national park service

The Road Inventory
of
Montezuma Castle National Monument
MOCA – 8650
Cycle 4

Prepared By:
Federal Highway Administration
Road Inventory Program
Cycle 4

DEPARTMENT OF TRANSPORTATION
UNITED STATES OF AMERICA

Montezuma Castle National Monument
in
Arizona

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Montezuma Castle National Monument

Section 1
Introduction

INTRODUCTION

Background: In 1976, the National Park Service (NPS) and the Federal Highway Administration (FHWA) entered into a Memorandum of Agreement (MOA), establishing the Road Inventory Program (RIP). In 1980, the NPS and the FHWA terminated the 1976 MOA and entered into a new MOA that provided for the completion of the initial phase of the RIP. The purpose of the RIP, per the 1980 MOA was to maintain and update RIP data in order to develop long-range costs and programs to bring National Park Service (NPS) roads up to, or to maintain, designated standards, and establish a maintenance management program.

The FHWA's Federal Lands Highway (FLH) was assigned the task of identifying condition deficiencies and corrective priorities along with associated corrective costs, inventorying maintenance features (e.g., culverts, signs, guardrail, etc.), summarizing the data and findings in a report and providing a photographic record of the road system.

The FLH completed the initial phase of the RIP in the early 1980's. As a result of this effort, each park received a RIP book, also known as the "Brown Book," that included the information collected during this initial RIP phase.

In an effort to maintain and update the RIP data, a cyclical data collection and reporting process was reestablished in the 1990's. The FLH completed two cycles of RIP data collection between 1994 and 2001. Cycle 1 was collected in 44 large parks from 1994 to 1996. This data was found to be unusable for comparison to future cycles. Cycle 2 data was collected from March 1997 to January 2001 in 79 large parks and 5 small parks containing 4,874 route miles. Each park received a copy of a Cycle 2 RIP Report, also known as the "Blue Book". Cycle 3 was completed from 2001 through 2004, and included data collection in all parks that contain pavement.

Since 1984, the RIP Program has been funded through the Federal Lands Highway Program's Park Roads and Parkways (PRP) Program. Currently, the NPS Washington Headquarters' Park Facility Management Division is responsible for coordinating the RIP program with the FLH. The FLH Washington office coordinates policy and prepares national reports and needs assessment studies for congress.

In 1998, the Transportation Equity Act for the 21st Century (TEA-21) amended Title 23 U.S.C., and inserted Section 204(a)(6) which requires the Federal Highway Administration and the National Park Service, to develop, by rule, a Pavement Management System (PMS) for the park roads and parkways serving the National Park System. As a result of the requirements in TEA-21, the NPS and FHWA are in the process of developing a PMS. The PMS will assist the decision-makers in effectively spending limited PRP Program funds. The PMS

will provide information for planning and programming road maintenance, rehabilitation, and reconstruction activities. RIP data will provide the basic information for this system.

Key information included in the RIP is the mileage inventory and condition assessments accomplished by the RIP Program. The mileage and condition data are used in the current allocation formula of PRP Program funds.

RIP Cycle 4: Cycle 4 data collection was initiated in spring 2006, where 86 large parks, consisting of 5,553 route miles and 6,232 paved parking areas, were selected as a representative sample of the entire NPS paved road network. Cycle 4 is scheduled for completion in spring 2009 and will serve the PMS in further development of its pavement preservation techniques.

In the Cycle 4 Reports, a general condition rating of excellent, good, fair and poor is ascribed to each one-mile section of paved roadway, and to each paved parking area. This condition rating system provides a realistic means of assessing the general funding needs for road improvements. Along with these descriptive condition ratings, a numerical rating between 0 and 100 is ascribed to each mile of road and to each parking area. This numerical rating is called a Pavement Condition Rating (PCR). The PCR rating system is described in Section 10 of this report.

All of the fieldwork required for obtaining inventory, condition, and maintenance feature information is coordinated with each park and the regional offices to ensure that the information in the RIP reports is accurate.

The FLH is responsible for all the data presented in this report. Anyone having questions or comments regarding the contents of this report is encouraged to contact the FHWA RIP Coordinator. It is our aim to provide exceptional customer satisfaction in our delivery of the RIP program.

The FHWA RIP Team

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Montezuma Castle National Monument

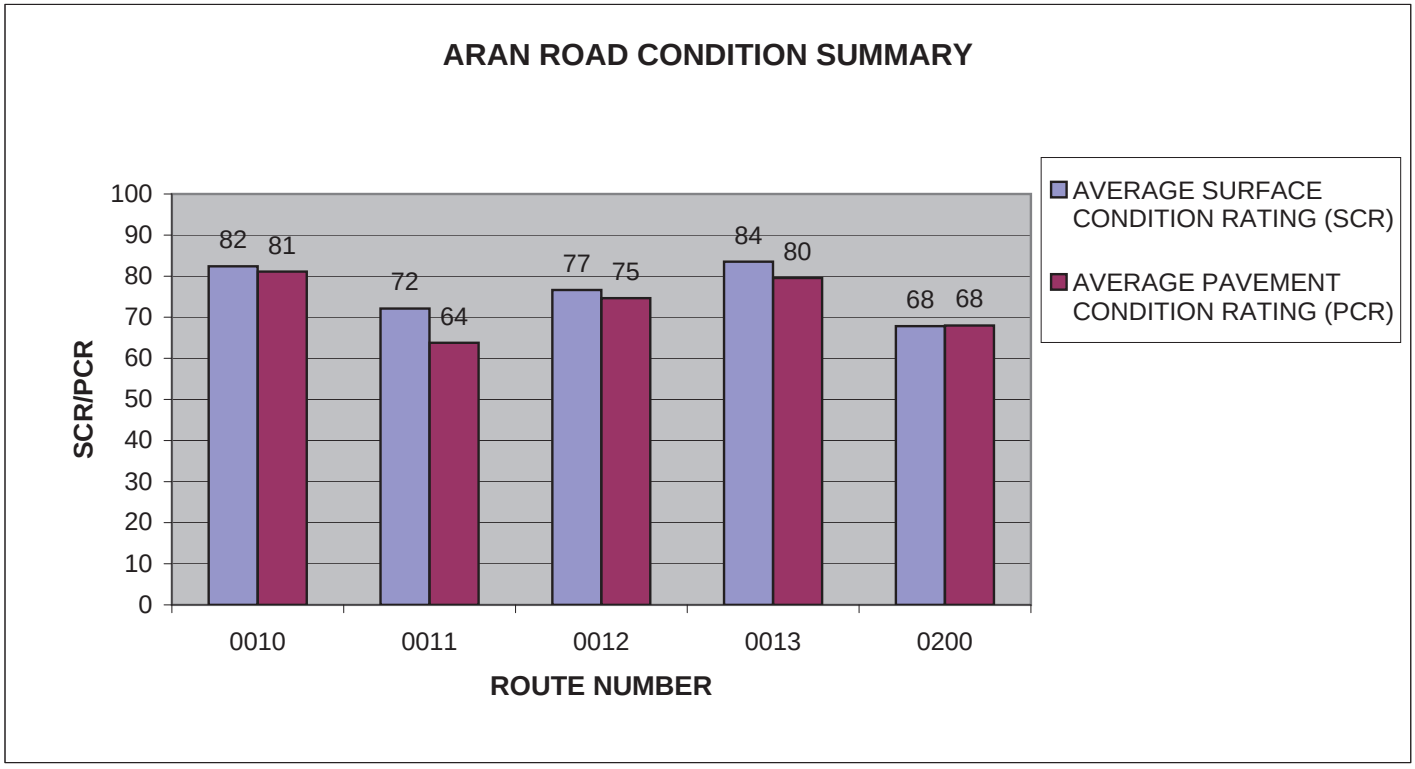
Section 2
Park Summary Information

MOCA: PAVED ROUTE MILES AND PERCENTAGES BY FUNCTIONAL CLASS AND PCR

F.C.	Pavement Condition Rating (PCR)								TOTAL MILES
	Poor (<=60)		Fair (61-84)		Good (85-94)		Excellent (95-100)		
	MILES	%	MILES	%	MILES	%	MILES	%	
1	0.25	9.92%	1.20	47.62%	0.70	27.78%	0.02	0.79%	**2.17**
2	0.04	1.59%	0.08	3.17%					**0.12**
3									
4									
5	0.06	2.38%	0.14	5.56%	0.03	1.19%			**0.23**
6									
7									
8									
Totals	**0.35**	**13.89%**	**1.42**	**56.35%**	**0.73**	**28.97%**	**0.02**	**0.79%**	**2.52**

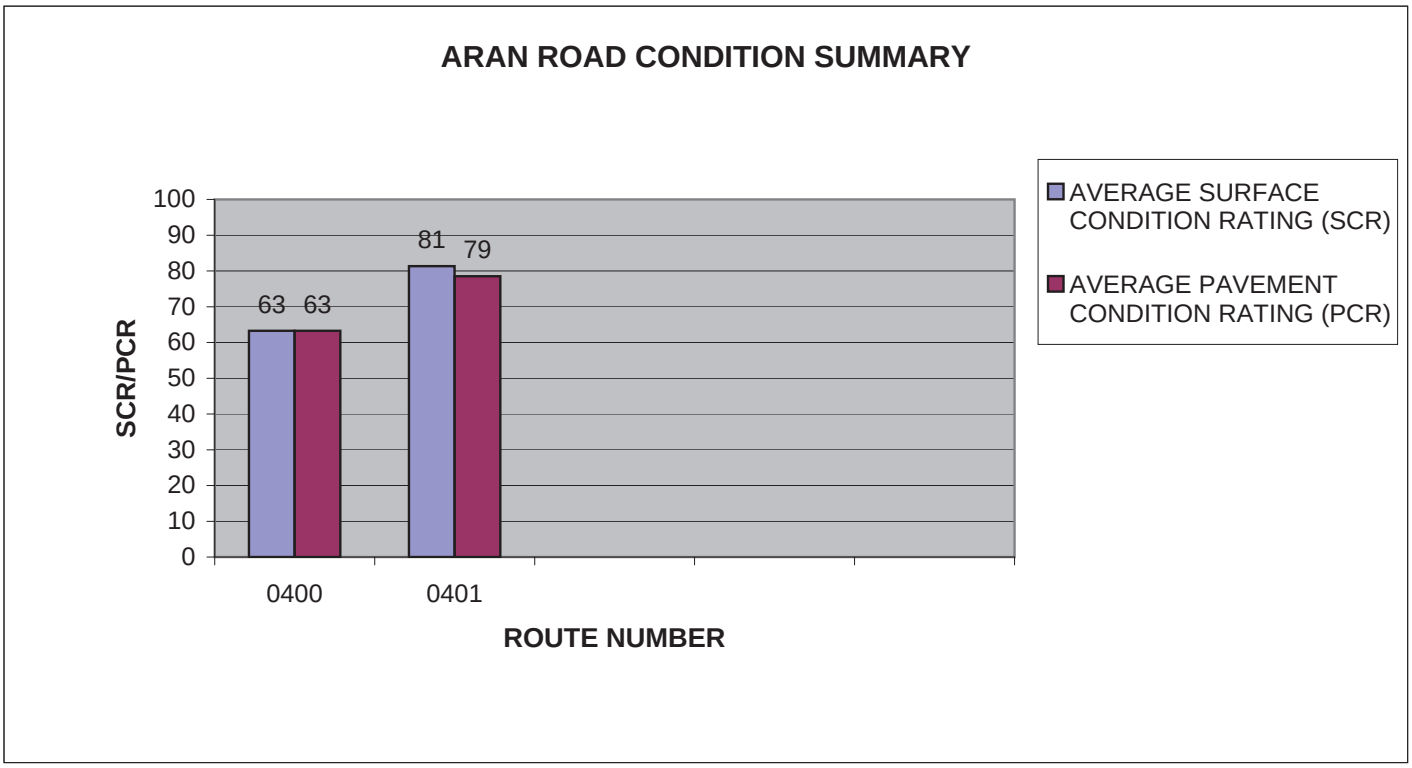
MOCA: ARAN ROAD CONDITION SUMMARY

ROUTE NUMBER	ROUTE NAME	FUNCT CLASS	ROUTE LENGTH	SURFACE TYPE	AVERAGE SURFACE CONDITION RATING (SCR)	AVERAGE PAVEMENT CONDITION RATING (PCR)
0010	MOCA CASTLE ACCESS ROAD	1	1.12	ASPHALT	82	81
0011	MOWE WELL ACCESS ROAD	1	0.37	ASPHALT	72	64
0012	MOCA BEAVER CREEK ESTATES ROAD	1	0.22	ASPHALT	77	75
0013	MOWE BEAVER CREEK ROAD	1	0.71	ASPHALT	84	80
0200	MOWE PICNIC AREA ROAD	2	0.12	ASPHALT	68	68



MOCA: ARAN ROAD CONDITION SUMMARY

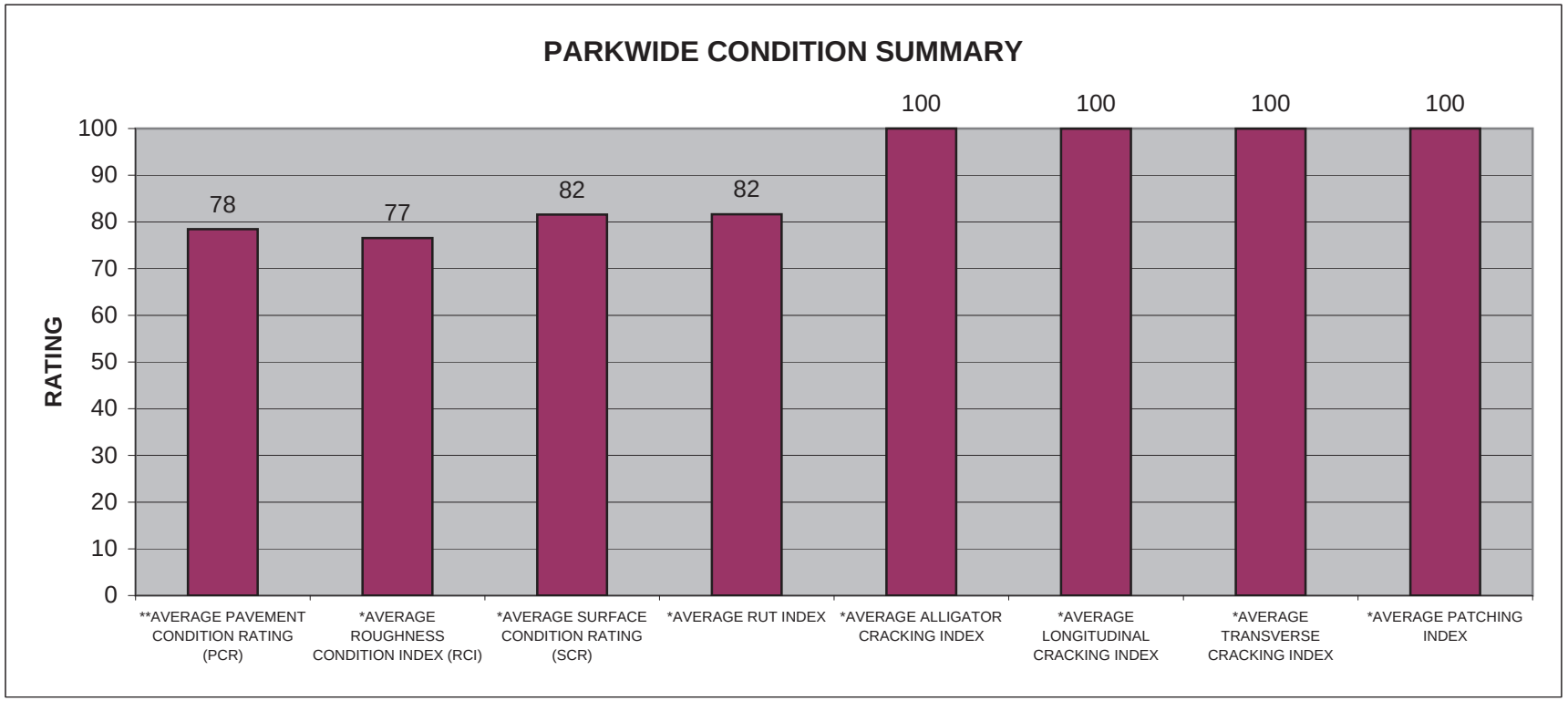
ROUTE NUMBER	ROUTE NAME	FUNCT CLASS	ROUTE LENGTH	SURFACE TYPE	AVERAGE SURFACE CONDITION RATING (SCR)	AVERAGE PAVEMENT CONDITION RATING (PCR)
0400	MOCA RESIDENCE AREA ROAD	5	0.08	ASPHALT	63	63
0401	MOWE RESIDENCE ROAD	5	0.15	ASPHALT	81	79



MOCA: PARKWIDE CONDITION SUMMARY

**AVERAGE PAVEMENT CONDITION RATING (PCR)	*AVERAGE ROUGHNESS CONDITION INDEX (RCI)	*AVERAGE SURFACE CONDITION RATING (SCR)	*AVERAGE RUT INDEX	*AVERAGE ALLIGATOR CRACKING INDEX	*AVERAGE LONGITUDINAL CRACKING INDEX	*AVERAGE TRANSVERSE CRACKING INDEX	*AVERAGE PATCHING INDEX
78	77	82	82	100	100	100	100

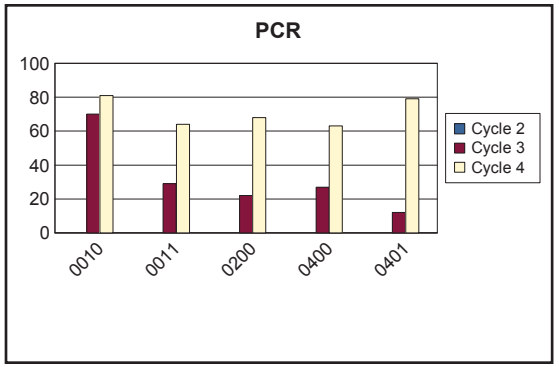
*** PCR Index is based on all ARAN-driven roads, parking areas, and manually rated routes.*
** Index values are based on ARAN-driven roads only.*

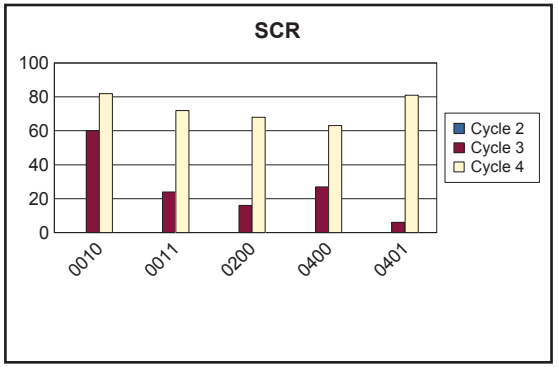


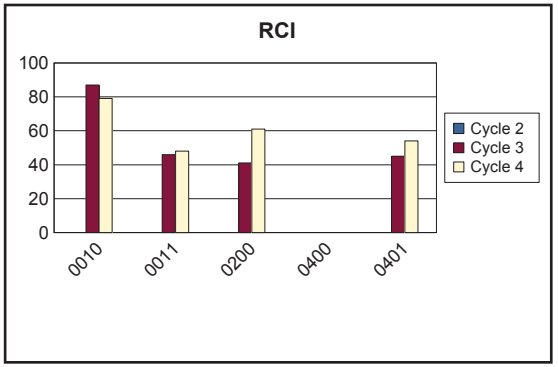
Data Collected 10/26/2009

MOCA CYCLE 2 vs CYCLE 3 vs CYCLE 4 CONDITION COMPARISONS

				PAVEMENT CONDITION RATING (PCR)				SURFACE CONDITION RATING (SCR)				ROUGHNESS CONDITION INDEX (RCI)				
ROUTE NUMBER	PAVED MILES	FROM MILEPOST	TO MILEPOST	CYCLE 2	CYCLE 3	CYCLE 4	PERCENT CHANGE	CYCLE 2	CYCLE 3	CYCLE 4	PERCENT CHANGE	CYCLE 2	CYCLE 3	CYCLE 4	PERCENT CHANGE	COMMENT
0010	1.12	0.00	1.12	N/A	70	81	+16%	N/A	60	82	+37%	N/A	87	79	-9%	
0011	0.38	0.00	0.38	N/A	29	64	+121%	N/A	24	72	+200%	N/A	46	48	+4%	
0200	0.13	0.00	0.13	N/A	22	68	+209%	N/A	16	68	+325%	N/A	41	61	+49%	
0400	0.09	0.00	0.09	N/A	27	63	+133%	N/A	27	63	+133%	N/A	N/A	N/A	N/A	RCI not collected in Cycle 3 or Cycle 4.
0401	0.16	0.00	0.16	N/A	12	79	+558%	N/A	6	81	+1250%	N/A	45	54	+20%	





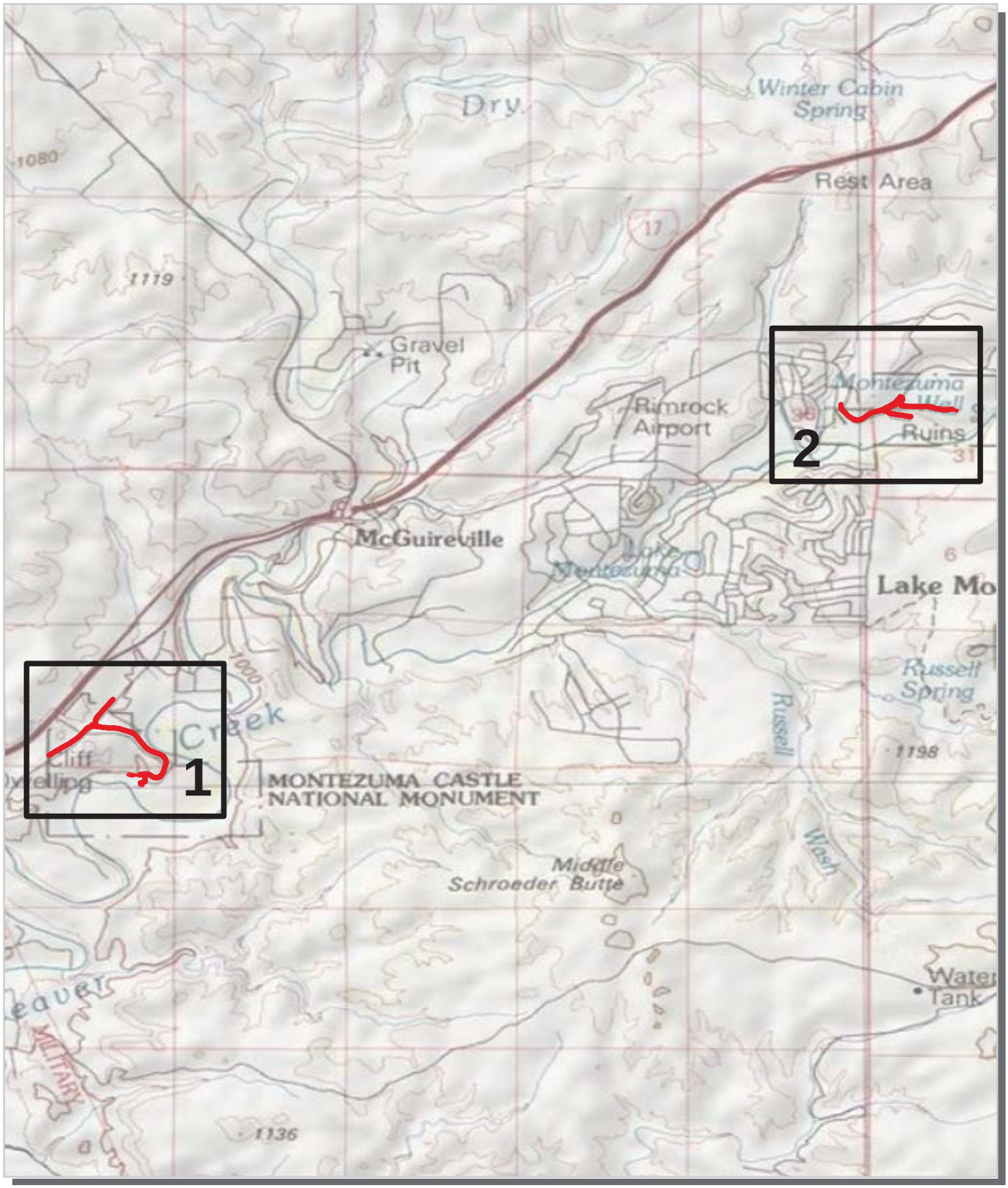


Cycle 4 Data Collected 10/26/2009 - 10/26/2009

Montezuma Castle National Monument

Section 3
Park Route Location / Condition Maps

Montezuma Castle National Monument
Route Location Map
Key Map

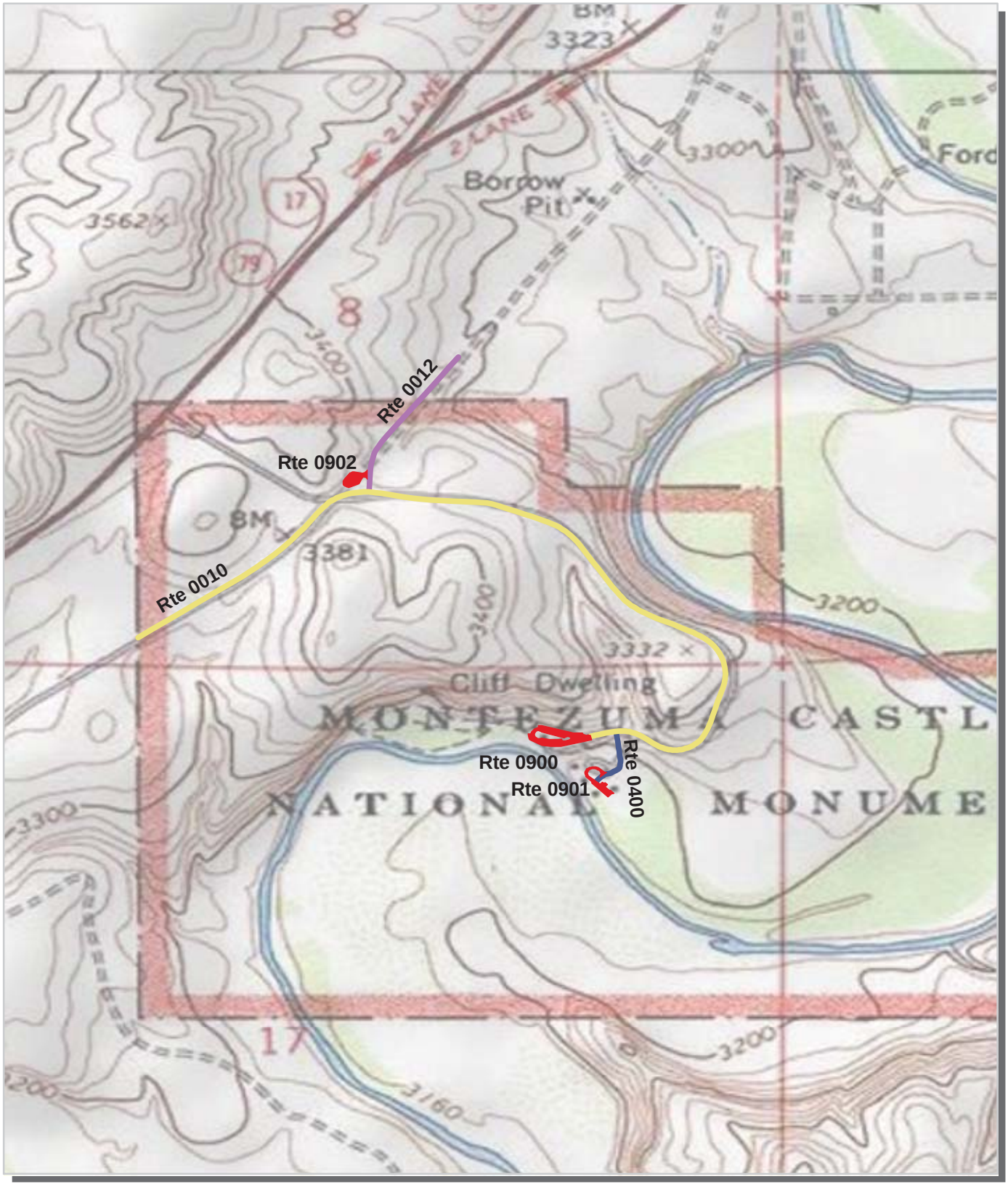


Park Owned Routes

1 0.5 0 1 Miles

N

Montezuma Castle National Monument
Route Location Map
Area 1

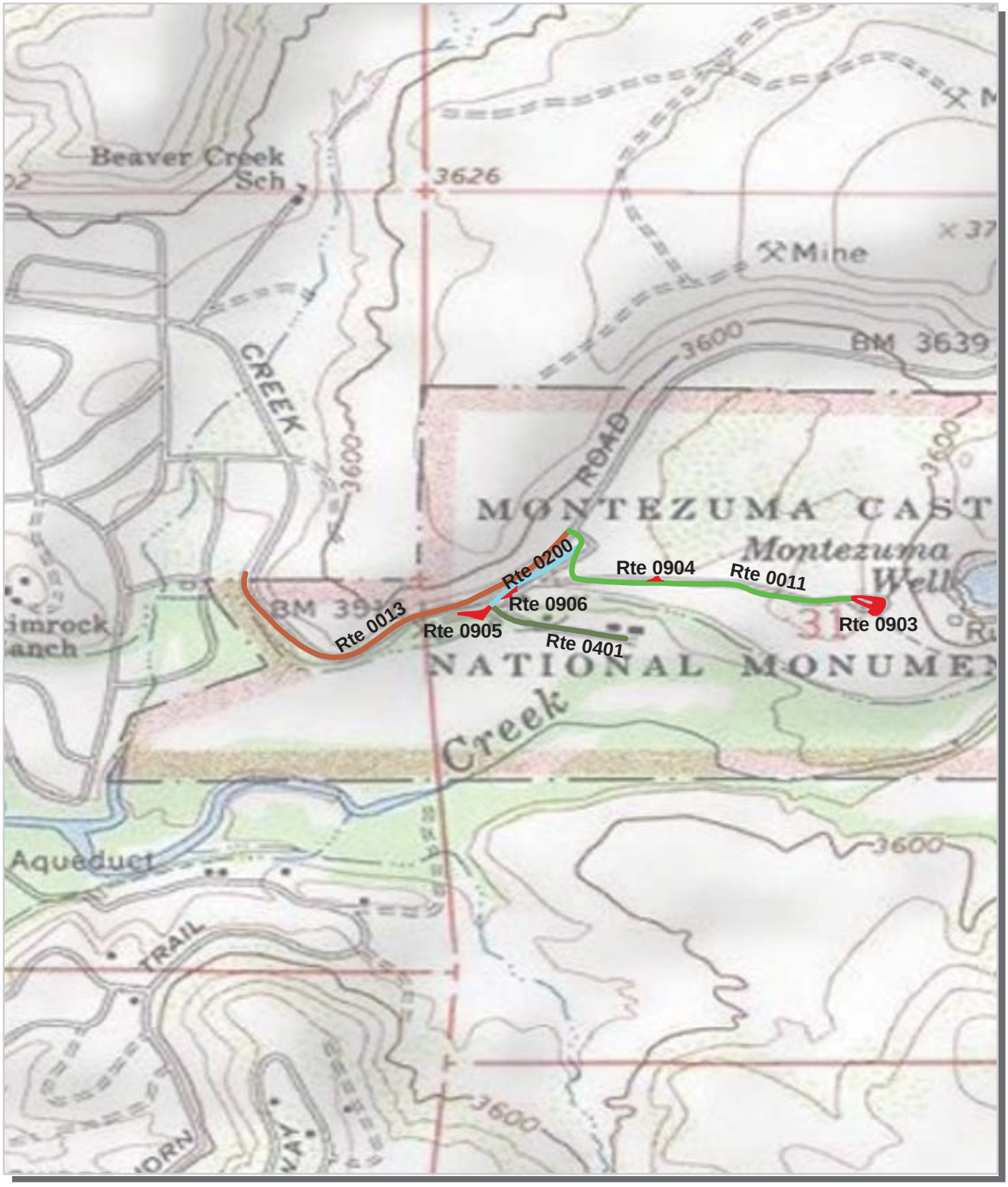


Unique colors used to differentiate routes

0.2 0.1 0 0.2 Miles

N

Montezuma Castle National Monument
Route Location Map
Area 2

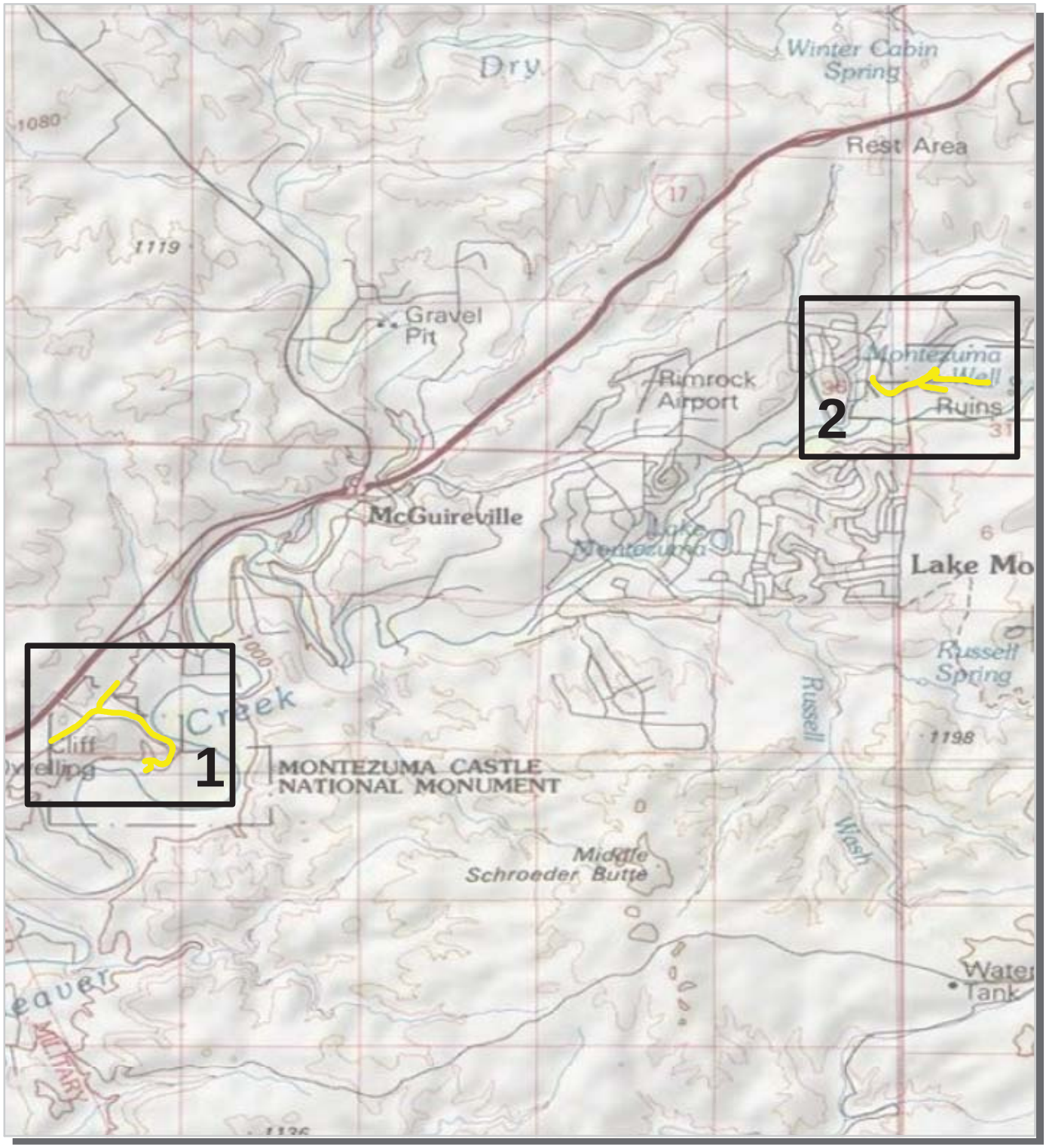


Unique colors used to differentiate routes

0.2 0.1 0 0.2
Miles

N

Montezuma Castle National Monument
Route Condition Map
PCR - Mile by Mile
Key Map



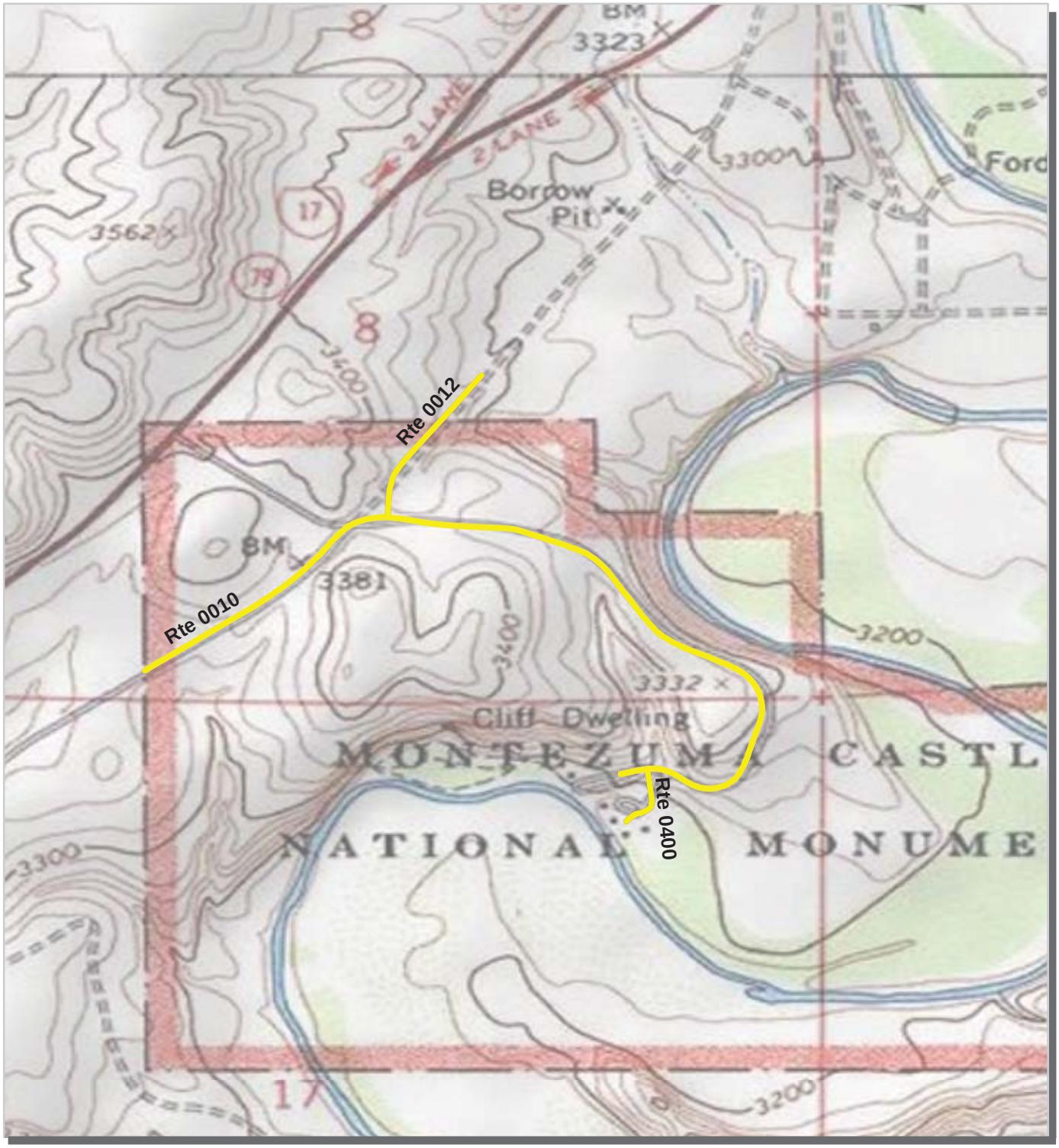
PCR	Poor	Fair	Good	Excellent	No Data
	(<=60)	(61 - 84)	(85 - 94)	(95 - 100)	

* If the PCR rating is not available for a section, the SCR rating will be displayed. See appendix for definitions and formulas.

1 0.5 0 1 Miles

N

Montezuma Castle National Monument
Route Condition Map
PCR - Mile by Mile
Area 1



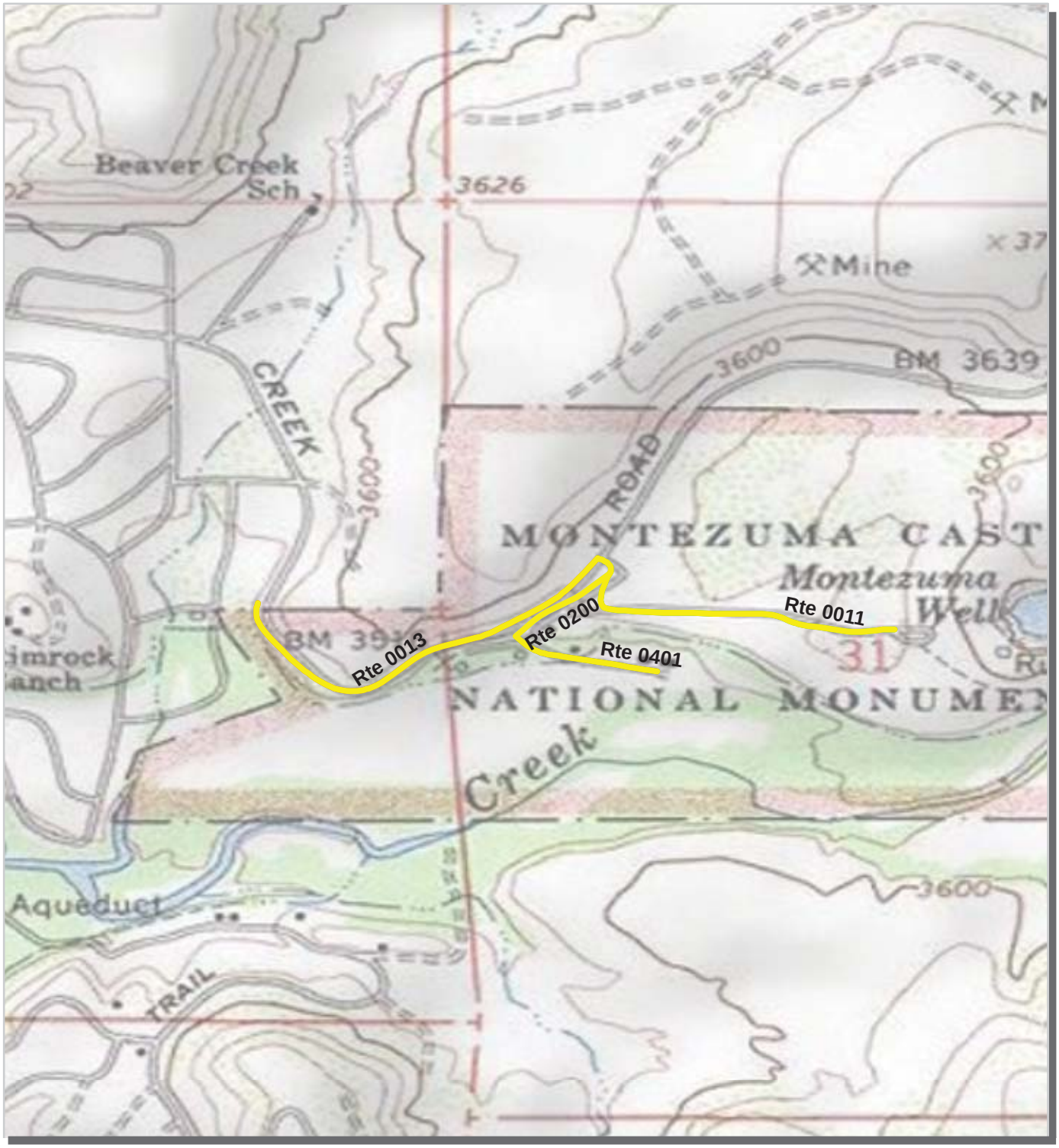
PCR	Poor	Fair	Good	Excellent	No Data
	(<=60)	(61 - 84)	(85 - 94)	(95 - 100)	

* If the PCR rating is not available for a section, the SCR rating will be displayed. See appendix for definitions and formulas.

0.2 0.1 0 0.2 Miles

N

Montezuma Castle National Monument
Route Condition Map
PCR - Mile by Mile
Area 2



PCR	Poor	Fair	Good	Excellent	No Data
	(<=60)	(61 - 84)	(85 - 94)	(95 - 100)	

* If the PCR rating is not available for a section, the SCR rating will be displayed. See appendix for definitions and formulas.

0.2 0.1 0 0.2 Miles

N

Montezuma Castle National Monument

Section 4
Park Route Inventory

NPS/RIP Route ID Report

Shading Color Key:
Red text denotes approx. mileage

White = Paved Routes, ARAN Driven
Yellow = Unpaved Routes, ARAN not Driven
Blue = All Paved Parking Areas
Green = All Unpaved Parking Areas
Grey = Paved Routes, ARAN not Driven
Black = Paved State, Local or Private non-NPS Routes, ARAN Driven
= Concession Route Flag ON

** Unpaved Routes displayed on report were obtained from FMSS database and not inventoried by Road Inventory Program (RIP)

MOCA

MONTEZUMA CASTLE NATIONAL MONUMENT

Rte. No.	FMSS No.	Concess Route	Route Name	Route Description From	Route Description To	Maint. District	Paved Miles	Un-Paved Miles	Total Route Length	Func. Class	Rte. Lanes	Manual Rated SQ/FT	Surf. Type	Area Maps
0010	13300		MOCA CASTLE ACCESS ROAD	FROM PARK BOUNDARY (PAVEMENT CHANGE AND FENCE)	TO ROUTE 0900 (MOCA CASTLE VISITOR CENTER PARKING)	N/A	1.120	0.000	1.120	1		0	AS	1
0011	13354		MOWE WELL ACCESS ROAD	FROM ROUTE 0013 (MOWE BEAVER CREEK ROAD) AT MP 0.46 (ON RIGHT)	TO ROUTE 0903 (MOWE WELL PARKING)	N/A	0.370	0.000	0.370	1		0	AS	2
0012	N/A		MOCA BEAVER CREEK ESTATES ROAD	FROM ROUTE 0010 (MOCA CASTLE ACCESS ROAD) AT MP 0.34 (ON LEFT)	TO PARK BOUNDARY (FENCE)	N/A	0.220	0.000	0.220	1		0	AS	1
0013	N/A		MOWE BEAVER CREEK ROAD	FROM WEST PARK BOUNDARY (PAVEMENT CHANGE)	TO NORTH PARK BOUNDARY (FENCE)	N/A	0.460	0.250	0.710	1		0	AS	2
0200	58031		MOWE PICNIC AREA ROAD	FROM ROUTE 0011 (MOWE WELL ACCESS ROAD) AT MP 0.03 (ON RIGHT)	TO ROUTE 0905 (MOWE PICNIC AREA PARKING)	N/A	0.120	0.000	0.120	2		0	AS	2
0400	13318		MOCA RESIDENCE AREA ROAD	FROM ROUTE 0010 (MOCA CASTLE ACCESS ROAD) AT MP 1.07 (ON LEFT)	TO ROUTE 0901 (MOCA RESIDENCE AREA PARKING)	N/A	0.080	0.000	0.080	5		0	AS	1
0401	13358		MOWE RESIDENCE ROAD	FROM ROUTE 0200 (MOWE PICNIC AREA ROAD) AT MP 0.12 (ON LEFT)	TO DEAD END AT DRIVEWAY	N/A	0.150	0.000	0.150	5		0	AS	2
0402	26615		MOWE SOUTH BOUNDARY ROAD	FROM ROUTE 0401 (MOWE RESIDENCE ROAD)	TO TRAIL	N/A	0.000	0.250	0.250	6		0	NV	
0403	29319		MOCA LAGOON ROAD	FROM ROUTE 0400 (MOCA RESIDENCE AREA ROAD)	TO LAGOON	N/A	0.000	0.200	0.200	5		0	GR	
0404	N/A		MOCA WATER TANK ROAD	FROM ROUTE 0010 (MOCA CASTLE ACCESS ROAD)	TO WATER TANK	N/A	0.000	0.500	0.500	6		0	NV	
0600	N/A		MOCA PARK LANE	FROM CREST VIEW DRIVE	TO BEAVER CREEK	N/A	0.000	0.250	0.250	8		0	NV	
0900	58028		MOCA CASTLE VISITOR CENTER PARKING	FROM ROUTE 0010 (MOCA CASTLE ACCESS ROAD) AT END	TO PARKING	N/A	0.000	0.000	0.000			30,927	AS	1
0901	58033		MOCA RESIDENCE AREA PARKING	FROM ROUTE 0400 (MOCA RESIDENCE AREA ROAD) AT END	TO ROUTE 0403 (MOCA LAGOON ROAD)	N/A	0.000	0.000	0.000			10,424	AS	1
0902	58036		MOCA ELEPHANT TRACKS PARKING	FROM ROUTE 0012 (MOCA BEAVER CREEK ESTATES ROAD) AT MP 0.02 (ON LEFT)	TO PARKING	N/A	0.000	0.000	0.000			11,115	AS	1
0903	58041		MOWE WELL PARKING	FROM ROUTE 0011 (MOWE WELL ACCESS ROAD) AT END	TO PARKING	N/A	0.000	0.000	0.000			13,339	AS	2

NPS/RIP Route ID Report

Shading Color Key:
Red text denotes approx. mileage

White = Paved Routes, ARAN Driven
Yellow = Unpaved Routes, ARAN not Driven
Blue = All Paved Parking Areas
Green = All Unpaved Parking Areas
Grey = Paved Routes, ARAN not Driven
Black = Paved State, Local or Private non-NPS Routes, ARAN Driven
= Concession Route Flag ON

** Unpaved Routes displayed on report were obtained from FMSS database and not inventoried by Road Inventory Program (RIP)

MOCA

MONTEZUMA CASTLE NATIONAL MONUMENT

Rte. No.	FMSS No.	Concess Route	Route Name	Route Description From	To	Maint. District	Paved Miles	Un-Paved Miles	Total Route Length	Func. Class	Rte. Lanes	Manual Rated SQ/FT	Surf. Type	Area Maps
0904	58044		MOWE PITHOUSE PARKING	ADJACENT TO ROUTE 0011 (MOWE WELL ACCESS ROAD)		N/A	0.000	0.000	0.000			1,493	AS	2
0905	58047		MOWE PICNIC AREA PARKING	FROM ROUTE 0200 (MOWE PICNIC AREA ROAD) AT END	TO PARKING	N/A	0.000	0.000	0.000			7,439	AS	2
0906	58048		MOWE PREHISTORIC DITCH PARKING	ADJACENT TO ROUTE 0200 (MOWE PICNIC AREA ROAD)		N/A	0.000	0.000	0.000			1,828	AS	2

SUMMARY TOTALS FOR MONTEZUMA CASTLE NATIONAL MONUMENT

ROUTE TOTALS

ARAN Driven Route Miles	2.520
All Paved Route Miles	2.520
All Unpaved Route Miles	1.450
TOTAL PARK ROUTE MILES	3.970
All Manually Rated Roads (SQFT)	0

LANE MILE TOTALS

ARAN Driven Lane Miles	5.299
Paved Parking Lane Miles	1.318
Paved MRR Lane Miles	0.000
TOTAL PAVED LANE MILES	6.617

CONCESSION TOTALS

Concession Paved Route Miles	0.000
Concession Unpaved Route Miles	0.000
Concession Paved Parking Area SQFT	0
Concession Unpaved Parking Area SQFT	0
Concession Paved MRR SQFT	0

PARKING AREA TOTALS

All Paved Parking (SQFT)	76,566
All Unpaved Parking (SQFT)	0
TOTAL ALL PARKING (SQFT)	76,566

WEIGHTED AVERAGE PARK VALUES

PCR (Rating)	SCR (Rating)	RCI (Rating)	RUT (Index)	AC (Index)	LC (Index)	TC (Index)	PATCH (Index)	PCR (Concession)
78.45	81.56	76.54	81.63	100.00	99.97	99.96	100.00	N/A

NPS/RIP Route ID Report

Shading Color Key:
Red text denotes approx. mileage

White = Paved Routes, ARAN Driven
Yellow = Unpaved Routes, ARAN not Driven
Blue = All Paved Parking Areas
Green = All Unpaved Parking Areas
Grey = Paved Routes, ARAN not Driven
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= Concession Route Flag ON

** Unpaved Routes displayed on report were obtained from FMSS database and not inventoried by Road Inventory Program (RIP)

General Park Road Functional Classification Table

Class 1 Principal Park Road/Rural Parkway (Public Roads) Roads which constitute the main access route, circulatory tour, or thoroughfare for park visitors. Route Numbers 1 - 99. Note: Rural parkways (e.g. Natchez Trace) are numbered 1 - 9. State Routes Inventoried for Park. Route Numbers 5000-5999

Class 2 Connector Park Road (Public Roads) - Roads which provide access within a park to areas of scenic, scientific, recreational or cultural interest, such as overlooks, campgrounds, etc. Route Numbers 100-199.

Class 3 Special Purpose Park Road (Public Roads) - Roads which provide circulation within public areas, such as campgrounds, picnic areas, visitor center complexes, concessionaire facilities, etc. These roads generally serve low-speed traffic and are often designed for one-way circulation. Route Numbers 200-299.

Class 4 Primitive Park Roads (Public Roads) - Roads which provide circulation through remote areas and/or access to primitive campgrounds and undeveloped areas. These roads frequently have no minimum design standards and their use may be limited to specially equipped vehicles. Route Numbers 200-299.
Note: Functional Classes 3 and 4 have the same route numbers because, historically, they were numbered similarly.

Class 5 Administrative Access Road (Administrative Roads) - All public roads intended for access to administrative developments or structures such as park offices, employee quarters, or utility areas. Route Numbers 400-499.

Class 6 Restricted Road (Administrative Roads) - All roads normally closed to the public, including patrol roads, truck trails, and other similar roads. Route Numbers 400-499.
Note: Functional Classes 5 and 6 have the same route numbers because historically they were numbered similarly and often there is little distinction between these routes. For example, because utility areas and employee housing are often closed to the public, this restriction would result in classification of FC 6 rather than FC 5.

Class 7 Urban Parkway (Urban Parkways and City Streets) - These facilities serve high volumes of park and non-park related traffic and are restricted, limited-access facilities in an urban area. This category of roads primarily encompasses the major parkways which serve as gateways to our nation's capital. Other major park roads or portions thereof, however, may be included in this category. Route Numbers 1-9.

Class 8 City Streets (Urban Parkways and City Streets) - City streets are usually extensions of the adjoining street system that are owned and maintained by the National Park Service. The construction and/or reconstruction should conform with accepted local engineering practice and local conditions. Route Numbers 600-699.

****

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

The historic route numbering system also included a 300 number series for interpretive roads, and a 500 series for one-way roads. There are approximately 250 roads nationwide which are designated by the 300 and 500 series. The numbers for these roads will be maintained for reporting consistency. However, since these interpretive and one-way routes are not as clearly tied to a specific functional class, the 300 and 500 series will be discontinued for future use.

5000 route numbers are assigned to Non-NPS Routes that are State, County or City owned which border, traverse, or provide access to Park Facilities or Assets. 5000 Routes are driven for GPS, Video Log and Road Features only.

Surface Type Abbreviations:

AS - Asphaltic Concrete Pavement

CO - Portland Cement Concrete Pavement

BR - Brick or Pavers Road Bed

CB - Cobble Stone Road Bed

GR - Gravel Road Bed

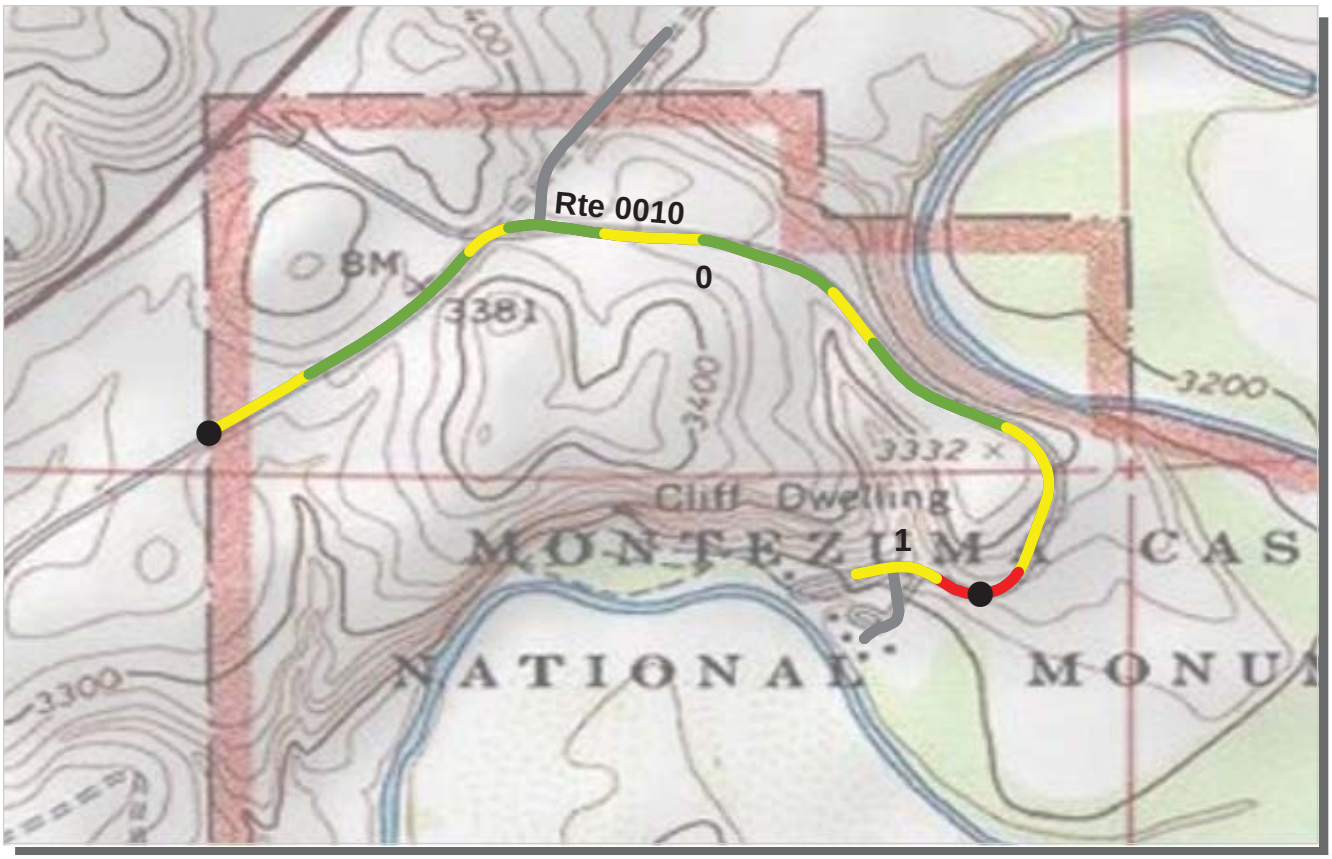
SA - Sand Road Bed

NV - Native or Dirt Material Road Bed

OT - Other Materials Road Bed

Montezuma Castle National Monument

Section 5
Paved Route Condition Rating Sheets (CRS)



PCR Poor (<=60) Fair (61 - 84) Good (85 - 94) Excellent (95 - 100) No Data

* If the PCR rating is not available for a section, the SCR rating will be displayed. See appendix for definitions and formulas.

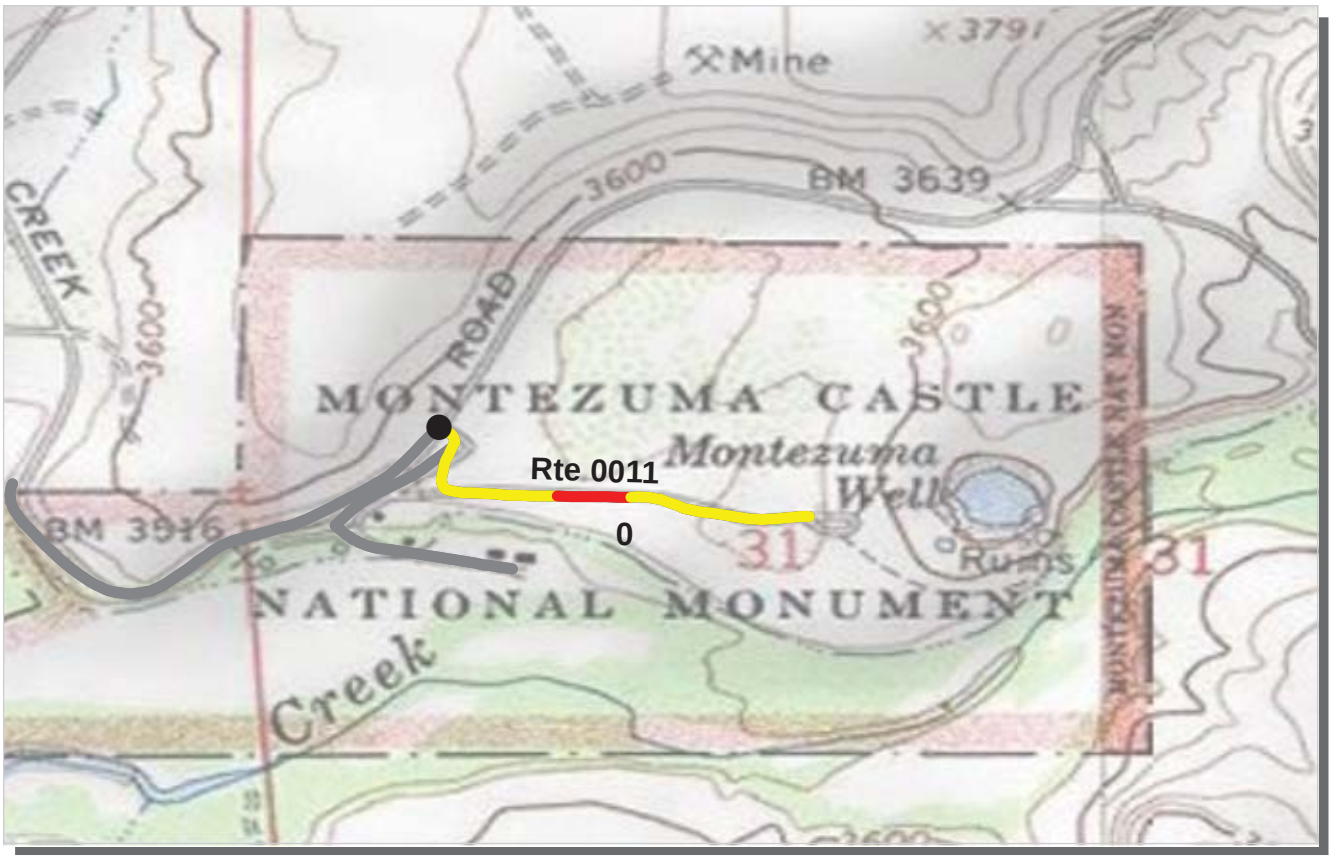
ROUTE: 0010 MOCA CASTLE ACCESS ROAD
MOCA : MONTEZUMA CASTLE NATIONAL MONUMENT

COLLECTED: 10/26/2009

INTERMOUNTAIN REGION **TOTAL LENGTH: 1.12 Miles**

Section Number	0	1			
Section Length (mi)	1.00	0.12			
Traffic					
AADT	Traffic data may be found at www.efl.fhwa.dot.gov Click on PROGRAMS / NPS Traffic Data (Note: Not all parks have traffic data)				
SADT					
ADT Date					
Cross Section Information					
Number of Lanes	2	2			
Paved Width (ft)	26	32			
Lane Width (ft)	10	13			
Shoulder Width Right (ft)	NC	NC			
Shoulder Width Left (ft)	NC	NC			
Roadway Condition Information					
SCR (Surface Condition Rating)	84	71			
PCR (Pavement Condition Rating)	83	64			
Distress Index Values					
Alligator Cracking Index	100	100			
Longitudinal Cracking Index	100	100			
Tranverse Cracking Index	100	100			
Patching Index	100	100			
Rutting Index	84	71			
Roughness Condition Index (RCI)	82	54			

NC - Not Collected



PCR Poor (<=60) Fair (61 - 84) Good (85 - 94) Excellent (95 - 100) No Data

* If the PCR rating is not available for a section, the SCR rating will be displayed. See appendix for definitions and formulas.

ROUTE: 0011 MOWE WELL ACCESS ROAD
MOCA : MONTEZUMA CASTLE NATIONAL MONUMENT

COLLECTED: 10/26/2009
INTERMOUNTAIN REGION **TOTAL LENGTH: 0.37 Miles**

Section Number	0				
Section Length (mi)	0.37				
Traffic					
AADT	Traffic data may be found at www.efl.fhwa.dot.gov Click on PROGRAMS / NPS Traffic Data (Note: Not all parks have traffic data)				
SADT					
ADT Date					
Cross Section Information					
Number of Lanes	2				
Paved Width (ft)	19				
Lane Width (ft)	9				
Shoulder Width Right (ft)	NC				
Shoulder Width Left (ft)	NC				
Roadway Condition Information					
SCR (Surface Condition Rating)	72				
PCR (Pavement Condition Rating)	64				
Distress Index Values					
Alligator Cracking Index	100				
Longitudinal Cracking Index	100				
Tranverse Cracking Index	100				
Patching Index	100				
Rutting Index	72				
Roughness Condition Index (RCI)	48				

NC - Not Collected

PCR Poor (<=60) Fair (61 - 84) Good (85 - 94) Excellent (95 - 100) No Data

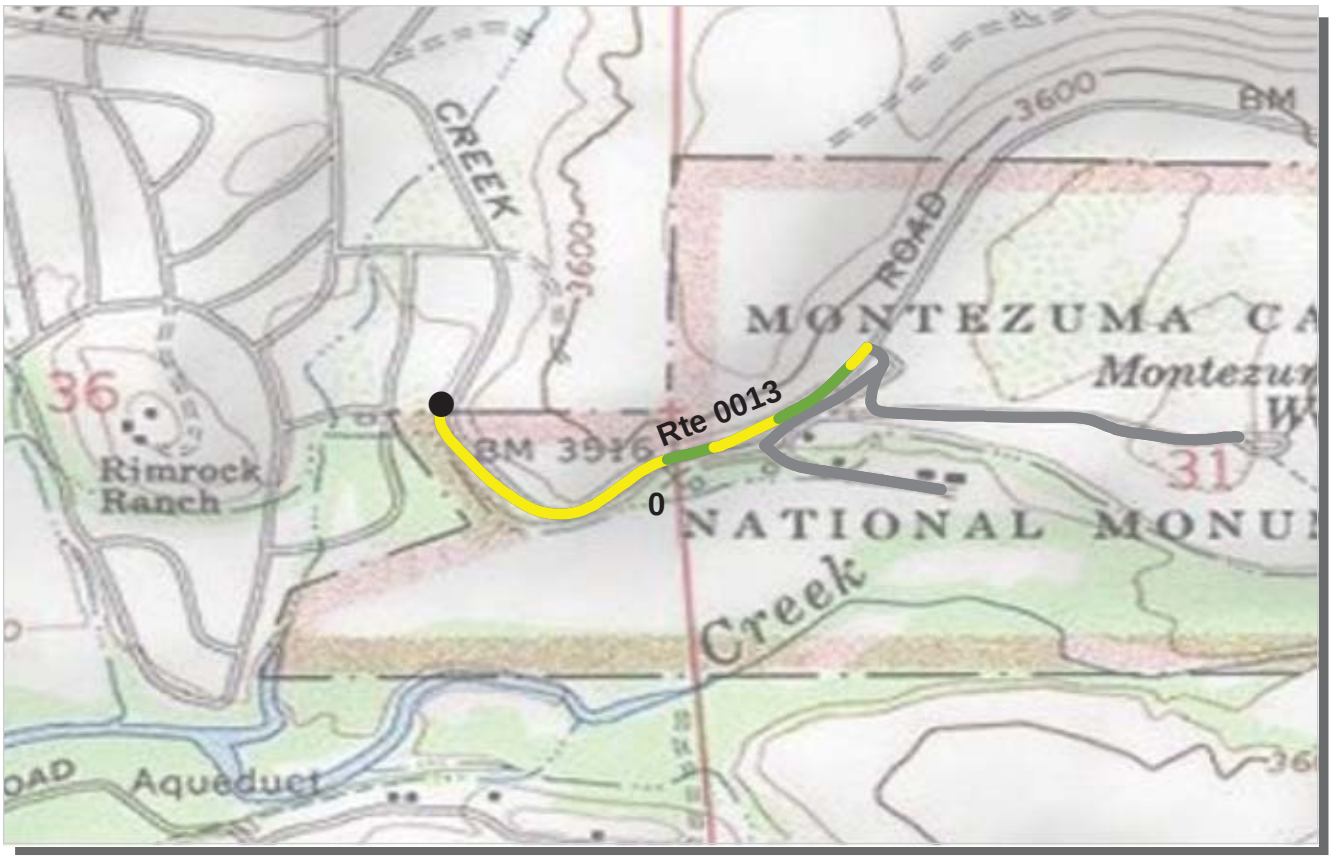
* If the PCR rating is not available for a section, the SCR rating will be displayed. See appendix for definitions and formulas.

ROUTE: 0012 MOCA BEAVER CREEK ESTATES ROAD
MOCA : MONTEZUMA CASTLE NATIONAL MONUMENT

COLLECTED: 10/26/2009
INTERMOUNTAIN REGION **TOTAL LENGTH: 0.22 Miles**

Section Number	0				
Section Length (mi)	0.22				
Traffic					
AADT	Traffic data may be found at www.efl.fhwa.dot.gov Click on PROGRAMS / NPS Traffic Data (Note: Not all parks have traffic data)				
SADT					
ADT Date					
Cross Section Information					
Number of Lanes	2				
Paved Width (ft)	26				
Lane Width (ft)	13				
Shoulder Width Right (ft)	NC				
Shoulder Width Left (ft)	NC				
Roadway Condition Information					
SCR (Surface Condition Rating)	77				
PCR (Pavement Condition Rating)	75				
Distress Index Values					
Alligator Cracking Index	100				
Longitudinal Cracking Index	100				
Tranverse Cracking Index	99				
Patching Index	100				
Rutting Index	78				
Roughness Condition Index (RCI)	74				

NC - Not Collected



PCR Poor (<=60) Fair (61 - 84) Good (85 - 94) Excellent (95 - 100) No Data

* If the PCR rating is not available for a section, the SCR rating will be displayed. See appendix for definitions and formulas.

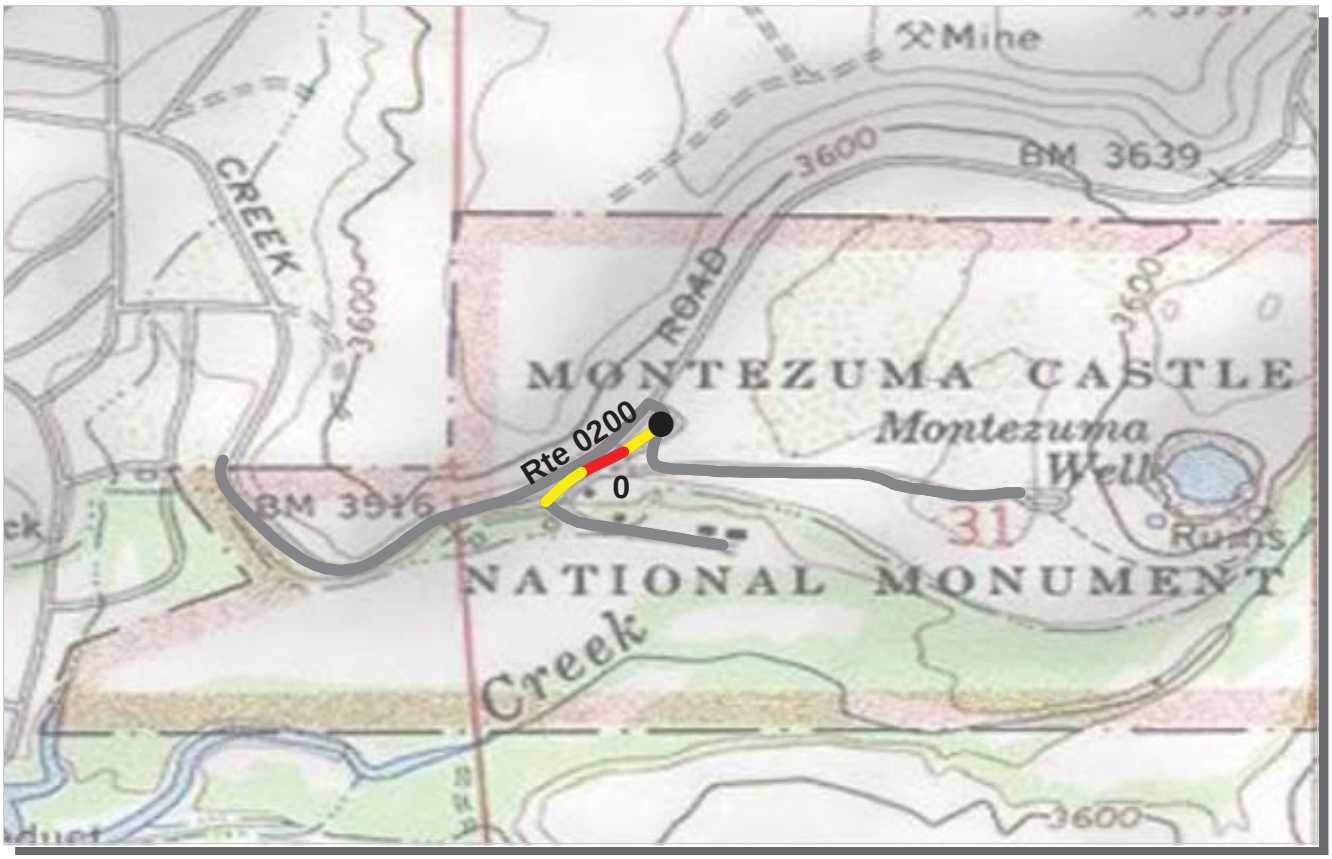
ROUTE: 0013 MOWE BEAVER CREEK ROAD
MOCA : MONTEZUMA CASTLE NATIONAL MONUMENT

COLLECTED: 10/26/2009
INTERMOUNTAIN REGION **TOTAL LENGTH: 0.46 Miles**

Section Number	0				
Section Length (mi)	0.46				
Traffic	Traffic data may be found at www.efl.fhwa.dot.gov Click on PROGRAMS / NPS Traffic Data (Note: Not all parks have traffic data)				
AADT					
SADT					
ADT Date					
Cross Section Information					
Number of Lanes	2				
Paved Width (ft)	22				
Lane Width (ft)	9				
Shoulder Width Right (ft)	NC				
Shoulder Width Left (ft)	NC				
Roadway Condition Information					
SCR (Surface Condition Rating)	84				
PCR (Pavement Condition Rating)	80				
Distress Index Values					
Alligator Cracking Index	100				
Longitudinal Cracking Index	100				
Tranverse Cracking Index	100				
Patching Index	100				
Rutting Index	84				
Roughness Condition Index (RCI)	73				

NC - Not Collected

ROUTE: 0013 MOWE BEAVER CREEK ROAD



PCR Poor (<=60) Fair (61 - 84) Good (85 - 94) Excellent (95 - 100) No Data

* If the PCR rating is not available for a section, the SCR rating will be displayed. See appendix for definitions and formulas.

ROUTE: 0200 MOWE PICNIC AREA ROAD
MOCA : MONTEZUMA CASTLE NATIONAL MONUMENT

COLLECTED: 10/26/2009
INTERMOUNTAIN REGION **TOTAL LENGTH: 0.12 Miles**

Section Number	0				
Section Length (mi)	0.12				
Traffic	Traffic data may be found at www.efl.fhwa.dot.gov Click on PROGRAMS / NPS Traffic Data (Note: Not all parks have traffic data)				
AADT					
SADT					
ADT Date					
Cross Section Information					
Number of Lanes	2				
Paved Width (ft)	18				
Lane Width (ft)	9				
Shoulder Width Right (ft)	NC				
Shoulder Width Left (ft)	NC				
Roadway Condition Information					
SCR (Surface Condition Rating)	68				
PCR (Pavement Condition Rating)	68				
Distress Index Values					
Alligator Cracking Index	100				
Longitudinal Cracking Index	100				
Tranverse Cracking Index	100				
Patching Index	100				
Rutting Index	68				
Roughness Condition Index (RCI)	61				

NC - Not Collected

PCR Poor (<=60) Fair (61 - 84) Good (85 - 94) Excellent (95 - 100) No Data

* If the PCR rating is not available for a section, the SCR rating will be displayed. See appendix for definitions and formulas.

ROUTE: 0400 MOCA RESIDENCE AREA ROAD
MOCA : MONTEZUMA CASTLE NATIONAL MONUMENT

COLLECTED: 10/26/2009
INTERMOUNTAIN REGION **TOTAL LENGTH: 0.08 Miles**

Section Number	0				
Section Length (mi)	0.08				
Traffic					
AADT	Traffic data may be found at www.efl.fhwa.dot.gov Click on PROGRAMS / NPS Traffic Data (Note: Not all parks have traffic data)				
SADT					
ADT Date					
Cross Section Information					
Number of Lanes	2				
Paved Width (ft)	20				
Lane Width (ft)	10				
Shoulder Width Right (ft)	NC				
Shoulder Width Left (ft)	NC				
Roadway Condition Information					
SCR (Surface Condition Rating)	63				
PCR (Pavement Condition Rating)	63				
Distress Index Values					
Alligator Cracking Index	100				
Longitudinal Cracking Index	100				
Tranverse Cracking Index	100				
Patching Index	100				
Rutting Index	63				
Roughness Condition Index (RCI)	NC				

NC - Not Collected

PCR Poor (<=60) Fair (61 - 84) Good (85 - 94) Excellent (95 - 100) No Data

* If the PCR rating is not available for a section, the SCR rating will be displayed. See appendix for definitions and formulas.

ROUTE: 0401 MOWE RESIDENCE ROAD
MOCA : MONTEZUMA CASTLE NATIONAL MONUMENT

COLLECTED: 10/26/2009
INTERMOUNTAIN REGION **TOTAL LENGTH: 0.15 Miles**

Section Number	0				
Section Length (mi)	0.15				
Traffic					
AADT	Traffic data may be found at www.efl.fhwa.dot.gov Click on PROGRAMS / NPS Traffic Data (Note: Not all parks have traffic data)				
SADT					
ADT Date					
Cross Section Information					
Number of Lanes	2				
Paved Width (ft)	17				
Lane Width (ft)	8				
Shoulder Width Right (ft)	NC				
Shoulder Width Left (ft)	NC				
Roadway Condition Information					
SCR (Surface Condition Rating)	82				
PCR (Pavement Condition Rating)	79				
Distress Index Values					
Alligator Cracking Index	100				
Longitudinal Cracking Index	100				
Tranverse Cracking Index	100				
Patching Index	100				
Rutting Index	82				
Roughness Condition Index (RCI)	54				

NC - Not Collected

ROUTE: 0401 MOWE RESIDENCE ROAD

Montezuma Castle National Monument

Section 6
Manually Rated Paved Route Condition Rating Sheets (MRR)

Section 6: Manually Rated Paved Route Condition Rating Sheets

No data available for this section.

Montezuma Castle National Monument

Section 7
Parking Area Condition Rating Sheets

MONTEZUMA CASTLE NATIONAL MONUMENT

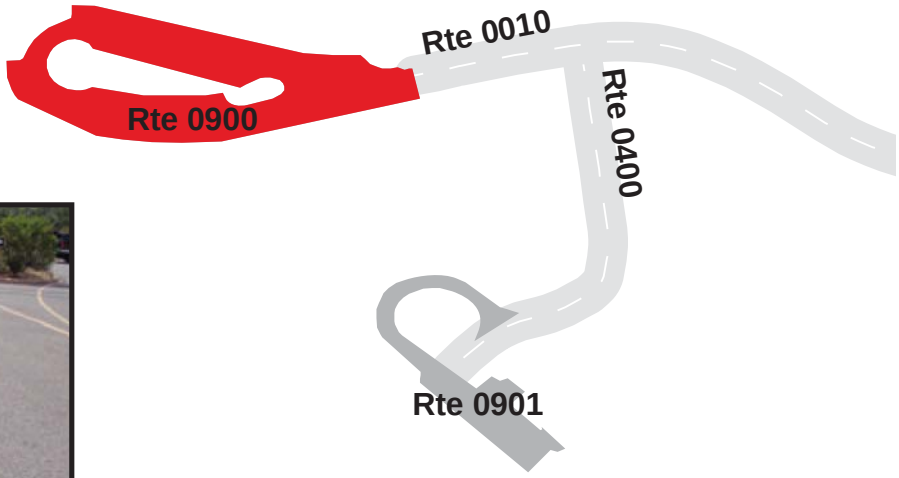
Route 0900

MOCA CASTLE VISITOR CENTER PARKING

FROM ROUTE 0010 (MOCA CASTLE ACCESS ROAD) AT END
TO PARKING

Route Number	Public / NonPublic	Date Visited		Area (sq ft)	Lane Miles *	Surface Type
0900	PUBLIC	9/11/2009		30,927	0.53	AS
Culverts	**Drop Inlets**	**Gates**	**Fire Hydrants**	**Curb & Gutter**	**Curb**	**PCR**
0	0	0	0	CONCRETE CURB AND GUTTER	NO CURB	GOOD/90

* Lane miles are based on 11' lane widths



320 160 0 320
Feet

N

MONTEZUMA CASTLE NATIONAL MONUMENT

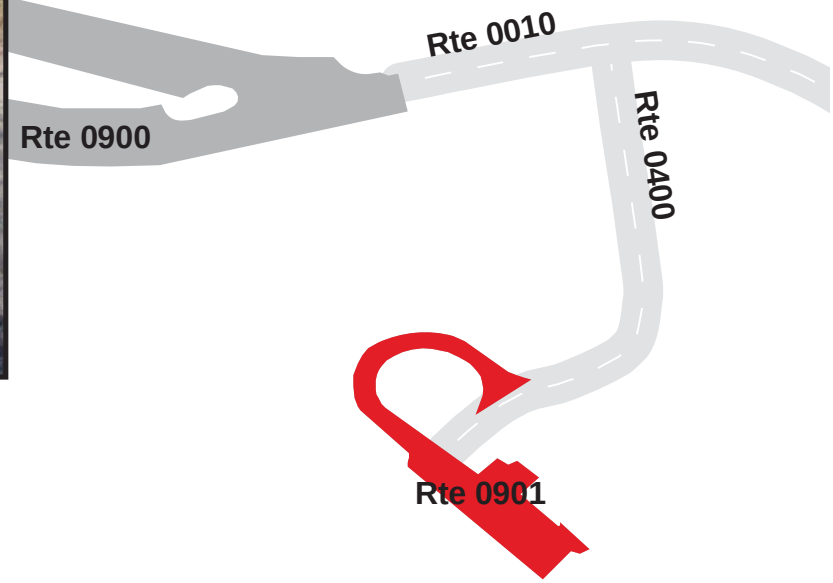
Route 0901

MOCA RESIDENCE AREA PARKING

FROM ROUTE 0400 (MOCA RESIDENCE AREA ROAD) AT END
TO ROUTE 0403 (MOCA LAGOON ROAD)

Route Number	Public / NonPublic	Date Visited		Area (sq ft)	Lane Miles *	Surface Type
0901	PUBLIC	9/11/2009		10,424	0.18	AS
Culverts	**Drop Inlets**	**Gates**	**Fire Hydrants**	**Curb & Gutter**	**Curb**	**PCR**
0	0	0	2	CONCRETE CURB AND GUTTER	NO CURB	FAIR/73

* Lane miles are based on 11' lane widths



250 125 0 250
Feet

N

MONTEZUMA CASTLE NATIONAL MONUMENT

Route 0902

MOCA ELEPHANT TRACKS PARKING

FROM ROUTE 0012 (MOCA BEAVER CREEK ESTATES ROAD) AT MP 0.02 (ON LEFT)

TO PARKING

Route Number	Public / NonPublic	Date Visited		Area (sq ft)	Lane Miles *	Surface Type
0902	NONPUBLIC	9/11/2009		11,115	0.19	AS
Culverts	**Drop Inlets**	**Gates**	**Fire Hydrants**	**Curb & Gutter**	**Curb**	**PCR**
0	0	1	1	NO CURB AND GUTTER	NO CURB	GOOD/90

* Lane miles are based on 11' lane widths

MONTEZUMA CASTLE NATIONAL MONUMENT

Route 0903

MOWE WELL PARKING

FROM ROUTE 0011 (MOWE WELL ACCESS ROAD) AT END
TO PARKING

Route Number	Public / NonPublic	Date Visited		Area (sq ft)	Lane Miles *	Surface Type
0903	PUBLIC	9/11/2009		13,339	0.23	AS
Culverts	**Drop Inlets**	**Gates**	**Fire Hydrants**	**Curb & Gutter**	**Curb**	**PCR**
0	0	0	0	NO CURB AND GUTTER	NO CURB	FAIR/73

* Lane miles are based on 11' lane widths

150 75 0 150
Feet

MONTEZUMA CASTLE NATIONAL MONUMENT

Route 0904

MOWE PITHOUSE PARKING

ADJACENT TO ROUTE 0011 (MOWE WELL ACCESS ROAD)

Route Number	Public / NonPublic	Date Visited		Area (sq ft)	Lane Miles *	Surface Type
0904	PUBLIC	9/11/2009		1,493	0.03	AS
Culverts	**Drop Inlets**	**Gates**	**Fire Hydrants**	**Curb & Gutter**	**Curb**	**PCR**
0	0	0	0	NO CURB AND GUTTER	NO CURB	FAIR/73

* Lane miles are based on 11' lane widths

MONTEZUMA CASTLE NATIONAL MONUMENT

Route 0905

MOWE PICNIC AREA PARKING

FROM ROUTE 0200 (MOWE PICNIC AREA ROAD) AT END
TO PARKING

Route Number	Public / NonPublic	Date Visited		Area (sq ft)	Lane Miles *	Surface Type
0905	PUBLIC	9/11/2009		7,439	0.13	AS
Culverts	**Drop Inlets**	**Gates**	**Fire Hydrants**	**Curb & Gutter**	**Curb**	**PCR**
0	0	0	0	NO CURB AND GUTTER	NO CURB	GOOD/90

* Lane miles are based on 11' lane widths

190 95 0 190
Feet

N

MONTEZUMA CASTLE NATIONAL MONUMENT

Route 0906

MOWE PREHISTORIC DITCH PARKING

ADJACENT TO ROUTE 0200 (MOWE PICNIC AREA ROAD)

Route Number	Public / NonPublic	Date Visited		Area (sq ft)	Lane Miles *	Surface Type
0906	PUBLIC	9/11/2009		1,828	0.03	AS
Culverts	**Drop Inlets**	**Gates**	**Fire Hydrants**	**Curb & Gutter**	**Curb**	**PCR**
0	0	0	0	NO CURB AND GUTTER	NO CURB	FAIR/73

* Lane miles are based on 11' lane widths

Montezuma Castle National Monument

Section 8
Parkwide / Route Maintenance
Features Summaries

MOCA: PARKWIDE MAINTENANCE FEATURES SUMMARY

Notice: Culverts and drop inlets were marked by NPS and inventoried by RIP in Cycle 4, therefore the culvert and drop inlet count below includes those on ARAN-driven routes, Manually Rated Routes and in Paved Parking Areas.

FEATURE	LINEAR FEET	COUNT
BARRIER	1,294	--
BOLLARD	0	--
BRIDGE	--	0
CABLE	0	--
CATTLE GUARD	--	1
CULVERT	--	15
CURB	0	--
DROP INLET	--	4
FIRE HYDRANT	--	3
GATE	--	3
GUARD/GUIDE RAIL	1,294	--
GUARD/GUIDE WALL	0	--
INTERSECTION	--	32
LOW WATER CROSSING	0	0
MILE MARKER	--	0
OVERPASS	--	0
OVERHEAD SIGN	--	0
PARK BOUNDARY	--	3
PAVED DITCH	1,579	--
PULLOUT	--	0
RAILROAD CROSSING	--	0
RETAINING WALL	0	0
SIGN	--	59
STATE BOUNDARY	--	0
TEMPORARY BARRIER	0	--
TRAFFIC LIGHT	--	0
TUNNEL	0	0
TURNOUT	0	--

MOCA: ROUTE MAINTENANCE FEATURES SUMMARY

FEATURE	ROUTE 0010 MOCA CASTLE ACCESS ROAD	ROUTE 0011 MOWE WELL ACCESS ROAD	ROUTE 0012 MOCA BEAVER CREEK ESTATES ROAD	ROUTE 0013 MOWE BEAVER CREEK ROAD	ROUTE 0200 MOWE PICNIC AREA ROAD	ROUTE 0400 MOCA RESIDENCE AREA ROAD	UNIT
BARRIER	491	0	0	803	0	0	LINEAR FEET
BOLLARD	0	0	0	0	0	0	LINEAR FEET
BRIDGE	0	0	0	0	0	0	EACH
CABLE	0	0	0	0	0	0	LINEAR FEET
CATTLE GUARD	1	0	0	0	0	0	EACH
CULVERT	8	0	1	4	1	0	EACH
CURB	0	0	0	0	0	0	LINEAR FEET
DROP INLET	4	0	0	0	0	0	EACH
FIRE HYDRANT	0	0	0	0	0	0	EACH
GATE	1	1	0	0	0	0	EACH
GUARD/GUIDE RAIL	491	0	0	803	0	0	LINEAR FEET
GUARD/GUIDE WALL	0	0	0	0	0	0	LINEAR FEET
INTERSECTION	5	5	4	3	5	5	EACH
LOW WATER CROSSING	0	0	0	0	0	0	EACH
LOW WATER CROSSING	0	0	0	0	0	0	LINEAR FEET
MILE MARKER	0	0	0	0	0	0	EACH
OVERHEAD SIGN	0	0	0	0	0	0	EACH
OVERPASS	0	0	0	0	0	0	EACH
PARK BOUNDARY	1	0	1	1	0	0	EACH
PAVED DITCH	1,579	0	0	0	0	0	LINEAR FEET
PULLOUT	0	0	0	0	0	0	EACH
RAILROAD CROSSING	0	0	0	0	0	0	EACH
RETAINING WALL	0	0	0	0	0	0	EACH
RETAINING WALL	0	0	0	0	0	0	LINEAR FEET
SIGN	23	11	7	8	7	3	EACH
STATE BOUNDARY	0	0	0	0	0	0	EACH
TEMPORARY BARRIER	0	0	0	0	0	0	LINEAR FEET
TRAFFIC LIGHT	0	0	0	0	0	0	EACH
TUNNEL	0	0	0	0	0	0	EACH
TUNNEL	0	0	0	0	0	0	LINEAR FEET
TURNOUT	0	0	0	0	0	0	LINEAR FEET

Notice: Culverts and drop inlets were marked by NPS and inventoried by RIP in Cycle 4, therefore the culvert and drop inlet count below includes those on ARAN-driven routes, Manually Rated Routes and in Paved Parking Areas.

MOCA: ROUTE MAINTENANCE FEATURES SUMMARY

FEATURE	ROUTE 0401 MOWE RESIDENCE ROAD	UNIT
BARRIER	0	LINEAR FEET
BOLLARD	0	LINEAR FEET
BRIDGE	0	EACH
CABLE	0	LINEAR FEET
CATTLE GUARD	0	EACH
CULVERT	1	EACH
CURB	0	LINEAR FEET
DROP INLET	0	EACH
FIRE HYDRANT	0	EACH
GATE	0	EACH
GUARD/GUIDE RAIL	0	LINEAR FEET
GUARD/GUIDE WALL	0	LINEAR FEET
INTERSECTION	5	EACH
LOW WATER CROSSING	0	EACH
LOW WATER CROSSING	0	LINEAR FEET
MILE MARKER	0	EACH
OVERHEAD SIGN	0	EACH
OVERPASS	0	EACH
PARK BOUNDARY	0	EACH
PAVED DITCH	0	LINEAR FEET
PULLOUT	0	EACH
RAILROAD CROSSING	0	EACH
RETAINING WALL	0	EACH
RETAINING WALL	0	LINEAR FEET
SIGN	0	EACH
STATE BOUNDARY	0	EACH
TEMPORARY BARRIER	0	LINEAR FEET
TRAFFIC LIGHT	0	EACH
TUNNEL	0	EACH
TUNNEL	0	LINEAR FEET
TURNOUT	0	LINEAR FEET

Notice: Culverts and drop inlets were marked by NPS and inventoried by RIP in Cycle 4, therefore the culvert and drop inlet count below includes those on ARAN-driven routes, Manually Rated Routes and in Paved Parking Areas.

MOCA: STRUCTURE LIST

ROUTE NUMBER	FUNCTIONAL CLASS	MILEPOST START	MILEPOST END	FEATURE	STRUCTURE NUMBER

No data available for this section.

Montezuma Castle National Monument

Section 9
Park Route Maintenance Features
Road Logs

MOCA: ROUTE MAINTENANCE FEATURES ROAD LOG

ROUTE 0010: MOCA CASTLE ACCESS ROAD

FROM MILEPOST	TO MILEPOST	FEATURE	SIDE	COMMENT
0.000	0.000	ROUTE BEGIN	N/A	FROM PARK BOUNDARY (PAVEMENT CHANGE AND FENCE)
0.000	0.000	PARK BOUNDARY	N/A	
0.000	0.000	SIGN	RIGHT	REGULATORY, SPEED LIMIT 35
0.000	0.000	INTERSECTION	N/A	PAVED ROUTE (MONTEZUMA CASTLE ROAD / NON NPS)
0.017	0.017	SIGN	RIGHT	REGULATORY, SPEED LIMIT 35
0.038	0.038	CULVERT	N/A	
0.110	0.110	SIGN	RIGHT	GUIDE, MONTEZUMA CASTLE NATIONAL MONUMENT
0.175	0.175	CULVERT	N/A	
0.224	0.224	SIGN	RIGHT	WARNING, 25 M.P.H.
0.224	0.224	SIGN	RIGHT	WARNING, GRAPHIC SIGN, NO TEXT
0.272	0.272	SIGN	RIGHT	WARNING, GATE AHEAD SLOW DOWN
0.330	0.330	SIGN	LEFT	GUIDE, MONTEZUMA CASTLE VISITOR CENTER 1 MILE
0.330	0.330	SIGN	LEFT	GUIDE, OPEN 8AM TO 5PM
0.342	0.342	SIGN	LEFT	GUIDE, UNABLE TO READ FROM VIDEO
0.342	0.342	SIGN	RIGHT	GUIDE, UNABLE TO READ FROM VIDEO
0.344	0.344	INTERSECTION	LEFT	ROUTE 0012 (MOCA BEAVER CREEK ESTATES ROAD)
0.350	0.350	CULVERT	N/A	
0.362	0.362	CATTLE GUARD	N/A	
0.367	0.367	GATE	N/A	
0.367	0.367	SIGN	N/A	GUIDE, GATE LOCKED 5P.M.
0.367	0.367	SIGN	N/A	GUIDE, NO TRESPASSING
0.367	0.367	SIGN	N/A	GUIDE, VEHICLE AND PEDESTRIAN ENTRY PROHIBITED
0.367	0.367	SIGN	N/A	REGULATORY, STOP
0.396	0.396	CULVERT	N/A	
0.409	0.409	SIGN	RIGHT	REGULATORY, SPEED LIMIT 35
0.411	0.411	INTERSECTION	RIGHT	UNPAVED ROUTE
0.442	0.442	CULVERT	N/A	
0.548	0.548	CULVERT	N/A	
0.583	0.583	CULVERT	N/A	
0.723	0.723	SIGN	RIGHT	REGULATORY, SPEED LIMIT 35
0.760	0.760	SIGN	RIGHT	WARNING, 25 M.P.H.
0.760	0.760	SIGN	RIGHT	WARNING, HILL
0.795	1.063	PAVED DITCH	RIGHT	
0.832	0.885	GUARD/GUIDE RAIL	LEFT	

MOCA: ROUTE MAINTENANCE FEATURES ROAD LOG

ROUTE 0010: MOCA CASTLE ACCESS ROAD

FROM MILEPOST	TO MILEPOST	FEATURE	SIDE	COMMENT
0.889	0.889	DROP INLET	RIGHT	
0.929	0.929	SIGN	RIGHT	GUIDE, ATTENTION BUSSES ENGINE OFF POLICY ENFORCED $50 FINE 36CFR 1.5
0.945	0.945	SIGN	RIGHT	REGULATORY, NO PARKING
0.945	0.945	SIGN	RIGHT	WARNING, SLOW
0.960	0.960	DROP INLET	RIGHT	
1.002	1.042	GUARD/GUIDE RAIL	LEFT	
1.027	1.027	DROP INLET	RIGHT	
1.054	1.054	SIGN	RIGHT	REGULATORY, NO PARKING
1.054	1.054	SIGN	RIGHT	REGULATORY, SPEED LIMIT 15
1.074	1.074	INTERSECTION	LEFT	ROUTE 0400 (MOCA RESIDENCE AREA ROAD)
1.076	1.076	CULVERT	N/A	
1.083	1.114	PAVED DITCH	RIGHT	
1.114	1.114	DROP INLET	RIGHT	
1.120	1.120	INTERSECTION	N/A	ROUTE 0900 (MOCA CASTLE VISITOR CENTER PARKING)
1.120	1.120	ROUTE END	N/A	TO ROUTE 0900 (MOCA CASTLE VISITOR CENTER PARKING)

MOCA: ROUTE MAINTENANCE FEATURES ROAD LOG

ROUTE 0011: MOWE WELL ACCESS ROAD

FROM MILEPOST	TO MILEPOST	FEATURE	SIDE	COMMENT
0.000	0.000	ROUTE BEGIN	N/A	FROM ROUTE 0013 (MOWE BEAVER CREEK ROAD) AT MP 0.46 (ON RIGHT)
0.000	0.000	SIGN	N/A	GUIDE, MONTEZUMA CASTLE INTERSTATE 17 SOUTH FLAGSTAFF NORTH INTERSTATE 17
0.000	0.000	INTERSECTION	RIGHT	ROUTE 0013 (MOWE BEAVER CREEK ROAD)
0.000	0.000	INTERSECTION	LEFT	ROUTE 0013 (MOWE BEAVER CREEK ROAD) UNPAVED SECTION
0.006	0.006	GATE	N/A	
0.006	0.006	SIGN	N/A	GUIDE, GATE LOCKED 5 P.M.
0.006	0.006	SIGN	N/A	GUIDE, GATE LOCKED 5 P.M.
0.008	0.008	SIGN	RIGHT	REGULATORY, STOP
0.032	0.032	INTERSECTION	RIGHT	ROUTE 0200 (MOWE PICNIC AREA ROAD)
0.045	0.045	SIGN	RIGHT	GUIDE, MONTEZUMA WELL
0.110	0.110	SIGN	RIGHT	WARNING, GRAPHIC SIGN, NO TEXT
0.110	0.110	SIGN	RIGHT	WARNING, SLOW
0.147	0.147	SIGN	RIGHT	GUIDE, PITHOUSE RUIN
0.156	0.156	INTERSECTION	LEFT	ROUTE 0904 (MOWE PITHOUSE PARKING)
0.170	0.170	SIGN	RIGHT	GUIDE, PITHOUSE RUIN
0.370	0.370	SIGN	N/A	GUIDE, DON'T TEMPT A THIEF KEEP VALUABLES WITH YOU
0.370	0.370	INTERSECTION	N/A	ROUTE 0903 (MOWE WELL PARKING)
0.370	0.370	SIGN	N/A	REGULATORY, KEEP RIGHT
0.370	0.370	ROUTE END	N/A	TO ROUTE 0903 (MOWE WELL PARKING)

MOCA: ROUTE MAINTENANCE FEATURES ROAD LOG

ROUTE 0012: MOCA BEAVER CREEK ESTATES ROAD

FROM MILEPOST	TO MILEPOST	FEATURE	SIDE	COMMENT
0.000	0.000	ROUTE BEGIN	N/A	FROM ROUTE 0010 (MOCA CASTLE ACCESS ROAD) AT MP 0.34 (ON LEFT)
0.000	0.000	INTERSECTION	RIGHT	ROUTE 0010 (MOCA CASTLE ACCESS ROAD)
0.000	0.000	SIGN	LEFT	GUIDE, UNABLE TO READ FROM VIDEO
0.000	0.000	INTERSECTION	LEFT	ROUTE 0010 (MOCA CASTLE ACCESS ROAD)
0.007	0.007	SIGN	RIGHT	GUIDE, MONTEZUMA CASTLE
0.007	0.007	SIGN	RIGHT	REGULATORY, STOP
0.015	0.015	SIGN	RIGHT	WARNING, DEAD END
0.016	0.016	CULVERT	N/A	
0.018	0.018	INTERSECTION	LEFT	ROUTE 0902 (MOCA ELEPHANT TRACKS PARKING)
0.025	0.025	SIGN	RIGHT	REGULATORY, SPEED LIMIT 35
0.058	0.058	SIGN	RIGHT	WARNING, GRAPHIC SIGN, NO TEXT
0.185	0.185	SIGN	RIGHT	WARNING, GRAPHIC SIGN, NO TEXT
0.220	0.220	INTERSECTION	N/A	PAVED ROUTE (BEAR CREEK ESTATES ROAD / NON NPS)
0.220	0.220	PARK BOUNDARY	N/A	
0.220	0.220	ROUTE END	N/A	TO PARK BOUNDARY (FENCE)

MOCA: ROUTE MAINTENANCE FEATURES ROAD LOG

ROUTE 0013: MOWE BEAVER CREEK ROAD

FROM MILEPOST	TO MILEPOST	FEATURE	SIDE	COMMENT
0.000	0.000	ROUTE BEGIN	N/A	FROM WEST PARK BOUNDARY (PAVEMENT CHANGE)
0.000	0.000	PARK BOUNDARY	N/A	
0.000	0.000	INTERSECTION	N/A	PAVED ROUTE (EAST BEAVER CREEK ROAD / NON NPS)
0.005	0.005	SIGN	RIGHT	GUIDE, ENTERING MONTEZUMA WELL SECTION MONTEZUMA CASTLE NATIONAL MONUMENT
0.057	0.057	CULVERT	N/A	
0.110	0.110	CULVERT	N/A	
0.150	0.150	SIGN	RIGHT	WARNING, GRAPHIC SIGN, NO TEXT
0.150	0.225	GUARD/GUIDE RAIL	RIGHT	
0.245	0.245	CULVERT	N/A	
0.272	0.272	SIGN	RIGHT	WARNING, GRAPHIC SIGN, NO TEXT
0.272	0.349	GUARD/GUIDE RAIL	RIGHT	
0.349	0.349	SIGN	LEFT	WARNING, GRAPHIC SIGN, NO TEXT
0.398	0.398	SIGN	RIGHT	WARNING, PAVEMENT ENDS
0.412	0.412	CULVERT	N/A	
0.446	0.446	SIGN	RIGHT	GUIDE, MONTEZUMA WELL
0.446	0.446	SIGN	RIGHT	GUIDE, OPEN 8AM TO 5PM
0.460	0.460	SIGN	LEFT	GUIDE, MONTEZUMA WELL
0.460	0.460	INTERSECTION	RIGHT	ROUTE 0011 (MOWE WELL ACCESS ROAD)
0.460	0.460	INTERSECTION	N/A	ROUTE 0013 (MOWE BEAVER CREEK ROAD) UNPAVED SECTION
0.460	0.460	ROUTE END	N/A	TO NORTH PARK BOUNDARY (FENCE)

MOCA: ROUTE MAINTENANCE FEATURES ROAD LOG

ROUTE 0200: MOWE PICNIC AREA ROAD

FROM MILEPOST	TO MILEPOST	FEATURE	SIDE	COMMENT
0.000	0.000	ROUTE BEGIN	N/A	FROM ROUTE 0011 (MOWE WELL ACCESS ROAD) AT MP 0.03 (ON RIGHT)
0.000	0.000	INTERSECTION	LEFT	ROUTE 0011 (MOWE WELL ACCESS ROAD)
0.000	0.000	INTERSECTION	N/A	ROUTE 0011 (MOWE WELL ACCESS ROAD)
0.016	0.016	SIGN	LEFT	GUIDE, GRAPHIC SIGN, NO TEXT
0.017	0.017	SIGN	RIGHT	REGULATORY, YIELD
0.054	0.054	CULVERT	N/A	
0.095	0.095	INTERSECTION	LEFT	ROUTE 0906 (MOWE PREHISTORIC DITCH PARKING)
0.116	0.116	INTERSECTION	LEFT	ROUTE 0401 (MOWE RESIDENCE ROAD)
0.119	0.119	SIGN	RIGHT	GUIDE, GRAPHIC SIGN, NO TEXT
0.119	0.119	SIGN	RIGHT	GUIDE, GRAPHIC SIGN, NO TEXT
0.119	0.119	SIGN	RIGHT	GUIDE, GRAPHIC SIGN, NO TEXT
0.120	0.120	SIGN	LEFT	REGULATORY, UNABLE TO READ FROM VIDEO
0.120	0.120	INTERSECTION	N/A	ROUTE 0905 (MOWE PICNIC AREA PARKING)
0.120	0.120	SIGN	LEFT	GUIDE, RESIDENTIAL AREA EMPLOYEES ONLY
0.120	0.120	ROUTE END	N/A	TO ROUTE 0905 (MOWE PICNIC AREA PARKING)

MOCA: ROUTE MAINTENANCE FEATURES ROAD LOG

ROUTE 0400: MOCA RESIDENCE AREA ROAD

FROM MILEPOST	TO MILEPOST	FEATURE	SIDE	COMMENT
0.000	0.000	ROUTE BEGIN	N/A	FROM ROUTE 0010 (MOCA CASTLE ACCESS ROAD) AT MP 1.07 (ON LEFT)
0.000	0.000	INTERSECTION	RIGHT	ROUTE 0010 (MOCA CASTLE ACCESS ROAD)
0.000	0.000	INTERSECTION	LEFT	ROUTE 0010 (MOCA CASTLE ACCESS ROAD)
0.004	0.004	SIGN	RIGHT	REGULATORY, STOP
0.016	0.016	SIGN	RIGHT	GUIDE, RESIDENTIAL AREA EMPLOYEES ONLY
0.016	0.016	SIGN	RIGHT	REGULATORY, RESTRICTED AREA NO ADMITTANCE
0.045	0.045	INTERSECTION	LEFT	ROUTE 0403 (MOCA LAGOON ROAD)
0.065	0.065	INTERSECTION	RIGHT	ROUTE 0901 (MOCA RESIDENCE AREA PARKING)
0.080	0.080	INTERSECTION	N/A	ROUTE 0901 (MOCA RESIDENCE AREA PARKING)
0.080	0.080	ROUTE END	N/A	TO ROUTE 0901 (MOCA RESIDENCE AREA PARKING)

MOCA: ROUTE MAINTENANCE FEATURES ROAD LOG

ROUTE 0401: MOWE RESIDENCE ROAD

FROM MILEPOST	TO MILEPOST	FEATURE	SIDE	COMMENT
0.000	0.000	ROUTE BEGIN	N/A	FROM ROUTE 0200 (MOWE PICNIC AREA ROAD) AT MP 0.12 (ON LEFT)
0.000	0.000	INTERSECTION	RIGHT	ROUTE 0905 (MOWE PICNIC AREA PARKING)
0.000	0.000	INTERSECTION	LEFT	ROUTE 0200 (MOWE PICNIC AREA ROAD)
0.044	0.044	CULVERT	N/A	
0.097	0.097	INTERSECTION	LEFT	UNPAVED PARKING (MAINTENANCE)
0.128	0.128	INTERSECTION	RIGHT	UNPAVED ROUTE
0.150	0.150	INTERSECTION	N/A	DEAD END
0.150	0.150	ROUTE END	N/A	TO DEAD END AT DRIVEWAY

Montezuma Castle National Monument

Section 10
Appendix

APPENDIX A: GLOSSARY OF TERMS AND ABBREVIATIONS

TERM OR ABBREVIATION	DESCRIPTION OR DEFINITION
AADT	(Annual Average Daily Traffic) The estimate of typical daily traffic on a road segment for all days of the week over the period of one year.
CRS	Condition Rating Sheets. (Section 5)
Excellent	Excellent rating with an index value of 95 or greater
Fair	Fair rating with an index value from 61 to 84
Func. Class	Funtional Classification (see Route ID, Section 4)
Good	Good rating with an index value from 85 to 94
IRI	International Roughness Index
Lane Width	Width from road centerline to fogline, or from centerline to edge-of-pavement when no fogline exists
MRR	Manually Rated Route
N/A	Not Applicable
NC	Not Collected
Paved Width	Width from edge-of-pavement to edge-of-pavement
PCR	Pavement Condition Rating (Appendix B, Section 10)
Poor	Poor Rating with an index value of 60 or less
RCI	Roughness Condition Index
SADT	(Seasonal Annual Daily Traffic) The AADT adjusted to represent just the period of the year containing 80 percent of the total annual traffic.
SCR	Surface Condition Rating (Appendix B, Section 10)
Shoulder Width	Distance from fogline to hinge point, or if no fogline, from edge-of-pavement to hinge point.

APPENDIX B: DESCRIPTION OF RATING SYSTEM

A numerical roadway rating system is used to describe the overall condition of the paved roadways and paved parking areas. In this system, a numerical rating between 0 and 100 is ascribed to each 0.02 miles of road. This numerical rating is called a Pavement Condition Rating (PCR). A "perfect" road, newly constructed with no surface distresses and a smooth surface, would be assigned a PCR rating of 100. Based on the type, severity, and extent of surface distresses points are deducted from 100 to arrive at the final PCR.

Data is collected on the following distresses and conditions:

- **Alligator Cracking** - a series of interconnecting cracks resembling alligator skin or chicken wire, which can occur anywhere in the lane.
- **Longitudinal Cracking** - cracks which are parallel to the pavement centerline or asphalt lay-down direction.
- **Transverse Cracking** - cracks perpendicular to the pavement centerline.
- **Pothole (patch)** - a bowl-shaped hole in the pavement surface. May be patched or not.
- **Rutting** - surface depressions in the wheel paths.
- **Roughness** is collected as International Roughness Index (IRI) and is used in the PCR formula. Roughness is measured in inches of vertical displacement of the vehicle per mile traveled.

A Distress Rating Index value is calculated for each of the individual distresses at the 0.02 mile, or every 105.6 feet.

Calculation of Index Values

Note: Index values < 0 default to 0. Index values > 100 default to 100.
For all indices, a higher value indicates a better road condition, and a lower value indicates a poorer road condition.
All severity protocols are taken from the SHRP Distress Identification Manual.

Condition Ranges for all Indices

Excellent	>=95
Good	>=85 and <95
Fair	>60 and <85
Poor	<=60

Alligator Crack Index

AC_INDEX = 100 – 40 * [(%LOW / 70) + (%MED / 30) + (%HI / 10)]

Where :

The values %LOW, %MED and %HI describe the percent of the total WX measured area that is affected by alligator cracking of each severity level. These values range from ≥ 0 to ≤ 100.

%LOW = (Total square area WX measured low severity alligator cracking) / (Section length * WX measured lane width)

%MED = (Total square area WX measured medium severity alligator cracking) / (Section length * WX measured lane width)
%HI = (Total square area WX measured high severity alligator cracking) / (Section length * WX measured lane width)

The denominators 70, 30, and 10 are the maximum allowable extents for the numerator value in the same units. For example, low severity alligator cracking totaling 70% of the measured section area would alone fail that section of road for this index.

The threshold for failure for this index is AC_INDEX = 60.

Severity Levels:

Low severity alligator cracking describes an area of cracks with no or only a few connecting cracks; cracks are not spalled (cracked, broken, chipped, frayed along the cracks); pumping (water seepage from beneath the pavement through the cracks) is not evident. Any sealed alligator cracks are low severity alligator cracks, as long as the sealant is still in good condition. If the sealant has reopened, and the crack is visible and can be measured, the crack severity is assigned according to that measurement.

Medium severity alligator cracking describes an area of interconnected cracks forming a complete pattern; cracks may be slightly spalled; pumping is not evident.

High severity alligator cracking describes an area of moderately or severely spalled interconnected cracks forming a complete pattern; pieces may move when subjected to traffic; pumping may be evident.

Longitudinal Crack Index

LC_INDEX = 100 – 40 * [(%LOW / 350) + (%MED / 200) + (%HI / 75)]

Where:

The values %LOW, %MED and %HI describe the length of longitudinal cracking of each severity as a percent of the section length. These values are ≥ 0 and can exceed 100.

%LOW = (Total linear feet WX measured low severity longitudinal cracking) / (Section length in linear feet)
%MED = (Total linear feet WX measured medium severity longitudinal cracking) / (Section length in linear feet)
%HI = (Total linear feet WX measured high severity longitudinal cracking) / (Section length in linear feet)

The denominators 350, 200, and 75 are the maximum allowable extents for the numerator value in the same units. For example, medium severity longitudinal cracking with a total length that is 200% of the length of the section would alone fail that section of road for this index.

The threshold for failure for this index is LC_INDEX = 60.

Severity Levels:

Low severity longitudinal cracks have a mean width ≤ ¼”, or are sealed cracks of indeterminate width whose sealant material is in good condition.

Medium severity longitudinal cracks have a mean width > ¼” and ≤ ¾”.

High severity longitudinal cracks have a mean width > ¾”.

Transverse Crack Index

TC_INDEX = 100 – {[20 * ((LOW / 15.1) + (MED / 7.5))] + [40 * (HI / 1.9)]}

Where:

The values LOW, MED and HI describe a count of the total number of transverse cracks of each severity level, where one transverse crack unit is equal to the WX measured lane width. These values are ≥ 0.

LOW = (Total linear feet WX measured low severity transverse cracking) / (WX measured lane width)
MED = (Total linear feet WX measured medium severity transverse cracking) / (WX measured lane width)
HI = (Total linear feet WX measured high severity transverse cracking) / (WX measured lane width)

The denominators 15.1, 7.5, and 1.9 are the maximum allowable extents for the numerator value in the same units. For example, high severity transverse cracking with a total length that amounts to 1.9 times the WX measured lane width would alone fail that section of road for this index.

The threshold for failure for this index is TC_INDEX = 60.

Severity Levels:

Low severity transverse cracks have a mean width ≤ ¼", or are sealed cracks of indeterminate width whose sealant material is in good condition.

Medium severity transverse cracks have a mean width > ¼" and ≤ ¾".

High severity transverse cracks have a mean width > ¾".

Patching Index

PATCH_INDEX = 100 – 40 * (%PATCHING / 80)

Where:

The value %PATCHING describes the percent of the total WX measured area that is affected by patching. This value ranges from ≥ 0 to ≤ 100.

%PATCHING = (Total area WX measured patching) / (Section length * WX measured lane width)

The denominator 80 is the maximum allowable extent for the numerator value in the same units. Patching totaling 80% or more of the measured section area fails a section of road for this index.

The threshold for failure for this index is PATCH_INDEX = 60.

There are no severity levels for patching.

Rutting Index

RUT_INDEX = 100 – 40 * [(%LOW / 160) + (%MED / 80) + (%HI / 40)]

Where:

10 ARAN rut depth measurements are taken per full .02 section for each of 2 wheel paths (left and right), resulting in a total of 20 measurements taken for both wheel paths. The values %LOW, %MED and %HI describe the number of ARAN rut depth measurements of both wheel paths in the section whose values are of each severity level, calculated as a percentage of the total number of ARAN rut depth measurements taken for a single wheel path in the section. These values range from ≥ 0 to ≤ 200.

%LOW = (Total number of ARAN measured low severity ruts in section for both wheel paths) / (Total number of ARAN rut measurements in section for a single wheel path)
%MED = (Total number of ARAN measured medium severity ruts in section for both wheel paths) / (Total number of ARAN rut measurements in section for a single wheel path)
%HI = (Total number of ARAN measured high severity ruts in section for both wheel paths) / (Total number of ARAN rut measurements in section for a single wheel path)

The denominators 160, 80, and 40 are the maximum allowable extents for the numerator value in the same units. For example, low severity ruts recorded in 16 of the 20 total readings (or 160% of a full wheel path's worth of readings) for a full .02 section would fail that section for this index.

The threshold for failure for this index is RUT_INDEX = 60.

Severity Levels:

Ruts with an ARAN measured depth < 0.20" are not included in the distress calculations.

Low severity ruts have an ARAN measured depth ≥ 0.20" and ≤ 0.49".

Medium severity ruts have an ARAN measured depth ≥ 0.50" and ≤ 0.99".

High severity ruts have an ARAN measured depth ≥ 1.00".

Roughness Condition Index

RCI **= 32 * [5 * (2.718282 ^ (-0.0041 * AVG IRI))]**

Where:

The value AVG IRI describes the average value of the Left IRI and Right IRI measurements for the section. This value can range from approximately 40 to over 1000.

AVG IRI = (ARAN measured Left IRI + ARAN measured Right IRI) / 2

There is no applicable threshold for failure for this index.

NOTE: Collection of roughness data is dependent on the data collection vehicle traveling at a minimum speed of 12 mph. In the event that a route cannot be safely traveled at this minimum speed, and results in no roughness data, the SCR only will be calculated.

Surface Condition Rating Index

SCR = 100 - [(100 - AC_INDEX) + (100 - LC_INDEX) + (100 - TC_INDEX) + (100 - PATCH_INDEX) + (100 - RUT_INDEX)]

Where:

See above for determinations of AC_INDEX, LC_INDEX, TC_INDEX, PATCH_INDEX and RUT_INDEX.

The threshold for failure for this index is SCR = 60.

Pavement Condition Rating Index Asphaltic Concrete Pavement (AS)

PCR = (0.60 * SCR) + (0.40 * RCI)

Where:

See above for determinations of SCR and RCI.

The values 0.60 and 0.40 function as weights within the formula.

If SCR equals zero (which means that the road surface condition is very poor), then the formula simply reduces to: PCR = 0.40 * RCI.

If RCI equals zero (which means that this value was not available for some reason), then the formula becomes: PCR = SCR.

The threshold for failure for this index is PCR = 60.

Pavement Condition Rating Index Portland Cement Concrete Pavement (CO)

Concrete PCR = -0.0012(IRI^2)+0.0499(IRI)+99.542

Where:

The threshold for failure for this index is PCR = 60.

Parking Lot and Manually Rated Road Condition Rating

Surface Condition Distresses- Chip Seal:

Raveling – loss of surface rock chips revealing previous surface
Bleeding – asphalt or tar is bleeding through to the surface where surface looks slick with asphalt
Rutting
Potholes/Patching

Ratings - Chip Seal:

Excellent – None of the surface affected by the above (recently constructed)
Good – Less than 10% of surface affected by the above
Fair – Between 10% and 40% of surface affected by the above
Poor – More than 40% of surface affected by the above

Surface Condition - Asphalt:

Cracking of any type
Rutting
Potholes/Patching

Ratings - Asphalt:

Excellent – None of the surface affected by the above (recently constructed)
Good – Less than 10% of surface affected by the above
Fair – Between 10% and 40% of surface affected by the above
Poor – More than 40% of surface affected by the above

Index Values of Visual Ratings on Parking Lots and Manually Rated Roads

Under Construction 100

Excellent 97

Good 90

Fair 73

Poor 45

APPENDIX C: GENERAL INFORMATION ON RIP SYSTEMS

DMI (Distance Measuring Instrument)

The DMI (Distance Measuring Instrument) obtains road length measurements that are highly accurate (to 0.001 miles). The DMI is connected to the outside of the rear wheel on the driver's side, and is wired into the antilock braking system (ABS). The number of pulses recorded for each wheel rotation by the ABS is registered by the DMI, which transmits a measurement of distance traveled to the processing computers in the ARAN. The DMI distance measurements are the foundation to which all the other subsystems are tied.

Digital Image Information

All images collected in Cycle 4 are digital images in .jpg format. These images provide adequate resolution for identifying sign and feature inventories and pavement evaluations. The images can be viewed with an interactive software program called VisiData. Each park will receive a copy of the VisiData program. Cycle 4 data, as well as Cycle 3 data, can be viewed using the Visi-Data software program. This program is a data presentation and analysis tool that can be accessed either at the individual park, park region or at NPS headquarters. The data is organized in a hierarchical manner and presented in tabular and graphical formats. The user is able to perform queries and drill down through the data to find the particular information they are looking for. Associated digital right-of-way images from either the LAN, USB port, individual DVD can be presented along with GPS locations.

Right-of-way (ROW) Video

Three digital cameras are mounted above the vehicle's windshield that point directly forward and slightly to the left and right. These cameras each collect one image every 0.002 miles (10.56 feet) in the primary-direction lane, to give a panoramic field-of-view of about 160 degrees. (Forward-facing video from the center camera only is collected in the opposite-direction lane of travel.)

If data collection speed exceeds 35-40 mph, the network and storage computers may become overwhelmed and may begin to drop individual video frames. Occasional common video quality issues include sun glare and rapid changes between sunlight and shadow. The camera system is equipped with auto risers that sometimes cannot adjust quickly enough to collect optimal video images.

FHWA ARAN CAMERA SPECIFICATIONS **Forward-Facing Cameras (ROW)**	
Focal length	10 mm
Chip size	8.71mm X 6.90mm
Naming convention of each image	chainage.jpg
Image resolution	1300 X 1030
Image pixel size	depends on distance
Relative position of the GPS unit to each camera	2.104 meters from front-center rutbar to camera
The ARAN has a lever arm setting which tells the POS system where the center of the rutbar is with respect to the GPS antennas.	

Pavement Video

Pavement video images are collected by the data collection vehicle to use in later analysis to determine extents and severities of different types of pavement distress. The pavement in the primary-direction road lane is filmed continuously by two analog cameras attached to booms extended from the rear of the ARAN on the left and right sides. Strobe lights fire synchronously with the opening of the camera shutters to eliminate shadows and motion blur. The images from the two cameras overlap, and are stitched together in real time to create a continuous strip image of the pavement in the primary direction lane. This strip has a maximum width of 3.0 meters (actual width depends on pavement camera calibration) and is sectioned for ease of file management every 0.010 miles (52.8 feet).

The cameras both have a resolution of 640 x 480, making the threshold of visible pavement cracks about 3 mm. Because the cameras are triggered by time and not distance traveled, this subsystem requires a minimum operating speed of 6 mph, otherwise images are taken on top of one another and result in checkered or black pavement video.

FHWA ARAN CAMERA SPECIFICATIONS **Pavement Cameras**	
Image Pixel size	3.135 mm /side
Image Resolution	640 X 480
Area that images cover	1.5 m X 1.2 m
Full color or grayscale	grayscale
Vehicle speed limitations	80km/h
Aperture setting	Auto-iris
Exposure setting	1/50000

FHWA ARAN GPS & Inertial System

GPS is collected by a NovAtel MiLLenium, 12 channel, dual frequency L1/L2, DGPS ready receiver with a MiLLennium 502 GPS antenna. An OmniStar 3000 LR provides real-time differential correction. An Applanix POS/LV is the inertial system that fills in when GPS is unavailable. The antenna is mounted in the center of the roof, slightly toward the rear of the vehicle, but a lever arm is applied to place the operational location of GPS recording at the center of the rutbar on the front bumper of the vehicle. Expected accuracy under ideal conditions is sub meter.

GPS Collected on Manually Rated Routes

Parking areas and roads that are not fully drivable with the ARAN data collection vehicle are collected manually by field technicians. GPS is collected for these routes using GPS field data collection utilizes Trimble ProXRS or ProXH Receivers matched with Trimble TSC1 or Ranger handheld Data Loggers, connected to Trimble Hurricane Antennas giving sub meter accuracy in ideal conditions. This collection equipment has varied as technology has improved over the years of RIP data collection. Some GPS files collected as early as 1998 have been verified for accuracy and perpetuated through the current cycle of data collection.

GPS SHAPEFILES

Type of Route and Collection		**Shape Filename**
Roads driven by ARAN	Line	park_road_04.dbf/.shp/.shx
Parking Areas	Polygon	park_pkg_04.dbf/.shp/.shx
Roads Manually Rated as Lines (not in every park)	Line	park_mrl_04.dbf/.shp/.shx
Roads Manually Rated as Polygons (not in every park)	Polygon	park_mrp_04.dbf/.shp/.shx

• Datum for all GPS shapefiles is LL_WGS84_DD (Latitude Longitude _World Geodetic Survey 1984_Decimal Degrees)
• In filename, “park” is NPS four-letter alphabetic code.
• The source for route data required for data processing and report production is the PARK_RouteInfo.mdb.

Condition Photos Taken of Manually Rated Roads

One or more digital photos are taken by Canon Power Shot G2 4.0 Mega Pixel digital camera for each manually rated route in a National Park. They are stored in .jpg format named with the four-letter NPS park alphabetic code, route number, and the photo number assigned by the camera. For example, YOSE_0900_4434.jpg is the filename of the photo named 4434 by the camera that was taken of Yosemite National Park route 0900.

Scenic Photos

Scenic photos are taken by Canon Power Shot G2 4.0 Mega Pixel digital camera throughout each park and are named with the four-letter NPS park alphabetic code and the count of the photo taken in that park. For example, GRCA003.jpg is the filename of the third scenic photo taken in Grand Canyon National Park. The number of scenic photos provided will vary between parks.

APPENDIX D: METADATA

FHWA – NPS Road Inventory Program Cycle 4 Metadata

The purpose of these sheets is to provide users of the Road Inventory Program's data with data accuracies and tolerances to help users define ways in which the RIP data can and cannot be used. For further information on specifics of data collection equipment, data collection procedures, equipment calibrations, or quality control/quality assurance procedures, please contact Jim Kennedy, Project Manager, Data Quality Assurance, at 720-963-3560 or jim.kennedy@fhwa.dot.gov.

All Road Inventory Program data undergoes quality control and quality assurance testing. This document represents the known data accuracies and tolerances for the data collection equipment, data collection procedures, and data processing procedures currently in use. Many additional tests conducted on the park databases during the quality assurance phase to ensure data integrity are not listed as a part of this document. Before it is delivered, a park database undergoes a large set of table design consistency, field data format consistency, data completeness, uniqueness of key fields, data reasonableness, acceptable data range, within-field data consistency, between-field data consistency, and between-table data consistency tests. Additional data sampling checks are conducted to ensure proper data upload from raw files into the park database and to quality check the pavement crack analysis. Further information is detailed in the FHWA – NPS RIP Quality Assurance Manual, available upon request.

This description of metadata includes only the known accuracies with which a data field matches its expected value. The tables that follow this page show each database field's:

- Field – field name
- Format – data type and number of characters of field
- Expected Value – meaning of value assigned to field
- Source – when in process field value obtained
- Validation – how field value obtained
- Expected Accuracy – accuracy with which contents of field match Expected Value

Verifying and continually improving the accuracy of Road Inventory Program data is an ongoing goal of the Federal Highway Administration and the National Park Service. Field testing and post-collection analysis of ARAN (Automatic Road ANalyzer) -collected data will continue in Cycle 4. Data quality is expected to improve as the FHWA – NPS Road Inventory Program continues to operate, due to the fact that future data collection cycles will consist in large part of data updates. Also, technological improvements are expected to render the data increasingly consistent with actual roadway conditions as data collection cycles progress.

Specific Caveats

- MUTCD based on contents & colors of sign, not on size
- Database records that show a Portland Cement Concrete (CO) surface type sometimes include distress index values that seem to show a perfect roadway. Condition assessments on concrete pavements are not conducted for Alligator Cracking, Transverse or Longitudinal Cracking, Patching, or Rutting. Perfect values for concrete road sections for these indexes are default values and do not represent a condition assessment of the concrete surfaces.
- On the USB drive, in the Database folder, parks are provided with intersection lists and exceptions lists. These documents should be treated as raw files and are not accurate. Refer to the final database for accurately post-processed intersection data.
- Most roadway data is collected in the primary direction lane of a roadway. To save data storage space and to reduce data analysis efforts, the assumption was made that the paved surface condition of a route's primary lane adequately represents the surface condition of the full roadway. Therefore, in the database, opposite-direction records in the PMS_Tenth table do not include assessed values for roadway surface distresses. Values such as 0, N/A, -1, or a repeat of the primary-direction assessed value indicate that no assessment was performed. The PMS_20 and PMS_Mile tables simply exclude all opposite routes.

- Roadway Data is collected in intervals of 0.010 miles (52.8feet) constituting a "station".
- Most roadway features are collected relative to the primary direction lane of a roadway, using the primary-direction video and mileage. Signs and Mile Markers are the only features collected using the opposite-direction video with mileage location referenced to the primary direction lane of the roadway.
- Route_GPS table contains GPS positional information collected by the ARAN and post processed with Applanix POSPac Land 5.0 post-processing software. No manual adjustments have occurred on this table.
- Modifications to the Park_ROAD_04.dbf/.shp/.shx files may have been necessary for report esthetics.
- Modifications to the Park_PKG_04. dbf/.shp/.shx files may have been necessary for report esthetics.
- Cycle 4 utilizes the Microsoft Office 2003 suite of products and Crystal Reports XI for document and data file generation and reporting.
- All PDF files are in Adobe Acrobat 7.0 Professional format.
- All ArcGIS files are created using ESRI Version 9.x software.
- Thumbnail images are created at 1/10 original image size for Right-of-Way and Pavement Images.
- FHWA is investigating the rutting methodology and calculated values it currently reports. Equipment limitations and analysis methods may be over reporting, low severity rutting.

Key to Notes in Tables

(1): Note that only one value fits in field, so even if this value varies throughout the route, only predominant value is recorded here.
(2): Shoulder width is measured at route start and every half-mile along the route in the primary direction. Width is the entire width of the drivable shoulder, regardless of the presence or absence of pavement, from the fog line to the shoulder hinge point, or if no fog line exists, from the edge of pavement to the hinge point. Identification of shoulder hinge point can be problematic using video analysis. Some paved ditches may be mistakenly recorded as shoulders where the shoulder hinge point and change in slope are not easily distinguished from the video.
(3): Mileage is measured by the ARAN (Automatic Road ANalyzer) data collection vehicle out to the 0.001 decimal place. The DMI (distance measuring instrument) is very accurate, with extremely slight variations in measurement due to air temperature, tire inflation, curves, hills, and equipment calibration.
(4): Features are measured differently depending on whether they are visible in the forward-facing video of the roadway, but every feature milepost measurement depends on the baseline measurement of the data collection vehicle's mileage. The ARAN (Automatic Road ANalyzer) data collection vehicle's mileage is measured by the DMI (distance measuring instrument) out to the 0.001 decimal place. The DMI is very accurate, with extremely slight variations in measurement due to air temperature, tire inflation, curves, hills, and equipment calibration. If a feature will not be visible in the forward-facing video, its milepost is determined by the data collectors' key press tagging the milepost when the ARAN passes the feature. Key presses are entered into the ARAN software when the vehicle travels typically between 15 and 45 miles/hour, so a delay of a single second as the vehicle passes a feature would result in an inaccuracy of 0.004 miles (22 feet) to 0.012 miles (66 feet). If a feature is visible in the video, its milepost is determined during post-processing using a video measurement software called Surveyor.
(5): Condition assessments on concrete (PCC) pavements are not conducted for Alligator Cracking, Transverse or Longitudinal Cracking, Patching, or Rutting. Perfect values for concrete road sections for these indexes are default values and do not represent a condition assessment of the concrete surfaces.
(6): Roadway cracking presence, type, severity, and extent are determined by filming the roadway in the primary lane continuously with two overlapping analog cameras of 640 x 480 resolutions. The images from both cameras are stitched together in real time to create a continuous strip image of the roadway pavement in the primary lane. Cracks 3 mm or greater in width are visible in this video. A semi-automatic process running the WiseCrax software with additional input by human operators provides the cracking quantities recorded in these database fields. Quality checks have determined that a consistent 80% or better of the visible cracks are recorded.

Access Database Metadata

MASTER Table Metadata:

	FIELD	FORMAT	EXPECTED VALUE	SOURCE	VALIDATION	EXPECTED ACCURACY
1	RIP_CYCLE	XX	4, for data collection cycle 4	Route ID Meeting	FHWA Determination	100% Referenced to other tables
2	STATE	XX	State where route is located	Route ID Meeting	Park Input / FHWA Determination	100%, Referenced to other tables (1)
3	PARK_ALPHA	XXXX	Park alpha code	Route ID Meeting	NPS References	100%, Referenced to other tables
4	PARK_NO	XXXX	Park numeric code	Route ID Meeting	NPS References	100%, Referenced to other tables
5	RTE_NO	9999XXX	Route number	Route ID Meeting	Park Input / FHWA Classification	100%, Referenced to other tables
6	RTE_NAME	(Text)	Route name	Route ID Meeting	Park Input	100%, Referenced to other tables. 100 characters fit in field
7	FUNCT_CLASS	X	Route functional classification	Route ID Meeting	Park Input / FHWA Classification	100%, Referenced to other tables
8	DIRECTION	XXX	Survey lane: PRI (primary) or OPP (opposite)	Route ID Meeting	Park Input / FHWA Determination	100%,
9	BEG_MP_EST	999.999 (miles)	Estimated starting MP	Route ID Meeting	Park Input / FHWA Determination	Estimated before data collected
10	END_MP_EST	999.999 (miles)	Estimated ending MP	Route ID Meeting	Park Input / FHWA Determination	Estimated before data collected
11	RTE_LENGTH	999.999 (miles)	Collected route length	ARAN Data Collection	Automatic Output	100%
12	FROM_DESC	(Text)	Beginning terminus of route	Route ID Meeting	Park Input / FHWA Determination	100% Referenced to other tables
13	TO_DESC	(Text)	Ending terminus of route	Route ID Meeting	Park Input / FHWA Determination	100% Referenced to other tables
14	NO_LANES	X	Number of lanes in route	ARAN Data Collection	Survey Crew Input	Untested. (1)
15	SURF_TYPE	XX	Surface type of route	ARAN Data Collection	Survey Crew Input	100%, Referenced to other tables (1)
16	COMP_DIR	XX	Compass direction of route's primary lane (nearest cardinal direction)	Route ID Meeting	Park Input / FHWA Determination	Untested
17	COMMENTS	(Text)	Special information, if any	Contractor Post-processing	Contractor Input	Untested
18	FILENAME	(Text)	Filename of raw data files	ARAN Data Collection	Automatic Output	100%
19	SECTION	(Text)	Route section ID	Route ID Meeting/ARAN Data Collection	Survey Crew Input/Automatic Output	100%

20	FKEY	9999999	Unique record ID	Contractor Post-processing	Database Processing	100%
21	DATE	MM/DD/YY	Data collection date	ARAN Data Collection	Automatic Output	100%
22	BEG_MP	999.999 (miles)	Beginning MP collected	ARAN Data Collection	Automatic Output	100% (3)
23	END_MP	999.999 (miles)	Ending MP collected	ARAN Data Collection	Automatic Output	100% (3)

PMS_FEATURE Table Metadata:

	FIELD	FORMAT	EXPECTED VALUE	SOURCE	VALIDATION	EXPECTED ACCURACY
1	RIP_CYCLE	XX	4, for data collection cycle 4	Route ID Meeting	FHWA Determination	100% Referenced to other tables
2	STATE	XX	State where route is located	Route ID Meeting	Park Input / FHWA Determination	Untested (1)
3	PARK_ALPHA	XXXX	Park alpha code	Route ID Meeting	NPS References	100% Referenced to other tables
4	PARK_NO	XXXX	Park numeric code	Route ID Meeting	NPS References	100% Referenced to other tables
5	RTE_NO	9999XXX	Route number	Route ID Meeting	Park Input / FHWA Classification	100% Referenced to other tables
6	FMSS_EQUIP	XXXXXXX	Facility Management Software System Equipment number	NPS FMSS application	NPS References	Untested
7	FUNCT_CLASS	X	Route functional class	Route ID Meeting	Park Input / FHWA Classification	100% Referenced to other tables
8	DIRECTION	XXX	Survey lane: PRI (primary) or OPP (opposite)	Route ID Meeting	Park Input / FHWA Determination	100%
9	MP	999.999 (miles)	Feature location along route	ARAN Data Collection/Contractor Post-processing	Video Analysis	<=0.001 mile
10	BEG_MP	999.999 (miles)	Feature Beginning location along route	Contractor Post-processing	Video Analysis	<=0.001 mile
11	END_MP	999.999 (miles)	Feature Ending location along route	Contractor Post-processing	Video Analysis	<=0.001 mile
12	FEATURE_LENGTH	999.99 (Feet)	Linear Feature Length	Contractor Post-processing	Database Processing	100%
13	EVENT	XXXX	Event category of feature	Contractor Post-processing	Video Analysis	Untested
14	EVENT_CODE	XXXX	Event sub-category of feature	Contractor Post-processing	Video Analysis	Untested
15	FEATURE_TYPE	(Text)	Feature designation: LINEAR or POINT	Contractor Post-processing	Video Analysis	Untested
16	EVENT_DESC	(Text)	Description of feature/contents of sign	Contractor Post-processing	Video Analysis	Untested
17	MUTCD	(Text)	MUTCD Code of Sign	Contractor Post-processing	Database Processing	95%
18	CONDITION	"N/A"	Sign condition. N/A. Not to be populated	Contractor Post-processing	Video Analysis	Values inaccurate, defaulted to "N/A"
19	COMMENT	(Text)	Sign label, intersecting route, etc.	Contractor Post-processing	Database Processing	Untested
20	OFFSET	"N/A"	Offset from Road Edge. N/A. Not to be populated	Contractor Post-processing	Database Processing	Values inaccurate, defaulted to "N/A"

	FIELD	FORMAT	EXPECTED VALUE	SOURCE	VALIDATION	EXPECTED ACCURACY
21	SIDE	(Text)	Side of route relative to lane driven	Contractor Post-processing	Video Analysis	95%
22	STR_NUMBER	(Text)	FHWA bridge structure number	FHWA Post-processing	Database Processing	Untested
23	BARR_MAT	(Text)	Barrier Material Type	Contractor Post-processing	Video Analysis	Untested
24	BARR_TYPE	(Text)	Barrier Type	Contractor Post-processing	Video Analysis	Untested
25	BARR_POST_MAT	(Text)	Barrier Post Materials	Contractor Post-processing	Video Analysis	Untested
26	BARR_BEG_TERM	(Text)	Barrier Approach Treatment	Contractor Post-processing	Video Analysis	Untested
27	BARR_END_TERM	(Text)	Barrier End Treatment	Contractor Post-processing	Video Analysis	Untested
28	CURB_MAT	(Text)	Curb Material Type	Contractor Post-processing	Video Analysis	Untested
29	PAVED_DITCH_MAT	(Text)	Paved Ditch Material Type	Contractor Post-processing	Video Analysis	Untested (2)
30	GATE_MAT	(Text)	Gate Material Type	Contractor Post-processing	Video Analysis	Untested
31	GATE_STYLE	(Text)	Gate Style	Contractor Post-processing	Video Analysis	Untested
32	BEG_GPS_LAT	999.999999	GPS Latitude Co-ordinate (decimal degrees)	Contractor Post-processing	Video Analysis	<= 3.00 feet
33	BEG_GPS_LON	-999.999999	GPS Longitude Co-ordinate (-decimal degrees)	Contractor Post-processing	Video Analysis	<= 3.00 feet
34	BEG_GPS_ELEV	99999.9	GPS Elevation Feet	Contractor Post-processing	Video Analysis	Untested
35	BEG_GPS_MODE	(Text)	GPS Satellite Mode	Contractor Post-processing	Video Analysis	Untested
36	END_GPS_LAT	999.999999	GPS Latitude Co-ordinate (decimal degrees)	Contractor Post-processing	Video Analysis	<= 3.00 feet
37	END_GPS_LON	-999.999999	GPS Longitude Co-ordinate (-decimal degrees)	Contractor Post-processing	Video Analysis	<= 3.00 feet
38	END_GPS_ELEV	99999.9	GPS Elevation Feet	Contractor Post-processing	Video Analysis	Untested
39	END_GPS_MODE	(Text)	GPS Satellite Mode	Contractor Post-processing	Video Analysis	Untested
40	DATUM	(Text)	LL_WGS84_DD	Contractor Post-processing	Database Processing	100%
41	VIDEO	<*Park*>C04VID<#>	Removable USB video hard drive number	Contractor Post-processing	Database Processing	Untested
42	IMAGE	(Text)	Filename of .jpg image showing feature	Contractor Post-processing	Automatic Output	Untested
43	DATE	MM/DD/YY	Data collection date	ARAN Data Collection	Automatic Output	100%
44	FILENAME	(Text)	Filename of raw data files	ARAN Data Collection	Automatic Output	100%
45	SECTION	(Text)	Route section ID	Route ID Meeting/ARAN Data Collection	Survey Crew Input/Automatic Output	100%
46	FKEY	(Numeric)	Unique record ID	Contractor Post-processing	Database Processing	100%
47	VISI_FROM	999999 (millimiles)	Raw MP of first video frame showing feature	Contractor Post-processing	Database Processing	Untested
48	VISI_TO	999999 (millimiles)	Raw MP of last video frame showing feature	Contractor Post-processing	Database Processing	Untested

	FIELD	FORMAT	EXPECTED VALUE	SOURCE	VALIDATION	EXPECTED ACCURACY
49	IDKEY	(Text)	Unique record ID used by VisiData	Contractor Post-processing	Database Processing	Untested
50	MP_REF	(Text)	Range of mileage to play in VisiData	Contractor Post-processing	Database Processing	Untested

List of Roadway Features

#	EVENT	EVENT_CODE	FEATURE_TYPE	EVENT_DESC	STRUCTURE #	COLLECTED BY
1	BRIDGE	BRDG	LINEAR	BRIDGE	ALWAYS	ARAN
2	CATTLE GUARD	CGD	POINT	CATTLE GUARD	-	VIDEO RATING
3	CONSTRUCTION	CNST	LINEAR	CONSTRUCTION WORK ZONE	-	ARAN
4	CULVERT	CUL	POINT	CULVERT	SOMETIMES	ARAN
5	CURB	CRBL	LINEAR	CURB ON LEFT	-	VIDEO RATING
	""	CRBR	LINEAR	CURB ON RIGHT	-	VIDEO RATING
6	CURB-AND-GUTTER	CAGL	LINEAR	CURB-AND-GUTTER ON LEFT	-	VIDEO RATING
	""	CAGR	LINEAR	CURB-AND-GUTTER ON RIGHT	-	VIDEO RATING
7	DROP INLET	DINL	POINT	DROP INLET ON LEFT	-	ARAN
	""	DINR	POINT	DROP INLET ON RIGHT	-	ARAN
8	GATE	GATE	POINT	GATE	-	VIDEO RATING
9	FIRE HYDRANT	FHDL	POINT	FIRE HYDRANT ON LEFT	-	VIDEO RATING
	""	FHDR	POINT	FIRE HYDRANT ON RIGHT	-	VIDEO RATING
10	GUARD/GUIDE WALL	GGWL	LINEAR	GUARD/GUIDE WALL ON LEFT	-	VIDEO RATING
	""	GGWR	LINEAR	GUARD/GUIDE WALL ON RIGHT	-	VIDEO RATING
11	GUARD/GUIDE RAIL	GGRL	LINEAR	GUARD/GUIDE RAIL ON LEFT	-	VIDEO RATING
	""	GGRR	LINEAR	GUARD/GUIDE RAIL ON RIGHT	-	VIDEO RATING
12	INTERSECTION	INTL	POINT	INTERSECTION ON LEFT	-	ARAN
	""	INTR	POINT	INTERSECTION ON RIGHT	-	ARAN
	""	INTN	POINT	INTERSECTION SIDE N/A	-	ARAN

13	LANE DEVIATION	LADV	LINEAR	LANE DEVIATION	-	ARAN
14	LOW WATER CROSSING	LWCR	LINEAR	LOW WATER CROSSING	SOMETIMES	VIDEO RATING
15	MILE MARKER	MML	POINT	MILE MARKER ON LEFT	-	VIDEO RATING
	""	MMR	POINT	MILE MARKER ON RIGHT	-	VIDEO RATING
16	OVERPASS	OPV	POINT	OVERPASS VEHICULAR	SOMETIMES	ARAN
	""	OPP	POINT	OVERPASS PEDESTRIAN	SOMETIMES	ARAN
	""	OPRX	POINT	OVERPASS RAILROAD CROSSING	SOMETIMES	ARAN
17	PARK BOUNDARY	PRK	POINT	PARK BOUNDARY	-	ARAN
18	PAVED DITCH	PVDL	LINEAR	PAVED DITCH ON LEFT	-	VIDEO RATING
	""	PVDR	LINEAR	PAVED DITCH ON RIGHT	-	VIDEO RATING
19	PULLOUT	PLOL	LINEAR	PULLOUT ON LEFT	-	VIDEO RATING
	""	PLOR	LINEAR	PULLOUT ON RIGHT	-	VIDEO RATING
20	RAILROAD CROSSING	RRX	POINT	RAILROAD CROSSING	-	VIDEO RATING
21	RETAINING WALL	RTWL	LINEAR	RETAINING WALL ON LEFT	-	VIDEO RATING
	""	RTWR	LINEAR	RETAINING WALL ON RIGHT	-	VIDEO RATING
22	ROUTE BEGIN	RBEG	POINT	ROUTE BEGIN	-	ARAN
23	ROUTE END	REND	POINT	ROUTE END	-	ARAN
24	SIGN	REGU, WARN, GUID, UNKN	POINT	DOCUMENT CONTENTS OF SIGN. (WHAT THE SIGN SAYS) FOR GRAPHICS ONLY SIGNS POPULATED WITH ("GRAPHIC SIGN, NO TEXT") FOR UNREADABLE TEXT POPULATED WITH ("UNABLE TO READ FROM VIDEO")	-	VIDEO RATING
25	STATE BOUNDARY	STB	POINT	STATE BOUNDARY	-	ARAN
26	TRAFFIC LIGHT	TRF	POINT	TRAFFIC LIGHT	-	VIDEO RATING
27	TUNNEL	TUN	LINEAR	TUNNEL	ALWAYS	ARAN

PMS_20, PMS_MILE, & PMS_TENTH Tables Metadata:

	FIELD	FORMAT	EXPECTED VALUE	SOURCE	VALIDATION	EXPECTED ACCURACY
1	RIP_CYCLE	XX	4, for RIP data collection Cycle 4	Route ID Meeting	FHWA Determination	100% Referenced to other tables
2	STATE	XX	State where route is located	Route ID Meeting	Park Input/FHWA Determination	Untested. (1)
3	PARK_ALPHA	XXXX	Park alpha code	Route ID Meeting	NPS References	100% Referenced to other tables
4	PARK_NO	XXXX	Park numeric code	Route ID Meeting	NPS References	100% Referenced to other tables
5	RTE_NO	9999XXX	Route number	Route ID Meeting	Park Input/FHWA Classification	100% Referenced to other tables
6	FUNCT_CLASS	X	Route functional class	Route ID Meeting	Park Input/FHWA Classification	100% Referenced to other tables
7	DIRECTION	XXX	Survey lane: PRI (primary) or OPP (opposite)	Route ID Meeting	Park Input/FHWA Determination	100%
8	BEG_MP	999.999 (miles)	MP at start of road interval described by database record	Contractor Post-processing	Database Processing	100% (3)
9	END_MP	999.999 (miles)	MP at end of road interval described by database record	Contractor Post-processing	Database Processing	100% (3)
10	INT_LENGTH	999.9 (ft)	Length of road interval as aggregated for data table	Contractor Post-processing	Database Processing	100%
11	RTE_LENGTH	999.999 (miles)	Collected route length	ARAN Data Collection	Automatic Output	100% (3)
12	NO_LANES	99	Number of lanes in route	ARAN Data Collection	Survey Crew Input	Untested. (1)
13	LANE_NO	99	Data collection lane	Contractor Post-processing	Database Processing	Untested
14	D_LANE_WIDTH	99.999 (ft)	WiseCrax (crack detection software) analysis width	Contractor Post-processing	Automatic Output	Untested
15	LANE_WIDTH	99.9 (ft)	Width of lane	Contractor Post-processing	Video Analysis	95%, <=1.0 foot
16	PAVE_WIDTH	99.9 (ft)	Full pavement width	Contractor Post-processing	Video Analysis	95%, <=1.0 foot
17	SHLD_WIDTH_L	99.9 (ft)	Left shoulder width	Contractor Post-processing	Video Analysis	95%, <=1.0 foot (2)
18	SHLD_WIDTH_R	99.9 (ft)	Right shoulder width	Contractor Post-processing	Video Analysis	95%, <=1.0 foot (2)
19	SHLD_COND_L	N/A	N/A. Intended to be Left shoulder condition	ARAN Data Collection	Survey Crew Input	Values inaccurate, defaulted to “N/A”
20	SHLD_COND_R	N/A	N/A. Intended to be Right shoulder condition	ARAN Data Collection	Survey Crew Input	Values inaccurate, defaulted to “N/A”
21	DRAIN_COND_L	N/A	N/A. Intended to be Left drainage condition	ARAN Data Collection	Survey Crew Input	Values inaccurate, defaulted to “N/A”
22	DRAIN_COND_R	N/A	N/A. Intended to be Right drainage condition	ARAN Data Collection	Survey Crew Input	Values inaccurate, defaulted to “N/A”

	FIELD	FORMAT	EXPECTED VALUE	SOURCE	VALIDATION	EXPECTED ACCURACY
23	SURF_TYPE	XX	Surface type of route	ARAN Data Collection	Survey Crew Input	Untested. (1)
24	PCR	999	Pavement Condition Rating	Contractor Post-processing	Database Processing	100% for calculation (6)
25	RCI	999	Roughness Condition Index; -1 if invalid IRI	Contractor Post-processing	Database Processing	100% for calculation
26	SCR	999	Surface Condition Rating	Contractor Post-processing	Database Processing	100% for calculation (5) (6)
27	IRI_AVG	999.9 (inches/mile)	Average IRI	Contractor Post-processing	Database Processing	Untested
28	IRI_SD	999.9 (inches/mile)	IRI standard deviation	Contractor Post-processing	Database Processing	Untested
29	IRI_L	999.9 (inches/mile)	Left wheel path IRI	ARAN Data Collection	Automatic Output	Untested
30	IRI_R	999.9 (inches/mile)	Right wheel path IRI	ARAN Data Collection	Automatic Output	Untested
31	IRI_FLAG	0 or -1	-1 if invalid IRI data	Contractor Post-processing	Database Processing	Untested
32	RUT_INDEX	999	Rut index	Contractor Post-processing	Database Processing	100% for calculation (5)
33	RUT_AVG	99.99 (inches)	Average rut depth of both wheelpaths	Contractor Post-processing	Database Processing	Untested (5)
34	RUT_MAX	99.99 (inches)	Maximum rut depth of both wheelpaths	Contractor Post-processing	Database Processing	Untested (5)
35	RUT_SD	9.9	Rut depth standard deviation	Contractor Post-processing	Database Processing	Untested (5)
36	RUT_LOW	999 (%)	Percent of low severity ruts (on a 0-200% scale) in both wheelpaths	Contractor Post-processing	Database Processing	Untested (5)
37	RUT_MED	999 (%)	Percent of medium severity ruts (on a 0-200% scale) in both wheelpaths	Contractor Post-processing	Database Processing	Untested (5)
38	RUT_HI	999 (%)	Percent of high severity ruts (on a 0-200% scale) in both wheelpaths	Contractor Post-processing	Database Processing	Untested (5)
39	XFALL	999.9 (% slope)	Cross fall at start of road interval	ARAN Data Collection	Automatic Output	Untested
40	GRADE	999.9 (% slope)	Grade at start of road interval	ARAN Data Collection	Automatic Output	Untested
41	AC_INDEX	999	Alligator cracking index	Contractor Post-processing	Database Processing	100% for calculation (5) (6)
42	AC_LOW	999.9999 (%)	Percent of WiseCrax measured lane area with low-severity alligator cracking	Contractor Post-processing	Pavement Video Analysis	As a Computed 95% Confidence Level (5) (6)
43	AC_MED	999.9999 (%)	Percent of WiseCrax measured lane area with medium-severity alligator cracking	Contractor Post-processing	Pavement Video Analysis	As a Computed 95% Confidence Level (5) (6)
44	AC_HI	999.9999 (%)	Percent of WiseCrax measured lane area with high-severity alligator	Contractor Post-processing	Pavement Video Analysis	As a Computed 95% Confidence Level (5) (6)

	FIELD	FORMAT	EXPECTED VALUE	SOURCE	VALIDATION	EXPECTED ACCURACY
			cracking			
45	LC_INDEX	999	Longitudinal cracking index	Contractor Post-processing	Database Processing	100% for calculation (5) (6)
46	LC_LOW	999.99 (%)	Low-severity longitudinal cracking in lane as a percentage of road interval length	Contractor Post-processing	Pavement Video Analysis	As a Computed 95% Confidence Level (5) (6)
47	LC_MED	999.99 (%)	Medium-severity longitudinal cracking in lane as a percentage of road interval length	Contractor Post-processing	Pavement Video Analysis	As a Computed 95% Confidence Level (5) (6)
48	LC_HI	999.99 (%)	High-severity longitudinal cracking in lane as a percentage of road interval length	Contractor Post-processing	Pavement Video Analysis	As a Computed 95% Confidence Level (5) (6)
49	TC_INDEX	999	Transverse cracking index	Contractor Post-processing	Database Processing	100% for calculation (5) (6)
50	TC_LOW	999.99 (cracks)	Count of low-severity transverse cracks, where one crack unit equals the WiseCrax measured lane width	Contractor Post-processing	Pavement Video Analysis	As a Computed 95% Confidence Level (5) (6)
51	TC_MED	999.99 (cracks)	Count of medium-severity transverse cracks, where one crack unit equals the WiseCrax measured lane width	Contractor Post-processing	Pavement Video Analysis	As a Computed 95% Confidence Level (5) (6)
52	TC_HI	999.99 (cracks)	Count of high-severity transverse cracks, where one crack unit equals the WiseCrax measured lane width	Contractor Post-processing	Pavement Video Analysis	As a Computed 95% Confidence Level (5) (6)
53	PATCH_INDEX	999	Patching index	Contractor Post-processing	Database Processing	100% for calculation (5) (6)
54	PATCHING	999.9999 (%)	Percent of WiseCrax measured lane area affected by patching	Contractor Post-processing	Pavement Video Analysis	As a Computed 95% Confidence Level (5) (6)
55	GPS_LAT	999.999999	Latitude coordinate	ARAN Data Collection	Automatic Output	<= 3.00 feet
56	GPS_LON	-999.999999	Longitude coordinate	ARAN Data Collection	Automatic Output	<= 3.00 feet
57	GPS_ELEV	99999.9	Elevation	ARAN Data Collection	Automatic Output	Untested
58	GPS_MODE	XXX	GPS Satellite Mode during collection	ARAN Data Collection	Automatic Output	Untested
59	DATUM	(Text)	LL_WGS84_DD	ARAN Data Collection	Database Processing	100%
60	VIDEO	<*Park*>C04VID<#>	Removable USB video hard	Contractor Post-processing	Database Processing	Untested

	FIELD	FORMAT	EXPECTED VALUE	SOURCE	VALIDATION	EXPECTED ACCURACY
			drive number			
61	IMAGE	(Text)	Filename of .jpg image showing road interval	Contractor Post-processing	Automatic Output	Untested
62	SPEED	999 (miles/hour)	Average ARAN speed during data collection	ARAN Data Collection	Automatic Output	Untested
63	BRIDGE_FLAG	0 or 1	Flag indicating presence of bridge in interval	ARAN Data Collection	Survey Crew Input	Untested
64	CONSTR_FLAG	0 or 1	Flag indicating construction in interval	ARAN Data Collection	Survey Crew Input	Untested
65	LANEDEV_FLAG	0 or 1	Flag indicating lane deviation in interval	ARAN Data Collection	Survey Crew Input	Untested
66	DATE	MM/DD/YY	Data collection date	ARAN Data Collection	Automatic Output	100%
67	NODISTRESS	0 OR 1	Flag indicating absence of pavement distress	Contractor Post-processing	Database Processing	100%
68	FILENAME	(Text)	Filename of raw data files	ARAN Data Collection	Automatic Output	100%
69	SECTION	(Text)	Route section ID	Route ID Meeting/ARAN Data Collection	Survey Crew Input/Automatic Output	100%
70	FKEY	(Numeric)	Unique record ID	Contractor Post-processing	Database Processing	100%
71	CONTRACTOR1	(Numeric)	Raw MP of first video frame in section	Contractor Post-processing	Database Processing	Untested
72	CONTRACTOR2	(Numeric)	Raw MP of last video frame in section	Contractor Post-processing	Database Processing	Untested
73	CONTRACTOR3	(Text)	Unique record ID used by VisiData	Contractor Post-processing	Database Processing	Untested
74	CONTRACTOR4	(Text)	Range of mileage to play in VisiData	Contractor Post-processing	Database Processing	Untested

ROUTE_GPS table metadata:

	FIELD	FORMAT	EXPECTED VALUE	SOURCE	VALIDATION	EXPECTED ACCURACY
1	RIP_CYCLE	XX	4, for RIP data collection Cycle 4	Route ID Meeting	FHWA Determination	100% referenced to other tables
2	STATE	XX	State where route is located	Route ID Meeting	Park Input/FHWA Determination	Untested
3	PARK_ALPHA	XXXX	Park alpha code	Route ID Meeting	NPS References	100% Referenced to other tables
4	PARK_NO	XXXX	Park numeric code	Route ID Meeting	NPS References	100% Referenced to other tables
5	RTE_NO	9999XXX	Route number	Route ID Meeting	Park Input/FHWA Classification	100% Referenced to other tables
6	FUNCT_CLASS	X	Route functional classification	Route ID Meeting	Park Input/FHWA Classification	100% Referenced to other tables
7	RTE_NAME	(Text)	Route name	Route ID Meeting	Park Input	100% Referenced to other tables . 100 characters fit in field
8	LANE_NUMBER	99	Data collection lane	Contractor Post-processing	Database Processing	Untested
9	DIRECTION	XXX	Survey lane: PRI (primary) or OPP (opposite)	Route ID Meeting	Park Input/FHWA Determination	Untested
10	MP	999.999	Mile Post (at 0.01 record)	ARAN Data Collection, Contractor Post-processing	Survey Crew Input/GPS Processing	Untested (3)
11	GPS_LAT	999.999999	GPS Latitude Co-ordinate (decimal degrees)	ARAN Data Collection, Contractor Post-processing	Automatic Output	<= 3.00 feet
12	GPS_LON	-999.999999	GPS Longitude Co-ordinate (-decimal degrees)	ARAN Data Collection, Contractor Post-processing	Automatic Output	<= 3.00 feet
13	GPS_ELEV	99999.9	Elevation	ARAN Data Collection, Contractor Post-processing	Automatic Output	Untested
14	GPS_MODE	XXX	GPS Satellite Mode during collection	ARAN Data Collection, Contractor Post-processing	Automatic Output	Untested
15	XFALL	999.9	Cross Fall: % Slope at GPS Location (Caution, Data not Validated)	ARAN Data Collection, Contractor Post-processing	Automatic Output	Untested
16	GRADE	999.9	Grade: % Slope at GPS Location (Caution, Data not Validated)	ARAN Data Collection, Contractor Post-processing	Automatic Output	Untested
17	HEADING	999.9	Heading Relative to True North	ARAN Data Collection	Automatic Output	Untested
18	DATUM	(Text)	LL_WGS84_DD	ARAN Data Collection	Database Processing	Untested
19	FILENAME	(Text)	Filename of raw data files	ARAN Data Collection	Automatic Output	Untested
20	FKEY	9999999	Unique record ID	Contractor Post-processing	Database Processing	Untested

21	DATE	MM/DD/YY	ARAN Data Collection Date	ARAN Data Collection	Automatic Output	Untested
22	COMMENT	(Text)	Source of Any Digitized Data	ARAN Data Collection	Database Processing	Untested
23	CONTRACTOR1	(Numeric)	Visi_from	Contractor Post-processing	Database Processing	Untested
24	CONTRACTOR2	(Numeric)	Visi_to	Contractor Post-processing	Database Processing	Untested
25	CONTRACTOR3	(Text)	Visi_dir (ipdated to chapter 1)	Contractor Post-processing	Database Processing	Untested
26	CONTRACTOR4	(Text)	Comments/exceptions	Contractor Post-processing	Database Processing	Untested

FHWA "Route ID Program" Database
Database Name: ROUTEINFO.mdb
Table Name: ROUTE_ID

	FIELD	FORMAT	EXPECTED VALUE	SOURCE	VALIDATION	EXPECTED ACCURACY
1	ROUTE_IDENT	XXXX-9999XXX	The Park's Alpha Code + "-" + RTE_NO (below).	Route ID Meeting	Automatic Output	100%, Reference source for all tables
2	RIP_CYCLE	99	4, for RIP data collection Cycle 4	Route ID Meeting	FHWA Determination	100%, Reference source for all tables
3	PARK_ALPHA	XXXX	Park Alpha Code	Route ID Meeting	NPS References	100%, Reference source for all tables
4	GROUP_ALPHA	XXXX	Group Alpha Code	Route ID Meeting	NPS References	100%, Reference source for all tables
5	PARK_NO	9999	Park Numeric Code	Route ID Meeting	NPS References	100%, Reference source for all tables
6	PARK_NAME	(text)	NPS Name of Park	Route ID Meeting	NPS References	100%, Reference source for all tables
7	RTE_NO	9999XXX	Route Number	Route ID Meeting	Park Input	100%, Reference source for all tables
8	RTE_NAME	(Text)	Route Name	Route ID Meeting	Park Input	100%, Reference source for all tables
9	FROM_DESC	(Text)	Beginning terminus of route	Route ID Meeting	Park Input/FHWA Determination	100%, Reference source for all tables
10	TO_DESC	(Text)	Ending terminus of route	Route ID Meeting	Park Input/FHWA Determination	100%, Reference source for all tables
11	INSP_DATE	MM/DD/YYYY	Collection Date	ARAN Data Collection	FHWA Determination	100%, Reference source for all tables
12	FUNCT_CLASS	XX	Functional Class	Route ID Meeting	Park Input/FHWA Determination	100%, Reference source for all tables
13	STATE	XX	State where route is located	Route ID Meeting	Park Input/FHWA Determination	Untested (1)
14	STATE2	XX	Additional State Park Route traverses	Route ID Meeting	Park Input/FHWA Determination	Untested (1)
15	FMSS_NO	(Text)	NPS's Facility Management Software System (FMSS) Asset number	Route ID Meeting	Park Input	100%, Reference source for all tables
16	FMSS_SUR_EQP	(Text)	FMSS Surface Equipment Number	Route ID Meeting	Park Input	Untested
17	M_DISTRICT	(Text)	Park Maintenance District Route resides in	Route ID Meeting	Park Input	100%, Reference source for all tables (1)
18	TOPOGRAPHY	(Text)	Predominate Terrain condition for	Route ID Meeting	FHWA Determination	100%, Reference source for all

	FIELD	FORMAT	EXPECTED VALUE	SOURCE	VALIDATION	EXPECTED ACCURACY
			Route. (FLAT, ROLLING, MOUNTAINOUS, or URBAN)			tables (1)
19	POSTED_SPEED	99	Posted Speed Limit for Route (Value is Predominate Speed Limit along Route)	Route ID Meeting	Park Input/FHWA Determination	Untested (1)
20	ARAN_ROUTE	XXX	Yes/No	Route ID Meeting	Park Input/FHWA Determination	100%, Reference source for all tables
21	PARKING_AREA	XXX	Yes/No	Route ID Meeting	Park Input/FHWA Determination	100%, Reference source for all tables
22	CONCESSION	XXX	Yes/No	Route ID Meeting	Park Input	100%, Reference source for all tables
23	PAVED_MI	999.999	Paved mileage (to the nearest 0.001)	ARAN Data Collection	Automatic Output	100%, Reference source for all tables
24	UNPAVED_MI	999.999	Unpaved mileage (to the nearest 0.001)	Route ID Meeting	Automatic Output	100%, Reference source for all tables
25	RTE_LENGTH	999.999	Official Route Length	Contractor Post-processing	Automatic Output	100%, Reference source for all tables
26	SURF_TYPE	XX	Surface type (PAVED: AS (asphalt, includes composite), CO (concrete), BR (brick/pavers), CB (cobblestone), OT (other))	Route ID Meeting	Survey Crew Input	100%, Reference source for all tables (1)
27	UNPAVED	XXXX	Unpaved Route (Yes/No/Both)	Route ID Meeting	Automatic Output	100%, Reference source for all tables
28	UNPAVED_CAT	XXX	Unpaved Road Category	Route ID Meeting	Automatic Output	Untested
29	CURB	(Text)	Parking Area with Curb around perimeter.	Route ID Meeting	Park Input/FHWA Determination	Untested
30	CURB_GUTTER	(Text)	Parking Area with Curb and Gutter around perimeter.	Route ID Meeting	Park Input/FHWA Determination	Untested
31	ADJ_ROUTE	9999XXX	Route number	Route ID Meeting	Automatic Output	100%, Reference source for all tables
32	USER_ACCESS	(Text)	Access Designation for Parking	Route ID Meeting	Park Input/FHWA Determination	100%, Reference source for all tables
33	PHOTO_NO	(Text)	Photo or Image	Route ID Meeting	Survey Crew Input	100%, Reference source for all tables
34	PLOT_SIZE	(Text)	Unpaved Parking Area Size	Route ID Meeting	Automatic Output	100%, Reference source for all tables
35	SQ_FEET	999.999	Route Square Footage	Contractor Post-processing	Automatic Output	100%, Reference source for all tables
36	M_RATING	(Text)	Manual Rating	Route ID Meeting	Automatic Output	100%, Reference source for all tables

	FIELD	FORMAT	EXPECTED VALUE	SOURCE	VALIDATION	EXPECTED ACCURACY
37	SQ_YARDS	999.999	Route Square Yardage	Contractor Post-processing	Automatic Output	100%, Reference source for all tables
38	LANES	XX	Route travel lanes	Route ID Meeting	Automatic Output	Untested (1)
39	PAVE_WIDTH	999.99	Pavement Width (Weighted average)	RIP Post-processing	Automatic Output	100% Referenced to other tables
40	LANE_MILES	999.999	Route Equivalent Lane Miles	RIP Post-processing	Automatic Output	100%, Reference source for all tables
41	AREA_MAP	(Text)	1 or 2-digit number	Contractor Post-processing	FHWA/Contractor Input	100%, Reference source for all tables
42	REMARKS	(Memo)	General remarks on Park route and data collection operations.	Contractor Post-processing	FHWA/Contractor Input	Untested
43	SUMMARY_REC	XXXX-9999XXX	ROUTE_IDENT of summary Park Asset	Route ID Meeting	Park Input/FHWA Determination	100%, Reference source for all tables
44	NPS_REGION	(Text)	Park Region	Route ID Meeting	Park Input/FHWA Determination	100%, Reference source for all tables
45	DIVISION	(Text)	FHWA Division	Route ID Meeting	Park Input/FHWA Determination	100%, Reference source for all tables
46	PCR	999.99	Route Weighted Average PCR value	RIP Post-processing	Automatic Output	100% Referenced to other tables
47	SCR	999.99	Route Weighted Average SCR value	RIP Post-processing	Automatic Output	100% Referenced to other tables
48	AADT	999	Average Adjusted Daily Traffic	RIP	Automatic Output	Untested
49	SADT	999	Seasonal Adjusted Daily Traffic	RIP	Automatic Output	Untested
50	ADT_DATE	MM/DD/YYYY	Traffic Date of Collection	RIP	Automatic Output	Untested
51	BEG_LAT	999.999999	Route Begin GPS Latitude Co-ordinate (decimal degrees)	ARAN Data Collection	Automatic Output	<= 3.00 feet, Referenced from other tables
52	BEG_LON	-999.999999	Route Begin GPS Longitude Co-ordinate (-decimal degrees)	ARAN Data Collection	Automatic Output	<= 3.00 feet, Referenced from other tables
53	BEG_ELEV	99999.9	Route Begin Elevation	ARAN Data Collection	Automatic Output	100% Referenced to other tables
54	BEG_MODE	XXX	Route Begin GPS Satellite Mode during collection	ARAN Data Collection	Automatic Output	100% Referenced to other tables
55	END_LAT	999.999999	Route End GPS Latitude Co-ordinate (decimal degrees)	ARAN Data Collection	Automatic Output	<= 3.00 feet, Referenced from other tables

	FIELD	FORMAT	EXPECTED VALUE	SOURCE	VALIDATION	EXPECTED ACCURACY
56	END_LON	-999.999999	Route End GPS Longitude Co-ordinate (-decimal degrees)	ARAN Data Collection	Automatic Output	<= 3.00 feet, Referenced from other tables
57	END_ELEV	99999.9	Route End Elevation	ARAN Data Collection	Automatic Output	100% Referenced to other tables
58	END_MODE	XXX	Route End GPS Satellite Mode during collection	ARAN Data Collection	Automatic Output	100% Referenced to other tables
59	DATUM	(Text)	LL_WGS84_DD	ARAN Data Collection	Automatic Output	100% Referenced to other tables
60	CHILD_ROUTE	XXX	Yes/No	Route ID Meeting	Automatic Output	100% Reference source for all tables
61	CULVERT_CNT	999	Route Culvert Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
62	DROP_INLET_CNT	999	Route Drop Inlet Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
63	GATE_CNT	999	Route Gate Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
64	TRAFLIGHT_CNT	999	Route Traffic Light Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
65	SIGN_CNT	999	Route Sign Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
66	LWCROSS_CNT	999	Route Low Water Crossing Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
67	BRIDGE_CNT	999	Route Bridge Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
68	TUNNEL_CNT	999	Route Tunnel Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
69	PULLOUT_CNT	999	Route Pullout Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
70	INTERSEC_CNT	999	Route Intersection Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
71	ST_BNDRY_CNT	999	Route State Boundary Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
72	PRK_BNDRY_CNT	999	Route Park Boundary Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
73	RETWALL_CNT	999	Route Retaining Wall Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
74	RR_CROSS_CNT	999	Route RR Crossing Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
75	CATTLE_CNT	999	Route Cattle Guard Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
76	OVHDSIGN_CNT	999	Route Overhead Sign Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
77	MILEMARK_CNT	999	Route Mile Marker Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
78	FHYD_CNT	999	Route Fire Hydrant Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
79	OVERPASS_CNT	999	Route Overpass Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
80	CABLE_TLNG	9999.999 (ft)	Route Total Length Cable Barriers	RIP Post-processing	Automatic Output	100% Referenced to other tables

	FIELD	FORMAT	EXPECTED VALUE	SOURCE	VALIDATION	EXPECTED ACCURACY
81	GDRAIL_TLNG	9999.999 (ft)	Route Total Length Guard/Guide Rail Barriers	RIP Post-processing	Automatic Output	100% Referenced to other tables
82	GDWALL_TLNG	9999.999 (ft)	Route Total Length Guard/Guide Wall Barriers	RIP Post-processing	Automatic Output	100% Referenced to other tables
83	TEMP_BARR_TLNG	9999.999 (ft)	Route Total Length Temporary Barriers	RIP Post-processing	Automatic Output	100% Referenced to other tables
84	BOLLARD_TLNG	9999.999 (ft)	Route Total Length Bollard Barriers	RIP Post-processing	Automatic Output	100% Referenced to other tables
85	BARRIER_TLNG	9999.999 (ft)	Route Total Length All Barriers	RIP Post-processing	Automatic Output	100% Referenced to other tables
86	CURB_TLNG	9999.999 (ft)	Route Total Length Curbing (excludes Parking Areas)	RIP Post-processing	Automatic Output	100% Referenced to other tables
87	LWCROSS_TLNG	9999.999 (ft)	Route Total Length Low Water Crossings	RIP Post-processing	Automatic Output	100% Referenced to other tables
88	PAVDITCH_TLNG	9999.999 (ft)	Route Total Length Paved Ditch	RIP Post-processing	Automatic Output	100% Referenced to other tables (2)
89	TURNOUT_TLNG	9999.999 (ft)	Route Total Length Turnouts	RIP Post-processing	Automatic Output	100% Referenced to other tables
90	LANE_NUMBER	99	Number of Lane Tested	RIP Post-processing	Automatic Output	100% Referenced to other tables
91	LOCAL_FACTOR	9.9999	Park Location Factor	NPS Partner	Automatic Output	100% Reference source for all tables
92	E_ZONE	XXX	Route Environmental Zone	FHWA HPMA	Automatic Output	100% Reference source for all tables
93	PAVEMENT_DM	$99,999,999.99	Pavement Deferred Maintenance	FHWA HPMA	Automatic Output	100% Reference source for all tables
94	CRV	$99,999,999.99	Current Replacement Value	RIP Post-processing	Automatic Output	100% Reference source for all tables

Database Name: ROUTEINFO.mdb
Table Name: PARK_TOTALS

	FIELD	FORMAT	EXPECTED VALUE	SOURCE	VALIDATION	EXPECTED ACCURACY
1	RIP_CYCLE	99	4, for RIP data collection Cycle 4	Route ID Meeting	FHWA Determination	100% Referenced to other tables
2	PARK_ALPHA	XXXX	Park Alpha Code	Route ID Meeting	FHWA Determination	100% Referenced to other tables
3	GROUP_ALPHA	XXXX	Group Alpha Code	Route ID Meeting	NPS References	100% Referenced to other tables
4	PARK_NO	9999	Park Numeric Code	Route ID Meeting	NPS References	100% Referenced to other tables
5	PARK_NAME	XXXX	NPS Name of Park	Route ID Meeting	NPS References	100% Referenced to other tables
6	INSP_DATE	MM/DD/YYYY	Date that data was collected in the park (completion date).	Route ID Meeting and ARAN Data Collection	FHWA Determination	100% Referenced to other tables
7	NPS_REGION	XXXX	Park Region	Route ID Meeting	Park Input	100% Referenced to other tables
8	DIVISION	XXXX	FHWA Division	Route ID Meeting	FHWA Determination	100% Referenced to other tables
9	T_PAVED_MI	999.999	Total Park Paved Miles	RIP Post-processing	Automatic Output	100% Referenced to other tables
10	T_UNPAVED_MI	999.999	Total Park Unpaved Miles	RIP Post-processing	Automatic Output	100% Referenced to other tables
11	T_ROUTE_MILES	999.999	Total Park Route Miles	RIP Post-processing	Automatic Output	100% Referenced to other tables
12	T_ARAN_DRIVEN	999.999	Total Park ARAN Driven Miles	RIP Post-processing	Automatic Output	100% Referenced to other tables
13	T_ARAN_LMILES	999.999	Total Park ARAN Lane Miles	RIP Post-processing	Automatic Output	100% Referenced to other tables
14	T_CONCESS_PAVED	999.999	Total Park Concession Paved Miles	RIP Post-processing	Automatic Output	100% Referenced to other tables
15	T_CONCESS_UNPAVED	999.999	Total Park Concession Unpaved Miles	RIP Post-processing	Automatic Output	100% Referenced to other tables
16	T_PRK_PAVEDSQFT	999.999	Total Park Parking Paved Square Feet	RIP Post-processing	Automatic Output	100% Referenced to other tables
17	T_PRK_UNPAVEDSQFT	999.999	Total Park Parking Unpaved Square Feet	RIP Post-processing	Automatic Output	100% Referenced to other tables
18	T_CPRK_PAVEDSQFT	999.999	Total Park Concession Parking Paved Square Feet	RIP Post-processing	Automatic Output	100% Referenced to other tables

	FIELD	FORMAT	EXPECTED VALUE	SOURCE	VALIDATION	EXPECTED ACCURACY
19	T_CPRK_UNPAVEDSQFT	999.999	Total Park Concession Parking Unpaved Square Feet	RIP Post-processing	Automatic Output	100% Referenced to other tables
20	T_PARKING_SQFT	999.999	Total Park Parking Square Feet	RIP Post-processing	Automatic Output	100% Referenced to other tables
21	T_PARKING_LMILES	999.999	Total Park Parking Equivalent Lane Miles	RIP Post-processing	Automatic Output	100% Referenced to other tables
22	T_MRR_SQFT	999.999	Total Park Manually Rated Road Square Feet	RIP Post-processing	Automatic Output	100% Referenced to other tables
23	T_CMRR_SQFT	999.999	Total Park Concession Manually Rated Road Square Feet	RIP Post-processing	Automatic Output	100% Referenced to other tables
24	T_MRR_LMILES	999.999	Total Park Manually Rated Road Equivalent Lane Miles	RIP Post-processing	Automatic Output	100% Referenced to other tables
25	T_LMILES	999.999	Total Park Lane Miles	RIP Post-processing	Automatic Output	100% Referenced to other tables
26	T_CULVERT_CNT	999	Total Park Culvert Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
27	T_DROP_INLET_CNT	999	Total Park Drop Inlet Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
28	T_GATE_CNT	999	Total Park Gate Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
29	T_TRAFLIGHT_CNT	999	Total Park Traffic light Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
30	T_SIGN_CNT	999	Total Park Sign Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
31	T_LWCROSS_CNT	999	Total Park Low Water Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
32	T_BRIDGE_CNT	999	Total Park Bridge Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
33	T_TUNNEL_CNT	999	Total Park Tunnel Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
34	T_PULLOUT_CNT	999	Total Park Pullout Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
35	T_INTERSEC_CNT	999	Total Park Intersections Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
36	T_ST_BNDRY_CNT	999	Total Park State Boundaries Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
37	T_PRK_BNDRY_CNT	999	Total Park Boundaries Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
38	T_RETWALL_CNT	999	Total Park Retaining Wall Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
39	T_RR_CROSS_CNT	999	Total Park RR Crossing Count	RIP Post-processing	Automatic Output	100% Referenced to other

	FIELD	FORMAT	EXPECTED VALUE	SOURCE	VALIDATION	EXPECTED ACCURACY
						tables
40	T_CATTLE_CNT	999	Total Park Cattle Guard Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
41	T_OVHDSIGN_CNT	999	Total Park Overhead Sign Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
42	T_MILEMARK_CNT	999	Total Park Mile Marker Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
43	T_FHYD_CNT	999	Total Park Fire Hydrant Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
44	T_OVERPASS_CNT	999	Total Park Overpass Count	RIP Post-processing	Automatic Output	100% Referenced to other tables
45	T_CABLE_TLNG	9999.999 (ft)	Total Length Park Cable Barriers	RIP Post-processing	Automatic Output	100% Referenced to other tables
46	T_GDRAIL_TLNG	9999.999 (ft)	Total Length Park Guard/Guide Rail Barriers	RIP Post-processing	Automatic Output	100% Referenced to other tables
47	T_GDWALL_TLNG	9999.999 (ft)	Total Length Park Guard/Guide Wall Barriers	RIP Post-processing	Automatic Output	100% Referenced to other tables
48	T_TEMP_BARR_TLNG	9999.999 (ft)	Total Length Park Temporary Barriers	RIP Post-processing	Automatic Output	100% Referenced to other tables
49	T_BOLLARD_TLNG	9999.999 (ft)	Total Length Park Bollard Barriers	RIP Post-processing	Automatic Output	100% Referenced to other tables
50	T_BARRIER_TLNG	9999.999 (ft)	Total Length All Park Barriers	RIP Post-processing	Automatic Output	100% Referenced to other tables
51	T_CURB_TLNG	9999.999 (ft)	Total Length Park Curbing	RIP Post-processing	Automatic Output	100% Referenced to other tables
52	T_LWCROSS_TLNG	9999.999 (ft)	Total Length Park Low Water Crossings	RIP Post-processing	Automatic Output	100% Referenced to other tables
53	T_PAVDITCH_TLNG	9999.999 (ft)	Total Length Park Paved Ditches	RIP Post-processing	Automatic Output	100% Referenced to other tables (2)
54	T_TURNOUT_TLNG	9999.999 (ft)	Total Length Park Turnouts	RIP Post-processing	Automatic Output	100% Referenced to other tables
55	PARK_PCR	99.99	Overall Park PCR Rating	RIP Post-processing	Automatic Output	100% Referenced to other tables
56	PARK_RCI	99.99	Overall Park RCI Rating	RIP Post-processing	Automatic Output	100% Referenced to other tables
57	PARK_SCR	99.99	Overall Park SCR Rating	RIP Post-processing	Automatic Output	100% Referenced to other tables
58	PARK_RUT_INDEX	99.99	Overall Park Rutting Index Rating	RIP Post-processing	Automatic Output	100% Referenced to other tables
59	PARK_AC_INDEX	99.99	Overall Park Alligator Cracking Index Rating	RIP Post-processing	Automatic Output	100% Referenced to other tables

	FIELD	FORMAT	EXPECTED VALUE	SOURCE	VALIDATION	EXPECTED ACCURACY
60	PARK_LC_INDEX	99.99	Overall Park Longitudinal Cracking Index Rating	RIP Post-processing	Automatic Output	100% Referenced to other tables
61	PARK_TC_INDEX	99.99	Overall Park Transverse Cracking Index Rating	RIP Post-processing	Automatic Output	100% Referenced to other tables
62	PARK_PATCH_INDEX	99.99	Overall Park Patching Index Rating	RIP Post-processing	Automatic Output	100% Referenced to other tables
63	PARK_CONC_PCR	99.99	Overall Park Concession PCR Rating	RIP Post-processing	Automatic Output	100% Referenced to other tables

Business Practices for Route Numbering and Roadway Asset Identification

Introduction and Background:
Beginning in November 2006, inventory and condition information gathered by the Federal Highway Administration (FHWA) has been stored in FMSS to enable NPS to report Deferred Maintenance (DM) and Current Replacement Value (CRV) for NPS paved roads, paved parking areas, bridges, and tunnels. The NPS Roads Working Group (RWG) has been tasked with developing and implementing the procedures necessary to transfer DM and CRV from FHWA's databases to NPS' Facility Management Software System (FMSS).

Current business practices for roadway definition in national parks involve face-to-face meetings between FHWA personnel and individual park staff known as "Route ID" meetings. These meetings have been ongoing for several years and have been performed within the context of the Road Inventory Program (RIP) executed mainly by FHWA. The primary focus of these meetings has been on defining roadway static information such as route names, numbers, functional class, etc. The FHWA personnel are the primary individuals responsible for implementing the RIP and the route ID meetings are an integral and fundamental part of that process. The RIP process provides route numbers for each individual road and parking area in each park. After the route ID meetings establish a given park's roadway asset base, various types of condition and inventory data are collected either manually or with a data collection van that drives each individual road with an individual route number.

The FMSS requires asset numbers as unique identifiers for all asset types including roadways. **The current practice is that all roadways that are assigned a route number at route ID, also are defined as assets and therefore also receive an FMSS asset number** (Route names and functional classes are also collaboratively assigned during the face-to-face route ID meetings). This practice began midway through the third RIP data collection cycle (ending in 2003) and was further reinforced during an asset alignment process conducted in the summer of 2006. The alignment process ensured that each route number in RIP and each asset number in FMSS were matched to the correct road and parking area.

Issue Statement:
As a result of various pre-existing business practices associated with the RIP, which predates FMSS by several years, route numbers are assigned for routes that are often very small. In tandem with the current business practice that all routes with route numbers are considered assets, this has caused a proliferation of asset numbers within FMSS. Over the past year, the RWG has learned that this business practice has significantly increased time and resources that parks must dedicate to administering FMSS data entry and management. This additional work effort is due to the fact that tying FMSS asset records to the more detailed, granular RIP route numbers has generated numerous new assets that require additional database and work order management. This has led to a situation where assets are not being defined the way they are managed.

The following proposed practices seek to create an asset definition process that is dictated by to how road assets are managed at the park level, not according to the pre-existing practices used in RIP for collecting detailed road information. RIP practices assign route numbers mainly based on how data are collected and driven with a data collection device. These procedures will disassociate the driving of roads with the data collection van from the process of assigning them asset status. **The end goal is to only assign asset numbers based on how parks manage their facilities within guidelines set up within FMSS and herein.** Driving the road with the data collection van allows for the collection of higher quality data as well as the ability to view road segments with video viewing software (Visidata). By de-linking driving the roads with the assignment of "asset status", we are able to get the best quality data without the proliferation of assets that has serious negative ramifications for managing roadways in parks using asset management tools.

Proposed Actions:

1. Make a distinction within the route number field in the RIP database between those route numbers that represent assets, those that are subcomponents of assets and those that are groups of sub-components. The route number field in the RIP database will be expanded from 6 to 7 characters. The additional character will denote the asset status of the route in question. Combined routes will be designated with a double "zz", while subcomponents will be designated with one "z". Whenever possible, a combined route should use the lowest route number to be combined as the combined route number.
2. Only show assets, whether a group of subcomponents or a single component, on the Route ID report. Assets that are composed of subcomponents will have "zz" in the route number. Individual routes will have no additional characters in the route number. Subcomponents (designated in RIP with a "z") will not be listed on the route ID report. Only assign asset numbers to those routes listed on the route ID report.
3. Provide a separate reporting function (other than the Route ID report) to identify and display information for route numbers not representing assets. Specific reporting requirements and format TBD.
4. Add a new field to the RIP database to indicate the "asset status" of a route number. The flag will have three possible values:
    a. Asset with no subcomponents.
    b. Asset with subcomponents.
    c. Non-asset (i.e. subcomponent).

    Both a change in the route number and a new "asset ID" field in the RIP database are recommended. It is easier to perform queries and other database manipulations using a separate field instead of a character within the route number field. The character in the route number field allows for rapid identification of the asset status of a road without having to access the database as a whole. Even thought non-asset routes will not be included in the route ID report (the primary location for parks to view road information in RIP), there are many other reports as well as the Visidata application where the route number is

displayed. In these cases, the character in the route number will clearly identify the asset status of the roadway.

5. Focus asset definition practices on NPS asset management needs. Create roadway assets based on how parks manage these assets within the following guidelines:
    a. Individual road segments (asset subcomponents) may be combined into a single asset**. Note that all the attributes of individual subcomponents (paved area, equipment, work orders, etc) will be included in the combined asset.**
    b. In general, combination should be used in complex circulatory environments such as campground areas, housing and other administrative areas, maintenance areas, etc.
    c. Public and non-public segments may not be combined.
    d. Segments with differing functional classes may not be combined.
    e. Discrete parking areas may be combined into a single asset where they service the same facility or resource and are within walking distance of each other.
    f. Parking areas and roads may not be combined. This includes short road segments that may be near or adjacent to parking areas. See 5h below for exceptions to this.
    g. Where the primary purpose of a road is to provide access to a parking area, and that road segment is approximately 0.25 miles in length or shorter, the access road should be considered part of the parking area (Note that this is an existing RIP business practice).
    h. Particularly long routes may be divided into multiple assets based on how a park manages the roadway network. This should not be confused with the use of sub-components listed in 5a.
    i. Roads that are actively managed by concession operations may not be combined with those managed by the NPS.

Discussion:
The first four items listed above are actions required by FHWA RIP to allow for the adoption of the practices shown in 5a-i. The following will provide additional direction and examples for guidelines listed.

<u>Individual road segments (asset subcomponents) may be combined into a single asset.</u>
Where previous route ID practices have generated more assets (routes) than are practical from an asset management standpoint, small, discrete road lengths may be designated as asset subcomponents and then combined into a larger single asset. A subcomponent is NOT an FMSS term. Subcomponents will be used in RIP to indicate which routes are small, drivable individual road segments and which routes may include these segments. Once a piece of road is designated a subcomponent of another route, it will no longer have any individual identity in FMSS. Only those routes listed on the RIP Route ID report will have asset numbers in FMSS. As stated in business rule 2 above, subcomponents will not be listed on the route ID. The quantity information (length, area) will be included into the larger route of which they are a part. See Figures 1 and 2 for an example of how existing assets may be combined using subcomponents. Note that

subcomponents will have an identity in the RIP database and, if driven by RIP team, may be referenced in RIP reports, Visidata, or other RIP documentation.

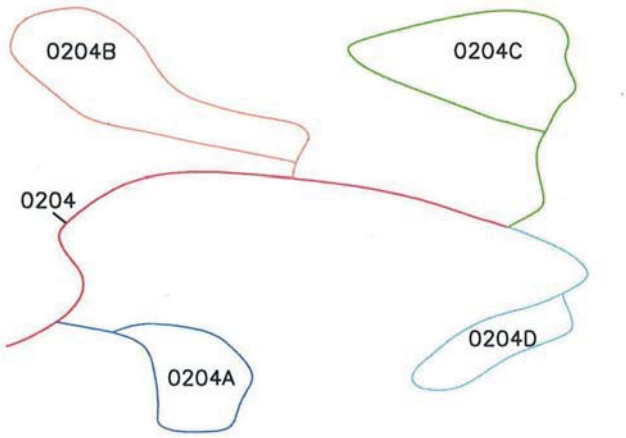


Figure 1: Campground with five routes and five assets

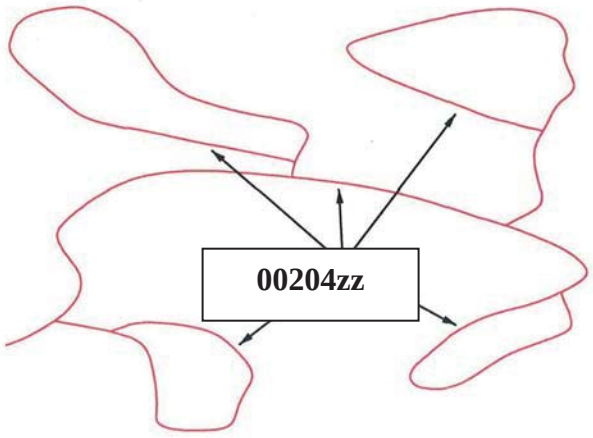


Figure 2: Campground with all loops combined into one route and one asset. This has eliminated four assets.

In general, combination should occur in complex circulatory environments such as campground areas, housing and other administrative areas, maintenance areas, etc.

Typically these complex situations are where too many assets have been used to define roadways. Combining simple "point A to point B" roads that are clearly defined and provide access to different facilities or locations may not be done.

Public and non-public segments may not be combined. Roads that are posted as closed to the public or are intended as administrative access only (maintenance areas, housing areas, fire roads, etc) can not be combined with roads open to the public.

Segments with differing functional classes may not be combined. The roadway functional class is found on the Route ID report. Functional class indicates the type of circulatory function a given road provides. Functional class is used in a variety of applications (engineering, safety, funding) so it is important to maintain the correct functional class attributes of individual roads/assets. There are some cases where functional class was erroneously assigned in prior Route ID meetings such as where campground loops have a different functional class than the campground road. Functional classes of individual roads may be modified to correct discrepancies. The functional class definitions may not be modified.

Discrete parking areas may be combined into a single asset where they service the same facility or resource and are within walking distance of each other. These combined areas should be maintained as one asset. There are many instances where small (5-10 space), discrete parking areas have been separated into individual assets even though they provide parking for the same area or facility. These may be combined into a single asset. Figures 3 and 4 shows examples of combining parking areas.

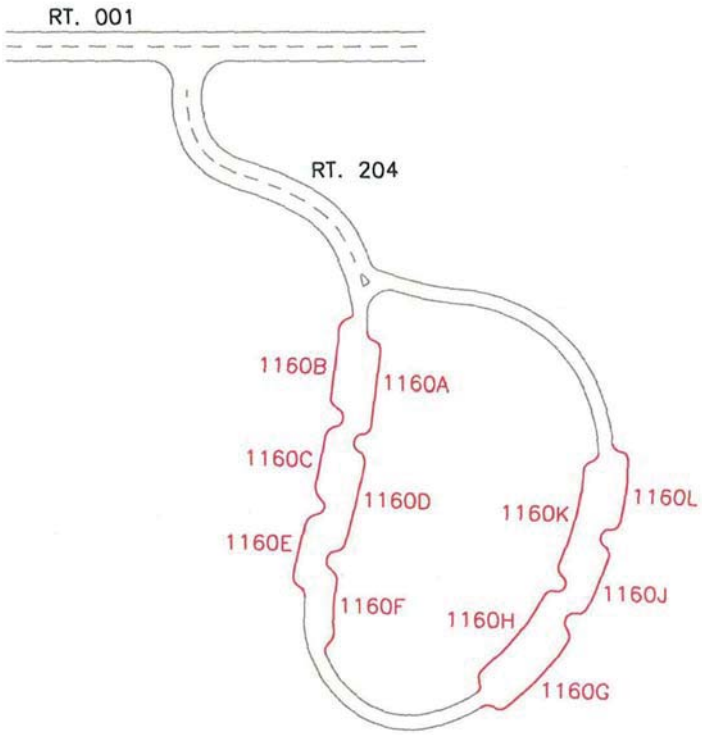


Figure 3: Parking with access route 204 and multiple parking areas (1160 A-L). Currently, this parking area is 12 routes and 12 assets (one 1100 asset and 11 1300 assets).

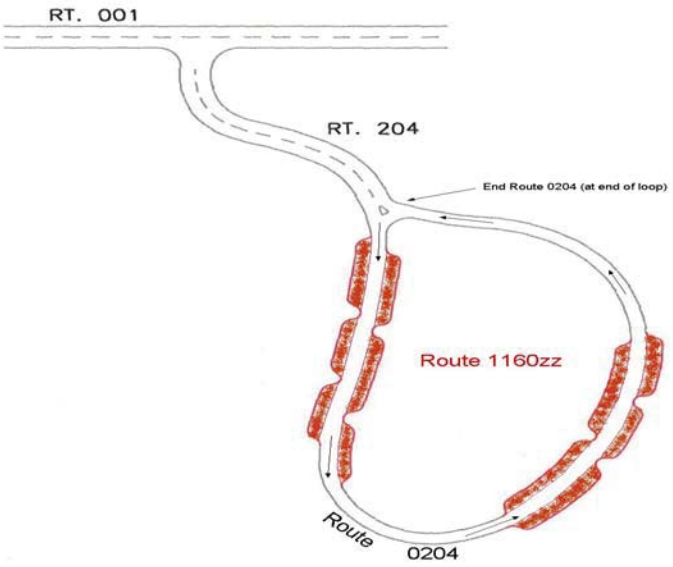


Figure 4: Parking with access route 204 and one parking area 1160zz. Route 204 is assumed longer than 0.25 miles. There are now 2 assets (one 1100 asset, one 1300 asset) instead of 12.

Parking areas and roads may not be combined. Parking areas and roads are tracked as separate asset types (1300 vs. 1100) in FMSS and as such should not be combined except in situations described by 5g. In Figure 5, Route 207 is a spur road from the main route running through parking area 1102. Since the spur road continues through and beyond the parking area, it will remain a separate route.

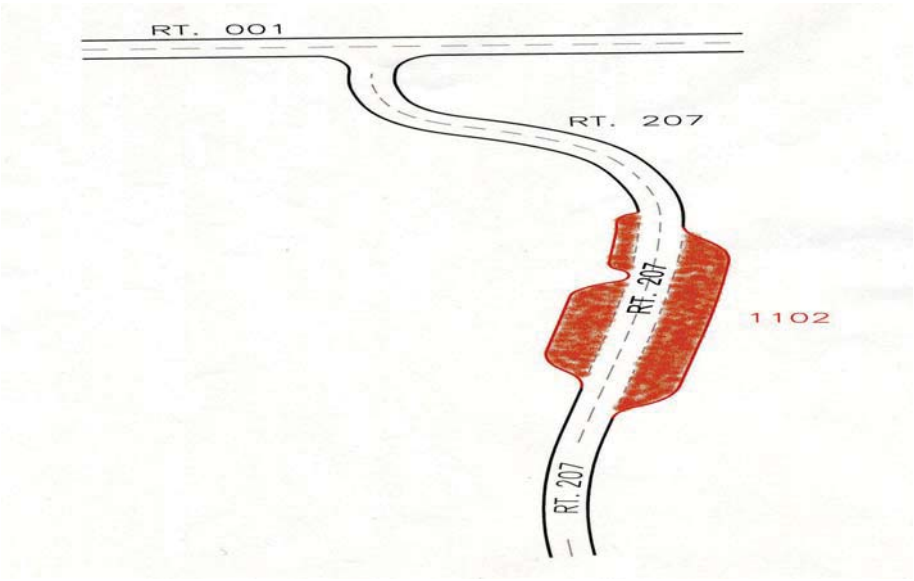


Figure 5: Parking with access route 207 running through and continuing beyond parking 1102. This access route cannot be considered a part of the parking area and two routes and two assets continue to exist.

Where the primary purpose of a road is to provide access to a parking area, and that road segment is less than 0.25 miles in length, the access road should be considered part of the parking area. See Figures 8. Where a road continues on past a parking area to another facility or destination, even if it is less than 0.25 miles to the initial parking area, the road and parking area may not be combined.

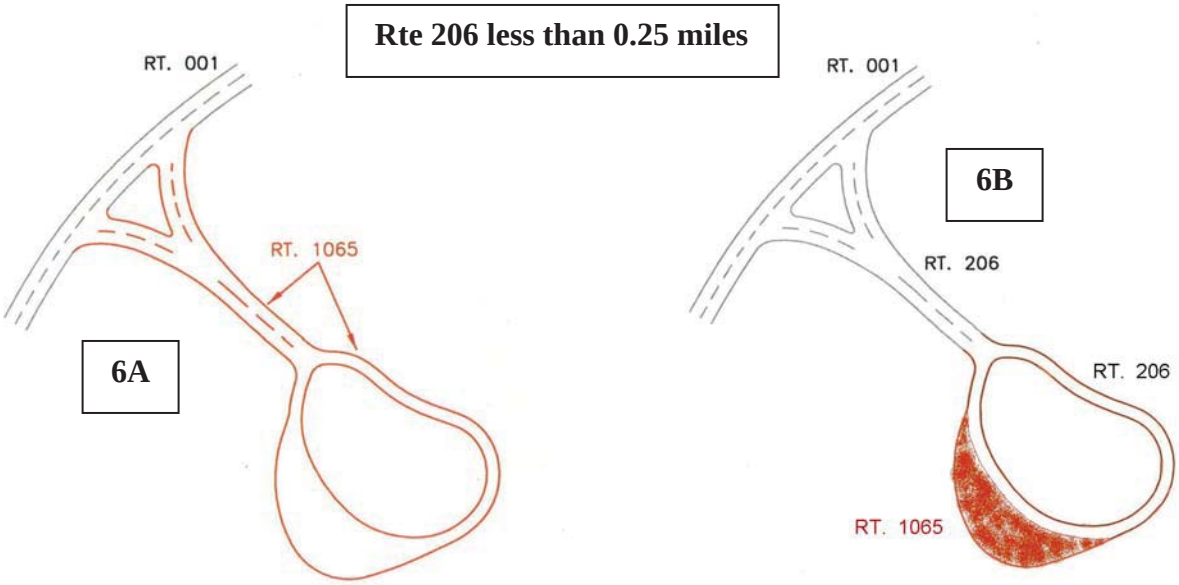


Figure 6: Since the access route is less than .25 miles in length and the only use of the access is to the parking, one route for both the access and the parking area can be established.

Particularly long routes may be divided into multiple assets based on how a park manages the roadway network. This should not be confused with the use of sub-components listed in 5a. Routes like the Blue Ridge Parkway or the Yellowstone Grand Loop may not lend themselves to management as a single asset by virtue of their length. Often management districts are created for sections of these routes and maintenance activities occur primarily within these districts. Parks may break routes up into separate assets during the Route ID process if the road is managed as discrete sections. This should only be done for very long roads.

The following example illustrates a complex road system and how the proposed business practice and several of the guidelines could be applied to create fewer assets that are consistent with local management.

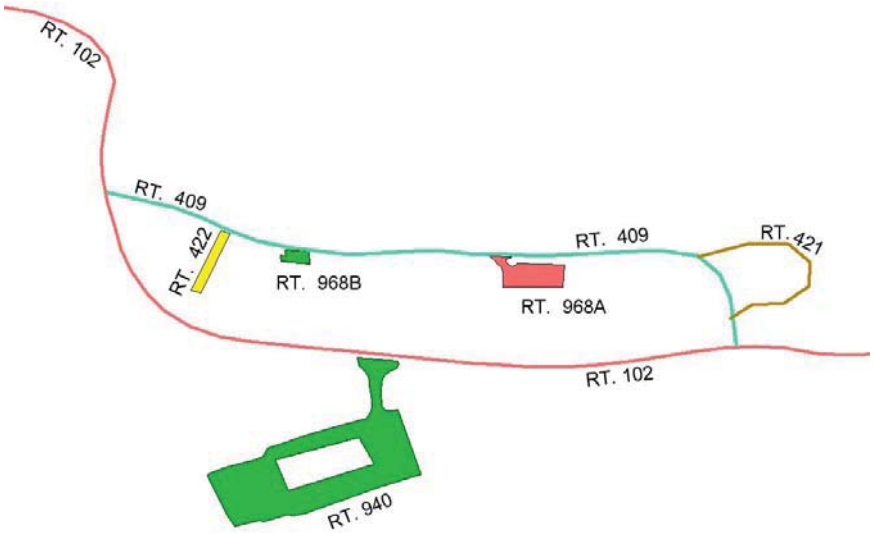


Figure 7 – Current Housing area access configuration. Route 409 is less than 0.25 miles long.

The area serviced by Routes 409, 421, 422, 968A, and 968B is all employee housing. Route 940 provides access to visitor services and not to the housing area. Routes may be combined to create assets that reflect local management. Routes 409, 421, and 422 are all the same functional class, provide access to one type of activity (housing) and are all posted as non-public. These routes may be combined. They should not be combined with any parking areas even though they are all less than 0.25 miles long. This is because their main function is not to provide access to parking. Routes 968A and B provide parking for access to the same facility (housing). Even though these discrete areas may provide parking to different housing units, it's reasonable to manage them as a single asset. They may also be combined.

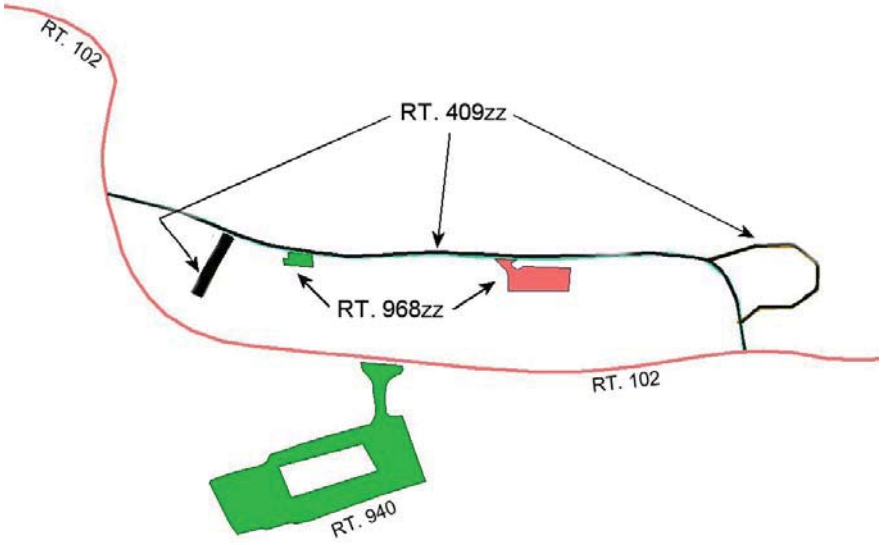


Figure 8 – Combined housing area access configuration – Parking and road assets combined to eliminate 3 assets.