Foothills Parkway Analysis

Final Report

March 2002

Wilbur Smith Associates

Based on input received from the public through interviews and public meetings, a solid majority of respondents favor full completion of the Parkway. An overwhelming majority also desire options to the personal vehicle in providing the visitor experience. Finally, should any section not be constructed, public sentiment suggests that the National Park Service retain the right-of-way for Park use.

TABLE C. Impact Assessment

	Quality of Viewsheds				Projected Year 2030 Parkway Traffic		Cost			Park Road Traffic Relief		Environmental
	Park		Total		Typ. Summer			Total Annual O&M				
SCENARIO	Score	Rating	Score	Rating	Weekday	Rating	$ per mile	Cost (thousands)	Rating	Reduction	Rating	
No Build	0	-	0	-	0	"	0	0	+	0	-	+
Full Build (33.5 mi.)	123.01	++	160.67	++	4,400 - 10,300	"	$7.5m	$320	"	6,100 (Little River Rd.)	+	-
Build B (14.1 mi.)	86.89	++	85.37	++	4,400	+	$7m	$86	"	0	-	-
Build B Alternate (Pittman Center Proposal)	7.92	-	17.14	-	23,800	-	$10m+	$338	-	0	-	"
Build C (9.6 mi.)	24.41	+	35.4	+	7,800	-	$5m	$64	+	0	-	-
Build D (9.8 mi.)	11.71	+	39.9	+	10,300	-	$10m	$170	-	6,100 (Little River Rd.)	+	-
Build Transit:												
Rail	?		?		n/a	+	$35m+	$2,000 - $3,500	--	n/a	-	-
Monorail	123.01	++	160.67	++	n/a	+	$70m+	$3,500 - $4,500	--	n/a	-	-

++ Very Good + Good " Neutral - Poor -- Very Poor

In summary, the analysis indicates that all sections offer opportunities to view the Park and surrounding foothills area. Consequently, they all have the potential to provide a pleasant visitor experience. This visitor experience may over time be impacted by excessive traffic on certain sections. A technology such as ITS may need to be implemented. Completion of all sections of the Parkway best achieves the Congressional mandate and its associated goals. A completed parkway will provide improved connections to the regional roadway network and will reduce traffic on several existing roadway sections within and outside the Park.

This report was produced by Wilbur Smith Associates in conjunction with the U.S. Department of Interior, the National Park Service, the U.S. Department of Transportation, Federal Highway Administration, and the Knoxville Regional Transportation Planning Organization.

Executive Summary

Foothills Parkway Analysis

Great Smoky Mountains National Park, a gift from the people of Tennessee and North Carolina, was created early in the 20th century for the "benefit and enjoyment of the people." The Park straddles the Tennessee-North Carolina border in the Southern Appalachians and is now the most visited of National Parks. This heavy visitation comes at a price, part of which is traffic congestion. Even prior to World War II, traffic congestion on the Tennessee side of the Park had become a significant issue.

Foothills Parkway came about in response to rising public sentiment in the early 1940's. With a favorable report from Secretary of the Interior Harold L. Ickes, the 78th Congress approved Public Law 232 on February 22, 1944. This mandate of Congress "…authorized the acceptance of donations of land for the construction of a scenic parkway to provide an appropriate view of the Great Smoky Mountains National Park from the Tennessee side of the park, and for other purposes…" The state of Tennessee confirmed its commitment in 1947 and the proposed road was christened the "Foothills Parkway."

Steady progress was made by the National Park Service and the Department of Interior during the 1950's and 60's. By 1968, construction of Sections A, G, and H, comprising 22.5 miles of the planned 72.1-mile facility, was complete. Construction was also complete on the Spur which links Gatlinburg

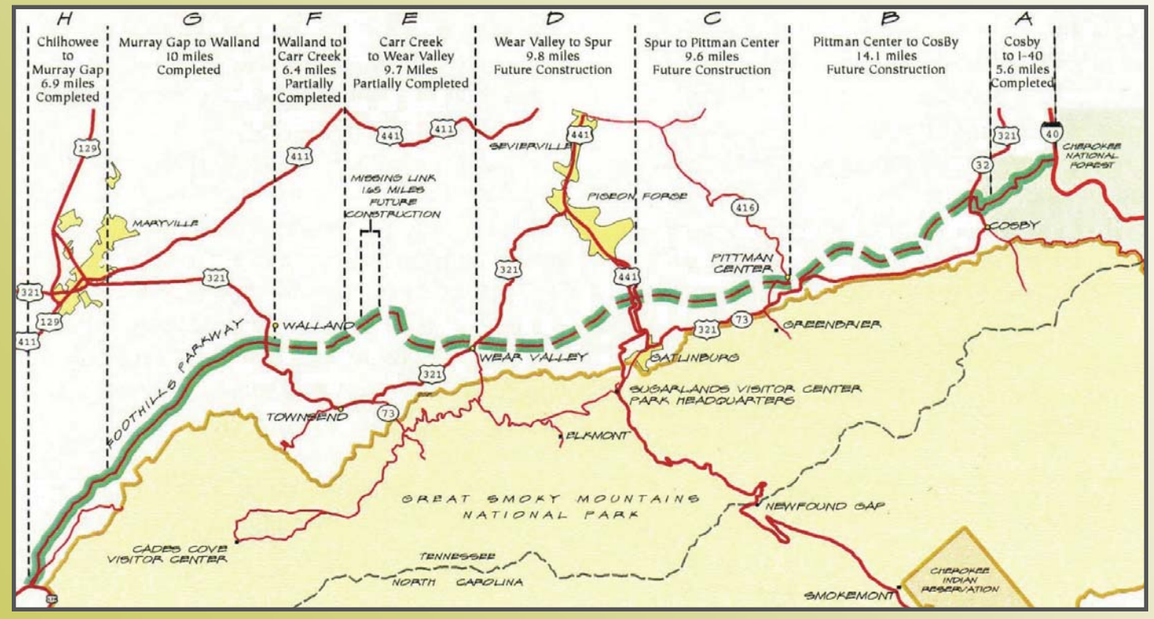


FIGURE 1. Foothills Parkway

Executive Summary—March 2002

and Pigeon Forge, and on the 3.4-mile Gatlinburg Bypass, which was intended to provide improved access to the Park while relieving traffic congestion in Gatlinburg.

The *Foothills Parkway Master Plan* (1968) describes the Parkway as a limited access facility with seven interchanges to connect it with the regional roadway system. The Plan "envisions a pattern of use and suggests a program of visitor services and resource management designed to meet the needs of the parkway visitor..." so it can reach full potential as a "nationally significant scenic recreation resource."

Project development slowed dramatically after 1968. With the advent of the National Environmental Policy Act, the consequences of construction were more fully considered and the planning and design process became more comprehensive. Also, priority changes at a Federal level made it increasingly difficult to obtain additional construction funds.

Significant questions have arisen in recent years as to whether the Congressional mandate can still be achieved and consequently whether the Parkway should be completed. In recognition of these concerns, this study was commissioned for the specific purpose of providing an in-depth assessment of the Foothills Parkway corridor in context with the Congressional mandate, the mission of Great Smoky Mountains National Park, the regional transportation network and Gateway communities in Blount, Cocke and Sevier counties.

TABLE A. Foothills Parkway Viewshed Analysis--Park View Only

Parkway Section	Section Length (miles)	Viewsheds Per Section	Viewsheds Per Mile	Park Viewshed Value	Viewshed Value Per Mile
B	14.10	22	1.56	86.89	6.16
C	9.60	7	0.73	24.41	2.54
D	9.80	3	0.31	11.71	1.19

TABLE B. Foothills Parkway Viewshed Analysis--Total View

Parkway Section	Section Length (miles)	Viewsheds Per Section	Viewsheds Per Mile	Total Viewshed Value	Viewshed Value Per Mile
B	14.10	22	1.56	3.58	0.25
C	9.60	10	1.04	35.40	3.69
D	9.80	11	1.12	39.90	4.07

To complete this assessment, the study considers:

- Viewsheds;
- Existing and projected traffic volumes;
- The ability of the Parkway to accommodate traffic demands;
- Visitor experience;
- Environmental impact; and
- Construction.

This study focused on Sections B, C, and D. Sections A, G, and H are complete and Sections E and F are currently under construction.

Figure 1 (on front page) shows the Parkway, section boundaries, and other descriptive information which is current as of 2001.

Projected 2030 Daily Summer Traffic on Foothills Parkway and Environs

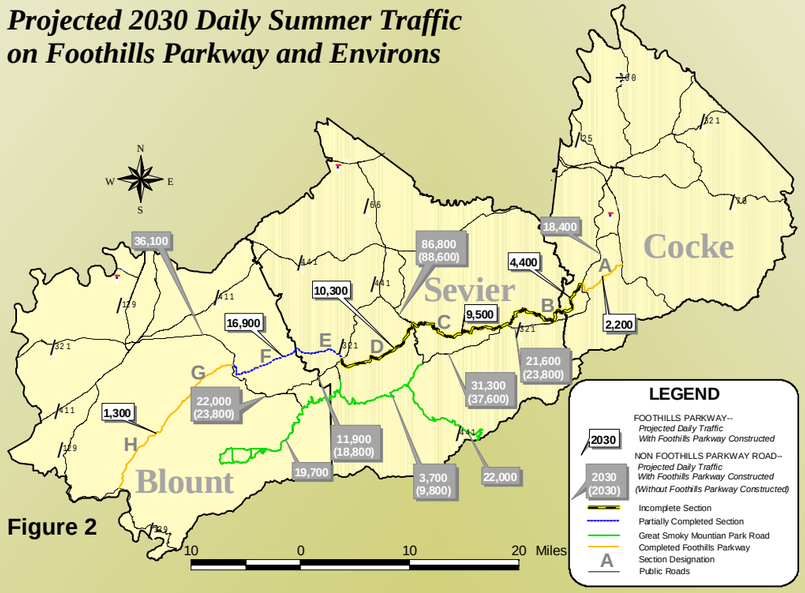


Figure 2

Foothills Parkway was conceived as a scenic drive and one measure of the value of this facility is the quality and availability of views or viewsheds (the geographic area visible to an observer from a specific location) available from the Parkway. In this study, 3D computer models and satellite imagery were used to identify, analyze, and quantify the quality of Parkway viewsheds. Viewshed quality was estimated by utilizing the results of a previous NPS study titled *Scientific Monograph Series No. 18, "Visual Preferences of Travelers Along the Blue Ridge Parkway."* Tables A and B summarize the viewshed analysis for the uncompleted sections of the Parkway. When views of both the Park and surrounding areas are considered, each of the uncompleted sections provides quality views. Viewshed values per mile range from a low of 3.69 for Section C to a high of 6.05 for Section B.

Traffic analysis for this study consisted of three primary components. These were to determine (1) the impact of Parkway construction on the regional transportation network and Park roads, (2) the projected traffic flow on the Parkway, and (3) the effect of projected Parkway traffic volume on visitor experience. The results of this analysis are illustrated in Figure 2, which shows Park roads in green. The analysis concluded that the completion of Foothills Parkway would have a significant impact on the regional transportation network and Little River Road in the Park. The Parkway itself would carry a substantial volume of traffic, both commuter and that traveling the road for the experience itself. Excessive traffic can detract from the ability to enjoy roadside views as drivers have to concern themselves with other motorists. In fact, this is a concern for Sections D,E and F where the projected traffic volume may be so high as to negatively affect visitor experience. Monitoring the volume of traffic along with the implementation of technologies such as Intelligent Transportation Systems (ITS) is recommended.

Based on current knowledge of the environment, construction of Sections B, C and D appears to be feasible, although further evaluation of environmental impacts is required. Cost estimates (Table C) for each of the sections reflect potential mitigation requirements and the cost of construction in mountainous terrain. Potential operational costs were only marginally assessed in this study and should be further considered.

A variety of future development scenarios that could provide mobility and a pleasant visitor experience were reviewed as a part of this study. These included several roadway construction options, a no build option, and alternative transportation system options ranging from trails to several types of mass transit. The results of the evaluation of each option with reference to quality of viewsheds provided, cost, Park road traffic relief and environmental impact are provided in Table C.

None of the alternatives (monorail, trails, etc.) to roadway construction were found to be cost effective and/or able to meet the mandate requirements. Should the Parkway be completed and opened to general non-commercial traffic, however, the addition of rubber tired transit as a modal choice is considered to be very

Table of Contents

Table of Contents

List of Figures

List of Tables

Foreword

The *Foothills Parkway Analysis Report* has been developed as part of the East Tennessee Regional Transportation Alternative Plan (RTAP). The purpose of the RTAP is to develop a long-term transportation strategy for a ten-county region in east Tennessee, including the Knoxville metropolitan area. In addition to the Foothills Parkway element, the RTAP focuses on the potential for alternative transportation strategies in corridors throughout the region, as well as an examination of alternative transportation technologies for Cades Cove. Agencies developing the plan included the Knoxville Regional Transportation Planning Organization, the National Park Service, and the East Tennessee Development District.

This report was prepared in cooperation with the U.S. Department of Interior, National Park Service, and the U.S. Department of Transportation, Federal Highway Administration.

Chapter 1: Introduction

History and Purpose

Great Smoky Mountains National Park was created through donations of land early in the 20th century "for the benefit and enjoyment of the people." The 800 square mile Park lies on the Tennessee-North Carolina border (Figure 1) and is within a day's drive of 50% of the U.S. population. Given its diverse vegetation, wildlife concentration and cultural significance, the Park has steadily grown in popularity and annual visitation.

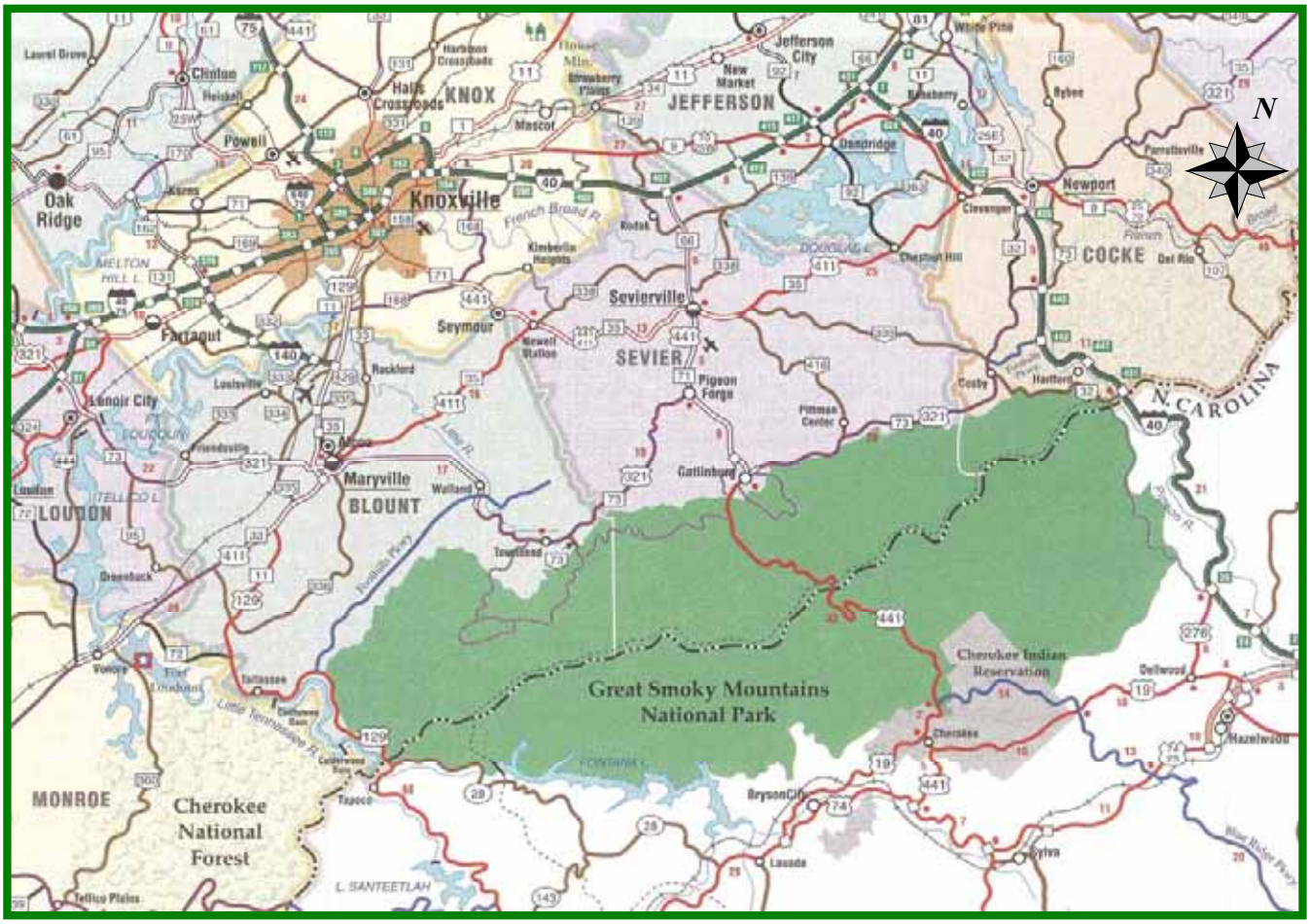
From humble beginnings, Great Smoky Mountains National Park has now become the most visited of the National Parks. Heavy visitation comes at a price, however, and a part of that price is traffic congestion. Even prior to World War II, traffic congestion on the Tennessee side of the Park had become a significant issue. The Park's transportation infrastructure at that time consisted primarily of Little River Road and Newfound Gap Road (U.S. 441), which are two-lane low speed roadways. In fact, that is still the primary infrastructure existing today. Although significant improvements have been made in the regional roadway system in the surrounding Gateway area of Blount, Sevier and Cocke counties over the years, the sheer magnitude of visitor traffic to the Park and Gateway area continues to tax the limited roadway network.

In response to the traffic congestion in the early 1940's, citizens of the middle eastern area of Tennessee petitioned the National Park Service and Congress to build a new roadway. It was envisioned that this "parkway" would be located "outside the main range of mountains and generally on the slopes of small secondary ridges in Tennessee to relieve the traffic pressure on the Park" (*Foothills Parkway Master Plan*).

1.1 Study Purpose

Development of the Foothills Parkway has been in progress for 57 years and is only 30% complete. In addition, it has never benefited from holistic planning to evaluate the facility in context with the regional transportation network. Certainly there are significant challenges to project completion at this point. Among them are:

- The estimated cost of completion is in excess of $300M.
- Federal budgetary constraints increasingly limit funding potential.
- Severe environmental constraints identified by Federal and State regulatory agencies.



Reprinted with authority of Superior Mapping Co.

Figure 1. Great Smoky Mountains Park Region

- The impact major changes in land use and growth in population, tourism and traffic have on the visitor experience.

Recognizing these issues and concerns, this study was commissioned for the specific purpose of providing an in-depth assessment of the Foothills Parkway corridor in context with the Congressional mandate, the mission of Great Smoky Mountains National Park, the regional transportation network and the Gateway communities in Blount, Cocke and Sevier Counties. To complete this assessment, the study will consider:

- Existing and projected traffic volumes;
- the ability of the Parkway to accommodate traffic demands;
- Visitor experience;
- Environmental impact; and
- Construction and operational costs.

Given the intense development of the Gateway area during the last three decades, questions have been raised as to whether the Congressional mandate of providing "appropriate views" of the Park can still be achieved. Central to this issue is whether visitors will actually drive on the Parkway if it is available, and if they do, whether panoramic views of the Park will be available. It appears that the answer to these questions may not be "yes" or "no" but rather one of

degree; i.e., the level of visitor experience.

The 1940-era goals for the Parkway also included the expectation that traffic on Park roads would be reduced and that congestion would be mitigated in the Gateway area. Hence, an important purpose of this study is to confirm the relationship of this proposed new road to the existing regional and Park roadway systems. Realizing that too much traffic on the Parkway will in fact negatively impact the visitor experience, traffic projections for the constructed Parkway itself are also of significant importance.

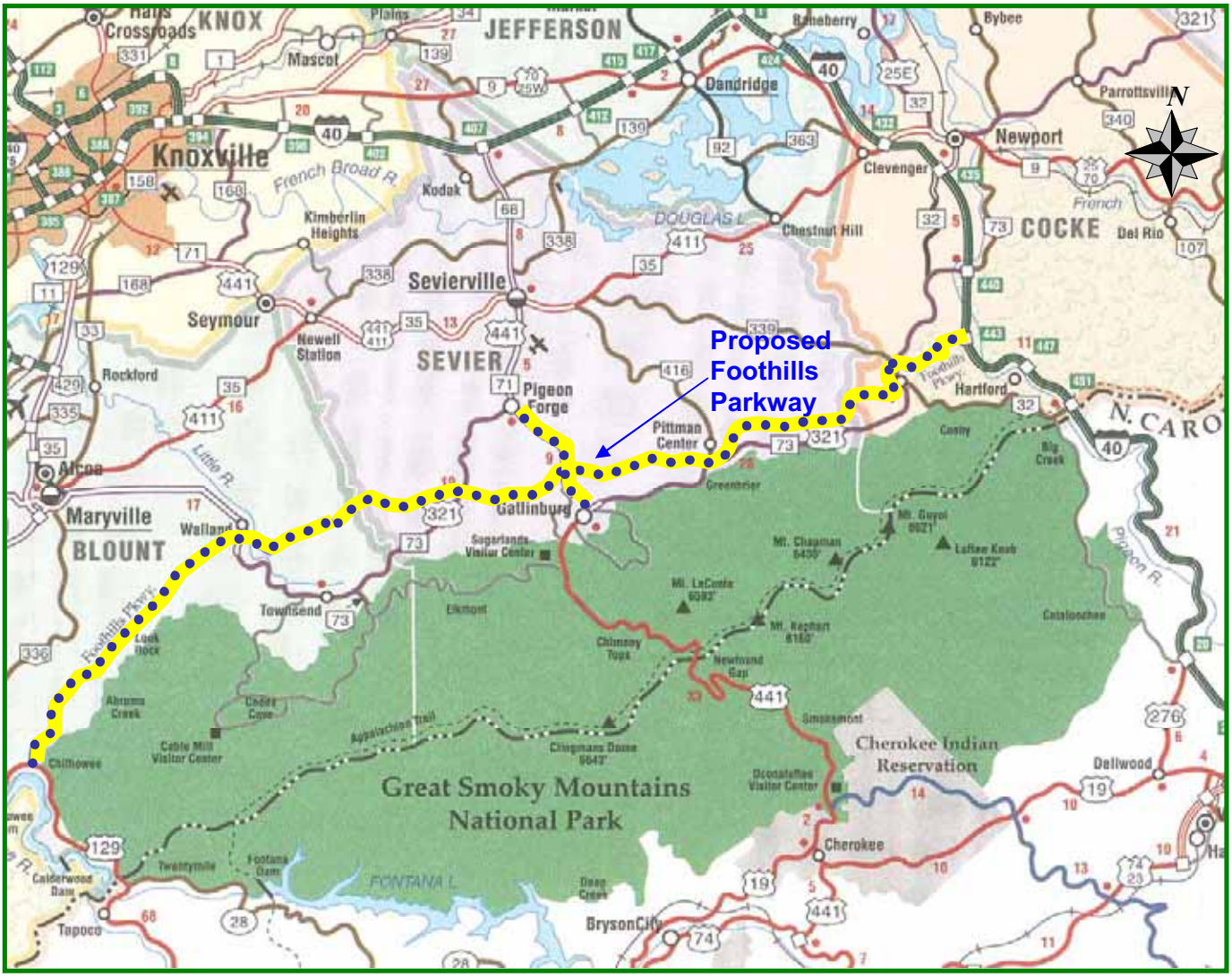
Another concern of Great Smoky Mountains National Park staff is the comparative lack of public involvement in the decision-making process to date. The primary opportunities for public comment since the original legislation was passed involved either design or construction-related elements of specific sections. Consequently, another critical element of this study is to facilitate public participation in the process as well as to foster regional cooperation through collaboration with local government officials and stakeholders. Opportunities were provided for the public and stakeholders to be made aware of the project's goals and objectives, to define regional concerns and major issues, and to discuss alternatives under consideration.

The study was also designed to explore various completion scenarios including traditional build options and the use of available right-of-way for alternative modes of travel as well as the consequences of a "no-build" option. Given the passage of time, new technologies, roadway constructability concerns (environmental impacts, cost, etc.) and a heightened public awareness of the desirability of mass transit options, the study looked at transportation options including traditional rail, monorail and rubber tired transit as well as the possible use of the available right-of-way for trail development. It should be noted that the study assumes the eventual completion of Sections E and F and therefore considers completion options and related impacts of only Sections B, C and D.

It is anticipated that this study will be used as input to future decision-making by the National Park Service and the Federal Highway Administration. Very likely, it will be incorporated into an environmental impact statement (EIS) which would then become the decision document for future Foothills Parkway development. **This study itself will not serve as a decision document or offer a final recommendation.**

1.2 The Mandate

In response to rising public sentiment and with a favorable report from Secretary of the Interior Harold L. Ickes, the 78th Congress approved Public Law 232 on February 22, 1944. This mandate of Congress "…authorized the acceptance of donations of land for the construction of a scenic parkway to provide an appropriate view of Great Smoky Mountains National Park from the Tennessee side of the park, and for other purposes…" It was envisioned



Reprinted with authority of Superior Mapping Co.

Figure 2. Proposed Foothills Parkway

that this “scenic parkway” would generally parallel the boundary of the Park and be appropriately connected to the Park.

As described by the National Park Service, a “parkway” is a limited access roadway on which commercial traffic is not permitted, that serves as an elongated park featuring pleasant motoring plus enjoyment of cultural/historic, natural scenic and recreational features of national significance. Subsequently, the National Park Service with the assistance of the Bureau of Roads (the predecessor to the FHWA) developed an alignment for this new facility. It would extend approximately 72 miles from U.S. 129 in the Little Tennessee River Valley of Blount County through Sevier County to U.S. 321 near Cosby in Cocke County (and later to the proposed Interstate Highway-40 located in the Pigeon River valley east of Cosby) (Figure 2). In addition, an improved access to Gatlinburg and Pigeon Forge known as the “Spur” and a three plus mile bypass of Gatlinburg from the Spur to the Park were envisioned as a part of the total facility.

Proponents of the parkway noted several goals for the new facility. Among those were traffic relief, improved access to the Park and an

improved opportunity for pleasure driving. Indeed, it was the combination of these goals that attracted public attention. While the regional roadway system to the Gateway vicinity was good and improving, access to the immediate Park area south of the Newport/Sevierville/Maryville corridor was more problematic. U.S. 441 provided primary access, but it traversed the congested downtown area of Gatlinburg to reach the Park. Other routes south of this corridor were primarily substandard state and county roads located in deep valleys that did not generally provide a pleasant driving experience for the sightseer.

The new parkway would connect to the regional highway system at several locations, traversing the Gateway area via a well-designed facility located along the ridge-tops rather than in the valleys. It would provide a scenic, pleasurable driving experience and improved access to the Park via the Spur and Gatlinburg Bypass. These arguments proved convincing to both the Congress and the Tennessee State Legislature, and as a result, the "Foothills Parkway" was given birth by Congress in 1944 and confirmed by the State of Tennessee in 1947.

1.3 Historical Setting

In the early 1940's, the Gateway area of Blount, Sevier and Cocke Counties was a rural, farming area dotted with small communities including Townsend, Pigeon Forge and Cosby. The seats of the three counties--Maryville, Sevierville and Newport--were relatively small hubs of commercial, banking and governmental activity. The one notable exception was Gatlinburg, which was already a bustling city and staging area for Park visitors, although very small in comparison to its current 6,000-motel-room size.

There were no multi-lane highway sections south of Knoxville at that time. The built-up areas of the rural counties (Blount, Sevier and Cocke) were connected by what would today be considered very substandard two-lane state and county roads. U.S. 441 and U.S. 321, both substandard as well by current policy, were Federal highways that provided access to the Park. U.S. 441 (now Newfound Gap Road) traversed the Park to Cherokee, North Carolina.

It was against this backdrop that Congress considered and ultimately mandated construction of the new Parkway. Congress placed two limitations on its mandate, however. First, Federal funds would not be used to buy the right-of-way. Though not stated, property purchase was to be the responsibility of the State of Tennessee. Second, construction would commence at an unspecified future date as World War II was still in progress at that time.

A series of Tennessee legislative actions occurred during the mid-1940's that solidified state participation in the project, and right-of-way acquisition commenced in 1947. It was apparently during these legislative deliberations that this new facility came to be called "Foothills Parkway." The property purchase proved to be a daunting task in its own right, requiring more than 20 years for completion. By 1979 all

property needed for the project, an average of 125 acres per mile, had been purchased by the State of Tennessee and transferred to the Federal government.

During this period, steady progress was being made by the National Park Service and the Department of Interior. Early on, the alignment was established and the total project subdivided into eight primary sections, A through H (Figure 3). Project planning continued through the decade of the 1950's with final design and construction drawings completed on Sections A, G and H. Construction began on the first section of the Parkway in 1960.

By 1968, construction of Sections A, G and H was completed. These three sections comprise a total of 22.5 miles of the planned 72.1-mile facility. These sections also formed the northeastern and southwestern termini respectively, thus leaving the 49.6-mile center section for future construction.

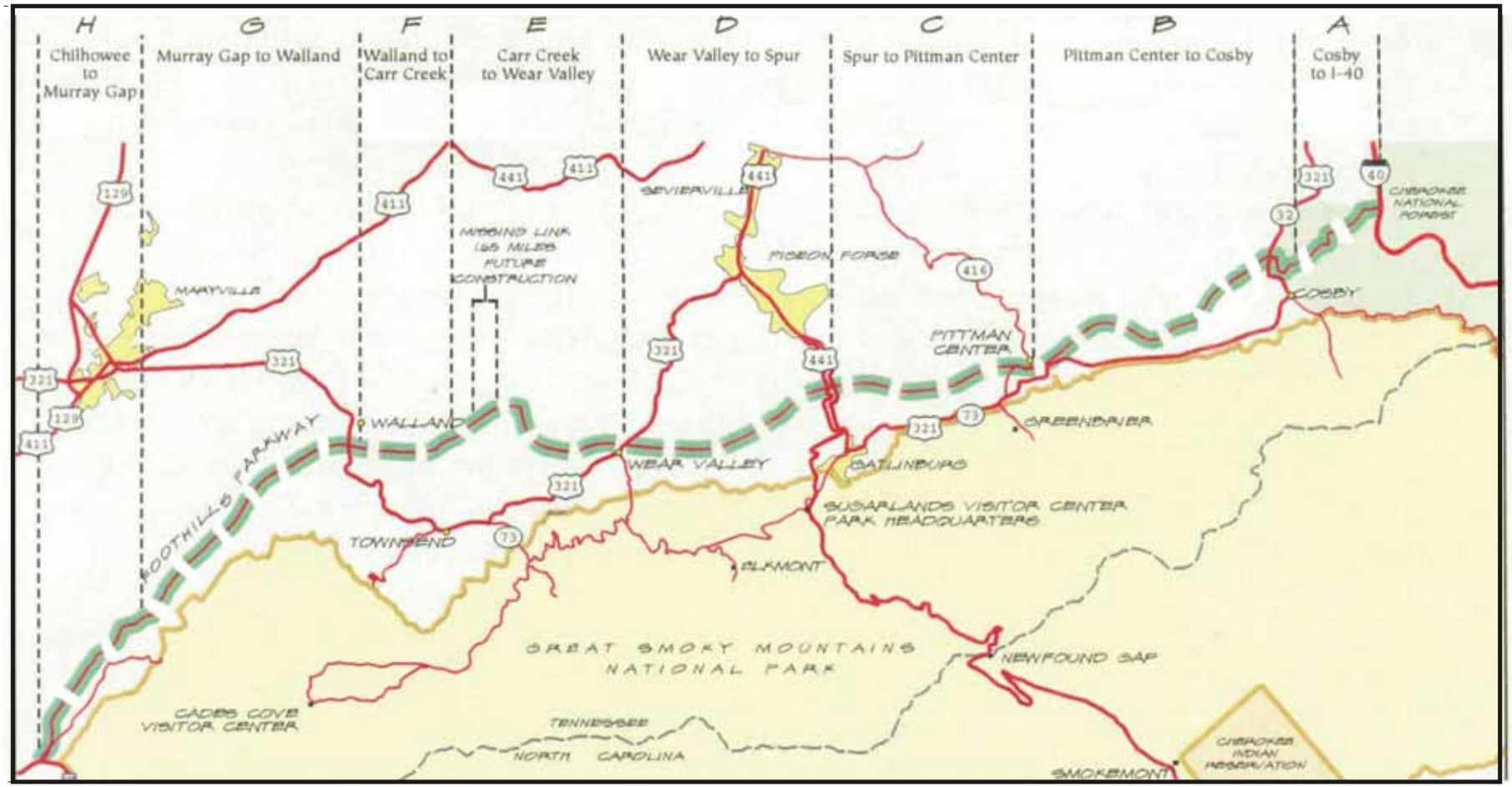
Construction was also completed by 1968 on the Spur and on the 3.4-mile Gatlinburg Bypass. These two roadway sections were intended to provide improved access to the Park while relieving traffic congestion in Gatlinburg.

Another significant project milestone was accomplished in 1968 with publication of the *Foothills Parkway Master Plan*. The plan describes the Parkway as a limited access facility with seven interchanges to connect it with the regional roadway system and "…envisions a pattern of use and suggests a program of visitor services and resource management designed to meet the needs of the parkway visitor…," so that it can reach full potential as a "nationally significant scenic recreation resource."

Project development slowed dramatically after 1968. Priorities at the Federal level were such that funding for additional construction was difficult to obtain. In addition, new environmental protection policies and procedures, the National Environmental Policy Act of 1969, caused the planning and design process to be more involved and time consuming. It is noteworthy that the *Foothills Parkway Master Plan*, although discussing natural resource preservation at length, does not include the words "environment" or "environmental protection," terminology and requirements that are now central to every infrastructure development project.

In an attempt to assist, the State of Tennessee offered to construct part of the roadway. Construction of Sections E and F by the State commenced in 1982 and was partially completed; however, construction stopped in 1989. Significant and unanticipated environmental and geologic conditions were encountered, thus requiring redesign of a portion of that roadway which has come to be known as the "missing link." Since 1989 work on Sections E and F has continued under the direction of National Park Service and the Federal Highway Administration.

Figure 3. Foothills Parkway Sections



This post-1968 period also brought dramatic changes to the Gateway area which the Parkway traverses. Building on the ever-increasing popularity of Great Smoky Mountains National Park, the Blount/Sevier/Cocke County area began to emerge as a major tourist destination in its own right. This was especially true in Sevier County along the State Route 66/U.S. 441 corridor from I-40 to Gatlinburg. Billed as a family-oriented tourist destination, Gatlinburg, Pigeon Forge and most recently Sevierville, became intensely developed with thousands of motel rooms, world class entertainment venues, music theaters and a Minor League baseball stadium. In fact, the year 2001 marked the first time that tourist activity in the Gateway area increased while Park visitation decreased, an indication that the Park and the Gateway communities are now more equal partners in attracting visitors to the area.

Two aspects of this intense development are of concern to the Foothills Parkway. First, traffic volume on the regional roadway system has increased exponentially, thus causing concern that traffic volume on the Parkway, if constructed, would be so great that the visitor experience would be significantly impaired. Second, Gateway area development has included construction of homes, vacation chalets, motels and other commercial enterprise within the viewshed of the Foothills Parkway between the Parkway and the Park boundary, thus calling into question the value of the available views and the possibility that the mandate cannot be fully achieved by completion of Parkway construction.

1.4 Current Status

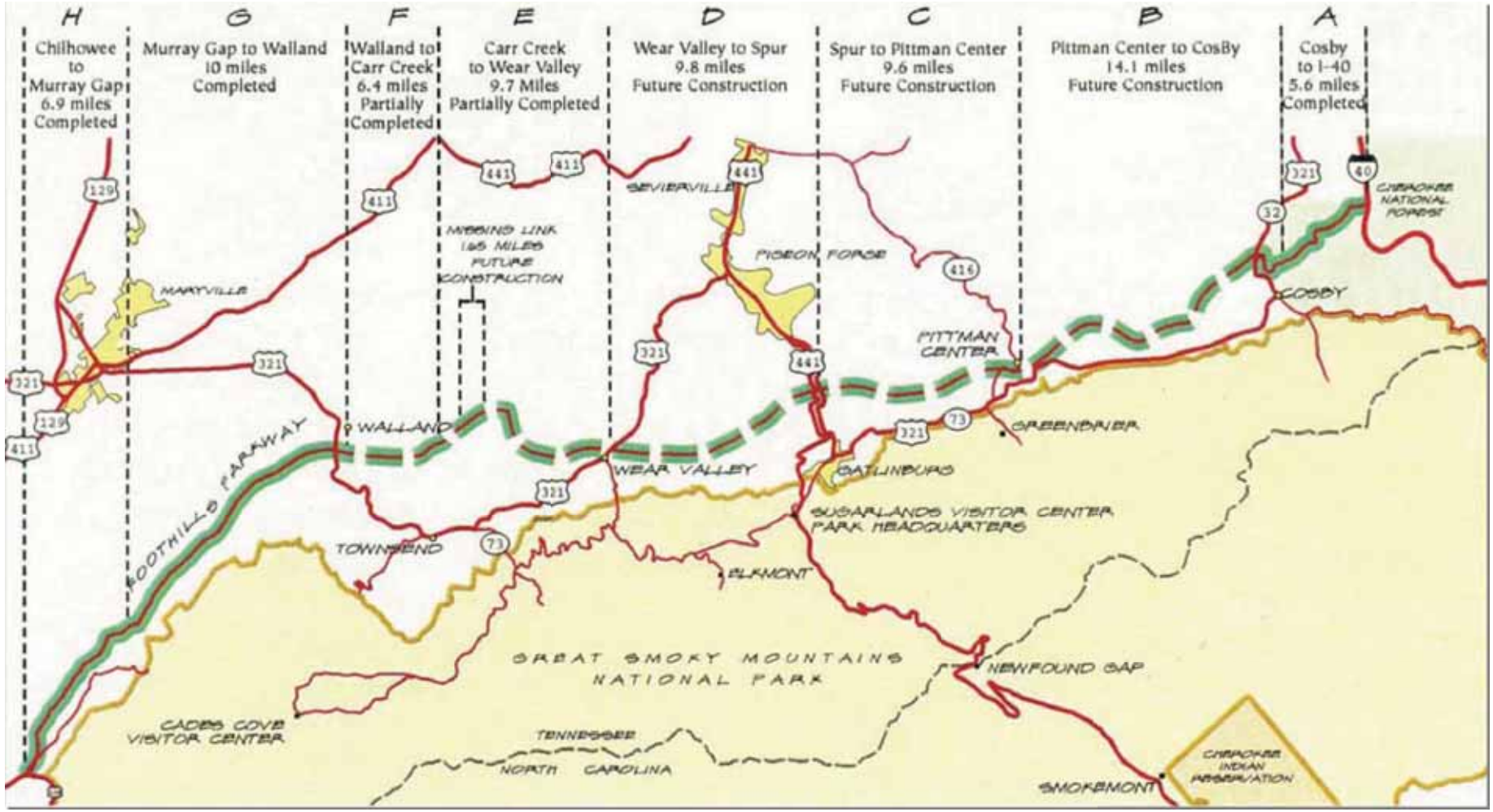
The following paragraphs describe the current (2001) status of each of the eight primary sections of the proposed Foothills Parkway. Figure 4 is a map showing the Parkway, section boundaries, and other descriptive information.

As noted in Figure 4, Section A, which is 5.6 miles in length, connects with Interstate-40 and represents the eastern terminus of the facility. Section A was opened to traffic in 1968 and has been in service since that time. The section of I-40 through the Pigeon River Valley linking Tennessee and North Carolina was also opened to traffic at about the same time. Together, these facilities offer a convenient access to Great Smoky Mountains National Park from the Coastal Carolina region.

At the other end of the Parkway, Sections G and H, which are a total of 16.9 miles in length, were also opened to traffic in the mid-1960's. Together they connect U.S. 321 at Walland with U.S. 129 at Chilhowee, and represent the southwestern terminus of the facility. This section of the Parkway offers several panoramic views of the Park as well as the Blockhouse Valley/Maryville area to the north, but it is somewhat remote and thus attracts rather modest visitor traffic at the present time.

As proposed, Section B is 14.1 miles in length, extending from an interchange with U.S. 321 (and Section A) at Cosby to an interchange with S.R. 416 in

Figure 4. Foothills Parkway Sections



Pittman Center. Section B provides the opportunity for a number of excellent views of the Smokies with perhaps the most spectacular view within the corridor provided from the summit of Webb Mountain. Due to topographic and roadway design parameters, the summit is not directly accessible from the main Parkway. As a result, the Parkway right-of-way was expanded to include the summit, and a 1.2-mile access road from the Parkway to the ridgetop was included in the *Master Plan*. The National Park Service published a draft *Final Environmental Report* for this section in 1999. Preliminary design plans for this section are also available.

Section C is 9.6 miles in length, extending from the S.R. 416 interchange in Pittman Center to an interchange with the Spur (U.S. 441), the previously described access roadway to Pigeon Forge and Gatlinburg. Little work has been done on this section to date. There are no roadway plans and no environmental analysis has been conducted.

Section D is 9.8 miles in length, extending from the Spur to an interchange with U.S. 321 in Wears Valley. Preliminary design plans are available and the National Park Service published a draft Environmental Impact Statement (EIS) in 1995. Section D includes an 1,100-foot tunnel through Crooked Arm Ridge of Cove Mountain. Near the southwesterly terminus of Section D, an extensive complementary visitor use area is also proposed as a part of the Parkway development. If developed as proposed, it will include a staffed visitor orientation station, campgrounds, picnic areas and an amphitheater in addition to maintenance and administrative facilities. At this location, the Parkway right-of-way touches the Park boundary and offers direct access to the Metcalf Bottoms area of the Park.

Sections E and F, which are normally considered together as a unit, are a total of 16.1 miles in length and extend from an interchange with U.S. 321 in Wears Valley to another interchange with U.S. 321 in Walland north of Townsend. As previously noted, construction on these sections began in 1982, was partially completed, but was suspended in 1989. Prior to suspension of construction, all but approximately 1.65 miles was completed with the exception of final paving. This 1.65-mile "missing link" was also included in the project, but it was determined after encountering extreme geologic and environmental difficulties that the roadway could not be completed as designed. This section has now been redesigned using a series of long, segmented bridges, two of which were completed in 2001. Construction of a third bridge is anticipated to begin in 2002. Actual costs for constructing these three bridges have far exceeded estimates and have made it difficult to obtain funding to complete the segment. The design of this segment was recently re-examined by the Federal Highway Administration and it was decided not to modify the current design.

1.5 Previous Studies and Plans

The 1968 *Foothills Parkway Master Plan* established the framework for full and

orderly development of the Parkway in a manner complementary to Great Smoky Mountains National Park. As a result of the heightened public awareness toward environmental impacts of infrastructure development and passage of the National Environmental Policy Act (NEPA), a draft EIS has been prepared for Section D and a draft final environmental report has been issued for Section B.

Given the passage of nearly five decades and the dramatic changes that have occurred during this period in the area surrounding the Foothills Parkway corridor, serious questions have been raised in recent years as to the continued viability of this project. National Park Service staff has developed two documents which describe their concerns in some detail and outline a strategy for a dialog of discussions concerning the future of the facility. One result of the continuing dialog was the decision to commission a traffic study in 1996 for the purpose of better understanding the implications of recent land use development trends and their relationship to Parkway and regional highway system traffic volume.

A short summary of each of these documents is provided in the following paragraphs:

Foothills Parkway Master Plan, 1968

"This Plan envisions a pattern of use and suggests a program of visitor services and resource management designed to meet the needs of the parkway visitor." Further, it states that "…until all 71 miles of the parkway are completed and major traffic arteries and related accesses to Great Smoky Mountains National Park are connected, full utilization of the parkway as a nationally significant scenic recreational resource will not be achieved."

The Plan outlines the physical location of the Parkway corridor, its interchanges and the additional visitor amenities needed to maximize the quality of the visitor experience. It also describes the natural resources of the area, noting that "…the long-term control, management and use of the land in the scenic corridor is critical to the aesthetic significance of the parkway."

Finally, the Plan provides a design theme, noting that "…upon completion the parkway will tie together much of the recreational resources of the mountains and rivers of East Tennessee." Further, it states that "…the landscape and the recreation of the region are more important considerations rather than the road itself. No matter how well the roadway is engineered or how fine the complementary facilities are along the way, there must be a distinguishing characteristic of natural beauty or other quality that causes the location to stand out among other recreational driving opportunities."

General Management Plan, Great Smoky Mountains National Park

As quoted from its introduction, the "…*General Management Plan* is both a manager's guide for meeting the objectives established for Great Smoky Mountains National Park and a public statement of National Park Service Management intentions. The plan establishes long-range strategies for

resource management, visitor use, and development of an integrated park system, thereby creating a framework for all future programs, facilities and management actions."

This *Plan* includes the Foothills Parkway and related facilities as part of its general development strategy, thus reaffirming the commitment of the National Park Service to continue progress and complete the facility. The *Plan* does note, however, that "…completion of the Parkway will be contingent upon the future appropriateness of additional recreational roadways."

(Draft) Environmental Impact Statement, Foothills Parkway, Section 8D, 1994

The National Park Service compiled this draft EIS in 1994. Much of the information contained therein was developed by the Oak Ridge National Laboratory and reported in a 1992 environmental report. The purpose of the EIS was to assess the impacts of the proposed construction of Section 8D of the Foothills Parkway, a 9.8 mile section of roadway extending from an interchange with U.S. 321 in Wears Valley to an interchange with the Spur (U.S. 441) near Pigeon Forge and Gatlinburg.

Two alternatives were studied. Under a no build option, the existing right-of-way, which currently includes a pioneer road, would be allowed to revegetate and reestablish the forest canopy. There would be no adverse effects on cultural resources.

The build option includes construction of typical bridge, tunnel and roadway sections. The document describes in great detail the potential impact on a variety of cultural and natural resources and discusses mitigation measures.

Foothills Parkway Traffic Study, 1997

Oak Ridge National Laboratory (ORNL) conducted this study, which analyzed potential traffic operations of various build alternatives. A gravity model was used to estimate current and future (2006 and 2026) traffic flow on a street network consisting of primarily U.S. routes, state routes and Park roads. For future traffic projections, historical Park visitation growth trends were applied to the gravity model, then a determination was made as to the percent of projected traffic that would divert to the Foothills Parkway.

The traffic diversion estimate began with the assumption that it would function "solely as a scenic parkway; i.e., the proposed segments will not give motorists any travel time advantage over the existing roadway network." Given this assumption, ORNL created a traffic diversion model to estimate traffic volumes on the Foothills Parkway. The model assumed that only traffic oriented to/from the Gateway Communities of Pigeon Forge, Gatlinburg and Townsend plus traffic related to the Park would be attracted to the Foothills Parkway. Links parallel to the Foothills Parkway were identified and a percentage of tourist-related traffic was diverted from these links to the Foothills Parkway. Tourist-related traffic was categorized as Park-related (50 percent diversion of trips with origin or

destination within the Park), tourist-related (20 percent diversion of trips with origin or destination of Gatlinburg or Pigeon Forge) and secondary tourist related (10 percent diversion of trips with origin or destination of Townsend or the fringe areas of Pigeon Forge and Gatlinburg). For example, 50 percent of the traffic on US 411 and US 321 originating from or destined to Cades Cove was assumed to divert to the Foothills Parkway.

Foothills Parkway, A Briefing Statement, 1998

This document, prepared by the National Park Service, describes the origin and history of the Parkway from 1944 through the mid-1990's. It describes the 1944 vision for the Parkway as a "special place" and suggests that this vision may no longer be possible due to the changes that have occurred in the area adjacent to the corridor in the past five decades.

It notes that one of the original goals for the Parkway was that it would relieve traffic congestion on Park roads and the regional transportation network. The 1997 *Foothills Parkway Traffic Study*, however, suggests that the Parkway will not achieve this goal and that sections of the Parkway itself would accommodate light traffic volumes in 2026. The *Statement* also recognizes the potentially significant environmental impacts and high cost of construction.

The *Statement* concludes that additional study is needed to evaluate the 21st century viability of the Parkway and suggests that dialog of discussion is needed with a broad cross-section of interests to build a consensus as to the future of the Parkway.

Foothills Parkway - A Technical Paper for Future Strategies, 1998

This report is a stand-alone appendix to the *Briefing Statement.* It was developed by an interdisciplinary team of National Park Service, Federal Highway Administration and environmental consultant specialists which convened in 1995 to evaluate the current status of the Parkway and review various completion scenarios.

The team analyzed seven completion alternatives ranging from full build to no build. The team had at its disposal a recent traffic study prepared by the Oak Ridge National Laboratory which concluded that the Parkway will not divert substantial traffic from local roadways or have significant impact on their operation, and that traffic on the Parkway itself would be relatively light.

The study concluded that three build options involving sections D, E and F should be further explored but that "…the construction of no other section or combination of sections makes sense, when benefits are weighed against costs and impacts." It suggested that the vision could be met in principle by the completed portions of the Parkway available for use and that the Parkway should be considered in regional transportation planning efforts.

(Draft) Final Environmental Report, Foothills Parkway Section 8B, 1999

The Oak Ridge National Laboratory published this document in 1999. It considered two options: (1) to build the

project within the previously purchased right-of-way, or (2) to abandon the project. The build option considered the construction of a 14.1-mile section extending from the current terminus of Section A at U.S. 321 in Cosby to the S.R. 416/U.S. 321 area in Pittman Center.

The document describes the existing environmental setting and the resources that might be affected by construction of the roadway as well as an analysis of potential impacts. The assessment includes information on geology, soils, water, aquatic ecology, terrestrial ecology, meteorology and air quality, socioeconomics, aesthetics and archaeology and historic resources.

Chapter 2: Viewshed Analysis

Human awareness of historical, cultural and environmental resources as revealed in America's landscape is ever increasing. Our national parks and parkways are charged with preservation of these valuable resources for the pleasure of the visitor. The Foothills Parkway is no exception to this charge. Originally perceived as a "scenic parkway," the Foothills Parkway would allow the visitor to experience the historical, cultural and environmental resources available in Great Smoky Mountains National Park.

Driving for pleasure, sightseeing, hiking and biking are some of the popular recreational activities that may attract visitors to the Foothills Parkway. The enjoyment that visitors receive from these recreational activities depends largely on how the visitor perceives the visual surroundings. A recent study commissioned by the National Park Service entitled *Scientific Monograph Series No. 18* (SMS 18), "Visual Preferences of Travelers Along the Blue Ridge Parkway" reports that many of the benefits received by visitors from engaging in recreational activities are directly related to how the visual surroundings are viewed, managed and presented to the visitors (Poe et al., 1988; Hammitt, 1980; Mercer, 1975; Moeller et al., 1974).

Consistent with the 1944 Congressional action mandating the Foothills Parkway, one of the determining factors as to whether the remaining sections (B, C and D) should be built is the availability of views or viewsheds. Consequently, this study includes an analysis of the availability and appropriateness of viewsheds along the Foothills Parkway.

2.1 Viewshed Defined

A viewshed is defined as the geographic area visible to an observer from a specific location. Ridges, valleys and other topographic features bound viewsheds along the Foothills Parkway. The viewshed quality directly affects the level of pleasure a visitor may experience. Factors such as season, time of day, vegetation, commercial development and residential development affect the viewshed quality.

2.2 Viewshed Analysis Methodology

An analysis of each individual viewshed provides a method of quantifying the viewshed quality. The viewshed analysis methodology includes three primary steps. The first step is to identify available views along the Foothills Parkway. The second step allows an analysis of each view to determine specific viewshed attributes. The final step is to quantify the viewshed quality.

Quantifying allows assignment of a numerical value to each individual viewshed for comparison and ranking purposes. The results of the viewshed analysis provide an indication of the level of pleasure a visitor may experience.

The combination of three-dimensional (3D) computer rendering techniques and current (2001) satellite imagery allows a thorough analysis of each individual viewshed. A detailed description of each step of the viewshed analysis follows:

Step 1 – Identify Available Views

Since Sections B, C and D of the Foothills Parkway are not constructed, it is difficult to accurately identify the locations of available "appropriate views" using traditional methods. Walking and viewing the incomplete sections of the Foothills Parkway provides an indication of where appropriate views may be present; however, vertical and horizontal alignment constraints of the proposed parkway may limit or even prohibit the view.

To overcome the difficulty of accurately determining the location of appropriate views, a 3D computer model was created to depict the topography of the area. Geographic Information System (GIS) data was obtained from the National Park Service, which allowed creation of a 3D computer model of the Park including the Foothills Parkway corridor and areas in between. Actual design data for Sections B and D provided by the FHWA and for Section C prepared by Wilbur Smith Associates was used to develop a 3D computer model. Merging the 3D computer models of the Park and the Foothills Parkway together provided an "as-built" 3D computer model of the proposed Foothills Parkway corridor and surrounding area.

Viewing the proposed construction cross sections of the Foothills Parkway quickly and accurately identified available view locations. A verification of each view location was obtained by viewing the 3D computer model. Figure 5 provides examples of the 3D computer model used to determine and verify potential view locations.

Step 2 – Determine Viewshed Attributes

Measurable viewshed attributes having a direct impact on viewshed quality include viewshed area inside and outside the Park, development density within the viewshed and distance from the observer to the nearest "target" view within the Park.

The viewshed area affects quality since the viewshed area outside the Park is subject to development or other negative disturbances while the viewshed area inside the Park is regulated by the NPS. With the 3D computer model and other proprietary computer software, visualization techniques were employed to accurately identify the viewshed areas. From the viewshed observation point, a circumferential scan identified visible surfaces within the 3D model. As expected, ridges, valleys and other topographic features bound these visible surfaces. Areas were obtained by planar measurement inside and outside the Park. Figure 6 provides a sample viewshed determined by the

circumferential scan of the 3D-computer model.

The development density within the viewshed affects how the observer will perceive the viewshed quality. Overlaying the satellite imagery onto the viewshed area reveals the number of buildings within the viewshed area and the corresponding development density. Figure 7 provides a sample viewshed with development shown from the satellite imagery.

The distance from the observer to the target view is an important attribute since air quality, time of day and season affect the observer's ability to see. As shown in Figure 8, this linear measurement is readily obtained directly from the 3D-computer model.

Step 3 – Quantify Viewshed Quality

Quantifying the viewshed quality allows assessment of the appropriateness of available views toward meeting the 1944 Congressional mandate. *"Scientific Monograph Series Number 18"* (SMS 18), published by the National Park Service in 1988, allows the quantification of viewshed quality by providing a method of ranking viewsheds based on human visual preferences. The primary goal of SMS 18 was to identify landscape themes most preferred for viewing by the visitor.

The SMS 18 study was conducted from vista scenes taken along the completed Blue Ridge Parkway.

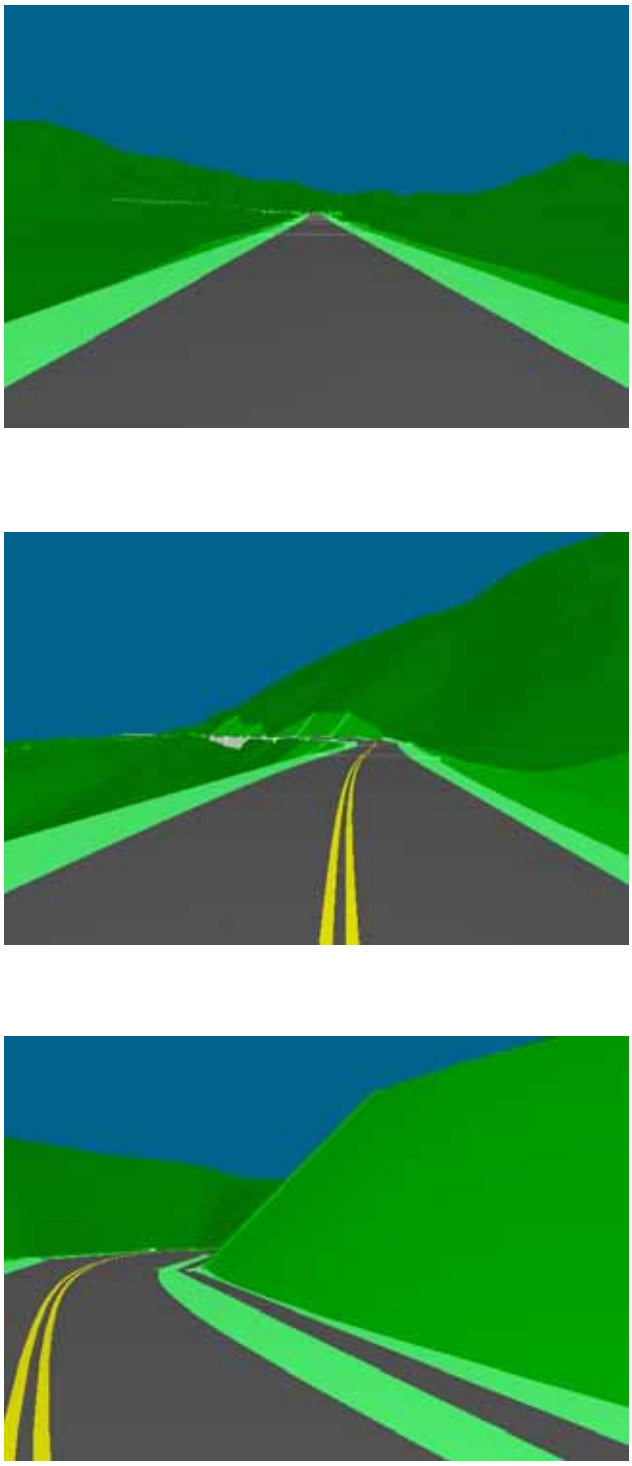


Figure 5: Sample 3D Model Views

Figure 6. Sample of a Viewshed Analysis

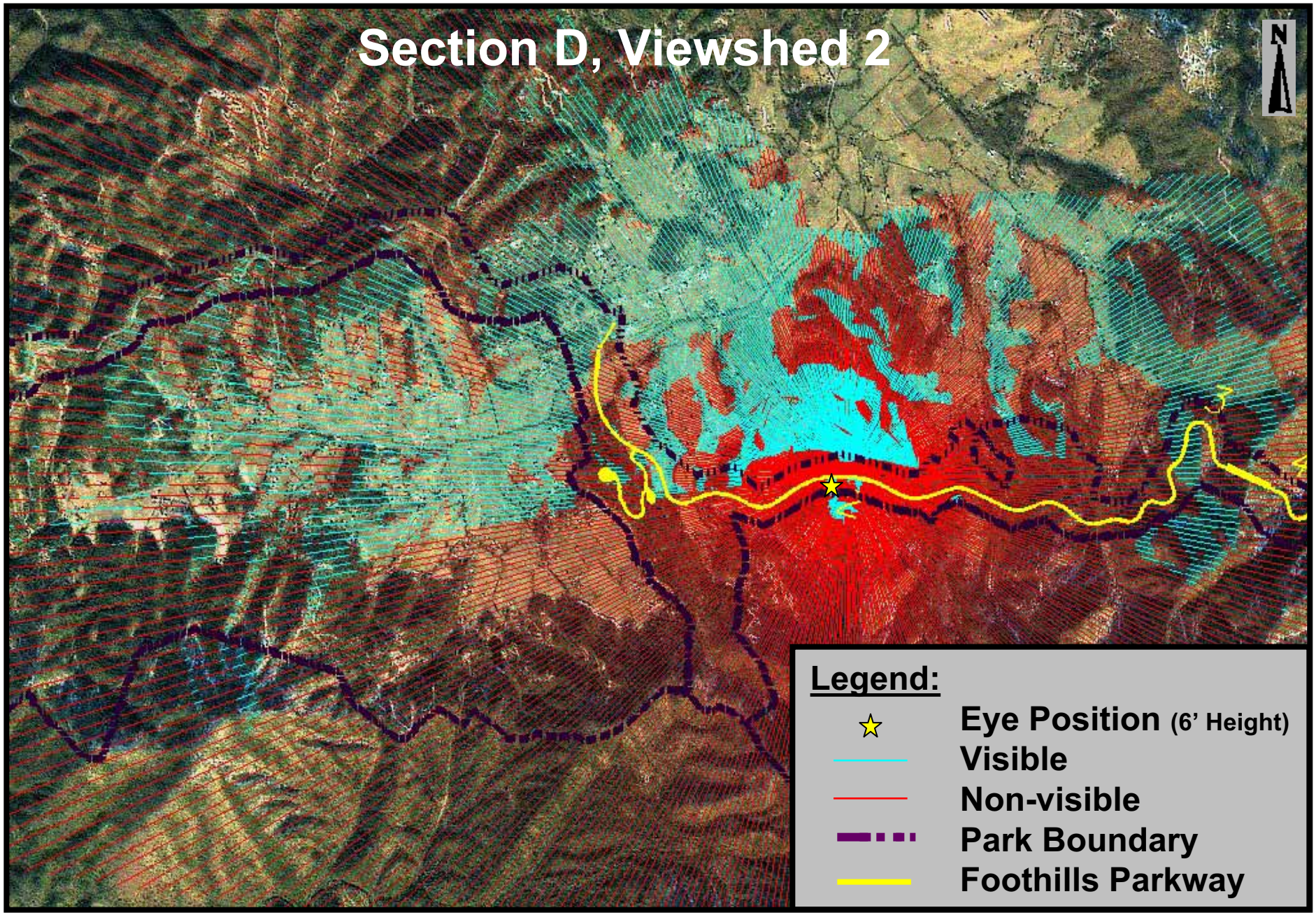


Figure 7. Sample Development Density

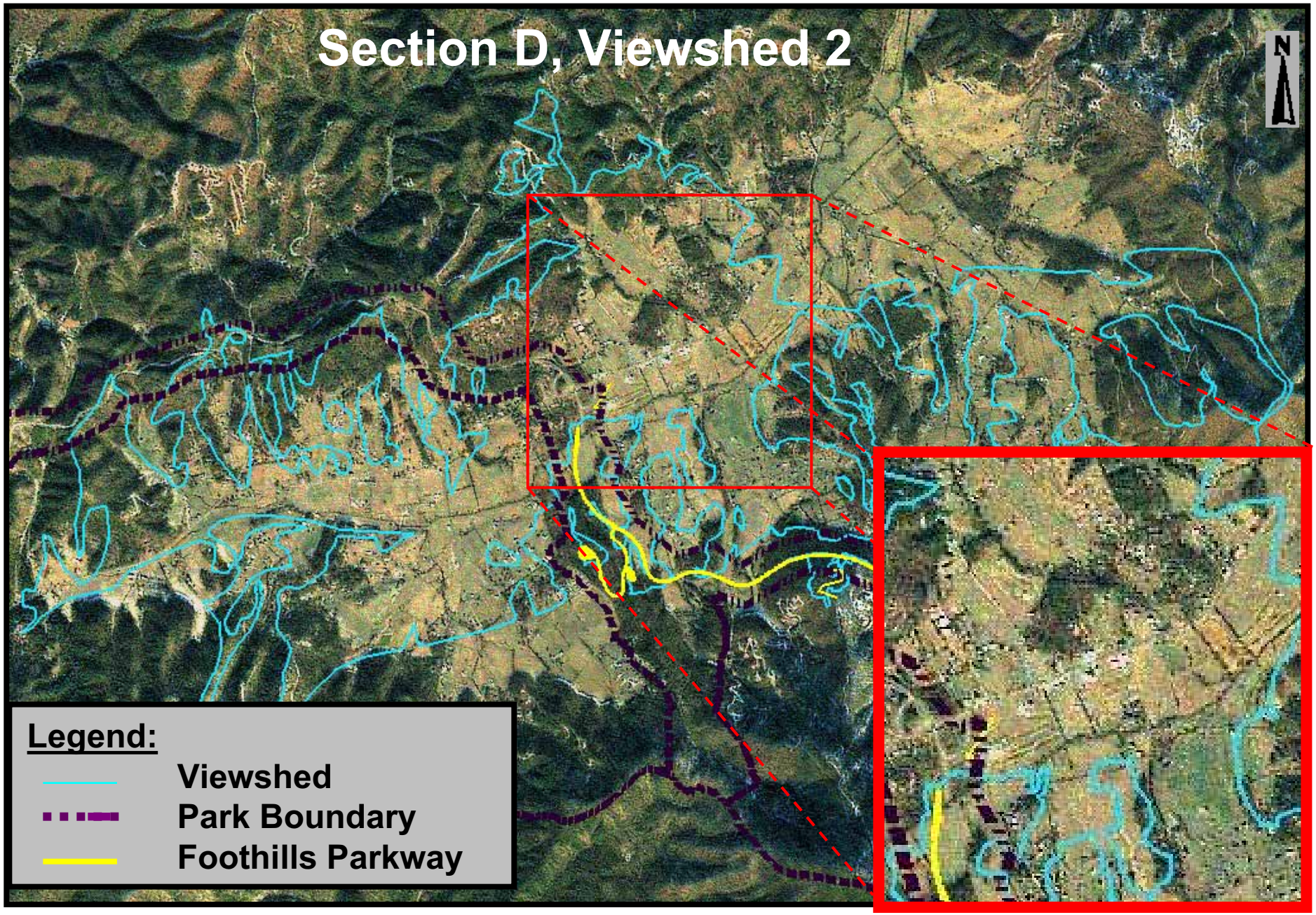
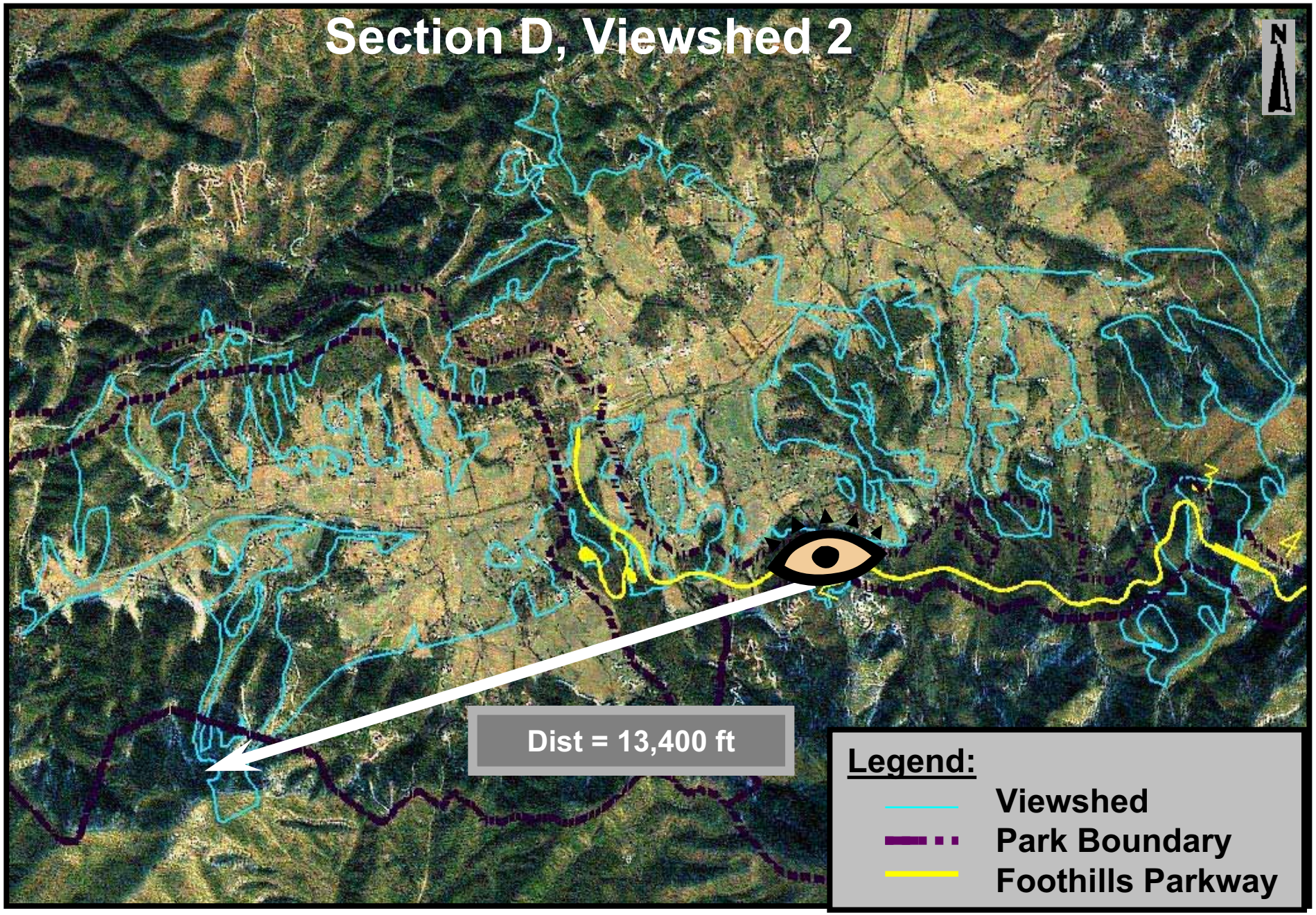


Figure 8. Sample Viewshed Distance



The visitor ranked photographs of 96 vista scenes from a value of 1 (least preferred) to a value of 5 (most preferred) based on his/her own opinion. These individual preference ratings were then averaged to determine a mean numerical value for each vista scene. The photos were analyzed using methods described in SMS 18 to reduce the large data set of photos to small groups of themes that demonstrated a shared commonality of content. For these small groups of common themes, a mean value was determined and used as a basis for interpreting the visual preferences of visitors. Table 1 provides the individual preference value and ranking for each vista dimension with viewshed typology results as reported in SMS 18.

For quantifying the value of viewsheds along the Foothills Parkway, six vista dimensions were adapted from SMS 18 including stream/river, pond/lake, several ridges, pastoral development, one ridge and unmaintained vegetation.

These six vista dimensions are also common themes found along the Foothills Parkway. A comparative examination of actual photographs taken along the Foothills Parkway depicts these six vista dimensions and reveals the range of individual preference values as shown in Figure 9. Potential viewsheds along Foothills Parkway typically contain multiple vista scenes. Each vista scene was reviewed and categorized into one of the six categories providing a corresponding preference value for each vista scene. Two methods were employed to determine the category of each view including 1) review of actual photographs taken in the field and 2) review of computerized images taken in the 3D computer model.

Table 1: Visual Preference of Vistas

Means	Vista Dimensions	Typology
High Preference		
4.61	Stream/River	WATER VISTAS
4.12	Pond/Lake	
3.96	Several-Ridged	MULTI-RIDGED
3.75	Rolling Plateau	VISTAS
3.68	One-Ridged	
3.60	Farm Valley	PASTORAL
3.57	Valley Development	VISTAS
3.46	Ridge and Valley	
3.36	Unmaintained	
3.21	Unmaintained	UNMAINTAINED
3.19	One-Ridged	VISTAS
2.99	Unmaintained	
Low Preference		

*Scientific Monograph Series (SMS) No. 18: "Visual Preferences of Travelers Along the Blue Ridge Parkway"

Unmaintained Vegetation

Score* = 2.99

Mountains with One Ridge

Score* = 3.19

Pastoral Development

Score* = 3.61

Mountains with Several Ridges

Score* = 3.96

Stationary Water

Score* = 4.12

Rapidly Moving Water

Score* =4.61

*** Scientific Monograph Series (SMS) No. 18:**
"Visual Preferences of Travelers Along the Blue Ridge Parkway"

Figure 9: Range of Vista Dimensions

With the first method, actual photographs of vista scenes along the Foothills Parkway were taken at accessible locations known from 3D computer model inspection to provide adequate visitor viewing upon construction completion. The vista scene positions were identified in the 3D computer model. Utilizing Global Positioning System (GPS) methods, the vista scene position was identified in the field. The photographs were then taken in the field at the exact vista scene position. The actual photographs were objectively reviewed to determine the vista scene's vista dimension and corresponding preference value.

The second method for reviewing vista scenes along the Foothills Parkway was employed at non-accessible vista scene positions. Non-accessible vista scenes are locations that are physically difficult to access and/or locations that are dramatically affected by future construction. Locations of this type include areas of extreme cut or fill necessitated by the horizontal and vertical alignment of the proposed Foothills Parkway. Computerized images were taken in the 3D-computer model at the vista scene position. The computerized images and the digital satellite imagery were reviewed to determine the vista scene's vista dimension. The digital satellite imagery provides information not available in the 3D computer model such as locations of ponds, streams, lakes and development pertinent to determining the vista scene's vista dimension and corresponding preference value. Figure 10 provides a computerized image of the 3D computer model and satellite imagery for a typical vista scene found on the Foothills Parkway.

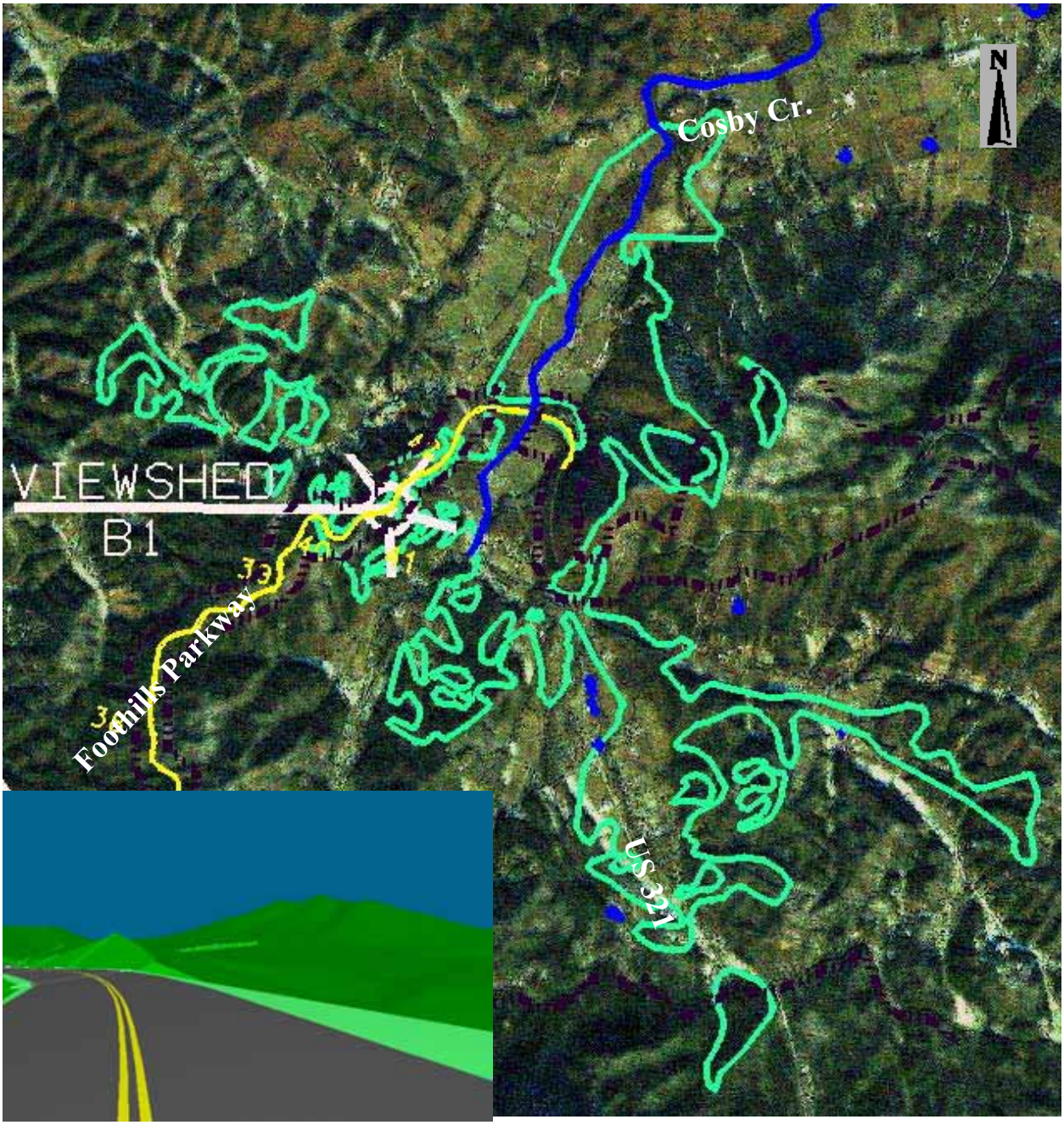
With the preference value for each individual vista scene determined, the preference value for the entire viewshed was calculated by averaging the preference values of each individual vista dimension found in the viewshed. To determine the overall preference value for each of the remaining sections (sectional preference value) of the Foothills Parkway (i.e. Sections B, C and D), the average viewshed preference values were summed for all viewsheds contained in each section. The viewshed preference value provides an indication of quality and level of pleasure experienced by the viewshed visitor at a specified location, while the sectional preference value provides an indication of quality or level of pleasure experienced by the visitor along a section of the Parkway.

2.3 Viewshed Analysis Results

Using the procedures discussed in Step 1 of the Viewshed Analysis Methodology, a total of 43 view locations were identified along the Foothills Parkway including 22 in Section B, 10 in Section C and 11 in Section D. The proposed cross sections utilized to determine the view locations are available in digital format and are contained in the file *xs_fh.dgn* located on the Appendix Compact Disc. The 3D-computer model used to verify the view locations is available at Great Smoky Mountains National Park in digital format (filename *Foothills_3d.dgn).* This file can be viewed using Microstation J and GEOPAK 2000 proprietary software.

Figure 10. Typical Vista Analysis

Section B Viewshed 41 (B1) Station 1784+00, Looking NE



The 43 identified view locations are depicted in Figures 11, 12 and 13 for Sections B, C and D, respectively.

The viewshed attributes for each individual view location were determined using the procedures identified in Step 2 of the Viewshed Analysis Methodology. The viewsheds for each of the 43 view locations were delineated by the circumferential scan of the 3D model at each observation point. Table 2 displays the viewshed attribute results for each of the 43 view locations. The delineated viewsheds are available from Great Smoky Mountains National Park in digital format (filename *fhvs.dgn*). The digital file can be viewed using Microstation J proprietary software.

Viewsheds containing the predominant area inside the Park include Viewshed Numbers 16 through 20, 22 through 25, 27 through 30, 33, 35 through 39 and 42 (20 total viewsheds) and are not subject to private development since the area inside the Park is regulated by the NPS. Viewsheds containing the predominant area outside the Park include Viewshed Numbers 1 through 15, 21, 26, 31, 32, 34, 40, 41 and 43 (23 total viewsheds) and are subject to private development as regulated by local zoning restrictions and terrain. Since the Congressional mandate specifically refers to views of the Park, the analysis considered “Park” and “non-Park” viewshed areas accordingly. Visibility data as recorded by the NPS for GSMNP reveals that the typical summer season visibility, given regional air quality issues, averages about 79,200 feet (15 miles).
The visibility improves during other seasons. Therefore, all viewsheds should have ample visibility of GSMNP. It should be noted that under natural conditions (i.e. no haze or other unnatural air pollutants), the typical summer season visibility averages about 316,800 feet (60 miles) with a 20% annual best days average of about 696,960 feet (132 miles).

The viewshed preference values and sectional preference values were determined using the procedures outlined in Step 3 of the Viewshed Analysis Methodology. Actual photographs taken in the field and computer images taken in the 3D computer model utilized in the preference value determination are available in digital format and contained in the *Model Snap Shot* folder located on the Appendix Compact Disc. The digital file is readily viewed using any *.jpg* format software. An example of a computer generated image is shown in the inset of Figure 10.

Tables 3, 4 and 5 display the viewshed preference value and sectional preference value results for Sections B, C and D, respectively. Tables 6a and 6b provide a summary of the viewshed analysis results. These tables describe the Park viewshed values and separately indicate the total viewshed value, which includes non-Park viewshed attributes.

The methodology used to determine the viewshed preference values reveals that the least preferred vista dimension has a value of 2.99 and the most preferred vista dimension has a preference value of 4.61. The average of all preference values reported in SMS 18 is 3.625. Intuitively, any viewshed with a preference value over the average value can be considered as being above average in quality.

Figure 11. Foothills Parkway Section B

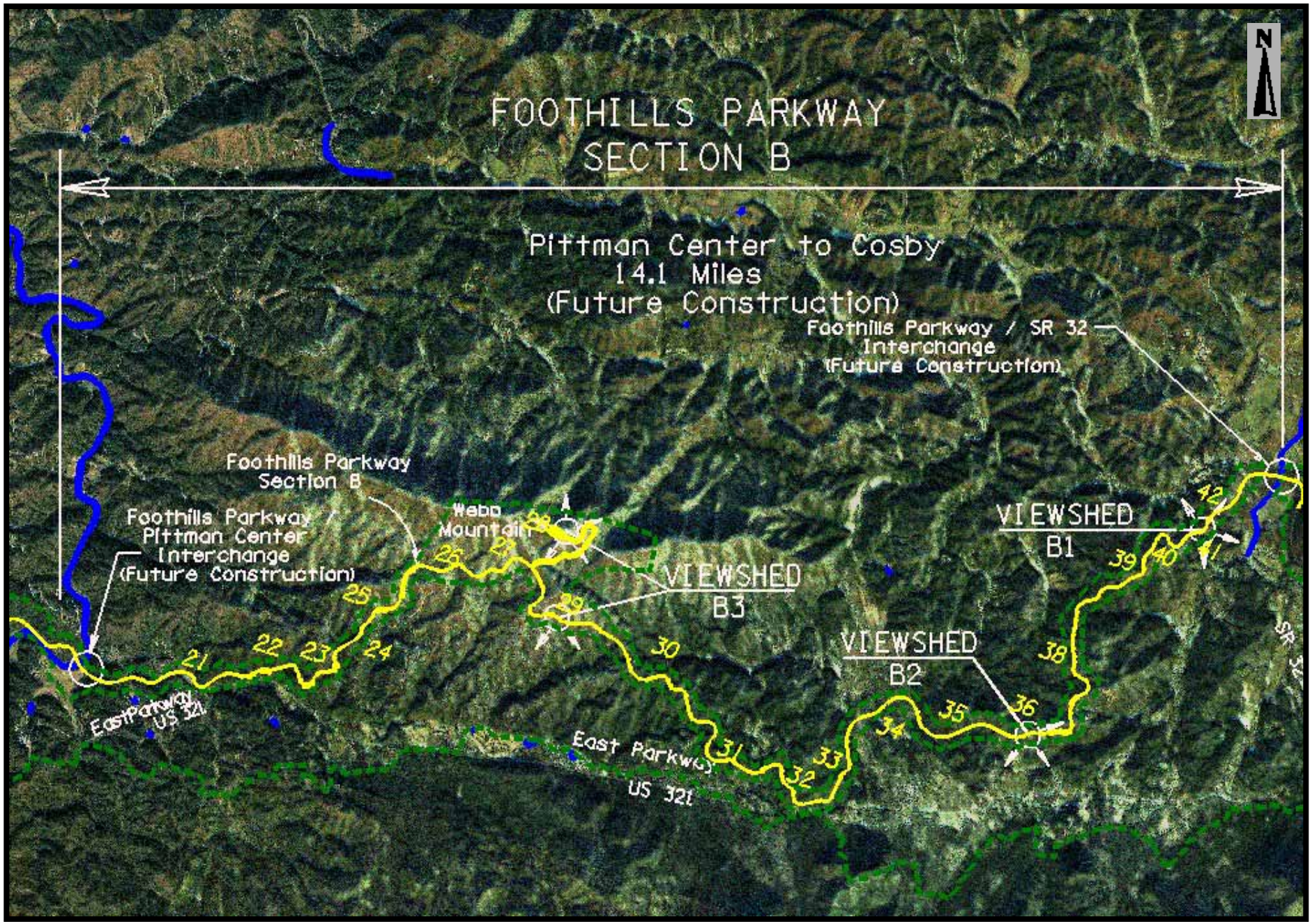


Figure 12. Foothills Parkway Section C

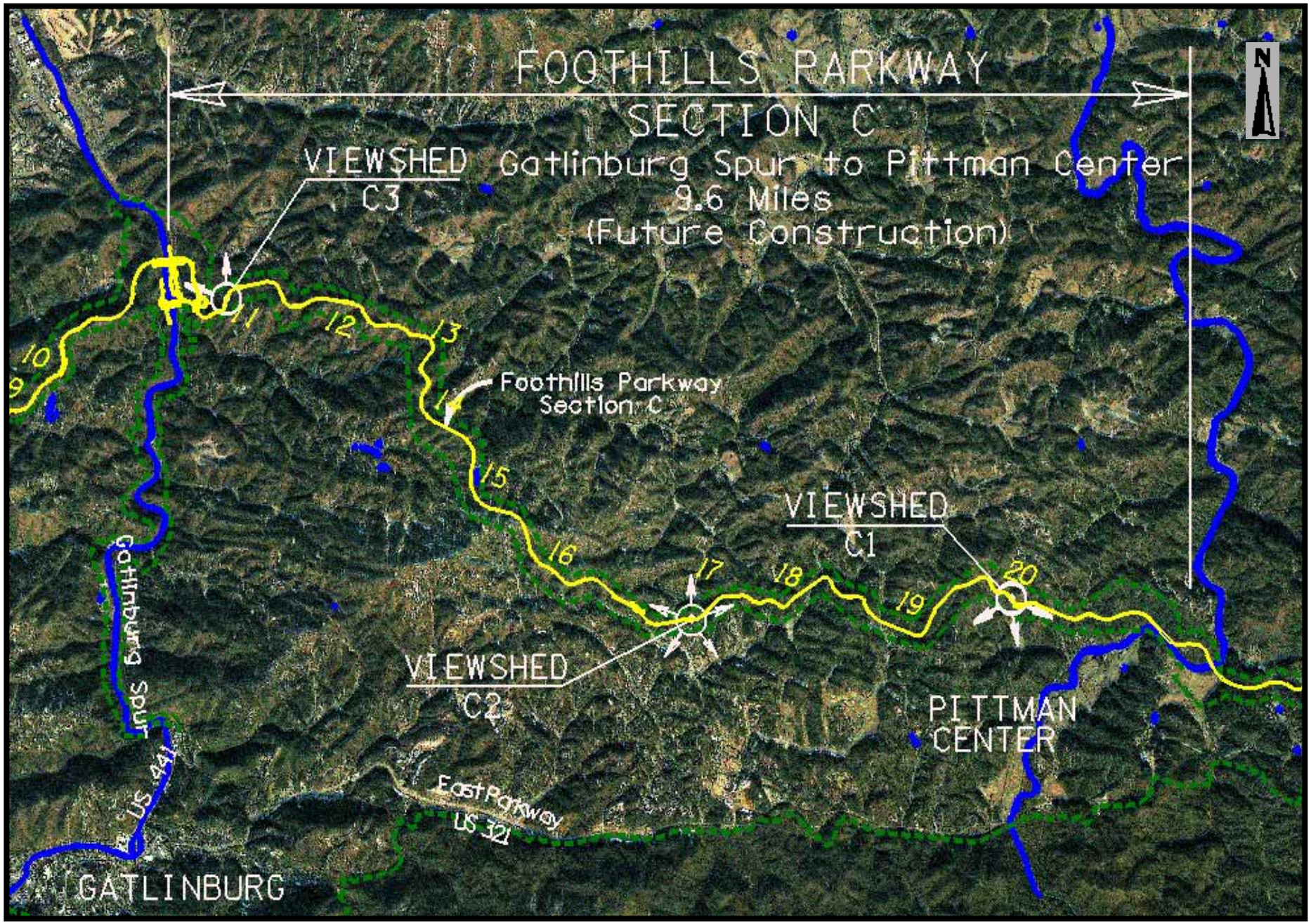


Figure 13. Foothills Parkway Section D

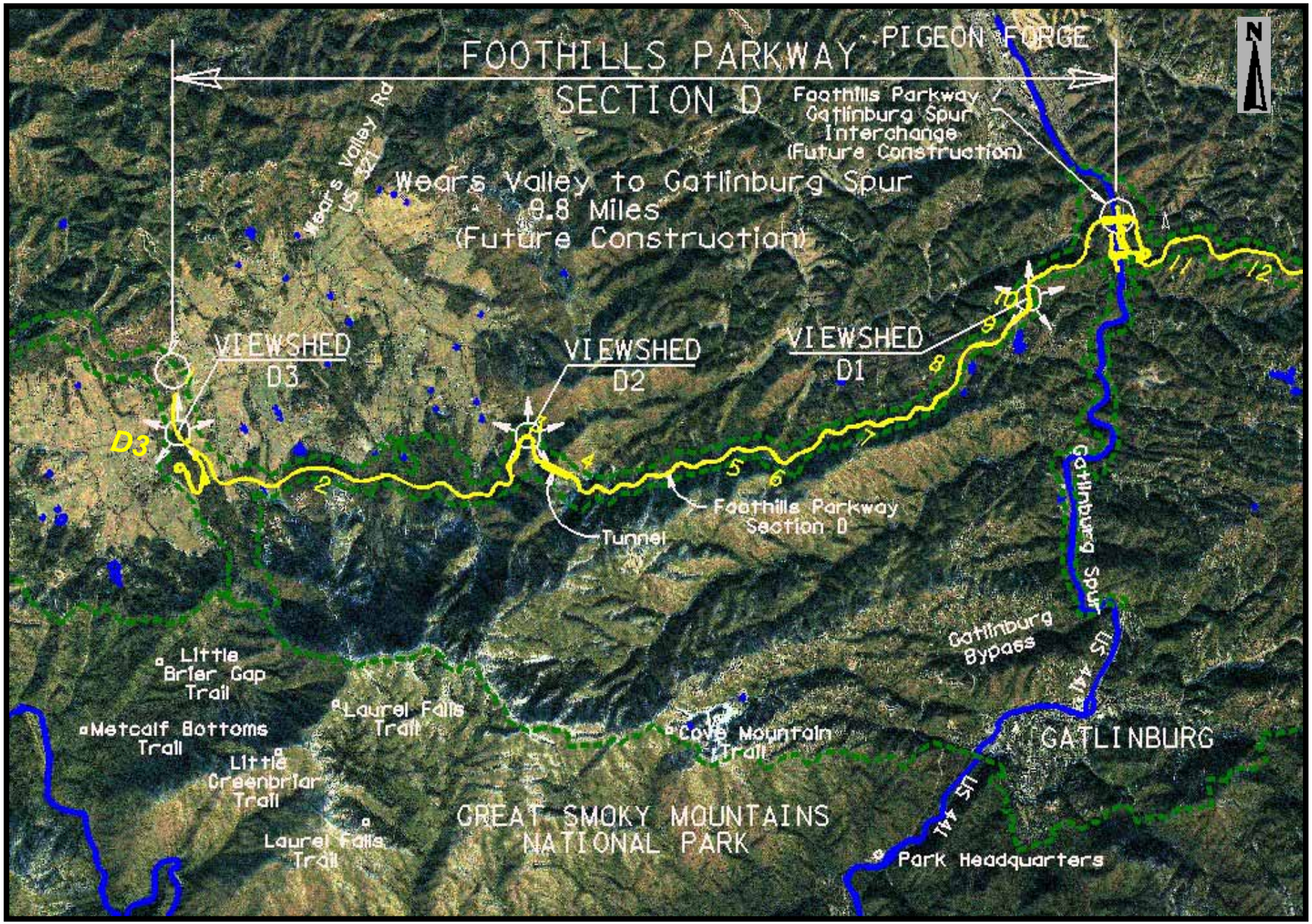


Table 2. Viewshed Attribute Evaluation

Parkway Section	Viewshed Designation	Location Range of Station No.		Viewshed Area (Acres)		Building Structures		Density (structures/acre)
				Inside GSMNP	Outside GSMNP	Inside GSMNP	Outside GSMNP	
B	21	1142 + 00	1146 + 00	422	810	0	9	0.01
	22	1184 + 00	1188 + 00	1,759	1,730	0	27	0.02
	23	1214 + 00	1218 + 00	3,070	1,230	0	42	0.03
	24	1229 + 00	1233 + 00	155	68	0	5	0.07
	25	1244 + 00	1248 + 00	2,060	132	0	13	0.10
	26	1285 + 00	1289 + 00	2,444	5,219	0	70	0.01
	27	1319 + 00	1323 + 00	3,194	213	0	22	0.10
	28 / 29 (B3)	1357 + 00	1361 + 00	2,926	1,248	0	6	0.00
	30	1417 + 00	1421 + 00	1,856	904	0	37	0.04
	31	1458 + 00	1462 + 00	2,401	3,859	0	123	0.03
	32	1496 + 00	1500 + 00	1,972	4,720	0	129	0.03
	33	1530 + 00	1534 + 00	4,068	477	0	17	0.04
	34	1565 + 00	1569 + 00	36	509	0	25	0.05
	35	1608 + 00	1612 + 00	4,387	370	0	17	0.05
	36 (B2)	1638 + 00	1642 + 00	1,289	840	0	112	0.13
	37	1655 + 00	1659 + 00	8,045	1,644	0	0	0.00
	38	1692 + 00	1696 + 00	3,734	1,923	0	0	0.00
	39	1740 + 00	1744 + 00	4,809	1,055	0	0	0.00
	40	1760 + 00	1764 + 00	98	1,439	0	22	0.02
	41 (B1)	1782 + 00	1786 + 00	35	1,557	0	58	0.04
	42	1798 + 00	1802 + 00	3,974	1,057	0	9	0.01
Subtotal				**30,474**	**10,871**	**0**	**260**	
C	11 (C3)	641 + 00	645 + 00	0	394	0	3	0.01
	12	686 + 00	690 + 00	0	212	0	21	0.10
	13	720 + 00	724 + 00	19	1,792	0	161	0.09
	14	742 + 00	746 + 00	0	2,590	0	211	0.08
	15	787 + 00	791 + 00	22	1,077	0	110	0.10
	16	823 + 00	827 + 00	2,388	640	0	11	0.02
	17 (C2)	878 + 00	882 + 00	767	449	0	29	0.06
	18	923 + 00	927 + 00	578	315	0	8	0.03
	19	976 + 00	980 + 00	448	252	0	12	0.05
	20 (C1)	1014 + 00	1018 + 00	805	376	0	4	0.01
Subtotal				**5,027**	**8,097**	**0**	**570**	
D	1	98 + 00	102 + 00	255	2,228	0	300	0.13
	43 (D3)	113 + 50	117 + 50	145	3,860	0	102	0.03
	2	184 + 00	188 + 00	43	3,049	0	207	0.07
	3 (D2)	290 + 00	294 + 00	0	1,285	0	87	0.07
	4	319 + 00	323 + 00	0	996	0	27	0.03
	5	389 + 00	393 + 00	0	589	0	9	0.02
	6	415 + 00	419 + 00	0	356	0	11	0.03
	7	457 + 00	461 + 00	0	971	0	12	0.01
	8	508 + 00	512 + 00	0	1,540	0	15	0.01
	9	532 + 00	536 + 00	0	1,398	0	21	0.02
	10 (D1)	548 + 00	552 + 00	0	1,493	0	12	0.01
Subtotal				**443**	**17,766**	**0**	**803**	
Total				**35,945**	**36,734**	**0**	**1,633**	

Table 3. Section B Viewshed Analysis

Viewshed Designation	Location Station No.		View Direction	Viewshed Typology	Viewshed Value	Average Viewshed Value	
						Park **	Total ***
21	1142 + 00	1146 + 00	0	3	3.96	3.96	3.96
			90R *	3	3.96		
22	1184 + 00	1188 + 00	0	3	3.96	3.96	3.96
			90R *	3	3.96		
			150R *	3	3.96		
23	1214 + 00	1218 + 00	0	1	3.19	3.96	3.70
			90R *	3	3.96		
			140R *	3	3.96		
24	1229 + 00	1233 + 00	0	3	3.96	3.96	3.96
			70L	3	3.96		
			120L	3	3.96		
			150R *	3	3.96		
25	1244 + 00	1248 + 00	0	1	3.19	3.96	3.70
			60R *	3	3.96		
			120R *	3	3.96		
26	1285 + 00	1289 + 00	0	1	3.19	3.96	3.58
			90R *	3	3.96		
27	1319 + 00	1323 + 00	0	3	3.96	3.96	3.96
			110R *	3	3.96		
28 (B3)	1328 + 00	1332 + 00	0	1	3.19	3.58	3.70
			60L	3	3.96		
			120L	3	3.96		
			180L	3	3.96		
			60R *	1	3.19		
			150R *	3	3.96		
29 (B3)	1357 + 00	1361 + 00	0 *	3	3.96	3.70	3.70
			60R *	3	3.96		
			120R *	1	3.19		
30	1417 + 00	1421 + 00	0 *	3	3.96	4.00	3.83
			90R *	1	3.19		
			120R *	3	3.96		
			180R	3	3.96		
			60L	3	3.96		
			90L	3	3.96		
31	1458 + 00	1462 + 00	0	5	4.61	4.61	4.61
			90R *	5	4.61		
32	1496 + 00	1500 + 00	0	5	4.61	4.61	4.61
			30R *	5	4.61		
			90R *	5	4.61		
			140R *	5	4.61		
33	1530 + 00	1534 + 00	0	3	3.96	3.96	3.96
			60R *	3	3.96		
			100R *	3	3.96		
			150R *	3	3.96		
34	1565 + 00	1569 + 00	0	1	3.19	3.19	3.36
			50L	2	3.61		
			90L	2	3.61		
			135L	1	3.19		
			150R *	1	3.19		
35	1608 + 00	1612 + 00	0	3	3.96	3.96	3.96
			60R *	3	3.96		
			120R *	3	3.96		
36 (B2)	1638 + 00	1642 + 00	0	3	3.96	3.92	3.81
			30L	3	3.96		
			130L	1	3.19		
			70R *	1	3.19		
			120R *	5	4.61		
			150R *	3	3.96		
37	1655 + 00	1659 + 00	0	1	3.19	3.96	3.70
			60R *	3	3.96		
			140R *	3	3.96		
38	1692 + 00	1696 + 00	0	3	3.96	3.96	3.96
			60L	3	3.96		
			120L *	3	3.96		
			60R	3	3.96		
			140R *	3	3.96		
39	1740 + 00	1744 + 00	0	1	3.19	3.96	3.58
			100R *	3	3.96		
40	1760 + 00	1764 + 00	0	1	3.19	3.19	3.19
			60L	1	3.19		
			90L	1	3.19		
			120L	1	3.19		
			180R *	1	3.19		
41 (B1)	1782 + 00	1786 + 00	0	3	3.96	4.61	4.29
			45R *	5	4.61		
			90R	5	4.61		
			135R	3	3.96		
42	1798 + 00	1802 + 00	60R	5	4.61	3.96	4.29
			90R	5	4.61		
			120R *	6	3.96		
			150R *	7	3.96		
Total						**86.89**	**85.37**

* Views inside the Park boundary.
** Includes only views inside the Park boundary.
*** Includes views both inside and outside the Park boundary.

Table 4. Section C Viewshed Analysis

Viewshed Designation	Location Station No.		View Direction	Viewshed Value	Average Viewshed Value	
					Park **	Total ***
11	641 + 00	645 + 00	0	3.19	0.00	3.56
			45L	3.96		
			90L	4.61		
			45R	3.19		
			90R	3.19		
			120R	3.19		
12	686 + 00	690 + 00	0	3.96	0.00	3.96
			30L	3.96		
			90L	3.96		
			150L	3.96		
13	720 + 00	724 + 00	0	3.19	3.19	3.19
			130R *	3.19		
			165R	3.19		
14	742 + 00	746 + 00	0	3.19	0.00	3.19
			60R	3.19		
			120R	3.19		
15	787 + 00	791 + 00	0	3.19	3.19	3.19
			30R	3.19		
			85R *	3.19		
			120R	3.19		
16	823 + 00	827 + 00	0 *	3.96	3.96	3.96
			30R *	3.96		
			90R *	3.96		
			150R *	3.96		
17 (C2)	878 + 00	882 + 00	0	3.96	3.73	3.75
			30L	3.96		
			90L	3.19		
			150L	3.96		
			60R *	3.96		
			90R *	3.61		
			150R *	3.61		
18	923 + 00	927 + 00	0	3.96	3.96	3.96
			45R *	3.96		
			90R *	3.96		
			150R *	3.96		
19	976 + 00	980 + 00	0	3.19	3.19	3.19
			60R *	3.19		
			90R *	3.19		
			150R	3.19		
20 (C1)	1014 + 00	1018 + 00	0	3.96	3.19	3.45
			30R	3.19		
			70R *	3.19		
			90R	3.19		
Total					**24.41**	**35.40**

* Views inside the Park boundary.

** Includes only views inside the Park boundary.

*** Includes views both inside and outside the Park boundary.

Table 5. Section D Viewshed Analysis

Viewshed Designation	Location Station No.		View Direction	Viewshed Value	Average Viewshed Value	
					Park **	Total ***
1	98 + 00	102 + 00	0	3.96	3.96	3.79
			45L	3.61		
			100L	3.61		
			20R *	3.96		
43 (D3)	113 + 50	117 + 50	0	3.19	3.79	3.83
			70L	4.12		
			120L	4.12		
			30R *	3.96		
			90R *	3.61		
			150R	3.96		
2	184 + 00	188 + 00	0	3.19	3.96	3.59
			70L	3.61		
			120L	3.61		
			170R *	3.96		
3 (D2)	290 + 00	294 + 00	0	3.19	0.00	3.19
			90L	3.19		
			150L	3.19		
			175L	3.19		
			150R	3.19		
4	319 + 00	323 + 00	0	3.19	0.00	3.58
			60L	3.96		
5	389 + 00	393 + 00	0	3.19	0.00	3.38
			60L	3.19		
			100L	3.19		
			150L	3.96		
6	415 + 00	419 + 00	0	3.19	0.00	3.45
			60L	3.96		
			90L	3.19		
7	457 + 00	461 + 00	0	3.19	0.00	3.77
			30L	3.96		
			90L	3.96		
			130L	3.96		
8	508 + 00	512 + 00	0	3.19	0.00	3.72
			20L	3.19		
			120L	3.96		
			60R	4.12		
			120R	4.12		
9	532 + 00	536 + 00	0	3.19	0.00	3.76
			50R	4.12		
			120R	4.12		
			170R	3.61		
10 (D1)	548 + 00	552 + 00	0	3.19	0.00	3.84
			90L	3.96		
			150L	3.96		
			90R	3.96		
			150R	4.12		
Total					**11.71**	**39.90**

* Views inside the Park boundary.
** Includes only views inside the Park boundary
*** Includes views both inside and outside the Park boundary.

Table 6a. Summary of Foothills Parkway Viewshed Analysis--Park View Only

Parkway Section	Section Length (miles)	Viewsheds Per Section	Viewsheds Per Mile	Park Viewshed Value	Viewshed Value Per Mile
B	14.10	22	1.56	86.89	6.16
C	9.60	7	0.73	24.41	2.54
D	9.80	3	0.31	11.71	1.19

Table 6b. Summary of Foothills Parkway Viewshed Analysis--Total View

Parkway Section	Section Length (miles)	Viewsheds Per Section	Viewsheds Per Mile	Total Viewshed Value	Viewshed Value Per Mile
B	14.10	22	1.56	85.37	6.05
C	9.60	10	1.04	35.40	3.69
D	9.80	11	1.12	39.90	4.07

2.4 Limitations

The viewshed preference values and sectional preference values determined in this report reflect the aesthetic quality of the viewshed under ideal conditions. Attributes such as development density and distance from the observation point to the target view were not used to discredit or credit the preference values. However, it is important to note that the current development as viewed from the digital satellite imagery within each viewshed area contained outside the Park is consistent with the land use projected in the 1968 *Foothills Parkway Master Plan*. The expectation of the typical Foothills Parkway user being consistent with the Blue Ridge Parkway user may not be valid, even though each parkway traverses similar topography and geography. Further study may be warranted to determine the affect of viewshed attributes on the preference values conducted only on the Foothills Parkway.

Traffic density also affects the visitor's ability to view the visual resources available along the Foothills Parkway. Pleasure driving and sightseeing are primary parkway visitor objectives that may be severely hindered by traffic congestion. The viewshed and sectional preference values do not take into consideration the affects traffic congestion may have on the parkway visitor. The next chapter addresses how traffic congestion affects the overall level of visitor experience.

Chapter 3: Traffic Analysis

In keeping with the original goals for the Foothills Parkway, this traffic analysis had three primary components: (1) to determine the impact on the regional transportation network and Park roads, (2) to determine projected traffic flow on the Parkway and (3) to determine the effect of projected Parkway traffic volume on visitor experience. The following sections provide background information and further discuss the three primary components of the traffic analysis.

3.1 Foothills Parkway Description

If completed as envisioned, the approximately 72-mile Foothills Parkway would have the following seven interchanges (listed from east to west):

- I-40;
- U.S. 321 in Cosby;
- S.R. 416 in Pittman Center;
- U.S. 441 (Spur) near Gatlinburg;
- U.S. 321 in Wears Valley;
- U.S. 321 in Townsend; and
- U.S. 129 in Chilhowee.

No other external access to the Foothills Parkway is planned. Internally, frequent pull-offs are planned for viewing the Park and a limited number of "spur" roads leading to recreation areas are included as well. Its typical section would include one 10-foot lane in each direction with 4 to 8 foot, stabilized shoulders. A 30-mph design speed is envisioned.

Given the physical location of the Parkway (spanning three counties: Blount, Sevier and Cocke) and the connectivity described above, it is apparent that the Parkway will to some extent serve a regional network function in addition to its primary role as a scenic parkway. The reasons are:

- The Parkway roughly parallels U.S. 321 from Walland to Cosby, and is a better road than U.S. 321 in the Walland–Wears Valley area.
- The Parkway provides a "bypass" of congested areas in Townsend, Pigeon Forge and Gatlinburg.
- The Parkway provides direct access from the Gatlinburg area to Walland and thence to the regional airport and traffic arteries leading to I-40/75 west of Knoxville.

It has been widely speculated, though not previously supported by analysis, that the section of the Parkway between Walland and Wears Valley (Sections E and F) would have the most regional traffic utility. Further, it appears that the extension of the Parkway to the Spur (Section D) might have substantial regional traffic utility as well.

3.2 Existing Summer Daily Traffic

Sections of the Foothills Parkway anticipated to be most frequently used lie in heavily tourist-oriented Sevier County. As such, substantial fluctuations in traffic from month to month can be expected. In the planning and design of new roads, wide traffic variations are usually addressed by attempting to meet the traffic needs on a relatively busy day, but not necessarily the busiest day of the year. Reliable monthly variation data are available for Sevier County, and factors based on those data were applied to roads affected by tourism. In Blount and Cocke Counties, tourist traffic is less predominant, so traffic fluctuation factors were not used on all roads.

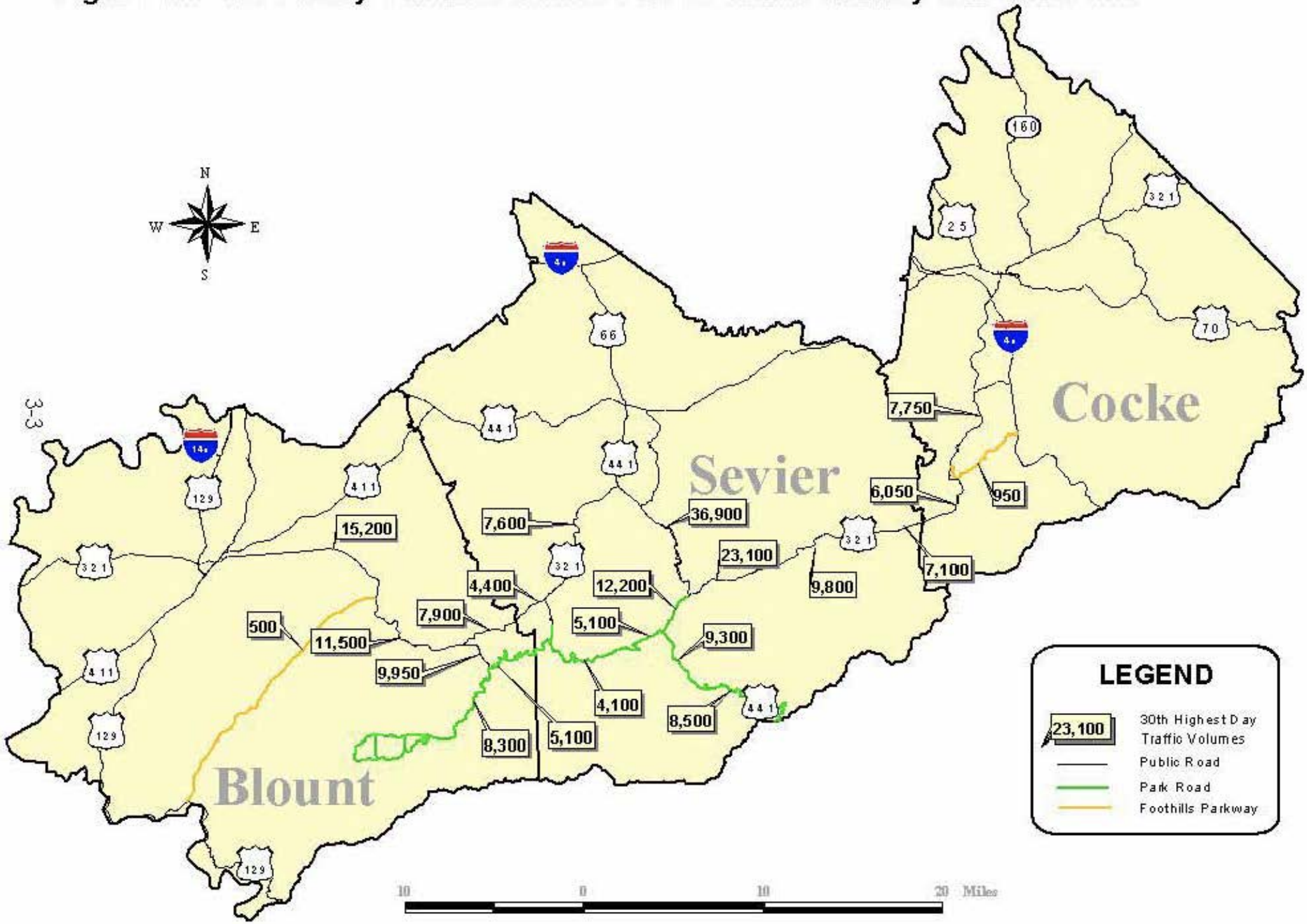
All traffic projections on the Foothills Parkway and nearby roads represent the 30th most busy day of the year, which in Sevier County is about 43 percent above an average day and most closely relates to a summer weekday. Referencing the two completed sections of the Parkway, the section between Cosby and I-40 (Section A) carried 950 vehicles per day (vpd) in 2000 and Section G and H southwest of Walland carried 500 vpd. Figure 14 depicts Year 2000 30th highest day traffic volumes on roads in the immediate environs of the Foothills Parkway. It should be noted that traffic conditions in Sevier County can be extreme during the fall and summer months with excessive delays occurring on principal corridors and at major street junctions. The daily traffic volumes, as shown in Figure 14, do not fully reflect the peak period congestion and delays experienced by motorists.

Roads in the Park are extremely congested during summer and fall. On a typical summer weekday, the volume of traffic on Newfound Gap Road between the Sugarlands Visitor Center and the North Carolina state line is 8,500 to 9,300 vpd. Approximately 4,100 to 5,100 vpd use Little River Road on a typical summer weekday. Laurel Creek Road sees 8,300 vpd and the Cades Cove Loop road carries about 4,000 vpd.

3.3 Traffic Projection Methodology

Traffic using the Foothills Parkway can be categorized as commuter trips, destination trips, or a combination of both. The purpose of a commuter trip is to get from one point to the next in the most convenient fashion; the purpose of a commuter trip on the Parkway is merely to use it as a means of conveyance from one off-Parkway location to another. On the other hand, destination trips on the Foothills Parkway are for a sight seeing and recreational experience along the road itself. Drivers making a trip with a dual commuter/destination purpose might be traveling from one off-Parkway location to another but choose the Parkway route because of its scenic attributes as well as convenience. Some destination trips will actually be diverted link trips that would otherwise be destined to the Park. In other words, the visitor might choose to enjoy the Foothills Parkway and its visitor recreational development instead of locations within the Park.

Figure 14. 1999 Daily Summer Traffic on Foothills Parkway and Environs



In 1997, Wilbur Smith Associates (WSA) completed the *Sevier County Long Range Transportation Plan* that outlined roadway recommendations based on a TRANPLAN traffic model. The road network included all major roads in Sevier County and some of the roads in the Park. Land use and traffic data reflected 1994 conditions, and traffic projections were made for a 2004 design year.

Though there are some limitations to the Sevier County traffic model, it was apparent that it was the best tool available to estimate commuter traffic on the Foothills Parkway and the surrounding roads that would be affected by its completion. The limitations included 7-year-old traffic and land-use data and a road network confined to Sevier County. A lack of model network roads in Cocke County was not critical because no access to the Foothills Parkway will be provided between S.R. 416 in Sevier County and U.S. 321 in Cocke County. On the other hand, a lack of model network roads in Blount County and the northwest edge of the Park was somewhat problematic regarding traffic projections. Section E/F of the Foothills Parkway and the western portion of Little River Road were inserted into the model's street network as a link leading to an external station, therefore the traffic assignment might be less accurate than if they were internal links.

The Foothills Parkway was inserted into the traffic model's existing-plus-committed (E+C) road network with Year 2004 land use and traffic conditions. Its attributes included two travel lanes, a 30-mph operating speed and interchanges located as described earlier in this chapter. Model runs were performed with every possible section combination of the Foothills Parkway being constructed (e.g., all sections; Sections B, C and D separately; Sections E and F as a unit, etc.).

Traffic projections from the model were limited to those resulting from Year 2004 land use projections. However, for the Foothills Parkway analysis, there was a need to project traffic for more distant horizons including Year 2010, 2020 and 2030. Consequently, the Year 2004 traffic assignments were used to determine the percent of traffic that would be assigned to the Foothills Parkway and its parallel routes. For example, in Year 2004, 24,523 vpd were assigned to the corridor that includes U.S. 321 and Little River Road. Without the Foothills Parkway, 18,464 vpd (75 percent) were assigned to U.S. 321, 4,807 vpd (20 percent) to Little River Road and 1,252 to other minor routes. With the Foothills Parkway, a total of 24,523 trips were assigned to the corridor with 15,173 vpd (62 percent) assigned to US 321, 6,150 vpd (26 percent) to the Foothills Parkway and 3,200 vpd (13 percent) to Little River Road. No trips were assigned to other minor routes.

Once the percentages were determined, the Year 2001 traffic volumes (actual counts as opposed to the model estimated Year 2004 trips) were inflated by 4 percent annually to estimate Year 2010, 2020 and 2030 conditions without the Foothills Parkway. Then traffic volumes in the corridors affected by the

Foothills Parkway were re-allocated, using percentages determined by the Year 2004 traffic model, to reflect the Foothills Parkway. The annual growth rate was determined from regression analyses conducted using data from several Tennessee Department of Transportation (TDOT) count stations with substantial historical data.

Accurately estimating destination trips to the Foothills Parkway was difficult because of its uniqueness. In essence, the Foothills Parkway has many of the same characteristics as a public park, including campgrounds, picnic areas, and other visitor recreational development areas. For the most part, it could be thought of as a 72-mile linear park with attractions scattered throughout its entirety. More accurately, it could be viewed as 8 separate parks correlating with the 8 sections.

The Institute of Transportation Engineers' publication *Trip Generation; Sixth Edition* contains trip generation information for various land uses including city, county and state parks as well as national monuments. The most widely used independent variable for each of these land use categories is acres of land. For example, two national monuments were studied, and the average daily trip generation rate was 5.37 trips per acre. Therefore, a 323-acre national monument (the average size of the two studied) would be expected to generate just over 1,700 trips per day. Since the Foothills Parkway is a "linear park" with over 8,800 acres of land, this methodology was judged inappropriate.

A more reliable approach for estimating destination trips is to examine traffic on existing sections of the Foothills Parkway in comparison to the Blue Ridge Parkway, another linear park. On the northeast end, Foothills Parkway Section A, a summer daily traffic volume of 950 vpd has been estimated, probably split between commuter trips and destination trips. On the west end of the Foothills Parkway, the summer daily traffic volume is 500 vpd, most of which is probably destination trips. It should be noted that both the east and west ends of the Foothills Parkway are relatively isolated from major activity centers although access is provided to a small subdivision on the west end.

Comprehensive monthly traffic count data are maintained at 43 locations along the Blue Ridge Parkway in North Carolina. In 2000, the overall average daily traffic volume at the 43 stations was 590 vpd. October is the busiest month with traffic being reported at 54 percent above average. Considering all 43 stations, the average daily traffic volume in October 2000 was 891 vpd.

Given the traffic volumes on existing sections of the Foothills Parkway and the Blue Ridge Parkway, it is estimated that Sections C and D would generate approximately 1,500 daily destination trips today. Included in these destination trips are trips to the various visitor recreational development areas. Sections C and D are near tourist centers, so they are expected to attract more trips than Sections A, G and H and more trips than the average of all Blue Ridge Parkway stations. Additionally,

the remaining sections (B, E and F) should generate approximately 1,000 destination trips per day (driving to enjoy a vista with minimal stops, stopping to enjoy the various visitor recreational developments, or both), or roughly the average of 43 Blue Ridge Parkway stations and Section A's 30th highest day volume. These values are expected to grow yearly at about 4 percent to Year 2030.

On many Sevier County roads, historical traffic growth has exceeded 4 percent annually over the past 10 years. US 321, Wears Valley Road, should experience a 3.50 percent annual traffic growth through Year 2030 according to the regression analysis. Likewise, historical data on US 441 between the Sugarlands Visitor Center and the North Carolina state line suggest future annual traffic growth will occur at 4.22 percent. The projected Foothills Parkway growth rate of 4 percent was based on overall historical traffic growth in Sevier County and projected future traffic growth on US 321 and US 441.

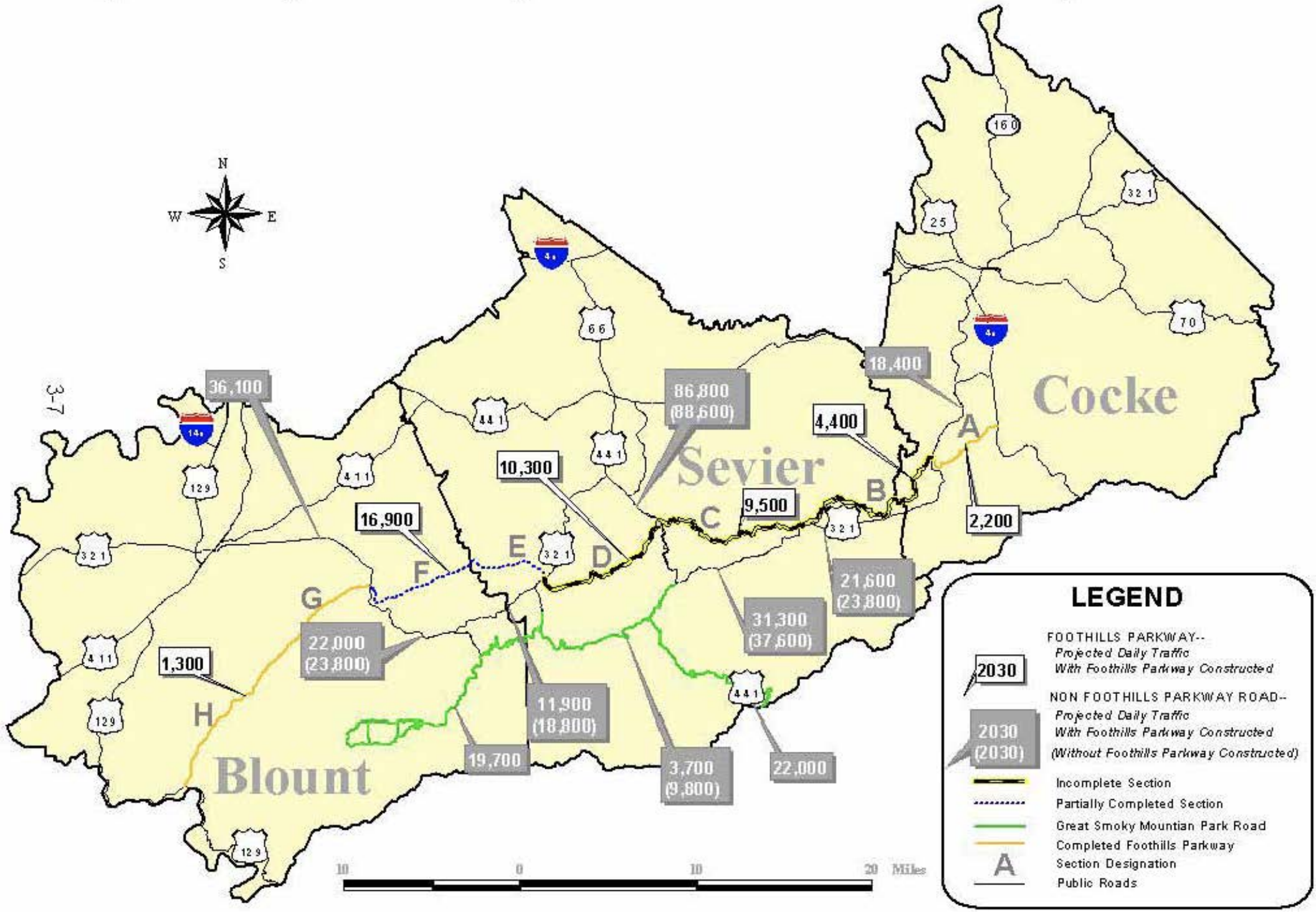
Traffic counts for the last 10 years were used to perform regression analysis on both completed sections of the Foothills Parkway. According to the regression analysis, traffic on the east end should increase by 3.1 percent annually to Year 2030 and traffic on the west end at 1.8 percent annually to Year 2030. These projections assume that other sections of the Foothills Parkway will not be completed. In the final analysis, the 4 percent growth rate was used on the completed sections of the Foothills Parkway instead of the 3.1 and 1.8 percent.

3.4 Regional and Park Impact in Year 2030

Constructing the Foothills Parkway in its entirety would have a significant impact on the regional transportation network as evidenced by Figure 15. The Appendix includes illustrations depicting Years 2001, 2010, 2020 and 2030 traffic estimates with and without the Foothills Parkway. By Year 2030, Section E/F is expected to accommodate approximately 16,900 vpd with about 2,200 of those being destination trips. The traffic volume on Section D is projected to be approximately 10,300 vpd with 3,200 of those being destination trips. About 6,300 commuter and 3,200 destination trips on Section C result in a total Year 2030 daily traffic estimate of 9,500 vpd. Section B is anticipated to have a balance of commuter and destination trips with 2,200 of each traversing this section of the Foothills Parkway on a peak summer weekday.

Surrounding parallel roads, including Little River Road in the Park, should benefit the most from the Foothills Parkway. Without the Foothills Parkway in Year 2030, daily traffic on Little River Road is projected to be about 9,800 vpd, but with the Foothills Parkway the volume is expected to drop to about 3,700 vpd. Similarly, traffic on U.S. 321 from Townsend to Wears Valley is projected to drop from 18,800 vpd without the Foothills Parkway to 11,900 vpd with the Foothills Parkway. U.S. 321 between Gatlinburg and Cosby would also realize a reduction in traffic as a result of the Foothills Parkway. Near Gatlinburg, the reduction is expected to

Figure 15. Projected 2030 Daily Summer Traffic on Foothills Parkway and Environs



be approximately 6,300 vpd, and further to the east, the reduction should be about 2,200 vpd. With the exception of a modest decrease in traffic on the Spur (U.S.441 between Gatlinburg and Pigeon Forge), other roads in the Foothills Parkway environs should not be significantly affected by its construction.

The Park Service has indicated that they are committed to completing construction of Section E/F. Therefore, the traffic analysis discussed herein is limited to the feasibility of constructing Sections B, C and D. Options include full-build as well as constructing one or more individual sections or combination of sections. The various combinations of construction alternatives are as follows:

- All sections;
- Section E/F;
- Sections E/F and B;
- Sections E/F and C;
- Sections E/F and D;
- Sections E/F, B and C;
- Sections E/F, B and D; and,
- Sections E/F, C and D.

Each of these combinations was inserted into the transportation model's road network using Year 2004 land use and committed roadway projects. In short, section traffic projections on all construction combinations appear to be equal to the full-build (Sections B, C, D and E/F) projection except when the alternative involves Section C.

If Section C were constructed alone instead of with all other sections, the Year 2030 traffic projection is expected to decrease from 9,500 vpd (with Sections B, C and D constructed) to 7,600 vpd. With Sections B and C constructed but not Section D, the traffic assigned to Section C is also expected to be 7,600 vpd. Conversely, if Sections C and D are constructed without Section B, the traffic assigned to Section C is projected to approximate 8,400 vpd. It is concluded that Section D will have more influence on Section C than would Section B.

3.5 Impact of Traffic on Level of Visitor Experience

Normally a road is constructed with the anticipation that it will be well utilized when it opens. If it were not well utilized, most transportation planners would deem it a failure or at least not cost effective. By contrast, the goal of the Foothills Parkway is not necessarily to accommodate a significant amount of traffic upon opening or in the future. Rather the goal is to provide a scenic view of the Park and a positive visitor experience. If traffic is excessive, it will detract from the visitor experience (the ability to enjoy the views) as motorists concern themselves with vehicles ahead of or behind them or in the opposing traffic lane. Ideally the Foothills Parkway will attract destination trips (to enjoy the views and the visitor recreational development) and destination/commuter trips but not at levels that will detract from the visitor experience. It should be noted that it is impractical to differentiate between commuter and destination trips, as the Park Service would have no mechanism to restrict commuter trips on the Foothills Parkway.

Figure 16. Foothills Parkway Anticipated Year 2030 Traffic Flow:

Traffic Density for a Summer Weekday Half-Mile Representative Section

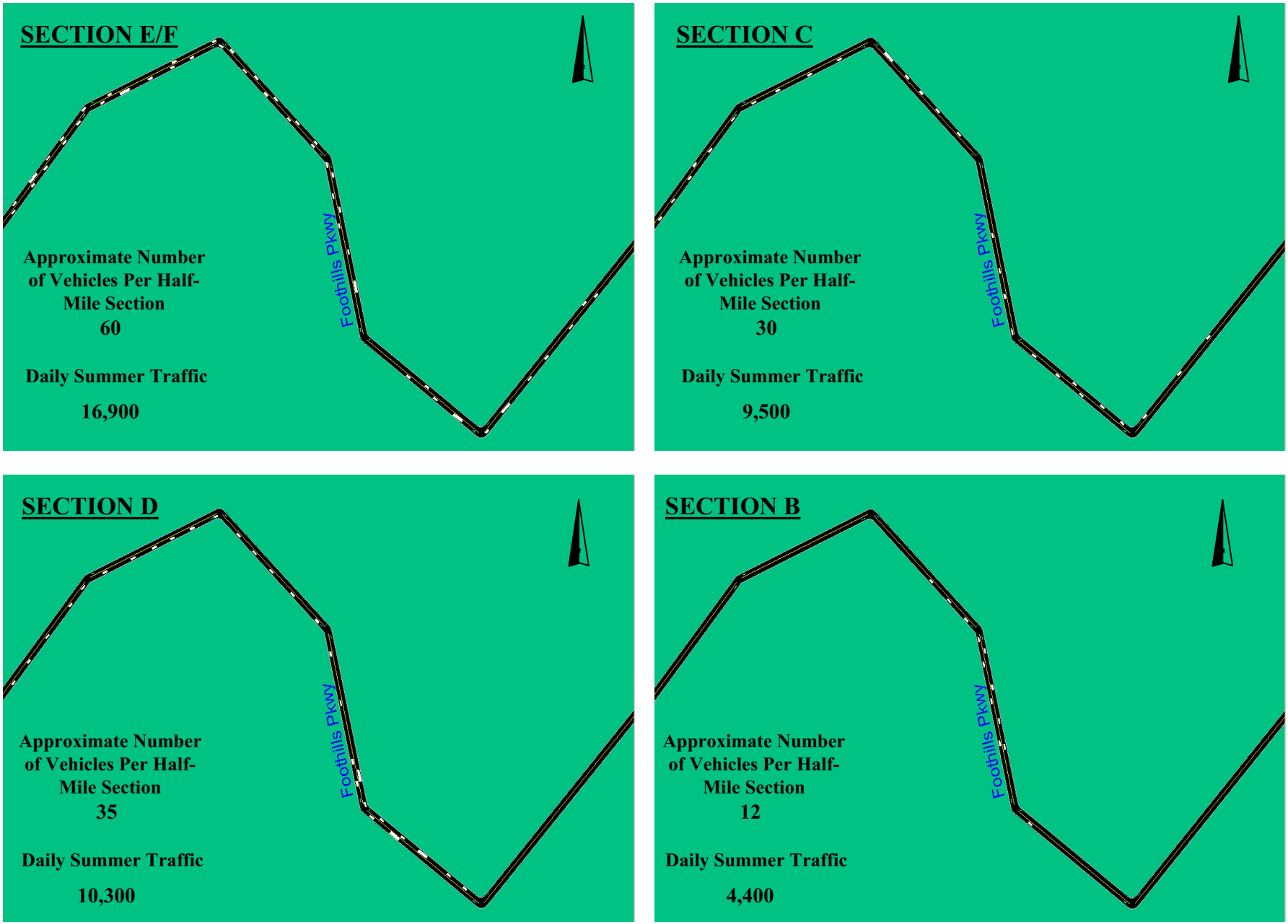


Figure 16 depicts Year 2030 traffic flow information on the four incomplete sections of the Foothills Parkway. The traffic simulation model SimTraffic was used to produce an instantaneous snapshot of traffic density on a typical half-mile segment. It was assumed that a peak hour would produce about 12 percent of the daily traffic, and that at any given time, half of the traffic would be traveling in each direction. The traffic density is what might be expected during a peak hour of a typical summer weekday.

Section E/F is projected to have a density of approximately 60 vehicles per half-mile segment, or about 29 percent of the road occupied by vehicles. Section D is projected to experience a density of about 35 vehicles per half-mile or about 18 percent of the road occupied. Section C should have a density of 30 vehicles per half-mile segment, which would result in about 15 percent of the road occupied. Section B should experience the lowest density of traffic with only 6 percent of the road occupied from the projected 12 vehicles per half-mile segment.

Traffic engineers typically quantify two-lane roadway operating conditions using a quality of service (Level of Service) concept that is published in the *Highway Capacity Manual (HCM)*. Two-lane highway Level of Service is defined with two criteria: average travel speed and percent of time spent following other vehicles. For the Foothills Parkway, however, this evaluation process is not valid. First, the HCM's evaluation procedure is applicable for high design speed roads. Second, and more importantly, the criteria used in the HCM evaluates motorists' mobility, and travel time is a major consideration.

Travel time and being restrained by other vehicles should not be a major evaluation criterion for the Foothills Parkway, except to the extent that each of these detracts from the visitor experience. Instead, the criteria should be based on roadway density, or the percent of the road occupied by vehicles at a given moment. More than likely, the densities that result in a poor Level of Service using the HCM criteria will far exceed the density at which a significant detraction from the visitor experience occurs.

At what density does traffic volume begin to detract from the visitor experience? Additional studies are required to determine this, but instinctively, an order of magnitude of 10 to 15 vehicles in a half-mile roadway segment seems reasonable. These densities relate to approximately 4,500 vpd assuming a 12 percent peak hour traffic and a 50/50 directional distribution factor. Little River Road, with daily summer traffic volumes ranging from 4,100 to 5,100 vpd, experiences peak period traffic densities of approximately 10 to 15 vehicles per half mile section. On the other hand, Newfound Gap Road between the Sugarlands Visitor Center and the North Carolina state line carries roughly 8,500 vpd on summer weekdays and probably experiences traffic densities of over 25 vehicles in a half-

mile section. This density level is very noticeable to motorists and hinders their visitor experience.

On Section B, the Year 2030 daily traffic projection is 4,400 vpd so the traffic should not detract from the visitor experience. Sections C and D, conversely, will attract 9,500 vpd and 10,300 vpd, respectively, so traffic is expected to detract from the visitor experience.

Chapter 4: Alternate Scenarios and Constructability Issues

The purpose of this study was in part to review all available options for future use of the Foothills Parkway right-of-way. These options include completing the construction of the full 72.1-mile roadway as originally planned, constructing one or more of the three remaining sections but not the full route, developing the remaining sections of the corridor to accommodate mass transit movement (traditional rail, monorail or rubber tired transit), halting any future roadway construction on the remaining sections but developing the right-of-way with a system of non-motorized trails, and halting all future construction of any kind within the right-of-way.

These future development options must be reviewed not only in relation to their ability to meet the 1944 vision but also to physical implementation. Matters such as the environmental impacts, cost of construction and cost effectiveness of the various options are also of prime importance.

4.1 Alternate Scenarios

The following paragraphs describe each of the options listed above. Also included is a discussion of each option relative to environmental impact, cost estimate/cost effectiveness, traffic analysis, viewshed analysis, Gateway area impact and the level of visitor experience/relationship to the mandate.

4.1.1 Build Section B Roadway

Description

As proposed, Section B is 14.1 miles in length, extending from an interchange with U.S. 321 at the terminus of the previously completed Section A at Cosby in Cocke County to an interchange with S.R. 416 in Pittman Center. Much of the alignment is along the southerly slope of Webb Mountain, thus providing a significant number of viewsheds into the park. The 1968 *Foothills Parkway Master Plan* also includes a 1.2-mile access road to the summit of Webb Mountain near Cosby, from which a spectacular 360 degree view of the area is available.

Under this option, Sections C and D would not be constructed. The Parkway would then consist of a 19.7-mile combination of Sections A and B to the northeast of the Gateway area and a 33.0-mile section to the southwest, a combination of Sections E, F, G and H.

Environmental Impact

Oak Ridge National Laboratory compiled the draft *Foothills Parkway Section 8B Final Environmental Report* in July 1999. This review and report included a public scoping process and provides a detailed description of the

environmental setting and impacts relative to geology and soils, water resources, aquatic ecology, terrestrial resources, meteorology and air quality, socioeconomics, traffic and noise, aesthetics resources and cultural resources. From this report and more recent discussions with representatives of the National Park Service, Tennessee Department of Environment and Conservation (TDEC) and the U.S. Army Corps of Engineers (USACOE), there are significant concerns about the need to cross more than 30 streams, general drainage patterns from the Parkway onto adjacent properties, stream stability and runoff rates, discharge to the Little Pigeon River which is a "National Resource Water," the rugged terrain and resulting steep slopes, possible pyritic rock deposits, a butternut tree grove near the Pittman Center interchange, potential archaeological sites within the right-of-way and cultural heritage of the Emerts Cove area of Pittman Center.

It should be noted that the draft *Final Environmental Report* describes several alternate design/construction scenarios within the section. These include elimination of the S.R. 416 interchange, relocation of this interchange a short distance south to U.S. 321, construction of a tunnel in the area east of S.R. 416 to eliminate extensive cut of a ridgeline, and elimination of the Webb Mountain access road.

Environmental regulators note that the approval process will be especially challenging given the above concerns and that extensive mitigation efforts will be required. It is their collective opinion, however, that given currently available information, the required construction permits can be granted.

Cost Estimate/Cost Effectiveness

The current construction cost estimate for this section is $7.1M per mile. This cost reflects the mountainous terrain and the extraordinary environmental mitigation requirements. The additional cost associated with the Webb Mountain overlook, including the access road, is estimated to be $8.5 million.

Describing the cost effectiveness of this project is difficult in that it is not subject to the typical cost/benefit analysis as the "need" is not based on accommodating a projected traffic volume. Rather, the Parkway is an extension of Great Smoky Mountains National Park and the primary "need" is the desire to provide a quality visitor experience. In fact, a volume of traffic high enough to provide a positive cost/benefit ratio may be counterproductive to a positive visitor experience. It can be said that the cost of construction of this section is moderate in comparison to other build options and alternate usage scenarios.

Traffic Analysis

Traffic analysis (Chapter 3) indicates a projected volume of 4,400 vpd in Year 2030. This is a substantial yet manageable traffic volume, which should not be detrimental to the visitor experience.

Analysis also indicates that the availability of this roadway will have a positive effect on the regional roadway network. Specifically, projected Year 2030 traffic on the section of U.S. 321

between Cosby and Pittman Center is 21,600 vpd with the Parkway in place and 23,800 vpd without the Parkway.

Analysis indicates that Section B of the Parkway has no relationship to traffic on existing Park roads in that traffic volume on Park roads will not change as a result of Section B being built or not built.

Viewshed Analysis

As noted in Chapter 2, there are a substantial number of viewsheds associated with Section B. A total of 22 viewsheds with a total quality value of 85.37 were found to be available. This total is substantially greater than either of the other two incomplete sections. All viewsheds within Section B include the Park as well as acreage outside the Park. If only Park views are considered, the quality value is slightly higher, 86.89.

Gateway Area Impact

As noted, inclusion of Section B in the regional transportation network will reduce projected traffic growth on the parallel section of U.S. 321. In fact, if the Parkway were in place today it might forestall the widening of U.S. 321 to a multilane facility. However, given that the Parkway will not be complete in the near future and is not intended to carry high volumes of traffic, the need to provide additional corridor capacity will persist.

The northeastern terminus of the Parkway including Section A and a portion of Section B is located within Cocke County. Officials there are very supportive of completing Section B and the balance of the Parkway, citing the potential for economic development associated with increased tourism and better connectivity to the region.

The Town of Pittman Center has expressed concern about the impact of the S.R. 416 interchange with respect to additional traffic on roadways within the Town and also on the cultural resources of the Emerts Cove area. As a result, the Town has offered two recommendations for consideration. First is that the Parkway alignment be revised to allow an interchange with U.S. 321 rather than S.R. 416; this was considered as an option in the ORNL environmental review.

More recently, the Town has suggested that the Parkway be combined with U.S. 321 using the existing U.S. 321 alignment but that it retain the access control aspect of the Parkway. This would have the effect of eliminating construction within the Parkway right-of-way, but would require reconstruction of U.S. 321 as a 4-lane facility. The Town is concerned about the potential commercialization of the U.S. 321 corridor and believes that its transformation to an access controlled Parkway will minimize future development. For the purpose of this report, this proposal is referred to as "Section B Alternate" and is reviewed in detail in the following report section.

Level of Visitor Experience/ Relationship to Mandate

The level of visitor experience afforded by Section B is considered very good. The viewshed value is 86.89 Park

only/85.37 total, substantially greater than the other studied sections, and the projected 4,400 vpd traffic volume is not considered a detriment to visitor experience. Construction of Section B is clearly consistent with the Congressional mandate and does much to achieve its stated goals.

4.1.2 Build Section B Alternate Roadway

Description

This alternate as proposed by the Town of Pittman Center and several individuals at the public meetings would eliminate construction within the existing right-of-way of the Foothills Parkway. Rather, it would co-designate the existing parallel section of U.S. 321 as "Foothills Parkway", and the existing roadway would be reconstructed/ enhanced with Parkway features including access control. Detailed analysis and functional planning has not been undertaken for this alternate, however, the following considerations are pertinent:

- Analysis indicates Year 2030 traffic volume in the corridor of in excess of 20,000 vpd. This suggests the need for a multi-lane facility, which is inconsistent with the *Foothills Parkway Master Plan.*
- Being currently designated as a U.S. highway, commercial traffic is permitted. This is inconsistent with a "Parkway" designation, so that the regulation would either have to be waived or commercial traffic prohibited on the route.
- Access control of the Parkway carries with it the need to purchase access rights from all adjacent properties and typically to provide an alternate form of access to them. This is commonly done with parallel frontage roads and outlets via crossroads.
- Co-designation would likely suggest a higher design speed for the "Parkway" and certainly a wider roadway template to accommodate the multiple lanes and frontage roads.

Environmental Impact

No studies are available or have been undertaken to review this matter.

Cost Estimate/Cost Effectiveness

The cost of this option is expected to be substantially higher than construction of Section B as currently planned given the substantially wider roadway template and the significant right-of-way cost including payment for loss of access. The cost is roughly estimated at $10M per mile.

The cost effectiveness of Section B Alternate is obviously not as good as the currently proposed Section B.

Traffic Issues

As previously noted, the projected Year 2030 traffic volume for U.S. 321 without Section B of the Parkway is 23,800 vpd. Extreme operational and safety problems will result unless the roadway is widened and upgraded to accommodate the heavy volume. As is the case with Section B, Section B Alternate has no traffic related relationship to existing Park roads.

Viewshed Analysis
Existing U.S. 321 is located in a valley between Webb Mountain and the uplands within the Park boundary. Consequently, a parkway in this location will not have many viewsheds. Four viewsheds were identified along existing U.S. 321, and they provided a viewshed score of 17.14. Two of these viewsheds were into the Park, and they yielded a score of 7.92. These scores are compared to 85.37 (total) and 86.89 (Park only) for the currently proposed Section B.

Gateway Area Impact
The stated objective of proponents of Section B Alternate is to minimize impact on the Gateway area. The Town of Pittman Center is concerned that construction of the Parkway will encourage development within the Town that is inconsistent with its goals. The Town's expectation is that construction of Section B Alternate will minimize that possibility. Cocke County officials, while preferring Section B, have indicated a willingness to accept Section B Alternate, feeling that it addresses their goal of improved economic development opportunity through better connectivity and increased tourism.

Level of Visitor Experience/ Relationship to Mandate
The visitor experience afforded by Section B Alternate is poor:

- Viewshed analysis indicates a score of 7.92 Park only/17.14 total.
- Traffic analysis indicates a daily traffic volume which requires a multilane, high-speed roadway.

These attributes are inconsistent with the goals of the Congressional mandate.

4.1.3 Build Section C Roadway

Description
Section C is 9.6 miles in length, extending from an interchange in the U.S. 321/S.R. 416 area of Pittman Center to the "Spur" which connects the Parkway to Pigeon Forge and Gatlinburg. It traverses less difficult terrain than the other sections.

Under this option, Sections B and D would not be built. Consequently, the Parkway would consist of three disjointed sections: Section A (5.6 miles) at Cosby, Sections E,F and G (33 miles) connecting U.S. 321 at Wears Valley to U.S. 129 in Blount County, and Section C (9.6 miles). In fact, Section C could function independently as a "bypass" of Gatlinburg's center city given its termini at the Spur and in Pittman Center.

Environmental Impact
No formal environmental review has previously been conducted on Section C. Recent discussions with National Park Service, TDEC and USACOE staff, however, provide a basic knowledge of the area from an environmental perspective and resulted in the following general observations.

- This area is more "built-up" than the other sections. A considerable amount of permanent and visitor housing is located along this section of the corridor.
- There are numerous stream crossings but no compliance studies or records are available.
- As is the case with Section B, runoff from a portion of the Section C will

reach the Little Pigeon River, a "National Resource Water."
- The topography of Section C is similar to the other sections although the terrain is not as steep.
- There may be fewer threatened and endangered species than in other sections given the more "urban" character.
- Impact on cultural resources can be anticipated.

Cost Estimate/Cost Effectiveness

The estimated construction cost of Section C is $5M per mile. Though challenging, this cost per mile is indicative of construction in somewhat better terrain. It should be noted that this cost estimate does not include the interchanges at either end of the section, as these are included in the cost of adjacent sections. Consideration of Section C construction as a stand-alone facility, however, must include appropriate interchange access to S.R. 416/U.S. 321 and the Spur. The estimated construction cost of these interchanges based on current design concepts is $500,000 and $7M respectively.

Traffic Analysis

Constructing Section C irrespective of Sections B or D is rational, since it connects with the existing regional roadway network on both ends, essentially serving as a northeasterly bypass around Gatlinburg much like the existing southwesterly bypass that provides access to the Park from the Spur and was a part of the *Foothills Parkway Master Plan*.

Analysis indicates that Section C, if constructed without B or D, would carry a projected 7,600 vpd in Year 2030. This is a moderate traffic volume in comparison to the roadway capacity but high enough to cause a detrimental effect on recreational visitor experience.

Traffic analysis also indicates a positive effect on the existing regional roadway network. Under this option, the traffic volume on the Spur between the Parkway and Gatlinburg and on the section of U.S. 321 east of downtown Gatlinburg is projected to be 1,500 vpd less in Year 2030 if Section C is constructed. Construction of Section C appears to have no effect on existing Park roads other than the Spur.

Viewshed Analysis

As noted in Chapter 2, there are a total of 10 viewsheds associated with Section C. Seven of these 10 viewsheds include the Park and provide a viewshed quality score of 24.41. Three additional viewsheds of non-Park lands are also available, and when taken into account, provide a total viewshed quality score of 35.40.

Gateway Area Impact

As noted, Section C will serve as a northeasterly bypass around the central city area of Gatlinburg. The Parkway will serve to reduce traffic on both the Spur and U.S. 321 east of downtown. It will provide an alternate route for both local and visitor traffic destined for east Gatlinburg, Pittman Center and points east of Gatlinburg on U.S. 321. Section C terminates at S.R. 416 in the Town of Pittman Center. Should Section C be constructed without Section B, through traffic will impact

S.R. 416 and the Town.

Level of Visitor Experience/ Relationship to Mandate

The viewshed score for Section C, 24.41 Park/ 35.40 total, is considered good but certainly not as good as Section B. This section also traverses a built-up area of Gatlinburg, and several of the viewsheds include a relatively high density of structures (see Table 2) within their boundaries.

Traffic volume is estimated at 7,600 vpd in Year 2030. As noted in Chapter 3, traffic volume in excess of 4,500 is considered increasingly problematic in terms of its effect on visitor experience. Consequently, the projected traffic volume will clearly have a detrimental effect on visitor experience during peak season and on peak days throughout the year.

Construction of Section C is consistent with the Congressional mandate and does much to achieve its stated goals.

4.1.4 Build Section D Roadway

Description

Section D is 9.8 miles in length, extending from an interchange with the Spur which connects the Parkway to Pigeon Forge and Gatlinburg to U.S. 321 in Wears Valley. It traverses the most difficult terrain of the three remaining sections. It follows the steep northerly slope of Cove Mountain for several miles before extending through the ridge in a 1,000 ft. long tunnel near the Spur.

Section D also provides access to Wear Cove, proposed to be the most extensively developed recreation area along the Parkway. Proposed visitor facilities include a staffed orientation station, campground, picnic areas and an amphitheater. Wear Cove also provides direct access to Metcalf Bottoms and the Park.

Under this option, Sections B and C would not be built. Consequently, the Parkway would consist of two sections; Section A (5.6 miles) at Cosby, and Sections D, E, F and G (42.8 miles) connecting the Spur (U.S. 441) to U.S. 129 in Blount County. Combined with Sections E and F, Section D also provides a 25.9-mile direct link from the heart of Sevier County to U.S. 321 in the Walland area of Blount County and thereby with easy access to the regional airport and to Interstate Highways 40 and 75 in the west Knox County/ northeast Loudon County area.

Environmental Impact

Section D presents the greatest known environmental challenges of the three remaining sections. The previously described draft *Final Environmental Impact Statement* and more recent interviews with National Park Service staff and environmental regulators provide the following concerns:

- The alignment crosses the West Prong of the Little Pigeon River at the Spur;
- The roadway may aggravate existing stormwater runoff problems in the Gnatty Branch and Kings Ridge areas;
- Extreme cuts and fills are required;
- There are several caves and

sinkholes located within the right-of-way;
- The caves provide habitat for plant and animal life;
- There is potential impact on cultural resources although no properties within the corridor are listed on the National Register of Historic Places; and
- Twenty-five acres of wetlands near Cove Creek are potentially affected.

Environmental regulators note that the approval process will be especially challenging given the above concerns and that extensive mitigation efforts will be required. It is their collective opinion, however, that required construction permits can be granted based on current knowledge.

Cost Estimate/Cost Effectiveness

The estimated cost of Section D is $10M per mile including the Spur interchange and the tunnel. This represents the highest per mile cost, however, this section is projected to carry the highest ADT of the remaining sections by a wide margin. Development of the proposed Wear Cove recreation area which is accessed from Section D is not included in the above cost estimate.

Traffic Analysis

Constructing Section D exclusive of Sections B or C is rational since it connects with the regional transportation network at both termini and via Sections E and F forms a very important link to Blount County. Given these connections, the Year 2030 traffic volume is projected to be 10,300 vpd, a traffic volume which approaches the capacity of this 2-lane roadway and which is clearly a detriment to visitor experience.

Analysis indicates that construction of Section D has a positive effect on the regional transportation network. The projected traffic volume on the section of U.S. 321 between Wears Valley and Pigeon Forge is 17,100 vpd with Section D in place and 18,100 vpd without Section D. In addition, analysis indicates that Section D will reduce the volume of traffic on Little River Road, an existing Park road, by 6,100 vpd in Year 2030. The projected 3,700 vpd for Year 2030 is actually less than the existing volume on this roadway.

Viewshed Analysis

Section D rises from the floor of Wears Valley and then extends along the steep northerly slope of Cove Mountain for several miles, thus providing panoramic views of Wears Valley and points north but no views into the Park until it exits the tunnel near the Spur. Though these views to the north are picturesque, they do not include the Park and therefore are not considered as meeting the letter of the Congressional mandate.

As noted in Figures 2, 3 and 6 in Chapter 2, Section D provides a significant number of viewsheds. A total of 11 viewsheds were identified and the total viewshed quality score was 39.90. There are three viewsheds east of the tunnel that include the Park, and the viewshed quality value specifically associated with the Park is 11.71.

Gateway Area Impact

Section D in combination with Sections E and F provides a very positive impact

on the Gateway area of Sevier and Blount Counties but is of little value to Cocke County. As noted, inclusion of Section D in the regional transportation network will reduce projected traffic growth on the parallel section of U.S. 321.

One of the primary transportation-related recommendations of a recent visioning process conducted by the Gatlinburg Gateway Foundation was the need for a more direct route from Gatlinburg to the regional airport in Blount County. If constructed, this section of the Foothills Parkway in conjunction with currently proposed improvements to the regional network in Blount County would serve that need.

The Blount County/Walland/Townsend approach to the Park is becoming increasingly important as the S.R. 66/U.S. 441 corridor becomes more congested. Townsend, which bills itself as the "Quiet Side of the Smokies," desires that the Foothills Parkway corridor be in place to accept part of the visitor traffic. Officials there view the Section F/E/D approach to Sevier County as the best means of insulating that area from visitors who do not have a Townsend or Cades Cove destination.

Level of Visitor Experience/ Relationship to Mandate

Analysis indicates a viewshed quality score of 11.71 specifically associated with the Park. This score increases to 39.90 when enhanced by vistas to the north. When combined with Sections E, F, G and H, a 42.8-mile section of the Parkway is made available. Since the eastern terminus is on the Spur between Pigeon Forge and Gatlinburg, the Parkway becomes convenient and easily accessible to the primary visitor population.

Unfortunately, this easy accessibility coupled with location and multiple connections to the regional roadway network results in a projected traffic volume that clearly will be a detriment to quality visitor experience during peak seasons and peak days throughout the year. It may become necessary to implement traffic management techniques to minimize negative impact on visitor experience.

Construction of Section D is consistent with the Congressional mandate in several respects. It affords the visitor opportunities to view the Park as well as providing access to the large Wears Cove recreation complex. Through Wears Cove, direct access to Metcalf Bottoms and the Park is also available. In addition, Section D, coupled with other completed sections to the southwest, will reduce traffic congestion on several sections of the regional transportation network as well as on Little River Road within the Park.

4.1.5 Full Build Roadway

Description

Under this option all three remaining sections, Sections B, C and D, would be constructed. Coupled with previously completed Sections A, G and H and Sections E and F where construction is now in progress, the full 72.1-mile Foothills Parkway would be completed in accordance with the 1944 mandate and the 1968 *Foothills Parkway Master*

Plan. As described in the *Plan*, the Foothills Parkway would parallel the northerly Great Smoky Mountains National Park boundary, extending from I-40 near Cosby in Cocke County, through Sevier County to a terminus at U.S. 129 in the Chilhowee area of Blount County. The Parkway would include seven interchanges, thus providing excellent connections to the regional transportation network while restricting secondary access to preserve the integrity of the Parkway setting. As envisioned by the *Plan*, several recreation areas would also be developed within the right-of-way to further enhance the visitor experience.

Environmental Impact

The proposed Parkway is located in a mountainous area that is known for its diverse natural resources and rich cultural heritage. Developing a roadway in this area presents significant challenges in both physical construction and mitigation of environmental impacts.

These challenges are detailed section by section in the above paragraphs and consequently will not be further discussed here. Based on current information, environmental regulators advise that given close adherence to proper procedures and implementation of strict construction practices and mitigation requirements, permits can be obtained and construction allowed.

Substantial environmental impact assessment remains, so it is still a possibility that conditions may be determined in the future that will render one or more sections impractical to construct.

Cost Estimate/Cost Effectiveness

The total estimated cost of completing Sections B, C and D in accordance with the 1968 *Foothills Parkway Master Plan* is approximately $7.5M per mile. This cost does not include development of visitor recreation areas at Webb Mountain or Wear Cove.

As previously noted, describing the cost effectiveness of this project is difficult in that it is not subject to the typical cost/benefit analysis as justification is not based on accommodating a projected traffic volume. Rather, the Parkway is an extension of Great Smoky Mountains National Park and the primary “need” is the desire to provide a quality visitor experience. In fact, a volume of traffic high enough to provide a positive cost/benefit ratio may be counterproductive to a positive visitor experience.

Traffic Analysis

A detailed traffic analysis of the completed parkway is provided in Chapter 3. Key points include:

- Projected Year 2030 summer weekday traffic volumes on the completed Parkway vary from 4,400 on Section B to 9,500 on Section C to 10,300 on Section D.
- The Parkway will have a significant impact on the regional transportation network, (Chapter 3, Figure 15). It is anticipated that the Parkway will absorb part of the growth in visitor and local traffic, thus lessening the impact on the existing network.
- Sections D, E and F in combination will substantially reduce traffic on Little River Road within the Park.

Viewshed Analysis

A total of 31 viewsheds with a composite quality score of 123.01 specifically associated with the Park were identified along the corridor. When enhanced by non-Park viewsheds, the total increases to 43 and the quality score to 160.67. Chapter 2 provides a more detailed discussion of this subject.

Gateway Area Impact

The impact of Foothills Parkway on the surrounding Gateway area has been described for the individual Sections B, C and D. The "Full Build" option cumulatively incorporates those impacts. In general, the Parkway is expected to have a positive effect on traffic operations of parallel facilities inside and outside the Park.

Townsend, Pigeon Forge and Gatlinburg will all benefit from reduced traffic as the Parkway will provide a more direct route to destinations, thus eliminating the need for circuitous trips through one or more of the cities.

Residents and officials of the Town of Pittman Center, although somewhat supportive of Parkway construction have expressed reservations about potential negative impacts on this community. In particular, there is concern that the Parkway will bring pressure for more intense commercial development, especially along the parallel U.S. 321 corridor. However, it should be realized that with or without the Parkway, commercial development will continue unless local government acts to restrict development through stricter zoning regulations or other land use control measures. An alternate proposal of the Town to designate and improve U.S. 321 itself as the Parkway does not seem to meet the goals of the mandate.

Cocke County officials strongly support completion of the Parkway, especially Section B. They expect a very positive impact in the form of economic development opportunities generated by increases in tourism and improved connectivity to the regional transportation system

Level of Visitor Experience/ Relationship to Mandate

The viewshed analysis described in Chapter 2 indicates that each of the remaining three sections provides views of the Park; a total of 31 viewsheds were identified along the Section B/C/D corridor. These sections of the Parkway also provide 12 non-Park viewsheds. The composite viewshed quality score is 123.01 Park/160.67 total for this composite section. Given that there are a substantial number of quality views of the Park throughout its length, the mandate of providing a facility with views of the Park is met by the Parkway at its proposed location throughout its length, section by section.

The analysis documented in Chapter 3 projects Year 2030 traffic flow on a completed Parkway in the range of 4,400 vpd on Section B on a typical summer day to 9,500 on Section C and 10,300 on Section D. Chapter 3 also notes that volumes exceeding approximately 4,500 vpd have an increasingly detrimental effect on visitor experience. Consequently, it may be necessary to institute some form of traffic management for the Parkway

during higher traffic periods of the year in order to provide a good experience for Parkway users.

4.1.6 Other Roadway Build Options

Since the three remaining sections of the Parkway can be constructed and function independent of the others, there are three additional build options. These are:

- Build Sections B and C but not D;
- Build Sections B and D but not C; or
- Build Sections C and D but not B.

The impacts and effects of these options are readily apparent from the information provided above and therefore will not be further detailed.

4.1.7 Provide Exclusive Mass Transit

Description

There is an array of available and proven technologies that could provide scenic experiences of Great Smoky Mountains for visitors along the Foothills Parkway right-of-way in Sections B, C and D. The alternatives discussed are identical in route length, number of visitor stops and stations and the location of required auxiliary parking areas. The difference among alternatives is in the type of mass transit technology that would be employed. These alternatives include:

- Motorized trams;
- Motor buses;
- Scenic railway;
- Light rail transit (LRT); and
- Monorail.

Under all alternatives, the Parkway would be closed to general traffic and transit usage would be mandatory. Motorized trams and buses would require the construction of a suitable roadway surface within the Parkway right-of-way. A scenic railway or LRT system would require preparation of the right-of-way for construction of track and bridges necessary to support surface operation of standard or narrow gauge trains and light rail vehicles. An elevated monorail would require the construction of a new guideway system. The LRT and monorail systems would require construction of an electrical power supply system for the guideways including substation buildings as well as overhead catenary wires and support poles for the LRT system. LRT and monorail systems would also require a service roadway for maintenance.

Auxiliary parking areas would be required at appropriate locations along the right-of-way and/or in the Gateway communities.

Environmental Impact

The environmental impact associated with implementation of any of these alternate modes is similar to the roadway construction options previously discussed. The motorized tram or bus option requires construction of essentially the same roadway as previously described, thus causing the same impacts. A scenic railway (traditional steel-wheeled trains) requires flatter grades than for a roadway, hence cuts and fills would be greater and environmental impact

likewise. LRT and monorail requires service roadways in addition to the guideways and involve more visual impact from overhead facilities.

Cost Estimate/Cost Effectiveness

Motorized trams or buses require a roadway of essentially the same design as previously described, so that the infrastructure cost is similar, however additional costs are involved in purchasing, operating and maintaining a transit fleet. It is difficult to justify the roadway construction expense with a transit only restriction, since a considerable percentage of visitors who might otherwise travel along the Parkway would not be expected to do so if required to use mass transit.

Given the terrain, more stringent vertical and horizontal alignment standards, and the need for ancillary facilities, the cost of the rail options are projected to be in the order of magnitude of $35M per mile. The cost effectiveness is extremely questionable, since it is in the range of three to five times the cost of the roadway option.

The monorail system of transportation technology consists of vehicles supported and guided by a single guideway (rail or beam), usually elevated. There are two basic types. In a supported monorail, vehicles straddle the beam or are laterally supported by it. In a suspended monorail, vehicles hang directly below the guideway. Hanging systems can be either symmetrically suspended or asymmetrically suspended when supports are to one side of the beam.

Table 7, which follows, provides basic information about monorail systems currently in use in the United States.

USA Monorail Systems
Characteristics and Capital Costs

System	Year	Length (miles - km)	Stations	Daily Riders	Capital Cost ($ millions)	Cost per Mile ($ millions)
Disneyland	1959	2.0 mi – 4.00 km	2	Unk	NA	NA
Seattle	1964	0.9 mi – 1.40 km	2	9,500	NA	NA
Walt Disney World	1976	10.3 mi – 16.5 km	6	110,000	NA	NA
Newark Airport	1996	1.9 mi – 3.04 km	7	38,000	$ 354.0	$ 186.32
MGM/Bally's	1996	0.7 mi – 1.20 km	2	18,000	$ 25.0	$ 35.71
Jacksonville	1997	2.5 mi – 4.00 km	9	3,000	$ 184.0	$ 73.60
Mandalay Bay Tram	1999	0.5 mi – 0.84 km	2	15,000	$ 20.0	$ 40.00
Las Vegas	2004	3.8 mi – 6.08 km	7	≈54,000	$ 350.0	$ 92.11

Source: ASCE 8th Annual Automated People Conference and Wilbur Smith Associates.

Table 7. Monorail Systems Size and Location

Of note is that all these systems are rather short and operate in urban or recreational environments. Also, capital costs are extremely high in comparison to standard rail construction and several times higher than roadway construction. Cost considerations suggest that monorail is not a practical alternative in this corridor.

Traffic Analysis

These alternative transportation modes have essentially unlimited ability to accommodate visitors within this corridor. Should public transit be abailable on the Parkway, it seems likely that Year 2030 traffic on the regional transportation network and the Park roads would be somewhat less than that projected without Foothills Parkway construction (Chapter 3, Figure 15).

Viewshed Analysis

The number and quality of viewsheds available to the visitor via these alternative transportation modes is consistent with that available through roadway construction. The exception is traditional steel-wheeled rail which must operate on a very flat slope. Achieving these flat slopes would likely restrict several of the viewsheds.

Gateway Area Impact

The positive effects of Parkway construction on the regional roadway network and within the Gateway communities will likely not be realized if the Parkway right-of-way is utilized for an alternative transportation mode. In addition, parking facilities would be needed at appropriate locations.

Level of Visitor Experience/ Relationship to Mandate

The level of visitor experience provided by these alternative transportation modes (with the possible exception of traditional rail) should be excellent. The number and quality of views of the Park should be consistent with that previously described for each roadway section, and the visitor will experience no driving distractions due to congested traffic. The mandate requirements are likewise effectively met, however the associated goals relative to improved traffic operations will likely not be achieved.

4.1.8 Trails

Description

The Foothills Parkway right-of-way could accommodate non-motorized trails for hiking and biking if the roadway is not constructed in one or more sections. These trails could follow the lay of the land in similar fashion to existing trails within the Park; however, they would be very steep at many locations. Although the Americans with Disabilities Act's (ADA) standards have not been formalized, AASHTO standards and other best practice designs can be followed. Given the mountainous terrain, the practicality of meeting ADA standards is uncertain.

Environmental Impact

Intuitively, construction and operation of trails should cause little impact to the environment. Areas of special concern could be avoided given the very wide right-of-way available for trail construction. It should be noted,

however, that trail development would be subject to the NEPA requirements and appropriate environmental review and documentation must precede construction. Construction to current ADA requirements for pedestrian facilities could substantially increase impact on the environment, however, as extreme measures might be required in some areas to meet maximum permissible grade.

Cost Estimate/Cost Effectiveness
The cost of trail construction is typically modest in comparison to other transportation facilities, however ADA requirements offer the potential for substantial cost escalation.

Traffic Analysis
This option involves no vehicular traffic considerations for the Parkway itself. Further, the effect of this option on the regional roadway network and Park roads is negligible.

Viewshed Analysis
The previously described analysis was conducted under the assumption that the viewers eye level would be a few feet above the proposed roadway elevation. This analysis is not fully applicable to trails as different horizontal and vertical geometrics would be utilized, thus requiring a new review of viewsheds for the chosen alignment.

Gateway Area Impact
Negligible impact, positive or negative, is anticipated. It will be necessary, however, to provide parking either in close proximity to the trails or at other locations within the Gateway area with shuttle service being provided to the trail(s).

Level of Visitor Experience/ Relationship to Mandate
A primary concern of this option is the relatively low number of visitors expected to take advantage of the opportunity to view the Park. Only those with good physical ability could be accommodated even if ADA design standards are fully achieved, and for those, a lesser number of viewsheds will be available than with other options.

Neither the spirit nor letter of the mandate is achieved by this option. The facility will not by definition be considered a “parkway.” Further, the viewsheds will be less in number and available to only a small percentage of the visitor population.

4.1.9 No Build

Description
With this option, no further construction would be undertaken. Sections B, C and D would be abandoned. The disposition of the right-of-way is not clear, as it was purchased by the State of Tennessee and conveyed to the Federal Government under a contract binding the Federal Government to build the Parkway.

Environmental Impact
If the right-of-way remains under National Park Service control, environmentally sensitive areas that would be impacted by construction would remain undisturbed.

Cost Estimate/Cost Effectiveness
There is essentially no cost associated with the no build option.

Traffic Analysis
No modifications of otherwise prevalent

traffic flow will result from this option. As a result, there will be no benefit to either the regional or Park roadway network.

Viewshed Analysis
This option would eliminate the opportunity of the visitor to view the Park from the vantage points provided by the Parkway.

Gateway Area Impact
The no build alternative offers no additional benefit to the Gateway area beyond minimizing impact on environmentally sensitive areas. The attraction of potential viewsheds cannot be made available to the visitor and related to this, potential economic development from extended visits will be lost.

Experience/ Relationship to Mandate
The no build option ignores the mandate and provides no visitor experience beyond that provided by the currently completed sections.

4.2 Operation and Maintenance Costs

The continuing cost of operations and maintenance must also be considered as a part of the decision making process. Included in this category are costs associated with maintenance of the pavement surface, the drainage system, and traffic signs and markings. Also included is the cost of ranger patrols, roadside mowing, litter pickup and exotic plant control.

Based on an analysis conducted by an interdisciplinary team of National Park Service and Federal Highway Administration personnel in 1998 (see Figure 11, *Foothills Parkway – A Technical Paper for Future Strategies*, 1998), the estimated annual cost of operation and maintenance associated with each of the roadway construction alternatives is as follows:

Section	Est. Annual O&M Costs (cost/mile)	Est. Annual O&M Costs (thousands)
B	**$** 6,100	$ 86
B alternate	24,000	338
C	6,700	64
D	17,300	170
Full Build (B, C, D)	9,500	320
No Build	0	0

These estimated 2001 costs were derived by increasing the 1998 estimates by a 4% annual inflation factor. Also, these costs are related only to the roadway environs, and do not include operation and maintenance costs of the associated recreation areas.

The annual operation and maintenance costs associated with transportation system options other than roadway alternatives cannot be measured simply as a cost per mile. The unit of measure is typically expressed as a cost per vehicle mile or train mile. Costs per vehicle mile in the following table are derived from the National Transit Database.

Alternate	O&M Costs (cost per vehicle mile)
Motorized Trams or Buses	**$** 8.00
Conventional Rail	10.00
Light Rail Transit (LRT)	12.50
Monorail	17.50

The annual cost is derived by multiplying the unit cost by the numbers of vehicle or train miles operated during a year. To provide some basis for comparison, the estimated annual operating and maintenance cost for providing alternative transportation the full length of the sections B, C, and D is shown in the table below. These estimates are based on one vehicle trip per hour over a ten-hour day for 300 days per year.

These costs may be compared to the operation and maintenance cost of the "full build" option ($320,000).

Alternate	O&M Costs B, C, and D (millions)
Motorized Trams or Buses	**$** 1.5 – 2.5
Conventional Rail	2.0 - 3.0
Light Rail Transit (LRT)	2.5 – 3.5
Monorail	3.5 – 4.5

It is apparent that the operation and maintenance costs associated with alternative transportation systems far exceed that for roadways. This is due in large measure to costs associated with vehicle ownership and operation (fuel, maintenance, etc.) and with labor (drivers, mechanics, and so forth).

Chapter 5: Public Participation

Historically, the opportunities for formal public input into the planning process for the Foothills Parkway have been relatively limited. Public meetings have been held as a part of the environmental assessment work on Sections B and D, but little opportunity has been otherwise provided.

Holistic planning regarding the Parkway location, basic design parameters and associated amenities was primarily accomplished between passage of the Congressional mandate in 1944 and publication of the *Foothills Parkway Master Plan* in 1968, although the Foothills Parkway was reconfirmed as an element of the 1982 *General Management Plan, Great Smoky Mountains National Park*. Public input was not considered a significant element of planning during that period, planning and design being considered a more pure governmental function. Further, more than three decades have passed since this more holistic planning was accomplished, giving additional emphasis to the need for gauging public sentiment as a part of the reevaluation process.

As a result, this planning effort placed substantial emphasis on obtaining input from Gateway area governmental leaders, stakeholders and the general public.

5.1 Public Input Plan

The public involvement element of the Foothills Parkway Analysis developed from the Regional Transportation Alternatives Plan (RTAP) process, which included a ten county area. The Foothills Parkway Analysis concentrated on the three counties through which the Foothills Parkway passes: Cocke, Sevier and Blount. Interviews with governmental leaders and stakeholders in those counties dealt in part with the Foothills Parkway, and public comment was sought independent of RTAP. Primary plan elements include:

- Identifying individual and organizational stakeholders;
- Conducting interviews with local government leaders in the three counties;
- Conducting interviews with other stakeholders;
- Conducting three Public Scoping Meetings;
- Conducting three additional public meetings to report the study results; and
- Documenting comments through comment cards, on-site recording with a court reporter and accepting

electronic and regular mail responses.

5.2 Public Input Process

A total of eighteen interviews were conducted with individual and organizational stakeholders including local government officials. These interviews included:

- Cocke County Executive;
- Sevier County Executive;
- Blount County Executive;
- Mayor of Newport;
- Mayor of Pittman Center;
- City Manager of Gatlinburg;
- Mayor of Pigeon Forge;
- City Manager of Pigeon Forge;
- Mayor and City Planner of Sevierville;
- City Manager of Sevierville;
- Mayor and Vice Mayor of Townsend;
- City Manager of Alcoa;
- Executive Director, Sevier County Economic Development Council;
- President, Gatlinburg Gateway Foundation (GGF);
- General Manager, Dollywood Theme Park;
- National Parks Conservation Association (NPCA);
- Chairman, Tennessee Park Commission; and
- Vice Chairman, Tennessee Park Commission.

A series of ten public meetings, one per county, associated with the larger RTAP project was held early in the study process. The Foothills Parkway Analysis element and its association with Foothills Parkway was introduced and attendees were advised that separate meetings would be held to gain input on that project element.

Three Public Scoping Meetings were held midway through the planning process, two in Gatlinburg and one in Townsend. Attendees were provided a "fact sheet" on the study. The meeting format consisted of a PowerPoint slide presentation of the project elements followed by a lengthy period for attendees to review a series of four displays: History and Purpose of Study, Traffic Considerations, Visitor Experience and Construction Related Considerations. The review period provided the opportunity for informal, one-on-one information exchanges with the project staff. Opportunities for formal input were provided through a written questionnaire, verbal comments to a court reporter and/or electronic mail to the Park office.

Three additional public meetings were held at the conclusion of the study to inform the public of the study process and findings. These meetings were held in Newport, Gatlinburg and Townsend. Attendees were again provided a fact sheet and a written questionnaire. The meeting format consisted of a PowerPoint slide presentation and a formal question/answer session which was recorded in full by a court reporter. Attendees were asked to complete the questionnaire and were also given the opportunity for communication via electronic or regular mail to the Park office.

Included in the Appendix are copies of the two fact sheets, the two

questionnaires and the two PowerPoint presentation slide sets.

5.3 Public Input Results

The following paragraphs summarize the input from interviews and the two sets of public meetings.

5.3.1 Interviews

Notes from each of the 18 interviews are provided in the Appendix. All elected and appointed local government officials interviewed strongly favored further construction of the Parkway with one exception. Some officials felt more strongly about completing Sections B, E and F than C and D if funding continued to be a problem. The Mayor of Pittman Center did not oppose further construction but is not a strong supporter; he expressed doubt that it would ever be completed but did strongly recommend that Section B be combined with U.S. 321 (herein referred to as Section B Alternate) if it is further pursued. Other government officials of the area directly affected by Section B Alternate expressed a willingness to combine these two roadways as well.

Representatives of Dollywood and the Sevier County Economic Development Council expressed reservations about further construction, citing the high cost for completion, and suggesting that the decision-making process consider other local priorities. The Gatlinburg Gateway Foundation (GGF) representative noted that that organization typically did not of itself "take sides" but rather provided a forum and mechanism for discussion, evaluation and change. He personally expressed concern about the environmental impacts and indicated that the Section B/U.S. 321 combination should be given thorough consideration if Section B is pursued.

The National Parks Conservation Association (NPCA) representatives said that their organization had not yet taken a position on the matter. It was noted that the Park and Parkway areas are nationally significant resources and that further development should be preceded by logical analysis of more detailed information on goals, intended use, preservation of viewsheds, environmental impacts of construction and related concerns. He cautioned against its use as a "commuter route."

The Tennessee Great Smoky Mountains National Park Commission is an official organization of the State of Tennessee which provides liaison to Great Smoky Mountains National Park. The Chairman and Vice Chairman in separate interviews both expressed extremely strong sentiment toward completion of the Parkway. They noted that there is a compelling national interest involved, that they feel the best views of the Park are from the uncompleted sections, that there is a long-standing contract between the State and Federal governments which should be honored, and that there has never been a strong legislative champion for the project. Much of the local sentiment expressed by the public at the public scoping meetings mirrors that of the National Park Commission.

5.3.2 Public Scoping Meetings

A series of three Public Scoping

Meetings was held on 2-3 April 2001. Two meetings were held in Gatlinburg on the 2nd, one during the normal workday and a second that evening. The third meeting was held in Townsend on 3 April 2001. A total of 197 persons attended the three meetings. A total of 109 responses were received including questionnaires turned in at the meeting, e-mails, faxes, letters and comments to the court reporter. Figure 17 summarizes the results.

Of the 109 responses, a total of 60 respondents (55%) favored completing the entire Parkway in a timely manner. An additional 19 respondents (17%) favored completion of Sections E and F but not Sections B, C and D. Twenty-four respondents (22%) did not support additional construction and 6% did not indicate a position. Reasons cited for completing the Parkway included enhancing the visitor experience, relieving traffic congestion inside and outside the Park and an obligation to fulfill the mandate. Reasons cited for stopping further construction included the expense of construction and concern about environmental impact.

Other themes included:

- An overwhelming majority desire options to the personal vehicle in providing the visitor experience. Transportation options such as rail, bus, trolley, hiking, biking and horseback riding were mentioned; realizing that some were dependent on the final build/no-build decision.
- There was strong support for keeping the right-of-way under National Park Service control regardless of whether the Parkway is built.
- The Town of Pittman Center presented a recommendation for an alternate alignment that would combine Section B of the Parkway with U.S. 321. (Note: This proposal, herein referred to as "Section B Alternate", was reviewed as a part of the study).
- Cocke County representatives and residents voiced strong support for completion regardless of the alignment.
- Six respondents at the Townsend meeting discussed an additional Parkway interchange at Carr Creek; the respondents were evenly split for and against the proposal.

Copies of the attendance rosters and written responses are on file at the Park Headquarters.

5.3.3 Final Public Meetings

Three additional public meetings were held to present the conclusions of the study and to again receive public input. A total of 128 persons attended the meetings, which were held on 23 July 2001 in Gatlinburg, 24 July in Newport and 26 July in Townsend.

A total of 56 completed questionnaires were returned. Of the total, 42 respondents (75%) favored completion of the full 72-mile roadway, 13 (23%) were opposed and 1 (2%) was undecided. Table 8 presents a summary of the questions and responses.

Figure 17. Public Scoping Meeting

April 2-3, 2001 in Gatlinburg and Townsend –
197 attendees, 109 responses

- Why build?
  - enhanced visitor experience
  - relieve traffic congestion
  - obligation to mandate

- Why not build?
  - expense
  - environmental impacts

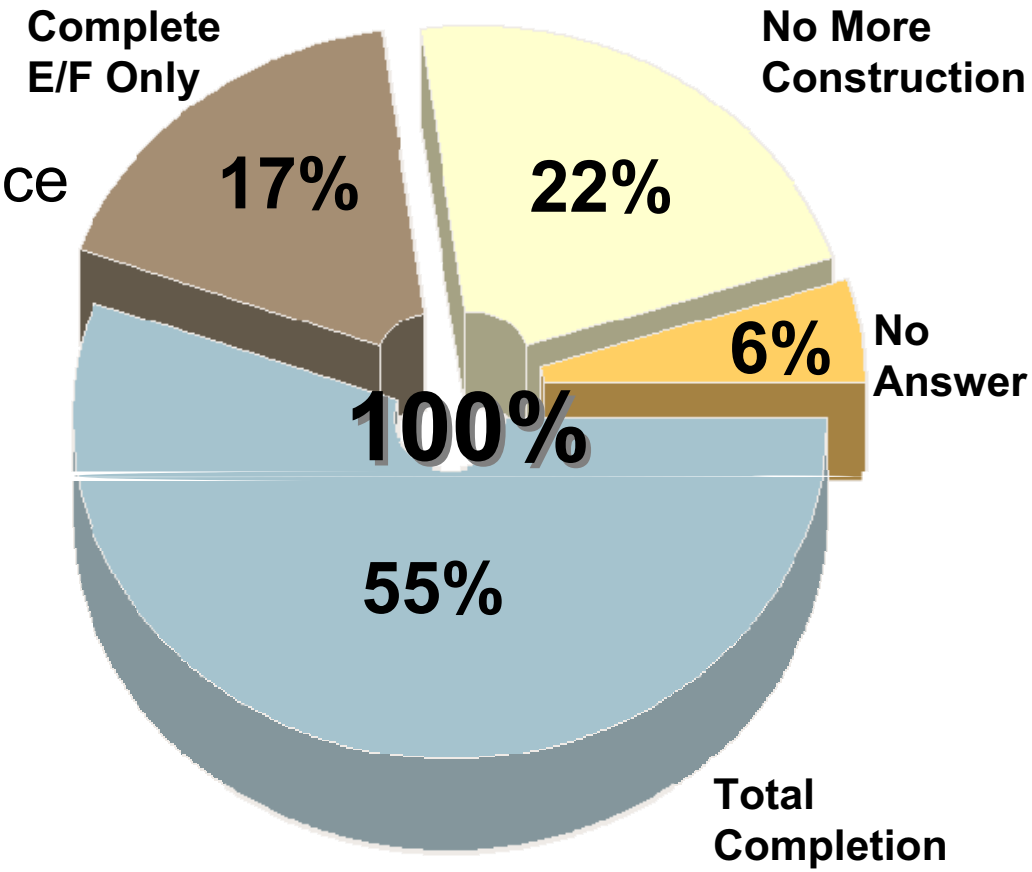


Table 8. Foothills Parkway Public Meeting - July 23-25, 2001

Survey Summary-- 56 completed surveys (as of 8/31) **Total Attendance-- 128**

	Yes	No	Other	Comments
Given current information, do you favor completion of all 72 miles of the Foothills Parkway? Yes No Explain.	42	13	1 - undecided	2 - Qualified yes answers: . 1 - If Pittman Center Proposal w/public transit; 1 - If too expensive don't do Sections B and D 1 - Supports the "Circle-the-Smokies" Scenic Drive concept.
Would you favor partial completion of the remaining sections? Yes No If yes, which sections and why.	17	30	7 - left blank 2 - undecided	1 - Section B as Highway 321 1 - Need comprehensive study of corridor between Gatlinburg and Cosby 4 - In favor of B; 1 - C; 1 - B/C; 1 - E thru H; 1 - E/F; 1 - D/E 2 - Favor partial completion only if entire 72 miles is not going to be constructed. 1 - Sections C and D as monorail - less disruption to soils and vegetation.
Should an alternative form of transportation be considered along with or instead of one or more sections? Yes No Explain.	33	22	1 - unclear	13 - Favor hiking, biking or scenic trails; 8 - rail, bus or trolley; 3 - no rail. 1 - Propone powered buses for subsidized sightseeing. Trails will not do the job. 1 -Hiking and biking trails along with not in place of. 1 -Traffic in the park should be limited not encouraged.
Would you prefer the "No Build" option for Sections B, C and/or D? Yes No Explain.	12	36	5 3 - left blank	3 - Plan similar to Pittman Ctr. Proposal 1 - Buffer for animals 3 - Stated environmental concerns 1 - If sections B, C and D not completed - no relief to Park roads 2 - Too many roads already.
If one or more sections of the Parkway are not constructed, what should be done with the existing ROW?				
1.NPS retain and use for recreation and trails;	36		11	1 - Views would be too spectacular to miss. If going to do it, then do it.
2.NPS retain in an undeveloped state;	8			4 - Checked both 1 and 2
3. Return ROW to state.	1			4 - Return to original owner 2 - Left blank
Do you agree that heavier traffic volume detracts from the visitor experience of viewing the Park? Yes No. If yes, favor limiting traffic during peak times?	32	10	14 - left blank	10 - Agree heavy traffic detracts but against limiting traffic. 1 - Doubt there will ever be that much traffic on the FHP. 2 - Second yes, dependent on method of limitation.
Are home, cabins and other such structures significant detriment to the viewsheds toward the Park? Yes No Explain	21	30	2 - left blank 3 - general comment	1 - Control visual experience through zoning; 1- 321 uncontrolled growth will be as tacky as Highway 66 1 - Commercial development will continue between Gatlinburg and Cosby 2 - Blue Ridge Parkway and Natchez Trace both have areas of residential development. People like to see how "others" live. 1 - TN has no control over mountain top construction. 2 - Degree of density - a few are not objectionable yet a large subdivision would be objectionable. 1 - Need legislation like North Carolina has had since 1980s protecting ridge tops. 1- Government should not try to control private property or an individual's

Additional comments:

1. Need to look at entire transportation corridor between Gatlinburg and Cosby- not at individual projects.
2. Strongly oppose any further construction.
3. Use 321 as Parkway through Section B (Pittman Ctr. Proposal)
4. Completion of entire parkway is the best option.
5. Decisions should be made on long-term benefit to Park and not on preliminary costs.
6. Carr Creek exit a must to preserve Townsend
7. No exit at Carr Creek
8. Hiking, biking trail options are viable alternatives.
9. Impressed with the thoroughness of research and presentation.
10. Excellent opportunity for visitors to experience the Park w/o impacting roads within the Park.
11. Can do anything in an environmentally sound manner. Mountaintop destruction rivals billboard desecration of the natural beauty TN has to present to the world.
12. Need to purchase development rights of mountain ridges.
13. Complete "missing link"; build trails on C and B to preserve; complete E and F; complete B as scenic alternative to 321; complete C then complete D.
14. Don't complete. If anything finish F and use the rest for trails.

There continued to be strong support for the National Park Service to retain the right-of-way of any uncompleted sections and to use it for trails if practical.

Copies of the attendance roster, completed questionnaires and the text of the question/answer session are available at Park Headquarters.

Chapter 6: Summary

In 1944, the United States Congress issued a mandate to construct a "…scenic parkway to provide an appropriate view of Great Smoky Mountains National Park from the Tennessee side of the Park…" At that point in time, the Park had become a major tourist destination imbedded in a very rural setting in eastern Tennessee and western North Carolina. Access to the Park was via a relatively well developed but low capacity roadway network, and circulation within the Park was provided on a few even more problematic roads. Having an apparent vision of the future, Congress issued the stated mandate, which also carried with it the goals of providing improved access and circulation in the area surrounding the Park and reduced traffic congestion within its boundaries.

In the 57 years that have passed since the mandate was issued to construct what later came to be known as the Foothills Parkway, much has been done toward implementation of its requirements, but full completion of the project as outlined in the *Foothills Parkway Master Plan* remains a distant and increasingly elusive goal. In fact, so much has changed in the intervening years that significant questions are being raised as to the continued viability of the intended visitor experience and the extent to which other stated goals can be achieved. There are also concerns about the very substantial development costs and constructability of the remaining sections due to impacts on the environment.

In realization of the passage of time and a radically changed Gateway area, this study was commissioned for the primary purpose of providing an in-depth assessment of the Foothills Parkway corridor in context with the Congressional mandate, the mission of Great Smoky Mountains National Park, the regional transportation network and the Gateway communities in Blount, Cocke and Sevier Counties. This assessment included evaluation of a variety of construction and alternative transportation development strategies in comparison to traffic impacts and environmental impacts, construction cost and visitor experience.

6.1 Year 2001 Conditions

Great Smoky Mountains National Park was established in 1926 for "the benefit and enjoyment of the people." Park visitation has dramatically increased over the years, exceeding 10 million visitors in 2000. Not surprisingly, the once rural Gateway area of Blount, Sevier and Cocke Counties has responded through development of an extensive tourist service infrastructure. This metamorphosis has turned the

farmland of past decades into more than 15,000 motel rooms and overnight rental units, world class entertainment and recreation venues, expansive shopping districts, and a baseball stadium.

The year 2001 will apparently mark the first time that visitor activity in the Gateway area will increase while visitation to the Park will decrease, an indication that the Park and the Gateway area are now more equal partners in attracting visitors to the area. There are two aspects of the Gateway area development which are of concern to further Foothills Parkway development. Realizing that traffic volume has increased dramatically on the regional network, future traffic volume on the Parkway is of concern as it may negatively impact the visitor experience. In addition, continued development of the area between the Parkway and the Park may detract from the quality of the viewsheds, again negatively impacting visitor experience. Although land use in this area appears to be compatible with that envisioned in the *Foothills Parkway Master Plan*, the density of development is of increasing concern.

6.2 Alternative Development Summary

A variety of potential future development scenarios were reviewed as a part of this study. These included several roadway construction options, a no build option, and alternative transportation system options. The results of the evaluation of each option with reference to quality of viewsheds provided, Parkway traffic volume projections, cost, Park road traffic relief and environmental impact is provided in Table 9 and described in the following paragraphs.

No Build Option

"No build" means to take no further construction action on Sections B, C, and D, thus this area of the Parkway right-of-way would remain undeveloped if retained by the National Park Service. As a result, no additional viewsheds would be available to the visitor, there would be no impact on traffic flow inside or outside the Park, and no impact on the environment. There is essentially no cost associated with the No Build option.

Full Build Option

Implementing this plan would include construction of the remaining 33.5 miles of roadway encompassing Sections B, C, and D. With the now pending completion of Sections E and F, the total 72.1-mile Parkway would be open to traffic.

The quality of viewshed score for this alternative (considering only Sections B, C, and D, not the total 72.1 miles) is 123.01 for Park views only and 160.67 for all viewsheds, the highest of the available options. Each individual section contributes to this score. Not surprisingly, this is in keeping with the statement in the *Foothills Parkway Master Plan* that the full Parkway must be completed in order to achieve "…full utilization of the parkway as a nationally significant scenic recreational resource…"

Table 9. Impact Assessment

SCENARIO	Quality of Viewsheds: Park Score	Quality of Viewsheds: Park Rating	Quality of Viewsheds: Total Score	Quality of Viewsheds: Total Rating	Projected Year 2030 Parkway Traffic: Typ. Summer Weekday	Projected Year 2030 Parkway Traffic: Rating	Cost: $ per mile	Cost: Total Annual O&M Cost (thousands)	Cost: Rating	Park Road Traffic Relief: Reduction	Park Road Traffic Relief: Rating	Environmental
No Build	0	-	0	-	0	"	0	0	+	0	-	+
Full Build (33.5 mi.)	123.01	++	160.67	++	4,400 - 10,300	"	$7.5m	$320	"	6,100 (Little River Rd.)	+	-
Build B (14.1 mi.)	86.89	++	85.37	++	4,400	+	$7m	$86	"	0	-	-
Build B Alternate (Pittman Center Proposal)	7.92	-	17.14	-	23,800	-	$10m+	$338	-	0	-	"
Build C (9.6 mi.)	24.41	+	35.4	+	7,800	-	$5m	$64	+	0	-	-
Build D (9.8 mi.)	11.71	+	39.9	+	10,300	-	$10m	$170	-	6,100 (Little River Rd.)	+	-
Build Transit:												
Rail	?		?		n/a	+	$35m+	$2,000 - $3,500	--	n/a	-	-
Monorail	123.01	++	160.67	++	n/a	+	$70m+	$3,500 - $4,500	--	n/a	-	-

++ Very Good
+ Good
" Neutral
- Poor
-- Very Poor

Traffic analysis indicates a Year 2030 volume ranging from 4,400 vpd in Section B to 10,300 vpd in Section D. The Section B volume is consistent with a good visitor experience. The traffic volume on Sections C and D, however, are of concern in this respect. Should these sections be constructed, traffic conditions should be monitored and preparations made for some type of traffic management such as an Intelligent Transportation System (ITS) to control day to day volume to a level appropriate for good visitor experience. Analysis also indicates that completion of full Parkway construction will reduce traffic on Little River Road by an estimated 6,100 vpd in Year 2030. If, however, some type of traffic demand management is implemented on the Parkway, the benefit to Little River Road will likely be affected.

The projected development cost of this option is $7.5M per mile or an approximate total of $251M. This represents the highest construction cost of the roadway build options but is substantially less than rail development in the corridor.

Of the roadway build options, this one causes the greatest impact on the environment as it is cumulative. Based on current knowledge, environmental regulators believe all sections can be permitted and successfully completed, given proper attention to regulatory procedures and mitigation requirements. It is possible, however, that insurmountable environmental problems may come to light should development proceed.

Build Section B Roadway

Section B is 14.1 miles in length, extending from Cosby to Pittman Center. Evaluation indicates that it is the most scenic of the remaining three sections. The sectional preference value for Section B is 86.89 Park/85.37 total, substantially greater than the score of the other sections.

The projected Year 2030 traffic volume on Section B is 4,400 vpd, a level that should not negatively affect the visitor experience. Analysis indicates that Section B will reduce traffic on U.S. 321, but there appears to be no relationship between Section B and traffic on Park roads.

The estimated construction cost of Section B is $7M per mile, not including the Webb Mountain recreation area. This is close to the average construction cost for the total roadway. While environmental impacts could be a challenge, based on current knowledge, this section can be permitted and completed.

Build Section B Alternate Roadway

This option was recommended by the Town of Pittman Center. It proposes to combine Foothills Parkway with U.S. 321 within the Section B corridor and to preserve it with access control to discourage future commercial development. Analysis indicates several concerns with this plan.

Existing U.S. 321 is in a valley and thus provides limited views of the Park. The calculated sectional preference value for Section B Alternate is 7.92 Park/17.14

total as opposed to 86.89 Park/ 85.37 total for the currently planned Section B. In addition, projected Year 2030 traffic is 23,800 vpd, thus requiring a multi-lane, higher design speed roadway. The cost of construction is estimated at $10M per mile, considerably higher than for Section B, due to the wider typical section, the need for frontage roads and the requirement to purchase access control.

For these reasons, Section B Alternate does not appear to be better than or even a close equivalent to the currently planned Section B.

Build Section C Roadway

Section C is 9.6 miles in length, extending from Pittman Center to the Spur. The terrain in this area is not as steep as in other sections, which translates to a lower estimated construction cost of $5M per mile. As previously noted, this cost does not include the cost of the interchange at either end of the section, those costs being included with the adjacent sections.

This section traverses a more developed area partially within the city limits of Gatlinburg, suggesting less impact on the environment; however, no formal environmental assessment has yet been undertaken. The sectional preference value is 24.41 Park/35.40 total, a substantial score although not the equivalent of Section B. Section C offers more and better views of the Park than Section D, but Section D offers a better total viewshed score.

Section C, if built without the adjacent sections, is projected to carry a Year 2030 traffic volume on 7,600 vpd. This traffic volume will likely be a detriment to visitor experience, and consequently, this section of the Parkway should be considered a candidate for traffic management as described above. Section C construction has a positive effect on traffic congestion on adjacent and intersecting network roadways but no definable relationship to roadways within the Park.

Build Section D Roadway

Section D is 9.8 miles in length, extending from the Spur to U.S. 321 in Wears Valley. Due to the steep terrain and geologic features, this section is the most problematic to construct. Construction challenges, due in part to the need for a tunnel, are significant, the $10M per mile cost is high in comparison to other sections, and the environmental impacts are the most severe.

The section provides a rather modest 11.71 viewshed quality score for Park views only but a more substantial total preference value, 39.90, and is projected to carry a Year 2030 traffic volume of 10,300 vpd. Again, traffic management as previously discussed may also be required on this section.

Coupled with Sections E/F, Section D produces the most positive effect on the regional roadway network and also is projected to reduce traffic on Little River Road within the Park by 6,100 vpd in Year 2030.

Build Rail Transit
Under this option, either traditional or light rail would be built in the available right-of-way of the Parkway rather than the currently planned roadway. Given the more rigid design and operational requirements for rail, construction in this corridor is extremely difficult and expensive, estimated at $35M per mile.

There are no advantages of rail construction versus roadway construction relative to environmental impact. Detailed evaluation of viewsheds would require a functional design; excessive cuts associated with the need for flatter slopes, however, suggest that the number and quality of viewsheds would be less than the roadway alternatives.

Build Monorail Transit
With proper design attention to elevations and the minimization of cuts, a monorail transit system in the corridor would provide a superior visitor experience in terms of providing views into the Park. Unfortunately, the cost of construction even in more favorable terrain exceeds $70M per mile. This excessive construction cost renders the option infeasible.

Exclusive Rubber Tired Transit
Chapter 4 provides an evaluation of rubber tired transit as an option to currently proposed roadway construction. This approach does not appear to be feasible or cost effective as an alternate, because a roadway of the same basic construction standards as currently proposed would be required for rubber tired transit operation.

Should the Parkway be completed and opened to general non-commercial traffic, the addition of rubber tired transit as a modal choice is considered to be especially viable. Recent and current Gateway area studies have indicated that transit must become an integral part of the mobility solution, and the Parkway should certainly be included in future planning. In fact, if traffic demand management techniques are implemented, a rubber tired transit system might well meet the need of those who otherwise would be denied access due to traffic densities reaching the specified threshold.

Trails
Trail development is not considered a viable alternative to roadway construction in meeting the 1944 vision. Trail development within the corridor, however, should be seriously considered as Parkway planning continues.

Trail development may take two forms:
- As a co-use with a roadway on currently opened sections and on sections constructed in the future. It is believed that the corridor is wide enough to accommodate both in some fashion.
- As a primary use on any section where roadway construction is not completed.

Considerable research and discussion is currently underway within the National Park Service, the Federal Highway Administration, and other organizations on the relationship of trails, especially bike trails, to roadways in recreational

settings. Future trails planning for Foothills Parkway should be accomplished in light of then current policy.

6.3 Level of Visitor Experience

The level of visitor experience along the Foothills Parkway depends primarily on the number and quality of Park views available to visitors and the traffic density they will encounter as they attempt to enjoy those views. To be successful, the Foothills Parkway must attract visitors, but if too many visitors use it, the congestion will likely detract from the visitor experience.

6.3.1 Visitor Use

Foothills Parkway Sections B, C, and D are all expected to attract a substantial number of visitors. Some will be exclusively commuters traveling from one off-Parkway location to another. Others will have the opposite objective of viewing the Park and enjoying the recreational opportunities provided by the Foothills Parkway. These visitors are making destination trips to the Foothills Parkway. Finally, many will have the dual purpose of using the Foothills Parkway to travel from one off-Parkway location to another and along the way enjoying the Parkway for its views of the Park and its recreational value.

Additional studies will be necessary to better quantify what traffic density will detract from the visitor experience, but an order of magnitude of 10 to 15 vehicles in a half-mile segment of road seems reasonable. This traffic density will most likely occur during summer weekday peak hours when the daily traffic volume is about 4,500 vpd. Section B is expected to attract approximately 4,400 vpd in Year 2030, and this magnitude is not expected to result in a traffic density that will significantly detract from the visitor experience. Sections C and D are expected to attract about 9,500 and 10,300 vpd, respectively, which should result in traffic densities at times that do detract from the visitor experience.

6.3.2 Visitor Experience

Using the procedures discussed in Chapter 2, Viewshed Analysis, a total of 32 locations were identified along the Foothills Parkway where views of the Park are available; an additional 11 locations offer views of the Foothills area but no Park lands. Section B provides 22 viewsheds, all of which include Park lands; Section C provides 10 viewsheds, seven (7) of which include Park lands; and Section D provides 11 viewsheds, three (3) of which include Park lands. Not only are there a significant number of views of the Park, but the views are generally of high quality as evidenced by good viewshed preference values. As noted, some viewsheds, though picturesque, do not include the Park and therefore do not technically meet the mandate requirement, thus separate analysis and scores are provided.

For each viewshed designation within each Foothills Parkway section, all of the viewshed preference values were averaged, and then those values were aggregated into section viewshed scores. The sectional preference values for Section B are substantially greater than for Sections C and D. These two

latter sections provide fewer views of the Park and slightly lower viewshed preference values than Section B. In summary, the viewsheds in Section B were rated “very good”, whereas in Sections C and D, they were rated as “good”.

6.3.3 Traffic Density

Section B has the highest sectional preference value and projected daily traffic volumes below the magnitude which would significantly detract from the visitor experience. The overall visitor experience would be rated “very good.” Sections C and D have lower viewshed scores and Year 2030 traffic volumes that probably will detract from the visitor experience during peak hours of typical summer weekdays. Some traffic management techniques may be required to restrict access to the Foothills Parkway during the hours of highest demand. Nevertheless, the level of visitor experience would be considered “good” for Sections C and D and could be improved with traffic management techniques.

6.4 Issues For Future Evaluation

During the course of the study, several issues presented themselves that suggest the need for additional consideration or evaluation in the future. Some relate to more detailed evaluation of implementation options and others are pertinent only after a final implementation decision has been made.

The first category includes:

1) Evaluation of traffic density impact on the level of visitor experience,
2) Updating the Gateway area traffic model, and
3) Evaluation of impact of uphill development on visitor experience.

Three additional items fall into the latter category:

4) The need for demand management,
5) The use of rubber tired transit, and
6) Potential trail development.

The following paragraphs provide a more detailed description of these issues.

6.4.1 Traffic Density Impact on Level of Visitor Experience

Section 3.5 notes that the typical procedure for evaluating operating conditions on a two-lane highway, as outlined in the *Highway Capacity Manual*, is not applicable when the primary use is for recreational traffic. Moderate to high volume to capacity ratios are acceptable under typical high design speed highway operating conditions, but the careful and constant attention of drivers is required. This condition would translate to a density of perhaps 45 vehicles per half mile, 25% of the roadway occupied, or 12,000 vpd (midrange Level of Service D values).

In recreational driving, however, a reasonable percentage of driver attention is desirably directed to the scenery. A density on the order of that described above will clearly not allow what could be more typically described as "driver inattention".

The results of this study suggest that a density of up to10 to 15 vehicles per

half-mile of roadway would provide a suitable environment for recreational driving. This translates to about 5% of the roadway being occupied or roughly 4,500 vpd. This conclusion, however, is based primarily on the experiences of the evaluation team and observations of traffic on Little River Road and Newfound Gap Road, two other recreational routes within the Park.

Intuitively, as the density of traffic on recreational routes increases, the level of negative impact on visitor experience increases as well. The intuitive conclusion that visitor experience is not materially impacted when the density of traffic is less than 15 vehicles per half mile is subject to further research and analysis. Likewise, the incremental impact of traffic density on the quality of the visitor experience is a worthy subject for further research.

6.4.2 Traffic Model Update

Chapter 3 also describes the use of the *Sevier County Long Range Transportation Plan* traffic model as a primary evaluation tool in this study. As noted, there are several limitations:

- The model is somewhat dated in that it was based on 1994 land use and traffic data;
- The model produced traffic projections for 2004, a much shorter horizon period than used in this study; and
- The model included only the Sevier County roadway system. Specifically, it did not include either Cocke County or Blount County roads that are affected by the Parkway nor did it include all such roads within the Park itself.

The evaluation team developed a procedure to expand the model to include the additional roadways and is convinced that the resulting analysis is sound. Given the need for projections to Year 2030, however, an update of this model using more current data and an expanded geographic base is encouraged.

6.4.3 Impact of Uphill Development

Much concern has been expressed over several decades about the effect of residential and commercial development on the Parkway viewsheds. The 1968 *Foothills Parkway Master Plan* notes that "…Without adequate protection, the character of the corridor through which the scenic parkway passes in time may be altered and lose some of its recreation and scenic value…" and suggests cooperation with local government in developing scenic control through zoning.

In fact, little has been done in this regard, and development of the Gateway area over the years has included a considerable number of structures within the viewsheds. Land use in the area between the Parkway and the Park is generally consistent with that envisioned in the *Foothills Parkway Master Plan*, but development density in some areas is significant; so much so, in fact, that some have questioned the viability of achieving the 1944 vision of the Parkway being a "special place."

Conversely, the SMS 18 research has

indicated that the public does not necessarily consider development within the viewshed as being particularly objectionable. In fact, viewsheds which included modern structures were given medium to high approval ratings in that study. Interestingly, this question was posed in the questionnaire for the second round of Parkway public meetings with the result being: detrimental—38%, not detrimental—55%, and 7% no response.

It appears that most, if not all, of the Blue Ridge viewsheds that included development, however, were in a downhill environment, i.e., the view was from above looking down into a valley. In the Parkway situation, however, a majority of the views will be uphill with the structures being in the foreground of more distant mountain vistas. This situation suggests further consideration and possible action. First, additional research is suggested to confirm the extent to which uphill development is considered objectionable to the viewer. Second and perhaps dependent on the result of the first, discussion of scenic control zoning and/or easements may need to be initiated with appropriate Gateway communities.

6.4.4 Need For Demand Management

Long range traffic projections for Sections C, D, E, and F suggest a density of traffic that will clearly be a detriment to the quality of the visitor experience. Sections E and F, which are scheduled for completion in the relatively near future, are especially problematic in this respect.

It appears that maintaining a good visitor experience for decades into the future will require some form of demand management. An evaluation of Intelligent Transportation System alternatives is recommended.

6.5 Conclusion

Approximately 22.5 miles of the 72.1-mile Foothills Parkway envisioned by Congress in 1944 are now open to traffic; 16.1 miles are partially constructed and 33.5 miles (Sections B, C and D) require further commitment. Based on current information, construction of these three sections appears feasible, although further evaluation of environmental impacts and the cost of construction is required.

Analysis indicates that completion of all sections of the 72.1-mile Parkway will best achieve the Congressional mandate and its associated goals. More specifically, all sections offer opportunities to view the Park and the surrounding foothills area and consequently have the potential to provide a pleasant driving experience. The visitor experience may potentially be impacted over time by excessive traffic on certain sections, thus monitoring is recommended along with implementation of demand management if needed. A completed Parkway will also provide improved connections to the regional roadway network and will reduce traffic on several existing roadway sections within and outside the Park.

The study also reviewed alternatives to roadway construction within the corridor

that would provide mobility and a pleasant visitor experience. None of these alternatives, which included trail development and several types of mass transit, were found to be cost effective and/or able to meet the mandate requirements. Should the Parkway be completed and opened to general non-commercial traffic however, the addition of rubber tired transit as a modal choice is considered to be very desirable.

Based on input received from the public through interviews and public meetings, a solid majority of respondents favor full completion of the Parkway. An overwhelming majority also desire options to the personal vehicle in providing the visitor experience. Finally, should any section not be constructed, public sentiment suggests that the National Park Service retain the right-of-way for Park use.

KNOXVILLE REGIONAL **TPO** TRANSPORTATION PLANNING ORGANIZATION

U.S. Department of Transportation
Federal Highway Administration

ENGINEERS
PLANNERS
ECONOMISTS

Wilbur Smith Associates
50 Years