

Great Smoky Mountains National Park

Appendix F

Buildings & Infrastructure Existing Conditions Report

October 2004

United States Department
Of the Interior
National Park Service

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Introduction

Great Smoky Mountains National Park

Established in 1934, Great Smoky Mountains National Park lies in Tennessee and North Carolina. It was among the first national parks assembled from private lands. Known for its size and temperate climate, the park receives more than 10 million visitors each year. The Park's distinctive features include natural resources, historical sites and outdoor activities.

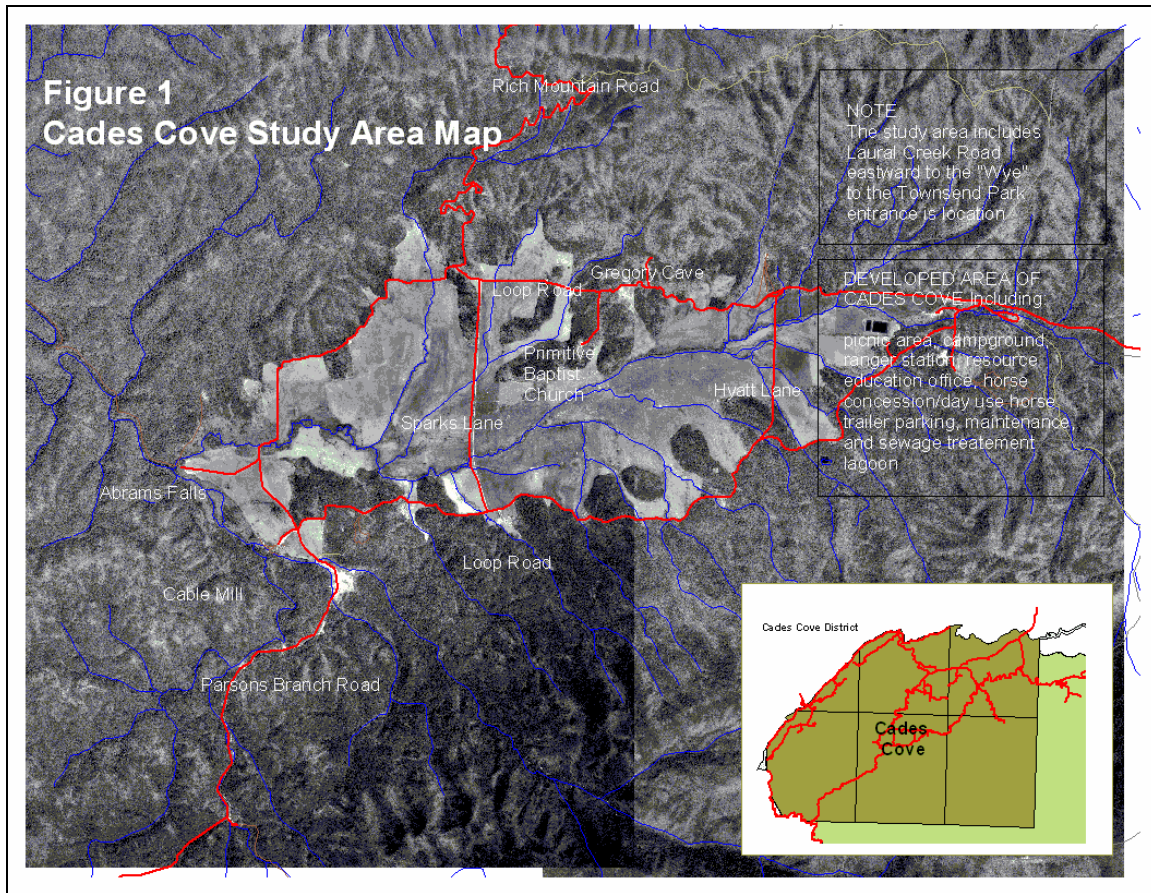
Cades Cove

Cades Cove lies within Great Smoky Mountains National Park. The two primary attractions of Cades Cove are the largest collection of settlement era structures in the United States and a diversity of wildlife that can be viewed while touring the 11-mile Loop Road. These attractions attract many visitors, most of whom arrive via motor vehicles.

The National Park Service has established a Cades Cove District that encompasses the area north of the state line and east of the Sevier County line and includes the Western Foothills Parkway. A permanent staff of rangers, maintenance employees, resource education, and volunteers work in the district.

The Opportunities Plan study area (Figure 1) is significantly smaller in area than the overall district and encompasses the Cove valley floor within the Loop Road as well as the surrounding mountain side to an elevation of approximately 2,200 feet. The study area includes the access roadway corridors along Laurel Creek Road and the Townsend Entrance Road.

This report summarizes existing conditions of the "non resource" roads, bridges, buildings/structures, utility systems, and landscape amenities in the study area. It also provides basic information about the age, function, and capacity of these facilities and amenities. This report does not address buildings or amenities related to the Cove's cultural/historical landscape, nor does it contain a roadway capacity analysis.



Roadways

Description

The roadways in the study area include the main Park entrance road, U.S. 321 from Townsend, Tenn., to the Townsend "Wye," and Laurel Creek Road, which serves as the main access road to Cades Cove. This two-lane/two-way paved roadway has some trail head parking and pull-off areas for visitor use.

One-tenth of a mile west of the Wye (off Laurel Creek Road) is the turn-off into the Tremont Center Environmental Education Center. This two-lane roadway, also known as Tremont Road, is paved for the first five miles and gravel for the last few. West on Laurel Creek Road past the Tremont turn-off is a tunnel approximately three miles west of the Wye, while the entrance to the Cove is seven miles west of the Wye.

The "Cades Cove Loop" includes the primary, one way, 11-mile Loop Road and other cut-through or exit roads. These are Sparks Lane, Primitive Baptist Church Road, Hyatt Lane, Abrams Falls Road, Cable Mill Road, Rich Mountain Road and Forge

Creek/Parsons Branch Road (both Rich Mountain Road and Forge Creek/Parsons Branch Road are one way gravel roads that lead out of Cades Cove).

Another road in the study area is the main access road leading to the “developed” area of the Cove. This road serves the picnic area, horse concession stable, campstore, campground, ranger station, resource education/residences, and maintenance facilities. Figure 2 is a map of the study area roads, while Table 1 details their characteristics.

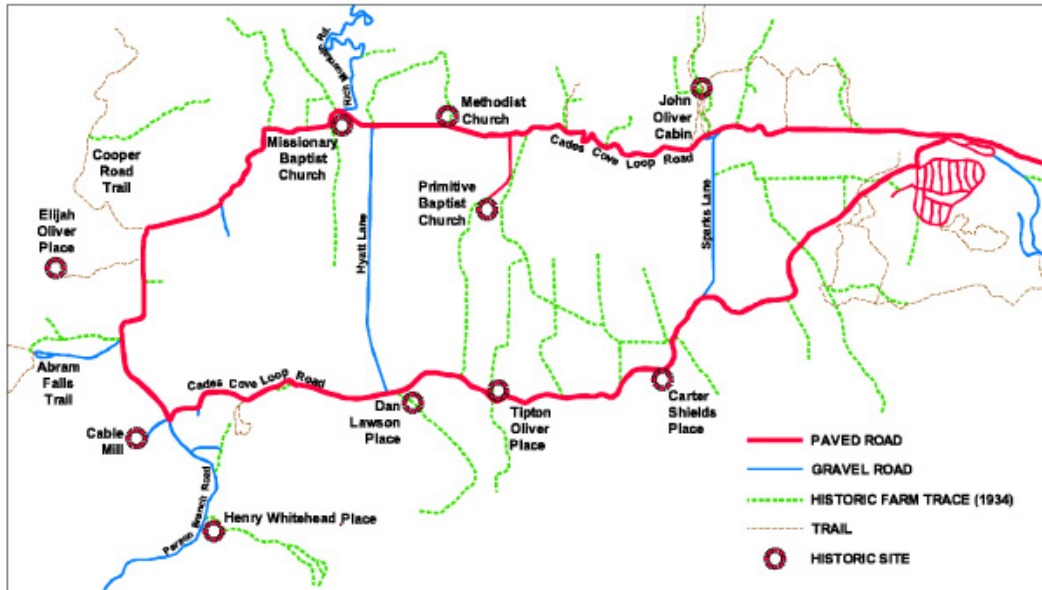


Figure 2: Map of Study Area Roads, Cades Cove Opportunities Plan

Table 1: Study Area Roadways

ROAD NAME	GENERAL DESCRIPTION	ROUTE MILES	UN-PAVED MILES	LANES	PAVED WIDTH
Townsend Entrance Road	Park Gateway	0.75	0	2	24
Laurel Creek Road	Access Road	7.60	0	2	22
Tremont Environmental Education Center	Education Center Access	5.15	3.23	2	20
Cades Cove	Loop Road	9.98	0	1	11
Cades Cove	Loop Road	0.34	0.34	2	
Sparks Lane	Gravel Road	0.84	0.84	2	NA
Parsons Branch Road	Gravel Exit Road				NA
Primitive Baptist Church Road	Church access road	0.32	0.32	2	NA
Hyatt Lane	Gravel Road	1.28	1.28	2	NA
Rich Mountain Road	Gravel Exit Road	6.70	6.70	1	NA
Abrams Falls Road	Trailhead Parking	0.46	0.46	2	NA
Cable Mill Road	Exhibit Parking	0.20	0	1	NA
Forge Creek Road	Exhibit and Parsons Branch Access Road	2.20	2.20	2	NA
Cades Cove	Picnic Area	0.93	0	1	NA
Cades Cove	Stable Access	0.31	0	2	NA
Cades Cove	Campground	5.33	0	1	NA
Cades Cove	Maintenance area	0.19	0	2	NA
Cades Cove	Residence	0.41	0	2	NA

Roadway Condition Assessment

In 1999, the Federal Highway Administration (FHA) documented the condition of roadways throughout the Park, including the Cades Cove study area. This road inventory remains the most current road condition assessment of paved roads in the Cove and provides a great deal of detail that will not be duplicated here.

In the report, the overall condition of paved roadways in the study area was rated as poor. Pavement conditions were assigned a numerical rating based on surface condition and the roughness of the road and were ranked from 0, or failing, to 100, or excellent. Surface conditions were rated on the extent of alligator cracking, patching, longitudinal cracking, rutting, and transverse cracking.

Roadway Descriptions

Laurel Creek Road (Route 15): This road has two paved travel lanes; each is 11 feet wide. The pavement condition ranges from good (scores in the low 80s) to poor (low 50s).

The area from the tunnel to the beginning of the Loop Road has the poorest pavement. Starting in January 2003, 6.5 miles of Laurel Creek Road underwent rehabilitation work and repaving. The rehabilitation began after the tunnel and proceeds west into the Cades Cove area. These improvements include a partial depth reconstruction of the entire road, a full-depth reconstruction where needed, milling and overlaying existing parking lots and pull-offs, construction of new pull-offs, repair of one slide area, replacement of undersized and deteriorated culverts, and other miscellaneous work including replacing signs, striping the pavement, improving ditches and shoulder work. As part of this work, a very short turning lane will be added for traffic exiting the Loop Road that will make it easier to make a left turn to the campstore area.

Tremont Road is one-tenth mile west of the Wye on Laurel Creek Road. This road proceeds south from Laurel Creek Road and provides access to the Tremont Environmental Education Center. Tremont Road is a two-way, two-lane paved roadway. Two miles of Tremont Road were repaved as a part of the Laurel Creek Road project. The remaining three miles of Tremont Road are gravel and were not part of the Laurel Creek road project.

Access roads to the developed area of the Cove: At the western end of Laurel Creek Road is a "T" intersection. South from this intersection is a road that provides access to the developed area of Cades Cove, including the picnic area, horse concession area, campstore, the Ranger Station, NPS residences, Resource Education office, campground areas and Cades Cove maintenance facility.

This road has two lanes and allows travel in both directions. The lanes average 12 feet in width and the road has no shoulders. The section of roadway along the campstore parking lot and driveway to the Resource Education building are included in the roadway improvement project affecting Laurel Creek Road. However, the picnic area access road is not a part of the improvement project.

The picnic area road is an 11-foot wide one-way loop road and was not included in the pavement condition ratings undertaken by the FHWA. The pavement for the picnic area is in poor condition, however, and has had a significant amount of cold-patch used to fill cracks and potholes.

The access road to the developed area is fairly short but is often well traveled. It handles all traffic exiting the Loop Road, as well as traffic to and from the picnic area, horse concession area and campstore, all of which are significant traffic generators. The number of conflicting turning movements on this relatively short stretch of road adds to the congestion in Cades Cove.

Cades Cove Loop Road: The two-way section of roadway that begins the inbound section of Loop Road extends 317 feet and has recently been replaced. Parking for the orientation shelter is located along the south side of the road. At the entry gate is a small paved area that provides basic orientation information (via a sign) to visitors and bicyclists.

After the entry section, the Loop Road becomes a one-way road consisting of one 11-foot travel lane. The road's overall condition is considered "poor," with pavement condition ratings ranging from 57 to 79 (according to the 1999 FHWA Pavement Condition Study). Pavement cracking and shoulder deterioration are two of the most prevalent problems.

Other than cold-patching cracks and potholes and grading shoulders, no road surface improvements have been made in the past 20 years. The most recent improvement is the reconstruction of one of the wet water crossing areas on the Loop Road. Requests for funding to resurface the road have been submitted but not been authorized. Maintenance issues include a lack of adequate resources (equipment and manpower) to keep the road maintained as well as difficulty undertaking maintenance activities under a steady flow of visitor traffic.

Sparks Lane: This two-way gravel road begins in the vicinity of the John Oliver Place and cuts a 1,352-foot perpendicular line across the valley floor. This road has been maintained with applications of gravel at least once a year and after major storm events.

Hyatt Lane: This two-way gravel road begins just east of Rich Mountain Road and cuts a perpendicular line across the valley. The 2,100-foot long roadway requires similar maintenance as Sparks Lane.

Rich Mountain Road: This one-way gravel road exits the Loop Road and connects to Townsend. The portion within the Park's borders is approximately three miles long and contains a large number of switchbacks, steep curves, and steep grades. Because of these features, this road is difficult to maintain and becomes impassable during and after storms and washouts. The road is closed during the winter, which is generally mid-November to March.

Abrams Creek Access Road: This short access road connects to the Abrams Falls trailhead parking area. It is a two-way gravel road and requires the addition of gravel and regular grading to maintain it in good condition. The Abrams Falls trailhead is a popular visitor attraction.

Parsons Branch/Forge Creek Roads: This combination of roads (Forge Creek-two-way, and Parsons Branch one-way exit) leads the visitor to the North Carolina side of Great Smoky Mountains National Park. This narrow gravel roadway has many stream crossings and steep grades, is difficult to maintain and often becomes impassable during and after storms. Parsons Branch Road is closed during the winter months. Extensive flood damage in 2003 has kept the road closed, and it will remain closed until it is repaired.

Road Maintenance

A roads crew of eight full-time and four seasonal workers is responsible for more than 100 miles of roadway in the Cades Cove district. Routine road maintenance includes patching asphalt pavement, repairing and re-grading shoulders to keep them level with the roadway, cleaning and clearing ditches and drainage pipes, and maintaining parking facilities.

The Loop and Laurel Creek roads pose a major maintenance challenge. The primary issues with maintaining these roadways relate to the impacts of wear-and-tear because of the high volume of traffic they experience. In addition, having to undertake routine maintenance under heavy traffic conditions significantly reduces the efficiency of these maintenance activities. The maintenance division does not have the ability to close portions of the one-way road for maintenance and is often forced to work in 10-minute intervals to minimize disruption to visitors. For several years, the roads maintenance crew has utilized cold patch as a means of keeping the road passable.

Parking

There are approximately 730 parking spaces in the study area, the majority of which are used by visitors. Of these, 390 are paved and about 135 are on gravel. Two field areas near Cable Mill are used for overflow parking. These fields can accommodate 200 to 300 vehicles.

Twelve handicapped parking spaces are available in the Cove, in the parking lots at the visitor orientation shelter at the beginning of the Loop Road, Cable Mill, campstore, and the Picnic ground area. Also, 6 percent of the parking in Cades Cove is reserved for the NPS and two areas have been established for special use

parking. These areas include seven horse trailers spaces at the horse concession area and the eight bus parking spaces at Cable Mill. Table 2 lists the number of parking spaces at each lot.

Table 2: Parking in Cades Cove

ID	Location Name	Total Spaces	Paved Spaces	Gravel Spaces	Handicap Spaces	Administrative Spaces	Bus Parking	Grass Parking	Horse Trailer Parking
1	Visitor Shelter parking lot	63	63	0	2	0	0	0	0
2	John Oliver Cabin Parking I	9	9	0	0	0	0	0	0
3	John Oliver Cabin Parking II	6	6	0	0	0	0	0	0
4	Primitive Baptist Church parking	9	0	9	0	0	0	0	0
5	Methodist Church parking	7	7	0	0	0	0	0	0
6	Missionary Baptists Church parking	8	8	0	0	0	0	0	0
7	Cades Cove Overlook parking	15	15	0	0	0	0	0	0
8	Cooper Road Overlook parking	4	4	0	0	0	0	0	0
9	Elijah Oliver parking	26	26	0	0	0	0	0	0
10	Abrams Falls parking I	24	0	24	0	0	0	0	0
11	Abrams Falls parking II	24	0	24	0	0	0	0	0
12	Cable Mill parking	61	53	0	2	2	8	45	0
13	Event Overflow parking I	45	0	0	0	0	0	153	0
14	Event Overflow parking II	153	0	0	0	0	0	0	0
15	Cemetery gravel parking	3	0	3	0	0	0	0	0
16	Cable Mill water tank parking	4	0	4	0	4	0	0	0
17	Pine Oak trail parking I	2	2	0	0	0	0	0	0
18	Pine Oak trail parking II	2	2	0	0	0	0	0	0
19	Dan Lawson parking	7	7	0	0	0	0	0	0
20	Tipton Oliver parking	5	5	0	0	0	0	0	0
21	Viewshed parking	7	7	0	0	0	0	0	0
22	Carter Shields parking	4	4	0	0	0	0	0	0
23	Viewshed parking	8	8	0	0	0	0	0	0
24	Sewage Treatment Plan parking	4	0	4	0	0	0	0	0
25	Campstore parking	51	51	0	2	0	0	0	0
26	Interp/Resc Education office parking	4	4	0	0	4	0	0	0
27	Visitor in the Park parking	8	0	8	0	8	0	0	0
28	Maintenance Facility parking	25	25	0	0	25	0	0	0
29	Horse Concession parking	25	25	0	2	0	0	0	0
30	Cove - Overflow parking	40	0	40	0	0	0	0	0
31	Horse Trailer parking	7	0	7	0	0	0	0	7
32	Picnic area parking	68	58	10	4	0	0	0	0
42	Developed area water tanks parking	4	0	4	0	4	0	0	0
	Total parking	732	389	137	12	47	8	198	7
			53%	19%	2%	6%	1%	27%	1%

The Cove has several parking issues, including but not limited to the lack of available spaces during peak visitation periods or special activities such as bicycle/pedestrian only periods. A lack of parking at the cabins along the Loop Road, parking congestion at Cable Mill, a lack of signs identifying the location of day-use horse parking and trailhead parking, and parking congestion related to the bicycle/pedestrian only periods also are issues.

Reserving the Loop Road for bicycles and pedestrian creates a two-fold parking issue. The first relates to visitors who drive to the Cove, park their vehicle and walk or ride their bike on the Loop Road. When the 63 spaces at the visitor orientation shelter are filled, parking overflows into the picnic area, horse concession area, and campstore parking lots. The second problem occurs when motorists try to access the Loop Road when the bicycle/pedestrian period ends. This traffic forms a queue at the gate for the Loop Road that often winds onto Laurel Creek Road. The Wednesday/Saturday bike/pedestrian only periods place a significant strain on Cades Cove parking.

Visitor Pull-offs

A significant number of vehicle pull-offs have been created along the Loop Road. Pull-off areas designated by the National Park Service for visitor use are paved and depicted with a “red flag” on Figure 3. These 37 paved pull-offs have been established to accommodate visitors who want to view wildlife, hike, or visit historic structures.

Unfortunately, many visitors pull off the road whenever they see wildlife. Thus, over the years, a significant number of “informal” pull-off areas have been created. (These are depicted on Figure 3 with a square icon.) As use of these informal pull-offs has increased, maintenance workers have added management logs or boulders to restrict their use and have filled in ruts and mud holes with gravel.

For this plan, field reconnaissance was undertaken to document the number and locations of pull-off areas, and 139 unpaved pull-off areas were accounted for. The fieldwork undertaken to identify these areas provided the means to estimate the capacity of these pull-off areas to accommodate vehicles. It is estimated that these areas can serve 200 to 250 vehicles.

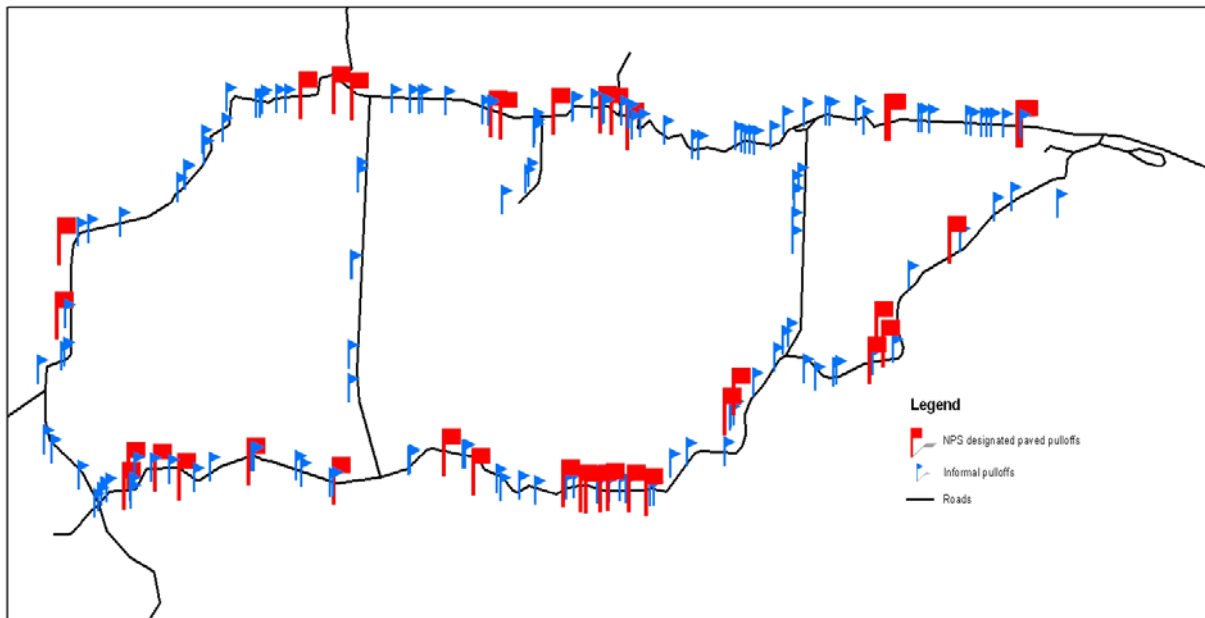


Figure 3: Vehicle Pull-Offs along the Cades Cove Loop Road

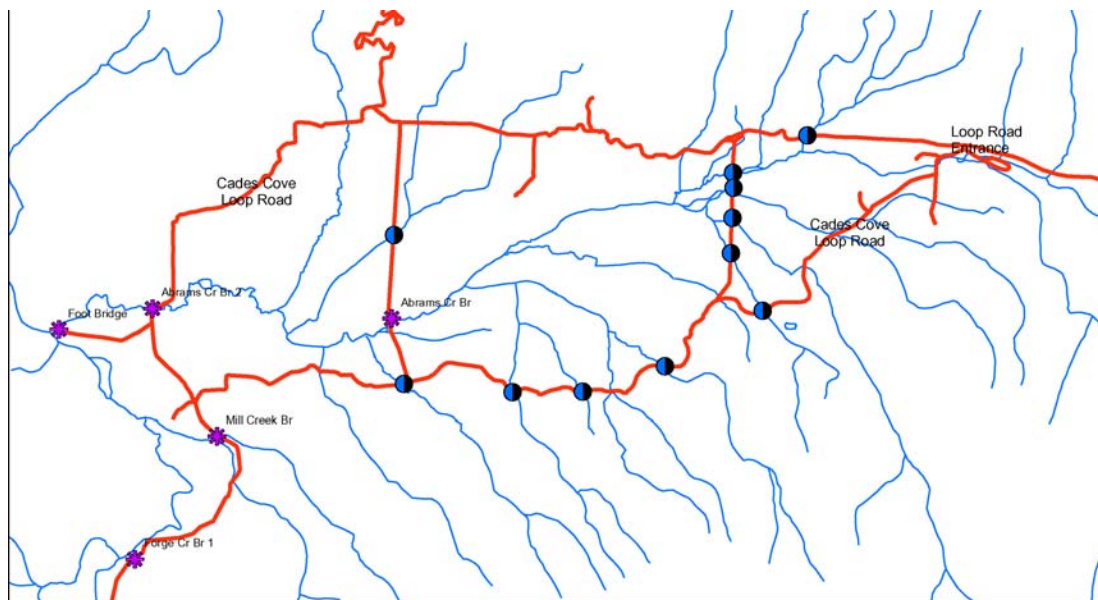
Bridges

Bridge Descriptions

The study area contains five bridges and 11 wet water crossings. These include two vehicular bridges, one foot bridge over Abrams Creek, a Mill Creek Bridge, and one bridge over Forge Creek. Table 3 summarizes the conditions of these five bridges, as well as five that are not directly in the study area. The location of bridges is shown on Figure 4.

In general, these bridges are in good condition. The only bridge that received negative reporting is the "number four" bridge over Forge Creek (which is not in study area). There is also a tunnel on Laurel Creek Road 6.6 miles from the Townsend Wye. Built in 1948, the tunnel was last inspected in 2002 by FHA and found to be in fair condition, with some moderate to severe spalling of the tunnel lining along the spring line and crown and moderate deterioration in the drain chase area (U.S. DOT, Federal Highway Administration, Federal Lands Highway, 2000).

Table 3: Bridge Conditions in Cades Cove		
	Bridge Name	Condition
1	Abrams Creek Bridge #1	Good
2	Abrams Creek Bridge #2	Good
3	Mill Creek Bridge	Fair to good
4	Forge Creek Bridge #1	Fair to good
5	Forge Creek Bridge #2	Fair to good
6	Forge Creek Bridge #3	Fair to good
7	Forge Creek Bridge #4	Although components of this bridge are in good condition, differential settlement of approximately 1/2" - 1" has occurred at the pier.
8	Forge Creek Bridge #5	Good
9	Parson Branch Bridge #1	Good
10	Parson Branch Bridge #2	Good



Legend

- Wet water Crossings
- ✱ Bridges
- Roadways
- Streams

* Note: Only bridges within the study area are shown. All other bridges fall outside of the study area (on Parson Branch Rd.) and can be referenced in the Background Scoping - Existing Conditions - Facilities and Infrastructure Technical Summary

Figure 4: Bridge Crossings in Cades Cove

Buildings and Facilities

Description

An assessment of the buildings and facilities was undertaken during the course of this project. The buildings included in this review include structures used by the National Park Service for administration and/or visitor activities: the campstore, ranger station, interpretation and visitor services office, residences, concrete trailer pads with utilities (for volunteers), NPS horse barn, and maintenance buildings. This analysis does not include cultural or historic buildings, which are addressed in the Cultural Resources report.

The maintenance staff for buildings, grounds, and facilities within the Cades Cove district includes 10 full-time employees, three employees who are subject to furlough, 12 seasonal employees and four to eight volunteers. The staff is responsible for cleaning and maintaining structures, maintaining the grounds, mowing, leaf pick-up, and other general maintenance activities.

The next section of this report describes each of the major buildings in the study area. Table 4 provides technical details for each building and a condition assessment related to visitor and/or park service needs. The assessment is based on field review and information provided by the maintenance staff in Cades Cove.

Table 4: Facilities Conditions Report - Building¹ Assessment and Comfort Stations

Building Name	Location	Year Constructed	Square Footage (Capacity)	Assessment Summary	Men		Women
					Urinals	Stalls	Stalls
Campstore/ Amphitheater	Campstore Area	1958	1,540 (200)	Campstore comfort station capacity inadequate to meet current peak season demand. Campstore section of building is inadequate given the current approved products and services offered with a lack of storage and seating for food customers. Amphitheater program use impacted by location. Campstore parking demand exceeds capacity of lot during peak usage periods.	3	2	4
Bicycle Rental/Vending	Campstore Area	1970s (estimate)	1071	Operation would be improved with secure, covered storage of bicycles.			
Resource Education Office	Residential Area	1957	1237	Residential building modified for current use. Currently crowded with no capacity to support increased education program.			
Taxi Biodiversity Inventory ATBI workspace	Residential Area	1956	1754	Residential building modified for current use.			
Ranger Station/ Campground Office	Campstore Area	1984	1567	No secure area for ranger vehicles or SAR/Fire cache storage. Currently crowded with no capacity to support for increased ranger presence.			
Picnic Area Comfort Stations - 2 total	Picnic ground	1953-1955	378 each	Comfort station capacity inadequate to meet current peak season demand.	3 each 6 total	2 each 4 total	4 each 8 total
Campground Comfort Stations – 6 total	Campground	1955-1958	424 each	Meeting current campground demand.	3 each 18 total	2 each 12 total	4 each 24 total
Maintenance Office and Carpenter Shop	Maintenance Area	1958	4720	Adequate for current usage but office space is crowded with no capacity for increased office space.			
Maintenance Auto Shop and Storage	Maintenance Area	1985	4912	Auto shop area inadequate for current program needs. Storage insufficient to meet current storage needs.			
Maintenance Sand Building	Maintenance Area	1991	1923	Meeting current demand			

¹ Note: This list includes many Cades Cove visitor use and program support buildings. However, not all Cades Cove District buildings are included in this listing.

Table 4: Facilities Conditions Report - Building¹ Assessment and Comfort Stations

Building Name	Location	Year Constructed	Square Footage (Capacity)	Assessment Summary	Men		Women
					Urinals	Stalls	Stalls
Maintenance Land Area	Maintenance Area		Approx. 2.5 acres	Operational inefficiencies resulting from inadequate secure storage area and a location that does not meet all district maintenance needs. Location adjacent to campground limits normal operational hours – to reduce potential noise impact.			
Concession Stables Building	Horse Concession Area	1966	2888	All horse concession stable facilities in Park to be replaced with stables meeting current NPS stable requirements. Parking demand exceeds capacity during peak season.			
Concession Stables Building	Horse Concession Area	1967	2837				
Horse Concession Comfort Station	Horse Concession Area	1968	240	Not meeting current visitor needs.	3	2	4
Cable Mill Visitor Center	Cable Mill Area	1972	1,946	Lacks space to adequately display current interpretive information/bookstore materials. Log cabin design leads to impression that structure is historic.			
Cable Mill Comfort Station	Cable Mill Area	1974	1,043	Capacity inadequate to meet current peak season demand.	3	2	9
Total Comfort Station Facilities					33	22	49

Campstore

The campstore area is made up of two buildings. The first is a retail store providing food and basic supplies for campground and other visitors. It also includes the amphitheater, which is incorporated into this building under a large “A” frame roof structure. A second building, located east of the store, is used for storing firewood and contains a covered space for vending machines and the administrative area for the bicycle rental service. Bicycles available for rent are stored in the open between this building and the campstore and are covered with tarps (see below). The store is privately operated through a concession agreement with the National Park Service.



The restrooms in this building are heavily used, especially on weekends, and are generally inadequate given the current demand. A study in 2003 found peak use for men at 1,782 people on weekdays and 2,398 on weekend days. For women, these peak figures were 3,308 on weekdays and 4,070 on weekend days. The heavy demand is significant given a common complaint voiced in the 1998 visitor survey about a general lack of restroom facilities in the Cove.

Space in the store is generally too limited to adequately display the items the store is authorized to sell. For example, food is available, but seating is not available for food customers. Similarly, the aisles are narrow and it is difficult for customers to move through the store during busy periods. Inventory storage space is also limited.

Covered storage of the bicycles in a secure location would improve the operation of the bicycle rental facility. Parking is also an issue. Motorists compete with buses for spaces in the campstore parking area because there is no designated bus parking. The parking area also serves a variety of uses: visitors to the amphitheater, visitors who park to use the Loop Road during bicycle-only periods and overflow parking from the campground.

Amphitheater (Building 472)

The amphitheater is a National Park Service facility used for education and interpretation purposes and is adjacent to the campground. This covered, open air A-frame roof structure is integral to the campstore. It is particularly convenient to campers, but foot traffic to the campstore and the adjacent restrooms as well as traffic on the adjacent roadway detracts from programs in the amphitheater. This detracts from the Park's goal of attracting non-campers to the amphitheater. Also, parking is limited for non-campers because of the competing usage in the campstore parking

lot. Because there is no seating for food customers in the campstore, many use the amphitheater as a picnic spot.

Resource Education Facilities (Building 354)

This structure was originally designed as a residence for NPS staff. The building is now used for office space for resource education programs.

Residential Structure (Building 423)

A second structure originally designed as a residence is located adjacent to the Resource Education building. This building is currently used to house All Taxa Biodiversity Inventory (ATBI) personnel. It is similar in age, size, and function as Building 354.



Although Buildings 354 and 423 are no longer used for housing, they are in an area designated for housing in the Cove. While the structures meet current demand, they are crowded and cannot accommodate expanded program needs. Moreover, these structures were not designed for their current uses and, as a result, do not function as well as similarly-sized facilities designed for them.

Buildings 354 and 423 share an access drive that leads to a series of paved trailer pads for park service volunteers. There are 10 pad sites associated with the residence area.

Ranger Station (Building 336)

This building is located across the road from the campstore parking lot. It is a small residential style building serving as the campground and Ranger Station office. The building was constructed in 1984.

This small building is crowded with eight rangers who work from one office space. Consequently, it cannot serve expanded program needs. There is no fenced area for rangers to secure their vehicles. The building does not include several features common to most ranger stations, including equipment for search and rescue, fire response and exercise.

Maintenance Facility

The maintenance facility is located across the road from the 'C' loop of the Cades Cove campground. It is comprised of a series of buildings. The main building has administrative offices in front, a break room in the middle and garage facilities at the rear, all under one roof. There are two additional garage buildings adjacent to the maintenance building that are used for storage and an auto shop for the maintenance of vehicles. The main maintenance compound also includes fuel storage and pumping facilities. Material storage areas are adjacent to the parking area for the maintenance facility, and a portion of the grounds is fenced.

This facility has several deficiencies:

- (1) The auto shop is too small for current needs. The shop has only one functional bay and, if a repair is tying up the bay, staff cannot complete routine maintenance or repairs on other vehicles.
- (2) The fenced area is not large enough for efficient operations. To reach needed equipment, staff often needs to move several other pieces. The area also is too small to store all the equipment that should be secured.
- (3) There is a need for covered equipment storage. Expensive equipment such as graders is stored outside. Covered storage would improve the useful life of this equipment.
- (4) Because of its proximity to the campground and picnic area, the facility is convenient for the maintenance and utilities staff. However, the location is not ideal for all maintenance operations. To operate efficiently, the road maintenance operation, for example, should be located closer to the center of the entire Cades Cove district. Staff also must use their own equipment and vehicles to get to the maintenance area when Cove roads are closed because of downed trees, etc. Noise generated by emergency repairs and other work can affect the campground at all hours, such as when emergency repairs or

- roadway clearance is needed or deliveries must be made. Semi-trailers and other large trucks must share the campground road with visiting motorists at certain times during the day.
- (5) The facility is not large enough to accommodate growth, whether a demand for more office space, more space for maintenance work (whether secured or not) and/or additional storage buildings.

Horse Concession

The horse concession area is comprised of an administrative office, barns (40 stalls), and a comfort station. The horse concession operator has a trail separate from other horse and hiking trails in the Cove. One issue with the facility is that the area for day-use horse trailer parking is not designated and user conflicts occur. Some interest was raised during public input sessions for co-locating the day-use parking with the horse camp area.

The Park is looking to replace the horse concession facilities throughout the Park with facilities that meet new standards for stables. Restrooms have been identified as being inadequate to serve the existing level of users (bicyclists, day use horse riders, and horse concession customers). Lack of parking has been identified as an issue on bicycle closure days as well as during the fall hayride season. During the hayride season in particular, parking overflows onto highly visible grassy area adjacent to the Loop Road.

Picnic Area

The picnic area covers approximately two acres at the southeast corner of Laurel Creek Road and the Cades Cove “developed area” access road. Sixty picnic sites are located in a graveled area with stationary barbeque and tables. Two of the picnic sites are ADA accessible, a number that does not meet current accessibility standards.

There are two comfort stations (restrooms) located in the picnic area. These buildings are approximately 350 square feet in size and were designed and built in the late 1950s to early 1960s. Each building includes four stalls for women and three urinals and two stalls for men.

The picnic area is open year round, although one of the comfort stations is closed during off-peak visitation periods. Although many large groups use this area, it is not designed to serve large numbers of people.



Campground

The campground covers approximately three acres and contains 161 individual campsites and four group campsites, one with a pavilion. The campground is divided into three sections, each having access via a loop road. The condition of the loop roads was not assessed by the FHWA Pavement Condition Report. A preliminary assessment by the consultant team indicated that the pavement along these roads is in fair-to-poor condition.

The campground is divided into three sections. Section B has 85 campsites; Section C has 76 campsites; and the group camp area has four areas that provide space for 100 campers. Campsites can be reserved in advance from May 15 through October 31. The length of stay is limited to seven consecutive days from May 15 through October 31, with a 14 consecutive-day limit from November 1 through May 14. Campsites are limited to six people and two vehicles. Campfires are permitted only in fire grates. Individual campsites include a fire ring, table designated tent pad and paved area for parking, while ranger led programs are held at the amphitheater, campstore, and trailer sanitary station.

There are six restroom buildings in the campground. These are approximately 350 square feet in size and were built in the late 1950s to early 1960s. Each building

includes four stalls for women and three urinals and two stalls for men; there is no hot water or showers associated with the campground area.

Horse Camp

An overnight horse camp near the entrance to the Loop Road operates from April through October. The camp has three sites. It does not have potable water and is served by portable toilets. The sites are accessed through the day use picnic area off of the Anthony Creek trail. Because of the proximity of these facilities, the horse camp often conflicts with the picnic area. Riders are required to dismount their horses, walk through the picnic area and pick up any droppings. Moreover, patrons of the horse camp must cross through the picnic area to reach the horse trailers.



Visitor Orientation Shelter

Two areas have been developed to augment the visitor experience. These include the developed area at the east end of the Cove and the Cable Mill area. The developed area includes the Visitor Orientation Shelter (located at the beginning of the Loop Road). This is a small (12' by 12') open air shelter. It is constructed of short stone

walls and posts supporting a sloped roof. This shelter provides minimal orientation to the Loop Road. This area also includes a small paved area and sign that provides orientation information for bicyclist riding the Loop Road.



Cable Mill

There are two buildings at the Cable Mill visitor area. One is a restroom facility and the second is a small log cabin used by the Great Smoky Mountains Association (formerly the Natural History Association) as a visitor center and bookstore. This building is approximately 500 square feet in size and provides display for books, maps, educational materials, and a small area for the display of cultural artifacts related to Cades Cove.

The restroom facility provides nine stalls for women and two stalls with three urinals for men. These restrooms are inadequate to serve current demand. The Park would prefer to use paper toweling to reduce trash, but the power generated by the current propane generator is insufficient to serve this purpose.

The visitor center/bookstore lacks space to adequately display the current inventory. The log cabin design of the center itself is an issue because some visitors believe it is historic. The only telephone service available at the center is provided by satellite and requires a credit card. No voice telephones are available for emergency use.

Utilities and Infrastructure

Utilities in Cades Cove include electricity, telephone, potable water (storage and distribution), and sewage conveyance and treatment facilities. For this report, utilities were analyzed for their existing condition, capacity to serve existing activities in the Cove and capacity to serve expanded demand in the future.

Telephone and Electric Service

Underground electric and phone service extend to the Townsend Entrance Road, Laurel Creek Road, Tremont and the facilities at the developed section of Cove (ranger station, store, maintenance, horse concession, etc.). Sevier County Electric Cooperative is the service provider. Phone service is provided via underground fiber optic cable by BellSouth. Electric service has been extended to the campground and picnic area primarily for use at the comfort stations. There is no electric service at campsites or picnic sites.

The Cable Mill Visitor Center (located at the midway point of the Loop Road) has electricity provided by two propane powered generators (total, 80,000-kilowatt). These generators are adequate for current demand but do not have the capacity to provide additional service. Telephone service is not available.

Water

There are two separate water storage facilities in the study area. Each is located at the head of the underground water distribution system. Each system is fed by groundwater that is pumped from a well into large storage tanks. These facilities provide potable water to two separate portions of the study area.

The first facility is located behind the group camp area (and east of the picnic area). Made up of three 35,000-gallon water tanks, it provides water to the campgrounds, picnic area, campstore, ranger station, residences/offices, horse concession area and maintenance facility. The second is in the vicinity of the Cable Mill visitor center off Forge Creek Road. This facility includes one 35,000-gallon tank and a looped underground distribution system that provides water to the comfort station at Cable Mill.

The current number of restroom stalls at Cable Mill is inadequate for the level of visitors. Expansion of the restroom facilities and other water-dependent uses that would coincide with increased visitor demand will require increasing the capacity of the water tank at Cable Mill.

Each of these is above ground water tanks and is sited at an elevation that provides pressure to the distribution system. The water distribution system is looped to maintain consistent pressure and enable maintenance and service to occur without major disruptions to the system. Water quality is monitored on a regular basis and has been found to be consistently safe for drinking.

Sewage Treatment

The treatment of sewage is handled through two separate facilities in the study area. One sewage treatment facility, located near the horse barn, was constructed in the late 1960s and includes two settling ponds that provide primary and secondary treatment of effluent. Recently, a drip field was built to provide tertiary treatment of effluent. This step enabled the treatment facility to stop discharging into Abrams Creek.

Sewage treatment is provided to the campground, picnic area, campstore, ranger station, residences/administrative offices, and horse concession area. Effluent from these areas is piped on a gravity system into the treatment facility.

The ability for this treatment plant to handle additional development in Cades Cove is constrained. The age of the settling ponds is an issue, as they are over 30 years old and their capacity has been restricted due to sedimentation. Additional analysis will be required regarding the capacity of the treatment facility as it may relate to future developments such as additional restrooms or campground amenities.

The treatment facility described above does not serve the Cable Mill visitor center. Instead, the comfort station at Cable Mill is served by a septic system located behind the building. This facility includes an underground tank for capturing solids and a drip field for filtering liquid wastes through the ground. During peak season, the system is stretched to capacity, requiring the tank to be pumped out weekly (by a commercial contractor). This septic field system is a primary constraint to providing additional visitor facilities (primarily restrooms) to this portion of the study area.

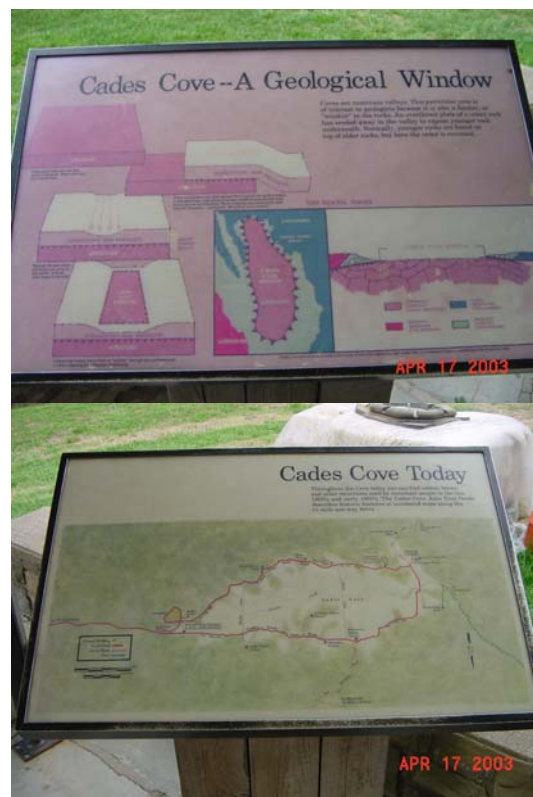
Landscape Amenities

The primary landscape amenities of Cades Cove relate directly to the existing natural terrain and plant material. In general, few landscape amenities have been added to the Cove. The National Park Service has restricted additions of landscape elements to items that help manage visitor activities, such as fencing, gates, and wayfinding signs.

One area where landscape amenities have been added is Cable Mill. The Cable Mill site has been developed by the National Park Service to provide a representation of the daily life in the Cove during the early settlement period. The structures, walking paths, fencing and perimeter plantings have been designed and arranged to evoke an era of sustainable agriculture during this era.

Interpretive Signs

A limited number of interpretive signs are located in the study area. These include a series of signs at the Visitor Orientation shelter that provide the visitor with information on the geology, wildlife, settlement history, and NPS management activities being undertaken in the Cove today.



There are also a limited number of interpretive signs located at the Oliver Cabin, Main Viewing Area, and Cable Mill. These are depicted in the following photos:

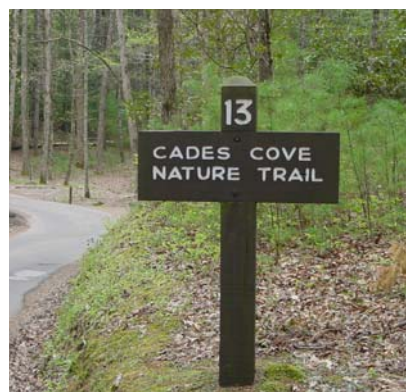


There is also an interpretive sign related to the self guided Cades Cove Nature Trail. The style and design of these interpretive signs are similar and fit into the 'rustic' settlement theme of Cades Cove.

One of the primary issues with interpretive materials within Cades Cove is that there is not enough information being provided to the visitor. A balance between interpretive signing and other methods is needed to educate visitors on the Cove's resources as well as appropriate visitation activities in the Cove. It is recommended that a "Master Sign" plan that covers both interpretation, informational, and traffic control sign needs be a part of the next phase of this project.



Within the Cove are directional signs, informational signs, traffic control signs and warning signs that vary in type style and nature. These are located along the Loop Road as well as on Sparks and Hyatt lanes (with fewer on these roads than on the Loop Road). The following photos depict some of these signs:





Sign kiosks also provide information on the Great Smoky Mountains and Cades Cove. These are located at the Ranger Station, Visitor Orientation Shelter, and at comfort stations in the picnic area and campground.

Fencing

Post and wire fence is the predominant small scale landscape feature within the Cove. This type of fence is used primarily to keep private vehicles from gaining access to the fields and it is consistent with the rural agricultural areas. However, the wire fence requires constant maintenance because visitors often bend the non-barbed portions down or push posts over the wire to gain access to the fields.



Another style of fencing is the worm or snake fencing that is made from rough hewn logs and can be seen at the entry to the Loop Road as well as at exhibit sites. It may be used to accent historic sites and can be found at the beginning of the Loop Road, around parking areas related to cabins and churches, and at the Cable Mill Visitor Center. The fencing is representative of the settlement era.



Management Gates

There are two types of management gates in Cades Cove. Steel post gates are used along Laurel Creek Road and at the entry to the Loop Road (and other locations such as Sparks and Hyatt lane). These gates are constructed to effectively close a road to vehicle traffic.

The second is related to managing access to the valley floor. These gates have been installed in conjunction with wire fencing and are used by park staff for field management and research access. (Sample photos are provided below and Figure 5 is a map identifying the location of gates.)



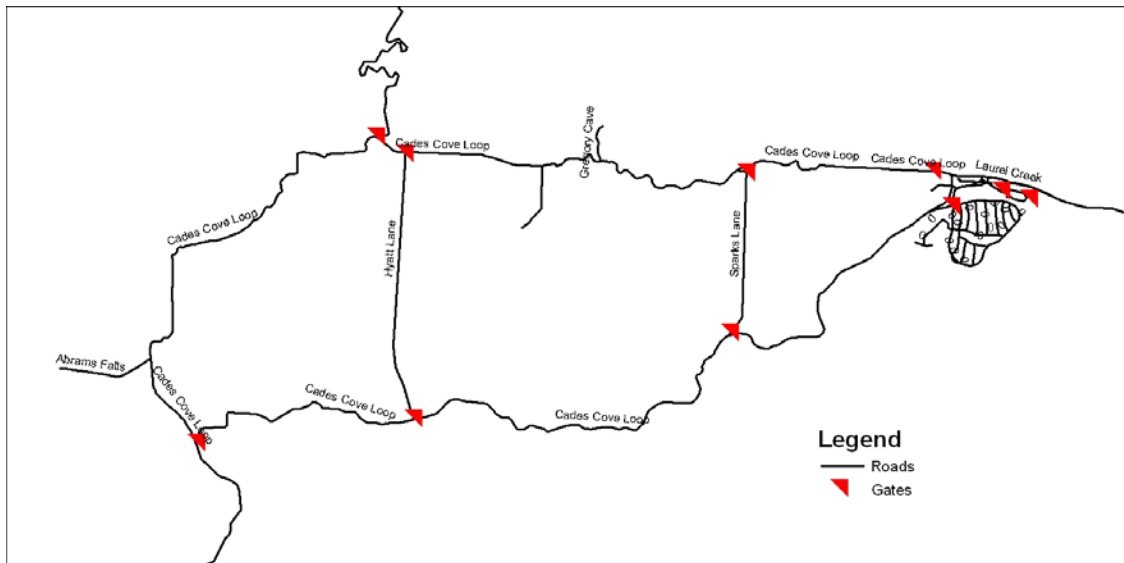


Figure 5: Location of Gates along the Cades Cove Loop Road

Note: A gate located on Laurel Creek Road just west of the Wye is used to close the Loop Road.

Trash Receptacles

Garbage cans are located at larger visitor areas such as the visitor orientation and Cable Mill area. These are small bear proof garbage cans are illustrated below.



Management/Maintenance

Grass is mowed (maintained turf) along the edge of the roadway and is typically the width of one mower pass along the inside of the fence at the roadway edge. Management boulders and logs are used to manage the visitors and keep vehicles restricted to the road and driveway areas.

Vehicles parking "wheel stops" are not typically considered landscape amenities. Although within Great Smoky Mountains National Park some wheel stops are molded to give the appearance of logs taken from the forest. These wheel stops are used in the parking lots within the Cove and in some locations along the Loop Road to prevent vehicle access into the fields.

Trails

There are 14 trailhead access points in the study area. Four of these trailheads are accessed from Laurel Creek Road as visitors enter the Cove, while the other 10 are located along the Loop Road, Forge Creek Road at Cable Mill or Parsons Branch Road. The following section describes these trails:

Trailheads off Laurel Creek Road

Schoolhouse Gap Trail: This trail proceeds from the Townsend Wye toward Cades Cove on the Laurel Creek Road for 3.9 miles. The trailhead is a large, paved parking area on the right. The 2.2-mile segment from Laurel Creek Road to Scott Mountain Trail features birding and wildflowers.

Turkeypen Ridge Trail: This 3.6-mile horse and hiking trail winds along the eastern face of Turkeypen Ridge from Schoolhouse Gap Trail to Laurel Creek Road.

Finley Cane Trail: This horse and hiking trail traverses 2.8 miles from Laurel Creek Road to Bote Mountain Trail and features the Rhododendron tunnels. The trailhead is 5.5 miles west of Laurel Creek Road.

Lead Cove Trail: This 1.8-mile horse and hiking trail travels from Laurel Creek Road to Bote Mountain Trail and features historic cabin sites, fields and reforested cropland.

Trailheads off the Loop Road

Rich Mountain Trail: This 3.3-mile trail connects the Loop Road to Indian Grave.

Ace Gap Trail: This 5.6-mile horse and hiking trail starts at the terminus of Rich Mountain Road and traverses to the junction with Beard Cane Trail. Key highlights include Ace Gap, the crossing of an old railroad bed.

Cooper Road Trail: This 10.9-mile horse and hiking trail starts at the Loop Road and terminates at Abrams Creek Campground. It features redbuds in March and early April.

Abrams Falls Trail: This 4.2-mile hiking trail leads to Hannah Mountain and Hatcher Mountain trails (2.5 miles to Abrams Falls). The trailhead is located between signposts #10 and #11 on the Loop Road. Key highlights include Abrams Creek and Abrams Falls.

Rabbit Creek Trail: This 7.8-mile horse and hiking trail starts at the Abrams Falls trailhead off the Loop Road to Abrams Creek Ranger Station. This trail crosses Crossing Mill and Rabbit Creeks.

Trailhead access off Forge Creek Road

Gregory Ridge Trail: This 5.0-mile hiking trail connects Forge Creek Road to Gregory Bald Trail and features old-growth forests, scenic views, and access to Gregory Bald.

Trail head access off Parsons Branch Road

Gregory Bald Trail: This is a 7.3-mile horse and hiking trail from Parson Branch Road at Sams Gap to Appalachian Trail at Doe Knob (4.5 miles if only going to Gregory Bald). Key features include Sheep Pen Gap and Gregory Bald.

Trailhead access off the Loop Road

Nature Trail: This self-guiding nature trail loop starts a half-mile east of Forge Creek Road and highlights early settlement areas.

Trailhead access through the picnic area

Anthony Creek Trail: This horse and hiking trail traverses 3.6 miles from the picnic area to Bote Mountain Trail.

Crib Gap Trail: This 1.6-mile horse and hiking trail connects Anthony Creek Trail to Turkeypen Ridge Trail and features mushrooms and wildlife.

References

U.S. Department of Transportation Federal Highway Administration. Bridge Inspection and Management Program. June 2000 - These are reports that reflect the condition of bridges within Cades Cove.

AutoCAD Drawings Cable Mill and Cades Cove – 2001

GIS Shapefiles, Great Smoky Mountains National Park – 2001,2002.

Water, Sewer, and Electric utilities plans for Cades Cove (hard copy map) - 2001 .

USGS Digital Ortho Photography (1989 and 1990) covering Cades Cove, Laurel Creek Road and Tuckaleechee Cove areas.

General Management Plan, Great Smoky Mountains 1981, NPS

Hiking Trails of the Smokies, Great Smoky Mountains Natural History Association. (2001)