National Park Service
U.S. Department of the Interior

PAVEMENT INVESTIGATION AND ANALYSIS REPORT

Cowpens National Battlefield (COWP)

NPS Contract No. **140P2022D0002**
NPS Task Order No. **140P2025F0167**
PMIS **334929**

July 28, 2025

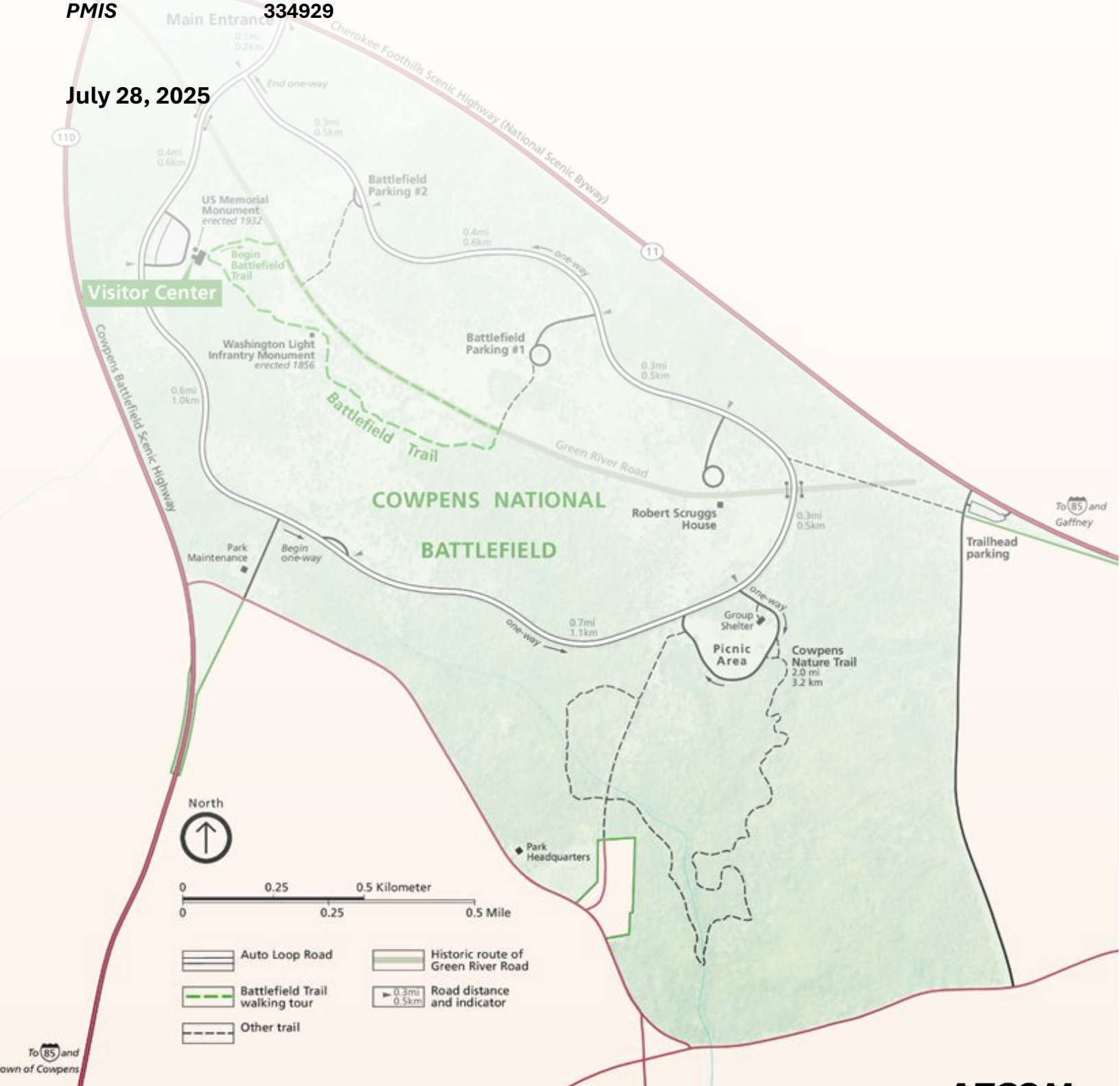


Table of Contents

1.0 Project Description 3

2.0 Scope of Work – Predesign (PD) Phase 3

2.1 Review of RIP Data 3

2.2 Review of FY19 Pavement Preservation Design Scoping Report for COWP 4

2.3 On-Site Scoping 4

3.0 Scope of Work – Design Development (DD) Phase 5

3.1 70% Design Site Visit 5

3.2 Subsurface Sampling and Investigation 5

3.3 Review of Available Traffic Data 6

3.4 Construction Summary Estimate 6

3.5 Construction Schedule Summary 6

4.0 Pavement Analysis, Findings, and Recommendations 7

Appendix A – Project Location

Appendix B – Scoping Site Visit Field Notes and Photos

Appendix C1 – Subsurface Sampling and Geotechnical Testing Data

Appendix C2 – Material Sampling Photo Documentation Log

Appendix C3 – Laboratory Test Results of Unbound Materials

Appendix D – Traffic Data for Pavement Design

Appendix E – *AASHTO 1993* Pavement Design Calculations

Appendix F – Construction Cost Estimate Summary

Appendix G – Construction Schedule Summary

1.0 Project Description

National Park System (NPS) retained AECOM Services, Inc. (AECOM) to provide engineering services related to pavement preservation at multiple parks in South Carolina. Preservation is the strategy designed to maintain and restore the overall condition of relatively new pavements that are in good to fair condition (distress severity and extent are low/moderate) by protecting them from water intrusion and limiting oxidation using treatments such as crack seal, slurry seal, chip seal, micro surfacing, and thin overlays. Pavement preservation treatments generally can extend the life of pavement in good or fair condition by 5-7 years and delay more expensive and intrusive rehabilitation activities.

As outlined in the project Scope of Services, the goal is to evaluate selected paved roads and parking areas at Cowpens National Battlefield (COWP) and identify suitable pavement preservation or rehabilitation treatments. AECOM conducted pre-design activities, including an on-site scoping site visit and review of available project documents, to perform an initial pavement assessment. The preliminary findings were documented in a Pavement Analysis Report dated February 22, 2025. This report supplements the February 2025 pavement analysis by incorporating findings from additional pavement investigations and analyses conducted by AECOM during the Design Development (DD) phase. It presents the final recommendations for pavement treatment options for the designated roads and parking areas at COWP, **in accordance with Chapter 11 of the *Federal Highway Administration (FHWA) Project Design and Development Manual*.**

To ensure continuity and completeness in documenting the pavement evaluation efforts and findings, the activities conducted during the predesign (PD) phase are discussed in Section 2 of this report, while the DD phase activities are documented in Section 3. Section 4 contains the findings and recommendations. The specific roadway and parking lot sections are listed in Table 1, and the project location is provided in Appendix A.

2.0 Scope of Work – Predesign (PD) Phase

AECOM performed the following activities at COWP during the predesign phase:

2.1 Review of RIP Data

NPS provided AECOM with the Federal Highway Administration's (FHWA) Road Inventory Program (RIP) report for COWP (*Cycle 6 Final Report – Road Inventory and Condition Assessment of Paved Road, November 2021*). AECOM reviewed the RIP report to gather the roadway inventory and current condition information for the target road and parking lot sections of COWP; i.e., sections identified by the RIP report as candidates for pavement preservation, as well as sections adjacent to these candidate sections and/or sections considered to be in similar condition. Table 1 summarizes the relevant RIP data for the candidate/added section of COWP. The added sections (shown in blue text throughout the report) are included in the 70% design plans as "Options".

Table 1: COWP Target Road/Parking Lot Sections RIP Data

ROUTE ID	ROAD	AREA (SF)	SEGMENT LENGTH (MILES)	ROADWAY WIDTH (FT)	PAVEMENT TYPE	PCR	RECOMMENDED TREATMENT
COWP-0010	MAIN ENTRANCE ROAD		0.45	20.0	Asphalt	99	Localized Repair
COWP-0011	TOUR ROAD		2.54	14.0	Asphalt	99	Localized Repair
COWP-0401	MAINTENANCE AREA ACCESS RD		0.13	18.5	Asphalt	99	Localized Repair
COWP-0900	VISITOR CENTER PARKING	63,085			Asphalt	90	Preventative Maintenance
COWP-0902	MAINTENANCE AREA	13,387			Asphalt	90	Preventative Maintenance
COWP-0903	OVERLOOK NO.1 PARKING	7,001			Asphalt	90	Preventative Maintenance
COWP-0904	SCRUGGS HOUSE PARKING	19,631			Asphalt	90	Preventative Maintenance
COWP-0905	BATTLEFIELD PARKING NUMBER 1	21,623			Asphalt	90	Preventative Maintenance
COWP-0906	BATTLEFIELD PARKING NUMBER 2	6,051			Asphalt	97	Localized Repair
COWP-0907	PICNIC AREA LOOP	41,114			Asphalt	97	Localized Repair
COWP-0913	GOV PARKING	6,303			Asphalt	90	Preventative Maintenance
COWP-0914	TRAILHEAD PARKING	18,190			Asphalt	73	L3R

Notes:

1) *PCR = Pavement Condition Rating, L3R = Light Rehabilitation, H3R = Heavy Rehabilitation*
2) *Throughout this report, Added Sections are shown in BLUE.*

2.2 Review of FY19 Pavement Preservation Design Scoping Report for COWP

NPS provided AECOM with the Design Scoping Report for the previous round of pavement preservation projects for COWP (NP-SER PMS FY19). A review of this report indicated that all COWP target sections were also considered for pavement preservation treatments as part of the FY19 project. Further discussions with the NPS team and the Park Units, along with a review of other relevant project documents, confirmed that these sections received pavement preservation under the SER PMS FY19 Project. The available project plans included four proposed preservation treatment options: 1.5 in. overlay, 0.75 in. overlay, chip seal, and micro-surfacing; however, the actual treatment selection for each road or parking lot section was left to the contractors. AECOM's visual observations regarding the most likely past pavement preservation treatments are included in Table 3.

2.3 On-Site Scoping

AECOM performed an on-site scoping field visit on November 25, 2024, along with members of the NPS project team and the COWP Park Unit team. Per the project scope, the on-site scoping field visit was conducted to evaluate the current site conditions of the park sections listed in Table 1. The project team's on-site scoping field visit activities included the following:

- Conduct tailgate safety briefings with the project team and sign Task Hazard Assessment (THA).
- Discuss the scope and objectives of the on-site field visits with the Park Unit Team.
- Gather site-specific information from the Park Unit Team including:
  - Priorities of roadways to treat,
  - Other ongoing/planned projects that may impact the planned pavement treatment work,
  - Concerns with existing roadway configurations (one-way roads),
  - Any present or anticipated changes in vehicular traffic volume and/or type within the park.

- Past safety incidents/concerns related to roadway signage reported by park users,
- Past pavement preservation/rehabilitation work at the park and experiences with those treatments,
- Any other relevant information such as staging areas, permitting requirements, etc.

- Conducting the site walk of each roadway/parking lot section to:
  - Evaluate the existing pavement condition, including estimating cracks and identifying the preliminary pavement preservation treatment.
  - Evaluate the conditions of existing curbs, gutters, wheel stops, drainage inlets, ADA ramps, etc., and note improvement requirements.
  - Provide opinion on the condition and adequacy of existing roadway and parking signage, including handicap parking signs.
  - Review the existing striping (including the need for scarifying thermoplastic prior to treatments) and the need for striping parking stalls, as well as add/relocate handicap parking spots.

The draft on-site scoping field meeting minutes were submitted to NPS on December 15, 2024, and the final meeting minutes (revised per NPS comments) were submitted to NPS on January 17, 2025. The field notes from the on-site scoping field meeting including geo-referenced photographs taken by the project team are included in Appendix B.

3.0 Scope of Work – Design Development (DD) Phase

AECOM performed the following activities during the DD phase to finalize the pavement preservation treatment recommendations for the COWP sections:

3.1 70% Design Site Visit

AECOM conducted a 70% design site walk at the park on May 21, 2025, to supplement the findings from the scoping site walk and perform a more detailed pavement condition survey. This was to finalize pavement recommendations and the 70% design deliverables. The following activities were conducted during the 70% design site walk:

- Establish the project baseline for the 70% design plans.
- Mark the core and test pit locations for the Geotechnical investigation.
- Identify the locations and conditions of existing roadway features, such as structures (bridges and culverts), signage, utility features, traffic loops, and other elements, and note any needs for improvements.
- Identify locations that need localized pavement treatments, such as full or partial depth patching and aggregate/seed mixes for shoulder support.

The findings from the 70% design site walk, along with corresponding recommendations, are incorporated into Section 4 of this report and the 70% design plans.

3.2 Subsurface Sampling and Investigation

Due to extensive pavement distress observed at the Main Entrance Road (COWP-0010, outside the entrance gate) and the Trailhead Parking Area (COWP-0914), subsurface investigation was conducted to obtain detailed pavement structure information—such as layer types, thicknesses, and engineering properties of both bound and unbound layers—to support the final treatment

recommendations. On May 30, 2025, AECOM extracted one (1) pavement core and one (1) test pit from COWP-0010, and three (3) cores and one (1) test pit from COWP-0914. Geotechnical test results are provided in Appendices C1 through C3, and the key findings are summarized below:

- **Main Entrance Road (COWP-0010)** – *Outside the park entrance gate*:
    - Asphalt thickness ranges from 2 to 3 inches.
    - A 2-inch crushed aggregate base layer is present beneath the asphalt.
    - The subgrade consists of silty sand (AASHTO classification A-7-6), with **a design resilient modulus (M_R) of 6,000 psi.**
- **Trailhead Parking (COWP-0914)**:
    - Asphalt thickness ranges from 2.75 to 4 inches, averaging approximately 3.75 inches.
    - Surface course debonding was observed in two of five cores, occurring at depths between 0.75 and 1.25 inches.
    - All four cores taken on visible cracks showed the cracking had propagated through the full asphalt depth.
    - Approximately 5 inches of aggregate base material were present, based on visual observation; this thickness was used for pavement design.
    - Subgrade soils were classified as silty sand or sandy silt with gravel (AASHTO classification A-4), with a **design M_R of 10,000 psi**.

3.3 Review of Available Traffic Data

AECOM reviewed the Year 2024 traffic counts provided by the National Park Service (NPS) at key locations within the park. Historical traffic data from the "NPS Stats Report Viewer" were also reviewed to assess long-term trends. The 2024 counts indicated an Average Daily Traffic (ADT) of 108 vehicles at the Main Gate (COWP-0010) and 43 vehicles at the Trailhead Parking Area (COWP-0914). Based on historical data from 2021 to 2024, design ADT values of 120 and 50 were selected for COWP-0010 and COWP-0914, respectively.

Although vehicle classification data were not available, the monthly count of buses (FHWA Truck Class 4) was provided. This information, combined with the design ADT, was used to estimate the 18-kip Equivalent Single Axle Load (ESAL) values for pavement design. Full traffic and ESAL calculation details are included in Appendix D. The estimated 20-year d**esign ESALs are 11,252 for COWP-0010 and 4,688 for COWP-0914**.

3.4 Construction Summary Estimate

A DD level construction cost estimate, consistent with the Department of the Interior (DOI) Estimate Type B, is being developed based on the pavement preservation treatments proposed for the parking lots and roadway sections of COWP. This estimate will be submitted as a separate deliverable with the 70% design package. A summary of the estimated construction cost, based on a DOI Estimate Type C for COWP, is included in Appendix F.

3.5 Construction Schedule Summary

A construction schedule was developed based on the pavement preservation treatments proposed for the parking lots and roadway sections of COWP, and it is included in Appendix G.

4.0 Pavement Analysis, Findings, and Recommendations

AECOM performed pavement design analysis to determine the structural adequacy of the section of COWP-0010 outside the park entrance gate and COWP-0914 parking lot to support the expected design traffic load for a 20-year service life. Pavement design calculations were performed according to the *AASHTO Guide for Design of Pavement Structures, 1993*, and in line with Chapter 11 of the *FHWA Project Design and Development Manual*. The *AASHTO 1993* design calculations are included in Appendix E, and the findings and recommendations are discussed below:

Main Entrance Road (COWP-0010) – *Outside the park entrance gate*

Based on *AASHTO 1993* design calculations, the existing pavement structure—consisting of 2 to 3 inches of asphalt over a 2-inch aggregate base with a subgrade resilient modulus (M_R) of 6,000 psi—is structurally inadequate. The pavement is in poor condition, exhibiting widespread medium- to high-severity alligator cracking. In addition to its structural deficiencies, this section is subjected to frequent stop-and-go and turning movements due to its location at the intersection with Chesnee Highway, further accelerating deterioration. **Reconstruction is recommended with a new pavement section consisting of 5 inches of asphalt over a 6-inch aggregate base** to accommodate the traffic demands and improve long-term performance.

Trailhead Parking (COWP-0914)

The trailhead parking lot consists of two distinct sections with varying pavement conditions and structural characteristics. The area near the entrance (approximately 50 feet from Hayes Road) has a thinner asphalt section—about 2.75 inches—and exhibits high-severity alligator cracking. The remainder of the lot has a thicker asphalt layer, approximately 4 inches, and shows low- to medium-severity longitudinal and transverse cracking, along with localized medium-severity alligator cracking.

Although *AASHTO 1993* design calculations show that the existing pavement is structurally sufficient, a full-depth asphalt reconstruction is recommended for the entrance area due to its poor condition. A new pavement box consisting of 5 inches of asphalt over a 6-inch aggregate base is recommended for this area, similar to the entrance at the Main Entrance Road.

The remaining area of the parking lot should be repaired with localized patching to fix the medium-severity alligator cracking, followed by a 2-inch asphalt mill and overlay. The 2-inch milling thickness is chosen because it will remove the debonding issues observed in the surface layer.

The remaining sections of COWP exhibit limited pavement surface distress and are hence considered ideal for pavement preservation treatments. The pavement conditions and treatment recommendations for each of the remaining sections of COWP are discussed in further detail below:

Main Entrance Road (COWP-0010) – *Remaining Area*

The pavement inside the entrance gate shows low-severity longitudinal and transverse cracking. Surface treatment through crack sealing and seal coating will be appropriate for this pavement.

Tour Road (COWP-0011)

The pavement contains low-severity longitudinal and transverse cracking. Pavement preservation via a surface treatment, consisting of crack sealing and seal coating, will be appropriate for this pavement.

Maintenance Area Access Road (COWP-0401) & Maintenance Area (COWP-0902)

The pavement condition is similar to that of COWP-0011; therefore, the same treatment should apply to the Maintenance Area Access Road (crack sealing and seal coating).

The Maintenance Area was not in the original project scope. However, considering that the pavement condition is similar to that of adjacent COWP-0401, COWP-0902 is being added to the 70% design plans as an option, with the same recommended treatment as COWP-0401.

Visitor Center Parking (COWP-0900) & GOV Parking (COWP-0913)

The pavement is in good condition with low-severity longitudinal and transverse cracking. Surface treatment via crack sealing and seal coating is proposed for this pavement.

The GOV Parking was not in the original project scope. However, considering that the pavement condition is similar to that of adjacent COWP-0900, COWP-0913 is being added to the 70% design plans as an option, with the same recommended treatment as COWP-0900.

Overlook Number 1 Parking (COWP-0903)

The pavement is in good condition with low-severity longitudinal and transverse cracking being the predominant distress. Surface treatment via crack sealing and seal coating is proposed for this pavement.

Scruggs House Parking (COWP-0904)

The pavement is in good condition with low-severity longitudinal and transverse cracking being the predominant distress. Surface treatment via crack sealing and seal coating is appropriate for this parking area.

Battlefield Parking Number 1 (COWP-0905)

The pavement is in good condition with low-severity longitudinal and transverse cracking being the predominant distress. Surface treatment via crack sealing and seal coating is appropriate for this parking area.

Battlefield Parking Number 2 (COWP-0906)

The pavement is in good condition with low-severity longitudinal and transverse cracking being the predominant distress. Surface treatment via crack sealing and seal coating is appropriate for this parking area.

Picnic Area Loop (COWP-0907)

The pavement is in good condition, with low-severity longitudinal and transverse cracking being the predominant distress. Surface treatment via crack sealing and seal coating is appropriate for this parking area.

The following additional design considerations apply to COWP:

- Isolated areas needing more extensive repairs, such as partial- or full-depth patches due to significant damage like high-severity alligator cracks, edge cracks, or potholes, are identified during AECOM's 70% design site visit and shown in the 70% design plans.
- Aggregate/seed mixes are recommended to fix edge-shoulder drop-off in specific areas along COWP-0010, COWP-0011, and COWP-0401. The locations and quantities of these mixes are detailed in the 70% design plans.
- The existing rubberized sidewalks at COWP-0904, COWP-0905, and COWP-0906 are in poor condition; however, the Park Unit noted that efforts are underway to improve/restore the sidewalks under separate projects.
- Due to the high volume of pedestrian and bike traffic on COWP-0010 and COWP-0011, a pedestrian/bike lane is proposed along the outbound lane of these roads (COWP-0010 and the two-way traffic portion of COWP-0011), marked with pavement markings and signage.
- Other signage improvements are recommended, including "Wrong Way" signs along the one-way traffic portion of COWP-0011 at COWP-0904, COWP-0905, COWP-0906, and COWP-0907 to restrict right turns while exiting the respective parking areas.
- Revising structural grading is not a part of this pavement preservation project but the observed adverse drainage conditions (water ponding issues, failed/deteriorated drainage structures, etc.) were noted during the site scoping field visit. Minor grade corrections will be achieved via asphalt mill and overlay treatments, where such treatments are recommended. The table below includes the drainage condition observations for each COWP section:

Table 2: Drainage Observations for COWP Sections

Route ID	Drainage Observation
COWP-0010	4 pipe culverts (one 36" RCP, and three CMP culverts) in good condition
COWP-0011	2 CMP culverts in good condition
COWP-0401	None
COWP-0900	Catch basins in good condition
COWP-0902	Pavement drainage swale in fair condition (cracks to be sealed)
COWP-0903	CMP culvert in fair condition
COWP-0904	CMP culvert (needs cleaning)
COWP-0905	CMP culvert in good condition
COWP-0906	None
COWP-0907	CMP culverts in fair condition (needs cleaning)
COWP-0913	None
COWP-0914	RCP culvert in good condition

Below is a summary of the findings and recommendations for each park section based on the pavement investigation and analysis results:

Table 3: Findings and Recommendations for Each COWP Road/Parking Lot Section

Route ID	Previous Preservation Treatment (FY19)[1]	From the RIP Report		From AECOM's Field Scoping Site Visit			Comment / Reasons for Variance
		PCR	Recommended Treatment[2]	Overall Pavement Condition	Predominant Distress	Treatment Recommendation	
COWP-0010	Microsurfacing	99	Localized Repair	Good	Thermal (L&T) cracking Alligator cracking	Entrance: Reconstruction Rest: Crack seal & seal coat w/ localized patching	The area near the entrance is in much worse condition than the RIP reported.
COWP-0011	Microsurfacing	99	Localized Repair	Good	Thermal (L&T) cracking	Crack seal & seal coat	No localized repair needs were observed during site visits.
COWP-0401	Microsurfacing	99	Localized Repair	Good	Edge cracking	Crack seal & seal coat w/ localized patching	
COWP-0900	Microsurfacing	90	Preventative Maintenance	Good	Thermal (L&T) cracking	Crack seal & seal coat	
COWP-0902	Microsurfacing	90	Preventative Maintenance	Good	Thermal (L&T) cracking	Crack seal & seal coat	
COWP-0903	Microsurfacing	90	Preventative Maintenance	Good	Thermal (L&T) cracking	Crack seal & seal coat	
COWP-0904	Microsurfacing	90	Preventative Maintenance	Good	Thermal (L&T) cracking	Crack seal & seal coat	
COWP-0905	Microsurfacing	90	Preventative Maintenance	Good	Thermal (L&T) cracking	Crack seal & seal coat	
COWP-0906	Microsurfacing	97	Localized Repair	Good	Thermal (L&T) cracking	Crack seal & seal coat	No localized repair needs were observed during site visits. The recommended treatment was changed from localized repair to preventive maintenance.
COWP-0907	Microsurfacing	97	Localized Repair	Good	Thermal (L&T) cracking Alligator cracking	Crack seal & seal coat	
COWP-0913	Microsurfacing	90	Preventative Maintenance	Good	Thermal (L&T) cracking	Crack seal & seal coat	
COWP-0914	Microsurfacing	73	L3R	Fair to Poor	Thermal (L&T) cracking Alligator cracking	Reconstruction 2" Mill & Overlay w/ Localized Patching	The area near the west entrance is in much worse condition than the RIP reported.

Notes:

1) The most likely previous pavement preservation treatment based on the visual observations during the on-site scoping site visit.
2) Per the RIP Report, below are the descriptions of the recommended treatment categories:
    a. Localized Repair: Pavement in "Excellent" condition (PCR = 95-100). Treatment includes spot repairs.
    b. Preventative Maintenance: Pavement in "Good" condition (PCR = 85-95). Treatments include crack sealing, chip seal, slurry seal, micro-surfacing, thin/ ultrathin overlay, concrete joint sealing, diamond grinding, dowel-bar retrofit, and isolated, partial or full-depth concrete slab repairs.
    c. Light Rehabilitation: Pavement in "Fair" condition (PCR = 60-85). Treatment includes single-lift overlay up to 2.5" and milling and overlaying.
    d. Heavy Rehabilitation: Pavement in "Poor" condition (PCR < 60). Treatment includes multi-lift overlay > 2.5".
    e. Reconstruction: Pavement in "Poor" condition (PCR < 60). Treatment includes replacing the entire existing pavement structure.

Note that the overall pavement conditions were rated as Good/Fair/Poor based on AECOM's on-site scoping field visit observations. Standard pavement engineering practices were applied to determine such rating, a summary of which is included below for reference:

"Good" pavement condition:

- Pavement has minimal surface defects.
- No significant cracks, potholes, or raveling (loss of aggregate).
- Minimum aging (surface color remains dark, indicating minimal loss of asphalt binder due to oxidation).
- Maintenance treatments, e.g., seal coating, crack sealing, etc. are appropriate for a "Good" condition pavement.

"Fair" pavement condition

- Some visible signs of wear, such as minor cracks (hairline to ¼ inch wide).
- Early signs of aging (fading asphalt color).
- Some surface raveling or minor depressions but no major structural issues.
- Patching or previous repairs are intact.
- Heavier preservation treatments, such as localized repair, micro surfacing, or resurfacing are considered to treat a pavement in "Fair" condition.

"Poor" Condition

- Extensive cracking, including alligator (interconnected) cracks or wide transverse/longitudinal cracks (>¼ inch).
- Potholes, ruts, or significant depressions present, causing uneven surfaces.
- Medium to severe raveling or aggregate loss, leading to rough texture.
- Potential water pooling or drainage issues.
- Previous patches or repairs are deteriorating or failing.
- The pavement may be a candidate for a mill and overlay treatment or full-depth reconstruction.

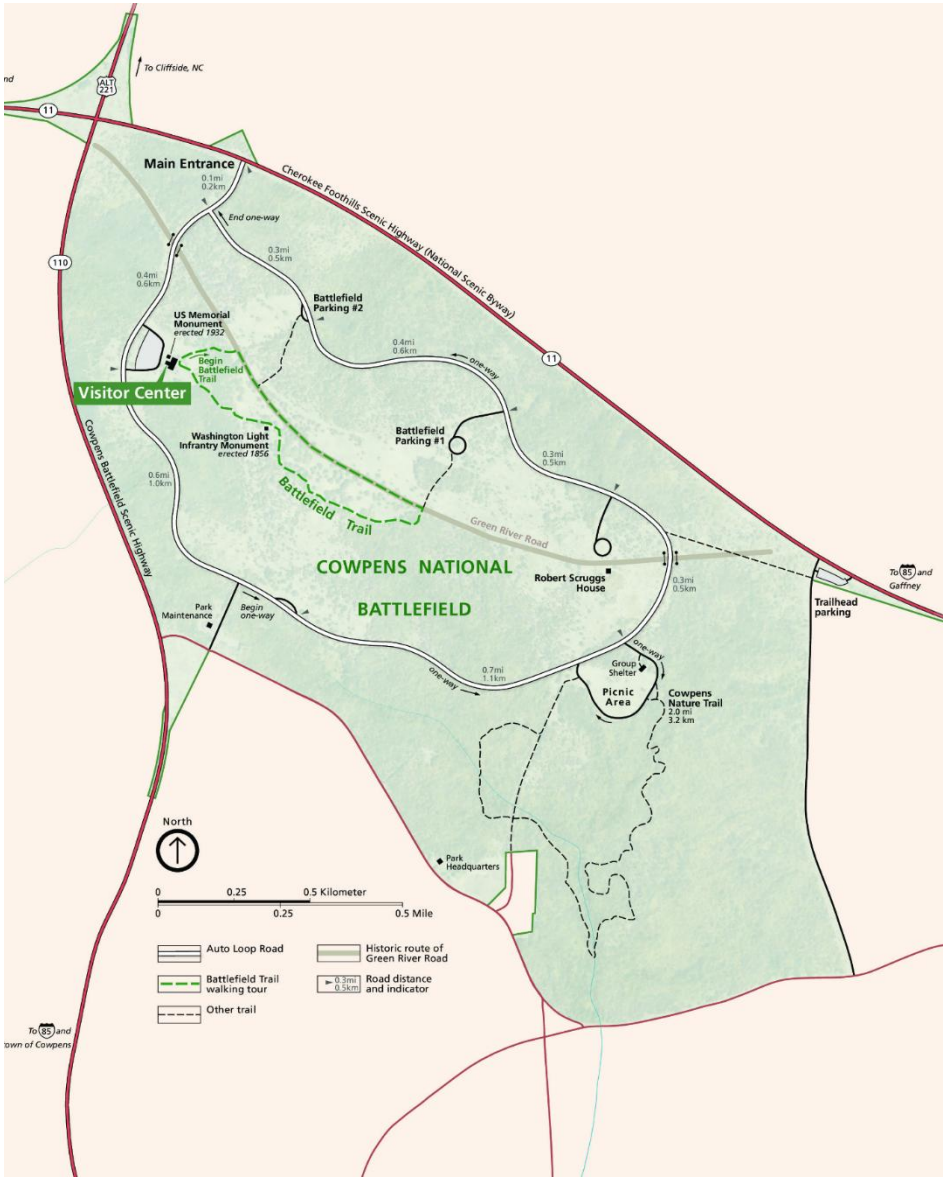
Depending on the treatment types, pavement preservation activities generally can extend the life of a pavement by 5-10 years. For reference, the table below provides a general guideline on the expected performances of the different preservation treatments *(when applied to a pavement in appropriate condition)*:

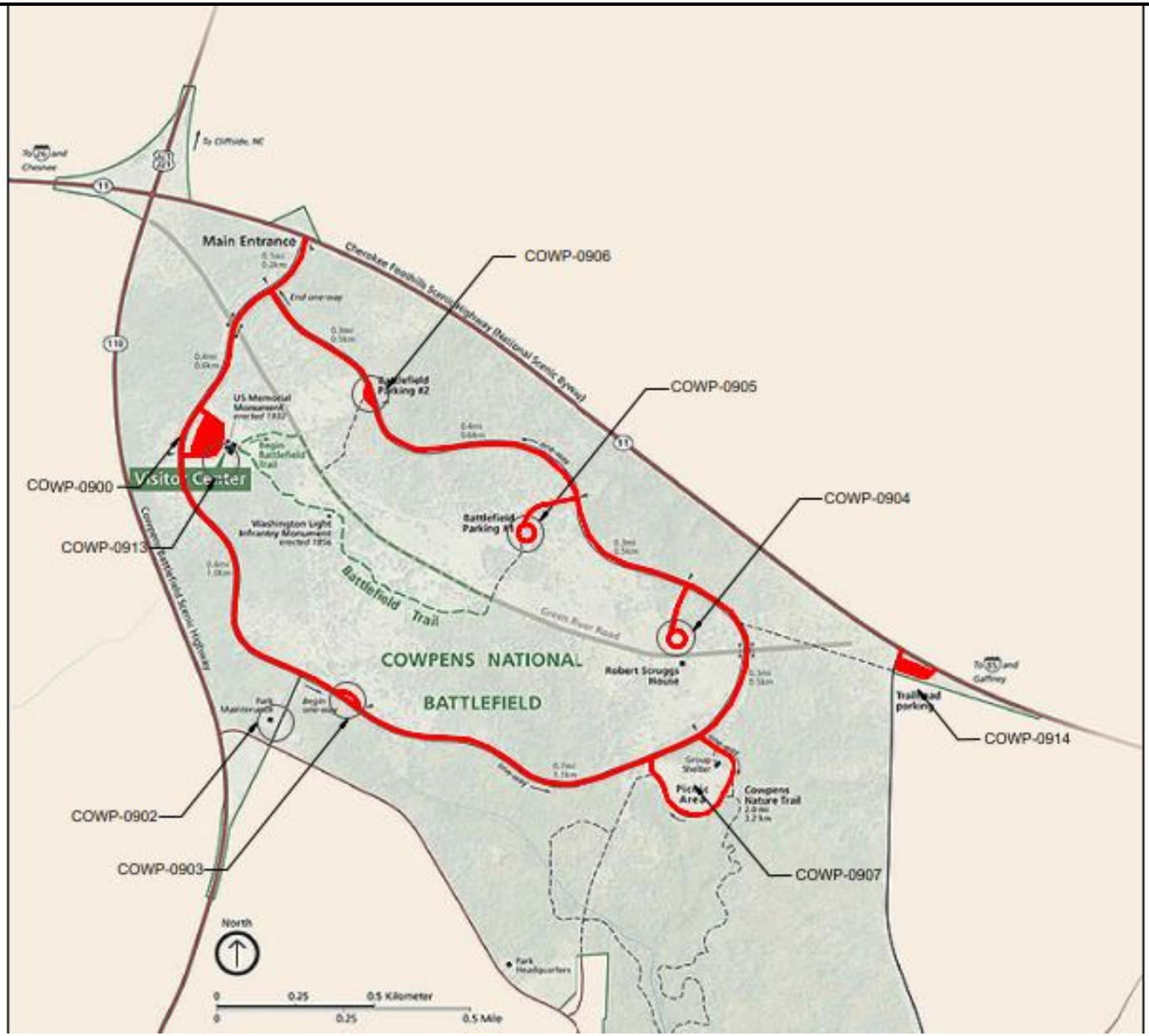
Table 4: "Expected" Performance Period of Typical Pavement Preservation Treatments

Treatment	Expected Performance (Years)
Crack Sealing + Seal Coating (Slurry Seal)	5-7
Microsurfacing	6-8
Thin Overlay	8-10
Non-structural Mill and Overlay	10+

Appendix A – Project Location

COWP


To Cliffside, NC
ALT 221
11
110
Main Entrance
0.1mi 0.2km
End one-way
Cherokee Foothills Scenic Highway (National Scenic Byway)
0.3mi 0.5km
0.4mi 0.6km
Battlefield Parking #2
US Memorial Monument erected 1932
Begin Battlefield Trail
Visitor Center
one-way
Washington Light Infrantry Monument erected 1856
Battlefield Parking #1
0.6mi 1.0km
Battlefield Trail
Green River Road
COWPENS NATIONAL BATTLEFIELD
Robert Scruggs House
Cowpens Battlefield Scenic Highway
Park Maintenance
Begin one-way
0.7mi 1.1km
Group Shelter
Picnic Area
Cowpens Nature Trail 2.0 mi 3.2 km
Trailhead parking
To 85 and Gaffney
North
Park Headquarters
0 0.25 0.5 Kilometer
0 0.25 0.5 Mile
Auto Loop Road
Historic route of Green River Road
Battlefield Trail walking tour
Road distance and indicator
Other trail
To 85 and Town of Cowpens


Main Entrance
COWP-0906
COWP-0905
COWP-0904
COWP-0900
COWP-0913
COWP-0914
COWP-0902
COWP-0903
COWP-0907
Visitor Center
Battlefield Trail
COWPENS NATIONAL
BATTLEFIELD
Robert Scruggs Route
Cowpens Nature Trail
Green River Road
North
0 0.25 0.5 Kilometer
0 0.25 0.5 Mile

Appendix B – Scoping Site Visit Field Notes and Photos

COWP-0010: Main Entrance Road

Section Length/Area	0.45 Miles	**Other Observations**	Proposed Bike/Ped. Lane (outbound lane)
Pavement Type	Asphalt	**Curb**	Concrete curb[1] (Fair/Poor)
RIP Data (PCR)	99	**Sidewalk**	None
Overall Pavement Condition	Good	**Drainage Structure**	Pipe Culverts[1]
Predominant Distress	Alligator cracking[1], Block cracking L&T cracking	**Road Signs**	Good. Proposed "Walking Sharrows"
Recommended Treatment	Entrance: Reconstruction Rest: Crack seal & seal coat w/ localized patching	**Handicap Parking**	None
Geotechnical Testing	1 Core & 1 test pit	**Existing Striping**	Thermoplastic DYCL (Good/Fair)

Notes:

1. *Locations on marked plan.*

Section	Distress		Treatment
1	M/H L	Alligator Cracking 400 SF L&T Cracking 1200'	Entrance: Reconstruction Rest: Crack seal & seal coat w/ localized patching

Legend:

L&T – Longitudinal & Transverse Cracking
L, M, H – Low, Medium, or High severity cracks
DYCL – Double Yellow Center Line Striping
CMP – Corrugated Metal Pipe
RCP – Reinforced Concrete Pipe

COWP-0010: Main Entrance Road

❶ **Lat/Long:** 35.13745,-81.819519
L-L&T/Block Cracking

❷ **Lat/Long:** 35.137256,-81.819397
Microsurfacing delaminating. Damaged concrete curb

❸ **Lat/Long:** 35.141769,-81.815903
M-Alligator Cracking (proposed patch)

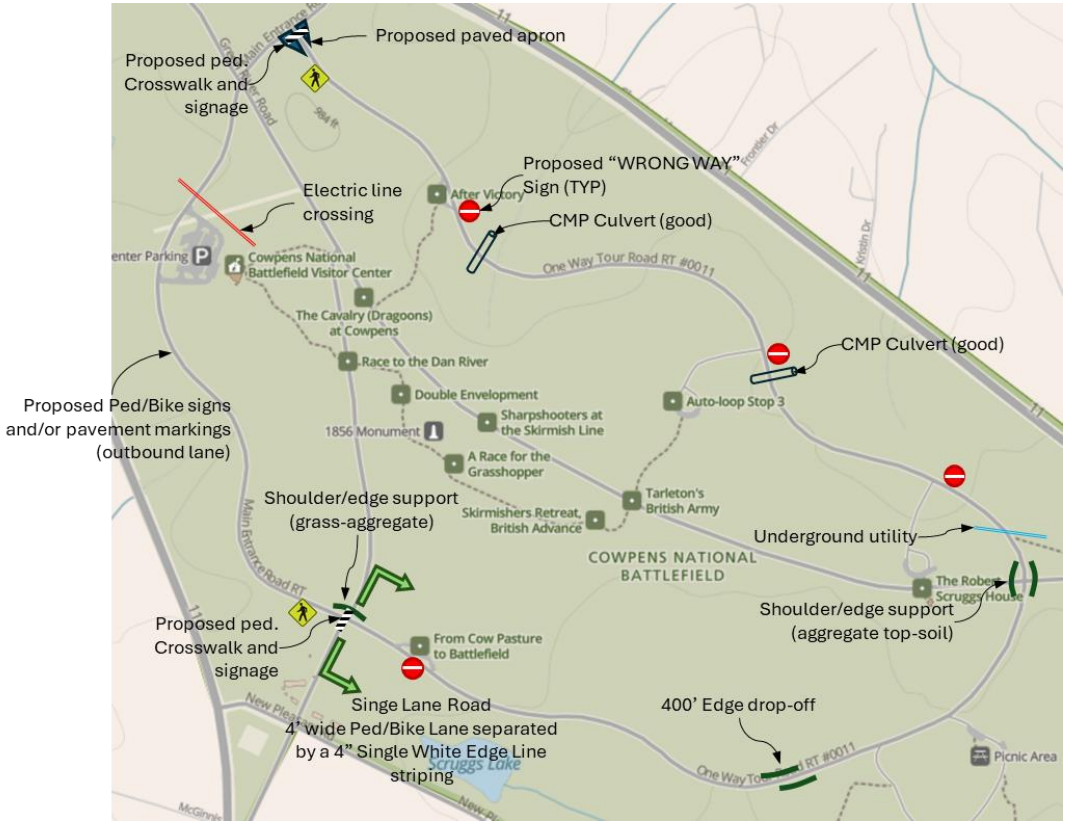
❹ **Lat/Long:** 35.139897,-81.817969
Edge drop-off (proposed edge support)

COWP-0011: Tour Road

Section Length/Area	2.54 Mile	**Other Observations**	Proposed Bike/Ped. Lane (outbound lane)
Pavement Type	Asphalt	**Curb**	None
RIP Data (PCR)	99	**Sidewalk**	None (shared Ped./Bike lane)[1]
Overall Pavement Condition	Good	**Drainage Structure**	Pipe culverts
Predominant Distress	L&T/Block cracking	**Road Signs**	Proposed WRONG WAY & Ped/Bike signs[1]
Recommended Treatment	Crack Seal & Seal Coat	**Handicap Parking**	None
Geotechnical Testing	None	**Existing Striping**	Thermoplastic paint (Fair)

Notes:

1. *Locations on the marked plan.*



Section	Distress		Treatment
1	L	Block Cracking	Crack Seal & Seal Coat

Legend:

L&T – Longitudinal & Transverse cracking
L, M – Low or Medium severity cracks
CMP – Corrugated Metal Pipe

COWP-0011: Tour Road

❶ **Lat/Long:** 35.13557,-81.819385
L-Block Cracking.

❷ **Lat/Long:** 35.131073,-81.816066
Beginning of one-way road with shared Ped/Bike lane.

❸ **Lat/Long:** 35.135539,-81.819436
L-Block Cracking. Thermoplastic Double Yellow Center Line (Fair).

❹ **Lat/Long:** 35.131006,-81.815886
Proposed seed-aggregate edge support.

COWP-0401: Maintenance Area Access Road

Section Length/Area	0.13 Miles	**Other Observations**	
Pavement Type	Asphalt	**Curb**	None
RIP Data (PCR)	99	**Sidewalk**	None
Overall Pavement Condition	Good	**Drainage Structure**	None
Predominant Distress	Edge cracking[1]	**Road Signs**	Okay
Recommended Treatment	Crack Seal & Seal Coat	**Handicap Parking**	None
Geotechnical Testing	None	**Existing Striping**	Thermoplastic (Fair)

Notes:

1. *Locations on the marked plan.*

Section	Distress	Treatment
1	M Edge Cracking 100' L L&T Cracking 40'	Crack Seal & Seal Coat

Legend:

L&T – Longitudinal & Transverse cracking
L, M – Low or Medium severity cracks

COWP-0401: Maintenance Area Access Road

❶ **Lat/Long:** 35.130772,-81.815986
M-Edge Cracking

❷ **Lat/Long:** 35.129744,-82.816663
L-L&T Cracking.

❸ **Lat/Long:** 35.130517,-81.816139
M-Edge Cracking

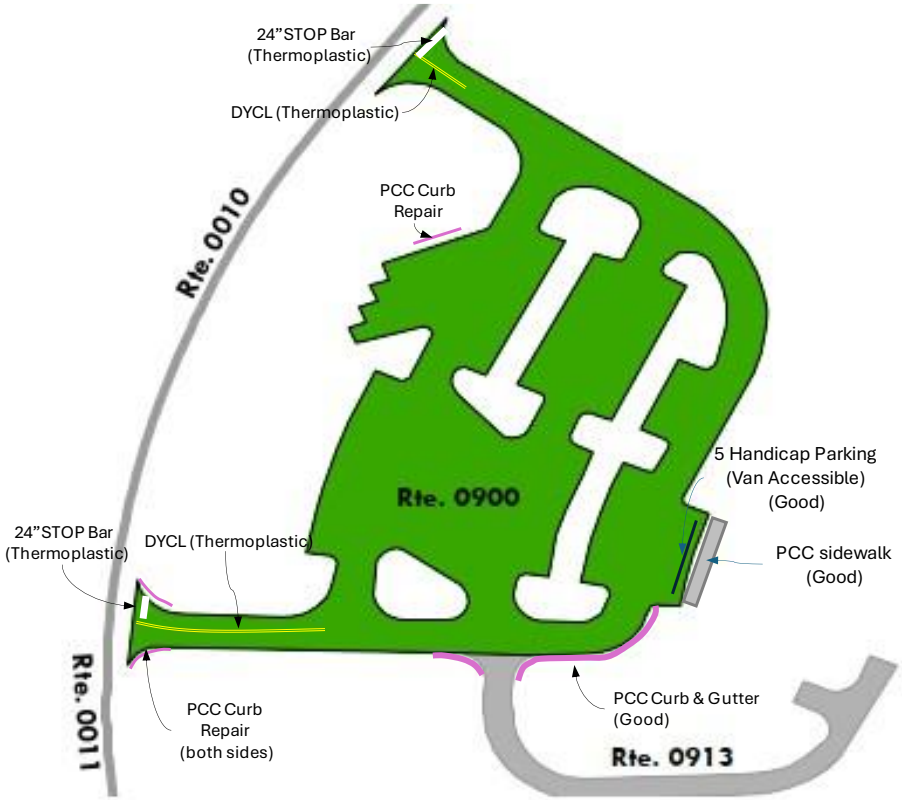
❹ **Lat/Long:** 35.130919,-81.815942
Minimum pavement distress. Thermoplastic striping (Fair)

COWP-0900: Visitor Center Parking

Section Length/Area	63,085 SF	**Other Observations**	
Pavement Type	Asphalt	**Curb**	PCC curbs (low reveal) (need repair[1]) Possible paved-over curb & gutter
RIP Data (PCR)	90	**Sidewalk**	PCC sidewalk (Good)
Overall Pavement Condition	Good	**Drainage Structure**	Catch basins (Good)
Predominant Distress	L&T Cracking	**Road Signs**	Okay
Recommended Treatment	Crack seal & seal coat	**Handicap Parking**	5 (Van access)
Geotechnical Testing	None	**Existing Striping**	Thermoplastic Stop bar & DYCL Other striping: regular paint (Fair)

Notes:

1. *Locations on marked plan.*



Section	Distress		Treatment
1	L	L&T Cracking 2,900'	Crack seal & seal coat

Legend:

L, M – Low or Medium severity cracks
L&T – Longitudinal & Transverse cracks
DYCL – Double Yellow Center Line striping.

COWP-0900: Visitor Center Parking

❶ **Lat/Long:** 35.136781,-81.818519
L-L&T Cracking. Handicap parking with signage (Good). PCC sidewalk (Good).

❷ **Lat/Long:** 35.136678,-81.818558
Microsurfacing delaminated

❸ **Lat/Long:** 35.136561,-81.819519
L-L&T Crack. Thermoplastic striping (Fair)

❹ **Lat/Long:**35.137342,-81.818917
Curb damage repair area, catch basin (Good).

COWP-0902: Maintenance Area (Added)

Section Length/Area	13,387 SF	**Other Observations**	
Pavement Type	Asphalt	**Curb**	None
RIP Data (PCR)	90	**Sidewalk**	None
Overall Pavement Condition	Good	**Drainage Structure**	Pavement drainage swale (cracks to be sealed)
Predominant Distress	L&T Cracking	**Road Signs**	Okay
Recommended Treatment	Crack Seal & Seal Coat	**Handicap Parking**	None
Geotechnical Testing	None	**Existing Striping**	None

Notes:

1. *The section was part of the SER-PMS-FY2019 project along with COWP-0401.*

Section	Distress		Treatment
1	L	L&T Cracking 300’	Crack Seal & Seal Coat

Legend:

L, M – Low or Medium severity cracks
L&T – Longitudinal & Transverse cracks

COWP-0902: Maintenance Area (Added)

❶ **Lat/Long:** 35.129863,-81.816896
L-L&T Cracking. Water valve.

❷ **Lat/Long:** 35.129912,-81.81682
L-L&T Cracking. Pavement drainage swale (cracks to be sealed)

❸ **Lat/Long**: 35.129862, -81.816815
Outfall area/drainage swale needs cleaning

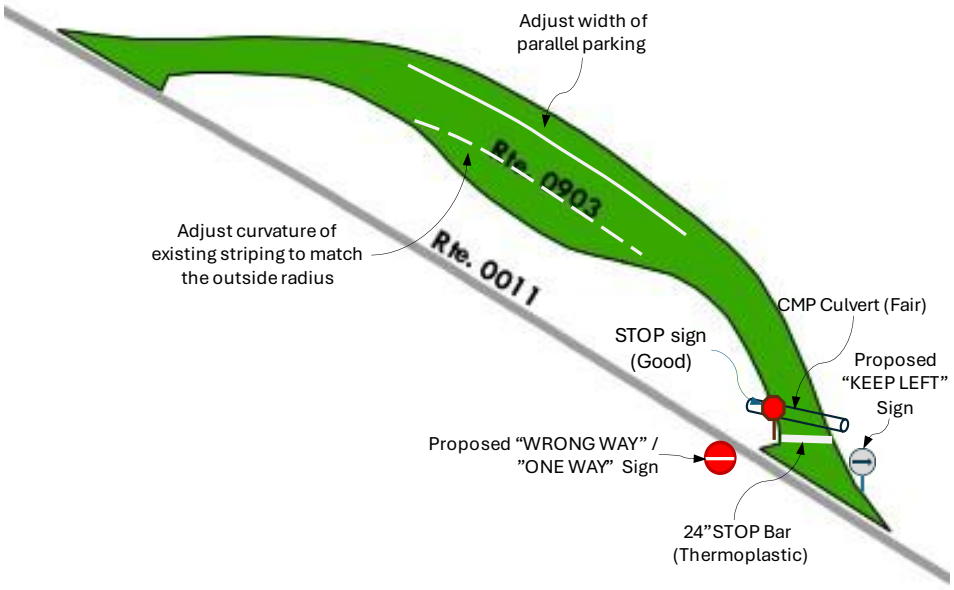
❹ **Lat/Long:** 35.129780, -81.816696
L-L&T Cracking.

COWP-0903: Overlook No.1 Parking

Section Length/Area	7,001 SF	**Other Observations**	Parallel parking spaces to be widened
Pavement Type	Asphalt	**Curb**	None
RIP Data (PCR)	90	**Sidewalk**	None
Overall Pavement Condition	Good	**Drainage Structure**	CMP culvert (Fair)[1]
Predominant Distress	L&T Cracking	**Road Signs**	Okay
Recommended Treatment	Surface treatment	**Handicap Parking**	None
Geotechnical Testing	None	**Existing Striping**	Thermoplastic Stop bar Other striping: regular paint (Fair)

Notes:

1. *Locations on the marked plan.*

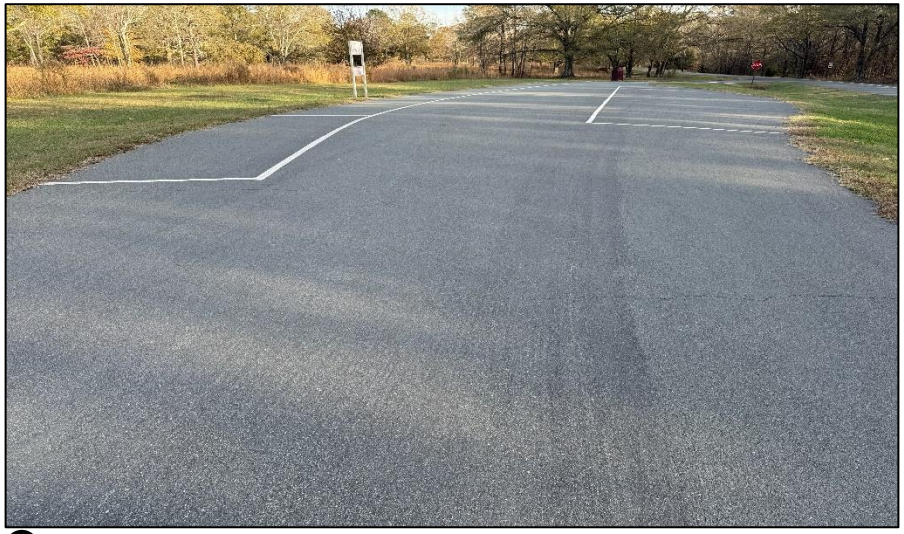


Section		Distress	Treatment
1	L	L&T Cracking 350'	Crack Seal & Seal Coat

Legend:

L, M – Low or Medium severity cracks
L&T – Longitudinal & Transverse cracks
CMP – Corrugated Metal Pipe

COWP-0903: Overlook No.1 Parking



❶ **Lat/Long:** 35.130569,-81.814614
L-L&T Cracking. Parallel parking spots to be widened

❷ **Lat/Long:** 35.130372,-81.814239
L-L&T Cracking

❸ **Lat/Long:** 35.130275,-81.814164
CMP culvert in fair condition

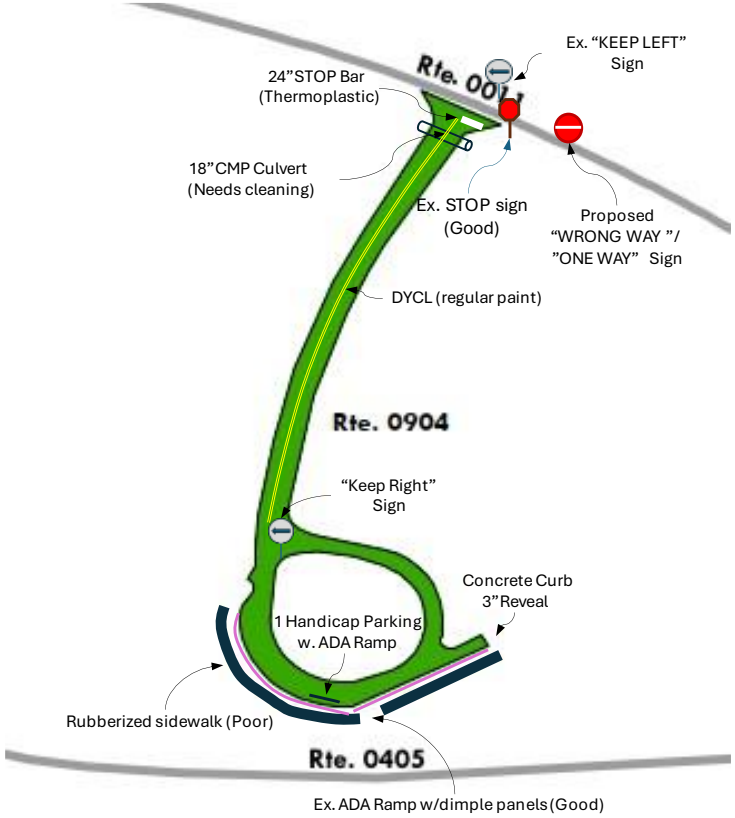
❹ **Lat/Long** :35.13025,-81.814147
Stop sign (Good) and thermoplastic stop bar (Fair)

COWP-0904: Scruggs House Parking

Section Length/Area	19,631 SF	**Other Observations**	
Pavement Type	Asphalt	**Curb**	PCC curbs[1] (Good)
RIP Data (PCR)	90	**Sidewalk**	Rubberized sidewalk[1] (Poor)
Overall Pavement Condition	Good	**Drainage Structure**	CMP culvert[1] (Good)
Predominant Distress	L&T Cracking	**Road Signs**	Okay
Recommended Treatment	Surface treatment	**Handicap Parking**	1 (Van access)
Geotechnical Testing	None	**Existing Striping**	Thermoplastic Stop bar Other striping: regular paint (Fair)

Notes:

1. *Locations on marked plan.*



Section	Distress		Treatment
1	L	L&T Cracking 1,150'	Crack Seal & Seal Coat

Legend:

L, M – Low or Medium severity cracks
L&T – Longitudinal & Transverse cracks
DYCL – Double Yellow Center Line striping
CMP – Corrugated Metal Pipe

COWP-0904: Scruggs House Parking

❶ **Lat/Long:** 35.132872,-81.804298
L-L&T Cracking.

❷ **Lat/Long:** 35.132534,-81.804455
L-L&T Cracking

❸ **Lat/Long:** 35.131898,-81.80464
L-L&T Crack. PCC curb & rubberized sidewalk

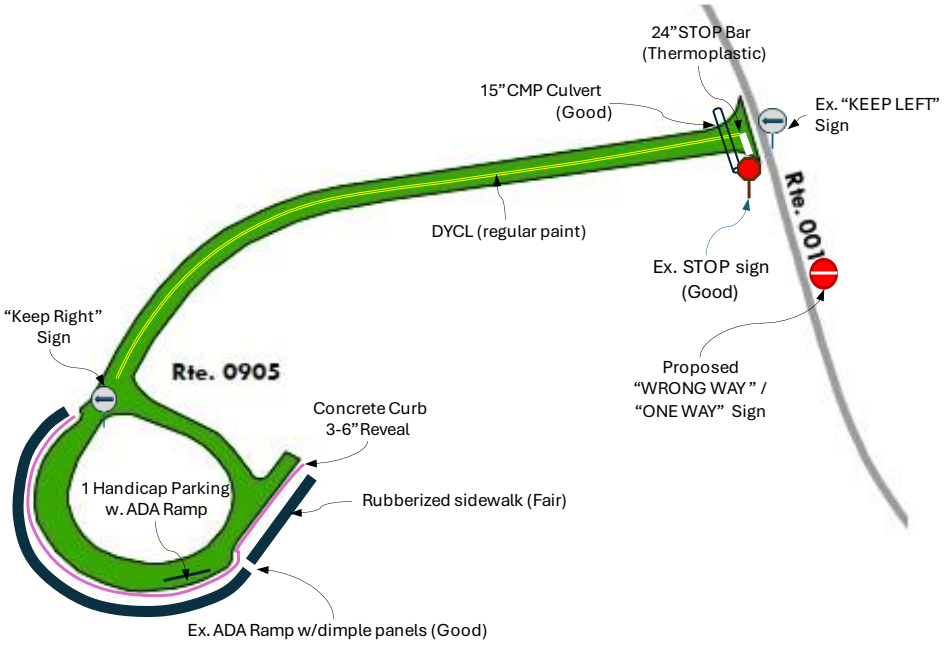
❹ **Lat/Long:**35.132953,-81.804178
CMP culvert (Good).

COWP-0905: Battlefield Parking Number 1

Section Length/Area	21,623 SF	**Other Observations**	
Pavement Type	Asphalt	**Curb**	PCC curbs[1] (Good)
RIP Data (PCR)	90	**Sidewalk**	Rubberized sidewalk[1] (Poor)
Overall Pavement Condition	Good	**Drainage Structure**	CMP culvert[1] (Good)
Predominant Distress	L&T Cracking	**Road Signs**	Okay
Recommended Treatment	Surface treatment	**Handicap Parking**	1 (Van access)
Geotechnical Testing	None	**Existing Striping**	Thermoplastic Stop bar Other striping: regular paint (Fair)

Notes:

1. *Locations on marked plan.*



Section	Distress		Treatment
1	L	L&T Cracking 1,700'	Crack Seal & Seal Coat

Legend:

L, M – Low or Medium severity cracks
L&T – Longitudinal & Transverse cracks
DYCL – Double Yellow Center Line striping
CMP – Corrugated Metal Pipe

COWP-0905: Battlefield Parking Number 1

❶ **Lat/Long:** 35.135418,-81.807679
L-L&T Cracking

❷ **Lat/Long:** 35.134739,-81.809144
L-L&T Crack. PCC curb & rubberized sidewalk

❸ **Lat/Long:** 35.13475,-81.809006
L-L&T Crack

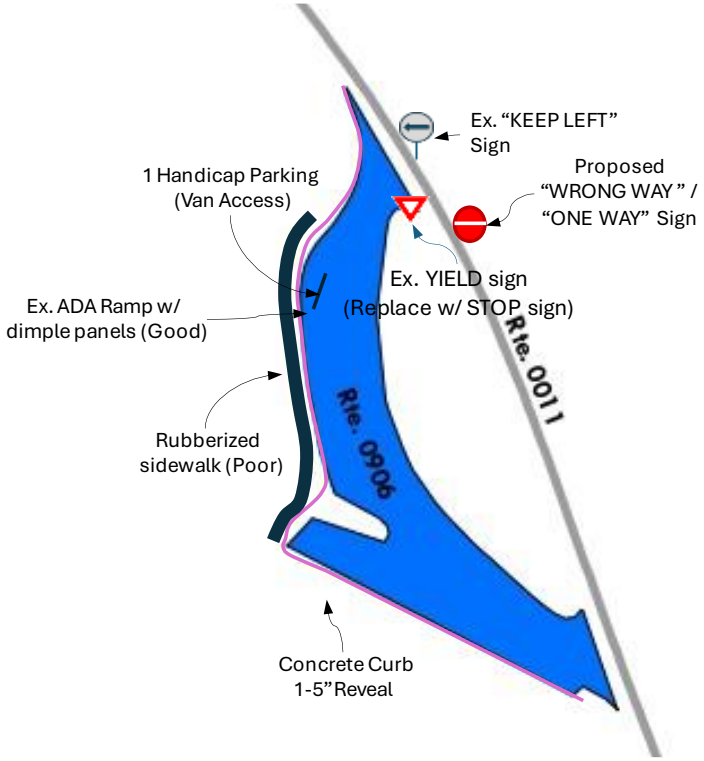
❹ **Lat/Long :**35.135514,-81.807594
CMP culvert (Good)

COWP-0906: Battlefield Parking Number 2

Section Length/Area	6,051 SF	**Other Observations**	
Pavement Type	Asphalt	**Curb**	PCC curbs[1] (Good)
RIP Data (PCR)	97	**Sidewalk**	Rubberized sidewalk[1] (Failed)
Overall Pavement Condition	Good	**Drainage Structure**	None
Predominant Distress	L&T Cracking	**Road Signs**	Proposed "WRONG WAY" sign. Replace existing "Yield" w/ STOP sign (for consistency)
Recommended Treatment	Surface treatment	**Handicap Parking**	1 (Van access)
Geotechnical Testing	None	**Existing Striping**	Regular paint (Fair)

Notes:

1. *Locations on marked plan.*



Section	Distress	Treatment
1	L L&T Cracking 500'	Crack Seal & Seal Coat

Legend:

L, M – Low or Medium severity cracks
L&T – Longitudinal & Transverse cracks

COWP-0906: Battlefield Parking Number 2

❶ **Lat/Long:** 35.137869,-81.813919
L-L&T Cracking.

❷ **Lat/Long:** 35.137912,-81.813944
L-L&T Cracking. Rubberized sidewalk (Poor)

❸ **Lat/Long:** 35.137931,-81.813956
L-L&T Crack. Handicap parking (van accessible)

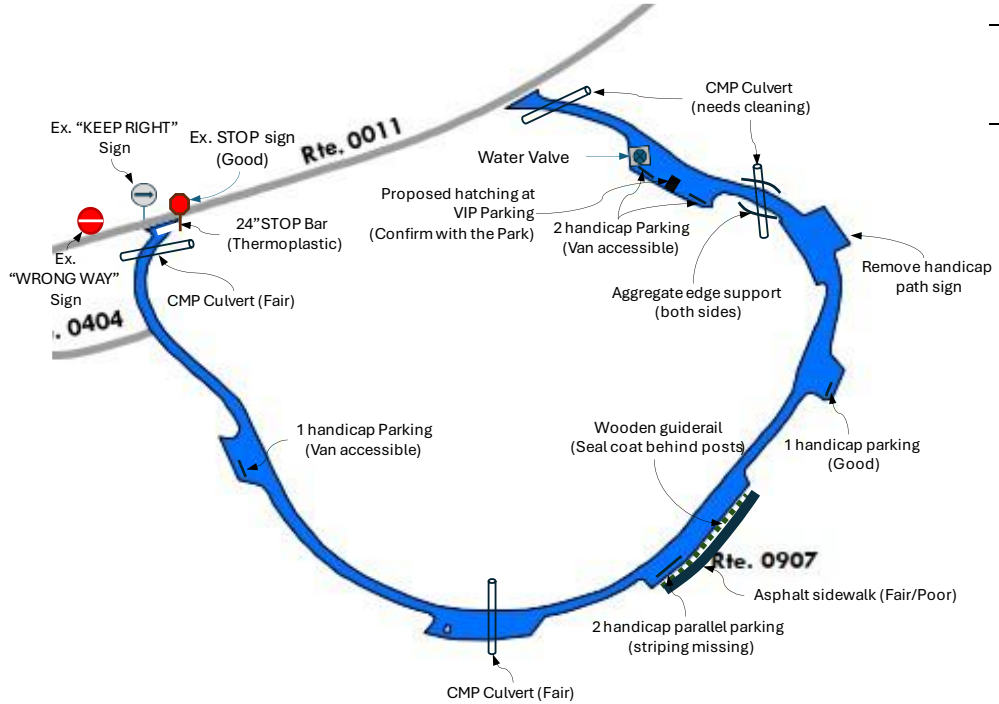
❹ **Lat/Long :**35.138083,-81.813956
Handicap parking (van accessible)

COWP-0907: Picnic Area Loop

Section Length/Area	41,114 SF	**Other Observations**	
Pavement Type	Asphalt	**Curb**	PCC wheel stops (50% Fair, 50% Good)
RIP Data (PCR)	97	**Sidewalk**	Asphalt sidewalk[1] (Fair)
Overall Pavement Condition	Good	**Drainage Structure**	CMP culverts (Fair)
Predominant Distress	L&T Cracking, Alligator Cracking	**Road Signs**	Okay
Recommended Treatment	Surface treatment	**Handicap Parking**	6 (Van access)[1]
Geotechnical Testing	None	**Existing Striping**	Thermoplastic Stop bar Other striping: regular paint (Fair)

Notes:

1. *Locations on marked plan.*



Section	Distress	Treatment
1	L L&T Cracking 550' M Alligator Cracking 20 SF	Crack Seal & Seal Coat

Legend:

L, M – Low or Medium severity cracks
L&T – Longitudinal & Transverse cracks
CMP – Corrugated Metal Pipe.

COWP-0907: Picnic Area Loop

❶ **Lat/Long:** 35.129345,-81.803858
M-Alligator Cracking.

❷ **Lat/Long:** 35.128954,-81.802835
CMP culvert (needs to be cleaned). Edge drop-off (edge support)

❸ **Lat/Long:** 35.128381,-81.802658
L-L&T Crack (tree root). PCC wheel stop (Fair-left, Good-right)

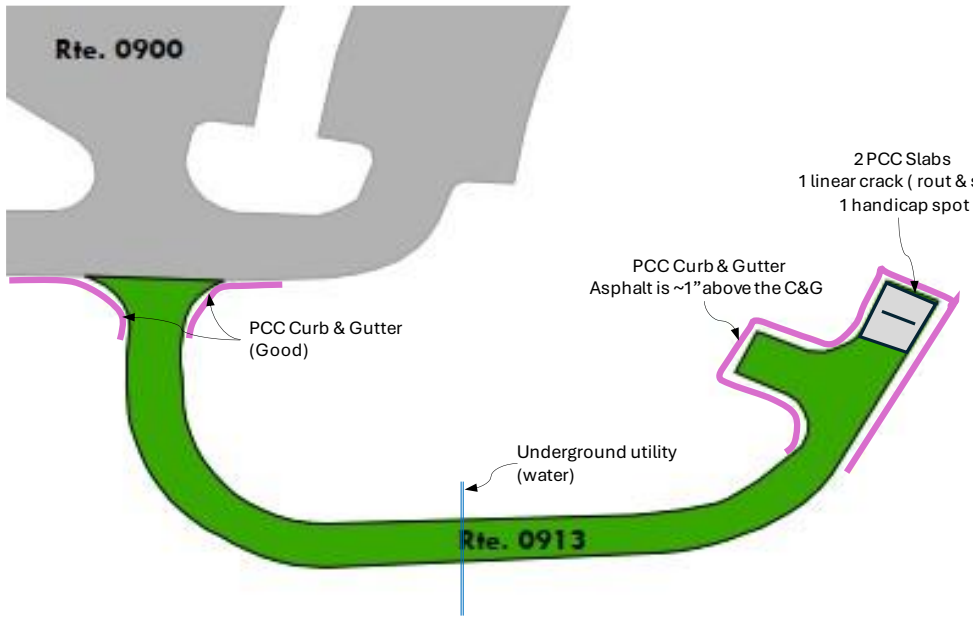
❹ **Lat/Long:**35.127719,-81.803231
Handicap parking. Wooden posts. Asphalt sidewalk (seal coat proposed)

COWP-0913: GOV Parking (Added)

Section Length/Area	6,303 SF	**Other Observations**	
Pavement Type	Asphalt	**Curb**	PCC curb and gutter[1]
RIP Data (PCR)	90	**Sidewalk**	None
Overall Pavement Condition	Good	**Drainage Structure**	None
Predominant Distress	L&T Cracking	**Road Signs**	Okay
Recommended Treatment	Crack seal & seal coat w/ localized patching	**Handicap Parking**	1 (Van access)
Geotechnical Testing	None	**Existing Striping**	Regular paint (Fair)

Notes:

1. *Locations on the marked plan.*



Section	Distress	Treatment
1	L L&T Cracking 275'	Crack seal & seal coat

Legend:

L, M – Low or Medium severity cracks
L&T – Longitudinal & Transverse cracks
C&G – Curb & Gutter

COWP-0913: GOV Parking (Added)

❶ **Lat/Long:** 35.136452,-81.81883
L-L&T Cracking.

❷ **Lat/Long:**35.136211,-81.818458
L-L&T Cracking/Reflecting utility patch

❸ **Lat/Long:** 35.136286,-81.818254
L-L&T Crack. Asphalt ~1” higher than the PCC curb & gutter.

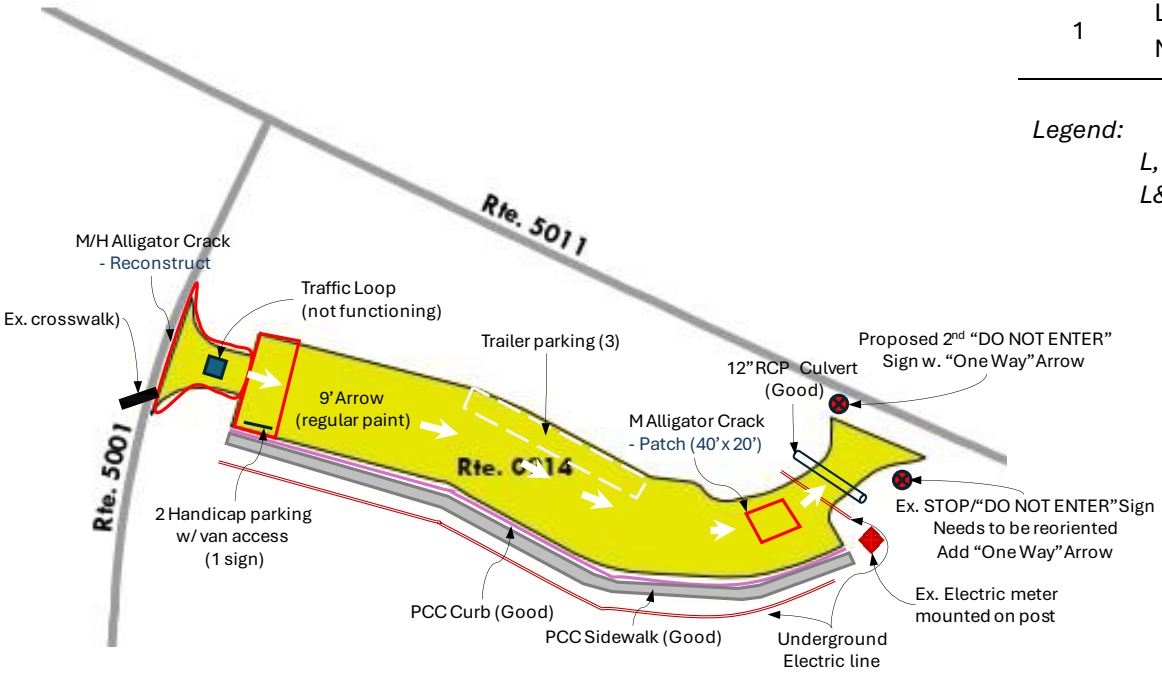
❹ **Lat/Long:**35.136456,-81.8181
Cracked concrete slabs.

COWP-0914: Trailhead Parking

Section Length/Area	18,190 SF	**Other Observations**	
Pavement Type	Asphalt	**Curb**	PCC curbs[1] (Good)
RIP Data (PCR)	73	**Sidewalk**	PCC sidewalk[1] (Good)
Overall Pavement Condition	Fair to Poor	**Drainage Structure**	RCP Culvert (Good)
Predominant Distress	Alligator Cracking, L&T Cracking	**Road Signs**	Reorient "DO NOT ENTER" Sign[1]
Recommended Treatment	Reconstruction 2" Mill & Overlay w/ Localized Patching	**Handicap Parking**	2 (Van access)
Geotechnical Testing	3 Cores & 2 Test Pits	**Existing Striping**	Regular paint (Fair)

Notes:

1. *Locations on the marked plan.*



Section	Distress		Treatment
1	L/M M/H	L&T Cracking 1,250' Alligator Cracking 3,000 SF	Reconstruction 2" Mill & Overlay w/ Localized Patching

Legend:

L, M, H – Low, Medium, or High severity cracks
L&T – Longitudinal & Transverse cracks

COWP-0914: Trailhead Parking

❶ **Lat/Long:** 35.131278,-81.797661
H-Alligator Cracking.

❷ **Lat/Long:** 35.131022,-81.796661
M-Alligator Cracking

❸ **Lat/Long:** 35.131074,-81.797124
L-L&T Crack

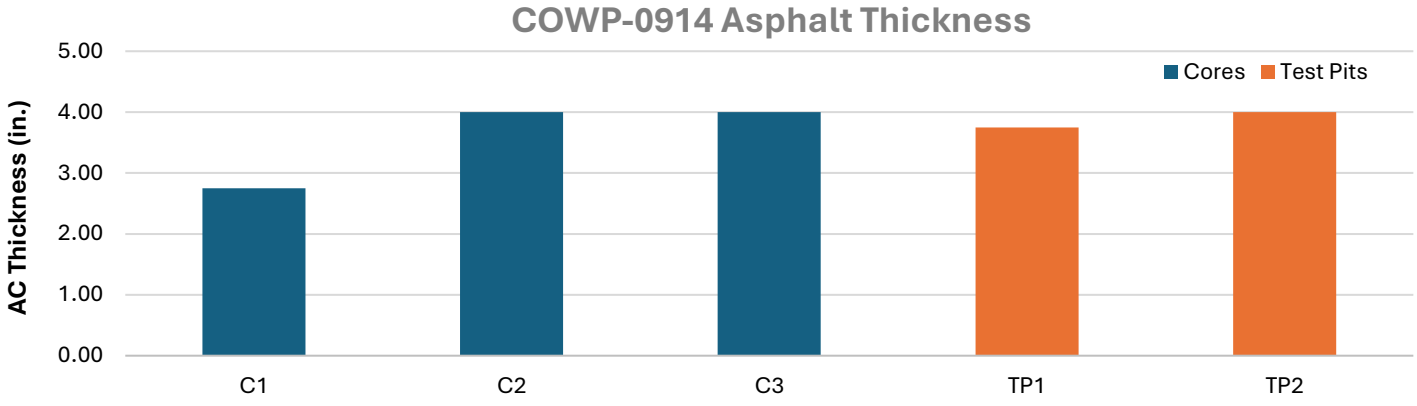
❹ **Lat/Long:** 35.131253,-81.797486
M-Alligator Cracking. Handicap parking spots.

Appendix C1 – Subsurface Sampling and Geotechnical Testing Data

COWP
Geotechnical Test Locations
Legend
Cores
Test Pits
COWP TP#03
COWP C#04
COWP C#0
COWP C#03
COWP TP#02
State Rd S-11-240
Cowpens National Battlefield Visitor Center
Cowpens Rd
Chesnee Hwy
Washington Light Infantry Monument
Green Valley Baptist Church
Piedmont Rd
Barnett Machining
Martin Farm Rd
Cowpens National Battlefield
Colors Collision
Scruggs
Anns Trail
Hayes Rd
Battleground Tour Rd
New Pleasant Rd
State Rd S-11-239
Google Earth
Image © 2025 Airbus
N
2000 ft

Table: Core Data Summary COWP

Core/TP #	Route ID	AC			Unbound Layers		Comment
		Thickness (in)	Cracking (in.)	Debonding (in.)	Base	Subgrade	
C1	COWP-0914	2.75	0.00-2.75	--	CAB	--	Taken on an Alligator Crack
C2	COWP-0914	4.00	0.00-4.00	1.25	CAB	--	Taken on a Longitudinal Crack
C3	COWP-0914	4.00	0.00-4.00	0.75	CAB	--	Taken on an Alligator Crack
C4	COWP-0010	2.00	--	--	CAB	--	
TP1	COWP-0914	3.75	0.00-3.75	--	4.75" of A-1-a	A-4	Taken on an Alligator Crack
TP2	COWP-0914	4.00	--	--	5" of A-1-a	A-4	
TP3	COWP-0010	3.00		--	2" of A-1-a	A-7-6	



Appendix C2 – Material Sampling Photo Documentation Log

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Appendix C2: MATERIAL SAMPLING
PHOTO DOCUMENTATION LOG

Date 5/30/2025 **Site Code:** COWP **Sampled By** JSG/NJ

Legend: G = Good F = Fair P = Poor

Sample Number: C1 **Dia.:** 6"

Location: COWP-0914

	Layer Type	Thickness	Description	Bond Quality	Stripping	Deterioration
HMA	Surface	2.75	HMA			
	--	--	--			
	--	--	--			
	--	--	--			
	--	--	--			
	Total Depth	**2.75**	**inches**			

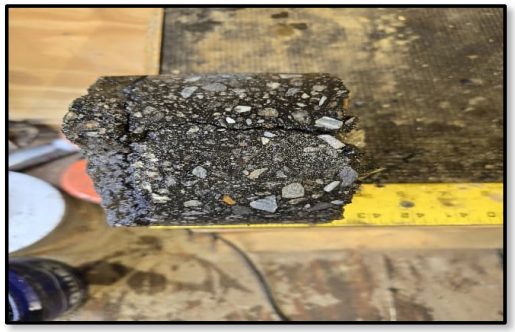
Core Notes: Subbase Course Visual Identification = Gray Coarse Aggregate Base
Taken on an Alligator Crack (Full Depth)

Sample Number: C2 **Dia.:** 6"

Location: COWP-0914

	Layer Type	Thickness	Description	Bond Quality	Stripping	Deterioration
HMA	Surface	1.25	HMA	P		
	Base	2.75	HMA			
	--	--	--			
	--	--	--			
	--	--	--			
	--	--	--			
	Total Depth	**4**	**inches**			

Core Notes: Subbase Course Visual Identification = Gray Coarse Aggregate Base
Taken on a Longitudinal Crack (Full Depth)



Sample Number: C3 **Dia.:** 6"

Location: COWP-0914

	Layer Type	Thickness	Description	Bond Quality	Stripping	Deterioration
HMA	Wearing Course/ Overlay	0.75	HMA	P		
	Base	3.25	HMA			
	--	--	--			
	--	--	--			
	--	--	--			
	--	--	--			
	Total Depth	**4**	**inches**			

Core Notes: Subbase Course Visual Identification = (¾)" Crushed Stone
Taken on an Alligator Crack (Full Depth)

AECOM

Appendix C2: MATERIAL SAMPLING
PHOTO DOCUMENTATION LOG

Date 5/30/2025 **Site Code:** COWP **Sampled By** JSG/NJ

Legend: G = Good F = Fair P = Poor

Sample Number: C4 **Dia.:** 6"

Location: COWP-0010

	Layer Type	Thickness	Description	Bond Quality	Stripping	Deterioration
HMA	Surface	0.75	HMA	G		
	Base	1.25	HMA			
	--	--	--			
	--	--	--			
	--	--	--			
	Total Depth	**2**	**inches**			

Core Notes: Subbase Course Visual Identification = Gray Crushed Agg Base

Sample Number: TP1 **Dia.:** 6"

Location: COWP-0914

	Layer Type	Thickness	Description	Bond Quality	Stripping	Deterioration
HMA	Surface	1.25	HMA	G		
	Base	2.5	HMA			
	--	--	--			
	--	--	--			
	--	--	--			
UNBOUND	Base	4.75	Gravel w/ Silt & Sand (GP-GM / A-1-a)			
	Subgrade	15.5	Sandy Silt w/ Gravel (ML / A-4)			
	Total Depth	**24**	**inches**			

Core Notes: Taken on an Alligator Crack (Full Depth)

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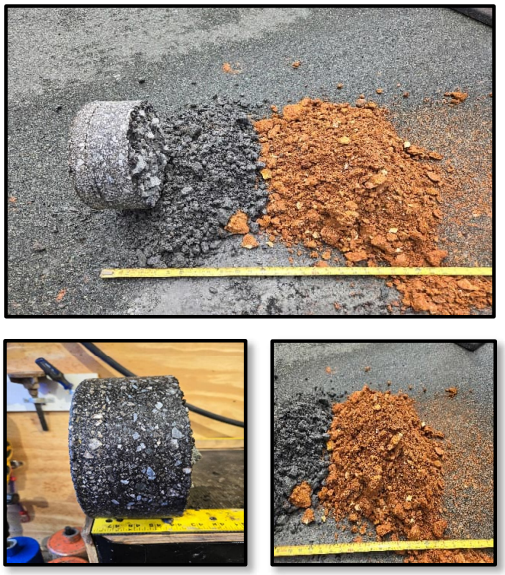
Appendix C2: MATERIAL SAMPLING
PHOTO DOCUMENTATION LOG

Date 5/30/2025 **Site Code:** COWP **Sampled By** JSG/NJ

Legend: G = Good F = Fair P = Poor



Sample Number: TP2 **Dia.:** 6"

Location: COWP-0914

	Layer Type	Thickness	Description	Bond Quality	Stripping	Deterioration
HMA	Surface	1.25	HMA	G		
	Base	2.75	HMA			
	--	--	--			
	--	--	--			
	--	--	--			
UNBOUND	Base	5	Gravel w/ Silt and Sand (GP-GM / A-1-a)			
	Subgrade	15	Silty Sand (SM / A-4)			
	Total Depth	**24**	**inches**			

Core Notes:

Sample Number: TP3 **Dia.:** 6"

Location: COWP-0010

	Layer Type	Thickness	Description	Bond Quality	Stripping	Deterioration
HMA	Surface	1	HMA	G		
	Base	2	HMA			
	--	--	--			
	--	--	--			
	--	--	--			
UNBOUND	Base	2	Gravel w/ Silt & Sand (GP-GM / A-1-a)			
	Subgrade	19	Silty Sand (ML / A-7-6)			
	Total Depth	**24**	**inches**			

Core Notes:

Appendix C3 – Laboratory Test Results of Unbound Materials

Project: NPS SC - COWP
Project No.: 60748151

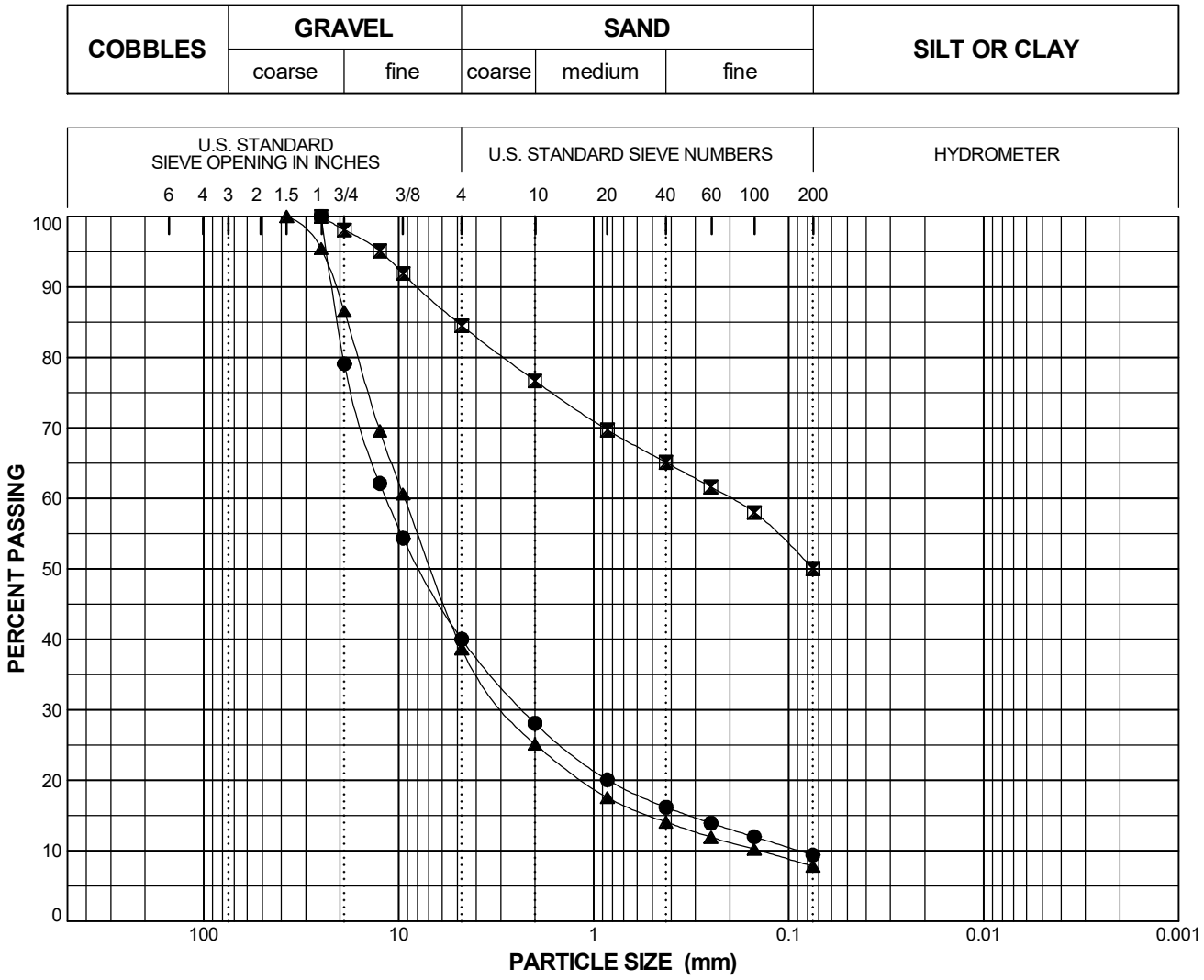
AECOM

SUMMARY OF LABORATORY TEST RESULTS

Boring and Sample Numbers	Depth (ft)	Classification	USCS and AASHTO Symbols	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits		Specific Gravity	Organic Content (%)	Grain Size		Compaction	Consolidation	Unconfined Compression		Triaxial Compression		Permeability (cm/sec)	Special Tests
						Liquid Limit	Plastic Limit			<#200 (%)	<2μ (%)			Strength (psi)	Strain (%)	UU	CIU		
TP1 Base	3.75-8.5	Gray POORLY GRADED GRAVEL with SILT and SAND	GP-GM A-1-a(0)	4.3						9									
TP1 Subbase 1	8.5-24.0	Red brown SANDY SILT with GRAVEL	ML A-4(2)	20.6		39	32			50									
TP2 Base	4.0-9.0	Gray POORLY GRADED GRAVEL with SILT and SAND	GP-GM A-1-a(0)	4.0						8									
TP2 Subbase 1	9.0-24.0	Red brown SILTY SAND	SM A-4(1)	22.0		37	31			50									
TP3 Base	3.0-5.0	Gray POORLY GRADED GRAVEL with SILT and SAND	GP-GM A-1-a(0)	6.2						12									
TP3 Subbase 1	5.0-24.0	Red brown SANDY SILT	ML A-7-6(7)	23.2		43	28			58									

Note: The soil classification is based partially on visual classification unless both grain size and Atterberg limits are performed.

* Refer to Laboratory Test Curves



SYMBOL	●	⊠	▲
Boring	TP1	TP1	TP2
Sample	Base	Subbase 1	Base
Spec			
Depth (ft)	3.75-8.5	8.5-24.0	4.0-9.0
% +3"	0.0	0.0	0.0
% Gravel	60.0	15.5	61.3
% Sand	30.6	34.5	30.9
% Fines	9.4	50.0	7.8
% -2μ			
Cc	5.16		5.67
Cu	131.17		66.06
LL		39	
PL		32	
PI		7	
AASHTO	A-1-a(0)	A-4(2)	A-1-a(0)
USCS	GP-GM	ML	GP-GM
w (%)	4.3	20.6	4.0

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
2"			
1 1/2"			100.0
1"	100.0	100.0	95.4
3/4"	79.1	98.1	86.6
1/2"	62.1	95.1	69.6
3/8"	54.4	91.9	60.6
4	40.0	84.5	38.7
10	28.1	76.7	25.1
20	20.1	69.7	17.5
40	16.2	65.1	14.1
60	13.9	61.6	11.9
100	12.0	58.0	10.2
200	9.4	50.0	7.8

SYMBOL	DESCRIPTION AND REMARKS
●	Gray POORLY GRADED GRAVEL with SILT and SAND (GP-GM)
⊠	Red brown SANDY SILT with GRAVEL (ML)
▲	Gray POORLY GRADED GRAVEL with SILT and SAND (GP-GM)

PARTICLE SIZE DISTRIBUTION

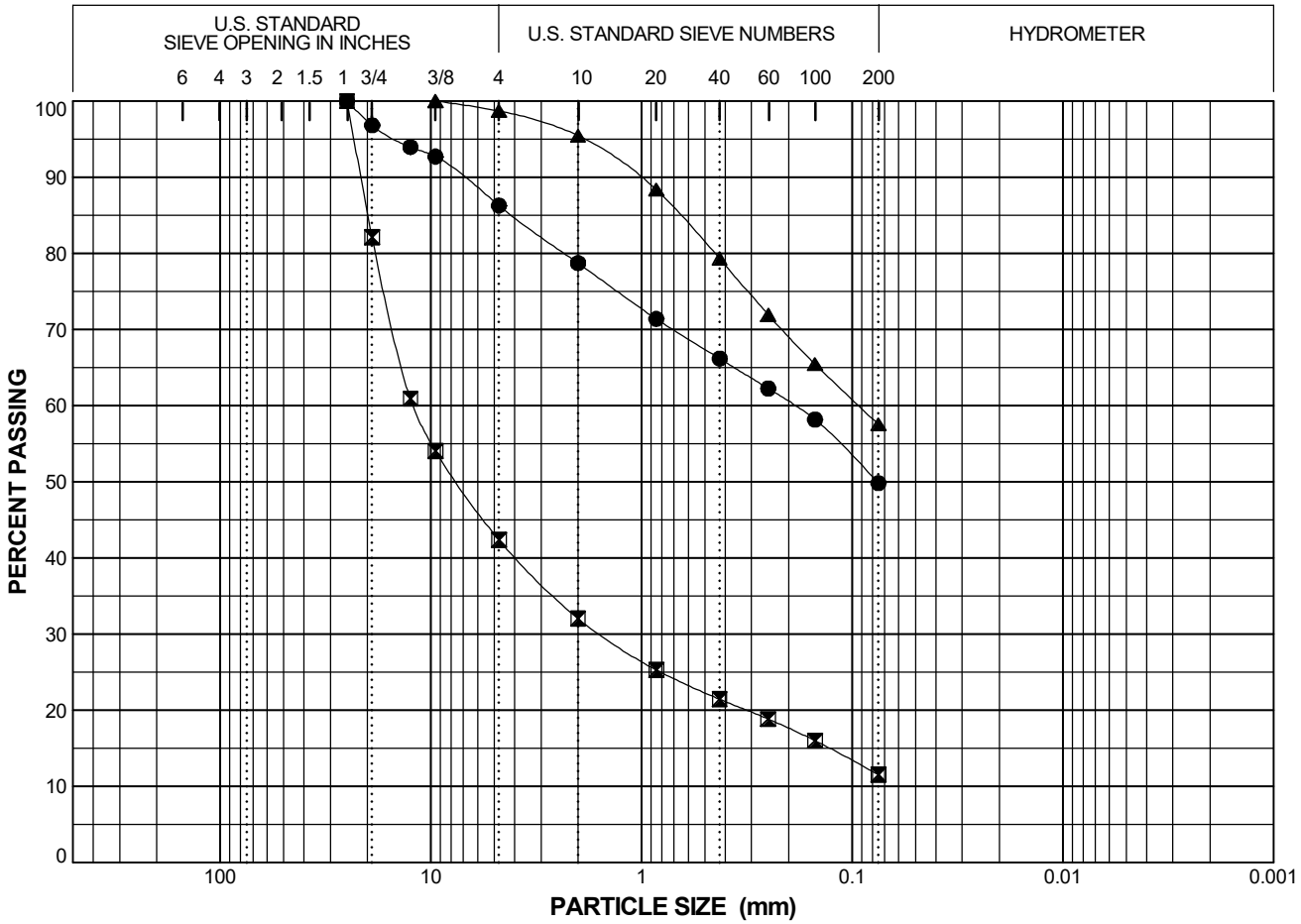
NPS SC - COWP

Project Number		
60748151	July 2025	Figure 1

AECOM

SIEVE_BLUEBELL_AASHTO 60748151_2025-06-15_NPS SC - COWP.GPJ URS_BLUE.GDT 7/11/25

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	



SYMBOL	●	⊠	▲
Boring	TP2	TP3	TP3
Sample	Subbase 1	Base	Subbase 1
Spec			
Depth (ft)	9.0-24.0	3.0-5.0	5.0-24.0
% +3"	0.0	0.0	0.0
% Gravel	13.7	57.6	1.3
% Sand	36.5	30.8	41.1
% Fines	49.8	11.5	57.6
% -2μ			
Cc		3.35	
Cu		204.35	
LL	37		43
PL	31		28
PI	6		15
AASHTO	A-4(1)	A-1-a(0)	A-7-6(7)
USCS	SM	GP-GM	ML
w (%)	22.0	6.2	23.2

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
2"			
1 1/2"			
1"	100.0	100.0	
3/4"	96.8	82.1	
1/2"	94.0	60.9	
3/8"	92.7	54.0	100.0
4	86.3	42.4	98.7
10	78.7	32.0	95.5
20	71.4	25.3	88.4
40	66.2	21.4	79.3
60	62.2	18.8	71.9
100	58.2	16.0	65.5
200	49.8	11.5	57.6

SYMBOL	DESCRIPTION AND REMARKS
●	Red brown SILTY SAND (SM)
⊠	Gray POORLY GRADED GRAVEL with SILT and SAND (GP-GM)
▲	Red brown SANDY SILT (ML)

PARTICLE SIZE DISTRIBUTION

NPS SC - COWP

Project Number		
60748151	July 2025	Figure 2

AECOM

SIEVE_BLUEBELL_AASHTO 60748151_2025-06-15_NPS SC - COWP.GPJ URS_BLUE.GDT 7/11/25

Appendix D – Traffic Data for Pavement Design

Traffic Data Provided by the NPS

2024 Inputs for Cowpens NB

Label	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
⊞ **BUSES**	**0**	**7**	**5**	**10**	**10**	**4**	**4**	**2**	**1**	**4**	**9**	**1**
⊞ **ORGANIZED GROUP VISITORS**	**311**	**232**	**233**	**560**	**284**	**162**	**195**	**41**	**126**	**198**	**464**	**92**
⊞ **Overnight Stays**	**71**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**46**	**1**
⊞ **Slide Presentation Attendance**	**1,022**	**1,822**	**1,656**	**1,779**	**1,736**	**1,639**	**1,710**	**1,205**	**918**	**920**	**1,405**	**779**
⊟ **Traffic Count at Main Gate**												
F1	3,171	3,321	3,954	3,430	4,037	3,943	3,803	3,678	3,001	1,619	2,971	2,333
⊞ **TRAFFIC COUNT AT PICNIC AREA**	**1,586**	**994**	**1,977**	**1,228**	**2,019**	**1,972**	**1,901**	**2,759**	**1,501**	**809**	**1,488**	**1,167**
⊟ **Traffic Count at Tour Road**												
F3	2,378	1,490	2,966	3,430	2,019	2,957	2,852	2,759	2,251	1,214	2,971	1,750
⊞ **Traffic Count at Trailhead Parking Area**	**999**	**1,362**	**1,499**	**1,221**	**1,311**	**1,343**	**1,361**	**1,238**	**1,051**	**1,214**	**1,556**	**1,556**
⊞ **Vans (15 or more passengers)**	**1**	**1**	**7**	**1**	**1**	**2**	**1**	**2**	**2**	**0**	**1**	**1**
⊞ **Visitors at Visitor Center**	**4,993**	**1,987**	**2,572**	**2,455**	**2,733**	**2,714**	**2,971**	**1,970**	**1,373**	**969**	**2,172**	**1,161**

Historical Traffic Data Downloaded from NPS Stats Report Viewer

(Website: https://irma.nps.gov/Stats/SSRSReports/Park%20Specific%20Reports/Traffic%20Counts?Park=GRCA)

Park: Cowpens NB Add Color Ramp: None

1 of 1 Find | Next

Cowpens NB

Current calendar year data are preliminary and subject to change. Data will be finalized by the end of the first quarter of next calendar year.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual Total	Change From Previous Year
TRAFFIC COUNT AT MAIN GATE														
2025	3,356	3,165	3,864	3,741	4,177	3,843							22,146	-43.6%
2024	3,171	3,321	3,954	3,430	4,037	3,943	3,803	3,678	3,001	1,619	2,971	2,333	39,261	-19.5%
2023	8,470	2,735	3,890	3,985	4,114	3,910	3,982	3,523	3,817	4,171	3,377	2,817	48,791	23.9%
2022	2,607	2,957	3,054	4,035	3,800	2,700	3,600	3,523	3,377	3,679	3,025	3,025	39,382	-7.1%
2021	3,590	2,358	3,848	3,938	2,971	3,920	3,636	3,149	4,190	3,926	3,803	3,048	42,377	-2.6%
2020	3,604	2,530	3,649	5,451	4,279	3,751	2,822	3,522	3,314	4,007	3,803	2,793	43,525	-8.0%
2019	414	4,582	5,176	3,193	3,610	3,756	3,389	10,416	3,389	3,819	3,054	2,498	47,296	23.2%
2018	3,212	2,495	2,595	2,595	2,945	4,041	3,293	3,580	5,567	3,836	3,620	619	38,398	-12.0%
2017	3,947	3,215	3,618	4,305	4,164	4,232	3,948	3,978	2,943	3,813	3,128	2,324	43,615	-2.9%
2016	3,989	2,486	3,794	4,147	4,055	3,791	4,886	3,631	3,826	4,588	3,395	2,308	44,896	6.1%
2015	4,561	2,089	3,441	3,448	4,257	3,996	4,283	5,116	2,747	3,508	2,612	2,264	42,322	-2.4%
2014	3,318	2,792	3,529	3,814	5,989	2,347	4,582	4,956	3,037	3,736	2,963	2,288	43,351	-12.2%
2013	3,939	2,400	3,620	2,568	4,012	4,511	5,949	7,057	8,434	1,674	2,974	2,214	49,352	5.2%
2012	3,812	2,183	3,606	3,210	3,542	4,101	9,362	3,941	3,128	3,298	4,012	2,712	46,907	-1.9%
2011	3,641	3,495	4,038	3,409	3,851	3,718	8,868	3,307	3,543	4,029	3,246	2,669	47,814	3.7%
2010	4,549	2,522	3,021	4,850	4,271	4,059	5,259	3,762	4,108	4,419	2,133	3,164	46,117	4.6%
2009	4,734	3,098	3,294	3,925	3,196	3,589	5,266	3,924	3,857	4,122	2,398	2,690	44,093	2.2%
2008	4,202	2,598	3,202	3,299	2,991	6,989	5,219	3,270	2,899	2,711	2,775	2,989	43,144	-7.9%
2007	6,370	2,003	4,112	3,541	4,251	7,198	4,399	3,046	3,918	3,296	3,201	1,501	46,836	0.7%
2006	5,783	2,726	4,284	4,710	3,701	3,175	5,627	4,056	3,616	4,203	3,048	1,602	46,531	-36.7%
2005	10,092	4,001	5,583	5,606	6,178	6,100	10,524	6,301	5,214	7,143	4,001	2,798	73,541	-0.2%
2004	8,928	4,263	6,937	6,071	6,329	6,225	9,213	6,393	5,279	6,992	4,407	2,651	73,688	-8.5%
2003	8,746	4,200	6,398	6,651	6,458	6,498	9,038	6,499	6,355	7,219	4,473	7,989	80,524	6.7%
2002	10,005	6,458	6,224	6,448	6,758	6,538	6,162	6,523	6,238	7,106	4,398	2,602	75,460	-2.0%
2001	9,189	6,428	6,408	6,302	6,501	6,500	8,775	6,435	6,501	7,001	4,678	2,275	76,993	2.6%
2000	8,506	6,181	5,926	5,777	6,424	6,128	9,445	7,198	6,081	6,480	4,570	2,301	75,017	14.1%

Table: 2024 Vehicle Counts

Month	COWP-0010	COWP-0914
Jan	3,171	999
Feb	3,321	1,362
Mar	3,954	1,499
Apr	3,430	1,221
May	4,037	1,311
Jun	3,943	1,343
Jul	3,803	1,361
Aug	3,678	1,238
Sep	3,001	1,051
Oct	1,619	1,214
Nov	2,971	1,556
Dec	2,333	1,556
Annual Total	**39,261**	**15,711**
ADT	**108**	**43**

Table: ESAL Calculation Tables for COWP-0010 & COWP-0914

Route ID	Class	Design AADT	Vehicle Distribution (%)	Truck Factor	ESAL	20-Year Design ESAL
COWP-0010	Classes 1-3	120	99.00%	0.0061	5,290	**11,252**
	Class 4		1.00%	0.6806	5,962	
COWP-0914	Classes 1-3	50	96.00%	0.0061	2,137	**12,074**
	Class 4		4.00%*	0.6806	9,937	

* 2 buses per day according to the Cherokee County Bus Transportation Information Website: https://www.cherokee.education/o/cherokee/page/bus-transportation-information

Appendix E – *AASHTO 1993* Pavement Design Calculations

AASHTO 1993 Pavement Design Calculations

Project SC192 Pavement Preservation, Multiple Parks in South Carolina
Section ID COWP-0010
Design for Structural Adequacy of Existing Pavement

Design Inputs	
Subgrade M_r (psi) =	6,000
Acceptable terminal servicibility P_t =	2.5
Initial servicibility P_0 =	4.2
Servicibility loss (ΔPSI) =	1.7
ADT =	120
% Trucks =	1.0%
Daily Truck Volume =	1.20
Design Life (Year) =	20.00
Design ESAL =	11,252
Reliability, R =	90
Z_R =	-1.282
Standard Deviation S_0 =	0.45
W_{18} =	11,252
Required SN =	**1.79**

Existing Structure		
Layer	**Thickness (in)**	**Layer Coeff.**
HMA	1.00	0.34
HMA	1.25	0.34
HMA	0.00	0.34
Agg. Base	2.00	0.14
Subbase	0.00	0.11
Total Pavement Thickness		**4**
Provided SN		**1.05**

Fail
[Provided SN < Required SN]

AASHTO 1993 Design Input References

Functional Classification	Urban	Rural
Interstate and other freew ays	85-99.9	80-99.9
Principle arterials	80-99	75-95
Collectors	80-95	75-95
Local	50-80	50-80

Page II-9

S_0=0.40-0.50 for flexible pavement (or overlay) design (I-62&III-82)
S_0=0.30-0.40 for AC overlay (III-121)

R	Z_R
50	0
60	-0.253
70	-0.524
80	-0.841
85	-1.037
90	-1.282
91	-1.34
92	-1.405
93	-1.476
94	-1.555
95	-1.645
96	-1.751
97	-1.881
98	-2.054
99	-2.327
100	-3.75

AASHTO 1993 Pavement Design Calculations

Project SC192 Pavement Preservation, Multiple Parks in South Carolina
Section ID COWP-0010
Design for Proposed Treatment: Reconstruction

Design Inputs	
Subgrade M_r (psi) =	6,000
Acceptable terminal servicibility P_t =	2.5
Initial servicibility P_0 =	4.2
Servicibility loss (ΔPSI) =	1.7
ADT =	120
% Trucks =	1.0%
Daily Truck Volume =	1.20
Design Life (Year) =	20.00
Design ESAL =	11,252
Reliability, R =	90
Z_R =	-1.282
Standard Deviation S_0 =	0.45
W_{18} =	11,252
Required SN =	**1.79**

Proposed Structure		
Layer	**Thickness (in)**	**Layer Coeff.**
HMA	1.50	0.44
HMA	3.50	0.44
HMA	0.00	0.44
Agg. Base	6.00	0.14
Subbase	0.00	0.11
Total Pavement Thickness		**11**
Provided SN		**3.04**

Pass
[Provided SN > Required SN]

AASHTO 1993 Design Input References

Functional Classification	Urban	Rural
Interstate and other freew ays	85-99.9	80-99.9
Principle arterials	80-99	75-95
Collectors	80-95	75-95
Local	50-80	50-80

Page II-9

S_0=0.40-0.50 for flexible pavement (or overlay) design (I-62&III-82)
S_0=0.30-0.40 for AC overlay (III-121)

R	Z_R
50	0
60	-0.253
70	-0.524
80	-0.841
85	-1.037
90	-1.282
91	-1.34
92	-1.405
93	-1.476
94	-1.555
95	-1.645
96	-1.751
97	-1.881
98	-2.054
99	-2.327
100	-3.75

AASHTO 1993 Pavement Design Calculations

Project SC192 Pavement Preservation, Multiple Parks in South Carolina
Section ID COWP-0914
Design for Structural Adequacy of Existing Pavement

Design Inputs	
Subgrade M_r (psi) =	10,000
Acceptable terminal servicibility P_t =	2.5
Initial servicibility P_0 =	4.2
Servicibility loss (ΔPSI) =	1.7
ADT =	50
% Trucks =	1.0%
Daily Truck Volume =	0.50
Design Life (Year) =	20.00
Design ESAL =	12,074
Reliability, R =	90
Z_R =	-1.282
Standard Deviation S_0 =	0.45
W_{18} =	12,074
Required SN =	**1.47**

Existing Structure		
Layer	**Thickness (in)**	**Layer Coeff.**
HMA	1.00	0.34
HMA	1.75	0.34
HMA	0.00	0.34
Agg. Base	5.00	0.14
Subbase	0.00	0.11
Total Pavement Thickness		**8**
Provided SN		**1.64**

Pass
[Provided SN > Required SN]

AASHTO 1993 Design Input References

Functional Classification	Urban	Rural
Interstate and other freew ays	85-99.9	80-99.9
Principle arterials	80-99	75-95
Collectors	80-95	75-95
Local	50-80	50-80

Page II-9

S_0=0.40-0.50 for flexible pavement (or overlay) design (I-62&III-82)
S_0=0.30-0.40 for AC overlay (III-121)

R	Z_R
50	0
60	-0.253
70	-0.524
80	-0.841
85	-1.037
90	-1.282
91	-1.34
92	-1.405
93	-1.476
94	-1.555
95	-1.645
96	-1.751
97	-1.881
98	-2.054
99	-2.327
100	-3.75

Appendix F – Construction Cost Estimate Summary
(Class B Estimate will be submitted separately)

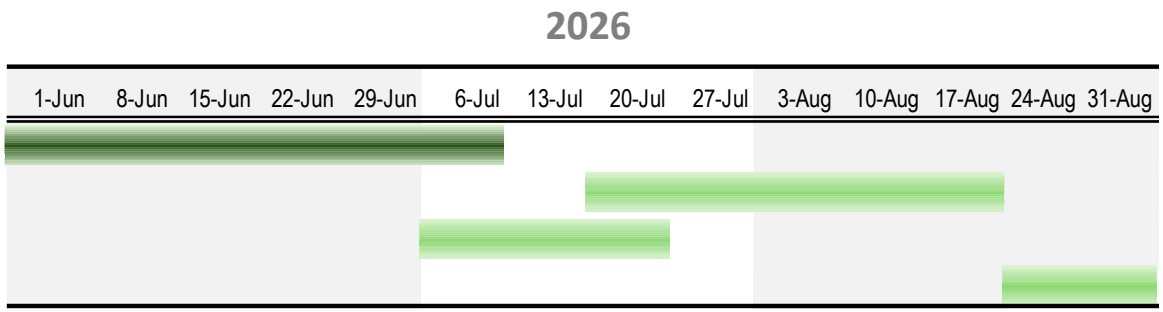
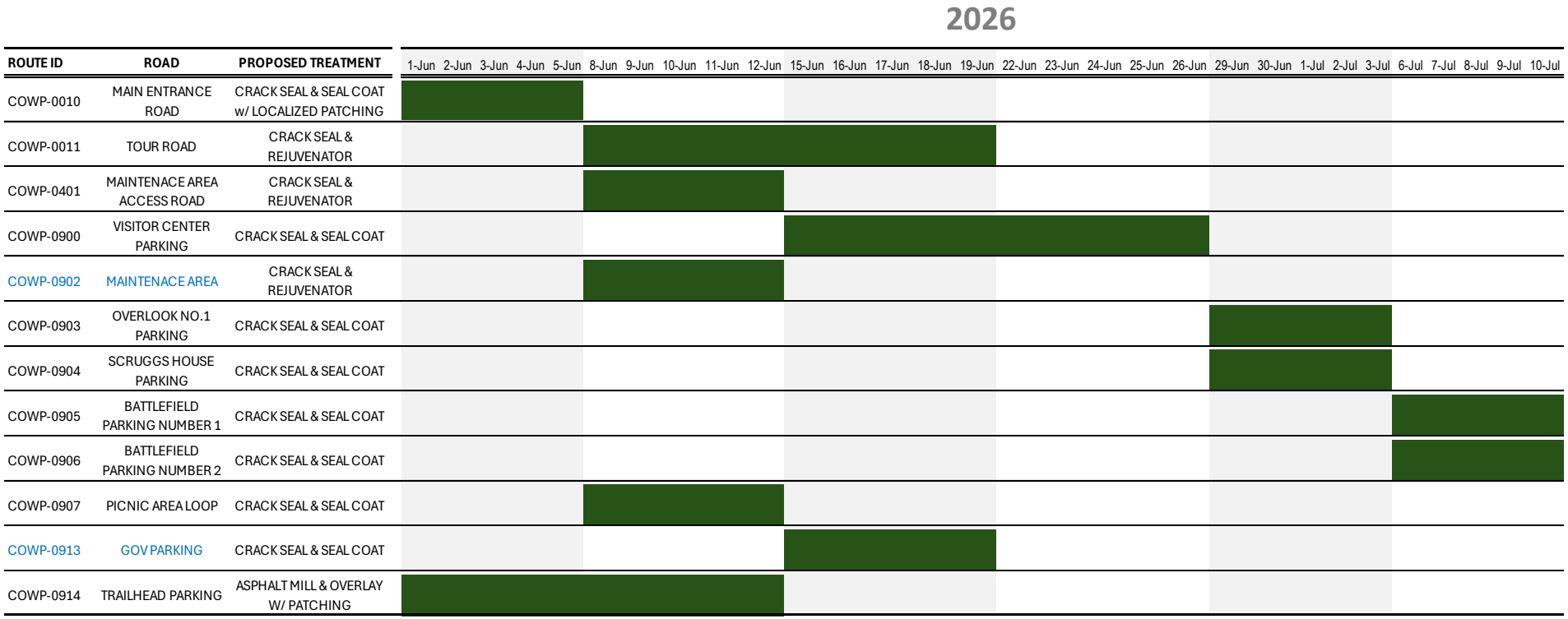
Class C Summary Estimate for all South Carolina Parks

Park	PMIS #	PMIS Estimated Budget	Base Bid			Options			Total W. Options		
			Direct Construction	Markups	Total	Direct Constructio	Markups	Total	Direct Construction	Markups	Total
COWP	**334929**	**$1,869,762**	**$346,791**	**$332,795**	**$679,586**	**$10,209**	**$9,797**	**$20,005**	**$357,000**	**$342,591**	**$699,591**
CONG	334914	$615,000	$403,196	$403,613	$806,809	$16,801	$16,819	$33,620	$419,997	$420,432	$840,429
KIMO	334920	$1,155,041	$987,432	$1,081,349	$2,068,780	$9,669	$10,589	$20,257	$997,101	$1,091,937	$2,089,038
NISI	334915	$121,000	$14,000	$16,030	$30,030	$9,608	$11,001	$20,610	$23,608	$27,031	$50,639
	Total	**$3,760,803**	**$1,751,419**	**$1,833,786**	**$3,585,205**	**$46,287**	**$48,205**	**$94,492**	**$1,797,706**	**$1,881,991**	**$3,679,697**

Class C Summary Estimate for the COWP Sections

ROUTE ID	ROAD	FMSS#	PAVEMENT TYPE	PROPOSED TREATMENT	COST W/O MARKUPS	TOTAL MARKUP	COST W/ MARKUPS	PMIS ESTIMATED BUDGET
COWP-0010	MAIN ENTRANCE ROAD	75891	Asphalt	CRACK SEAL & SEAL COAT w/ LOCALIZED PATCHING	$ 48,661	$ 46,697	$ 95,357	$ 255,258
COWP-0011	TOUR ROAD	75894	Asphalt	CRACK SEAL & REJUVENATOR	$ 145,618	$ 139,741	$ 285,359	$ 497,752
COWP-0401	MAINTENACE AREA ACCESS ROAD	104862	Asphalt	CRACK SEAL & REJUVENATOR	$ 6,476	$ 6,215	$ 12,691	$ 51,052
COWP-0900	VISITOR CENTER PARKING	75898	Asphalt	CRACK SEAL & SEAL COAT	$ 39,283	$ 37,698	$ 76,981	$ 472,227
COWP-0902	MAINTENACE AREA	75904	Asphalt	CRACK SEAL & REJUVENATOR	$ 6,700	$ 6,429	$ 13,129	
COWP-0903	OVERLOOK NO.1 PARKING	75906	Asphalt	CRACK SEAL & SEAL COAT	$ 4,278	$ 4,105	$ 8,383	$ 51,052
COWP-0904	SCRUGGS HOUSE PARKING	75907	Asphalt	CRACK SEAL & SEAL COAT	$ 12,915	$ 12,394	$ 25,309	$ 102,103
COWP-0905	BATTLEFIELD PARKING NUMBER 1	75909	Asphalt	CRACK SEAL & SEAL COAT	$ 15,357	$ 14,738	$ 30,095	$ 95,722
COWP-0906	BATTLEFIELD PARKING NUMBER 2	75911	Asphalt	CRACK SEAL & SEAL COAT	$ 4,171	$ 4,003	$ 8,174	$ 38,289
COWP-0907	PICNIC AREA LOOP	75896	Asphalt	CRACK SEAL & SEAL COAT	$ 21,061	$ 20,211	$ 41,273	$ 204,206
COWP-0913	GOV PARKING	75924	Asphalt	CRACK SEAL & SEAL COAT	$ 3,509	$ 3,367	$ 6,876	$ -
COWP-0914	TRAILHEAD PARKING	113293	Asphalt	ASPHALT MILL & OVERLAY W/ PATCHING	$ 48,970	$ 46,993	$ 95,963	$ 102,103
				Total Base Bid	**$ 346,791**	**$ 332,795**	**$ 679,586**	**$ 1,869,762**
				Total Options	**$ 10,209**	**$ 9,797**	**$ 20,005**	**$ - **
				Total	**$ 357,000**	**$ 342,591**	**$ 699,591**	**$ 1,869,762**

Note: The added sections (COWP-0902 & COWP-0913) will be included as "Bid Options" in the Class C Construct Cost Estimate and the 15% Design Plans.

Appendix G – Construction Schedule Summary

PARK ID	PMIS #	Duration (days)
COWP	**334929**	**41**
CONG	334914	34
KIMO	334920	20
NISI	334,915	13