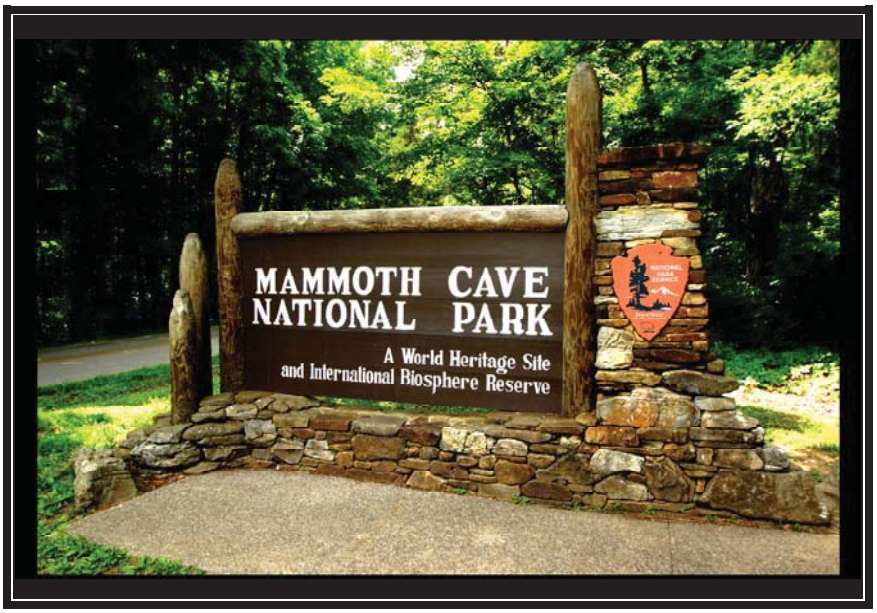
Federal Lands Highway

Road Inventory Program

Road Inventory and Condition Assessment

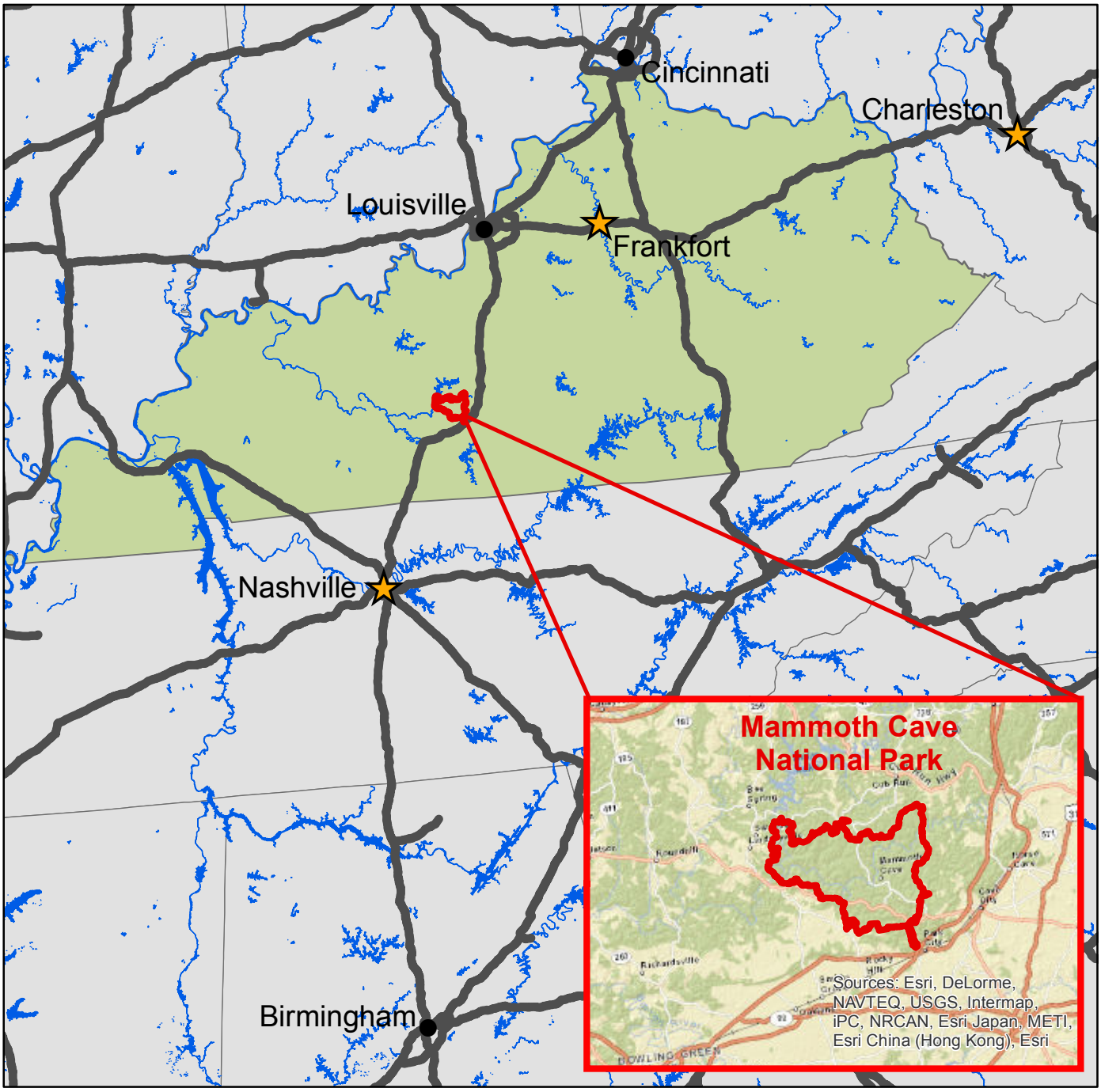


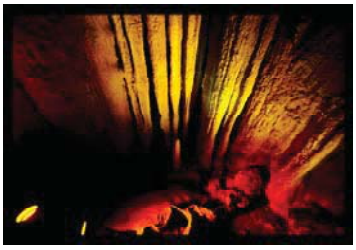
Mammoth Cave National Park
MACA

Cycle 5 Report

Prepared By: Federal Highway Administration
Road Inventory Program (RIP)
Data Collected: 10/2012
Report Date: 06/2013

Mammoth Cave National Park
in
Kentucky





DCV = Data Collection Vehicle

TABLE OF CONTENTS

Section 1
Introduction

Mammoth Cave National Park

Federal Lands Highway
Road Inventory Program

INTRODUCTION

The Federal Highway Administration, (FHWA), in the mid 1970s, was charged with the task of identifying surface condition deficiencies and corrective priorities on National Park Service (NPS) roads and parkways. Additionally, FHWA was tasked with establishing an integrated maintenance features inventory, locating features such as culverts, guardrails, and signs, among others, along NPS roads and parkways. As a result, in 1976 the NPS and FHWA entered into an MOA (Memorandum Of Agreement) which established the RIP (Road Inventory Program). This MOA was terminated and revised in 1980 to establish a new MOA aiming to update RIP data and develop a long-range program to improve and maintain NPS roads to designated condition standards and establish a maintenance management program.

The FHWA completed this initial phase of the RIP in the early 1980s. As a result of this effort, each NPS site included in the study received a RIP Report known as the "Brown Book" which included the information collected during this first RIP phase.

In the 1990s, the effort was again renewed to update and maintain the RIP data. By this time the computer age was upon us and a process was employed that relied heavily on electronic data collection and computer technology. A cyclical program was developed and the RIP completed two cycles of data collection from 1994 to 2001. Cycle 1, starting in 1994, was conducted in 44 "large parks" (parks containing 10 or more paved route miles). Cycle 2 began in 1997 and comprised 79 large parks and 5 small parks totaling 4,874 paved route miles. Each of these parks received a RIP Report known as the "Blue Book". Cycle 3, from 2001 to 2004, was conducted in all parks, large and small, that contained any paved routes, including parking areas and, again, each park received a RIP Report and associated electronic files.

Cycle 4 was initiated in the spring of 2006 covering 86 large parks and several associated small parks consisting of 5,553 paved route miles and 6,232 paved parking areas. Data collection has been completed for Cycle 4 and all data has been delivered to the NPS.

In 2005, the FHWA began implementing the use of a Pavement Management System (PMS) to assist the NPS in prioritizing Pavement Maintenance and Rehabilitation activities. The PMS used by FHWA is the Highway Pavement Management Application (HPMA) and this software has the ability to store inventory and condition data from RIP and forecast future performance using prediction models. Outputs include performance and condition reports at the National, Regional, Park, or Route level. A regional prioritized list and optimization have been produced for most regions and the Federal Highway Deferred Maintenance is calculated via the HPMA.

In an effort to improve the accuracy of treatment recommendations and pavement condition descriptions, an extensive study was completed throughout 2010 that has resulted in changes to the RIP condition reporting method, specifically the distresses and indexes that comprise the Pavement Condition Rating (PCR). It was determined that a better representation of PCR could

be achieved by modifying the relative impact certain distresses would have on the overall rating. The changes that were implemented were endorsed by management at both the FHWA and NPS in October 2010. These changes will allow greater use of RIP and HPMA data for not simply condition data reporting, but also as a reliable tool for project identification and selection. Because of these changes, the PCR Condition ratings reported in Cycle 5 do not directly relate to the condition ratings reported in previous cycle RIP Reports. For more detailed information about the changes, see Section 3 and Section 10 in this RIP Report.

Cycle 5 has launched in the summer of 2010 and will again comprise all parks, large and small, that are served by paved roads and/or parking areas. For Cycle 5, the decision was made to collect condition data in large parks on Functional Class 1, 2, and 7 paved routes only, as well as any new routes that were previously not collected. In small parks, all paved routes and parking areas will be collected. As a result, this will include 81 large parks with 4,459 paved route miles and 231 small parks with 529 paved route miles and associated paved parking areas.

Since 1984, the Road Inventory Program has been funded through the Federal Lands Highway Park Roads and Parkways (PRP) Program. Currently, coordination of the RIP with FLH is under the NPS Washington Headquarters Park Facility Management Division. 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) requiring the FHWA and NPS, to develop by rule, a Pavement Management System (PMS) applied to park roads and parkways serving the National Park System.

FLH is responsible for the accuracy of all data presented in this report. Any questions or comments concerning the contents of this report should be directed to the national RIP Coordinator located in Sterling, Virginia.

Respectfully,

FHWA RIP Team

FHWA/Eastern Federal Lands
21400 Ridgetop Circle
Sterling, VA 20166
(703) 404-6371

FHWA/Central Federal Lands
12300 West Dakota Ave
Lakewood, CO 80228
(720) 963-3556

Section 2
Park Route Inventory

Mammoth Cave National Park

Federal Lands Highway
Road Inventory Program

Cycle 5 NPS/RIP Route ID Report

Shading Color Key:
Red text denotes approx. mileage

White = Paved Routes, DCV Driven
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MACA

MAMMOTH CAVE NATIONAL PARK

Rte. No.	Cycle Collected	FMSS No.	Concess Route	Route Name	Route Description From	Route Description To	Maint. District	Paved Miles	Un-Paved Miles	Total Route Length	Func. Class	Manual Rated SQ/FT	Surf. Type	Area Maps
0010	5	50610		MAMMOTH CAVE PARKWAY	FROM END OF ROUTE 5010 (STATE HIGHWAY 70/255 (MAMMOTH CAVE PARKWAY EXTENDED)) AT PARK BOUNDARY	TO ROUTE 0901A (VISITOR CENTER PARKING AREA)	N/A	5.74	0.00	5.74	1		AS	3,3A
0012	5	50613		HOTEL ENTRANCE ROAD	FROM ROUTE 0010 (MAMMOTH CAVE PARKWAY) AT MP 5.59	TO ROUTE 0908 (MAMMOTH CAVE HOTEL PARKING) AND ROUTE 0901B (HOTEL SERVICES PARKING) ON RIGHT	N/A	0.12	0.00	0.12	1		AS	3,3A
0013	5	50112		GREEN RIVER FERRY ROAD SOUTH	FROM ROUTE 0010 (MAMMOTH CAVE PARKWAY) AT MP 5.08	TO GREEN RIVER FERRY CROSSING RAMP # 1	N/A	1.31	0.00	1.31	1		AS	3,3A
0014	5	50113		GREEN RIVER FERRY ROAD NORTH	FROM END OF ROUTE 5014 (GREEN RIVER FERRY ROAD NORTH (NON NPS)) AT NORTH PARK BOUNDARY	TO GREEN RIVER FERRY CROSSING RAMP #2	N/A	4.18	0.00	4.18	1		AS	2
0015	5	6061		BROWNSVILLE ROAD	FROM WEST PARK BOUNDARY AT INTERSECTION OF COUNTY HIGHWAY 2325 AND ROUTE 5015 (STATE HIGHWAY 70/BROWNSVILLE ROAD EXTENSION)	TO ROUTE 0010 (MAMMOTH CAVE PARKWAY)	N/A	5.10	0.00	5.10	1		AS	3,4
0016	5	50612		CAVE CITY ROAD	FROM HIGHWAY 255 AT EAST PARK BOUNDARY	TO ROUTE 0010 (MAMMOTH CAVE PARKWAY)	N/A	3.02	0.00	3.02	1		AS	3
0020	5	85739		PARK CITY ROAD	FROM I-65 AT PARK BOUNDARY (PARK CITY)	TO ROUTE 0010 (MAMMOTH CAVE PARKWAY)	N/A	2.28	0.00	2.28	1		AS	3
0101	5	50614		FLINT RIDGE ROAD	FROM ROUTE 0010 (MAMMOTH CAVE PARKWAY) AT MP 5.65 ON RIGHT	TO PARK BOUNDARY AND ROUTE 5106 (PARK RIDGE ROAD (NON-NPS SECTION)) ON RIGHT	N/A	3.63	0.00	3.63	2		AS	3,3A
0102	5	50609		CEDAR SINK ROAD	FROM ROUTE 0015 (BROWNSVILLE ROAD) AT MP 1.74 ON RIGHT	TO SOUTHWEST PARK BOUNDARY	N/A	1.22	0.00	1.22	2		AS	4

Cycle 5 NPS/RIP Route ID Report

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MAMMOTH CAVE NATIONAL PARK

Rte. No.	Cycle Collected	FMSS No.	Concess Route	Route Name	Route Description From	Route Description To	Maint. District	Paved Miles	Un-Paved Miles	Total Route Length	Func. Class	Manual Rated SQ/FT	Surf. Type	Area Maps
0103	5	50608		HOUCHINS FERRY ROAD SOUTH	FROM SOUTH PARK BOUNDARY	TO HOUCHINS FERRY CROSSING RAMP #1	N/A	1.07	0.00	1.07	2		AS	1
0103N	5	50144		HOUCHINS FERRY ROAD NORTH	FROM HOUCHINS FERRY RAMP CROSSING #2	TO OLLIE ROAD, OLLIE RIDGE ROAD INTERSECTION AT MP 5.33	N/A	0.50	4.83	5.33	2		AS	1
0104	NC	50143		GREAT ONYX CAVE ROAD	FROM ROUTE 0101 (FLINT RIDGE ROAD) AT MP 1.68 ON LEFT	TO GREAT ONYX CAVE (GATED)	N/A	0.00	2.09	2.09	2		GR	
0105	NC	50138		CRYSTAL CAVE ROAD	FROM ROUTE 0101 (FLINT RIDGE ROAD) AT MP 3.39 ON LEFT	TO CRYSTAL CAVE (GATED)	N/A	0.00	1.36	1.36	2		GR	
0106	5	50625		PARK RIDGE ROAD	FROM ROUTE 0016 (CAVE CITY ROAD) AT MP 0.32 ON RIGHT	TO INTERSECTION OF RAY HUNTER ROAD AND ROUTE 5106 (PARK RIDGE ROAD (NON-NPS SECTION))	N/A	1.26	0.00	1.26	2		AS	3
0107	NC	50155		LITTLE JORDAN ROAD (UGLY CREEK)	FROM COUNTY ROUTE 1352	TO EAST BOUNDARY AT DENNISON FERRY NORTH	N/A	0.00	4.80	4.80	3		GR	
0109	NC	50142		GOOD SPRING CHURCH ROAD	FROM ROUTE 0110 (MAPLE SPRINGS LOOP) AT MP 1.01 ON RIGHT	TO END OF LOOP AT GOOD SPRING CHURCH	N/A	0.00	0.50	0.50	2		GR	
0110	4	50110		MAPLE SPRINGS LOOP	FROM ROUTE 0014 (GREEN RIVER FERRY ROAD NORTH) AT MP 1.09 ON RIGHT	TO ROUTE 0014 (GREEN RIVER FERRY ROAD NORTH) AT MP 2.03 ON RIGHT	N/A	1.96	0.00	1.96	3		AS	2
0113	NC	50146		JOPPA RIDGE ROAD	FROM ROUTE 0013 (GREEN RIVER FERRY ROAD SOUTH) AT MP 0.81 ON LEFT	TO ROUTE 0015 (BROWNSVILLE ROAD)	N/A	0.00	2.16	2.16	3		GR	
0114	NC	50139		DENNISON FERRY ROAD	FROM COUNTY ROUTE 218 (COUNTY FLINT RIDGE ROAD)	TO CANOE LAUNCH AT DENNISON FERRY	N/A	0.00	1.54	1.54	2		GR	
0200	5	50617		FROZEN NIAGARA ENTRANCE ROAD	FROM ROUTE 0016 (CAVE CITY ROAD) AT MP 1.23 ON LEFT	TO END OF LOOP	N/A	1.10	0.00	1.10	2		AS	3
0201	5	50616		CARMICHAEL ENTRANCE ROAD	FROM ROUTE 0010 (MAMMOTH CAVE PARKWAY) AT MP 4.37 ON LEFT	TO END OF LOOP	N/A	1.04	0.00	1.04	2		AS	3

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MAMMOTH CAVE NATIONAL PARK

Rte. No.	Cycle Collected	FMSS No.	Concess Route	Route Name	Route Description From	Route Description To	Maint. District	Paved Miles	Un-Paved Miles	Total Route Length	Func. Class	Manual Rated SQ/FT	Surf. Type	Area Maps
0202	4	50117		VISITOR CENTER PICNIC GROUNDS ROAD	FROM ROUTE 0901A (VISITOR CENTER PARKING AREA)	TO END OF LOOP	N/A	0.45	0.00	0.45	3		AS	3,3A
0203	4	50118		VISITOR CENTER PICNIC SHELTER ROAD	FROM ROUTE 0202 (VISITOR CENTER PICNIC GROUNDS ROAD)	TO END OF LOOP	N/A	0.19	0.00	0.19	3		AS	3,3A
0205	**5**	**85740**		**HQ CAMPGROUND ACCESS ROAD**	**FROM ROUTE 0010 (MAMMOTH CAVE PARKWAY) AT MP 5.46 ON LEFT**	**TO ROUTE 0504 (VISITOR CENTER CAMPGROUND LOOP D)**	**N/A**	**0.18**	**0.00**	**0.18**	**2**		**AS**	**3,3A**
0215	4	50151		MAPLE SPRINGS TRAILHEAD PARKING ROAD	FROM ROUTE 0110 (MAPLE SPRINGS LOOP) AT MP 1.06 ON LEFT	TO ROUTE 0110 (MAPLE SPRINGS LOOP)	N/A	0.00	0.00	0.00	3	8,479	AS	2
0221	NC	50156		WILKINS CEMETERY ROAD	FROM ROUTE 0107 (LITTLE JORDAN ROAD (UGLY CREEK))	TO END	N/A	0.00	0.00	0.00	2		GR	
0222	NC	56048		HOUCHINS FERRY CAMPGROUND ROAD	FROM ROUTE 0103 (HOUCHINS FERRY ROAD SOUTH)	TO END OF LOOP	N/A	0.00	0.00	0.00	3		GR	
0223	4	85742		MAPLE SPRINGS LOOP CAMPGROUND	FROM ROUTE 0110 (MAPLE SPRINGS LOOP) AT MP 1.26	TO ROUTE 0110 (MAPLE SPRINGS LOOP) AT MP 1.34	N/A	0.25	0.00	0.25	3		AS	2
0224	**5**	**225959**		**VISITOR CENTER BUS LOOP**	**FROM ROUTE 0012 (HOTEL ENTRANCE ROAD)**	**TO END OF LOOP**	**N/A**	**0.23**	**0.00**	**0.23**	**3**		**AS**	**3,3A**
0225	NC	57781		PARK CITY CEMETERY ROAD	FROM ROUTE 0020 (PARK CITY ROAD)	TO CEMETERY	N/A	0.00	0.10	0.10	3		GR	
0226	NC	80625		JAMES CEMETERY ROAD	FROM PRIVATE GRAVEL ROAD	TO CEMETERY	N/A	0.00	0.45	0.45	3		GR	
0227	NC	50125		WONDERING WOODS ROADS	FROM ROUTE 0010 (MAMMOTH CAVE PARKWAY)	TO WODERING WOODS VILLAGE	N/A	0.00	1.20	1.20	6		GR	
0400	NC	50133		CEDAR SINK SERVICE ROAD	FROM ROUTE 0015 (BROWNSVILLE ROAD) AT MP 1.81 ON RIGHT	TO ROUTE 0102 (CEDAR SINK ROAD)	N/A	0.00	1.32	1.32	6		GR	
0403	NC	50128		BRANSFORD SPRING ROAD	FROM ROUTE 0104 (GREAT ONYX CAVE ROAD)	TO END	N/A	0.00	0.17	0.17	5		GR	
0404	NC	50147		LICK LOG ROAD	FROM ROUTE 0114 (DENNISON FERRY ROAD)	TO END	N/A	0.00	0.29	0.29	6		GR	

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0406	NC	50154		ROCK QUARRY ROAD	FROM ROUTE 0015 (BROWNSVILLE ROAD) AT MP 4.43 ON RIGHT	TO QUARRY	N/A	0.00	0.21	0.21	6		GR	
0407	4	50626		HISTORIC ENTRANCE ROAD	FROM ROUTE 0901B (HOTEL SERVICES PARKING)	TO END AT HISTORIC CAVE ENTRANCE	N/A	0.16	0.00	0.16	3	9,293	AS	3,3A
0409	NC	50141		FIRST CREEK TOWER ROAD	FROM PARK BOUNDARY AT CLELL ROAD (COUNTY)	TO END OF ROAD	N/A	0.00	3.20	3.20	3		GR	
0411	NC	50132		BUFFALO FERRY ROAD	FROM SOUTH PARK BOUNDARY	TO GREEN RIVER	N/A	0.00	1.78	1.78	3		GR	
0412	NC	50129		BROOKS CEMETERY ROAD	FROM ROUTE 0411 (BUFFALO FERRY ROAD)	TO CEMETERY	N/A	0.00	0.36	0.36	3		GR	
0416	NC	50152		NEW DISCOVERY ROAD	FROM ROUTE 0201 (CARMICHAEL ENTRANCE ROAD) AT MP 0.13 ON RIGHT	TO END	N/A	0.00	0.54	0.54	3		GR	
0417	4	50116		PARK MAINTENANCE ROAD	FROM ROUTE 0010 (MAMMOTH CAVE PARKWAY) AT MP 5.08 ON RGHT	TO END OF LOOP	N/A	0.58	0.00	0.58	5		AS	3,3A
0418	4	50119		RESIDENCE LOOP ROAD	FROM ROUTE 0417 (PARK MAINTENANCE ROAD)	TO END OF LOOP	N/A	0.32	0.00	0.32	5		AS	3,3A
0419	4	50120		SUPERINTENDENT OFFICE ROAD	FROM ROUTE 0418 (RESIDENCE LOOP ROAD)	TO ROUTE 0946 (ADMINISTRATION AREA EMPLOYEE PARKING)	N/A	0.10	0.00	0.10	5		AS	3,3A
0420	**5**	**50623**		**ELEVATOR SHAFT ROAD**	**FROM ROUTE 0016 (CAVE CITY ROAD) AT MP 2.44 ON RIGHT**	**TO END OF LOOP**	**N/A**	**0.08**	**0.00**	**0.08**	**2**		**AS**	**3**
0428	NC	50140		DOYLE VALLEY SERVICE ROAD	FROM ROUTE 0010 (MAMMOTH CAVE PARKWAY)	TO END OF ROAD	N/A	0.00	1.00	1.00	3		GR	
0430	4	50111		SUNSET LODGE ROAD	FROM SOUTHWEST END OF ROUTE 0908 (MAMMOTH CAVE HOTEL PARKING)	TO HIKING TRAIL AND END OF ROUTE 0957 (HERITAGE TRAIL PARKING) ON RIGHT	N/A	0.09	0.00	0.09	3		AS	3,3A
0431	NC	86305		POINT X SEWAGE LIFT STATION ROAD	FROM ROUTE 0013 (GREEN RIVER FERRY ROAD SOUTH) AT MP 0.08 ON RIGHT	TO END OF ROUTE	N/A	0.00	0.00	0.00	6		GR	

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0432	NC	86306		SUNSET POINT SEWAGE LIFT STATION ACCESS ROAD	FROM END OF ROUTE 0908 (MAMMOTH CAVE HOTEL PARKING)	TO END AT PUMP HOUSE	N/A	0.00	0.08	0.08	6		GR	
0433	NC	86308		MOUNT MCKINLEY UTILITY AREA	FROM ROUTE 0016 (CAVE CITY ROAD) AT MP 1.36 ON LEFT	TO END OF ROUTE	N/A	0.00	0.00	0.00	6		GR	
0434	4	225465		LEARNING CENTER ACCESS ROAD	FROM ROUTE 0110 (MAPLE SPRINGS LOOP)	TO END	N/A	0.05	0.02	0.07	5	3,379	AS	2
0435	NC	231811		THREE SPRINGS ROAD	FROM ROUTE 0101 (FLINT RIDGE ROAD)	TO THREE SPRINGS PUMPHOUSE	N/A	0.00	0.05	0.05	6		GR	
0500	4	50619		NEW ENTRANCE LOOP	FROM ROUTE 0200 (FROZEN NIAGARA ENTRANCE ROAD) AT MP 0.43	TO ROUTE 0200 (FROZEN NIAGARA ENTRANCE ROAD) AT MP 0.45	N/A	0.16	0.00	0.16	5		AS	3
0501	4	50122		VISITOR CENTER CAMPGROUND LOOP B	FROM ROUTE 0205 (HQ CAMPGROUND ACCESS ROAD) AT MP 0.08 ON RIGHT	TO END OF LOOP	N/A	0.26	0.00	0.26	3		AS	3,3A
0502	4	50109		VISITOR CENTER CAMPGROUND LOOP A	FROM ROUTE 0205 (HQ CAMPGROUND ACCESS ROAD) AT MP 0.10 ON LEFT	TO ROUTE 0205 (HQ CAMPGROUND ACCESS ROAD) AT MP 0.14	N/A	0.14	0.00	0.14	3		AS	3,3A
0503	4	50123		VISITOR CENTER CAMPGROUND LOOP C	FROM ROUTE 0205 (HQ CAMPGROUND ACCESS ROAD) AT MP 0.14 ON RIGHT	TO ROUTE 0205 (HQ CAMPGROUND ACCESS ROAD) AT MP 0.10	N/A	0.38	0.00	0.38	3		AS	3,3A
0504	4	50124		VISITOR CENTER CAMPGROUND LOOP D	FROM END OF ROUTE 0205 (HQ CAMPGROUND ACCESS ROAD)	TO END OF LOOP	N/A	0.41	0.00	0.41	3		AS	3,3A
0900	4	50187		DOYLE VALLEY OVERLOOK	ADJACENT TO ROUTE 0010 (MAMMOTH CAVE PARKWAY) AT MP 3.65 ON RIGHT		N/A	0.00	0.00	0.00		8,595	AS	3
0901A	4	50169		VISITOR CENTER PARKING AREA	FROM END OF ROUTE 0010 (MAMMOTH CAVE PARKWAY)	TO PARKING	N/A	0.00	0.00	0.00		246,952	AS	3,3A
0901B	4	50165		HOTEL SERVICES PARKING	FROM ROUTE 0908 (MAMMOTH CAVE HOTEL PARKING)	TO ROUTE 0407 (HISTORIC ENTRANCE ROAD)	N/A	0.00	0.00	0.00		5,775	AS	3,3A
0902A	4	50172		MAINTENANCE PARKING	FROM ROUTE 0417 (PARK MAINTENANCE ROAD)	TO PARKING	N/A	0.00	0.00	0.00		43,786	AS	3,3A

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MAMMOTH CAVE NATIONAL PARK

Rte. No.	Cycle Collected	FMSS No.	Concess Route	Route Name	Route Description From	Route Description To	Maint. District	Paved Miles	Un-Paved Miles	Total Route Length	Func. Class	Manual Rated SQ/FT	Surf. Type	Area Maps
0902B	4	50170		CONCESSION SERVICE PARKING	FROM ROUTE 0417 (PARK MAINTENANCE ROAD)	TO PARKING	N/A	0.00	0.00	0.00		16,224	AS	3,3A
0903ZZ	4	50184		RANGER TRAINING CENTER PARKING AREAS	FROM ROUTE 0417 (PARK MAINTENANCE ROAD)	TO PARKING AREAS	N/A	0.00	0.00	0.00		13,801	AS	3,3A
0904A	4	50167		HOUCHINS FERRY ROAD SOUTH PARKING	ADJACENT TO ROUTE 0103 (HOUCHINS FERRY ROAD SOUTH) NEAR END ON RIGHT		N/A	0.00	0.00	0.00		1,602	AS	1
0904B	4	86327		HOUCHINS FERRY ROAD SOUTH BOAT TRAILER PARKING	ADJACENT TO ROUTE 0103 (HOUCHINS FERRY ROAD SOUTH) NEAR END ON LEFT		N/A	0.00	0.00	0.00		3,164	AS	1
0905	4	50185		RECYCLING AREA PARKING	FROM ROUTE 0417 (PARK MAINTENANCE ROAD)	TO ROUTE 0419 (SUPERINTENDENT OFFICE ROAD)	N/A	0.00	0.00	0.00		8,238	AS	3,3A
0906A	4	50175		SUNSET LODGE PARKING A	ADJACENT TO ROUTE 0430 (SUNSET LODGE ROAD)		N/A	0.00	0.00	0.00		2,376	AS	3,3A
0906B	4	50176		SUNSET LODGE PARKING B	ADJACENT TO ROUTE 0430 (SUNSET LODGE ROAD)		N/A	0.00	0.00	0.00		2,647	AS	3,3A
0907A	4	50182		PICNIC SHELTER PARKING A	FROM ROUTE 0203 (VISITOR CENTER PICNIC SHELTER ROAD) AT MP 0.09 ON RIGHT	TO ROUTE 0203 (VISITOR CENTER PICNIC SHELTER ROAD)	N/A	0.00	0.00	0.00		7,779	AS	3,3A
0907B	4	50183		PICNIC SHELTER PARKING B	ADJACENT TO ROUTE 0203 (VISITOR CENTER PICNIC SHELTER ROAD) AT MP 0.03 ON LEFT		N/A	0.00	0.00	0.00		2,322	AS	3,3A
0907C	4	86328		PICNIC SHELTER PARKING C	ADJACENT TO ROUTE 0203 (VISITOR CENTER PICNIC SHELTER ROAD) AT MP 0.03 ON RIGHT		N/A	0.00	0.00	0.00		1,706	AS	3,3A
0908	4	50164		MAMMOTH CAVE HOTEL PARKING	FROM END OF ROUTE 0012 (HOTEL ENTRANCE ROAD)	TO ROUTE 0430 (SUNSET LODGE ROAD)	N/A	0.00	0.00	0.00		122,969	AS	3,3A
0909	4	50191		SLOANS CROSSING PICNIC/POND PARKING	FROM ROUTE 0010 (MAMMOTH CAVE PARKWAY) AT MP 2.56	TO ROUTE 0010 (MAMMOTH CAVE PARKWAY)	N/A	0.00	0.00	0.00		9,382	AS	3
0911	4	50179		PARK CITY ENTRANCE SIGN PARKING	ADJACENT TO ROUTE 0020 (PARK CITY ROAD) AT MP 0.40 ON RIGHT		N/A	0.00	0.00	0.00		9,746	AS	3

Cycle 5 NPS/RIP Route ID Report

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Green = All Unpaved Parking Areas
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MACA

MAMMOTH CAVE NATIONAL PARK

Rte. No.	Cycle Collected	FMSS No.	Concess Route	Route Name	Route Description From	Route Description To	Maint. District	Paved Miles	Un-Paved Miles	Total Route Length	Func. Class	Manual Rated SQ/FT	Surf. Type	Area Maps
0912	4	50193		TURNHOLE BEND NATURE TRAIL PARKING	ADJACENT TO ROUTE 0015 (BROWNSVILLE ROAD) AT MP 1.30 ON LEFT		N/A	0.00	0.00	0.00		6,046	AS	4
0913	4	50189		SAND CAVE PARKING	ADJACENT TO ROUTE 0016 (CAVE CITY ROAD) AT MP 0.18 ON RIGHT		N/A	0.00	0.00	0.00		6,310	AS	3
0915	4	50163		GREEN RIVER FERRY PARKING	FROM ROUTE 0013 (GREEN RIVER FERRY ROAD SOUTH) AT MP 1.28 ON RIGHT	TO PARKING	N/A	0.00	0.00	0.00		20,639	AS	3
0916	4	50168		LINCOLN LOOP PARKING	FROM OLLIE ROAD	TO OLLIE ROAD	N/A	0.00	0.00	0.00		12,926	AS	2
0918	NC	50204		MAPLE SPRINGS TRAILHEAD PARKING	ADJACENT TO ROUTE 0110 (MAPLE SPRINGS LOOP)		N/A	0.00	0.00	0.00			GR	
0919	4	50157		CEDAR SINK TRAILHEAD PARKING	ADJACENT TO ROUTE 0102 (CEDAR SINK ROAD) AT MP 0.57 ON LEFT		N/A	0.00	0.00	0.00		5,795	AS	4
0920	4	50194		WOODLAND COTTAGES PARKING	FROM ROUTE 0901A (VISITOR CENTER PARKING AREA)	TO PARKING	N/A	0.00	0.00	0.00		9,692	AS	3,3A
0922	4	50160		SERVICES PARKING (POST OFFICE/DUMP STATION/GAS)	FROM ROUTE 0010 (MAMMOTH CAVE PARKWAY)	TO ROUTE 0205 (HQ CAMPGROUND ACCESS ROAD)	N/A	0.00	0.00	0.00		46,174	AS	3,3A
0923	4	50162		ELEVATOR PARKING	FROM ROUTE 0420 (ELEVATOR SHAFT ROAD)	TO PARKING	N/A	0.00	0.00	0.00		4,631	AS	3
0931ZZ	4	50180		PICNIC GROUNDS PARKING AREAS	ADJACENT TO ROUTE 0202 (VISITOR CENTER PICNIC GROUNDS ROAD)		N/A	0.00	0.00	0.00		10,850	AS	3,3A
0933	NC	50196		DENNISON FERRY DAY USE PARKING	ADJACENT TO ROUTE 0114 (DENNISON FERRY ROAD)		N/A	0.00	0.00	0.00			GR	
0935	NC	50201		FIRST CREEK TRAILHEAD PARKING	ADJACENT TO ROUTE 0103N (HOUCHINS FERRY ROAD NORTH)		N/A	0.00	0.00	0.00			GR	
0938	NC	50207		HOUCHINS FERRY NORTH PARKING	ADJACENT TO ROUTE 0103 (HOUCHINS FERRY ROAD SOUTH) AT MP 0.03 ON LEFT		N/A	0.00	0.00	0.00			GR	
0939	NC	83606		TEMPLE HILL CEMETERY PARKING	ADJACENT TO ROUTE 0103N (HOUCHINS FERRY ROAD NORTH) AT MP 1.70 ON LEFT		N/A	0.00	0.00	0.00			GR	

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MACA

MAMMOTH CAVE NATIONAL PARK

Rte. No.	Cycle Collected	FMSS No.	Concess Route	Route Name	Route Description From	Route Description To	Maint. District	Paved Miles	Un-Paved Miles	Total Route Length	Func. Class	Manual Rated SQ/FT	Surf. Type	Area Maps
0940	NC	83607		TEMPLE HILL TRAILHEAD PARKING	ADJACENT TO ROUTE 0103N (HOUCHINS FERRY ROAD NORTH) AT MP 2.0 ON RIGHT		N/A	0.00	0.00	0.00			GR	
0941	NC	50148		JAGGERS CEMETERY PARKING	ADJACENT TO ROUTE 0103N (HOUCHINS FERRY ROAD NORTH) AT MP 5.10 ON RIGHT		N/A	0.00	0.00	0.00			GR	
0942	NC	50149		LOCUST GROVE CEMETERY PARKING	FROM ROUTE 0010 (MAMMOTH CAVE PARKWAY)	TO CEMETERY	N/A	0.00	0.00	0.00			GR	
0943	NC	50150		MAMMOTH CAVE CHURCH PARKING	FROM ROUTE 0101 (FLINT RIDGE ROAD) AT MP 2.02 ON LEFT	TO END	N/A	0.00	0.00	0.00			GR	
0944	NC	50200		LITTLE HOPE CEMETERY PARKING	FROM ROUTE 0016 (CAVE CITY ROAD) AT MP 0.68 ON RIGHT	TO END	N/A	0.00	0.00	0.00			GR	
0945	NC	50145		JOPPA CHURCH CEMETERY PARKING	FROM ROUTE 0015 (BROWNSVILLE ROAD) AT MP 2.66 ON LEFT	TO END	N/A	0.00	0.00	0.00			GR	
0946	NC	61219		ADMINISTRATION AREA EMPLOYEE PARKING	FROM ROUTE 0419 (SUPERINTENDENT OFFICE ROAD) AT END	TO PARKING	N/A	0.00	0.00	0.00			GR	
0947	4	50205		S & RM EMPLOYEE PARKING #1	ADJACENT TO ROUTE 0417 (PARK MAINTENANCE ROAD) AT MP 0.41 ON RIGHT		N/A	0.00	0.00	0.00		748	AS	3,3A
0948	NC	83608		S & RM EMPLOYEE PARKING #2	ADJACENT TO ROUTE 0417 (PARK MAINTENANCE ROAD) AT MP ON LEFT		N/A	0.00	0.00	0.00			GR	
0949	4	86331		HQ CAMPGROUND EMPLOYEE PARKING	FROM ROUTE 0205 (HQ CAMPGROUND ACCESS ROAD) AT MP 0.08 ON LEFT	TO PARKING	N/A	0.00	0.00	0.00		4,032	AS	3,3A
0950	NC	86290		NORTH GREEN RIVER FERRY PARKING	ADJACENT TO ROUTE 0014 (GREEN RIVER FERRY ROAD NORTH) AT MP 4.14 ON RIGHT		N/A	0.00	0.00	0.00			GR	
0951	4	113201		BIKE TRAIL PARKING AT LOCUST GROVE	ADJACENT TO ROUTE 0010 (MAMMOTH CAVE PARKWAY)		N/A	0.00	0.00	0.00		4,552	AS	3

Cycle 5 NPS/RIP Route ID Report

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MACA

MAMMOTH CAVE NATIONAL PARK

Rte. No.	Cycle Collected	FMSS No.	Concess Route	Route Name	Route Description From	Route Description To	Maint. District	Paved Miles	Un-Paved Miles	Total Route Length	Func. Class	Manual Rated SQ/FT	Surf. Type	Area Maps
0952	NC	113203		TRAIL PARKING AT ZION CEMETERY ROAD	ADJACENT TO ROUTE 0010 (MAMMOTH CAVE PARKWAY)		N/A	0.00	0.00	0.00		800	GR	
0955	4	231791		SEASONAL QUARTERS PARKING AREA	FROM ROUTE 0903ZZ (RANGER TRAINING CENTER PARKING AREAS)	TO PARKING	N/A	0.00	0.00	0.00		6,497	CO	3,3A
0956	4	231793		FITNESS CENTER PARKING AREA	ADJACENT TO ROUTE 0417 (PARK MAINTENANCE ROAD)		N/A	0.00	0.00	0.00		2,832	AS	3,3A
0957	4	225462		HERITAGE TRAIL PARKING	ADJACENT TO ROUTE 0430 (SUNSET LODGE ROAD)		N/A	0.00	0.00	0.00		821	AS	3,3A
0958	4	225463		FUELING/BUS PARKING AREA	FROM ROUTE 0417 (PARK MAINTENANCE ROAD)	TO ROUTE 0902B (CONCESSION SERVICE PARKING)	N/A	0.00	0.00	0.00		36,809	AS	3,3A
5010	4			STATE HIGHWAY 70/255 (MAMMOTH CAVE PARKWAY EXTENDED)	FROM 0.5 MILES EAST OF PARK BOUNDARY ON STATE HIGHWAY 70/255	TO PARK BOUNDARY / BEGIN ROUTE 0010 (MAMMOTH CAVE PARKWAY)	N/A	0.50	0.00	0.50			AS	3
5014	4			GREEN RIVER FERRY ROAD NORTH (NON NPS)	FROM LITTLE JORDAN ROAD	TO NORTH PARK BOUNDARY AT BEGIN ROUTE 0014 (GREEN RIVER FERRY ROAD NORTH)	N/A	0.41	0.00	0.41			AS	2
5015	4			STATE HIGHWAY 70/BROWNSVILLE ROAD EXTENSION	FROM STATE HIGHWAY 70 AT TAXIDERMY BUSINESS ON LEFT	TO PARK BOUNDARY AT COUNTY HIGHWAY 2325/BEGIN ROUTE 0015 (BROWNSVILLE ROAD)	N/A	0.91	0.00	0.91			AS	4
5106	**5**			**PARK RIDGE ROAD (NON-NPS SECTION)**	**FROM INTERSECTION OF RAY HUNTER ROAD AND ROUTE 0106 (PARK RIDGE ROAD)**	**TO PARK BOUNDARY AND ROUTE 0101 (FLINT RIDGE ROAD) ON LEFT**	**N/A**	**2.35**	**0.00**	**2.35**			**AS**	**3**
5111	4			CEDAR HILL CHURCH ROAD	FROM ROUTE 0020 (PARK CITY ROAD)	TO OLD MEXICO ROAD (PRIVATE ROAD) ON RIGHT	N/A	1.88	0.00	1.88			AS	3
5115	4			OLLIE RIDGE ROAD (GREAT ONYX JOB CORP CENTER)	FROM PARK BOUNDARY	TO CENTER ENTRANCE GATE	N/A	0.29	0.00	0.29			AS	1
5601	4			DOYLE ROAD	FROM ROUTE 0020 (PARK CITY ROAD) AT MP 0.20 ON RIGHT	TO PARK BOUNDARY MARKER ON LEFT (FENCE POST)	N/A	0.18	0.00	0.18			AS	3

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MACA

MAMMOTH CAVE NATIONAL PARK

Rte. No.	Cycle Collected	FMSS No.	Concess Route	Route Name	Route Description From	Route Description To	Maint. District	Paved Miles	Un-Paved Miles	Total Route Length	Func. Class	Manual Rated SQ/FT	Surf. Type	Area Maps
5602	4			ZION CEMETERY ROAD	FROM ROUTE 0020 (PARK CITY ROAD) AT MP 0.20 ON LEFT	TO PARK BOUNDARY MARKER ON RIGHT (FENCE POST)	N/A	0.22	0.00	0.22			AS	3
5603	4			SHORT CAVE ROAD	FROM ROUTE 0020 (PARK CITY ROAD) AT MP 1.23 ON LEFT	TO PARK BOUNDARY MARKER ON LEFT (FENCE LINE)	N/A	0.16	0.00	0.16			AS	3

Cycle 5 NPS/RIP Route ID Report

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CYCLE 5 COLLECTED SUMMARY TOTALS FOR MAMMOTH CAVE NATIONAL PARK

CYCLE 5 COLLECTED ROUTE TOTALS

DCV Driven Route Miles	32.06
Manually Rated Route Miles	0.00
TOTAL PARK ROUTE MILES COLLECTED IN CYCLE 5	32.06
Manually Rated Routes (SQFT)	0

* CYCLE 5 COLLECTED PARKING AREA TOTALS

Paved Parking (SQFT)	0

CYCLE 5 COLLECTED CONCESSION TOTALS

Concession Paved Route Miles	0.00
Concession Paved Parking Area SQFT	0
Concession Manually Rated Rotes SQFT	0

CYCLE 5 COLLECTED WEIGHTED AVERAGE PARK VALUES

DCV Driven PCR	95
**Manually Rated Routes PCR	N/A
**Parking PCR	N/A
***Total Equivalent Lane Miles	59.70

TOTAL PARK SUMMARY FOR MAMMOTH CAVE NATIONAL PARK

ROUTE TOTALS

TOTAL PAVED PARK ROUTE MILES	37.56
TOTAL PAVED PARKING (SQFT)	686,418

* - The Parking Area Totals SQFT value represents **all** parking areas collected in Cycle 5, both park and concessionaire.

** - Parking and Manually Rated Routes are assigned the following PCR values based on their observed condition: Construction=-1, Excellent=97, Good=90, Fair=73, and Poor=45.

*** - Equivalent Lane Miles are calculated by route using the following equations : DCV and Manually Rated Lines Routes=(PAVE_WIDTHxPAVED_MI)/11 foot lane. Parking Areas=SQ_FEET/5280/11. Manually Rated Polygons=SQ_FEET/5280/11.

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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 Locations. 5000 Routes are driven for GPS and Video Log 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

NPS/RIP Subcomponent Details for MACA

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MACA

MAMMOTH CAVE NATIONAL PARK

Rte. No.	FMSS No.	Cycle Collected	Route Name	Route Description From	Route Description To	Concess Route	Func. Class	Paved Miles	Un-Paved Miles	Total Route Length	Manual Rated SQ/FT
0903ZZ	50184	4	RANGER TRAINING CENTER PARKING AREAS	FROM ROUTE 0417 (PARK MAINTENANCE ROAD)	TO PARKING AREAS			0.00	0.00	0.00	13,801
0931ZZ	50180	4	PICNIC GROUNDS PARKING AREAS	ADJACENT TO ROUTE 0202 (VISITOR CENTER PICNIC GROUNDS ROAD)				0.00	0.00	0.00	10,850

MACA-0903ZZ Subcomponent Breakdown

Rte. No.	FMSS No.	Cycle Collected	Route Name	Route Description From	Route Description To	Concess Route	Func. Class	Paved Miles	Un-Paved Miles	Total Route Length	Manual Rated SQ/FT
0903AZ	50184	4	RANGER TRAINING CENTER PARKING AREA A	FROM ROUTE 0417 (PARK MAINTENANCE ROAD)	TO PARKING			0.00	0.00	0.00	9,974
0903BZ	50184	4	RANGER TRAINING CENTER PARKING AREA B	ADJACENT TO ROUTE 0903AZ (RANGER TRAINING CENTER PARKING AREA A)				0.00	0.00	0.00	3,827

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MACA

MAMMOTH CAVE NATIONAL PARK

MACA-0931ZZ Subcomponent Breakdown

Rte. No.	FMSS No.	Cycle Collected	Route Name	Route Description From	Route Description To	Concess Route	Func. Class	Paved Miles	Un-Paved Miles	Total Route Length	Manual Rated SQ/FT
0931AZ	50180	4	PICNIC GROUNDS PARKING AREA A	ADJACENT TO ROUTE 0202 (VISITOR CENTER PICNIC GROUNDS ROAD) AT MP 0.11 ON LEFT				0.00	0.00	0.00	1,147
0931BZ	50180	4	PICNIC GROUNDS PARKING AREA B	ADJACENT TO ROUTE 0202 (VISITOR CENTER PICNIC GROUNDS ROAD) AT MP 0.12 ON LEFT				0.00	0.00	0.00	1,039
0931CZ	50180	4	PICNIC GROUNDS PARKING AREA C	ADJACENT TO ROUTE 0202 (VISITOR CENTER PICNIC GROUNDS ROAD) AT MP 0.20 ON LEFT				0.00	0.00	0.00	3,452
0931DZ	50180	4	PICNIC GROUNDS PARKING AREA D	ADJACENT TO ROUTE 0202 (VISITOR CENTER PICNIC GROUNDS ROAD) AT MP 0.21 ON LEFT				0.00	0.00	0.00	1,478
0931EZ	50180	4	PICNIC GROUNDS PARKING AREA E	ADJACENT TO ROUTE 0202 (VISITOR CENTER PICNIC GROUNDS ROAD) AT MP 0.38 ON LEFT				0.00	0.00	0.00	2,276
0931FZ	50180	4	PICNIC GROUNDS PARKING AREA F	ADJACENT TO ROUTE 0202 (VISITOR CENTER PICNIC GROUNDS ROAD) AT MP 0.39 ON LEFT				0.00	0.00	0.00	1,458

ROUTE IDENTIFICATION CHANGES TO PAVED ROUTES FROM PREVIOUS CYCLE - MACA

OTHER CHANGES FROM PREVIOUS INVENTORY:			
Route #	**Route Name**	**Type of Change**	**Comments**
0106	PARK RIDGE ROAD	ROUTE SPLIT	CYCLE 4 ROUTE 0106 WAS SPLIT INTO ROUTE 0106 AND 5106 IN CYCLE 5 BECAUSE THE ROUTE 5106 SECTION IS NOT OWNED BY THE PARK.
0224	VISITOR CENTER BUS LOOP	COLLECTION METHOD CHANGE	THIS ROUTE WAS MANUALLY RATED IN CYCLE 4 BECAUSE IT WAS UNDER CONSTRUCTION. IT WAS COLLECTED WITH THE VEHICLE IN CYCLE 5.
0501	VISITOR CENTER CAMPGROUND LOOP B	ROUTE NAME	LOOP DESIGNATION CHANGED FROM D TO B IN CYCLE 5.
0504	VISITOR CENTER CAMPGROUND LOOP D	ROUTE NAME	LOOP DESIGNATION CHANGED FROM B TO D IN CYCLE 5.
5106	PARK RIDGE ROAD (NON-NPS SECTION)	ROUTE SPLIT	CYCLE 4 ROUTE 0106 WAS SPLIT INTO ROUTE 0106 AND 5106 IN CYCLE 5 BECAUSE THE ROUTE 5106 SECTION IS NOT OWNED BY THE PARK.
5115	OLLIE RIDGE ROAD (GREAT ONYX JOB CORP CENTER)	OTHER	ROUTE 5115 WAS PREVIOUSLY COLLECTED AS ROUTE 0115 IN CYCLE 4. ROUTE 0115 WAS CONVERTED TO A 5000 ROUTE IN CYCLE 5 BECAUSE IT IS NO LONGER OWNED AND MAINTAINED BY THE PARK.

Section 3
Park Summary Information

Mammoth Cave National Park

Federal Lands Highway
Road Inventory Program

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

F.C.	Pavement Condition Rating (PCR)								TOTAL MILES
	Poor (0-60)		Fair (61-84)		Good (85-94)		Excellent (95-100)		
	MILES	%	MILES	%	MILES	%	MILES	%	
1			0.30	0.94%	1.88	5.86%	19.57	61.04%	**21.75**
2	0.98	3.06%	2.51	7.83%	2.82	8.80%	3.77	11.76%	**10.08**
3			0.04	0.12%	0.02	0.06%	0.17	0.53%	**0.23**
4									
5									
6									
7									
8									
Totals	**0.98**	**3.06%**	**2.85**	**8.89%**	**4.72**	**14.72%**	**23.51**	**73.33%**	**32.06**

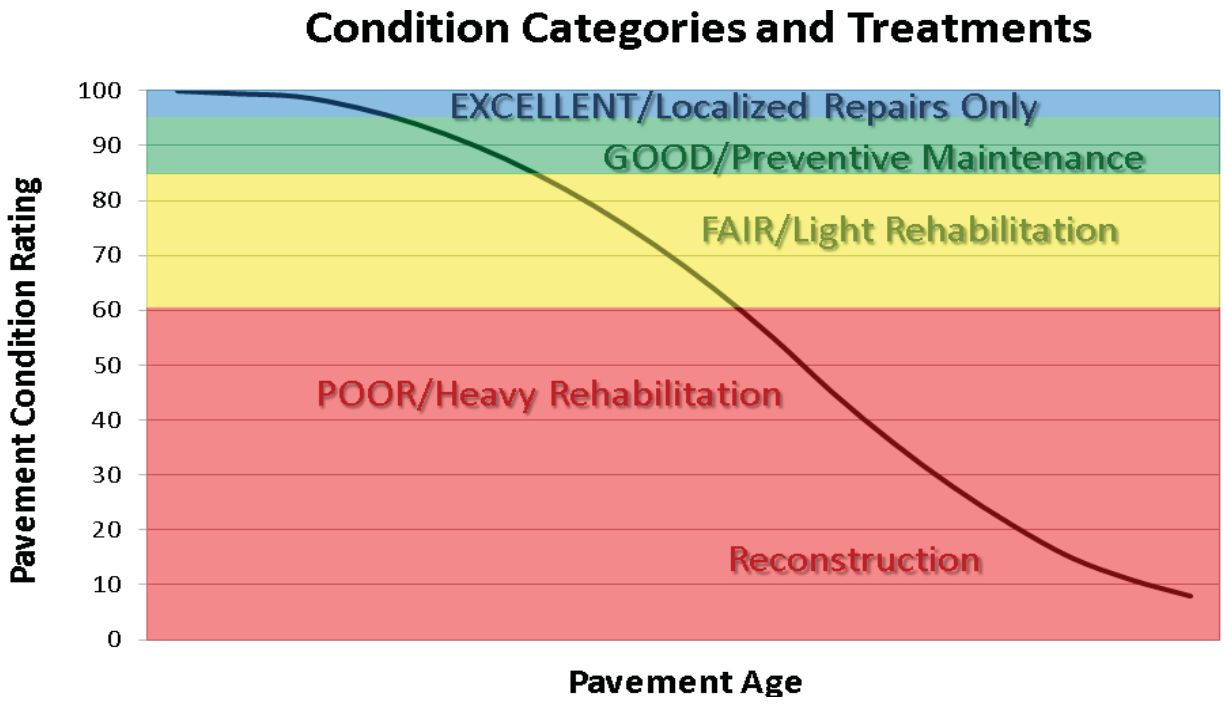
Note: **The information in this table is derived from the PMS_20 table in the Park database, which only contains processed data from routes collected with the Data Collection Vehicle (DCV). Information for Manually Rated Routes (MRR) and Parking Areas is not reported in this table. Only Functional Class 1, 2, & 7 routes, and any new routes not previously collected by RIP, are collected in Large Parks.**

Explanation of the Excellent, Good, Fair and Poor Condition Descriptions

In addition to the RIP Index changes that have been implemented in Cycle 5, we will also aim to provide greater assistance in translating excellent/good/fair/poor categories into pavement needs categories. The PCR can be used to indicate the place in the Pavement Life Cycle and the types of treatments that should be considered now and into the future.

- Excellent/New: PCR of 95-100. Pavements in this range will require only spot repairs
- Good: PCR of 85-94. Pavements in this range will likely be candidates for Preventive Maintenance. Examples include Chip and Slurry Seals, Micro Surfacing and Thin Overlays.
- Fair: PCR of 61-84. Pavements in this range will likely be candidates of Light Rehabilitation (L3R). Examples include single-lift overlays up to 2.5 inches in total thickness, milling and overlays.
- Poor: PCR of 0-60. Pavements in this range will likely be candidates of Heavy Rehabilitation or Reconstruction (H3R or 4R). Examples include Pulverization, Multiple Lift Overlays, and Reconstruction.

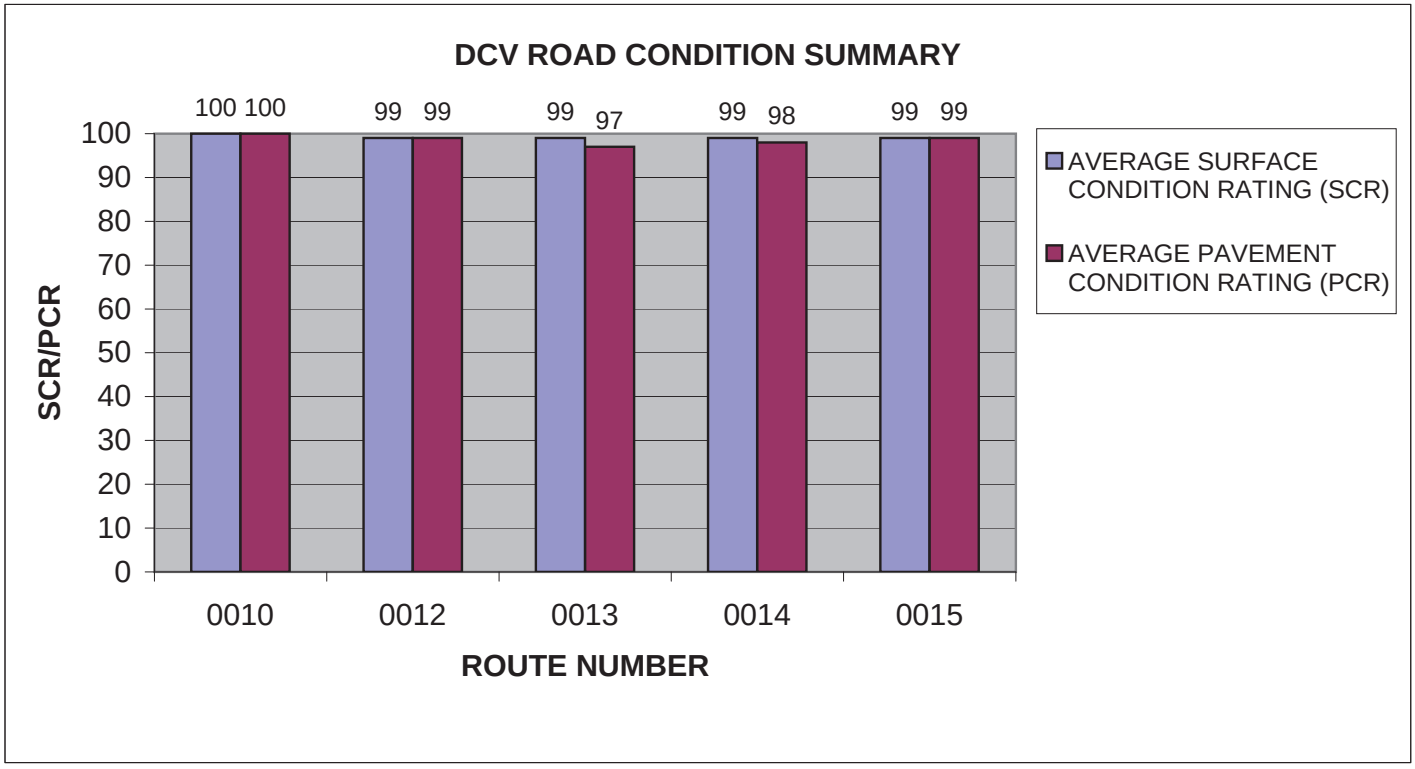
At this time, specific Maintenance and Rehabilitation activities should be evaluated and recommended at the project level. Site-specific conditions that influence treatment type should be determined based on performing a subsurface investigation and/or pavement condition survey, and not be based solely on RIP data. Additionally, RIP produces a snapshot of conditions the year in which the data was collected. For further information or to obtain additional Pavement Management System's data from our Highway Pavement Management Application (HPMA) please contact the Eastern Federal Lands pavement team.



MACA: DCV ROAD CONDITION SUMMARY

DCV - Data Collection Vehicle

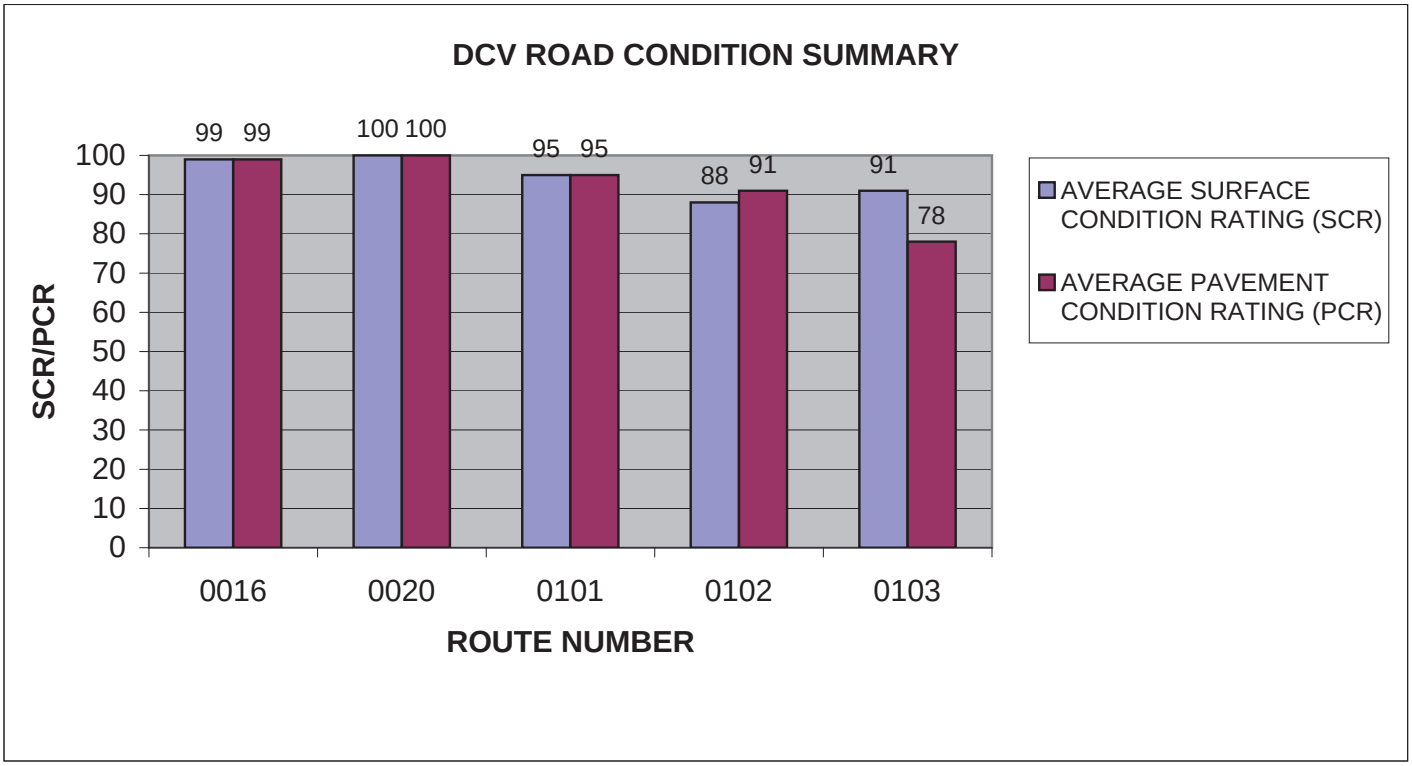
ROUTE NUMBER	ROUTE NAME	FUNCT CLASS	PAVED LENGTH	SURFACE TYPE	AVERAGE SURFACE CONDITION RATING (SCR)	AVERAGE PAVEMENT CONDITION RATING (PCR)
0010	MAMMOTH CAVE PARKWAY	1	5.74	ASPHALT	100	100
0012	HOTEL ENTRANCE ROAD	1	0.12	ASPHALT	99	99
0013	GREEN RIVER FERRY ROAD SOUTH	1	1.31	ASPHALT	99	97
0014	GREEN RIVER FERRY ROAD NORTH	1	4.18	ASPHALT	99	98
0015	BROWNSVILLE ROAD	1	5.10	ASPHALT	99	99



MACA: DCV ROAD CONDITION SUMMARY

DCV - Data Collection Vehicle

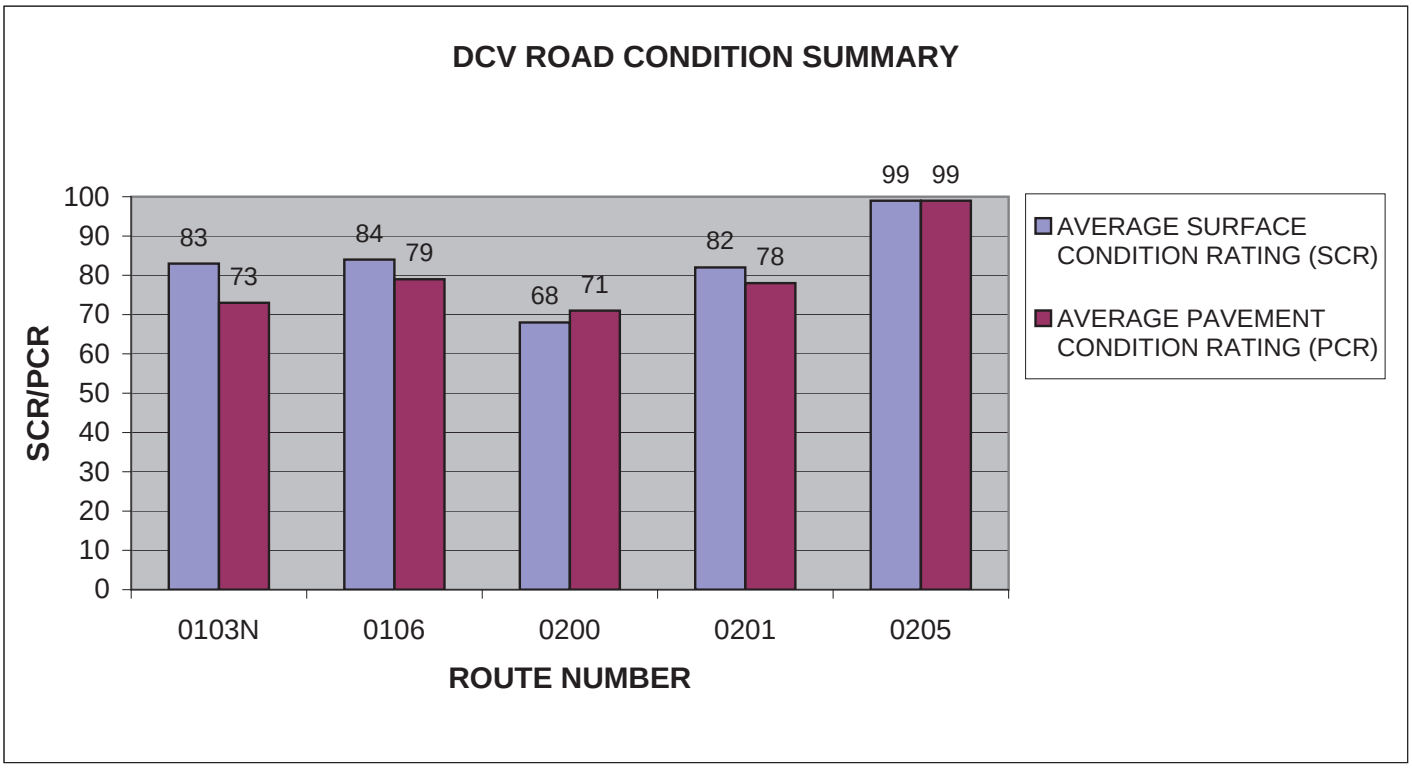
ROUTE NUMBER	ROUTE NAME	FUNCT CLASS	PAVED LENGTH	SURFACE TYPE	AVERAGE SURFACE CONDITION RATING (SCR)	AVERAGE PAVEMENT CONDITION RATING (PCR)
0016	CAVE CITY ROAD	1	3.02	ASPHALT	99	99
0020	PARK CITY ROAD	1	2.28	ASPHALT	100	100
0101	FLINT RIDGE ROAD	2	3.63	ASPHALT	95	95
0102	CEDAR SINK ROAD	2	1.22	ASPHALT	88	91
0103	HOUCHINS FERRY ROAD SOUTH	2	1.07	ASPHALT	91	78



MACA: DCV ROAD CONDITION SUMMARY

DCV - Data Collection Vehicle

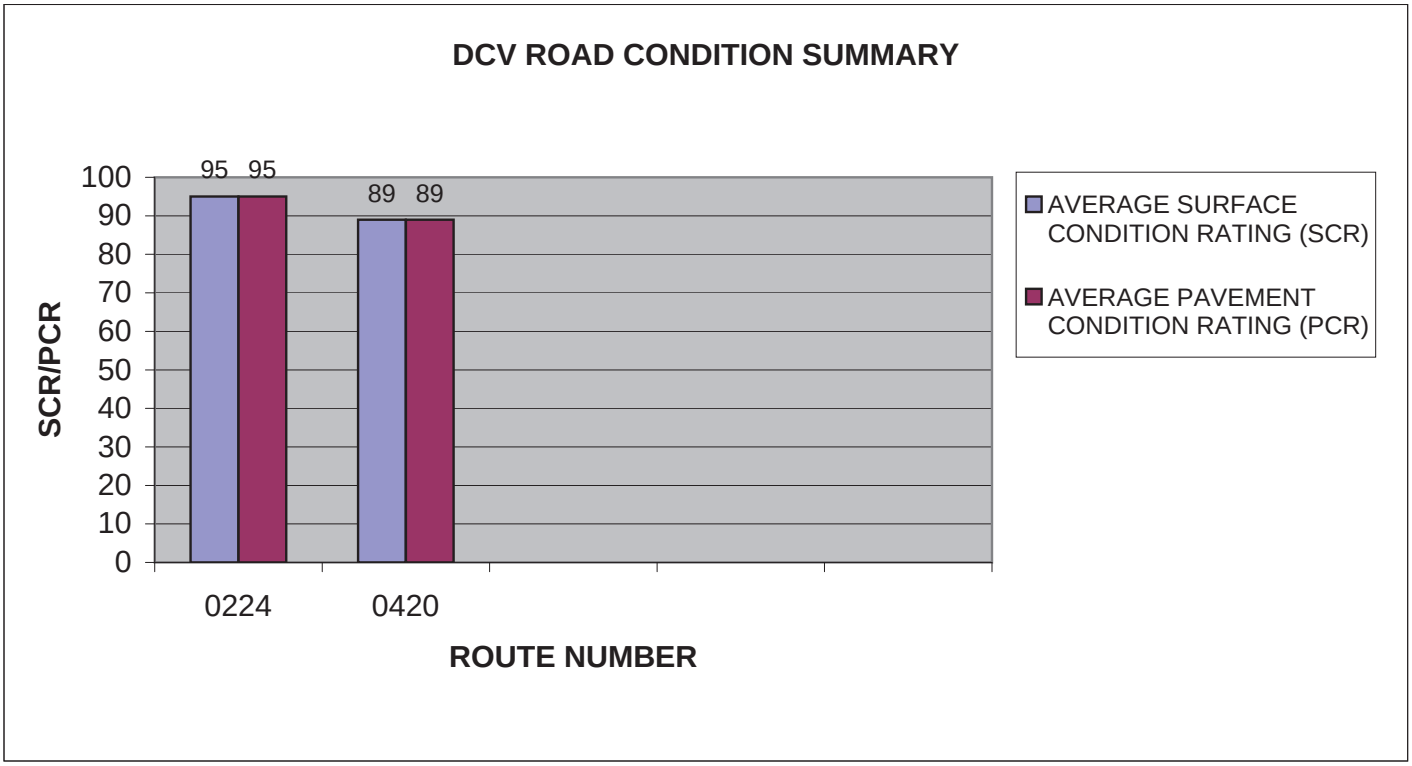
ROUTE NUMBER	ROUTE NAME	FUNCT CLASS	PAVED LENGTH	SURFACE TYPE	AVERAGE SURFACE CONDITION RATING (SCR)	AVERAGE PAVEMENT CONDITION RATING (PCR)
0103N	HOUCHINS FERRY ROAD NORTH	2	0.50	ASPHALT	83	73
0106	PARK RIDGE ROAD	2	1.26	ASPHALT	84	79
0200	FROZEN NIAGARA ENTRANCE ROAD	2	1.10	ASPHALT	68	71
0201	CARMICHAEL ENTRANCE ROAD	2	1.04	ASPHALT	82	78
0205	HQ CAMPGROUND ACCESS ROAD	2	0.18	ASPHALT	99	99



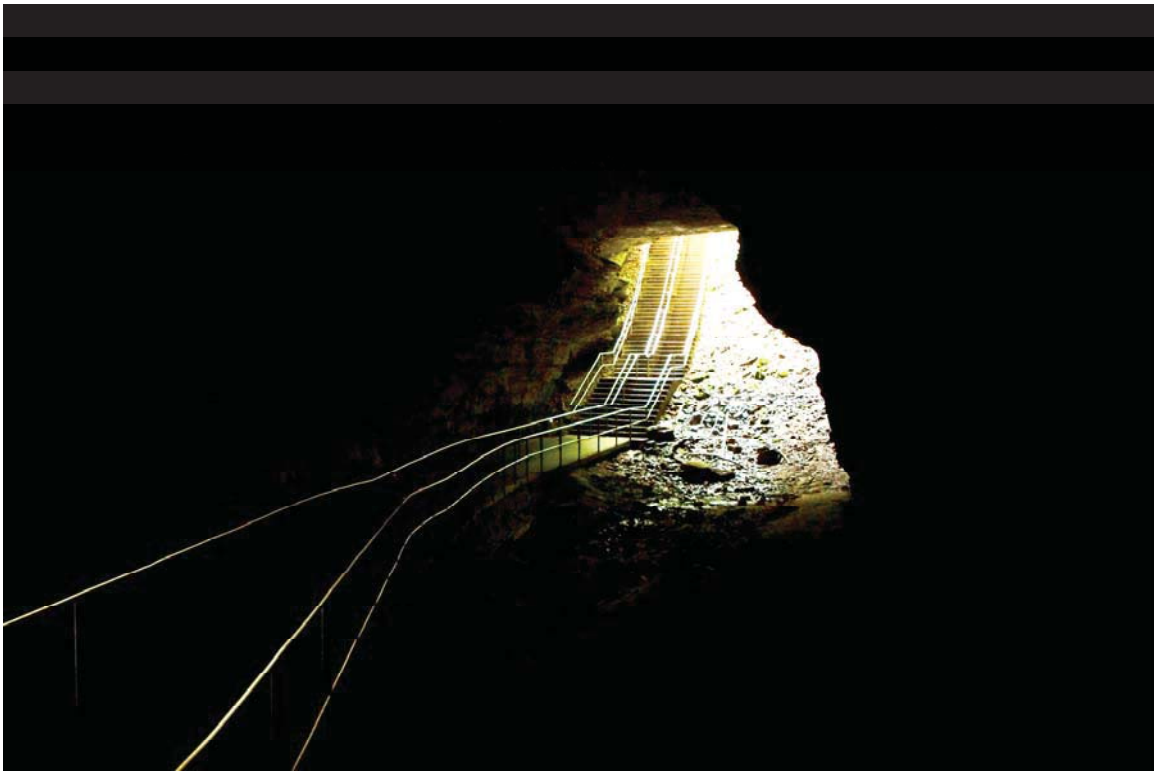
MACA: DCV ROAD CONDITION SUMMARY

DCV - Data Collection Vehicle

ROUTE NUMBER	ROUTE NAME	FUNCT CLASS	PAVED LENGTH	SURFACE TYPE	AVERAGE SURFACE CONDITION RATING (SCR)	AVERAGE PAVEMENT CONDITION RATING (PCR)
0224	VISITOR CENTER BUS LOOP	3	0.23	ASPHALT	95	95
0420	ELEVATOR SHAFT ROAD	2	0.08	ASPHALT	89	89



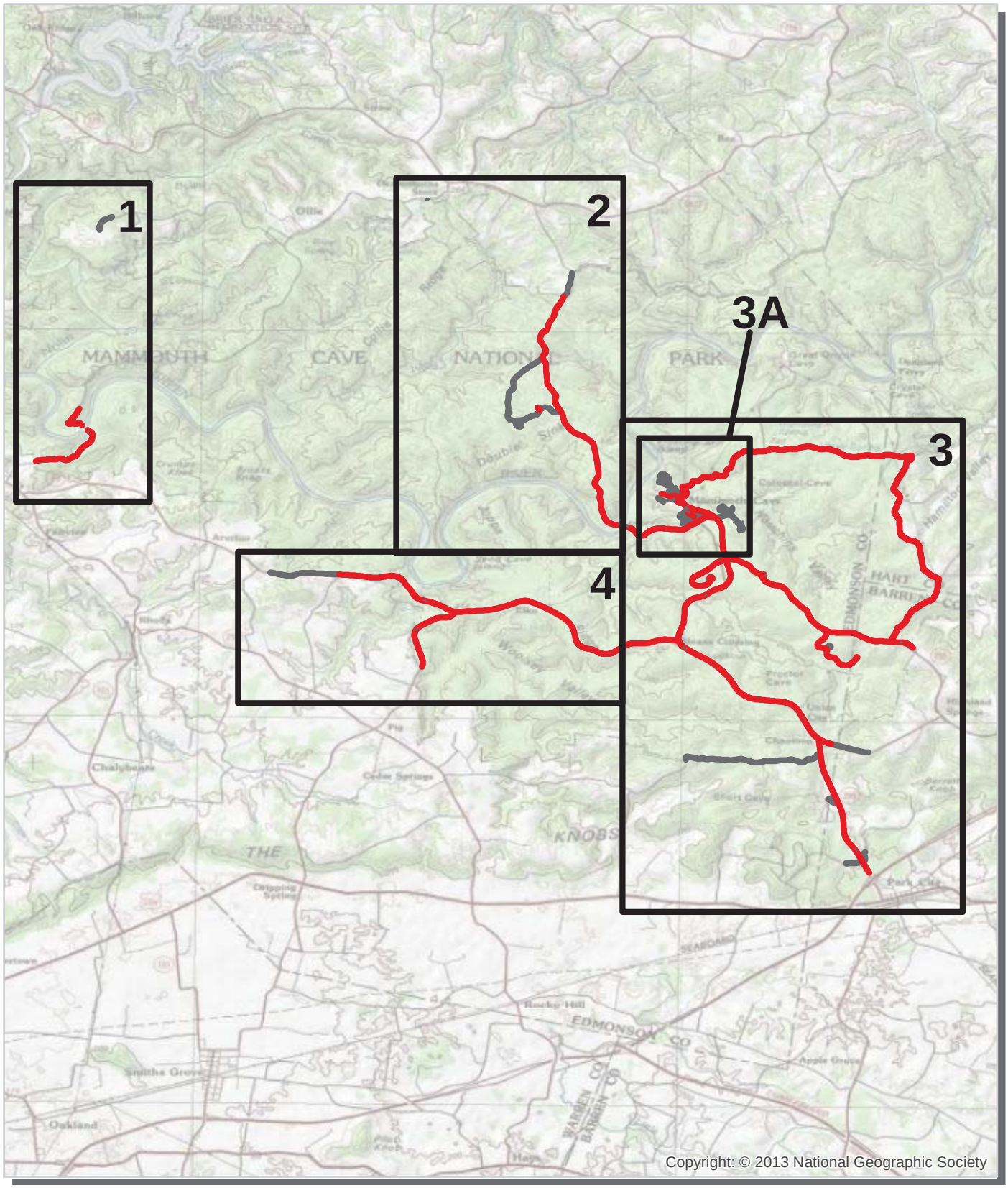
Section 4
Park Route Location Maps



Mammoth Cave National Park

Federal Lands Highway
Road Inventory Program

Mammoth Cave National Park
Route Location Map
Key Map



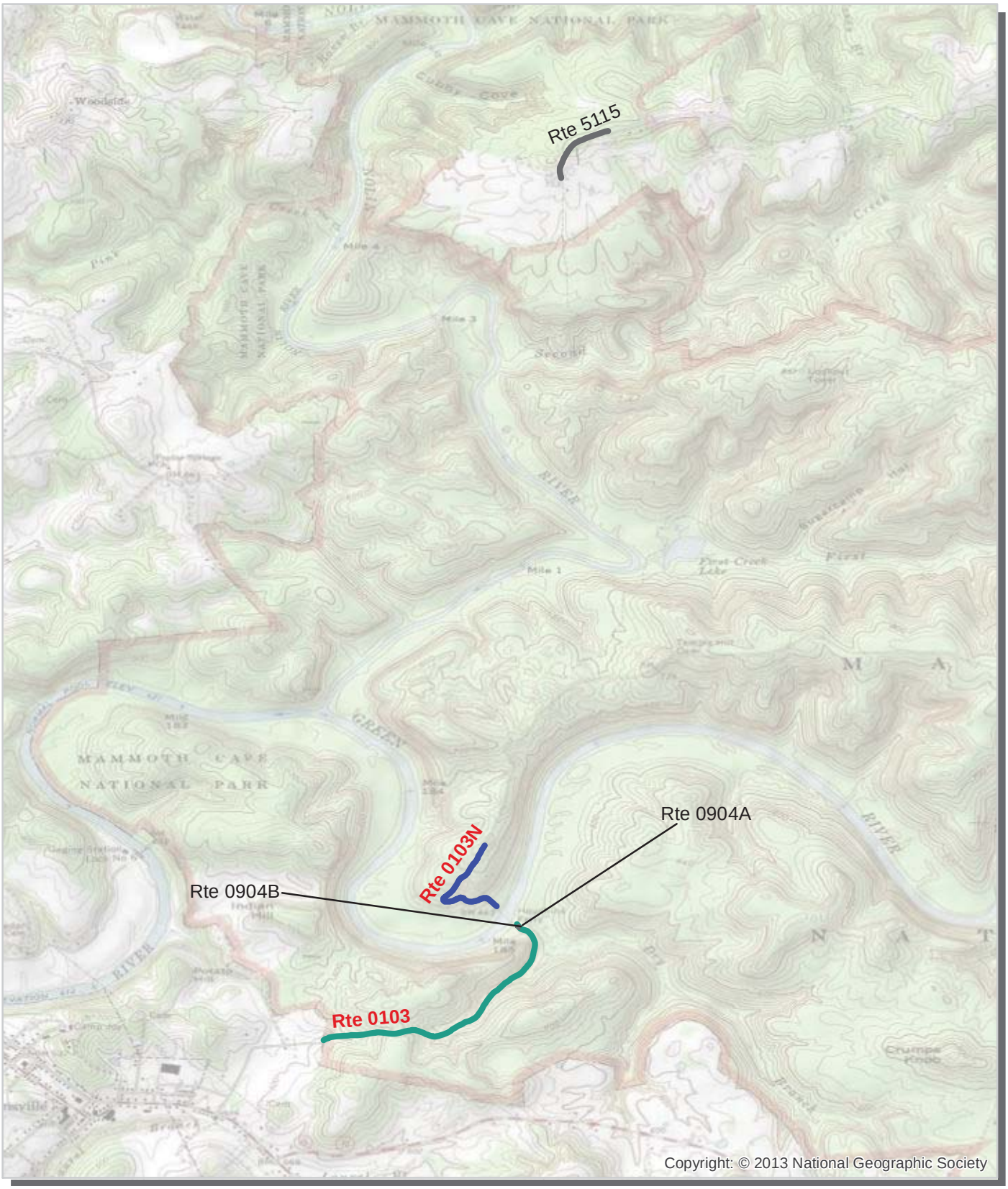
Cycle 5 Collected Routes

Routes Collected in Previous Cycle

2 1 0 2 Miles

N

Mammoth Cave National Park
Route Location Map
Area 1



Unique colors used to differentiate routes

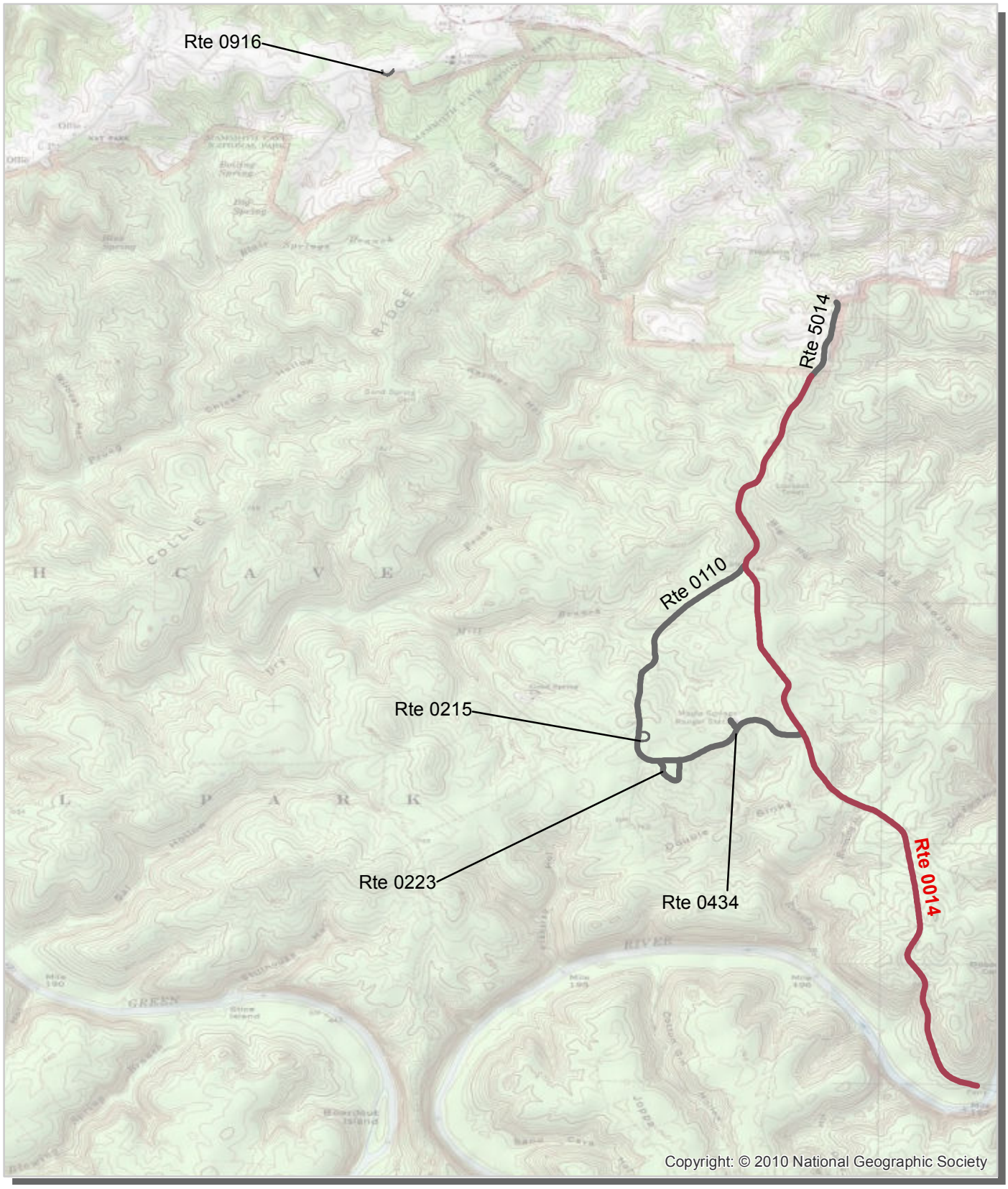
Routes Collected in Previous Cycle

0.5 0.25 0 0.5

Miles

N

Mammoth Cave National Park
Route Location Map
Area 2



Cycle 5 Collected Routes

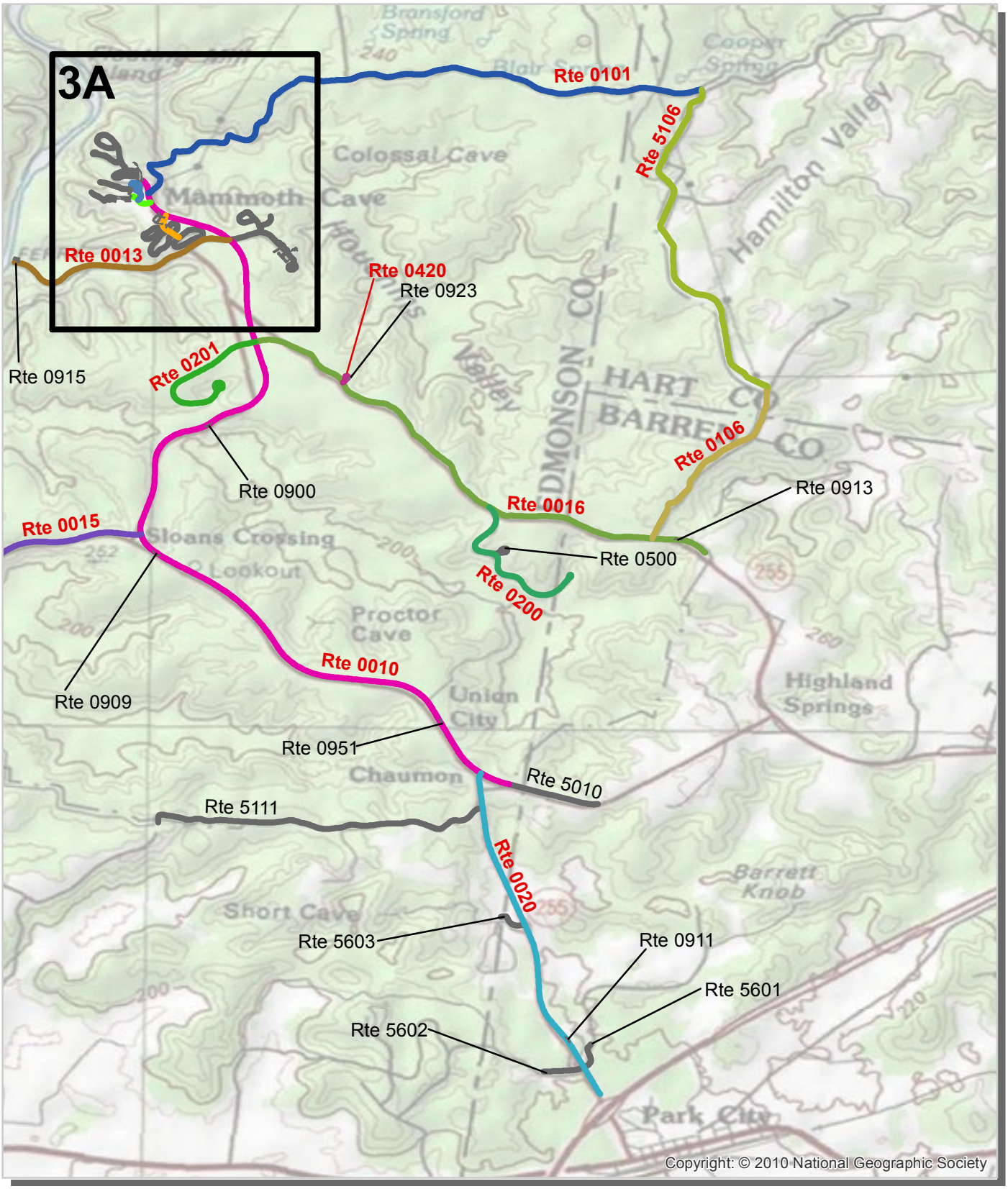
Routes Collected in Previous Cycle

0.8 0.4 0 0.8

Miles

N

Mammoth Cave National Park
Route Location Map
Area 3



Unique colors used to differentiate routes

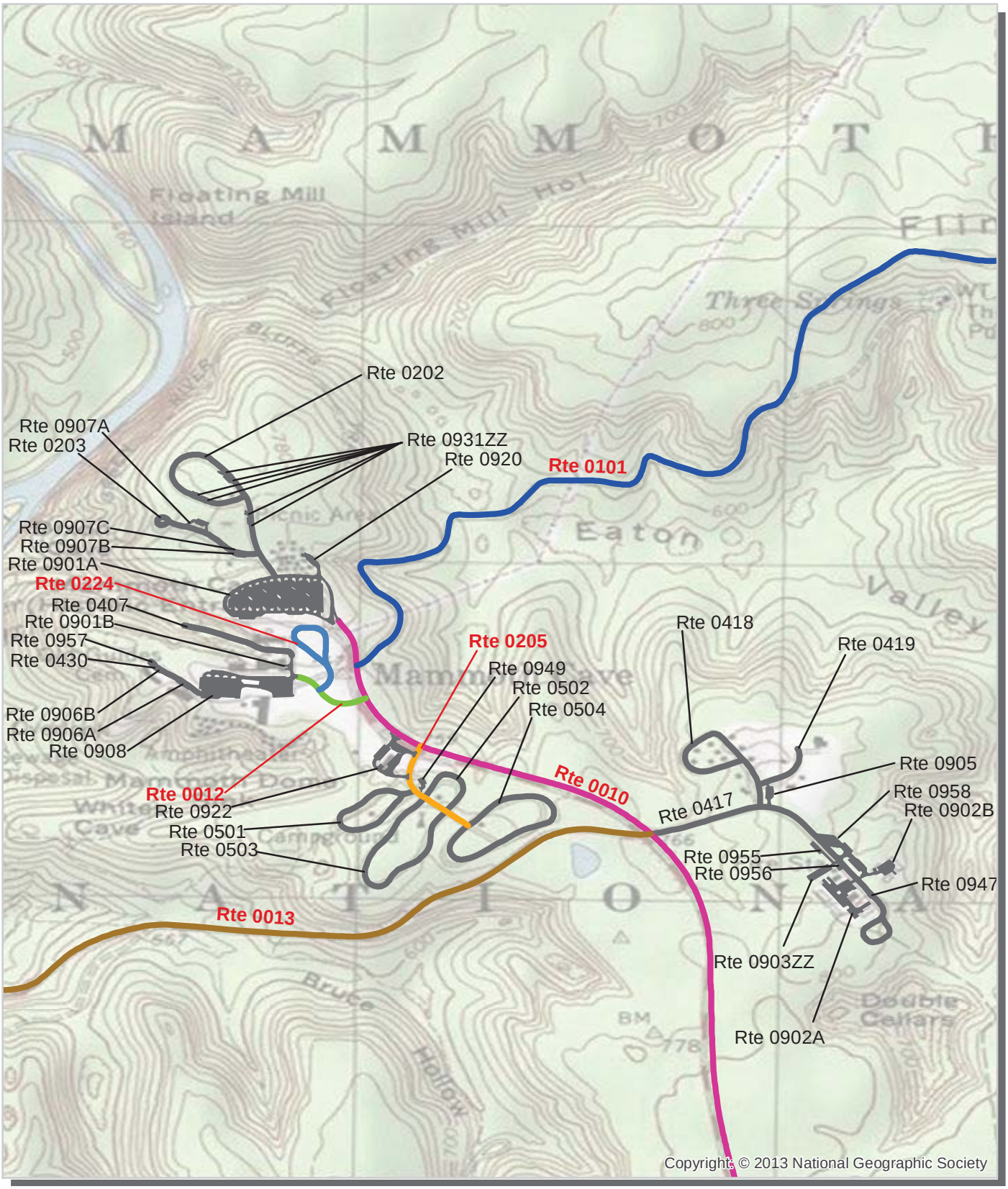
Routes Collected in Previous Cycle

0.8 0.4 0 0.8

Miles

N

Mammoth Cave National Park
Route Location Map
Area 3A



Unique colors used to differentiate routes

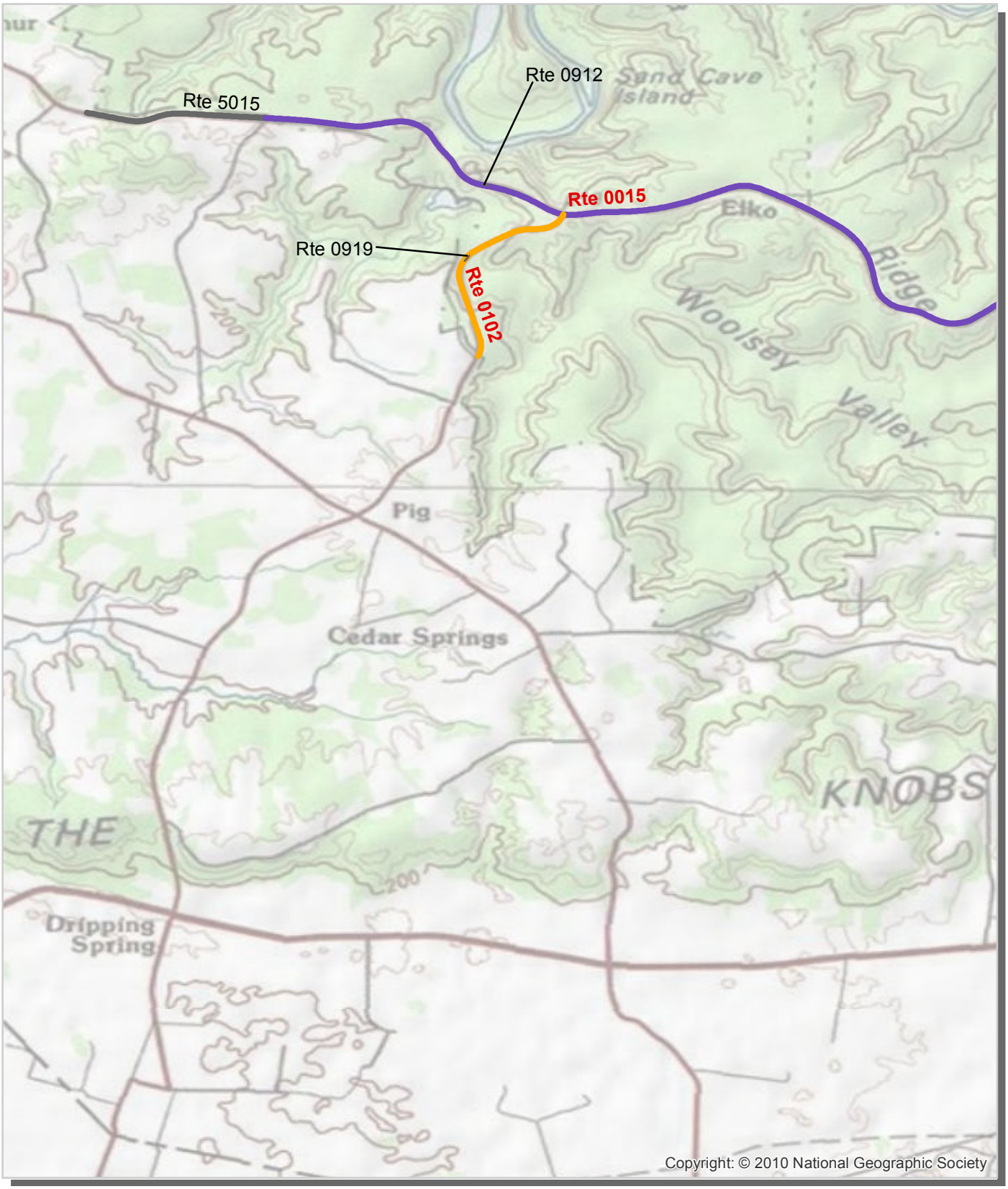
Routes Collected in Previous Cycle

0.2 0.1 0 0.2

Miles

N

Mammoth Cave National Park
Route Location Map
Area 4



Unique colors used to differentiate routes

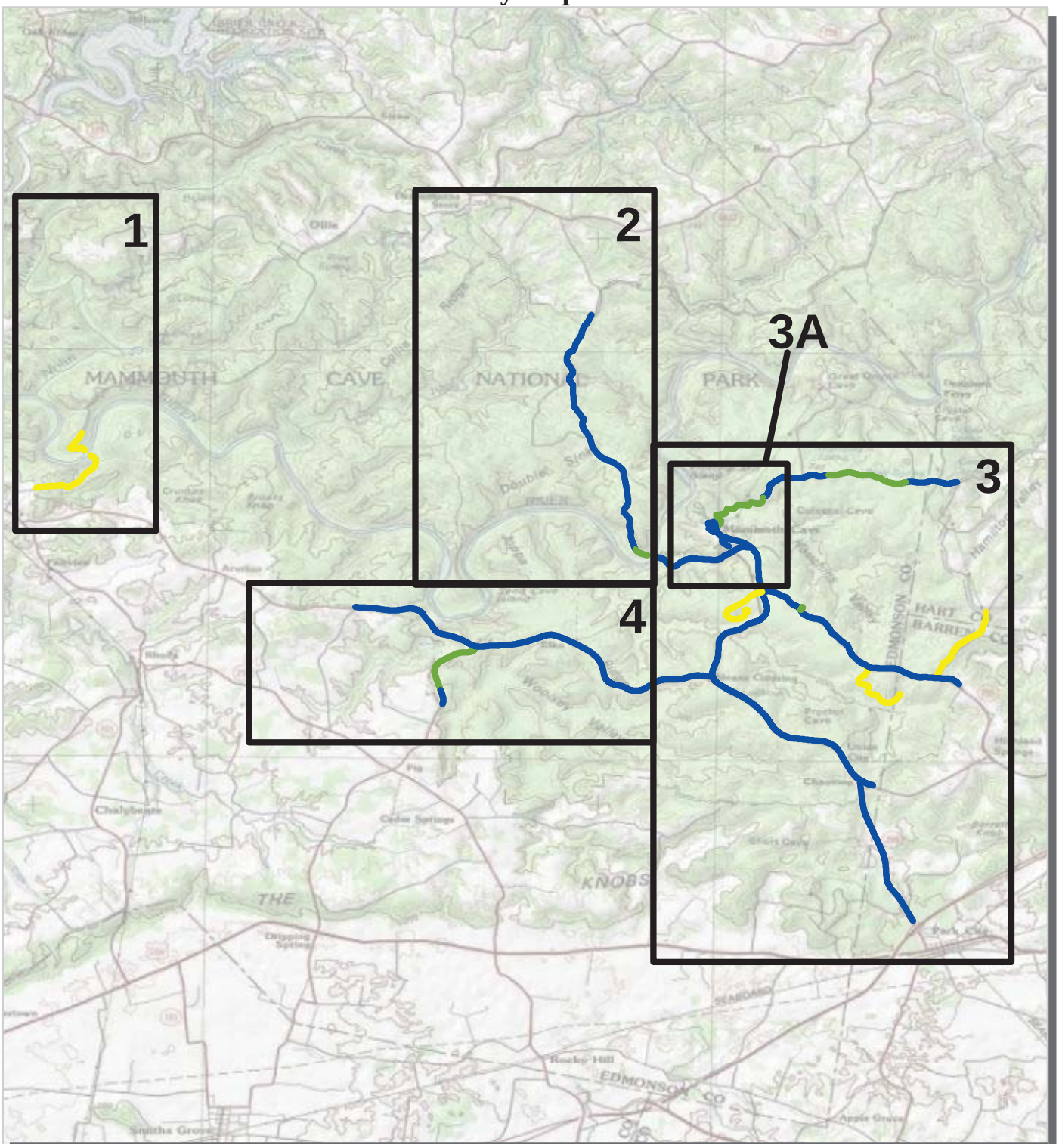
Routes Collected in Previous Cycle

0.8 0.4 0 0.8

Miles

N

Mammoth Cave National Park
Route Condition Map
PCR - Mile by Mile
Key Map



PCR — Poor (0 - 60) — Fair (61 - 84) — Good (85 - 94) — Excellent (95 - 100) — No Data

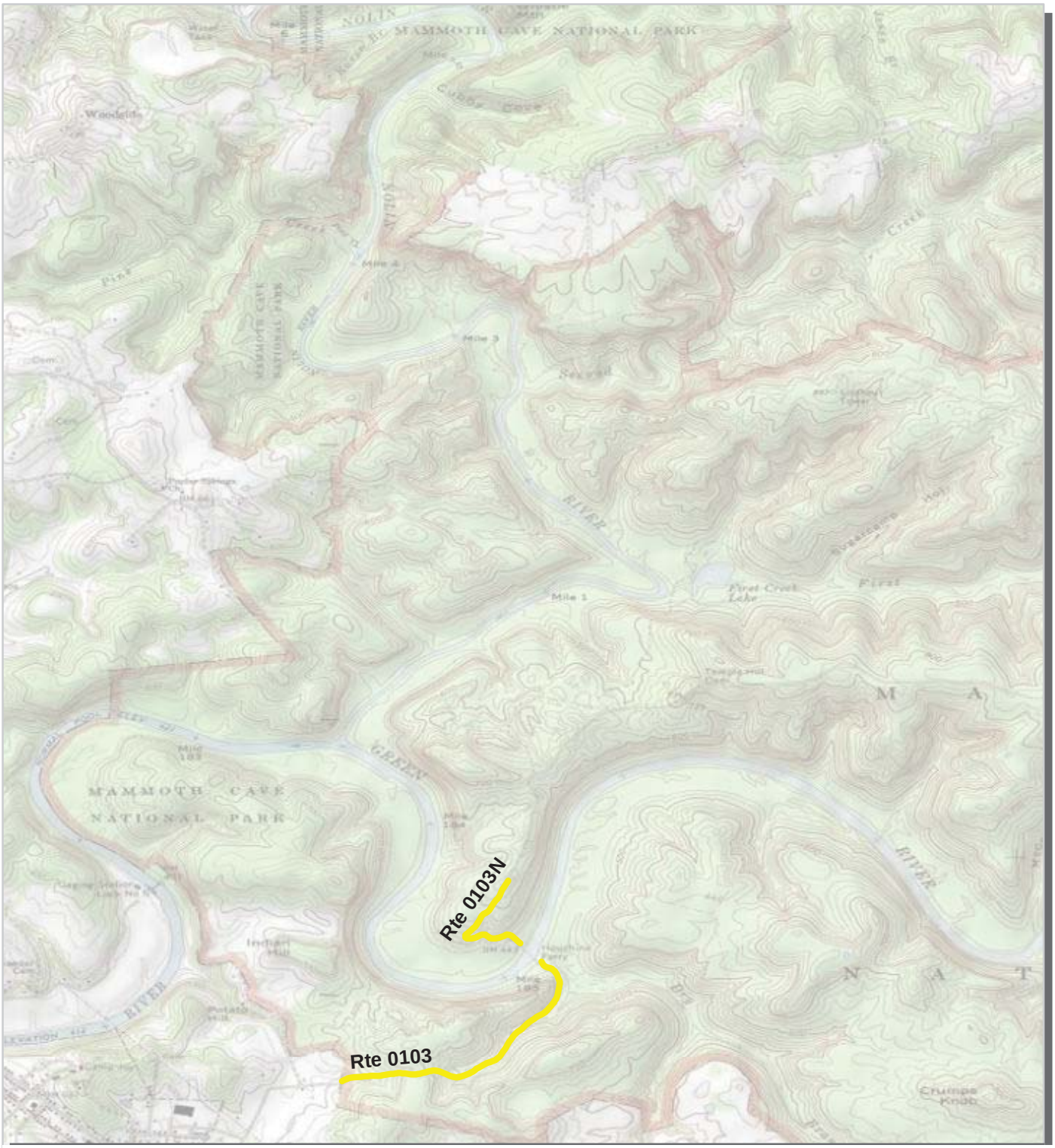
* If the PCR rating is not available for a section, the SCR rating will be displayed. See appendix for definitions and formulas.

Note: Only routes collected by the DCV in Cycle-5 are displayed.

2 1 0 2 Miles

N

Mammoth Cave National Park
Route Condition Map
PCR - Mile by Mile
Area 1



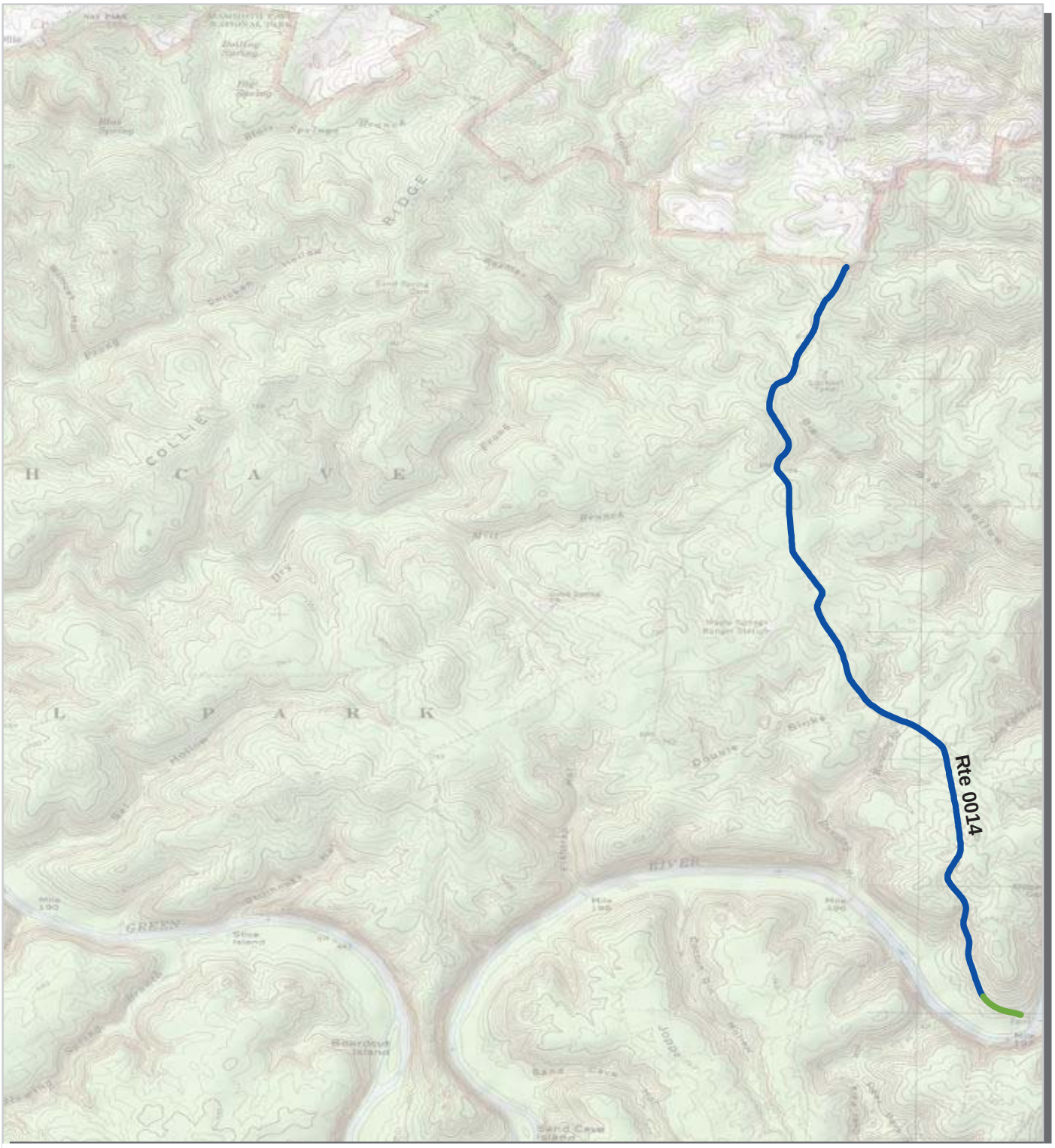
PCR — Poor (0 - 60) — Fair (61 - 84) — Good (85 - 94) — Excellent (95 - 100) — No Data

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

0.5 0.25 0 0.5 Miles

N

Mammoth Cave National Park
Route Condition Map
PCR - Mile by Mile
Area 2



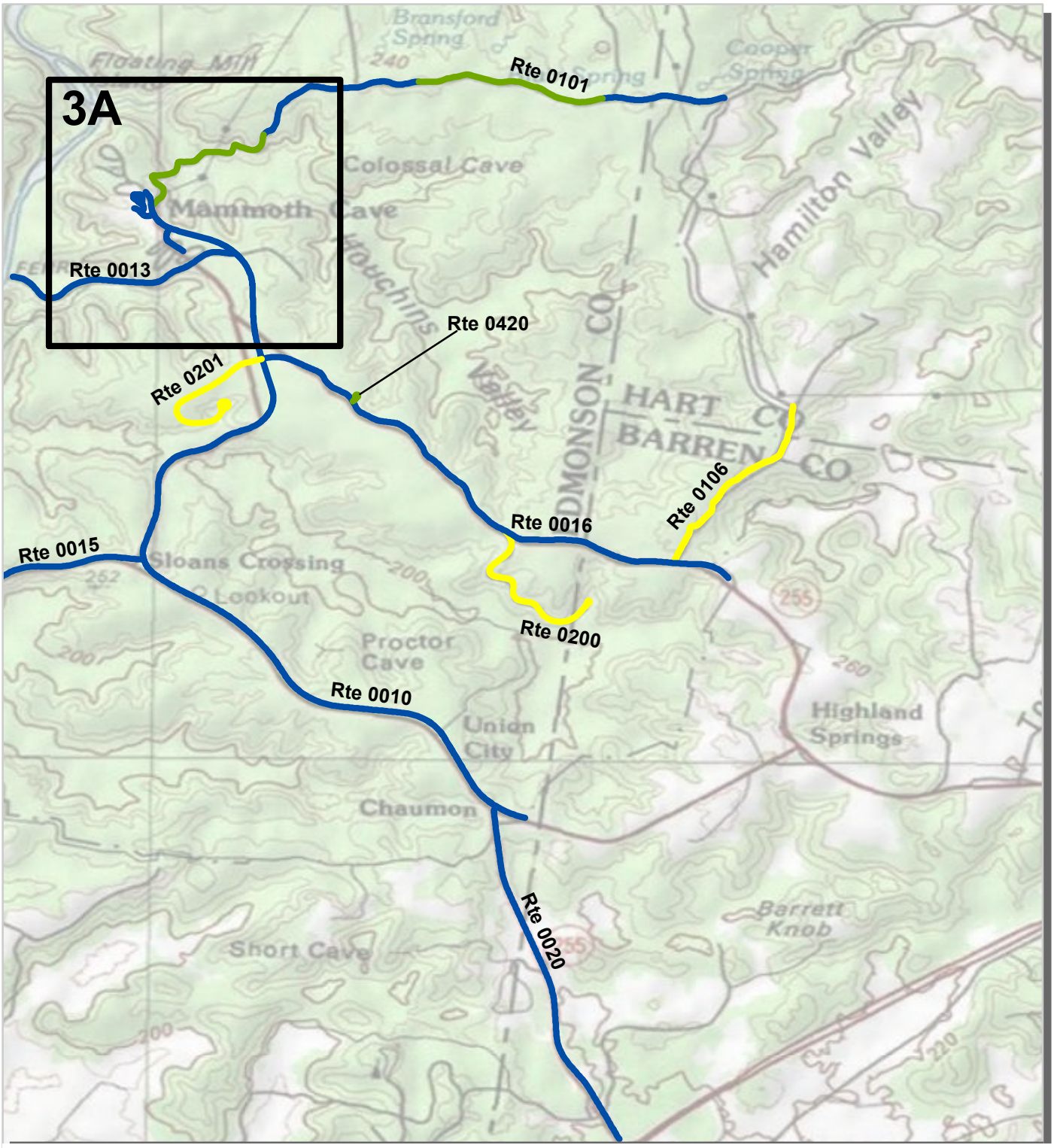
PCR	Poor	Fair	Good	Excellent	No Data
	(0 - 60)	(61 - 84)	(85 - 94)	(95 - 100)	

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

0.5 0.25 0 0.5 Miles

N

Mammoth Cave National Park
Route Condition Map
PCR - Mile by Mile
Area 3



PCR	Poor	Fair	Good	Excellent	No Data
	(0 - 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

Mammoth Cave National Park
Route Condition Map
PCR - Mile by Mile
Area 3A

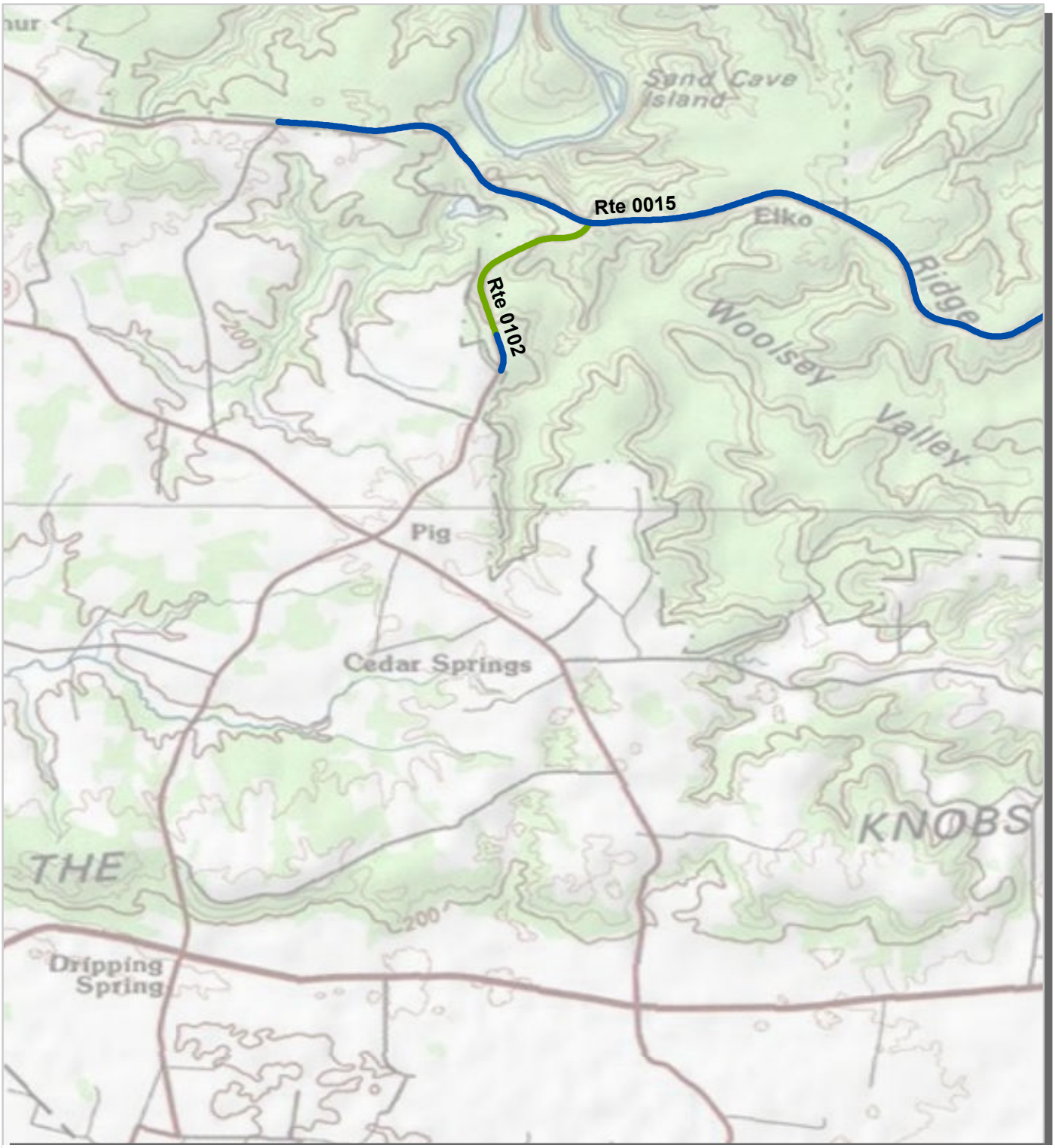
PCR	Poor	Fair	Good	Excellent	No Data
	(0 - 60)	(61 - 84)	(85 - 94)	(95 - 100)	

* 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

Mammoth Cave National Park
Route Condition Map
PCR - Mile by Mile
Area 4



PCR	Poor	Fair	Good	Excellent	No Data
	(0 - 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

Section 5
Paved Route
Condition Rating Sheets

Mammoth Cave National Park

Federal Lands Highway
Road Inventory Program

PCR Poor (0 - 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 MAMMOTH CAVE PARKWAY
MACA : MAMMOTH CAVE NATIONAL PARK

COLLECTED: 10/29/2012

SOUTHEAST REGION **TOTAL LENGTH: 5.74 Miles**

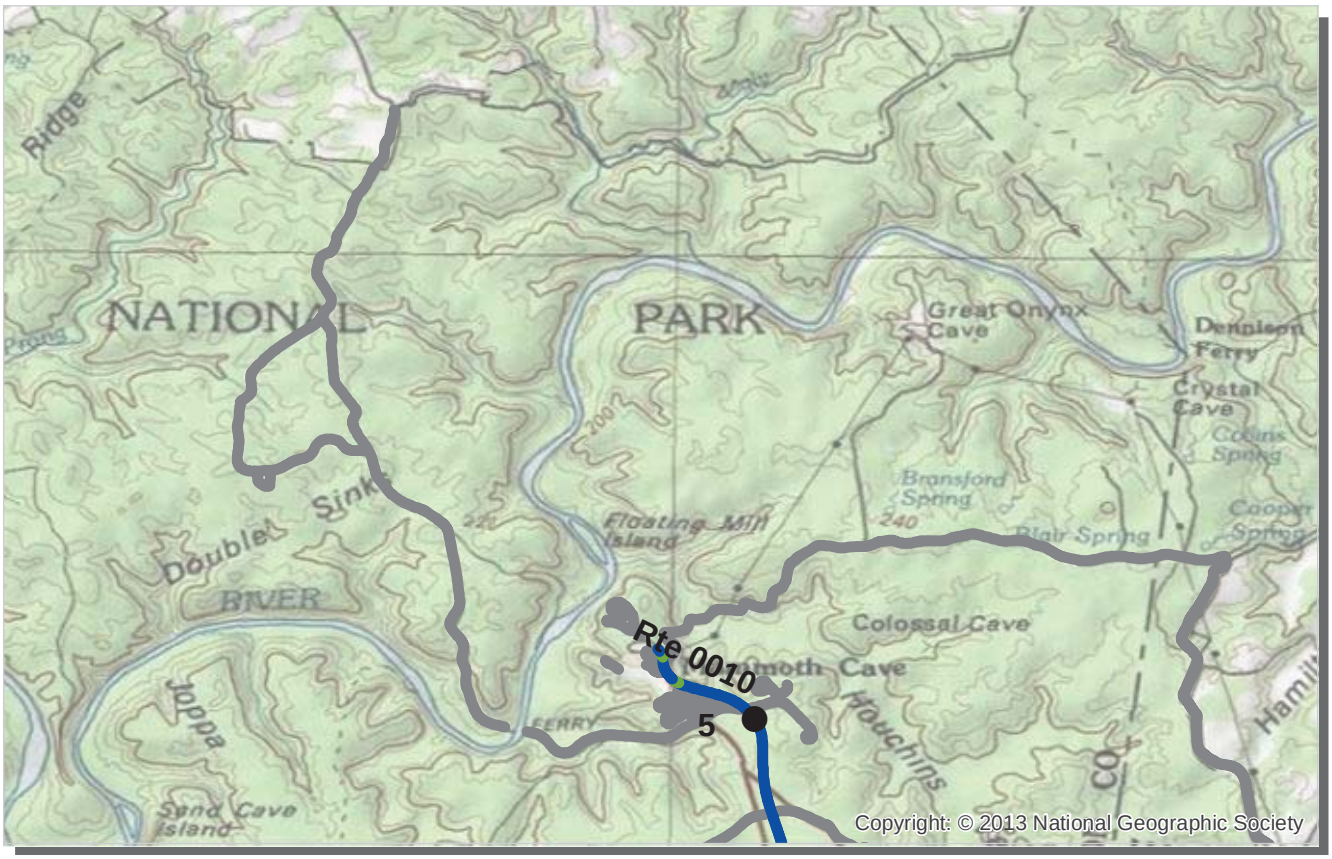
Section Number	0	1	2	3	4
Section Length (mi)	1.00	1.00	1.00	1.00	1.00
Cross Section Information					
Number of Lanes	2	2	2	2	2
Paved Width (ft)	26	21	25	23	21
Lane Width (ft)	11	10	11	10	9
Roadway Condition Information					
SCR (Surface Condition Rating)	99	100	100	100	100
PCR (Pavement Condition Rating)	99	100	100	100	100
Distress Index Values					
Structural Crack Index	99	100	100	100	100
Transverse Cracking Index	100	100	100	100	100
Patching Index	100	100	100	100	100
Rutting Index	100	100	100	100	100
Roughness Condition Index (RCI)	100	100	100	100	100

NOTES:

Structural Crack Index is a combination of the Longitudinal Cracking Index and Alligator Cracking Index.

See Section 10 for explanation of SCR, PCR, & all Distress Index Values.

NC - Not Collected N/A - Not Applicable



PCR Poor (0 - 60) Fair (61 - 84) Good (85 - 94) Excellent (95 - 100) No Data

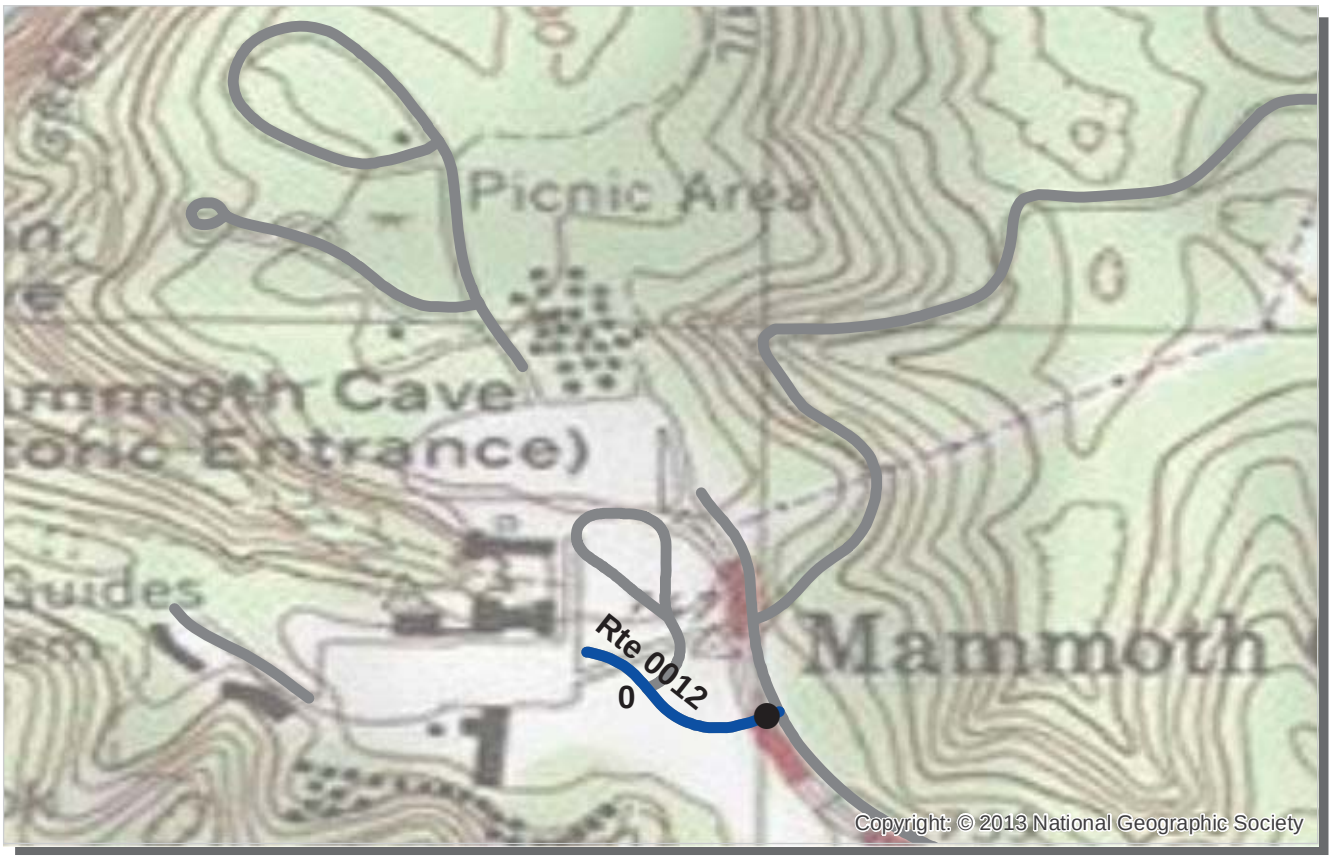
* If the PCR rating is not available for a section, the SCR rating will be displayed. See appendix for definitions and formulas.

ROUTE: 0010 MAMMOTH CAVE PARKWAY
MACA : MAMMOTH CAVE NATIONAL PARK

COLLECTED: 10/29/2012
SOUTHEAST REGION **TOTAL LENGTH: 5.74 Miles**

Section Number	5				
Section Length (mi)	0.74				
Cross Section Information					
Number of Lanes	2				
Paved Width (ft)	27				
Lane Width (ft)	11				
Roadway Condition Information					
SCR (Surface Condition Rating)	99				
PCR (Pavement Condition Rating)	99				
Distress Index Values					
Structural Crack Index	99				
Transverse Cracking Index	100				
Patching Index	100				
Rutting Index	100				
Roughness Condition Index (RCI)	100				

NOTES:
Structural Crack Index is a combination of the Longitudinal Cracking Index and Alligator Cracking Index.
See Section 10 for explanation of SCR, PCR, & all Distress Index Values.
NC - Not Collected N/A - Not Applicable



PCR Poor (0 - 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 HOTEL ENTRANCE ROAD
MACA : MAMMOTH CAVE NATIONAL PARK

COLLECTED: 10/30/2012
SOUTHEAST REGION **TOTAL LENGTH: 0.12 Miles**

Section Number	0				
Section Length (mi)	0.12				
Cross Section Information					
Number of Lanes	2				
Paved Width (ft)	20				
Lane Width (ft)	9				
Roadway Condition Information					
SCR (Surface Condition Rating)	99				
PCR (Pavement Condition Rating)	99				
Distress Index Values					
Structural Crack Index	100				
Transverse Cracking Index	100				
Patching Index	100				
Rutting Index	99				
Roughness Condition Index (RCI)	NC				

NOTES:
Structural Crack Index is a combination of the Longitudinal Cracking Index and Alligator Cracking Index.
See Section 10 for explanation of SCR, PCR, & all Distress Index Values.
NC - Not Collected N/A - Not Applicable

PCR Poor (0 - 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 GREEN RIVER FERRY ROAD SOUTH
MACA : MAMMOTH CAVE NATIONAL PARK

COLLECTED: 10/30/2012
SOUTHEAST REGION **TOTAL LENGTH: 1.31 Miles**

Section Number	0	1			
Section Length (mi)	1.00	0.31			
Cross Section Information					
Number of Lanes	2	2			
Paved Width (ft)	21	23			
Lane Width (ft)	9	9			
Roadway Condition Information					
SCR (Surface Condition Rating)	99	99			
PCR (Pavement Condition Rating)	97	99			
Distress Index Values					
Structural Crack Index	99	99			
Transverse Cracking Index	100	100			
Patching Index	100	100			
Rutting Index	99	99			
Roughness Condition Index (RCI)	93	100			

NOTES:
Structural Crack Index is a combination of the Longitudinal Cracking Index and Alligator Cracking Index.
See Section 10 for explanation of SCR, PCR, & all Distress Index Values.
NC - Not Collected N/A - Not Applicable

PCR Poor (0 - 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: 0014 GREEN RIVER FERRY ROAD NORTH
MACA : MAMMOTH CAVE NATIONAL PARK

COLLECTED: 10/30/2012
SOUTHEAST REGION **TOTAL LENGTH: 4.18 Miles**

Section Number	0	1	2	3	4
Section Length (mi)	1.00	1.00	1.00	1.00	0.18
Cross Section Information					
Number of Lanes	2	2	2	2	2
Paved Width (ft)	18	18	18	18	19
Lane Width (ft)	8	8	8	8	8
Roadway Condition Information					
SCR (Surface Condition Rating)	99	99	99	100	99
PCR (Pavement Condition Rating)	98	97	99	100	93
Distress Index Values					
Structural Crack Index	99	99	99	100	100
Transverse Cracking Index	100	100	100	100	100
Patching Index	100	100	100	100	100
Rutting Index	99	99	100	100	99
Roughness Condition Index (RCI)	96	94	100	100	84

NOTES:
Structural Crack Index is a combination of the Longitudinal Cracking Index and Alligator Cracking Index.
See Section 10 for explanation of SCR, PCR, & all Distress Index Values.
NC - Not Collected N/A - Not Applicable

PCR Poor (0 - 60) Fair (61 - 84) Good (85 - 94) Excellent (95 - 100) No Data

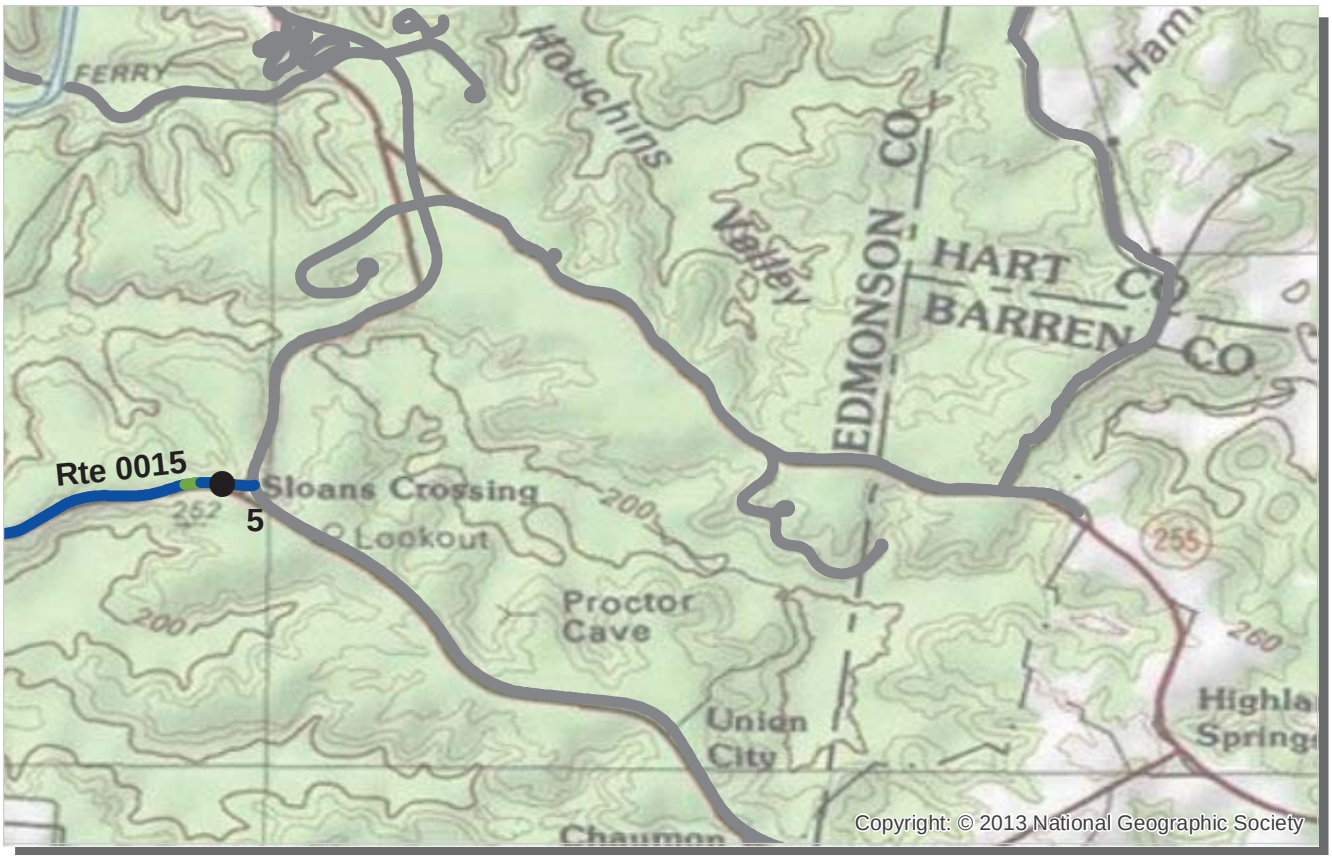
* If the PCR rating is not available for a section, the SCR rating will be displayed. See appendix for definitions and formulas.

ROUTE: 0015 BROWNSVILLE ROAD
MACA : MAMMOTH CAVE NATIONAL PARK

COLLECTED: 10/30/2012
SOUTHEAST REGION **TOTAL LENGTH: 5.10 Miles**

Section Number	0	1	2	3	4
Section Length (mi)	1.00	1.00	1.00	1.00	1.00
Cross Section Information					
Number of Lanes	2	2	2	2	2
Paved Width (ft)	21	21	21	21	21
Lane Width (ft)	9	9	9	9	9
Roadway Condition Information					
SCR (Surface Condition Rating)	100	99	100	95	99
PCR (Pavement Condition Rating)	100	99	100	97	99
Distress Index Values					
Structural Crack Index	100	99	100	95	99
Transverse Cracking Index	100	100	100	100	100
Patching Index	100	100	100	100	100
Rutting Index	100	100	100	100	100
Roughness Condition Index (RCI)	100	100	100	100	100

NOTES:
Structural Crack Index is a combination of the Longitudinal Cracking Index and Alligator Cracking Index.
See Section 10 for explanation of SCR, PCR, & all Distress Index Values.
NC - Not Collected N/A - Not Applicable



PCR Poor (0 - 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: 0015 BROWNSVILLE ROAD
MACA : MAMMOTH CAVE NATIONAL PARK

COLLECTED: 10/30/2012
SOUTHEAST REGION **TOTAL LENGTH: 5.10 Miles**

Section Number	5				
Section Length (mi)	0.10				
Cross Section Information					
Number of Lanes	2				
Paved Width (ft)	27				
Lane Width (ft)	11				
Roadway Condition Information					
SCR (Surface Condition Rating)	100				
PCR (Pavement Condition Rating)	100				
Distress Index Values					
Structural Crack Index	100				
Transverse Cracking Index	100				
Patching Index	100				
Rutting Index	100				
Roughness Condition Index (RCI)	100				

NOTES:
Structural Crack Index is a combination of the Longitudinal Cracking Index and Alligator Cracking Index.
See Section 10 for explanation of SCR, PCR, & all Distress Index Values.
NC - Not Collected N/A - Not Applicable

PCR Poor (0 - 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: 0016 CAVE CITY ROAD
MACA : MAMMOTH CAVE NATIONAL PARK

COLLECTED: 10/30/2012
SOUTHEAST REGION **TOTAL LENGTH: 3.02 Miles**

Section Number	0	1	2	3	
Section Length (mi)	1.00	1.00	1.00	0.02	
Cross Section Information					
Number of Lanes	2	2	2	2	
Paved Width (ft)	20	21	21	22	
Lane Width (ft)	9	9	9	9	
Roadway Condition Information					
SCR (Surface Condition Rating)	100	99	99	95	
PCR (Pavement Condition Rating)	100	99	99	95	
Distress Index Values					
Structural Crack Index	100	99	99	100	
Transverse Cracking Index	100	100	100	98	
Patching Index	100	100	100	100	
Rutting Index	100	100	100	95	
Roughness Condition Index (RCI)	100	100	100	NC	

NOTES:
Structural Crack Index is a combination of the Longitudinal Cracking Index and Alligator Cracking Index.
See Section 10 for explanation of SCR, PCR, & all Distress Index Values.
NC - Not Collected N/A - Not Applicable

PCR Poor (0 - 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: 0020 PARK CITY ROAD
MACA : MAMMOTH CAVE NATIONAL PARK

COLLECTED: 10/29/2012
SOUTHEAST REGION **TOTAL LENGTH: 2.28 Miles**

Section Number	0	1	2		
Section Length (mi)	1.00	1.00	0.28		
Cross Section Information					
Number of Lanes	2	2	2		
Paved Width (ft)	24	25	26		
Lane Width (ft)	10	10	11		
Roadway Condition Information					
SCR (Surface Condition Rating)	100	100	99		
PCR (Pavement Condition Rating)	100	100	99		
Distress Index Values					
Structural Crack Index	100	100	100		
Transverse Cracking Index	100	100	100		
Patching Index	100	100	100		
Rutting Index	100	100	99		
Roughness Condition Index (RCI)	100	100	100		

NOTES:
Structural Crack Index is a combination of the Longitudinal Cracking Index and Alligator Cracking Index.
See Section 10 for explanation of SCR, PCR, & all Distress Index Values.
NC - Not Collected N/A - Not Applicable

PCR Poor (0 - 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: 0101 FLINT RIDGE ROAD
MACA : MAMMOTH CAVE NATIONAL PARK

COLLECTED: 10/30/2012
SOUTHEAST REGION **TOTAL LENGTH: 3.63 Miles**

Section Number	0	1	2	3	
Section Length (mi)	1.00	1.00	1.00	0.63	
Cross Section Information					
Number of Lanes	2	2	2	2	
Paved Width (ft)	19	19	18	15	
Lane Width (ft)	9	9	8	8	
Roadway Condition Information					
SCR (Surface Condition Rating)	94	96	94	95	
PCR (Pavement Condition Rating)	94	96	94	95	
Distress Index Values					
Structural Crack Index	100	100	100	100	
Transverse Cracking Index	100	100	100	100	
Patching Index	100	100	100	100	
Rutting Index	94	96	94	95	
Roughness Condition Index (RCI)	NC	NC	NC	NC	

NOTES:
Structural Crack Index is a combination of the Longitudinal Cracking Index and Alligator Cracking Index.
See Section 10 for explanation of SCR, PCR, & all Distress Index Values.
NC - Not Collected N/A - Not Applicable

PCR Poor (0 - 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: 0102 CEDAR SINK ROAD
MACA : MAMMOTH CAVE NATIONAL PARK

COLLECTED: 10/30/2012
SOUTHEAST REGION **TOTAL LENGTH: 1.22 Miles**

Section Number	0	1			
Section Length (mi)	1.00	0.22			
Cross Section Information					
Number of Lanes	2	2			
Paved Width (ft)	20	20			
Lane Width (ft)	9	9			
Roadway Condition Information					
SCR (Surface Condition Rating)	87	93			
PCR (Pavement Condition Rating)	90	96			
Distress Index Values					
Structural Crack Index	87	93			
Transverse Cracking Index	97	94			
Patching Index	100	100			
Rutting Index	98	99			
Roughness Condition Index (RCI)	94	100			

NOTES:
Structural Crack Index is a combination of the Longitudinal Cracking Index and Alligator Cracking Index.
See Section 10 for explanation of SCR, PCR, & all Distress Index Values.
NC - Not Collected N/A - Not Applicable

PCR Poor (0 - 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: 0103 HOUCHINS FERRY ROAD SOUTH
MACA : MAMMOTH CAVE NATIONAL PARK

COLLECTED: 10/30/2012
SOUTHEAST REGION **TOTAL LENGTH: 1.07 Miles**

Section Number	0	1			
Section Length (mi)	1.00	0.07			
Cross Section Information					
Number of Lanes	2	2			
Paved Width (ft)	18	18			
Lane Width (ft)	8	8			
Roadway Condition Information					
SCR (Surface Condition Rating)	91	88			
PCR (Pavement Condition Rating)	79	62			
Distress Index Values					
Structural Crack Index	91	96			
Transverse Cracking Index	100	100			
Patching Index	100	100			
Rutting Index	91	88			
Roughness Condition Index (RCI)	62	24			

NOTES:
Structural Crack Index is a combination of the Longitudinal Cracking Index and Alligator Cracking Index.
See Section 10 for explanation of SCR, PCR, & all Distress Index Values.
NC - Not Collected N/A - Not Applicable

PCR Poor (0 - 60) Fair (61 - 84) Good (85 - 94) Excellent (95 - 100) No Data

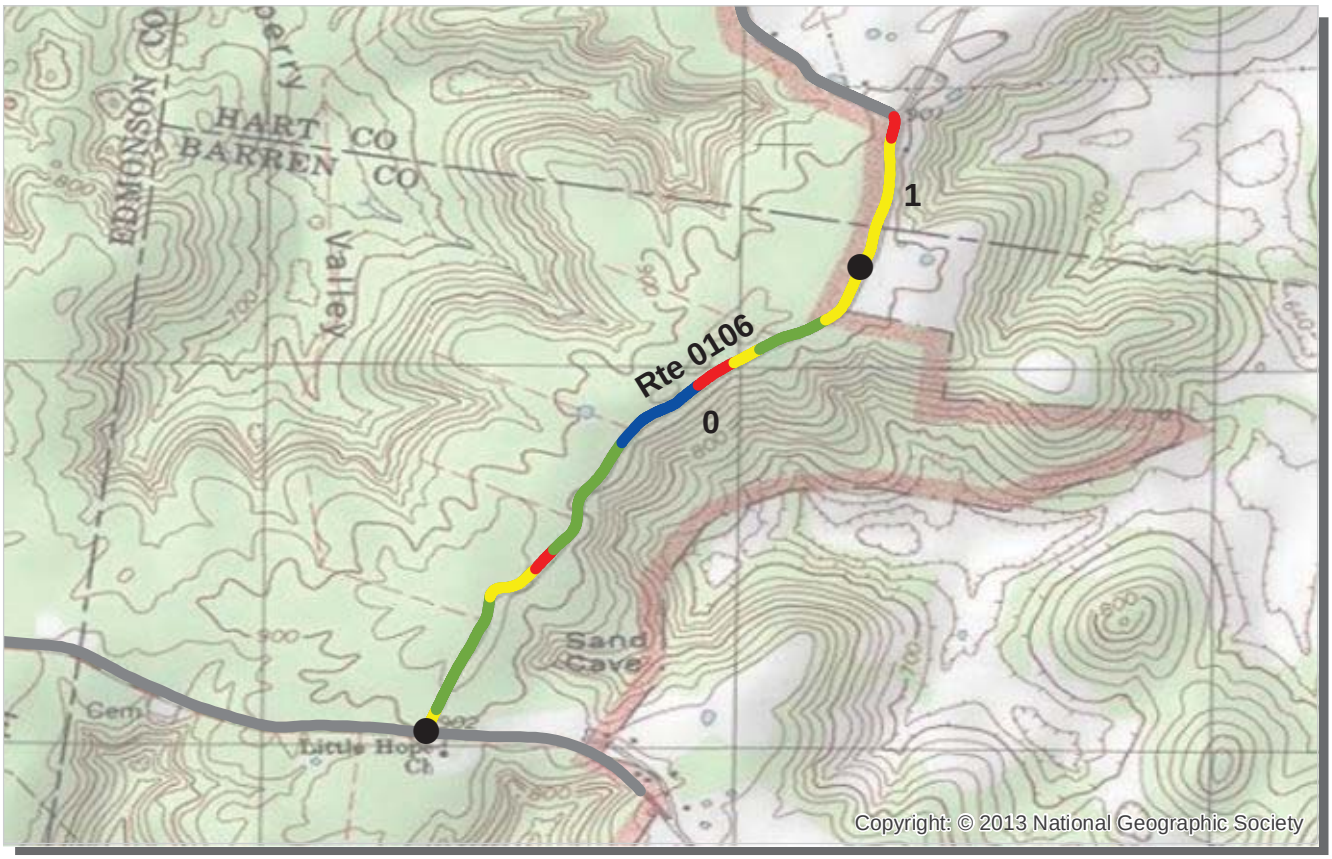
* If the PCR rating is not available for a section, the SCR rating will be displayed. See appendix for definitions and formulas.

ROUTE: 0103N HOUCHINS FERRY ROAD NORTH
MACA : MAMMOTH CAVE NATIONAL PARK

COLLECTED: 10/30/2012
SOUTHEAST REGION **TOTAL LENGTH: 0.50 Miles**

Section Number	0				
Section Length (mi)	0.50				
Cross Section Information					
Number of Lanes	2				
Paved Width (ft)	16				
Lane Width (ft)	9				
Roadway Condition Information					
SCR (Surface Condition Rating)	83				
PCR (Pavement Condition Rating)	73				
Distress Index Values					
Structural Crack Index	83				
Transverse Cracking Index	100				
Patching Index	100				
Rutting Index	95				
Roughness Condition Index (RCI)	57				

NOTES:
Structural Crack Index is a combination of the Longitudinal Cracking Index and Alligator Cracking Index.
See Section 10 for explanation of SCR, PCR, & all Distress Index Values.
NC - Not Collected N/A - Not Applicable



PCR Poor (0 - 60) Fair (61 - 84) Good (85 - 94) Excellent (95 - 100) No Data

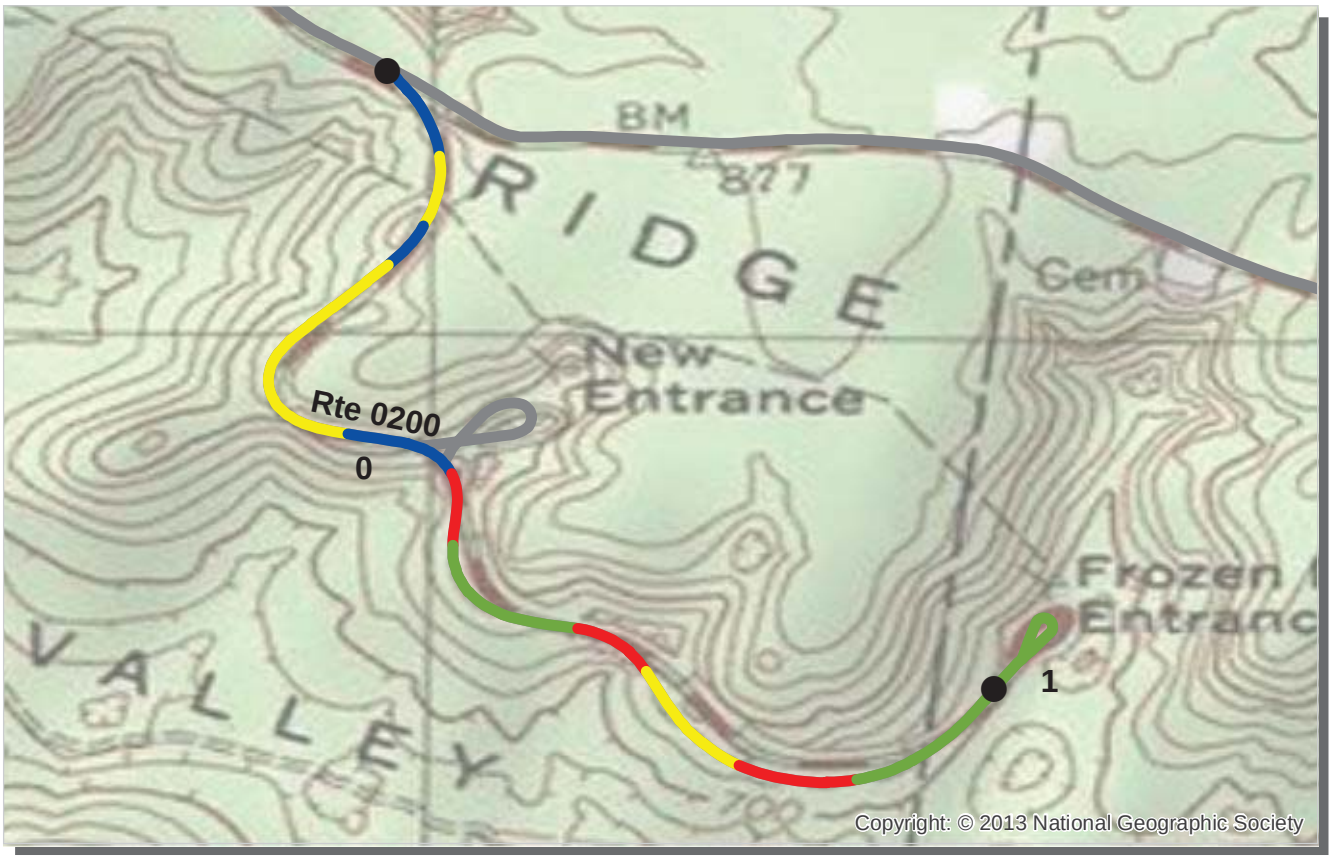
* If the PCR rating is not available for a section, the SCR rating will be displayed. See appendix for definitions and formulas.

ROUTE: 0106 PARK RIDGE ROAD
MACA : MAMMOTH CAVE NATIONAL PARK

COLLECTED: 10/30/2012
SOUTHEAST REGION **TOTAL LENGTH: 1.26 Miles**

Section Number	0	1			
Section Length (mi)	1.00	0.26			
Cross Section Information					
Number of Lanes	2	2			
Paved Width (ft)	16	14			
Lane Width (ft)	8	7			
Roadway Condition Information					
SCR (Surface Condition Rating)	85	80			
PCR (Pavement Condition Rating)	82	67			
Distress Index Values					
Structural Crack Index	85	98			
Transverse Cracking Index	100	100			
Patching Index	100	100			
Rutting Index	95	80			
Roughness Condition Index (RCI)	78	48			

NOTES:
Structural Crack Index is a combination of the Longitudinal Cracking Index and Alligator Cracking Index.
See Section 10 for explanation of SCR, PCR, & all Distress Index Values.
NC - Not Collected N/A - Not Applicable



PCR Poor (0 - 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 FROZEN NIAGARA ENTRANCE ROAD
MACA : MAMMOTH CAVE NATIONAL PARK

COLLECTED: 10/30/2012
SOUTHEAST REGION **TOTAL LENGTH: 1.10 Miles**

Section Number	0	1			
Section Length (mi)	1.00	0.10			
Cross Section Information					
Number of Lanes	2	1			
Paved Width (ft)	20	18			
Lane Width (ft)	9	13			
Roadway Condition Information					
SCR (Surface Condition Rating)	67	75			
PCR (Pavement Condition Rating)	71	68			
Distress Index Values					
Structural Crack Index	67	75			
Transverse Cracking Index	97	95			
Patching Index	100	100			
Rutting Index	95	97			
Roughness Condition Index (RCI)	76	57			

NOTES:
Structural Crack Index is a combination of the Longitudinal Cracking Index and Alligator Cracking Index.
See Section 10 for explanation of SCR, PCR, & all Distress Index Values.
NC - Not Collected N/A - Not Applicable

PCR Poor (0 - 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: 0201 CARMICHAEL ENTRANCE ROAD
MACA : MAMMOTH CAVE NATIONAL PARK

COLLECTED: 10/30/2012
SOUTHEAST REGION **TOTAL LENGTH: 1.04 Miles**

Section Number	0	1			
Section Length (mi)	1.00	0.04			
Cross Section Information					
Number of Lanes	2	1			
Paved Width (ft)	20	18			
Lane Width (ft)	10	18			
Roadway Condition Information					
SCR (Surface Condition Rating)	81	98			
PCR (Pavement Condition Rating)	78	83			
Distress Index Values					
Structural Crack Index	81	98			
Transverse Cracking Index	96	99			
Patching Index	100	100			
Rutting Index	90	98			
Roughness Condition Index (RCI)	74	61			

NOTES:
Structural Crack Index is a combination of the Longitudinal Cracking Index and Alligator Cracking Index.
See Section 10 for explanation of SCR, PCR, & all Distress Index Values.
NC - Not Collected N/A - Not Applicable

PCR Poor (0 - 60) Fair (61 - 84) Good (85 - 94) Excellent (95 - 100) No Data

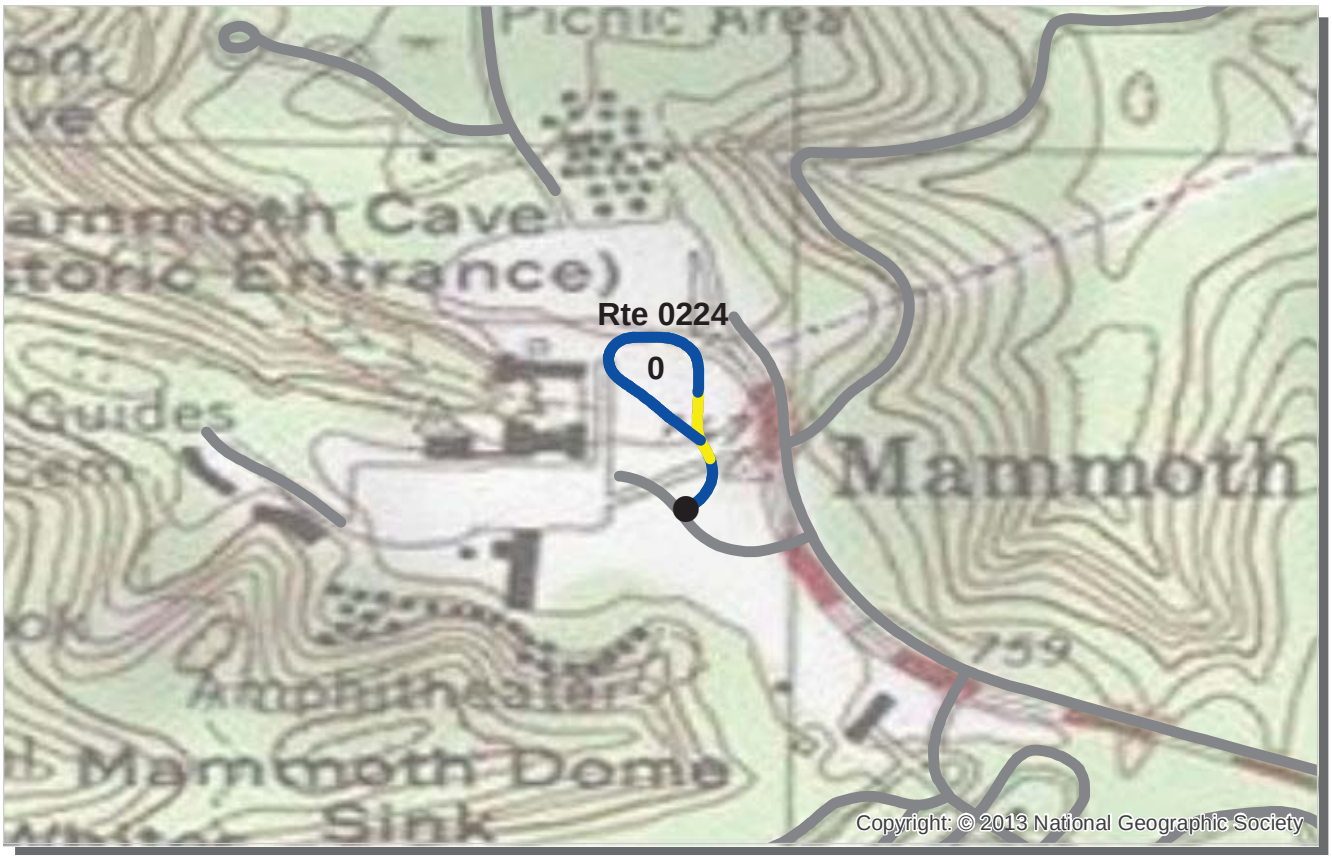
* If the PCR rating is not available for a section, the SCR rating will be displayed. See appendix for definitions and formulas.

ROUTE: 0205 HQ CAMPGROUND ACCESS ROAD
MACA : MAMMOTH CAVE NATIONAL PARK

COLLECTED: 10/30/2012
SOUTHEAST REGION **TOTAL LENGTH: 0.18 Miles**

Section Number	0				
Section Length (mi)	0.18				
Cross Section Information					
Number of Lanes	2				
Paved Width (ft)	25				
Lane Width (ft)	10				
Roadway Condition Information					
SCR (Surface Condition Rating)	99				
PCR (Pavement Condition Rating)	99				
Distress Index Values					
Structural Crack Index	100				
Transverse Cracking Index	100				
Patching Index	100				
Rutting Index	99				
Roughness Condition Index (RCI)	NC				

NOTES:
Structural Crack Index is a combination of the Longitudinal Cracking Index and Alligator Cracking Index.
See Section 10 for explanation of SCR, PCR, & all Distress Index Values.
NC - Not Collected N/A - Not Applicable



PCR Poor (0 - 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: 0224 VISITOR CENTER BUS LOOP
MACA : MAMMOTH CAVE NATIONAL PARK

COLLECTED: 10/30/2012
SOUTHEAST REGION **TOTAL LENGTH: 0.23 Miles**

Section Number	0				
Section Length (mi)	0.23				
Cross Section Information					
Number of Lanes	1				
Paved Width (ft)	22				
Lane Width (ft)	18				
Roadway Condition Information					
SCR (Surface Condition Rating)	95				
PCR (Pavement Condition Rating)	95				
Distress Index Values					
Structural Crack Index	100				
Transverse Cracking Index	100				
Patching Index	95				
Rutting Index	98				
Roughness Condition Index (RCI)	NC				

NOTES:
Structural Crack Index is a combination of the Longitudinal Cracking Index and Alligator Cracking Index.
See Section 10 for explanation of SCR, PCR, & all Distress Index Values.
NC - Not Collected N/A - Not Applicable

PCR Poor (0 - 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: 0420 ELEVATOR SHAFT ROAD
MACA : MAMMOTH CAVE NATIONAL PARK

COLLECTED: 10/30/2012
SOUTHEAST REGION **TOTAL LENGTH: 0.08 Miles**

Section Number	0				
Section Length (mi)	0.08				
Cross Section Information					
Number of Lanes	2				
Paved Width (ft)	17				
Lane Width (ft)	8				
Roadway Condition Information					
SCR (Surface Condition Rating)	89				
PCR (Pavement Condition Rating)	89				
Distress Index Values					
Structural Crack Index	98				
Transverse Cracking Index	100				
Patching Index	98				
Rutting Index	89				
Roughness Condition Index (RCI)	NC				

NOTES:
Structural Crack Index is a combination of the Longitudinal Cracking Index and Alligator Cracking Index.
See Section 10 for explanation of SCR, PCR, & all Distress Index Values.
NC - Not Collected N/A - Not Applicable

Section 6
Manually Rated Paved Route Condition Rating Sheets

Mammoth Cave National Park

Federal Lands Highway
Road Inventory Program

MANUALLY RATED ROUTE CONDITION RATING SHEETS

This park is classified as a Large Park. Therefore, in Cycle 5, no manually rated routes were collected unless the route was modified or previously uncollected by RIP.

Section 7
Parking Area
Condition Rating Sheets

Mammoth Cave National Park

Federal Lands Highway
Road Inventory Program

PARKING AREA CONDITION RATING SHEETS

This park is classified as a Large Park. Therefore, in Cycle 5, no parking area routes were collected unless the route was modified or previously uncollected by RIP.

Section 8
Route Maintenance Features Summaries

Mammoth Cave National Park

Federal Lands Highway
Road Inventory Program

MACA: DCV ROUTE MAINTENANCE FEATURES SUMMARY

Notice: Culverts and drop inlets were NOT marked by NPS in Cycle 5 along new or re-aligned DCV driven routes.

FEATURE	ROUTE 0224 VISITOR CENTER BUS LOOP	UNIT
BRIDGE	0	EACH
CATTLE GUARD	0	EACH
CULVERT	0	EACH
CURB	2,249	LINEAR FEET
DROP INLET	0	EACH
GATE	1	EACH
GUARD/GUIDE RAIL	0	LINEAR FEET
CABLE	0	LINEAR FEET
NON-CABLE	0	LINEAR FEET
GUARD/GUIDE WALL	0	LINEAR FEET
BOLLARD	0	LINEAR FEET
TEMPORARY BARRIER	0	LINEAR FEET
NON TEMP/BOLLARD	0	LINEAR FEET
INTERSECTION	5	EACH
LOW WATER CROSSING	0	EACH
LOW WATER CROSSING	0	LINEAR FEET
MILE MARKER	0	EACH
OVERPASS	0	EACH
PARK BOUNDARY	0	EACH
PAVED DITCH	0	LINEAR FEET
PULLOUT	0	EACH
PULLOUT	0	LINEAR FEET
RAILROAD CROSSING	0	EACH
RETAINING WALL	0	EACH
RETAINING WALL	0	LINEAR FEET
SIGN	5	EACH
STATE BOUNDARY	0	EACH
TRAFFIC LIGHT	0	EACH
TUNNEL	0	EACH
TUNNEL	0	LINEAR FEET

STRUCTURE LIST

This park is classified as a large park. Therefore, in Cycle 5, BIP-Structures were inventoried only if they were located along routes that were modified or previously uncollected by RIP, so this report does not provide an all-inclusive listing of all BIP-Structures in the park.

Section 9
Route Maintenance Features
Road Logs

Mammoth Cave National Park

Federal Lands Highway
Road Inventory Program

MACA: ROUTE MAINTENANCE FEATURES ROAD LOG

ROUTE 0224: VISITOR CENTER BUS LOOP

Notice: Culverts and drop inlets were NOT marked by NPS nor inventoried by RIP in Cycle 5 on any new or re-aligned DCV driven routes. Therefore no culverts or drop inlets are reported in Section 9, unless a culvert has a BIP structure number attached to it.

FROM MILEPOST	TO MILEPOST	FEATURE	SIDE	COMMENT
0.000	0.000	ROUTE BEGIN	N/A	FROM ROUTE 0012 (HOTEL ENTRANCE ROAD)
0.000	0.000	INTERSECTION	RIGHT	ROUTE 0012 (HOTEL ENTRANCE ROAD)
0.000	0.000	INTERSECTION	LEFT	ROUTE 0012 (HOTEL ENTRANCE ROAD)
0.003	0.055	CURB-AND-GUTTER	LEFT	N/A
0.003	0.125	CURB-AND-GUTTER	RIGHT	N/A
0.004	0.004	SIGN	RIGHT	REGULATORY, OFFICIAL VEHICLES ONLY
0.005	0.005	SIGN	LEFT	REGULATORY, STOP
0.005	0.005	GATE	N/A	N/A
0.007	0.007	SIGN	RIGHT	GUIDE, UNABLE TO READ FROM VIDEO
0.056	0.233	ONE-WAY	N/A	N/A
0.056	0.056	INTERSECTION	LEFT	ROUTE 0224 (VISITOR CENTER BUS LOOP)
0.060	0.226	CURB-AND-GUTTER	N/A	N/A
0.065	0.065	SIGN	N/A	REGULATORY, GRAPHIC SIGN NO TEXT
0.146	0.232	CURB-AND-GUTTER	RIGHT	N/A
0.205	0.205	SIGN	RIGHT	GUIDE, SHELTER B
0.233	0.233	INTERSECTION	LEFT	ROUTE 0224 (VISITOR CENTER BUS LOOP)
0.233	0.233	INTERSECTION	RIGHT	ROUTE 0224 (VISITOR CENTER BUS LOOP)
0.233	0.233	ROUTE END	N/A	TO END OF LOOP

Section 10
Appendix

Mammoth Cave National Park

Federal Lands Highway
Road Inventory Program

Explanation of Changes to the RIP Index Equations and Determination of PCR

In 2005, the FHWA began implementing the use of a Pavement Management System to assist the National Park Service in prioritizing Pavement Maintenance and Rehabilitation activities. The PMS used by FHWA is the Highway Pavement Management Application (HPMA) and this software has the ability to store inventory and condition data from RIP and forecast future performance using prediction models. Outputs include performance and condition reports at the National, Region, Park, or Route level. A regional prioritized list and optimization have been produced for most regions and the Federal Highway Deferred Maintenance is calculated via the HPMA as well.

In an effort to improve the accuracy of treatment recommendations and pavement condition descriptions in relation to the distresses and indexes that comprise the Pavement Condition Rating (PCR), an extensive study was completed throughout 2010 that resulted in changes to the Road Inventory Program condition reporting method and specifically, the calculation of PCR. It was determined that a better representation of PCR could be achieved by modifying the relative impact certain distresses would have on the overall rating.

Through the use of HPMA data, it was noted that false failure indicators existed with the existing PCR model, and that it would be necessary to reduce their impact. The distresses affected in this way were Rutting and Roughness. Conversely, experience showed that roadways with extensive cracking present were often shown to have a high PCR. Therefore, the crack index models were adjusted to be more sensitive to changes in crack severity or quantity. It was also determined that these issues were not due to a problem with data acquisition (i.e. the RIP "van"), but with the way the collected data was processed. The final change was to provide guidance on when to use the Roughness Condition Index (RCI) in the PCR calculation. Roughness data is of little value to determining overall condition on routes that, due to their length or geometrics, have lower vehicle operating speeds. Therefore, in Cycle 5, only routes that have lengths of one half mile or greater and posted speed limits of 25 mph or greater will have RCI reported and included in the PCR calculations.

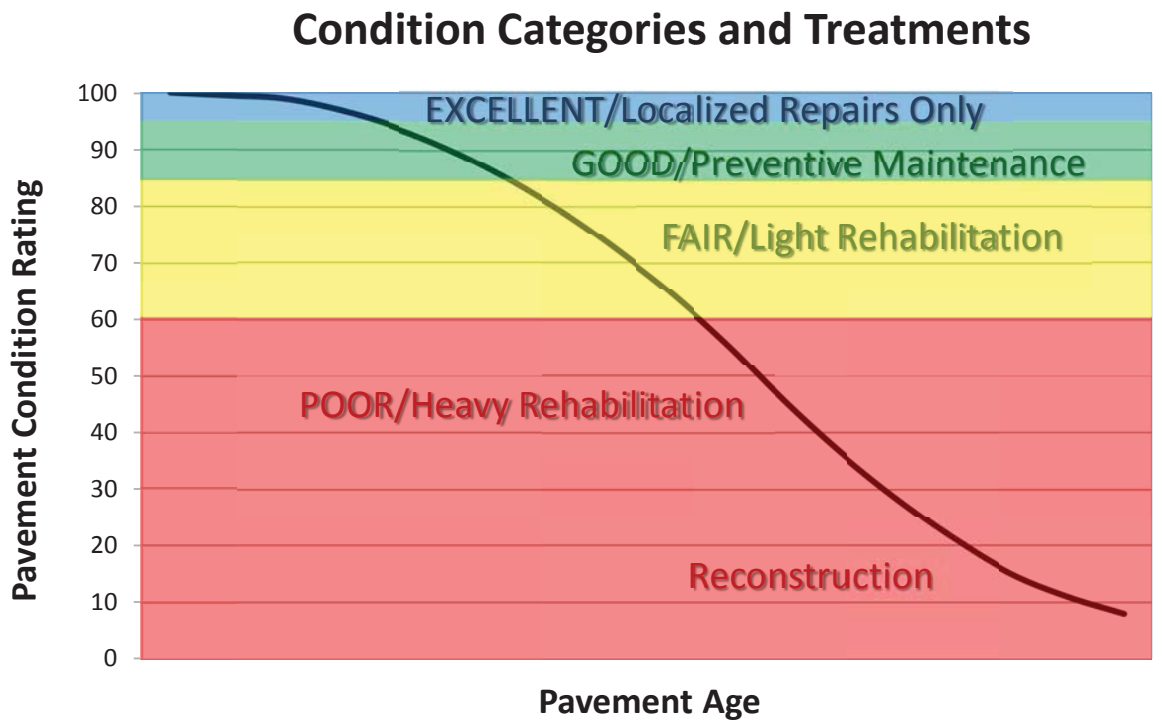
The changes that were implemented were endorsed by management at both the FHWA and NPS. In order to show the effectiveness of these changes, several sites were ground truth tested to ensure that an improvement was achieved between the relationship of PCR and the actual Maintenance and Rehabilitation needs that were represented. These changes will allow greater use of RIP and HPMA data for not simply condition data reporting, but also as a reliable tool for project identification and selection.

Explanation of the Excellent, Good, Fair and Poor Condition Descriptions

In addition to the RIP Index changes that were implemented in Cycle 5, we will provide greater assistance in translating good/fair/poor categories into pavement needs categories. The PCR can be used to indicate the place in the Pavement Life Cycle and the types of treatments that should be considered now and into the future.

- Excellent/New: PCR of 95-100. Pavements in this range will require only spot repairs.
- Good: PCR of 85-94. Pavements in this range will likely be candidates for Preventive Maintenance. Examples include Chip and Slurry Seals, Micro Surfacing and Thin Overlays.
- Fair: PCR of 61-84. Pavements in this range will likely be candidates of Light Rehabilitation (L3R). Examples include single-lift overlays up to 2.5 inches in total thickness, milling and overlays.
- Poor: PCR of 60 or below. Pavements in this range will likely be candidates of Heavy Rehabilitation or Reconstruction (H3R or 4R). Examples include Pulverization, Multiple Lift Overlays, and Reconstruction.

Specific Maintenance and Rehabilitation activities should be evaluated and recommended at the project level. Site-specific conditions that influence treatment type should be determined based on performing a subsurface investigation and/or pavement condition survey, and not be based solely on RIP data. Additionally, RIP produces a snapshot of conditions the year in which the data was collected. For further information or to obtain additional Pavement Management System's data from our Highway Pavement Management Application (HPMA) please contact the Eastern Federal Lands pavement team.



DESCRIPTION OF RATING SYSTEM

The Federal Highway Administration (FHWA), National Park Service Road Inventory Program (NPS-RIP), collects condition data on paved roads, parkways, and parking areas in park units nationwide. Road surface condition data is collected using an automated Data Collection Vehicle (DCV). Roads having brick, cobblestone, or wood surfaces are not normally surveyed with the DCV, but are manually rated for the purpose of assigning a condition rating. Unpaved roads, parkways, and parking areas are not currently being evaluated for condition. Paved campground pads and driveways are also not currently being evaluated for condition.

The FHWA RIP is implemented based on the premise that an accurate pavement surface condition assessment can be accomplished using automated crack detection technology as applied to digital images. Various methods of pavement condition assessment have been developed over the years with varying degrees of accuracy and acceptance. The use of digital photography to record pavement images and subsequent crack detection and classification has undergone continuous improvements over the past decade. Digital cameras with increasingly superior resolution and high definition have become more affordable, and the proprietary programming code and algorithms have been improved in crack detection software.

With the use of high quality digital photography and automated crack detection software, FHWA RIP is tasked with executing a pavement condition assessment on about 5000 miles of National Park Service roads and parkways. Foremost in setting up the basis of pavement distress identification is employing the distress identification protocols used by FHWA. There is no single distress identification system that is universal among entities conducting a program of distress identification. For the purpose of the NPS-RIP, FHWA employs distress identification protocols that are specific to this program.

FHWA has referenced the *"Distress Identification Manual for the Long-Term Pavement Performance Program", Publication No. FHWA-RD 03-031, June 2003,* as the point-of-reference for distress types on NPS pavement. The FHWA RIP distress types are similar to those described in the LTPP manual with some modifications. The document, *"Distress Identification Manual for the NPS Road Inventory Program, Cycle 5, 2010-2013"* was developed using the *"Distress Identification Manual for the Long-Term Pavement Performance Program"* as a guideline. Definitions of severity levels based on crack width contained in this document adhere to the LTPP Distress ID Manual. Modifications have been made to the definition of Alligator and Longitudinal Cracking and determination of Alligator Cracking severity. This manual also addresses Rutting and Roughness and its application to NPS-RIP.

In 2010, FHWA RIP began the fifth cycle of data collection in national parks. For Cycle 5, data will be collected in approximately 81 large parks (10 or more paved route miles) on Functional Class 1, 2, and 7 routes plus any new routes or parking areas previously not collected, totaling an estimated 4,459 paved route miles. Additionally, 231 small parks will be collected comprising approximately 529 paved route miles and associated paved parking areas. The data is used to support the National Park Service road maintenance program and Pavement Management System (PMS) developed and maintained by FHWA.

This ***"Distress Identification Manual for the NPS Road Inventory Program, Cycle 5, 2010-2013"*** will be used as a reference resource in crack detection and classification, determination of distress severity and extent, and in the calculation of distress index values for the FHWA RIP Cycle 5.

SURFACE DISTRESSES

Surface Condition Rating - SCR

Surface distresses are measured in the primary lane only. In the classification and measurement of all paved surface condition data, results will be reported in the database in record intervals of 0.02 miles (105.6 feet) (smallest granularity) along the route.

Surface distresses determined from digital images

- Transverse Cracks
- Longitudinal Cracks
- Alligator Cracks
- Patching/Potholes

Surface distress measured by DCV (Data Collection Vehicle) LRMS (Laser Rut Measuring System)

- Rutting

Each of the five surface distresses is assigned a computed surface distress index

- Transverse Crack Index
- Longitudinal Crack Index
- Alligator Crack Index
- Patching/Pothole Index
- Rutting Index

Surface distress data are classified as listed above, measured for severity, and quantified for extent. Classification, severity, and extent of these five surface distresses comprise the three main elements for calculation of SCR (Surface Condition Rating).

In addition to the five surface distresses, a **Structural Crack Index** is computed, which is a combination of the Longitudinal Crack Index and the Alligator Crack Index. The Structural Crack Index is then used in lieu of the LC and AC indices to compute SCR.

Roughness Condition Index - RCI

Additional condition data measured by DCV (lasers and accelerometers)

- Roughness (IRI)

Roughness is measured by FHWA's DCV and reported as International Roughness Index (IRI) in inches/mile. Using IRI, the Roughness Condition Index (RCI) is computed.

Pavement Condition Rating - PCR

Using the SCR (computed from the five surface distresses) and the RCI, an overall Pavement Condition Rating (PCR) is computed. The formula for PCR is:

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

A detailed description of each distress index formula, roughness index formula, SCR and PCR is provided in this document beginning on page 8.

Each classified surface distress will fall into one or more s*everity*…LOW, MEDIUM, or HIGH based on criteria listed. For each severity, an e*xtent* is established based on the measured quantity of the distress within that severity. Within each *severity* individual distresses are assigned a *Maximum Allowable Extent* (MAE). For example, LOW severity transverse cracking may be allowed up to 21.1 cracks within a 0.02 interval before it reaches MAE and fails.

The index formulas are based on a scale of 0-100. A PCR index value of 100 would indicate a "new" road with no measurable distresses or rough ride. A PCR value of 60 is determined to be *terminable serviceability* and the road is considered failed. The range of index values with condition descriptors is:

POOR (<=60), FAIR (61 - 84), GOOD (85 - 94), EXCELLENT (95 - 100)

Index values are generally computed based on cumulative deducts of the measured severities. As shown in the index formulas below, as any single severity reaches or exceeds MAE, the index computes to a value of 60 or less, and the road fails for that 0.02 interval.

> **Note:** As a result of a unique combination of measured surface distresses and IRI, index values occasionally compute to less than 0 or greater than 100. In this instance, an index value < 0 defaults 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.

On the following page, Table 1 summarizes the different types of distresses measured.

TABLE 1: Distress Summary

ASPHALT-SURFACED PAVEMENT DISTRESS TYPES with RUTTING and ROUGHNESS				
DISTRESS TYPE	**UNIT OF MEASURE…**	**…CONVERTED TO**	**DEFINED SEVERITY LEVELS?**	**MEASURED BY**
Alligator Cracking	**Square Feet**	**Percent of Lane Per 0.02 Mile**	**Yes**	**Digital Image Crack Detection Software**
Transverse Cracking	**Linear Feet**	**Number of Cracks Per 0.02 Mile**	**Yes**	**Digital Image Crack Detection Software**
Longitudinal Cracking	**Linear feet**	**Percent of Lane Length Per 0.02 Mile**	**Yes**	**Digital Image Crack Detection Software**
Patching/Potholes	**Square Feet**	**Percent of Lane Per 0.02 Mile**	**No**	**Digital Image Crack Detection Software**
Rutting	**Inches**	**Rut Depth Per 0.02 Mile**	**Yes**	**DCV – Laser Rut Measuring System (LRMS)**
Roughness	**IRI**	***RCI Per 0.02 Mile**	**No**	**DCV – Lasers /Accelerometers**

***Note: Roughness is measured on concrete roadways, but surface distresses and rutting are not measured. For concrete, PCR = RCI**

ALLIGATOR CRACKING

Description

Alligator cracking is considered a combination of fatigue and block cracking. It is a series of interconnected cracks in various stages of development. Alligator cracking develops into a many-sided pattern that resembles chicken wire or alligator skin. It can occur anywhere in the road lane. Alligator cracking must have a quantifiable area.

Severity Levels

LOW
An area of cracks with no or very few interconnecting cracks and the cracks are not spalled. Cracks are <= 0.25 in (6mm) in mean width. Cracks in the pattern are no further apart than 1 foot (0.328 m). May be sealed cracks with sealant in good condition and a crack width that cannot be determined.

MEDIUM
An area of interconnected cracks that form a complete pattern. Cracks may be slightly spalled. Cracks are >0.25 in. (6 mm) and <= 0.75 in. (19 mm) or any crack with a mean width <= 19 mm and adjacent low severity cracking. Cracks in the pattern are no further apart than 6 in. (150 mm).

HIGH
An area of interconnected cracks forming a complete pattern. Cracks are moderately or severely spalled. Cracks are >0.75 in (19mm) or any crack with a mean width <= 0.75 in (19mm) and adjacent medium to high severity random cracking.

A combination of observed crack width and crack pattern is used to determine overall severity of alligator cracking. Based on above description of each severity, the highest level of crack width and crack pattern determines overall severity. Table 2 illustrates this.

TABLE 2: Alligator Crack Severity Levels

ALLIGATOR CRACKING SEVERITY LEVELS		Crack Pattern		
		LOW	**MED**	**HIGH**
Crack Width	**LOW**	L	M	H
	MED	M	M	H
	HI	H	H	H

LONGITUDINAL CRACKING

Description

Longitudinal cracking occurs predominantly parallel to the pavement centerline. It can occur anywhere within the lane. Longitudinal cracks occurring in the wheelpath may be noteworthy.

Severity Levels

LOW
Cracks with a mean width of < 0.25 in. (6 mm). Sealed cracks with sealant in good condition and a width that cannot be determined.

MED
Cracks with a mean width > 0.25 in. (6 mm) and <= 0.75 in. (19 mm). Also, any crack with a mean width < 0.75 in. (19 mm) and adjacent random low severity cracking.

HIGH
Cracks with a mean width > 0.75 in. (19 mm). Also, any crack with a mean width < 0.75 in. (19 mm) and adjacent random medium to high severity cracking.

TRANSVERSE CRACKING

Description

Transverse cracking occurs predominantly perpendicular to the pavement centerline. It can occur anywhere within the lane.

Severity Levels

LOW
Cracks with a mean width of < 0.25 in. (6 mm). Sealed cracks with sealant in good condition and a width that cannot be determined.

MED
Cracks with a mean width > 0.25 in. (6 mm) and <= 0.75 in. (19 mm). Also, any crack with a mean width < 0.75 in. (19 mm) and adjacent random low severity cracking.

HIGH
Cracks with a mean width > 0.75 in. (19 mm). Also, any crack with a mean width < 0.75 in. (19 mm) and adjacent random medium to high severity cracking.

PATCHING AND POTHOLES

Description

Patching is an area of pavement surface that has been removed and replaced with patching material or an area of pavement surface that has had additional patching material applied. Patching may encompass partial-lane or full-lane width. On full-lane width patching; the total, contiguous length of a patch may not exceed 0.30 mi. (0.48 km). Any full-lane width patch exceeding 0.30 mi. in length is considered a pavement change, not a patch for the purposes of distress analysis. Patching must have a quantifiable area.

Potholes are bowl-shaped holes of various sizes occurring in the pavement surface.

Severity Levels

There are no stratified severities for Patching/Potholes. They either are present or they are not.

RUTTING

Description

Rutting is a longitudinal surface depression in the wheelpath.

Severity Levels

LOW
Ruts with a measured depth $\geq$ 0.20" and $\leq$ 0.49"

MED
Ruts with a measured depth $\geq$ 0.50" and $\leq$ 0.99"

HIGH
Ruts with a measured depth $\geq$ 1.00"

Ruts < 0.20" are not included in the distress calculations.

ROUGHNESS

Description

Roughness is the measurement of the unevenness of the pavement in the direction of travel. It is measured in units of IRI (International Roughness Index), inches per mile, and is indicative of ride comfort.

Severity Levels

There are no stratified severity levels for roughness. The roughness (or smoothness) of a road surface can be defined by IRI in the following table.

TABLE 3: IRI

IRI Descriptions	
Type of Road	**Typical IRI (in/mile)**
New Road, no noticeable roughness	<90
Small level of roughness	90 – 126
Road of average roughness	126 – 190
Road with above average roughness	190 – 253
Road with severe roughness	253 – 380
Nearly impassable	>380

INDEX FORMULAS

Note**:** All index formulas listed below contain MAE applicable to 0.02 mile (105.6 feet) interval.

Alligator Crack Index

AC_INDEX = 100 – 40 * [(%LOW / 35) + (%MED / 15) + (%HI / 5)]

Where:

The values *%LOW*, *%MED* and *%HI* report the percentage of the observed pavement (0.02 mile, primary lane) that contains alligator cracking within the respective severities. These values range from 0 to 100.

%LOW = Percent of total area (primary lane, 0.02 in length), low severity
%MED = Percent of total area (primary lane, 0.02 in length), medium severity
%HI = Percent of total area (primary lane, 0.02 in length), high severity

Percent of total area is computed as:

$$\frac{\text{square foot area of alligator crack severity}}{\text{0.02 mile * lane width}}$$

In AC_INDEX, the denominators 35, 15, and 5 are the Maximum Allowable Extents (MAE) for each severity. In other words, we will allow up to 35% of low severity alligator cracking for a 0.02 interval before failure, 15% for medium severity, and so on. As you can see, if any single severity reaches MAE the resulting index value is 60, or failure.

Longitudinal Crack Index

LC_INDEX = 100 – 40 * [(%LOW / 175) + (%MED / 75) + (%HI / 25)]

Where:

The values *%LOW*, *%MED*, and *%HI* report the length of longitudinal cracking within each severity as a percent of the section length (0.02 mile, primary lane).
These values are ≥ 0 and can exceed 100.

%LOW = Percent of interval length (primary lane, 0.02 in length), low severity
%MED = Percent of interval length (primary lane, 0.02 in length), medium severity
%HI = Percent of interval length (primary lane, 0.02 in length), high severity

Percent of interval length is computed as:

$$\frac{\text{length of respective longitudinal cracking}}{\text{0.02 mile (105.6 feet)}}$$

In LC_INDEX, the denominators 175, 75, and 25 are the Maximum Allowable Extents (MAE) for each severity. In other words, we will allow up to 175% of low severity alligator cracking for a 0.02 interval before failure, 75% for medium severity, and so on. As you can see, if any single severity reaches MAE the resulting index value is 60, or failure.

Structural Crack Index

SC_INDEX = [100 - ((100 - AC_INDEX) + (100 - LC_INDEX))]

Structural Crack Index is a combination of Alligator Cracking and Longitudinal Cracking, and is used in the SCR formula in lieu of AC and LC separately.

Transverse Crack Index

TC_INDEX = 100 – 40 * [(LOW / 21.1) + (MED / 4.4) + (HI / 2.6)]

Where:

The values *LOW*, *MED* and *HI* report a count of the total number of transverse cracks (reported to three decimals) within each severity level, where one transverse crack is equal to the lane width. These values are ≥ 0.

LOW = Number of cracks in interval (primary lane, 0.02 in length), low severity
MED = Number of cracks in interval (primary lane, 0.02 in length), medium severity
HI = Number of cracks in interval (primary lane, 0.02 in length), high severity

Number of cracks is computed as:

$$\frac{\text{Total length of transverse cracks}}{\text{Lane width}}$$

In TC_INDEX, the denominators 21.1, 4.4, and 2.6 are the Maximum Allowable Extents (MAE) for each severity. In other words, we will allow up to 21.1 low severity transverse cracks for a 0.02 interval before failure, 4.4 cracks for medium severity, and so on. As you can see, if any single severity reaches MAE the resulting index value is 60, or failure.

Patching Index

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

Where:

The value *%PATCHING* reports the percentage of the observed pavement (0.02 mile, primary lane) that contains patching/potholes. This value ranges from 0 to 100.

%PATCHING = Percent of total area (primary lane, 0.02 in length)

Percent of total area is computed as:

$$\frac{\text{square foot area of patching/potholes}}{\text{0.02 mile * lane width}}$$

There are no severity levels for patching. It either exists or does not.

In PATCH_INDEX, the denominator 80 is the Maximum Allowable Extent (MAE) for each severity. In other words, we will allow up to 80% patching for a 0.02 interval before failure. As you can see, if patching/potholes reaches MAE the resulting index value is 60, or failure.

Rutting Index

RUT_INDEX = 100 – 40 * [(%LOW / 535) + (%MED / 205) + (%HI / 40)]

Where:

20 rut depth measurements are taken per 0.02 interval for each of 2 wheel paths (left and right), resulting in a total of 40 measurements taken for both wheel paths. *Each wheelpath is analyzed independently for rut severities.* The values *%LOW*, *%MED* and *%HI* are a *total percentage* of left wheelpath percentage and right wheelpath percentage added together for the respective severity. These values range from 0 to 200.

%LOW = Percent of LOW ruts in left wheelpath based on 20 ruts, plus percent of LOW ruts in right wheelpath based on 20 ruts.
%MED = Percent of MED ruts in left wheelpath based on 20 ruts, plus percent of MED ruts in right wheelpath based on 20 ruts.
%HI = Percent of HI ruts in left wheelpath based on 20 ruts, plus percent of HI ruts in right wheelpath based on 20 ruts.

Percent of rut measurements within each severity can also be computed as:

$$\frac{\text{total number of ruts within each severity in both wheelpaths}}{20} * 100$$

In RUT_INDEX, the denominators 535, 205, and 40 are the Maximum Allowable Extents for each severity. In other words, the formula allows up to 535% low severity

ruts for a 0.02 interval before. However, since 200 is the highest measurable percentage allowed, 535% is unattainable and therefore, no amount of LOW severity rutting will cause the RUT_INDEX to fail a road. Similarly, since the MAE for MED severity rutting is 205, no amount of MED severity rutting will cause the RUT_INDEX to reach 60 and fail the road. As you can see, LOW severity rutting reaches MAE the resulting index value is 60, or failure. This formula was intentionally designed to minimize the impact of LOW and MED severity rutting on RUT_INDEX.

Roughness Condition Index (Asphalt)

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

Where:

The value *AVG IRI* reports the average value of the Left IRI and Right IRI measurements for the interval (0.02 mile, primary lane). This value can range from approximately 40 to 999.0.

Average IRI is computed as:

$$\frac{\text{Left wheelpath IRI + Right wheelpath IRI}}{2}$$

There is no applicable threshold for failure for this index.

Roughness Condition Index (Concrete)

RCI = $-0.0012(IRI^2) + 0.0499(IRI) + 99.542$

For concrete, PCR = RCI

Surface Condition Rating Index

SCR = *Lowest* Index Value Of: [SC_INDEX, TC_INDEX, PATCH_INDEX, RUT_INDEX]

Note: *The modified SCR equation above combines AC_INDEX and LC_INDEX, and considers that a single AC/LC index value of the Structural Crack Index (SC_INDEX). The lowest of the four computed index values (SC_INDEX, TC_INDEX, PATCH_INDEX, or RUT_INDEX) becomes the SCR.*

Where:

See above for determinations of SC_INDEX, TC_INDEX, PATCH_INDEX and RUT_INDEX.

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

Data Collection Vehicle Subsystems

Data on paved roads in Cycle 5 is collected by FHWA using a Pathway Services Inc. Data Collection Vehicle (DCV), called PathRunner. The DCV is driven in the primary-direction lane at posted speed limits and less.

CAMERAS

Forward-facing and rear-facing video is collected as .jpg digital imagery at a frequency of 26.4 feet.

Two forward-facing cameras are mounted above the vehicle cab, one pointed straight ahead and the other to the right shoulder providing seamless 120 degree viewing.

CAMERA SPECIFICATIONS **Two Forward/ One Rear Facing**	
Camera lens/type	FUJINON CCTV LENS H16x10B-Y41
Focal length	10 mm – 160 mm
Image size	8.8 mm x 6.6mm
Image format	*.jpg
Image resolution	HD 2000 X 1200
Image pixel size	depends on distance
Zoom ratio	16x
Max Relative Aperture	1:2.5
Iris range	F25-T800 (Equivalent to F800)

Pavement images are created using a Laser Scan Imaging System. This system is composed of a single high resolution line-scan camera and two lasers configured to image an approximate 11-foot wide lane with 1 mm resolution.

CAMERA SPECIFICATIONS **Pavement Line Scan**	
Image size	4280 pixels/line
Image width	4 meters (3950 mm nominal)
Laser class	3B
Power	250W
Vehicle speed limitations	62 mph
Environment	Dry pavement, day or night
Sensor size (approx)	300 mm(H) x 375 mm(L) x 200 mm(D)
Image frame length	26.4 feet

DMI (Distance Measuring Instrument)

The DMI (Distance Measuring Instrument) obtains road length measurements that are accurate to 0.1% for speeds up to 60 mph. The DMI is connected to the hub of the rear wheel on the driver's side, and is calibrated to the revolutions of the rear vehicle axle on a regular basis.

ROUGHNESS (IRI)

The collection system includes a South Dakota type laser profiler manufactured based on active Class 1 ASTM E950 standards. The dynamic profile of the pavement surface is collected from which the IRI roughness data is computed. The sensors include one accelerometer on each wheelpath, one height sensor (laser) on each wheelpath, and a distance transducer.

IRI SPECIFICATIONS	
Reported IRI units	Inches/mile
Vehicle speed limitations	12-62 mph
IRI equipment certification	Texas Transportation Institute (TTI)
Wavelengths accommodated	6 in. – 300 feet
IRI computed & reported	World Bank Technical Paper Number 46
Environment	Dry pavement, day or night, above 32 degrees F
Adherence to specifications	ASTM E950-98 (2004), ASTM E 1926-08, AASHTO MP 11-08, AASHTO PP 49-08

RUTTING

Rutting depths are measured using an INO Laser Rut Measurement System (LRMS). This system is a transverse profiling device that detects and characterizes pavement rutting. The LRMS can acquire full 4 meter width profiles of a pavement lane at normal traffic speeds and uses two laser profilers that digitize transverse sections of the pavement.

RUTTING SPECIFICATIONS	
Reported rut depth units	Inches
Vehicle speed limitations	Up to 62 mph
Sampling rate	30-150 profiles/second
Transverse resolution	1280 points/profile
Transverse field-of-view	4 m
Depth accuracy (nominal)	+/- 1 mm
Environment	Dry pavement, day or night, above 32 degrees F
Adherence to specifications	ASTM E1703M-95 (reapproved 2005)

GPS & INERTIAL SYSTEMS

GPS is collected by an onboard system employing OmniSTAR real-time correction and a gyroscope (spin-type) to provide accurate positioning data (pitch/roll/heading) in instances of satellite obstruction. All GPS coordinates are tied to image and linear distance measurements.

GPS SPECIFICATIONS	
Static accuracy	Sub-meter
Dynamic accuracy	2-3 meters
Receiver	12 satellite tracking
Coordinate system	Lat Lon WGS 84
Environment	Day or night
Cross-slope	+- 0.5 degrees
Grade	+- 0.5 degrees

GPS on Manually Rated Roads (MRR)

Parking areas, some roads, and other paved areas that are not fully drivable with the DCV are collected manually by field technicians. GPS is collected for these routes using portable Trimble GPS backpack units. Paved campground pads and driveways are not typically included in the inventory or GPS.

Geodatabase – Background and Metadata

In addition to this park report, a ***geodatabase*** containing both tabular and spatial data specific to this park has been provided. All data disseminated in the preceding report has been obtained from the tables and fields within said geodatabase. The geodatabase can be referenced for tabular data via Microsoft Access or for both tabular and spatial data via ESRI's ArcGIS Suite of software which consists of; ArcMap, ArcCatalog and ArcExplorer. Consolidating the RIP data into one database creates a seamless relationship of tabular and geographic data. It will allow RIP to facilitate easier updates and enhancements in the future.

A geodatabase can be thought of as simply a database containing spatial data. Many different tables are contained with the park's geodatabase. A complete and thorough description of the tables and fields contained within this geodatabase can be found in the ***metadata***. The metadata is attached directly within the geodatabase and can be accessed via ESRI's ArcCatalog. The metadata portion of the geodatabase also includes data dictionary report functionality that formats the metadata into an easy to read report.

GLOSSARY OF TERMS AND ABBREVIATIONS

TERM OR ABBREVIATION	DESCRIPTION OR DEFINITION
AC	Alligator Cracking
CRS	Condition Rating Sheets (Section 5)
DCV	Data Collection Vehicle
Excellent	Excellent rating with an index value of 95 to 100
Fair	Fair rating with an index value from 61 to 84
FUNCT_CLASS	Functional Classification (see Route ID, Section 2)
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
LC	Longitudinal Cracking
MRR	Manually Rated Route
MRL	Manually Rated Line
MRP	Manually Rated Polygon
N/A	Not Applicable
NC	Not Collected
PATCH	Patching and Potholes
Paved Width	Width from edge-of-pavement to edge-of-pavement
PCR	Pavement Condition Rating
PKG	Parking Area
Poor	Poor rating with an index value of 0 to 60
RCI	Roughness Condition Index
SC	Structural Cracking
SCR	Surface Condition Rating
TC	Transverse Cracking