

City, North Carolina) to replace the flooded NC 288. The 1943 Agreement also called for the state of North Carolina to construct a road from Bryson City to the GSMNP boundary. This was completed in 1959.

Approximately 7.2 miles (11.5 kilometers [km]) of the originally proposed North Shore Road have been constructed within GSMNP, with the last segment being completed in the 1970s. The need of the project is to determine whether or not it is feasible to complete the road and to evaluate other alternatives that would satisfy the obligation. Both build (i.e., road or other facilities) and no-build alternatives will be developed to determine how the 1943 obligation will be met.

### 1.3 Study Area Description

In order to provide the full range of study alternatives and thorough analyses that are required by the National Environmental Policy Act (NEPA), the EIS study area boundary covers a large expanse of land. Specifically, the inclusion of land south of Fontana Lake is necessary to evaluate the existing roadway network, the area's transportation needs, and potential access options across Fontana Lake. The inclusion of rural communities such as Lauada, Almond, and Stecoah, as well as Bryson City, provides insight on the local population's economy, demographics, and social values.

The study area, shown in Figure 1, is in western North Carolina, in portions of both Swain and Graham counties. It extends from just west of Fontana Village to the eastern municipal limits of Bryson City, covering an area of roughly 120,000 acres (48,562 ha). Fontana Lake divides the study area to include land north and south of the lake. The southern limits of the study area parallel just south of NC 28 and US 19/US 74, while the northern limits follow an arc that includes the majority of land transferred in the 1943 Agreement.

## 2. Development of Preliminary Study Alternatives

### 2.1 Methodology

All study alternatives must meet the purpose of and need for the project, adhere to the project's goals and objectives, and be reasonable. The purpose of and need for the project is described above in Section 1.2. The project's goals and objectives and reasonableness criteria, as well as the screening criteria used to evaluate alternatives, follow.

## 2.1.1 Project Goals and Objectives

Project goals and objectives are what the National Park Service (NPS) intends to accomplish by taking the proposed action. They are meant to protect the park's resources and to ensure the action is meaningful. The project study team developed the goals and objectives for the project by reviewing the GSMNP's General Management Plan (GMP), other management documents, and public and agency input.

Draft goals and objectives were presented to the public and agencies at the March 2003 scoping meetings. After reviewing all public and agency comments, the study team finalized the goals and objectives below.

### 2.1.1.1 Goals

While addressing the project's purpose and need and ensuring that resources within GSMNP, including the Appalachian National Scenic Trail (AT), are unimpaired for the enjoyment of future generations, the following goals will be fulfilled:

- § Ensure that proposed management actions are consistent with legislative and executive mandates and NPS policies.
- § Protect the significant and diverse natural resources and ecosystems (forest communities, water resources, and soundscapes) and the intangible benefits (peace and solitude) currently available in the areas where natural processes dominate.
- § Protect the tangible (archaeological sites, cemeteries, historic structures, landscapes, and Traditional Cultural Properties) and the intangible (feelings of attachment, family life, myth, folklore, and ideology) aspects of the cultural resources.
- § Foster and build relationships with Swain County and other North Carolina gateway communities.
- § Continue to provide the traditional recreational activities of hiking, camping, fishing, and horse use.
- § Avoid alternatives that would require taking of privately held lands.

#### 2.1.1.2 Objectives

Alternatives will incorporate natural resource management strategies that include the following elements:

- § Protect streams, seeps, wetlands, floodplains, and other water resources.
- § Protect federally-listed threatened and endangered species and their habitats.
- § Develop alternatives that minimize areas of disturbance. If disturbance is required, maximize the use of previously used roadway corridors.
- § Protect park resources from adverse effects of problematic geologic formations and acidic runoff.

Alternatives will incorporate cultural resource management strategies that include the following elements:

- § Ensure that any human remains, funerary objects, objects of cultural patrimony, or traditional grave sites are treated in accordance with the provisions of the Native American Graves Protection and Repatriation Act, and any other applicable laws and regulations.
- § Protect Traditional Cultural Properties present within the study area.
- § Ensure that all cultural resources located within the study area are evaluated and considered in accordance with the provisions of the National Historic Preservation Act.

Complete a comprehensive and inclusive public involvement program that will incorporate full consideration of all input provided by the public.

#### 2.1.2 Reasonability

The regulations promulgated by the Council on Environmental Quality (CEQ) for the implementation of the NEPA require an objective evaluation of “all reasonable alternatives.” These regulations do not provide a definition for reasonable. However,

“reasonable” can be defined as prudent (wise “in the management of practical affairs”<sup>1</sup>) and feasible (“capable of being done or carried out”<sup>1</sup>). To be reasonable, an alternative must not create any truly unique problems such as unusual factors, extraordinary magnitude of cost compared to benefits, community or environmental disruption of extraordinary magnitude, loss of irretrievable GSMNP resources, or an accumulation of these factors. This initial review for reasonability provided an appropriate level of detail to proceed with the NEPA process. Additional information obtained at any time in the NEPA process may cause elimination of an alternative if that alternative is found not to be reasonable or feasible in the future.

### 2.1.3 Screening Criteria

In addition to tentatively meeting the criteria described above, the selection and evaluation of build and partial-build preliminary study alternatives included consideration of a variety of screening criteria, which consisted of environmental, social, economic, and engineering constraints. Suggested impact topics to be utilized in screening alternatives for the EIS were presented to the public at the March 2003 Scoping Meetings and were finalized at the September 2003 Public Workshops. These impact topics provided the foundation of the screening criteria, shown in Appendix B. Also included in the criteria were the various laws and requirements addressed under the NEPA planning process. Both build and partial-build alternatives were located to avoid previously documented sensitive areas to the greatest extent possible and to minimize potential impacts without compromising the engineering standards of the project or unreasonably increasing construction costs.

### 2.1.4 Roadway Design Criteria

Roadway design criteria (also referred to as roadway design standards) were developed to determine the proposed typical sections (road types) for each of the partial-build and build preliminary study alternatives. The road types include Principal Park Road, Special Purpose Park Road, Primitive Park Road, and Administrative Access Road. The Primitive Park Road and Administrative Access Road follow the same roadway design criteria; however, they differ in that the Primitive Park Road would be open to

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<sup>1</sup> Merriam-Webster Dictionary. <http://www.m-w.com/cgi-bin/dictionary>. Accessed on October 20, 2003.

the public while the Administrative Access Road would be open to the public based on a prearranged cemetery visitation schedule. Transportation would be provided by NPS or personal vehicle depending on the condition of the road. The roadway design criteria are shown in Table 1. (Note: The roadway design criteria in Table 1 show standard guidance, which may require variations during implementation.) Figure 2 shows photographic examples of these road types and typical sections are shown in Figures 3, 4, and 5, respectively. Section 7 of this report explains the elimination of the Special Purpose Park Road from further study.

Roadway curvature advisory postings for each typical section may require lower speed limits than what is noted as the posted speed limit.

#### Principal Park Road

The proposed roadway typical section for the Principal Park Road has a two-way, asphalt surface with two 10-foot (3-meter [m]) travel lanes and 3-foot-wide (1-m-wide) grass shoulders. It has a maximum posted speed limit of 30 miles per hour (mph) (48.3 kilometers per hour [kph]).

#### Special Purpose Park Road

The proposed roadway typical section for the Special Purpose Park Road has a one-way, asphalt or gravel surface with one 12-foot (3.7-m) travel lane and 3-foot-wide (1-m-wide) grass shoulders. It has a maximum posted speed limit of 20 mph (32.2 kph).

#### Primitive Park Road/Administrative Access Road

The proposed roadway typical section for the Primitive Park Road/Administrative Access Road has a two-way, gravel surface with two 9-foot (2.7-m) travel lanes and 2-foot-wide (0.6-m-wide) grass shoulders. It has a maximum posted speed limit of 15 mph (24.1 kph). (Note: A Primitive Park Road would be open to public access at all times while an Administrative Access Road would be gated and only open to the public based on a prearranged cemetery visitation schedule. Transportation would be provided by NPS or personal vehicle depending on the condition of the road.)

Table 1. Roadway Design Criteria Guidance

Type of Facility	Principal Park Road 2-lane, 2-way	Special Purpose Park Road 1-lane, 1-way	Primitive Park Road /Administrative Access Road 2-lane, 2-way
Design Year Average Daily Traffic Volume <sup>1</sup>	400 – 1,000 vehicles per day (vpd)	< 400 vpd	< 200 vpd
Percentage of Tractor-Trailers and Semi-trailers (TTST)	0%	0%	0%
Percentage of Single-unit Truck with Dual Tires (Duals)	8%	8%	8%
Percentage of Directional Split	60%	NA	60%
Terrain Type	Mountainous	Mountainous	Mountainous
Design Speed Range	25 mph – 35 mph	15 mph – 30 mph	15 mph
Proposed Design Speed	35 mph	20 mph	15 mph
Posted Speed <sup>2</sup>	30 mph	20 mph	15 mph
Typical Section Type	2-lane	1-lane	2-lane
Travel Lane Width	10 feet	12 feet	9 feet
Sidewalks	None	None	None
Bicycle Lanes	None	None	None
Width of Grass Shoulder <sup>3</sup>			
Without Guardrail	3 feet	3 feet	2 feet
With Guardrail	6 feet	6 feet	5 feet
Surface Pavement Type	Asphalt	Asphalt or Gravel	Gravel
Grade			
Maximum <sup>4</sup>	13%	16%	17%
Minimum	0.3%	0.3%	0.3%
K Value <sup>5</sup>			
Sag	50	20	8
Crest	40	10	5
Horizontal Alignment			
Maximum Superelevation	6%	4%	4%
Minimum Radius	381 feet	127 feet	74 feet
Spiral Curves	None	None	None
Cross Slopes			
Pavement	0.02	0.02	0.02
Grass Shoulder	0.08	0.08	0.08
Clear Zone	5 feet	3 feet	2 feet

Table 1 Continued  
Roadway Design Criteria Guidance

- 1 The average daily traffic volumes were preliminary assumptions based on the range of traffic appropriate for each roadway type.
- 2 Roadway curvature advisory postings may have lower speed limits.
- 3 The width of grass shoulders may vary in some locations.
- 4 Grades may be up to 2 percent steeper for lengths less than 500 feet on one-way downgrades and low-volume roads.
- 5 K Value is associated with vertical curvature and stopping sight distance.

## 2.2 Initial Options Considered

An extensive list of initial options to be considered was compiled after review of previously documented concepts and recommended alternatives from various sources. North Carolina Department of Transportation files and GSMNP documents were reviewed. GSMNP documents included: the GMP, GMP Final EIS, Road System Evaluation, Transportation Concepts, and the Development Concept Plan Environmental Assessment for Deep Creek and Laurel Branch. The 1943 Agreement was also reviewed. Various other correspondence spanning the project's history, including public comments received since the study has begun and agency letters, was reviewed. Public comments were obtained through court reporter transcripts and other written correspondence sent to the project post office box, the NPS, the Federal Highway Administration (FHWA), and the project website.

All options were given full consideration in the development of the preliminary study alternatives. The list, which consisted of approximately 100 options, was preliminarily reviewed to determine if the options met the criteria described above. (Note: "Criteria" includes the purpose and need, the 1943 Agreement, the goals and objectives, the reasonability of the option, the screening criteria, and the roadway design criteria.) Those that did not meet the criteria were eliminated from further consideration. In addition, those options that were considered to have a substantially higher magnitude of adverse impact were eliminated from further consideration. The initial options are shown in Appendix A. This list was included in the public handout provided at the public workshops in February/March 2004 and on the project website.

Transportation System Management (TSM) should be included as an alternative for consideration in a transportation improvement project where applicable. The TSM alternative can include a variety of strategies for maximizing the efficiency and effectiveness of existing transportation facilities. The TSM alternative is usually relevant only for major projects proposed in urbanized areas with populations over 200,000. Because the study area is rural with a low density population, the existing

roadway network is operating at an acceptable LOS, and the purpose of and need for the proposed project does not include a traffic-related need, TSM options were eliminated from further study.

As appropriate, Mass Transit should be included as an alternative for consideration in a transportation improvement project. Such an alternative includes reasonable and feasible transit options such as bus and rail and should be evaluated as an alternative to major highway projects in urbanized areas with populations over 200,000. The study area is rural with low population density and no bus service operates in the area. Furthermore, because of the need for flat grades and gentle curves, the construction of a rail line through the study area would cause much greater environmental damage than any of the partial-build or build alternatives being proposed. For these reasons, Mass Transit was eliminated from further consideration as an alternative.

Whereas US 74-NC 28 has adequate capacity to serve through and local east-west traffic south of the lake, it offers no access to GSMNP. Even though the existing road is adequately serving local and through traffic, it is doing little, if anything, to enhance the GSMNP visitor experience. The 1943 Agreement specified a road on the north shore of Fontana Lake, connecting Bryson City and Deal's Gap. While the existing road system provides the east-west connection from Bryson City to Deal's Gap as intended in the 1943 Agreement, it is doubtful that improving the present system would meet the full intent of the 1943 Agreement because NC 28 does not traverse north of Fontana Lake. Therefore, any plans to improve existing NC 28 were eliminated from further consideration.

### 2.3 Initial Build and Partial-Build Concepts Considered

The initial partial-build and build concepts are shown as corridor segments in Figure 6. These concepts reflect the initial options discussed above that met the project's purpose and need, goals and objectives, and were considered reasonable. The screening criteria and roadway design criteria were used to locate these corridor segments. Because of the rugged terrain, engineering constraints such as the horizontal and vertical alignment were given careful consideration in the development of these corridor segments. After a review of the corridor segments, certain segments and destination locations were eliminated from further study due to the anticipated magnitude of their impacts as compared with the other corridor segments. The anticipated impacts included the likelihood for greater habitat fragmentation, wildlife segmentation, and other impacts to the backcountry experience. These potential segments would also likely require substantial earthwork, resulting in deeper cuts and higher fills. The remaining segments are shown in Figure 7 as the Preliminary Study Alternatives. The partial-

build and build preliminary study alternatives were analyzed as entire corridors rather than by individual segment.

#### 2.4 Corridors

At this stage, the build and partial-build alternatives are 2,000-foot-wide (609.6-m-wide) study corridors. The 2,000-foot-wide (609.6-m-wide) corridor does not mean that 2,000 feet is required to develop the construction footprint. It is a designated width to be studied so that if an environmentally sensitive area is found, the alignment can be shifted to avoid adverse impacts to sensitive areas. The required footprint for the build alternatives and site plans for the partial-build alternatives have not been determined at this time. Corridor locations and widths may need to be modified to avoid sensitive areas, based on the more-detailed DEIS design work and field investigations.

### 3. Description of Preliminary Study Alternatives

After consideration of approximately 100 initial options and a number of potential roadway alignments, 9 preliminary study alternatives were developed. They are described below and include: No-Action, Monetary Settlement, Laurel Branch Picnic Area, Bushnell Area (also known as the Partial-Build Alternative to Bushnell), Buckeye Branch Bridge Corridor, Cable Cove Bridge Corridor, Northern Shore Corridor, Interior Corridor, and Flint Gap Corridor. For purposes of describing some of the alternatives, reference is made to the Northern Shore Corridor. The Northern Shore Corridor is the most east-west corridor, and segments of many of the other corridors, both partial-build and build, utilize the same path. Since it is the most common link between the alternatives, it is used as a basis for describing the other corridors (Figure 7). Approximate lengths and corridor widths are shown in Table 2 (described in Section 4.1). These lengths are for the preliminary study corridors and may change for the detailed study alternatives, which are discussed in Section 8.

Annual ferry service for cemetery access is currently provided by the NPS on a scheduled basis for the public. Eleven trips are made to visit 20 cemeteries along the north shore of Fontana Lake each year. The annual ferry service would continue if an alternative does not include provisions for a new road, a build or partial-build alternative does not intersect an administrative road, or a build or partial-build alternative only reaches a portion of the cemeteries. If a build or partial-build alternative intersects a maintained GSMNP administrative road, the public would be allowed access to the road on a scheduled basis for access to cemeteries.