lin. Ft. for 13 = \$325. Replace a 13 ft section of W-beam rail which has been impacted. Structural backfill at \$50.00 per c.y. for 1 c.y. = \$50.00. Labor at \$60.00 per hour for 2 hour(s) = \$120. Fill in erosion around posts. Low Speed Traffic Control at \$1475- per -Day for 1 = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_7.692\_R\_1.jpg**



<b>Barrier ID:</b>	OLYM-0012-8.337-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	29.30		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	202		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM TRAILING END	<b>Is Beg. End Trtmt Crashworthy?:</b>	YES	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BURIED END	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	76.0
<b>Height (In.):</b>	30.0	<b>Lateral Offset (In.):</b>	41.0	<b>Road Grade (%):</b>	5.40
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking/cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking/cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering			

<b>Barrier ID:</b>	OLYM-0012-8.337-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		29.30	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_8.337\_L\_1.jpg**

<b>Barrier ID:</b>	OLYM-0012-8.961-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	28.60		
<b>Barrier Description</b>					
<b>Type:</b>	CONCRETE BARRIER	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	CONCRETE	<b>Post Material:</b>	N/A		
<b>Blockout Type:</b>	N/A	<b>Length (ft.):</b>	210		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	BOTH INSIDE AND OUTSIDE		
<b>Hazard Behind Barrier:</b>	EXTREME				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	21	<b>Width (In.):</b>	18.0	<b>Post Spacing (In.):</b>	0.0
<b>Height (In.):</b>	21.0	<b>Lateral Offset (In.):</b>	26.0	<b>Road Grade (%):</b>	2.10
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. The assumed design height is 21 in. Height is within 1-in of 21-in design height.			
	<b>Breaking and Cracking:</b>	Breaking and cracking is less than 1/4" for the full run of barrier.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering for the barrier length. No erosion at the barrier foundation.			
<b>End Treatments</b>	<b>Alignment and Height:</b>				
	<b>Breaking and Cracking:</b>				
	<b>Missing Elements:</b>				
	<b>Corrosion and Weathering:</b>				

<b>Barrier ID:</b>	OLYM-0012-8.961-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		28.60	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_8.961\_L\_1.jpg**

<b>Barrier ID:</b>	OLYM-0012-9.097-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	41.50		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	96		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	EXTREME				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	CONC/MASON W-BEAM
<b>Ending End Trtmt Type:</b>	W-BEAM TANGENT 350	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.0
<b>Height (In.):</b>	29.0	<b>Lateral Offset (In.):</b>	43.0	<b>Road Grade (%):</b>	6.60
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment is off by approx. 6in for the entire barrier. Height is within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	Erosion of more than 8in around every post along the length of the barrier.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	Erosion of more than 8in around 4 posts of the end treatments and 1 post with extreme erosion problems.			

<b>Barrier ID:</b>	OLYM-0012-9.097-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		41.50	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$6946
<b>Brief Workorder:</b>	Remove and reset post in order to fix erosion problems.				
<b>Workorder:</b>	W-beam tangent 350 compliant at \$3500- per -Each for 1 Unit(s) = \$3500. Replace entire end section because it is not practical to remove and reset an end treatment. Remove & reset guardrail at \$25- per -Lin. Ft. for 36 LF = \$900. Remove and reset 3-12ft sections = 36 LF of rail. Structural backfill at \$50.00 per c.y. for 4 c.y. = \$200.00. Labor at \$60.00 per hour for 4 hour(s) = \$240. Labor to place backfill and fix erosion. 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.					



**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_9.097\_L\_1.jpg**



**OLYM\_0012\_9.097\_L\_2.jpg**

<b>Barrier ID:</b>	OLYM-0012-9.221-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	37.20		
<b>Barrier Description</b>					
<b>Type:</b>	CONCRETE BARRIER	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	CONCRETE	<b>Post Material:</b>	N/A		
<b>Blockout Type:</b>	N/A	<b>Length (ft.):</b>	56		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	EXTREME				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	18	<b>Width (In.):</b>	18.0	<b>Post Spacing (In.):</b>	0.0
<b>Height (In.):</b>	17.7	<b>Lateral Offset (In.):</b>	39.0	<b>Road Grade (%):</b>	5.10
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Assumed design height is 18 in. Height is within 1-in of 18-in design height.			
	<b>Breaking and Cracking:</b>	4 ft of barrier is cracked more than 1/3 of the displaced width. There are expansion cracks of less than 1/4in at 20 ft intervals throughout the barrier length.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering throughout the barrier length. No erosion at the barrier foundation.			
<b>End Treatments</b>	<b>Alignment and Height:</b>				
	<b>Breaking and Cracking:</b>				
	<b>Missing Elements:</b>				
	<b>Corrosion and Weathering:</b>				

<b>Barrier ID:</b>	OLYM-0012-9.221-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		37.20	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$3729
<b>Brief Workorder:</b>	Remove and replace 4 ft of concrete wall barrier.				
<b>Workorder:</b>	Concrete Barrier at \$60- per -Lin. Ft. for 4 LF = \$240. Replace 4 ft of concrete barrier. Remove concrete barrier. at \$50- per -Lin. Ft. for 4 = \$200. Remove 4 ft of concrete barrier. Low Speed Traffic Control at \$1475- per -Day for 2 Day(s) = \$2950. 1 day to remove 4 ft of concrete wall and 1 day to replace the wall.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_9.221\_L\_1.jpg**



**OLYM\_0012\_9.221\_L\_2.jpg**

<b>Barrier ID:</b>	OLYM-0012-9.352-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	31.60		
<b>Barrier Description</b>					
<b>Type:</b>	CONCRETE BARRIER	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	CONCRETE	<b>Post Material:</b>	N/A		
<b>Blockout Type:</b>	N/A	<b>Length (ft.):</b>	214		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	INSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	EXTREME				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	24	<b>Width (In.):</b>	18.0	<b>Post Spacing (In.):</b>	0.0
<b>Height (In.):</b>	21.7	<b>Lateral Offset (In.):</b>	47.2	<b>Road Grade (%):</b>	5.70
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Assumed design height is 24 in. 70 ft. of barrier is more than 1 in lower than assumed design height.			
	<b>Breaking and Cracking:</b>	Minor cracking less than 1/4in. Minor chipping.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering.			
<b>End Treatments</b>	<b>Alignment and Height:</b>				
	<b>Breaking and Cracking:</b>				
	<b>Missing Elements:</b>				
	<b>Corrosion and Weathering:</b>				

<b>Barrier ID:</b>	OLYM-0012-9.352-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		31.60	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$14960
<b>Brief Workorder:</b>	Remove and replace 70-ft. of concrete wall barrier.				
<b>Workorder:</b>	Remove concrete barrier. at \$50- per -Lin. Ft. for 70 = \$3500. Concrete Barrier at \$60- per -Lin. Ft. for 70 LF = \$4200. Low Speed Traffic Control at \$1475- per -Day for 4 Day(s) = \$5900. 1 day for removal; 3 days for installation.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# **Olympic National Park**

## **ROUTE 0012: HURRICANE RIDGE ROAD**

### **Barrier Condition Photos**



**OLYM\_0012\_9.352\_L\_1.jpg**



**OLYM\_0012\_9.352\_L\_2.jpg**

<b>Barrier ID:</b>	OLYM-0012-10.642-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	31.20		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	143		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM TRAILING END	<b>Is Beg. End Trtmt Crashworthy?:</b>	YES	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BURIED END	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	74.3
<b>Height (In.):</b>	27.7	<b>Lateral Offset (In.):</b>	27.0	<b>Road Grade (%):</b>	5.90
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable corrosion or weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable corrosion or weathering			

<b>Barrier ID:</b>	OLYM-0012-10.642-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		31.20	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_10.642\_L\_1.jpg**

<b>Barrier ID:</b>	OLYM-0012-10.766-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	28.60		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	160		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	EXTREME				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM TRAILING END	<b>Is Beg. End Trtmt Crashworthy?:</b>	YES	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM FLARED 350 COMPLIANT	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.3
<b>Height (In.):</b>	28.2	<b>Lateral Offset (In.):</b>	26.2	<b>Road Grade (%):</b>	0.80
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking throughout the length of barrier.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion and weathering throughout the barrier length			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking at the end treatments			
	<b>Missing Elements:</b>	No missing elements at the end treatments			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering at the end treatments			

<b>Barrier ID:</b>	OLYM-0012-10.766-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		28.60	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_10.766\_L\_1.jpg**

<b>Barrier ID:</b>	OLYM-0012-10.972-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	22.80		
<b>Barrier Description</b>					
<b>Type:</b>	CONCRETE BARRIER	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	CONCRETE	<b>Post Material:</b>	N/A		
<b>Blockout Type:</b>	N/A	<b>Length (ft.):</b>	94		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	INSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	EXTREME				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	18	<b>Width (In.):</b>	18.0	<b>Post Spacing (In.):</b>	0.0
<b>Height (In.):</b>	19.0	<b>Lateral Offset (In.):</b>	41.2	<b>Road Grade (%):</b>	2.40
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Assumed design height is 18 in. Height is within 1-in of assumed 18-in design height.			
	<b>Breaking and Cracking:</b>	Some minor chipping less than 1/4in cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>				
	<b>Breaking and Cracking:</b>				
	<b>Missing Elements:</b>				
	<b>Corrosion and Weathering:</b>				

<b>Barrier ID:</b>	OLYM-0012-10.972-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		22.80	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# **Olympic National Park**

## **ROUTE 0012: HURRICANE RIDGE ROAD**

### **Barrier Condition Photos**



**OLYM\_0012\_10.972\_L\_1.jpg**



**OLYM\_0012\_10.972\_L\_2.jpg**

<b>Barrier ID:</b>	OLYM-0012-11.880-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	26.50		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	193		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM TRAILING END	<b>Is Beg. End Trtmt Crashworthy?:</b>	YES	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM TANGENT 350	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.0
<b>Height (In.):</b>	28.7	<b>Lateral Offset (In.):</b>	64.3	<b>Road Grade (%):</b>	5.30
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable corrosion or weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable weathering or corrosion			

<b>Barrier ID:</b>	OLYM-0012-11.880-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		26.50	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_11.880\_L\_1.jpg**

<b>Barrier ID:</b>	OLYM-0012-12.139-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	38.50		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	389		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	EXTREME				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM TRAILING END	<b>Is Beg. End Trtmt Crashworthy?:</b>	YES	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM FLARED 350 COMPLIANT	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	74.3
<b>Height (In.):</b>	28.2	<b>Lateral Offset (In.):</b>	21.7	<b>Road Grade (%):</b>	5.40
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking throughout the entire length.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering throughout the entire length. No erosion at the barrier foundation			
<b>End Treatments</b>	<b>Alignment and Height:</b>	6-ft. of beginning end treatment is more than 1-in lower than 27in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking at the barrier end treatments.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering at the end treatments.			

<b>Barrier ID:</b>	OLYM-0012-12.139-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		38.50	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$1688
<b>Brief Workorder:</b>	Raise 6 feet of W-beam at beginning end treatment to 27-in. design height.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 6 = \$60. Raise 6 ft of barrier at the beginning of SRT flared end treatment to 27-in. design height. Low Speed Traffic Control at \$1475- per -Day for 1 = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# **Olympic National Park**

## **ROUTE 0012: HURRICANE RIDGE ROAD**

### **Barrier Condition Photos**



**OLYM\_0012\_12.139\_L\_1.jpg**

<b>Barrier ID:</b>	OLYM-0012-17.195-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>	30.00		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	227		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	EXTREME				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM TANGENT 350	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.0
<b>Height (In.):</b>	28.0	<b>Lateral Offset (In.):</b>	58.2	<b>Road Grade (%):</b>	5.10
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking/cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking/cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering			

<b>Barrier ID:</b>	OLYM-0012-17.195-L				
<b>Route Name:</b>	HURRICANE RIDGE ROAD				
<b>Inspection Date:</b>	10/28/2009	<b>Barrier Rating:</b>		30.00	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



**Olympic National Park**  
**ROUTE 0012: HURRICANE RIDGE ROAD**

**Barrier Condition Photos**



**OLYM\_0012\_17.195\_L\_1.jpg**

<b>Barrier ID:</b>	OLYM-0103-1.680-R				
<b>Route Name:</b>	SOL DUC VALLEY ROAD				
<b>Inspection Date:</b>	11/01/2009		<b>Barrier Rating:</b>	34.00	
<b>Barrier Description</b>					
<b>Type:</b>	STEEL-BACKED TIMBER WITH BLOCKOUT		<b>Barrier Function:</b>	TRAFFIC	
<b>Barrier Material:</b>	STEEL-BACKED TIMBER/LOG		<b>Post Material:</b>	WOOD	
<b>Blockout Type:</b>	WOOD		<b>Length (ft.):</b>	757	
<b>Speed Limit (MPH):</b>	35		<b>Placement with Respect to Road:</b>	INSIDE OF CURVE	
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	SBT/LOG FLARED	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	SBT/LOG FLARED	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	6.0	<b>Post Spacing (In.):</b>	119.8
<b>Height (In.):</b>	26.5	<b>Lateral Offset (In.):</b>	20.0	<b>Road Grade (%):</b>	6.80
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. 20 ft of barrier is 3in below 27-in design height and should be adjusted. Then ends of 3 sections are miss aligned which creates a snag point.			
	<b>Breaking and Cracking:</b>	Numerous locations along barrier have cracking of more than 1/2in in rail posts and/or blocks, some cracking in rail due to over tightening of fasteners.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	Significant erosion issue for approx. 20 ft of barrier due to problem with retaining wall.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height of ending end 3in below 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable corrosion/weathering or erosions			

<b>Barrier ID:</b>	OLYM-0103-1.680-R				
<b>Route Name:</b>	SOL DUC VALLEY ROAD				
<b>Inspection Date:</b>	11/01/2009	<b>Barrier Rating:</b>		34.00	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$6534
<b>Brief Workorder:</b>	Raise 50-ft. of barrier up to 27-in. design height. Fix erosion problem and replace various elements.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 50 LF = \$500. Raise 50 ft of barrier to 27-in design height. Replace Rail at \$25- per -Lin. Ft. for 80 LF = \$2000. Replace approx 80 ft of cracked rail. Replace block at \$30- per -Each for 2 Block(s) = \$60. Replace 2 damaged blocks. Replace post at \$100- per -Each for 2 Post(s) = \$200. Replace 2 damaged posts. Labor at \$60- per -Hour for 2 Hrs = \$120. Fix 4 snag points 1/2 hr per snag point. Structural backfill at \$50- per -Cu. Yd. for 1 CY = \$50. Labor at \$60- per -Hour for 1 Hrs = \$60. Labor for structural backfill. 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.					

# Olympic National Park

ROUTE 0103: SOL DUC VALLEY ROAD

## Barrier Condition Photos



OLYM\_0103\_1.680\_R\_1.jpg



OLYM\_0103\_1.680\_R\_2.jpg

<b>Barrier ID:</b>	OLYM-0103-1.854-R				
<b>Route Name:</b>	SOL DUC VALLEY ROAD				
<b>Inspection Date:</b>	11/01/2009		<b>Barrier Rating:</b>	30.00	
<b>Barrier Description</b>					
<b>Type:</b>	STEEL-BACKED TIMBER WITH BLOCKOUT		<b>Barrier Function:</b>	TRAFFIC	
<b>Barrier Material:</b>	STEEL-BACKED TIMBER/LOG		<b>Post Material:</b>	WOOD	
<b>Blockout Type:</b>	WOOD		<b>Length (ft.):</b>	180	
<b>Speed Limit (MPH):</b>	35		<b>Placement with Respect to Road:</b>	INSIDE OF CURVE	
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	SBT/LOG FLARED	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	SBT/LOG FLARED	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	120.0
<b>Height (In.):</b>	25.0	<b>Lateral Offset (In.):</b>	25.2	<b>Road Grade (%):</b>	6.00
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	The alignment is off by 6-12 in for 40 ft of rail. The height is greater than 3 in from the design height of 27 in for 60 linear ft of rail.			
	<b>Breaking and Cracking:</b>	1 post is cracked greater than a 1/2in and 2 blocks are cracked or breaking greater than 1 in.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering at the rail length. There is erosion greater than 8 in at one post.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Both SBT/Log flared end sections are 4-in. lower than the 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking of the end treatments.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion weathering or erosion at the SBT/Log flared end sections.			



<b>Barrier ID:</b>	OLYM-0103-1.854-R				
<b>Route Name:</b>	SOL DUC VALLEY ROAD				
<b>Inspection Date:</b>	11/01/2009		<b>Barrier Rating:</b>	30.00	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$5302
<b>Brief Workorder:</b>	Raise 600-ft of barrier to 27-in. design height repair erosion replace 2 blocks and 1 post.				
<b>Workorder:</b>	Replace post at \$100- per -Each for 1 Post(s) = \$100. Replace 1 cracked post. Replace block at \$30- per -Each for 2 Block(s) = \$60. Replace 2 cracked blocks. Remove & Reset Guardrail at \$25- per -Lin. Ft. for 40 LF = \$1000. Remove and reset rail where alignment is greater than 6 to 12 inches from design and correct erosion. Adjust Guardrail at \$10- per -Lin. Ft. for 60 LF = \$600. Raise 600-ft of barrier to 27-in. design height. Structural backfill at \$50- per -Cu. Yd. for 1 CY = \$50. Repair erosion which is greater than 8 inches at 1 post 1ftx1ftx6ft then reset rail. Labor at \$60- per -Hour for 1 Hrs = \$60. Labor to place structural backfill. Low Speed Traffic Control at \$1475- per -Day for 2 Day(s) = \$2950. 1 day to remove and reset rail and 1 day to place structural backfill and adjust rail.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



**Olympic National Park**  
**ROUTE 0103: SOL DUC VALLEY ROAD**

**Barrier Condition Photos**



**OLYM\_0103\_1.854\_R\_1.jpg**

<b>Barrier ID:</b>	OLYM-0103-1.995-R				
<b>Route Name:</b>	SOL DUC VALLEY ROAD				
<b>Inspection Date:</b>	11/01/2009		<b>Barrier Rating:</b>	38.50	
<b>Barrier Description</b>					
<b>Type:</b>	STEEL-BACKED TIMBER WITH BLOCKOUT		<b>Barrier Function:</b>	TRAFFIC	
<b>Barrier Material:</b>	STEEL-BACKED TIMBER/LOG		<b>Post Material:</b>	WOOD	
<b>Blockout Type:</b>	WOOD		<b>Length (ft.):</b>	222	
<b>Speed Limit (MPH):</b>	35		<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE	
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	SBT/LOG FLARED	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	SBT/LOG FLARED	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	119.6
<b>Height (In.):</b>	25.0	<b>Lateral Offset (In.):</b>	20.7	<b>Road Grade (%):</b>	4.40
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height is 2in below design of 27" for 100ft and is 4" below design of 27" for 20ft			
	<b>Breaking and Cracking:</b>	No breaking/cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion little weathering no erosion			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height is 2-in. lower than 27-in design height on beginning end (30ft) and 4-in. lower than 27-in design height on ending end (20ft).			
	<b>Breaking and Cracking:</b>	No breaking/cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	Little weathering no corrosion no erosion			

<b>Barrier ID:</b>	OLYM-0103-1.995-R				
<b>Route Name:</b>	SOL DUC VALLEY ROAD				
<b>Inspection Date:</b>	11/01/2009	<b>Barrier Rating:</b>		38.50	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$3492
<b>Brief Workorder:</b>	Raise 170 lin. ft. of barrier to 27-in. design height.				
<b>Workorder:</b>	Adjust guardrail at \$10- per -Lin. Ft. for 170 LF = \$1700. Raise 170 lin. ft. of barrier 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.					

**Olympic National Park**  
**ROUTE 0103: SOL DUC VALLEY ROAD**

**Barrier Condition Photos**



**OLYM\_0103\_1.995\_R\_1.jpg**

<b>Barrier ID:</b>	OLYM-0103-4.402-R				
<b>Route Name:</b>	SOL DUC VALLEY ROAD				
<b>Inspection Date:</b>	11/01/2009	<b>Barrier Rating:</b>	34.50		
<b>Barrier Description</b>					
<b>Type:</b>	STEEL-BACKED TIMBER WITH BLOCKOUT	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	STEEL-BACKED TIMBER/LOG	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	131		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	INSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	EXTREME				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	SBT/LOG FLARED	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	SBT/LOG FLARED	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	6.0	<b>Post Spacing (In.):</b>	119.6
<b>Height (In.):</b>	25.2	<b>Lateral Offset (In.):</b>	14.6	<b>Road Grade (%):</b>	3.30
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	75 ft of barrier 2in to 3" below 27-in design height.			
	<b>Breaking and Cracking:</b>	1 rail badly cracked and beginning to splinter.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable corrosion/weathering or erosion			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Height is between 5in and 7" below 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable corrosion/weathering or erosion			

<b>Barrier ID:</b>	OLYM-0103-4.402-R				
<b>Route Name:</b>	SOL DUC VALLEY ROAD				
<b>Inspection Date:</b>	11/01/2009		<b>Barrier Rating:</b>	34.50	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$3272
<b>Brief Workorder:</b>	Raise 125 ft. of W-beam to the design height of 27-in. and replace a 10 ft. rail section.				
<b>Workorder:</b>	Adjust guardrail at \$10- per -Lin. Ft. for 125 LF = \$1250. Raise 125 feet of barrier to 27 inch design height. Replace rail at \$25- per -Lin. Ft. for 10 LF = \$250. Replace 1 10 ft section of rail. 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.					



**Olympic National Park**  
**ROUTE 0103: SOL DUC VALLEY ROAD**

**Barrier Condition Photos**



**OLYM\_0103\_4.402\_R\_1.jpg**

<b>Barrier ID:</b>	OLYM-0103-4.510-R				
<b>Route Name:</b>	SOL DUC VALLEY ROAD				
<b>Inspection Date:</b>	11/01/2009		<b>Barrier Rating:</b>	35.70	
<b>Barrier Description</b>					
<b>Type:</b>	STEEL-BACKED TIMBER WITH BLOCKOUT		<b>Barrier Function:</b>	TRAFFIC	
<b>Barrier Material:</b>	STEEL-BACKED TIMBER/LOG		<b>Post Material:</b>	WOOD	
<b>Blockout Type:</b>	WOOD		<b>Length (ft.):</b>	515	
<b>Speed Limit (MPH):</b>	35		<b>Placement with Respect to Road:</b>	INSIDE OF CURVE	
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	SBT/LOG FLARED	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	SBT/LOG FLARED	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	120.0
<b>Height (In.):</b>	24.2	<b>Lateral Offset (In.):</b>	22.2	<b>Road Grade (%):</b>	2.40
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. The height is 10 in below the design height of 27 in for a 50 ft section of rail.			
	<b>Breaking and Cracking:</b>	2 posts and 2 blocks are spilt in two. There are two section of rail were the connection between the rails should be planed to a smooth surface. The rail has a snag point were traffic can catch the rail in these locations.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion weathering or erosion at the rail section.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	20 ft. of the trailing end treatment is more than 1-in. lower than 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking of the end treatments.			
	<b>Missing Elements:</b>	No missing elements of the end treatments.			
	<b>Corrosion and Weathering:</b>	No corrosion weathering or erosion at the end treatments.			

<b>Barrier ID:</b>	OLYM-0103-4.510-R				
<b>Route Name:</b>	SOL DUC VALLEY ROAD				
<b>Inspection Date:</b>	11/01/2009	<b>Barrier Rating:</b>		35.70	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$4367
<b>Brief Workorder:</b>	Raise barrier to 27-in. design height and replace posts and blocks.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 70 LF = \$700. Raise 70 ft. of barrier to 27-in. design height. (50 ft. in run of barrier; 20 ft. in trailing end treatment.) Replace block at \$30- per -Each for 2 Block(s) = \$60. Replace 2 blocks which are split in half. Replace post at \$100- per -Each for 2 Post(s) = \$200. Replace 2 posts which are split in half. Labor at \$60- per -Hour for 1 Hrs = \$60. Plane 2 areas where the rail has an edge which could snag a vehicle. 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.					

**Olympic National Park**  
**ROUTE 0103: SOL DUC VALLEY ROAD**

**Barrier Condition Photos**



**OLYM\_0103\_4.510\_R\_1.jpg**

<b>Barrier ID:</b>	OLYM-0103-5.592-R				
<b>Route Name:</b>	SOL DUC VALLEY ROAD				
<b>Inspection Date:</b>	11/01/2009	<b>Barrier Rating:</b>	28.30		
<b>Barrier Description</b>					
<b>Type:</b>	STEEL-BACKED TIMBER WITH BLOCKOUT	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	STEEL-BACKED TIMBER/LOG	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	412		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	SBT/LOG FLARED	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	SBT/LOG FLARED	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	119.6
<b>Height (In.):</b>	28.0	<b>Lateral Offset (In.):</b>	16.2	<b>Road Grade (%):</b>	4.80
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking/cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering/erosion			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. Beginning end treatment is 3-in. lower than 27-in design height for 30 ft. Trailing end treatment is 5-in. lower than 27-in design height for 20 ft.			
	<b>Breaking and Cracking:</b>	No breaking/cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering/erosion			

<b>Barrier ID:</b>	OLYM-0103-5.592-R				
<b>Route Name:</b>	SOL DUC VALLEY ROAD				
<b>Inspection Date:</b>	11/01/2009	<b>Barrier Rating:</b>		28.30	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$2172
<b>Brief Workorder:</b>	Raise 50 lin. ft. of barrier to 27-in. design height.				
<b>Workorder:</b>	Adjust Guardrail SBT at \$10- per -Lin. Ft. for 50 = \$500. Raise beginning and ending end treatments to 27-in. design height. Low Speed Traffic Control at \$1475- per -Day for 1 = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# **Olympic National Park**

**ROUTE 0103: SOL DUC VALLEY ROAD**

## **Barrier Condition Photos**



**OLYM\_0103\_5.592\_R\_1.jpg**

<b>Barrier ID:</b>	OLYM-0103-5.862-R				
<b>Route Name:</b>	SOL DUC VALLEY ROAD				
<b>Inspection Date:</b>	11/01/2009		<b>Barrier Rating:</b>	37.00	
<b>Barrier Description</b>					
<b>Type:</b>	STEEL-BACKED TIMBER WITH BLOCKOUT		<b>Barrier Function:</b>	TRAFFIC	
<b>Barrier Material:</b>	STEEL-BACKED TIMBER/LOG		<b>Post Material:</b>	WOOD	
<b>Blockout Type:</b>	WOOD		<b>Length (ft.):</b>	280	
<b>Speed Limit (MPH):</b>	35		<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE	
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	SBT/LOG FLARED	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	SBT/LOG FLARED	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	120.0
<b>Height (In.):</b>	28.0	<b>Lateral Offset (In.):</b>	22.2	<b>Road Grade (%):</b>	2.60
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	2 posts are cracked in half; 1 block is broken in half.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion weathering or erosion at the barrier length.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height is more than 1-in below 27-in design height in both end treatments (total 60 ft.).			
	<b>Breaking and Cracking:</b>	No breaking or cracking of the end treatments.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion weathering or erosion at the end treatments.			

<b>Barrier ID:</b>	OLYM-0103-5.862-R				
<b>Route Name:</b>	SOL DUC VALLEY ROAD				
<b>Inspection Date:</b>	11/01/2009	<b>Barrier Rating:</b>		37.00	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$2536
<b>Brief Workorder:</b>	Raise end treatments (60-ft.) to 27-in. design height. Replace 2 posts and 1 block.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 60 = \$600. Raise the end sections 60 ft to the 27-in. design height. Replace block at \$30- per -Each for 1 = \$30. Replace 1 broken block. Replace post at \$100- per -Each for 2 = \$200. Replace two posts which are spilt. Low Speed Traffic Control at \$1475- per -Day for 1 = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# **Olympic National Park**

**ROUTE 0103: SOL DUC VALLEY ROAD**

## **Barrier Condition Photos**



**OLYM\_0103\_5.862\_R\_1.jpg**

<b>Barrier ID:</b>	OLYM-0103-6.719-R				
<b>Route Name:</b>	SOL DUC VALLEY ROAD				
<b>Inspection Date:</b>	11/01/2009		<b>Barrier Rating:</b>	25.70	
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST		<b>Barrier Function:</b>	TRAFFIC	
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN		<b>Post Material:</b>	WOOD	
<b>Blockout Type:</b>	WOOD		<b>Length (ft.):</b>	390	
<b>Speed Limit (MPH):</b>	35		<b>Placement with Respect to Road:</b>	TANGENT	
<b>Hazard Behind Barrier:</b>	EXTREME				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM TANGENT 350	<b>Is Beg. End Trtmt Crashworthy?:</b>	YES	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM TANGENT 350	<b>Ending End Trtmt Crashworthy?:</b>	YES		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	76.0
<b>Height (In.):</b>	27.7	<b>Lateral Offset (In.):</b>	17.0	<b>Road Grade (%):</b>	3.80
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	1 bent rail.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable corrosion/weathering or erosion			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable corrosion/weathering or erosion			

<b>Barrier ID:</b>	OLYM-0103-6.719-R				
<b>Route Name:</b>	SOL DUC VALLEY ROAD				
<b>Inspection Date:</b>	11/01/2009	<b>Barrier Rating:</b>		25.70	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$1980
<b>Brief Workorder:</b>	Replace 13-ft. of bent rail.				
<b>Workorder:</b>	Replace rail at \$25- per -Lin. Ft. for 13 = \$325. Replace 13 ft of rail. Low Speed Traffic Control at \$1475- per -Day for 1 = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# **Olympic National Park**

**ROUTE 0103: SOL DUC VALLEY ROAD**

## **Barrier Condition Photos**



**OLYM\_0103\_6.719\_R\_1.jpg**

<b>Barrier ID:</b>	OLYM-0103-7.435-R				
<b>Route Name:</b>	SOL DUC VALLEY ROAD				
<b>Inspection Date:</b>	11/01/2009	<b>Barrier Rating:</b>	27.80		
<b>Barrier Description</b>					
<b>Type:</b>	OTHER: PLASTIC HOLLOW JERSEY BARRIER	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	OTHER: PLASTIC	<b>Post Material:</b>	N/A		
<b>Blockout Type:</b>	N/A	<b>Length (ft.):</b>	75		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	INSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	NCW	<b>Is Barrier Crashworthy?:</b>	NO
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	22	<b>Width (In.):</b>	16.0	<b>Post Spacing (In.):</b>	0.0
<b>Height (In.):</b>	21.0	<b>Lateral Offset (In.):</b>	0.0	<b>Road Grade (%):</b>	0.30
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height within 1-in of 22-in design height.			
	<b>Breaking and Cracking:</b>	No breaking/cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering/erosion			
<b>End Treatments</b>	<b>Alignment and Height:</b>				
	<b>Breaking and Cracking:</b>				
	<b>Missing Elements:</b>				
	<b>Corrosion and Weathering:</b>				

<b>Barrier ID:</b>	OLYM-0103-7.435-R				
<b>Route Name:</b>	SOL DUC VALLEY ROAD				
<b>Inspection Date:</b>	11/01/2009	<b>Barrier Rating:</b>		27.80	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# **Olympic National Park**

**ROUTE 0103: SOL DUC VALLEY ROAD**

## **Barrier Condition Photos**



**OLYM\_0103\_7.435\_R\_1.jpg**

<b>Barrier ID:</b>	OLYM-0103-7.712-R				
<b>Route Name:</b>	SOL DUC VALLEY ROAD				
<b>Inspection Date:</b>	11/01/2009		<b>Barrier Rating:</b>	45.70	
<b>Barrier Description</b>					
<b>Type:</b>	STEEL-BACKED TIMBER WITH BLOCKOUT		<b>Barrier Function:</b>	TRAFFIC	
<b>Barrier Material:</b>	STEEL-BACKED TIMBER/LOG		<b>Post Material:</b>	WOOD	
<b>Blockout Type:</b>	WOOD		<b>Length (ft.):</b>	2190	
<b>Speed Limit (MPH):</b>	35		<b>Placement with Respect to Road:</b>	BOTH INSIDE AND OUTSIDE	
<b>Hazard Behind Barrier:</b>	EXTREME				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	SBT/LOG FLARED	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	SBT/LOG FLARED	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	114.9
<b>Height (In.):</b>	26.8	<b>Lateral Offset (In.):</b>	16.3	<b>Road Grade (%):</b>	2.60
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. The height is below the design height of 27 in by 3 in for 950 ft of rail.			
	<b>Breaking and Cracking:</b>	3 posts and 3 blocks are cracked or broken; 30 linear ft of rail is cracked.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion. 30 linear ft of rail exhibits more than 50 percent loss of cross section. Another 30 linear ft of rail exhibits more than 8 in of erosion around the posts.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. Both end treatments are more than 3-in. lower than 27-in design height (total of 60 ft.).			
	<b>Breaking and Cracking:</b>	No breaking or cracking of the end treatments.			
	<b>Missing Elements:</b>	No missing elements of the end treatments.			
	<b>Corrosion and Weathering:</b>	No corrosion weathering or erosion at the end treatments.			

<b>Barrier ID:</b>	OLYM-0103-7.712-R				
<b>Route Name:</b>	SOL DUC VALLEY ROAD				
<b>Inspection Date:</b>	11/01/2009		<b>Barrier Rating:</b>	45.70	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$211970
<b>Brief Workorder:</b>	Raise 950-ft of barrier to the design height of 27 inches. Replace 25 feet of rail 3 blocks and 3 posts. Address stability issues with the adjacent roadway.				
<b>Workorder:</b>	<p>Remove &amp; Reset Guardrail at \$25- per -Lin. Ft. for 30 LF = \$750.</p> <p>Replace Rail at \$25- per -Lin. Ft. for 30 LF = \$750. Replace 3 ten foot sections of damaged rail.</p> <p>Adjust Guardrail at \$10- per -Lin. Ft. for 950 LF = \$47500. Raise 950-ft of barrier to the design height of 27 inches.</p> <p>Replace block at \$30- per -Each for 3 Block(s) = \$90. Replace 3 posts which are split in two.</p> <p>Replace post at \$100- per -Each for 3 Post(s) = \$300. Replace 3 blocks which are cracked in half.</p> <p>Structural backfill at \$50- per -Cu. Yd. for 1 CY = \$70. Replace backfill at 3 posts.</p> <p>Remove asphalt pavement at \$10- per -Sq. Yd. for 444 SY = \$6660. Remove asphalt pavement 10x400ft (asphalt is sliding towards barrier).</p> <p>Subexcavation at \$40- per -Cu. Yd. for 296 CY = \$17760. Remove 2 ftx10ftx400ft of material (roadway is sliding towards barrier).</p> <p>Select borrow at \$50- per -Cu. Yd. for 296 CY = \$14800. Replace material which was excavated from roadway (2ftx10ftx400ft).</p> <p>Base Course at \$75- per -Cu. Yd. for 74 CY = \$5550. Place base material on roadway at a depth of 6 inches (6inx400ftx10ft).</p> <p>Asphalt patch at \$175- per -Sq. Yd. for 444 SY = \$77700. Place asphalt pavement for 400ftx10ft is 444 sq yds.</p> <p>Labor at \$60- per -Hour for 2 Hrs = \$120. Labor for structural backfill at 3 posts.</p> <p>Low Speed Traffic Control at \$1475- per -Day for 14 Day(s) = \$20650. 4 days to remove reset adjust rail; 10 days to repair roadway due to erosion.</p>				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# **Olympic National Park**

**ROUTE 0103: SOL DUC VALLEY ROAD**

## **Barrier Condition Photos**



**OLYM\_0103\_7.712\_R\_1.jpg**

<b>Barrier ID:</b>	OLYM-0103-8.510-R				
<b>Route Name:</b>	SOL DUC VALLEY ROAD				
<b>Inspection Date:</b>	11/01/2009	<b>Barrier Rating:</b>	29.50		
<b>Barrier Description</b>					
<b>Type:</b>	STEEL-BACKED TIMBER WITH BLOCKOUT	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	STEEL-BACKED TIMBER/LOG	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	311		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	INSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	SBT/LOG FLARED	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	SBT/LOG FLARED	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	120.0
<b>Height (In.):</b>	26.0	<b>Lateral Offset (In.):</b>	23.2	<b>Road Grade (%):</b>	3.70
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height is 2in below the 27-in design height for 70 ft.			
	<b>Breaking and Cracking:</b>	1 post is cracked more than 1/2in and 1 block is split all the way through.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable corrosion/weathering or erosion			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height is 5in to 6" below the 27-in design height for both end treatments (total of 60 ft.).			
	<b>Breaking and Cracking:</b>	No breaking or cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable corrosion/weathering or erosion			

<b>Barrier ID:</b>	OLYM-0103-8.510-R				
<b>Route Name:</b>	SOL DUC VALLEY ROAD				
<b>Inspection Date:</b>	11/01/2009	<b>Barrier Rating:</b>		29.50	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$3196
<b>Brief Workorder:</b>	Raise 130 ft of W-beam to the design height of 27" and replace 1 block and 1 post.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 130 LF = \$1300. Raise 130 ft of barrier and both end treatments (60-ft) to 27-in. design height. Replace post at \$100- per -Each for 1 Post(s) = \$100. Replace 1 damaged post Replace block at \$30- per -Each for 1 Block(s) = \$30. Replace 1 damaged block 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.					

# **Olympic National Park**

## **ROUTE 0103: SOL DUC VALLEY ROAD**

### **Barrier Condition Photos**



**OLYM\_0103\_8.510\_R\_1.jpg**

<b>Barrier ID:</b>	OLYM-0103-9.206-R				
<b>Route Name:</b>	SOL DUC VALLEY ROAD				
<b>Inspection Date:</b>	11/01/2009	<b>Barrier Rating:</b>	44.00		
<b>Barrier Description</b>					
<b>Type:</b>	STEEL-BACKED TIMBER WITH BLOCKOUT	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	STEEL-BACKED TIMBER/LOG	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	1119		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	BOTH INSIDE AND OUTSIDE		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	SBT/LOG FLARED	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	SBT/LOG FLARED	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	119.1
<b>Height (In.):</b>	26.7	<b>Lateral Offset (In.):</b>	19.2	<b>Road Grade (%):</b>	2.50
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable but 2 snag points where rails come together need to be smoothed out. Height is 5in lower than 27" design for 180ft and 3" lower than 27" design for 260 ft.			
	<b>Breaking and Cracking:</b>	6 broken posts 13 broken blocks in various places throughout barrier.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	Section of road along barrier and retaining wall is starting to fail 100ft x 10ft =111sqyds and section of road next to barrier has a 1.5in wide crack and is starting to fail 70ft x 10ft=77sqyds			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable for both end treatments. Height is 20in for beginning end(50ft) and 22" for ending end(30ft). Design height for end treatments is 27-in.			
	<b>Breaking and Cracking:</b>	No breaking/cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering/erosion			

Barrier ID:	OLYM-0103-9.206-R				
Route Name:	SOL DUC VALLEY ROAD				
Inspection Date:	11/01/2009		Barrier Rating:	44.00	
Repair Recommendations					
Repair Action:	REPAIR	FMSS Work Type:	DEFERRED MAINTENANCE	Repair Cost:	\$37560
Brief Workorder:	Address road stability issues and adjust Steel-Backed-Timber barrier to 30" design height.				
Workorder:	Adjust Guardrail at \$10- per -Lin. Ft. for 500 LF = \$5000. Raise 500 ft of barrier 27-in design height (440-ft in run of barrier and at both 30-ft end terminals.) Replace post at \$100- per -Each for 6 Post(s) = \$600. Replace block at \$30- per -Each for 13 Block(s) = \$390. Remove asphalt pavement at \$10- per -Sq. Yd. for 78 SY = \$780. [(70ft)(10ft)]/9 = 78 s.y. Subexcavation at \$40- per -Cu. Yd. for 52 CY = \$3120. [(700ft)(10ft)(2ft)] /27 = 52 c.y. Select borrow at \$50- per -Cu. Yd. for 39 CY = \$1950. [(70ft)(10ft)(1.5ft)] /27 = 39 c.y. Base Course at \$75- per -Cu. Yd. for 13 CY = \$975. [(70ft)(10ft)(0.5ft)] /27 = 13 c.y. Asphalt patch at \$175- per -Sq. Yd. for 78 SY = \$13650. [(70ft)(10ft)] /9 = 78 s.y. Asphalt removal milling at \$5- per -Sq. Yd. for 111 SY = \$555. [(100ft)(10ft)] /9 = 111 s.y. Minor asphalt at \$110- per -Ton for 24 Ton(s) = \$2640. [(111s.y.)(110lbs)(4inches)]/2000lbs= 24 tons. Labor at \$60- per -Hour for 1 Hrs = \$60. For smoothing out 2 snag points in rail. Low Speed Traffic Control at \$1475- per -Day for 3 Day(s) = \$4425. 2 days for barrier adjusting; 1 day for road work.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# Olympic National Park

ROUTE 0103: SOL DUC VALLEY ROAD

## Barrier Condition Photos



OLYM\_0103\_9.206\_R\_1.jpg



OLYM\_0103\_9.206\_R\_2.jpg

<b>Barrier ID:</b>	OLYM-0104ZZ-1.693-L				
<b>Route Name:</b>	QUINault NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>	12.10		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	53		
<b>Speed Limit (MPH):</b>	25	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-1	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	BRIDGE RAIL W-BEAM
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	41.2
<b>Height (In.):</b>	26.2	<b>Lateral Offset (In.):</b>	37.0	<b>Road Grade (%):</b>	2.30
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Barrier is 1-2 in below the 27-in design height for 7 linear ft at the barrier beginning.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. Beginning end treatment is 1-2 in below the 27-in design height for 5 ft.			
	<b>Breaking and Cracking:</b>	No breaking or cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			

<b>Barrier ID:</b>	OLYM-0104ZZ-1.693-L				
<b>Route Name:</b>	QUINAULT NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		12.10	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$1754
<b>Brief Workorder:</b>	Raise 12-ft of barrier to the 27-in. design height.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 12 LF = \$120. Raise 12-ft of barrier to the 27-in. design height. Low Speed Traffic Control at \$1475- per -Day for 1 Day(s) = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

ROUTE 0104ZZ: QUINAULT NORTH SHORE ROADS

## Barrier Condition Photos



OLYM\_0104ZZ\_1.693\_L\_1.JPG

<b>Barrier ID:</b>	OLYM-0104ZZ-1.693-R				
<b>Route Name:</b>	QUINAULT NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009		<b>Barrier Rating:</b>	12.10	
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST		<b>Barrier Function:</b>	TRAFFIC	
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN		<b>Post Material:</b>	WOOD	
<b>Blockout Type:</b>	WOOD		<b>Length (ft.):</b>	45	
<b>Speed Limit (MPH):</b>	25		<b>Placement with Respect to Road:</b>	TANGENT	
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-1	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	BRIDGE RAIL W-BEAM
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	61.7
<b>Height (In.):</b>	26.0	<b>Lateral Offset (In.):</b>	43.2	<b>Road Grade (%):</b>	1.30
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. 12 ft of barrier is between 1-3 in below the 27 in. design height; 12 ft. of barrier is more than 3-in. below the 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Beginning end treatment >3 in below the design height (5 ft. total).			
	<b>Breaking and Cracking:</b>	1 broken blockout in beginning end treatment is broken.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			



<b>Barrier ID:</b>	OLYM-0104ZZ-1.693-R				
<b>Route Name:</b>	QUINAULT NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		12.10	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$2057
<b>Brief Workorder:</b>	Raise 29-ft. of barrier up to 27-in. design height; replace 1 block.				
<b>Workorder:</b>	Remove & Reset Guardrail at \$25- per -Lin. Ft. for 5 LF = \$125. Reset BCT beginning end treatment to the 27 inch design height. Adjust Guardrail at \$10- per -Lin. Ft. for 24 LF = \$240. Raise 24-ft of barrier to the design height of 27 inches. Replace block at \$30- per -Each for 1 Block(s) = \$30. Replace the broken block in the beginning end treatment 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.					



# Olympic National Park

ROUTE 0104ZZ: QUINAULT NORTH SHORE ROADS

## Barrier Condition Photos



OLYM\_0104ZZ\_1.693\_R\_1.JPG

<b>Barrier ID:</b>	OLYM-0104ZZ-1.724-L				
<b>Route Name:</b>	QUINULT NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>	9.60		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	70		
<b>Speed Limit (MPH):</b>	25	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	LOW				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-1	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	BRIDGE RAIL W-BEAM
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	54.0
<b>Height (In.):</b>	26.0	<b>Lateral Offset (In.):</b>	40.2	<b>Road Grade (%):</b>	1.90
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			

<b>Barrier ID:</b>	OLYM-0104ZZ-1.724-L				
<b>Route Name:</b>	QUINAULT NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		9.60	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# **Olympic National Park**

**ROUTE 0104ZZ: QUINAULT NORTH SHORE ROADS**

## **Barrier Condition Photos**



**OLYM\_0104ZZ\_1.724\_L\_1.JPG**

<b>Barrier ID:</b>	OLYM-0104ZZ-1.724-R				
<b>Route Name:</b>	QUINault NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>	9.60		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	56		
<b>Speed Limit (MPH):</b>	25	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	LOW				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-1	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	BRIDGE RAIL W-BEAM
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	44.7
<b>Height (In.):</b>	26.2	<b>Lateral Offset (In.):</b>	37.2	<b>Road Grade (%):</b>	2.30
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering.			

<b>Barrier ID:</b>	OLYM-0104ZZ-1.724-R				
<b>Route Name:</b>	QUINAULT NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		9.60	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



**Olympic National Park**  
**ROUTE 0104ZZ: QUINAULT NORTH SHORE ROADS**

**Barrier Condition Photos**



**OLYM\_0104ZZ\_1.724\_R\_1.JPG**

<b>Barrier ID:</b>	OLYM-0104ZZ-4.760-L				
<b>Route Name:</b>	QUINault NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>	14.00		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	67		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	LOW				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	BRIDGE RAIL W-BEAM
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	62.7
<b>Height (In.):</b>	23.0	<b>Lateral Offset (In.):</b>	31.0	<b>Road Grade (%):</b>	2.50
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			

<b>Barrier ID:</b>	OLYM-0104ZZ-4.760-L				
<b>Route Name:</b>	QUINAULT NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		14.00	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

ROUTE 0104ZZ: QUINULT NORTH SHORE ROADS

## Barrier Condition Photos



OLYM\_0104ZZ\_4.760\_L\_1.JPG

<b>Barrier ID:</b>	OLYM-0104ZZ-4.760-R				
<b>Route Name:</b>	QUINault NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>	22.70		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	64		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	LOW				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	BRIDGE RAIL W-BEAM
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	61.2
<b>Height (In.):</b>	27.0	<b>Lateral Offset (In.):</b>	44.0	<b>Road Grade (%):</b>	1.00
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Barrier >3in below 27" the design height for 52 ft and 1" to 3" below the 27" design height for 12 ft.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable but the height is >3in below the 27" design height			
	<b>Breaking and Cracking:</b>	No breaking or cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			

<b>Barrier ID:</b>	OLYM-0104ZZ-4.760-R				
<b>Route Name:</b>	QUINAULT NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		22.70	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$2326
<b>Brief Workorder:</b>	Raise entire 64-ft. of W-beam to 27-in. design height.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 64 = \$640. Adjust the entire length of the barrier to the 27" design height Low Speed Traffic Control at \$1475- per -Day for 1 = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# Olympic National Park

ROUTE 0104ZZ: QUINAULT NORTH SHORE ROADS

## Barrier Condition Photos



OLYM\_0104ZZ\_4.760\_R\_1.JPG

<b>Barrier ID:</b>	OLYM-0104ZZ-4.786-L				
<b>Route Name:</b>	QUINAULT NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>	18.30		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	64		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	LOW				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	BRIDGE RAIL W-BEAM
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	74.3
<b>Height (In.):</b>	25.2	<b>Lateral Offset (In.):</b>	33.0	<b>Road Grade (%):</b>	0.90
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Barrier is 1in to 3" below 27" design height for the entire 64 ft length of barrier. Alignment acceptable.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Height 1in to 3" below the 27" design height. Alignment is acceptable.			
	<b>Breaking and Cracking:</b>	No breaking or cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			

<b>Barrier ID:</b>	OLYM-0104ZZ-4.786-L				
<b>Route Name:</b>	QUINAULT NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		18.30	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$2326
<b>Brief Workorder:</b>	Raise 64 ft of W-beam up to the design height of 27-in.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 64 = \$640. Raise 64 ft of barrier up to the design height of 27-in. Low Speed Traffic Control at \$1475- per -Day for 1 = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# **Olympic National Park**

**ROUTE 0104ZZ: QUINAULT NORTH SHORE ROADS**

## **Barrier Condition Photos**



**OLYM\_0104ZZ\_4.786\_L\_1.JPG**

<b>Barrier ID:</b>	OLYM-0104ZZ-4.786-R				
<b>Route Name:</b>	QUINAULT NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009		<b>Barrier Rating:</b>	14.00	
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST		<b>Barrier Function:</b>	TRAFFIC	
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN		<b>Post Material:</b>	WOOD	
<b>Blockout Type:</b>	WOOD		<b>Length (ft.):</b>	65	
<b>Speed Limit (MPH):</b>	35		<b>Placement with Respect to Road:</b>	TANGENT	
<b>Hazard Behind Barrier:</b>	LOW				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	BRIDGE RAIL W-BEAM
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	62.7
<b>Height (In.):</b>	26.7	<b>Lateral Offset (In.):</b>	27.0	<b>Road Grade (%):</b>	1.00
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			

<b>Barrier ID:</b>	OLYM-0104ZZ-4.786-R				
<b>Route Name:</b>	QUINAULT NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		14.00	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# **Olympic National Park**

## **ROUTE 0104ZZ: QUINAULT NORTH SHORE ROADS**

### **Barrier Condition Photos**



**OLYM\_0104ZZ\_4.786\_R\_1.JPG**

<b>Barrier ID:</b>	OLYM-0104ZZ-5.182-L				
<b>Route Name:</b>	QUINAULT NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>	18.30		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	64		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	LOW				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	BRIDGE RAIL W-BEAM
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	74.6
<b>Height (In.):</b>	25.7	<b>Lateral Offset (In.):</b>	25.0	<b>Road Grade (%):</b>	0.60
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment is acceptable. Height is 1in to 3" lower than the 27" design height for entire barrier (43 ft).			
	<b>Breaking and Cracking:</b>	One 6-in. bend in w-beam; no break or crack in rail.			
	<b>Missing Elements:</b>	No missing elements in rail			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height is 1in to 3" lower than the 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			

<b>Barrier ID:</b>	OLYM-0104ZZ-5.182-L				
<b>Route Name:</b>	QUINAULT NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		18.30	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$2426
<b>Brief Workorder:</b>	Raise 43 feet of barrier up to the design height of 27-in.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 43 LF = \$430. Raise 43 feet of barrier up to the design height of 27-in. Replace rail at \$25- per -Lin. Ft. for 12 LF = \$300. Replace 12 feet of rail. 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.					

# Olympic National Park

ROUTE 0104ZZ: QUINAULT NORTH SHORE ROADS

## Barrier Condition Photos



OLYM\_0104ZZ\_5.182\_L\_1.JPG

<b>Barrier ID:</b>	OLYM-0104ZZ-5.182-R				
<b>Route Name:</b>	QUINAULT NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>	18.30		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	63		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	LOW				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	BRIDGE RAIL W-BEAM
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.0
<b>Height (In.):</b>	25.5	<b>Lateral Offset (In.):</b>	36.0	<b>Road Grade (%):</b>	0.70
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	20 ft of barrier is 1-3 in below 27-in design height; remainder of barrier is at design height. Alignment acceptable.			
	<b>Breaking and Cracking:</b>	No breaking or cracking in barrier.			
	<b>Missing Elements:</b>	1 missing post/block/and 5 bolts; additional 4 bolts missing from rail			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering in barrier			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking/cracking at end treat			
	<b>Missing Elements:</b>	No missing elements at end treat			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering at end treat			

<b>Barrier ID:</b>	OLYM-0104ZZ-5.182-R				
<b>Route Name:</b>	QUINAULT NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		18.30	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$2035
<b>Brief Workorder:</b>	Raise 20 lin. ft. of barrier up to 27-in design height; replace 1 post and 1 block.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 20 = \$200. Raise barrier height up to 27-in Design height. Replace post at \$100- per -Each for 1 = \$100. Add missing post. Replace block at \$30- per -Each for 1 = \$30. Add missing block. 9 bolts at \$5- per - for 9 = \$45. Replace missing bolts. Low Speed Traffic Control at \$1475- per -Day for 1 = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# Olympic National Park

ROUTE 0104ZZ: QUINAULT NORTH SHORE ROADS

## Barrier Condition Photos



OLYM\_0104ZZ\_5.182\_R\_1.JPG

<b>Barrier ID:</b>	OLYM-0104ZZ-5.208-L				
<b>Route Name:</b>	QUINault NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009		<b>Barrier Rating:</b>	14.00	
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST		<b>Barrier Function:</b>	TRAFFIC	
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN		<b>Post Material:</b>	WOOD	
<b>Blockout Type:</b>	WOOD		<b>Length (ft.):</b>	66	
<b>Speed Limit (MPH):</b>	35		<b>Placement with Respect to Road:</b>	TANGENT	
<b>Hazard Behind Barrier:</b>	LOW				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	BRIDGE RAIL W-BEAM
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	62.0
<b>Height (In.):</b>	26.7	<b>Lateral Offset (In.):</b>	26.0	<b>Road Grade (%):</b>	0.60
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable and height within 27in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	Minor cracking at 1 post			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering			

<b>Barrier ID:</b>	OLYM-0104ZZ-5.208-L				
<b>Route Name:</b>	QUINAULT NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		14.00	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

ROUTE 0104ZZ: QUINAULT NORTH SHORE ROADS

## Barrier Condition Photos



OLYM\_0104ZZ\_5.208\_L\_1.JPG

<b>Barrier ID:</b>	OLYM-0104ZZ-5.208-R				
<b>Route Name:</b>	QUINAULT NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>	21.20		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	66		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	LOW				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	BRIDGE RAIL W-BEAM
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	61.7
<b>Height (In.):</b>	25.0	<b>Lateral Offset (In.):</b>	23.2	<b>Road Grade (%):</b>	0.50
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Barrier is 1 to 3 in. below 27in design height for 28 ft.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking/cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering			

<b>Barrier ID:</b>	OLYM-0104ZZ-5.208-R				
<b>Route Name:</b>	QUINAULT NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		21.20	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$2040
<b>Brief Workorder:</b>	Raise 38 lin. ft. of barrier up to 27-in. design height.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 38 = \$380. Raise 38-ft. of barrier to 27-in. design height. Low Speed Traffic Control at \$1475- per -Day for 1 = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# Olympic National Park

ROUTE 0104ZZ: QUINAULT NORTH SHORE ROADS

## Barrier Condition Photos



OLYM\_0104ZZ\_5.208\_R\_1.JPG

<b>Barrier ID:</b>	OLYM-0104ZZ-13.918-R				
<b>Route Name:</b>	QUINAULT NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>	19.50		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	370		
<b>Speed Limit (MPH):</b>	25	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-1	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.0
<b>Height (In.):</b>	27.0	<b>Lateral Offset (In.):</b>	38.0	<b>Road Grade (%):</b>	2.10
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Barrier height >3in below 27" design for 21 ft 1" to 3" below for 19 ft.			
	<b>Breaking and Cracking:</b>	Broken/damaged: 5 sections rail 1 post 1 block.			
	<b>Missing Elements:</b>	1 block missing			
	<b>Corrosion and Weathering:</b>	No corrosion/weather			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking/cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering			

<b>Barrier ID:</b>	OLYM-0104ZZ-13.918-R				
<b>Route Name:</b>	QUINAULT NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		19.50	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$3888
<b>Brief Workorder:</b>	Raise 40-ft. of W-beam to 27-in. design height. Replace 60-ft. of rail 2 blocks and 1 post.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 40 = \$400. Raise 40-ft. of W-beam to 27-in. design height. Replace post at \$100- per -Each for 1 = \$100. Replace block at \$30- per -Each for 2 = \$60. Replace rail at \$25- per -Lin. Ft. for 60 = \$1500. Low Speed Traffic Control at \$1475- per -Day for 1 = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

ROUTE 0104ZZ: QUINAULT NORTH SHORE ROADS

## Barrier Condition Photos



OLYM\_0104ZZ\_13.918\_R\_1.JPG

<b>Barrier ID:</b>	OLYM-0104ZZ-13.920-L				
<b>Route Name:</b>	QUINAULT NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>	23.80		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	365		
<b>Speed Limit (MPH):</b>	25	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-1	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	74.8
<b>Height (In.):</b>	25.0	<b>Lateral Offset (In.):</b>	44.2	<b>Road Grade (%):</b>	1.90
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. 132 ft of barrier is 1-3 in below 27-in design height; 82 ft of barrier is >3-in below 27-in design height.			
	<b>Breaking and Cracking:</b>	2 split posts and 1 split block; 2 sections of bent w-beam =24 ft.			
	<b>Missing Elements:</b>	Missing one block			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering on barrier			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. Trailing end treatment height is more than 3-in below 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking/cracking at ends			
	<b>Missing Elements:</b>	No missing elements at ends			
	<b>Corrosion and Weathering:</b>	No corrosion/weathering at ends			

<b>Barrier ID:</b>	OLYM-0104ZZ-13.920-L				
<b>Route Name:</b>	QUINAULT NORTH SHORE ROADS				
<b>Inspection Date:</b>	10/29/2009		<b>Barrier Rating:</b>	23.80	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$4922
<b>Brief Workorder:</b>	Raise 214 ft of barrier up to 27-in design height. Replace 2 posts 2 blocks and 24 ft of W-beam.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 214 = \$2140. Raise 214 ft of barrier up to 27-in design height. Replace post at \$100- per -Each for 2 = \$200. Replace block at \$30- per -Each for 2 = \$60. Replace rail at \$25- per -Lin. Ft. for 24 = \$600. Low Speed Traffic Control at \$1475- per -Day for 1 = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# Olympic National Park

ROUTE 0104ZZ: QUINAULT NORTH SHORE ROADS

## Barrier Condition Photos



OLYM\_0104ZZ\_13.920\_L\_1.JPG

<b>Barrier ID:</b>	OLYM-0105-0.849-L				
<b>Route Name:</b>	QUINAULT SOUTH SHORE ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>	17.00		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	112		
<b>Speed Limit (MPH):</b>	25	<b>Placement with Respect to Road:</b>	INSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-1	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	74.0
<b>Height (In.):</b>	31.7	<b>Lateral Offset (In.):</b>	40.0	<b>Road Grade (%):</b>	3.30
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. 50 ft of barrier is 9-in. over 27-in design height.			
	<b>Breaking and Cracking:</b>	1 rail moderately dented.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering.			

<b>Barrier ID:</b>	OLYM-0105-0.849-L				
<b>Route Name:</b>	QUINAULT SOUTH SHORE ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		17.00	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$2502
<b>Brief Workorder:</b>	Lower 50-ft. of barrier and replace 12-ft. of rail.				
<b>Workorder:</b>	Replace rail at \$25- per -Lin. Ft. for 12 = \$300. Replace 1 W-beam rail 12 lin. ft. Adjust Guardrail at \$10- per -Lin. Ft. for 50 LF = \$500. Lower 50-ft. of barrier to be no higher than 32 inches (5 inches over 27-in. design height). Low Speed Traffic Control at \$1475- per -Day for 1 = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

**Olympic National Park**  
**ROUTE 0105: QUINAULT SOUTH SHORE ROAD**

**Barrier Condition Photos**



**OLYM\_0105\_0.849\_L\_1.JPG**

<b>Barrier ID:</b>	OLYM-0107-0.004-R				
<b>Route Name:</b>	HOH ROAD				
<b>Inspection Date:</b>	11/02/2009		<b>Barrier Rating:</b>	29.70	
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST		<b>Barrier Function:</b>	TRAFFIC	
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN		<b>Post Material:</b>	WOOD	
<b>Blockout Type:</b>	WOOD		<b>Length (ft.):</b>	257	
<b>Speed Limit (MPH):</b>	35		<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE	
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	76.0
<b>Height (In.):</b>	27.0	<b>Lateral Offset (In.):</b>	45.0	<b>Road Grade (%):</b>	0.70
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	3 turned blocks that need to be replaced.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable corrosion/weathering or erosion			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	Ending end treatment has 1 rail that is bent.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No notable corrosion/weathering or erosion			

<b>Barrier ID:</b>	OLYM-0107-0.004-R				
<b>Route Name:</b>	HOH ROAD				
<b>Inspection Date:</b>	11/02/2009	<b>Barrier Rating:</b>		29.70	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$2079
<b>Brief Workorder:</b>	Replace 3 turned blocks and 13-ft. of rail.				
<b>Workorder:</b>	Replace block at \$30- per -Each for 3 = \$90. Replace three turned blocks Replace rail at \$25- per -Lin. Ft. for 13 = \$325. Replace 13 LF of bent rail on ending end treatment. Low Speed Traffic Control at \$1475- per -Day for 1 = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# Olympic National Park

ROUTE 0107: HOH ROAD

## Barrier Condition Photos



OLYM\_0107\_0.004\_R\_1.jpg

<b>Barrier ID:</b>	OLYM-0107-0.148-R				
<b>Route Name:</b>	HOH ROAD				
<b>Inspection Date:</b>	11/02/2009	<b>Barrier Rating:</b>	23.70		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	92		
<b>Speed Limit (MPH):</b>	35	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	MEDIUM				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-2	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	73.6
<b>Height (In.):</b>	24.2	<b>Lateral Offset (In.):</b>	23.2	<b>Road Grade (%):</b>	0.90
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment is acceptable. The height is 3 in lower than the design height of 27 in for the entire run of the barrier.			
	<b>Breaking and Cracking:</b>	1 section (12.5ft) of W-beam is cracked.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering at the rail length. There is no erosion at the barrier foundation.			
<b>End Treatments</b>	<b>Alignment and Height:</b>				
	<b>Breaking and Cracking:</b>				
	<b>Missing Elements:</b>				
	<b>Corrosion and Weathering:</b>				

<b>Barrier ID:</b>	OLYM-0107-0.148-R				
<b>Route Name:</b>	HOH ROAD				
<b>Inspection Date:</b>	11/02/2009		<b>Barrier Rating:</b>	23.70	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$2668
<b>Brief Workorder:</b>	Raise 92 lin. ft. of barrier up to the design height of 27 inches.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 92 LF = \$920. Raise 92 ft of barrier up to 27-in design height. Replace block at \$30- per -Each for 1 Block(s) = \$30. Replace 1 block which is cracked in half. 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.					

# Olympic National Park

ROUTE 0107: HOH ROAD

## Barrier Condition Photos



OLYM\_0107\_0.148\_R\_1.jpg

<b>Barrier ID:</b>	OLYM-0108-2.093-L				
<b>Route Name:</b>	EAST BEACH ROAD				
<b>Inspection Date:</b>	10/31/2009		<b>Barrier Rating:</b>	21.10	
<b>Barrier Description</b>					
<b>Type:</b>	OTHER: STEEL RAIL PAINTED		<b>Barrier Function:</b>	TRAFFIC	
<b>Barrier Material:</b>	OTHER: STEEL		<b>Post Material:</b>	WOOD	
<b>Blockout Type:</b>	N/A		<b>Length (ft.):</b>	25	
<b>Speed Limit (MPH):</b>	25		<b>Placement with Respect to Road:</b>	TANGENT	
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-1	<b>Barrier Test Level:</b>	NCW	<b>Is Barrier Crashworthy?:</b>	NO
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	19	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.0
<b>Height (In.):</b>	21.7	<b>Lateral Offset (In.):</b>	122.6	<b>Road Grade (%):</b>	3.10
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Assumed design height is 19 in. Height is above assumed 19-in. design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking in the barrier length.			
	<b>Missing Elements:</b>	There are no missing elements. The rail was not attached to the posts with a standard 5/8in bolt but with a 1/4" bolt.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering in the length of barrier. No erosion at the barrier foundation.			
<b>End Treatments</b>	<b>Alignment and Height:</b>				
	<b>Breaking and Cracking:</b>				
	<b>Missing Elements:</b>				
	<b>Corrosion and Weathering:</b>				

<b>Barrier ID:</b>	OLYM-0108-2.093-L				
<b>Route Name:</b>	EAST BEACH ROAD				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>		21.10	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# Olympic National Park

ROUTE 0108: EAST BEACH ROAD

## Barrier Condition Photos



OLYM\_0108\_2.093\_L\_1.jpg

<b>Barrier ID:</b>	OLYM-0108-2.168-L				
<b>Route Name:</b>	EAST BEACH ROAD				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>	16.70		
<b>Barrier Description</b>					
<b>Type:</b>	OTHER: STEEL RAIL PAINTED	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	OTHER: STEEL	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	N/A	<b>Length (ft.):</b>	37		
<b>Speed Limit (MPH):</b>	25	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-1	<b>Barrier Test Level:</b>	NCW	<b>Is Barrier Crashworthy?:</b>	NO
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	19	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	144.0
<b>Height (In.):</b>	24.7	<b>Lateral Offset (In.):</b>	86.3	<b>Road Grade (%):</b>	1.60
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Assumed design height is 25 in. Height is within 1-in. of assumed 25-in. design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking throughout the barrier length.			
	<b>Missing Elements:</b>	No missing elements. The steel rail was mounted to the 6inx6" wood posts with 1/4" bolts not the standard 5/8" barrier bolts.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering at the barrier length. There was no erosion at the foundation of the barrier.			
<b>End Treatments</b>	<b>Alignment and Height:</b>				
	<b>Breaking and Cracking:</b>				
	<b>Missing Elements:</b>				
	<b>Corrosion and Weathering:</b>				

<b>Barrier ID:</b>	OLYM-0108-2.168-L				
<b>Route Name:</b>	EAST BEACH ROAD				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>		16.70	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

ROUTE 0108: EAST BEACH ROAD

## Barrier Condition Photos



OLYM\_0108\_2.168\_L\_1.jpg

<b>Barrier ID:</b>	OLYM-0108-2.231-L				
<b>Route Name:</b>	EAST BEACH ROAD				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>	16.70		
<b>Barrier Description</b>					
<b>Type:</b>	OTHER: STEEL RAIL PAINTED	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	OTHER: STEEL	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	N/A	<b>Length (ft.):</b>	26		
<b>Speed Limit (MPH):</b>	25	<b>Placement with Respect to Road:</b>	TANGENT		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-1	<b>Barrier Test Level:</b>	NCW	<b>Is Barrier Crashworthy?:</b>	NO
<b>Beg. End Trtmt Type:</b>	NONE	<b>Is Beg. End Trtmt Crashworthy?:</b>	N/A	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	NONE	<b>Ending End Trtmt Crashworthy?:</b>	N/A		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	19	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	139.6
<b>Height (In.):</b>	20.2	<b>Lateral Offset (In.):</b>	112.6	<b>Road Grade (%):</b>	3.40
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Assumed design height is 19 in. Height is at or above assumed 19-in. design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking throughout the barrier length.			
	<b>Missing Elements:</b>	No missing elements. The steel rail is attached to 6inx6" posts with 1/4" bolts and not the standard 5/8" bolts.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering in the length. No erosion at the barrier foundation.			
<b>End Treatments</b>	<b>Alignment and Height:</b>				
	<b>Breaking and Cracking:</b>				
	<b>Missing Elements:</b>				
	<b>Corrosion and Weathering:</b>				

<b>Barrier ID:</b>	OLYM-0108-2.231-L				
<b>Route Name:</b>	EAST BEACH ROAD				
<b>Inspection Date:</b>	10/31/2009	<b>Barrier Rating:</b>		16.70	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# Olympic National Park

ROUTE 0108: EAST BEACH ROAD

## Barrier Condition Photos



OLYM\_0108\_2.231\_L\_1.jpg

<b>Barrier ID:</b>	OLYM-0115-1.953-L				
<b>Route Name:</b>	MORA ROAD				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>	27.20		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	448		
<b>Speed Limit (MPH):</b>	25	<b>Placement with Respect to Road:</b>	OUTSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	EXTREME				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-1	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	75.3
<b>Height (In.):</b>	26.2	<b>Lateral Offset (In.):</b>	31.2	<b>Road Grade (%):</b>	1.00
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment acceptable. Height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking			
	<b>Missing Elements:</b>	No missing elements			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering			

<b>Barrier ID:</b>	OLYM-0115-1.953-L				
<b>Route Name:</b>	MORA ROAD				
<b>Inspection Date:</b>	10/30/2009	<b>Barrier Rating:</b>		27.20	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	NO ACTION	<b>FMSS Work Type:</b>	N/A	<b>Repair Cost:</b>	\$0
<b>Brief Workorder:</b>	N/A				
<b>Workorder:</b>					
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					

# Olympic National Park

ROUTE 0115: MORA ROAD

## Barrier Condition Photos



OLYM\_0115\_1.953\_L\_1.JPG

<b>Barrier ID:</b>	OLYM-0210-0.000-L				
<b>Route Name:</b>	GRAVES CREEK ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>	17.10		
<b>Barrier Description</b>					
<b>Type:</b>	W-BEAM STRONG POST	<b>Barrier Function:</b>	TRAFFIC		
<b>Barrier Material:</b>	WEATHERING STEEL/CORTEN	<b>Post Material:</b>	WOOD		
<b>Blockout Type:</b>	WOOD	<b>Length (ft.):</b>	124		
<b>Speed Limit (MPH):</b>	25	<b>Placement with Respect to Road:</b>	INSIDE OF CURVE		
<b>Hazard Behind Barrier:</b>	HIGH				
<b>Barrier Crashworthiness</b>					
<b>Appropriate Test Level:</b>	TL-1	<b>Barrier Test Level:</b>	TL-3	<b>Is Barrier Crashworthy?:</b>	YES
<b>Beg. End Trtmt Type:</b>	W-BEAM BCT	<b>Is Beg. End Trtmt Crashworthy?:</b>	NO	<b>Approach Transition Type:</b>	NONE
<b>Ending End Trtmt Type:</b>	W-BEAM BCT	<b>Ending End Trtmt Crashworthy?:</b>	NO		
<b>Average Measurements</b>					
<b>Design Height (In.):</b>	27	<b>Width (In.):</b>	0.0	<b>Post Spacing (In.):</b>	74.3
<b>Height (In.):</b>	24.7	<b>Lateral Offset (In.):</b>	24.0	<b>Road Grade (%):</b>	0.90
<b>Physical Condition</b>					
<b>Barrier</b>	<b>Alignment and Height:</b>	Alignment is acceptable. Height is 1 to 3 in below 27in design height for 111 ft.			
	<b>Breaking and Cracking:</b>	1 rail moderately dented/damaged by fallen trees.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering.			
<b>End Treatments</b>	<b>Alignment and Height:</b>	Alignment acceptable. End treatment height within 1-in of 27-in design height.			
	<b>Breaking and Cracking:</b>	No breaking or cracking.			
	<b>Missing Elements:</b>	No missing elements.			
	<b>Corrosion and Weathering:</b>	No corrosion or weathering.			

<b>Barrier ID:</b>	OLYM-0210-0.000-L				
<b>Route Name:</b>	GRAVES CREEK ROAD				
<b>Inspection Date:</b>	10/29/2009	<b>Barrier Rating:</b>		17.10	
<b>Repair Recommendations</b>					
<b>Repair Action:</b>	REPAIR	<b>FMSS Work Type:</b>	DEFERRED MAINTENANCE	<b>Repair Cost:</b>	\$3174
<b>Brief Workorder:</b>	Raise 111 feet of barrier up to 27-in. design height and replace a 12 feet of rail.				
<b>Workorder:</b>	Adjust Guardrail at \$10- per -Lin. Ft. for 111 = \$1110. Raise 111-ft of barrier up to 27-in. design height. Replace rail at \$25- per -Lin. Ft. for 12 = \$300. Replace a 12-ft. section of rail. Low Speed Traffic Control at \$1475- per -Day for 1 = \$1475.				
2008 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.					



# **Olympic National Park**

## **ROUTE 0210: GRAVES CREEK ROAD**

### **Barrier Condition Photos**



**OLYM\_0210\_0.000\_L\_1.JPG**

# Appendix A

## Summary of GIP Definitions and Assessment



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

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

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



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

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

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

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

# 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
<b>SEGMENT VARIABLES</b>		
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
Posted Speed Limit	75.1 and greater	34.2
	15 – 25 mph	0.0
	30 – 40 mph	4.3
	45 and higher	8.6
<b>SITE VARIABLES</b>		
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
<b>BARRIER VARIABLES</b>		
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
Barrier Conformance with Current Crashworthiness Criteria	801 and above	21.5
	Yes	0.0
	No	5.7
<b>Maximum Total Possible Risk Score</b>		<b>100</b>

## 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(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.