

GATE WIP Report

NPS Retaining Wall Inventory Program Gateway National Recreation Area



Federal Lands Highway
Road Inventory Program

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Federal Highway Administration
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Road Inventory Program (RIP)

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Report Date: November 2015

Gateway National Recreation Area in New Jersey and New York



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



Gateway 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



Gateway National Recreation Area

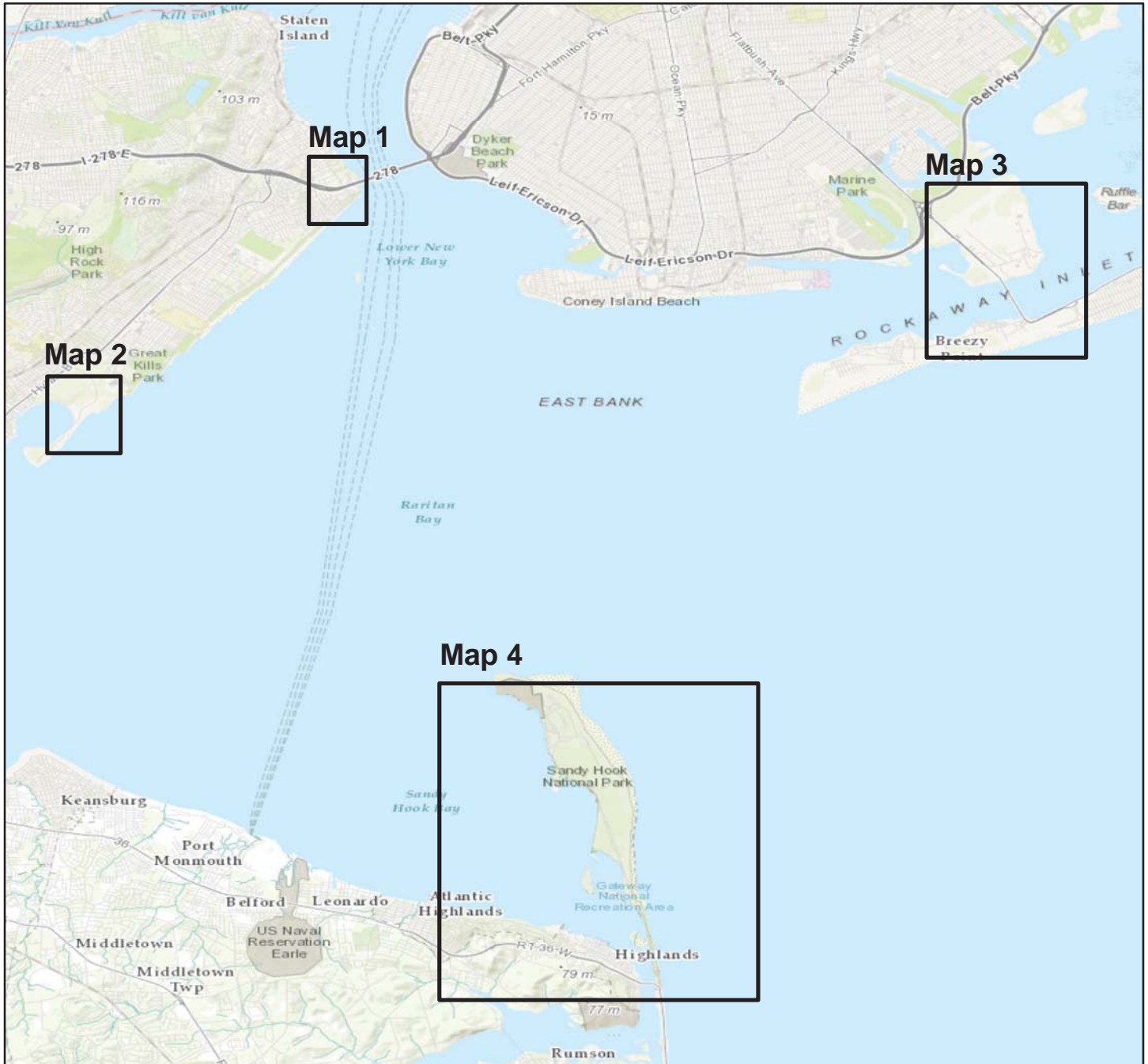


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Gateway National Recreation Area

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



Gateway National Recreation Area

WALL LOCATION MAP

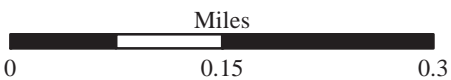
Map 1



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



Gateway 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



Gateway National Recreation Area

WALL LOCATION MAP

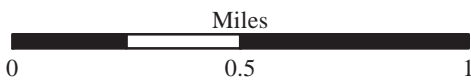
Map 3



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

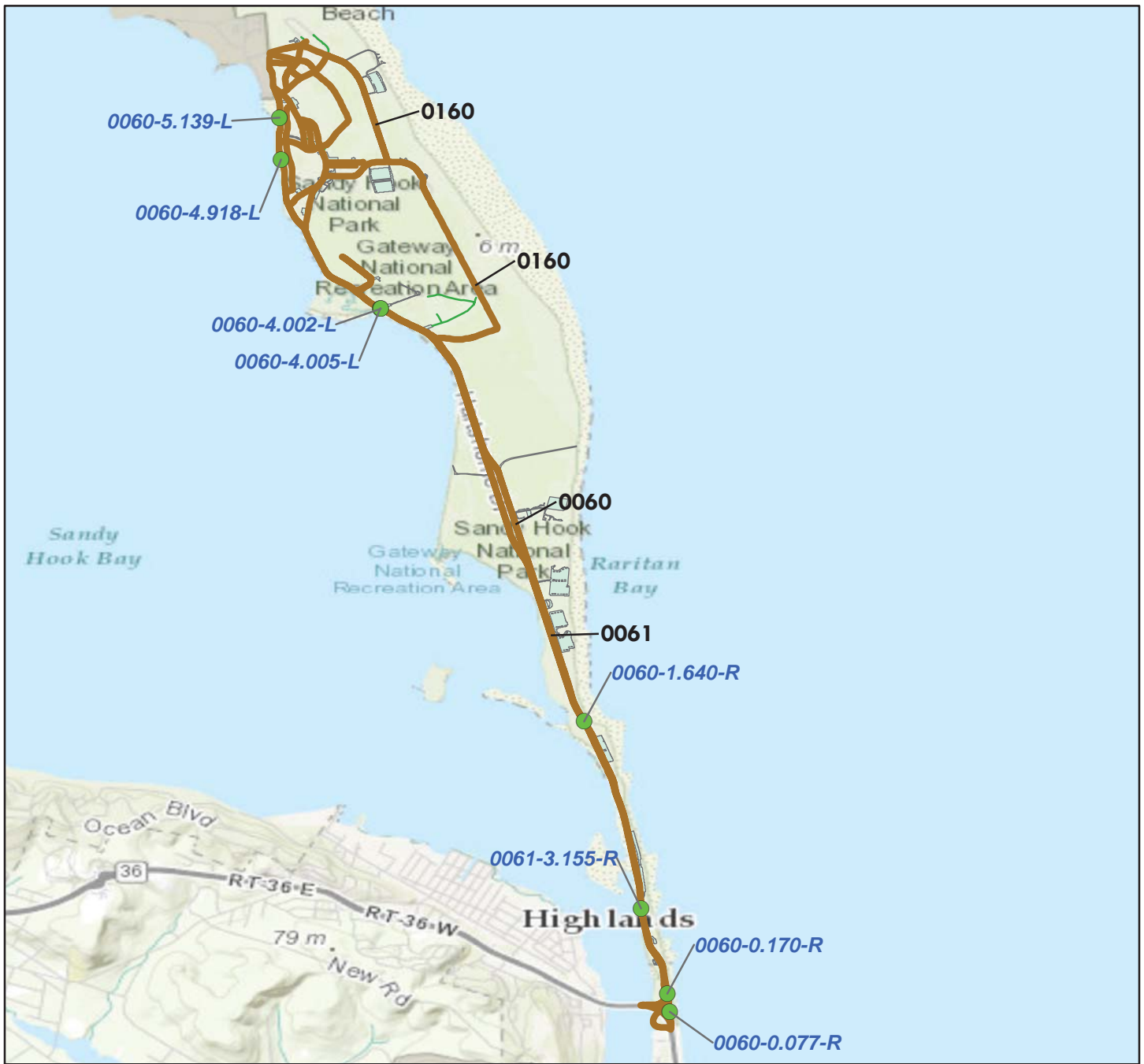
— RIP Collected Routes



Gateway National Recreation Area

WALL LOCATION MAP

Map 4



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

● Wall Locations

— RIP Collected Routes



Tier 1 Park Retaining Wall Overview



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Parkwide Summary: Gateway National Recreation Area

Initial retaining wall inspections were conducted at Gateway National Recreation Area in 2008, 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 Gateway 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, 20 walls were inventoried on the routes listed below.

Table 1: Number of Walls by Route

Route Number	Route Name	No. of Walls
0060	HARTSHORNE DRIVE (NORTHBOUND)	7
0061	HARTSHORNE DRIVE (SOUTHBOUND)	1
0232ZZ	BULKHEAD ROADS	1
0446	BATTERY WEED ROAD	1
0453	USS NORTH CAROLINA ROAD	1
0700	UNKNOWN ROUTE	1
0902	GATEWAY MARINA PARKING	1
0906	JACOB RIIS PARKING	1
0945	AREA "F" PARKING	1
0967	CAR TOP BOAT RAMP AND FISHING AREA PARKING	1
0971	TYLUNAS HALL PARKING (NYC COLLECTION)	1
0987	MAINTENANCE AREA PARKING	1
1016ZZ	RIIS LANDING PARKING AREAS	1
1024	NYPD PARKING 5	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

Wall Function	No. of Walls
CW - Cut Wall	2
FL - Flood Wall	13
FW - Fill Wall	5

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

Table 3: Number of Walls by Primary Wall Type

Primary Wall Type	No. of Walls
AS, Anchor - Tieback Sheet Pile	2
AT, Other - Anchor Tieback Timber Pile	1
CL, Cantilever - Concrete	2
GC, Gravity - Mass Concrete	3
GD, Gravity - Dry Stone	1
GG, Gravity - Gabion	2
GM, Gravity - Mortared Stone	2
MSP, Other -Metal Sheet Pile	2
TC, Other -Timber Cantilever	1
TPT, Other - Timber Pile w/Timber Lagging	4

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

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

Recommended Action	2007 Repair Costs*	No. of Walls
No Action	\$0	8
Monitor	\$164,000	4
Maintenance	\$67,500	1
Repair Elements	\$248,190	4
Replace Elements	\$345,955	2
Replace Wall	\$1,540,000	1
Totals	\$2,365,645	20

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

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

Table 5: Number of Walls Grouped by Associated 2007 Cost

Cost Range*	No. of Walls
\$0	8
\$1 - \$25,000	4
\$25,001 - \$50,000	1
\$50,001 - \$100,000	4
\$100,001 - \$250,000	1
\$250,001 - \$500,000	1
\$500,001 - \$1,000,000	0
\$1,000,001 - \$2,000,000	1
\$2,000,001 - \$3,000,000	0
\$3,000,001 - \$4,000,000	0
Total Number of Walls	20

*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 Gateway 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 Gateway 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

Wall Identification	Failure Consequence⁽¹⁾	Wall Rating⁽²⁾	Recommended Action⁽³⁾	2007 Repair Costs⁽⁴⁾
GATE-0060-4.918-L	MODERATE	46	REPLACE ELEMENTS	\$316,330
GATE-0060-5.139-L	LOW	37	REPAIR ELEMENTS	\$86,000

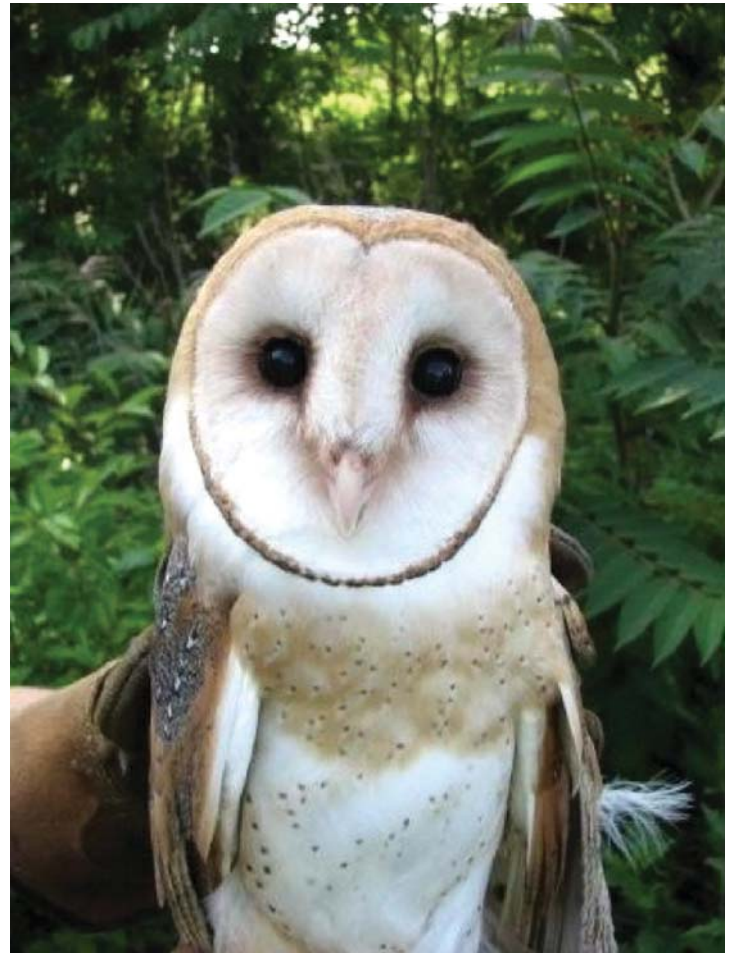
Notes: 1) Low consequence of failure and/or no recommended action may indicate repairs are not needed.

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



Gateway National Recreation Area



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Gateway National Recreation Area

ROUTE 0060: HARTSHORNE DRIVE (NORTHBOUND)



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

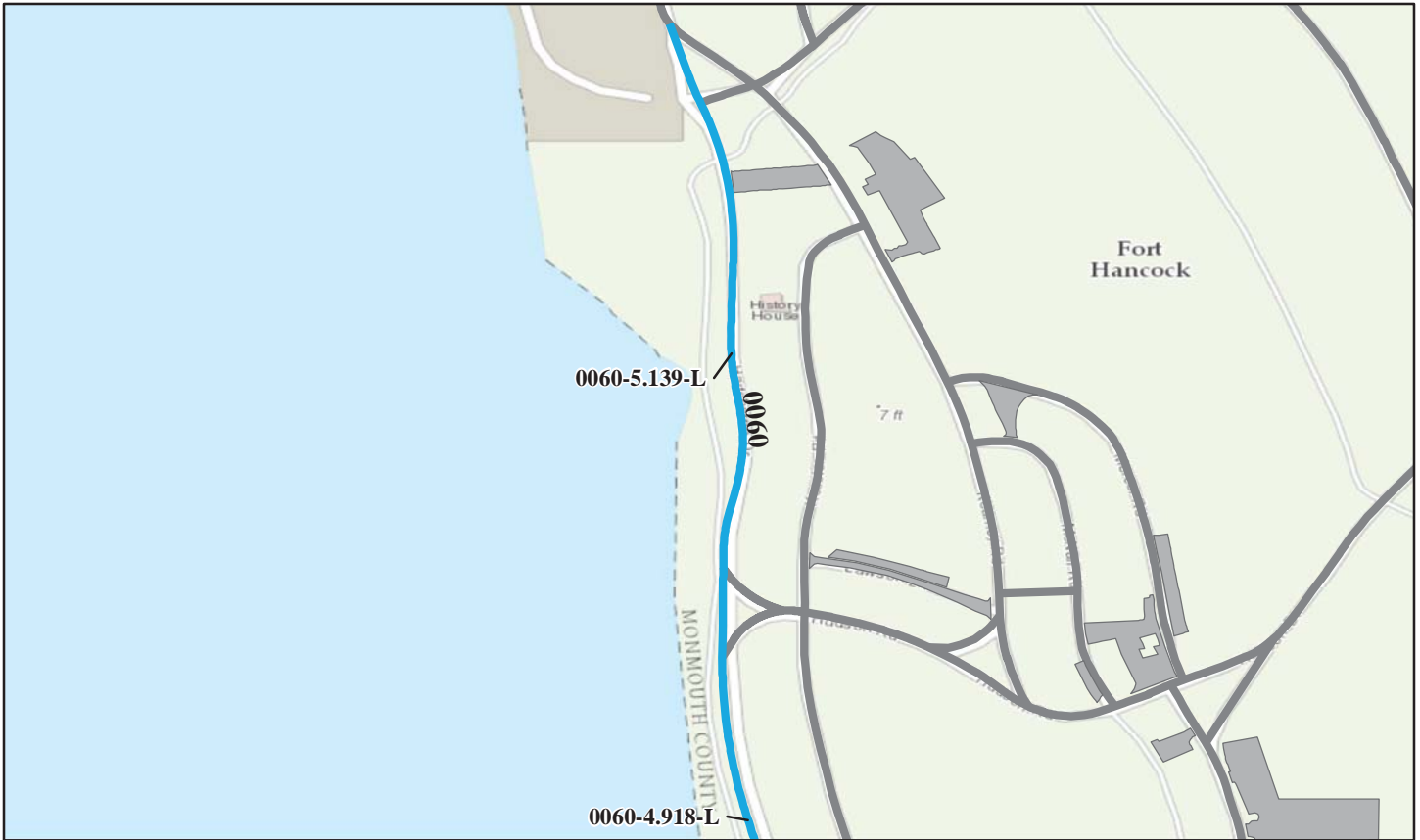
Critical / Poor (0 - 49)	Fair (50 - 69)	Good to Excellent (70 - 100)	No Data
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Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
GATE-0060-0.077-R 10/9/2008	2,600	500	Other -Metal Sheet Pile	Fill Wall	71	\$67,500.00
GATE-0060-0.170-R 10/9/2008	8,960	1,280	Gravity - Mortared Stone	Flood Wall	79	\$0.00
GATE-0060-1.640-R 10/9/2008	3,600	600	Other -Metal Sheet Pile	Flood Wall	81	\$0.00
GATE-0060-4.002-L 10/9/2008	1,580	316	Gravity - Gabion	Fill Wall	52	\$29,625.00
GATE-0060-4.005-L 10/9/2008	188	47	Gravity - Gabion	Fill Wall	59	\$3,990.00

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

Gateway National Recreation Area

ROUTE 0060: HARTSHORNE DRIVE (NORTHBOUND)



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)

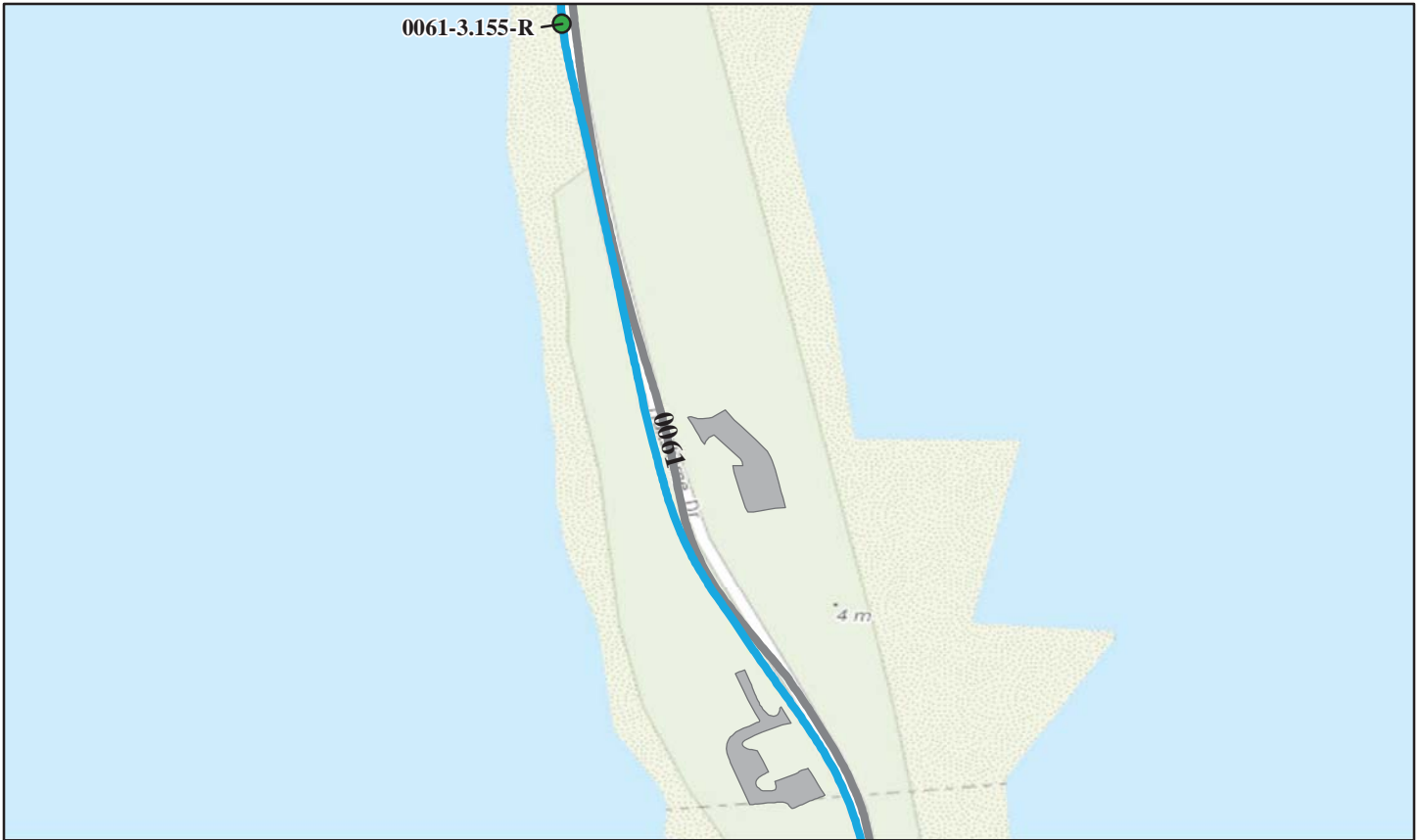
No Data

Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
GATE-0060-4.918-L 10/8/2008	4,848	1,212	Gravity - Mass Concrete	Flood Wall	46	\$316,330.00
GATE-0060-5.139-L 10/8/2008	6,650	1,330	Other - Anchor Tieback Timber Pile	Flood Wall	37	\$86,000.00

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

Gateway National Recreation Area

ROUTE 0061: HARTSHORNE DRIVE (SOUTHBOUND)



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)

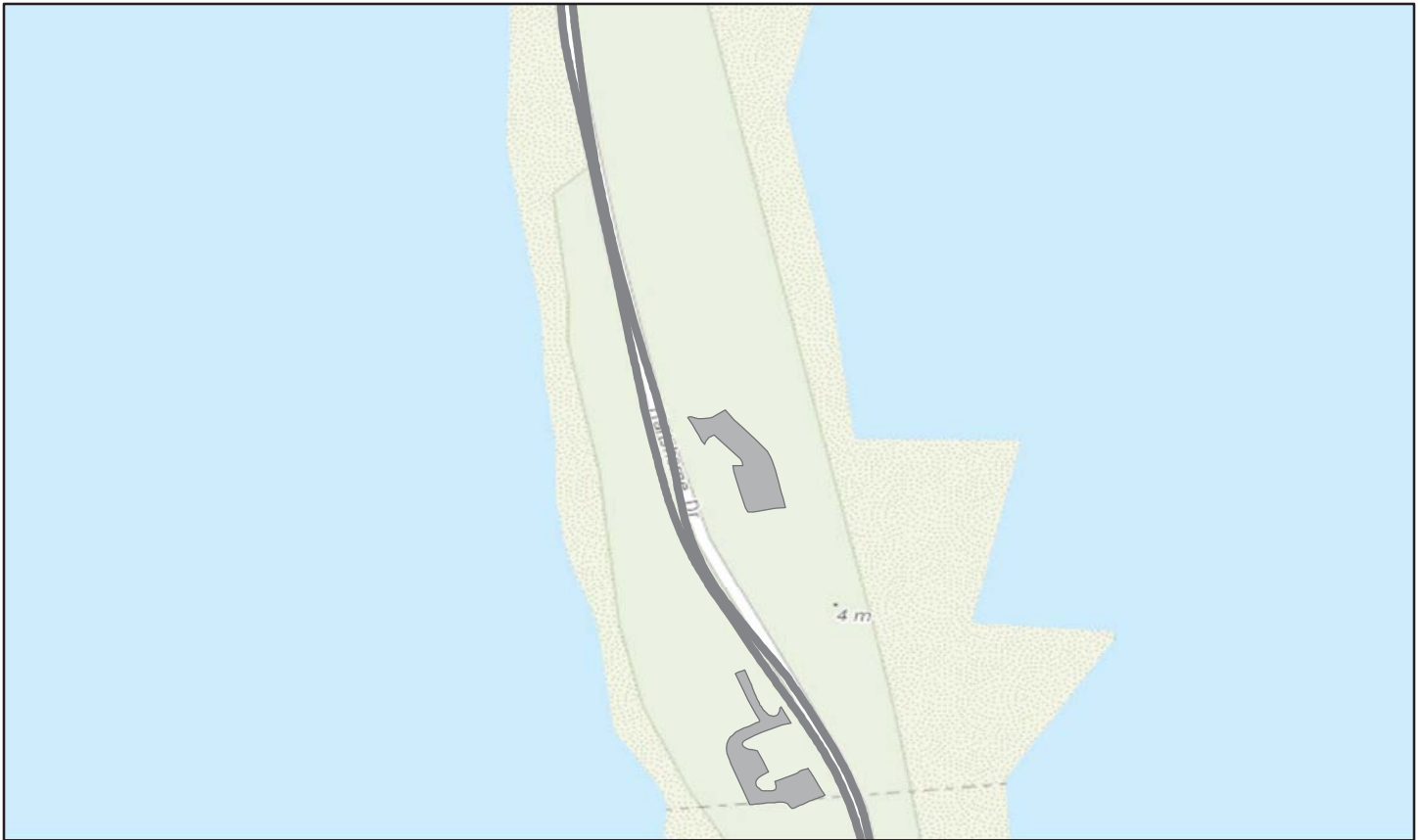
No Data

Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
GATE-0061-3.155-R 10/9/2008	3,320	1,660	Gravity - Mass Concrete	Fill Wall	77	\$0.00

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

Gateway National Recreation Area

ROUTE 0232ZZ: BULKHEAD ROADS



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

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
GATE-0232ZZ-0.400-L 10/7/2008	13,630	1,730	Other -Timber Cantilever	Flood Wall	54	\$1,540,000.00

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

Gateway National Recreation Area

ROUTE 0446: BATTERY WEED ROAD



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

Retaining Wall Condition Legend – Wall Condition Rating

Critical / Poor (0 - 49)

Fair (50 - 69)

Good to Excellent (70 - 100)

No Data

Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
GATE-0446-0.402-L 10/6/2008	95	64	Gravity - Dry Stone	Cut Wall	90	\$0.00

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

Gateway National Recreation Area

ROUTE 0453: USS NORTH CAROLINA ROAD



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

Retaining Wall Condition Legend – Wall Condition Rating

Critical / Poor (0 - 49)

Fair (50 - 69)

Good to Excellent (70 - 100)

No Data

Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
GATE-0453-0.650-L 10/6/2008	280	54	Gravity - Mortared Stone	Cut Wall	88	\$0.00

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

Gateway National Recreation Area

ROUTE 0700: UNKNOWN ROUTE

Wall location is unknown.

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

Retaining Wall Condition Legend – Wall Condition Rating

Critical / Poor (0 - 49)

Fair (50 - 69)

Good to Excellent (70 - 100)

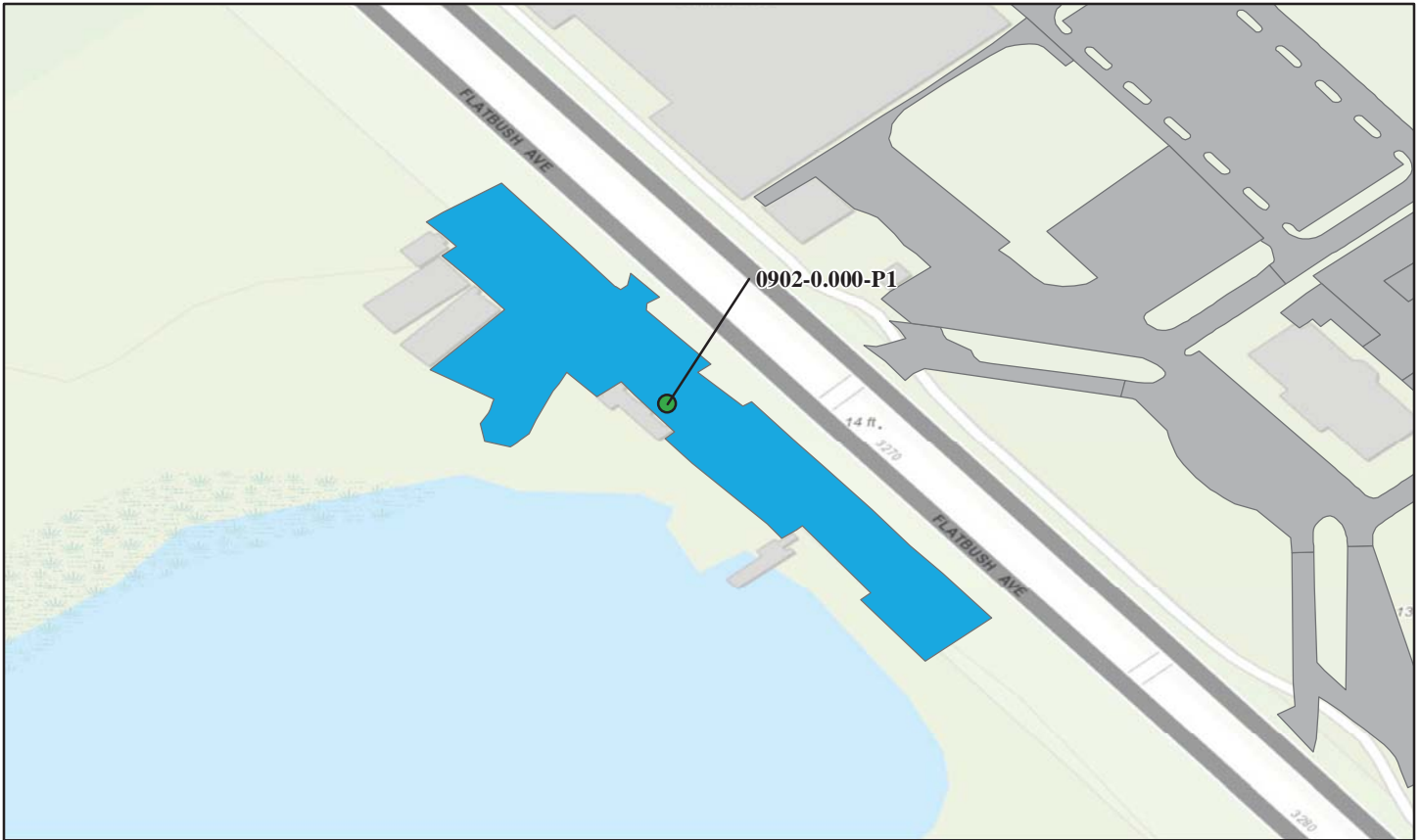
No Data

Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
GATE-0700-0.000-R 10/8/2008	25,348	4,780	Gravity - Mass Concrete	Fill Wall	87	\$0.00

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

Gateway National Recreation Area

ROUTE 0902: GATEWAY MARINA PARKING



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
GATE-0902-0.000-P1 10/9/2008	665	79	Other - Timber Pile w/Timber Lagging	Flood Wall	78	\$0.00

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

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ROUTE 0906: JACOB RIIS PARKING



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
GATE-0906-0.000-P1 10/8/2008	-1	5335	Cantilever - Concrete	Flood Wall	72	\$93,800.00

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

Gateway National Recreation Area

ROUTE 0945: AREA "F" PARKING



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)

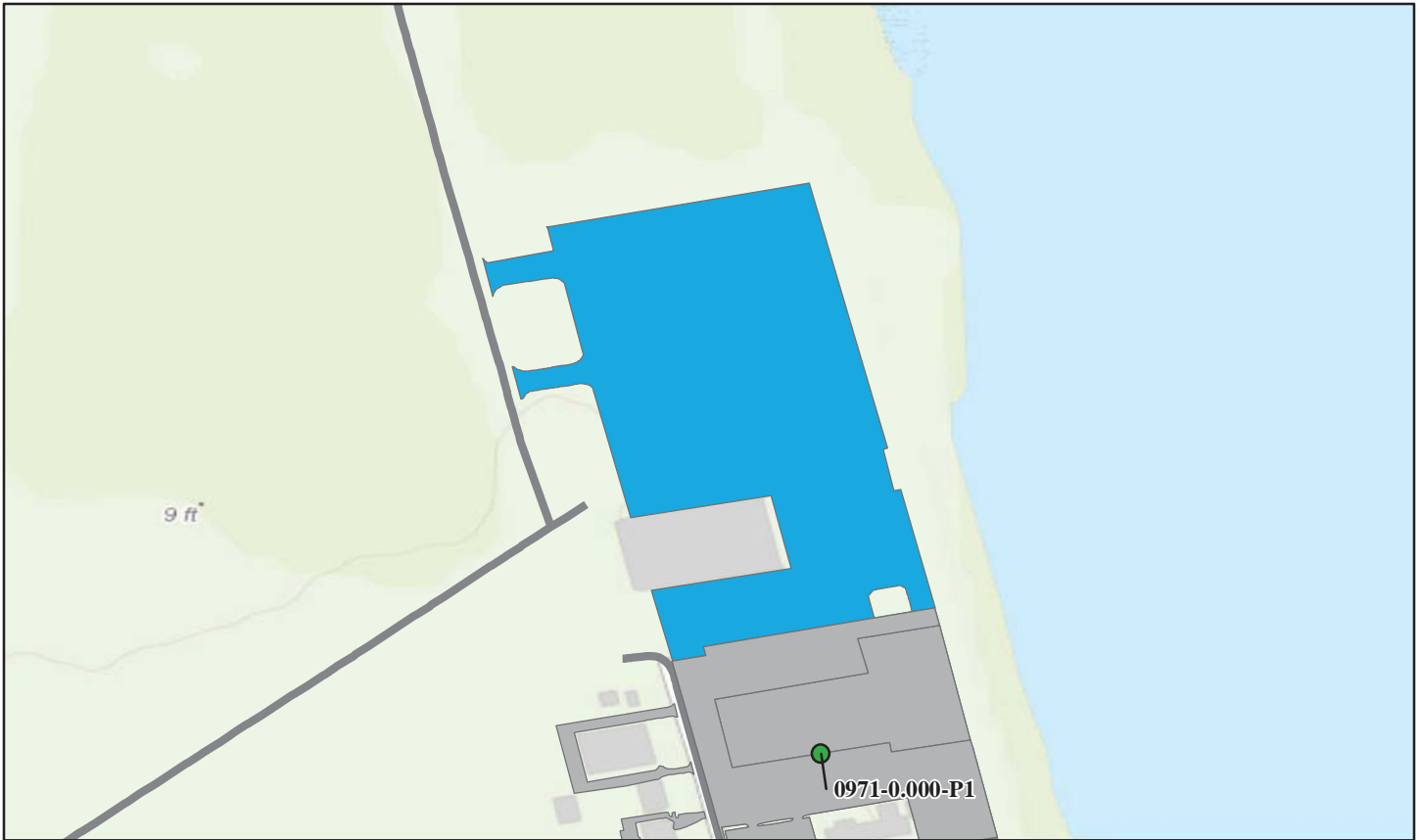
No Data

Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
GATE-0945-0.000-P1 10/6/2008	23320	1780	Other - Timber Pile w/Timber Lagging	Flood Wall	57	\$70,000.00

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

Gateway National Recreation Area

ROUTE 0967: CAR TOP BOAT RAMP AND FISHING AREA PARKING



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
GATE-0967-0.000-P1 10/6/2008	6531	1484	Other - Timber Pile w/Timber Lagging	Flood Wall	82	\$0.00

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

Gateway National Recreation Area

ROUTE 0971: TYLUNAS HALL PARKING (NYC COLLECTION)



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)

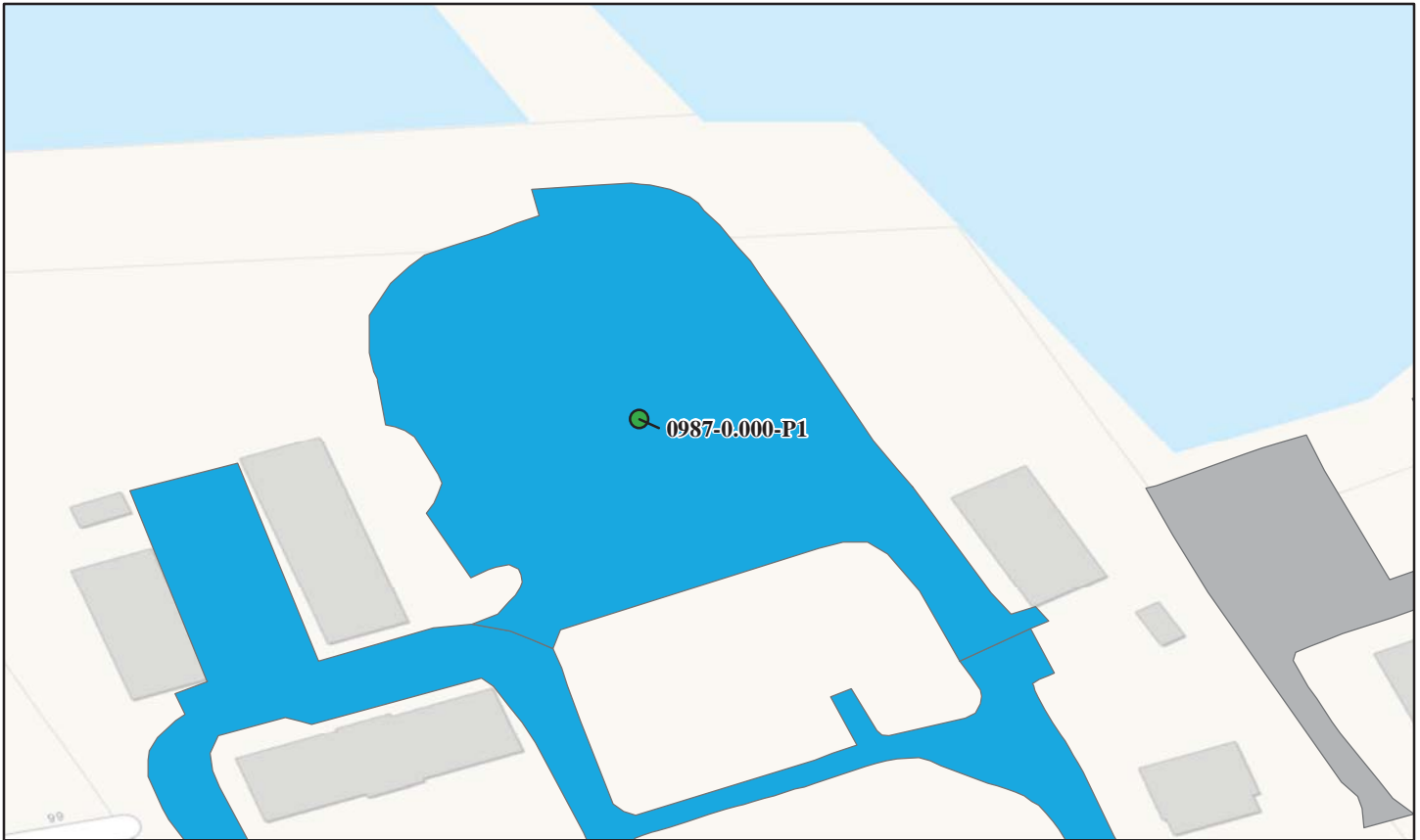
No Data

Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
GATE-0971-0.000-P1 10/8/2008	6115	816	Other - Timber Pile w/Timber Lagging	Flood Wall	88	\$0.00

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

Gateway National Recreation Area

ROUTE 0987: MAINTENANCE AREA PARKING



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)

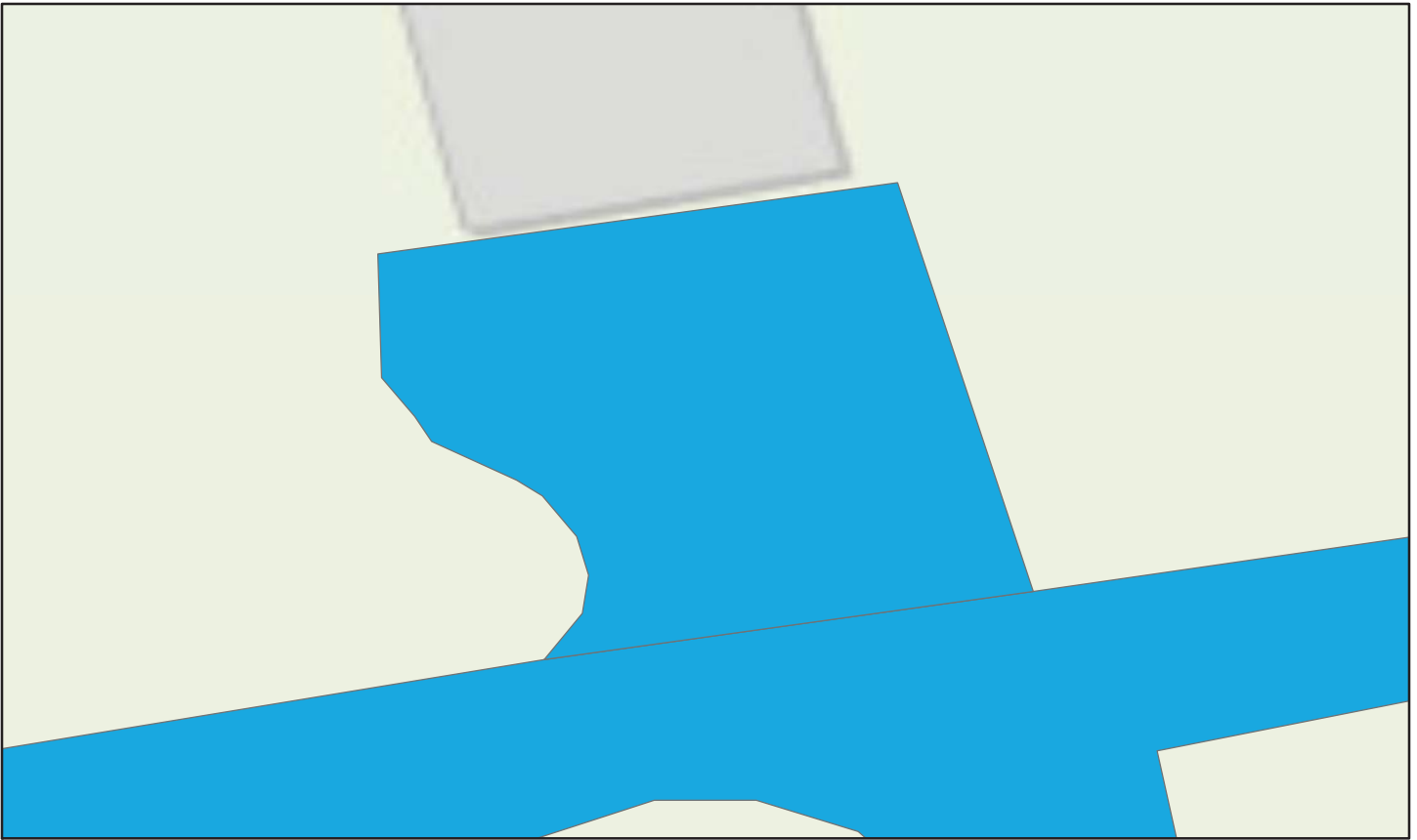
No Data

Wall ID Inspection Date:	Wall Area (Sq. Ft.)	Wall Length (Ft.)	Wall Type	Wall Function	Overall Rating	Repair Cost
GATE-0987-0.000-P1 10/8/2008	2280	255	Anchor - Tieback Sheet Pile	Flood Wall	78	\$200.00

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

Gateway National Recreation Area

ROUTE 1024: NYPD PARKING 5



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
GATE-1024-0.000-P1 10/8/2008	2140	430	Cantilever - Concrete	Flood Wall	70	\$146,000.00

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

Tier 3 Retaining Wall Details



Gateway National Recreation Area



**Federal Lands Highway
Road Inventory Program**

Wall ID:	GATE-0060-0.077-R		
Route Name:	HARTSHORNE DRIVE (NORTHBOUND)		
Inspection Date:	October 09, 2008	Approximate Year Built:	Unknown
*Wall Rating:	71	Maintenance Action:	Maintenance

Wall Description

Wall Function:	Fill Wall	Primary Wall Type:	Other -Metal Sheet Pile
Surface Treatment:	Painted	Secondary Wall Type:	
Secondary Surface Treatment:		Architectural Facing:	
General Description:	Metal sheet pile fill wall for roadway grade support, with a grouted riprap toe slope (erosion protection). Corrosion protection coating is severely weathered and needs to be reapplied.		

Wall Measurements

Wall Length (ft.):	500	Face Area (sq.):	2600
Average Wall Height (ft.):	5	Face Angle (deg.):	90
Maximum Wall Height (ft.):	7	Vertical Offset (ft.):	-2

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Excellent global condition. No signs of global instability or settlement in front or behind the wall. Corrosion protection is peeling off and needs to be reapplied to extend structural life.	6
WALL FOUNDATION MATERIAL 8.00	Grouted riprap has been placed at the toe of the wall to protect against erosion. No signs of cracking or settlement within the riprap. Sound foundation.	9
PILES AND SHAFTS 8.00	Metal sheet piles are in good condition. Corrosion protection paint is highly weathered and peeling off, though the piles show only minor corrosion. All joints are tight, and there are no significant signs of wall distress. Corrosion coating needs to be	6
ROAD/SIDEWALK/SHOULDER 0.50	No cracking or settlement in roadway due to wall distress.	8
TRAFFIC BARRIER/FENCE 0.50	K-rail traffic barrier is in good condition, showing no signs of wall-related distress. Chain link fencing is also in good condition.	8
WALL DRAINS 0.50	No wall drains are visible, though none are likely required. No signs of seepage or water staining.	8
DOWNSLOPE 0.50	Grouted riprap. Very stable with no signs of distress.	9
LATERAL SLOPE 0.50	Grouted riprap and gentle grassy slopes. No significant erosion or other signs of distress.	9

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	Remove peeled corrosion protection coating and prep piling surface. Apply new corrosion protection coating. Site prep (minor sand removal along wall face, labor/equip, sample testing, etc.): Lump sum = \$2,500. Weathered coating removal
Repair Cost:	\$67,500

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

Gateway National Recreation Area

ROUTE 0060: HARTSHORNE DRIVE (NORTHBOUND)

Retaining Wall Condition Photos



GATE_0060_0.077_R_1.jpg



GATE_0060_0.077_R_2.jpg

Wall ID:	GATE-0060-0.170-R		
Route Name:	HARTSHORNE DRIVE (NORTHBOUND)		
Inspection Date:	October 09, 2008	Approximate Year Built:	Unknown
*Wall Rating:	79	Maintenance Action:	No Action

Wall Description

Wall Function:	Flood Wall	Primary Wall Type:	Gravity - Mortared Stone
Surface Treatment:		Secondary Wall Type:	
Secondary Surface Treatment:		Architectural Facing:	
General Description:	Mortared, large stone riprap seawall. The structure is massive, and is primarily intended to protect from storm surges, though the wall does resist significant beachside earth loads.		

Wall Measurements

Wall Length (ft.):	1280	Face Area (sq.):	8960
Average Wall Height (ft.):	7	Face Angle (deg.):	55
Maximum Wall Height (ft.):	10	Vertical Offset (ft.):	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	No signs of global instability, settlement or missing elements. No scour or significant structural distress.	8
WALL FOUNDATION MATERIAL 8.00	Assumed dense beach sands. No signs of scour or settlement due to poor foundation materials.	8
MORTAR 8.00	Weathered mortar with coarse, exposed aggregate. Minor cracking. Overall, mortar is generally intact and functioning very well.	8
PLACED STONE 8.00	Variety of placed stone materials, ranging from basalt, granite, schist, possibly slate. As a result, variably weathered. Some cracking, though largely intact and in good to very good condition. No missing elements.	8
LATERAL SLOPE 0.50	Grouted riprap at both ends (non-qualifying or Park-related structures). Very stable.	8
ROAD/SIDEWALK/SHOULDER 0.50	Adjacent roadway shows no signs of wall-related distress.	8
UPSLOPE 0.50	Upslope is actually oceanside. Comprised of gently sloping beach sands with minor vegetation. No signs of settlement distress behind the wall.	8
DOWNSLOPE 1.00	Relatively flat downslope comprised of beach sand. Stable, with no signs of significant erosion.	7
WALL DRAINS 1.00	None installed, though self-draining.	7

Repair Recommendations

Failure Consequence:	LOW
Recommendation Narrative:	None
Repair Cost:	\$0

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

Gateway National Recreation Area

ROUTE 0060: HARTSHORNE DRIVE (NORTHBOUND)

Retaining Wall Condition Photos



GATE_0060_0.170_R_1.jpg



GATE_0060_0.170_R_2.jpg

Wall ID:	GATE-0060-1.640-R		
Route Name:	HARTSHORNE DRIVE (NORTHBOUND)		
Inspection Date:	October 09, 2008	Approximate Year Built:	Unknown
*Wall Rating:	81	Maintenance Action:	No Action

Wall Description

Wall Function:	Flood Wall	Primary Wall Type:	Other -Metal Sheet Pile
Surface Treatment:	Painted	Secondary Wall Type:	
Secondary Surface Treatment:		Architectural Facing:	
General Description:	Metal sheet pile wall to protect storm surge erosion across a narrow section of the Hook.		

Wall Measurements

Wall Length (ft.):	600	Face Area (sq.):	3600
Average Wall Height (ft.):	6	Face Angle (deg.):	90
Maximum Wall Height (ft.):	6	Vertical Offset (ft.):	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Minor weathering of metal elements, but no signs of global distress or wall settlement.	8
WALL FOUNDATION MATERIAL 8.00	Appears to be dense sand. No scour or signs of wall settlement.	8
PILES AND SHAFTS 8.00	Metal sheet piles are in very good condition, showing little to no signs of corrosion, and no signs of distortion, bending, cracking or significant weathering.	8
DOWNSLOPE 0.50	Flat downslope comprised of dense sand. Paved walkway at toe of wall shows no signs of wall-related distress.	9
LATERAL SLOPE 0.50	Gentle lateral slopes comprised of dense to loose sand with minor vegetation.	9
UPSLOPE 0.50	Generally flat top slope comprised of dense to loose sand with minor vegetation. No signs of settlement or sinkholes behind wall face.	9
VEGETATION 0.50	No vegetation impacts to wall elements.	9
WALL DRAINS 0.50	No wall drains are evident - and it appears that none are needed.	9

Repair Recommendations

Failure Consequence:	LOW
Recommendation Narrative:	None
Repair Cost:	\$0

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

Gateway National Recreation Area
ROUTE 0060: HARTSHORNE DRIVE (NORTHBOUND)

Retaining Wall Condition Photos



GATE_0060_1.640_R_1.jpg



GATE_0060_1.640_R_2.jpg

Wall ID:	GATE-0060-4.002-L		
Route Name:	HARTSHORNE DRIVE (NORTHBOUND)		
Inspection Date:	October 09, 2008	Approximate Year Built:	Unknown
*Wall Rating:	52	Maintenance Action:	Replace Elements

Wall Description

Wall Function:	Fill Wall	Primary Wall Type:	Gravity - Gabion
Surface Treatment:		Secondary Wall Type:	Other - Grouted Riprap, Class 4
Secondary Surface Treatment:		Architectural Facing:	
General Description:	Gabion wall with 3 x 3 x 6 baskets, overlaid with 1x3 x 9 revetment mattresses, filled with +6 in rock. Wall used to prevent erosion at Horseshoe Cove boardwalk. Wall is located well off main road, but is a Park asset.		

Wall Measurements

Wall Length (ft.):	316	Face Area (sq.):	1580
Average Wall Height (ft.):	3	Face Angle (deg.):	45
Maximum Wall Height (ft.):	6	Vertical Offset (ft.):	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Baskets have settled, show signs of sliding and rotation. Several baskets are open and have lost fill rock. Baskets are providing erosion protection and are retaining soils at the culverts. Very low earth loads are present, so baskets serve more as slop	5
WALL FOUNDATION MATERIAL 8.00	Foundation material is assumed to be beach sand. Settlement, possibly coupled with temporal scour, has caused basket deformations/displacements.	6
WIRE/GEOSYNTHETIC FACING 8.00	Wall baskets are weathered/corroded, and open at some locations. Baskets and mats show signs of deformation and displacement, with some fill rock lost. Many are deformed and displaced.	5
LATERAL SLOPE 0.50	Relatively flat (6:1 est.), with minor erosion and vegetation stabilization.	8
ROAD/SIDEWALK/SHOULDER 0.50	Boardwalk shows no signs of gabion-related distress.	8
UPSLOPE 0.50	Grades quickly to the boardwalk, and appears to be stable. Roadside end has small riprap placed above baskets, with stabilizing vegetation present.	8
VEGETATION 0.50	Minor vegetation along the top of the wall. No impact to wall performance.	8
WALL DRAINS 0.50	Porous wall system - no drains required.	8
DOWNSLOPE 1.00	Sand beach with signs of erosion in the immediate vicinity of the culvert.	7

Repair Recommendations

Failure Consequence:	LOW
Recommendation Narrative:	Replace 395 sqft of gabion wall face area @ \$75/sqft = \$29,625. (Alternative is to cover existing baskets with 135 cu yds of large riprap @ \$215/cuyd = \$28,670. Longer term solution. Culverts need to be replaced first.)
Repair Cost:	\$29,625

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

Gateway National Recreation Area
ROUTE 0060: HARTSHORNE DRIVE (NORTHBOUND)

Retaining Wall Condition Photos



GATE_0060_4.002_L_1.jpg



GATE_0060_4.002_L_2.jpg

Wall ID:	GATE-0060-4.005-L		
Route Name:	HARTSHORNE DRIVE (NORTHBOUND)		
Inspection Date:	October 09, 2008	Approximate Year Built:	Unknown
*Wall Rating:	59	Maintenance Action:	Repair Elements

Wall Description

Wall Function:	Fill Wall	Primary Wall Type:	Gravity - Gabion
Surface Treatment:		Secondary Wall Type:	
Secondary Surface Treatment:		Architectural Facing:	
General Description:	Gabion wall with 3 x 3 x 6 galvanized baskets overlain by 1x3 x 9 revettment baskets filled with +6 in rock. Gabions placed to protect Horseshoe Cove boardwalk foundation from erosion.		

Wall Measurements

Wall Length (ft.):	47	Face Area (sq.):	188
Average Wall Height (ft.):	4	Face Angle (deg.):	45
Maximum Wall Height (ft.):	6	Vertical Offset (ft.):	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Generally good performance with minor settlement and rotation along the face. Appears structurally stable, but does show minor signs of foundation distress.	7
WALL FOUNDATION MATERIAL 8.00	Generally beach sand with cobbles. Some erosion has occurred at isolated location resulting in undermining of the wall face.	6
WIRE/GEOSYNTHETIC FACING 8.00	A few of the galvanized baskets show significant corrosion, with some settlement and scouring of baskets evident.	6
DOWNSLOPE 0.50	Sand with cobbles. Appears stable with minor vegetation present.	8
LATERAL SLOPE 0.50	Well vegetated sand slopes. Stable with no signs of significant erosion.	8
ROAD/SIDEWALK/SHOULDER 0.50	Boardwalk shows no signs of distress due to gabion wall .	8
VEGETATION 0.50	Minor bushes along top of wall. Not affecting wall performance.	8
WALL DRAINS 0.50	Porous wall system - no drains required.	8
CULVERT 5.00	Four, 5-ft diameter, concrete culverts are in serious disrepair, with internal failure evident. Pipes still pass water and do not impact wall stability.	3

Repair Recommendations

Failure Consequence:	LOW
Recommendation Narrative:	Place approx. 3 cu yds of class 1 riprap at foundation: 3 cu yds @ \$80/cuyd = \$240 Replace 3 baskets that have failed: Approx. 30 sqft @ \$70/sqft = \$2,100. Misc. labor and equipment hours: 30 hrs @ \$55/hr = \$1,650.
Repair Cost:	\$3,990

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

Gateway National Recreation Area
ROUTE 0060: HARTSHORNE DRIVE (NORTHBOUND)

Retaining Wall Condition Photos



GATE_0060_4.005_L_1.jpg



GATE_0060_4.005_L_2.jpg

Wall ID:	GATE-0060-4.918-L		
Route Name:	HARTSHORNE DRIVE (NORTHBOUND)		
Inspection Date:	October 08, 2008	Approximate Year Built:	Unknown
*Wall Rating:	46	Maintenance Action:	Replace Elements
Wall Description			
Wall Function:	Flood Wall	Primary Wall Type:	Gravity - Mass Concrete
Surface Treatment:		Secondary Wall Type:	Other - Placed jetty rock in front
Secondary Surface Treatment:		Architectural Facing:	
General Description:	Gravity mass concrete seawall with 3.5 ft parapet. Jetty rock is placed at base of wall to protect scour. Jetty in front of this wall, protecting officer housing (est. at 2500 lineal ft) is designated FMSS# 21616.		
Wall Measurements			
Wall Length (ft.):	1212	Face Area (sq.):	4848
Average Wall Height (ft.):	4	Face Angle (deg.):	90
Maximum Wall Height (ft.):	4	Vertical Offset (ft.):	-1
Assessed Elements			
Element (Weighting Factor)	Narrative		Condition Rating (0 - 10)
PERFORMANCE 8.00	Primary wall is highly weathered with substantial sections fully undermined or pending erosional failure. Sections still intact do not show rotation or deformation, but are exhibiting severe structural damage at the waterline/foundation. Structure is i		5
WALL FOUNDATION MATERIAL 8.00	Unknown foundation material, and not visible through jetty rock in front of wall. Some areas are fully undermined due to wave scour. Severe foundation distress along a substantial portion of the wall.		3
CONCRETE 8.00	Severely weathered concrete with aggregate exposure, missing/broken concrete sections, and exposed and highly corroded reinforcement. Much of the wall length is heavily scoured, with sections undermined to the point of sidewalk collapse behind the wall.		4
PLACED STONE 8.00	Jetty rock placed along the toe of the wall is durable and in place. Wave action is undermining primary concrete wall behind rock, but rock is functioning as intended.		7
TRAFFIC BARRIER/FENCE 1.00	Concrete parapet is highly weathered, cracked and missing sections. Highly corroded reinforcement is exposed at many locations.		4
WALL DRAINS 1.00	No wall drains evident. No collection system evident for storm surge water behind the wall.		4
UPSLOPE 1.00	Generally flat, grassy top slope to the roadway. Minor erosion at areas where the wall/sidewalk have failed.		6
DOWNSLOPE 1.00	Unknown downslope condition, though riprap in front of wall appears stable and in place.		7
LATERAL SLOPE 1.00	Riprap at wall start is stable and in place. Wall terminates at timber pile wall. Lateral slopes are stable.		7

Wall ID:	GATE-0060-4.918-L		
Route Name:	HARTSHORNE DRIVE (NORTHBOUND)		
Inspection Date:	October 08, 2008	Approximate Year Built:	Unknown
*Wall Rating:	46	Maintenance Action:	Replace Elements

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	Replace/repair concrete wall sections with in-kind structure: Replace approx. 360 ft of concrete gravity wall and parapet, an estimated 2,880 sqft @ \$60/sqft = \$172,800. Repair approx. 1,500 sqft of parapet/wall face @ \$65/sqft = \$97,500. Replace concrete
Repair Cost:	\$316,330

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

Gateway National Recreation Area
ROUTE 0060: HARTSHORNE DRIVE (NORTHBOUND)

Retaining Wall Condition Photos



GATE_0060_4.918_L_1.jpg



GATE_0060_4.918_L_2.jpg

Wall ID:	GATE-0060-5.139-L		
Route Name:	HARTSHORNE DRIVE (NORTHBOUND)		
Inspection Date:	October 08, 2008	Approximate Year Built:	Unknown
*Wall Rating:	37	Maintenance Action:	Repair Elements
Wall Description			
Wall Function:	Flood Wall	Primary Wall Type:	Other - Anchor Tieback Timber
Surface Treatment:		Secondary Wall Type:	
Secondary Surface Treatment:		Architectural Facing:	
General Description:	Timber-lagged, timber pile wall anchored to timber post deadmen with steel tiebacks. Portions are fully non-functioning, with severely weathered and/or missing wall elements. Oceanside rock jetty placed to serve as coastal erosion protection.		
Wall Measurements			
Wall Length (ft.):	1330	Face Area (sq.):	6650
Average Wall Height (ft.):	5	Face Angle (deg.):	90
Maximum Wall Height (ft.):	5	Vertical Offset (ft.):	-5
Assessed Elements			
Element (Weighting Factor)	Narrative		Condition Rating (0 - 10)
PERFORMANCE 8.00	Severely weathered structured with missing and non-functioning elements. Anchor system is non-functioning over substantial section of wall. Although some sections are still retaining earth, primary purpose is to forestall erosion. Rock jetty is serving		4
WALL FOUNDATION MATERIAL 8.00	Appears to be compacted beach sands - unknown pile tip elevations. Highly eroded at locations where jetty rock in front of wall is insufficient to protect the shoreline.		4
ANCHOR HEADS 8.00	Anchor heads, 15-ft tieback rods and deadmen fixtures are corroded, loose and/or fully detached where exposed for viewing. Severely weathered and non-functioning in many cases.		3
LAGGING 8.00	Timber lagging is severely weathered, deteriorated, and/or missing. First 400-ft of wall appears to be in better condition than the rest of the wall - generally where the jetty rock placed in front of the wall is performing as intended. Lagging is missi		3
PILES AND SHAFTS 8.00	Severely weathered timber piling, with cracked and split posts at tieback connections. Most all posts are in place. Wall is in best shape toward the Coast Guard grounds, where jetty rock is protecting the wall. Parking area wall section is completely fai		3
DOWNSLOPE 1.00	Unknown downslope conditions. Jetty rock appears to be remaining in place on the ocean floor materials. Greater jetty rock height is required over a portion of the wall length to mitigate beach erosion issues.		7
LATERAL SLOPE 1.00	Timber wall abuts concrete seawall at wall start. Wall end is on Coast Guard property. At a distance, wall end lateral slope appeared to be stable and vegetated.		7
UPSLOPE 1.00	Beach sands to sandy soils with minor vegetation. Erosion is evident at areas not fully protected by jetty rock.		7
WALL DRAINS 1.00	Wall system is porous (at the time of construction), not requiring drainage. Functioning wall sections do not show signs of groundwater-related damage.		7

Wall ID:	GATE-0060-5.139-L		
Route Name:	HARTSHORNE DRIVE (NORTHBOUND)		
Inspection Date:	October 08, 2008	Approximate Year Built:	Unknown
*Wall Rating:	37	Maintenance Action:	Repair Elements

Repair Recommendations

Failure Consequence:	LOW
Recommendation Narrative:	Jetty rock needs to be added in front of timber pile wall where beach erosion is active. This area of the beach is just below the parking area and abuts the south end of the Coast Guard property. Place jetty rock (estimated at Class 7 riprap) for 300 ft
Repair Cost:	\$86,000

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

Gateway National Recreation Area
ROUTE 0060: HARTSHORNE DRIVE (NORTHBOUND)

Retaining Wall Condition Photos



GATE_0060_5.139_L_1.jpg



GATE_0060_5.139_L_2.jpg

Wall ID:	GATE-0061-3.155-R		
Route Name:	HARTSHORNE DRIVE (SOUTHBOUND)		
Inspection Date:	October 09, 2008	Approximate Year Built:	Unknown
*Wall Rating:	77	Maintenance Action:	No Action

Wall Description

Wall Function:	Fill Wall	Primary Wall Type:	Gravity - Mass Concrete
Surface Treatment:		Secondary Wall Type:	Other -Metal Sheet Pile
Secondary Surface Treatment:		Architectural Facing:	
General Description:	Concrete gravity wall constructed at 1:1 to support roadway fill. A short section of metal sheet pile wall is located at the toe near the wall start to protect from scour (?). Total wall length was difficult to determine as much of it is buried.		

Wall Measurements

Wall Length (ft.):	1660	Face Area (sq.):	3320
Average Wall Height (ft.):	2	Face Angle (deg.):	45
Maximum Wall Height (ft.):	9	Vertical Offset (ft.):	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	No signs of global distress, settlement or scour along the wall. Very good overall condition, though a sizable portion of the wall is buried and therefore not visible for inspection.	8
WALL FOUNDATION MATERIAL 8.00	Dense to medium-dense sand with significant vegetation stabilizing materials. No signs of scour or settlement distress.	8
CONCRETE 8.00	Moderate cracking and minor reinforcement corrosion. Some spalling due to weathering/salt attack. Localized missing segments (buried and difficult to see).	7
PILES AND SHAFTS 8.00	Metal sheet piles show very minor signs of corrosion, and no deformation or cracking distresses. Joints are all sound and fully functioning.	8
CULVERT 0.50	24-in diameter concrete culvert is in full working condition. No signs of significant distress.	8
DOWNSLOPE 0.50	Dense to medium-dense sand and lagoon water. Occasional riprap placed at toe of wall. Some sections are buried with well-vegetated slopes.	8
ROAD/SIDEWALK/SHOULDER 0.50	Roadway shows no signs of wall-related distress.	8
TRAFFIC BARRIER/FENCE 0.50	Concrete wall cap is fully intact, showing only minor cracking and weathering.	8
WALL DRAINS 0.50	Wall drains visible in taller wall sections. Clean and functioning. Condition/presence of wall drains in buried sections is unknown. No seepage evident from wall face or at wall toe.	8

Repair Recommendations

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

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

Gateway National Recreation Area
ROUTE 0061: HARTSHORNE DRIVE (SOUTHBOUND)

Retaining Wall Condition Photos



GATE_0061_3.155_R_1.jpg



GATE_0061_3.155_R_2.jpg

Wall ID:	GATE-0232ZZ-0.400-L		
Route Name:	BULKHEAD ROADS		
Inspection Date:	October 07, 2008	Approximate Year Built:	Unknown
*Wall Rating:	54	Maintenance Action:	Replace Wall

Wall Description

Wall Function:	Flood Wall	Primary Wall Type:	Other -Timber Cantilever
Surface Treatment:		Secondary Wall Type:	
Secondary Surface Treatment:		Architectural Facing:	
General Description:	Wall starts at end of spur off of Bulkhead (Greak Kills New Road - under construction) road at newer concrete walkway. Structure continues past 1730 ft length but is no longer functional due to aggradation and loss of backfill.		

Wall Measurements

Wall Length (ft.):	1730	Face Area (sq.):	13630
Average Wall Height (ft.):	7	Face Angle (deg.):	90
Maximum Wall Height (ft.):	16	Vertical Offset (ft.):	-6

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Still performing intended function but numerous distresses indicate loss of performance/function could occur at any time	5
WALL FOUNDATION MATERIAL 8.00	Wall rotated out over ~15% of length. Cant tell if this is foundation related. Foundation under water.	6
LAGGING 8.00	4"x12" timber lagging and cap, ~10" square waler ~5.5' below wall top. Square face plate anchors w#11 bars. Face timbers decayed - 6-12" voids over ~3-5% of wall face. Some voids over 2ft. Face timbers and cap cracked and checked throughout, 1/4-1" w	4
ANCHOR HEADS 8.00	Mostly under water. Anchors flush to waler and nuts in place. All heads rusted. Waler cracked and checked throughout 1/4-1"+.	6
DOWNSLOPE 0.50	Water. No distress	8
LATERAL SLOPE 0.50	Wall in good condition at start, non-functional wall at end. No distress	8
WALL DRAINS 0.50	None evident. No drainage related distress visible.	8
ROAD/SIDEWALK/SHOULDER 0.50	No distress in slope between road and wall.	9

Repair Recommendations

Failure Consequence:	LOW
Recommendation Narrative:	Replace 1730 feet of wall with new seawall. Vinyl Sheet pile: Multiply exposed face area by 3 to account for embedded length. 13630sf x 3 x \$15/sf = \$613,350. Anchors: Use 10 ft centers. Multiply by 1.5 to account for double rows in some areas.
Repair Cost:	\$1,540,000

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

Gateway National Recreation Area

ROUTE 0232ZZ: BULKHEAD ROADS

Retaining Wall Condition Photos

Condition photos are not available for GATE-0232ZZ-0.400-L.

Wall ID:	GATE-0446-0.402-L		
Route Name:	BATTERY WEED ROAD		
Inspection Date:	October 06, 2008	Approximate Year Built:	Unknown
*Wall Rating:	90	Maintenance Action:	No Action

Wall Description

Wall Function:	Cut Wall	Primary Wall Type:	Gravity - Dry Stone
Surface Treatment:		Secondary Wall Type:	
Secondary Surface Treatment:		Architectural Facing:	
General Description:	Short wall (under height) across from battery Weed.		

Wall Measurements

Wall Length (ft.):	64	Face Area (sq.):	95
Average Wall Height (ft.):	1	Face Angle (deg.):	90
Maximum Wall Height (ft.):	4	Vertical Offset (ft.):	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	As intended	9
WALL FOUNDATION MATERIAL 8.00	No distress	9
STONE MASONRY 8.00	~ 1' to 6' max dimension flat blocks, good interlock, no distress	9
LATERAL SLOPE 0.50	Well vegetated, no distress	9
ROAD/SIDEWALK/SHOULDER 0.50	No distress	9
UPSLOPE 0.50	Well vegetated, ~29 degrees, no distress	9
WALL DRAINS 0.50	None visible, no distress	9

Repair Recommendations

Failure Consequence:	LOW
Recommendation Narrative:	None
Repair Cost:	\$0

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

Gateway National Recreation Area

ROUTE 0446: BATTERY WEED ROAD

Retaining Wall Condition Photos

Condition photos are not available for GATE-0446-0.402-L.

Wall ID:	GATE-0453-0.650-L		
Route Name:	USS NORTH CAROLINA ROAD		
Inspection Date:	October 06, 2008	Approximate Year Built:	1890
*Wall Rating:	88	Maintenance Action:	No Action

Wall Description

Wall Function:	Cut Wall	Primary Wall Type:	Gravity - Mortared Stone
Surface Treatment:		Secondary Wall Type:	
Secondary Surface Treatment:		Architectural Facing:	
General Description:	Upgrade from Seabee park		

Wall Measurements

Wall Length (ft.):	54	Face Area (sq.):	280
Average Wall Height (ft.):	5	Face Angle (deg.):	90
Maximum Wall Height (ft.):	6	Vertical Offset (ft.):	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	As intended. Mainly functioning as dry laid instead of mortared. Interlock excellent so no impact on performance.	9
WALL FOUNDATION MATERIAL 8.00	road and ditch. No distress	9
MORTAR 8.00	Mortar loss in most joints ~ 1/4-1/2" - not effecting wall performance.	8
STONE MASONRY 8.00	2' to 7' max dimension masoned granite blocks. Excellent interlock, plum, no distress	9
CURB/BERM/DITCH 0.50	Paved ditch at toe, no distress	9
LATERAL SLOPE 0.50	~30 degrees, well vegetated, trees, no distress.	9
ROAD/SIDEWALK/SHOULDER 0.50	No distress	9
UPSLOPE 0.50	~33 degree slope, well vegetated, no distress	9
WALL DRAINS 0.50	No drains visible, no distress	9

Repair Recommendations

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

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

Gateway National Recreation Area

ROUTE 0453: USS NORTH CAROLINA ROAD

Retaining Wall Condition Photos

Condition photos are not available for GATE-0453-0.650-L.

Wall ID:	GATE-0700-0.000-R		
Route Name:	UNKNOWN ROUTE		
Inspection Date:	October 08, 2008	Approximate Year Built:	1960
*Wall Rating:	87	Maintenance Action:	No Action

Wall Description

Wall Function:	Fill Wall	Primary Wall Type:	Gravity - Mass Concrete
Surface Treatment:		Secondary Wall Type:	
Secondary Surface Treatment:		Architectural Facing:	
General Description:	Wall along concrete road and walkway at beach. JABA		

Wall Measurements

Wall Length (ft.):	4780	Face Area (sq.):	25348
Average Wall Height (ft.):	5	Face Angle (deg.):	90
Maximum Wall Height (ft.):	8	Vertical Offset (ft.):	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	As intended	9
WALL FOUNDATION MATERIAL 8.00	Sand, no distress	9
CONCRETE 8.00	Slightly weathered. Some plants in face joints. Plumb, no distortion.	8
DOWNSLOPE 0.50	Beach. No distress, flat	9
LATERAL SLOPE 0.50	No distress	9
ROAD/SIDEWALK/SHOULDER 0.50	No distress	9
WALL DRAINS 0.50	None visible, no distress	9

Repair Recommendations

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

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

Gateway National Recreation Area

ROUTE 0700: UNKNOWN ROUTE

Retaining Wall Condition Photos

Condition photos are not available for GATE-0700-0.000-R.

Wall ID:	GATE-0902-0.000-P1		
Route Name:	GATEWAY MARINA PARKING		
Inspection Date:	October 09, 2008	Approximate Year Built:	Unknown
*Wall Rating:	78	Maintenance Action:	Monitor

Wall Description

Wall Function:	Flood Wall	Primary Wall Type:	Other - Timber Pile w/Timber I
Surface Treatment:		Secondary Wall Type:	
Secondary Surface Treatment:		Architectural Facing:	
General Description:	JABA Gateway Marina boat launch facility. Wing wall is partly gravity block. Facility is elevated above beach/water. Subject to high point loads when loading/unloading boats into the water.		

Wall Measurements

Wall Length (ft.):	79	Face Area (sq.):	665
Average Wall Height (ft.):	8	Face Angle (deg.):	90
Maximum Wall Height (ft.):	10	Vertical Offset (ft.):	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Functional. No settlement or rotation. Ugly looking wall but working well.	7
WALL FOUNDATION MATERIAL 8.00	Beach. No scour, settlement or displacement. Foundation surface visible	9
LAGGING 8.00	Timber lagging decayed in some areas - some rutting	7
CONCRETE 8.00	Gravity wing wall section - no distress	8
PILES AND SHAFTS 8.00	12" timber piles 6' oc. Slightly weathered, no other distress	8
UPSLOPE 0.50	Concrete boat ramp. No distress	8
WALL DRAINS 0.50	Self draining with granular backfill. No distress.	8
LATERAL SLOPE 1.00	Slopes along both ends of wing walls eroded. Some stabilizing vegetation present. Still functional.	6

Repair Recommendations

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

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

Gateway National Recreation Area

ROUTE 0902: GATEWAY MARINA PARKING

Retaining Wall Condition Photos

Condition photos are not available for GATE-0902-0.000-P1.

Wall ID:	GATE-0906-0.000-P1		
Route Name:	JACOB RIIS PARKING		
Inspection Date:	October 08, 2008	Approximate Year Built:	Unknown
*Wall Rating:	72	Maintenance Action:	Monitor

Wall Description

Wall Function:	Flood Wall	Primary Wall Type:	Cantilever - Concrete
Surface Treatment:		Secondary Wall Type:	
Secondary Surface Treatment:		Architectural Facing:	
General Description:	Wall along Beach Channel Drive - non-NPS route. Jacob Riis Parking area is on other side of Beach Channel Drive from wall. Upper part of wall concrete. Cant see what lower wall is made of below horizontal timber member.		

Wall Measurements

Wall Length (ft.):	5335	Face Area (sq.):	(1)
Average Wall Height (ft.):	13	Face Angle (deg.):	90
Maximum Wall Height (ft.):	16	Vertical Offset (ft.):	-2

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Wall appears in good overall condition with no deflection or rotation. Settlement behind wall.	7
WALL FOUNDATION MATERIAL 8.00	Beach sand loose near surface and possibly med-dense to dense at depth.	7
PILES AND SHAFTS 8.00	No deflection or rotation. Medium to high corrosion.	7
ANCHOR HEADS 8.00	Mild to medium corrosion. Fully functional	8
LATERAL SLOPE 0.50	Walls both sides - no distress	8
WALL DRAINS 0.50	6" conduit through wall face	8
ROAD/SIDEWALK/SHOULDER 1.00	3 Sink holes have developed above top of wall. Largest hole is approx 8'x4'x1'. Pavement has settled along full length of wall.	6
ARCHITECTURAL FACING 1.00	Front timber for sheet pile is rutted at several locations. No distress.	7
UPSLOPE 1.00	Parking area flat with some settlement away from wall face	7

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	Perform full marine and ground geotech investigation to determine the cause of void formation behind wall. Investigation - \$70,000. Void Backfill: Fabric at wall face - 125sy*\$4.83/sy = \$604. Sand Backfill - 400cy*\$57.8/cy = \$23120.
Repair Cost:	\$93,800

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

Gateway National Recreation Area

ROUTE 0906: JACOB RIIS PARKING

Retaining Wall Condition Photos

Condition photos are not available for GATE-0906-0.000-P1.

Wall ID:	GATE-0945-0.000-P1		
Route Name:	AREA "F" PARKING		
Inspection Date:	October 06, 2008	Approximate Year Built:	1993
*Wall Rating:	57	Maintenance Action:	Monitor

Wall Description

Wall Function:	Flood Wall	Primary Wall Type:	Other - Timber Pile w/Timber I
Surface Treatment:		Secondary Wall Type:	
Secondary Surface Treatment:		Architectural Facing:	
General Description:	Timber pile wall in front of older wall at Great Kills Marina. Concession repairs 4/07 for bowed out wall end - added dead man anchors		

Wall Measurements

Wall Length (ft.):	1780	Face Area (sq.):	23320
Average Wall Height (ft.):	13	Face Angle (deg.):	90
Maximum Wall Height (ft.):	14	Vertical Offset (ft.):	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Still holding up marina area but deflected wall face is a concern.	5
WALL FOUNDATION MATERIAL 8.00	Not visible - wall face bowed out - may be foundation related, may not	7
ANCHOR HEADS 8.00	Anecdotal report from Marina mgr - "No tie rods in upper wall". Could not confirm/deny. Visible anchor ties at wall face - may be just for facing, may not.	5
PILES AND SHAFTS 8.00	15" treated timber piles w/timber lagging - wall face bowed out in several areas up to 6 feet. Bowed areas at about 1360' and 1460' most pronounced. Wall end ~ 60ft deflection repaired 4/07 according to Marina mgr Tomanek.	5
LAGGING 8.00	Also bowed out in spots	6
DOWNSLOPE 0.50	Water. Not visible,	8
LATERAL SLOPE 0.50	boat launch, water. No distress	8
ROAD/SIDEWALK/SHOULDER 1.00	Voids in parking area behind wall in several locations. Look to be excavated to see what may be causing wall face deflection. May be exacerbated by surface drainage.	6
WALL DRAINS 1.00	None visible - surface drainage of parking area behind wall may be contributing to wall distress.	6

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	Full geotech investigation to determine cause of deflected wall face. Include marine investigation - i.e. obtain info from underwater areas. Investigation \$70,000
Repair Cost:	\$70,000

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

Gateway National Recreation Area

ROUTE 0945: AREA "F" PARKING

Retaining Wall Condition Photos

Condition photos are not available for GATE-0945-0.000-P1.

Wall ID:	GATE-0967-0.000-P1		
Route Name:	CAR TOP BOAT RAMP AND FISHING AREA PARKING		
Inspection Date:	October 06, 2008	Approximate Year Built:	Unknown
*Wall Rating:	82	Maintenance Action:	No Action

Wall Description

Wall Function:	Flood Wall	Primary Wall Type:	Other - Timber Pile w/Timber I
Surface Treatment:		Secondary Wall Type:	Other -Timber Cantilever
Secondary Surface Treatment:		Architectural Facing:	
General Description:	JABA - Seawall at Car Top Parking Floyd Bennett field. Abandoned wall to left of parking area looking toward ocean. Riprap protection for first 300 ft of wall. 670 ft timber pile, remainder timber w/o piles visible.		

Wall Measurements

Wall Length (ft.):	1484	Face Area (sq.):	6531
Average Wall Height (ft.):	4	Face Angle (deg.):	90
Maximum Wall Height (ft.):	6	Vertical Offset (ft.):	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	As intended.	8
WALL FOUNDATION MATERIAL 8.00	Beach sand. No distress.	9
LAGGING 8.00	Lagging weathered. Plumb. Slight section loss.	7
PILES AND SHAFTS 8.00	15" timber piles 8' oc for first ~ 290 ft. 12" timber piles 10' oc after boat ramp. Piles weathered. Plumb, no rotation.	8
PLACED STONE 8.00	10' minus Riprap for first ~ 290 ft functioning as erosion protection. No distress.	9
DOWNSLOPE 0.50	Beach. No distress.	9
LATERAL SLOPE 0.50	Walls both sides. No distress.	9
ROAD/SIDEWALK/SHOULDER 0.50	No distress.	9
WALL DRAINS 0.50	None visible, no distress.	9

Repair Recommendations

Failure Consequence:	LOW
Recommendation Narrative:	None
Repair Cost:	\$0

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

Gateway National Recreation Area
ROUTE 0967: CAR TOP BOAT RAMP AND FISHING AREA PARKING

Retaining Wall Condition Photos

Condition photos are not available for GATE-0967-0.000-P1.

Wall ID:	GATE-0971-0.000-P1		
Route Name:	TYLUNAS HALL PARKING (NYC COLLECTION)		
Inspection Date:	October 08, 2008	Approximate Year Built:	Unknown
*Wall Rating:	88	Maintenance Action:	No Action

Wall Description

Wall Function:	Flood Wall	Primary Wall Type:	Other - Timber Pile w/Timber I
Surface Treatment:		Secondary Wall Type:	
Secondary Surface Treatment:		Architectural Facing:	
General Description:	Wall with lots of riprap in front of it along beach at NYC sanitation Dept facility		

Wall Measurements

Wall Length (ft.):	816	Face Area (sq.):	6115
Average Wall Height (ft.):	7	Face Angle (deg.):	90
Maximum Wall Height (ft.):	8	Vertical Offset (ft.):	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	As intended - Riprap providing very good erosion protection for most of wall	9
WALL FOUNDATION MATERIAL 8.00	Beach sand. No evident distress	9
PLACED STONE 8.00	Large ~10ft minus concrete and native stone riprap in front of wall in most sections. Some areas of wall w/no riprap. No distress in existing material.	8
LAGGING 8.00	Timber lagging - no distress	9
PILES AND SHAFTS 8.00	15" diameter timber piles 8' o.c. No rotation, no distress	9
ROAD/SIDEWALK/SHOULDER 0.50	Not visible - behind fence. No obvious settlement	8
WALL DRAINS 0.50	None visible. No distress	8
DOWNSLOPE 0.50	Flat beach - no distress	9
LATERAL SLOPE 0.50	Walls on both sides - no distress	9

Repair Recommendations

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

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

Gateway National Recreation Area
ROUTE 0971: TYLUNAS HALL PARKING (NYC COLLECTION)

Retaining Wall Condition Photos

Condition photos are not available for GATE-0971-0.000-P1.

Wall ID:	GATE-0987-0.000-P1		
Route Name:	MAINTENANCE AREA PARKING		
Inspection Date:	October 08, 2008	Approximate Year Built:	Unknown
*Wall Rating:	78	Maintenance Action:	Monitor

Wall Description

Wall Function:	Flood Wall	Primary Wall Type:	Anchor - Tieback Sheet Pile
Surface Treatment:		Secondary Wall Type:	
Secondary Surface Treatment:		Architectural Facing:	
General Description:	Seawall supporting east side of parking area. Also forms west side of harbor for USPP Marine Ops Bldg.		

Wall Measurements

Wall Length (ft.):	255	Face Area (sq.):	2280
Average Wall Height (ft.):	8	Face Angle (deg.):	90
Maximum Wall Height (ft.):	9	Vertical Offset (ft.):	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	As intended except at wall end where riprap has replaced wall function. Replacement appears effective.	7
WALL FOUNDATION MATERIAL 8.00	Not visible - No apparent foundation related distress	8
ANCHOR HEADS 8.00	Under water so not very visible. Appear tight to wall face. No visible distress other than rust patina	8
PILES AND SHAFTS 8.00	Sheet pile - rust patina throughout. No visible loss of section. Plumb, no voids.	8
WALL DRAINS 0.50	No visible drainage distress	8
ROAD/SIDEWALK/SHOULDER 0.50	No distress. No voids in backfill between wall and PA	9
UPSLOPE 0.50	No distress	9
LATERAL SLOPE 1.00	At ocean end, erosion has removed material from behind the wall. Dumped riprap has replaced previous retained backfill. Riprap now providing support function for ~ 15' of wall at end.	7

Repair Recommendations

Failure Consequence:	HIGH
Recommendation Narrative:	Monitor erosion at wall end annually. Add riprap as needed. No action required at this time.
Repair Cost:	\$200

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

Gateway National Recreation Area

ROUTE 0987: MAINTENANCE AREA PARKING

Retaining Wall Condition Photos

Condition photos are not available for GATE-0987-0.000-P1.

Wall ID:	GATE-1024-0.000-P1		
Route Name:	NYPD PARKING 5		
Inspection Date:	October 08, 2008	Approximate Year Built:	Unknown
*Wall Rating:	70	Maintenance Action:	Repair Elements

Wall Description

Wall Function:	Flood Wall	Primary Wall Type:	Cantilever - Concrete
Surface Treatment:		Secondary Wall Type:	
Secondary Surface Treatment:		Architectural Facing:	
General Description:	Wall along beach at NYPD Air Unit compound. Adjacent to boat ramp/helipad on one side and NY Sanitation Dept wall on the other		

Wall Measurements

Wall Length (ft.):	430	Face Area (sq.):	2140
Average Wall Height (ft.):	4	Face Angle (deg.):	90
Maximum Wall Height (ft.):	5	Vertical Offset (ft.):	0

Assessed Elements

Element (Weighting Factor)	Narrative	Condition Rating (0 - 10)
PERFORMANCE 8.00	Voids behind wall and rotation may compromise function in long term	7
WALL FOUNDATION MATERIAL 8.00	Sandy beach material - no obvious foundation distress	8
CONCRETE 8.00	Leaned past vertical over ~ 190ft and rotated. Could be at equilibrium based on wall age over 60 yrs. Wall cracked full height where rotated section and non-rotated section meet.	6
WALL DRAINS 0.50	None visible - no drainage distress visible	8
LATERAL SLOPE 0.50	No distress	9
ROAD/SIDEWALK/SHOULDER 1.00	Several settled spots/voids behind wall and in road/shoulder - 6'x3'x3' max. Some holes coned off at time of inspection.	6

Repair Recommendations

Failure Consequence:	MODERATE
Recommendation Narrative:	Repair void areas with select backfill and geotextile. Add deadman anchors to prevent further wall rotation. Anchors - Cost as ground anchors in FHWA retaining wall cost guide: Use anchors on 20' centers for 190 ft - 10ea x \$8020 = \$80200.
Repair Cost:	\$146,000

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

Gateway National Recreation Area

ROUTE 1024: NYPD PARKING 5

Retaining Wall Condition Photos

Condition photos are not available for GATE-1024-0.000-P1.

Appendix A

Summary of WIP Definitions



Gateway 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 $\geq 45^\circ$ ($\geq 1H:1V$ face slope ratio).
- *Include all walls where the intent is to support/protect the travelway, and where failure would require replacement with a retaining wall.

Definitions

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

Wall Function Codes

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

Wall Type Codes

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

Architectural Facing Type Codes

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

Surface Treatment Codes

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

Condition Ratings

Condition Ratings apply to all Primary and Secondary Wall Elements, and are intended to assist in consistently defining element **severity**, **extent**, and **repair/replace urgency** of wall element distresses.

9-10 (Excellent)	-Any defects are minor and are within normal range for <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.	<p>Good to Excellent - No observation of distresses not already captured by individual element condition assessment. No combination of element distresses indicating unseen problems or creating significant performance problems. No history of remediation or repair to wall or adjacent elements.</p> <p>Fair - Some observed global distress is not associated with specific elements. Some observation of element distress combinations that indicate wall component problems. Minor work on primary elements or major work on secondary elements has occurred improving overall wall function.</p> <p>Poor to Critical - Global wall rotation, settlement, and/or overturning is readily apparent. Combined element distresses clearly indicate serious stability problems with components or global wall stability. Major repairs have occurred to wall structural elements, though functionality has not improved significantly.</p>
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