The Road Inventory of Kilauea Point National Wildlife Refuge

Kilauea, HI

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Federal Highway Administration
Central Federal Lands Highway Division
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INTRODUCTION

The Transportation Equity Act for the 21st Century (Public Law 105-178) created the Refuge Roads Program. Refuge roads are those public roads that provide access to or within a unit of the National Wildlife Refuge System and for which title and maintenance responsibility is vested in the United States Government. Funds from the Highway Trust Fund are available for refuge roads and can be used by the station to pay the cost of:

(a) Maintenance and improvements of refuge roads.
(b) Maintenance and improvements of:
    (1) Adjacent vehicle parking areas
    (2) Provision for pedestrians and bicycles and
    (3) Construction and reconstruction of roadside rest areas that are located in or adjacent to wildlife refuges
(c) Administrative costs associated with such maintenance and improvements.

The funds available for refuge roads are to be disbursed based on the relative needs of the various refuges in the National Wildlife Refuge System, and taking into consideration:

(a) The comprehensive conservation plan for each refuge;
(b) The need for access as identified through land use planning; and
(c) The impact of land use planning on existing transportation facilities.

To determine the relative needs of the U.S. Fish and Wildlife Service, the Federal Highway Administration (FHWA) was asked to inventory all public access roads and parking lots and provide a condition assessment of each. In 2008 the inventory was expanded to include administrative (service use only) roads and parking lots. An FHWA representative meets with refuge personnel to identify route segments and assign route numbers and functional classifications (See Appendix) for each route. All roads and parking lots are mapped using Trimble GPS units and visually assessed for condition using the RSL method of evaluation developed at Utah State University (See Appendix). Culverts, Gates, Guardrails and Low Water Crossings are also mapped and inspected for any obvious defects.

An estimate is provided, in year 2008 dollars, based on the condition determined by the rating system. Estimates are based upon data and location factors from the 2008 RS Means Heavy Construction Cost Data 22nd Annual Edition. Cost estimates should be evaluated on a case-by-case basis when being used for programming purposes.

Native Surfaced roads and parking lots already inventoried will not be re-inventoried and will not appear individually in report chapters 5, 6 and 8. Mileages and areas of native surfaced roads and parking lots will still appear in all summaries in the report and will remain in the road inventory database. In addition to this report, the FHWA will furnish the condition ratings of each route and segment to the Fish and Wildlife Service in a Microsoft Access database so the data can be included in their Real Property Inventory.

Kilauea Point - 12530
Summaries

Route Miles and Percentages by Functional Class and Condition

Condition Rating (Based on RSL)*

F. C.	Excellent MILES	Excellent %	Good MILES	Good %	Fair MILES	Fair %	Poor MILES	Poor %	Failed MILES	Failed %	TOTAL MILES
I	0.00	0.0%	0.00	0.0%	0.16	100.0%	0.00	0.0%	0.00	0.0%	0.16
II	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.32	100.0%	0.00	0.0%	0.32
III	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00
IV	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00
V	0.00	0.0%	0.71	55.0%	0.58	45.0%	0.00	0.0%	0.00	0.0%	1.29
Totals	**0.00**	**0.0%**	**0.71**	**40.1%**	**0.74**	**41.8%**	**0.32**	**18.1%**	**0.00**	**0.0%**	**1.77**

*For a description of condition ratings for the various surface types see the Appendix.

Route Miles and Percentages by Surface Type and Condition

Paved Condition Rating [Condition(RSL)]

Surface	Excellent MILES	Excellent %	Good MILES	Good %	Fair MILES	Fair %	Poor MILES	Poor %	Failed MILES	Failed %	TOTAL MILES
AS	0.00	0.0%	0.00	0.0%	0.16	100.0%	0.00	0.0%	0.00	0.0%	0.16
CO	0.00	0.0%	0.09	100.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.09
Totals	**0.00**	**0.0%**	**0.09**	**36.0%**	**0.16**	**64.0%**	**0.00**	**0.0%**	**0.00**	**0.0%**	**0.25**

Unpaved Condition Rating [Condition(RSL)]

Surface	Excellent MILES	Excellent %	Good MILES	Good %	Fair MILES	Fair %	Poor MILES	Poor %	Failed MILES	Failed %	TOTAL MILES
GR	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00
NA	0.00	0.0%	0.62	40.8%	0.58	38.2%	0.32	21.1%	0.00	0.0%	1.52
PR	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00
Totals	0.00	**0.0%**	0.62	**40.8%**	0.58	**38.2%**	0.32	**21.1%**	0.00	**0.0%**	**1.52**

Square Footage (Parking Areas)

Condition Rating

Surface	Excellent SQ FT	Excellent %	Good SQ FT	Good %	Fair SQ FT	Fair %	Poor SQ FT	Poor %	Failed SQ FT	Failed %	Total SQ FT
AS	0	0.0%	13,405	63.2%	7,792	36.8%	0	0.0%	0	0.0%	21,197
CO	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0
GR	0	0.0%	20,491	83.6%	4,015	16.4%	0	0.0%	0	0.0%	24,506
NA	0	0.0%	5,294	30.6%	12,022	69.4%	0	0.0%	0	0.0%	17,316
PR	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0
Totals	**0**	**0.0%**	**39,190**	**62.2%**	**23,829**	**37.8%**	**0**	**0.0%**	**0**	**0.0%**	**63,019**

Kilauea Point - 12530
Summaries

Route Miles and Percentages by Use Type and Condition

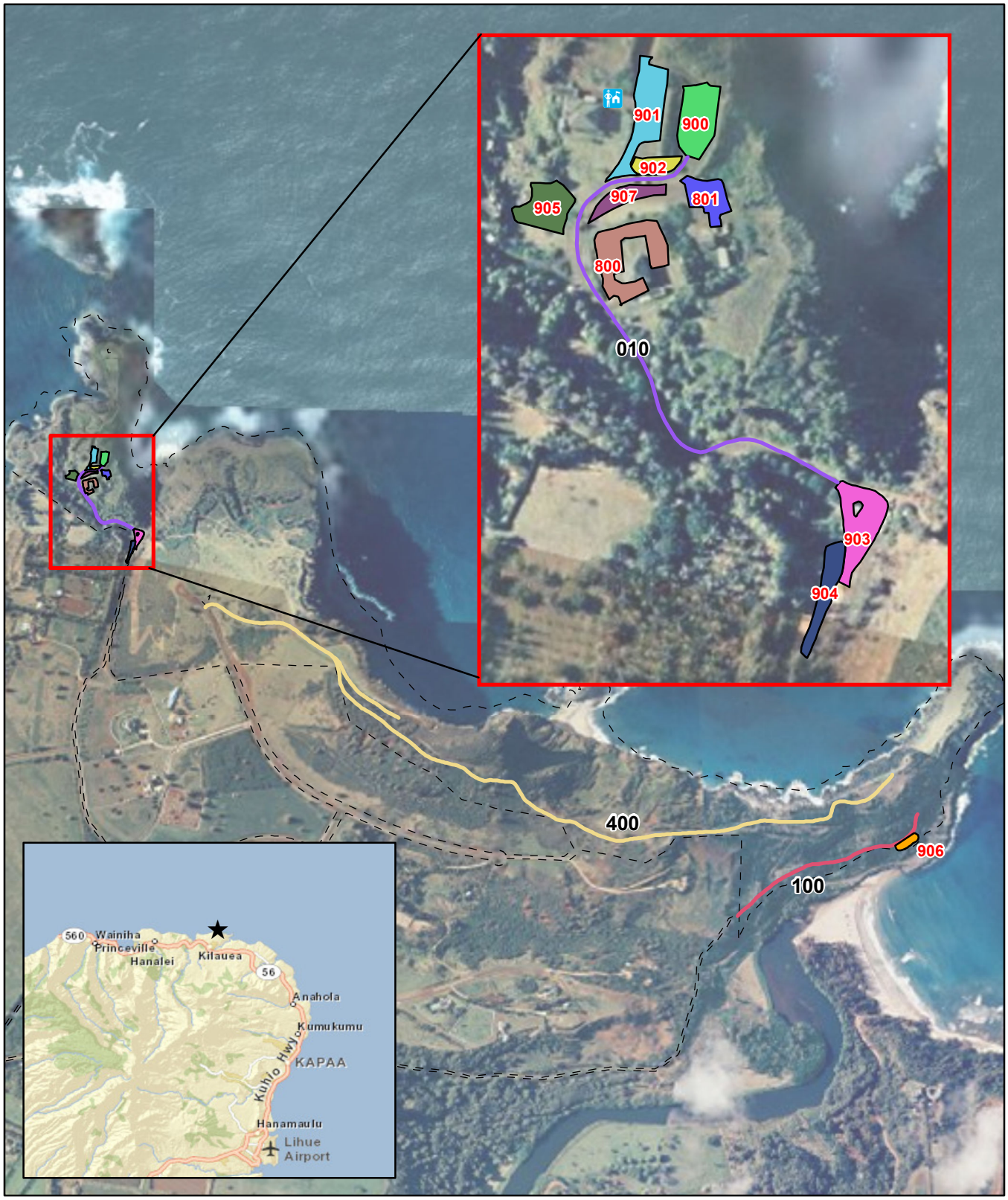
Road Condition Rating: Public/Administrative Use

USE TYPE	Excellent		Good		Fair		Poor		Failed		TOTAL
	MILES	%	MILES	%	MILES	%	MILES	%	MILES	%	MILES
Public (FC I-III)	0.00	0.0%	0.00	0.0%	0.16	33.3%	0.32	66.7%	0.00	0.0%	0.48
Admin (FC IV-V)	0.00	0.0%	0.71	55.0%	0.58	45.0%	0.00	0.0%	0.00	0.0%	1.29
Totals	**0.00**	**0.0%**	**0.71**	**40.1%**	**0.74**	**41.8%**	**0.32**	**18.1%**	**0.00**	**0.0%**	**1.77**

Parking Condition Rating: Public/Administrative Use

USE TYPE	Excellent		Good		Fair		Poor		Failed		Total
	Sq Ft	%	Sq Ft	%	Sq Ft	%	Sq Ft	%	Sq Ft	%	Sq Ft
Public	0	0.0%	27759	53.8%	23829	46.2%	0	0.0%	0	0.0%	51,588
Admin	0	0.0%	11431	100.0%	0	0.0%	0	0.0%	0	0.0%	11,431
Totals	**0**	**0.0%**	**39,190**	**62.2%**	**23,829**	**37.8%**	**0**	**0.0%**	**0**	**0.0%**	**63,019**

Kilauea Point National Wildlife Refuge
ROUTE LOCATION MAP



0 0.1 0.2 0.4 0.6 0.8 Miles

Kilauea Point - 12530
Route Identification List

Shading Color Key:	
	White = Paved Routes
	Yellow = Unpaved Routes

RTE #	Asset Number	ROUTE NAME	RTE MI	ROUTE DESCRIPTION	PAVED MI	UN-PAVED MI	LANES	FC
010	10002357	Kilauea Lighthouse Road	0.16	From Overlook Parking (Route 903) to Kilauea Lighthouse Lower Parking (Route 900)	0.16	-	2	1
100	10045183	Rock Quarry Road	0.32	From Refuge Boundary to end of route	-	0.32	1	2
400	10045179*	Crater Hill to Mokalea Point Service Road	1.29	From Makana Ano Place to end of route	0.09	1.20	1	5

* Route has more than one Asset Number

NUMERIC ROUTE ID

Kilauea Point - 12530

Route Identification List (Parking)

Shading Color Key:	
	White = Paved Routes
	Green = Unpaved Routes

Route #	Asset Number	ROUTE NAME	Area (Sq Ft)	ROUTE DESCRIPTION	Surface Type
800	-	Staff Administrative Parking	7,822	From Kilauea Lighthouse Road (Route 010)	Gravel
801	-	Maintenance Parking	3,609	From Kilauea Lighthouse Road (Route 010)	Gravel
900	10002364	Kilauea Lighthouse Lower Parking	6,243	From Kilauea Lighthouse Road (Route 010)	Asphalt
901	10002364	Kilauea Lighthouse Upper Parking	7,162	From Kilauea Lighthouse Road (Route 010)	Asphalt
902	10002364	Kilauea Lighthouse Overflow Parking A	4,530	From Kilauea Lighthouse Road (Route 010)	Gravel
903	10002365	Overlook Parking	7,792	From Kilauea Road	Asphalt
904	10002365	Overlook Overflow Parking	4,015	From Kilauea Road	Gravel
905	-	Kilauea Lighthouse Overflow Parking C	5,294	From Kilauea Lighthouse Road (Route 010)	Native
906	-	Rock Quarry Break Parking	12,022	From Rock Quarry Road (Route 100)	Native
907	10002364	Kilauea Lighthouse Overflow Parking B	4,530	From Kilauea Lighthouse Road (Route 010)	Gravel

Changes to Fish and Wildlife Service Road Inventory

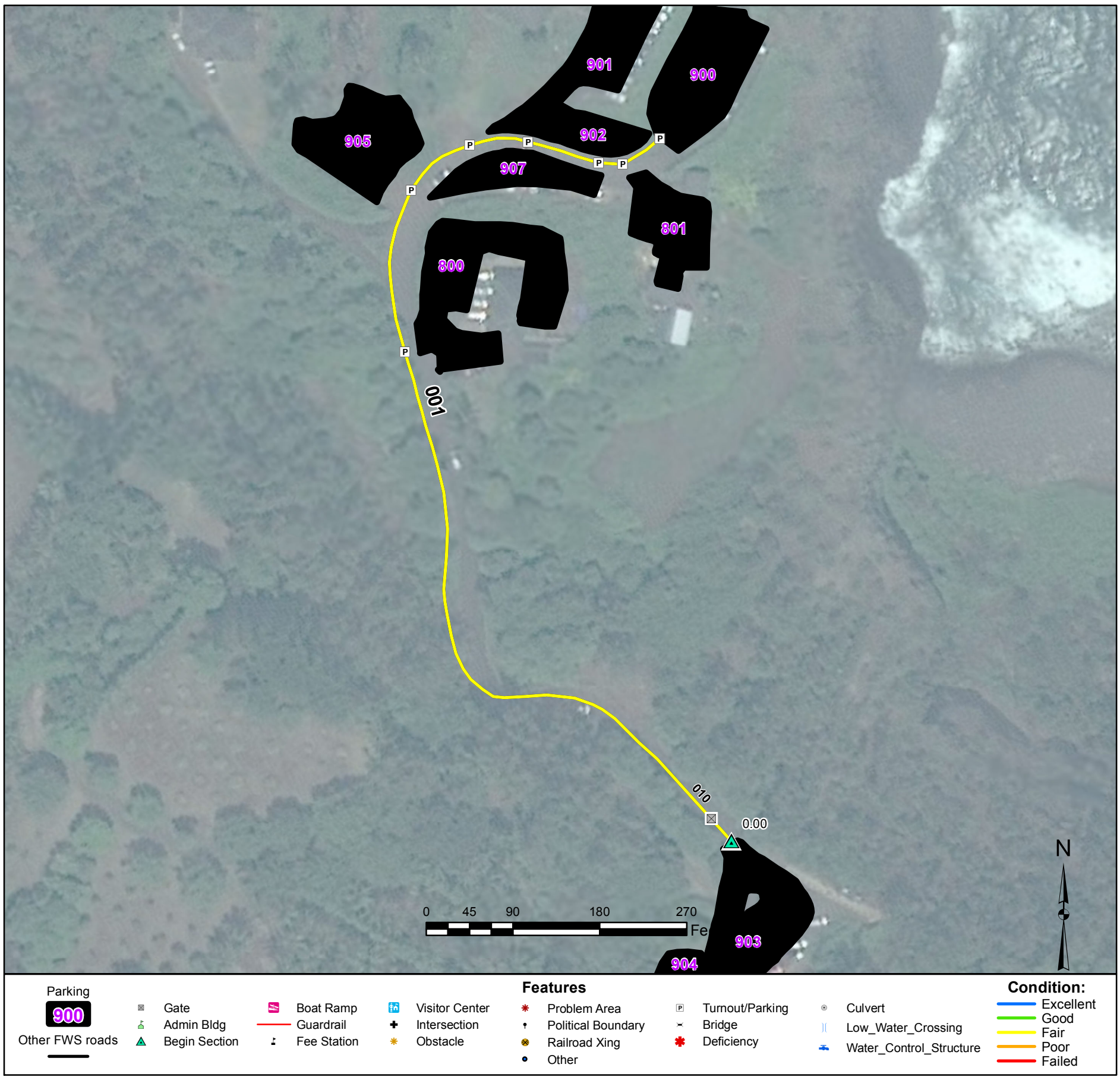
Kilauea Point NWR

Added

Rte #	Route Name	Description	Comments
400	Crater Hill to Mokalea Point Service Road	New Administrative Route	
800	Staff Administrative Parking	New Administrative Route	
801	Maintenance Parking	New Administrative Route	
904	Overlook Overflow Parking	New Public Route	
905	Kilauea Lighthouse Overflow Parking C	New Public Route	
906	Rock Quarry Break Parking	New Public Route	
907	Kilauea Lighthouse Overflow Parking B	New Public Route	Was a part of Kilauea Lighthouse Overflow Parking A (Route 902)

Modified

Rte #	Route Name	Description	Comments
902	Kilauea Lighthouse Overflow Parking A	Geometry change	Split into two parking lots. Now also Kilauea Lighthouse Overflow Parking B (Route 907)
903	Overlook Parking	New Geometry	



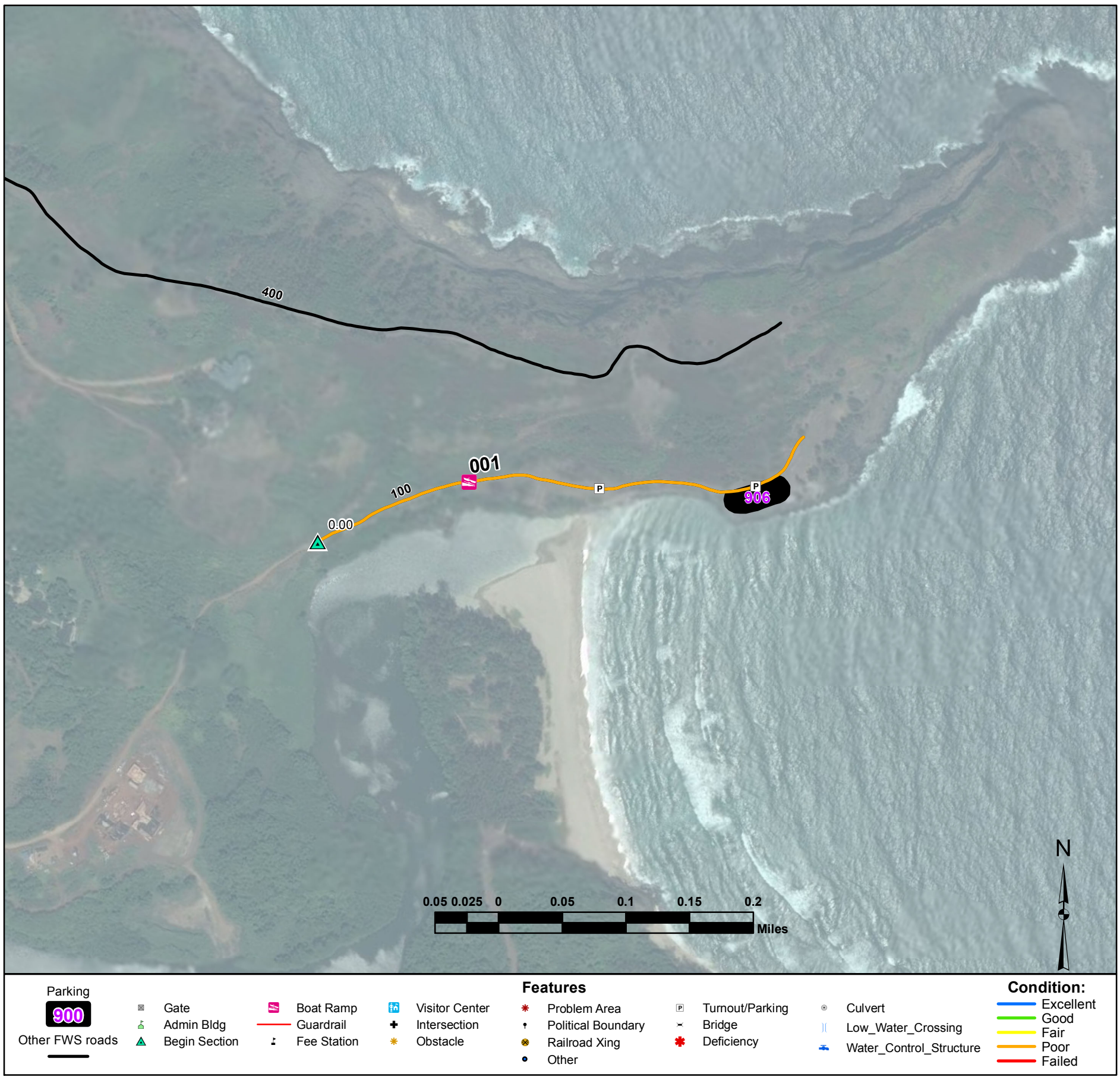
Kilauea Lighthouse Road

From Overlook Parking (Route 903) to Kilauea Lighthouse Lower Parking (Route 900)

Route Number: 010 Total Route Mileage: 0.16

Asset Number	10002357				
Section Number	001				
Section Length (miles)	0.16				
Inspection Date	01-25-2013				
Surface Type	Asphalt				
Number of Lanes	2				
Roadway Width (feet)	16				
Condition	Fair				
Remaining Service Life (years)	8				
Estimated Cost to Repair	$23,700				
Current Replacement Value	$262,500				

Features	Mile Post	Features	Mile Post	Features	Mile Post	Features	Mile Post
Begin Section	001-0.0						
Gate	001-0.01						
Turnout/Parking	001-0.19						
Turnout/Parking	001-0.24						
Turnout/Parking	001-0.26						
Turnout/Parking	001-0.28						
Turnout/Parking	001-0.3						
Turnout/Parking	001-0.31						
Turnout/Parking	001-0.32						



Rock Quarry Road

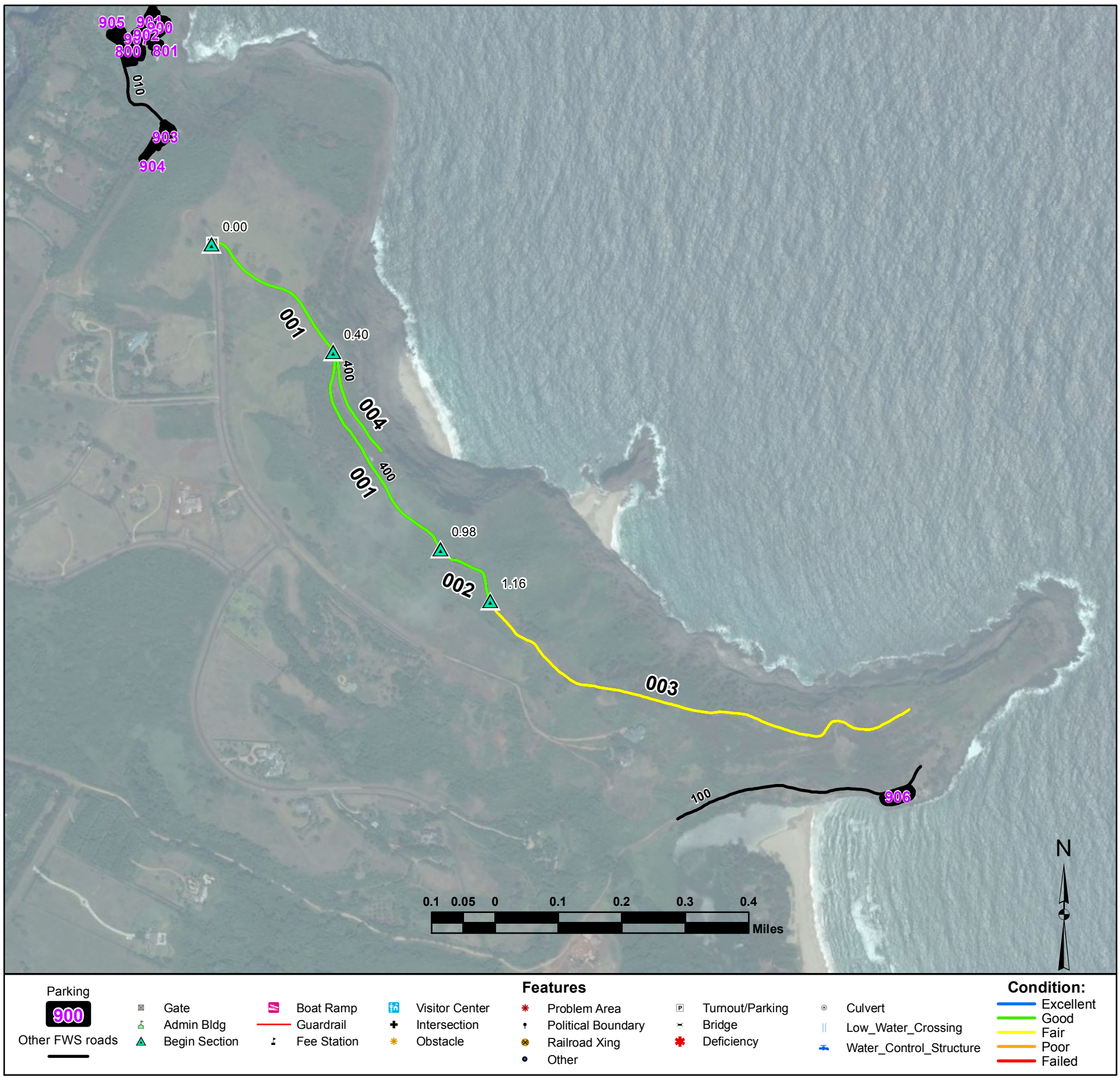
From Refuge Boundary to end of route

Route Number: 100

Total Route Mileage: 0.32

Asset Number	10045183				
Section Number	001				
Section Length (miles)	0.32				
Inspection Date	01-25-2013				
Surface Type	Native				
Number of Lanes	1				
Roadway Width (feet)	10				
Condition	Poor				
Remaining Service Life (years)	2				
Estimated Cost to Repair	$13,800				
Current Replacement Value	$156,500				

Features	Mile Post	Features	Mile Post	Features	Mile Post	Features	Mile Post
Begin Section	001-0.0						
Boat Ramp	001-0.19						
Turnout/Parking	001-0.36						
Turnout/Parking	001-0.56						



Crater Hill to Mokalea Point Service Road

From Makana Ano Place to end of route

Route Number: 400

Total Route Mileage: 1.29

Asset Number	10045179	10002369	10045179	10045179	
Section Number	001	002	003	004	
Section Length (miles)	0.49	0.09	0.58	0.13	
Inspection Date	01-25-2013	01-25-2013	01-25-2013	01-25-2013	
Surface Type	Native	Concrete	Native	Native	
Number of Lanes	1	1	1	1	
Roadway Width (feet)	10	10	10	8	
Condition	Good	Good	Fair	Good	
Remaining Service Life (years)	7	14	3	5	
Estimated Cost to Repair	$1,200	$1,500	$1,700	$300	
Current Replacement Value	$239,700	$188,800	$283,700	$63,600	

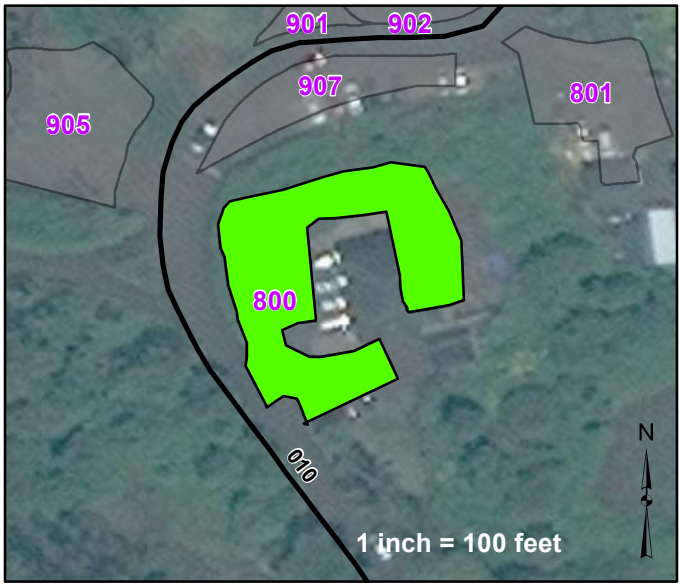
Features	Mile Post	Features	Mile Post	Features	Mile Post	Features	Mile Post
Begin Section	001-0.0						
Gate	001-0.0						
Begin Section	002-0.98						
Begin Section	003-1.16						
Begin Section	004-0.4						

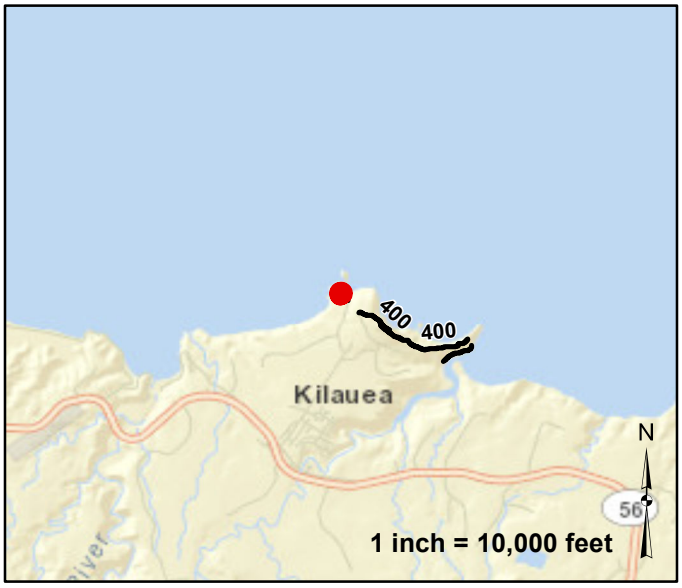
Route Number: 800

Staff Administrative Parking

From Kilauea Lighthouse Road (Route 010)

Asset Number	Area (Sq Ft)	Spaces	Condition	Surface Type	Cost to Improve	Inspection Date	Current Replacement Value
-	7822	15	Good	Gravel	$11,455	01-25-2013	$53,100





Parking

900

Other FWS roads

Features

Gate
Admin Bldg
Begin Section
Boat Ramp
Guardrail
Fee Station
Visitor Center
Other
Problem Area
Culvert
Low_Water_Crossing
Water_Control_Structure

Condition:

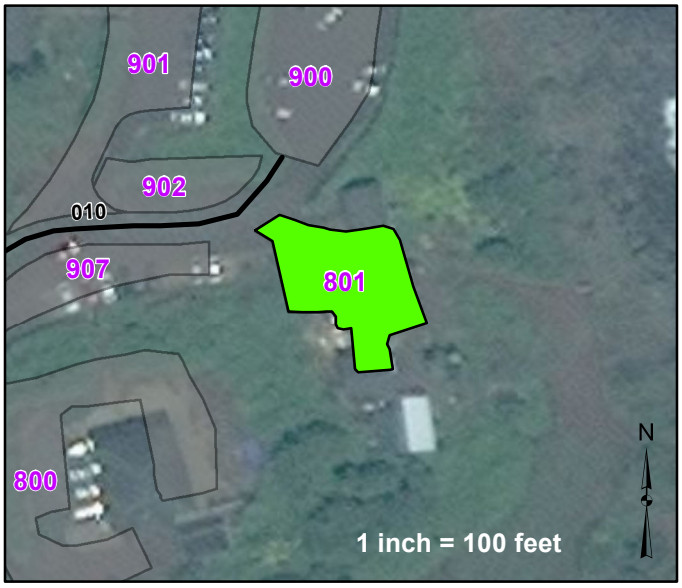
Excellent
Good
Fair
Poor
Failed

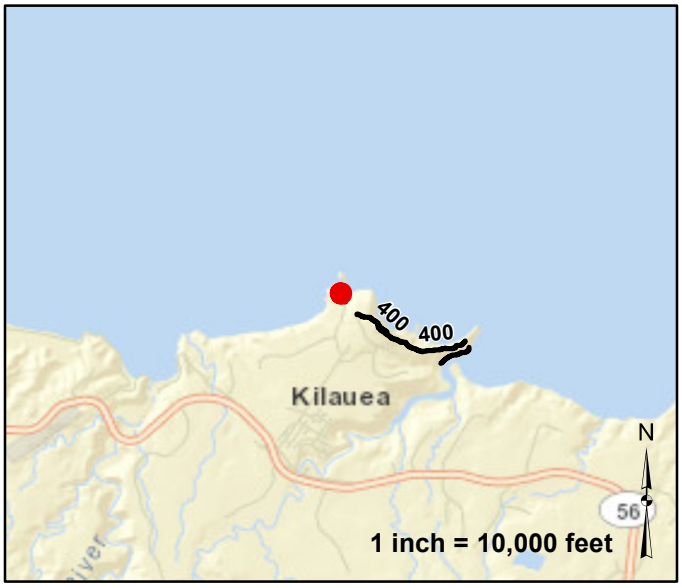
Route Number: 801

Maintenance Parking

From Kilauea Lighthouse Road (Route 010)

Asset Number	Area (Sq Ft)	Spaces	Condition	Surface Type	Cost to Improve	Inspection Date	Current Replacement Value
-	3609	6	Good	Gravel	$11,455	01-25-2013	$24,500





Parking

900

Other FWS roads

Features

Gate
Admin Bldg
Begin Section
Boat Ramp
Guardrail
Fee Station
Visitor Center
Other
Problem Area
Culvert
Low_Water_Crossing
Water_Control_Structure

Condition:

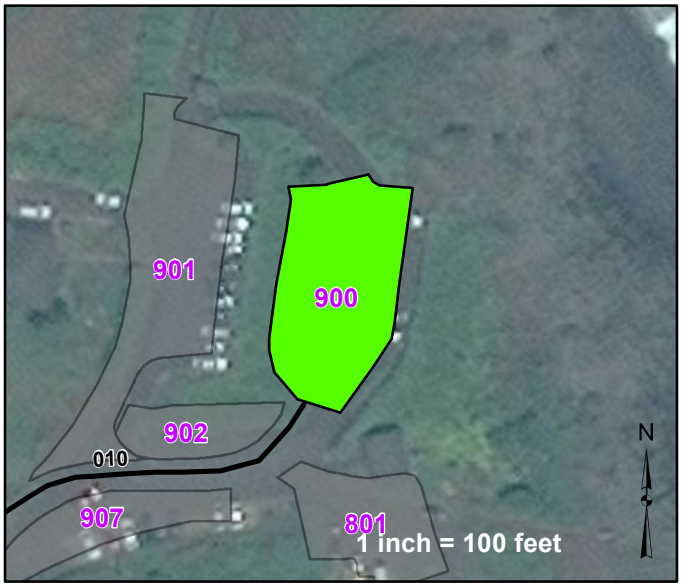
Excellent
Good
Fair
Poor
Failed

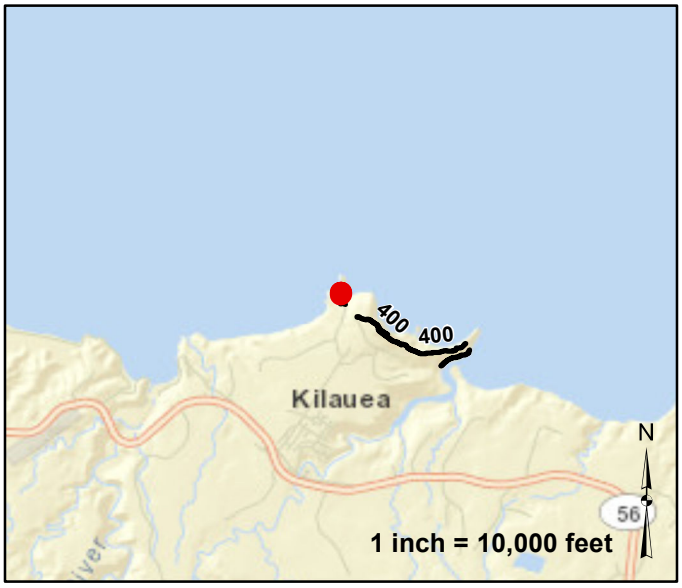
Route Number: 900

Kilauea Lighthouse Lower Parking

From Kilauea Lighthouse Road (Route 010)

Asset Number	Area (Sq Ft)	Spaces	Condition	Surface Type	Cost to Improve	Inspection Date	Current Replacement Value
10002364	6243	20	Good	Asphalt	$1,600	01-25-2013	$77,700





Parking

900

Other FWS roads

Features

Gate
Admin Bldg
Begin Section
Boat Ramp
Guardrail
Fee Station
Visitor Center
Other
Problem Area
Culvert
Low_Water_Crossing
Water_Control_Structure

Condition:

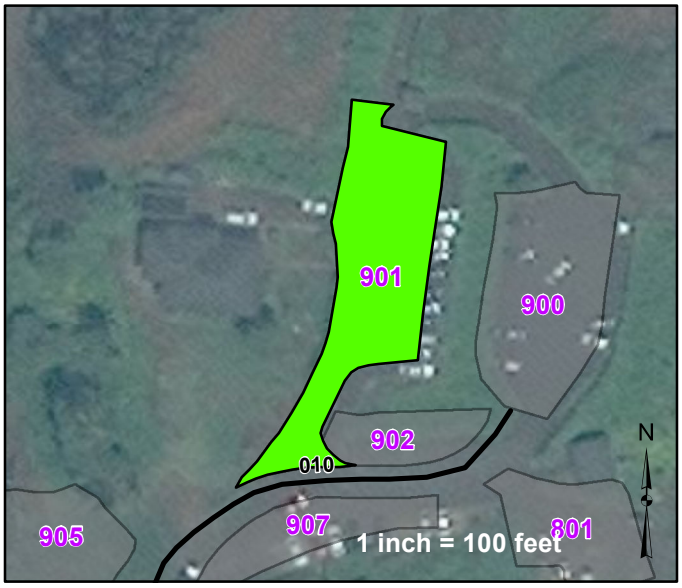
Excellent
Good
Fair
Poor
Failed

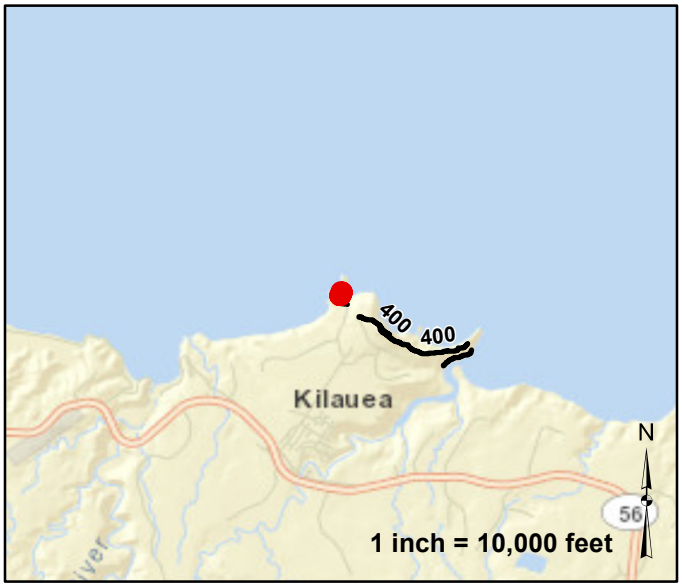
Route Number: 901

Kilauea Lighthouse Upper Parking

From Kilauea Lighthouse Road (Route 010)

Asset Number	Area (Sq Ft)	Spaces	Condition	Surface Type	Cost to Improve	Inspection Date	Current Replacement Value
10002364	7162	13	Good	Asphalt	$1,800	01-25-2013	$89,100





Parking

900

Other FWS roads

Features

Gate
Admin Bldg
Begin Section
Boat Ramp
Guardrail
Fee Station
Visitor Center
Other
Problem Area
Culvert
Low_Water_Crossing
Water_Control_Structure

Condition:

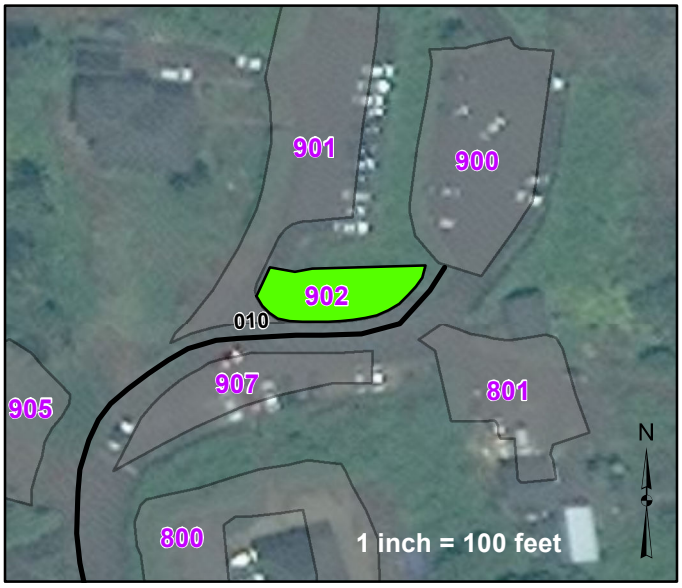
Excellent
Good
Fair
Poor
Failed

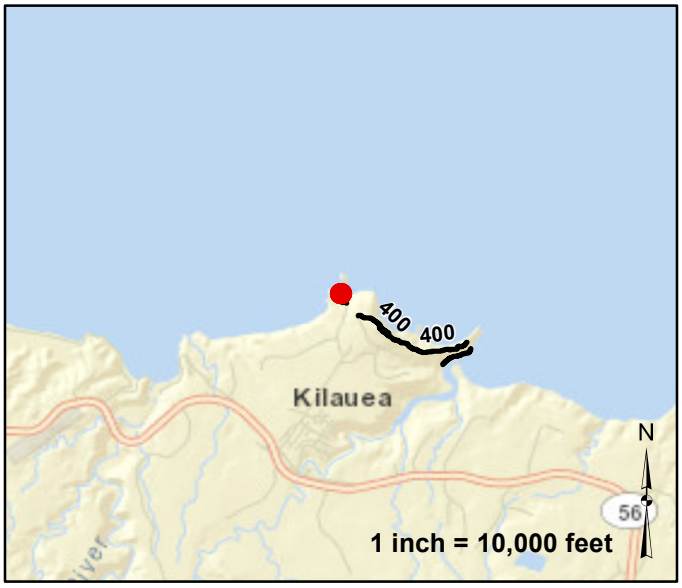
Route Number: 902

Kilauea Lighthouse Overflow Parking A

From Kilauea Lighthouse Road (Route 010)

Asset Number	Area (Sq Ft)	Spaces	Condition	Surface Type	Cost to Improve	Inspection Date	Current Replacement Value
10002364	4530	8	Good	Gravel	$900	01-25-2013	$30,800





Parking

900

Other FWS roads

Features

Gate
Admin Bldg
Begin Section
Boat Ramp
Guardrail
Fee Station
Visitor Center
Other
Problem Area
Culvert
Low_Water_Crossing
Water_Control_Structure

Condition:

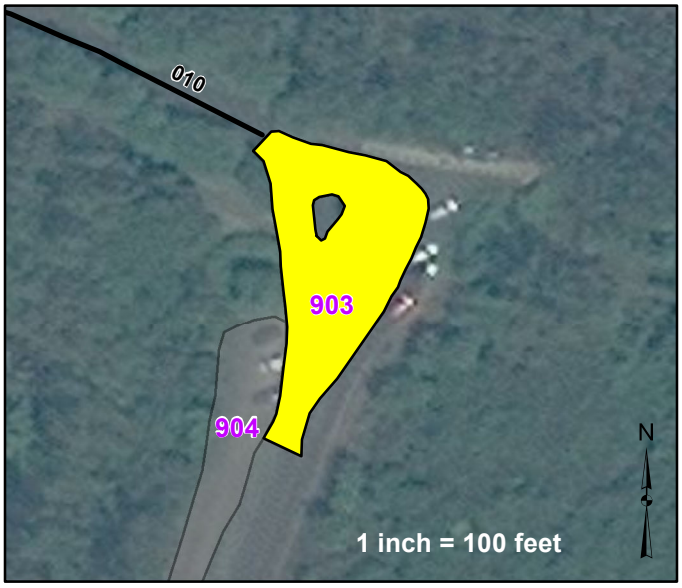
Excellent
Good
Fair
Poor
Failed

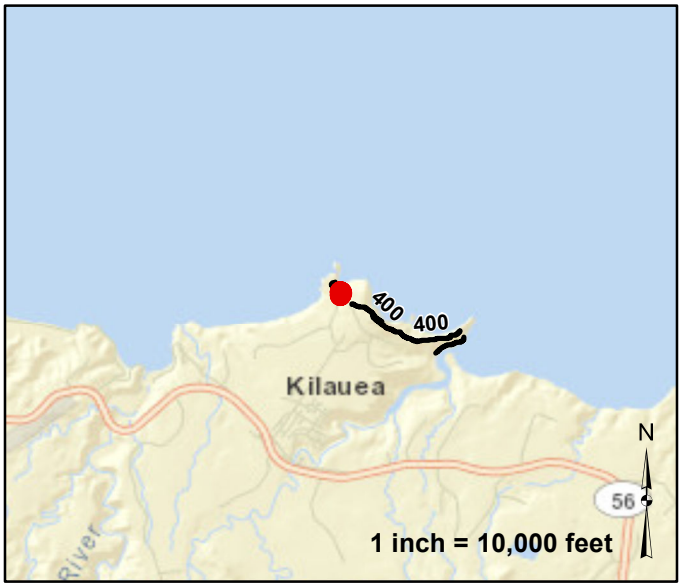
Route Number: 903

Overlook Parking

From Kilauea Road

Asset Number	Area (Sq Ft)	Spaces	Condition	Surface Type	Cost to Improve	Inspection Date	Current Replacement Value
10002365	7792	6	Fair	Asphalt	$9,100	01-25-2013	$96,900





Parking

900

Other FWS roads

Features

Gate
Admin Bldg
Begin Section
Boat Ramp
Guardrail
Fee Station
Visitor Center
Other
Problem Area
Culvert
Low_Water_Crossing
Water_Control_Structure

Condition:

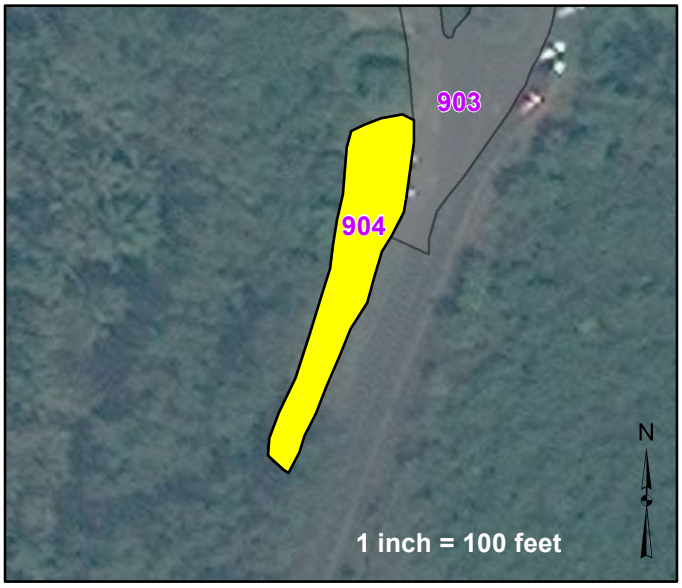
Excellent
Good
Fair
Poor
Failed

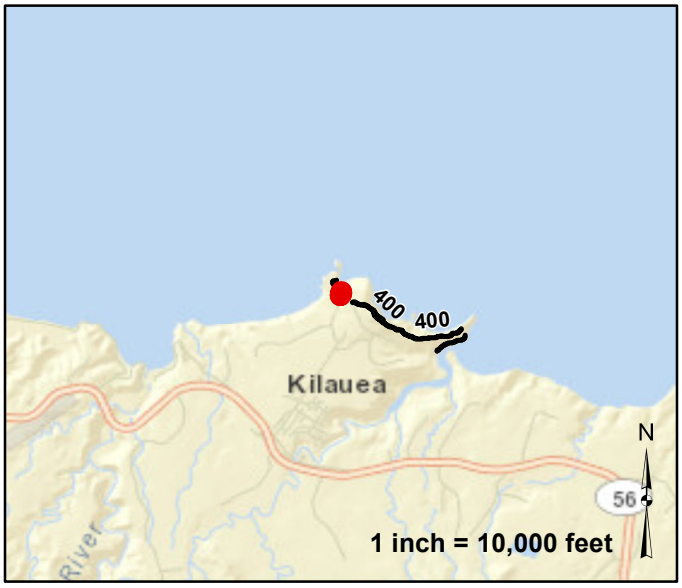
Route Number: 904

Overlook Overflow Parking

From Kilauea Road

Asset Number	Area (Sq Ft)	Spaces	Condition	Surface Type	Cost to Improve	Inspection Date	Current Replacement Value
10002365	4015	15	Fair	Gravel	$1,500	01-25-2013	$27,300





Parking

900

Other FWS roads

Features

Gate
Admin Bldg
Begin Section
Boat Ramp
Guardrail
Fee Station
Visitor Center
Other
Problem Area
Culvert
Low_Water_Crossing
Water_Control_Structure

Condition:

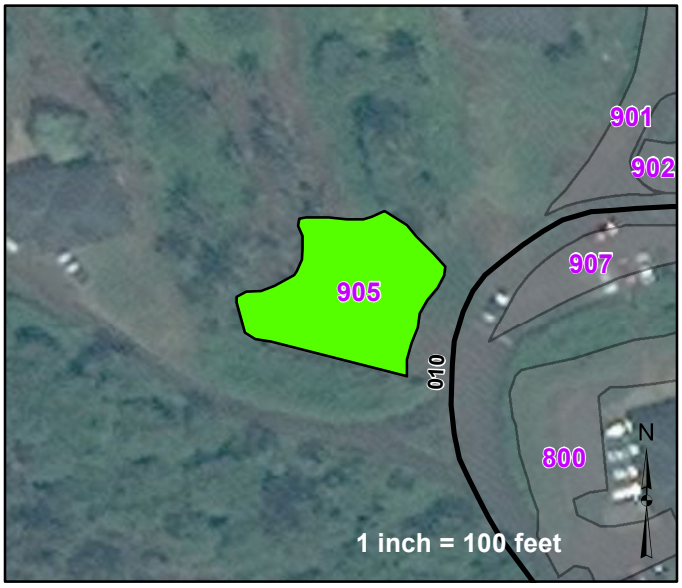
Excellent
Good
Fair
Poor
Failed

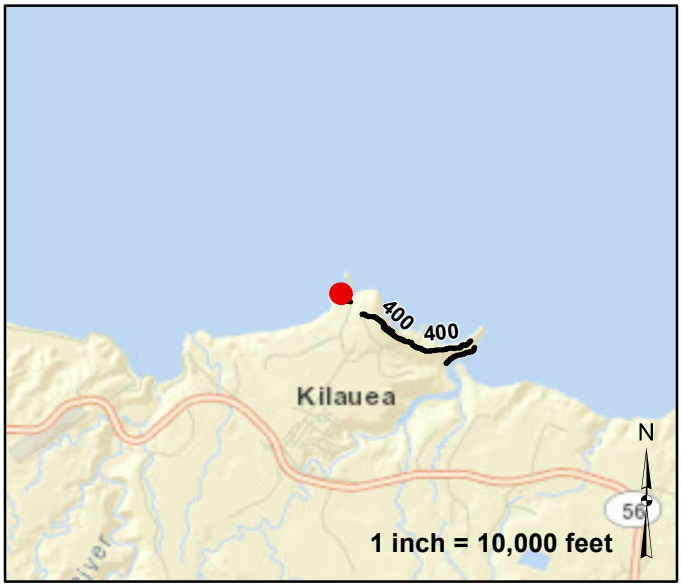
Route Number: 905

Kilauea Lighthouse Overflow Parking C

From Kilauea Lighthouse Road (Route 010)

Asset Number	Area (Sq Ft)	Spaces	Condition	Surface Type	Cost to Improve	Inspection Date	Current Replacement Value
-	5294	15	Good	Native	$11,455	01-25-2013	$15,500





Parking

900

Other FWS roads

Features

Gate
Admin Bldg
Begin Section
Boat Ramp
Guardrail
Fee Station
Visitor Center
Other
Problem Area
Culvert
Low_Water_Crossing
Water_Control_Structure

Condition:

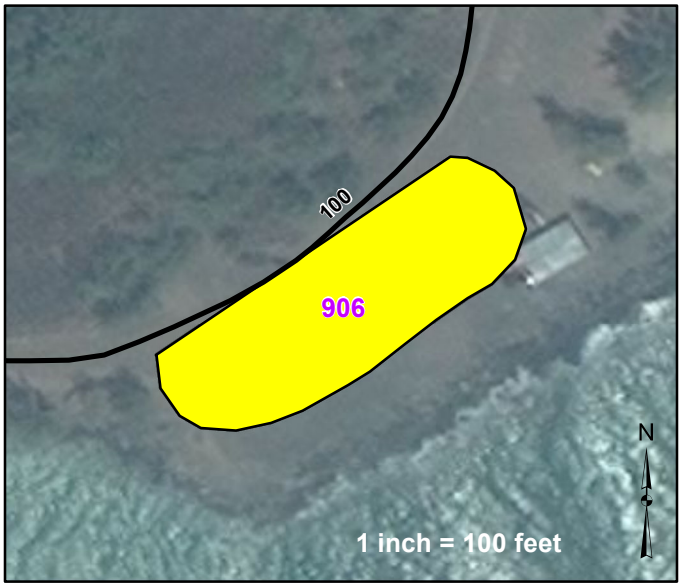
Excellent
Good
Fair
Poor
Failed

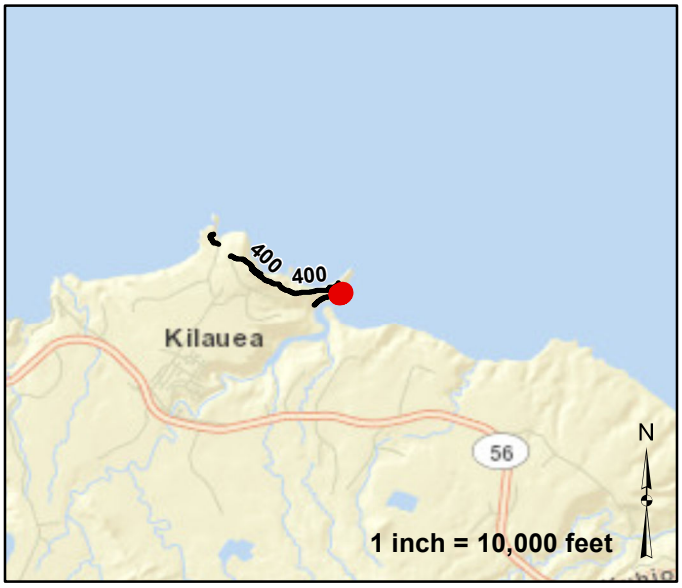
Route Number: 906

Rock Quarry Break Parking

From Rock Quarry Road (Route 100)

Asset Number	Area (Sq Ft)	Spaces	Condition	Surface Type	Cost to Improve	Inspection Date	Current Replacement Value
-	12022	20	Fair	Native	$4,400	01-25-2013	$35,200





Parking

900

Other FWS roads

Features

Gate
Admin Bldg
Begin Section
Boat Ramp
Guardrail
Fee Station
Visitor Center
Other
Problem Area
Culvert
Low_Water_Crossing
Water_Control_Structure

Condition:

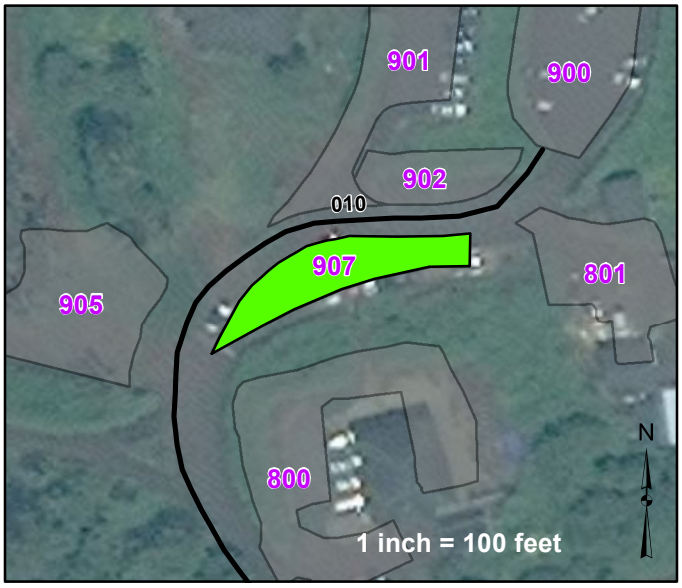
Excellent
Good
Fair
Poor
Failed

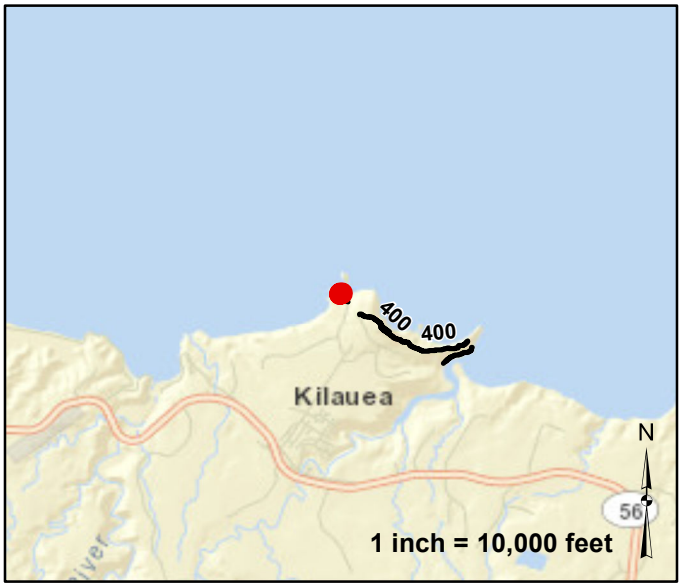
Route Number: 907

Kilauea Lighthouse Overflow Parking B

From Kilauea Lighthouse Road (Route 010)

Asset Number	Area (Sq Ft)	Spaces	Condition	Surface Type	Cost to Improve	Inspection Date	Current Replacement Value
10002364	4530	10	Good	Gravel	$900	01-25-2013	$30,800





Parking

900

Other FWS roads

Features

Gate
Admin Bldg
Begin Section
Boat Ramp
Guardrail
Fee Station
Visitor Center
Other
Problem Area
Culvert
Low_Water_Crossing
Water_Control_Structure

Condition:

Excellent
Good
Fair
Poor
Failed

Kilauea Point Bridge Inventory					
Rte #	Milepost	NBIS #	Sufficiency Rating	Functionally Obsolete	Structurally Deficient
No Bridges to Report					

ROUTE: 010

Features Photographs

Photo: KIPO_C4_1364 Route: 010-001-0.0
Begin Section

Photo: KIPO_C4_1353 Route: 010-001-0.01
Metal Open Rail Gate electric
Asset# NA

Features Photographs

Photo: KIPO_C4_1366 Route: 100-001-0.0
Begin Section

ROUTE: 400

Features Photographs

Photo: KIPO_C4_1369 Route: 400-001-0.0
Begin Section

Photo: KIPO_C4_1369 Route: 400-001-0.0
Metal Chain Link Gate
Asset# NA

Photo: KIPO_C4_1373 Route: 400-002-0.98
Begin Section

Photo: KIPO_C4_1374 Route: 400-003-1.16
Begin Section

Photo: KIPO_C4_1375 Route: 400-004-0.4
Begin Section

Accident Summary

Number of Accidents Reported	Timespan of Accidents	Injuries	Fatalities
0	No Accidents to Report	0	0

APPENDIX

TABLE 1 - GENERAL FWS ROAD FUNCTIONAL CLASSIFICATION	
Class I	Principal Refuge Road (Public Roads) - Routes that constitute the main access route, main auto tour route, or thoroughfare for refuge visitors. These routes are accessible by 2WD vehicles. Routes are numbered from 10 to 99.
Class II	Connector Refuge Road (Public Roads) - Routes that provide circulation within the refuge. These routes can also provide access to areas of scenic, scientific, recreational or cultural interest, such as overlooks, campgrounds, education centers, etc. These routes are accessible by 2WD vehicles. Routes are numbered from 100 to 199.
Class III	Special Purpose Refuge Road (Public Roads) - Roads that provide circulation within special use areas such as campgrounds or public concessionaire facilities or access to remote areas of the refuge. These routes may not be 2WD accessible. Routes are numbered from 200 to 299
Class IV	Administrative Access Road (Administrative Roads) - Routes intended for access to administrative developments or structures such as maintenance offices, employee quarters, or utility areas. These routes are accessible by 2WD vehicles. These routes may restrict access to the general public. Routes are numbered from 300 to 399.
Class V	Restricted Road (Administrative Roads) - Routes normally closed to the public, such as maintenance roads, service roads, patrol roads, and fire breaks. These routes may be open to the public for a short period of time for a special use, such as hunting access. These routes may not be 2WD accessible. Routes are numbered from 400 to 499.

A refuge road system contains those routes within or giving access to a refuge or other unit of the FWS that are administered by the FWS, or by the Service in cooperation with other agencies. The assignment of a functional classification (FC) to a refuge road is not based on traffic volumes or design speed, but on the intended use or function of that route

DESCRIPTION OF RATING SYSTEM

Rating Data is collected on four different surface types: Asphalt, Concrete, Gravel, and Native. The Utah LTAP Center's Remaining Service Life (RSL) system is used for all surface types. The RSL system is based on the Strategic Highway Research Program's (SHRP) Distress Identification Manual.

Asphalt Rating System

Data is collected on the following distresses and conditions:

- **Fatigue Cracking -** Interconnected cracks forming small irregular shapes.
- **Longitudinal Cracking -** Cracks running parallel with the roadway, in the direction of traffic.
- **Transverse Cracking -** Cracks perpendicular to the roadway, going across the lane or lanes.
- **Block Cracking -** Interconnected cracks forming large blocks.
- **Edge Cracking –** Cracks running along the edge of the pavement surface.
- **Patches -** Original surface repaired with new asphalt patch material.
- **Potholes -** Holes or depressions in the pavement.
- **Rutting -** surface depressions in the wheel paths.
- **Roughness –** Evenness of pavement for serviceability.
- **Drainage –** Ability of the road surface to drain water based on proper slope.

A Condition Rating value is calculated for each homogenous pavement section, and can be up to 1 mile in length.

Rating Index Formula

Fatigue, longitudinal, transverse, block, and edge cracking, along with patching and potholes are rated on a 0 - 9 scale (0 = no distress, 9 = maximum distress). The rating given is based on the extent and the severity of the distress. Rutting, roughness, and drainage are rated on a 0 - 3 scale (0 = excellent, 3 = poor). Each distress type has given Remaining Service Life (RSL) values (in years) based on the rating for that particular distress. The distress with the rating resulting in the lowest RSL value is considered to be the governing distress. That value is then assigned as the RSL of the road segment.

Concrete Rating System

Data is collected on the following distresses and conditions:

- **Spalling of Joints –** Chipping, breaking, or cracking of slab edges
- **Joint Seal Damage –** Any damage or condition that enables materials or water to infiltrate into the joint from the surface.
- **Corner Breaks –** A portion of the slab separated by a crack that intersects the adjacent transverse and longitudinal joints, forming approximately a 45° angle to the direction.
- **Broken Slabs –** Faulting and/or cracking localized to individual slabs.

- **Faulting** – Difference in elevation across a crack or joint.
- **Longitudinal Cracking** – Cracks in the pavement running parallel to road.
- **Transverse Cracking** - Cracks in the pavement running perpendicular to the direction of traffic.
- **Patch Deterioration** – Faulting, settling, or cracking of previously placed patch
- **Map Cracking** – A series of cracks that extend only into the upper surface of the Slab

A Condition Rating value is calculated for each homogenous pavement section, and can be up to 1 mile in length.

Rating Index Formula
The rating procedure for concrete pavement is the same as that for asphalt pavement described previously. Each of the distresses described above are rated on the same 0 – 9 scale. The governing distress is then determined and the RSL associated with that distress is assigned to the road segment.

Gravel and Native Rating System

Data is collected on the following distresses and conditions:
- **Cross Section (Crown)** - Roadway built so that the center is higher than the shoulder, to prevent water from pooling on roadway.
- **Roadside Drainage** - Roadside ditches and culverts to handle water flow and prevent pooling on the roadside.
- **Corrugations (Washboarding)** - Small trenches or holes developing perpendicular to the roadway.
- **Potholes** - Holes or depressions in the roadway.
- **Rutting** - Depressions running parallel with the roadway, in the wheelpaths.
- **Dust** - Amount of dust caused by traffic.
- **Loose Aggregate (Gravel Only)** - Loose gravel, typically piled up on the roadway edges or centerline.

A Condition Rating value is calculated for each homogenous pavement section, and can be up to 1 mile in length.

Rating Index Formula
The rating procedure for unpaved roads is the same as that for asphalt and concrete pavements described previously. Of the distresses described above, corrugations, potholes, rutting, and loose aggregate are rated on the same 0 – 9 scale previously mentioned. Cross section, roadside drainage, and dust are rated on the same 0 – 3 scale described for asphalt pavement. The governing distress is then determined and the RSL associated with that distress is assigned to the road segment.

Condition Descriptions by Surface Type

The following definitions are used to describe pavement condition for the various surface types. These are general guidelines for condition indications.

Asphalt

Excellent – Recently constructed or overlaid road where construction or overlay was performed correctly- No maintenance required. RSL = 19-20 years.

Good – Low extent longitudinal and transverse cracks. All cracks are 1/4" or less with little or no crack erosion. Patches are in good condition and applied correctly. Routine Maintenance recommended. RSL = 13-18 years.

Fair - Roads are in good structural condition with little or no fatigue cracking. Longitudinal, transverse, and edge cracking is at medium extent and severity. Block cracking is not extensive. Any patches are in good condition. Preventative maintenance recommended. RSL = 7-12 years.

Poor - Road beginning to show signs of structural distress. Fatigue cracking is medium to high extent and medium severity. Cracking will be severe. Surface may have severe block cracking and show. Patches are in fair to poor condition. There is moderate distortion or rutting and occasional potholes. Rehabilitation recommended. RSL = 1-6 years.

Failed - Road is severely deteriorated. Signs of structural failure appear along with severe and extensive fatigue cracking, distortion, potholes, or extensive patches in poor condition. Reconstruction recommended. RSL = 0 years.

Concrete

Excellent - New pavement. No maintenance required. RSL = 19-20 years

Good - First signs of transverse cracking, patch or repair, more extensive pop-outs, or scaling. Sealing or routine maintenance recommended. RSL = 13-18 years.

Fair – Pavement has join or crack spalling, and/or faulting, along with cracking at corners with broken pieces. Any Patches are in fair condition and faulting is at a minimum. Preventative maintenance recommended. RSL = 7-12 years.

Poor - Joints and cracks are open 1 inch, spalled, or patched. Faulting is more severe. Rehabilitation recommended. RSL = 1-6 years.

Failed - Most slabs have failed structurally, and faulting is severe. Reconstruction recommended. RSL = 0 years.11-9

The following table shows the relationship between RSL and condition.

SUBJECTIVE CONDITION RATING FOR REMAINING SERVICE LIFE (Asphalt and Concrete Pavements)								
	FAILED	POOR		FAIR		GOOD		EXCELLENT
RSL Years	0	1-3	4-6	7-9	10-12	13-15	16-18	19-20

Gravel and Native

Note - Native surfaces do not have a gravel layer.

Excellent - Newly constructed road that has been constructed properly with proper crown, drainage and gravel layer. Little or no distress. No maintenance recommended. RSL = 8-10 years.

Good - Crown, drainage provisions, and gravel layer are in good condition. Distress limited to traffic effects such as dust, loose aggregate, and low severity corrugations (wash boarding). RSL = 5-7 years.

Fair - Adequate drainage and crown through majority of roadway. Crown repair, ditch improvement may be necessary. Road has more severe corrugations and potholes. Preventative maintenance recommended. RSL = 3-4 years.

Poor - Travel at slow speeds is necessary. Additional gravel layer needed to carry traffic. Poor crown. Ditching is inadequate and rutting is extensive and severe. Rehabilitation recommended. RSL = 1-2 years.

Failed - Travel is difficult, and road may be closed at times. Rutting and Corrugations are very severe. Total Reconstruction of road is recommended. RSL = 0 years.

The following table shows the RSL values for gravel and native roads in terms of excellent, good, fair, poor, and failed condition.

SUBJECTIVE CONDITION RATING FOR REMAINING SERVICE LIFE (Gravel and Native Surfaces)					
	FAILED	POOR	FAIR	GOOD	EXCELLENT
RSL Years	0	1-2	3-4	5-7	8-10

NATIVE PRIMITIVE/IMPROVED RATING SHEET

Cross Section (Crown)*

Severity	Condition		Description
	No Defects	0	Crown 4-6" with no restriction of water flow from centerline to ditch.
	Minor Defects	1	Inadequate or inconsistent crown. Drainage to ditch may be restricted.
	Moderate Defects	2	Flat crown, drainage to ditch restricted.
	Major Defects	3	Reverse crown, bowl-shaped road, drainage on roadway

Rutting

Severity	No Defects	Extent (Length) Low <10%	Med 10-30%	High >30%
	Low < 6"	1	2	3
	Med 6-12"	4	5	6
	High > 12"	7	8	9

Roadside Drainage*

Severity	Condition		Description
	No Defects	0	Wide, deep ditches (>4') with no restriction to water flow.
	Minor Defects	1	Adequate ditches (>2' deep), minor obstructions restrict water flow.
	Moderate Defects	2	Shallow, narrow and obstructed ditches. Minor erosion of road.
	Major Defects	3	No ditch, drainage on roadway with moderate to severe erosion.

Potholes

Severity	No Defects	Extent (Area) Low <10%	Med 10-30%	High >30%
	Low < 6"	1	2	3
	Med 6-12"	4	5	6
	High > 12"	7	8	9

Dust

Severity	Condition		Description
	No Defects	0	No obstruction to sight distance.
	Minor Defects	1	Sight distance > 550'
	Moderate Defects	2	Sight distance 225'-550'
	Major Defects	3	Sight distance < 225'

Corrugations

Severity	No Defects	Extent (Length) Low <10%	Med 10-30%	High >30%
	Low < 3"	1	2	3
	Med 3-6"	4	5	6
	High > 6"	7	8	9

* Crown and Drainage are not rated for roads that have no constructed crown or drainage. This applies to Native and Gravel roads.

GRAVEL RATING SHEET

Cross Section (Crown)

Severity	Condition		Description
	No Defects	0	Crown 4-6" with no restriction of water flow from centerline to ditch.
	Minor Defects	1	Inadequate or inconsistent crown. Drainage to ditch may be restricted.
	Moderate Defects	2	Flat crown, drainage to ditch restricted.
	Major Defects	3	Reverse crown, bowl-shaped road, drainage on roadway

Rutting

Severity	No Defects	Extent (Length) Low <10%	Med 10-30%	High >30%
	Low < 1"	1	2	3
	Med 1-3"	4	5	6
	High > 3"	7	8	9

Roadside Drainage

Severity	Condition		Description
	No Defects	0	Wide, deep ditches (>4') with no restriction to water flow.
	Minor Defects	1	Adequate ditches (>2' deep), minor obstructions restrict water flow.
	Moderate Defects	2	Shallow, narrow and obstructed ditches. Minor erosion of road.
	Major Defects	3	No ditch, drainage on roadway with moderate to severe erosion.

Potholes

Severity	No Defects	Extent (Area) Low <10%	Med 10-30%	High >30%
	Low < 1"	1	2	3
	Med 1-3"	4	5	6
	High > 3"	7	8	9

Dust

Severity	Condition		Description
	No Defects	0	No obstruction to sight distance.
	Minor Defects	1	Sight distance > 550'
	Moderate Defects	2	Sight distance 225'-550'
	Major Defects	3	Sight distance < 225'

Corrugations

Severity	No Defects	Extent (Length) Low <10%	Med 10-30%	High >30%
	Low < 2"	1	2	3
	Med 2-4"	4	5	6
	High > 4"	7	8	9

* Crown and Drainage are not rated for roads that have no constructed crown or drainage. This applies to Native and Gravel roads.

Loose Aggregate

Severity	No Defects	Extent (Area) Low <10%	Med 10-30%	High >30%
	Low < 1"	1	2	3
	Med 1-3"	4	5	6
	High > 3"	7	8	9

ASPHALT RATING SHEET

Fatigue Cracking

Severity	Extent: Low 1 crack WP	Extent: Med 2 cracks WP	Extent: High >30% length
Low-Cracks < 1/4"	1	2	3
Med-Cracks 1/4-3/4"	4	5	6
High-Cracks > 3/4"	7	8	9

Edge Cracking

Severity	Extent (Length): Low <10%	Extent (Length): Med 10-30%	Extent (Length): High >30%
0-6" from curb	1	2	3
6-18" from curb	4	5	6
> 18" from curb	7	8	9

Longitudinal Cracking

Severity	Extent: Low 1 crack full length	Extent: Med 2 cracks full length	Extent: High >2 cracks full length
Low-Cracks < 1/4"	1	2	3
Med-Cracks 1/4-3/4"	4	5	6
High-Cracks > 3/4"	7	8	9

Block Cracking

Severity	Extent (Length): Low > 15x15' squares	Extent (Length): Med 15-10' squares	Extent (Length): High <10x10' squares
Low-Cracks < 1/4"	1	2	3
Med-Cracks 1/4-3/4"	4	5	6
High-Cracks > 3/4"	7	8	9

Transverse Cracking

Severity	Extent (ft between cracks): Low > 200'	Extent (ft between cracks): Med 200-50'	Extent (ft between cracks): High < 50'
Low-Cracks < 1/4"	1	2	3
Med-Cracks 1/4-3/4"	4	5	6
High-Cracks > 3/4"	7	8	9

Utility Cuts

Severity	Extent (Length): Low <10%	Extent (Length): Med 10-30%	Extent (Length): High >30%
Low-Cracks < 1/4"	1	2	3
Med-Cracks 1/4-3/4"	4	5	6
High-Cracks > 3/4"	7	8	9

Drainage/Roughness/Rutting

Condition	Severity	Description
No Defects	0	Wide, deep ditches with no obstructions, smooth ride, no rutting, no potholes.
Minor Defects	1	Drainage may be obstructed, < 1" rutting, minor roughness.
Moderate Defects	2	Poor drainage, 1-2" rutting, noticeable roughness, potholes < 6" wide.
Major Defects	3	No drainage; > 2" rutting; potholes 6-12" wide create roughness requiring reduced speeds.

CONCRETE RATING SHEET

Spalling of Joints

Extent (% joints)

Severity	No Defects	Low <10%	Med 10-20%	High >20%
	Low Spalls < 3"	1	2	3
	Med Spalls 3-6"	4	5	6
	High Spalls > 6"	7	8	9

Broken Slabs

Extent (% slabs)

Severity	No Defects	Low <5%	Med 5-15%	High >15%
	Low-no more than 3 pieces, no spalling/faulting	1	2	3
	Med-broken into >3 pieces, spalling/faulting <1/4"	4	5	6
	High-4 or more pieces, spalling/faulting >1/4"	7	8	9

Transverse Cracks

Extent (% slabs)

Severity	No Defects	Low <10%	Med 10-20%	High >20%
	Low-Cracks < 1/8"; no spalling/faulting	1	2	3
	Med-Cracks 1/8-1/2"; spall <3", fault >1/4"	4	5	6
	High-Cracks > 1/2"; spall >3", fault >1/4"	7	8	9

Joint Seal Damage

Extent (%joints)

Severity	No Defects	Low <10%	Med 10-20%	High >20%
	Low <10% joint length	1	2	3
	Med 10-50% joint length	4	5	6
	High >50% joint length	7	8	9

Faulting

Extent (Length)

Severity	No Defects	Low <10%	Med 10-30%	High >30%
	Low < 1/2"	1	2	3
	Med 1/2-1"	4	5	6
	High > 1"	7	8	9

Patch Deterioration

Extent (Area)

Severity	No Defects	Low <10%	Med 10-30%	High >30%
	Low-no fault, no settle at perimeter	1	2	3
	Med-fault & settle <1/4" at perimeter	4	5	6
	High-fault & settle >1/4" at perimeter, cracked patch	7	8	9

Corner Breaks

Extent (% of slabs)

Severity	No Defects	Low <10%	Med 10-20%	High >20%
	Low-corner cracks, no spalling or faulting	1	2	3
	Med-crack slightly spalled & faulted <1/4"	4	5	6
	High-crack highly spalled & faulted >1/4"	7	8	9

Longitudinal Cracks

Extent (% slabs)

Severity	No Defects	Low <10%	Med 10-20%	High >20%
	Low-Cracks < 1/8"; no spalling/faulting	1	2	3
	Med-Cracks 1/8-1/2"; spall <3", fault >1/2"	4	5	6
	High-Cracks > 1/2"; spall >3", fault >1/2"	7	8	9

Map Cracks

Extent (Area)

Severity	No Defects	Low <10%	Med 10-20%	High >20%
	Low-small connected cracks, no spalling	1	2	3
	Med-connected cracks, no spalling	4	5	6
	High-large connected cracks with surface spalling	7	8	9

Deficiency Ratings With Associated Remaining Service Life

Asphalt Rating Sheet

Fatigue Cracking	
Distress Rating	Remaining Service Life
0	20
1	10
2	8
3	6
4	8
5	6
6	4
7	6
8	2
9	0

Edge Cracking	
Distress Rating	Remaining Service Life
0	20
1	12
2	10
3	8
4	10
5	8
6	6
7	8
8	6
9	4

Transverse Cracking	
Distress Rating	Remaining Service Life
0	20
1	14
2	12
3	10
4	12
5	10
6	8
7	10
8	6
9	2

Utility Cuts	
Distress Rating	Remaining Service Life
0	20
1	14
2	12
3	10
4	12
5	10
6	8
7	10
8	6
9	2

Longitudinal Cracking	
Distress Rating	Remaining Service Life
0	20
1	14
2	12
3	10
4	12
5	10
6	8
7	10
8	8
9	6

Block Cracking	
Distress Rating	Remaining Service Life
0	20
1	12
2	10
3	8
4	10
5	8
6	6
7	12
8	6
9	2

Drainage/Roughness/Rutting	
Distress Rating	Remaining Service Life
0	20
1	16
2	10
3	4

SUBJECTIVE CONDITION RATING FOR REMAINING SERVICE LIFE IN YEARS (Asphalt & Concrete Roads)

RSL	FAILED 0	POOR 1 - 6	FAIR 7 - 12	GOOD 13 - 18	EXCELLENT 19 - 20

Concrete Rating Sheet

Spalling	
Distress Rating	Remaining Service Life
0	20
1	15
2	12
3	10
4	12
5	10
6	8
7	10
8	6
9	0

Broken Slabs	
Distress Rating	Remaining Service Life
0	20
1	15
2	12
3	10
4	12
5	10
6	8
7	10
8	6
9	0

Transverse Cracks	
Distress Rating	Remaining Service Life
0	20
1	18
2	15
3	12
4	15
5	10
6	6
7	10
8	4
9	0

Joint Seal Damage	
Distress Rating	Remaining Service Life
0	20
1	16
2	14
3	12
4	14
5	10
6	8
7	12
8	8
9	6

Faulting	
Distress Rating	Remaining Service Life
0	20
1	15
2	12
3	10
4	12
5	8
6	6
7	10
8	4
9	0

Patch Deterioration	
Distress Rating	Remaining Service Life
0	18
1	16
2	14
3	12
4	12
5	10
6	8
7	10
8	6
9	0

Corner Breaks	
Distress Rating	Remaining Service Life
0	18
1	16
2	14
3	12
4	12
5	10
6	8
7	10
8	6
9	0

Longitudinal Cracks	
Distress Rating	Remaining Service Life
0	20
1	18
2	15
3	12
4	15
5	10
6	6
7	10
8	4
9	0

Map Cracks	
Distress Rating	Remaining Service Life
0	20
1	18
2	15
3	12
4	12
5	10
6	6
7	10
8	4
9	0

Deficiency Ratings With Associated Remaining Service Life

Native Primitive Improved Rating Sheet

Cross Section	
Distress Rating	Remaining Service Life
0	10
1	7
2	5
3	0

Rutting	
Distress Rating	Remaining Service Life
0	10
1	9
2	7
3	5
4	7
5	4
6	3
7	4
8	2
9	0

Roadside Drainage	
Distress Rating	Remaining Service Life
0	10
1	8
2	4
3	0

Potholes	
Distress Rating	Remaining Service Life
0	10
1	9
2	7
3	5
4	7
5	4
6	3
7	4
8	2
9	0

Dust	
Distress Rating	Remaining Service Life
0	10
1	8
2	6
3	2

Corrugations	
Distress Rating	Remaining Service Life
0	10
1	9
2	7
3	7
4	6
5	5
6	5
7	4
8	3
9	0

SUBJECTIVE CONDITION RATING FOR REMAINING SERVICE LIFE IN YEARS (Gravel & Native Roads)

RSL	FAILED 0	POOR 1 - 2	FAIR 3 - 4	GOOD 5 - 7	EXCELLENT 8 - 10

Gravel Rating Sheet

Cross Section	
Distress Rating	Remaining Service Life
0	10
1	7
2	5
3	0

Rutting	
Distress Rating	Remaining Service Life
0	10
1	9
2	7
3	5
4	7
5	4
6	3
7	4
8	2
9	0

Roadside Drainage	
Distress Rating	Remaining Service Life
0	10
1	8
2	4
3	0

Potholes	
Distress Rating	Remaining Service Life
0	10
1	9
2	7
3	5
4	7
5	4
6	3
7	4
8	2
9	0

Dust	
Distress Rating	Remaining Service Life
0	10
1	8
2	6
3	2

Corrugations	
Distress Rating	Remaining Service Life
0	10
1	9
2	7
3	7
4	6
5	5
6	5
7	4
8	3
9	0

Loose Aggregate	
Distress Rating	Remaining Service Life
0	10
1	9
2	8
3	7
4	8
5	7
6	6
7	5
8	3
9	0