OLYM
WIP Report

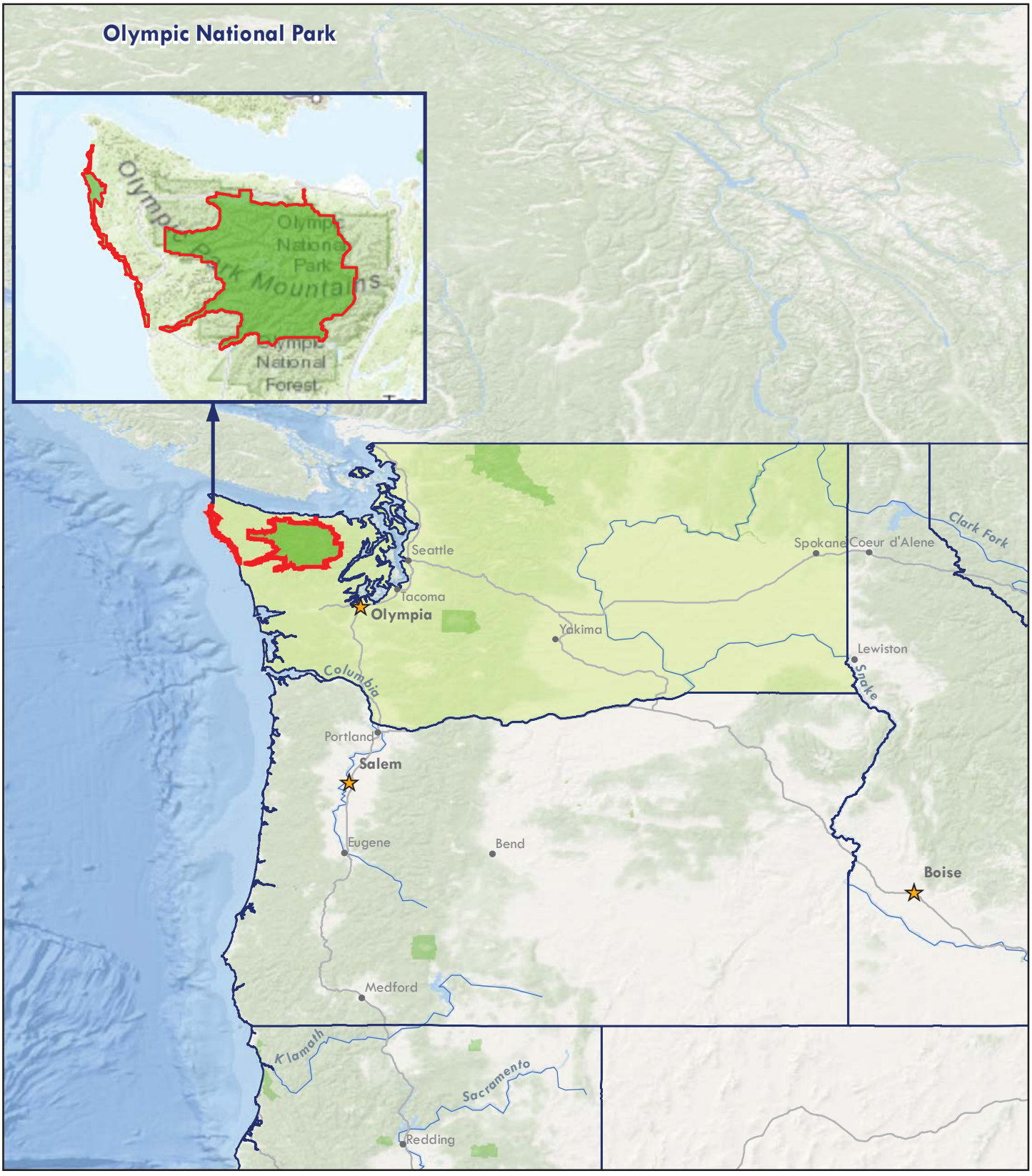
NPS Retaining Wall Inventory Program
Olympic National Park

Federal Lands Highway
Road Inventory Program

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

Data Collection Date: July 2007
Report Date: October 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

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Introduction

The Federal Lands Highway Division (FLH) of the Federal Highway Administration (FHWA), in partnership with the National Park Service (NPS), has conducted a retaining wall inventory and condition assessment as part of the NPS Retaining Wall Inventory Program (WIP). This inventory provides information to the NPS Facility Management Software System (FMSS) regarding such things as type, size and location of retaining structures, as well as the condition of these facilities and consequences of failure. In addition, when wall and/or adjacent element deficiencies are identified, repair recommendations and estimated costs are also provided, suitable for use as FMSS work orders.

The main intent of this effort is to determine the backlog of needs associated with retaining wall assets – equipment features ascribed to the "parent" roadway asset. Inventory and condition assessments (pavement only) for the roads themselves are conducted under the NPS Road Inventory Program (RIP). Prior to development of the WIP, the vast majority of retaining walls were not accounted for in FMSS. Based on WIP inventory work to date, NPS wall assets are valued at well over $400M. A second and equally important intent of this effort is to inform and improve project selection, prioritization, and development activities and processes at NPS regions/parks, FLH Division offices and the NPS Denver Service Center.

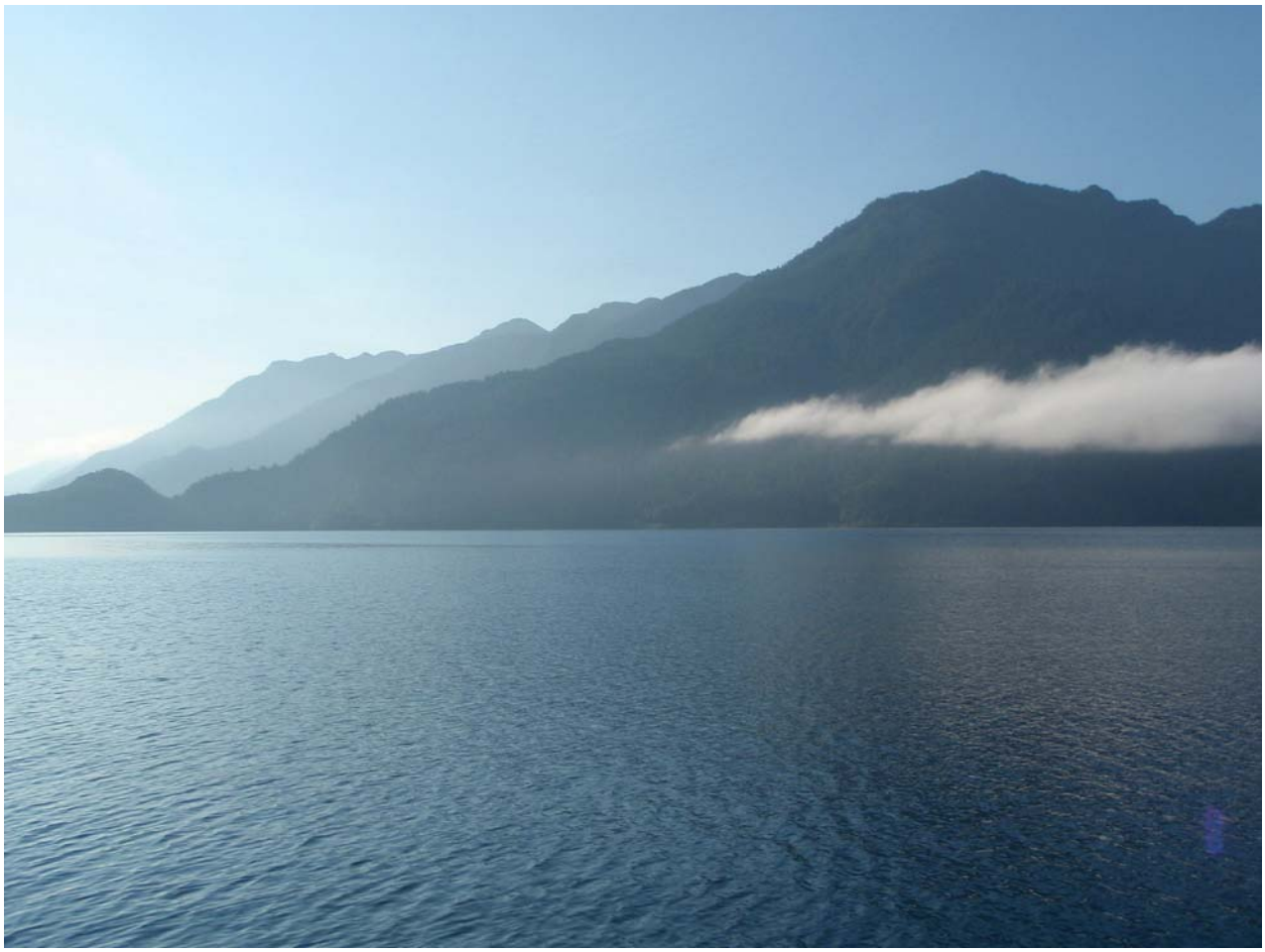
In support of WIP, a comprehensive procedures manual (available at the following link: http://www.cflhd.gov/programs/techDevelopment/geotech/WIP/) was developed to document the data collection and management process, wall attribute and element definitions, and team member responsibilities for conducting retaining wall inventories and condition assessments. This manual was used for nearly 3,500 wall assessments initially conducted between 2007 and 2008 within 34 national parks. WIP is supported by several key components described in the procedures manual, including a comprehensive training program for field inspectors, an Oracle-based database for long-term data management, unique data collection forms, a supporting field guide, and a wall repair/replace cost estimate guide.

Ultimately, condition assessments for retaining wall structures are expressed as deferred maintenance costs, which are then divided by current year replacement costs to arrive at a "Facility Condition Index" (FCI). Coupling this condition prioritization index with an "Asset Priority Index" (API), which measures the feature's importance to the mission of the park, capital asset investments are made more efficiently. This approach appropriately focuses maintenance and construction priorities on value, rather than solely on cost. Wall inventory condition and cost data are transferred from the WIP database to FMSS, the primary asset documentation, management and planning platform maintained at each park. In addition, wall data are also provided to the Road Inventory Program to update equipment assets associated with the parent roadway asset.

Initial inventories were conducted based on RIP Cycle 3 data, but future planning has ensured updates to WIP will occur simultaneously with RIP. For long-term data management purposes, the WIP database will be linked to the larger, parent RIP database and be updated under the responsibility of the RIP Database Administrator.

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 wall (Tier 3). Tier 1 presents park wall location maps and an overall park-specific summary narrative of the results of the wall inventory program. Tier 2 presents route overview maps with associated wall summary information. Tier 3 presents individual wall information in a three-page detailed format, including a photograph of each wall. Appendix A provides a condensed summary of wall inventory definitions and assessment categories to assist in reading this report.

Park Retaining Wall Location Maps



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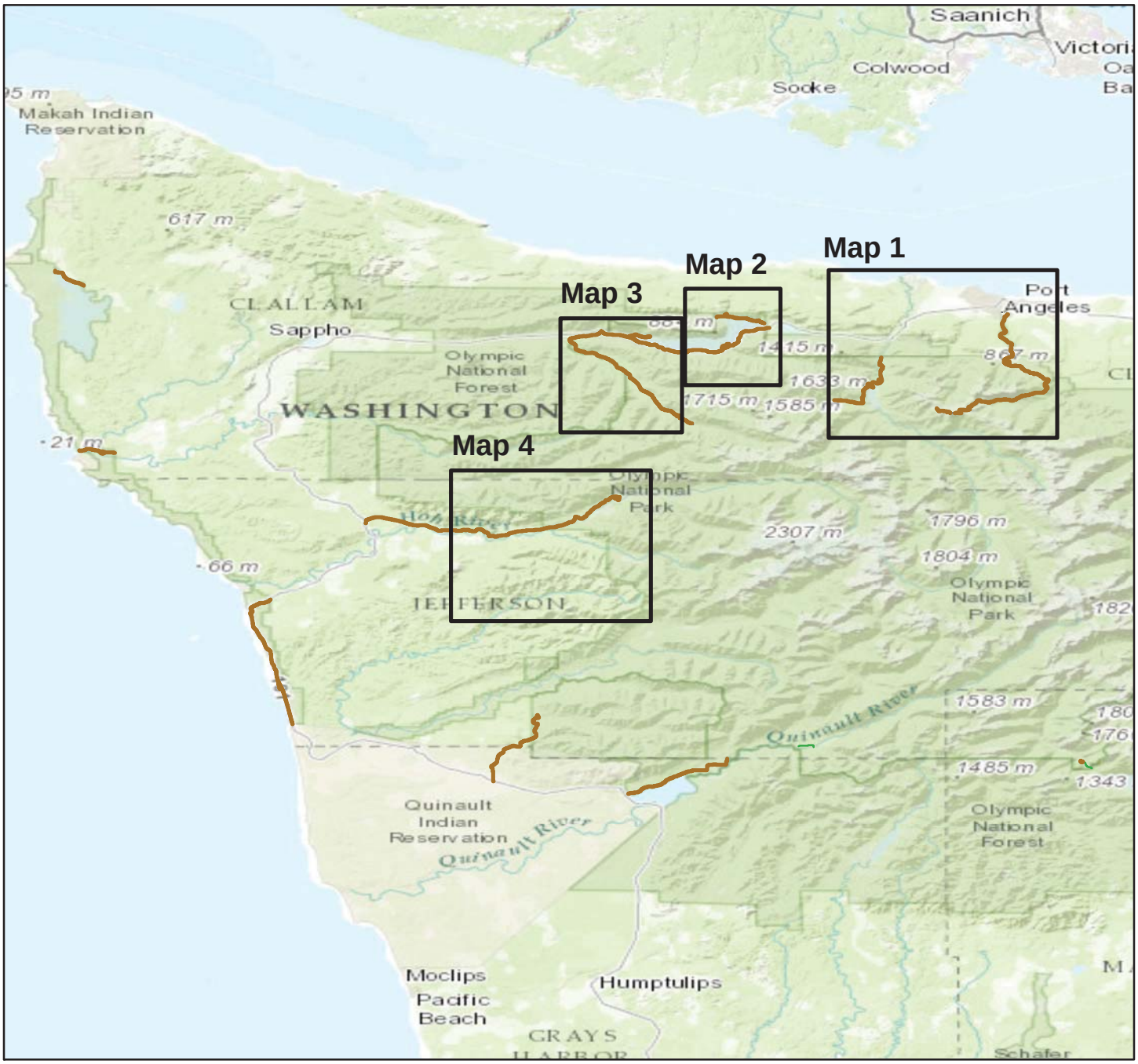
WALL LOCATION MAP

Key Map



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RIP Collected Routes

Miles

0 10 20

N

Olympic National Park

WALL 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

Wall Locations

RIP Collected Routes

Miles

0 2.5 5

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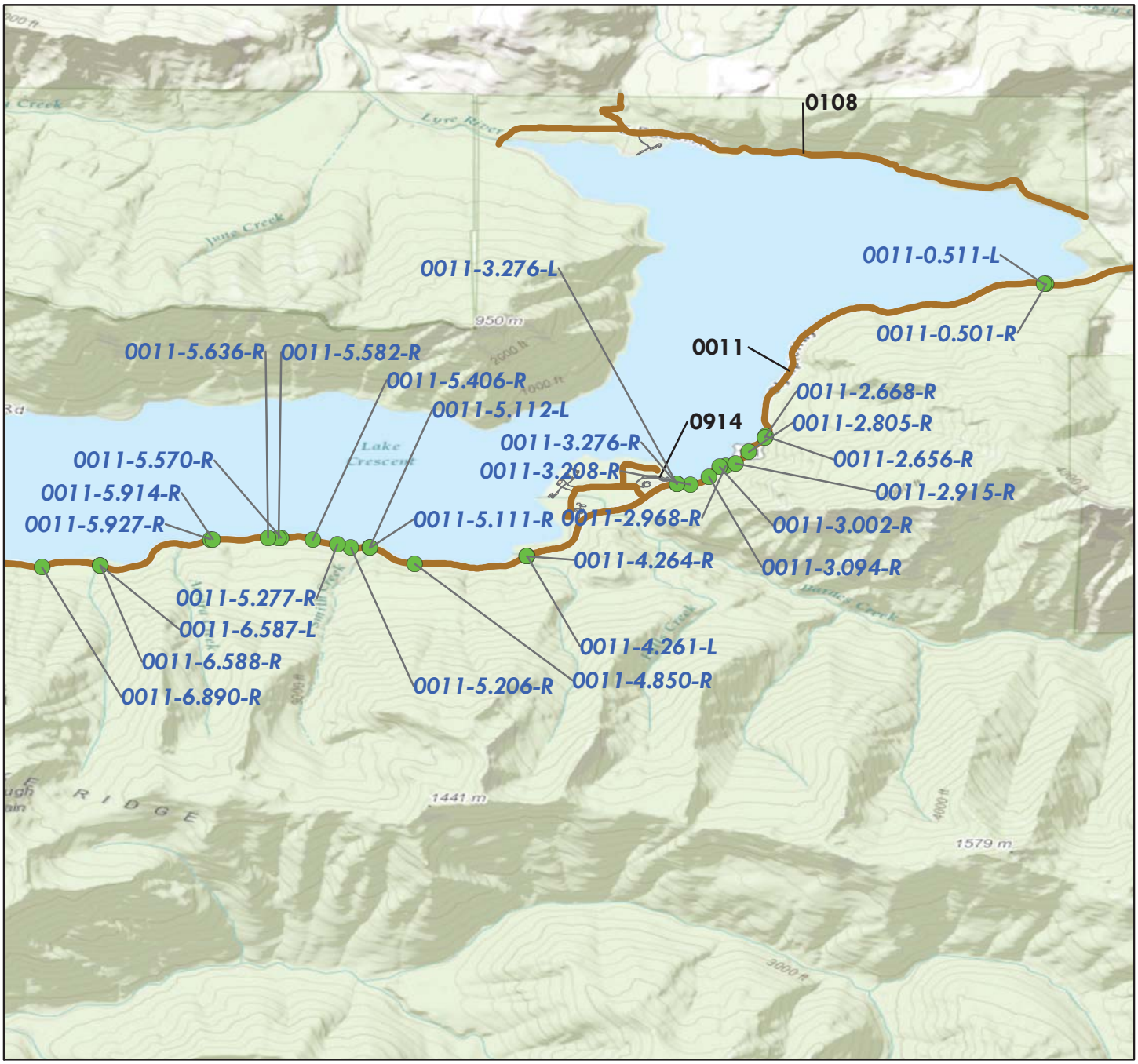
Olympic National Park

WALL LOCATION MAP

Map 2



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Wall Locations

RIP Collected Routes

Miles

0 1 2

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Olympic National Park

WALL 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

Wall Locations

RIP Collected Routes

Miles

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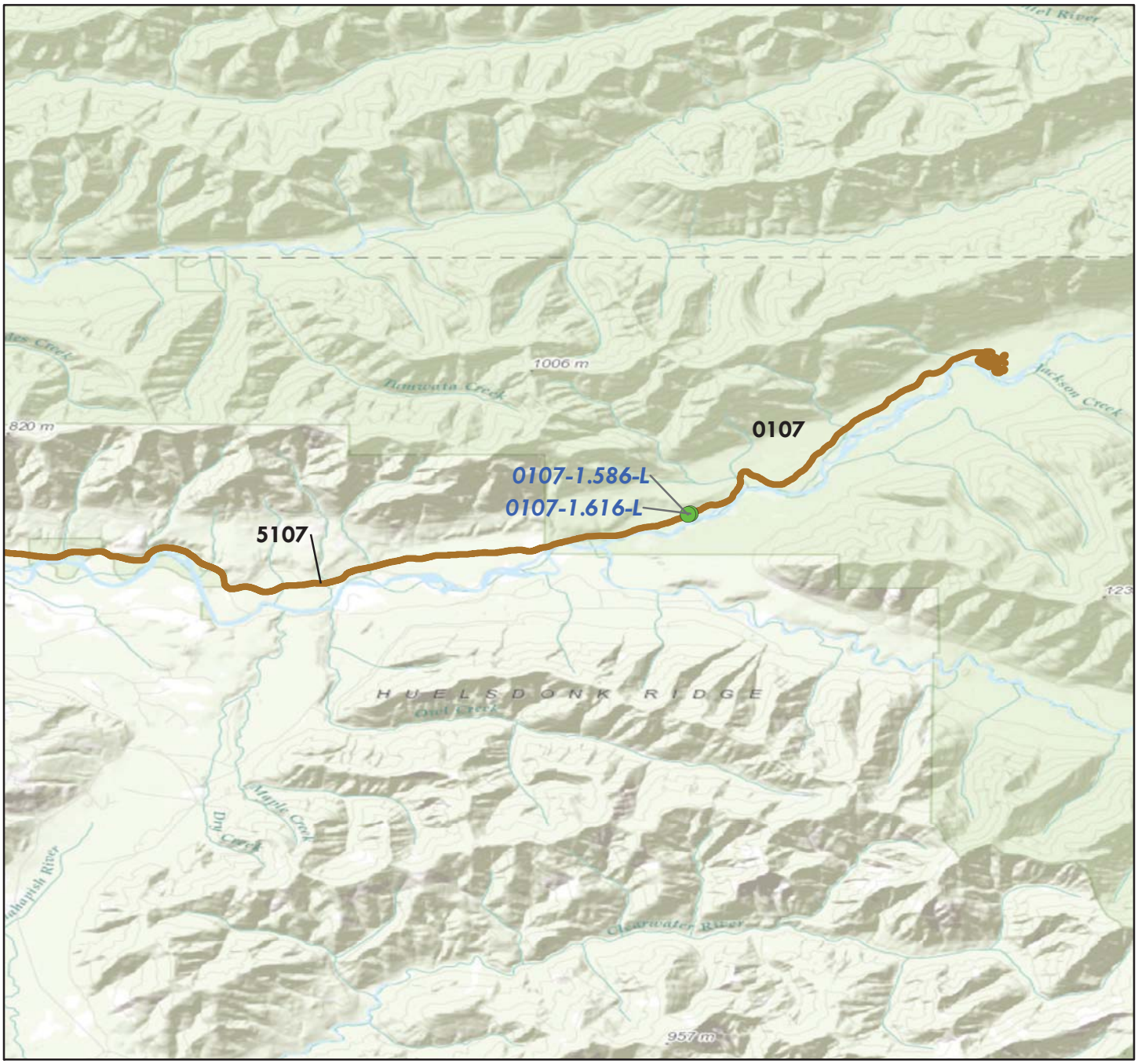
Olympic National Park

WALL LOCATION MAP

Map 4



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Wall Locations

RIP Collected Routes

Miles

0 2.5 5

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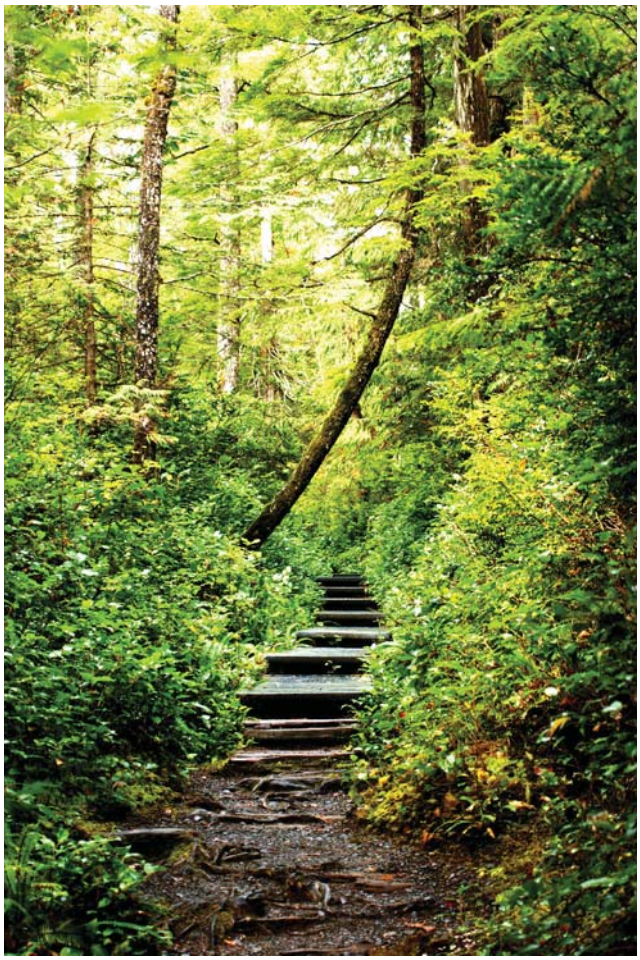
Tier 1
Park Retaining Wall Overview



Olympic National Park

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Parkwide Summary: Olympic National Park

Initial retaining wall inspections were conducted at Olympic National Park in 2007, and encompassed all known retaining wall structures associated with Park roadways - including structure's retaining cuts and fills, as well as qualifying headwalls at culverts. For the purposes of the assessment, walls must be a minimum of 4 feet in maximum height of retained earth and greater than 6 feet in maximum height for culvert headwalls. This does not include the height of parapet or guardwall above a retaining wall. In general, guardwall or parapets are not included in this assessment, but were inspected for Olympic National Park in 2009 under a separate effort as part of the Guardwall/Rail Inventory Program (GIP). A report for GIP is available under separate cover.

All paved roadways and parking areas listed in the RIP Route Identification Report were inspected for walls. Occasionally, unpaved routes not in RIP were inventoried due to their future programmatic addition at the park, which was a decision made on site specific to each park.

The following tables provide an overview of the findings of this inspection and assessment effort. In all, 65 walls were inventoried on the routes listed below.

Table 1: Number of Walls by Route

Route Number	Route Name	No. of Walls
0011	LAKE CRESCENT HIGHWAY (US 101)	39
0012	HURRICANE RIDGE ROAD	5
0100	ELWHA VALLEY ROAD	2
0103	SOL DUC VALLEY ROAD	17
0107	HOH ROAD	2

The following table shows the number of walls broken out by seven possible categories of basic wall function.

Table 2: Number of Walls by Wall Function

Wall Function	No. of Walls
CW - Cut Wall	3
FW - Fill Wall	46
HW - Head Wall	16

The following table shows the primary wall types that were inventoried and assessed. There are 24 possible primary wall types, which are summarized in Appendix A.

Table 3: Number of Walls by Primary Wall Type

Primary Wall Type	No. of Walls
CC, Crib - Concrete	2
CL, Cantilever - Concrete	15
CP, Cantilever - Soldier Pile	17
GC, Gravity - Mass Concrete	1
GD, Gravity - Dry Stone	2
GG, Gravity - Gabion	21
GM, Gravity - Mortared Stone	3
MP, MSE - Precast Panel	2
MW, MSE - Welded Wire Face	2

The following table shows the number of walls by one of six categories of recommended action along with associated 2007 costs and the number of walls that are in each recommended action category. The majority of walls have a recommendation of *No Action* or *Monitor*; work orders were created for all other recommended actions.

Table 4: Number of Walls by Recommended Action and Associated 2007 Cost

Recommended Action	2007 Repair Costs*	No. of Walls
No Action	$0	51
Monitor	$0	0
Maintenance	$9,200	5
Repair Elements	$109,720	7
Replace Elements	$110,000	1
Replace Wall	$23,072	1
Totals	**$251,992**	**65**

*2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

The following table categorizes the number of walls 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 walls are listed by individual wall in Tier 3 of this report.

Table 5: Number of Walls Grouped by Associated 2007 Cost

Cost Range*	No. of Walls
$0	51
$1 - $25,000	11
$25,001 - $50,000	2
$50,001 - $100,000	0
$100,001 - $250,000	1
$250,001 - $500,000	0
$500,001 - $1,000,000	0
$1,000,001 - $2,000,000	0
$2,000,001 - $3,000,000	0
$3,000,001 - $4,000,000	0
Total Number of Walls	**65**

*2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Routine inspection and performing the noted maintenance will greatly aid in the continued performance of all walls at Olympic National Park. Work orders for walls needing maintenance generally included items such as replacing missing stones, replacing mortar, filling voids at the top or bottom of fill walls, and clearing vegetation.

Work orders for walls needing localized element repairs generally included items such as adding riprap protection to the wall foundation, replacing missing sections of dry stone walls, replacing culverts, grouting voids in walls, and patching/restoring roadway pavement. While decaying mortor generally does not threaten wall stability in the near term, grout repair will extend the life of these walls.

Work orders for walls needing major repairs (replace elements or replace wall) generally include items such as foundation repair or replacement, fill voids, repair roadway shoulder, replace or extend retaining wall in either height or length, rebuild failed segments of walls, repair elements across 50% or more of the wall, remove and recompact backfill material, add scour protection (typically with riprap, concrete, or rock fill), and remove/reset culvert headwalls. Due to the large unit items associated with major repairs, recommendations vary by specific wall and are presented in Tier 3 of this report.

WIP identified 55 critically deficient walls nationally based on wall ratings less than 49 (poor/critical overall condition). The following table presents the walls in Olympic National Park that are on this list and have been elevated to the Park Regional Coordinators in a Regional Park Summary Memorandum. Generally, these are walls with major repair element recommendations that may be a priority for repair work in your park.

Table 6: Number of Walls by Route

Wall Identification	Failure Consequence(1)	Wall Rating(2)	Recommended Action(3)	2007 Repair Costs(4)
OLYM-0011-9.117-R	LOW	44	REPLACE WALL	$23,072

Notes: 1) Low consequence of failure and/or no recommended action may indicate repairs are not needed.
2) Wall ratings listed range from 0-49 (Poor/Critical).
3) Information was prepared for project planning purposes only. Actual repair work order scopes and actual costs will need to be evaluated based on current pay item unit prices for specific locations.
4) 2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Tier 2
Route Retaining Wall Overview

Olympic National Park

Federal Lands Highway
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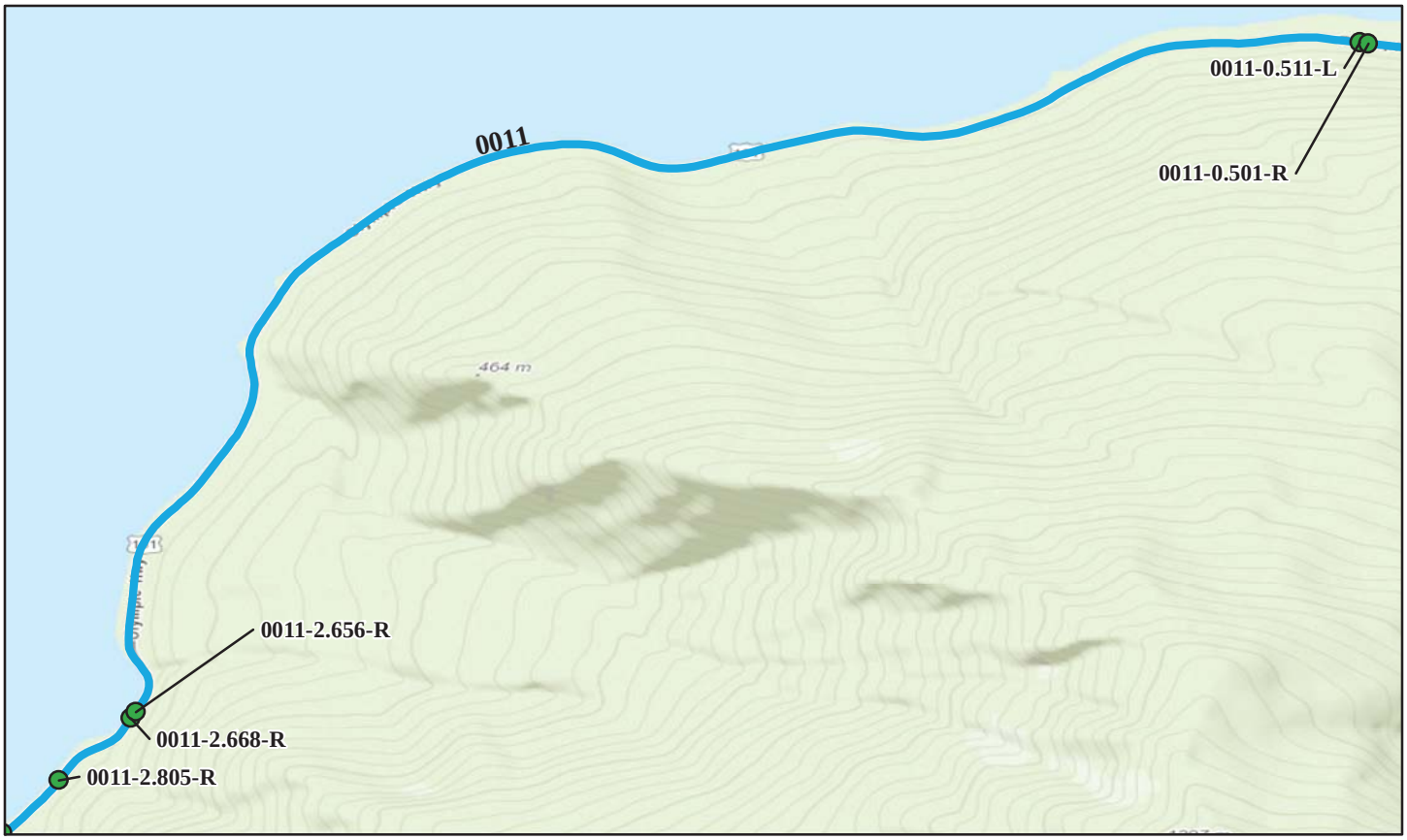
ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)



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Retaining Wall Condition Legend – Wall Condition Rating

Critical / Poor (0 - 49)	Fair (50 - 69)	Good to Excellent (70 - 100)	No Data

Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
OLYM-0011-0.501-R 7/19/2007	2,929	175	MSE - Welded Wire Face	Fill Wall	93	$0.00
OLYM-0011-0.511-L 7/19/2007	179	22	Cantilever - Concrete	Head Wall	88	$0.00
OLYM-0011-2.656-R 7/23/2007	200	17	Gravity - Mass Concrete	Fill Wall	81	$0.00
OLYM-0011-2.668-R 7/23/2007	132	21	Gravity - Gabion	Fill Wall	78	$6,600.00
OLYM-0011-2.805-R 7/23/2007	1,600	240	Gravity - Gabion	Fill Wall	90	$0.00

*2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

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Retaining Wall Condition Legend – Wall Condition Rating

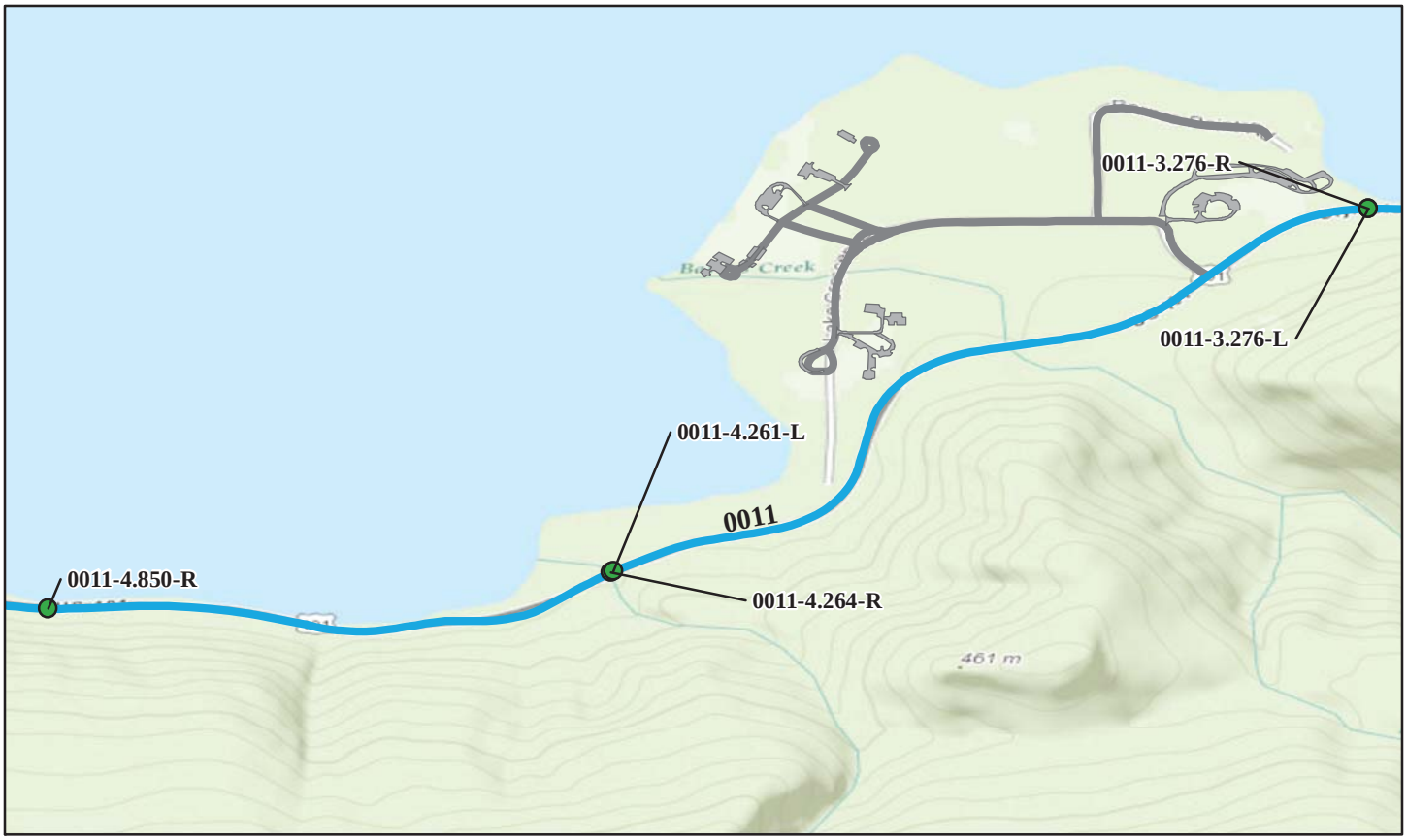
Critical / Poor (0 - 49)	Fair (50 - 69)	Good to Excellent (70 - 100)	No Data

Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
OLYM-0011-2.915-R 7/23/2007	1,313	184	Gravity - Gabion	Fill Wall	91	$0.00
OLYM-0011-2.968-R 7/23/2007	391	103	Gravity - Gabion	Fill Wall	91	$0.00
OLYM-0011-3.002-R 7/23/2007	1,244	227	Gravity - Gabion	Fill Wall	91	$0.00
OLYM-0011-3.094-R 7/23/2007	816	137	Gravity - Gabion	Fill Wall	81	$17,000.00
OLYM-0011-3.208-R 7/23/2007	486	115	Gravity - Gabion	Fill Wall	91	$0.00

*2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)



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Critical / Poor (0 - 49)	Fair (50 - 69)	Good to Excellent (70 - 100)	No Data

Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
OLYM-0011-3.276-L 7/19/2007	183	30	Gravity - Mortared Stone	Head Wall	98	$0.00
OLYM-0011-3.276-R 7/19/2007	183	60	Gravity - Mortared Stone	Head Wall	98	$0.00
OLYM-0011-4.261-L 7/19/2007	73	22	Cantilever - Concrete	Head Wall	97	$0.00
OLYM-0011-4.264-R 7/19/2007	69	24	Cantilever - Concrete	Head Wall	86	$0.00
OLYM-0011-4.850-R 7/23/2007	392	56	Gravity - Gabion	Fill Wall	83	$0.00

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Olympic National Park

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Critical / Poor (0 - 49)	Fair (50 - 69)	Good to Excellent (70 - 100)	No Data

Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
OLYM-0011-5.111-R 7/19/2007	74	22	Cantilever - Concrete	Head Wall	87	$0.00
OLYM-0011-5.112-L 7/19/2007	66	20	Cantilever - Concrete	Head Wall	99	$0.00
OLYM-0011-5.206-R 7/23/2007	2,320	298	Gravity - Gabion	Fill Wall	80	$0.00
OLYM-0011-5.277-R 7/23/2007	283	63	Gravity - Gabion	Fill Wall	81	$0.00
OLYM-0011-5.406-R 7/23/2007	1,480	293	Gravity - Gabion	Fill Wall	58	$31,840.00

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Olympic National Park

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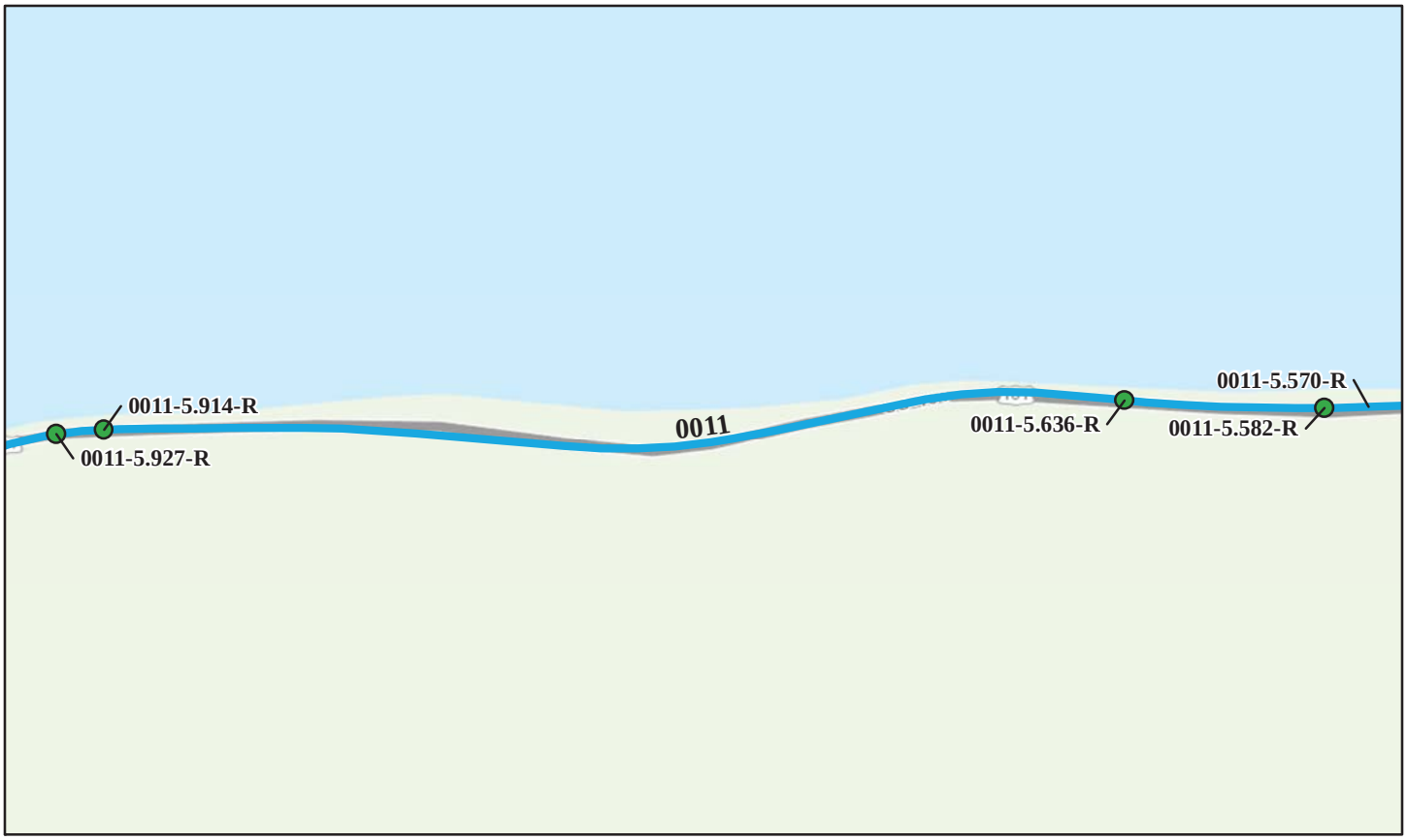

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Critical / Poor (0 - 49)	Fair (50 - 69)	Good to Excellent (70 - 100)	No Data

Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
OLYM-0011-5.570-R 7/23/2007	150	25	Gravity - Gabion	Fill Wall	54	$9,700.00
OLYM-0011-5.582-R 7/23/2007	320	80	Gravity - Gabion	Fill Wall	80	$0.00
OLYM-0011-5.636-R 7/23/2007	1,595	288	Gravity - Gabion	Fill Wall	83	$0.00
OLYM-0011-5.914-R 7/23/2007	238	42	Gravity - Gabion	Fill Wall	81	$0.00
OLYM-0011-5.927-R 7/23/2007	100	25	Gravity - Gabion	Fill Wall	84	$0.00

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Olympic National Park

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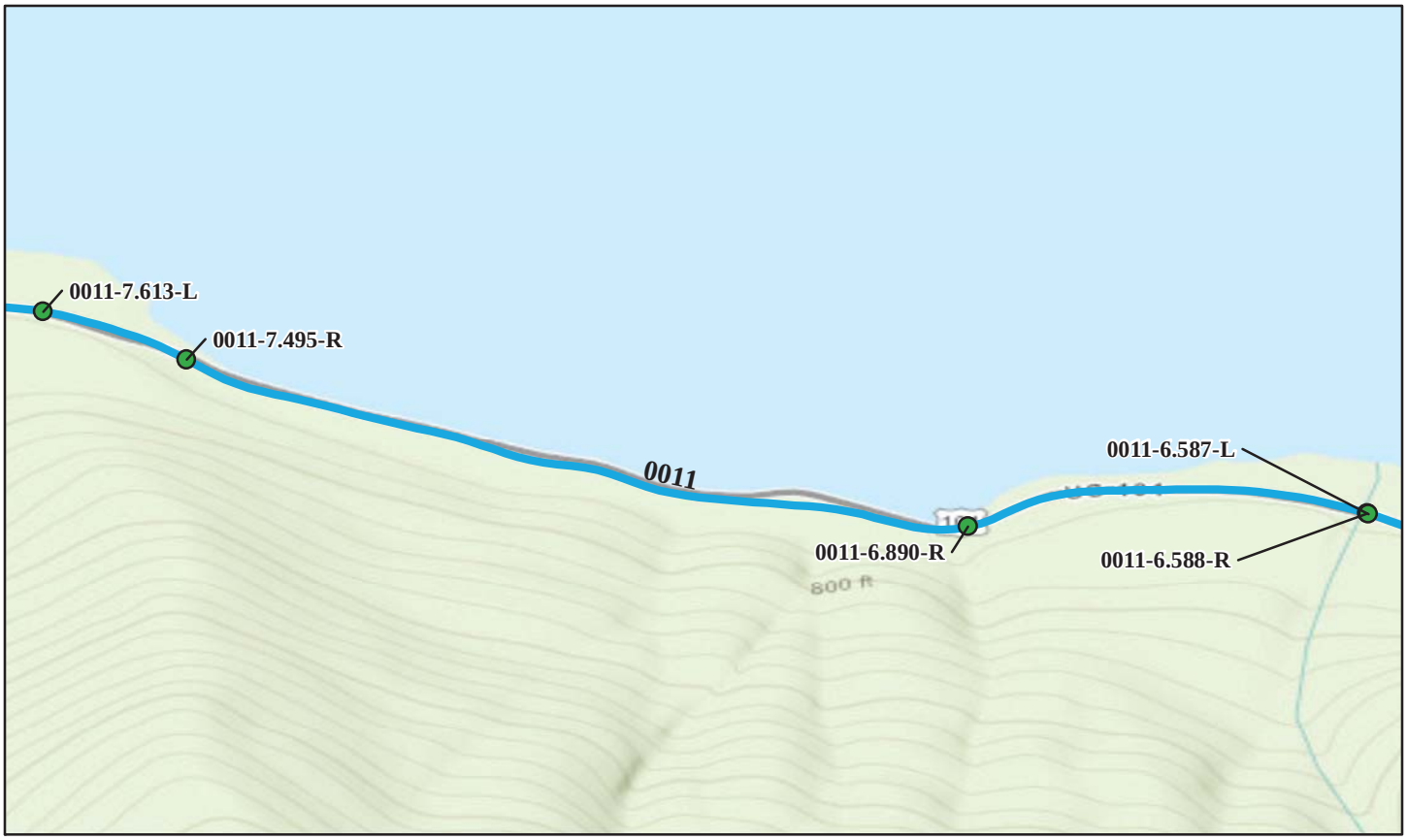

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Critical / Poor (0 - 49)	Fair (50 - 69)	Good to Excellent (70 - 100)	No Data

Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
OLYM-0011-6.587-L 7/19/2007	69	24	Cantilever - Concrete	Head Wall	90	$0.00
OLYM-0011-6.588-R 7/19/2007	88	30	Cantilever - Concrete	Head Wall	84	$0.00
OLYM-0011-6.890-R 7/23/2007	1,505	184	Gravity - Gabion	Fill Wall	81	$0.00
OLYM-0011-7.495-R 7/19/2007	54	24	Cantilever - Concrete	Head Wall	87	$0.00
OLYM-0011-7.613-L 7/19/2007	64	23	Cantilever - Concrete	Head Wall	93	$0.00

*2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

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Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
OLYM-0011-8.067-L 7/19/2007	64	21	Cantilever - Concrete	Head Wall	80	$2,500.00
OLYM-0011-8.067-R 7/19/2007	66	22	Cantilever - Concrete	Head Wall	83	$2,500.00
OLYM-0011-8.233-R 7/24/2007	364	104	Gravity - Gabion	Fill Wall	80	$0.00
OLYM-0011-8.449-R 7/24/2007	336	48	Crib - Concrete	Fill Wall	71	$0.00
OLYM-0011-8.492-R 7/24/2007	2,762	370	Gravity - Gabion	Fill Wall	71	$33,720.00

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Olympic National Park

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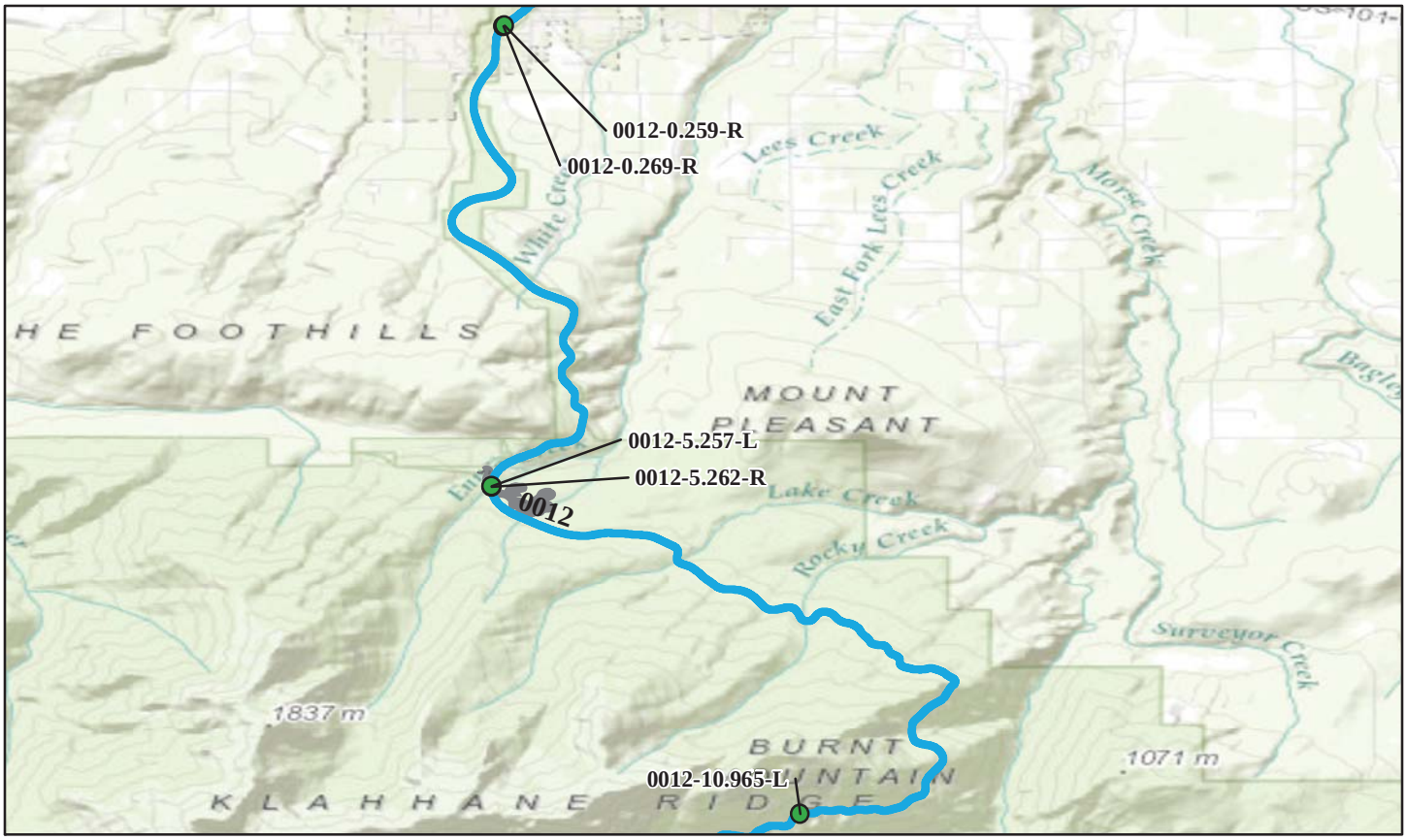
Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
OLYM-0011-8.690-R 7/24/2007	382	137	Gravity - Gabion	Fill Wall	67	$8,210.00
OLYM-0011-8.766-R 7/24/2007	700	100	Gravity - Gabion	Fill Wall	84	$0.00
OLYM-0011-9.117-R 7/24/2007	100	25	Crib - Concrete	Fill Wall	44	$23,072.00
OLYM-0011-10.253-R 7/24/2007	715	75	Cantilever - Concrete	Fill Wall	50	$110,000.00

*2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0012: HURRICANE RIDGE ROAD



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Critical / Poor (0 - 49)	Fair (50 - 69)	Good to Excellent (70 - 100)	No Data

Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
OLYM-0012-0.259-R 7/20/2007	5,060	375	MSE - Precast Panel	Fill Wall	91	$0.00
OLYM-0012-0.269-R 7/20/2007	4,460	266	MSE - Precast Panel	Fill Wall	83	$0.00
OLYM-0012-5.257-L 7/20/2007	80	27	Cantilever - Concrete	Head Wall	90	$0.00
OLYM-0012-5.262-R 7/20/2007	234	41	Cantilever - Concrete	Head Wall	94	$0.00
OLYM-0012-10.965-L 7/20/2007	670	93	Cantilever - Concrete	Fill Wall	78	$0.00

*2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0100: ELWHA 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

Retaining Wall Condition Legend – Wall Condition Rating

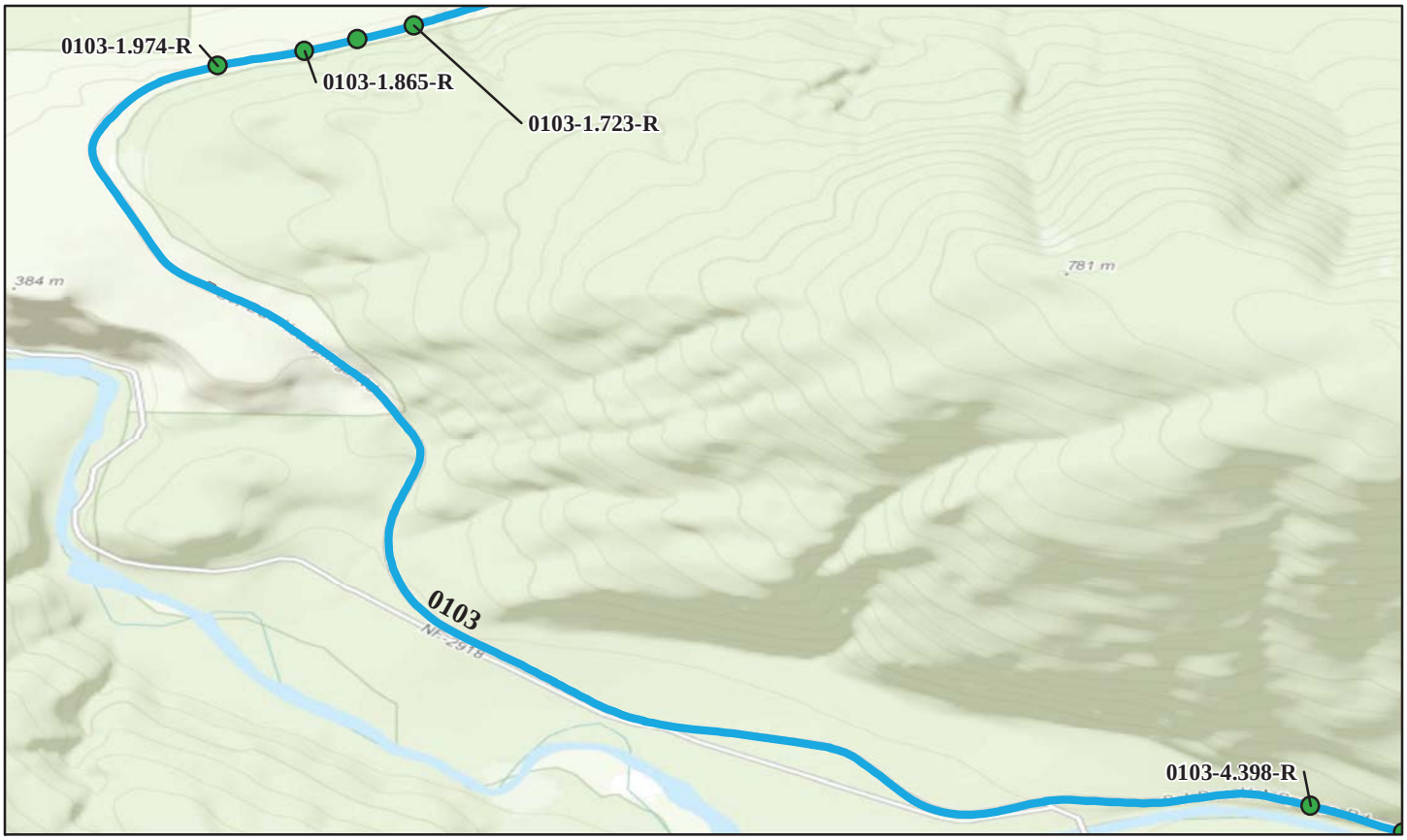
Critical / Poor (0 - 49)	Fair (50 - 69)	Good to Excellent (70 - 100)	No Data

Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
OLYM-0100-1.880-L 7/18/2007	90	24	Gravity - Mortared Stone	Head Wall	76	$0.00
OLYM-0100-3.396-R 7/19/2007	460	115	Cantilever - Soldier Pile	Cut Wall	81	$0.00

*2007 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

Retaining Wall Condition Legend – Wall Condition Rating

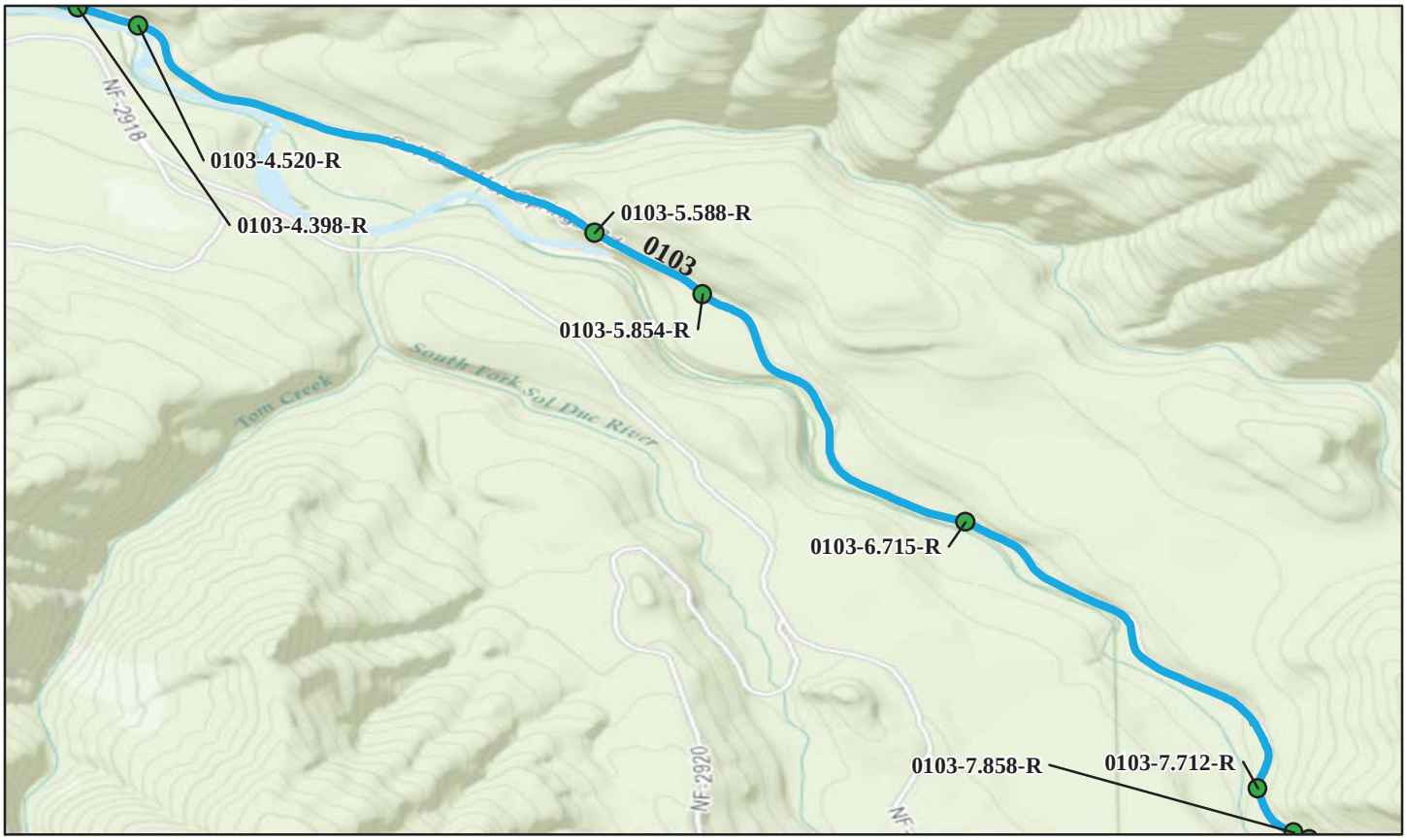
Critical / Poor (0 - 49)	Fair (50 - 69)	Good to Excellent (70 - 100)	No Data

Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
OLYM-0103-1.723-R 7/19/2007	1,631	251	Cantilever - Soldier Pile	Fill Wall	87	$0.00
OLYM-0103-1.797-R 7/19/2007	792	132	Cantilever - Soldier Pile	Fill Wall	88	$0.00
OLYM-0103-1.865-R 7/19/2007	196	87	Cantilever - Soldier Pile	Fill Wall	80	$0.00
OLYM-0103-1.974-R 7/19/2007	279	93	Cantilever - Soldier Pile	Fill Wall	84	$0.00
OLYM-0103-4.398-R 7/19/2007	126	28	Cantilever - Soldier Pile	Fill Wall	75	$0.00

*2007 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

Retaining Wall Condition Legend – Wall Condition Rating

Critical / Poor (0 - 49)	Fair (50 - 69)	Good to Excellent (70 - 100)	No Data

Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
OLYM-0103-4.520-R 7/19/2007	582	97	Cantilever - Soldier Pile	Fill Wall	80	$0.00
OLYM-0103-5.588-R 7/19/2007	723	257	Cantilever - Soldier Pile	Fill Wall	83	$0.00
OLYM-0103-5.854-R 7/19/2007	698	171	Cantilever - Soldier Pile	Fill Wall	83	$0.00
OLYM-0103-6.715-R 7/19/2007	3,095	262	MSE - Welded Wire Face	Fill Wall	89	$0.00
OLYM-0103-7.712-R 7/19/2007	2,548	394	Cantilever - Soldier Pile	Fill Wall	83	$0.00

*2007 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

Retaining Wall Condition Legend – Wall Condition Rating

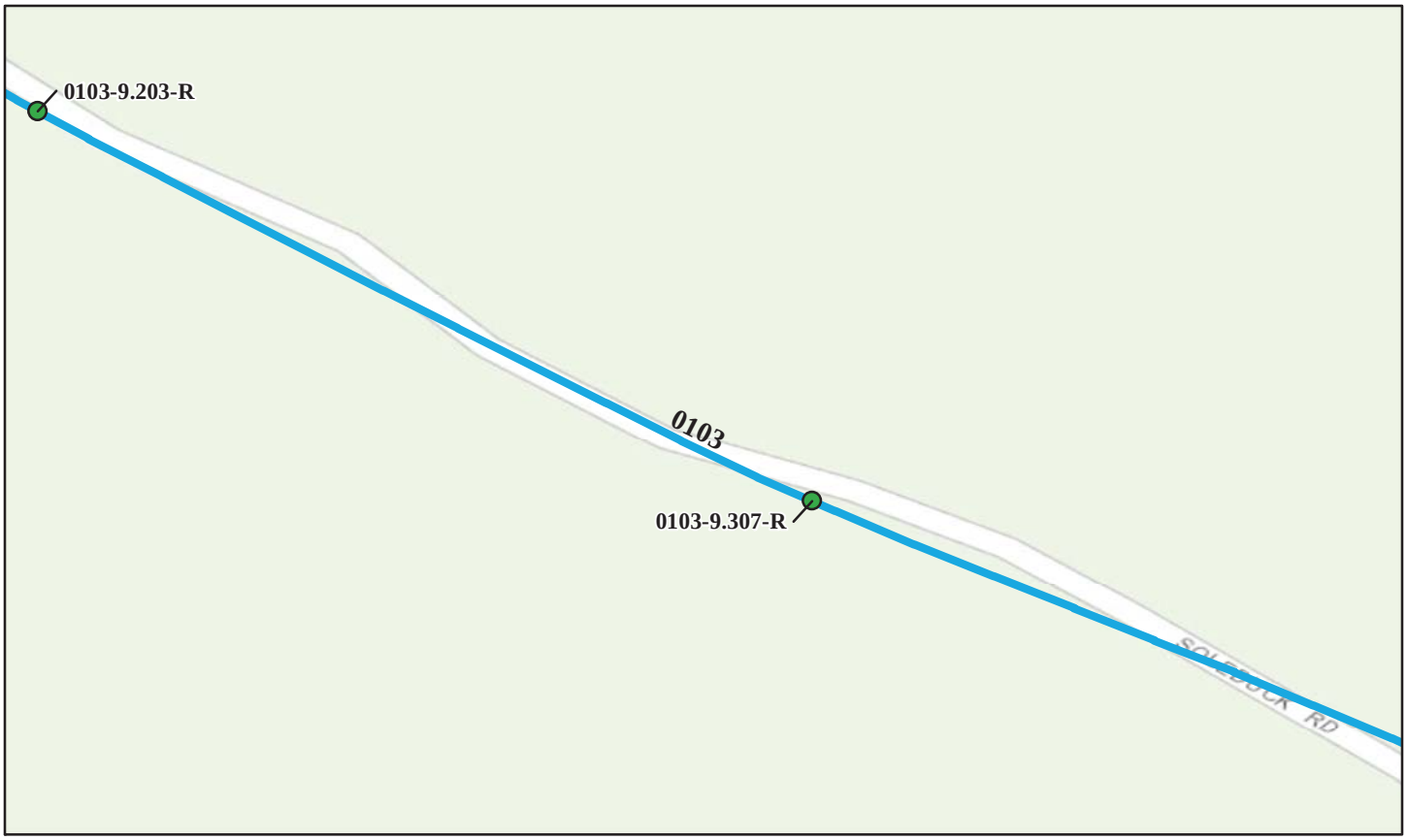
Critical / Poor (0 - 49)	Fair (50 - 69)	Good to Excellent (70 - 100)	No Data

Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
OLYM-0103-7.858-R 7/20/2007	372	149	Cantilever - Soldier Pile	Fill Wall	77	$0.00
OLYM-0103-7.892-R 7/20/2007	4,336	774	Cantilever - Soldier Pile	Fill Wall	80	$0.00
OLYM-0103-8.049-R 7/20/2007	232	58	Cantilever - Soldier Pile	Fill Wall	80	$0.00
OLYM-0103-8.074-R 7/20/2007	752	167	Cantilever - Soldier Pile	Fill Wall	80	$0.00
OLYM-0103-8.503-R 7/20/2007	1,350	230	Cantilever - Soldier Pile	Fill Wall	77	$440.00

*2007 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

Retaining Wall Condition Legend – Wall Condition Rating

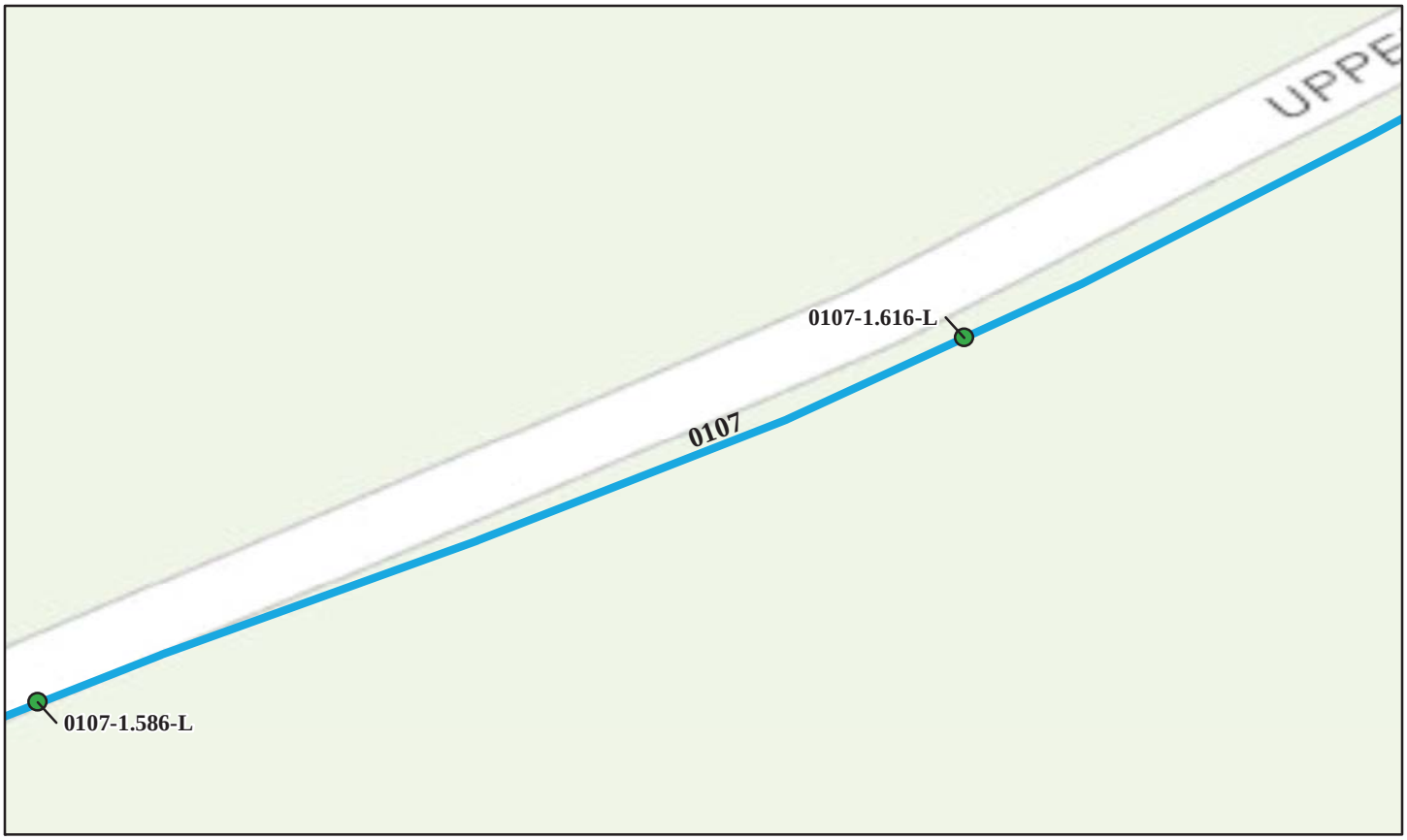
Critical / Poor (0 - 49)	Fair (50 - 69)	Good to Excellent (70 - 100)	No Data

Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
OLYM-0103-9.203-R 7/20/2007	2,235	460	Cantilever - Soldier Pile	Fill Wall	79	$3,320.00
OLYM-0103-9.307-R 7/20/2007	2,135	370	Cantilever - Soldier Pile	Fill Wall	80	$440.00

*2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0107: HOH ROAD



Retaining Wall Condition Legend – Wall Condition Rating

Critical / Poor (0 - 49)	Fair (50 - 69)	Good to Excellent (70 - 100)	No Data

Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
OLYM-0107-1.586-L 7/18/2007	487	80	Gravity - Dry Stone	Cut Wall	80	$2,650.00
OLYM-0107-1.616-L 7/18/2007	375	75	Gravity - Dry Stone	Cut Wall	88	$0.00

*2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Tier 3
Retaining Wall Details

Olympic National Park

Federal Lands Highway
Road Inventory Program

Wall ID:	**OLYM-0011-0.501-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 19, 2007	**Approximate Year Built:**	2000
***Wall Rating:**	93	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	MSE - Welded Wire Face
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	4 ft CMP extending into a supported half-pipe downdrain		

Wall Measurements

Wall Length (ft.):	175	**Face Area (sq.):**	2929
Average Wall Height (ft.):	16	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	29	**Vertical Offset (ft.):**	-1

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - wall performing as intended	9
WALL FOUNDATION MATERIAL 8.00	Bedrock	10
WIRE/GEOSYNTHETIC FACING 8.00	No distress, minimal vegetation on wall	9
DOWNSLOPE 0.50	Moderate to very steep, heavily vegetated	8
LATERAL SLOPE 0.50	Very steep, heavily vegetated	8
ROAD/SIDEWALK/SHOULDER 0.50	No distress	9
TRAFFIC BARRIER/FENCE 0.50	No distress	9
WALL DRAINS 0.50	None visible, no distress	9
CULVERT 0.50	4' steel pipe outlet	10

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_0.501_R_1.jpg

Wall ID:	**OLYM-0011-0.511-L**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 19, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	88	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Head Wall	**Primary Wall Type:**	Cantilever - Concrete
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	Shotcrete (nozzle finish)
General Description:	Cast In Place concrete headwall w/ shotcrete facing, 5 ditch drains (2 10 in, 3 2 in pvc,) enter catchment for 3 ft diameter. CMP		

Wall Measurements

Wall Length (ft.):	22	**Face Area (sq.):**	179
Average Wall Height (ft.):	8	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	8	**Vertical Offset (ft.):**	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good	9
WALL FOUNDATION MATERIAL 8.00	Bedrock	10
CONCRETE 8.00	CIP	8
SHOTCRETE 8.00	No distress	8
CULVERT 0.50	3' inlet, shortcreted	8
UPSLOPE 0.50	Wmbankment	9
DOWNSLOPE 0.50	Waterfall on bedrock	10
LATERAL SLOPE 0.50	Bedrock	10
WALL DRAINS 0.50	5 drains, all functional	10

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_0.511_L_1.jpg

Wall ID:	**OLYM-0011-2.656-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 23, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	81	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Gravity - Mass Concrete
Surface Treatment:		**Secondary Wall Type:**	Crib - Concrete
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Combination wall, face angle is stair stepped vertically		

Wall Measurements

Wall Length (ft.):	17	**Face Area (sq.):**	200
Average Wall Height (ft.):	11	**Face Angle (deg.):**	65
Maximum Wall Height (ft.):	12	**Vertical Offset (ft.):**	3

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - no distress	8
WALL FOUNDATION MATERIAL 8.00	Bedrock, boulders	9
BIN OR CRIB 8.00	Top two beams of crib are broken in middle, possibly from rockfall	7
CONCRETE 8.00	Cast in place, very good condition, crib concrete in fair condition	8
LATERAL SLOPE 0.50	Bedrock, boulders, fresh riprap repair uproad	9
ROAD/SIDEWALK/SHOULDER 0.50	No distress	9
TRAFFIC BARRIER/FENCE 0.50	No distress	9
WALL DRAINS 0.50	No distress	10

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_2.656_R_1.jpg

Wall ID:	**OLYM-0011-2.668-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 23, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	78	**Maintenance Action:**	Repair Elements

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Gravity - Gabion
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Good general wall		

Wall Measurements

Wall Length (ft.):	21	**Face Area (sq.):**	132
Average Wall Height (ft.):	6	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	7	**Vertical Offset (ft.):**	-2

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - Minor undercutting, still stable	8
WALL FOUNDATION MATERIAL 8.00	Angular colluvium	7
WIRE/GEOSYNTHETIC FACING 8.00	Wire in good condition	8
UPSLOPE 0.50	Vegetated	9
WALL DRAINS 0.50	No distress	9
ROAD/SIDEWALK/SHOULDER 0.50	No distress	10
TRAFFIC BARRIER/FENCE 0.50	Guardrail in good condition	10
LATERAL SLOPE 1.00	Moderate erosion at base of wall, no riprap, still stable	7

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	Toe protection: Riprap, 30cy * $120/cy = $3000. Excavator- 8hrs * $195/hr = $1560. Site prep - 4hrs * $55/hr = $220. Traffic control, 8hrs * $150/hr = $1200. $3000+$1560+$1200+$220 = $6580, or about $6600
Repair Cost:	$6,600

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_2.668_R_1.jpg

OLYM_0011_2.668_R_2.jpg

Wall ID:	**OLYM-0011-2.805-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 23, 2007	**Approximate Year Built:**	1984
***Wall Rating:**	90	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Gravity - Gabion
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	West half of wall masked w/ thick fir tree growth		

Wall Measurements

Wall Length (ft.):	240	**Face Area (sq.):**	1600
Average Wall Height (ft.):	6	**Face Angle (deg.):**	78
Maximum Wall Height (ft.):	11	**Vertical Offset (ft.):**	-2

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Very good condition, minor tension crack in pavement	9
WALL FOUNDATION MATERIAL 8.00	Colluviun, wall base is located 10-11 ft above summer lake level	9
WIRE/GEOSYNTHETIC FACING 8.00	Very good condition	9
DOWNSLOPE 0.50	Stable down to wave impact zone 8' below wall foundation	8
ROAD/SIDEWALK/SHOULDER 0.50	One 1/8" tension crack in pavement at 50' to 175' of wall	8
LATERAL SLOPE 0.50	Stable, no distress	9
TRAFFIC BARRIER/FENCE 0.50	Very good condition	9
WALL DRAINS 0.50	No distress	9

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_2.805_R_1.jpg

OLYM_0011_2.805_R_2.jpg

Wall ID:	**OLYM-0011-2.915-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 23, 2007	**Approximate Year Built:**	1984
***Wall Rating:**	91	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Gravity - Gabion
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Last 60 ft is one basket (3 ft) high		

Wall Measurements

Wall Length (ft.):	184	**Face Area (sq.):**	1313
Average Wall Height (ft.):	7	**Face Angle (deg.):**	78
Maximum Wall Height (ft.):	10	**Vertical Offset (ft.):**	-2

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - No distress	9
WALL FOUNDATION MATERIAL 8.00	Stable colluvium, ~10' above summer water level	9
WIRE/GEOSYNTHETIC FACING 8.00	Very good condition	9
DOWNSLOPE 0.50	Well vegetated, stable	9
ROAD/SIDEWALK/SHOULDER 0.50	Tension crack, acute at wall start, shoulder to centerline, 30' long overall	9
LATERAL SLOPE 0.50	Stable, large trees	10
TRAFFIC BARRIER/FENCE 0.50	Guardrail, v good condition	10
WALL DRAINS 0.50	No distress	10

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_2.915_R_1.jpg

Wall ID:	**OLYM-0011-2.968-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 23, 2007	**Approximate Year Built:**	1984
***Wall Rating:**	91	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Gravity - Gabion
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Heavily masked w/ vegetation		

Wall Measurements

Wall Length (ft.):	103	**Face Area (sq.):**	391
Average Wall Height (ft.):	3	**Face Angle (deg.):**	80
Maximum Wall Height (ft.):	6	**Vertical Offset (ft.):**	-1

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Very good condition, performing as designed	9
WALL FOUNDATION MATERIAL 8.00	Colluvium, stable	9
WIRE/GEOSYNTHETIC FACING 8.00	Very good condition	9
DOWNSLOPE 0.50	Stable below toe to wave cut zone, well vegetated	9
ROAD/SIDEWALK/SHOULDER 0.50	Arcuate tension crack, 50' long, shoulder to fogline	9
LATERAL SLOPE 0.50	Stable, no distress	10
TRAFFIC BARRIER/FENCE 0.50	Guardrail	10
WALL DRAINS 0.50	No distress	10

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_2.968_R_1.jpg

Wall ID:	**OLYM-0011-3.002-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 23, 2007	**Approximate Year Built:**	1984
***Wall Rating:**	91	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Gravity - Gabion
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Frst 20 ft is buried		

Wall Measurements

Wall Length (ft.):	227	**Face Area (sq.):**	1244
Average Wall Height (ft.):	5	**Face Angle (deg.):**	85
Maximum Wall Height (ft.):	10	**Vertical Offset (ft.):**	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - No distress	9
WALL FOUNDATION MATERIAL 8.00	Colluvium	9
WIRE/GEOSYNTHETIC FACING 8.00	Very good condition	9
VEGETATION 0.50	One alder rooted in wall face, heavily vegetated at and below wall toe	9
LATERAL SLOPE 0.50	Stable, vegetated, no distress	10
ROAD/SIDEWALK/SHOULDER 0.50	Excellent	10
TRAFFIC BARRIER/FENCE 0.50	No distress	10
WALL DRAINS 0.50	No distress	10

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_3.002_R_1.jpg

OLYM_0011_3.002_R_2.jpg

Wall ID:	**OLYM-0011-3.094-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 23, 2007	**Approximate Year Built:**	1984
***Wall Rating:**	81	**Maintenance Action:**	Repair Elements

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Gravity - Gabion
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Storm waves recently exposed 7 ft long section of gabion foundation		

Wall Measurements

Wall Length (ft.):	137	**Face Area (sq.):**	816
Average Wall Height (ft.):	5	**Face Angle (deg.):**	85
Maximum Wall Height (ft.):	7	**Vertical Offset (ft.):**	-2

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Fair condition, some riprap reinforcement is recommended.	8
WALL FOUNDATION MATERIAL 8.00	Colluvium, 10 ft section exposed by erosion	7
WIRE/GEOSYNTHETIC FACING 8.00	Very good condition	9
CULVERT 0.50	1.5' CMP outlet has invert at 3' below top of wall at 66' ahead of start of wall, outlet in good condition	9
LATERAL SLOPE 0.50	Stable, well vegetated	9
ROAD/SIDEWALK/SHOULDER 0.50	Minor 1/16"crack in right wheel path	9
TRAFFIC BARRIER/FENCE 0.50	Very good condition	10
WALL DRAINS 0.50	No distress	10
DOWNSLOPE 1.00	Wave erosion exposed wall base for 8' in center portion of wall	6

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	Place class 6 riprap from low lake water level to 2' above wall foundation. Riprap, 120cy * $120/cy = $14400. Traffic control, 8hrs = $1200. Excavator, 8hrs * $150 = $1200. Sit prep bush removal (2men, 2hrs), 4hrs * $55/hr = $220. $14400+$1200+$1200+$220 = $17020
Repair Cost:	$17,000

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_3.094_R_1.jpg

Wall ID:	**OLYM-0011-3.208-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 23, 2007	**Approximate Year Built:**	1984
***Wall Rating:**	91	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Gravity - Gabion
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	A solid wall		

Wall Measurements

Wall Length (ft.):	115	**Face Area (sq.):**	486
Average Wall Height (ft.):	4	**Face Angle (deg.):**	80
Maximum Wall Height (ft.):	6	**Vertical Offset (ft.):**	-3

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - No distress	9
WALL FOUNDATION MATERIAL 8.00	Stable colluvium	9
WIRE/GEOSYNTHETIC FACING 8.00	Very good condition	9
DOWNSLOPE 0.50	Minor wave action at beach below wall toe	9
LATERAL SLOPE 0.50	Stable, well vegetated	10
ROAD/SIDEWALK/SHOULDER 0.50	No distress	10
TRAFFIC BARRIER/FENCE 0.50	No distress	10
WALL DRAINS 0.50	No distress	10

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	None
Repair Cost:	$0

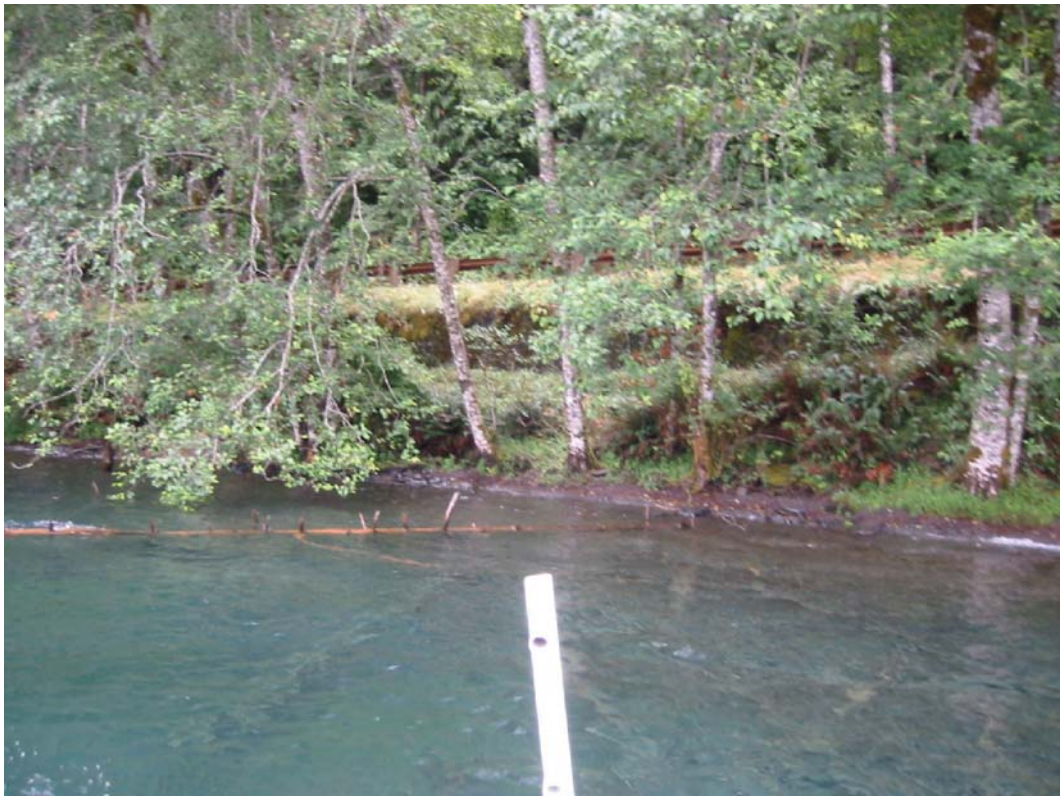
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_3.208_R_1.jpg



OLYM_0011_3.208_R_2.jpg

Wall ID:	**OLYM-0011-3.276-L**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 19, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	98	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Head Wall	**Primary Wall Type:**	Gravity - Mortared Stone
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Pedestrian underpass		

Wall Measurements

Wall Length (ft.):	30	**Face Area (sq.):**	183
Average Wall Height (ft.):	6	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	10	**Vertical Offset (ft.):**	-4

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - wall performing as intended	10
WALL FOUNDATION MATERIAL 8.00	Soil	10
MORTAR 8.00	Excellent condition	9
STONE MASONRY 8.00	No distress	10
WALL DRAINS 0.50	No distress	9
CULVERT 0.50	No distress	10
DOWNSLOPE 0.50	Stable, low angle, pathway	10
LATERAL SLOPE 0.50	Vegetated embankment	10
ROAD/SIDEWALK/SHOULDER 0.50	No distress	10

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

Condition photos are not available for OLYM-0011-3.276-L.

Wall ID:	**OLYM-0011-3.276-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 19, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	98	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Head Wall	**Primary Wall Type:**	Gravity - Mortared Stone
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Pedestrian underpass		

Wall Measurements

Wall Length (ft.):	60	**Face Area (sq.):**	183
Average Wall Height (ft.):	3	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	10	**Vertical Offset (ft.):**	-4

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Excellent - wall performing as intended	10
WALL FOUNDATION MATERIAL 8.00	Soil	10
MORTAR 8.00	Excellent condition	9
STONE MASONRY 8.00	No distress	10
WALL DRAINS 0.50	No distress	9
CULVERT 0.50	No distress	10
DOWNSLOPE 0.50	Low angle, stable, pathway	10
LATERAL SLOPE 0.50	Vegetated embankment	10
ROAD/SIDEWALK/SHOULDER 0.50	No distress	10

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_3.276_R_1.jpg

Wall ID:	**OLYM-0011-4.261-L**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 19, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	97	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Head Wall	**Primary Wall Type:**	Cantilever - Concrete
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	6 ft x 6 ft CIP concrete culvert inlet		

Wall Measurements

Wall Length (ft.):	22	**Face Area (sq.):**	73
Average Wall Height (ft.):	3	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	6	**Vertical Offset (ft.):**	-1

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - wall performing as intended	10
WALL FOUNDATION MATERIAL 8.00	Streambed	9
CONCRETE 8.00	No distress	10
DOWNSLOPE 0.50	Streambed	9
LATERAL SLOPE 0.50	Vegetated soil	9
UPSLOPE 0.50	Vegetated	10
WALL DRAINS 0.50	No distress	10

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_4.261_L_1.jpg

Wall ID:	**OLYM-0011-4.264-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 19, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	86	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Head Wall	**Primary Wall Type:**	Cantilever - Concrete
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	6 ft x 6 ft CIP concrete culvert outlet		

Wall Measurements

Wall Length (ft.):	24	**Face Area (sq.):**	69
Average Wall Height (ft.):	2	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	6	**Vertical Offset (ft.):**	-4

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - wall performing as intended	9
WALL FOUNDATION MATERIAL 8.00	Riverbed, sandy silty gravel, stable	8
CONCRETE 8.00	No distress	9
CULVERT 0.50	No distress	9
LATERAL SLOPE 0.50	Gentle slope, vegetated, stable	9
WALL DRAINS 0.50	None, no distress	9
ROAD/SIDEWALK/SHOULDER 0.50	No distress	10
DOWNSLOPE 1.00	Riverbed, seasonally high flow obvious, massive erosion downstream	7

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_4.264_R_1.jpg

Wall ID:	**OLYM-0011-4.850-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 23, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	83	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Gravity - Gabion
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Gabion wall along lake shore, slight lean of gabion basket out to about 95%		

Wall Measurements

Wall Length (ft.):	56	**Face Area (sq.):**	392
Average Wall Height (ft.):	7	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	7	**Vertical Offset (ft.):**	-1

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Excellent - wall is performing as intended	8
WALL FOUNDATION MATERIAL 8.00	Firm beach deposits, no distress noted	9
WIRE/GEOSYNTHETIC FACING 8.00	Galvanized wire, some broken wires, no distress noted	8
ROAD/SIDEWALK/SHOULDER 0.50	Road as new condition shoulder is uneven grass covered	8
WALL DRAINS 0.50	No distress noted	9
LATERAL SLOPE 1.00	Moderate erosion of slope	7

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_4.850_R_1.jpg

Wall ID:	**OLYM-0011-5.111-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 19, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	87	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Head Wall	**Primary Wall Type:**	Cantilever - Concrete
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	6 ft x 6 ft CIP concrete culvert outlet, face area approx.		

Wall Measurements

Wall Length (ft.):	22	**Face Area (sq.):**	74
Average Wall Height (ft.):	3	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	7	**Vertical Offset (ft.):**	-3

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - wall performing as intended	9
WALL FOUNDATION MATERIAL 8.00	Riverbed	8
CONCRETE 8.00	No distress	9
DOWNSLOPE 0.50	Riverbed, seasonal high flows, massive erosion downstream	8
WALL DRAINS 0.50	None, no distress	8
LATERAL SLOPE 0.50	Highly vegetated, gentle slope, rock + soil	9
ROAD/SIDEWALK/SHOULDER 0.50	No distress	9
TRAFFIC BARRIER/FENCE 0.50	No distress	9
CULVERT 0.50	No distress	10

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_5.111_R_1.jpg

Wall ID:	**OLYM-0011-5.112-L**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 19, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	99	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Head Wall	**Primary Wall Type:**	Cantilever - Concrete
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	6 ft x 6 ft CIP concrete culvert inlet, face area approx.		

Wall Measurements

Wall Length (ft.):	20	**Face Area (sq.):**	66
Average Wall Height (ft.):	3	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	7	**Vertical Offset (ft.):**	-1

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - wall performing as intended	10
WALL FOUNDATION MATERIAL 8.00	Streambed material	10
CONCRETE 8.00	Minor spalling from recent fill/riprap replacement	10
LATERAL SLOPE 0.50	Vegetated, new fill + riprap on left side	8
UPSLOPE 0.50	Erosion	8
DOWNSLOPE 0.50	Streambed	9
WALL DRAINS 0.50	No distress	9
ROAD/SIDEWALK/SHOULDER 0.50	No distress	10
TRAFFIC BARRIER/FENCE 0.50	No distress	10

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_5.112_L_1.jpg

Wall ID:	**OLYM-0011-5.206-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 23, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	80	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Gravity - Gabion
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Gabion wall along lake shore, buttress at start of wall consisting of 4 ft riprap with culverts, also a riprap buttress at 230 ft to the end of wall		

Wall Measurements

Wall Length (ft.):	298	**Face Area (sq.):**	2320
Average Wall Height (ft.):	7	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	10	**Vertical Offset (ft.):**	-2

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Excellent - wall performing as intended	8
WALL FOUNDATION MATERIAL 8.00	No distress noted, firm beach deposit, no underminining	9
WIRE/GEOSYNTHETIC FACING 8.00	Galvanized wire in good condition 20% of rock is degrading to soil	7
LATERAL SLOPE 0.50	Buttressed with riprap, no distress noted	8
ROAD/SIDEWALK/SHOULDER 0.50	No road distress noted shoulde is well vegitated, no distress noted	9
WALL DRAINS 0.50	No distress noted	9

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_5.206_R_1.jpg

OLYM_0011_5.206_R_2.jpg

Wall ID:	**OLYM-0011-5.277-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 23, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	81	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Gravity - Gabion
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Gabion wall with riprap buttress		

Wall Measurements

Wall Length (ft.):	63	**Face Area (sq.):**	283
Average Wall Height (ft.):	4	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	6	**Vertical Offset (ft.):**	-2

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Excellent - wall performing as intended	8
WALL FOUNDATION MATERIAL 8.00	Stabel riprap material	9
WIRE/GEOSYNTHETIC FACING 8.00	Galvanized wire 20% of rock degrading	7
DOWNSLOPE 0.50	Angular riprap material, well interlocked	9
LATERAL SLOPE 0.50	Riprap butress, no distress noted	9
ROAD/SIDEWALK/SHOULDER 0.50	Road is as new shoulder is wel vegitated no distess noted in either	9
WALL DRAINS 0.50	No distress noted	9

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_5.277_R_1.jpg

OLYM_0011_5.277_R_2.jpg

Wall ID:	**OLYM-0011-5.406-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 23, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	58	**Maintenance Action:**	Repair Elements

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Gravity - Gabion
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Gabion fill wall, 24 ft section near start is bulging and wire is rusting out, 30 ft section near end is toppling		

Wall Measurements

Wall Length (ft.):	293	**Face Area (sq.):**	1480
Average Wall Height (ft.):	5	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	7	**Vertical Offset (ft.):**	-2

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Poor- wall is in poor condition, needs to be repaired	6
WALL FOUNDATION MATERIAL 8.00	Riprap and beach deposits, some undermining (10-20%)	6
WIRE/GEOSYNTHETIC FACING 8.00	Baskets are bulging, some rusted wire, tipping over of baskets, some degrading of rock	5
LATERAL SLOPE 0.50	Well vegitated slope	8
ROAD/SIDEWALK/SHOULDER 1.00	Road- no distress noted shoulder- sluffing and creeping, bad shape	4
DOWNSLOPE 0.50	Riprap and rocky beach deposit	9
WALL DRAINS 0.50	No distress noted	9
CULVERT 1.00	24" concrete culvert, half full of rock	6

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	Place riprap along wall (class 6) - 133 cuyd riprap @ $120.00 cuyd =$15,960, 24 hrs excavator @ $150.00 hr = $3,600. 2 laborers 48hrs @ $ 55.00 hr = $2,640. 2 dumptrucks 72 hrs@ $120.00hr = $ 8,640. Traffic control@ 3% = $1,000
Repair Cost:	$31,840

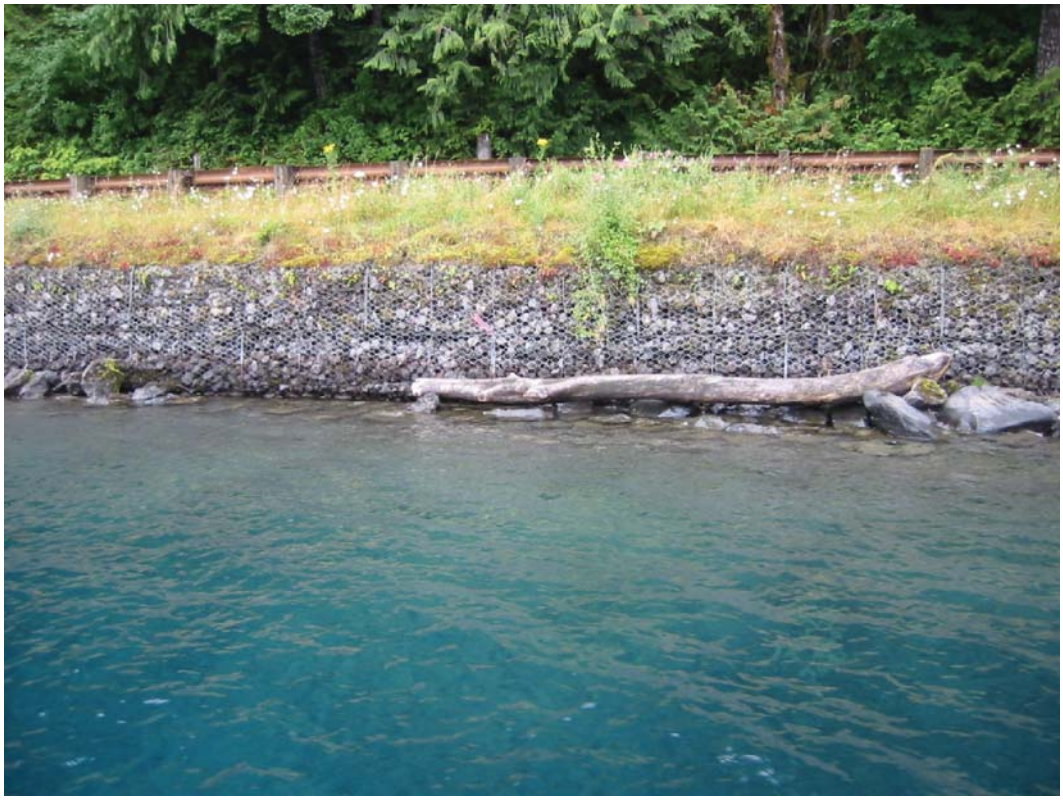
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_5.406_R_1.jpg



OLYM_0011_5.406_R_2.jpg

Wall ID:	**OLYM-0011-5.570-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 23, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	54	**Maintenance Action:**	Repair Elements

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Gravity - Gabion
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Gabion fill wall along lake shore is toppling and undermining		

Wall Measurements

Wall Length (ft.):	25	**Face Area (sq.):**	150
Average Wall Height (ft.):	6	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	6	**Vertical Offset (ft.):**	-3

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Poor- wall needs repair	4
WALL FOUNDATION MATERIAL 8.00	Underminging under most of wall, lake shore material	5
WIRE/GEOSYNTHETIC FACING 8.00	Face is bulging, appears deformed, baskets are toppling	7
ROAD/SIDEWALK/SHOULDER 1.00	Shoulder is failing, has grassy vegitation covering	4
WALL DRAINS 0.50	No distress noted	9
LATERAL SLOPE 1.00	Failing at start of wall riprap bank protection at end of wall	6

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	Place riprap along length of wall (class 6 riprap). Riprap- 45cuyd @ $120.00 cuyd = $5,400. Excavator- 8hrs @ $150.00hr = $1,200. 2 laborers- 16 hrs @ $55.00 hr = $880.00. 2 dumptrucks- 16hrs @ $120.00hr = $1,920.00. Traffic control = 3% of ee = $300.00.
Repair Cost:	$9,700

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_5.570_R_1.jpg

Wall ID:	**OLYM-0011-5.582-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 23, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	80	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Gravity - Gabion
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Gabion wall along lake shore with rip rap toe		

Wall Measurements

Wall Length (ft.):	80	**Face Area (sq.):**	320
Average Wall Height (ft.):	4	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	4	**Vertical Offset (ft.):**	-2

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - wall performing as intended	8
WALL FOUNDATION MATERIAL 8.00	No distress noted, rip rap material	9
WIRE/GEOSYNTHETIC FACING 8.00	Some bulging and irregularity not affecting wall performance	7
DOWNSLOPE 0.50	Rip rap to lake, well interlocked	8
LATERAL SLOPE 0.50	Rip rap- moss covered appears stable	8
ROAD/SIDEWALK/SHOULDER 0.50	Road- small overlayed area, no distress shoulder- well vegitated	9
WALL DRAINS 0.50	No signs of distress noted	9

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_5.582_R_1.jpg

OLYM_0011_5.582_R_2.jpg

Wall ID:	**OLYM-0011-5.636-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 23, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	83	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Gravity - Gabion
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Gabion wall along lake shore with rip rap at toe		

Wall Measurements

Wall Length (ft.):	288	**Face Area (sq.):**	1595
Average Wall Height (ft.):	5	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	6	**Vertical Offset (ft.):**	-1

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - wall performing as intended	8
WALL FOUNDATION MATERIAL 8.00	Firm beach deposits and rip rap	9
WIRE/GEOSYNTHETIC FACING 8.00	Wire is in good shape, minor bulging, irregular rock degradation	8
DOWNSLOPE 0.50	Beach deposit and rip rap, appears stable	8
LATERAL SLOPE 0.50	Rip rap and heavy vegitation	8
ROAD/SIDEWALK/SHOULDER 0.50	Road- no distress noted shoulder- no distress, well vegitated	9
WALL DRAINS 0.50	No distress noted	9

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_5.636_R_1.jpg

OLYM_0011_5.636_R_2.jpg

Wall ID:	**OLYM-0011-5.914-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 23, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	81	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Gravity - Gabion
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Gabion wall along lake, in generally good condition		

Wall Measurements

Wall Length (ft.):	42	**Face Area (sq.):**	238
Average Wall Height (ft.):	5	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	6	**Vertical Offset (ft.):**	-1

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - wall performing as intended	8
WALL FOUNDATION MATERIAL 8.00	Rip rap and gravel beach deposits	9
WIRE/GEOSYNTHETIC FACING 8.00	Some irregularity to face, 10% rock degradation	7
LATERAL SLOPE 0.50	Heavily vegitated, rip rap	8
DOWNSLOPE 0.50	Beach gravel and rip rap, stable	9
ROAD/SIDEWALK/SHOULDER 0.50	Road- no distress noted shoulder- grass covered no distress noted	9
WALL DRAINS 0.50	No distress noted	9

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_5.914_R_1.jpg

Wall ID:	**OLYM-0011-5.927-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 23, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	84	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Gravity - Gabion
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Small gabion wall along lake shore with riprap along base of wall		

Wall Measurements

Wall Length (ft.):	25	**Face Area (sq.):**	100
Average Wall Height (ft.):	4	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	4	**Vertical Offset (ft.):**	-1

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Excellent - wall performing as intended	8
WALL FOUNDATION MATERIAL 8.00	Rip rap material, no apparent distress	9
WIRE/GEOSYNTHETIC FACING 8.00	Galvinized wire in good condition, some degrading of rock	8
DOWNSLOPE 0.50	Rip rap material that appears stable	9
LATERAL SLOPE 0.50	Heavily vegitated embankment, appears stabel	9
ROAD/SIDEWALK/SHOULDER 0.50	Road- no distress noted shoulder- grass covered, no distress	9
WALL DRAINS 0.50	No distress noted	9

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_5.927_R_1.jpg

Wall ID:	**OLYM-0011-6.587-L**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 19, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	90	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Head Wall	**Primary Wall Type:**	Cantilever - Concrete
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	8 ft x 8 ft CIP concrete culvert inlet, face area approx.		

Wall Measurements

Wall Length (ft.):	24	**Face Area (sq.):**	69
Average Wall Height (ft.):	2	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	9	**Vertical Offset (ft.):**	-1

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - Minor distress in left wing	9
WALL FOUNDATION MATERIAL 8.00	Alluvium (streambed)	10
CONCRETE 8.00	2 cracks w/ leaching	8
DOWNSLOPE 0.50	Streambed uphill 30% gradient	8
LATERAL SLOPE 0.50	Vegetated w/ riprap behind left wing	8
ROAD/SIDEWALK/SHOULDER 0.50	No distress	10
UPSLOPE 0.50	No distress	10
WALL DRAINS 0.50	No distress	10

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_6.587_L_1.jpg

Wall ID:	**OLYM-0011-6.588-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 19, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	84	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Head Wall	**Primary Wall Type:**	Cantilever - Concrete
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	8 ft x 8 ft CIP concrete culvert outlet		

Wall Measurements

Wall Length (ft.):	30	**Face Area (sq.):**	88
Average Wall Height (ft.):	2	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	9	**Vertical Offset (ft.):**	-4

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - wall performing as intended	9
WALL FOUNDATION MATERIAL 8.00	Riverbed soil +rock, minor undermining at foot of sill, 6"-8" w/ cracks, but does not affect stability of wall	7
CONCRETE 8.00	No distress	9
LATERAL SLOPE 0.50	Highly vegetated, stable	9
TRAFFIC BARRIER/FENCE 0.50	No distress	9
WALL DRAINS 0.50	None, no distress	9
CULVERT 0.50	No distress	10
DOWNSLOPE 1.00	Riverbed, seasonally high flows, massive erosion downstream	7

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_6.588_R_1.jpg

OLYM_0011_6.588_R_2.jpg

Wall ID:	**OLYM-0011-6.890-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 23, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	81	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Gravity - Gabion
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Gabion wall along lake shore		

Wall Measurements

Wall Length (ft.):	184	**Face Area (sq.):**	1505
Average Wall Height (ft.):	8	**Face Angle (deg.):**	85
Maximum Wall Height (ft.):	11	**Vertical Offset (ft.):**	-2

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Excellent, wall performing as intended	8
WALL FOUNDATION MATERIAL 8.00	Solid riprap material, no distress noted	9
WIRE/GEOSYNTHETIC FACING 8.00	Galvanized wire some bulging and irregular face	7
LATERAL SLOPE 0.50	Riprap embankment fill, good condition	8
DOWNSLOPE 0.50	Riprap and beach ravel appears stable	9
ROAD/SIDEWALK/SHOULDER 0.50	No distress in road or shoulder	9
WALL DRAINS 0.50	No distress noted	9

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_6.890_R_1.jpg

Wall ID:	**OLYM-0011-7.495-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 19, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	87	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Head Wall	**Primary Wall Type:**	Cantilever - Concrete
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	6 ft x 6 ft CIP concrete culvert outlet		

Wall Measurements

Wall Length (ft.):	24	**Face Area (sq.):**	54
Average Wall Height (ft.):	2	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	7	**Vertical Offset (ft.):**	-4

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - wall performing as intended	9
WALL FOUNDATION MATERIAL 8.00	Fast moving streambed, appears stable	8
CONCRETE 8.00	No distress	9
DOWNSLOPE 0.50	River, 1' deep no distress	8
LATERAL SLOPE 0.50	1:1, vegetated	9
WALL DRAINS 0.50	None, no distress	9
CULVERT 0.50	No distress	10
ROAD/SIDEWALK/SHOULDER 0.50	No distress	10

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

Condition photos are not available for OLYM-0011-7.495-R.

Wall ID:	**OLYM-0011-7.613-L**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 19, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	93	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Head Wall	**Primary Wall Type:**	Cantilever - Concrete
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	6 ft x 6 ft CIP concrete culvert inlet, box skewed 20 deg to road		

Wall Measurements

Wall Length (ft.):	23	**Face Area (sq.):**	64
Average Wall Height (ft.):	2	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	7	**Vertical Offset (ft.):**	-1

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - wall performing as intended	9
WALL FOUNDATION MATERIAL 8.00	Alluvium	9
CONCRETE 8.00	No distress	10
CULVERT 0.50	No distress	9
WALL DRAINS 0.50	No distress	9
ROAD/SIDEWALK/SHOULDER 0.50	No distress	10
UPSLOPE 0.50	Vegetated, stable	10
LATERAL SLOPE 1.00	Erosion on left side, but stabilized by logs	7

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_7.613_L_1.jpg

Wall ID:	**OLYM-0011-8.067-L**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 19, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	80	**Maintenance Action:**	Maintenance

Wall Description

Wall Function:	Head Wall	**Primary Wall Type:**	Cantilever - Concrete
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	6 ft x 6 ft CIP concrete culvert inlet		

Wall Measurements

Wall Length (ft.):	21	**Face Area (sq.):**	64
Average Wall Height (ft.):	3	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	7	**Vertical Offset (ft.):**	-2

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - Minor distress in concrete, needs cleanout	7
WALL FOUNDATION MATERIAL 8.00	Alluvium	9
CONCRETE 8.00	Crack w/ mineral deposits, minor chips in face, top edge, and top of sill	8
LATERAL SLOPE 0.50	Vegetated, stable	9
WALL DRAINS 0.50	No distress	9
ROAD/SIDEWALK/SHOULDER 0.50	No distress	10
UPSLOPE 0.50	No distress	10
DOWNSLOPE 1.00	Streambed w/ boulders partially blocking inlet	6

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	Clean out rock debris from inlet, outlet and internal box section. 4 man crew x 4 hours @ $55.00/hr = $880. Backhoe 4 hrs @ $150/hr = $600. Dump truck 4 hrs @ $120 = $480. Bobcat 4 hrs @ 120 = $480
Repair Cost:	$2,500

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

Condition photos are not available for OLYM-0011-8.067-L.

Wall ID:	**OLYM-0011-8.067-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 19, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	83	**Maintenance Action:**	Maintenance

Wall Description

Wall Function:	Head Wall	**Primary Wall Type:**	Cantilever - Concrete
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	6 ft x 6 ft CP concrete culvert outlet		

Wall Measurements

Wall Length (ft.):	22	**Face Area (sq.):**	66
Average Wall Height (ft.):	3	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	7	**Vertical Offset (ft.):**	-4

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good, but needs clean out	8
WALL FOUNDATION MATERIAL 8.00	Streambed and rock	8
CONCRETE 8.00	No distress	9
DOWNSLOPE 0.50	Streambed material, seasonally high flow, massive erosion downstream	8
LATERAL SLOPE 0.50	Vegetated, stable	9
ROAD/SIDEWALK/SHOULDER 0.50	Minor erosion, not wall related	9
UPSLOPE 0.50	1:1, vegetated	9
WALL DRAINS 0.50	None, no distress	9
CULVERT 1.00	Filled w/ 2'-3' of debris	7

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	Clean out rock debris from inlet, outlet and internal box section. 4 man crew x 4 hours @ $55.00/hr = $880. Backhoe 4 hrs @ $150/hr = $600. Dump truck 4 hrs @ $120 = $480. Bobcat 4 hrs @ 120 = $480
Repair Cost:	$2,500

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_8.067_R_1.jpg

Wall ID:	**OLYM-0011-8.233-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 24, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	80	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Gravity - Gabion
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Gabion wall along lake shore with a riprap toe		

Wall Measurements

Wall Length (ft.):	104	**Face Area (sq.):**	364
Average Wall Height (ft.):	3	**Face Angle (deg.):**	85
Maximum Wall Height (ft.):	5	**Vertical Offset (ft.):**	-1

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Excellent - wall performing as intended	8
WALL FOUNDATION MATERIAL 8.00	Riprap material seems firm and stable	8
WIRE/GEOSYNTHETIC FACING 8.00	Galvinized wire in good condition, some face distortion, mild rock degradation, overall in good condition	8
DOWNSLOPE 0.50	Sub angular, stable, well interlocked riprap	8
LATERAL SLOPE 0.50	Riprap embankment fill, minor ravelling	8
ROAD/SIDEWALK/SHOULDER 0.50	No distress in road or shoulder	9
WALL DRAINS 0.50	No distress noted	9

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_8.233_R_1.jpg

Wall ID:	**OLYM-0011-8.449-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 24, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	71	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Crib - Concrete
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Crib concrete fill wall at edge of lake, riprap toe		

Wall Measurements

Wall Length (ft.):	48	**Face Area (sq.):**	336
Average Wall Height (ft.):	7	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	7	**Vertical Offset (ft.):**	-1

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - mild leaning, some missing elements	7
WALL FOUNDATION MATERIAL 8.00	Sub angular riprap, minor setteling, likely from wave action	7
BIN OR CRIB 8.00	Components have minor chips, no cracking, lost 9 elements at base	7
DOWNSLOPE 0.50	Riprap toe at lake edge, minor wave erosion	8
LATERAL SLOPE 0.50	Minor erosion	8
ROAD/SIDEWALK/SHOULDER 0.50	Minor surface irregularities, and holes, in shoulder no distress in road	8
WALL DRAINS 0.50	No distress noted	9

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_8.449_R_1.jpg

OLYM_0011_8.449_R_2.jpg

Wall ID:	**OLYM-0011-8.492-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 24, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	71	**Maintenance Action:**	Repair Elements

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Gravity - Gabion
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Gabion fill wall along lake shore, first 126 ft of wall is undermined by wave action		

Wall Measurements

Wall Length (ft.):	370	**Face Area (sq.):**	2762
Average Wall Height (ft.):	7	**Face Angle (deg.):**	85
Maximum Wall Height (ft.):	8	**Vertical Offset (ft.):**	-2

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - half of wall is settling and leaning due to undermining by wave action	6
WALL FOUNDATION MATERIAL 8.00	Riprap and bedrock, first 126' of wall is undermined by wave action	6
BIN OR CRIB 8.00	Minor settling and minor lean, wire has minor rusting at base of wall	8
WIRE/GEOSYNTHETIC FACING 8.00	Galvanizied wire, no distress noted	8
LATERAL SLOPE 0.50	Riprap, no distress noted, minor creep/ravelling	8
CULVERT 0.50	18" culvert outlets through wall, no distress noted	9
WALL DRAINS 0.50	No distress noted	9
DOWNSLOPE 1.00	Riprap over bedrock at lake edge, steep wave erosion	7
ROAD/SIDEWALK/SHOULDER 1.00	Shoulder has voids for 30ft	7

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	Place riprap along wall (class 6 riprap). Riprap- 190cuyd @ $120.00cuyd = $22,800. Excavator- 16hrs @ $150.00hr = $2,400. 3 dumptrucks - 48 hrs @ $120.00hr = $5760.00. 2 laborers - 32hrs @ $55.00hr = $1,760.00. Traffic control= 3% of ee = $1,000.00
Repair Cost:	$33,720

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_8.492_R_1.jpg

OLYM_0011_8.492_R_2.jpg

Wall ID:	**OLYM-0011-8.690-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 24, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	67	**Maintenance Action:**	Repair Elements

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Gravity - Gabion
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Gabion fill wall along lake shore, minor to moderate undermining caused by wave action		

Wall Measurements

Wall Length (ft.):	137	**Face Area (sq.):**	382
Average Wall Height (ft.):	2	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	6	**Vertical Offset (ft.):**	-1

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - wall performing as intended, first 50' of wall needs to be repaired	6
WALL FOUNDATION MATERIAL 8.00	Undermining of wall due to wave action, foundation is shallow bedrock	7
WIRE/GEOSYNTHETIC FACING 8.00	Wire has no distress, baskets are sagging, 20% of rock is degrading, first 50 ft of wall is leaning out to 100%	7
WALL DRAINS 0.50	No distress noted	9
ROAD/SIDEWALK/SHOULDER 1.00	Shoulder has a minor irregular surface, first 50' has had a void filled with soil and rock by maintence, road is new, no distress noted	6
DOWNSLOPE 1.00	Bedrock ledge along lake edge, wave erosion	7
LATERAL SLOPE 1.00	Riprap, minor raveling	7

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	Place riprap along toe of wall, first 50' of wall (class 6). Close one lane of road, 1 day job. Riprap- 33cuyd@ $120.00=$3,960. Excavator- 8 hrs @ $150.00hr = $1,200. 2 dumptrucks- 16 hrs@ $120.00hr = $1,920. 2 laborers - 16 hrs @ $55.00hr = $880.00
Repair Cost:	$8,210

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_8.690_R_1.jpg

Wall ID:	**OLYM-0011-8.766-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 24, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	84	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Gravity - Gabion
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Gabion wall on lake shore		

Wall Measurements

Wall Length (ft.):	100	**Face Area (sq.):**	700
Average Wall Height (ft.):	7	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	7	**Vertical Offset (ft.):**	-1

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Excellent - wall performing as intended	8
WALL FOUNDATION MATERIAL 8.00	Riprap material in good condition	9
WIRE/GEOSYNTHETIC FACING 8.00	Galvanized wire - good condition minor face irregularity	8
LATERAL SLOPE 0.50	Riprap embankment fill, minor ravel, well vegitated	8
DOWNSLOPE 0.50	Shallow riprap slope	9
ROAD/SIDEWALK/SHOULDER 0.50	Road- as new, no distress noted shoulder- good condition	9
WALL DRAINS 0.50	No distress noted	9

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_8.766_R_1.jpg

Wall ID:	**OLYM-0011-9.117-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 24, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	44	**Maintenance Action:**	Replace Wall

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Crib - Concrete
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Failed concrete crib wall on lake shore		

Wall Measurements

Wall Length (ft.):	25	**Face Area (sq.):**	100
Average Wall Height (ft.):	4	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	4	**Vertical Offset (ft.):**	-2

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Poor - wall has failed	2
WALL FOUNDATION MATERIAL 8.00	Riprap material, firm	9
BIN OR CRIB 8.00	Wall has failed	1
DOWNSLOPE 0.50	Riprap, appears stable	9
ROAD/SIDEWALK/SHOULDER 0.50	No distress in road or shoulder	9
WALL DRAINS 0.50	No distress noted	9
LATERAL SLOPE 1.00	Very steep riprap, some ravelling	7

Repair Recommendations

Failure Consequence:	LOW
Recommendation Narrative:	Replace failed wall with Class 6 riprap(two day job). Very narrow road, with no staging area, need a one lane closure. Class 6 riprap -120 cubic yards @ $120.00 cuyd = $14,400.00. Traffic control - 2 flaggers is 3% EE = $672.00. 2 laborers
Repair Cost:	$23,072

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_9.117_R_1.jpg

Wall ID:	**OLYM-0011-10.253-R**		
Route Name:	LAKE CRESCENT HIGHWAY (US 101)		
Inspection Date:	July 24, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	50	**Maintenance Action:**	Replace Elements

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Cantilever - Concrete
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Fairholme parking area, starts at route shoulder		

Wall Measurements

Wall Length (ft.):	75	**Face Area (sq.):**	715
Average Wall Height (ft.):	9	**Face Angle (deg.):**	96
Maximum Wall Height (ft.):	14	**Vertical Offset (ft.):**	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Poor - distress in concrete + parking area, poor downslope conditions	4
WALL FOUNDATION MATERIAL 8.00	Colluvium, undercut in several places	6
CONCRETE 8.00	Fair condition, multiple cracks in 35' wing, few very thin cracks and many microcracks in 40' wing	5
DOWNSLOPE 1.00	Very steep and badly eroded at 40' win, riprap at 35' wing is in good condition	4
ROAD/SIDEWALK/SHOULDER 1.00	Moderate to severe distress/settlement, patched asphalt, sunken areas, several tension cracks.	4
WALL DRAINS 1.00	No evidence of stainage from weep holes in 40' wall, no drainage in 35' wall - appears to be a part of the damage	4
TRAFFIC BARRIER/FENCE 1.00	Handrail separated, repaired partially	5
LATERAL SLOPE 1.00	Stable on stone end, guardrail + slumping 6" to 2' on back/end of 40' wing	6
VEGETATION 1.00	Mountain ash (?) In middle of 35' wing, 6" diameter, 3' from curb/guardwall	7

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	Wall: MSE, 900sf * ($60/sf MSE + $50/sf facing) = $99,000. Toe riprap: Riprap, 75cy * $120/cy = $9000. Excavator, 8hrs * $195/hr = $1560. $99,000+$9000+$1560 = $109,500, or about $110,000
Repair Cost:	$110,000

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0011: LAKE CRESCENT HIGHWAY (US 101)

Retaining Wall Condition Photos

OLYM_0011_10.253_R_1.jpg

OLYM_0011_10.253_R_2.jpg

Wall ID:	**OLYM-0012-0.259-R**		
Route Name:	HURRICANE RIDGE ROAD		
Inspection Date:	July 20, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	91	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	MSE - Precast Panel
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Covered in graffiti		

Wall Measurements

Wall Length (ft.):	375	**Face Area (sq.):**	5060
Average Wall Height (ft.):	13	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	21	**Vertical Offset (ft.):**	-1

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - wall performing as intended	9
WALL FOUNDATION MATERIAL 8.00	Stable soil	9
CONCRETE 8.00	Panel pitted 20% of area 1/4" deep, many panels in wall center pitted /stained w/ adhesive from "climbing wall" holds that were removed, random bulging in places, no impact to wall stability	9
ARCHITECTURAL FACING 0.50	Minor pitting - graffiti	9
WALL DRAINS 0.50	No distress	9
DOWNSLOPE 0.50	Stable, vegetated	10
LATERAL SLOPE 0.50	Stable, vegetated	10
ROAD/SIDEWALK/SHOULDER 0.50	No distress	10
UPSLOPE 0.50	Stable, vegetated	10

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	None
Repair Cost:	$0

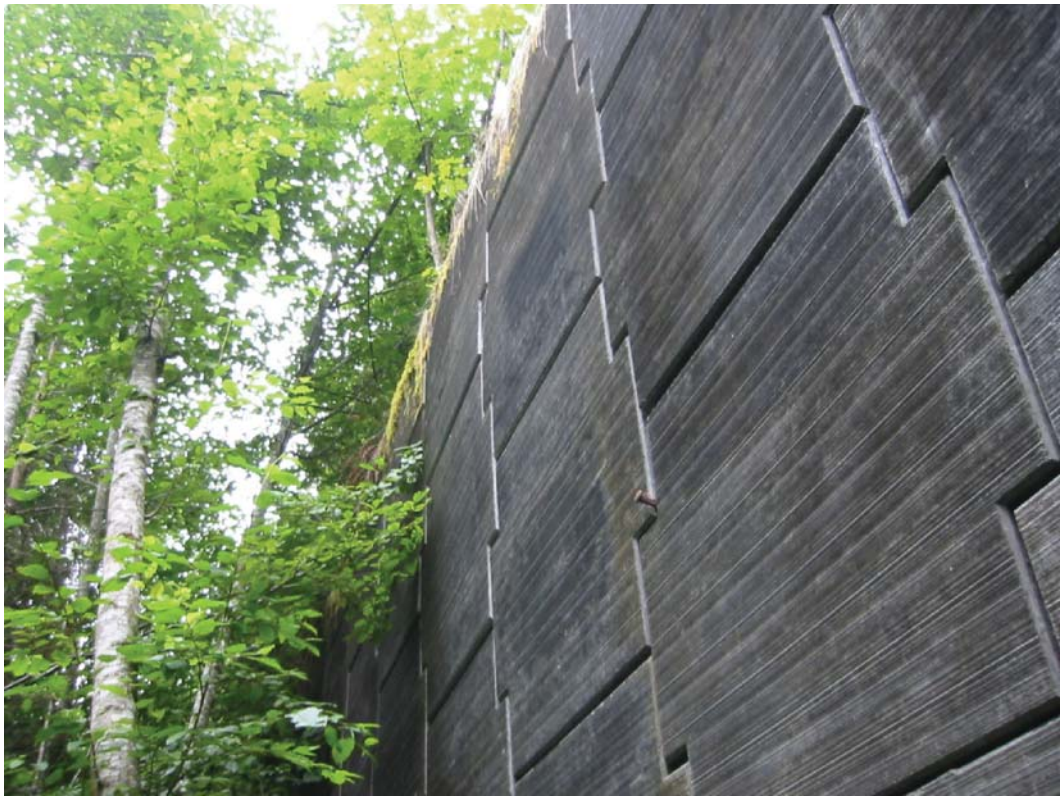
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0012: HURRICANE RIDGE ROAD

Retaining Wall Condition Photos

OLYM_0012_0.259_R_1.jpg



OLYM_0012_0.259_R_2.jpg

Wall ID:	**OLYM-0012-0.269-R**		
Route Name:	HURRICANE RIDGE ROAD		
Inspection Date:	July 20, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	83	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	MSE - Precast Panel
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Lower wall in 2-wall complex		

Wall Measurements

Wall Length (ft.):	266	**Face Area (sq.):**	4460
Average Wall Height (ft.):	16	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	25	**Vertical Offset (ft.):**	-46

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good, slight bulging at downroad end, slight lean, most likely caused by settlement of fill	8
WALL FOUNDATION MATERIAL 8.00	Firm soil, slight wall lean, not foundation related	8
CONCRETE 8.00	No distress	9
LATERAL SLOPE 0.50	Steep, vegetated, firm soil, stable	8
UPSLOPE 0.50	Moderately steep, vegetated, firm soil, stable	8
DOWNSLOPE 0.50	Flat, vegetated, stable	9
WALL DRAINS 0.50	None, no distress	9

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0012: HURRICANE RIDGE ROAD

Retaining Wall Condition Photos

OLYM_0012_0.269_R_1.jpg

OLYM_0012_0.269_R_2.jpg

Wall ID:	**OLYM-0012-5.257-L**		
Route Name:	HURRICANE RIDGE ROAD		
Inspection Date:	July 20, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	90	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Head Wall	**Primary Wall Type:**	Cantilever - Concrete
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	8 ft x 8 ft CIP concrete culvert outlet		

Wall Measurements

Wall Length (ft.):	27	**Face Area (sq.):**	80
Average Wall Height (ft.):	2	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	7	**Vertical Offset (ft.):**	-1

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - wall performing as intended	9
WALL FOUNDATION MATERIAL 8.00	Stable streambed	9
CONCRETE 8.00	No distress	9
VEGETATION 0.50	Covered in fallen vegetation, does not impede flow or effect wall stability	8
CULVERT 0.50	No distress	9
WALL DRAINS 0.50	None, no distress	9
DOWNSLOPE 0.50	Stable riverbed	10
LATERAL SLOPE 0.50	Vegetated, moderate slope, soft silt	10
ROAD/SIDEWALK/SHOULDER 0.50	No distress	10

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0012: HURRICANE RIDGE ROAD

Retaining Wall Condition Photos

OLYM_0012_5.257_L_1.jpg

Wall ID:	**OLYM-0012-5.262-R**		
Route Name:	HURRICANE RIDGE ROAD		
Inspection Date:	July 20, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	94	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Head Wall	**Primary Wall Type:**	Cantilever - Concrete
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	8 ft x 8 ft CIP concrete culvert inlet		

Wall Measurements

Wall Length (ft.):	41	**Face Area (sq.):**	234
Average Wall Height (ft.):	5	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	8	**Vertical Offset (ft.):**	-3

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - wall performing as intended	9
WALL FOUNDATION MATERIAL 8.00	Streambed	10
CONCRETE 8.00	No distress, large apron at inlet	9
LATERAL SLOPE 0.50	Vegetated, no distress	10
ROAD/SIDEWALK/SHOULDER 0.50	No distress	10
WALL DRAINS 0.50	None, no distress	10

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0012: HURRICANE RIDGE ROAD

Retaining Wall Condition Photos

OLYM_0012_5.262_R_1.jpg

Wall ID:	**OLYM-0012-10.965-L**		
Route Name:	HURRICANE RIDGE ROAD		
Inspection Date:	July 20, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	78	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Cantilever - Concrete
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Approx 2 ft guardwall		

Wall Measurements

Wall Length (ft.):	93	**Face Area (sq.):**	670
Average Wall Height (ft.):	7	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	10	**Vertical Offset (ft.):**	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - Stable foundation, minor distress, 2 vertical cracks	7
WALL FOUNDATION MATERIAL 8.00	Likely on bedrock	9
CONCRETE 8.00	Thin cracks w/ leachate along all major form lines, minor random micro-cracks in concrete	7
DOWNSLOPE 0.50	Rubble on bedrock, no vegetation	9
LATERAL SLOPE 0.50	Soil/gravel on bedrock, stable	9
WALL DRAINS 0.50	3 4" rounds at base of wall, partially filled but still functional	9
ROAD/SIDEWALK/SHOULDER 0.50	No distress	10

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0012: HURRICANE RIDGE ROAD

Retaining Wall Condition Photos

OLYM_0012_10.965_L_1.jpg

Wall ID:	**OLYM-0100-1.880-L**		
Route Name:	ELWHA VALLEY ROAD		
Inspection Date:	July 18, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	76	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Head Wall	**Primary Wall Type:**	Gravity - Mortared Stone
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Inlet Corrugated Metal Pipe 6 ft diameter.		

Wall Measurements

Wall Length (ft.):	24	**Face Area (sq.):**	90
Average Wall Height (ft.):	3	**Face Angle (deg.):**	80
Maximum Wall Height (ft.):	6	**Vertical Offset (ft.):**	-3

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Fair but no signs of significant instability.	7
WALL FOUNDATION MATERIAL 8.00	Stream gravel	8
MORTAR 8.00	Minor debonding, displaced stones, probably done by high water flow/flooding, small 3"x3" void, cracks .5'-1", no large distress	6
PLACED STONE 8.00	No distress	9
LATERAL SLOPE 0.50	Steep, heavily vegetated, softer materials	8
DOWNSLOPE 0.50	Riverbed, stable	9
UPSLOPE 0.50	Gentle short slope	9
WALL DRAINS 0.50	No distress	9
CULVERT 0.50	6' CMP inlet	10

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0100: ELWHA VALLEY ROAD

Retaining Wall Condition Photos

OLYM_0100_1.880_L_1.jpg

OLYM_0100_1.880_L_2.jpg

Wall ID:	**OLYM-0100-3.396-R**		
Route Name:	ELWHA VALLEY ROAD		
Inspection Date:	July 19, 2007	**Approximate Year Built:**	1992
***Wall Rating:**	81	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Cut Wall	**Primary Wall Type:**	Cantilever - Soldier Pile
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Stabling cut side creep failure		

Wall Measurements

Wall Length (ft.):	115	**Face Area (sq.):**	460
Average Wall Height (ft.):	4	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	4	**Vertical Offset (ft.):**	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - wall performing as intended	8
WALL FOUNDATION MATERIAL 8.00	Medium granular soil	8
PILES AND SHAFTS 8.00	Treated wood, 6"x8", 4' spacing, uniform	7
LAGGING 8.00	Treated wood, 4"x12", no distress	9
LATERAL SLOPE 0.50	Same as upslope	9
ROAD/SIDEWALK/SHOULDER 0.50	No distress	9
UPSLOPE 0.50	Gentle slope, heavily vegetated, no trees within 20' of wall	9
WALL DRAINS 0.50	None, no distress	9

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0100: ELWHA VALLEY ROAD

Retaining Wall Condition Photos

OLYM_0100_3.396_R_1.jpg

Wall ID:	**OLYM-0103-1.723-R**		
Route Name:	SOL DUC VALLEY ROAD		
Inspection Date:	July 19, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	87	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Cantilever - Soldier Pile
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Soldier pile and wood lagging wall with 10 foot on center pile repaired in 2003		

Wall Measurements

Wall Length (ft.):	251	**Face Area (sq.):**	1631
Average Wall Height (ft.):	6	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	13	**Vertical Offset (ft.):**	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Excellent - wall performing as intended	9
WALL FOUNDATION MATERIAL 8.00	Firm slope, no distress noted	9
PILES AND SHAFTS 8.00	Weathered surface- minor pitting pile has a slight lean, may be a construction defect	8
LAGGING 8.00	As new slight bow in 10% of boards	9
LATERAL SLOPE 0.50	Steep forested slope no distress noted	9
ROAD/SIDEWALK/SHOULDER 0.50	Road and shoulder as new	9
WALL DRAINS 0.50	4 inch pvc pipe every 10 ft, as new	10
DOWNSLOPE 1.00	Very steep forested areas of raveling fill material	7

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0103: SOL DUC VALLEY ROAD

Retaining Wall Condition Photos

OLYM_0103_1.723_R_1.jpg

Wall ID:	**OLYM-0103-1.797-R**		
Route Name:	SOL DUC VALLEY ROAD		
Inspection Date:	July 19, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	88	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Cantilever - Soldier Pile
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Soldier pile and wood lagging with 10 ft on center pile spacing repaired in 2003		

Wall Measurements

Wall Length (ft.):	132	**Face Area (sq.):**	792
Average Wall Height (ft.):	6	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	12	**Vertical Offset (ft.):**	-1

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Excellent - wall performing as intended	9
WALL FOUNDATION MATERIAL 8.00	Firm soil, no distress noted	9
PILES AND SHAFTS 8.00	Weathered steel with minor pitting, appears vertical	8
LAGGING 8.00	As new wood with a few bowed boards	9
DOWNSLOPE 0.50	Very steep vegitated and forested	9
LATERAL SLOPE 0.50	Steep forested slopes no distress noted	9
ROAD/SIDEWALK/SHOULDER 0.50	No distress noted	9
WALL DRAINS 0.50	4 inch pvc pipe observed, as new no distress noted	10

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0103: SOL DUC VALLEY ROAD

Retaining Wall Condition Photos

OLYM_0103_1.797_R_1.jpg

Wall ID:	**OLYM-0103-1.865-R**		
Route Name:	SOL DUC VALLEY ROAD		
Inspection Date:	July 19, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	80	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Cantilever - Soldier Pile
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Soldier pile wall with wood lagging, 10 ft center on piles		

Wall Measurements

Wall Length (ft.):	87	**Face Area (sq.):**	196
Average Wall Height (ft.):	2	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	4	**Vertical Offset (ft.):**	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Excellent - wall performing as intended, slight cracking in roadway	8
WALL FOUNDATION MATERIAL 8.00	Firm fill soil	8
LAGGING 8.00	Slight bow in 10% of wood lagging, mild weathering of wood	8
PILES AND SHAFTS 8.00	Minor rusting and slight weathering, minor pitting	8
LATERAL SLOPE 0.50	Steep forested slope, mild creep	8
WALL DRAINS 0.50	No internal wall drain distress noted	9
DOWNSLOPE 1.00	Steep wooded fill slope, mild creep 2'dia cmp culvert daylights mid slope	7
ROAD/SIDEWALK/SHOULDER 1.00	Mild settling and cracking of roadway, previously patched	7

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0103: SOL DUC VALLEY ROAD

Retaining Wall Condition Photos

OLYM_0103_1.865_R_1.jpg

Wall ID:	**OLYM-0103-1.974-R**		
Route Name:	SOL DUC VALLEY ROAD		
Inspection Date:	July 19, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	84	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Cantilever - Soldier Pile
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Soldier pile with wood lagging @ 10 ft on center		

Wall Measurements

Wall Length (ft.):	93	**Face Area (sq.):**	279
Average Wall Height (ft.):	3	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	6	**Vertical Offset (ft.):**	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Excellent - wall performing as intented	8
WALL FOUNDATION MATERIAL 8.00	No distress noted, firm soil	9
PILES AND SHAFTS 8.00	Minor pitting weathered surface	8
LAGGING 8.00	As new pressure treated wood few bowed boards, may be a construction defect	9
ROAD/SIDEWALK/SHOULDER 0.50	No distress noted, pavement has been overlayed	9
WALL DRAINS 0.50	No internal wall drain distress noted	9
DOWNSLOPE 1.00	Steep forested slope minor pistol butting of tree truncks due to possible slope creep	7
LATERAL SLOPE 1.00	Steep forested slope minor pistol butting of tree truncks due to possible slope creep	7

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0103: SOL DUC VALLEY ROAD

Retaining Wall Condition Photos

OLYM_0103_1.974_R_1.jpg

Wall ID:	**OLYM-0103-4.398-R**		
Route Name:	SOL DUC VALLEY ROAD		
Inspection Date:	July 19, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	75	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Cantilever - Soldier Pile
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Overgrown soldier pile wall with wood lagging on 10 ft center		

Wall Measurements

Wall Length (ft.):	28	**Face Area (sq.):**	126
Average Wall Height (ft.):	4	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	9	**Vertical Offset (ft.):**	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - presence of tension crack on either side of wall	7
WALL FOUNDATION MATERIAL 8.00	Fill material, slight ravelling	7
LAGGING 8.00	Moss covered in areas, weathered surface, pressure treated wood	8
PILES AND SHAFTS 8.00	No distress noted, minor surface pitting	8
CULVERT 0.50	3 ft from invert to base of wall good free flowing 24" cmp	8
DOWNSLOPE 0.50	Steep well vegitated slope	8
ROAD/SIDEWALK/SHOULDER 0.50	No distress noted, overlay on pavement	9
WALL DRAINS 0.50	No internal wall drain distress noted	9
LATERAL SLOPE 1.00	Tension cracks, fill placed on steep lateral slope	6

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0103: SOL DUC VALLEY ROAD

Retaining Wall Condition Photos

OLYM_0103_4.398_R_1.jpg

Wall ID:	**OLYM-0103-4.520-R**		
Route Name:	SOL DUC VALLEY ROAD		
Inspection Date:	July 19, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	80	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Cantilever - Soldier Pile
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Soldier pile wall with wood lagging, 10 ft on center piles, repaired 2003		

Wall Measurements

Wall Length (ft.):	97	**Face Area (sq.):**	582
Average Wall Height (ft.):	6	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	12	**Vertical Offset (ft.):**	-1

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - wall performing as intended, repaired in 2003	8
WALL FOUNDATION MATERIAL 8.00	Some movement of soil at base of wall, which promted placement of additional rows of wood lagging at base, no new distress	8
LAGGING 8.00	Slight bow in 20% of lagging, pressure treated	8
PILES AND SHAFTS 8.00	Mild oxidation of steel at surface, minor pitting	8
ROAD/SIDEWALK/SHOULDER 0.50	New road surface, no distress noted	9
WALL DRAINS 0.50	3" pvc drain at base of wall, no distress, 8'-10' centers	9
DOWNSLOPE 1.00	Steep fill slope with wood debris and rock debris dumbed on slope, evidence of creeping to the river	7
LATERAL SLOPE 1.00	Moderate shallow slumping at road fill	7

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0103: SOL DUC VALLEY ROAD

Retaining Wall Condition Photos

OLYM_0103_4.520_R_1.jpg

Wall ID:	**OLYM-0103-5.588-R**		
Route Name:	SOL DUC VALLEY ROAD		
Inspection Date:	July 19, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	83	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Cantilever - Soldier Pile
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Cantiliever soldier pile with wood lagging, 10 ft on center spacing, visqueen visible behind lagging (pmis 102667)		

Wall Measurements

Wall Length (ft.):	257	**Face Area (sq.):**	723
Average Wall Height (ft.):	2	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	8	**Vertical Offset (ft.):**	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Excellent - wall performing as intended	8
WALL FOUNDATION MATERIAL 8.00	Firm soil	9
LAGGING 8.00	As new, pressure treated wood some bowed, visquen visible behind gaps	8
PILES AND SHAFTS 8.00	Minor pitting, surface weathering	8
DOWNSLOPE 0.50	Forested stable slope to a bench	8
LATERAL SLOPE 0.50	Steep stable forested slope	8
ROAD/SIDEWALK/SHOULDER 0.50	Overlay on road - no distress	9
WALL DRAINS 0.50	No distress	9

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0103: SOL DUC VALLEY ROAD

Retaining Wall Condition Photos

OLYM_0103_5.588_R_1.jpg

Wall ID:	**OLYM-0103-5.854-R**		
Route Name:	SOL DUC VALLEY ROAD		
Inspection Date:	July 19, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	83	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Cantilever - Soldier Pile
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Soldier pile wall with wood lagging, pavement overlay behind wall, (pmis102607)		

Wall Measurements

Wall Length (ft.):	171	**Face Area (sq.):**	698
Average Wall Height (ft.):	4	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	8	**Vertical Offset (ft.):**	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Excellent - wall performing as intended	8
WALL FOUNDATION MATERIAL 8.00	Firm soil, no distress noted	9
LAGGING 8.00	Weathered pressure treated lumber	8
PILES AND SHAFTS 8.00	Minor pitting, weathered surface	8
DOWNSLOPE 0.50	Heavily vegetated, moderate steepness slope	9
LATERAL SLOPE 0.50	Heavily vegetated, moderate steepness slope	9
ROAD/SIDEWALK/SHOULDER 0.50	Roadway has an overlay with no distress	9
WALL DRAINS 0.50	No distress noted	9

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0103: SOL DUC VALLEY ROAD

Retaining Wall Condition Photos

OLYM_0103_5.854_R_1.jpg

Wall ID:	**OLYM-0103-6.715-R**		
Route Name:	SOL DUC VALLEY ROAD		
Inspection Date:	July 19, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	89	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	MSE - Welded Wire Face
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Hilficker wall, wall is above a riprap buttress		

Wall Measurements

Wall Length (ft.):	262	**Face Area (sq.):**	3095
Average Wall Height (ft.):	11	**Face Angle (deg.):**	85
Maximum Wall Height (ft.):	13	**Vertical Offset (ft.):**	-2

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Excellent - wall performing as intended	8
WALL FOUNDATION MATERIAL 8.00	Firm riprap or bedrock, no distress noted	9
WIRE/GEOSYNTHETIC FACING 8.00	Heavy gauge galvanized wire, new condition	10
DOWNSLOPE 0.50	Riprap buttress at rivers edge	8
CULVERT 0.50	30" cmp at 207', no distress noted	9
ROAD/SIDEWALK/SHOULDER 0.50	New road, no distress noted	9
WALL DRAINS 0.50	No distress noted	9
LATERAL SLOPE 1.00	Evidence of past scour by river	7

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0103: SOL DUC VALLEY ROAD

Retaining Wall Condition Photos

OLYM_0103_6.715_R_1.jpg

Wall ID:	**OLYM-0103-7.712-R**		
Route Name:	SOL DUC VALLEY ROAD		
Inspection Date:	July 19, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	83	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Cantilever - Soldier Pile
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Soldier pile wall with wood lagging that is on 10 ft centers, repaired in 2003		

Wall Measurements

Wall Length (ft.):	394	**Face Area (sq.):**	2548
Average Wall Height (ft.):	6	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	10	**Vertical Offset (ft.):**	-1

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Excellent - wall performing as intended	8
WALL FOUNDATION MATERIAL 8.00	No distress noted, firm fill soil	9
LAGGING 8.00	Weathered pressure treated lumber, gaps in lagging @ 30' and 250' (from start of wall)	8
PILES AND SHAFTS 8.00	Minor pitting and slight weathering of piles	8
DOWNSLOPE 0.50	Steep heavily forested slope, possible creep	8
LATERAL SLOPE 0.50	Very steep forested slope	8
CULVERT 0.50	Flowing culvert @ 165' from start, no distress noted	9
ROAD/SIDEWALK/SHOULDER 0.50	Roadway has an overlay, no distress noted	9
WALL DRAINS 0.50	No distress noted	9

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0103: SOL DUC VALLEY ROAD

Retaining Wall Condition Photos

OLYM_0103_7.712_R_1.jpg

Wall ID:	**OLYM-0103-7.858-R**		
Route Name:	SOL DUC VALLEY ROAD		
Inspection Date:	July 20, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	77	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Cantilever - Soldier Pile
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Cantilever soldier pile wall on a fill slope		

Wall Measurements

Wall Length (ft.):	149	**Face Area (sq.):**	372
Average Wall Height (ft.):	2	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	5	**Vertical Offset (ft.):**	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - wall performing as intended, minor distress, monitor	7
WALL FOUNDATION MATERIAL 8.00	Firm soil, no distress noted	9
LAGGING 8.00	30% of lagging has minor bowing, slight seperation of of timber	7
PILES AND SHAFTS 8.00	Minor oxidation and pitting of piles	8
WALL DRAINS 0.50	No distress noted	9
DOWNSLOPE 1.00	Steep forested with minor creep	7
LATERAL SLOPE 1.00	Steep forested with minor creep	7
ROAD/SIDEWALK/SHOULDER 1.00	Some distress in roadway (cracking), from 51ft to 132ft (81ft total)	7

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0103: SOL DUC VALLEY ROAD

Retaining Wall Condition Photos

OLYM_0103_7.858_R_1.jpg

Wall ID:	**OLYM-0103-7.892-R**		
Route Name:	SOL DUC VALLEY ROAD		
Inspection Date:	July 20, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	80	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Cantilever - Soldier Pile
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Long soldier pile wall with wood lagging, many areas of pavement have been overlayed, has been repaired in 2003, no distress in overlays		

Wall Measurements

Wall Length (ft.):	774	**Face Area (sq.):**	4336
Average Wall Height (ft.):	5	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	15	**Vertical Offset (ft.):**	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - wall is performing as intended, possible future maintenance of lagging	8
WALL FOUNDATION MATERIAL 8.00	Firm fill soil, no distress noted	9
LAGGING 8.00	50% of lumber is bowed, wood lagging has gaps up to 14" @ base, minor weathering of wood	7
PILES AND SHAFTS 8.00	Minor pitting and weathering of surface	8
CULVERT 0.50	Two 24" cmp, some debris and rocks in culvert	8
LATERAL SLOPE 0.50	Steep heavily forested slope, minor creep of embankment fill	8
ROAD/SIDEWALK/SHOULDER 0.50	Many areas where pavement was overlayed, no distress noted	9
WALL DRAINS 0.50	One drain pipe observed, no distress noted	9
DOWNSLOPE 1.00	Steep forested vegitated slope, possible creep	7

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0103: SOL DUC VALLEY ROAD

Retaining Wall Condition Photos

OLYM_0103_7.892_R_1.jpg

Wall ID:	**OLYM-0103-8.049-R**		
Route Name:	SOL DUC VALLEY ROAD		
Inspection Date:	July 20, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	80	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Cantilever - Soldier Pile
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Soldier pile wall with treated timber, 10 ft on center piles, 2 in culvert outlet		

Wall Measurements

Wall Length (ft.):	58	**Face Area (sq.):**	232
Average Wall Height (ft.):	4	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	8	**Vertical Offset (ft.):**	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - wall performing as intended	8
WALL FOUNDATION MATERIAL 8.00	Firm soil, no distress	9
LAGGING 8.00	Minor weathering, 30% show minor bowing	7
PILES AND SHAFTS 8.00	Minor oxidation and pitting	8
CULVERT 0.50	24" cmp, no distress noted	9
ROAD/SIDEWALK/SHOULDER 0.50	No distress noted, recent overlay	9
WALL DRAINS 0.50	No distress noted	9
DOWNSLOPE 1.00	Steep wooded slope, minor creep in fill	7
LATERAL SLOPE 1.00	Steep wooded slope, shallow creep in fill	7

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0103: SOL DUC VALLEY ROAD

Retaining Wall Condition Photos

OLYM_0103_8.049_R_1.jpg

Wall ID:	**OLYM-0103-8.074-R**		
Route Name:	SOL DUC VALLEY ROAD		
Inspection Date:	July 20, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	80	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Cantilever - Soldier Pile
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Soldier pile wall with wood lagging, 10 foot on center, road has been overlayed		

Wall Measurements

Wall Length (ft.):	167	**Face Area (sq.):**	752
Average Wall Height (ft.):	4	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	9	**Vertical Offset (ft.):**	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - performing as intended	8
WALL FOUNDATION MATERIAL 8.00	Firm soil , no undermining	9
LAGGING 8.00	40% of timber is bowed	7
PILES AND SHAFTS 8.00	Minor surface pitting and weathering	8
LATERAL SLOPE 0.50	Heavily forested, no distress noted	8
ROAD/SIDEWALK/SHOULDER 0.50	Pavement overlay, no distress noted	9
WALL DRAINS 0.50	No internal wall drain distress noted	9
DOWNSLOPE 1.00	Heavily vegitated, possible creep	7

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0103: SOL DUC VALLEY ROAD

Retaining Wall Condition Photos

OLYM_0103_8.074_R_1.jpg

Wall ID:	**OLYM-0103-8.503-R**		
Route Name:	SOL DUC VALLEY ROAD		
Inspection Date:	July 20, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	77	**Maintenance Action:**	Maintenance

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Cantilever - Soldier Pile
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Soldier pile fill wall with wood lagging (pmis102667)		

Wall Measurements

Wall Length (ft.):	230	**Face Area (sq.):**	1350
Average Wall Height (ft.):	5	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	12	**Vertical Offset (ft.):**	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - wall performing as designed, needs minor maintence	7
WALL FOUNDATION MATERIAL 8.00	Firm fill material, no distress noted	9
LAGGING 8.00	Mild weathering of wood, seperation 1"--2" of timbers over 1% of total wall, 1 top timber displaced, vegitation covering 30% of wall	7
PILES AND SHAFTS 8.00	Mild oxidation and pitting of steel	8
WALL DRAINS 0.50	No distress noted	9
CULVERT 1.00	Dented at outlet, small boulders lodged in pipe	6
DOWNSLOPE 1.00	Steep wooded slope with mild creep	7
LATERAL SLOPE 1.00	Steep wooded slope with mild creep	7
ROAD/SIDEWALK/SHOULDER 1.00	Cracked and patched roadway, no distress in overlay	7

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	Clean out culvert and repair top lagging - 2 laborers @ $55.00 hr x 8 hrs = $440.00. Good access at end of wall
Repair Cost:	$440

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0103: SOL DUC VALLEY ROAD

Retaining Wall Condition Photos

OLYM_0103_8.503_R_1.jpg

Wall ID:	**OLYM-0103-9.203-R**		
Route Name:	SOL DUC VALLEY ROAD		
Inspection Date:	July 20, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	79	**Maintenance Action:**	Maintenance

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Cantilever - Soldier Pile
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Soldier pile fill wall, 10 ft on center lagging, pressure treated lagging		

Wall Measurements

Wall Length (ft.):	460	**Face Area (sq.):**	2235
Average Wall Height (ft.):	4	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	9	**Vertical Offset (ft.):**	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - wall performing as intended,	7
WALL FOUNDATION MATERIAL 8.00	Firm soil, no distress noted	9
LAGGING 8.00	Bowed and gaps between boards up to 2 inches, mild weathering of timbers	8
PILES AND SHAFTS 8.00	Minor pitting and weathering of steel	8
DOWNSLOPE 0.50	Heavily vegitated/forested slope, some possible slope creep	8
LATERAL SLOPE 0.50	Forested slope, possible creep of slope	8
WALL DRAINS 0.50	No internal distress noted	9
CULVERT 1.00	24" cmp not flowing, possible plug	6
ROAD/SIDEWALK/SHOULDER 1.00	Distress in pavement, multiple areas with overlays, no distress in overlays	7

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	Clean out culvert: 2 LABORERS @ $55.00/HR x 4 HRS = $440.00. 2 LABORERS @$55.00/HR X 8 HRS prep and seal cracks = $ 880.00. SEAL CRACKS EST. 300 FT @ $5.00/FT
Repair Cost:	$3,320

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0103: SOL DUC VALLEY ROAD

Retaining Wall Condition Photos

OLYM_0103_9.203_R_1.jpg

Wall ID:	**OLYM-0103-9.307-R**		
Route Name:	SOL DUC VALLEY ROAD		
Inspection Date:	July 20, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	80	**Maintenance Action:**	Maintenance

Wall Description

Wall Function:	Fill Wall	**Primary Wall Type:**	Cantilever - Soldier Pile
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Soldier pile fill wall with wood lagging on 10 ft centers, upper 3 ft of lagging bowed		

Wall Measurements

Wall Length (ft.):	370	**Face Area (sq.):**	2135
Average Wall Height (ft.):	5	**Face Angle (deg.):**	90
Maximum Wall Height (ft.):	10	**Vertical Offset (ft.):**	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - wall performing as intended	8
WALL FOUNDATION MATERIAL 8.00	Firm fill material	9
LAGGING 8.00	Pressure treated wood lagging, minor weathering, upper 3 ft of wall is bowed	7
PILES AND SHAFTS 8.00	Minor surface piting and weathering of steel	8
DOWNSLOPE 0.50	Steep forested slope with possible creep	8
LATERAL SLOPE 0.50	Heavily vegitated slope with minor creep of embankment fill	8
ROAD/SIDEWALK/SHOULDER 0.50	Recent overlays, no distress noted	9
WALL DRAINS 0.50	No internal distress noted	9
CULVERT 1.00	24" corrugated metal pipe, possible plug	7

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	Clean out culvert - 2 laborers @ $55.00 hr x 8 hrs = $440.00. Good access
Repair Cost:	$440

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0103: SOL DUC VALLEY ROAD

Retaining Wall Condition Photos

OLYM_0103_9.307_R_1.jpg

Wall ID:	**OLYM-0107-1.586-L**		
Route Name:	HOH ROAD		
Inspection Date:	July 18, 2007	**Approximate Year Built:**	Unknown
***Wall Rating:**	80	**Maintenance Action:**	Repair Elements

Wall Description

Wall Function:	Cut Wall	**Primary Wall Type:**	Gravity - Dry Stone
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Rockery wall on cut side, rockery damaged by tree fall		

Wall Measurements

Wall Length (ft.):	80	**Face Area (sq.):**	487
Average Wall Height (ft.):	6	**Face Angle (deg.):**	80
Maximum Wall Height (ft.):	10	**Vertical Offset (ft.):**	-1

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - small area of stone knocked over by tree, need to fix portion of wall	6
WALL FOUNDATION MATERIAL 8.00	Firm soil, no distress noted	9
PLACED STONE 8.00	Some voids, no distress noted	9
LATERAL SLOPE 0.50	Steep vegetated grassy slope, no distress noted	9
WALL DRAINS 0.50	No distress noted	9
CURB/BERM/DITCH 1.00	Partial blockage by rockery rock knocked over by tree fall	7

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	Rebuild 40 sqft of rockery wall, use existing material on site - 40 sqft rockery @ $50.00 sqft = $2,000.00. Excavator - 2 hrs @ $150.00 hr = $300.00. Mob 11% = $250.00. Traffic 3% = $100.00
Repair Cost:	$2,650

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0107: HOH ROAD

Retaining Wall Condition Photos

OLYM_0107_1.586_L_1.jpg

Wall ID:	**OLYM-0107-1.616-L**		
Route Name:	HOH ROAD		
Inspection Date:	July 18, 2007	**Approximate Year Built:**	2002
***Wall Rating:**	88	**Maintenance Action:**	No Action

Wall Description

Wall Function:	Cut Wall	**Primary Wall Type:**	Gravity - Dry Stone
Surface Treatment:		**Secondary Wall Type:**	
Secondary Surface Treatment:		**Architectural Facing:**	
General Description:	Rockery supporting moderately steep cut slope		

Wall Measurements

Wall Length (ft.):	75	**Face Area (sq.):**	375
Average Wall Height (ft.):	5	**Face Angle (deg.):**	80
Maximum Wall Height (ft.):	10	**Vertical Offset (ft.):**	-1

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Good - wall performing as intended	9
WALL FOUNDATION MATERIAL 8.00	Stable	9
PLACED STONE 8.00	4'-, stable, few large voids	8
UPSLOPE 0.50	Stable, vegetated	9
CURB/BERM/DITCH 0.50	Substantial veg along ditch at wall toe	10
LATERAL SLOPE 0.50	Stable, vegetated	10
ROAD/SIDEWALK/SHOULDER 0.50	No distress	10
WALL DRAINS 0.50	No distress	10

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	None
Repair Cost:	$0

2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.

Olympic National Park

ROUTE 0107: HOH ROAD

Retaining Wall Condition Photos

OLYM_0107_1.616_L_1.jpg

Appendix A
Summary of WIP Definitions

Olympic National Park

Federal Lands Highway
Road Inventory Program

Appendix A

Summary of WIP Definitions and Assessment Categories

Wall Naming Convention

Unique "Wall Identification" names were assigned to the retaining walls that were inventoried. The Wall Identification includes the Park Name, the RIP Route Number (e.g., **0013**), the beginning milepoint of a wall (e.g., **0.622**) and the side of the road the wall is located on (e.g., **L**.) relative to the primary direction of travel (direction of increasing mileposts). Thus, a typical wall identified would have the following format: **YOSE-0013-0.622-L.**

For roadways not in RIP, park-supplied route numbers were used or the convention RRR#. Similarly, for parking areas not in RIP, the park-supplied parking area number or the convention PPP# was used. Also for parking areas, walls are numbered in ascending order as they are encountered when traveling counterclockwise around the parking area (most common direction of traffic flow). Parking area walls are designated P1, P2, P3, etc. as new walls are encountered.

- NPS Retaining Wall Inventory Program Field Guide (WIFG)-

Retaining Wall Acceptance Criteria

*****All classes of paved roadways and parking areas included in the RIP Route Investigation Report and/or identified by park staff.
*Walls must reside within the constructed roadway/parking area prism.
*Maximum wall height, including only that portion actively retaining soil and/or rock, must be ≥ 4 ft. (>6ft for culvert headwalls).
*Consider known/verifiable wall embedment in determining maximum retaining wall height. Include fully buried retaining structures.
*Walls have an internal wall face angle ≥ 45˚ (≥ 1H:1V face slope ratio).
*Include all walls where the intent is to support/protect the travelway, and where failure would require replacement with a retaining wall.

Definitions

Design Criteria	Measure of how well current design criteria are satisfied: **None** - Does not meet any known standards. **Non-AASHTO** - Does not meet AASHTO, but is consistent with other structures of its type/period with good performance. **AASHTO** - Apparently meets current AASHTO Geometric, Design, Materials, and Construction Standards.
Consequence of Failure	**Low** - No loss of roadway, no to low public risk, no impact to traffic during wall repair/replacement **Moderate**- Hourly to short-term closure of roadway, low-to-moderate public risk, multiple alternate routes available **High**- Seasonal to long-term loss of roadway, substantial loss-of-life risk, no alternate routes available
Action	Select from: **No Action, Monitor, Maintenance, Repair Elements, Replace Elements,** and **Replace Wall**
Weighting Factor	Weighting Factor to be applied to the Condition Rating (CR). When indicated on the Condition Assessment Input Form: WF=**0.5** for CR=8-10; WF=**1.0** for CR=4-7; and WF=**5** for CR=1-3.
Data Reliability	Estimate of how well observed conditions represent wall performance, and if additional investigations may be warranted. **1-Poor** Conditions cannot be sufficiently observed to rate element(s), warranting additional investigations to better define element performance and/or to determine the cause(s) or poor performance. **2-Good** Observed conditions are sufficient to rate the conditions of wall element(s); however, additional investigations would be useful to better understand element performance. **3-Very Good** Observed conditions clearly describe wall performance. Additional investigations are not needed.

Wall Function Codes

[**FW**] Fill Wall	[**BW**] Bridge Wall	[**SW**] Switchback Wall
[**CW**] Cut Wall	[**HW**] Head Wall	[**SP**] Slope Protection **[FL]** Flood Wall

Wall Type Codes

[**AH**] Anchor, Tieback H-Pile	[**CC**] Crib, Concrete	[**MG**] MSE, Geosynthetic Wrapped Face
[**AM**] Anchor, Micropile	[**CM**] Crib, Metal	[**MP**] MSE, Precast Panel
[**AS**] Anchor, Tieback Sheet Pile	[**CT**] Crib, Timber	[**MS**] MSE, Segmental Block
[**BC**] Bin, Concrete	[**GB**] Gravity, Concrete Block/ Brick	[**MW**] MSE, Welded Wire Face
[**BM**] Bin, Metal	[**GC**] Gravity, Mass Concrete	[**SN**] Soil Nail
[**CL**] Cantilever, Concrete	[**GD**] Gravity, Dry Stone	[**TP**] Tangent/ Secant Pile
[**CP**] Cantilever, Soldier Pile	[**GG**] Gravity, Gabion	[**OT**] Other, User Defined
[**CS**] Cantilever, Sheet Pile	[**GM**] Gravity, Mortared Stone	[**NO**] None

Architectural Facing Type Codes

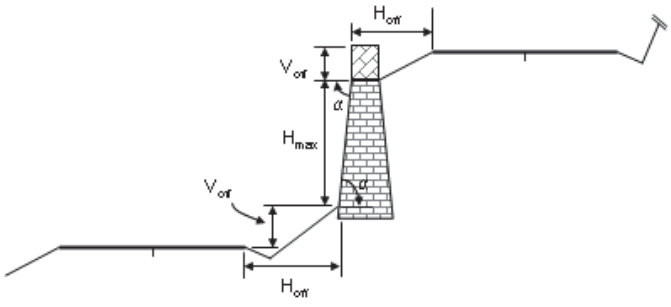
[**BV**] Brick Veneer	[**PF**] Planted Face	[**SS**] Simulated Stone
[**CO**] Cementitious Overlay	[**SC**] Sculpted Shotcrete	[**SV**] Stone Veneer
[**FF**] Fractured Fin Concrete	[**SH**] Shotcrete (nozzle finish)	[**TI**] Timber
[**FL**] Formlined Concrete	[**SM**] Steel/Metal	[**OT**] Other, User Defined
[**PC**] Plain Concrete (float finish or light texture)	[**SO**] Stone	[**NO**] None

Surface Treatment Codes

[**BG**] Bush Gun (tool-textured concrete)	[**PS**] Preservative	[**WS**] Weathering Steel
[**CA**] Color Additive	[**SE**] Silane Sealer	[**OT**] Other, User Defined
[**GL**] Galvanized	[**ST**] Stain	[**NO**] None
[**PA**] Painted	[**TR**] Tar Coated	

Condition Ratings	
Condition Ratings apply to all Primary and Secondary Wall Elements, and are intended to assist in consistently defining element **severity**, **extent**, and **repair/replace urgency** of wall element distresses.	
9-10 (Excellent)	-Any defects are minor and are within normal range for *newly constructed or fabricated* elements. -Defects may include those typically caused from fabrication or construction.
7-8 (Good)	-Low-to-moderate extent of low severity distress. -Distress present does not significantly compromise the element function, nor is there significantly severe distress to major structural components of an element.
5-6 (Fair)	-High extent of low severity distress and/or low-to-medium extent of medium to high severity distress. -Distress present does not compromise element function, but lack of treatment may lead to impaired function/elevated risk of element failure in the near term.
3-4 (Poor)	-Medium-to-high extent of medium-to-high severity distress. -Distress present threatens element function, and strength is obviously compromised and/or structural analysis is warranted. -The element condition does not pose an immediate threat to wall stability and road closure is not necessary.
1-2 (Critical)	-Medium-to-high extent of high severity distress. -Element is no longer serving intended function. Element performance threatening overall stability of the wall at the time of inspection.

Wall Performance Condition Ratings		
Performance	Evaluation of overall wall performance as indicated by observations not necessarily captured by observed distresses for specific elements, including global wall distresses (rotation, settlement, translation, displacement, etc.) and/or evidence of prior repairs that may further indicate component problems.	**Good to Excellent** - No observation of distresses not already captured by individual element condition assessment. No combination of element distresses indicating unseen problems or creating significant performance problems. No history of remediation or repair to wall or adjacent elements.
		Fair - Some observed global distress is not associated with specific elements. Some observation of element distress combinations that indicate wall component problems. Minor work on primary elements or major work on secondary elements has occurred improving overall wall function.
		Poor to Critical - Global wall rotation, settlement, and/or overturning is readily apparent. Combined element distresses clearly indicate serious stability problems with components or global wall stability. Major repairs have occurred to wall structural elements, though functionality has not improved significantly.



H_{max}	Maximum exposed wall height, ft
V_{off}	Average vertical distance from pavement to cut wall toe or groundline at top of fill wall (+ above/ - below roadway), ft
H_{off}	Horizontal distance to wall face from edge of roadway, ft
α	Wall face angle measured from the horizontal, degrees
L	Maximum earth retaining length of the wall (excluding guardwalls). Wall length is the actual length of the structure, not simply the projected length along the roadway, ft