

# DEWA WIP Report

## NPS Retaining Wall Inventory Program Delaware Water Gap National Recreation Area



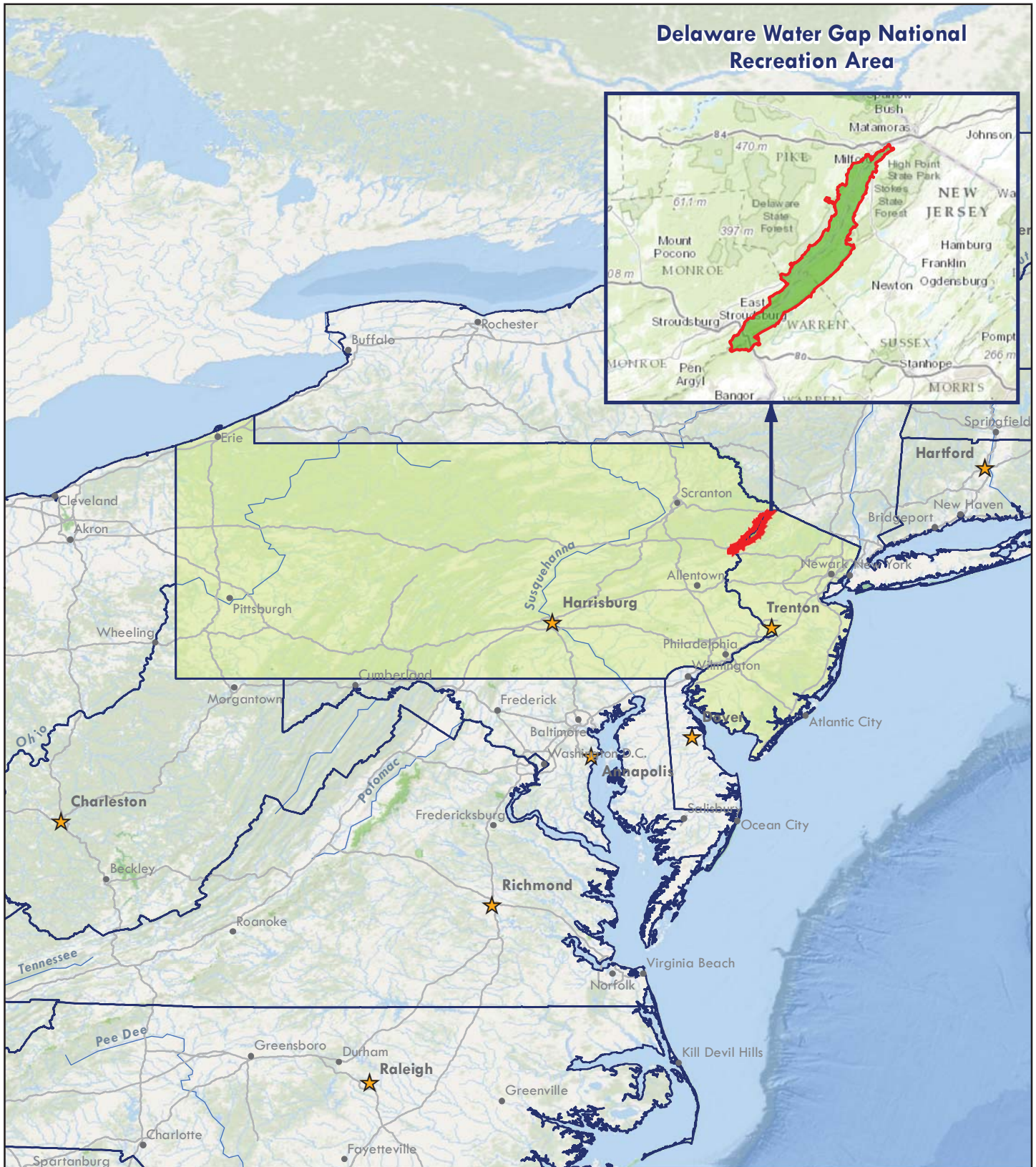
**Federal Lands Highway  
Road Inventory Program**

### Prepared By:

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

Data Collection Date: December 2007  
Report Date: October 2015

# Delaware Water Gap National Recreation Area in New Jersey and Pennsylvania



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



## Delaware Water Gap National Recreation Area



**Federal Lands Highway  
Road Inventory Program**



## **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



**Delaware Water Gap National Recreation Area**



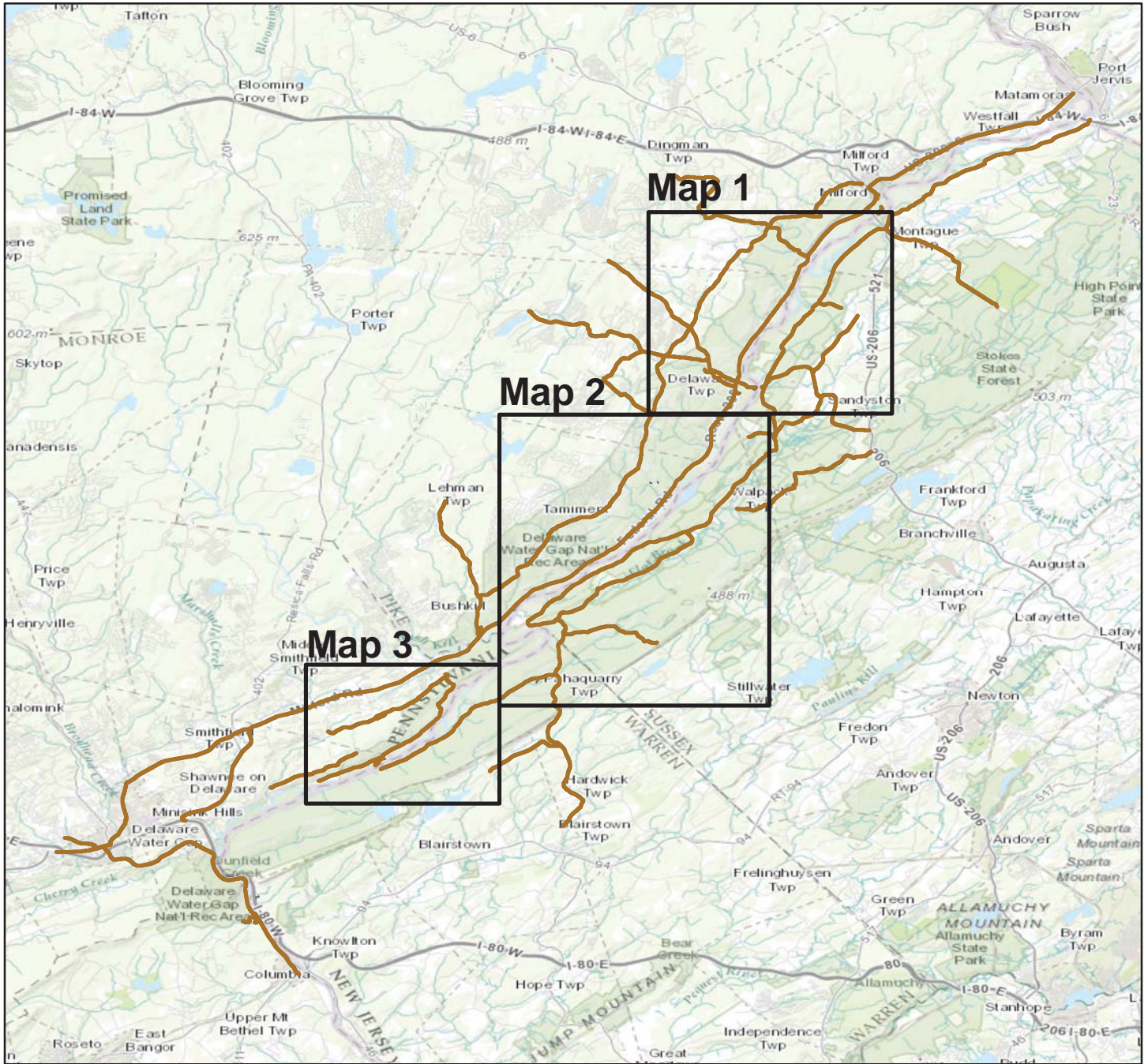
**Federal Lands Highway  
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# Delaware Water Gap National Recreation Area

## WALL LOCATION MAP

### Key Map



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

 RIP Collected Routes

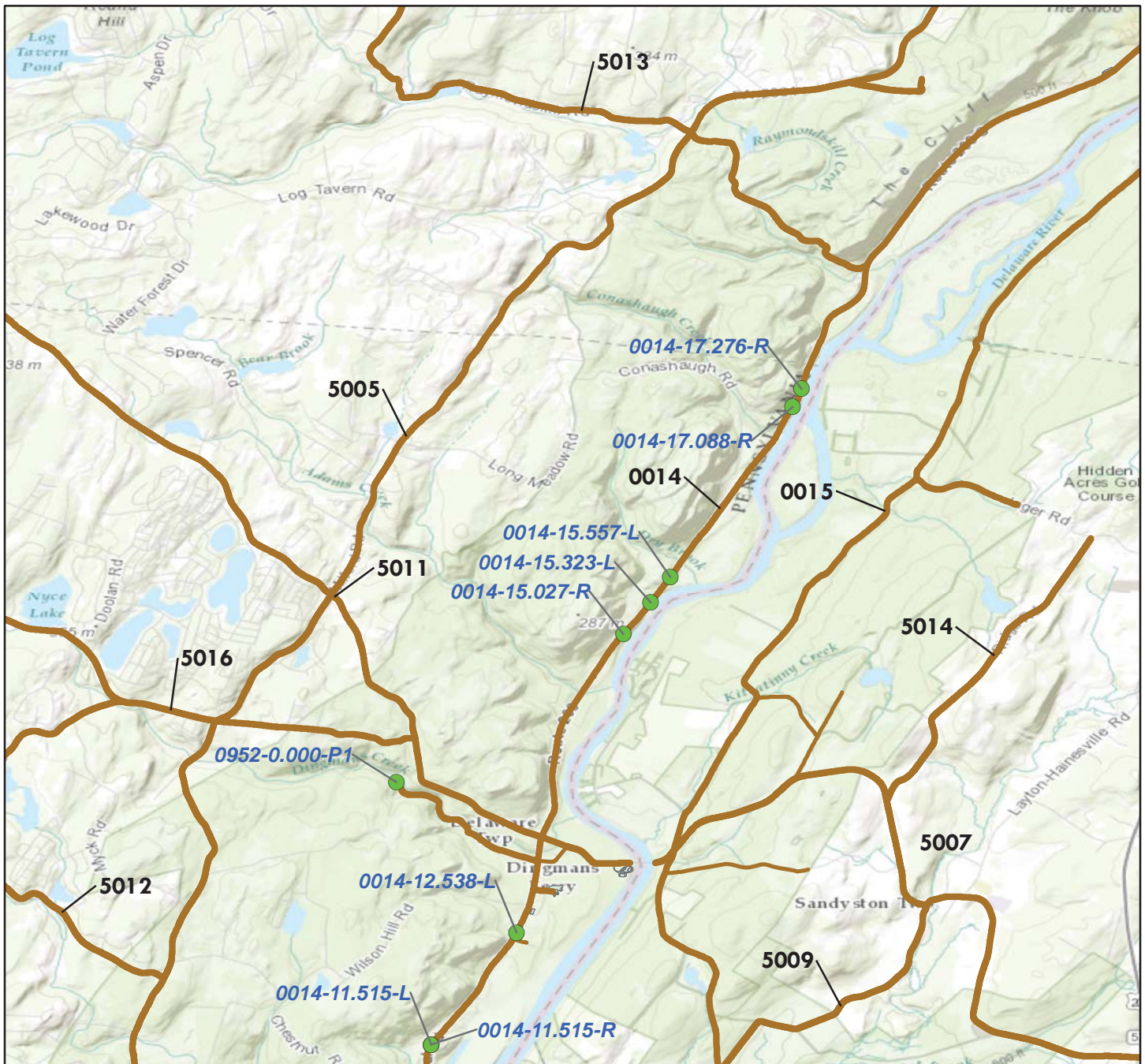




# Delaware Water Gap National Recreation Area

## WALL LOCATION MAP

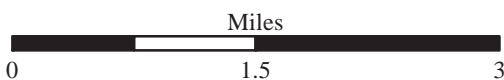
### Map 1



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

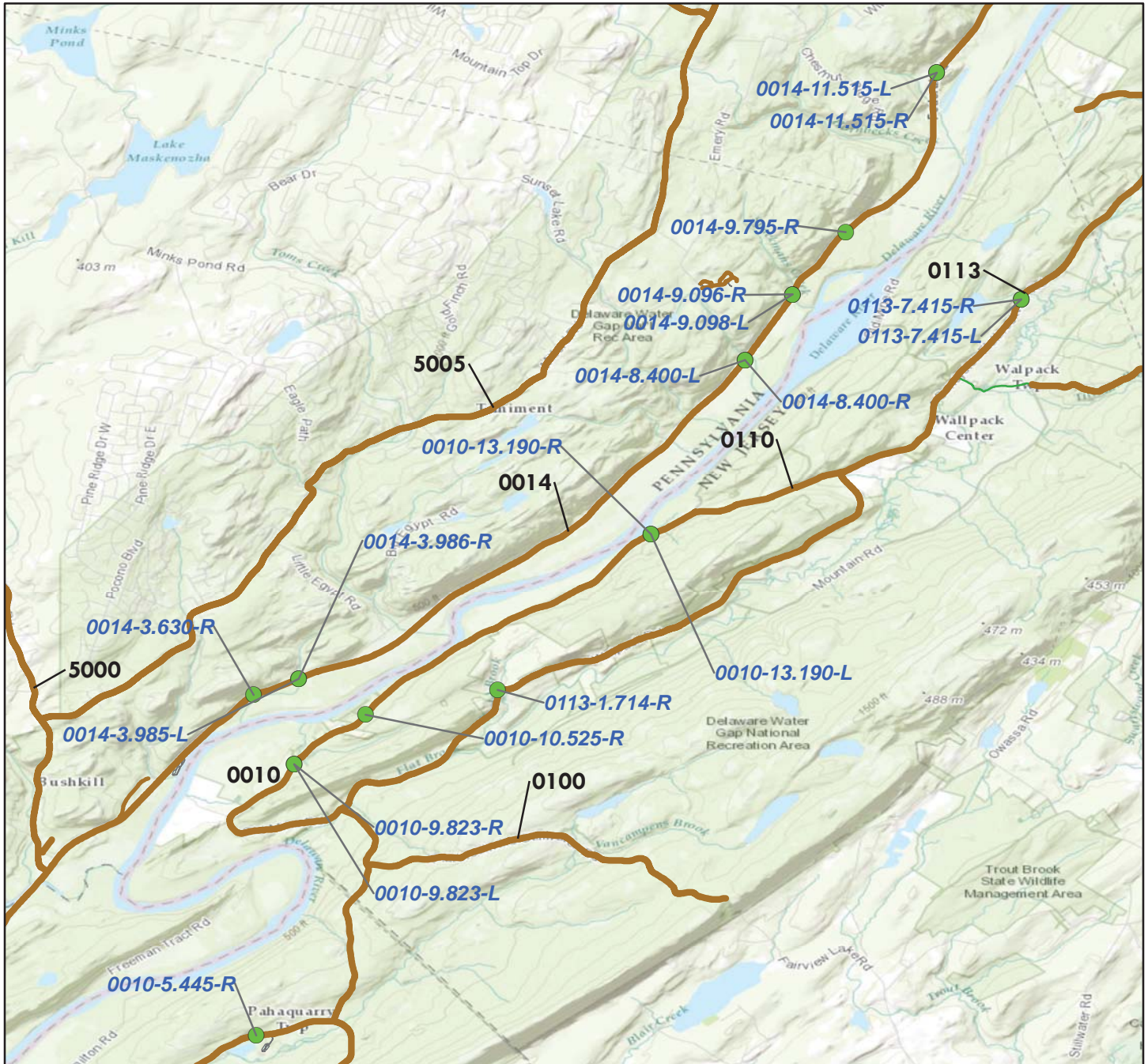




# Delaware Water Gap National Recreation Area

## WALL LOCATION MAP

### Map 2



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

● Wall Locations

— RIP Collected Routes

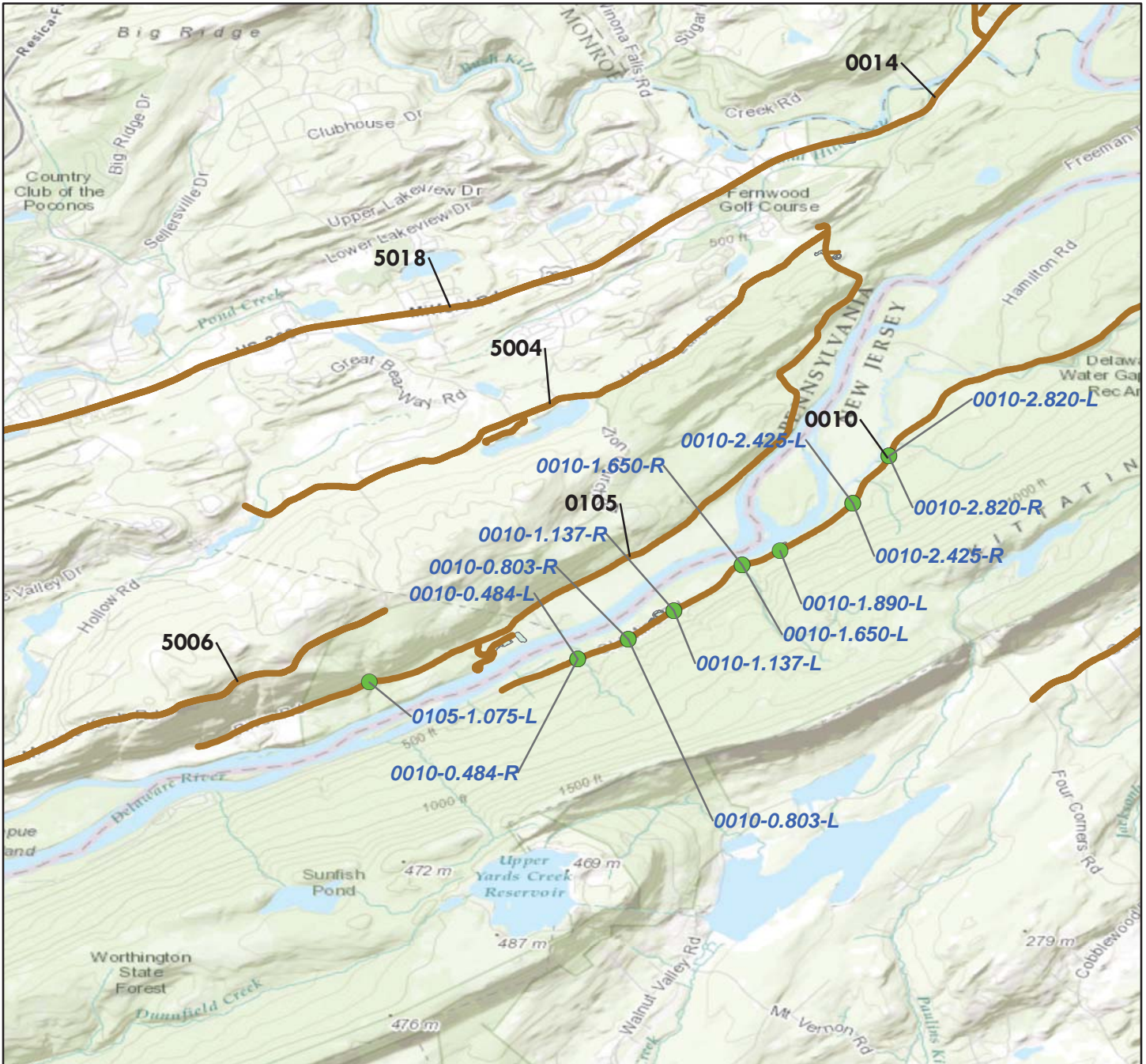




# Delaware Water Gap National Recreation Area

## WALL LOCATION MAP

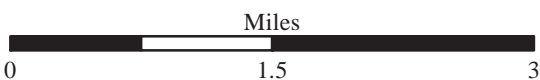
### Map 3



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





# **Tier 1 Park Retaining Wall Overview**



**Delaware Water Gap National Recreation Area**



**Federal Lands Highway  
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## Parkwide Summary: Delaware Water Gap National Recreation Area

Initial retaining wall inspections were conducted at Delaware Water Gap National Recreation Area 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 Delaware Water Gap National Recreation Area in 2010 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, 40 walls were inventoried on the routes listed below.

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

<b>Route Number</b>	<b>Route Name</b>	<b>No. of Walls</b>
0010	OLD MINE ROAD (SOUTH SECTION)	19
0014	US ROUTE 209	16
0105	RIVER ROAD	1
0113	NPS ROUTE 615	3
0952	DINGMANS FALLS VISITOR CENTER	1

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**

<b>Wall Function</b>	<b>No. of Walls</b>
CW - Cut Wall	1
FW - Fill Wall	4
HW - Head Wall	35



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**

<b>Primary Wall Type</b>	<b>No. of Walls</b>
CP, Cantilever - Soldier Pile	3
CT, Crib - Timber	1
GC, Gravity - Mass Concrete	27
GD, Gravity - Dry Stone	4
GM, Gravity - Mortared Stone	5

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**

<b>Recommended Action</b>	<b>2007 Repair Costs*</b>	<b>No. of Walls</b>
No Action	\$0	11
Monitor	\$0	0
Maintenance	\$108,123	16
Repair Elements	\$251,754	10
Replace Elements	\$0	0
Replace Wall	\$65,452	3
<b>Totals</b>	<b>\$425,329</b>	<b>40</b>

\*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**

<b>Cost Range*</b>	<b>No. of Walls</b>
\$0	11
\$1 - \$25,000	22
\$25,001 - \$50,000	5
\$50,001 - \$100,000	2
\$100,001 - \$250,000	0
\$250,001 - \$500,000	0
\$500,001 - \$1,000,000	0
\$1,000,001 - \$2,000,000	0
\$2,000,001 - \$3,000,000	0
\$3,000,001 - \$4,000,000	0
<b>Total Number of Walls</b>	<b>40</b>

\*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 Delaware Water Gap National Recreation Area. 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 mortar 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 Delaware Water Gap National Recreation Area 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**

<b>Wall Identification</b>	<b>Failure Consequence<sup>(1)</sup></b>	<b>Wall Rating<sup>(2)</sup></b>	<b>Recommended Action<sup>(3)</sup></b>	<b>2007 Repair Costs<sup>(4)</sup></b>
DEWA-0010-9.823-L	MODERATE	25	REPLACE WALL	\$21,143
DEWA-0014-17.276-R	MODERATE	49	REPLACE WALL	\$28,275

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**



**Delaware Water Gap National Recreation Area**

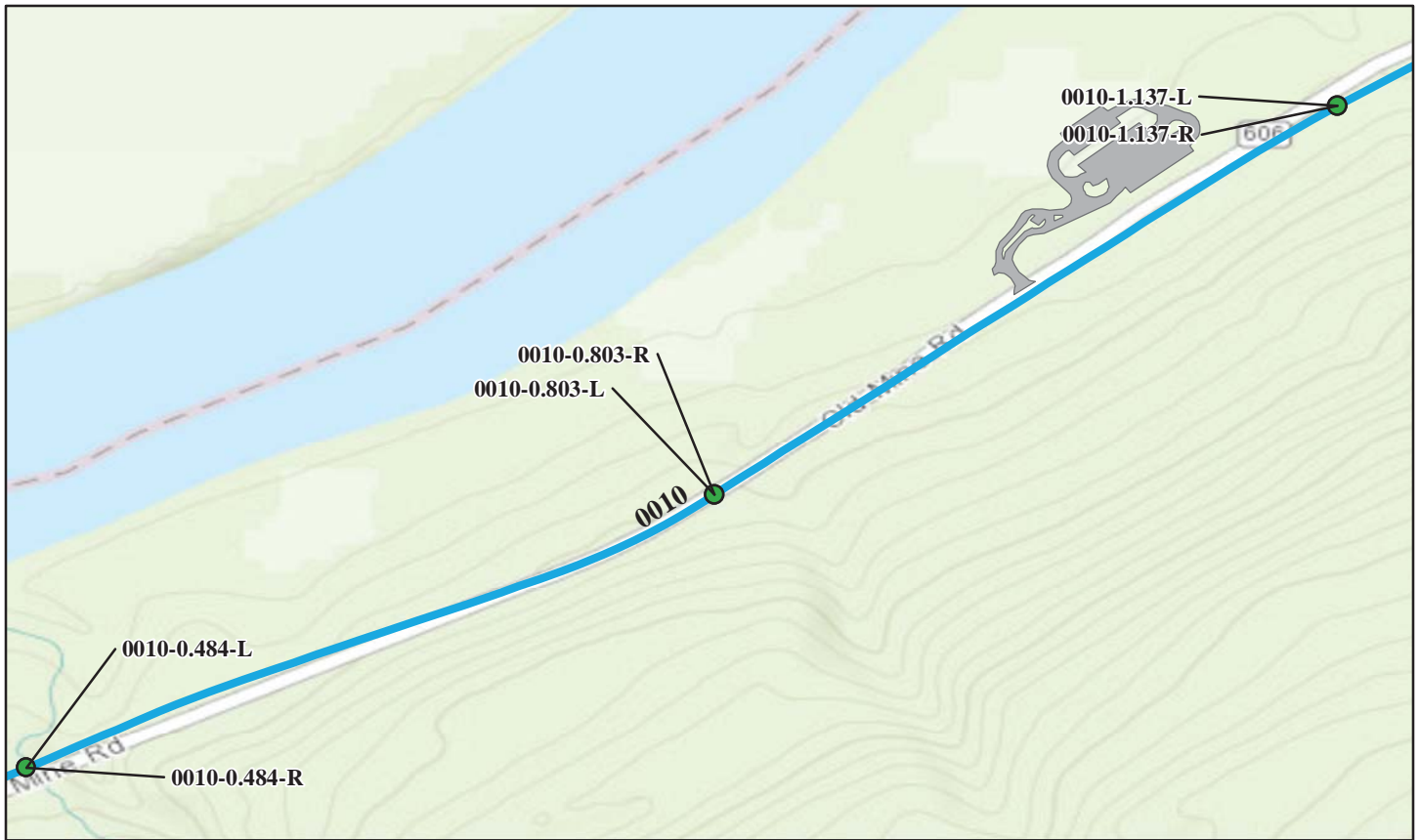


**Federal Lands Highway  
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# Delaware Water Gap National Recreation Area

## ROUTE 0010: OLD MINE ROAD (SOUTH SECTION)



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
DEWA-0010-0.484-L 8/2/2007	94	20	Gravity - Mass Concrete	Head Wall	72	\$39,902.00
DEWA-0010-0.484-R 8/2/2007	95	22	Gravity - Mass Concrete	Head Wall	73	\$792.00
DEWA-0010-0.803-L 8/2/2007	74	20	Gravity - Mass Concrete	Head Wall	72	\$53,176.00
DEWA-0010-0.803-R 8/2/2007	72	18	Gravity - Mass Concrete	Head Wall	87	\$40,625.00
DEWA-0010-1.137-L 8/2/2007	90	22	Gravity - Mass Concrete	Head Wall	83	\$3,658.00

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

# Delaware Water Gap National Recreation Area

## ROUTE 0010: OLD MINE ROAD (SOUTH SECTION)



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### Retaining Wall Condition Legend – Wall Condition Rating

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Fair (50 - 69)

Good to Excellent (70 - 100)

No Data

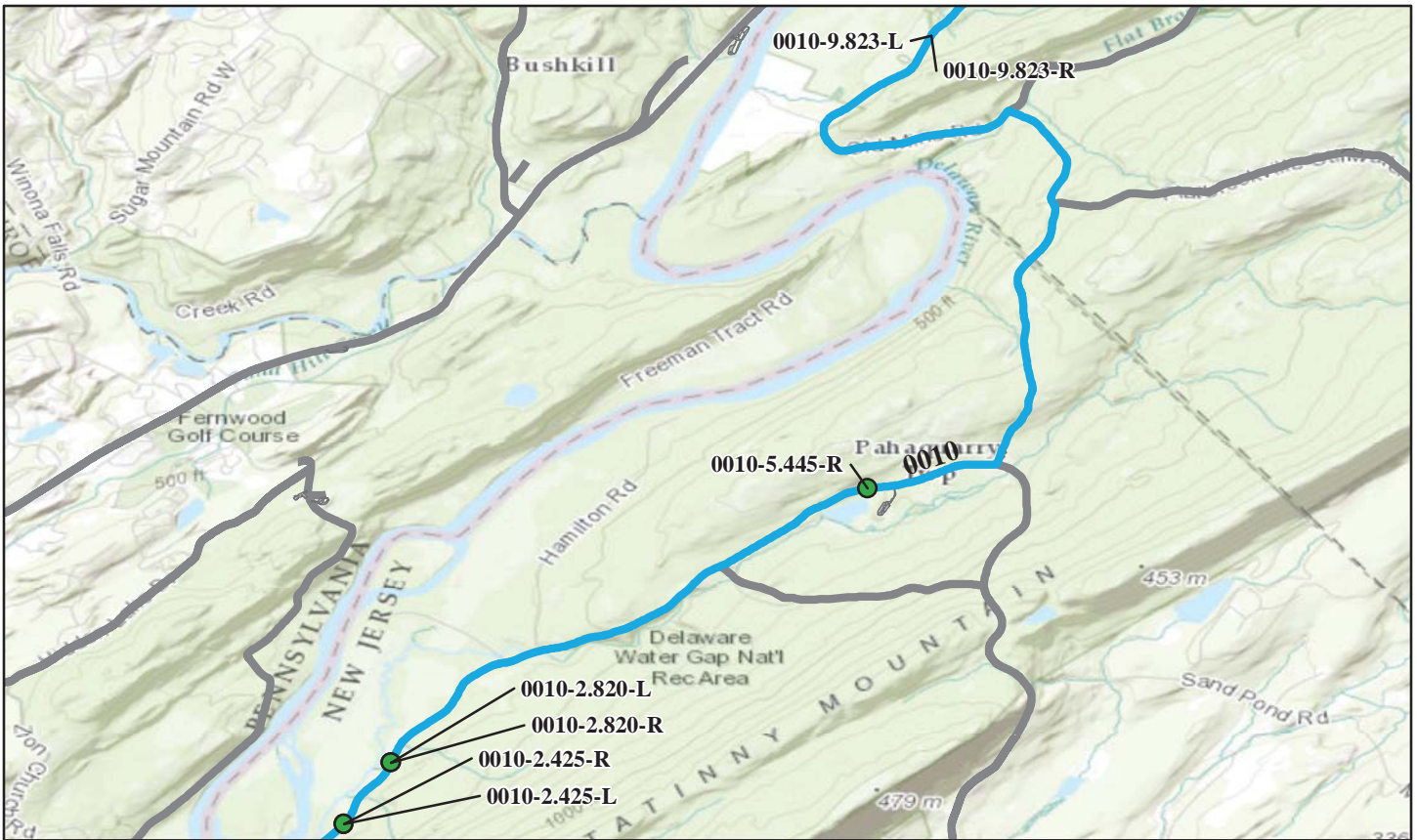
Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
DEWA-0010-1.137-R 8/2/2007	107	23	Gravity - Mass Concrete	Head Wall	84	\$35,200.00
DEWA-0010-1.650-L 8/2/2007	191	44	Gravity - Mortared Stone	Head Wall	81	\$11,477.00
DEWA-0010-1.650-R 8/2/2007	131	34	Gravity - Mortared Stone	Head Wall	76	\$13,781.00
DEWA-0010-1.890-L 8/2/2007	46	12	Gravity - Mortared Stone	Head Wall	87	\$1,775.00
DEWA-0010-2.425-L 8/2/2007	41	12	Gravity - Mass Concrete	Head Wall	100	\$0.00

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



# Delaware Water Gap National Recreation Area

## ROUTE 0010: OLD MINE ROAD (SOUTH SECTION)



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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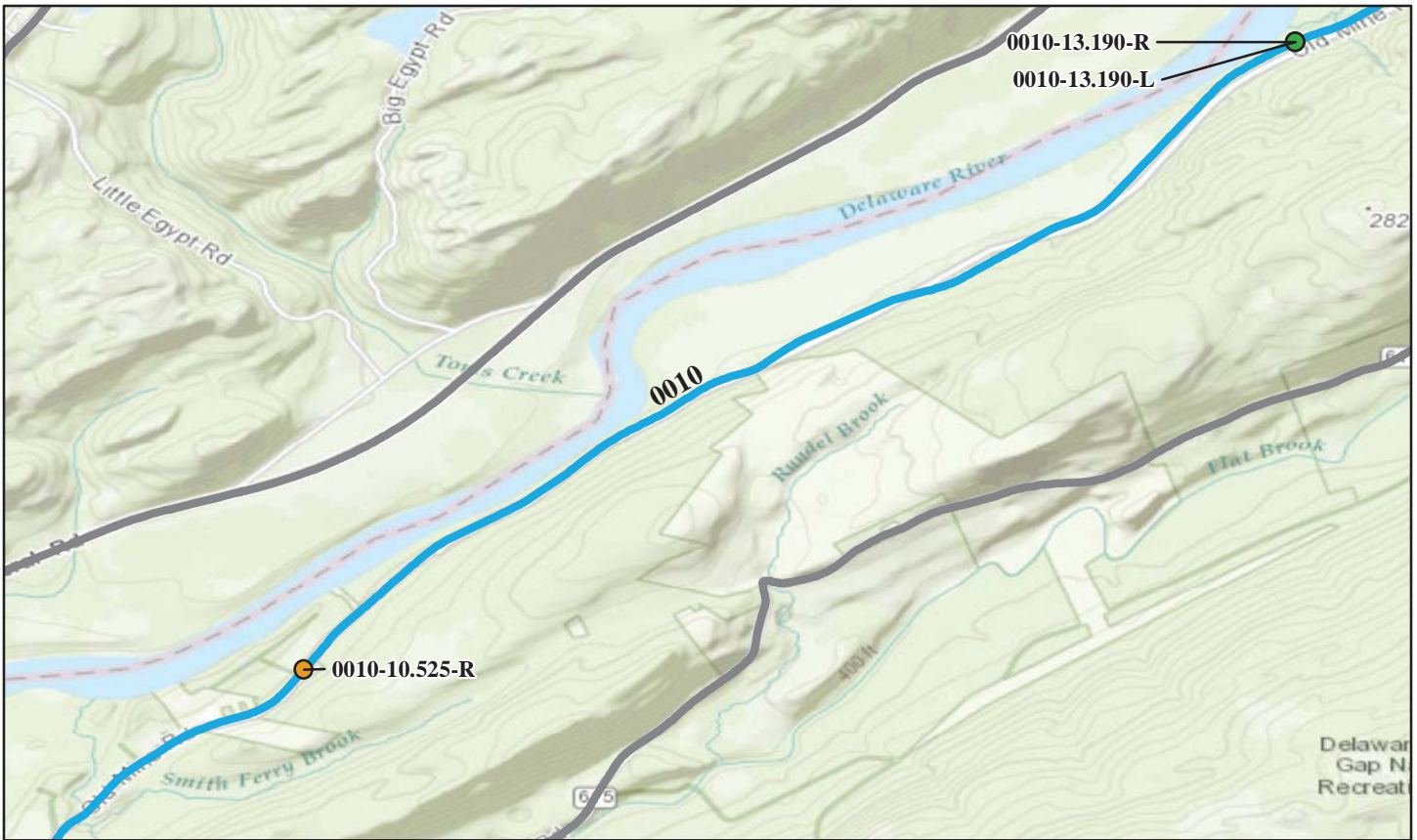
No Data

Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
DEWA-0010-2.425-R 8/2/2007	47	12	Gravity - Mass Concrete	Head Wall	97	\$0.00
DEWA-0010-2.820-L 8/2/2007	156	24	Gravity - Mass Concrete	Head Wall	91	\$0.00
DEWA-0010-2.820-R 8/2/2007	51	16	Gravity - Mass Concrete	Head Wall	90	\$0.00
DEWA-0010-5.445-R 8/2/2007	42	13	Gravity - Mass Concrete	Head Wall	97	\$0.00
DEWA-0010-9.823-L 8/2/2007	79	16	Gravity - Mass Concrete	Head Wall	25	\$21,143.00

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

# Delaware Water Gap National Recreation Area

## ROUTE 0010: OLD MINE ROAD (SOUTH SECTION)



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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Fair (50 - 69)

Good to Excellent (70 - 100)

No Data

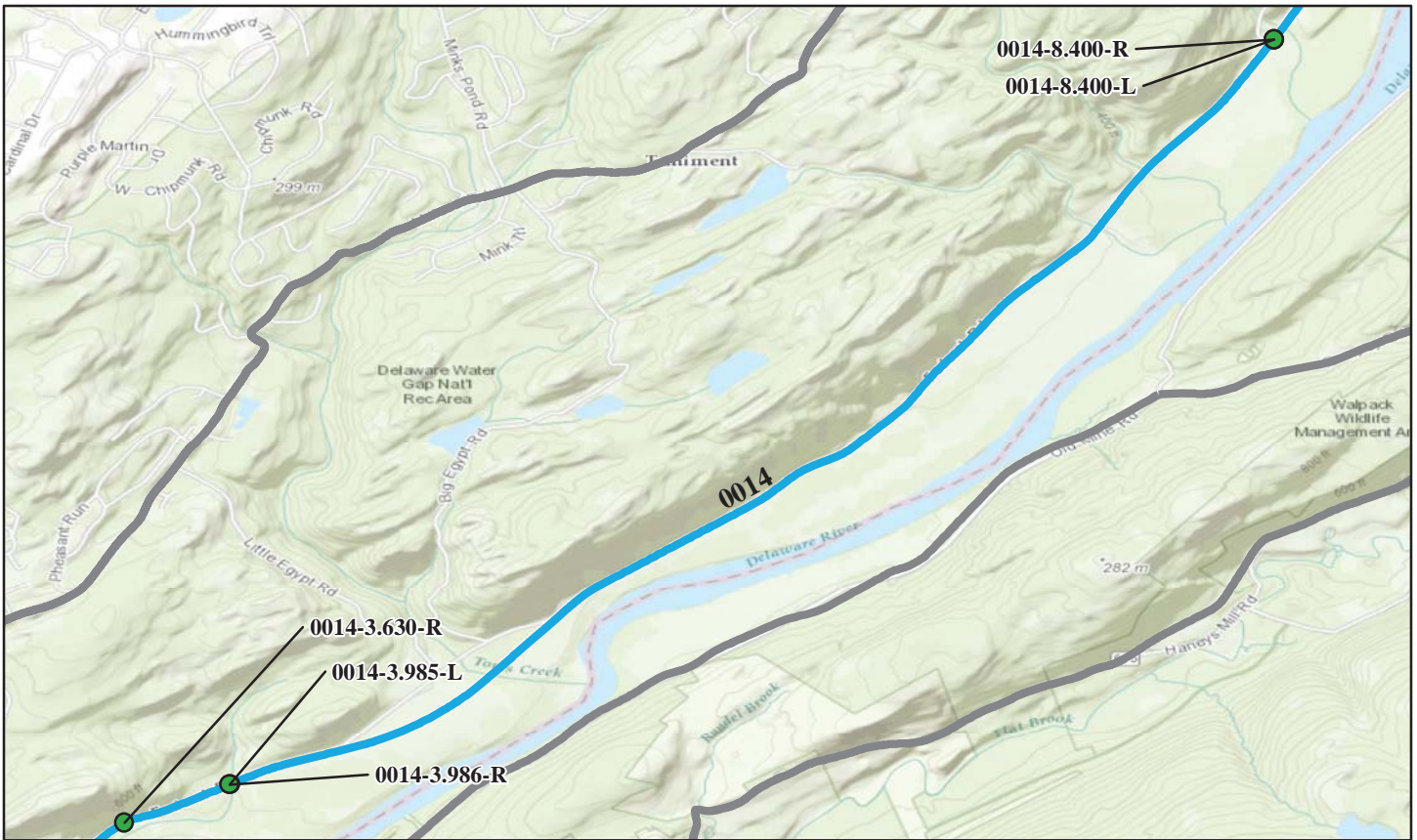
Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
DEWA-0010-9.823-R 8/3/2007	43	16	Gravity - Mass Concrete	Head Wall	57	\$16,034.00
DEWA-0010-10.525-R 8/3/2007	28	12	Gravity - Mortared Stone	Head Wall	64	\$7,907.00
DEWA-0010-13.190-L 8/3/2007	38	12	Gravity - Dry Stone	Head Wall	93	\$0.00
DEWA-0010-13.190-R 8/3/2007	37	11	Gravity - Dry Stone	Head Wall	87	\$440.00

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



# Delaware Water Gap National Recreation Area

## ROUTE 0014: US ROUTE 209



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)

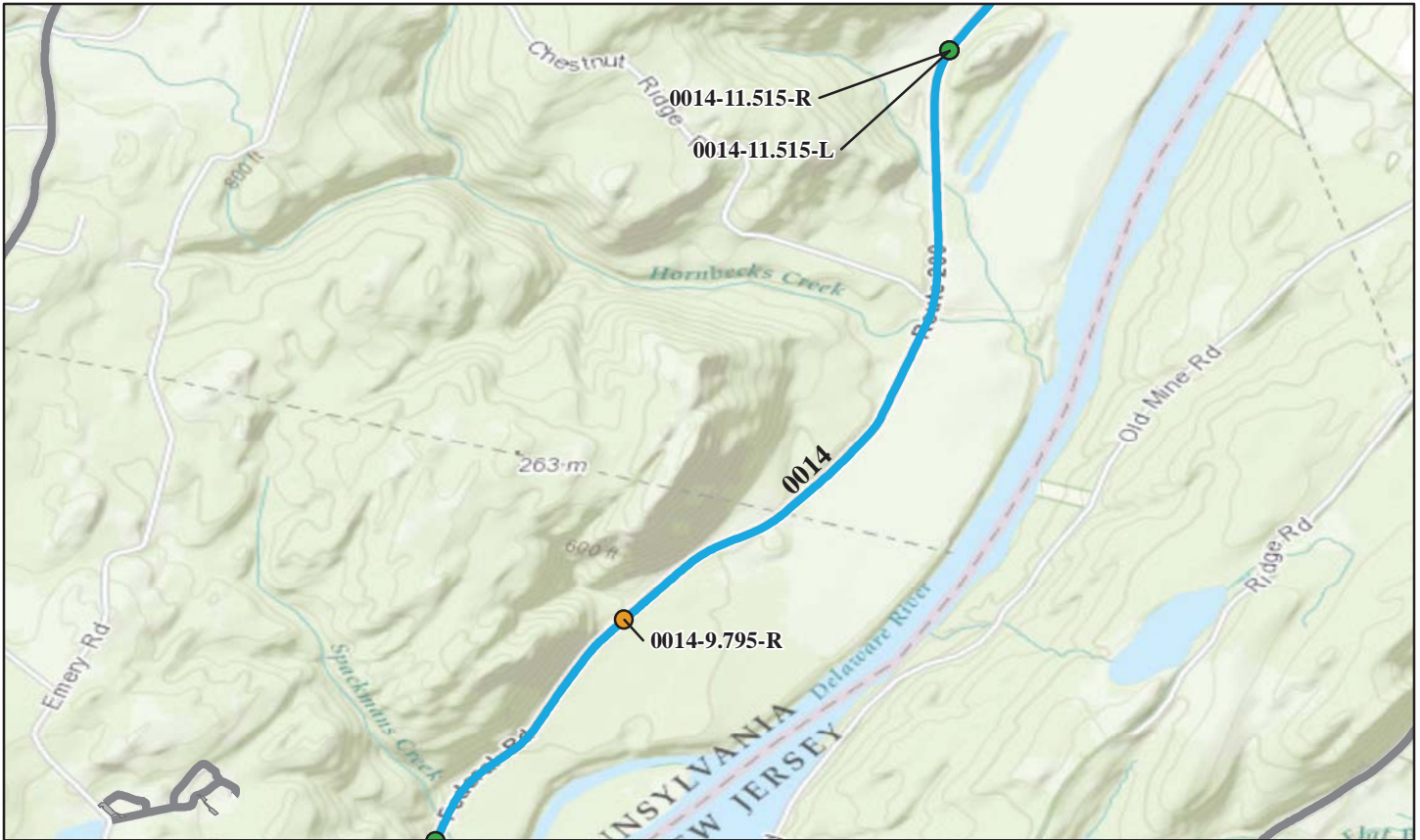
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Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
DEWA-0014-3.630-R 8/1/2007	202	101	Cantilever - Soldier Pile	Fill Wall	88	\$0.00
DEWA-0014-3.985-L 8/1/2007	78	19	Gravity - Mass Concrete	Head Wall	94	\$0.00
DEWA-0014-3.986-R 8/1/2007	92	19	Gravity - Mass Concrete	Head Wall	86	\$880.00
DEWA-0014-8.400-L 8/2/2007	184	29	Gravity - Mass Concrete	Head Wall	75	\$1,520.00
DEWA-0014-8.400-R 8/2/2007	184	29	Gravity - Mass Concrete	Head Wall	64	\$2,800.00

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

# Delaware Water Gap National Recreation Area

## ROUTE 0014: US ROUTE 209



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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No Data

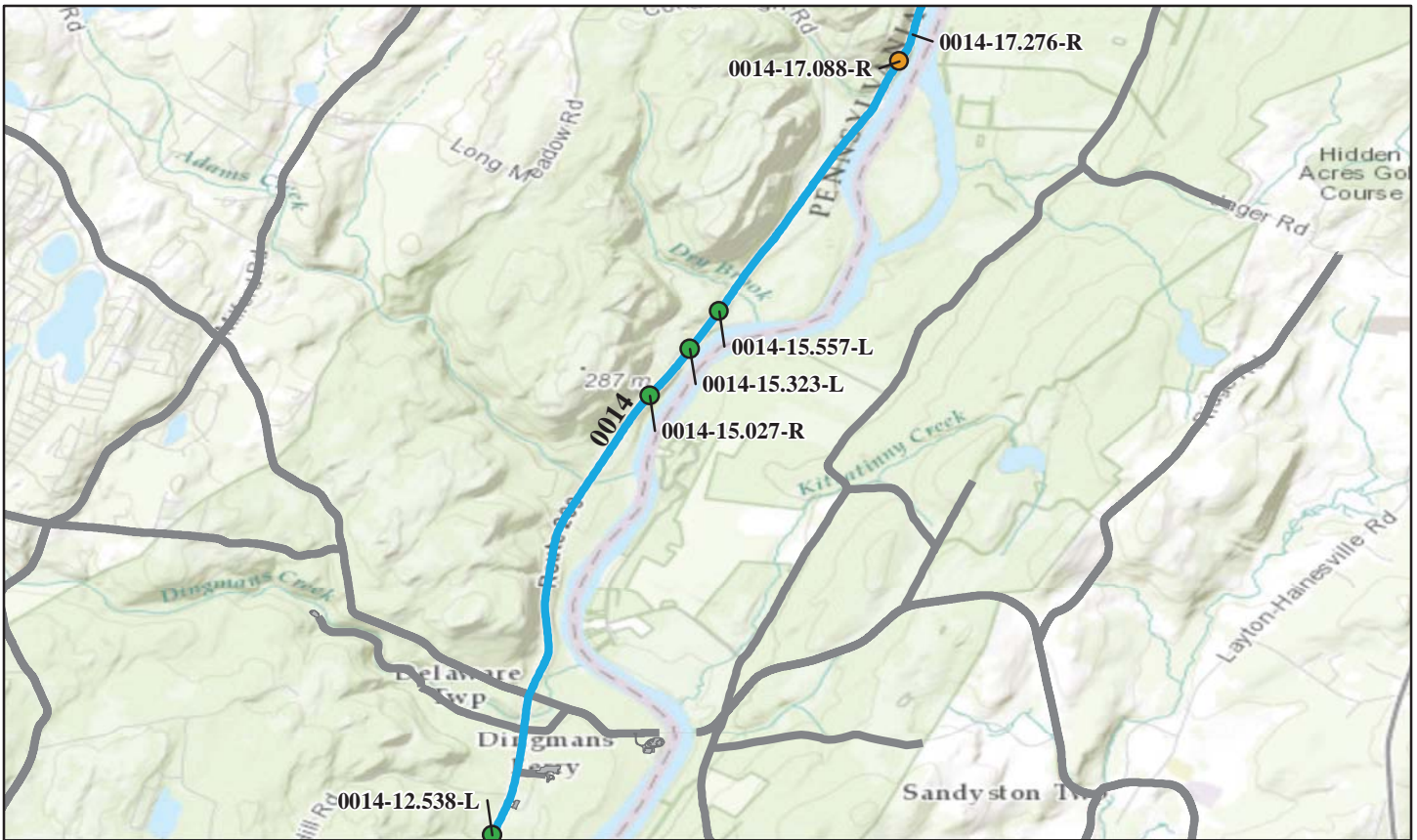
Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
DEWA-0014-9.096-R 8/1/2007	187	27	Gravity - Mass Concrete	Head Wall	56	\$40,200.00
DEWA-0014-9.098-L 8/1/2007	172	34	Gravity - Mass Concrete	Head Wall	75	\$1,200.00
DEWA-0014-9.795-R 8/1/2007	27	8	Gravity - Mass Concrete	Head Wall	65	\$4,910.00
DEWA-0014-11.515-L 8/1/2007	19	9	Gravity - Mass Concrete	Head Wall	87	\$500.00
DEWA-0014-11.515-R 8/1/2007	58	20	Gravity - Mass Concrete	Head Wall	81	\$5,029.00

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



# Delaware Water Gap National Recreation Area

## ROUTE 0014: US ROUTE 209



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
DEWA-0014-12.538-L 8/1/2007	22	6	Gravity - Mass Concrete	Head Wall	82	\$947.00
DEWA-0014-15.027-R 8/1/2007	270	270	Cantilever - Soldier Pile	Fill Wall	80	\$880.00
DEWA-0014-15.323-L 8/1/2007	20	8	Gravity - Mass Concrete	Head Wall	83	\$400.00
DEWA-0014-15.557-L 8/1/2007	34	16	Gravity - Mass Concrete	Head Wall	73	\$3,229.00
DEWA-0014-17.088-R 12/6/2007	4,675	425	Cantilever - Soldier Pile	Fill Wall	67	\$14,190.00

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

# Delaware Water Gap National Recreation Area

ROUTE 0014: US ROUTE 209



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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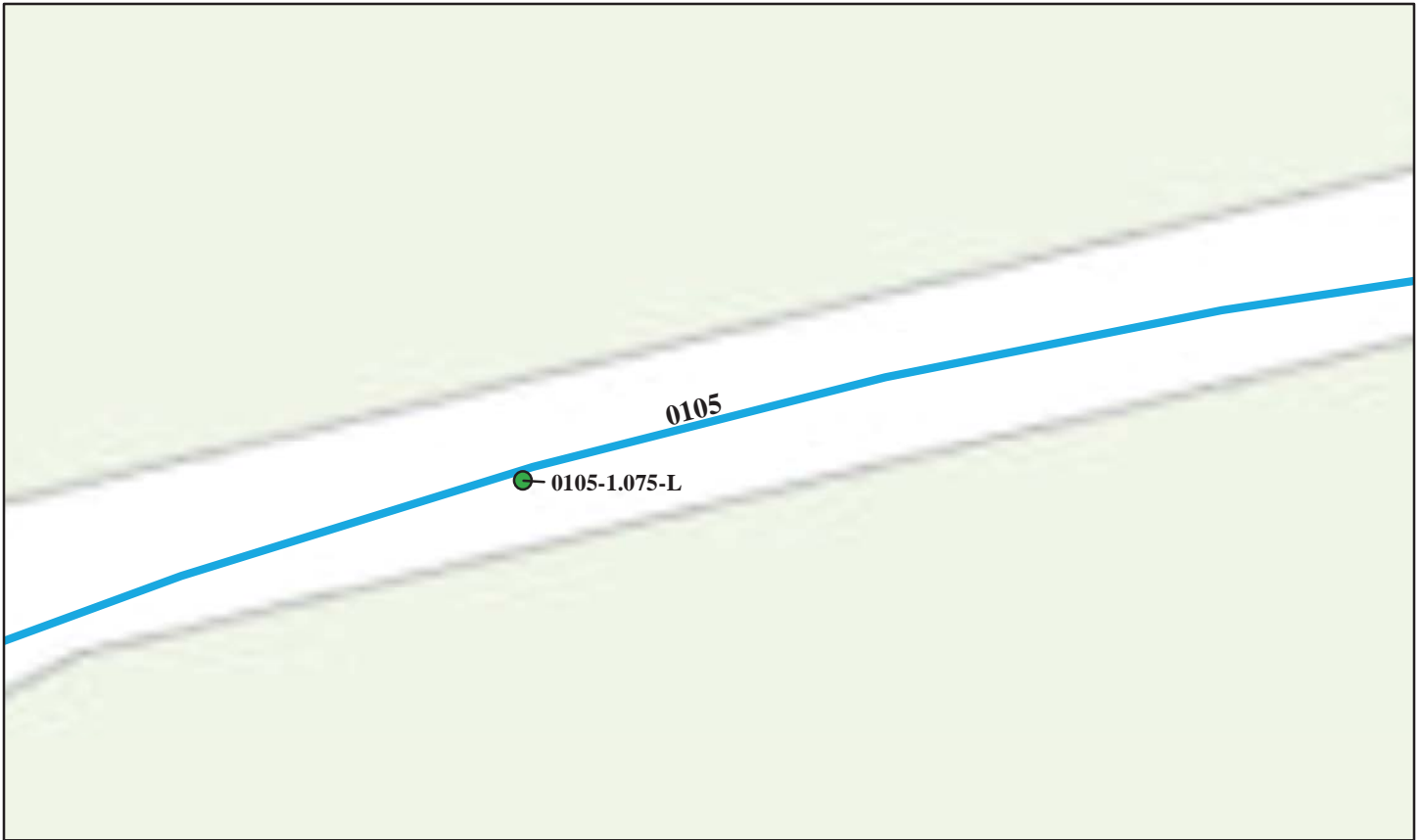
Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
DEWA-0014-17.276-R 8/1/2007	140	20	Crib - Timber	Fill Wall	49	\$28,275.00

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



# Delaware Water Gap National Recreation Area

## ROUTE 0105: RIVER 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

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Fair (50 - 69)

Good to Excellent (70 - 100)

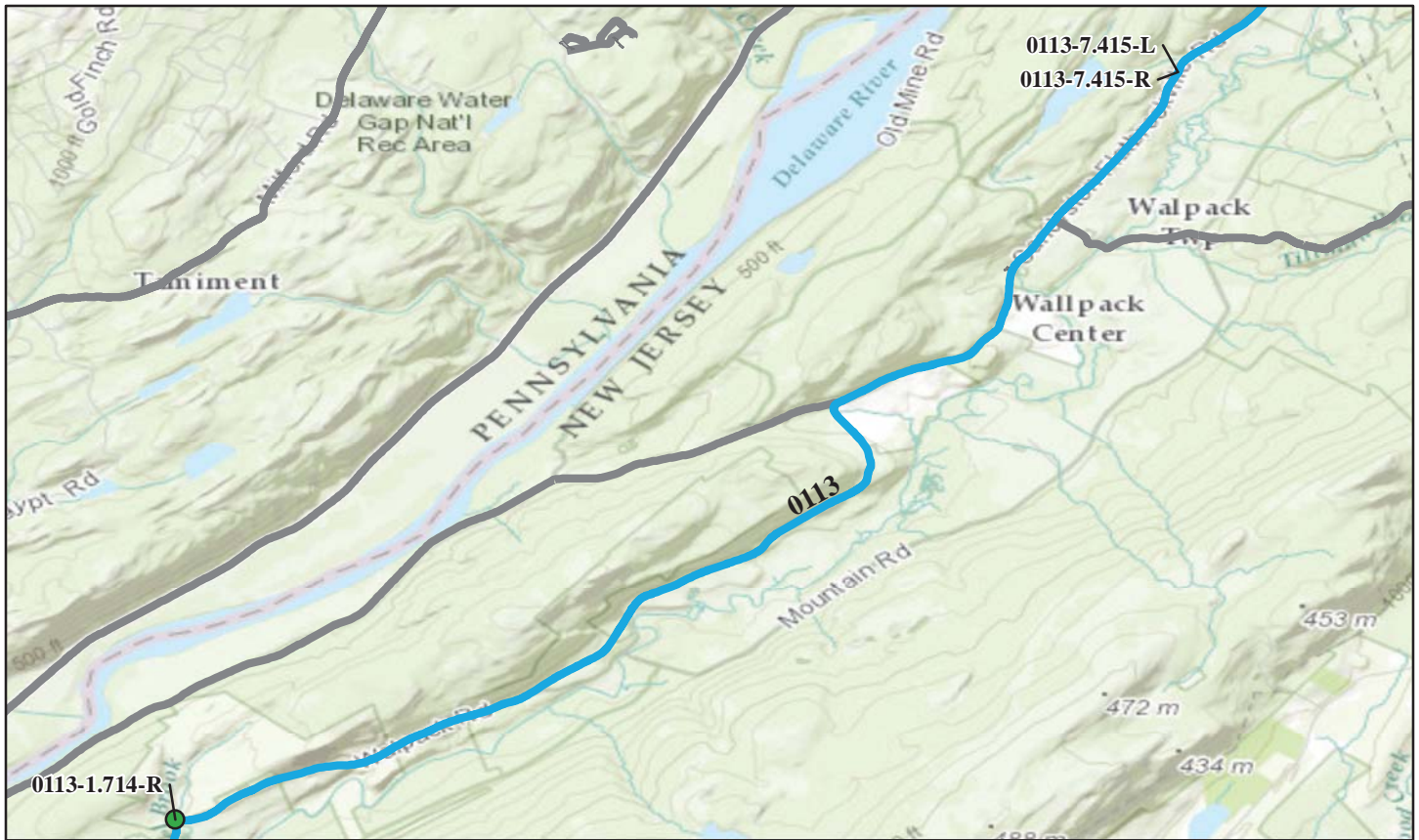
No Data

Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
DEWA-0105-1.075-L 8/2/2007	122	28	Gravity - Dry Stone	Head Wall	82	\$0.00

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

# Delaware Water Gap National Recreation Area

ROUTE 0113: NPS ROUTE 615



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
DEWA-0113-1.714-R 8/1/2007	95	20	Gravity - Mass Concrete	Head Wall	97	\$0.00
DEWA-0113-7.415-L 8/3/2007	134	24	Gravity - Mass Concrete	Head Wall	50	\$24,103.00
DEWA-0113-7.415-R 8/3/2007	168	32	Gravity - Mortared Stone	Head Wall	51	\$50,356.00

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

# Delaware Water Gap National Recreation Area

## ROUTE 0952: DINGMANS FALLS VISITOR CENTER



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)

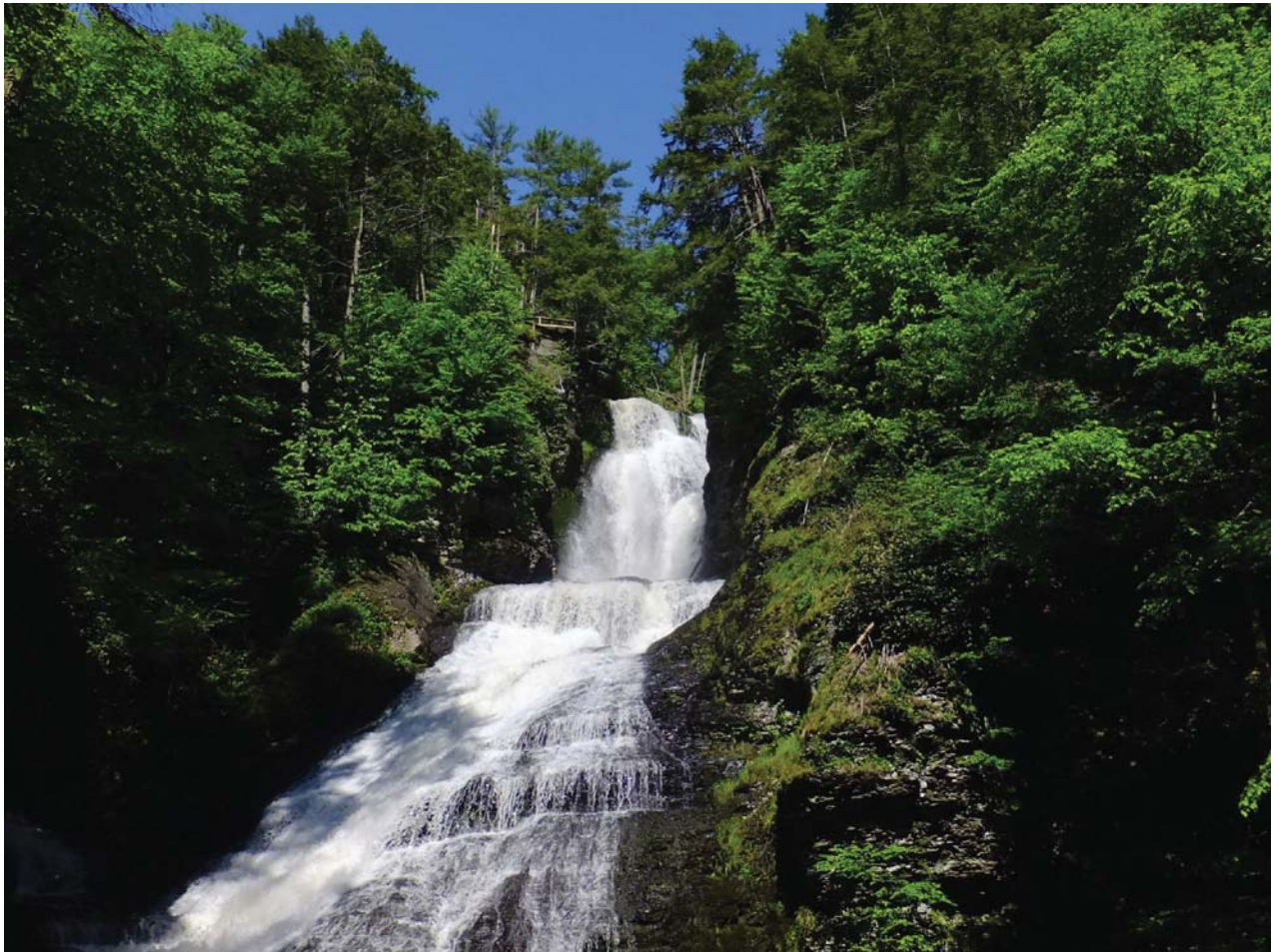
No Data

Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
DEWA-0952-0.000-P1 8/1/2007	409	98	Gravity - Dry Stone	Cut Wall	97	\$0.00

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



# Tier 3 Retaining Wall Details



Delaware Water Gap National Recreation Area



Federal Lands Highway  
Road Inventory Program

<b>Wall ID:</b>	DEWA-0010-0.484-L		
<b>Route Name:</b>	OLD MINE ROAD (SOUTH SECTION)		
<b>Inspection Date:</b>	August 02, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	72	<b>Maintenance Action:</b>	Repair Elements
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Concrete outlet headwall for a 60 in diameter CMP culvert constructed along left shoulder and along base of steep slope supporting a very low ADT roadway moderate consequence of failure		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	20	<b>Face Area (sq.):</b>	94
<b>Average Wall Height (ft.):</b>	4	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	9	<b>Vertical Offset (ft.):</b>	-25
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Good condition; 1/8-in. crack along top of wall; scour hole causing ongoing bank erosion and undermining of concrete apron; several medium to large diameter trees growing within 3 ft of wall		5
WALL FOUNDATION MATERIAL 8.00	No evidence of rotation, seepage or undermining; crack along top of wall suggests minor settlement along southern half of wall		8
CONCRETE 8.00	1/8-inch crack emanating from crown of culvert and extending up to top of wall; minor efflorescence around opening		8
WALL DRAINS 0.50	No evidence of drainage-related distress		9
LATERAL SLOPE 0.50	No distress; no evidence of movement; no erosion		10
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement		10
TRAFFIC BARRIER/FENCE 0.50	No distress to relatively new steel-backed timber guard rail		10
UPSLOPE 0.50	No distress to moderate-to-steep heavily-vegetated slope		10
DOWNSLOPE 1.00	7-ft diameter x 0.5-ft deep scour hole adjacent to wall; scour hole is causing ongoing bank erosion		6
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	MODERATE		
<b>Recommendation Narrative:</b>	Repair crack - 4.75 lft (\$5/lft) = \$23.75. Backfill scour hole - earthwork geotextile - (49sqft/9)(\$5/sqyd) = \$27.22. Placed riprap, class 3 - (24.5 cuft/27)(\$200/cuyd) = \$181.48 - 8 labor hrs (\$55/hr) = \$440. Reline 60-in. dia. cu		
<b>Repair Cost:</b>	\$39,902		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			



# Delaware Water Gap National Recreation Area

ROUTE 0010: OLD MINE ROAD (SOUTH SECTION)

## Retaining Wall Condition Photos



DEWA\_0010\_0.484\_L\_1.jpg



DEWA\_0010\_0.484\_L\_2.jpg



<b>Wall ID:</b>	DEWA-0010-0.484-R		
<b>Route Name:</b>	OLD MINE ROAD (SOUTH SECTION)		
<b>Inspection Date:</b>	August 02, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	73	<b>Maintenance Action:</b>	Maintenance
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Concrete inlet headwall for a 60 in diameter CMP culvert constructed along right shoulder and along base of a steep slope supporting a very low ADT roadway moderate consequence of failure.		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	22	<b>Face Area (sq.):</b>	95
<b>Average Wall Height (ft.):</b>	4	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	8	<b>Vertical Offset (ft.):</b>	-20
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Good condition; 1/8-in. crack emanating from crown of culvert and extends up to top of wall; possible seepage under wall; possible minor past settlement; debris blocking inlet at culvert		6
WALL FOUNDATION MATERIAL 8.00	Evidence of seepage under wall along the right side of opening; seepage may have led to minor settlement of the right one-third of headwall; no evidence of ongoing movement		7
CONCRETE 8.00	Concrete is generally in good condition; one 1/8-inch diameter crack emanating from the crown of culvert to top of wall		8
DOWNSLOPE 0.50	Wood debris at inlet to culvert is probably impeding flow; no distress to natural stream channel		8
WALL DRAINS 0.50	Possible seepage under wall resulting in minor past settlement		8
LATERAL SLOPE 0.50	No distress; no evidence of movement or erosion		9
VEGETATION 0.50	One small diameter tree is growing adjacent to wall; tree is not currently affecting the wall's performance, but should be removed		9
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement; no distress to shoulder		10
TRAFFIC BARRIER/FENCE 0.50	No distress to relatively new steel-backed guard rail		10
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	MODERATE		
<b>Recommendation Narrative:</b>	Clear debris - 6 labor hrs (\$55/hr) = \$330. Crack cleaning, routing and sealing - 6.5 lnft (\$5/lnft) = \$32.50. Cut small tree - 1 tree (\$100/tree) = \$100. Investigate seepage - 6 labor hrs (\$55/hr) = \$330.		
<b>Repair Cost:</b>	\$792		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			

# **Delaware Water Gap National Recreation Area**

**ROUTE 0010: OLD MINE ROAD (SOUTH SECTION)**

## **Retaining Wall Condition Photos**



**DEWA\_0010\_0.484\_R\_1.jpg**

<b>Wall ID:</b>	DEWA-0010-0.803-L		
<b>Route Name:</b>	OLD MINE ROAD (SOUTH SECTION)		
<b>Inspection Date:</b>	August 02, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	72	<b>Maintenance Action:</b>	Repair Elements
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Concrete inlet headwall for a 60 in diameter CMP constructed along left shoulder and along base of steep slope supporting a very low ADT roadway low consequence of failure		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	20	<b>Face Area (sq.):</b>	74
<b>Average Wall Height (ft.):</b>	3	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	8	<b>Vertical Offset (ft.):</b>	-30
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Good condition; ongoing channel erosion is encroaching on wall; minor rusting along invert; two medium dia. Trees growing adjacent to wall and threatening long-term stability of wall		7
WALL FOUNDATION MATERIAL 8.00	1/8-in. crack may have resulted from minor past settlement along the south half of wall; no evidence of recent or ongoing movement		7
CONCRETE 8.00	Good condition; one 1/8-in. crack emanating from crown of culvert; crack extends through wall		7
WALL DRAINS 0.50	No evidence of drainage-related distress		9
LATERAL SLOPE 0.50	No distress; no evidence of movement; no erosion		10
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement or relatively flat, narrow grassy shoulder		10
TRAFFIC BARRIER/FENCE 0.50	No distress to relatively new steel-backed timber guard rail		10
UPSLOPE 0.50	No distress to steep, lightly-vegetated slope		10
CULVERT 1.00	Minor rusting along invert		7
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	LOW		
<b>Recommendation Narrative:</b>	Crack cleaning, routing & sealing - 4.0 lnft (\$10/lnft) = \$40. Erosion Protection - place riprap, Class III - (30/27)(\$200/cuyd) = \$222.22. Earthwork geotextile - (25/9)(\$5/sqyd) = \$13.89. Line 60-in. dia. Culvert - 70 lnft (\$750/lnft).		
<b>Repair Cost:</b>	\$53,176		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			



# **Delaware Water Gap National Recreation Area**

**ROUTE 0010: OLD MINE ROAD (SOUTH SECTION)**

## **Retaining Wall Condition Photos**



**DEWA\_0010\_0.803\_L\_1.jpg**

<b>Wall ID:</b>	DEWA-0010-0.803-R		
<b>Route Name:</b>	OLD MINE ROAD (SOUTH SECTION)		
<b>Inspection Date:</b>	August 02, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	87	<b>Maintenance Action:</b>	Maintenance
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Concrete inlet headwall for a 60 in diameter CMP culvert constructed along right shoulder and along base of steep to moderate slope supporting a very low ADT roadway moderate consequence of failure		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	18	<b>Face Area (sq.):</b>	72
<b>Average Wall Height (ft.):</b>	4	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	8	<b>Vertical Offset (ft.):</b>	-15
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>	<b>Condition Rating (0 - 10)</b>	
PERFORMANCE 8.00	Good condition; moderate rusting along culvert's invert; one medium diameter tree growing adjacent to wall	8	
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or seepage	9	
CONCRETE 8.00	No distress; good to excellent condition	9	
VEGETATION 0.50	One medium diameter tree growing immediately adjacent to wall; tree threatens long-term stability of wall	8	
DOWNSLOPE 0.50	No distress to dry creek bed	10	
LATERAL SLOPE 0.50	No distress; no evidence of movement; no erosion	10	
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement	10	
TRAFFIC BARRIER/FENCE 0.50	No distress to relatively new steel-backed timber guard rail	10	
UPSLOPE 0.50	No distress to steep to moderate, lightly forested slope	10	
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	MODERATE		
<b>Recommendation Narrative:</b>	Cut medium dia. Tree - 1 tree (\$200/tree) = \$200. Line 60-in. dia. Culvert (1/2 length) - 51.5 lnft (\$750/lnft) = \$38,625		
<b>Repair Cost:</b>	\$40,625		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			

# **Delaware Water Gap National Recreation Area**

**ROUTE 0010: OLD MINE ROAD (SOUTH SECTION)**

## **Retaining Wall Condition Photos**



**DEWA\_0010\_0.803\_R\_1.jpg**



<b>Wall ID:</b>	DEWA-0010-1.137-L		
<b>Route Name:</b>	OLD MINE ROAD (SOUTH SECTION)		
<b>Inspection Date:</b>	August 02, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	83	<b>Maintenance Action:</b>	Maintenance
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Concrete outlet headwall for a 60 in diameter CMP culvert constructed along left shoulder and along base of steep slope supporting a very low ADT roadway moderate consequence of failure		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	22	<b>Face Area (sq.):</b>	90
<b>Average Wall Height (ft.):</b>	4	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	8	<b>Vertical Offset (ft.):</b>	-17
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Good condition; minor rusting along invert of pipe; one small diameter tree and brush growing atop wall; ongoing bank erosion due to formation of scour hole		7
WALL FOUNDATION MATERIAL 8.00	No distress; appears to be founded on an 18-in. thick concrete footing; no evidence of settlement, rotation, undermining or seepage		9
CONCRETE 8.00	Good condition; general age-related weathering		9
CULVERT 0.50	60-in. diameter CMP; minor rusting along invert		8
LATERAL SLOPE 0.50	Moderate erosion along south end of wall		8
UPSLOPE 0.50	No distress to moderately-sloping, well-vegetated slope		9
WALL DRAINS 0.50	No evidence of drainage-related distress		9
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement or shoulder		10
TRAFFIC BARRIER/FENCE 0.50	No distress to relatively new steel-backed timber guard rail		10
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	MODERATE		
<b>Recommendation Narrative:</b>	Cut medium diameter tree - 1 tree (\$200/tree) = \$200. Backfill scour hole - earthwork geotextile - 25 sqyd (\$5/sqyd) = \$125. Placed riprap, Class III - 16.67 cuyd (\$200/cuyd) = \$3,333.33.		
<b>Repair Cost:</b>	\$3,658		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			

# **Delaware Water Gap National Recreation Area**

**ROUTE 0010: OLD MINE ROAD (SOUTH SECTION)**

## **Retaining Wall Condition Photos**



**DEWA\_0010\_1.137\_L\_1.jpg**

<b>Wall ID:</b>	DEWA-0010-1.137-R		
<b>Route Name:</b>	OLD MINE ROAD (SOUTH SECTION)		
<b>Inspection Date:</b>	August 02, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	84	<b>Maintenance Action:</b>	Maintenance
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Concrete inlet headwall for 60 in diameter CMP constructed along right shoulder and along base of steep slope supporting very low ADT roadway moderate consequence of failure		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	23	<b>Face Area (sq.):</b>	107
<b>Average Wall Height (ft.):</b>	4	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	8	<b>Vertical Offset (ft.):</b>	-12
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Good condition; minor rusting along invert of pipe; two small diameter trees growing adjacent to wall		7
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or seepage		9
CONCRETE 8.00	Good condition; general age-related weathering		9
CULVERT 0.50	60-in. diameter CMP; minor rusting along invert		8
DOWNSLOPE 0.50	No distress to dry creek bed		9
UPSLOPE 0.50	No distress to steep lightly forested slope		9
WALL DRAINS 0.50	No evidence of drainage-related distress		9
LATERAL SLOPE 0.50	No distress; no evidence of movement; no erosion		10
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement or relatively flat and narrow grassy shoulder		10
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	MODERATE		
<b>Recommendation Narrative:</b>	Cut trees - 2 trees (\$100/tree) = \$200. Line 60-in. diameter culvert - 44 lnft (\$750/lnft) = \$33,000.		
<b>Repair Cost:</b>	\$35,200		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			



# **Delaware Water Gap National Recreation Area**

**ROUTE 0010: OLD MINE ROAD (SOUTH SECTION)**

## **Retaining Wall Condition Photos**



**DEWA\_0010\_1.137\_R\_1.jpg**

<b>Wall ID:</b>	DEWA-0010-1.650-L		
<b>Route Name:</b>	OLD MINE ROAD (SOUTH SECTION)		
<b>Inspection Date:</b>	August 02, 2007	<b>Approximate Year Built:</b>	1936
<b>*Wall Rating:</b>	81	<b>Maintenance Action:</b>	Maintenance
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mortared Stone
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Stone masonry outlet headwall for 13 ft diameter concrete arch culvert 2.75 ft integrated stone masonry guard wall integrated into wall constructed along left side and directly supports a low ADT roadway		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	44	<b>Face Area (sq.):</b>	191
<b>Average Wall Height (ft.):</b>	4	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	8	<b>Vertical Offset (ft.):</b>	0
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Good condition; 80% of guard wall and 30% of wall needs to be repointed		7
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or seepage		9
MORTAR 8.00	Minor mortar degradation with minor debonding across 30% of wall; minor cracking		7
STONE MASONRY 8.00	No distress to stone blocks		9
WALL DRAINS 0.50	No evidence of drainage-related distress		9
CULVERT 0.50	No distress to 13 ft diameter concrete arch culvert		10
DOWNSLOPE 0.50	No distress to dry, natural stream bed		10
LATERAL SLOPE 0.50	No distress; no evidence of movement; no erosion		10
ROAD/SIDEWALK/SHOULDER 0.50	No distress to asphalt pavement		10
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	HIGH		
<b>Recommendation Narrative:</b>	Repoint 30% of wall - 0.30(191.10 sqft)(\$75/sqft) = \$4,299.67. Repoint 80% of guard wall - 0.80(119.625 sqft) (\$75/sqft) = \$7,177.50.		
<b>Repair Cost:</b>	\$11,477		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			

# **Delaware Water Gap National Recreation Area**

**ROUTE 0010: OLD MINE ROAD (SOUTH SECTION)**

## **Retaining Wall Condition Photos**



**DEWA\_0010\_1.650\_L\_1.jpg**



<b>Wall ID:</b>	DEWA-0010-1.650-R		
<b>Route Name:</b>	OLD MINE ROAD (SOUTH SECTION)		
<b>Inspection Date:</b>	August 02, 2007	<b>Approximate Year Built:</b>	1936
<b>*Wall Rating:</b>	76	<b>Maintenance Action:</b>	Repair Elements
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mortared Stone
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Stone masonry inlet headwall for a 13 ft x 6 ft concrete arch culvert 2.75 ft integrated stone masonry guard wall integrated into wall constructed along right side and directly supports a low ADT roadway		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	34	<b>Face Area (sq.):</b>	131
<b>Average Wall Height (ft.):</b>	3	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	8	<b>Vertical Offset (ft.):</b>	0
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Good to fair condition; moderate to severe degradation of mortar across 70% of wall and 100% of guard wall; minor cracking and moderate debonding of mortar		6
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or seepage		9
MORTAR 8.00	Minor to moderate degradation along 70% of wall; minor cracking; moderate debonding		6
STONE MASONRY 8.00	No distress to blocks		9
VEGETATION 0.50	Two medium diameter trees along south end of wall; trees not causing distress to wall, but threatens the long-term stability of wall		8
CULVERT 0.50	No distress to 13 ft diameter concrete arch culvert		9
DOWNSLOPE 0.50	No distress to dry stream bed		9
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement		9
WALL DRAINS 0.50	No evidence of drainage-related distress		9
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	HIGH		
<b>Recommendation Narrative:</b>	Cut two medium diameter trees - 2 trees (\$200/tree) = \$400. Stone masonry repointing - 0.79(130.88 sqft) (\$75/sqft) = \$6,871.20, 92.125 sqft (\$75/sqft) = \$6,909.38.		
<b>Repair Cost:</b>	\$13,781		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			

# Delaware Water Gap National Recreation Area

ROUTE 0010: OLD MINE ROAD (SOUTH SECTION)

## Retaining Wall Condition Photos



DEWA\_0010\_1.650\_R\_1.jpg



DEWA\_0010\_1.650\_R\_2.jpg

<b>Wall ID:</b>	DEWA-0010-1.890-L		
<b>Route Name:</b>	OLD MINE ROAD (SOUTH SECTION)		
<b>Inspection Date:</b>	August 02, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	87	<b>Maintenance Action:</b>	Maintenance
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mortared Stone
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Stone masonry outlet headwall for a 36 in CMP culvert constructed along left shoulder of very low ADT roadway low consequence of failure		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	12	<b>Face Area (sq.):</b>	46
<b>Average Wall Height (ft.):</b>	3	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	5	<b>Vertical Offset (ft.):</b>	0
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>	<b>Condition Rating (0 - 10)</b>	
PERFORMANCE 8.00	Good condition; minor debonding; one large tree and several small diameter trees growing adjacent to wall; minor rusting and sedimentation along invert	8	
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or seepage	9	
MORTAR 8.00	General age-related weathering; minor debonding across 10% of wall	8	
STONE MASONRY 8.00	No distress to blocks	10	
CULVERT 0.50	36-in. diameter CMP; minor rusting and sedimentation along invert; some cobbles at outlet	8	
DOWNSLOPE 0.50	Minor erosion of dry channel	8	
LATERAL SLOPE 0.50	No distress; no evidence of movement; no erosion	9	
WALL DRAINS 0.50	No evidence of drainage-related distress	9	
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement or relatively flat, vegetated shoulder	10	
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	LOW		
<b>Recommendation Narrative:</b>	Cut trees - 1 large tree (\$955/tree) = \$955. 4 small trees (\$100/tree) = \$400. Clean culvert in place - 20 lnft (\$10/lnft) = \$200. 4 labor hrs (\$55/hr) = \$220.		
<b>Repair Cost:</b>	\$1,775		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			



# **Delaware Water Gap National Recreation Area**

**ROUTE 0010: OLD MINE ROAD (SOUTH SECTION)**

## **Retaining Wall Condition Photos**



**DEWA\_0010\_1.890\_L\_1.jpg**

<b>Wall ID:</b>	DEWA-0010-2.425-L		
<b>Route Name:</b>	OLD MINE ROAD (SOUTH SECTION)		
<b>Inspection Date:</b>	August 02, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	100	<b>Maintenance Action:</b>	No Action
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Relatively new concrete inlet headwall for a 36 in diameter concrete pipe culvert constructed along right shoulder of very low ADT roadway low consequence of failure		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	12	<b>Face Area (sq.):</b>	41
<b>Average Wall Height (ft.):</b>	3	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	4	<b>Vertical Offset (ft.):</b>	-3
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Excellent condition; relatively new concrete headwall		10
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or seepage		10
CONCRETE 8.00	No distress to relatively new concrete headwall		10
CULVERT 0.50	36-in. diameter concrete pipe; relatively new concrete headwall		10
DOWNSLOPE 0.50	No distress to dry channel; good drainage ways from wall		10
LATERAL SLOPE 0.50	No distress; no evidence of movement; no erosion		10
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement		10
TRAFFIC BARRIER/FENCE 0.50	No distress to steel-backed timber guard rail		10
UPSLOPE 0.50	No distress to moderately-sloping, well-vegetated slope		10
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	LOW		
<b>Recommendation Narrative:</b>	None		
<b>Repair Cost:</b>	\$0		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			

# **Delaware Water Gap National Recreation Area**

**ROUTE 0010: OLD MINE ROAD (SOUTH SECTION)**

## **Retaining Wall Condition Photos**



**DEWA\_0010\_2.425\_L\_1.jpg**



<b>Wall ID:</b>	DEWA-0010-2.425-R		
<b>Route Name:</b>	OLD MINE ROAD (SOUTH SECTION)		
<b>Inspection Date:</b>	August 02, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	97	<b>Maintenance Action:</b>	No Action
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Relatively new concrete outlet headwall for a 36 in diameter concrete pipe culvert constructed along left shoulder of very low ADT roadway low consequence of failure		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	12	<b>Face Area (sq.):</b>	47
<b>Average Wall Height (ft.):</b>	3	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	4	<b>Vertical Offset (ft.):</b>	-2
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Excellent condition; relatively new concrete headwall; minor erosion along both ends of wall		9
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or seepage		10
CONCRETE 8.00	No distress; relatively new concrete headwall		10
CULVERT 0.50	No distress to 36-in. diameter concrete pipe		10
DOWNSLOPE 0.50	No distress; good drainage away from wall		10
LATERAL SLOPE 0.50	Minor erosion along both ends of wall		10
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement		10
TRAFFIC BARRIER/FENCE 0.50	No distress to steel-backed timber guard rail		10
UPSLOPE 0.50	No distress to relatively flat, vegetated slope		10
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	LOW		
<b>Recommendation Narrative:</b>	None		
<b>Repair Cost:</b>	\$0		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			

# **Delaware Water Gap National Recreation Area**

**ROUTE 0010: OLD MINE ROAD (SOUTH SECTION)**

## **Retaining Wall Condition Photos**



**DEWA\_0010\_2.425\_R\_1.jpg**

<b>Wall ID:</b>	DEWA-0010-2.820-L		
<b>Route Name:</b>	OLD MINE ROAD (SOUTH SECTION)		
<b>Inspection Date:</b>	August 02, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	91	<b>Maintenance Action:</b>	No Action
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Relatively new concrete outlet headwall for a 4 ft x 6 ft concrete box culvert constructed along left shoulder of very low ADT roadway high consequence of failure as structure directly supports roadway		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	24	<b>Face Area (sq.):</b>	156
<b>Average Wall Height (ft.):</b>	6	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	8	<b>Vertical Offset (ft.):</b>	-1
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>	<b>Condition Rating (0 - 10)</b>	
PERFORMANCE 8.00	Good to excellent condition; no observed distress to relatively new concrete headwall	9	
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or seepage	9	
CONCRETE 8.00	No distress to relatively new headwall	9	
VEGETATION 0.50	Wall is overgrown with brush	8	
CULVERT 0.50	No distress to 4 ft x 6 ft concrete box culvert	9	
WALL DRAINS 0.50	No evidence of drainage-related distress	9	
DOWNSLOPE 0.50	No distress to dry channel; good drainage ways from wall	10	
LATERAL SLOPE 0.50	No distress; no evidence of movement; no erosion	10	
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement	10	
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	HIGH		
<b>Recommendation Narrative:</b>	None		
<b>Repair Cost:</b>	\$0		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			



# **Delaware Water Gap National Recreation Area**

**ROUTE 0010: OLD MINE ROAD (SOUTH SECTION)**

## **Retaining Wall Condition Photos**



**DEWA\_0010\_2.820\_L\_1.jpg**

<b>Wall ID:</b>	DEWA-0010-2.820-R		
<b>Route Name:</b>	OLD MINE ROAD (SOUTH SECTION)		
<b>Inspection Date:</b>	August 02, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	90	<b>Maintenance Action:</b>	No Action
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Concrete inlet headwall for 3.75 ft x 5.5 ft concrete box culvert constructed along right shoulder of a very low ADT roadway high consequence of failure		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	16	<b>Face Area (sq.):</b>	51
<b>Average Wall Height (ft.):</b>	3	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	6	<b>Vertical Offset (ft.):</b>	-2
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Good to excellent condition; small brush has overgrown wall		9
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or seepage		9
CONCRETE 8.00	No distress		9
VEGETATION 0.50	Small brush has overgrown wall; vegetation not currently causing distress		8
CULVERT 0.50	No distress to 3.75 ft by 5.5 ft concrete box culvert		9
DOWNSLOPE 0.50	No distress to dry channel; good drainage away from wall		9
LATERAL SLOPE 0.50	No distress; no evidence of movement; no erosion		9
UPSLOPE 0.50	No distress to gently-sloping, well-vegetated slope		9
WALL DRAINS 0.50	No evidence of drainage-related distress		9
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	HIGH		
<b>Recommendation Narrative:</b>	None		
<b>Repair Cost:</b>	\$0		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			

# **Delaware Water Gap National Recreation Area**

**ROUTE 0010: OLD MINE ROAD (SOUTH SECTION)**

## **Retaining Wall Condition Photos**



**DEWA\_0010\_2.820\_R\_1.jpg**



<b>Wall ID:</b>	DEWA-0010-5.445-R		
<b>Route Name:</b>	OLD MINE ROAD (SOUTH SECTION)		
<b>Inspection Date:</b>	August 02, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	97	<b>Maintenance Action:</b>	No Action
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Relatively new concrete headwall for a 4.5 ft x 2.75 ft elliptical concrete culvert founded on a concrete footing and bearing a bedrock outcrop constructed within moderate to flat slope low consequence of failure		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	13	<b>Face Area (sq.):</b>	42
<b>Average Wall Height (ft.):</b>	3	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	4	<b>Vertical Offset (ft.):</b>	-2
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Good to excellent condition; no observed distress		9
WALL FOUNDATION MATERIAL 8.00	No distress; wall founded on a concrete footing and is founded on a bedrock outcrop; no evidence of settlement, rotation, undermining or seepage		10
CONCRETE 8.00	No distress to relatively new concrete headwall		10
VEGETATION 0.50	Brush and one small tree growing within 3 ft of wall; vegetation is not causing distress		9
CULVERT 0.50	Relatively new 4.5 ft x 2.75 ft reinforced concrete elliptical culvert		10
DOWNSLOPE 0.50	No distress; outcropping of weathered mica schist bedrock		10
LATERAL SLOPE 0.50	No distress; no evidence of movement; no erosion		10
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement		10
TRAFFIC BARRIER/FENCE 0.50	No distress to steel-backed timber guard rail		10
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	LOW		
<b>Recommendation Narrative:</b>	None		
<b>Repair Cost:</b>	\$0		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			

# **Delaware Water Gap National Recreation Area**

**ROUTE 0010: OLD MINE ROAD (SOUTH SECTION)**

## **Retaining Wall Condition Photos**



**DEWA\_0010\_5.445\_R\_1.jpg**

<b>Wall ID:</b>	DEWA-0010-9.823-L		
<b>Route Name:</b>	OLD MINE ROAD (SOUTH SECTION)		
<b>Inspection Date:</b>	August 02, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	25	<b>Maintenance Action:</b>	Replace Wall
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Concrete outlet headwall for a 48 in diameter CMP culvert constructed along left shoulder and along base of moderate slope supporting a very low ADT roadway moderate consequence of failure wall is in critical condition		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	16	<b>Face Area (sq.):</b>	79
<b>Average Wall Height (ft.):</b>	4	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	8	<b>Vertical Offset (ft.):</b>	-14
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Critical condition; wall is in a state of impending failure resulting from severe foundation undermining, severe cracking, moderate rusting of culvert, and large scour hole at outlet		1
WALL FOUNDATION MATERIAL 8.00	Foundation is severely undermined resulting in severe cracking and settlement; 2/3 of foundation is not in contact with the ground		3
CONCRETE 8.00	Full length crack at the approximate centerline of wall; 1/4-inch cracks at other locations; severe spalling of concrete along base of wall		2
UPSLOPE 0.50	No distress to moderate-to-steep, heavily-vegetated slope		8
WALL DRAINS 0.50	Damage to wall does not appear to be a function of internal drainage; no evidence of drainage-related distress		9
DOWNSLOPE 5.00	16 ft dia. X 2 ft deep scour hole at outlet; scour hole has severely undermined the wall resulting in critical damage to wall		1
LATERAL SLOPE 1.00	Moderate to severe erosion along both ends of wall		5
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement		10
VEGETATION 0.50	No distress		10
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	MODERATE		
<b>Recommendation Narrative:</b>	Replace GC headwall & extend 2 ft at both ends - 99.43 sqft (\$60/sqft) = \$5,965.80. Select borrow backfill = 51.85 cuyd (\$60/cuyd) = \$3,111.11. Backfill scour hole - 14.89 cuyd (\$35/cuyd) = \$521.27. Outlet erosion protection		
<b>Repair Cost:</b>	\$21,143		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			



# Delaware Water Gap National Recreation Area

ROUTE 0010: OLD MINE ROAD (SOUTH SECTION)

## Retaining Wall Condition Photos



DEWA\_0010\_9.823\_L\_1.jpg



DEWA\_0010\_9.823\_L\_2.jpg

<b>Wall ID:</b>	DEWA-0010-9.823-R		
<b>Route Name:</b>	OLD MINE ROAD (SOUTH SECTION)		
<b>Inspection Date:</b>	August 03, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	57	<b>Maintenance Action:</b>	Replace Wall
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	Gravity - Dry Stone
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Concrete inlet headwall for a 48 in diameter CMP culvert constructed along right shoulder and along base of moderate slope supporting a very low ADT roadway low consequence of failure due to size and distance from roadway		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	16	<b>Face Area (sq.):</b>	43
<b>Average Wall Height (ft.):</b>	2	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	6	<b>Vertical Offset (ft.):</b>	-11
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Poor condition; severe deterioration and cracking of wall; severe rusting of culvert; unraveled dry stack stone wall		4
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or erosion		9
CONCRETE 8.00	Severe ongoing delamination of the surface finish; approximately 70% of finish has spalled off; several 1-inch cracks through wall, all emanating from crown of culvert		4
STONE MASONRY 8.00	Dry stack stone wall along north end of wall is serving as slope protection; moderate unraveling		7
LATERAL SLOPE 0.50	No distress along north end; dry stack wall along south end is serving as slope protection and shows signs of moderate unraveling; no distress to slope		8
CULVERT 1.00	48-inch diameter CMP culvert; moderate to severe rusting along invert; wood debris at inlet will impede flow		5
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement or relatively flat, vegetated shoulder		10
UPSLOPE 0.50	No distress to moderate, well-vegetated slope		10
VEGETATION 0.50	No distress		10
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	LOW		
<b>Recommendation Narrative:</b>	Replace concrete headwall - 43.1 sqft (\$60/sqft) = \$2,583.75. Replace section of pipe - 7 lnft (\$210/lnft) = \$1,470. Line pipe (1/2 of length) - 27.75 lnft (\$400/lnft) = \$11,100. Select gravel backfill - 33.61 cuyd (\$60/cuyd) = \$2,016.67		
<b>Repair Cost:</b>	\$16,034		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			

# **Delaware Water Gap National Recreation Area**

**ROUTE 0010: OLD MINE ROAD (SOUTH SECTION)**

## **Retaining Wall Condition Photos**



**DEWA\_0010\_9.823\_R\_1.jpg**



<b>Wall ID:</b>	DEWA-0010-10.525-R		
<b>Route Name:</b>	OLD MINE ROAD (SOUTH SECTION)		
<b>Inspection Date:</b>	August 03, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	64	<b>Maintenance Action:</b>	Repair Elements
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mortared Stone
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Stone masonry inlet headwall for a 36 in diameter CMP culvert constructed along right shoulder of very low ADT roadway moderate consequence of failure due to proximity to roadway		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	12	<b>Face Area (sq.):</b>	28
<b>Average Wall Height (ft.):</b>	2	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	4	<b>Vertical Offset (ft.):</b>	0
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Poor conditions; severe degradation and spalling of mortar resulting in settlement of blocks; culvert is rusted through; 3-in. of sedimentation inside culvert		4
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or seepage		10
MORTAR 8.00	Severely degraded resulting in settlement of blocks and rotation of wall face; severe spalling of mortar above culvert opening; severe debonding		3
STONE MASONRY 8.00	No distress; general age-related weathering		10
DOWNSLOPE 0.50	No distress to gently sloping, heavily-vegetated slope; good drainage towards wall		8
LATERAL SLOPE 0.50	No distress; no evidence of movement; no erosion		9
VEGETATION 0.50	No distress; small brush is growing adjacent to wall		9
WALL DRAINS 0.50	No evidence of drainage-related distress		9
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement or relatively flat, grassy shoulder		10
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	MODERATE		
<b>Recommendation Narrative:</b>	Stone masonry repointing - 28.43 sqft (\$75/sqft) = \$2,132.25. Replace 36-in. diameter culvert, entire length - 35 lnft (\$165/lnft) = \$5,775.		
<b>Repair Cost:</b>	\$7,907		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			

# **Delaware Water Gap National Recreation Area**

**ROUTE 0010: OLD MINE ROAD (SOUTH SECTION)**

## **Retaining Wall Condition Photos**



**DEWA\_0010\_10.525\_R\_1.jpg**



**DEWA\_0010\_10.525\_R\_2.jpg**

<b>Wall ID:</b>	DEWA-0010-13.190-L		
<b>Route Name:</b>	OLD MINE ROAD (SOUTH SECTION)		
<b>Inspection Date:</b>	August 03, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	93	<b>Maintenance Action:</b>	No Action
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Dry Stone
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Dry stacked stone inlet headwall for a 36 in diameter CMP culvert constructed along right shoulder and directly supports a low ADT roadway moderate consequence of failure as failure will directly affect the roadway		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	12	<b>Face Area (sq.):</b>	38
<b>Average Wall Height (ft.):</b>	3	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	6	<b>Vertical Offset (ft.):</b>	0
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Good condition		8
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or seepage		10
PLACED STONE 8.00	No distress; good condition with no evidence of movement		10
DOWNSLOPE 0.50	No distress; steep bedrock outcrop above culvert		10
LATERAL SLOPE 0.50	No distress; no evidence of movement; no erosion		10
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement		10
TRAFFIC BARRIER/FENCE 0.50	No distress to steel guard rail		10
VEGETATION 0.50	No distress; no vegetation in close proximity to wall		10
WALL DRAINS 0.50	Wall is self-draining; no evidence of drainage-related distress		10
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	MODERATE		
<b>Recommendation Narrative:</b>	None		
<b>Repair Cost:</b>	\$0		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			



# **Delaware Water Gap National Recreation Area**

**ROUTE 0010: OLD MINE ROAD (SOUTH SECTION)**

## **Retaining Wall Condition Photos**



**DEWA\_0010\_13.190\_L\_1.jpg**

<b>Wall ID:</b>	DEWA-0010-13.190-R		
<b>Route Name:</b>	OLD MINE ROAD (SOUTH SECTION)		
<b>Inspection Date:</b>	August 03, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	87	<b>Maintenance Action:</b>	Maintenance
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Dry Stone
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Dry stacked stone outlet headwall for a 36 in diameter CMP culvert constructed along left shoulder and directly supports a low ADT roadway high consequence of failure due to size and proximity to roadway		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	11	<b>Face Area (sq.):</b>	37
<b>Average Wall Height (ft.):</b>	3	<b>Face Angle (deg.):</b>	75
<b>Maximum Wall Height (ft.):</b>	5	<b>Vertical Offset (ft.):</b>	-2
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Good condition; culvert is crushed at outlet resulting in a loss of capacity		7
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation or undermining		9
PLACED STONE 8.00	no distress to large diameter boulders		10
DOWNSLOPE 0.50	No distress to moderate to gentle slope; good drainage away from wall		10
LATERAL SLOPE 0.50	No distress; no evidence of movement; no erosion		10
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement		10
TRAFFIC BARRIER/FENCE 0.50	No distress to relatively new steel guard rail		10
VEGETATION 0.50	No distress; no vegetation in close proximity to wall		10
WALL DRAINS 0.50	No distress; wall is self-draining		10
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	HIGH		
<b>Recommendation Narrative:</b>	Check culvert capacity - 8 labor hrs (\$55/hr) = \$440		
<b>Repair Cost:</b>	\$440		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			

# **Delaware Water Gap National Recreation Area**

**ROUTE 0010: OLD MINE ROAD (SOUTH SECTION)**

## **Retaining Wall Condition Photos**



**DEWA\_0010\_13.190\_R\_1.jpg**



<b>Wall ID:</b>	DEWA-0014-3.630-R		
<b>Route Name:</b>	US ROUTE 209		
<b>Inspection Date:</b>	August 01, 2007	<b>Approximate Year Built:</b>	1996
<b>*Wall Rating:</b>	88	<b>Maintenance Action:</b>	No Action
<b>Wall Description</b>			
<b>Wall Function:</b>	Fill Wall	<b>Primary Wall Type:</b>	Cantilever - Soldier Pile
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Embedded cantilevered soldier pile fill wall constructed along right shoulder and directly supports high ADT roadway high consequence of failure due to size and its direct support of roadway		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	101	<b>Face Area (sq.):</b>	202
<b>Average Wall Height (ft.):</b>	2	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	40	<b>Vertical Offset (ft.):</b>	1
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Good to excellent condition; spot rusting of H-pile members		9
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of wall movement		9
PILES AND SHAFTS 8.00	Minor spot rusting of painted steel H-pile members		8
LAGGING 8.00	No distress to concrete lagging		9
DOWNSLOPE 0.50	No distress to steep grassy shoulder; wetlands along base of slope		9
TRAFFIC BARRIER/FENCE 0.50	Minor impact damage to steel guard rail		9
VEGETATION 0.50	No distress; small brush is growing along face of wall, but is not causing distress to wall		9
LATERAL SLOPE 0.50	No distress; no evidence of movement; no erosion		10
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement		10
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	HIGH		
<b>Recommendation Narrative:</b>	None		
<b>Repair Cost:</b>	\$0		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			

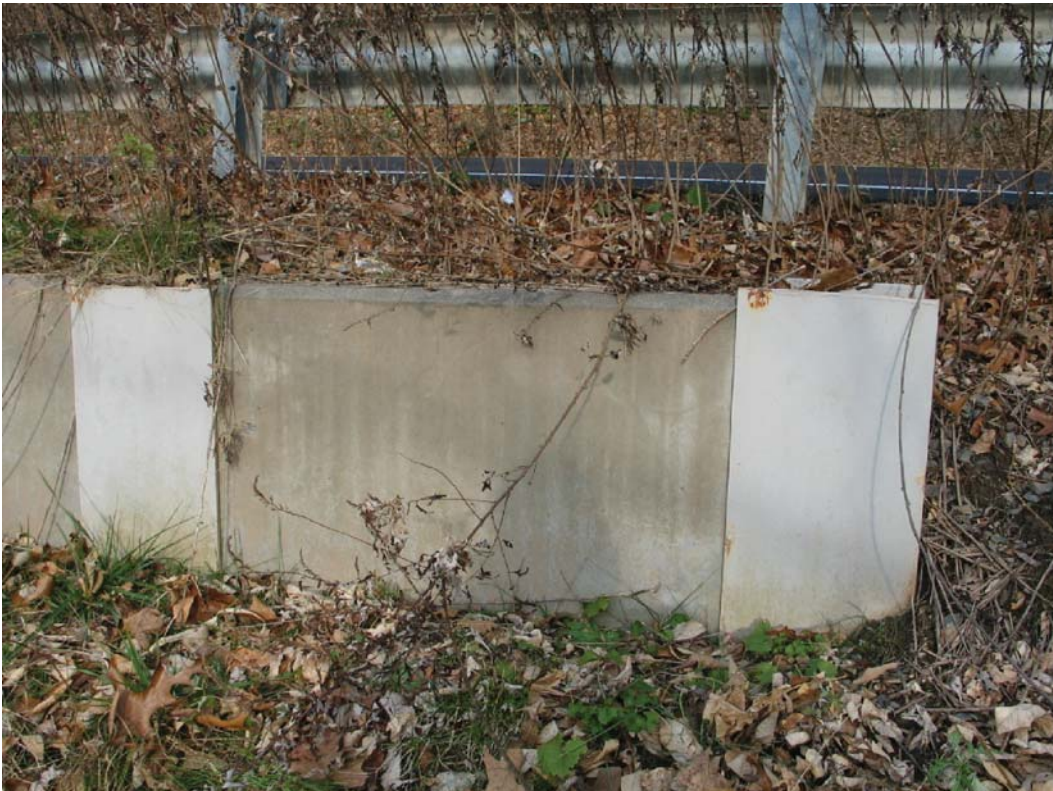
# Delaware Water Gap National Recreation Area

ROUTE 0014: US ROUTE 209

## Retaining Wall Condition Photos



DEWA\_0014\_3.630\_R\_1.jpg



DEWA\_0014\_3.630\_R\_2.jpg

<b>Wall ID:</b>	DEWA-0014-3.985-L		
<b>Route Name:</b>	US ROUTE 209		
<b>Inspection Date:</b>	August 01, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	94	<b>Maintenance Action:</b>	No Action
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Relatively new concrete inlet headwall for a 48 in diameter corrugated plastic pipe culvert constructed along left shoulder of a high ADT roadway high consequence of failure		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	19	<b>Face Area (sq.):</b>	78
<b>Average Wall Height (ft.):</b>	4	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	7	<b>Vertical Offset (ft.):</b>	-9
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>	<b>Condition Rating (0 - 10)</b>	
PERFORMANCE 8.00	Excellent condition	9	
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or seepage	9	
CONCRETE 8.00	No distress to relatively new concrete headwall	10	
DOWNSLOPE 0.50	No distress to rip rap lined stream channel	9	
UPSLOPE 0.50	No distress to moderate slope; loose rip rap fill along face of slope	9	
CULVERT 0.50	No distress to 48-in. diameter corrugated plastic pipe	10	
LATERAL SLOPE 0.50	No distress; lateral slope is covered with loose-placed rip rap	10	
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement	10	
TRAFFIC BARRIER/FENCE 0.50	No distress to steel guard rail	10	
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	HIGH		
<b>Recommendation Narrative:</b>	None		
<b>Repair Cost:</b>	\$0		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			



# Delaware Water Gap National Recreation Area

ROUTE 0014: US ROUTE 209

## Retaining Wall Condition Photos



DEWA\_0014\_3.985\_L\_1.jpg



DEWA\_0014\_3.985\_L\_2.jpg

<b>Wall ID:</b>	DEWA-0014-3.986-R		
<b>Route Name:</b>	US ROUTE 209		
<b>Inspection Date:</b>	August 01, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	86	<b>Maintenance Action:</b>	Maintenance
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Relatively new concrete outlet headwall for a 48 in diameter corrugated plastic pipe culvert constructed along right shoulder of high ADT roadway high consequence of failure		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	19	<b>Face Area (sq.):</b>	92
<b>Average Wall Height (ft.):</b>	4	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	7	<b>Vertical Offset (ft.):</b>	-9
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Good condition; scour hole at outlet threatens the long-term stability of wall		7
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or seepage		9
CONCRETE 8.00	No distress to relatively new concrete headwall		10
UPSLOPE 0.50	No distress to moderate slope; loose rip rap fill along face of slope		9
VEGETATION 0.50	No distress		9
CULVERT 0.50	No distress to 48-in. diameter corrugated plastic pipe		10
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement		10
TRAFFIC BARRIER/FENCE 0.50	No distress to steel guard rail		10
WALL DRAINS 0.50	No evidence of drainage-related distress		10
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	HIGH		
<b>Recommendation Narrative:</b>	Clear channel - 16 labor hrs (\$55/hr) = \$880		
<b>Repair Cost:</b>	\$880		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			



# Delaware Water Gap National Recreation Area

ROUTE 0014: US ROUTE 209

## Retaining Wall Condition Photos



DEWA\_0014\_3.986\_R\_1.jpg



DEWA\_0014\_3.986\_R\_2.jpg



<b>Wall ID:</b>	DEWA-0014-8.400-L		
<b>Route Name:</b>	US ROUTE 209		
<b>Inspection Date:</b>	August 02, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	75	<b>Maintenance Action:</b>	Maintenance
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Concrete inlet headwall for a 8 ft x 8.5 ft concrete arch culvert constructed along left shoulder of high ADT roadway high consequence of failure as structure directly supports roadway		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	29	<b>Face Area (sq.):</b>	184
<b>Average Wall Height (ft.):</b>	6	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	12	<b>Vertical Offset (ft.):</b>	0
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Good condition; moderate efflorescence and several small cracks along face of wall; brush and vines have overgrown the wall		7
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or seepage		9
CONCRETE 8.00	1/8-in. cracks emanating from crown at opening up to the top of wall; minor spalling; moderate efflorescence at opening		6
CULVERT 0.50	No distress to 8 ft x 8.5 ft concrete arch culvert		9
DOWNSLOPE 0.50	No distress to stream channel; good drainage towards wall		9
LATERAL SLOPE 0.50	No distress; no evidence of movement; no erosion		9
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement or relatively flat and narrow shoulder		9
TRAFFIC BARRIER/FENCE 0.50	No distress to steel guard rail; guard rail does not appear to meet current safety standards (too short)		9
VEGETATION 1.00	Wall is entirely covered with creeping vines and small vines along base of wall; brush is encroaching on the inlet		7
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	HIGH		
<b>Recommendation Narrative:</b>	Clear vegetation - 16 labor hrs (\$55/hr) = \$880. Clean efflorescence - 8 labor hrs (\$55/hr) = \$440. Crack cleaning, routing & sealing - 20 lnft (\$10/lnft) = \$200.		
<b>Repair Cost:</b>	\$1,520		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			

# Delaware Water Gap National Recreation Area

ROUTE 0014: US ROUTE 209

## Retaining Wall Condition Photos



DEWA\_0014\_8.400\_L\_1.jpg



DEWA\_0014\_8.400\_L\_2.jpg



<b>Wall ID:</b>	DEWA-0014-8.400-R		
<b>Route Name:</b>	US ROUTE 209		
<b>Inspection Date:</b>	August 02, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	64	<b>Maintenance Action:</b>	Maintenance
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Concrete outlet headwall for 8 ft x 8.5 ft concrete arch culvert constructed along right shoulder and directly supports a high ADT roadway high consequence of failure		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	29	<b>Face Area (sq.):</b>	184
<b>Average Wall Height (ft.):</b>	6	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	12	<b>Vertical Offset (ft.):</b>	0
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Fair condition; many 1/8-in. to 1/4-in. cracks with minor to moderate spalling; moderate efflorescence along face of wall; poor drainage way from wall		5
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or seepage		9
CONCRETE 8.00	Minor to moderate delamination across wall; minor to moderate cracking with minor efflorescence; moderate cracking with spalled concrete at ends of both wingwalls		5
ROAD/SIDEWALK/SHOULDER 0.50	Minor transverse cracking of pavement; no distress to relatively narrow grassy shoulder		8
TRAFFIC BARRIER/FENCE 0.50	No distress to steel guard rail; guard rail does not appear to meet current safety standards (too short)		8
CULVERT 1.00	8 ft x 8.5 ft concrete arch culvert; several 1/8-in. to 1/4-in. cracks along face of wall; some cracks extend up to 6 ft inside culvert		5
LATERAL SLOPE 0.50	No distress; no evidence of movement; no erosion		10
WALL DRAINS 1.00	Evidence of freeze-thaw cracking along face of wall		6
DOWNSLOPE 1.00	Poor drainage away from wall due to accumulation of gravel downstream; no erosion of scouring of channel		7
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	HIGH		
<b>Recommendation Narrative:</b>	Clear downstream channel - 8 labor hrs (\$55/hr) = \$440. Clear vegetation - 16 labor hrs (\$55/hr) = \$880. Clean efflorescence - 16 labor hrs (\$55/hr) = \$880, material cost = \$100. Crack cleaning, routing & sealing - 50 lft (\$10/lft) = \$50		
<b>Repair Cost:</b>	\$2,800		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			



# Delaware Water Gap National Recreation Area

ROUTE 0014: US ROUTE 209

## Retaining Wall Condition Photos



DEWA\_0014\_8.400\_R\_1.jpg



DEWA\_0014\_8.400\_R\_2.jpg

<b>Wall ID:</b>	DEWA-0014-9.096-R		
<b>Route Name:</b>	US ROUTE 209		
<b>Inspection Date:</b>	August 01, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	56	<b>Maintenance Action:</b>	Repair Elements
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Concrete outlet headwall for an 11 ft x 6.67 ft concrete arch culvert constructed along right shoulder and along base of moderate slope supporting a high ADT roadway high consequence of failure		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	27	<b>Face Area (sq.):</b>	187
<b>Average Wall Height (ft.):</b>	6	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	9	<b>Vertical Offset (ft.):</b>	-14
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>	<b>Condition Rating (0 - 10)</b>	
PERFORMANCE 8.00	Fair condition; moderate cracking and delamination along face of wall; severe ongoing scour and erosion of downslope and lateral slope	5	
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation or seepage; moderate ongoing scour with up to 24-in. of the footing exposed	6	
CONCRETE 8.00	Minor cracking and delamination along wingwalls; minor spalling along ends of wingwalls (appears to be from equipment); moderate efflorescence along base of wall	5	
DOWNSLOPE 1.00	31 ft x 39 ft x 2 ft scour hole has formed at outlet and is eroding the foundation material and stream channel; scour hole threatens the near-term stability of wall	4	
LATERAL SLOPE 1.00	Severe ongoing erosion of bank resulting from scour hole; several undermined trees will topple into stream in the near term	4	
VEGETATION 0.50	Small brush and vegetation growing adjacent to wall, but not currently causing distress	8	
CULVERT 0.50	No distress to 11 ft x 6.67 ft concrete arch culvert	9	
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement	10	
TRAFFIC BARRIER/FENCE 0.50	No distress to steel guard rail	10	
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	HIGH		
<b>Recommendation Narrative:</b>	Backfill scour hole - earthwork geotextile = 5.55 sqyd (\$5/sqyd) = \$27.78. Placed rip rap, Class 3 = 185 cuyd (\$200/cuyd) = \$37,037. Protect lateral slope - placed rip rap, Class 2 = 8.89 cuyd (\$220/cuyd) = \$1,955.56. Crack cleaning, routing		
<b>Repair Cost:</b>	\$40,200		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			



# Delaware Water Gap National Recreation Area

ROUTE 0014: US ROUTE 209

## Retaining Wall Condition Photos



DEWA\_0014\_9.096\_R\_1.jpg



DEWA\_0014\_9.096\_R\_2.jpg



<b>Wall ID:</b>	DEWA-0014-9.098-L		
<b>Route Name:</b>	US ROUTE 209		
<b>Inspection Date:</b>	August 01, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	75	<b>Maintenance Action:</b>	Maintenance
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Concrete inlet headwall for a 9.25 ft x 3.67 ft concrete arch culvert constructed along left shoulder and along base of moderate slope supporting a high ADT roadway high consequence of failure		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	34	<b>Face Area (sq.):</b>	172
<b>Average Wall Height (ft.):</b>	5	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	8	<b>Vertical Offset (ft.):</b>	-11
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Good condition; minor spalling of concrete resulting in exposure of rebar; exposed rebar is moderately rusted; moderate delamination; moderate erosion of lateral slope		7
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or seepage		9
CONCRETE 8.00	Minor to moderate delamination with minor spalling along face of wall; minor cracking; minor to moderate efflorescence		6
WALL DRAINS 0.50	Evidence of minor water infiltration		8
DOWNSLOPE 0.50	No distress to riprap -lined channel; a concrete apron extends out approximately 3 ft from the face of wall		9
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement		9
TRAFFIC BARRIER/FENCE 0.50	Minor impact damage to steel guard rail		9
VEGETATION 0.50	Small brush growing adjacent to wall, but is not currently affecting wall performance		9
UPSLOPE 0.50	No distress to moderate, well-vegetated slope; some loosely placed pieces of concrete acting as slope protection		10
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	HIGH		
<b>Recommendation Narrative:</b>	Crack cleaning, routing & sealing - 15 lnft (\$10/lnft) = \$150. Concrete repair - 3 sqft (\$150/sqft) = \$450. Placed riprap, Class 3 - 3 cuyd (\$200/cuyd) = \$600.		
<b>Repair Cost:</b>	\$1,200		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			

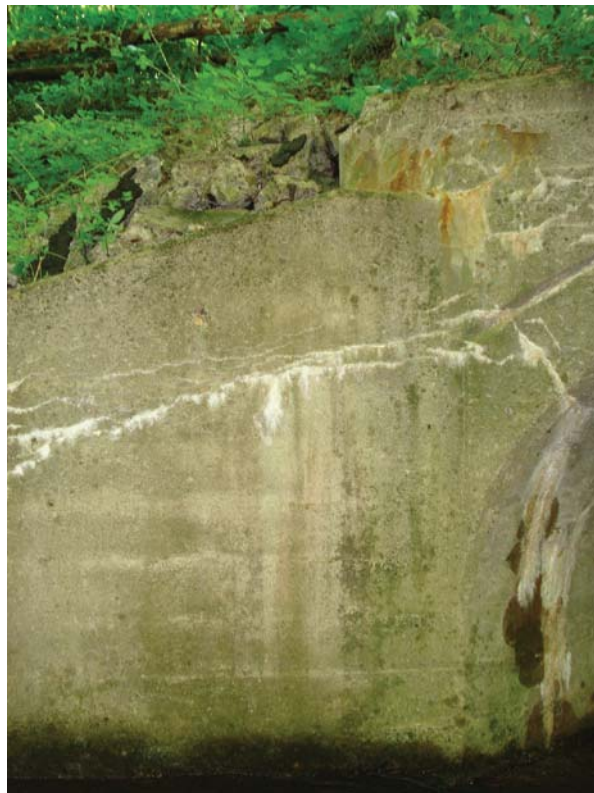
# Delaware Water Gap National Recreation Area

ROUTE 0014: US ROUTE 209

## Retaining Wall Condition Photos



DEWA\_0014\_9.098\_L\_1.jpg



DEWA\_0014\_9.098\_L\_2.jpg

<b>Wall ID:</b>	DEWA-0014-9.795-R		
<b>Route Name:</b>	US ROUTE 209		
<b>Inspection Date:</b>	August 01, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	65	<b>Maintenance Action:</b>	Repair Elements
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Concrete outlet headwall for a 30 in diameter concrete pipe culvert constructed along right shoulder of high ADT roadway high consequence of failure due to its proximity to roadway		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	8	<b>Face Area (sq.):</b>	27
<b>Average Wall Height (ft.):</b>	3	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	4	<b>Vertical Offset (ft.):</b>	0
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>	<b>Condition Rating (0 - 10)</b>	
PERFORMANCE 8.00	Fair condition; moderate to severe delamination with moderate spalling; poor drainage away from wall; moderate erosion of lateral slope	6	
WALL FOUNDATION MATERIAL 8.00	No evidence of settlement, rotation, undermining or seepage	9	
CONCRETE 8.00	Moderate to severe delamination and spalling of concrete	4	
VEGETATION 0.50	No distress from small vegetation immediate to wall	8	
CULVERT 0.50	No distress to 30-in. diameter concrete pipe	9	
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement or relatively narrow shoulder	9	
DOWNSLOPE 1.00	Accumulation of sediment downstream is promoting negative flow;	6	
LATERAL SLOPE 1.00	Moderate erosion along north end of wall (5 ft x 4 ft x 8-in.)	6	
WALL DRAINS 1.00	Evidence of minor weeping causing cracking and delamination	7	
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	HIGH		
<b>Recommendation Narrative:</b>	Concrete repair (entire wall) - 26.67 sqft (\$150/sqft) = \$4,000.50. Backfill lateral slope - structural backfill = 0.49 cuyd (\$60) = \$29.63. Clear downstream channel - 16 labor hrs (\$55/hr) = \$880.		
<b>Repair Cost:</b>	\$4,910		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			



# Delaware Water Gap National Recreation Area

ROUTE 0014: US ROUTE 209

## Retaining Wall Condition Photos



DEWA\_0014\_9.795\_R\_1.jpg



DEWA\_0014\_9.795\_R\_2.jpg

<b>Wall ID:</b>	DEWA-0014-11.515-L		
<b>Route Name:</b>	US ROUTE 209		
<b>Inspection Date:</b>	August 01, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	87	<b>Maintenance Action:</b>	Maintenance
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Concrete outlet headwall for a 48 in diameter concrete pipe culvert constructed along right shoulder of high ADT roadway moderate consequence of failure		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	9	<b>Face Area (sq.):</b>	19
<b>Average Wall Height (ft.):</b>	2	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	6	<b>Vertical Offset (ft.):</b>	-1
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>	<b>Condition Rating (0 - 10)</b>	
PERFORMANCE 8.00	Good condition; approximately 8-in. of sedimentation in invert; medium diameter tree threatens long-term stability of wall	8	
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or seepage	9	
CONCRETE 8.00	No distress; concrete is in good to excellent condition	9	
CULVERT 0.50	No distress to 48-in. diameter concrete pipe culvert; approximately 8-in. sedimentation along invert	8	
DOWNSLOPE 0.50	No distress to creek bed; good drainage way from wall; approximately 8-in. of sedimentation along invert	8	
VEGETATION 0.50	One medium diameter tree growing within 3 ft of wall, but is not currently affecting wall performance	8	
LATERAL SLOPE 0.50	No distress; no evidence of movement; no erosion	9	
ROAD/SIDEWALK/SHOULDER 0.50	Minor reflective cracking of pavement; no distress to shoulder	9	
WALL DRAINS 0.50	No evidence of drainage-related distress	10	
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	MODERATE		
<b>Recommendation Narrative:</b>	Clean culvert, in-place - 20 lnft (\$15/lnft) = \$300. Cut medium dia. Tree - 1 tree (\$200/tree) = \$200		
<b>Repair Cost:</b>	\$500		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			



# **Delaware Water Gap National Recreation Area**

**ROUTE 0014: US ROUTE 209**

## **Retaining Wall Condition Photos**



**DEWA\_0014\_11.515\_L\_1.jpg**



<b>Wall ID:</b>	DEWA-0014-11.515-R		
<b>Route Name:</b>	US ROUTE 209		
<b>Inspection Date:</b>	August 01, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	81	<b>Maintenance Action:</b>	Maintenance
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Concrete inlet headwall for a 4.5 ft x 3.25 ft concrete box culvert constructed along left shoulder and directly supports a high ADT roadway high consequence of failure due to size and proximity to roadway		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	20	<b>Face Area (sq.):</b>	58
<b>Average Wall Height (ft.):</b>	2	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	5	<b>Vertical Offset (ft.):</b>	0
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>	<b>Condition Rating (0 - 10)</b>	
PERFORMANCE 8.00	Good condition; moderate localized cracking and spalling of concrete	8	
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or seepage	9	
CONCRETE 8.00	Moderate cracking and spalling along crown of culvert	7	
DOWNSLOPE 0.50	Approximately 6-in. of sedimentation in channel; sedimentation extends out approximately 5 ft from face of wall	8	
CULVERT 0.50	No distress to 4.5 ft x 3.25 ft concrete arch culvert	9	
LATERAL SLOPE 0.50	No distress; no evidence of movement; no erosion	9	
VEGETATION 0.50	Small brush growing adjacent to wall, but is not currently affecting wall performance	9	
WALL DRAINS 0.50	No evidence of drainage-related distress	9	
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement or relatively flat grassy shoulder	10	
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	HIGH		
<b>Recommendation Narrative:</b>	Concrete repair - 11.65 sqft (\$150/sqft) = \$4,368.75. Clear vegetation - 8 labor hrs (\$55/hr) = \$440. Clear sedimentation - 4 labor hrs (\$55/hr) = \$220.		
<b>Repair Cost:</b>	\$5,029		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			

# **Delaware Water Gap National Recreation Area**

**ROUTE 0014: US ROUTE 209**

## **Retaining Wall Condition Photos**



**DEWA\_0014\_11.515\_R\_1.jpg**

<b>Wall ID:</b>	DEWA-0014-12.538-L		
<b>Route Name:</b>	US ROUTE 209		
<b>Inspection Date:</b>	August 01, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	82	<b>Maintenance Action:</b>	Maintenance
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Concrete inlet headwall for a 24 in diameter corrugated plastic pipe culvert constructed along left shoulder and is immediately adjacent to a high ADT roadway moderate consequence of failure due to its proximity to roadway		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	6	<b>Face Area (sq.):</b>	22
<b>Average Wall Height (ft.):</b>	3	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	4	<b>Vertical Offset (ft.):</b>	0
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Good condition; severe erosion of lateral slope is encroaching on roadway		7
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or seepage		10
CONCRETE 8.00	Good condition; scratches along face are likely from earthwork equipment		8
VEGETATION 0.50	No distress; no significant vegetation in close proximity to wall		9
LATERAL SLOPE 1.00	Severe erosion along north end of wall is encroaching on roadway		5
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement or relatively narrow grassy shoulder		10
WALL DRAINS 0.50	No evidence of drainage-related distress		10
CULVERT 1.00	24-in. diameter corrugated plastic pipe; approximately 12-in. of sedimentation along invert		7
DOWNSLOPE 1.00	Dry creek bed with substantial sedimentation		7
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	MODERATE		
<b>Recommendation Narrative:</b>	Clear debris - 16 labor hrs (\$55/hr) = \$880. Structural Backfill - 1.11 cuyd (\$60/cuyd) = \$66.70.		
<b>Repair Cost:</b>	\$947		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			



# Delaware Water Gap National Recreation Area

ROUTE 0014: US ROUTE 209

## Retaining Wall Condition Photos



DEWA\_0014\_12.538\_L\_1.jpg

<b>Wall ID:</b>	DEWA-0014-15.027-R		
<b>Route Name:</b>	US ROUTE 209		
<b>Inspection Date:</b>	August 01, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	80	<b>Maintenance Action:</b>	Maintenance
<b>Wall Description</b>			
<b>Wall Function:</b>	Fill Wall	<b>Primary Wall Type:</b>	Cantilever - Soldier Pile
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Cantilevered soldier pile fill wall constructed along right shoulder and directly supports a high ADT roadway an average of 1.0 ft of wall is visible, but the wall is known to be embedded up to 40 ft		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	270	<b>Face Area (sq.):</b>	270
<b>Average Wall Height (ft.):</b>	1	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	40	<b>Vertical Offset (ft.):</b>	-1
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Good condition of wall; moderate spot rusting of soldier piles; severe ongoing down slope erosion threatens the long-term stability of wall		7
WALL FOUNDATION MATERIAL 8.00	No evidence of wall movement		9
PILES AND SHAFTS 8.00	Moderate spot rusting of painted H-pile members		7
LAGGING 8.00	No distress to visible concrete lagging		9
LATERAL SLOPE 0.50	No distress; no evidence of movement; no erosion		9
DOWNSLOPE 1.00	Severe ongoing erosion of moderate to steep slope; the ongoing erosion threatens the long-term stability of the wall		5
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement or to relatively flat, grassy shoulder		10
TRAFFIC BARRIER/FENCE 0.50	No distress to relatively new steel guard rail		10
VEGETATION 0.50	No distress from vegetation; grass has overgrown the wall; no large vegetation in close proximity to wall		10
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	HIGH		
<b>Recommendation Narrative:</b>	Clean & Repaint soldier piles - 16 labor hrs (\$55/hr) = \$880		
<b>Repair Cost:</b>	\$880		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			



# Delaware Water Gap National Recreation Area

ROUTE 0014: US ROUTE 209

## Retaining Wall Condition Photos



DEWA\_0014\_15.027\_R\_1.jpg



DEWA\_0014\_15.027\_R\_2.jpg



<b>Wall ID:</b>	DEWA-0014-15.323-L		
<b>Route Name:</b>	US ROUTE 209		
<b>Inspection Date:</b>	August 01, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	83	<b>Maintenance Action:</b>	Maintenance
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Concrete inlet headwall for a 24 in diameter concrete pipe culvert constructed along left shoulder of a high ADT roadway moderate consequence of failure due to proximity to roadway		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	8	<b>Face Area (sq.):</b>	20
<b>Average Wall Height (ft.):</b>	2	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	5	<b>Vertical Offset (ft.):</b>	0
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Good condition; minor cracking and spalling; leaf debris along channel and along invert of pipe		8
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or seepage		9
CONCRETE 8.00	Minor cracking and spalling along south end of wall; spalling is likely due to impact damage from earthwork equipment		8
DOWNSLOPE 0.50	No distress; leaf debris in channel may impede flow		8
VEGETATION 0.50	No distress from vegetation; no large vegetation in close proximity to wall		8
LATERAL SLOPE 0.50	No distress; no evidence of movement; no erosion		9
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement or relatively narrow, paved shoulder		9
WALL DRAINS 0.50	No evidence of drainage-related distress		10
CULVERT 1.00	24-in. diameter concrete pipe; approximately 6-in. of leaf debris along invert		7
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	MODERATE		
<b>Recommendation Narrative:</b>	Clean culvert in-place - 12 lnft (\$15/lnft) = \$180. Clear channel - 4 labor hrs (\$55/hr) = \$220		
<b>Repair Cost:</b>	\$400		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			

# **Delaware Water Gap National Recreation Area**

**ROUTE 0014: US ROUTE 209**

## **Retaining Wall Condition Photos**



**DEWA\_0014\_15.323\_L\_1.jpg**

<b>Wall ID:</b>	DEWA-0014-15.557-L		
<b>Route Name:</b>	US ROUTE 209		
<b>Inspection Date:</b>	August 01, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	73	<b>Maintenance Action:</b>	Repair Elements
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Concrete inlet headwall for a 6 ft x 3.75 ft concrete arch culvert constructed along left shoulder and along base of steep slope supporting a high ADT roadway moderate consequence of failure		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	16	<b>Face Area (sq.):</b>	34
<b>Average Wall Height (ft.):</b>	2	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	6	<b>Vertical Offset (ft.):</b>	-17
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Fair to good condition; severe delamination across face of wall; 6-in. of debris within the channel		7
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or seepage		9
CONCRETE 8.00	Severe delamination across face of wall		6
CULVERT 0.50	No distress to 6 ft x 3.75 ft concrete arch culvert		8
ROAD/SIDEWALK/SHOULDER 0.50	Minor fatigue cracking of pavement		8
TRAFFIC BARRIER/FENCE 1.00	Major impact damage to steel guard rail		4
LATERAL SLOPE 0.50	No distress; no evidence of movement; no erosion		9
UPSLOPE 0.50	No distress to steep, well-vegetated slope		9
WALL DRAINS 0.50	No evidence of drainage-related distress		9
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	MODERATE		
<b>Recommendation Narrative:</b>	Concrete repair (25% of wall) - 8.46 sqft (\$150/sqft) = \$1,269.38. Clear debris - 32 labor hrs (\$55/hr) = \$1,760. Cut medium dia. Tree - 1 tree (\$200/tree) = \$200.		
<b>Repair Cost:</b>	\$3,229		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			



# Delaware Water Gap National Recreation Area

ROUTE 0014: US ROUTE 209

## Retaining Wall Condition Photos



DEWA\_0014\_15.557\_L\_1.jpg



DEWA\_0014\_15.557\_L\_2.jpg

<b>Wall ID:</b>	DEWA-0014-17.088-R		
<b>Route Name:</b>	US ROUTE 209		
<b>Inspection Date:</b>	December 06, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	67	<b>Maintenance Action:</b>	Repair Elements
<b>Wall Description</b>			
<b>Wall Function:</b>	Fill Wall	<b>Primary Wall Type:</b>	Cantilever - Soldier Pile
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	Gravity - Gabion
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Cantilevered FRP composite pile wall with gabion baskets acting as lagging constructed along right shoulder and directly supports a high ADT roadway high consequence of failure		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	425	<b>Face Area (sq.):</b>	4675
<b>Average Wall Height (ft.):</b>	11	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	11	<b>Vertical Offset (ft.):</b>	-1
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>	<b>Condition Rating (0 - 10)</b>	
PERFORMANCE 8.00	Fair to good condition; moderate to severe damage to a number of piles; damage to piles threaten the near-term stability of wall; pile damage has translated into bulging of gabions	6	
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or settlement	9	
PILES AND SHAFTS 8.00	Moderate to severe cracking and spalling of fiber-reinforced polymer (FRP) composite piles; damage is to approximately 5 piles; moderate rusting of H-piles members where concrete has spalled; the top 2-ft of approximately 11 members are severely damaged	5	
CONCRETE 8.00	Concrete has spalled from piles where FRP encapsulation has been lost	6	
LAGGING 8.00	Minor localized bulging of gabion baskets; 3/4-in. gravel backfill	7	
ROAD/SIDEWALK/SHOULDER 0.50	Minor fatigue cracking along inboard wheel line; no distress to paved shoulder	8	
TRAFFIC BARRIER/FENCE 0.50	Minor impact damage to steep guard rail	8	
VEGETATION 0.50	No distress; small brush has overgrown the wall; brush is not affecting wall performance, but should be cut back	8	
DOWNSLOPE 0.50	No distress to steep, well-vegetated slope; river along toes of slope	9	
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	HIGH		
<b>Recommendation Narrative:</b>	Clear vegetation - 8 labor hrs (\$55/hr) = \$440. FRP pile repair - 55 lnft (\$250/lnft) = \$13,750		
<b>Repair Cost:</b>	\$14,190		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			



# Delaware Water Gap National Recreation Area

ROUTE 0014: US ROUTE 209

## Retaining Wall Condition Photos



DEWA\_0014\_17.088\_R\_1.jpg



DEWA\_0014\_17.088\_R\_2.jpg



<b>Wall ID:</b>	DEWA-0014-17.276-R		
<b>Route Name:</b>	US ROUTE 209		
<b>Inspection Date:</b>	August 01, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	49	<b>Maintenance Action:</b>	Replace Wall
<b>Wall Description</b>			
<b>Wall Function:</b>	Fill Wall	<b>Primary Wall Type:</b>	Crib - Timber
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Timber crib wall with 3 in minus gravel backfill constructed along right shoulder of high ADT roadway wall is understood to be scheduled for removal in the near-term moderate consequence of failure		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	20	<b>Face Area (sq.):</b>	140
<b>Average Wall Height (ft.):</b>	7	<b>Face Angle (deg.):</b>	80
<b>Maximum Wall Height (ft.):</b>	7	<b>Vertical Offset (ft.):</b>	-9
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Fair condition; severe deterioration of timber crib elements; ongoing minor erosion of foundation and lateral slope		5
WALL FOUNDATION MATERIAL 8.00	Founded on natural slope and loose riprap; minor and ongoing erosion of foundation material will cause wall to settle in the near-term		4
BIN OR CRIB 8.00	Moderate to severe decay of timber logs; logs are still functional but should be replaced		4
TRAFFIC BARRIER/FENCE 0.50	Minor impact damage to steel guard rail		8
UPSLOPE 0.50	No distress to steep slope; slope has loose riprap fill as slope protection		8
VEGETATION 0.50	Small brush growing along lateral slope, but is not causing distress to wall		9
WALL DRAINS 1.00	Wall is self-draining; evidence that drainage of water through wall is eroding foundation soils		6
DOWNSLOPE 1.00	Ongoing minor erosion		7
LATERAL SLOPE 1.00	Evidence of minor ongoing erosion		7
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	MODERATE		
<b>Recommendation Narrative:</b>	Replace timber crib wall - 140 sqft (4185/sqft) = \$25,900. Remove/replace w-beam guard rail - 100 lnft (\$15/lnft) = \$1,500. Rebuild lateral slope with unclassified borrow - 25 cuyd (\$35/cuyd) = \$875.		
<b>Repair Cost:</b>	\$28,275		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			

# Delaware Water Gap National Recreation Area

ROUTE 0014: US ROUTE 209

## Retaining Wall Condition Photos



DEWA\_0014\_17.276\_R\_1.jpg



DEWA\_0014\_17.276\_R\_2.jpg

<b>Wall ID:</b>	DEWA-0105-1.075-L		
<b>Route Name:</b>	RIVER ROAD		
<b>Inspection Date:</b>	August 02, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	82	<b>Maintenance Action:</b>	No Action
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Dry Stone
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Dry stacked stone inlet headwall for a 36 in diameter CMP culvert constructed along left shoulder of a low ADT roadway moderate consequence of failure due to size and proximity to roadway		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	28	<b>Face Area (sq.):</b>	122
<b>Average Wall Height (ft.):</b>	4	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	5	<b>Vertical Offset (ft.):</b>	-2
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Good condition; minor unraveling of wall; minor rusting along invert of culvert; 3 medium diameter trees growing in close proximity to wall		8
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or seepage		9
PLACED STONE 8.00	Generally in good condition; minor unraveling; no distress to blocks		7
CULVERT 0.50	36-in. diameter CMP with minor rusting along the invert		8
VEGETATION 0.50	Three medium diameter trees are growing adjacent to wall; trees not causing wall distress		8
WALL DRAINS 0.50	Wall is self-draining; no evidence of drainage-related distress		9
DOWNSLOPE 0.50	No distress to stream channel		10
LATERAL SLOPE 0.50	No distress; no evidence of movement; no distress		10
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement or shoulder		10
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	MODERATE		
<b>Recommendation Narrative:</b>	None		
<b>Repair Cost:</b>	\$0		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			



# **Delaware Water Gap National Recreation Area**

**ROUTE 0105: RIVER ROAD**

## **Retaining Wall Condition Photos**



**DEWA\_0105\_1.075\_L\_1.jpg**

<b>Wall ID:</b>	DEWA-0113-1.714-R		
<b>Route Name:</b>	NPS ROUTE 615		
<b>Inspection Date:</b>	August 01, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	97	<b>Maintenance Action:</b>	No Action
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Relatively new cast in-place concrete outlet headwall for a 48 in diameter concrete culvert constructed along inside curve and directly supports a very low ADT roadway high consequence of failure		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	20	<b>Face Area (sq.):</b>	95
<b>Average Wall Height (ft.):</b>	4	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	6	<b>Vertical Offset (ft.):</b>	0
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Good to excellent condition		9
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or seepage		10
CONCRETE 8.00	No distress to relatively new concrete headwall		10
CULVERT 0.50	No distress to 48-in. diameter concrete pipe		9
DOWNSLOPE 0.50	No distress to riprap-lined channel		9
LATERAL SLOPE 0.50	No distress; no evidence of movement; no erosion		10
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement		10
TRAFFIC BARRIER/FENCE 0.50	No distress to relatively new steel-backed timber guard rail		10
VEGETATION 0.50	No distress		10
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	HIGH		
<b>Recommendation Narrative:</b>	None		
<b>Repair Cost:</b>	\$0		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			



# Delaware Water Gap National Recreation Area

ROUTE 0113: NPS ROUTE 615

## Retaining Wall Condition Photos



DEWA\_0113\_1.714\_R\_1.jpg



DEWA\_0113\_1.714\_R\_2.jpg

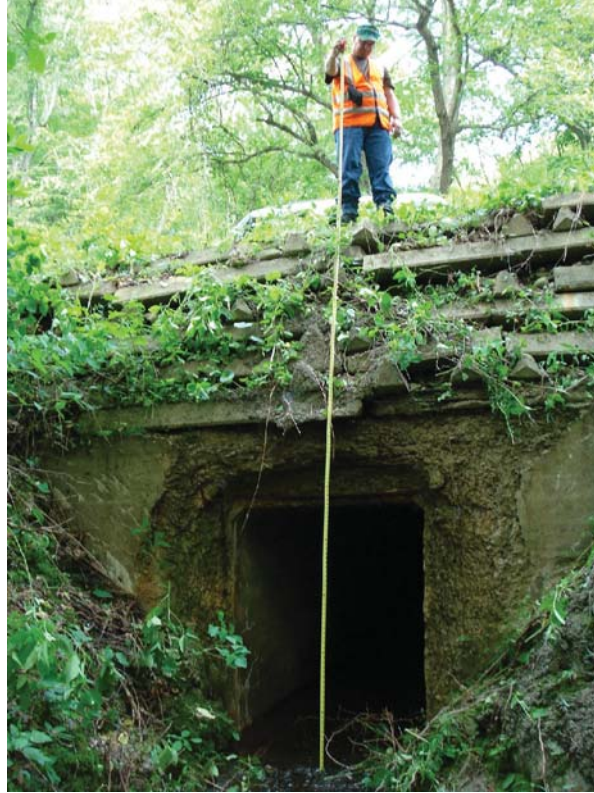


<b>Wall ID:</b>	DEWA-0113-7.415-L		
<b>Route Name:</b>	NPS ROUTE 615		
<b>Inspection Date:</b>	August 03, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	50	<b>Maintenance Action:</b>	Repair Elements
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mass Concrete
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	Crib - Concrete
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Concrete outlet headwall for a 5 ft square concrete box culvert concrete cribbing atop wall is serving as slope protection constructed along right shoulder and directly supports a very low ADT roadway		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	24	<b>Face Area (sq.):</b>	134
<b>Average Wall Height (ft.):</b>	5	<b>Face Angle (deg.):</b>	80
<b>Maximum Wall Height (ft.):</b>	13	<b>Vertical Offset (ft.):</b>	-5
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Fair to poor condition; wall is functioning as intended, but with severe distress and an elevated risk of failure in the near-term		4
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or seepage		9
CONCRETE 8.00	Severe delamination of concrete along headwall with severe spalling; severe rusting of exposed rebar		4
BIN OR CRIB 8.00	Good condition; evidence of minor past movement		8
LATERAL SLOPE 0.50	No distress; loose placed riprap along lateral slope		9
OTHER SECONDARY ELEMENT 0.50	No distress to 4 ft x 30 ft concrete apron		9
UPSLOPE 0.50	No distress to moderately sloping, well-vegetated slope		9
VEGETATION 0.50	No significant vegetation immediate to wall		10
WALL DRAINS 1.00	Severity of delamination suggests some freeze-thaw cracking and spalling		5
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	HIGH		
<b>Recommendation Narrative:</b>	Concrete repair (75% of wall) - 101 sqft (\$150/sqft) = \$15,103.10. Backfill scour hole - earthwork geotextile = 33.33 sqyd (\$5/sqyd) = \$166.67. Placed riprap, Class 3 = 16.67 cuyd (\$200/cuyd) = \$3,333.33. Remove/replace guard rail - 50 lft		
<b>Repair Cost:</b>	\$24,103		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			

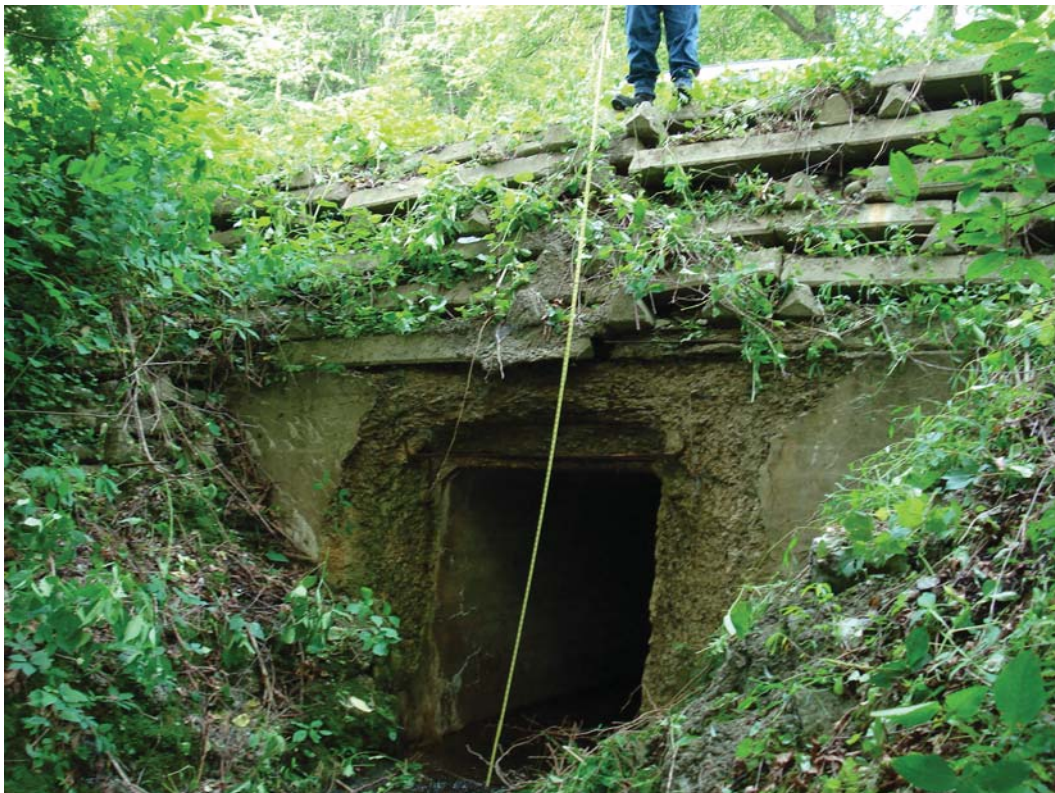
# Delaware Water Gap National Recreation Area

ROUTE 0113: NPS ROUTE 615

## Retaining Wall Condition Photos



DEWA\_0113\_7.415\_L\_1.jpg



DEWA\_0113\_7.415\_L\_2.jpg

<b>Wall ID:</b>	DEWA-0113-7.415-R		
<b>Route Name:</b>	NPS ROUTE 615		
<b>Inspection Date:</b>	August 03, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	51	<b>Maintenance Action:</b>	Repair Elements
<b>Wall Description</b>			
<b>Wall Function:</b>	Head Wall	<b>Primary Wall Type:</b>	Gravity - Mortared Stone
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	Cementitious Overlay
<b>General Description:</b>	Stone masonry inlet headwall for a 5 ft x 6 ft stone masonry arch culvert cementitious overlay across face of wall constructed along left shoulder and directly supports a very low ADT roadway		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	32	<b>Face Area (sq.):</b>	168
<b>Average Wall Height (ft.):</b>	5	<b>Face Angle (deg.):</b>	90
<b>Maximum Wall Height (ft.):</b>	10	<b>Vertical Offset (ft.):</b>	0
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Fair to poor condition; moderate degradation of mortar and cementitious facing with moderate spalling; large diameter tree threatens near-term stability of wall		5
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement, rotation, undermining or seepage		9
MORTAR 8.00	Moderate to severe degradation with moderate to severe debonding and spalling		4
STONE MASONRY 8.00	No distress to blocks; general age-related weathering		9
VEGETATION 1.00	One large diameter tree is growing immediately adjacent to wall; small brush and vines have overgrown wall; tree threatens the near-term stability of wall		4
DOWNSLOPE 0.50	No distress to natural stream channel		9
LATERAL SLOPE 0.50	No distress; no evidence of movement; no erosion		9
WALL DRAINS 0.50	No evidence of drainage-related distress		9
TRAFFIC BARRIER/FENCE 5.00	Non-functional cable guard rail with concrete posts		1
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	HIGH		
<b>Recommendation Narrative:</b>	Stone masonry repointing - 167.62 sqft (\$75/sqft) = \$12,571.50. Repoint culvert - 411 sqft (\$75/sqft) = \$30,849.60. Cut tree & clear vegetation - 1 large tree (\$955/tree) = \$955, 8 labor hrs (\$55/hr) = \$440 Remove/replace guard rail		
<b>Repair Cost:</b>	\$50,356		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			



# Delaware Water Gap National Recreation Area

ROUTE 0113: NPS ROUTE 615

## Retaining Wall Condition Photos



DEWA\_0113\_7.415\_R\_1.jpg



DEWA\_0113\_7.415\_R\_2.jpg

<b>Wall ID:</b>	DEWA-0952-0.000-P1		
<b>Route Name:</b>	DINGMANS FALLS VISITOR CENTER		
<b>Inspection Date:</b>	August 01, 2007	<b>Approximate Year Built:</b>	Unknown
<b>*Wall Rating:</b>	97	<b>Maintenance Action:</b>	No Action
<b>Wall Description</b>			
<b>Wall Function:</b>	Cut Wall	<b>Primary Wall Type:</b>	Gravity - Dry Stone
<b>Surface Treatment:</b>		<b>Secondary Wall Type:</b>	
<b>Secondary Surface Treatment:</b>		<b>Architectural Facing:</b>	
<b>General Description:</b>	Relatively-new, dry stacked stone cut wall constructed along the base of steep forested slope constructed along the perimeter of a paved parking lot low consequence of failure		
<b>Wall Measurements</b>			
<b>Wall Length (ft.):</b>	98	<b>Face Area (sq.):</b>	409
<b>Average Wall Height (ft.):</b>	4	<b>Face Angle (deg.):</b>	85
<b>Maximum Wall Height (ft.):</b>	5	<b>Vertical Offset (ft.):</b>	0
<b>Assessed Elements</b>			
<b>Element (Weighting Factor)</b>	<b>Narrative</b>		<b>Condition Rating (0 - 10)</b>
PERFORMANCE 8.00	Good to excellent condition		9
WALL FOUNDATION MATERIAL 8.00	No distress; no evidence of settlement or rotation		10
PLACED STONE 8.00	Good to excellent condition; no observed distress		10
WIRE/GEOSYNTHETIC FACING 8.00	Geosynthetic is not visible, but type of wall suggests that there is geosynthetic reinforcement		10
VEGETATION 0.50	Small brush growing within 3 ft of wall; vegetation is not causing distress to wall		9
WALL DRAINS 0.50	No observed drainage-related distress; No. 57 stone backfill suggests that there's an underdrain though it is not visible		9
LATERAL SLOPE 0.50	No distress; no evidence of movement; no erosion		10
ROAD/SIDEWALK/SHOULDER 0.50	No distress to pavement; no distress to concrete sidewalk		10
UPSLOPE 0.50	No distress to steep, forested slope		10
<b>Repair Recommendations</b>			
<b>Failure Consequence:</b>	LOW		
<b>Recommendation Narrative:</b>	None		
<b>Repair Cost:</b>	\$0		
2007 cost estimate (ASTM Class D), preliminary for comparison to other repair costs only.			



# Delaware Water Gap National Recreation Area

ROUTE 0952: DINGMANS FALLS VISITOR CENTER

## Retaining Wall Condition Photos



DEWA\_0952\_0.000\_P1\_1.jpg



DEWA\_0952\_0.000\_P1\_2.jpg



# Appendix A

## Summary of WIP Definitions



Delaware Water Gap National Recreation Area



**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: <b>None</b> - Does not meet any known standards. <b>Non-AASHTO</b> - Does not meet AASHTO, but is consistent with other structures of its type/period with good performance. <b>AASHTO</b> - Apparently meets current AASHTO Geometric, Design, Materials, and Construction Standards.	
Consequence of Failure	<b>Low</b> - No loss of roadway, no to low public risk, no impact to traffic during wall repair/replacement <b>Moderate</b> - Hourly to short-term closure of roadway, low-to-moderate public risk, multiple alternate routes available <b>High</b> - Seasonal to long-term loss of roadway, substantial loss-of-life risk, no alternate routes available	
Action	Select from: <b>No Action, Monitor, Maintenance, Repair Elements, Replace Elements, and Replace Wall</b>	
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. <b>1-Poor</b> 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. <b>2-Good</b> Observed conditions are sufficient to rate the conditions of wall element(s); however, additional investigations would be useful to better understand element performance. <b>3-Very Good</b> 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 <b>severity</b> , <b>extent</b> , and <b>repair/replace urgency</b> of wall element distresses.		
9-10 (Excellent)	-Any defects are minor and are within normal range for <i>newly constructed or fabricated</i> 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.	<b>Good to Excellent</b> - 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.
		<b>Fair</b> - 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.
		<b>Poor to Critical</b> - 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.

