



# Federal Lands Highway Road Inventory Program

Road Inventory and Condition Assessment



## Guadalupe Mountains National Park GUMO - 7180

### Cycle 5 Report

Prepared By: Federal Highway Administration  
Road Inventory Program (RIP)  
Data Collected: 03/2011  
Report Date: 06/2012

# Guadalupe Mountains National Park in Texas





DCV = Data Collection Vehicle

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# Section 1 Introduction



## Guadalupe Mountains 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 168 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 21<sup>st</sup> 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

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# Section 2 Park Route Inventory



## Guadalupe Mountains National Park



Federal Lands Highway  
Road Inventory Program

# Cycle 5 NPS/RIP Route ID Report

Road Inventory Program 05/17/2012

(Numerical By Route #)

Page 1 of 5

Shading Color Key:

White = Paved Routes, DCV Driven

Yellow = Unpaved Routes, DCV not Driven

Blue = All Paved Parking Areas

Green = All Unpaved Parking Areas

Red text denotes approx. mileage

Grey = Paved Routes, DCV not Driven

Black = State, Local or Private non-NPS Routes

■ = Concession Route Flag ON

\*Unpaved route data was obtained from NPS and was not inventoried by the Road Inventory Program (RIP).

\*\* DCV - Data Collection Vehicle NC - Not Collected

## GUMO

### GUADALUPE MOUNTAINS NATIONAL PARK

Rte. No.	Cycle Collected	FMSS No.	Concess Route	Route Name	Route Description From To	Maint. District	Paved Miles	Un-Paved Miles	Total Route Length	Func. Class	Manual Rated SQ/FT	Surf. Type	Area Maps
0010	5	80498		MCKITTRICK CANYON ROAD	FROM ROUTE 5000 (STATE HIGHWAY 62/180) TO ROUTE 0900 (MCKITTRICK CANYON VISITOR CENTER PARKING)	N/A	4.22	0.00	4.22	1	0	AS	2
0100	5	72192		FRIJOLE VISITOR CENTER ROAD	FROM ROUTE 5000 (STATE HIGHWAY 62/180) TO END	N/A	0.04	0.65	0.69	2	0	AS	2
0101	5	81915		PINE CANYON DRIVE	FROM ROUTE 0903 (VISITOR CENTER PARKING) TO ROUTE 0905 (RV CAMPGROUND)	N/A	0.61	0.00	0.61	2	0	AS	1
0200	5	81916		PINE SPRINGS CAR CAMPGROUND	FROM ROUTE 0101 (PINE CANYON DRIVE) AT MP 0.58 ON LEFT TO END	N/A	0.05	0.35	0.40	3	0	AS	1
0201	NC	72464		WILLIAMS RANCH ROAD	FROM ROUTE 5000 (STATE HIGHWAY 62/180) TO ROUTE 0903 (VISITOR CENTER PARKING)	N/A	0.00	7.50	7.50	3	0	GR	
0202	NC	72283		DOG CANYON ROAD	FROM PARK BOUNDARY TO END	N/A	0.00	0.50	0.50	4	0	GR	
0204	NC	72466		SALT BASIN DUNES ROAD	FROM FARM ROAD 1576 TO END	N/A	0.00	2.00	2.00	4	0	GR	
0207	NC	81932		PX ROAD	FROM ROUTE 0204 (SALT BASIN DUNES ROAD) TO PARK BOUNDARY	N/A	0.00	3.46	3.46	6	0	GR	
0400	5	81923		PRATT DRIVE	FROM ROUTE 0010 (MCKITTRICK CANYON ROAD) AT MP 1.96 ON LEFT TO RESEARCH CENTER ENTRANCE	N/A	1.34	0.00	1.34	6	0	AS	2
0402	NC	72459		WATER PUMP SERVICE ROAD	FROM ROUTE 0010 (MCKITTRICK CANYON ROAD) TO END	N/A	0.00	0.87	0.87	6	0	GR	
0403	5	115265		PARK VIEW DRIVE	FROM ROUTE 5000 (STATE HIGHWAY 62/180) TO END OF LOOP	N/A	0.68	0.00	0.68	6	0	AS	1
0404	5	115266		BEAR CANYON VISTA	FROM ROUTE 0403 (PARK VIEW DRIVE) AT MP 0.34 ON RIGHT TO END OF LOOP	N/A	0.12	0.00	0.12	6	0	AS	1
0405	5	68417		CAPITAN VISTA	FROM ROUTE 0403 (PARK VIEW DRIVE) AT MP 0.11 ON RIGHT TO TEXAS DOT / NON NPS AT PARK BOUNDARY	N/A	0.06	0.00	0.06	6	0	AS	1
0406	NC	81924		PS WASTEWATER ACCESS ROAD	FROM ROUTE 0403 (PARK VIEW DRIVE) TO PARK BOUNDARY	N/A	0.00	1.90	1.90	6	0	GR	
0900	5	72305		MCKITTRICK CANYON VISITOR CENTER PARKING	FROM END OF ROUTE 0010 (MCKITTRICK CANYON ROAD) TO PARKING	N/A	0.00	0.00	0.00		53,036	AS	2







# Cycle 5 NPS/RIP Route ID Report

Shading Color Key:  
Red text denotes approx. mileage

White = Paved Routes, DCV Driven
Grey = Paved Routes, DCV not Driven

Yellow = Unpaved Routes, DCV not Driven
Black = State, Local or Private non-NPS Routes

Blue = All Paved Parking Areas
■ = Concession Route Flag ON

Green = All Unpaved Parking Areas
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\*Unpaved route data was obtained from NPS and was not inventoried by the Road Inventory Program (RIP).

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## CYCLE 5 SUMMARY TOTALS FOR GUADALUPE MOUNTAINS NATIONAL PARK

<b>CYCLE 5 ROUTE TOTALS</b>	
DCV Driven Route Miles	7.11
Manually Rated Route Miles	0.00
<b>TOTAL PARK ROUTE MILES COLLECTED IN CYCLE 5</b>	<b>7.11</b>
Manually Rated Routes (SQFT)	0
<b>TOTAL UNPAVED PARK ROUTE MILES</b>	<b>17.24</b>

<b>CYCLE 5 CONCESSION TOTALS</b>	
Concession Paved Route Miles	0.00
Concession Unpaved Route Miles	0.00
<b>TOTAL CONCESSION ROUTE MILES</b>	<b>0.00</b>
Concession Paved Parking Area SQFT	0
Concession Unpaved Parking Area SQFT	0
<b>TOTAL CONCESSION PARKING AREA SQFT</b>	<b>0</b>
Concession Manually Rated Routes SQFT	0

<b>* CYCLE 5 PARKING AREA TOTALS</b>	
Paved Parking (SQFT)	245,395
Unpaved Parking (SQFT)	64,700
<b>TOTAL PARKING (SQFT)</b>	<b>310,095</b>

<b>CYCLE 5 WEIGHTED AVERAGE PARK VALUES</b>	
DCV Driven PCR	91
**Manually Rated Routes PCR	N/A
**Parking PCR	70
<b>***Total Equivalent Lane Miles</b>	<b>18.11</b>

\* - 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.

# Cycle 5 NPS/RIP Route ID Report

Road Inventory Program 05/17/2012

(Numerical By Route #)

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Shading Color Key:  
Red text denotes approx. mileage

White = Paved Routes, DCV Driven
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\*\* DCV - Data Collection Vehicle      NC - Not Collected

## General Park Road Functional Classification Table

- Class 1** Principal Park Road/Rural Parkway (Public Roads) Roads which constitute the main access route, circulatory tour, or thoroughfare for park visitors. Route Numbers 1 - 99. Note: Rural parkways (e.g. Natchez Trace) are numbered 1 - 9. State Routes Inventoried for Park. Route Numbers 5000-5999
- Class 2** Connector Park Road (Public Roads) - Roads which provide access within a park to areas of scenic, scientific, recreational or cultural interest, such as overlooks, campgrounds, etc. Route Numbers 100-199.
- Class 3** Special Purpose Park Road (Public Roads) - Roads which provide circulation within public areas, such as campgrounds, picnic areas, visitor center complexes, concessionaire facilities, etc. These roads generally serve low-speed traffic and are often designed for one-way circulation. Route Numbers 200-299.
- Class 4** Primitive Park Roads (Public Roads) - Roads which provide circulation through remote areas and/or access to primitive campgrounds and undeveloped areas. These roads frequently have no minimum design standards and their use may be limited to specially equipped vehicles. Route Numbers 200-299. Note: Functional Classes 3 and 4 have the same route numbers because, historically, they were numbered similarly.
- Class 5** Administrative Access Road (Administrative Roads) - All public roads intended for access to administrative developments or structures such as park offices, employee quarters, or utility areas. Route Numbers 400-499.
- Class 6** Restricted Road (Administrative Roads) - All roads normally closed to the public, including patrol roads, truck trails, and other similar roads. Route Numbers 400-499. Note: Functional Classes 5 and 6 have the same route numbers because historically they were numbered similarly and often there is little distinction between these routes. For example, because utility areas and employee housing are often closed to the public, this restriction would result in classification of FC 6 rather than FC 5.
- Class 7** Urban Parkway (Urban Parkways and City Streets) - These facilities serve high volumes of park and non-park related traffic and are restricted, limited-access facilities in an urban area. This category of roads primarily encompasses the major parkways which serve as gateways to our nation's capital. Other major park roads or portions thereof, however, may be included in this category. Route Numbers 1-9.
- Class 8** City Streets (Urban Parkways and City Streets) - City streets are usually extensions of the adjoining street system that are owned and maintained by the National Park Service. The construction and/or reconstruction should conform with accepted local engineering practice and local conditions. Route Numbers 600-699.

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

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

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

**ROUTE IDENTIFICATION CHANGES TO PAVED ROUTES FROM PREVIOUS CYCLE - GUMO**

<b>ROUTES ADDED FROM PREVIOUS INVENTORY:</b>			
<b>Route #</b>	<b>Route Name</b>	<b>Reason for Addition</b>	<b>Comments</b>
0915	SEASONAL HOUSING WEST PARKING LOT	OTHER	NEW ROUTE ADDED TO THE INVENTORY IN CYCLE 5.
0916	SEASONAL HOUSING EAST PARKING LOT	OTHER	NEW ROUTE ADDED TO THE INVENTORY IN CYCLE 5.
0917	NEW FRIJOLE PARKING	OTHER	NEW ROUTE ADDED TO THE INVENTORY IN CYCLE 5.
5000	STATE HIGHWAY 62/180	OTHER	NEW ROUTE ADDED TO THE INVENTORY IN CYCLE 5.
<b>ROUTES MODIFIED FROM PREVIOUS INVENTORY:</b>			
<b>Route #</b>	<b>Route Name</b>	<b>Type of Modification</b>	<b>Comments</b>
0100	FRIJOLE VISITOR CENTER ROAD	SURFACE TYPE CHANGE	ROUTE WAS UNPAVED IN CYCLE 3, PARTIALLY PAVED IN CY5.
0200	PINE SPRINGS CAR CAMPGROUND	SURFACE TYPE CHANGE	ROUTE WAS UNPAVED IN CYCLE 3, PARTIALLY PAVED IN CY5.

**ROUTE IDENTIFICATION CHANGES TO PAVED ROUTES FROM PREVIOUS CYCLE - GUMO**

OTHER CHANGES FROM PREVIOUS INVENTORY:			
Route #	Route Name	Type of Change	Comments
0403	PARK VIEW DRIVE	ROUTES COMBINED	ROUTE 0403A FROM CYCLE 3 WAS COMBINED WITH ROUTE 0403 AT THE CYCLE 5 MEETING.
0404	BEAR CANYON VISTA	ROUTES COMBINED	ROUTE 0404A FROM CYCLE 3 WAS COMBINED WITH ROUTE 0404 AT THE CYCLE 5 MEETING.
0914A	MAINTENANCE EMPLOYEE PARKING	SQ FEET CHANGE	ROUTE 0914B WAS COLLECTED AS PART OF ROUTE 0914A IN CYCLE 3. ROUTE 0914B WAS SPLIT OUT IN CYCLE 5, THEREFORE THE SQ FEET WAS REDUCED FOR 0914A.
0914B	MAINTENANCE YARD	OTHER	ROUTE 0914B WAS ERRONEOUSLY IDENTIFIED AS AN UNPAVED PARKING IN CYCLE 3. IN CYCLE 5, ROUTE 0914B WAS SPLIT OUT OF ROUTE 0914A.

# Section 3

## Park Summary Information



## Guadalupe Mountains National Park



## GUMO: 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	0.08	1.12%	0.54	7.58%	2.16	30.34%	1.44	20.22%	4.22
2			0.04	0.56%	0.08	1.12%	0.52	7.30%	0.64
3					0.02	0.28%	0.03	0.42%	0.05
4									
5									
6	0.08	1.12%	0.70	9.83%	1.21	16.99%	0.22	3.09%	2.21
7									
8									
<b>Totals</b>	<b>0.16</b>	<b>2.25%</b>	<b>1.28</b>	<b>17.98%</b>	<b>3.47</b>	<b>48.73%</b>	<b>2.21</b>	<b>31.04%</b>	<b>7.12</b>

**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

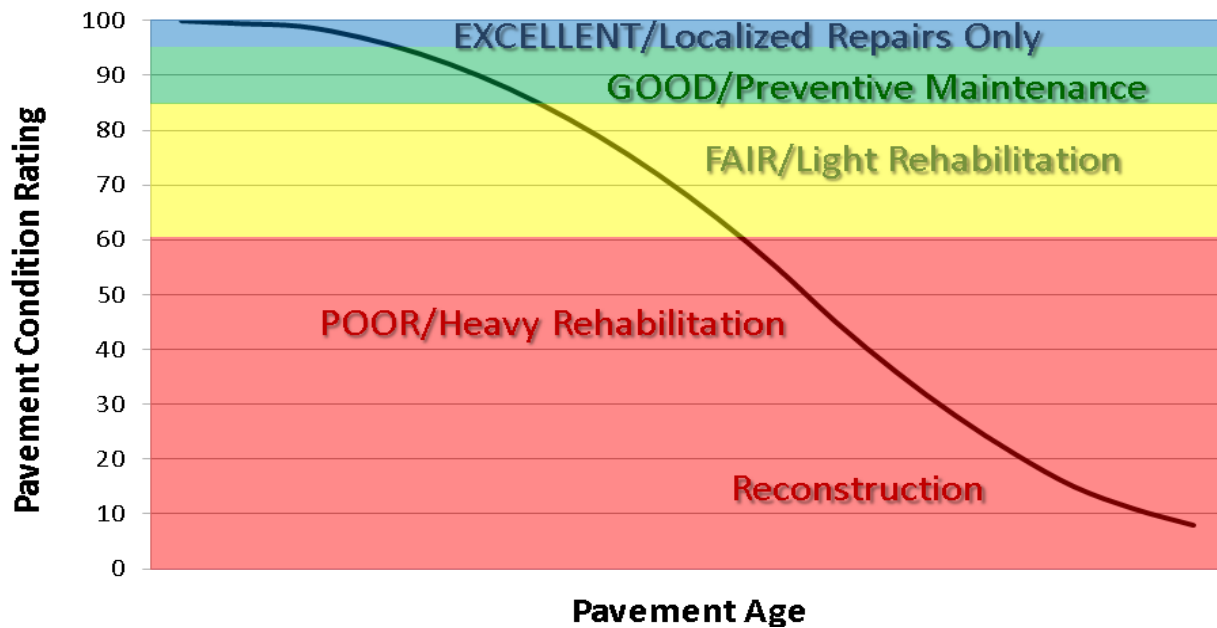
In addition to the RIP Index changes that have been implemented in Cycle 5, we will also aim to provide greater assistance in translating excellent/good/fair/poor categories into pavement needs categories. The PCR can be used to indicate the place in the Pavement Life Cycle and the types of treatments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

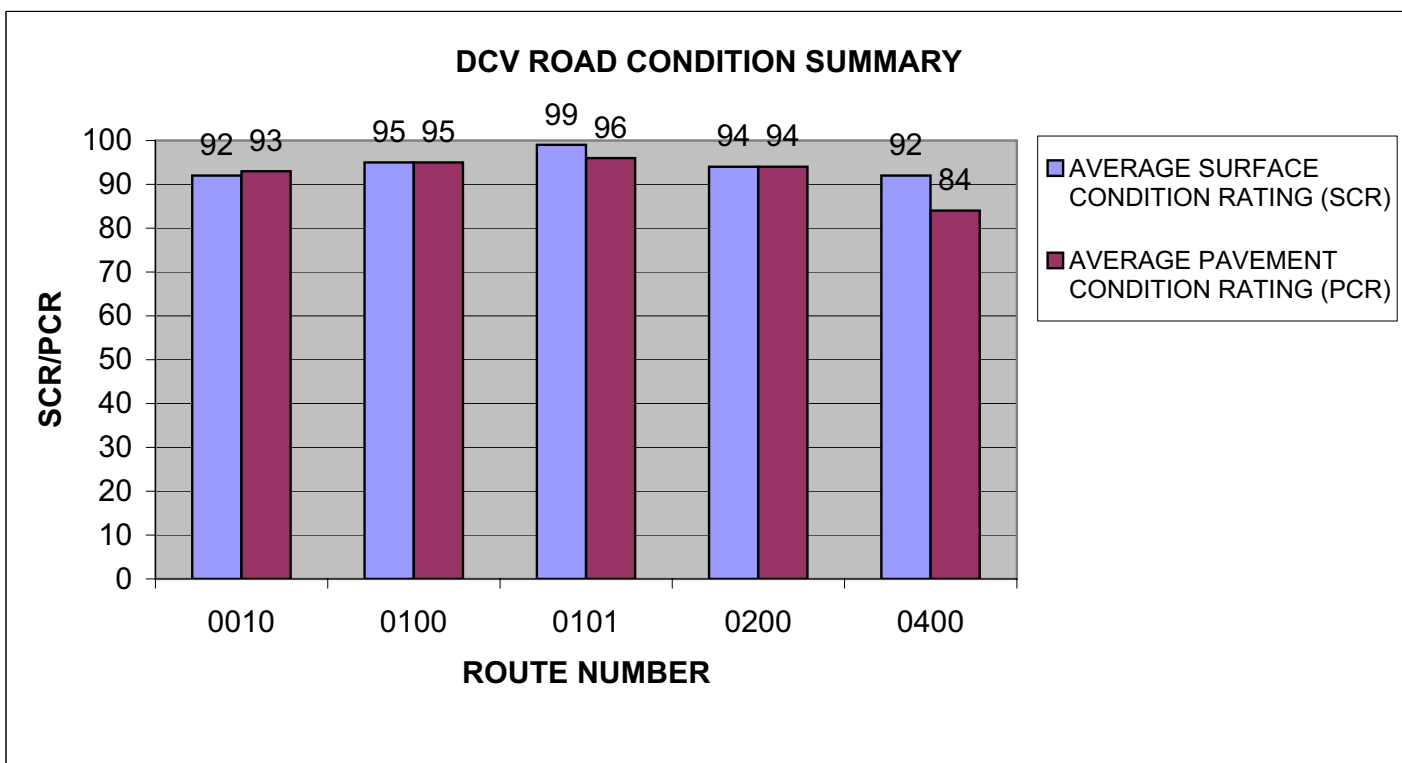
### Condition Categories and Treatments



# GUMO: DCV ROAD CONDITION SUMMARY

DCV - Data Collection Vehicle

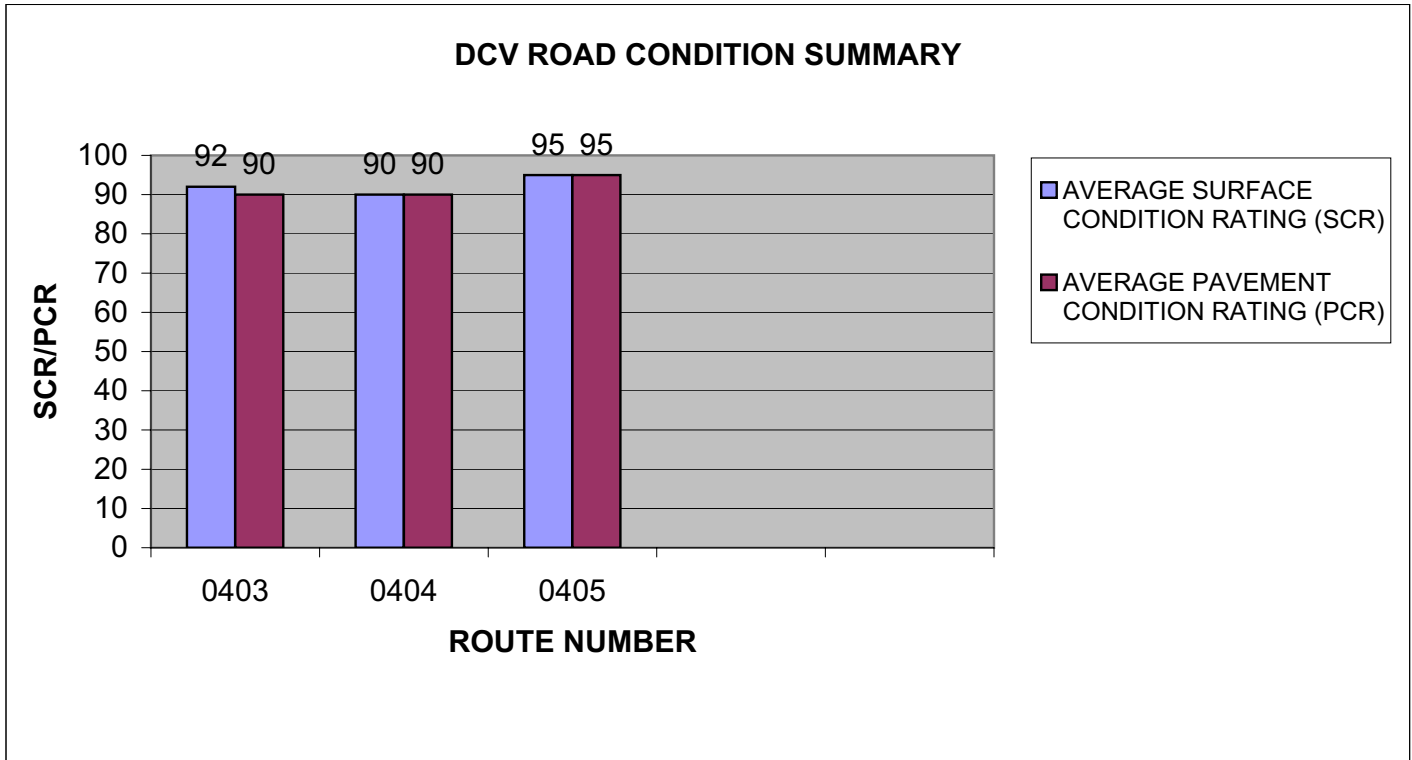
ROUTE NUMBER	ROUTE NAME	FUNCT CLASS	ROUTE LENGTH	SURFACE TYPE	AVERAGE SURFACE CONDITION RATING (SCR)	AVERAGE PAVEMENT CONDITION RATING (PCR)
0010	MCKITTRICK CANYON ROAD	1	4.22	ASPHALT	92	93
0100	FRIJOLE VISITOR CENTER ROAD	2	0.69	ASPHALT	95	95
0101	PINE CANYON DRIVE	2	0.61	ASPHALT	99	96
0200	PINE SPRINGS CAR CAMPGROUND	3	0.40	ASPHALT	94	94
0400	PRATT DRIVE	6	1.34	ASPHALT	92	84



# GUMO: DCV ROAD CONDITION SUMMARY

DCV - Data Collection Vehicle

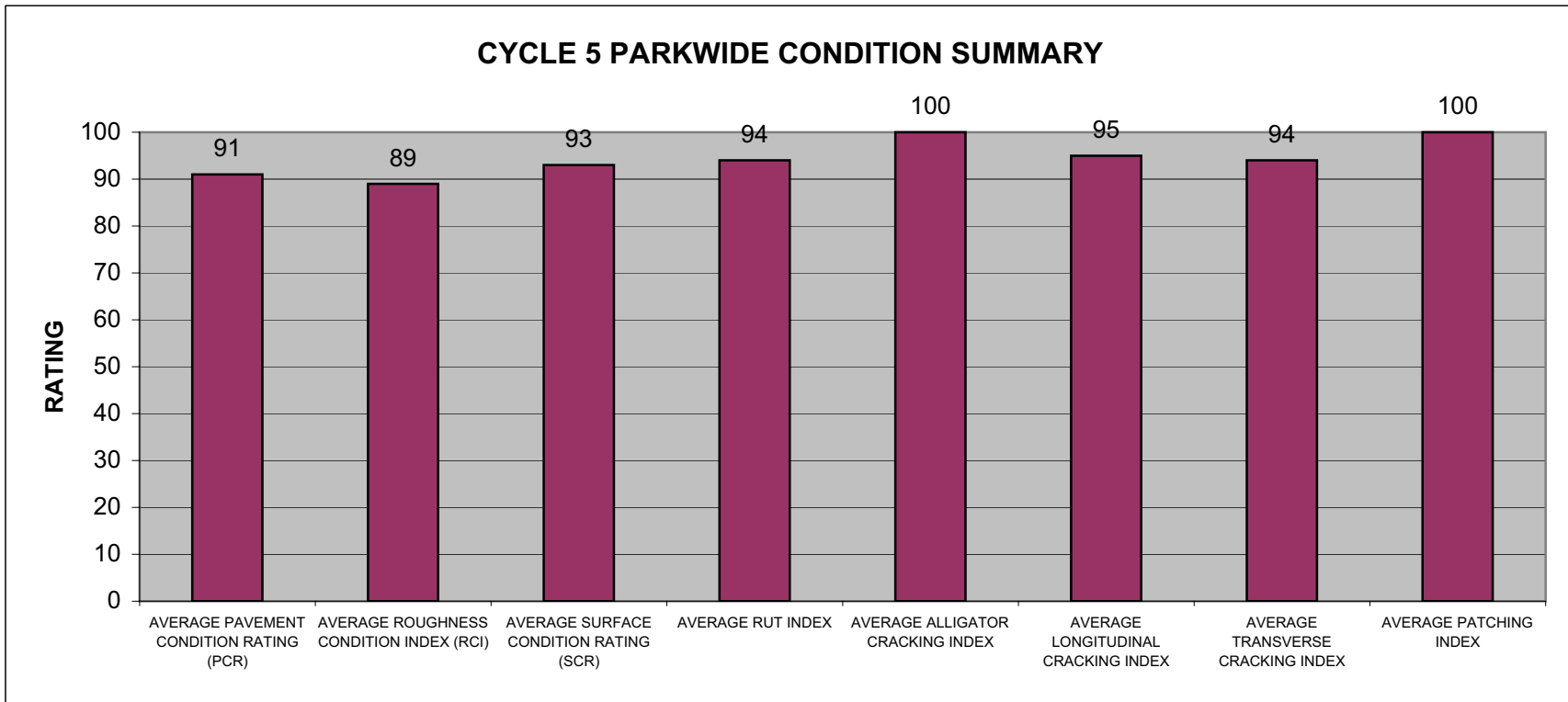
ROUTE NUMBER	ROUTE NAME	FUNCT CLASS	ROUTE LENGTH	SURFACE TYPE	AVERAGE SURFACE CONDITION RATING (SCR)	AVERAGE PAVEMENT CONDITION RATING (PCR)
0403	PARK VIEW DRIVE	6	0.68	ASPHALT	92	90
0404	BEAR CANYON VISTA	6	0.12	ASPHALT	90	90
0405	CAPITAN VISTA	6	0.06	ASPHALT	95	95



# GUMO: PARKWIDE DCV CONDITION SUMMARY

AVERAGE PAVEMENT CONDITION RATING (PCR)	AVERAGE ROUGHNESS CONDITION INDEX (RCI)	AVERAGE SURFACE CONDITION RATING (SCR)	AVERAGE RUT INDEX	AVERAGE ALLIGATOR CRACKING INDEX	AVERAGE LONGITUDINAL CRACKING INDEX	AVERAGE TRANSVERSE CRACKING INDEX	AVERAGE PATCHING INDEX
91	89	93	94	100	95	94	100

All Index values are based on Data Collection Vehicle (DCV) driven roads that were collected in Cycle-5.  
 Roughness data is only collected on routes with lengths greater than 0.5 miles and a posted speed limit of 25 MPH or greater.



# Section 4

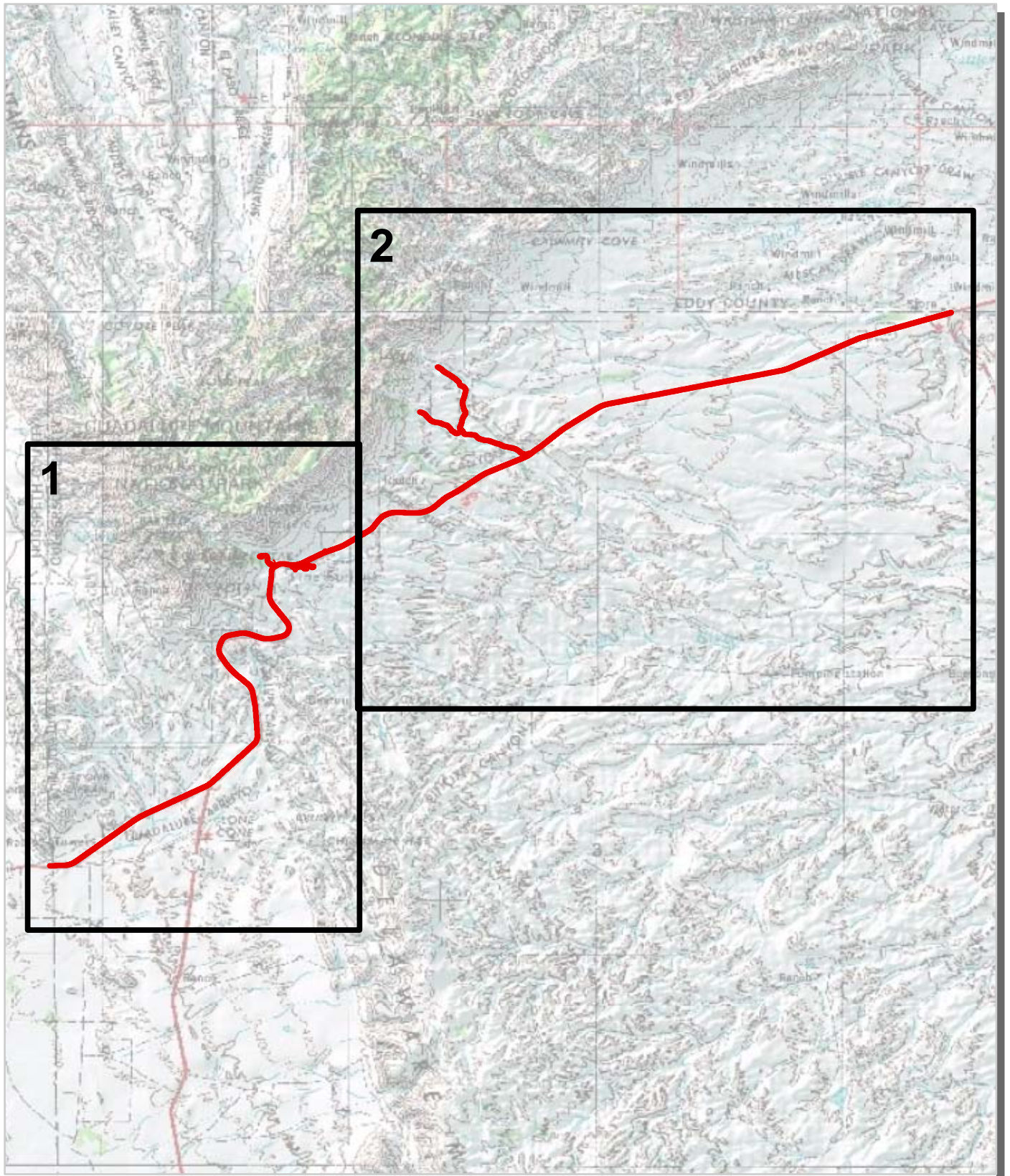
## Park Route Location Maps




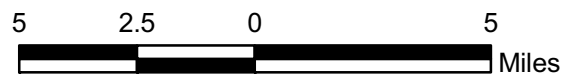
Guadalupe Mountains National Park



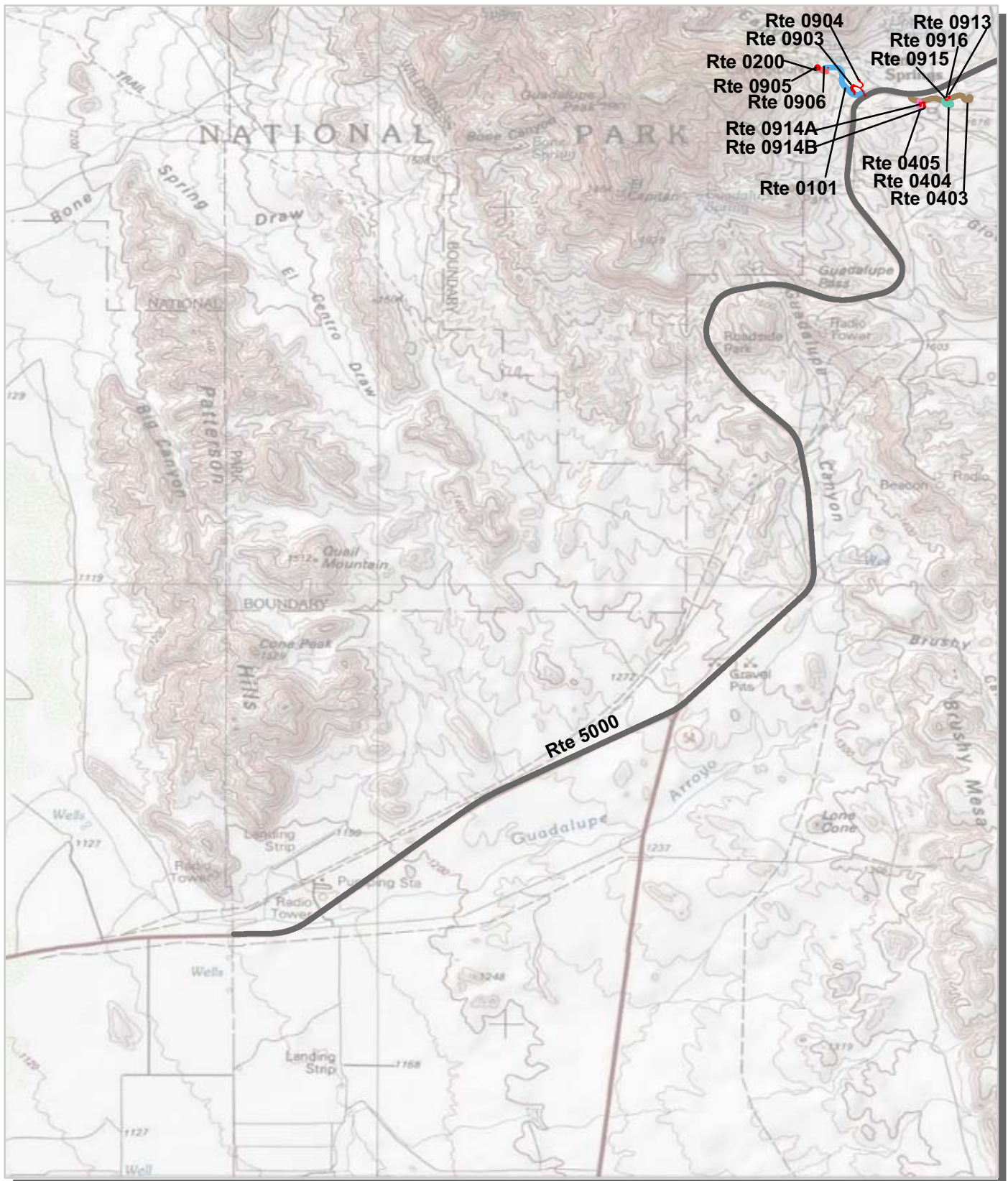
# Guadalupe Mountains National Park Route Location Map Key Map



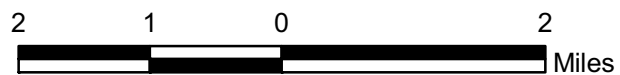
 Cycle 5 Collected Routes



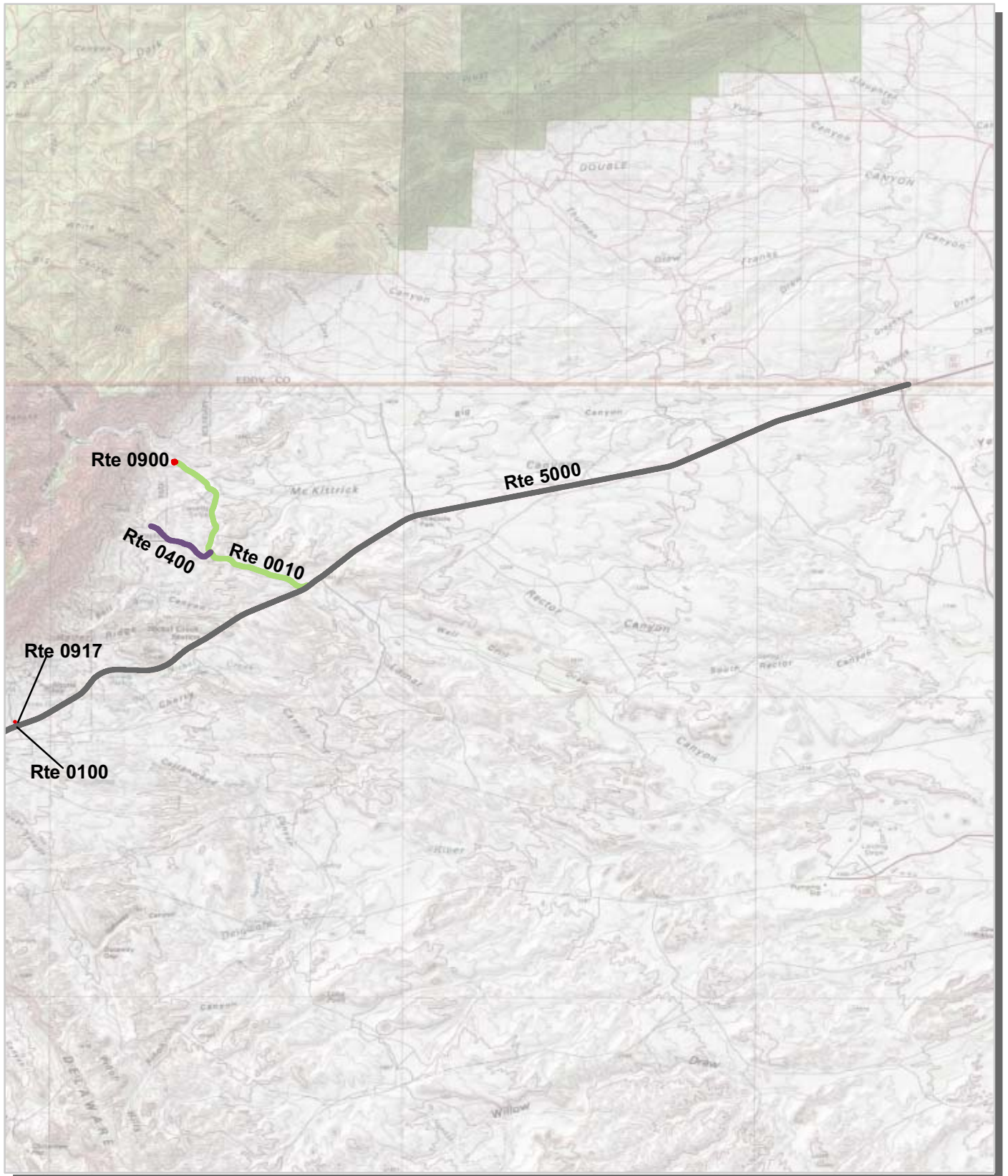
# Guadalupe Mountains National Park Route Location Map Area 1



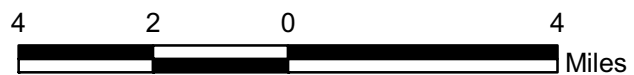
Unique colors used to differentiate routes



# Guadalupe Mountains National Park Route Location Map Area 2

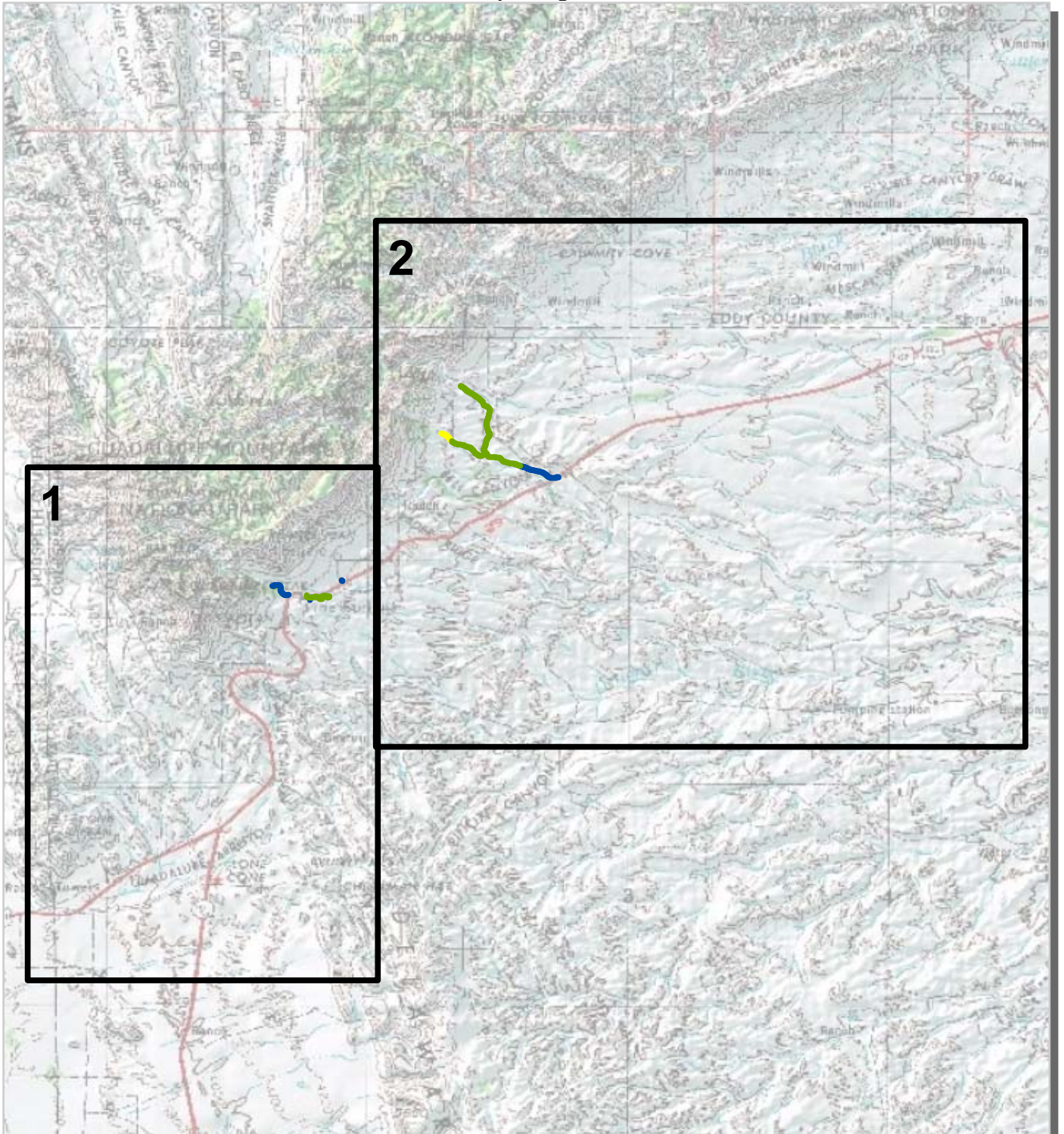


Unique colors used to differentiate routes





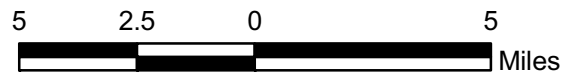
# Guadalupe Mountains National Park Route Condition Map PCR - Mile by Mile Key Map



PCR	Poor	<span style="display: inline-block; width: 15px; height: 15px; background-color: red; border: 1px solid black;"></span>	Fair	<span style="display: inline-block; width: 15px; height: 15px; background-color: yellow; border: 1px solid black;"></span>	Good	<span style="display: inline-block; width: 15px; height: 15px; background-color: green; border: 1px solid black;"></span>	Excellent	<span style="display: inline-block; width: 15px; height: 15px; background-color: blue; border: 1px solid black;"></span>	No Data	<span style="display: inline-block; width: 15px; height: 15px; background-color: black; border: 1px solid black;"></span>
	(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.

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

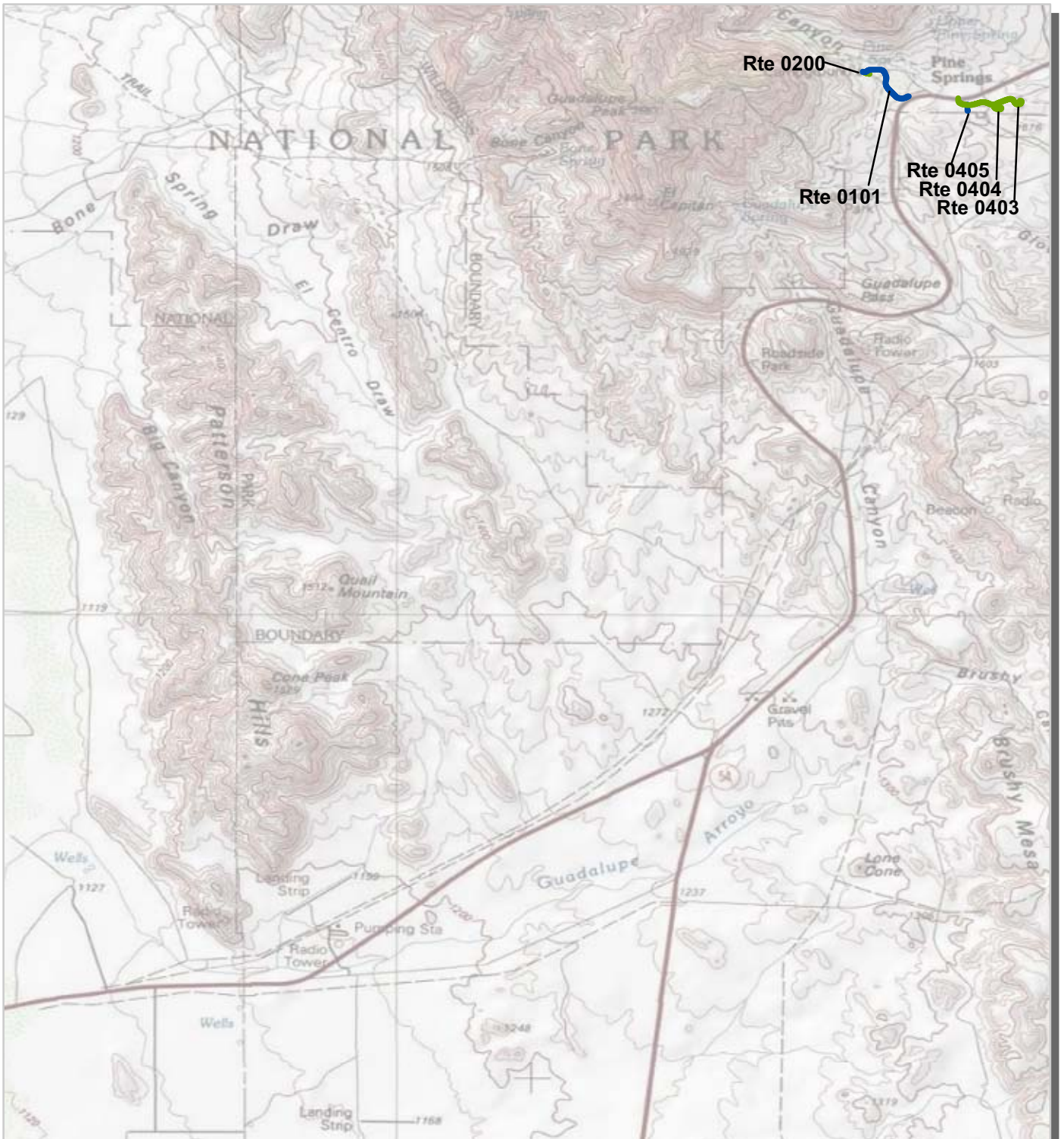


# Guadalupe Mountains National Park

## Route Condition Map

### PCR - Mile by Mile

#### Area 1



PCR	Poor	<span style="display: inline-block; width: 20px; height: 10px; background-color: red; border: 1px solid black;"></span>	Fair	<span style="display: inline-block; width: 20px; height: 10px; background-color: yellow; border: 1px solid black;"></span>	Good	<span style="display: inline-block; width: 20px; height: 10px; background-color: green; border: 1px solid black;"></span>	Excellent	<span style="display: inline-block; width: 20px; height: 10px; background-color: blue; border: 1px solid black;"></span>	No Data	<span style="display: inline-block; width: 20px; height: 10px; background-color: black; border: 1px solid black;"></span>
	(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.

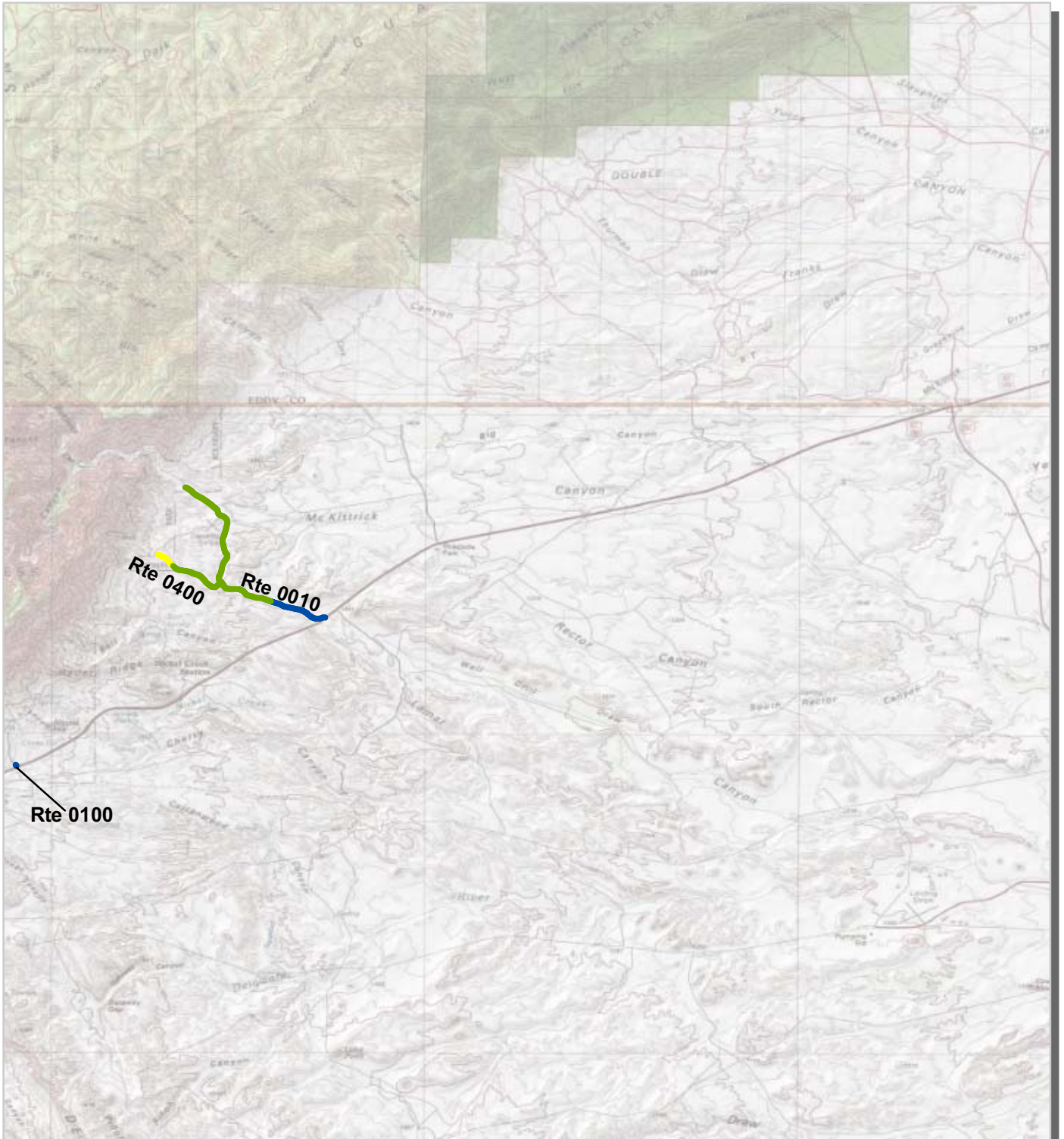


# Guadalupe Mountains National Park

## Route Condition Map

### PCR - Mile by Mile

#### Area 2



PCR	Poor	<span style="display: inline-block; width: 15px; height: 15px; background-color: red; border: 1px solid black;"></span>	Fair	<span style="display: inline-block; width: 15px; height: 15px; background-color: yellow; border: 1px solid black;"></span>	Good	<span style="display: inline-block; width: 15px; height: 15px; background-color: green; border: 1px solid black;"></span>	Excellent	<span style="display: inline-block; width: 15px; height: 15px; background-color: blue; border: 1px solid black;"></span>	No Data	<span style="display: inline-block; width: 15px; height: 15px; background-color: black; border: 1px solid black;"></span>
	(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.

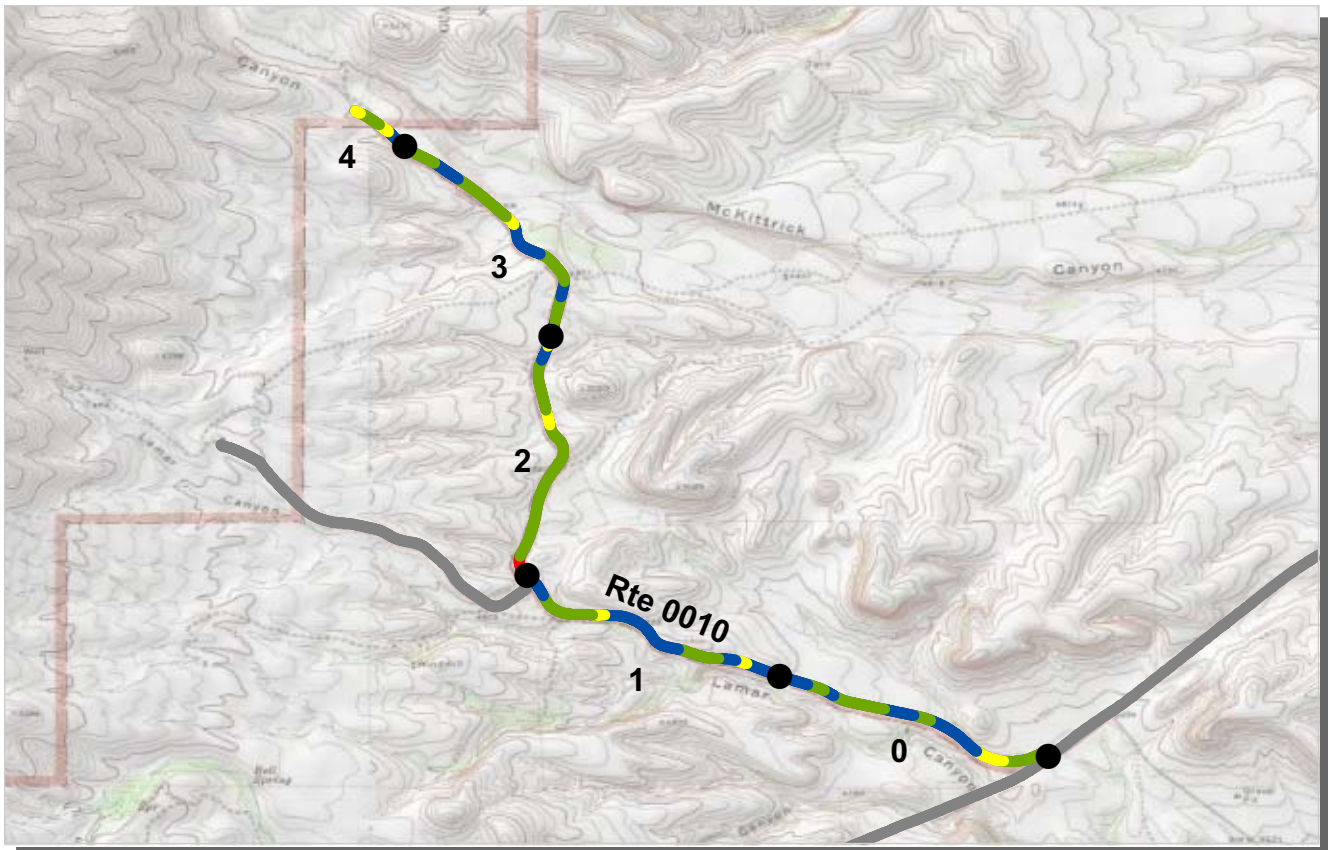


**Section 5**  
**Paved Route**  
**Condition Rating Sheets**



Guadalupe Mountains National Park





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.

**ROUTE: 0010 MCKITTRICK CANYON ROAD**  
**GUMO : GUADALUPE MOUNTAINS NATIONAL PARK**

**COLLECTED: 3/23/2011**  
**TOTAL LENGTH: 4.22 Miles**

**INTERMOUNTAIN REGION**

<i>Section Number</i>	0	1	2	3	4
<i>Section Length (mi)</i>	1.00	1.00	1.00	1.00	0.22
<i>Cross Section Information</i>					
Number of Lanes	2	2	2	2	2
Paved Width (ft)	23	23	23	23	23
Lane Width (ft)	10	10	10	10	10
<i>Roadway Condition Information</i>					
SCR (Surface Condition Rating)	91	92	91	94	95
PCR (Pavement Condition Rating)	95	94	91	94	85
<i>Distress Index Values</i>					
Structural Crack Index	91	98	94	98	96
Transverse Cracking Index	91	92	92	94	98
Patching Index	100	100	100	100	100
Rutting Index	95	95	91	96	95
Roughness Condition Index (RCI)	100	96	90	94	69

**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

**ROUTE: 0010 MCKITTRICK CANYON ROAD**



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.

**ROUTE: 0100 FRIJOLE VISITOR CENTER ROAD**  
**GUMO : GUADALUPE MOUNTAINS NATIONAL PARK**

**COLLECTED: 3/23/2011**  
**TOTAL LENGTH: 0.04 Miles**

**INTERMOUNTAIN REGION**

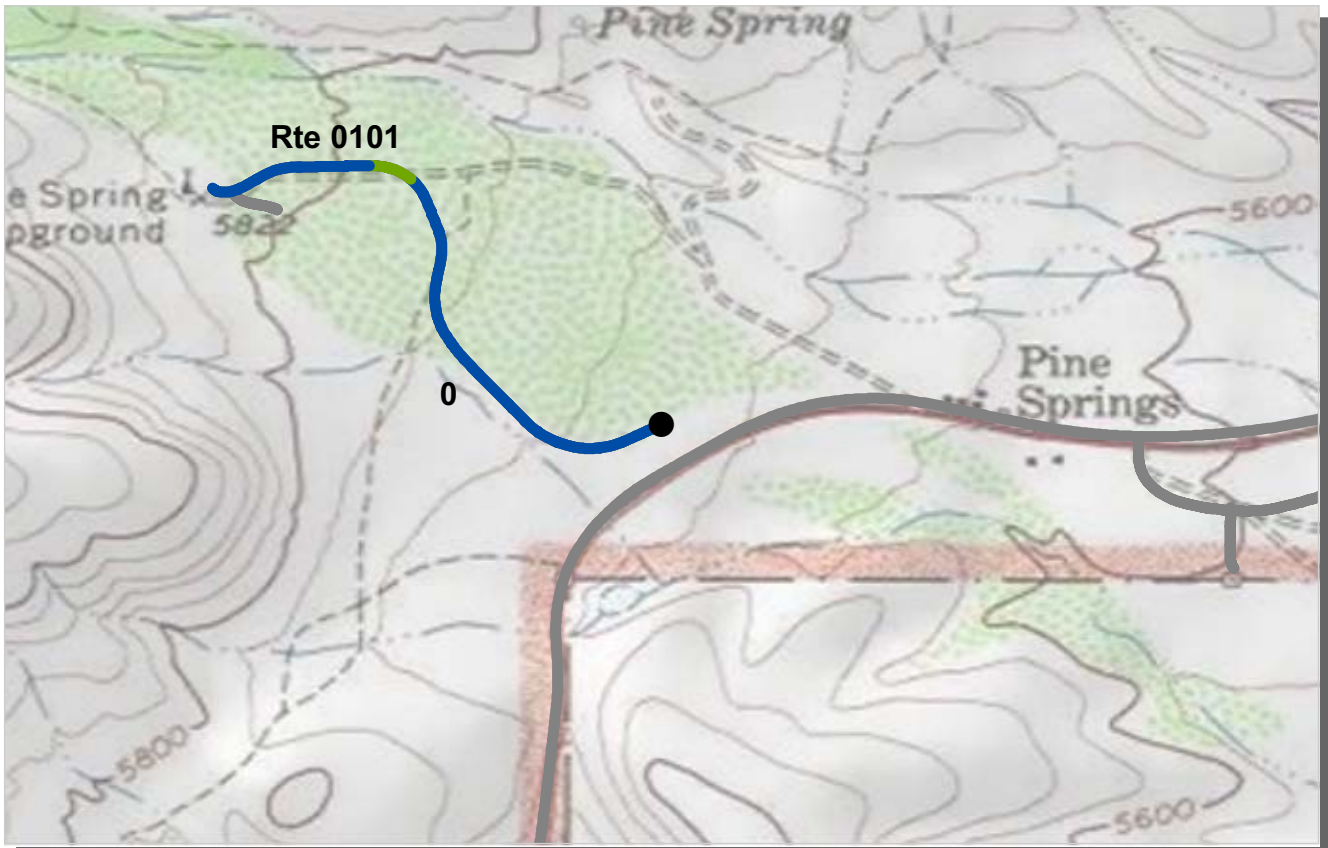
<b>Section Number</b>	0				
<b>Section Length (mi)</b>	0.04				
<b>Cross Section Information</b>					
Number of Lanes	2				
Paved Width (ft)	26				
Lane Width (ft)	13				
<b>Roadway Condition Information</b>					
SCR (Surface Condition Rating)	95				
PCR (Pavement Condition Rating)	95				
<b>Distress Index Values</b>					
Structural Crack Index	99				
Transverse Cracking Index	99				
Patching Index	100				
Rutting Index	95				
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

**ROUTE: 0100 FRIJOLE VISITOR CENTER ROAD**



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 PINE CANYON DRIVE**  
**GUMO : GUADALUPE MOUNTAINS NATIONAL PARK**

**COLLECTED: 3/23/2011**  
**TOTAL LENGTH: 0.61 Miles**

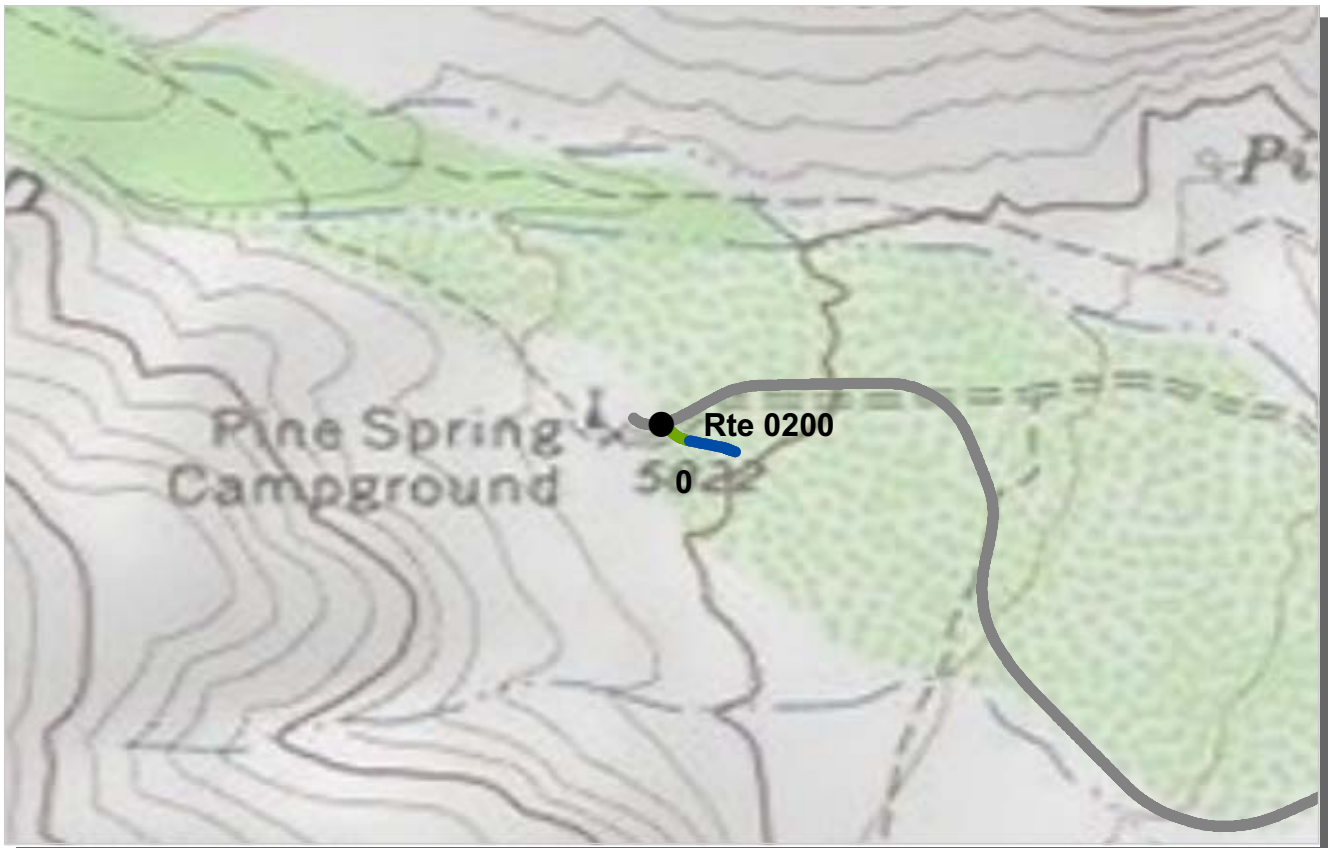
**INTERMOUNTAIN REGION**

<b>Section Number</b>	0				
<b>Section Length (mi)</b>	0.61				
<b>Cross Section Information</b>					
Number of Lanes	2				
Paved Width (ft)	23				
Lane Width (ft)	10				
<b>Roadway Condition Information</b>					
SCR (Surface Condition Rating)	99				
PCR (Pavement Condition Rating)	96				
<b>Distress Index Values</b>					
Structural Crack Index	100				
Transverse Cracking Index	100				
Patching Index	99				
Rutting Index	99				
Roughness Condition Index (RCI)	92				

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



**ROUTE: 0101 PINE CANYON DRIVE**



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.

**ROUTE: 0200 PINE SPRINGS CAR CAMPGROUND**  
**GUMO : GUADALUPE MOUNTAINS NATIONAL PARK**

**COLLECTED: 3/23/2011**  
**TOTAL LENGTH: 0.05 Miles**

**INTERMOUNTAIN REGION**

<b>Section Number</b>	0				
<b>Section Length (mi)</b>	0.05				
<b>Cross Section Information</b>					
Number of Lanes	2				
Paved Width (ft)	23				
Lane Width (ft)	10				
<b>Roadway Condition Information</b>					
SCR (Surface Condition Rating)	94				
PCR (Pavement Condition Rating)	94				
<b>Distress Index Values</b>					
Structural Crack Index	100				
Transverse Cracking Index	100				
Patching Index	100				
Rutting Index	94				
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

**ROUTE: 0200 PINE SPRINGS CAR CAMPGROUND**





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.

**ROUTE: 0400 PRATT DRIVE**  
**GUMO : GUADALUPE MOUNTAINS NATIONAL PARK**

**COLLECTED: 3/23/2011**  
**TOTAL LENGTH: 1.34 Miles**

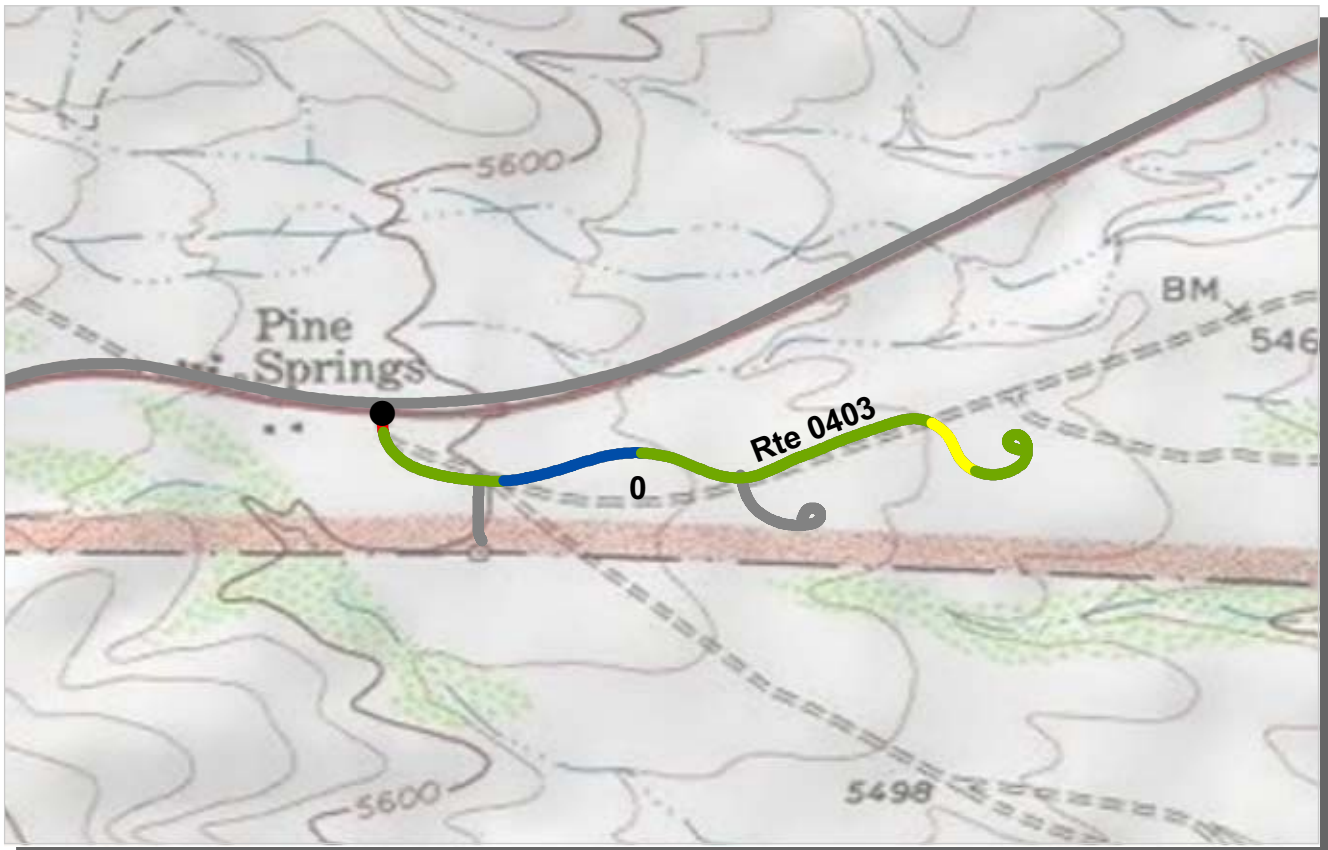
**INTERMOUNTAIN REGION**

<i>Section Number</i>	0	1			
<i>Section Length (mi)</i>	1.00	0.34			
<i>Cross Section Information</i>					
Number of Lanes	2	2			
Paved Width (ft)	16	17			
Lane Width (ft)	8	8			
<i>Roadway Condition Information</i>					
SCR (Surface Condition Rating)	92	91			
PCR (Pavement Condition Rating)	86	80			
<i>Distress Index Values</i>					
Structural Crack Index	94	94			
Transverse Cracking Index	92	93			
Patching Index	100	100			
Rutting Index	92	91			
Roughness Condition Index (RCI)	78	64			

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



**ROUTE: 0400 PRATT DRIVE**



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.

**ROUTE: 0403 PARK VIEW DRIVE**  
**GUMO : GUADALUPE MOUNTAINS NATIONAL PARK**

**COLLECTED: 3/23/2011**  
**TOTAL LENGTH: 0.68 Miles**

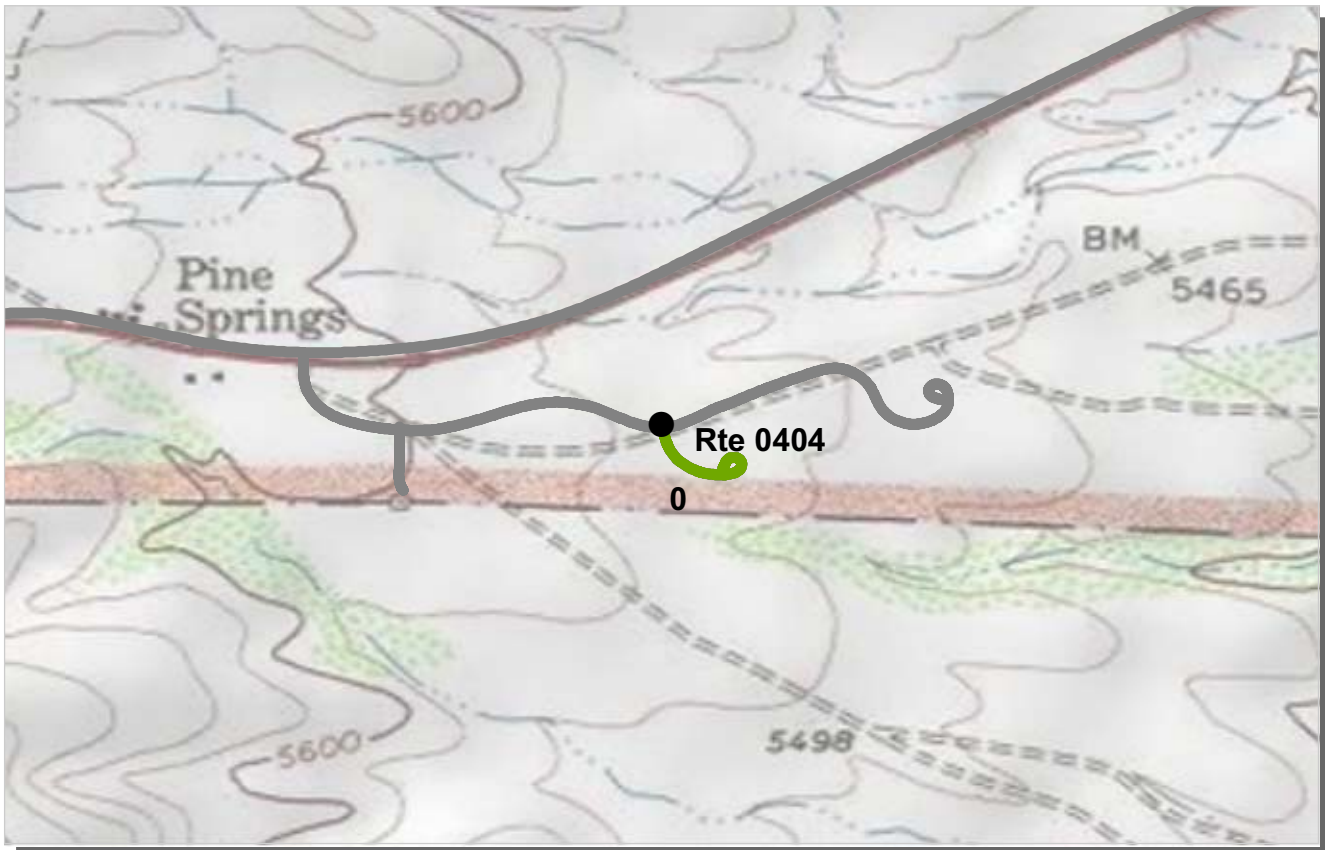
**INTERMOUNTAIN REGION**

<b>Section Number</b>	0				
<b>Section Length (mi)</b>	0.68				
<b>Cross Section Information</b>					
Number of Lanes	2				
Paved Width (ft)	21				
Lane Width (ft)	10				
<b>Roadway Condition Information</b>					
SCR (Surface Condition Rating)	92				
PCR (Pavement Condition Rating)	90				
<b>Distress Index Values</b>					
Structural Crack Index	94				
Transverse Cracking Index	98				
Patching Index	100				
Rutting Index	92				
Roughness Condition Index (RCI)	86				

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



**ROUTE: 0403 PARK VIEW DRIVE**



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.

**ROUTE: 0404 BEAR CANYON VISTA**  
**GUMO : GUADALUPE MOUNTAINS NATIONAL PARK**

**COLLECTED: 3/23/2011**  
**TOTAL LENGTH: 0.12 Miles**

**INTERMOUNTAIN REGION**

<b>Section Number</b>	0				
<b>Section Length (mi)</b>	0.12				
<b>Cross Section Information</b>					
Number of Lanes	2				
Paved Width (ft)	21				
Lane Width (ft)	11				
<b>Roadway Condition Information</b>					
SCR (Surface Condition Rating)	90				
PCR (Pavement Condition Rating)	90				
<b>Distress Index Values</b>					
Structural Crack Index	92				
Transverse Cracking Index	97				
Patching Index	100				
Rutting Index	90				
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



**ROUTE: 0404 BEAR CANYON VISTA**



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.

**ROUTE: 0405 CAPITAN VISTA**  
**GUMO : GUADALUPE MOUNTAINS NATIONAL PARK**

**COLLECTED: 3/23/2011**  
**TOTAL LENGTH: 0.06 Miles**

**INTERMOUNTAIN REGION**

<b>Section Number</b>	0				
<b>Section Length (mi)</b>	0.06				
<b>Cross Section Information</b>					
Number of Lanes	2				
Paved Width (ft)	23				
Lane Width (ft)	9				
<b>Roadway Condition Information</b>					
SCR (Surface Condition Rating)	95				
PCR (Pavement Condition Rating)	95				
<b>Distress Index Values</b>					
Structural Crack Index	98				
Transverse Cracking Index	97				
Patching Index	100				
Rutting Index	95				
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



**ROUTE: 0405 CAPITAN VISTA**

**Section 6**  
**Manually Rated Paved Route**  
**Condition Rating Sheets**



Guadalupe Mountains National Park



## **MANUALLY RATED ROUTE CONDITION RATING SHEETS**

No data available for this section.

# Section 7

## Parking Area

### Condition Rating Sheets



Guadalupe Mountains National Park



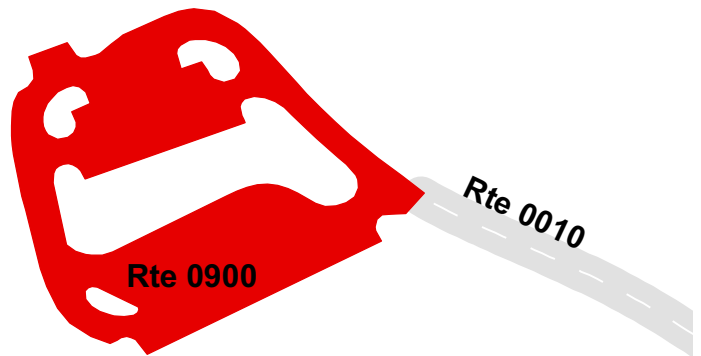
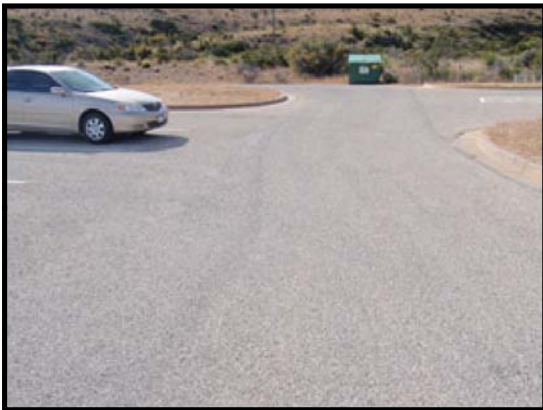
# GUADALUPE MOUNTAINS NATIONAL PARK

## Route 0900

MCKITTRICK CANYON VISITOR CENTER PARKING  
 FROM END OF ROUTE 0010 (MCKITTRICK CANYON ROAD)  
 TO PARKING

Route Number	Public / NonPublic	Date Visited	Area (sq ft)	Lane Miles *	Surface Type
0900	PUBLIC	12/3/2010	53,036	0.91	AS
Culverts	Drop Inlets	Gates	Curb & Gutter	Curb	PCR
1	2	0	CONCRETE CURB AND GUTTER	NO CURB	FAIR/73

\* Lane miles are based on 11' lane widths





# GUADALUPE MOUNTAINS NATIONAL PARK

## Route 0903

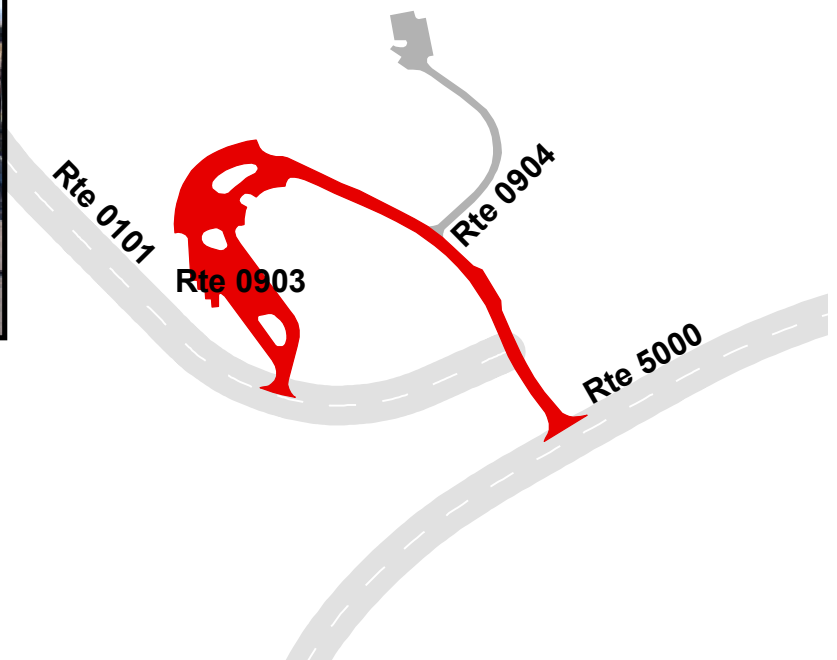
### VISITOR CENTER PARKING

FROM ROUTE 5000 (STATE HIGHWAY 62/180)

TO ROUTE 0101 (PINE CANYON DRIVE) AND ROUTE 0904 (EMPLOYEE PARKING)

Route Number	Public / NonPublic	Date Visited	Area (sq ft)	Lane Miles *	Surface Type
0903	PUBLIC	12/3/2010	69,274	1.19	AS
Culverts	Drop Inlets	Gates	Curb & Gutter	Curb	PCR
0	0	1	CONCRETE CURB AND GUTTER	NO CURB	FAIR/73

\* Lane miles are based on 11' lane widths



# GUADALUPE MOUNTAINS NATIONAL PARK

## Route 0904

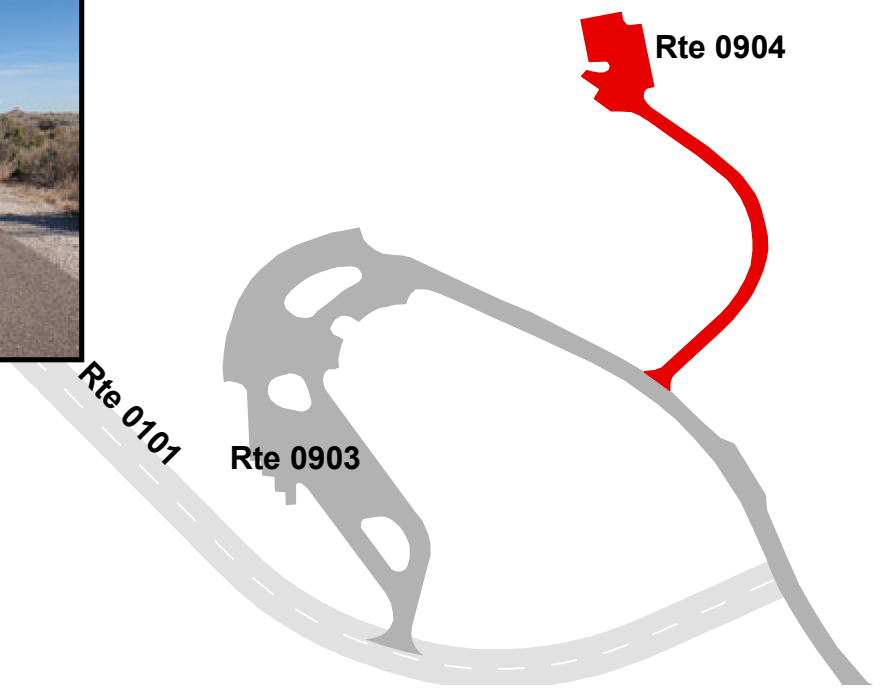
### EMPLOYEE PARKING

FROM ROUTE 0903 (VISITOR CENTER PARKING)

TO PARKING

Route Number	Public / NonPublic	Date Visited	Area (sq ft)	Lane Miles *	Surface Type
0904	NONPUBLIC	12/3/2010	14,035	0.24	AS
Culverts	Drop Inlets	Gates	Curb & Gutter	Curb	PCR
0	0	0	CONCRETE CURB AND GUTTER	NO CURB	POOR/45

\* Lane miles are based on 11' lane widths



340 170 0 340 Feet



# GUADALUPE MOUNTAINS NATIONAL PARK

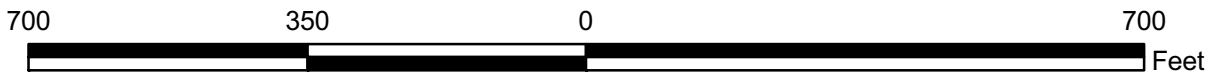
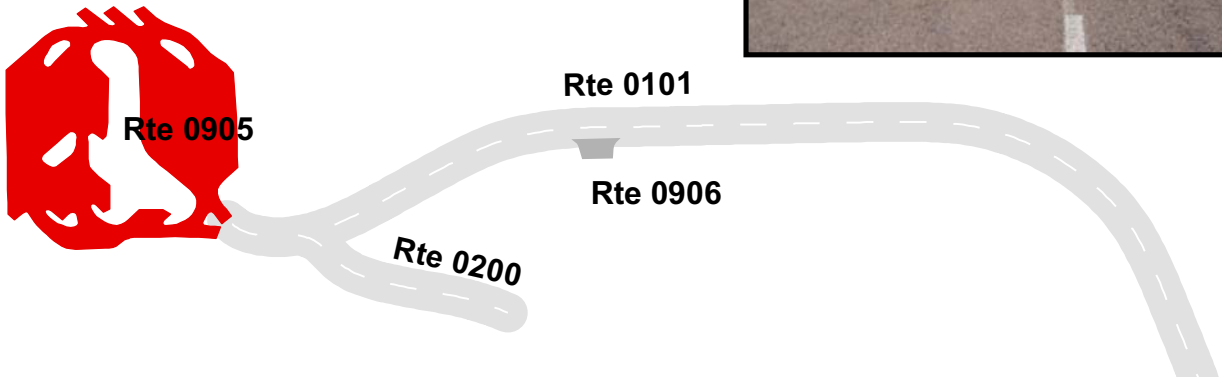
## Route 0905

### RV CAMPGROUND

FROM END OF ROUTE 0101 (PINE CANYON DRIVE)  
TO PARKING

Route Number	Public / NonPublic	Date Visited	Area (sq ft)	Lane Miles *	Surface Type
0905	PUBLIC	12/3/2010	45,476	0.78	AS
Culverts	Drop Inlets	Gates	Curb & Gutter	Curb	PCR
0	1	0	CONCRETE CURB AND GUTTER	NO CURB	FAIR/73

\* Lane miles are based on 11' lane widths



# GUADALUPE MOUNTAINS NATIONAL PARK

## Route 0906

### AMPHITHEATER PARKING

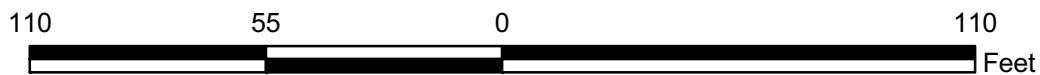
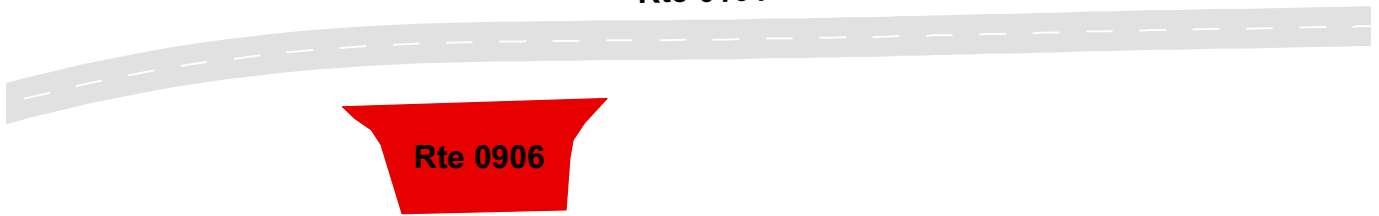
ADJACENT TO ROUTE 0101 (PINE CANYON DRIVE) AT MP 0.51 ON LEFT

Route Number	Public / NonPublic	Date Visited	Area (sq ft)	Lane Miles *	Surface Type
0906	PUBLIC	12/3/2010	972	0.02	AS
Culverts	Drop Inlets	Gates	Curb & Gutter	Curb	PCR
0	0	0	NO CURB AND GUTTER	NO CURB	POOR/45

\* Lane miles are based on 11' lane widths



Rte 0101



# GUADALUPE MOUNTAINS NATIONAL PARK

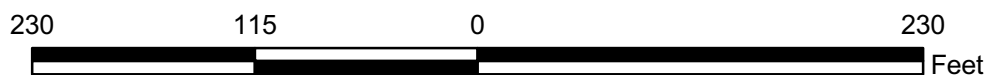
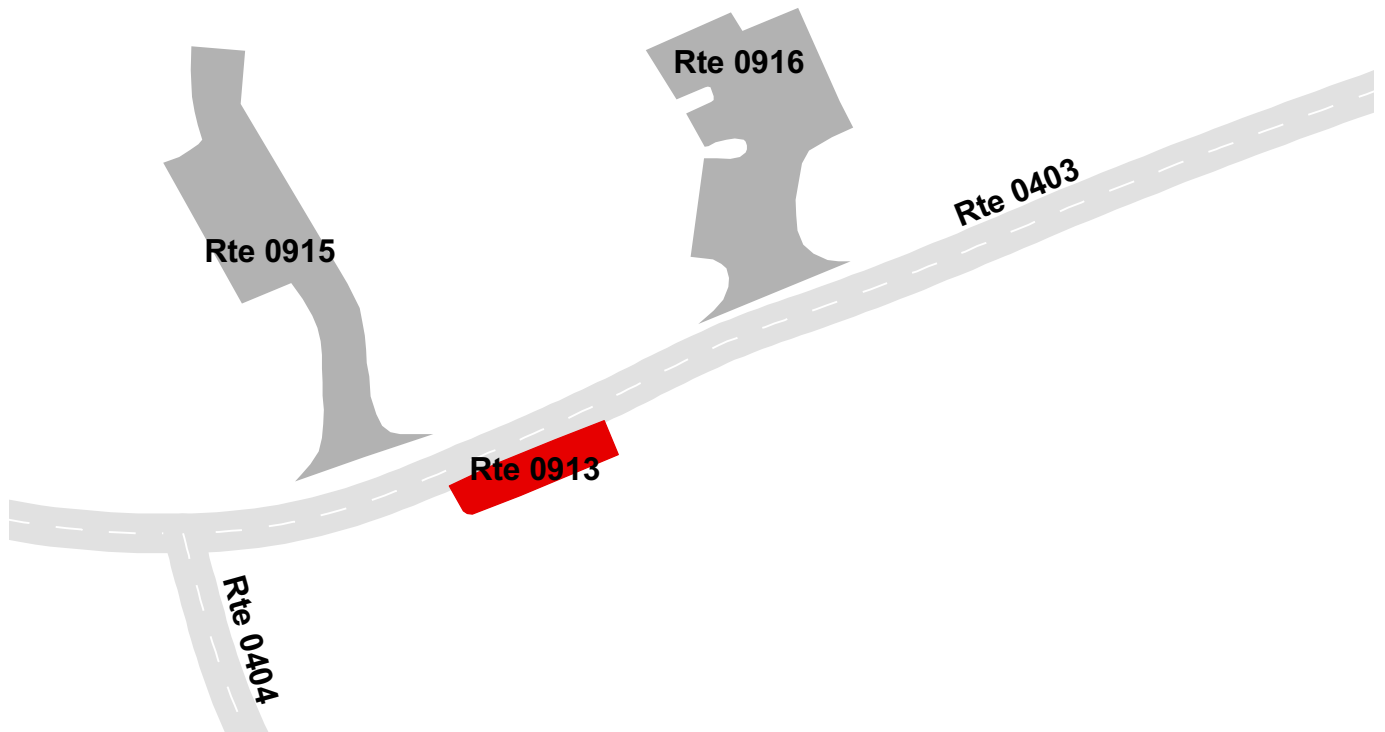
## Route 0913

### RESIDENCE ROAD PARKING

ADJACENT TO ROUTE 0403 (PARK VIEW DRIVE) AT MP 0.37 ON RIGHT

Route Number	Public / NonPublic	Date Visited	Area (sq ft)	Lane Miles *	Surface Type
0913	NONPUBLIC	12/3/2010	1,408	0.02	AS
Culverts	Drop Inlets	Gates	Curb & Gutter	Curb	PCR
0	0	0	NO CURB AND GUTTER	NO CURB	FAIR/73

\* Lane miles are based on 11' lane widths



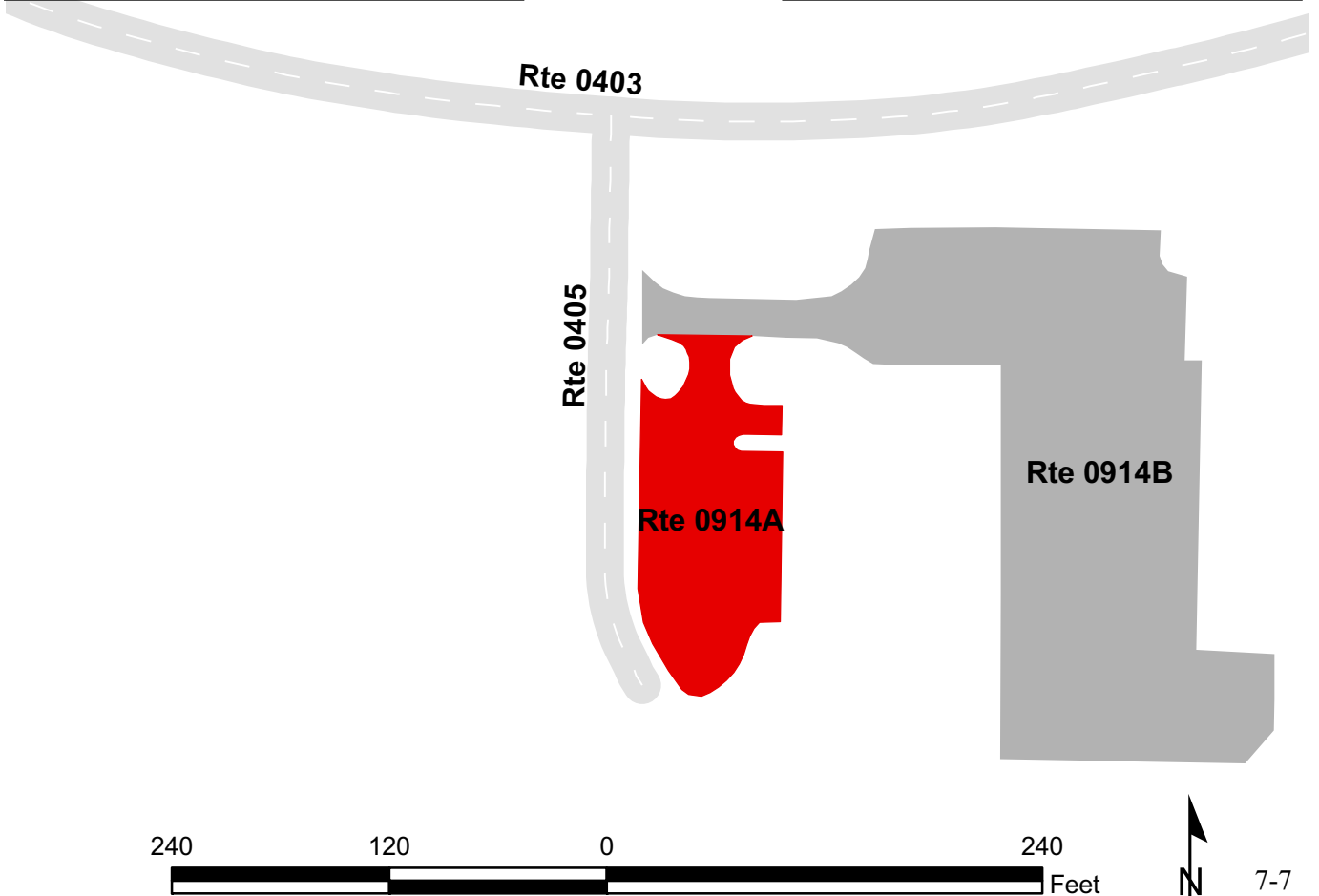
# GUADALUPE MOUNTAINS NATIONAL PARK

## Route 0914A

MAINTENANCE EMPLOYEE PARKING  
 FROM ROUTE 0405 (CAPITAN VISTA) AT MP 0.04 ON LEFT  
 TO ROUTE 0914B (MAINTENANCE YARD)

Route Number	Public / NonPublic	Date Visited	Area (sq ft)	Lane Miles *	Surface Type
0914A	NONPUBLIC	12/3/2010	10,194	0.18	AS
Culverts	Drop Inlets	Gates	Curb & Gutter	Curb	PCR
0	0	0	CONCRETE CURB AND GUTTER	CONCRETE CURB	FAIR/73

\* Lane miles are based on 11' lane widths



# GUADALUPE MOUNTAINS NATIONAL PARK

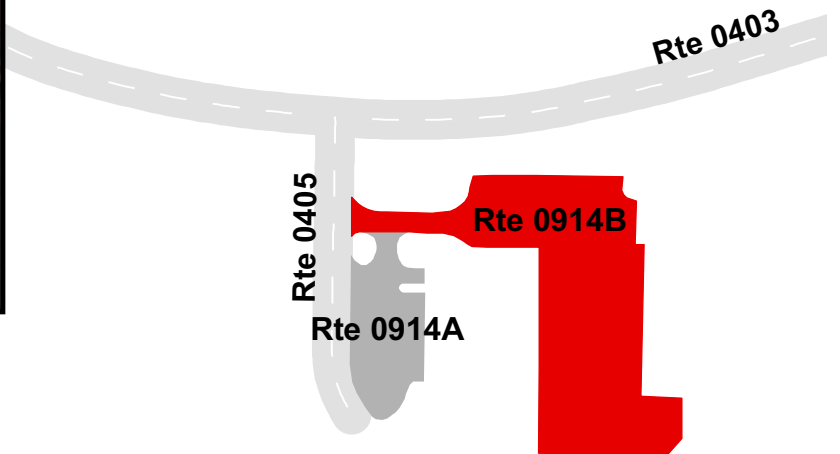
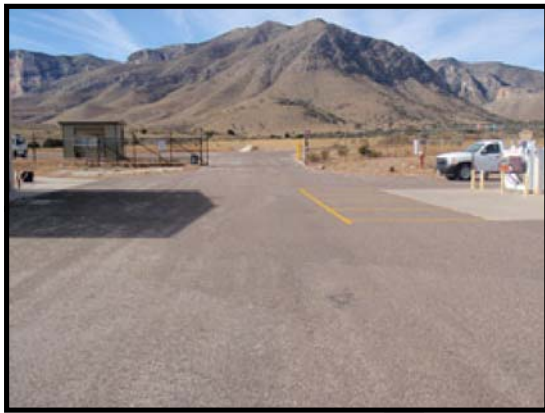
## Route 0914B

### MAINTENANCE YARD

FROM ROUTE 0405 (CAPITAN VISTA) AT MP 0.02 ON LEFT  
TO PARKING

Route Number	Public / NonPublic	Date Visited	Area (sq ft)	Lane Miles *	Surface Type
0914B	NONPUBLIC	12/3/2010	35,892	0.62	AS
Culverts	Drop Inlets	Gates	Curb & Gutter	Curb	PCR
1	0	1	NO CURB AND GUTTER	NO CURB	FAIR/73

\* Lane miles are based on 11' lane widths



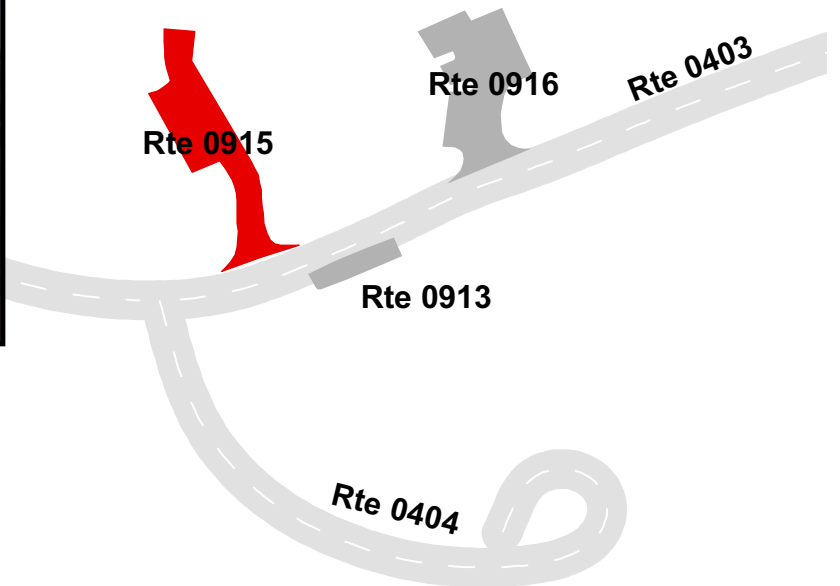
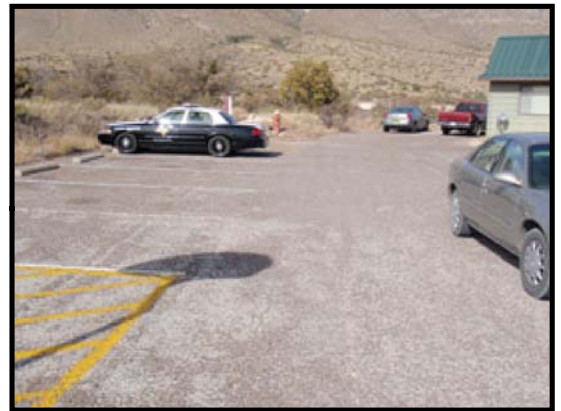
# GUADALUPE MOUNTAINS NATIONAL PARK

## Route 0915

SEASONAL HOUSING WEST PARKING LOT  
 FROM ROUTE 0403 (PARK VIEW DRIVE) AT MP 0.36 ON LEFT  
 TO PARKING

Route Number	Public / NonPublic	Date Visited	Area (sq ft)	Lane Miles *	Surface Type
0915	NONPUBLIC	12/3/2010	6,977	0.12	AS
Culverts	Drop Inlets	Gates	Curb & Gutter	Curb	PCR
0	0	0	CONCRETE CURB AND GUTTER	NO CURB	POOR/45

\* Lane miles are based on 11' lane widths





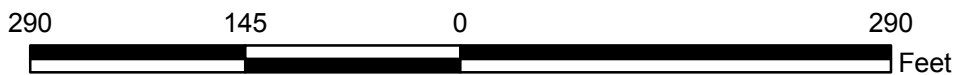
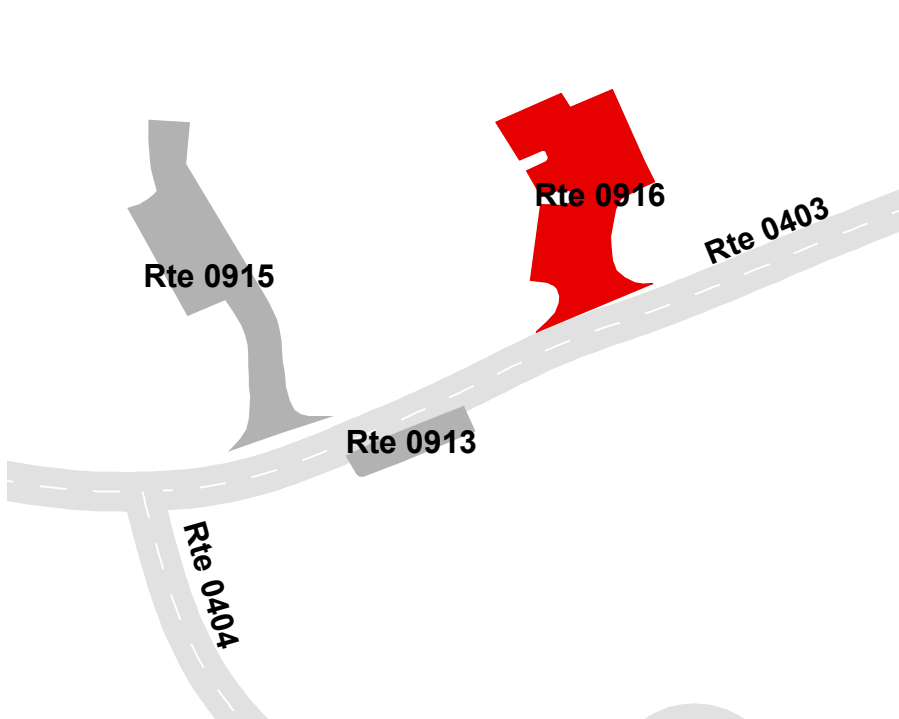
# GUADALUPE MOUNTAINS NATIONAL PARK

## Route 0916

SEASONAL HOUSING EAST PARKING LOT  
 FROM ROUTE 0403 (PARK VIEW DRIVE) AT MP 0.40 ON LEFT  
 TO PARKING

Route Number	Public / NonPublic	Date Visited	Area (sq ft)	Lane Miles *	Surface Type
0916	NONPUBLIC	12/3/2010	7,515	0.13	AS
Culverts	Drop Inlets	Gates	Curb & Gutter	Curb	PCR
1	0	0	NO CURB AND GUTTER	NO CURB	POOR/45

\* Lane miles are based on 11' lane widths



# GUADALUPE MOUNTAINS NATIONAL PARK

## Route 0917

### NEW FRIJOLE PARKING

ADJACENT TO UNPAVED SECTION OF ROUTE 0100 (FRIJOLE VISITOR CENTER ROAD)

Route Number	Public / NonPublic	Date Visited	Area (sq ft)	Lane Miles *	Surface Type
0917	PUBLIC	12/3/2010	616	0.01	CO
Culverts	Drop Inlets	Gates	Curb & Gutter	Curb	PCR
0	0	0	NO CURB AND GUTTER	NO CURB	FAIR/73

\* Lane miles are based on 11' lane widths



**Section 8**  
**Parkwide/Route**  
**Maintenance Features Summaries**



Guadalupe Mountains National Park



**GUMO: PARKWIDE MAINTENANCE FEATURES SUMMARY**  
**Includes DCV, MRL, MRP & PKG routes collected in Cycle-5**

Notice: Culverts and drop inlets were marked by NPS and inventoried by RIP in Cycle 5 on all DCV driven routes. Culverts, drop inlets, and gates were also collected on all Manually Rated Routes and Paved Parking areas. Those totals are reflected below.

<b>FEATURE</b>	<b>LINEAR FEET</b>	<b>COUNT</b>
BRIDGE	--	0
CATTLE GUARD	--	2
CULVERT	--	12
CURB	79	--
DROP INLET	--	3
GATE	--	4
GUARD/GUIDE RAIL	3,000	--
CABLE	0	--
NON-CABLE	3,000	--
GUARD/GUIDE WALL	0	--
BOLLARD	0	--
TEMPORARY BARRIER	0	--
NON TEMP/BOLLARD	0	--
INTERSECTION	--	52
LOW WATER CROSSING	0	0
MILE MARKER	--	0
OVERPASS	--	0
PARK BOUNDARY	--	1
PAVED DITCH	0	--
PULLOUT	259	2
RAILROAD CROSSING	--	0
RETAINING WALL	0	0
SIGN	--	87
STATE BOUNDARY	--	0
TRAFFIC LIGHT	--	0
TUNNEL	0	0

## GUMO: DCV ROUTE MAINTENANCE FEATURES SUMMARY

FEATURE	ROUTE 0010 MCKITTRICK CANYON ROAD	ROUTE 0100 FRIOLE VISITOR CENTER ROAD	ROUTE 0101 PINE CANYON DRIVE	ROUTE 0200 PINE SPRINGS CAR CAMPGROUND	ROUTE 0400 PRATT DRIVE	ROUTE 0403 PARK VIEW DRIVE	UNIT
BRIDGE	0	0	0	0	0	0	EACH
CATTLE GUARD	1	0	0	0	1	0	EACH
CULVERT	4	0	5	0	0	0	EACH
CURB	63	0	16	0	0	0	LINEAR FEET
DROP INLET	0	0	0	0	0	0	EACH
GATE	1	0	0	0	1	0	EACH
GUARD/GUIDE RAIL	3,000	0	0	0	0	0	LINEAR FEET
CABLE	0	0	0	0	0	0	LINEAR FEET
NON-CABLE	3,000	0	0	0	0	0	LINEAR FEET
GUARD/GUIDE WALL	0	0	0	0	0	0	LINEAR FEET
BOLLARD	0	0	0	0	0	0	LINEAR FEET
TEMPORARY BARRIER	0	0	0	0	0	0	LINEAR FEET
NON TEMP/BOLLARD	0	0	0	0	0	0	LINEAR FEET
INTERSECTION	9	3	5	5	7	12	EACH
LOW WATER CROSSING	0	0	0	0	0	0	EACH
LOW WATER CROSSING	0	0	0	0	0	0	LINEAR FEET
MILE MARKER	0	0	0	0	0	0	EACH
OVERPASS	0	0	0	0	0	0	EACH
PARK BOUNDARY	0	0	0	0	0	0	EACH
PAVED DITCH	0	0	0	0	0	0	LINEAR FEET
PULLOUT	1	0	0	0	0	1	EACH
PULLOUT	95	0	0	0	0	164	LINEAR FEET
RAILROAD CROSSING	0	0	0	0	0	0	EACH
RETAINING WALL	0	0	0	0	0	0	EACH
RETAINING WALL	0	0	0	0	0	0	LINEAR FEET
SIGN	30	2	23	3	4	21	EACH
STATE BOUNDARY	0	0	0	0	0	0	EACH
TRAFFIC LIGHT	0	0	0	0	0	0	EACH
TUNNEL	0	0	0	0	0	0	EACH
TUNNEL	0	0	0	0	0	0	LINEAR FEET

Notice: Culverts and drop inlets were marked by NPS and inventoried by RIP in Cycle 5.

## GUMO: DCV ROUTE MAINTENANCE FEATURES SUMMARY

FEATURE	ROUTE 0404 BEAR CANYON VISTA	ROUTE 0405 CAPITAN VISTA	UNIT
BRIDGE	0	0	EACH
CATTLE GUARD	0	0	EACH
CULVERT	0	0	EACH
CURB	0	0	LINEAR FEET
DROP INLET	0	0	EACH
GATE	0	0	EACH
GUARD/GUIDE RAIL	0	0	LINEAR FEET
CABLE	0	0	LINEAR FEET
NON-CABLE	0	0	LINEAR FEET
GUARD/GUIDE WALL	0	0	LINEAR FEET
BOLLARD	0	0	LINEAR FEET
TEMPORARY BARRIER	0	0	LINEAR FEET
NON TEMP/BOLLARD	0	0	LINEAR FEET
INTERSECTION	5	6	EACH
LOW WATER CROSSING	0	0	EACH
LOW WATER CROSSING	0	0	LINEAR FEET
MILE MARKER	0	0	EACH
OVERPASS	0	0	EACH
PARK BOUNDARY	0	1	EACH
PAVED DITCH	0	0	LINEAR FEET
PULLOUT	0	0	EACH
PULLOUT	0	0	LINEAR FEET
RAILROAD CROSSING	0	0	EACH
RETAINING WALL	0	0	EACH
RETAINING WALL	0	0	LINEAR FEET
SIGN	1	3	EACH
STATE BOUNDARY	0	0	EACH
TRAFFIC LIGHT	0	0	EACH
TUNNEL	0	0	EACH
TUNNEL	0	0	LINEAR FEET

Notice: Culverts and drop inlets were marked by NPS and inventoried by RIP in Cycle 5.

## **STRUCTURE LIST**

No data available for this section.

**Section 9**  
**Route Maintenance Features**  
**Road Logs**



Guadalupe Mountains National Park





# GUMO: ROUTE MAINTENANCE FEATURES ROAD LOG

## ROUTE 0010: MCKITTRICK CANYON ROAD

**Notice:** Culverts and drop inlets were marked by NPS and inventoried by RIP in Cycle 5 on all paved routes.

FROM MILEPOST	TO MILEPOST	FEATURE	SIDE	COMMENT
0.000	0.000	ROUTE BEGIN	N/A	FROM ROUTE 5000 (STATE HIGHWAY 62/180)
0.000	0.000	SIGN	RIGHT	GUIDE, UNABLE TO READ FROM VIDEO
0.000	0.000	INTERSECTION	LEFT	ROUTE 5000 (STATE HIGHWAY 62/180)
0.000	0.000	SIGN	RIGHT	REGULATORY, ONE WAY
0.000	0.000	SIGN	N/A	REGULATORY, ONE WAY
0.000	0.000	SIGN	N/A	GUIDE, GRAPHIC SIGN NO TEXT
0.000	0.000	SIGN	N/A	GUIDE, EAST
0.000	0.000	SIGN	N/A	GUIDE, 62
0.000	0.000	SIGN	N/A	GUIDE, 180
0.000	0.000	SIGN	LEFT	REGULATORY, STOP
0.000	0.000	SIGN	LEFT	REGULATORY, ONE WAY
0.000	0.000	INTERSECTION	RIGHT	ROUTE 5000 (STATE HIGHWAY 62/180)
0.000	0.000	SIGN	RIGHT	REGULATORY, STOP
0.008	0.008	GATE	N/A	N/A
0.011	0.011	SIGN	LEFT	REGULATORY, STOP
0.015	0.015	SIGN	RIGHT	GUIDE, MCKITTRICK CANYON DAY USE AREA MOUNTAIN STANDARD TIME GATE OPENS 8:00 A.M. GATE CLOSSES 6:00 P.M.
0.015	0.015	SIGN	RIGHT	GUIDE, U.S. FEE AREA
0.040	0.040	SIGN	RIGHT	REGULATORY, SPEED LIMIT 35
0.059	0.059	SIGN	LEFT	WARNING, GRAPHIC SIGN NO TEXT
0.079	0.079	SIGN	LEFT	WARNING, 15 M.P.H.
0.079	0.079	SIGN	LEFT	WARNING, GRAPHIC SIGN NO TEXT
0.178	0.196	PULLOUT	RIGHT	N/A
0.199	0.199	SIGN	RIGHT	GUIDE, NATIONAL PARK SERVICE
0.199	0.199	SIGN	RIGHT	GUIDE, GUADALUPE MOUNTAINS NATIONAL PARK MCKITTRICK CANYON
0.377	0.377	SIGN	RIGHT	GUIDE, NO HUNTING OR COLLECTING OF NATURAL, HISTORIC OR PREHISTORIC OBJECTS
1.026	1.026	SIGN	RIGHT	WARNING, GRAPHIC SIGN NO TEXT
1.586	1.586	CULVERT	N/A	N/A
1.612	1.715	GUARD/GUIDE RAIL	LEFT	N/A

# GUMO: ROUTE MAINTENANCE FEATURES ROAD LOG

## ROUTE 0010: MCKITTRICK CANYON ROAD

**Notice:** Culverts and drop inlets were marked by NPS and inventoried by RIP in Cycle 5 on all paved routes.

<b>FROM MILEPOST</b>	<b>TO MILEPOST</b>	<b>FEATURE</b>	<b>SIDE</b>	<b>COMMENT</b>
1.631	1.708	GUARD/GUIDE RAIL	RIGHT	N/A
1.673	1.673	CULVERT	N/A	N/A
1.842	1.842	INTERSECTION	LEFT	UNPAVED ROUTE
1.923	1.923	SIGN	LEFT	REGULATORY, SPEED LIMIT 35
1.962	1.962	INTERSECTION	LEFT	ROUTE 0400 (PRATT DRIVE)
1.962	1.962	INTERSECTION	RIGHT	UNPAVED ROUTE
1.982	1.982	SIGN	RIGHT	REGULATORY, SPEED LIMIT 35
2.013	2.082	GUARD/GUIDE RAIL	RIGHT	N/A
2.023	2.086	GUARD/GUIDE RAIL	LEFT	N/A
2.112	2.112	CULVERT	N/A	N/A
2.112	2.112	SIGN	LEFT	WARNING, GRAPHIC SIGN NO TEXT
2.620	2.620	CULVERT	N/A	N/A
3.357	3.357	SIGN	RIGHT	WARNING, GRAPHIC SIGN NO TEXT
3.461	3.567	GUARD/GUIDE RAIL	LEFT	N/A
3.475	3.625	GUARD/GUIDE RAIL	RIGHT	N/A
3.591	3.591	INTERSECTION	LEFT	UNPAVED ROUTE
3.673	3.673	INTERSECTION	RIGHT	UNPAVED ROUTE
4.062	4.062	SIGN	LEFT	REGULATORY, BUCKLE UP IT'S FOR THEM TOO
4.080	4.080	SIGN	LEFT	WARNING, GRAPHIC SIGN NO TEXT
4.101	4.101	CATTLE GUARD	N/A	N/A
4.129	4.129	SIGN	RIGHT	REGULATORY, REDUCED SPEED AHEAD
4.138	4.138	INTERSECTION	RIGHT	UNPAVED ROUTE
4.170	4.170	SIGN	LEFT	REGULATORY, SPEED LIMIT 35
4.176	4.176	SIGN	RIGHT	REGULATORY, SPEED LIMIT 15
4.209	4.221	CURB-AND-GUTTER	RIGHT	N/A
4.221	4.221	INTERSECTION	N/A	ROUTE 0900 (MCKITTRICK CANYON VISITOR CENTER PARKING)
4.221	4.221	ROUTE END	N/A	TO ROUTE 0900 (MCKITTRICK CANYON VISITOR CENTER PARKING)

# GUMO: ROUTE MAINTENANCE FEATURES ROAD LOG

## ROUTE 0100: FRIJOLE VISITOR CENTER ROAD

**Notice:** Culverts and drop inlets were marked by NPS and inventoried by RIP in Cycle 5 on all paved routes.

<b>FROM MILEPOST</b>	<b>TO MILEPOST</b>	<b>FEATURE</b>	<b>SIDE</b>	<b>COMMENT</b>
0.000	0.000	ROUTE BEGIN	N/A	FROM ROUTE 5000 (STATE HIGHWAY 62/180)
0.000	0.000	INTERSECTION	LEFT	ROUTE 5000 (STATE HIGHWAY 62/180)
0.000	0.000	INTERSECTION	RIGHT	ROUTE 5000 (STATE HIGHWAY 62/180)
0.005	0.005	SIGN	LEFT	REGULATORY, STOP
0.025	0.025	SIGN	LEFT	REGULATORY, BUCKLE UP IT`S FOR THEM TOO
0.037	0.037	INTERSECTION	N/A	ROUTE 0100 (FRIJOLE VISITOR CENTER ROAD) UNPAVED SECTION
0.037	0.037	ROUTE END	N/A	TO END AT MP 0.69

# GUMO: ROUTE MAINTENANCE FEATURES ROAD LOG

## ROUTE 0101: PINE CANYON DRIVE

**Notice:** Culverts and drop inlets were marked by NPS and inventoried by RIP in Cycle 5 on all paved routes.

FROM MILEPOST	TO MILEPOST	FEATURE	SIDE	COMMENT
0.000	0.000	ROUTE BEGIN	N/A	FROM ROUTE 0903 (VISITOR CENTER PARKING)
0.000	0.000	SIGN	N/A	GUIDE, UNABLE TO READ FROM VIDEO
0.000	0.000	INTERSECTION	N/A	ROUTE 0903 (VISITOR CENTER PARKING)
0.000	0.000	SIGN	N/A	GUIDE, HWY 62-180 VISITOR CENTER
0.000	0.000	SIGN	N/A	GUIDE, MADRONE CIRCLE
0.006	0.006	SIGN	LEFT	REGULATORY, STOP
0.023	0.023	CULVERT	N/A	N/A
0.058	0.058	SIGN	RIGHT	GUIDE, PINE SPRINGS CAMPGROUND & TRAILHEAD VEHICLES OVER 55 FT. NOT RECOMMENDED VISITOR CENTER
0.073	0.073	SIGN	LEFT	WARNING, GRAPHIC SIGN NO TEXT
0.091	0.091	CULVERT	N/A	N/A
0.091	0.091	INTERSECTION	RIGHT	ROUTE 0903 (VISITOR CENTER PARKING)
0.118	0.118	SIGN	RIGHT	REGULATORY, SPEED LIMIT 25
0.142	0.142	SIGN	LEFT	WARNING, GRAPHIC SIGN NO TEXT
0.223	0.223	SIGN	RIGHT	GUIDE, NO HUNTING OR COLLECTING OF NATURAL, HISTORIC OR PREHISTORIC OBJECTS
0.258	0.258	SIGN	RIGHT	WARNING, GRAPHIC SIGN NO TEXT
0.288	0.288	CULVERT	N/A	N/A
0.304	0.304	CULVERT	N/A	N/A
0.304	0.304	SIGN	LEFT	WARNING, GRAPHIC SIGN NO TEXT
0.353	0.353	CULVERT	N/A	N/A
0.497	0.497	SIGN	RIGHT	WARNING, SPEED BUMP AHEAD
0.502	0.502	SIGN	LEFT	REGULATORY, SPEED LIMIT 25
0.509	0.509	SIGN	RIGHT	REGULATORY, SPEED LIMIT 15
0.512	0.512	SIGN	LEFT	WARNING, SPEED BUMP AHEAD
0.517	0.517	SIGN	RIGHT	GUIDE, AMPHITHEATER NO PROGRAM THIS EVENING
0.518	0.518	INTERSECTION	LEFT	ROUTE 0906 (AMPHITHEATER PARKING)
0.543	0.543	SIGN	RIGHT	GUIDE, DAILY CAMPING FEES \$100 PER SITE \$4.00 WITH COLDEN ACE PASSPORT
0.543	0.543	SIGN	RIGHT	GUIDE, U.S. FEE AREA
0.578	0.578	SIGN	RIGHT	GUIDE, GRAPHIC SIGN NO TEXT

# GUMO: ROUTE MAINTENANCE FEATURES ROAD LOG

## ROUTE 0101: PINE CANYON DRIVE

**Notice:** Culverts and drop inlets were marked by NPS and inventoried by RIP in Cycle 5 on all paved routes.

<b>FROM MILEPOST</b>	<b>TO MILEPOST</b>	<b>FEATURE</b>	<b>SIDE</b>	<b>COMMENT</b>
0.578	0.578	SIGN	RIGHT	GUIDE, SELF REGISTRATION
0.578	0.578	SIGN	RIGHT	GUIDE, GRAPHIC SIGN NO TEXT
0.581	0.581	INTERSECTION	LEFT	ROUTE 0200 (PINE SPRINGS CAR CAMPGROUND)
0.587	0.587	SIGN	N/A	GUIDE, GRAPHIC SIGN NO TEXT
0.602	0.605	CURB-AND-GUTTER	N/A	N/A
0.603	0.603	SIGN	N/A	REGULATORY, ONE WAY
0.605	0.605	INTERSECTION	N/A	ROUTE 0905 (RV CAMPGROUND)
0.605	0.605	ROUTE END	N/A	TO ROUTE 0905 (RV CAMPGROUND)

# GUMO: ROUTE MAINTENANCE FEATURES ROAD LOG

## ROUTE 0200: PINE SPRINGS CAR CAMPGROUND

**Notice:** Culverts and drop inlets were marked by NPS and inventoried by RIP in Cycle 5 on all paved routes.

<b>FROM MILEPOST</b>	<b>TO MILEPOST</b>	<b>FEATURE</b>	<b>SIDE</b>	<b>COMMENT</b>
0.000	0.000	ROUTE BEGIN	N/A	FROM ROUTE 0101 (PINE CANYON DRIVE) AT MP 0.58 ON LEFT
0.000	0.000	INTERSECTION	LEFT	ROUTE 0101 (PINE CANYON DRIVE)
0.000	0.000	INTERSECTION	RIGHT	ROUTE 0101 (PINE CANYON DRIVE)
0.005	0.005	SIGN	LEFT	REGULATORY, STOP
0.013	0.013	INTERSECTION	RIGHT	UNPAVED PARKING
0.026	0.026	SIGN	RIGHT	GUIDE, GRAPHIC SIGN NO TEXT
0.026	0.026	SIGN	RIGHT	GUIDE, GRAPHIC SIGN NO TEXT
0.035	0.035	INTERSECTION	LEFT	UNPAVED ROUTE
0.046	0.046	INTERSECTION	N/A	ROUTE 0200 (PINE SPRINGS CAR CAMPGROUND) UNPAVED SECTION
0.046	0.046	ROUTE END	N/A	TO END AT MP 0.40

# GUMO: ROUTE MAINTENANCE FEATURES ROAD LOG

## ROUTE 0400: PRATT DRIVE

**Notice:** Culverts and drop inlets were marked by NPS and inventoried by RIP in Cycle 5 on all paved routes.

<b>FROM MILEPOST</b>	<b>TO MILEPOST</b>	<b>FEATURE</b>	<b>SIDE</b>	<b>COMMENT</b>
0.000	0.000	ROUTE BEGIN	N/A	FROM ROUTE 0010 (MCKITTRICK CANYON ROAD) AT MP 1.96 ON LEFT
0.000	0.000	INTERSECTION	LEFT	ROUTE 0010 (MCKITTRICK CANYON ROAD)
0.000	0.000	INTERSECTION	N/A	UNPAVED ROUTE
0.000	0.000	INTERSECTION	RIGHT	ROUTE 0010 (MCKITTRICK CANYON ROAD)
0.007	0.007	SIGN	LEFT	REGULATORY, STOP
0.018	0.018	SIGN	LEFT	GUIDE, ROAD ONLY
0.019	0.019	GATE	N/A	N/A
0.060	0.060	SIGN	RIGHT	REGULATORY, SPEED LIMIT 25
0.103	0.103	SIGN	RIGHT	WARNING, GRAPHIC SIGN NO TEXT
0.193	0.193	INTERSECTION	LEFT	UNPAVED ROUTE
0.895	0.895	INTERSECTION	RIGHT	UNPAVED ROUTE
1.185	1.200	LANE DEVIATION	N/A	N/A
1.187	1.187	INTERSECTION	RIGHT	UNPAVED ROUTE
1.189	1.189	CATTLE GUARD	N/A	N/A
1.341	1.341	INTERSECTION	N/A	PAVED ROUTE (RESEARCH CENTER ENTRANCE)
1.341	1.341	ROUTE END	N/A	TO RESEARCH CENTER ENTRANCE

# GUMO: ROUTE MAINTENANCE FEATURES ROAD LOG

## ROUTE 0403: PARK VIEW DRIVE

**Notice:** Culverts and drop inlets were marked by NPS and inventoried by RIP in Cycle 5 on all paved routes.

FROM MILEPOST	TO MILEPOST	FEATURE	SIDE	COMMENT
0.000	0.000	ROUTE BEGIN	N/A	FROM ROUTE 5000 (STATE HIGHWAY 62/180)
0.000	0.000	INTERSECTION	RIGHT	ROUTE 5000 (STATE HIGHWAY 62/180)
0.000	0.000	INTERSECTION	LEFT	ROUTE 5000 (STATE HIGHWAY 62/180)
0.005	0.005	SIGN	LEFT	REGULATORY, STOP
0.011	0.011	SIGN	RIGHT	GUIDE, PARKVIEW DRIVE
0.014	0.014	SIGN	LEFT	REGULATORY, BUCKLE UP IT`S FOR THEM TOO
0.015	0.046	PULLOUT	LEFT	N/A
0.024	0.024	SIGN	RIGHT	REGULATORY, SPEED LIMIT 25
0.024	0.024	SIGN	RIGHT	WARNING, SLOW CHILDREN
0.096	0.096	SIGN	RIGHT	GUIDE, TEXAS DEPARTMENT OF TRANSPORTATION
0.112	0.112	SIGN	RIGHT	GUIDE, PARKVIEW DRIVE
0.114	0.114	SIGN	RIGHT	GUIDE, CAPITAN VISTA
0.119	0.119	INTERSECTION	RIGHT	ROUTE 0405 (CAPITAN VISTA)
0.134	0.134	SIGN	RIGHT	GUIDE, SERVICE ROAD ONLY
0.137	0.137	SIGN	RIGHT	GUIDE, UNABLE TO READ FROM VIDEO
0.141	0.141	SIGN	RIGHT	REGULATORY, SPEED LIMIT 25
0.141	0.141	SIGN	RIGHT	WARNING, SLOW CHILDREN
0.181	0.181	INTERSECTION	RIGHT	UNPAVED ROUTE
0.325	0.325	SIGN	LEFT	REGULATORY, SPEED LIMIT 15
0.325	0.325	SIGN	RIGHT	REGULATORY, SPEED LIMIT 15
0.345	0.345	SIGN	RIGHT	GUIDE, BEAR CANYON VISTA
0.345	0.345	SIGN	RIGHT	GUIDE, PARKVIEW DRIVE
0.345	0.345	INTERSECTION	RIGHT	ROUTE 0404 (BEAR CANYON VISTA)
0.355	0.355	SIGN	LEFT	GUIDE, PARKVIEW DRIVE
0.355	0.355	SIGN	LEFT	GUIDE, CHOLLA LANE
0.364	0.364	INTERSECTION	LEFT	ROUTE 0915 (SEASONAL HOUSING WEST PARKING LOT)
0.374	0.374	INTERSECTION	RIGHT	ROUTE 0913 (RESIDENCE ROAD PARKING)
0.400	0.400	INTERSECTION	LEFT	ROUTE 0916 (SEASONAL HOUSING EAST PARKING LOT)
0.407	0.407	SIGN	LEFT	GUIDE, DESERT WILLOW LANE
0.407	0.407	SIGN	LEFT	GUIDE, PARKVIEW DRIVE



# GUMO: ROUTE MAINTENANCE FEATURES ROAD LOG

## ROUTE 0403: PARK VIEW DRIVE

**Notice:** Culverts and drop inlets were marked by NPS and inventoried by RIP in Cycle 5 on all paved routes.

<b>FROM MILEPOST</b>	<b>TO MILEPOST</b>	<b>FEATURE</b>	<b>SIDE</b>	<b>COMMENT</b>
0.493	0.493	SIGN	LEFT	WARNING, UNABLE TO READ FROM VIDEO
0.505	0.505	INTERSECTION	LEFT	UNPAVED ROUTE
0.640	0.640	INTERSECTION	LEFT	ROUTE 0403 (PARK VIEW DRIVE)
0.677	0.677	INTERSECTION	LEFT	ROUTE 0403 (PARK VIEW DRIVE)
0.677	0.677	INTERSECTION	RIGHT	ROUTE 0403 (PARK VIEW DRIVE)
0.677	0.677	ROUTE END	N/A	TO END OF LOOP

# GUMO: ROUTE MAINTENANCE FEATURES ROAD LOG

## ROUTE 0404: BEAR CANYON VISTA

**Notice:** Culverts and drop inlets were marked by NPS and inventoried by RIP in Cycle 5 on all paved routes.

<b>FROM MILEPOST</b>	<b>TO MILEPOST</b>	<b>FEATURE</b>	<b>SIDE</b>	<b>COMMENT</b>
0.000	0.000	ROUTE BEGIN	N/A	FROM ROUTE 0403 (PARK VIEW DRIVE) AT MP 0.34 ON RIGHT
0.000	0.000	INTERSECTION	LEFT	ROUTE 0403 (PARK VIEW DRIVE)
0.000	0.000	INTERSECTION	RIGHT	ROUTE 0403 (PARK VIEW DRIVE)
0.004	0.004	SIGN	LEFT	REGULATORY, YIELD
0.080	0.080	INTERSECTION	LEFT	ROUTE 0404 (BEAR CANYON VISTA)
0.123	0.123	INTERSECTION	LEFT	ROUTE 0404 (BEAR CANYON VISTA)
0.123	0.123	INTERSECTION	RIGHT	ROUTE 0404 (BEAR CANYON VISTA)
0.123	0.123	ROUTE END	N/A	TO END OF LOOP

# GUMO: ROUTE MAINTENANCE FEATURES ROAD LOG

## ROUTE 0405: CAPITAN VISTA

**Notice:** Culverts and drop inlets were marked by NPS and inventoried by RIP in Cycle 5 on all paved routes.

<b>FROM MILEPOST</b>	<b>TO MILEPOST</b>	<b>FEATURE</b>	<b>SIDE</b>	<b>COMMENT</b>
0.000	0.000	ROUTE BEGIN	N/A	FROM ROUTE 0403 (PARK VIEW DRIVE) AT MP 0.11 ON RIGHT
0.000	0.000	INTERSECTION	LEFT	ROUTE 0403 (PARK VIEW DRIVE)
0.000	0.000	INTERSECTION	RIGHT	ROUTE 0403 (PARK VIEW DRIVE)
0.005	0.005	SIGN	LEFT	REGULATORY, YIELD
0.021	0.021	INTERSECTION	LEFT	ROUTE 0914B (MAINTENANCE YARD)
0.026	0.026	SIGN	RIGHT	GUIDE, UNABLE TO READ FROM VIDEO
0.049	0.049	INTERSECTION	LEFT	ROUTE 0914A (MAINTENANCE EMPLOYEE PARKING)
0.056	0.056	INTERSECTION	RIGHT	UNPAVED ROUTE
0.063	0.063	SIGN	RIGHT	GUIDE, TEXAS DEPARTMENT OF TRANSPORTATION
0.063	0.063	INTERSECTION	LEFT	PAVED ROUTE (TEXAS DOT / NON NPS)
0.063	0.063	PARK BOUNDARY	N/A	N/A
0.063	0.063	ROUTE END	N/A	TO TEXAS DOT / NON NPS AT PARK BOUNDARY

# Section 10 Appendix



## Guadalupe Mountains National Park



Federal Lands Highway  
Road Inventory Program

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

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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 vis a vis the distresses and indexes that comprise the Pavement Condition Rating (PCR), an extensive study was completed throughout 2010 that has 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. The 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.

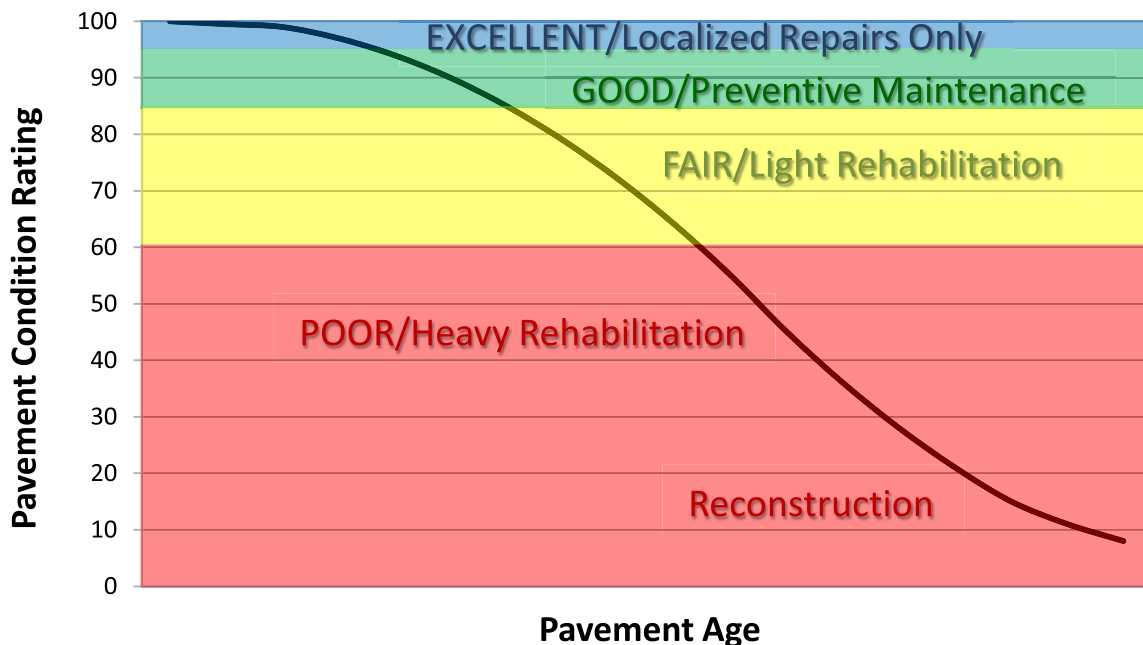
# Explanation of the Excellent, Good, Fair and Poor Condition Descriptions

In addition to the RIP Index changes that will be implemented in Cycle 5, we will also aim to 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.

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.

## Condition Categories and Treatments



## DESCRIPTION OF RATING SYSTEM

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The Federal Highway Administration (FHWA), Road Inventory Program (RIP) for the National Park Service (NPS), collects roadway condition data on paved surfaces (asphalt, concrete, brick, and cobblestone) on roads, parkways, and parking areas in national parks nationwide. The road surface condition data is collected using an automated Data Collection Vehicle (DCV). Roads having brick or cobblestone surfacing are not normally surveyed with the DCV, but are manually rated for condition rating.

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 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. In truth, the FHWA RIP distress types are similar to those described in the LTPP manual with some modifications. This 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 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, 168 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**

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## **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:

$$\text{Asphalt PCR} = (0.60 * \text{SCR}) + (0.40 * \text{RCI})$$

$$\text{Concrete PCR} = \text{RCI}$$

A detailed description of each distress index formula, roughness index formula, SCR and PCR is provided in this document beginning on page 23.

Each classified surface distress will fall into one or more *severity*...LOW, MEDIUM, or HIGH based on criteria listed. For each severity, an *extent* 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**

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

**\*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  $\leq 0.25$  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  $\leq 0.75$  in. (19 mm) or any crack with a mean width  $\leq 19$  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  $\leq 0.75$  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**

<b>ALLIGATOR CRACKING SEVERITY LEVELS</b>		<b>Crack Pattern</b>		
		<b>LOW</b>	<b>MED</b>	<b>HIGH</b>
<b>Crack Width</b>	<b>LOW</b>	L	M	H
	<b>MED</b>	M	M	H
	<b>HI</b>	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  $\leq 0.75$  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  $\leq 0.75$  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 patch may not exceed 0.30 mi. (0.48 km). (Any full-lane patch exceeding 0.30 mi. in length is considered a pavement change). 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**

<b>IRI Descriptions</b>	
<b>Type of Road</b>	<b>Typical IRI ( in/mile )</b>
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

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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:

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

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  $\geq 0$  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:

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



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  $\geq 0$ .

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

$$\text{PATCH\_INDEX} = 100 - 40 * (\% \text{PATCHING} / 80)$$

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:

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

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

$$\text{RUT\_INDEX} = 100 - 40 * [(\% \text{LOW} / 535) + (\% \text{MED} / 205) + (\% \text{HI} / 40)]$$

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:

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

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

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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.

<b>CAMERA SPECIFICATIONS</b>	
<b>Two Forward/ One Rear Facing</b>	
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.

<b>CAMERA SPECIFICATIONS</b>	
<b>Pavement Line Scan</b>	
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.

<b>IRI SPECIFICATIONS</b>	
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.

<b>RUTTING SPECIFICATIONS</b>	
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 Inertial Measuring Unit (IMU) to provide accurate positioning data in instances of satellite obstruction. All GPS coordinates are tied to image and linear distance measurements.

<b>GPS SPECIFICATIONS</b>	
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	+ - 0.1 degrees
Grade	+ - 0.1 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.

## Geodatabase – Background and Metadata

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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 tables 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.

## **GLOSSARY OF TERMS AND ABBREVIATIONS**

<b><u>TERM OR ABBREVIATION</u></b>	<b><u>DESCRIPTION OR DEFINITION</u></b>
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