

# BISO WIP Report

## NPS Retaining Wall Inventory Program Big South Fork National River and 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: September 2007  
Report Date: October 2015**

# Big South Fork National River and Recreation Area in Kentucky and Tennessee



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



# Table of Contents

| <b>SECTION</b>  | <b>PAGE NO.</b> |
|---|-----------------|
| <b>1. INTRODUCTION</b>  | <b>1 - 1</b>    |
| <b>2. PARK RETAINING WALL LOCATION MAPS</b><br>Retaining Wall Location Maps | <b>2 - 1</b>    |
| <b>3. TIER 1 - PARK RETAINING WALL OVERVIEW</b>                             | <b>3 - 1</b>    |
| <b>4. TIER 2 - ROUTE RETAINING WALL OVERVIEW</b>                            | <b>4 - 1</b>    |
| <b>5. TIER 3 - RETAINING WALL DETAILS</b>                                   | <b>5 - 1</b>    |
| <b>6. APPENDIX A - SUMMARY OF WIP DEFINITIONS AND ASSESSMENT CATEGORIES</b> | <b>A - 1</b>    |

# Introduction



## Big South Fork National River and 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



## Big South Fork National River and Recreation Area

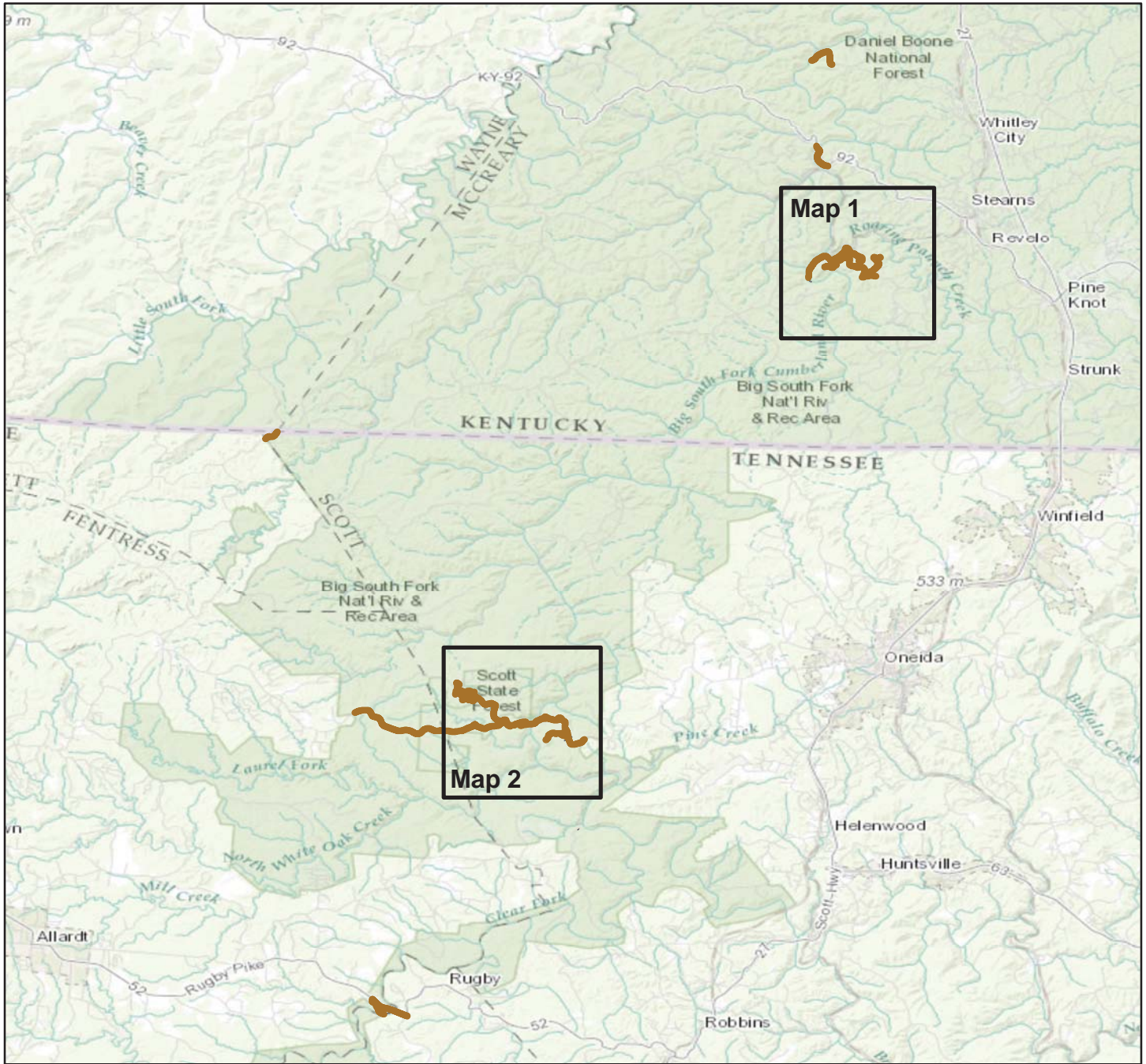


**Federal Lands Highway  
Road Inventory Program**

# Big South Fork National River and 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

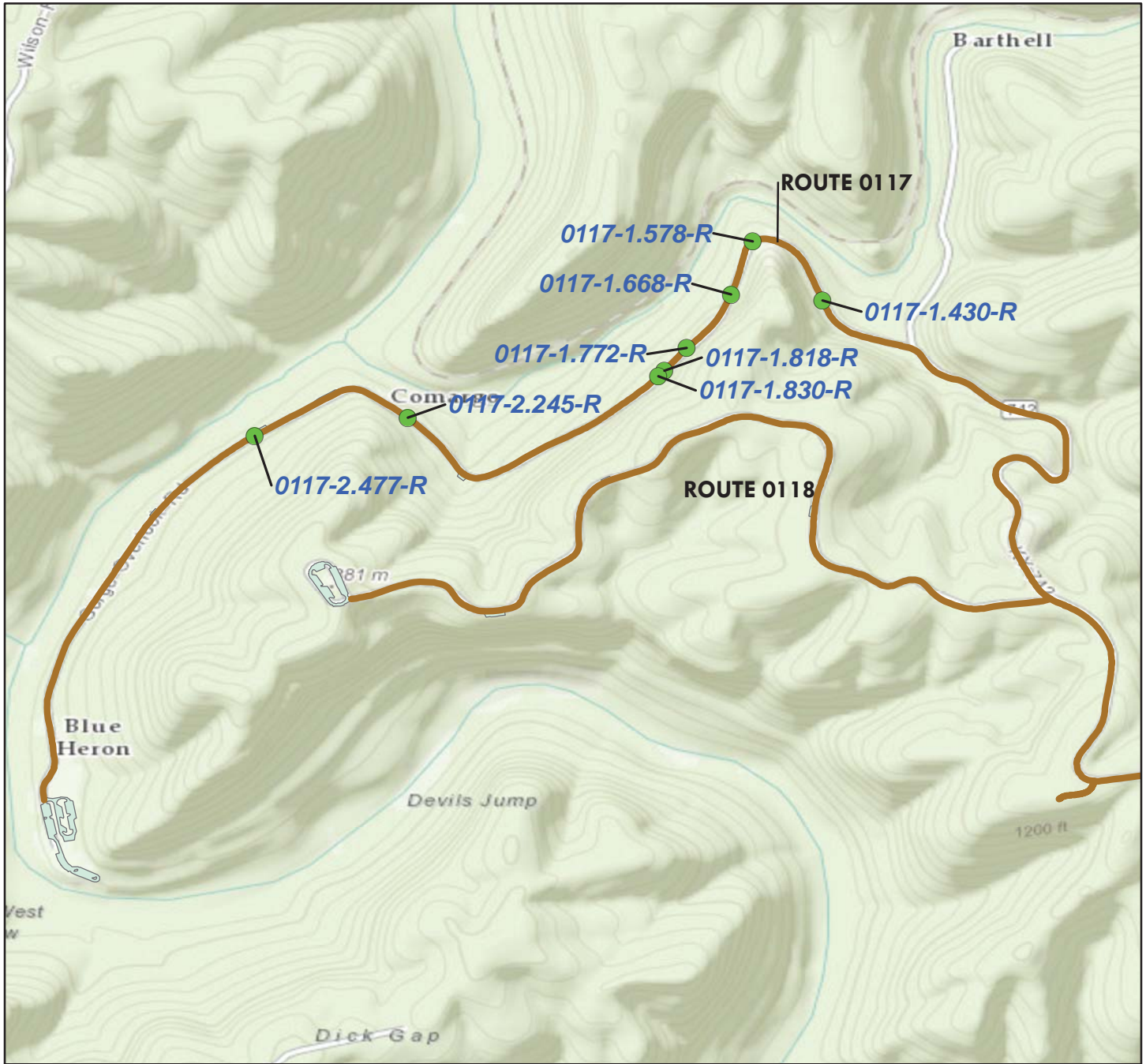
— RIP Collected Routes



# Big South Fork National River & 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

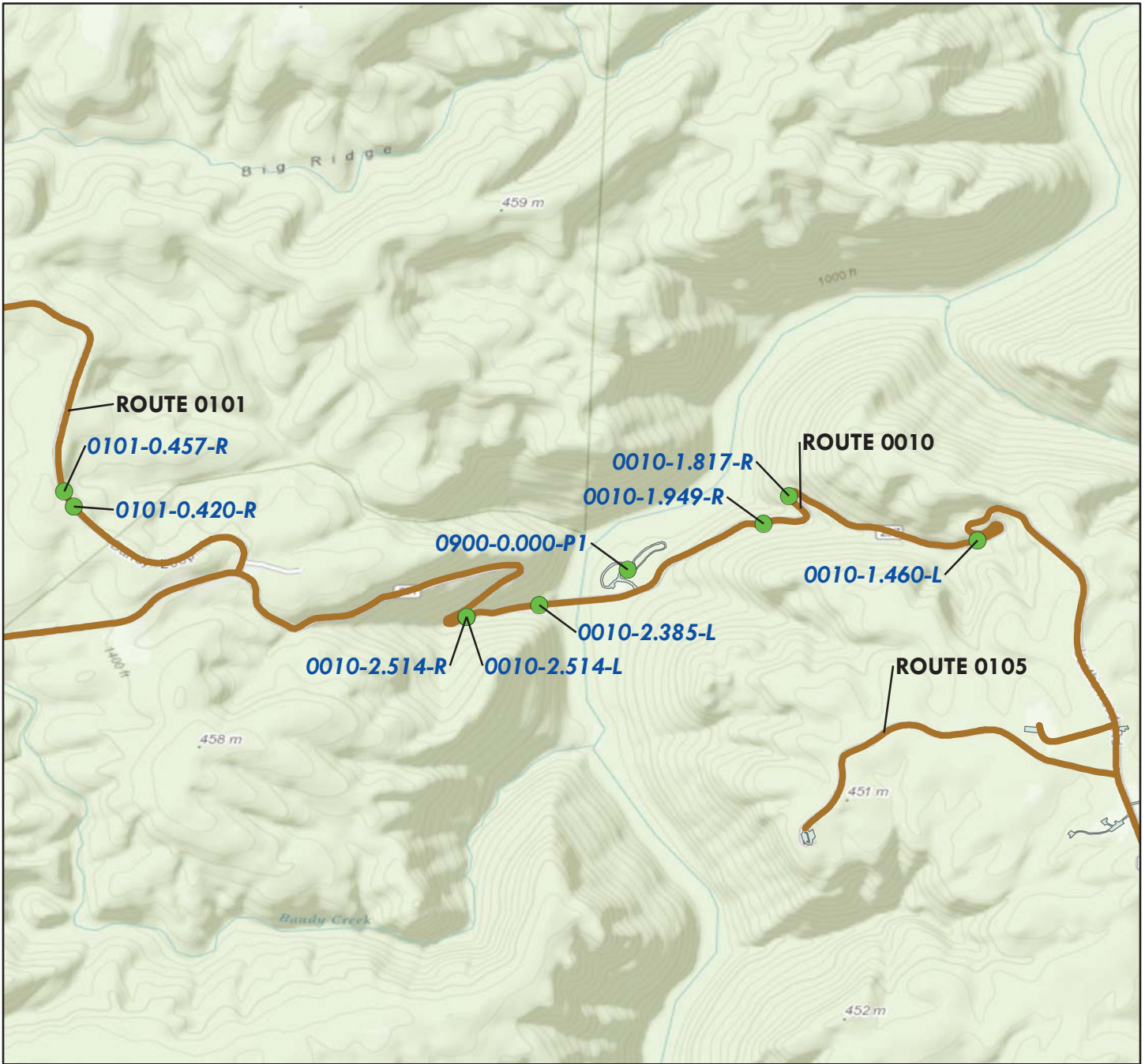




# Big South Fork National River & Recreation Area

## WALL LOCATION MAP

### Map 2



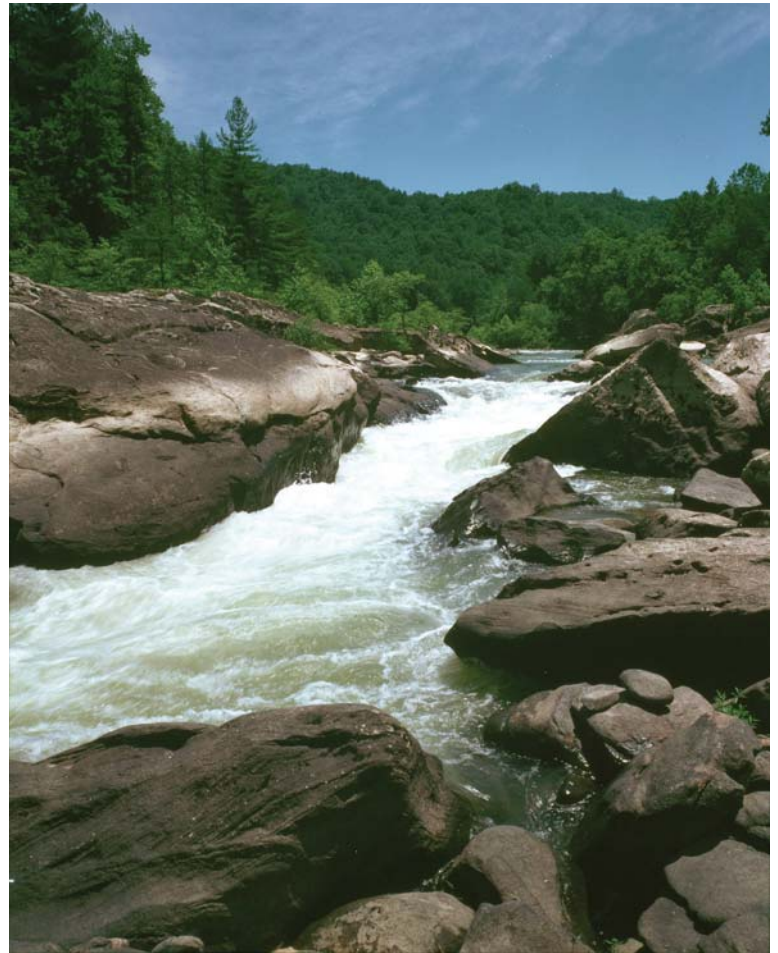
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

● Wall Locations

— RIP Collected Routes



# Tier 1 Park Retaining Wall Overview



**Big South Fork National River and Recreation Area**



**Federal Lands Highway  
Road Inventory Program**

## Parkwide Summary: Big South Fork National River and Recreation Area

Initial retaining wall inspections were conducted at Big South Fork National River and 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 Big South Fork National River and 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, 18 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                | LEATHERWOOD FORD ROAD (STATE HIGHWAY 297) | 6                   |
| 0101                | BANDY CREEK ROAD                          | 2                   |
| 0117                | BLUE HERON ROAD (HWY 742)                 | 8                   |
| 0122                | YAMACRAW WEST ACCESS ROAD                 | 1                   |
| 0900                | LEATHERWOOD DAY USE PARKING               | 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        | 2                   |
| FW - Fill Wall       | 16                  |

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

**Table 3: Number of Walls by Primary Wall Type**

| Primary Wall Type                   | No. of Walls |
|-------------------------------------|--------------|
| AH, Anchor - Tieback H-Pile         | 2            |
| GD, Gravity - Dry Stone             | 1            |
| GG, Gravity - Gabion                | 1            |
| MG, MSE - Geosynthetic Wrapped Face | 1            |
| MP, MSE - Precast Panel             | 12           |
| RT, Other - Railroad Tie Wall       | 1            |

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                | 15           |
| Monitor            | \$0                | 0            |
| Maintenance        | \$6,380            | 2            |
| Repair Elements    | \$0                | 0            |
| Replace Elements   | \$0                | 0            |
| Replace Wall       | \$112,500          | 1            |
| <b>Totals</b>      | <b>\$118,880</b>   | <b>18</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                          | 15                  |
| \$1 - \$25,000               | 2                   |
| \$25,001 - \$50,000          | 0                   |
| \$50,001 - \$100,000         | 0                   |
| \$100,001 - \$250,000        | 1                   |
| \$250,001 - \$500,000        | 0                   |
| \$500,001 - \$1,000,000      | 0                   |
| \$1,000,001 - \$2,000,000    | 0                   |
| \$2,000,001 - \$3,000,000    | 0                   |
| \$3,000,001 - \$4,000,000    | 0                   |
| <b>Total Number of Walls</b> | <b>18</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 Big South Fork National River and 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 significantly.

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 Big South Fork National River and 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> |
|----------------------------|--|----------------------------------|---|--|
| BISO-0122-0.028-R          | HIGH                                     | 49                               | REPLACE WALL                            | \$112,500                              |

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



**Big South Fork National River and Recreation Area**



**Federal Lands Highway  
Road Inventory Program**

# Big South Fork National River and Recreation Area

## ROUTE 0010: LEATHERWOOD FORD ROAD (STATE HIGHWAY 297)



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

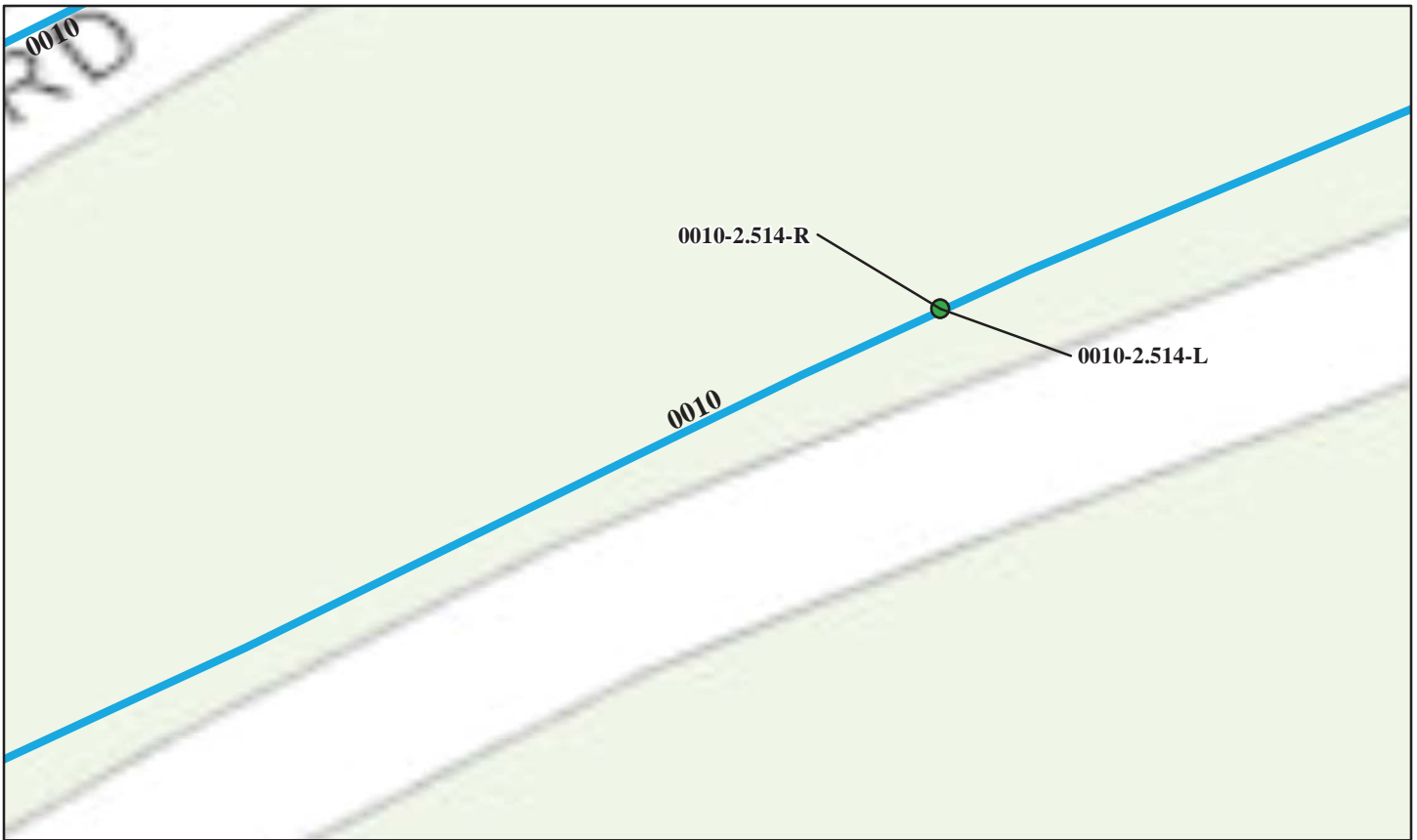
| Wall ID<br>Inspection Date:    | Wall Area<br>(Sq. Ft.) | Wall Length<br>(Ft.) | Wall<br>Type            | Wall<br>Function | Overall<br>Rating | Repair<br>Cost |
|--------------------------------|------------------------|----------------------|-------------------------|------------------|-------------------|----------------|
| BISO-0010-1.460-L<br>9/13/2007 | 1,370                  | 272                  | MSE - Precast Panel     | Fill Wall        | 90                | \$0.00         |
| BISO-0010-1.817-R<br>9/13/2007 | 3,175                  | 259                  | MSE - Precast Panel     | Fill Wall        | 90                | \$0.00         |
| BISO-0010-1.949-R<br>9/13/2007 | 856                    | 166                  | Anchor - Tieback H-Pile | Fill Wall        | 74                | \$6,160.00     |
| BISO-0010-2.385-L<br>9/13/2007 | 1,900                  | 140                  | MSE - Precast Panel     | Fill Wall        | 89                | \$0.00         |
| BISO-0010-2.514-L<br>9/13/2007 | 245                    | 49                   | Gravity - Dry Stone     | Cut Wall         | 86                | \$0.00         |

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



# Big South Fork National River and Recreation Area

ROUTE 0010: LEATHERWOOD FORD ROAD (STATE HIGHWAY 297)



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)

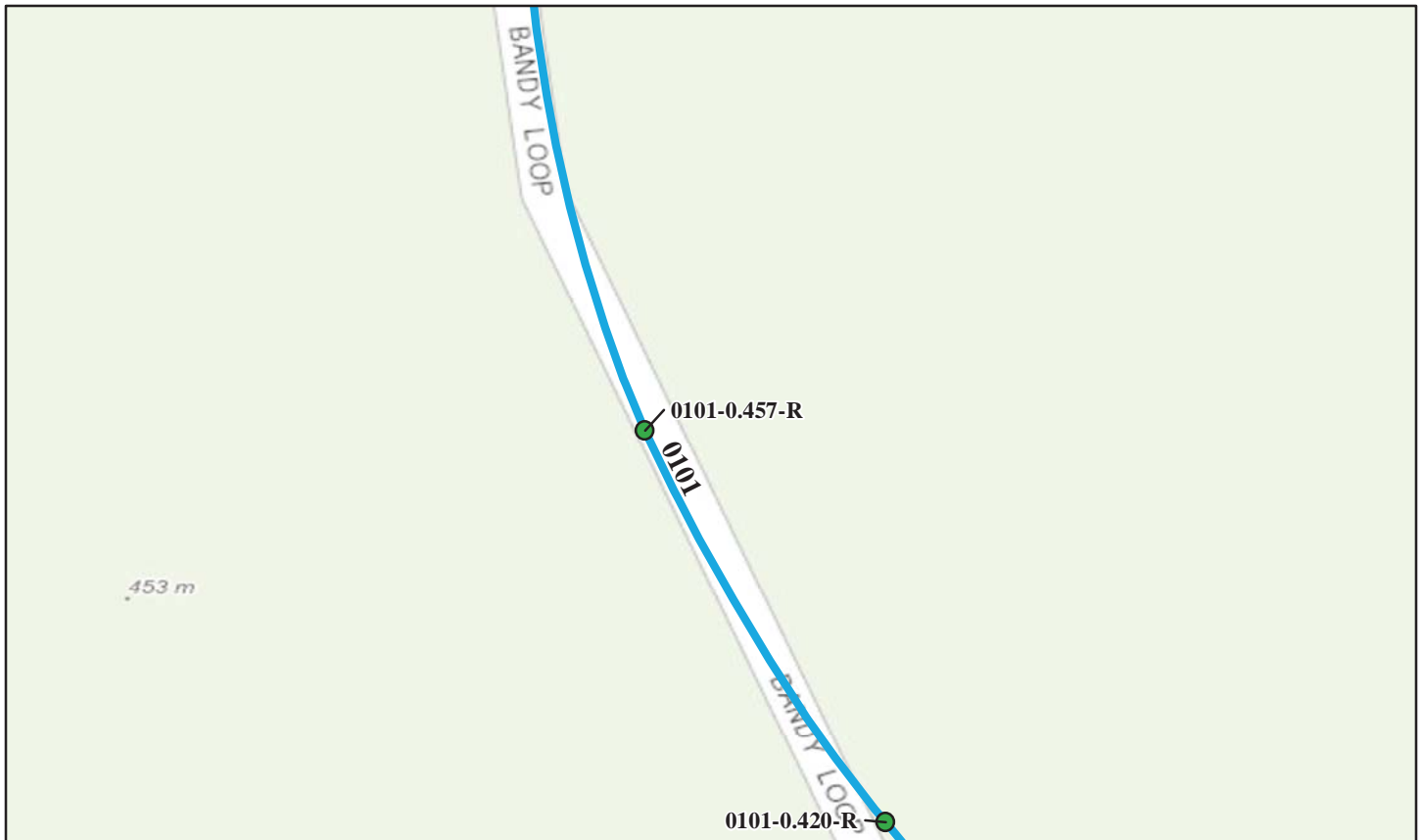
No Data

| Wall ID<br>Inspection Date:    | Wall Area<br>(Sq. Ft.) | Wall Length<br>(Ft.) | Wall<br>Type        | Wall<br>Function | Overall<br>Rating | Repair<br>Cost |
|--------------------------------|------------------------|----------------------|---------------------|------------------|-------------------|----------------|
| BISO-0010-2.514-R<br>9/13/2007 | 1,700                  | 210                  | MSE - Precast Panel | Fill Wall        | 90                | \$0.00         |
|                                |                        |                      |                     |                  |                   |                |
|                                |                        |                      |                     |                  |                   |                |
|                                |                        |                      |                     |                  |                   |                |
|                                |                        |                      |                     |                  |                   |                |

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

# Big South Fork National River and Recreation Area

## ROUTE 0101: BANDY CREEK ROAD



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

### Retaining Wall Condition Legend – Wall Condition Rating

Critical / Poor (0 - 49)

Fair (50 - 69)

Good to Excellent (70 - 100)

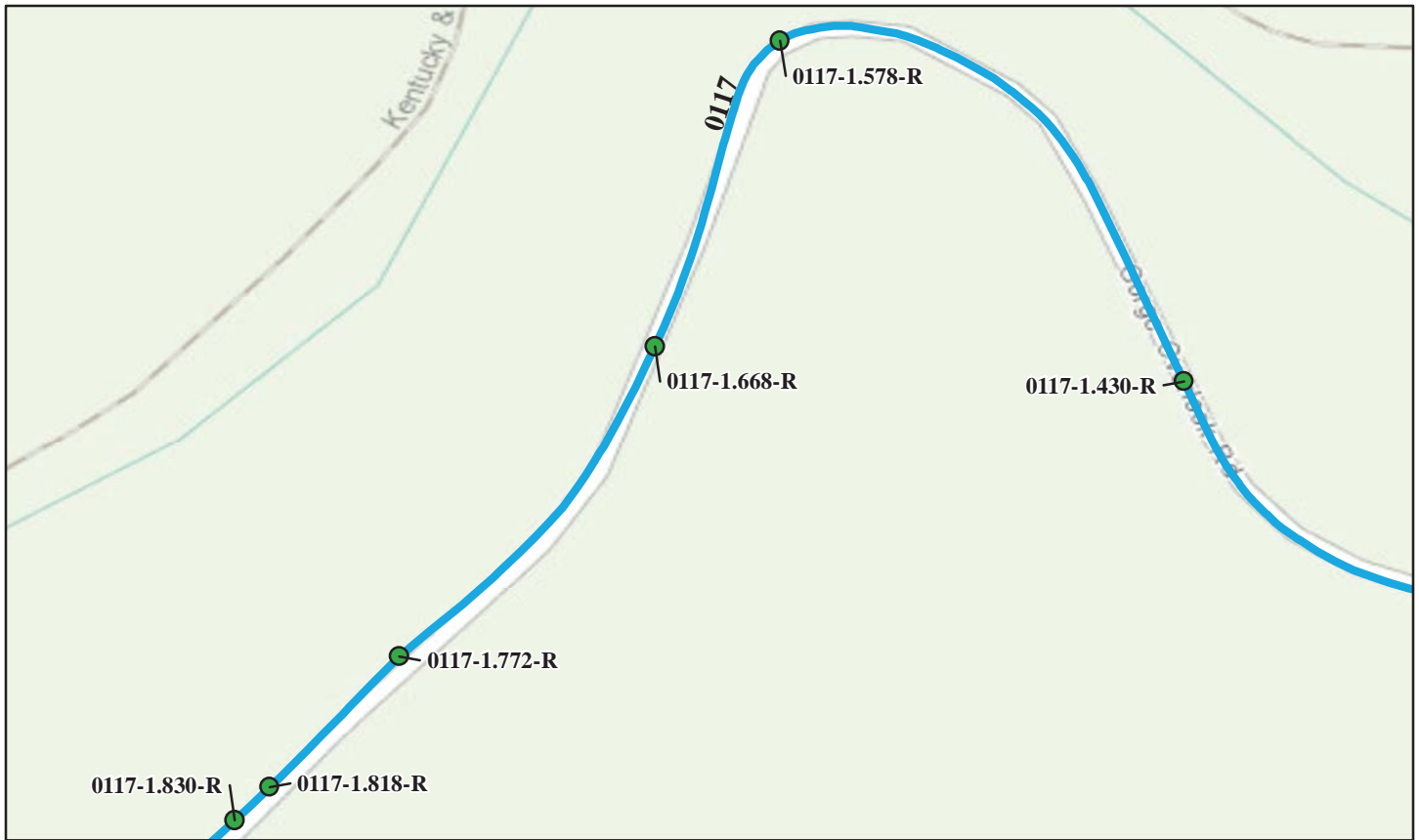
No Data

| Wall ID<br>Inspection Date:    | Wall Area<br>(Sq. Ft.) | Wall Length<br>(Ft.) | Wall<br>Type        | Wall<br>Function | Overall<br>Rating | Repair<br>Cost |
|--------------------------------|------------------------|----------------------|---------------------|------------------|-------------------|----------------|
| BISO-0101-0.420-R<br>9/13/2007 | 284                    | 96                   | MSE - Precast Panel | Fill Wall        | 90                | \$0.00         |
| BISO-0101-0.457-R<br>9/13/2007 | 702                    | 177                  | MSE - Precast Panel | Fill Wall        | 90                | \$0.00         |
|                                |                        |                      |                     |                  |                   |                |
|                                |                        |                      |                     |                  |                   |                |
|                                |                        |                      |                     |                  |                   |                |

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

# Big South Fork National River and Recreation Area

## ROUTE 0117: BLUE HERON ROAD (HWY 742)



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)

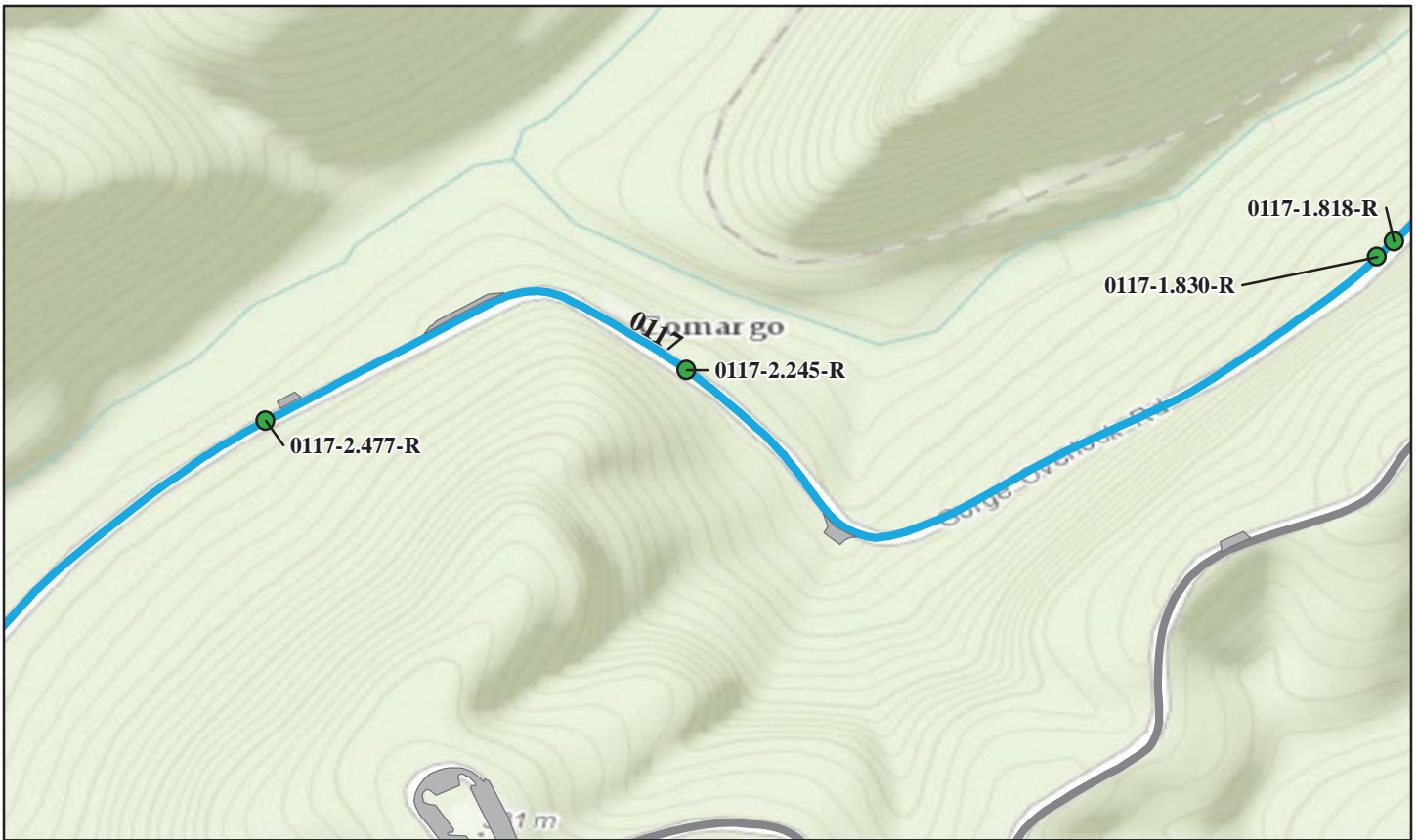
No Data

| Wall ID<br>Inspection Date:    | Wall Area<br>(Sq. Ft.) | Wall Length<br>(Ft.) | Wall<br>Type            | Wall<br>Function | Overall<br>Rating | Repair<br>Cost |
|--------------------------------|------------------------|----------------------|-------------------------|------------------|-------------------|----------------|
| BISO-0117-1.430-R<br>9/12/2007 | 5,246                  | 628                  | MSE - Precast Panel     | Fill Wall        | 90                | \$220.00       |
| BISO-0117-1.578-R<br>9/12/2007 | 175                    | 50                   | MSE - Precast Panel     | Fill Wall        | 90                | \$0.00         |
| BISO-0117-1.668-R<br>9/12/2007 | 8,000                  | 575                  | MSE - Precast Panel     | Fill Wall        | 90                | \$0.00         |
| BISO-0117-1.772-R<br>9/12/2007 | 5,160                  | 215                  | Anchor - Tieback H-Pile | Fill Wall        | 82                | \$0.00         |
| BISO-0117-1.818-R<br>9/12/2007 | 1,342                  | 61                   | MSE - Precast Panel     | Fill Wall        | 90                | \$0.00         |

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

# Big South Fork National River and Recreation Area

## ROUTE 0117: BLUE HERON ROAD (HWY 742)



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<br>Inspection Date:    | Wall Area<br>(Sq. Ft.) | Wall Length<br>(Ft.) | Wall<br>Type                       | Wall<br>Function | Overall<br>Rating | Repair<br>Cost |
|--------------------------------|------------------------|----------------------|------------------------------------|------------------|-------------------|----------------|
| BISO-0117-1.830-R<br>9/12/2007 | 8,100                  | 848                  | MSE - Precast Panel                | Fill Wall        | 90                | \$0.00         |
| BISO-0117-2.245-R<br>9/12/2007 | 3,700                  | 374                  | MSE - Geosynthetic Wrapped<br>Face | Fill Wall        | 76                | \$0.00         |
| BISO-0117-2.477-R<br>9/12/2007 | 4,500                  | 759                  | MSE - Precast Panel                | Fill Wall        | 90                | \$0.00         |
|                                |                        |                      |                                    |                  |                   |                |
|                                |                        |                      |                                    |                  |                   |                |

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

# Big South Fork National River and Recreation Area

## ROUTE 0122: YAMACRAW WEST ACCESS 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)

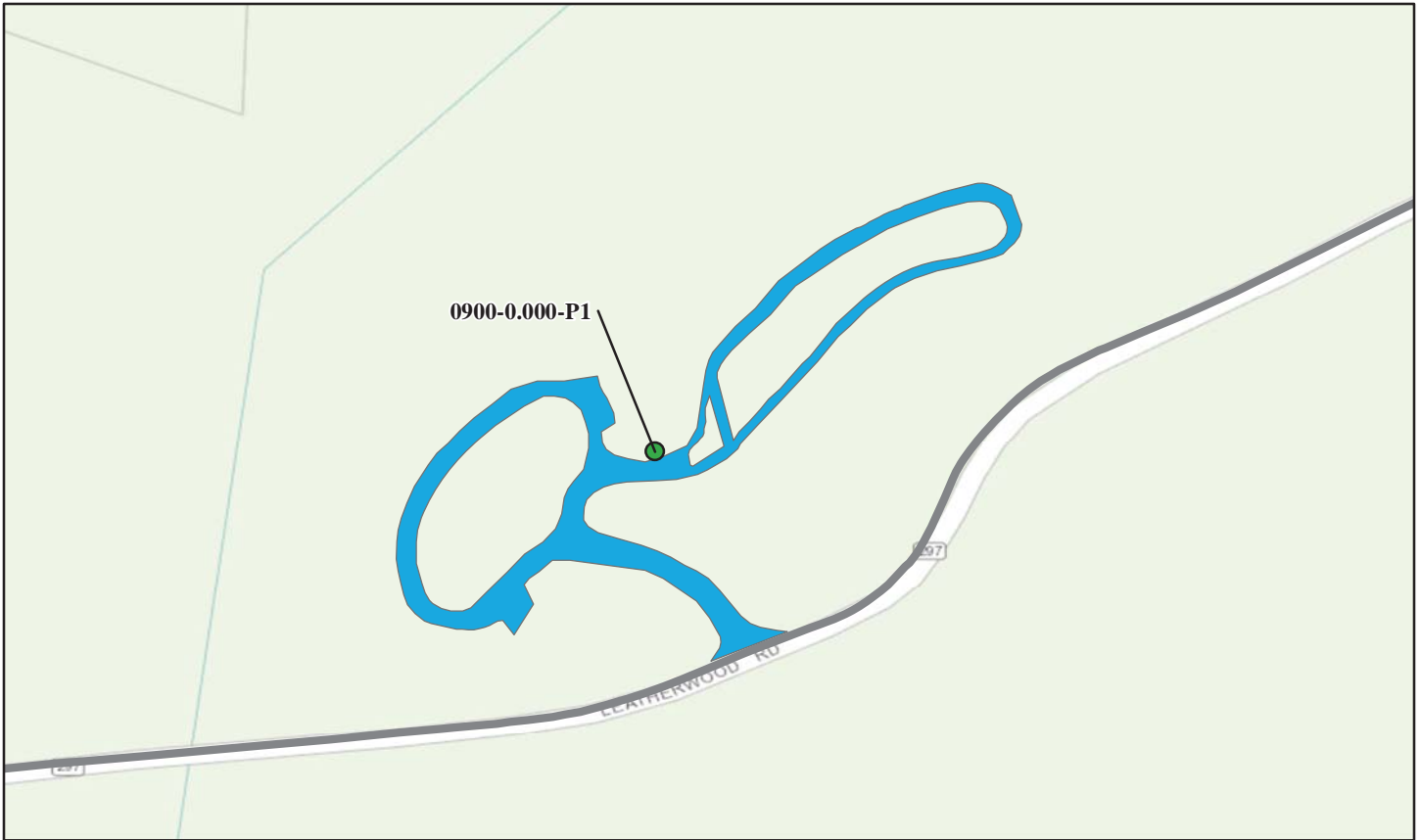
No Data

| Wall ID<br>Inspection Date:    | Wall Area<br>(Sq. Ft.) | Wall Length<br>(Ft.) | Wall<br>Type     | Wall<br>Function | Overall<br>Rating | Repair<br>Cost |
|--------------------------------|------------------------|----------------------|------------------|------------------|-------------------|----------------|
| BISO-0122-0.028-R<br>9/12/2007 | 1,500                  | 136                  | Gravity - Gabion | Fill Wall        | 49                | \$112,500.00   |
|                                |                        |                      |                  |                  |                   |                |
|                                |                        |                      |                  |                  |                   |                |
|                                |                        |                      |                  |                  |                   |                |
|                                |                        |                      |                  |                  |                   |                |

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

# Big South Fork National River and Recreation Area

## ROUTE 0900: LEATHERWOOD DAY USE 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<br>Inspection Date:     | Wall Area<br>(Sq. Ft.) | Wall Length<br>(Ft.) | Wall<br>Type              | Wall<br>Function | Overall<br>Rating | Repair<br>Cost |
|---------------------------------|------------------------|----------------------|---------------------------|------------------|-------------------|----------------|
| BISO-0900-0.000-P1<br>9/13/2007 | 890                    | 143                  | Other - Railroad Tie Wall | Cut Wall         | 85                | \$0.00         |
|                                 |                        |                      |                           |                  |                   |                |
|                                 |                        |                      |                           |                  |                   |                |
|                                 |                        |                      |                           |                  |                   |                |
|                                 |                        |                      |                           |                  |                   |                |

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

# Tier 3 Retaining Wall Details



**Big South Fork National River and Recreation Area**



**Federal Lands Highway  
Road Inventory Program**

|                         |   |                                |           |
|-------------------------|---|--------------------------------|-----------|
| <b>Wall ID:</b>         | BISO-0010-1.46-L                          |                                |           |
| <b>Route Name:</b>      | LEATHERWOOD FORD ROAD (STATE HIGHWAY 297) |                                |           |
| <b>Inspection Date:</b> | September 13, 2007                        | <b>Approximate Year Built:</b> | Unknown   |
| <b>*Wall Rating:</b>    | 90  | <b>Maintenance Action:</b>     | No Action |

### Wall Description

|                                     |   |                              |                     |
|-------------------------------------|---|------------------------------|---------------------|
| <b>Wall Function:</b>               | Fill Wall   | <b>Primary Wall Type:</b>    | MSE - Precast Panel |
| <b>Surface Treatment:</b>           |   | <b>Secondary Wall Type:</b>  |                     |
| <b>Secondary Surface Treatment:</b> |   | <b>Architectural Facing:</b> |                     |
| <b>General Description:</b>         | MSE wall (Reinforced Earth Company) with concrete plus shaped panels. |                              |                     |

### Wall Measurements

|                                   |     |                               |      |
|-----------------------------------|-----|-------------------------------|------|
| <b>Wall Length (ft.):</b>         | 272 | <b>Face Area (sq.):</b>       | 1370 |
| <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> | -2   |

### Assessed Elements

| <b>Element<br/>(Weighting Factor)</b> | <b>Narrative</b>  | <b>Condition Rating<br/>(0 - 10)</b> |
|---------------------------------------|---|--------------------------------------|
| PERFORMANCE<br>8.00                   | As designed.  | 9                                    |
| WALL FOUNDATION MATERIAL<br>8.00      | Leaf litter covered firm soil.  | 9                                    |
| CONCRETE<br>8.00                      | Panel concrete appears as new - no distress.                              | 9                                    |
| WIRE/GEOSYNTHETIC FACING<br>8.00      | No distress observed.   | 9                                    |
| DOWNSLOPE<br>0.50                     | Forested slope - starting as a shallow bench grading to a steep drainage. | 8                                    |
| LATERAL SLOPE<br>0.50                 | Rock outcrop at start. Embankment fill at end.                            | 8                                    |
| ROAD/SIDEWALK/SHOULDER<br>0.50        | No distress.  | 9                                    |
| WALL DRAINS<br>0.50                   | No distress.  | 9                                    |

### Repair Recommendations

|                                  |      |
|----------------------------------|------|
| <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.



# Big South Fork National River and Recreation Area

ROUTE 0010: LEATHERWOOD FORD ROAD (STATE HIGHWAY 297)

## Retaining Wall Condition Photos



BISO\_0010\_1.460\_L\_1.jpg

|                         |   |                                |           |
|-------------------------|---|--------------------------------|-----------|
| <b>Wall ID:</b>         | BISO-0010-1.817-R                         |                                |           |
| <b>Route Name:</b>      | LEATHERWOOD FORD ROAD (STATE HIGHWAY 297) |                                |           |
| <b>Inspection Date:</b> | September 13, 2007                        | <b>Approximate Year Built:</b> | Unknown   |
| <b>*Wall Rating:</b>    | 90  | <b>Maintenance Action:</b>     | No Action |

### Wall Description

|                                     |  |                              |                     |
|-------------------------------------|--|------------------------------|---------------------|
| <b>Wall Function:</b>               | Fill Wall  | <b>Primary Wall Type:</b>    | MSE - Precast Panel |
| <b>Surface Treatment:</b>           |  | <b>Secondary Wall Type:</b>  |                     |
| <b>Secondary Surface Treatment:</b> |  | <b>Architectural Facing:</b> |                     |
| <b>General Description:</b>         | MSE Wall (Reinforced Earth Company) plus shape concrete panel. |                              |                     |

### Wall Measurements

|                                   |     |                               |      |
|-----------------------------------|-----|-------------------------------|------|
| <b>Wall Length (ft.):</b>         | 259 | <b>Face Area (sq.):</b>       | 3175 |
| <b>Average Wall Height (ft.):</b> | 12  | <b>Face Angle (deg.):</b>     | 90   |
| <b>Maximum Wall Height (ft.):</b> | 20  | <b>Vertical Offset (ft.):</b> | -2   |

### Assessed Elements

| <b>Element<br/>(Weighting Factor)</b> | <b>Narrative</b>                                      | <b>Condition Rating<br/>(0 - 10)</b> |
|---------------------------------------|---|--------------------------------------|
| PERFORMANCE<br>8.00                   | As designed.  | 9                                    |
| WALL FOUNDATION MATERIAL<br>8.00      | Leaf covered firm soil.                               | 9                                    |
| CONCRETE<br>8.00                      | No distress.  | 9                                    |
| WIRE/GEOSYNTHETIC FACING<br>8.00      | No visible distress. Plus shape panels appear as new. | 9                                    |
| DOWNSLOPE<br>0.50                     | Forested - moderate slope.                            | 9                                    |
| LATERAL SLOPE<br>0.50                 | Forested - shallow slope.                             | 9                                    |
| ROAD/SIDEWALK/SHOULDER<br>0.50        | No distress.  | 9                                    |
| WALL DRAINS<br>0.50                   | No distress.  | 9                                    |

### Repair Recommendations

|                                  |      |
|----------------------------------|------|
| <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.

# Big South Fork National River and Recreation Area

ROUTE 0010: LEATHERWOOD FORD ROAD (STATE HIGHWAY 297)

## Retaining Wall Condition Photos



**BISO\_0010\_1.817\_R\_1.jpg**

|                         |   |                                |             |
|-------------------------|---|--------------------------------|-------------|
| <b>Wall ID:</b>         | BISO-0010-1.949-R                         |                                |             |
| <b>Route Name:</b>      | LEATHERWOOD FORD ROAD (STATE HIGHWAY 297) |                                |             |
| <b>Inspection Date:</b> | September 13, 2007                        | <b>Approximate Year Built:</b> | Unknown     |
| <b>*Wall Rating:</b>    | 74  | <b>Maintenance Action:</b>     | Maintenance |

### Wall Description

|                                     |  |                              |                         |
|-------------------------------------|--|------------------------------|-------------------------|
| <b>Wall Function:</b>               | Fill Wall  | <b>Primary Wall Type:</b>    | Anchor - Tieback H-Pile |
| <b>Surface Treatment:</b>           | Painted  | <b>Secondary Wall Type:</b>  |                         |
| <b>Secondary Surface Treatment:</b> | Preservative                                     | <b>Architectural Facing:</b> |                         |
| <b>General Description:</b>         | Soldier pile and tieback wall with wood lagging. |                              |                         |

### Wall Measurements

|                                   |     |                               |     |
|-----------------------------------|-----|-------------------------------|-----|
| <b>Wall Length (ft.):</b>         | 166 | <b>Face Area (sq.):</b>       | 856 |
| <b>Average Wall Height (ft.):</b> | 5   | <b>Face Angle (deg.):</b>     | 90  |
| <b>Maximum Wall Height (ft.):</b> | 9   | <b>Vertical Offset (ft.):</b> | 0   |

### Assessed Elements

| Element<br>(Weighting Factor)    | Narrative   | Condition Rating<br>(0 - 10) |
|----------------------------------|---|------------------------------|
| PERFORMANCE<br>8.00              | Wall is currently performing, however needs maintenance.                              | 7                            |
| WALL FOUNDATION MATERIAL<br>8.00 | Firm soil   | 9                            |
| ANCHOR HEADS<br>8.00             | Paint is peeling from anchor head. Exposed steel is mildly to moderately pitted.      | 6                            |
| PILES AND SHAFTS<br>8.00         | Painted steel H pile section. Paint is peeling, exposed steel has minor surface rust. | 7                            |
| LAGGING<br>8.00                  | Pressure treated wood lagging is in good condition. Minor surface weathering.         | 8                            |
| LATERAL SLOPE<br>0.50            | Steep forested slope and embankment fill.   | 8                            |
| ROAD/SIDEWALK/SHOULDER<br>0.50   | Slight cracking in roadway - probably not related to wall movement.                   | 8                            |
| WALL DRAINS<br>0.50              | No distress.  | 9                            |
| DOWNSLOPE<br>1.00                | Terraced forested slope, possible movement.   | 7                            |

### Repair Recommendations

|                                  |   |
|----------------------------------|---|
| <b>Failure Consequence:</b>      | HIGH  |
| <b>Recommendation Narrative:</b> | Remove vegetation from in front of wall. 2 laborers x 8 hours x \$55/hour = \$880. Remove paint and prepare surface for repainting - 27 piles x 6 ft tall x 1.2 ft wide = ~200 ft <sup>2</sup> + 19 anchor heads x 2 ft <sup>2</sup> = 38 ft <sup>2</sup> + 140 feet of waler x [Front of waler |
| <b>Repair Cost:</b>              | \$6,160   |

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

# Big South Fork National River and Recreation Area

ROUTE 0010: LEATHERWOOD FORD ROAD (STATE HIGHWAY 297)

## Retaining Wall Condition Photos



BISO\_0010\_1.949\_R\_1.jpg

|                         |   |                                |           |
|-------------------------|---|--------------------------------|-----------|
| <b>Wall ID:</b>         | BISO-0010-2.385-L                         |                                |           |
| <b>Route Name:</b>      | LEATHERWOOD FORD ROAD (STATE HIGHWAY 297) |                                |           |
| <b>Inspection Date:</b> | September 13, 2007                        | <b>Approximate Year Built:</b> | Unknown   |
| <b>*Wall Rating:</b>    | 89  | <b>Maintenance Action:</b>     | No Action |

### Wall Description

|                                     |   |                              |                     |
|-------------------------------------|---|------------------------------|---------------------|
| <b>Wall Function:</b>               | Fill Wall   | <b>Primary Wall Type:</b>    | MSE - Precast Panel |
| <b>Surface Treatment:</b>           |   | <b>Secondary Wall Type:</b>  |                     |
| <b>Secondary Surface Treatment:</b> |   | <b>Architectural Facing:</b> |                     |
| <b>General Description:</b>         | Reinforced Earth Company wall serving as approach fill to bridge. |                              |                     |

### Wall Measurements

|                                   |     |                               |      |
|-----------------------------------|-----|-------------------------------|------|
| <b>Wall Length (ft.):</b>         | 140 | <b>Face Area (sq.):</b>       | 1900 |
| <b>Average Wall Height (ft.):</b> | 13  | <b>Face Angle (deg.):</b>     | 90   |
| <b>Maximum Wall Height (ft.):</b> | 23  | <b>Vertical Offset (ft.):</b> | -2   |

### Assessed Elements

| <b>Element<br/>(Weighting Factor)</b> | <b>Narrative</b>   | <b>Condition Rating<br/>(0 - 10)</b> |
|---------------------------------------|--|--------------------------------------|
| PERFORMANCE<br>8.00                   | As designed  | 9                                    |
| WALL FOUNDATION MATERIAL<br>8.00      | Firm soil.   | 9                                    |
| CONCRETE<br>8.00                      | No distress.   | 9                                    |
| WIRE/GEOSYNTHETIC FACING<br>8.00      | No distress observed.  | 9                                    |
| ROAD/SIDEWALK/SHOULDER<br>0.50        | No distress.   | 9                                    |
| WALL DRAINS<br>0.50                   | No distress.   | 9                                    |
| DOWNSLOPE<br>1.00                     | Forested steep slope, some pistoled trees, possible slope creep. | 7                                    |
| LATERAL SLOPE<br>1.00                 | Bridge abutment at start, very steep forested slope.             | 7                                    |

### Repair Recommendations

|                                  |      |
|----------------------------------|------|
| <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.

# Big South Fork National River and Recreation Area

ROUTE 0010: LEATHERWOOD FORD ROAD (STATE HIGHWAY 297)

## Retaining Wall Condition Photos



BISO\_0010\_2.385\_L\_1.jpg

|                         |   |                                |           |
|-------------------------|---|--------------------------------|-----------|
| <b>Wall ID:</b>         | BISO-0010-2.514-L                         |                                |           |
| <b>Route Name:</b>      | LEATHERWOOD FORD ROAD (STATE HIGHWAY 297) |                                |           |
| <b>Inspection Date:</b> | September 13, 2007                        | <b>Approximate Year Built:</b> | Unknown   |
| <b>*Wall Rating:</b>    | 86  | <b>Maintenance Action:</b>     | No Action |

### Wall Description

|                                     |  |                              |                     |
|-------------------------------------|--|------------------------------|---------------------|
| <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>         | Crudely stacked rockery wall consisting of large plate like rocks. |                              |                     |

### Wall Measurements

|                                   |    |                               |     |
|-----------------------------------|----|-------------------------------|-----|
| <b>Wall Length (ft.):</b>         | 49 | <b>Face Area (sq.):</b>       | 245 |
| <b>Average Wall Height (ft.):</b> | 5  | <b>Face Angle (deg.):</b>     | 75  |
| <b>Maximum Wall Height (ft.):</b> | 5  | <b>Vertical Offset (ft.):</b> | 0   |

### Assessed Elements

| <b>Element<br/>(Weighting Factor)</b> | <b>Narrative</b>  | <b>Condition Rating<br/>(0 - 10)</b> |
|---------------------------------------|---|--------------------------------------|
| PERFORMANCE<br>8.00                   | As required.  | 9                                    |
| WALL FOUNDATION MATERIAL<br>8.00      | Roadway embankment fill.  | 9                                    |
| PLACED STONE<br>8.00                  | Competent and intact, mild lichen growth on surface. 3 plus foot in the long dimension.<br>Plate shape. | 8                                    |
| LATERAL SLOPE<br>0.50                 | Steep soil and rock slope - no raveling, vegetated.   | 8                                    |
| UPSLOPE<br>0.50                       | Rock fill and some vegetation, moderately steep.  | 8                                    |
| WALL DRAINS<br>0.50                   | No distress.  | 9                                    |

### Repair Recommendations

|                                      |      |
|--------------------------------------|------|
| <b>Failure Consequence:</b>          | HIGH |
| <b>Recommendation<br/>Narrative:</b> | None |
| <b>Repair Cost:</b>                  | \$0  |

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



# Big South Fork National River and Recreation Area

ROUTE 0010: LEATHERWOOD FORD ROAD (STATE HIGHWAY 297)

## Retaining Wall Condition Photos



BISO\_0010\_2.514\_L\_1.jpg

|                         |   |                                |           |
|-------------------------|---|--------------------------------|-----------|
| <b>Wall ID:</b>         | BISO-0010-2.514-R                         |                                |           |
| <b>Route Name:</b>      | LEATHERWOOD FORD ROAD (STATE HIGHWAY 297) |                                |           |
| <b>Inspection Date:</b> | September 13, 2007                        | <b>Approximate Year Built:</b> | Unknown   |
| <b>*Wall Rating:</b>    | 90  | <b>Maintenance Action:</b>     | No Action |

### Wall Description

|                                     |   |                              |                     |
|-------------------------------------|---|------------------------------|---------------------|
| <b>Wall Function:</b>               | Fill Wall   | <b>Primary Wall Type:</b>    | MSE - Precast Panel |
| <b>Surface Treatment:</b>           |   | <b>Secondary Wall Type:</b>  |                     |
| <b>Secondary Surface Treatment:</b> |   | <b>Architectural Facing:</b> |                     |
| <b>General Description:</b>         | MSE Wall (Reinforced Earth Company) with plus sign shape concrete panels. |                              |                     |

### Wall Measurements

|                                   |     |                               |      |
|-----------------------------------|-----|-------------------------------|------|
| <b>Wall Length (ft.):</b>         | 210 | <b>Face Area (sq.):</b>       | 1700 |
| <b>Average Wall Height (ft.):</b> | 8   | <b>Face Angle (deg.):</b>     | 90   |
| <b>Maximum Wall Height (ft.):</b> | 15  | <b>Vertical Offset (ft.):</b> | -2   |

### Assessed Elements

| <b>Element<br/>(Weighting Factor)</b> | <b>Narrative</b>   | <b>Condition Rating<br/>(0 - 10)</b> |
|---------------------------------------|--|--------------------------------------|
| PERFORMANCE<br>8.00                   | As designed.   | 9                                    |
| WALL FOUNDATION MATERIAL<br>8.00      | Firm soil.   | 9                                    |
| CONCRETE<br>8.00                      | No distress.   | 9                                    |
| WIRE/GEOSYNTHETIC FACING<br>8.00      | No distress.   | 9                                    |
| LATERAL SLOPE<br>0.50                 | Forested slope. Drainage at end possibility for erosion. | 8                                    |
| DOWNSLOPE<br>0.50                     | Basically flat forested area.                            | 9                                    |
| ROAD/SIDEWALK/SHOULDER<br>0.50        | No distress.   | 9                                    |
| WALL DRAINS<br>0.50                   | No distress.   | 9                                    |

### Repair Recommendations

|                                  |      |
|----------------------------------|------|
| <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.

# Big South Fork National River and Recreation Area

ROUTE 0010: LEATHERWOOD FORD ROAD (STATE HIGHWAY 297)

## Retaining Wall Condition Photos



BISO\_0010\_2.514\_R\_1.jpg

|                         |                    |                                |           |
|-------------------------|--------------------|--------------------------------|-----------|
| <b>Wall ID:</b>         | BISO-0101-.42-R    |                                |           |
| <b>Route Name:</b>      | BANDY CREEK ROAD   |                                |           |
| <b>Inspection Date:</b> | September 13, 2007 | <b>Approximate Year Built:</b> | Unknown   |
| <b>*Wall Rating:</b>    | 90                 | <b>Maintenance Action:</b>     | No Action |

### Wall Description

|                                     |  |                              |                     |
|-------------------------------------|--|------------------------------|---------------------|
| <b>Wall Function:</b>               | Fill Wall  | <b>Primary Wall Type:</b>    | MSE - Precast Panel |
| <b>Surface Treatment:</b>           |  | <b>Secondary Wall Type:</b>  |                     |
| <b>Secondary Surface Treatment:</b> |  | <b>Architectural Facing:</b> |                     |
| <b>General Description:</b>         | Reinforced Earth Company Wall with plus sign shaped concrete panels. |                              |                     |

### Wall Measurements

|                                   |    |                               |     |
|-----------------------------------|----|-------------------------------|-----|
| <b>Wall Length (ft.):</b>         | 96 | <b>Face Area (sq.):</b>       | 284 |
| <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> | -1  |

### Assessed Elements

| <b>Element<br/>(Weighting Factor)</b> | <b>Narrative</b>                          | <b>Condition Rating<br/>(0 - 10)</b> |
|---------------------------------------|---|--------------------------------------|
| PERFORMANCE<br>8.00                   | As designed.                              | 9                                    |
| WALL FOUNDATION MATERIAL<br>8.00      | Forest duff over firm soil.               | 9                                    |
| CONCRETE<br>8.00                      | No distress.                              | 9                                    |
| WIRE/GEOSYNTHETIC FACING<br>8.00      | No distress.                              | 9                                    |
| DOWNSLOPE<br>0.50                     | Heavily forested/vegetated shallow slope. | 9                                    |
| LATERAL SLOPE<br>0.50                 | Forested shallow slope.                   | 9                                    |
| ROAD/SIDEWALK/SHOULDER<br>0.50        | No distress.                              | 9                                    |
| WALL DRAINS<br>0.50                   | No distress.                              | 9                                    |

### Repair Recommendations

|                                  |          |
|----------------------------------|----------|
| <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.

# Big South Fork National River and Recreation Area

ROUTE 0101: BANDY CREEK ROAD

## Retaining Wall Condition Photos



BISO\_0101\_0.420\_R\_1.jpg

|                         |                    |                                |           |
|-------------------------|--------------------|--------------------------------|-----------|
| <b>Wall ID:</b>         | BISO-0101-.457-R   |                                |           |
| <b>Route Name:</b>      | BANDY CREEK ROAD   |                                |           |
| <b>Inspection Date:</b> | September 13, 2007 | <b>Approximate Year Built:</b> | Unknown   |
| <b>*Wall Rating:</b>    | 90                 | <b>Maintenance Action:</b>     | No Action |

### Wall Description

|                                     |  |                              |                     |
|-------------------------------------|--|------------------------------|---------------------|
| <b>Wall Function:</b>               | Fill Wall  | <b>Primary Wall Type:</b>    | MSE - Precast Panel |
| <b>Surface Treatment:</b>           |  | <b>Secondary Wall Type:</b>  |                     |
| <b>Secondary Surface Treatment:</b> |  | <b>Architectural Facing:</b> |                     |
| <b>General Description:</b>         | Reinforced Earth company wall with plus sign shaped concrete panels. |                              |                     |

### Wall Measurements

|                                   |     |                               |     |
|-----------------------------------|-----|-------------------------------|-----|
| <b>Wall Length (ft.):</b>         | 177 | <b>Face Area (sq.):</b>       | 702 |
| <b>Average Wall Height (ft.):</b> | 3   | <b>Face Angle (deg.):</b>     | 90  |
| <b>Maximum Wall Height (ft.):</b> | 7   | <b>Vertical Offset (ft.):</b> | -1  |

### Assessed Elements

| <b>Element<br/>(Weighting Factor)</b> | <b>Narrative</b>               | <b>Condition Rating<br/>(0 - 10)</b> |
|---------------------------------------|--------------------------------|--------------------------------------|
| PERFORMANCE<br>8.00                   | As designed.                   | 9                                    |
| WALL FOUNDATION MATERIAL<br>8.00      | Firm soil under forest duff.   | 9                                    |
| CONCRETE<br>8.00                      | No distress.                   | 9                                    |
| WIRE/GEOSYNTHETIC FACING<br>8.00      | No distress.                   | 9                                    |
| DOWNSLOPE<br>0.50                     | Gentle heavily forested slope. | 9                                    |
| LATERAL SLOPE<br>0.50                 | Grassy embankment fill.        | 9                                    |
| ROAD/SIDEWALK/SHOULDER<br>0.50        | No distress.                   | 9                                    |
| WALL DRAINS<br>0.50                   | No distress.                   | 9                                    |

### Repair Recommendations

|                                  |          |
|----------------------------------|----------|
| <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.

# Big South Fork National River and Recreation Area

ROUTE 0101: BANDY CREEK ROAD

## Retaining Wall Condition Photos



BISO\_0101\_0.457\_R\_1.jpg

|                         |                           |                                |             |
|-------------------------|---------------------------|--------------------------------|-------------|
| <b>Wall ID:</b>         | BISO-0117-1.43-R          |                                |             |
| <b>Route Name:</b>      | BLUE HERON ROAD (HWY 742) |                                |             |
| <b>Inspection Date:</b> | September 12, 2007        | <b>Approximate Year Built:</b> | Unknown     |
| <b>*Wall Rating:</b>    | 90                        | <b>Maintenance Action:</b>     | Maintenance |

### Wall Description

|                                     |  |                              |                       |
|-------------------------------------|--|------------------------------|-----------------------|
| <b>Wall Function:</b>               | Fill Wall  | <b>Primary Wall Type:</b>    | MSE - Precast Panel   |
| <b>Surface Treatment:</b>           |  | <b>Secondary Wall Type:</b>  | Cantilever - Concrete |
| <b>Secondary Surface Treatment:</b> |  | <b>Architectural Facing:</b> |                       |
| <b>General Description:</b>         | MSE wall (Reinforced Earth Company) with 40 foot section of concrete cantilever. |                              |                       |

### Wall Measurements

|                                   |     |                               |      |
|-----------------------------------|-----|-------------------------------|------|
| <b>Wall Length (ft.):</b>         | 628 | <b>Face Area (sq.):</b>       | 5246 |
| <b>Average Wall Height (ft.):</b> | 8   | <b>Face Angle (deg.):</b>     | 90   |
| <b>Maximum Wall Height (ft.):</b> | 14  | <b>Vertical Offset (ft.):</b> | 0    |

### Assessed Elements

| <b>Element<br/>(Weighting Factor)</b> | <b>Narrative</b>  | <b>Condition Rating<br/>(0 - 10)</b> |
|---------------------------------------|---|--------------------------------------|
| PERFORMANCE<br>8.00                   | As designed   | 9                                    |
| WALL FOUNDATION MATERIAL<br>8.00      | Firm gravel   | 9                                    |
| CONCRETE<br>8.00                      | As new - except may be slightly over hanging 95 degrees     | 9                                    |
| WIRE/GEOSYNTHETIC FACING<br>8.00      | As new except for vines growing between panels              | 9                                    |
| DOWNSLOPE<br>0.50                     | Mix of forested slope and cliff outcrops, no creep observed | 8                                    |
| LATERAL SLOPE<br>0.50                 | Well vegetated. slope at start - rock slope at end          | 8                                    |
| ROAD/SIDEWALK/SHOULDER<br>0.50        | Road is in good condition - As new, no cracks observed      | 9                                    |
| WALL DRAINS<br>0.50                   | No distress   | 9                                    |

### Repair Recommendations

|                                  |  |
|----------------------------------|--|
| <b>Failure Consequence:</b>      | HIGH   |
| <b>Recommendation Narrative:</b> | Use herbicide to remove vines and vegetation from between the panels on the wall face. Labor (4 hours) @ \$55 hr = \$220 |
| <b>Repair Cost:</b>              | \$220  |

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



# Big South Fork National River and Recreation Area

ROUTE 0117: BLUE HERON ROAD (HWY 742)

## Retaining Wall Condition Photos



BISO\_0117\_1.430\_R\_1.jpg

|                         |                           |                                |           |
|-------------------------|---------------------------|--------------------------------|-----------|
| <b>Wall ID:</b>         | BISO-0117-1.578-R         |                                |           |
| <b>Route Name:</b>      | BLUE HERON ROAD (HWY 742) |                                |           |
| <b>Inspection Date:</b> | September 12, 2007        | <b>Approximate Year Built:</b> | Unknown   |
| <b>*Wall Rating:</b>    | 90                        | <b>Maintenance Action:</b>     | No Action |

### Wall Description

|                                     |                                     |                              |                     |
|-------------------------------------|-------------------------------------|------------------------------|---------------------|
| <b>Wall Function:</b>               | Fill Wall                           | <b>Primary Wall Type:</b>    | MSE - Precast Panel |
| <b>Surface Treatment:</b>           |                                     | <b>Secondary Wall Type:</b>  |                     |
| <b>Secondary Surface Treatment:</b> |                                     | <b>Architectural Facing:</b> |                     |
| <b>General Description:</b>         | MSE wall (Reinforced Earth Company) |                              |                     |

### Wall Measurements

|                                   |    |                               |     |
|-----------------------------------|----|-------------------------------|-----|
| <b>Wall Length (ft.):</b>         | 50 | <b>Face Area (sq.):</b>       | 175 |
| <b>Average Wall Height (ft.):</b> | 3  | <b>Face Angle (deg.):</b>     | 90  |
| <b>Maximum Wall Height (ft.):</b> | 7  | <b>Vertical Offset (ft.):</b> | 0   |

### Assessed Elements

| <b>Element<br/>(Weighting Factor)</b> | <b>Narrative</b>                      | <b>Condition Rating<br/>(0 - 10)</b> |
|---------------------------------------|---------------------------------------|--------------------------------------|
| PERFORMANCE<br>8.00                   | As designed                           | 9                                    |
| WALL FOUNDATION MATERIAL<br>8.00      | Firm Gravel                           | 9                                    |
| CONCRETE<br>8.00                      | No distress                           | 9                                    |
| WIRE/GEOSYNTHETIC FACING<br>8.00      | As new                                | 9                                    |
| DOWNSLOPE<br>0.50                     | Forested slope - no distress          | 9                                    |
| LATERAL SLOPE<br>0.50                 | Rock slope start - Forested slope end | 9                                    |
| ROAD/SIDEWALK/SHOULDER<br>0.50        | No distress - grass covered shoulder  | 9                                    |
| WALL DRAINS<br>0.50                   | No distress                           | 9                                    |

### Repair Recommendations

|                                  |      |
|----------------------------------|------|
| <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.

# Big South Fork National River and Recreation Area

ROUTE 0117: BLUE HERON ROAD (HWY 742)

## Retaining Wall Condition Photos



BISO\_0117\_1.578\_R\_1.jpg

|                         |                           |                                |           |
|-------------------------|---------------------------|--------------------------------|-----------|
| <b>Wall ID:</b>         | BISO-0117-1.668-R         |                                |           |
| <b>Route Name:</b>      | BLUE HERON ROAD (HWY 742) |                                |           |
| <b>Inspection Date:</b> | September 12, 2007        | <b>Approximate Year Built:</b> | Unknown   |
| <b>*Wall Rating:</b>    | 90                        | <b>Maintenance Action:</b>     | No Action |

### Wall Description

|                                     |                                   |                              |                     |
|-------------------------------------|-----------------------------------|------------------------------|---------------------|
| <b>Wall Function:</b>               | Fill Wall                         | <b>Primary Wall Type:</b>    | MSE - Precast Panel |
| <b>Surface Treatment:</b>           |                                   | <b>Secondary Wall Type:</b>  |                     |
| <b>Secondary Surface Treatment:</b> |                                   | <b>Architectural Facing:</b> |                     |
| <b>General Description:</b>         | MSE Wall (Retained Earth Company) |                              |                     |

### Wall Measurements

|                                   |     |                               |      |
|-----------------------------------|-----|-------------------------------|------|
| <b>Wall Length (ft.):</b>         | 575 | <b>Face Area (sq.):</b>       | 8000 |
| <b>Average Wall Height (ft.):</b> | 13  | <b>Face Angle (deg.):</b>     | 90   |
| <b>Maximum Wall Height (ft.):</b> | 22  | <b>Vertical Offset (ft.):</b> | -1   |

### Assessed Elements

| <b>Element<br/>(Weighting Factor)</b> | <b>Narrative</b>                      | <b>Condition Rating<br/>(0 - 10)</b> |
|---------------------------------------|---------------------------------------|--------------------------------------|
| PERFORMANCE<br>8.00                   | As designed                           | 9                                    |
| WALL FOUNDATION MATERIAL<br>8.00      | Firm, gravel soil                     | 9                                    |
| CONCRETE<br>8.00                      | No distress                           | 9                                    |
| WIRE/GEOSYNTHETIC FACING<br>8.00      | As new (plus sign) shape panels       | 9                                    |
| DOWNSLOPE<br>0.50                     | Forest - no distress                  | 9                                    |
| LATERAL SLOPE<br>0.50                 | Steep forested at start - wall at end | 9                                    |
| ROAD/SIDEWALK/SHOULDER<br>0.50        | No distress                           | 9                                    |
| WALL DRAINS<br>0.50                   | No distress                           | 9                                    |

### Repair Recommendations

|                                  |      |
|----------------------------------|------|
| <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.

# Big South Fork National River and Recreation Area

ROUTE 0117: BLUE HERON ROAD (HWY 742)

## Retaining Wall Condition Photos



BISO\_0117\_1.668\_R\_1.jpg

|                         |                           |                                |           |
|-------------------------|---------------------------|--------------------------------|-----------|
| <b>Wall ID:</b>         | BISO-0117-1.772-R         |                                |           |
| <b>Route Name:</b>      | BLUE HERON ROAD (HWY 742) |                                |           |
| <b>Inspection Date:</b> | September 12, 2007        | <b>Approximate Year Built:</b> | Unknown   |
| <b>*Wall Rating:</b>    | 82                        | <b>Maintenance Action:</b>     | No Action |

### Wall Description

|                                     |  |                              |                         |
|-------------------------------------|--|------------------------------|-------------------------|
| <b>Wall Function:</b>               | Fill Wall  | <b>Primary Wall Type:</b>    | Anchor - Tieback H-Pile |
| <b>Surface Treatment:</b>           |  | <b>Secondary Wall Type:</b>  |                         |
| <b>Secondary Surface Treatment:</b> |  | <b>Architectural Facing:</b> |                         |
| <b>General Description:</b>         | Soldier pile and tie back wall with two rows of tie back and board lagging |                              |                         |

### Wall Measurements

|                                   |     |                               |      |
|-----------------------------------|-----|-------------------------------|------|
| <b>Wall Length (ft.):</b>         | 215 | <b>Face Area (sq.):</b>       | 5160 |
| <b>Average Wall Height (ft.):</b> | 24  | <b>Face Angle (deg.):</b>     | 90   |
| <b>Maximum Wall Height (ft.):</b> | 24  | <b>Vertical Offset (ft.):</b> | -3   |

### Assessed Elements

| <b>Element<br/>(Weighting Factor)</b> | <b>Narrative</b>                             | <b>Condition Rating<br/>(0 - 10)</b> |
|---------------------------------------|--|--------------------------------------|
| PERFORMANCE<br>8.00                   | As designed                                  | 8                                    |
| WALL FOUNDATION MATERIAL<br>8.00      | Firm soil                                    | 9                                    |
| ANCHOR HEADS<br>8.00                  | Surface rust, good condition                 | 8                                    |
| LAGGING<br>8.00                       | Weathered surface, good condition            | 8                                    |
| PILES AND SHAFTS<br>8.00              | Surface pitting, good condition              | 8                                    |
| DOWNSLOPE<br>0.50                     | Forested moderately steep                    | 8                                    |
| LATERAL SLOPE<br>0.50                 | Walls MSE at start , MSE with anchors at end | 9                                    |
| ROAD/SIDEWALK/SHOULDER<br>0.50        | No distress                                  | 9                                    |
| WALL DRAINS<br>0.50                   | No distress                                  | 9                                    |

### Repair Recommendations

|                                  |      |
|----------------------------------|------|
| <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.

# Big South Fork National River and Recreation Area

ROUTE 0117: BLUE HERON ROAD (HWY 742)

## Retaining Wall Condition Photos



BISO\_0117\_1.772\_R\_1.jpg

|                         |                           |                                |           |
|-------------------------|---------------------------|--------------------------------|-----------|
| <b>Wall ID:</b>         | BISO-0117-1.818-R         |                                |           |
| <b>Route Name:</b>      | BLUE HERON ROAD (HWY 742) |                                |           |
| <b>Inspection Date:</b> | September 12, 2007        | <b>Approximate Year Built:</b> | Unknown   |
| <b>*Wall Rating:</b>    | 90                        | <b>Maintenance Action:</b>     | No Action |

### Wall Description

|                                     |   |                              |                         |
|-------------------------------------|---|------------------------------|-------------------------|
| <b>Wall Function:</b>               | Fill Wall   | <b>Primary Wall Type:</b>    | MSE - Precast Panel     |
| <b>Surface Treatment:</b>           |   | <b>Secondary Wall Type:</b>  | Anchor - Tieback H-Pile |
| <b>Secondary Surface Treatment:</b> |   | <b>Architectural Facing:</b> |                         |
| <b>General Description:</b>         | MSE (Reinforced Earth Company) wall with soldier pile and tieback wall in front |                              |                         |

### Wall Measurements

|                                   |    |                               |      |
|-----------------------------------|----|-------------------------------|------|
| <b>Wall Length (ft.):</b>         | 61 | <b>Face Area (sq.):</b>       | 1342 |
| <b>Average Wall Height (ft.):</b> | 22 | <b>Face Angle (deg.):</b>     | 90   |
| <b>Maximum Wall Height (ft.):</b> | 22 | <b>Vertical Offset (ft.):</b> | -2   |

### Assessed Elements

| <b>Element<br/>(Weighting Factor)</b> | <b>Narrative</b>               | <b>Condition Rating<br/>(0 - 10)</b> |
|---------------------------------------|--------------------------------|--------------------------------------|
| PERFORMANCE<br>8.00                   | As designed                    | 9                                    |
| WALL FOUNDATION MATERIAL<br>8.00      | Firm soil                      | 9                                    |
| ANCHOR HEADS<br>8.00                  | Slight surface rust            | 9                                    |
| CONCRETE<br>8.00                      | No distress                    | 9                                    |
| LAGGING<br>8.00                       | MSE wall is serving as lagging | 9                                    |
| PILES AND SHAFTS<br>8.00              | As new - encased in concrete   | 9                                    |
| WIRE/GEOSYNTHETIC FACING<br>8.00      | Face panels appear as new      | 9                                    |
| DOWNSLOPE<br>0.50                     | Moderate forested slope        | 8                                    |
| LATERAL SLOPE<br>0.50                 | Walls AH at start, MP at end   | 9                                    |

### Repair Recommendations

|                                  |      |
|----------------------------------|------|
| <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.



# Big South Fork National River and Recreation Area

ROUTE 0117: BLUE HERON ROAD (HWY 742)

## Retaining Wall Condition Photos



BISO\_0117\_1.818\_R\_1.jpg

|                         |                           |                                |           |
|-------------------------|---------------------------|--------------------------------|-----------|
| <b>Wall ID:</b>         | BISO-0117-1.83-R          |                                |           |
| <b>Route Name:</b>      | BLUE HERON ROAD (HWY 742) |                                |           |
| <b>Inspection Date:</b> | September 12, 2007        | <b>Approximate Year Built:</b> | Unknown   |
| <b>*Wall Rating:</b>    | 90                        | <b>Maintenance Action:</b>     | No Action |

### Wall Description

|                                     |  |                              |                     |
|-------------------------------------|--|------------------------------|---------------------|
| <b>Wall Function:</b>               | Fill Wall  | <b>Primary Wall Type:</b>    | MSE - Precast Panel |
| <b>Surface Treatment:</b>           |  | <b>Secondary Wall Type:</b>  |                     |
| <b>Secondary Surface Treatment:</b> |  | <b>Architectural Facing:</b> |                     |
| <b>General Description:</b>         | Mechanically stabilized earth wall (Reinforce Earth Company) with plus shape panels. |                              |                     |

### Wall Measurements

|                                   |     |                               |      |
|-----------------------------------|-----|-------------------------------|------|
| <b>Wall Length (ft.):</b>         | 848 | <b>Face Area (sq.):</b>       | 8100 |
| <b>Average Wall Height (ft.):</b> | 9   | <b>Face Angle (deg.):</b>     | 90   |
| <b>Maximum Wall Height (ft.):</b> | 22  | <b>Vertical Offset (ft.):</b> | -2   |

### Assessed Elements

| <b>Element<br/>(Weighting Factor)</b> | <b>Narrative</b>   | <b>Condition Rating<br/>(0 - 10)</b> |
|---------------------------------------|--|--------------------------------------|
| PERFORMANCE<br>8.00                   | As designed.   | 9                                    |
| WALL FOUNDATION MATERIAL<br>8.00      | Firm soil  | 9                                    |
| CONCRETE<br>8.00                      | No distress  | 9                                    |
| WIRE/GEOSYNTHETIC FACING<br>8.00      | No distress - concrete panel facing. Panels are plus shaped and look new | 9                                    |
| DOWNSLOPE<br>0.50                     | Forested slope - appears stable.   | 9                                    |
| LATERAL SLOPE<br>0.50                 | Wall at start. Vegetated slope at end.                                   | 9                                    |
| ROAD/SIDEWALK/SHOULDER<br>0.50        | No distress.   | 9                                    |
| WALL DRAINS<br>0.50                   | No distress.   | 9                                    |

### Repair Recommendations

|                                  |      |
|----------------------------------|------|
| <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.

# Big South Fork National River and Recreation Area

ROUTE 0117: BLUE HERON ROAD (HWY 742)

## Retaining Wall Condition Photos



BISO\_0117\_1.830\_R\_1.jpg

|                         |                           |                                |           |
|-------------------------|---------------------------|--------------------------------|-----------|
| <b>Wall ID:</b>         | BISO-0117-2.245-R         |                                |           |
| <b>Route Name:</b>      | BLUE HERON ROAD (HWY 742) |                                |           |
| <b>Inspection Date:</b> | September 12, 2007        | <b>Approximate Year Built:</b> | Unknown   |
| <b>*Wall Rating:</b>    | 76                        | <b>Maintenance Action:</b>     | No Action |

### Wall Description

|                                     |  |                              |                                 |
|-------------------------------------|--|------------------------------|---------------------------------|
| <b>Wall Function:</b>               | Fill Wall  | <b>Primary Wall Type:</b>    | MSE - Geosynthetic Wrapped Face |
| <b>Surface Treatment:</b>           |  | <b>Secondary Wall Type:</b>  |                                 |
| <b>Secondary Surface Treatment:</b> |  | <b>Architectural Facing:</b> | Shotcrete (nozzle finish)       |
| <b>General Description:</b>         | Possible wrapped face mechanically stabilized earth wall with shotcrete applied to face. |                              |                                 |

### Wall Measurements

|                                   |     |                               |      |
|-----------------------------------|-----|-------------------------------|------|
| <b>Wall Length (ft.):</b>         | 374 | <b>Face Area (sq.):</b>       | 3700 |
| <b>Average Wall Height (ft.):</b> | 9   | <b>Face Angle (deg.):</b>     | 75   |
| <b>Maximum Wall Height (ft.):</b> | 15  | <b>Vertical Offset (ft.):</b> | 0    |

### Assessed Elements

| <b>Element<br/>(Weighting Factor)</b> | <b>Narrative</b>   | <b>Condition Rating<br/>(0 - 10)</b> |
|---------------------------------------|--|--------------------------------------|
| PERFORMANCE<br>8.00                   | MSE is probably performance acceptably. Shotcrete facing is less than perfect but performing adequately. | 8                                    |
| WALL FOUNDATION MATERIAL<br>8.00      | Difficult to access due to heavy vegetation. No observed signs of foundation problems.                   | 8                                    |
| SHOTCRETE<br>8.00                     | Shotcrete surface treatment has minor cracking and minor efflorescence.                                  | 7                                    |
| WIRE/GEOSYNTHETIC FACING<br>8.00      | Not visible due to shotcrete surface treatment.  | 7                                    |
| DOWNSLOPE<br>0.50                     | Heavily vegetated shallow slope.   | 9                                    |
| LATERAL SLOPE<br>0.50                 | Vegetated slope at start of wall. Rock fill slope at end. No distress.                                   | 9                                    |
| ROAD/SIDEWALK/SHOULDER<br>0.50        | No distress.   | 9                                    |
| WALL DRAINS<br>0.50                   | Pipe protruding from face - no distress.   | 9                                    |
| ARCHITECTURAL FACING<br>1.00          | Shotcrete - minor cracking.  | 7                                    |

### Repair Recommendations

|                                  |      |
|----------------------------------|------|
| <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.

# Big South Fork National River and Recreation Area

ROUTE 0117: BLUE HERON ROAD (HWY 742)

## Retaining Wall Condition Photos



BISO\_0117\_2.245\_R\_1.jpg

|                         |                           |                                |           |
|-------------------------|---------------------------|--------------------------------|-----------|
| <b>Wall ID:</b>         | BISO-0117-2.477-R         |                                |           |
| <b>Route Name:</b>      | BLUE HERON ROAD (HWY 742) |                                |           |
| <b>Inspection Date:</b> | September 12, 2007        | <b>Approximate Year Built:</b> | Unknown   |
| <b>*Wall Rating:</b>    | 90                        | <b>Maintenance Action:</b>     | No Action |

### Wall Description

|                                     |   |                              |                     |
|-------------------------------------|---|------------------------------|---------------------|
| <b>Wall Function:</b>               | Fill Wall   | <b>Primary Wall Type:</b>    | MSE - Precast Panel |
| <b>Surface Treatment:</b>           |   | <b>Secondary Wall Type:</b>  |                     |
| <b>Secondary Surface Treatment:</b> |   | <b>Architectural Facing:</b> |                     |
| <b>General Description:</b>         | Mechanically stabilized earth wall (Reinforced Earth Company) with concrete plus shaped panels. |                              |                     |

### Wall Measurements

|                                   |     |                               |      |
|-----------------------------------|-----|-------------------------------|------|
| <b>Wall Length (ft.):</b>         | 759 | <b>Face Area (sq.):</b>       | 4500 |
| <b>Average Wall Height (ft.):</b> | 5   | <b>Face Angle (deg.):</b>     | 90   |
| <b>Maximum Wall Height (ft.):</b> | 9   | <b>Vertical Offset (ft.):</b> | -1   |

### Assessed Elements

| <b>Element<br/>(Weighting Factor)</b> | <b>Narrative</b>                                | <b>Condition Rating<br/>(0 - 10)</b> |
|---------------------------------------|---|--------------------------------------|
| PERFORMANCE<br>8.00                   | As designed.                                    | 9                                    |
| WALL FOUNDATION MATERIAL<br>8.00      | Soil and Rock Outcrops (or possible boulders)   | 9                                    |
| CONCRETE<br>8.00                      | No distress.                                    | 9                                    |
| WIRE/GEOSYNTHETIC FACING<br>8.00      | Facing panels appears as new - no distress.     | 9                                    |
| DOWNSLOPE<br>0.50                     | Gentle forested slope                           | 9                                    |
| LATERAL SLOPE<br>0.50                 | Grass covered embankment fill - appears stable. | 9                                    |
| ROAD/SIDEWALK/SHOULDER<br>0.50        | No distress.                                    | 9                                    |
| WALL DRAINS<br>0.50                   | No distress.                                    | 9                                    |

### Repair Recommendations

|                                  |      |
|----------------------------------|------|
| <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.

# Big South Fork National River and Recreation Area

ROUTE 0117: BLUE HERON ROAD (HWY 742)

## Retaining Wall Condition Photos



BISO\_0117\_2.477\_R\_1.jpg

|                         |                           |                                |              |
|-------------------------|---------------------------|--------------------------------|--------------|
| <b>Wall ID:</b>         | BISO-0122-.028-R          |                                |              |
| <b>Route Name:</b>      | YAMACRAW WEST ACCESS ROAD |                                |              |
| <b>Inspection Date:</b> | September 12, 2007        | <b>Approximate Year Built:</b> | Unknown      |
| <b>*Wall Rating:</b>    | 49                        | <b>Maintenance Action:</b>     | Replace Wall |

### Wall Description

|                                     |   |                              |                                     |
|-------------------------------------|---|------------------------------|-------------------------------------|
| <b>Wall Function:</b>               | Fill Wall   | <b>Primary Wall Type:</b>    | Gravity - Gabion                    |
| <b>Surface Treatment:</b>           |   | <b>Secondary Wall Type:</b>  | Other - Chain link fence held up wi |
| <b>Secondary Surface Treatment:</b> |   | <b>Architectural Facing:</b> |                                     |
| <b>General Description:</b>         | Gabion wall with a chain link fence contained rock fill in front. Chain link fence is held in place with rail road rail (vertical) and fence post horizontal. |                              |                                     |

### Wall Measurements

|                                   |     |                               |      |
|-----------------------------------|-----|-------------------------------|------|
| <b>Wall Length (ft.):</b>         | 136 | <b>Face Area (sq.):</b>       | 1500 |
| <b>Average Wall Height (ft.):</b> | 11  | <b>Face Angle (deg.):</b>     | 80   |
| <b>Maximum Wall Height (ft.):</b> | 14  | <b>Vertical Offset (ft.):</b> | -1   |

### Assessed Elements

| <b>Element<br/>(Weighting Factor)</b> | <b>Narrative</b>   | <b>Condition Rating<br/>(0 - 10)</b> |
|---------------------------------------|--|--------------------------------------|
| PERFORMANCE<br>8.00                   | Wall is failing  | 4                                    |
| WALL FOUNDATION MATERIAL<br>8.00      | Soft soil potential settlement   | 6                                    |
| WIRE/GEOSYNTHETIC FACING<br>8.00      | Bulging, distorted, separating baskets. Railroad rails are yielding, rock fill is over hanging | 4                                    |
| WALL DRAINS<br>0.50                   | No distress  | 9                                    |
| DOWNSLOPE<br>1.00                     | Terraced, slope creeping, trees leaning  | 6                                    |
| LATERAL SLOPE<br>1.00                 | Forested slope, possible creep   | 7                                    |

### Repair Recommendations

|                                  |   |
|----------------------------------|---|
| <b>Failure Consequence:</b>      | HIGH  |
| <b>Recommendation Narrative:</b> | Replace with 1500 square feet of gabion wall after investigation. Average replacement costs for Gravity, Gabion wall @ \$75.00 sq. ft. = \$112,500. |
| <b>Repair Cost:</b>              | \$112,500   |

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



# Big South Fork National River and Recreation Area

ROUTE 0122: YAMACRAW WEST ACCESS ROAD

## Retaining Wall Condition Photos



BISO\_0122\_0.028\_R\_1.jpg

|                         |                             |                                |           |
|-------------------------|-----------------------------|--------------------------------|-----------|
| <b>Wall ID:</b>         | BISO-0900-0-P1              |                                |           |
| <b>Route Name:</b>      | LEATHERWOOD DAY USE PARKING |                                |           |
| <b>Inspection Date:</b> | September 13, 2007          | <b>Approximate Year Built:</b> | Unknown   |
| <b>*Wall Rating:</b>    | 85                          | <b>Maintenance Action:</b>     | No Action |

### Wall Description

|                                     |  |                              |                           |
|-------------------------------------|--|------------------------------|---------------------------|
| <b>Wall Function:</b>               | Cut Wall   | <b>Primary Wall Type:</b>    | Other - Railroad Tie Wall |
| <b>Surface Treatment:</b>           | Preservative   | <b>Secondary Wall Type:</b>  |                           |
| <b>Secondary Surface Treatment:</b> |  | <b>Architectural Facing:</b> |                           |
| <b>General Description:</b>         | Leatherwood Ford Day Use Angel Falls Trailhead. Timber Railroad Tie Wall consisting of two tiers. Wall consists of horizontal lagging ties and vertical ties spaced 4 ft on center embedded into ground. |                              |                           |

### Wall Measurements

|                                   |     |                               |     |
|-----------------------------------|-----|-------------------------------|-----|
| <b>Wall Length (ft.):</b>         | 143 | <b>Face Area (sq.):</b>       | 890 |
| <b>Average Wall Height (ft.):</b> | 6   | <b>Face Angle (deg.):</b>     | 80  |
| <b>Maximum Wall Height (ft.):</b> | 9   | <b>Vertical Offset (ft.):</b> | 0   |

### Assessed Elements

| <b>Element<br/>(Weighting Factor)</b> | <b>Narrative</b>   | <b>Condition Rating<br/>(0 - 10)</b> |
|---------------------------------------|--|--------------------------------------|
| PERFORMANCE<br>8.00                   | As intended.   | 9                                    |
| WALL FOUNDATION MATERIAL<br>8.00      | Firm soil.   | 9                                    |
| LAGGING<br>8.00                       | Wood lagging is in good condition, mild weathering of surface. | 8                                    |
| PILES AND SHAFTS<br>8.00              | Wood shafts are in good condition, mild weathering of surface  | 8                                    |
| LATERAL SLOPE<br>0.50                 | Gentle vegetated/forested slope appears stable, no raveling.   | 9                                    |
| UPSLOPE<br>0.50                       | Shallow forested slope. Appears stable. No raveling.           | 9                                    |
| WALL DRAINS<br>0.50                   | No distress.   | 9                                    |

### Repair Recommendations

|                                  |      |
|----------------------------------|------|
| <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.

# Big South Fork National River and Recreation Area

ROUTE 0900: LEATHERWOOD DAY USE PARKING

## Retaining Wall Condition Photos



BISO\_0900\_0.000\_P1\_1.jpg

# Appendix A

## Summary of WIP Definitions



**Big South Fork National River and 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  $\geq 4$  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**

|                               |  |
|-------------------------------|--|
| <b>Design Criteria</b>        | Measure of how well current design criteria are satisfied:<br><b>None</b> - Does not meet any known standards.<br><b>Non-AASHTO</b> - Does not meet AASHTO, but is consistent with other structures of its type/period with good performance.<br><b>AASHTO</b> - Apparently meets current AASHTO Geometric, Design, Materials, and Construction Standards.   |
| <b>Consequence of Failure</b> | <b>Low</b> - No loss of roadway, no to low public risk, no impact to traffic during wall repair/replacement<br><b>Moderate</b> - Hourly to short-term closure of roadway, low-to-moderate public risk, multiple alternate routes available<br><b>High</b> - Seasonal to long-term loss of roadway, substantial loss-of-life risk, no alternate routes available  |
| <b>Action</b>                 | Select from: <b>No Action, Monitor, Maintenance, Repair Elements, Replace Elements, and Replace Wall</b>   |
| <b>Weighting Factor</b>       | 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.  |
| <b>Data Reliability</b>       | Estimate of how well observed conditions represent wall performance, and if additional investigations may be warranted.<br><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.<br><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.<br><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 **severity**, **extent**, and **repair/replace urgency** of wall element distresses.

|                             |  |
|-----------------------------|--|
| <b>9-10<br/>(Excellent)</b> | -Any defects are minor and are within normal range for <i>newly constructed or fabricated</i> elements.<br>-Defects may include those typically caused from fabrication or construction.   |
| <b>7-8<br/>(Good)</b>       | -Low-to-moderate extent of low severity distress.<br>-Distress present does not significantly compromise the element function, nor is there significantly severe distress to major structural components of an element.  |
| <b>5-6<br/>(Fair)</b>       | -High extent of low severity distress and/or low-to-medium extent of medium to high severity distress.<br>-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.                                     |
| <b>3-4<br/>(Poor)</b>       | -Medium-to-high extent of medium-to-high severity distress.<br>-Distress present threatens element function, and strength is obviously compromised and/or structural analysis is warranted.<br>-The element condition does not pose an immediate threat to wall stability and road closure is not necessary. |
| <b>1-2<br/>(Critical)</b>   | -Medium-to-high extent of high severity distress.<br>-Element is no longer serving intended function. Element performance threatening overall stability of the wall at the time of inspection.   |

### Wall Performance Condition Ratings

|                    |  |   |
|--------------------|--|---|
| <b>Performance</b> | 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><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.</p> <p><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.</p> <p><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.</p> |
|--------------------|--|---|

