1 Traffic Impact Study Area and Subarea Plan Development

The Traffic Impact Study and Subarea Transportation report is the culmination of a year-long transportation study in Walker and Catoosa Counties around the Chickamauga Battlefield Unit of the Chickamauga and Chattanooga National Military Park (CCNMP). The study process, methodology and results leading to the development of the Traffic Impact Study Area and the Battlefield Subarea final plans are described in this section.

Study Background

Study Areas

The study focused on two areas, the Traffic Impact Study area and the Chickamauga Battlefield Subarea. The Traffic Impact Study area covers approximately 58 square miles surrounding the Chickamauga Battlefield Unit of the CCNMP and includes portions of Walker County, Catoosa County and the City of Fort Oglethorpe. The Traffic Impact Study area is bounded by State Route 193 on the west, Three Notch Road on the east, Cloud Springs Road/State Route 146 on the north and the City of Chickamauga on the south. Portions of the study area are included in the 2000 Census Chattanooga, Tennessee urbanized area boundaries. The Subarea Transportation Plan study area consists of the Chickamauga Battlefield Unit of the CCNMP. The Battlefield Unit covers an area of 5,280 acres or approximately 8.25 square miles. The study areas are shown in Figure 1.1.

Purpose

The National Park Service (NPS), using funds provided by the Federal Highway Administration (FHWA), sponsored this study to:

- Evaluate current and future traffic patterns in and around the Chickamauga Battlefield resulting from the completion of the US 27 relocation in Walker County, Georgia
- Determine current and future transportation needs and issues
- Recommend short- and long-term transportation improvements for both study areas that consider impacts on both areas

At the request of the NPS, the Georgia Department of Transportation (GDOT) managed and administered the study. Additional study partners were the Coosa Valley Regional Development Center (RDC) and the Chattanooga Hamilton County North Georgia Area Transportation Planning Organization (CHCNGA TPO), which serves as the Chattanooga Metropolitan Planning Organization (MPO). The two study components were closely coordinated to ensure that the final recommendations address the interrelationships between the transportation systems of the Chickamauga Battlefield and the surrounding area.

This page is a placeholder for

Figure 1.1

Study Area Map with Urbanized Area Boundaries.

Components

The study process had four phases: data collection; data analysis and needs identification; improvement strategy identification and screening; and identification of a recommended plan of improvement strategies. Parallel efforts were conducted for both study areas. Analysis of current and future needs, deficiencies, and major issues for each study section was documented in a series of technical memoranda.

During the data collection phase, an understanding of the project areas was developed through review of relevant plans and documents, roadway characteristics, traffic and area travel patterns, and inventory of land use, socio-economic characteristics, and cultural and historic resources. During the initial phase, preparations were made to refine the CHCNGA TPO MINUTP travel demand forecasting model for use in the data analysis phase. In addition, study goals and objectives were developed through guidance and input from study partners and stakeholders.

Through the data analysis and needs identification phase, study area issues and needs were identified using quantitative and qualitative evaluation. An important quantitative tool utilized during this phase was the refined Chattanooga MINUTP model. Base travel model networks for 2003 and 2025 were developed to help identify daily existing and future system needs. Other evaluation techniques included field review, safety analysis of crash data, and level of service analysis. Within the Battlefield Subarea, roadways were assessed for their intrinsic cultural and historic value and potential sensitivity to transportation impacts. Stakeholder and public input were also essential during this stage to help obtain additional understanding of area transportation issues and needs.

Improvement strategies were developed to address the needs and issues. Strategies were screened using an evaluation matrix to assess each strategy against a variety of criteria. Capacity changing projects were tested in the refined MINUTP model. Since many of the improvement strategies impact both the Traffic Impact Study area and Battlefield Subarea, all the strategies considered impacts to both areas. Stakeholder input was an integral part of strategy refinement for the development of the preferred set of recommended strategies.

During the final stage of the study, a set of recommended improvement strategies for the Traffic Impact Study area and the Battlefield Subarea were developed. Input from study partners, stakeholders, and the public were crucial in developing the final set of recommended improvement strategies (presented in Section 2: Traffic Impact Study Area Plan and Section 3: Subarea Transportation Plan of this document).

Public Involvement and Stakeholder Outreach

Public involvement and outreach has been a vital and ongoing element of this study. Study stakeholders, including local governments, businesses, local and national historic preservation groups, and the general public, provided input and feedback throughout the study through meetings and workshops, newsletters, and a study website.

Public involvement and stakeholder participation opportunities were formally integrated at key milestones in the study. Stakeholder and public feedback has been fully considered in the identification of issues, needs and improvement strategies for both study areas. The public involvement strategy developed at the outset of the study served as the framework for informing and involving stakeholders and the general public during the study.

The strategy provided for early and ongoing opportunities to share information, bring together varied points of view, and obtain input from diverse stakeholders. The overall goal for stakeholder and public involvement was to achieve mutual understanding of transportation needs in the study area among all concerned stakeholders, develop a common vision for meeting transportation needs, and build support and consensus for study recommendations.

The approach to public involvement for the study was community-based and focused on building support at two levels throughout the study process: the organized stakeholder group and the general public. Major stakeholder groups in the study area and national groups with a strong interest in the Chickamauga Battlefield were invited to actively participate. Opportunities for general public input were also provided to ensure local residents were informed about the study and given opportunities to provide input at key study milestones. The public involvement approach took advantage of NPS, FHWA, GDOT and local governmental organizational processes already in place to disseminate information and encourage involvement.

Structure for Stakeholder Involvement

An organized structure for the public participation program is important for ensuring that the efforts to provide information on the study and obtain involvement from various stakeholders are cost effective and also reach the broad array of interests that are affected by the study. The structure for stakeholder involvement was organized around the Project Coordinating Committee (PCC) and Stakeholder Participation Panel (SPP). As the study progressed, efforts were made to broaden the base of support and input.

The PCC provided guidance and general oversight. The PCC met with the consultant team on a regular basis throughout the study to discuss progress, provide direction and review deliverables at key phases. Membership included the principal agencies involved in the study: Coosa Valley RDC, CHCNGA TPO, FHWA, NPS and GDOT. A list of PCC members is provided in Appendix A.

The second formal study group was composed of core stakeholders with a strong interest in the study and its recommendations. The SPP served as an advisory group and was actively involved in all phases of the study. The SPP worked closely with the PCC and study team to identify issues, and develop and evaluate transportation alternatives. SPP representation included local governments, business associations, local historic preservation groups, and national groups with an interest in the Chickamauga Battlefield, such as the Civil War Preservation Trust and the National Trust for Historic Preservation. A list of SPP members is included in Appendix A.

Stakeholder and Public Involvement Activities

The project team conducted five meetings with the PCC, four meetings with the SPP, and three general public meetings throughout the study. A summary of the public outreach activities is shown in Table 1.1.

Table 1.1
PCC, SPP, and Public Outreach Meetings Summary

	Meeting Date	No. of Attendees	Purpose
Project Coordinating Committee	May 2, 2003	13	Present study and obtain input on study elements and data needs.
	July 15, 2003	8	Develop study goals and objectives; identify issues and needs
	September 29, 2003	8	Confirm current and future needs
	December 8, 2003*	29	Present potential improvement strategies
	February 2, 2004*	28	Present study draft recommendations
Stakeholder Participation Panel	July 14, 2003	28	Present study and identify issues and needs
	September 29, 2003	27	Confirm current and future needs
	December 8, 2003*	29	Present potential improvement strategies
	February 2, 2004*	28	Present study draft recommendations
Public Open House Meetings	July 14, 2003	19	Present study and identify issues and needs
	December 12, 2003	14	Present potential improvement strategies
	March 30, 2004	54	Present study recommendations

*A joint PCC/SPP meeting was conducted.

A key element of any successful public involvement strategy is the development of a comprehensive mailing list. Working with GDOT staff and the PCC, a mailing list of local and national stakeholders was developed early in the study and was updated regularly. Study partners and the consultant team identified stakeholders and citizens representing all interests in the study area, including community leaders; businesses; local elected officials; local government officials; civic, historic and cultural groups; citizens advisory committees; and organizations and associations for low-income and minority, elderly and disabled citizens. The mailing list was updated throughout the process using sign-in sheets and comment forms and

included information to aid in contacting stakeholders in a variety of ways. The mailing list was used to reach stakeholders with announcements of upcoming events, meeting invitations, newsletters, and other information about activities.

Outreach activities included a website and a study newsletter. An informational website was developed to provide study information, schedule, and status updates, and it was updated throughout the study. Two newsletters were produced, in June 2003 and December 2003, to provide study information and results to the community. Newsletters were distributed at stakeholder and public meetings, published on the project website, and mailed to over 250 stakeholders for distribution to their constituencies. The final newsletter, an abbreviated version of the executive summary, will be published in May 2004 and provide a synopsis of the study process and final recommendations.

To promote broader dissemination of information about the study, news articles were developed over the course of the study. Numerous organizations and groups requested news articles for use in their regular publications. The news articles were also circulated to the local media and stakeholder groups for publication in newsletters and on websites.

A media outreach effort was implemented to increase both attendance and participant diversity at public information meetings. Media outreach efforts were supported by developing information materials for distribution to encourage attendance at meetings. Publicity for public involvement activities was generated through the use of press materials, such as press releases, fact sheets, and flyers. The study budget included paid advertisements, which were placed in local newspapers including the *Catoosa County News*, *Walker County Messenger*, and *Chattanooga Times Free Press*. Advertisements were also placed in national publications such as the *Civil War News* and several other civil war newsletters. Media/community outreach included a few outlets with low-income and minority audiences such as *La Voz de Dalton*, *The Advertiser*, and *The Busy Shopper*. A complete list of media contacts is included in Appendix A.

Environmental Justice

Identification of Populations and Outreach Efforts

The project team identified environmental justice (EJ) stakeholders and notified them of study activities to ensure that the concerns and needs of low-income and minority populations in the study area were considered. Because of the study's funding source, the study had to meet the requirements of *Title VI, Executive Order 12898* and *Section 450 of the Transportation Equity Act for the 21st Century*. These federal regulations and guidelines require that transportation plans and programs provide a fully inclusive public outreach program. They require that recommendations do not disproportionately impact minority and low-income communities while also allowing these groups to fully share in the benefits of transportation infrastructure investments.

Because the EJ communities in the study counties are very small and dispersed, the consultant team implemented an outreach program primarily focused on person to person outreach with local organizations and agencies through phone and written contacts to encourage participation and input. Organizations in the study area contacted on an ongoing basis include community and neighborhood groups, community service organizations, religious organizations, and churches.

A database of over 200 contact names and relevant information from these organizations and agencies was developed. The database was used for mailing information such as surveys, fact sheets, flyers, and newsletters and maintaining an ongoing record of communication with these groups. As such, outreach efforts built a network through which project information could continuously be disseminated and interest stimulated. Newsletters and fact sheets were sent to each contact for personal use or distribution to the public. Ten of the 52 initial surveys returned were from representatives of the EJ communities in the study area. The feedback from these groups was incorporated into overall survey results.

Evaluation of Potential Impacts

The identification and mapping of minority and low-income communities in the study area assisted in targeting outreach efforts and identifying the potential impacts, both positive and negative, of proposed transportation improvement strategies. Impacts of proposed projects (benefits and burdens) were considered during improvement strategy identification and screening.

Overall, the combined area of Catoosa and Walker Counties has a smaller non-white population (4.3 percent) than statewide (over 37 percent) and a smaller population of low-income persons (11.1 percent) than statewide (13 percent). Using 2000 Census data, non-white and low-income areas were identified by Census block groups in the study area. Areas where the non-white and low-income populations exceeded the combined averages for Catoosa and Walker Counties were identified using GIS mapping. The concentration of non-white persons and persons below the poverty level occurs in and around Fort Oglethorpe. These block groups are made up primarily of African-Americans, which make up three percent of the population. Hispanics make up one percent.

Study Goals

To help guide study development, goals and objectives for the Traffic Impact Study area and the Battlefield Subarea were developed in conjunction with the PCC, SPP, and public at the outset of the study. The project goals are summarized in Table 1.2. Development of project goals early in the study was important in that these goals and objectives served as a guide for the entire study and were considered throughout each project phase.

Table 1.2
Project Goals, Objectives and Performance Measures

Traffic Impact Study Area		
Goals	***Ensure that the transportation system meets the mobility needs of the community and region.***	***Increase the attraction of the US 27 relocation for through trips (motorists not destined to the Park).***
Objectives	• Provide a safe transportation system. • Promote the development of alternative modes and connections between modes. • Improve north-south connectivity east of Park.	• Ensure that non-Park traffic uses other alternatives. • Ensure that the community transportation system accommodates existing/future needs and provides easy access to the US 27 relocation.
Performance Measures	• Traffic volumes • Level of service • Accident rates	• Traffic volumes • Level of service • Percent split (percent of local and through traffic)
Chickamauga Battlefield Subarea		
Goals	***Minimize adverse impacts of traffic and transportation usage on the Chickamauga Battlefield Unit of the Chickamauga and Chattanooga National Military Park and its resources.***	***Develop feasible transportation strategies that will respond to anticipated future growth in the area and in the Park.***
Objectives	• Reduce non-Park traffic on Park roads. • Provide adequate and safe transportation facilities for Park users. • Provide an exceptional visitor experience.	• Identify transportation alternatives that reflect the Park's unique needs and preserve its historic resources. • Identify land use development strategies that complement and protect the Park.
Performance Measures	• Traffic volumes • Percent split (percent local and through traffic) • Accident rates • Level of service • Parking utilization • Visitor feedback	• Traffic volumes • Number of tourists • Economic value/tourism • Feasible implementation recommendations

Data Collection

For this planning-level study effort, data collection focused on information to help gain a thorough understanding of the Traffic Impact Study area and the Chickamauga Battlefield Subarea and the relationships between these two study areas. The goal was to have enough information and understanding to effect an informed decision-making process throughout the study.

Existing Data and Resources

This study differed from a traditional transportation study or traffic impact study because of the project context—the Chickamauga Battlefield Subarea is a trip attractor of national historic and cultural significance with irreplaceable historic, cultural and natural resources. The Traffic Impact Study area surrounding the Chickamauga Battlefield is undergoing change as a result of residential and commercial growth, resulting in greater pressure on the local transportation network which has historically served a relatively rural, agricultural population.

The data collection effort drew upon a broad range of sources. Existing data was collected from various agencies and organizations to help identify planned projects, understand travel patterns, and define the historic and cultural context within the study area. Table 1.3 summarizes the existing data collected for this study.

Table 1.3
Summary of Data and Resources

Transportation Data	Demographic Data	Geographic Information System (GIS)
1997 - 2002 Daily Traffic (AADT) 1999, 2001, 2002 Traffic Counts Chattanooga MPO MINUTP Travel Demand Model (2000, E+C, and 2025 Networks) Roadway Inventory (Major Roadways and Collector Streets within Project Boundary) in and outside of Park Traffic Control Inventory (Signals, Posted Speed Limits, 4-way Stops) 1996, 1997, 2002, 2003 (Jan.-May) Motor Vehicle Crash Logs for Chickamauga Battlefield 2001, 2002 Walker and Catoosa County Crash Records	Population Employment Journey to Work	Aerial Photography 3.75 Min Ortho Color Infrared (CIR) Photos 2001 (East Ridge Quad; Ft. Oglethorpe Quad.) Park Boundary, Cannons, Monuments, Markers, Buildings/Structures Road layers Urban area boundaries County boundaries Current and future land use
Plans and Reports	**Cultural/Natural Resources**	**National Park Service**
US 27 Reroute NEPA Documentation (1989) Construction Work Program for Walker and Catoosa Counties Walker County Comprehensive Plan/Land Use Plan Catoosa County Joint Comprehensive Plan 2020 (includes Ft. Oglethorpe and Ringgold) Regional Sewer Study Chattanooga Urban Area Transplan 25, Long Range Transportation Plan 2025; Adopted June 2000 Georgia State Transportation Improvement Program (Walker and Catoosa Counties) The Georgia Portion of the Chattanooga Urban Area Transportation Study TIP Projects FY 2004-2006, 3/27/03 Chattanooga Urban Area Bicycle Facilities Master Plan, April 2002 Chattanooga Area Wayfinding Plan and Graphic Standards Manual (2003) LaFayette Road Streetscape Concept Drawing	Chattanooga Area Civil War Sites Assessment Georgia State Historic Preservation Office	Federal Lands Alternative Transportation Study (USDOT, 2001) 2001 NPS Management Policies (Chapter Two, Park Planning) Director's Order #2 (Park Planning) Director's Order #12 (NEPA) Director's Order #27A (Transportation Planning Guidebook) Director's Order #27B (Transportation Planning Guidebook) Alternative Transportation in the NPS Director's Order #87D (Non-NPS Roads) Visitor Experience and Resource Protection (VERP) Guidelines NPS Road Standards Traffic Impact Analysis, Gettysburg National Military Park (Draft Report dated July 21, 1994) Chickamauga Chattanooga National Military Park Plans and Policies Administrative History of Chickamauga and Chattanooga National Military Park CCNMP General Management Plan, Development Concept Plan, Environmental Assessment Chickamauga Annual Performance Plan /CCNMP Government Performance and Result Act; FY 2003 Management Objectives Workshop (August 9-10, 1994) Theme Statements (1998) Theme Implementation (1998) 1979 through 2002 Park Visitation Data (Annual and Monthly Visitation of Recreational and Non-Recreational Visitors) Cultural Landscape Report: Part I, 50% Draft (March 2003) Historical Resource Study: 1999

New Data

New data was collected to supplement existing data sources. This data augmented project team understanding of study area travel patterns, transportation network usage, and cultural and historic resources. Area travel patterns and trip characteristics were essential for refining the MINUTP travel demand model and included new traffic counts, a license tag origin and destination survey, and a roadside interview survey. Table 1.4 summarizes the three traffic/travel related data collection efforts.

Table 1.4
Data Collection for Identifying Travel Patterns and Trip Characteristics

Data Collection/ Survey Information	Purpose	Time of Collection
Traffic Counts	Determined traffic patterns before and after US 27 relocation; used as target for model validation and calibration.	Tuesday, May 13, 2003 12 a.m. to 12 a.m. (24 hours) (before end of school year)
License Tag Survey	Determined traffic patterns for vehicles traveling into and through the Chickamauga Battlefield.	Tuesday, May 13, 2003; 7 a.m. to 7 p.m. (12 hours) (before end of school year)
Roadside Interview Survey	Identified trip character (i.e., trip purpose, frequency, origin and destination, auto occupancy, etc.)	Tuesday, July 29, 2003 and Saturday, August 2, 2003; 2 p.m. to 7 p.m. (5 hours) (during peak Park visitation)

Traffic Count Data Collection

To supplement existing traffic count data provided by GDOT and NPS, 24-hour traffic counts were conducted during May 2003 in order to capture normal traffic patterns in the study areas prior to dismissal of school students for the summer. Traffic counts were collected at 13 key locations surrounding and within the Chickamauga Battlefield, including along the US 27 relocation. The locations were selected in order to help evaluate the impact of the US 27 relocation and for use in calibrating the MINUTP travel demand model.

License Tag Origin and Destination Survey Information

An entry and exit license tag survey was conducted with the traffic counts in May 2003 at eight of the 13 count location sites surrounding the Chickamauga Battlefield. The license tag of each vehicle entering and exiting the Battlefield was recorded in 15-minute intervals and then matched within a spreadsheet to identify the travel pattern of vehicles going through the Battlefield and the travel distribution of non-Park trips.

Roadside Interview Survey Information

To supplement the license tag survey, a roadside interview survey was completed at the intersection of LaFayette Road and McFarland Gap Road/Reed's Bridge Road. The survey was conducted during the afternoon and early evening on one weekday and one weekend day during the Chickamauga Battlefield's peak visitation period in July and August 2003. Surveyors at each intersection approach stopped approximately every fifth traveler and asked the potential respondent to participate in the interview. Again, this survey information helped to identify travel and trip patterns as well as trip character in and around the Chickamauga Battlefield.

Cultural and Natural Resource Inventory

In addition to the transportation-focused data collection effort, a cultural and natural resource inventory was conducted outside the Chickamauga Battlefield boundary in Park gateway road corridors using field review and secondary sources. This effort focused on documenting representative features and characteristics of the corridors within the Transportation Impact Study area, as well as identification of cultural/natural/recreational resources found within those corridors. Natural and cultural resource data within the Battlefield Subarea was documented in accordance with the guidance offered in *A Guide to Cultural Landscape Reports: Content, Process, and Techniques.*

Study Area Characteristics

The following describes general present-day characteristics of both study areas related to population, transportation, and natural, cultural and historic features.

Demographics

The Traffic Impact Study area and Battlefield Subarea encompass portions of Walker and Catoosa Counties. Catoosa County has been a faster growing county than Walker County in the recent past. On average, Catoosa County has grown 15 percent per decade since 1960, increasing in population from 21,101 in 1960 to 51,356 in 2000, an addition of 8,000 new persons per decade. Walker County has grown at a slower pace, increasing from 45,264 in 1960 to 61,053 in 2000, an addition of approximately 3,900 persons per decade.

Population in the Traffic Impact Study area was approximated by grouping 767 contiguous census blocks. The population within this area was 36,149 in 2000, which is roughly one-third of the total population of the two counties combined. Table 1.5 summarizes general population statistics for the study area. The Traffic Impact Study area characteristics reflect those of the greater area.

Table 1.5
Traffic Impact Study Area Demographic Profile

Geography	2000 Popul-ation	2000 Race/Ethnicity						Age	
		White		Black		Hispanic		65+	
		No.	%	No.	%	No.	%	No.	%
Chattanooga MSA, GA Part	129,489	123,784	96%	3,075	2%	1,323	1%	16,581	13%
Walker County	61,053	57,652	94%	2,310	4%	565	1%	8,439	14%
Catoosa County	53,282	51,356	96%	669	1%	621	1%	6,322	12%
Fort Oglethorpe	6,940	6,464	93%	165	2%	98	1%	1,361	20%
Study Area*	**36,149**	**34,413**	**95%**	**950**	**3%**	**309**	**1%**	**4,991**	**14%**

**The study area calculation is an approximation based on a grouping of 767 contiguous Census blocks within the study area. Source: US Census.*

Transportation Network and Usage Characteristics

Daily Traffic Volumes

The traffic volumes within both study areas have changed since the US 27 relocation to the Chickamauga Battlefield's western boundary. Figure 1.2 shows historic weekday daily traffic volumes collected from existing sources and the new data collected in May 2003. Traffic Impact Study area roadways with the greatest daily traffic volumes are SR 2/Battlefield Parkway, US 27/SR 1, SR 146, McFarland Avenue, and Three Notch Road. Traffic volumes through the Chickamauga Battlefield have decreased since the US 27 relocation.

Road Classification and Ownership

Roads within the two study areas cross many jurisdictions. It is important to understand which jurisdiction has ownership over roadways because that jurisdiction (federal, state, county, or city) is ultimately responsible for the oversight, safety, operations, maintenance, and changes of the roadways within their jurisdiction. Within the Traffic Impact Study area, most of the major roadways (arterials and collectors) are either state routes or county roads, but a few are city streets. Within the Chickamauga Battlefield Subarea, all the roads are federally-owned and follow NPS functional classification guidelines, which differ from GDOT's functional classification system for roadways. Table 1.6 lists major roadways within the Traffic Impact Study area as well as which jurisdiction has ownership of the roadway.

This page is a placeholder for

Figure 1.2

Historic and Existing Daily Traffic Volumes.

Table 1.6
Traffic Impact Study Area Major Roadway Functional Classification and Jurisdiction

Interstate	Arterials	Collectors
I-75	Catoosa County	Catoosa County
	Cross Street	Burning Bush Road
	Dietz Road	Mack Smith Road
	Lakeview Drive	Poplar Springs Road
	Post Road	Post Oak Road
	Reed's Bridge Road	Red Belt Road
	Three Notch Road	Walker County
	Walker County	Burnt Mill Road
	Lee and Gordon Mill Road	Crest Ridge Drive
	McFarland Gap Road	Dry Valley Road
	McFarland Road	Hogan Road
	Mission Road	Jenkins Rd.
	Salem Road	Johnson Road
	Five Points Road	Longhollow Road
	Fort Oglethorpe	Park City Road
	LaFayette Road	Pine Street
	Georgia State Route	Schmitt Road
	SR 146/Cloud Springs Road	W. Gardon Rd.
	SR 2/Battlefield Parkway	W. Valley Dr.
	SR 341	Wilder Road
	US 27/SR 1	Fort Oglethorpe
		Forrest Road
		Thomas Road
		Georgia State Route
		SR 193
		SR 349

Commuting Patterns

Between 1990 and 2000, the Chattanooga urbanized area boundaries (as determined by the US Census) have increased over the study area. This increase in the urbanized area boundaries southward into the study area shows, over time, the growing relationship of the study area to the greater Chattanooga urban area. The relationship is exhibited by journey to work data collected by the US Census. In both Catoosa and Walker Counties, there has been an increase in the proportion of workers living in the counties who commute to Chattanooga/Hamilton County between 1990 and 2000. The greatest increase occurred in Catoosa County, where the number of workers who commuted from Catoosa County to Hamilton County increased from 8,786 in 1990 to 12,320 in 2000, an increase of 40 percent. Walker County residents commuting to Hamilton County also increased, from 8,657 in 1990 to 9,098 in 2000, a five percent increase. Overall, a greater share of Catoosa County residents leaves Catoosa County to work in Hamilton County (12,320 or 46 percent in 2000) than work in Catoosa County (7,167 or 27 percent in 2000).

There is a fair amount of cross commuting between Catoosa and Walker Counties. Out of the 13,255 persons working in Catoosa County in 2000, 7,167 (54 percent) lived in Catoosa County and 2,795 (21 percent) lived in Walker County. Out of the 17,823 persons working in Walker County in 2000, 11,244 (63 percent) lived in Walker County and 1,937 (11 percent) lived in Catoosa County.

Travel Patterns

The license tag origin and destination survey was used to determine the origin and destination of vehicles traveling through the Chickamauga Battlefield at eight Chickamauga Battlefield entrance/exit locations. The travel patterns are shown in Figure 1.3. The predominant travel patterns are indicated by the thickest lines. The location attracting or generating the most trips is the north entrance of the Chickamauga Battlefield at LaFayette Road.

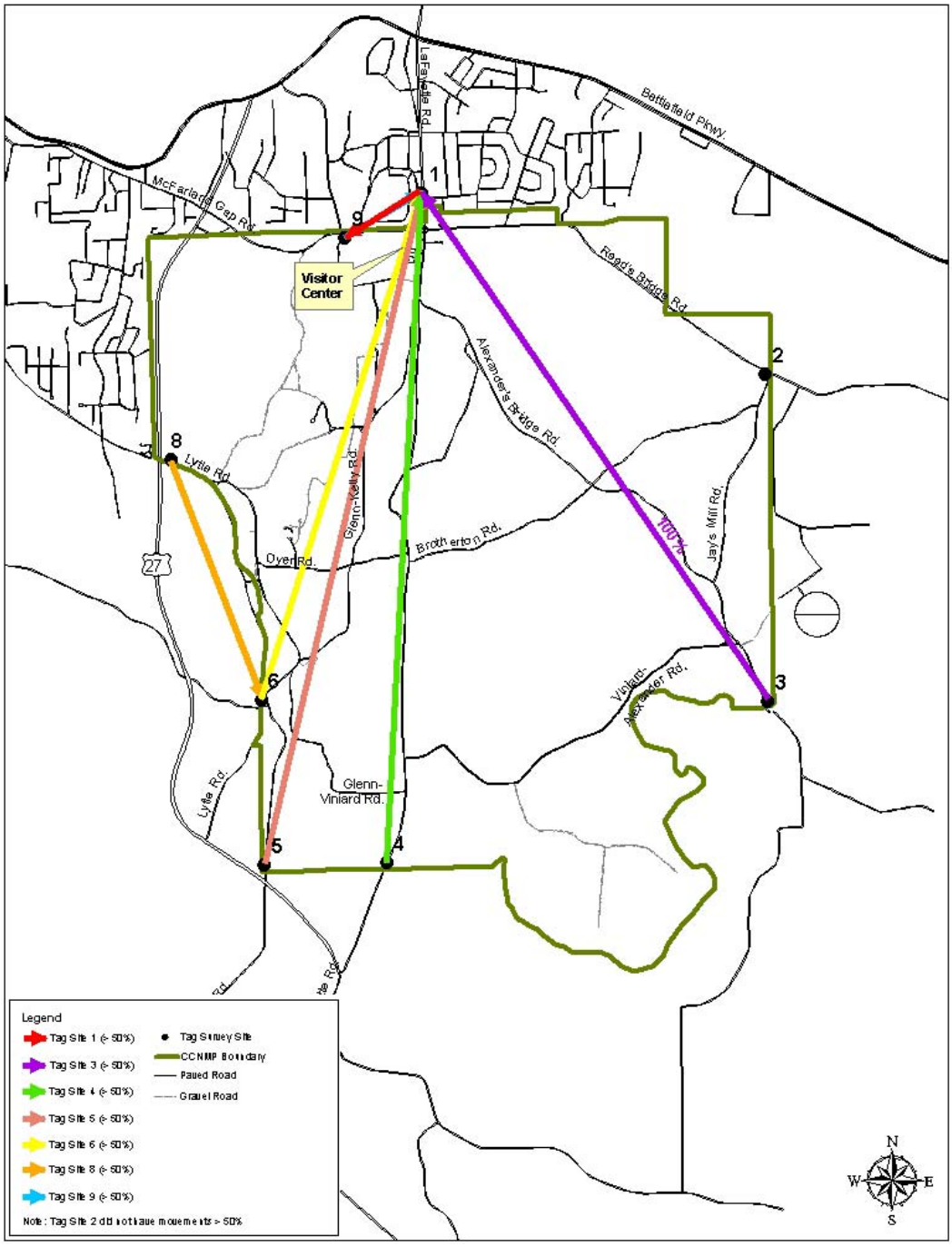
The roadside interview survey provided detailed information on trip character of vehicles traveling through the LaFayette Road intersection with McFarland Gap Road/Reed's Bridge Road. This included determining which travelers were visiting the Chickamauga Battlefield Park (Park trips) and which were traveling through the Chickamauga Battlefield (non-Park trips). The roadside interview survey also provided information on trip frequency, vehicle occupancy, trip purpose, origin and destination by state, city, and zip code, Park site visitation, Park trip duration, and transportation mode within and outside the Park.

Analysis of the survey data revealed the following:

- A majority of travelers into the Chickamauga Battlefield (83 percent) travel through the Battlefield and do not stop to visit the Battlefield. Only 17 percent of the survey respondents were either coming from or going to the Battlefield.

- Many of those traveling through the Chickamauga Battlefield use the Battlefield roads daily during the week. Nearly half of the survey respondents travel through the intersection five days a week, indicating that they are most likely traveling to and from work. Approximately one-quarter of the survey respondents stated they travel through the intersection less than one day a week on average.

Figure 1.3
Percent of Non-Park Destined Trips Going through Chickamauga Battlefield Entrances/Exits



- The average vehicle occupancy for Battlefield-bound and non-Park trips is approximately 1.86 persons per vehicle. The average auto occupancy for Park trips only is approximately 2.33 persons per vehicle, somewhat less than NPS's assumption of approximately 2.7 persons per recreation vehicle visiting the Chickamauga Battlefield. Non-Park trips have an average auto occupancy rate of 1.76 persons per vehicle.

- Most of the total trips (approximately 70 percent) are home-based other (HBO) trips, indicating that most people traveling through the intersection are from the local area. Approximately 18 percent of the total trips are home-based work, representing those people traveling to or from work.

- Whether originating or destined for the Chickamauga Battlefield, most of the vehicles traveling into or out of the Chickamauga Battlefield (around 70 percent) are from the local cities (see Table 1.7).

Table 1.7
Top Five Origin or Destination Cities for Vehicles
Traveling into or out of the Chickamauga Battlefield

Visiting the Chickamauga Battlefield		Traveling through the Chickamauga Battlefield	
City	**Percent**	**City**	**Percent**
Fort Oglethorpe	39%	Fort Oglethorpe	31%
Other Cities	24%	Other Cities	22%
Chattanooga	13%	Chattanooga	14%
Chickamauga	9%	Rossville	13%
Rossville and Ringgold	7%	Ringgold	12%

Characteristics of those visiting the Chickamauga Battlefield are:

- Approximately 54 percent stopped at the visitor center
- Approximately 38 percent took the auto tour
- Over half stayed at the Park between one and three hours
- An average of 69 percent toured the Battlefield using their vehicle only, 13 percent toured the Battlefield on foot, and seven percent toured the Battlefield on a bicycle

Cultural, Historic and Natural Resources

The Chickamauga Battlefield Subarea and the Traffic Impact Study area have natural, cultural and historic features and significance. The following provides an overview of these features.

Chickamauga Battlefield Subarea

The Chickamauga Battlefield was designated a National Military Park by Congress on August 19, 1890, "for the purpose of preserving and suitably marking for historical and professional military study the fields of some of the most remarkable maneuvers and most brilliant fighting" of the Civil War. Veterans of the Army of the Cumberland saw the need to preserve and commemorate the battlefield in 1888. The legislation was the first to authorize the preservation of an American battlefield and formed the basis of the establishment and development of a national system of military parks.[1]

Following acquisition of a significant portion of the Chickamauga Battlefield by the Park Commission, the land was developed as a commemorative landscape. Changes to the landscape since that time have included the improvement of historic roads, the removal of several buildings and structures located within the Park, as well as the addition of administration and maintenance buildings, the development and construction of new roads to enhance access, and the construction of a number of stone bridges and culverts. Of the 24 farmsteads that were present on the Chickamauga Battlefield in 1863, only three structures are presently being interpreted for their battle-era associations: the Kelly, Brotherton, and Snodgrass cabins. All three structures were either partially or completely destroyed during the war, rebuilt by their owners after the war, or further repaired in the 1930s as part of the Civilian Conservation Corps program in the Park.

In addition to these infrastructure improvements, which were generally made to accommodate visitors, the Park Commission also made changes to restore the landscape to its 1863 conditions to help visitors interpret and commemorate the battle. Since 1890, the Park Commission has added approximately 1,150 commemorative monuments, memorials, markers, cannons, and tablets. They range in size from Wilder Brigade Monument, over 80 feet high, to markers less than three feet high. Many of the monuments and cannons are located along LaFayette Road, Battleline Road, Poe Road, and Snodgrass Hill. Other commemorative features, particularly markers and tablets, are widely dispersed throughout the Battlefield. Although many of these features can be seen from Park roads, others can only be viewed by pedestrian paths and trails.

In order to accommodate visitor circulation needs, the Park maintains 71 pull-off/parking areas. Sixteen interpretive signs are also placed throughout the Park to help educate visitors about significant battle events and landscape features.

As the nation's first National Military Park, the Chickamauga Battlefield Unit of the Chickamauga and Chattanooga National Military Park is also nationally significant in the areas of conservation and social history.[2] The 1890 act that established the Park set several precedents

[1] B. Morris, et al, *Cultural Landscape Inventory, Chickamauaga and Chattanooga National Military Park* (Atlanta: National Park Service, Southeast Regional Office, October 1997), 2.
[2] Hanson and Blythe, 48-50; U.S. Department of the Interior, "National Register of Historic Places Inventory—Nomination Form, Chickamauga and Chattanooga National Military Park." Prepared by Jill K. Hanson and Robert W. Blythe (Atlanta: National Park Service, 1998).

for historic preservation in this country, including the recognition of the national significance of battlefields, the preservation of battle sites for the purpose of military study, the right of the federal government to obtain land through condemnation proceedings, and the creation of lease-back provisions for owners who sold their land to the federal government for inclusion in a national park. The national scope of commemoration represented by the marking of both Union and Confederate troop positions at Chickamauga also set a precedent for later efforts. As established in the *Historic Resource Study*, the Commemorative Period of significance spans the years 1890-1942.

The Chickamauga Battlefield Unit of the Chickamauga and Chattanooga National Military Park is significant for its design in the areas of art, architecture, and landscape architecture. The Chickamauga Battlefield landscape encompasses over one thousand commemorative monuments, markers, memorials, cannons, and tablets that were constructed well after the event that they commemorated, thus they are not directly associated with the battle that they commemorate. The Park contains potential archaeological sites relating to the battle, as well as potential archaeological sites associated with the continued military use of the Park by the War Department from the 1890s through the beginning of World War II.

The natural systems and features at Chickamauga Battlefield were critical during the time of the battle and remain critical today. Stands of forest, Chickamauga Creek, streams, glades, and hilltops influenced troop movement and position during the battle. Natural features were also influential in the location of Lafayette Road and other early circulation corridors. By 1863, significant portions of the natural forest were cleared for crops, pasture, and orchards. After the Civil War, several of the battle-era fields returned to forests, while other areas of forest were cleared for fields. General plant communities identified within the Park include stream banks/lowland forest, upland forest, glades, and cultural areas that are mown and maintained with ornamental vegetation.

West Chickamauga Creek serves as the primary drainage for the Chickamauga Valley with a large number of tributary streams running through the Park and into the creek. There are two known springs located within the Park: Mullis Spring and Cave Spring. Several other springs and ponds were identified on the 1863 Bett's map of the battlefield, but it is not known if these still remain. Two ponds exist within the Park, both the result of limestone quarry operations.[3] There are also several fords, or shallow areas, along the West Chickamauga Creek which served as crossing points for the soldiers during the battle. Dalton and Thedford Fords are located in the southwest section of the Park, at the terminus of the historic roads from which their names are derived. The creek flows naturally along this edge of the Park, and lowland forest vegetation is found along both banks.

[3] David M. Brewer, *An Archeological Overview and Assessment of Chickamauga and Chattanooga National Military Park* (Tallahassee: National Park Service, Southeast Archeological Center, 1987).

Traffic Impact Study Area Resources

A number of Civil War historic sites exist outside the Chickamauga Battlefield's boundary in the Traffic Impact Study area. The *Chattanooga Area Civil War Sites Assessment* identified 38 sites in Tennessee and Georgia that have Civil War historic significance and are not currently protected or part of the NPS system. The sites were ranked using evaluation criteria that included the sites' historical significance, the current state of preservation, threats to the sites, and the sites' preservation and interpretation potential. Six of the sites are in the Traffic Impact Study area in the gateway corridors. One location of particular interest is at the southeast corner of the Battlefield Park at Alexander's Bridge. One of the desired conditions at this location is to close the gate at the park entrance at Alexander Bridge Road to vehicular traffic.

In addition to the Civil War historic sights, other historic features in the Traffic Impact Study area include the Fort Oglethorpe National Register Historic District, Lee and Gordon Mill National Register Historic Site, and a number of houses included in the Georgia Historic Resources Survey. The most significant natural feature is the West Chickamauga Creek and watershed, which runs along the eastern boundary of the Chickamauga Battlefield.

Existing Plans

As summarized in Table 1.3 (page 1-9), a number of plans were reviewed. These studies were important in identifying area goals, issues and needs and understanding planned projects. In addition to the short-range projects in the CHCNGA TPO's Transportation Improvement Program, notable planned projects include:

- Chattanooga Urban Area Bicycle Facilities Master Plan, which recommends bicycle facilities and routes in and around the Chickamauga Battlefield, particularly on LaFayette Road
- The West Chickamauga Creek Greenway, following along most of the West Chickamauga Creek
- Streetscape improvements to LaFayette Road from north of the Battlefield's boundary to SR 2/Battlefield Parkway
- The Coosa Valley RDC Northwest Georgia Regional Wastewater Treatment Plan, which indicated existing and proposed sewerage in the study area

Needs and Issues Identification

A number of analysis tools were used to analyze, interpret and provide an understanding of the existing conditions in the Traffic Impact Study area and the Chickamauga Battlefield Subarea. Qualitative tools included public outreach activities such as coordination with the PCC and SPP, conducting public information open house meetings, and engaging the area's environmental justice communities.

Quantitative analysis techniques included using Geographic Information System (GIS) mapping to understand study area demographic characteristics and to identify the locations of planned projects and historic, natural, and other features. The Chattanooga MINUTP travel demand forecasting model was applied to evaluate existing and future transportation network usage and travel patterns. The following describes the major study findings and summarizes the identified issues and needs. In addition, field review and assessment was conducted to augment and verify qualitative and quantitative findings.

Public Input Summary

Critical to identifying key issues, deficiencies, and needs within the Traffic Impact Study area was engagement and consultation with interested parties. At each public meeting open house, written comments were solicited through comment forms. A questionnaire was developed at the outset of the study to help identify transportation issues and needs in both study areas. The project website, hosted by the GDOT, encouraged ongoing public participation and comment. Facilitated meetings with the PCC and SPP generated comments as well. The following highlights the major issues and needs identified through all public input sources in the Traffic Impact Study area and the Battlefield Subarea.

Traffic Impact Area Issues

- Improvements to north-south mobility and access east of the Battlefield are desired.
- Wayfinding throughout the study area is insufficient. Better signage could direct motorists to the Fort Oglethorpe business district and to historic sites.
- Some intersections along the US 27 relocation seem unsafe due to lack of lighting at these locations.
- Entering and exiting US 27 relocation at Osburn Road and McFarland Gap Road can be unsafe.
- There needs to be a balance between the commercial development interests of Walker County and preserving the historic nature of the Battlefield along the US 27 relocation.
- A decline in traffic on LaFayette Road has contributed to loss of business in the Fort Oglethorpe/LaFayette Road business district.
- The area needs to find ways to attract economic stimulus to the Fort Oglethorpe businesses impacted by the US 27 relocation.

- The City of Chickamauga wants to leverage its significance in the Civil War to attract tourism and visitation.
- North Georgia roads lack attention.

Chickamauga Battlefield Subarea Issues

- The purpose of visiting the Chickamauga Battlefield varies from active recreation (primarily hiking and bicycling) to commemorative (viewing the historic and cultural features).
- A conflict exists between Park visitors and those making through-trips. There needs to be a balance between the Chickamauga Battlefield's need to preserve its historic and cultural features within the broader community's objectives related to travel, access and economic development.
- The local demand for recreation opportunities is increasing with population growth. The primary CCNMP role is commemorative, preserving the historic and cultural features and enabling visitation of the resources. The surrounding communities should identify and plan for additional recreational facilities to serve the entire population.
- Bicycle and pedestrian access to the Chickamauga Battlefield should be emphasized.
- Non-motorized connections between gateway communities and the Battlefield should be developed.
- Visitors should have a positive experience in the Park and allowed time to enjoy it at a leisurely pace without feeling pressure from through traffic.
- There is too much traffic and noise generated by vehicles traveling through the Battlefield.

Traffic Impact Major Findings

Transportation Network Demand

Existing capacity needs in the Traffic Impact Study area were examined by performing a planning level of service (LOS) analysis and reviewing the refined 2003 base year CHCNGA TPO travel demand model. To perform the planning LOS analysis, existing daily traffic counts, traffic controls, speed limits and general roadway characteristics were considered. Generally throughout the study area, the terrain is hilly and many of the county roads are narrow, paved, two-lane facilities with limited shoulders Table 1.8 summarizes LOS on major roadways within the Traffic Impact Study area. Only SR 2 west of Dietz Road is showing an LOS below LOS C.

Table 1.8
Traffic Impact Study Area Daily Level of Service

Major Roadway	2002 Two-way Traffic Volume	Level of Service*
US 27 south of LaFayette Rd. merge, south of Park	14,500	B
US 27 north of Longhollow Road	17,500**	B
US 27 north of SR 146	22,780	B
SR 2 east of McFarland Road	13,500	B
SR 2 west of US 27 interchange	23,800	B
SR 2 west of Dietz Road	29,400	D
SR 341 east of Mission Road	5,080	A
SR 146 west of Fant Drive	9,800	B
LaFayette Road near Forrest Rd.	11,200	C

Source: GDOT
*Note: Planning Level of Service derived from Table 5, Generalized Annual Average Daily Volumes, GRTA Technical Guidelines.
** May 2003 Traffic Count

The refined CHCNGA TPO base model for the year 2003 was also examined to help identify locations where the traffic volumes exceed roadway capacity. By dividing the daily roadway volume by the roadway capacity, a volume-to-capacity (V/C) ratio was calculated. Any V/C ratio exceeding 1.0 indicates there is more traffic on the roadway than it theoretically can contain, and congested conditions likely exist. Major roadways in the study area that appear to have congested conditions or are approaching congested conditions include LaFayette Road/Chickamauga Avenue north of SR 2, McFarland Gap Road west of US 27, McFarland Avenue south of SR 2, Mission Ridge Road south of McFarland Gap Road, Cross Street north of SR 146, and SR 2/Battlefield Parkway from Dietz Road to Pine Grove Road. Figure 1.4 shows the locations of the congested roadways.

This page is a placeholder for

Figure 1.4

2003 Base Model Network Volume-to-Capacity.

Future Volumes

Two scenarios were considered for modeling the base future network conditions: a 2025 network with the short-range Existing plus Committed projects (E+C) and a 2025 network with all the Chattanooga 2025 Long Range Transportation Plan (LRTP) projects. Table 1.9 summarizes the forecasted 2025 volumes on major roads within the study area. Existing volumes are included for comparison. A review of these two forecasts indicates moderate differences between the 2025 E+C and 2025 LRTP scenarios.

Table 1.9
Traffic Impact Study Area Daily Traffic Volumes

Major Roadway	Two-Way Traffic Volume - Vehicles Per Day (VPD)		
	Existing Volume*	2025 Socioeconomic Data with E+C Network	2025 Long Range Transportation Plan
SR 146/Cloud Springs Road near Fant Dr.	9,800	13,800	10,700
SR 2/Battlefield Parkway near Fant Dr.	28,300	33,300	31,300
US 27 Relocation north of Longhollow Rd.	17,500	21,600	22,500
McFarland Gap Rd. west of LaFayette Rd.	3,400	6,900	7,300
Reed's Bridge Road west of Jay's Mill Rd.	4,100	10,000	10,500
LaFayette Road north of Park	7,600	9,900	9,600
LaFayette Road south of Park	4,400	5,000	4,400

Source: GDOT, CHCNGA TPO MINUTP Model, Cambridge Systematics
* The existing volume shows 2003 traffic counts conducted for this study for all locations except SR 146 and SR 2. At these locations, no new traffic counts were collected, so the 2002 GDOT counts are shown.

Based on future V/C ratios within the refined 2025 LRTP model, the following roadways demonstrate a potential need for transportation improvements or alternatives in the Traffic Impact Study area:

- LaFayette Road from SR 2/Battlefield Parkway north to 37th Avenue (changes name to Chickamauga Avenue and then Rossville Boulevard north of McFarland Gap Road)
- Battlefield Parkway from Cedar Lane to east of I-75
- Three Notch Road from Battlefield Parkway to US 41
- Burning Bush Road between Reed's Bridge Road and Alexander's Bridge Road
- McFarland Gap Road west of Schmidt Road

Figures 1.5 and 1.6 show the forecasted V/C ratios from the 2025 E+C and the 2025 LRTP model runs, which is considered the future No-Build model.

This page is a placeholder for

Figure 1.5

E+C Network with 2025 Socioeconomic Data Volume-to-Capacity Ratios.

This page is a placeholder for

Figure 1.6

2025 No-Build Network Volume-to-Capacity Ratios.

Travel Time

Travel times around and through the Chickamauga Battlefield from south of the Battlefield to north of the Battlefield were examined through field review. A field check of current conditions at either the AM or PM peak hour showed that traveling around the Chickamauga Battlefield on the US 27 relocation took an average of 6.6 minutes at an average travel speed of 52 miles per hour (mph). Traveling through the Chickamauga Battlefield on LaFayette Road took an average of 8.2 minutes at an average travel speed of 34 mph. Though the perception is that one could travel through the Park more quickly, in reality, using the US 27 relocation saves time.

Safety

Normalized crash rates (rate per 100 million vehicle miles traveled) for the Traffic Impact Study were calculated and evaluated with GIS using 2001 and 2002 GDOT data. Locations exceeding the statewide rate for the respective functional classes were mapped. Major roadways showing crash rates above the statewide averages for the roadway's respective functional classification include Burning Bush Road, SR 2/Battlefield Parkway, SR 146/Cloud Springs Road, Dietz Road, and SR 341. Locations exceeding the statewide crash rate averages for 2001 and 2002 are shown in Figures 1.7 and 1.8.

This page is a placeholder for

Figure 1.7

2001 Crash Rates Exceeding Statewide Averages.

This page is a placeholder for

Figure 1.8

2002 Crash Rates Exceeding Statewide Averages.

Chickamauga Battlefield Subarea Major Findings

Transportation Network Demand

The US 27 relocation has had a measurable impact on traffic volumes on the Chickamauga Battlefield roadways. On LaFayette Road, daily traffic volumes decreased over 70 percent from 13,200 in 2000 to 3,700 in 2002 after the relocated US 27 opened. A planning LOS evaluation was conducted to examine the existing capacity needs on the Park roads. With the present traffic, none of the roads within the Park operate at an unacceptable LOS (below LOS C). Table 1.10 summarizes existing volumes on roadways within the Battlefield.

Table 1.10
Battlefield Subarea Existing Traffic Volumes

	Daily Two-Way Traffic Volumes (2003)		
Road	**Daily**	**AM Peak Hour**	**PM Peak Hour**
LaFayette Rd. south of Glenn Viniard Rd. (at southern Park boundary)	4,400	280	350
LaFayette Road north of the McFarland Gap Road/Reed's Bridge Road intersection	7,600	440	660
Reed's Bridge Road at eastern Park boundary	4,100	400	450
McFarland Gap Road west of LaFayette Road	3,400	210	360
Viniard-Alexander Road north of Thedford Road	200	20	20
Alexander's Bridge Road at eastern Park boundary	380	30	50
Lytle Road west of Mullis Road	300	20	30

Source: 2003 Traffic counts

Volume-to-capacity (V/C) ratios from the refined 2025 LRTP model were evaluated to identify future deficiencies in the study area.[4] Estimated capacities are 630 vehicles per hour per lane for Park collectors and 720 vehicles per hour per lane for Park minor arterials. These values can be translated to approximately 12,600 and 14,400 vehicles per day on two-lane roadways for Park collectors and minor arterials, respectively. The only minor arterial roadway within the Park is LaFayette Road. The remaining roadways within the Park are collectors. To be consistent with

[4] During the 2003 base year model validation, a designation was added to the model to represent roadways within the Park boundary. As a result, roadways within the Park could be assigned a lower capacity. Capacities used within the Park were based on the rural area type capacities with a ten percent reduction to represent roadway curvature, posted speed, and design standards.

the validated 2003 base year model, the refined 2025 LRTP model capacities are the same for all three models (2003, E+C, and 2025 LRTP) by area type, facility type, and number of lanes.

Table 1.11 shows the forecasted Park road volumes as compared to the existing 2003 counts. V/C ratios were calculated and examined. Based on future V/C ratios within the refined 2025 LRTP model, no excessive V/C ratios were found on roadways within the Park subarea. However, higher future volumes in relation to the Park road's classification are indicated on Reed's Bridge Road, McFarland Gap Road and LaFayette Road.

Table 1.11
Battlefield Subarea Forecasted Traffic Volumes

Major Roadway	Daily Two-Way Traffic Volumes Comparison		
	2003 Counts	2025 Socioeconomic Data with E+C Network	2025 Long Range Transportation Plan
LaFayette Road south of Glenn Viniard Road (at southern Park boundary)	4,400	5,000	4,400
LaFayette Road north of the McFarland Gap Road/Reed's Bridge Road intersection	7,600	9,900	9,600
LaFayette Road south of Brotherton Road	3,700	4,800	4,400
Reed's Bridge Road at eastern Park boundary	4,100	10,000	10,100
McFarland Gap Road west of LaFayette Road	3,400	6,900	7,300
Viniard-Alexander Road north of Thedford Road	200	200	100
Alexander's Bridge Road at eastern Park boundary	380	460	1,000
Lytle Road west of Mullis Road	300	50	50

Source: 2003 Traffic counts, NPS, CHCNGA TPO MINUTP Model, Cambridge Systematics

Parking Facilities

Through discussions with Park staff and from data collected during the cultural landscape assessment, parking utilization and needs within the Chickamauga Battlefield were evaluated. The Park has not conducted any parking utilization studies to date. Historically, the greatest demand for parking has been during the spring and fall on weekend afternoons, especially Sunday. The greatest demand for parking is at the more significant historic sites. On occasion, recreational groups have met on the Park grounds, which has led to a limitation of spaces available for other Park users. Parking shortages have occurred sporadically. In order to accommodate visitor circulation needs, the Park maintains 71 pull-off and parking areas. Parking is provided at the major historical visitor attractions and along the auto tour routes.

Safety

Maintaining a safe environment for visitors touring the Chickamauga Battlefield is very important. The type of vehicular operations by visitors differs from those traveling through the Park because they are more likely to slow down suddenly or stop as is dictated by their desire to interpret the Battlefield.

Since the US 27 relocation, the number of vehicular crashes has decreased in the Battlefield, especially along LaFayette Road. US 27/Lafayette Road experienced 80 crashes in 1996 and 47 crashes in 1997. In 2002, LaFayette Road experienced only five crashes. However, there have been a few more crashes on McFarland Gap Road in 2002 (three crashes) and 2003 (five crashes) than in previous years (two crashes in 1996 and no crashes in 1997). Historically, many of the crashes within the Battlefield involved vehicle-deer collisions.

Battlefield Roadway Sensitivity

Understanding the cultural and historic significance of the CCNMP Battlefield Park's roadways was essential for developing a recommended plan of improvement strategies. Though many of the roadways that traverse through the Park continue outside the Park, while in the Park, the roads are Park roads. They serve to access the historic and cultural features within the Park, and the visitor experience within the Park is impacted by non-Park use of the roads. In order to better understand the historic and cultural importance of the Park roads, a ranking system was employed to determine which roads have relatively greater historic, cultural, and interpretative nature than others. The rankings were based upon five criteria:

- The road's association with a historic period
- The road's interpretive value
- The road's historic integrity
- Whether or not the road is part of the auto tour route
- The road's contribution to a positive visitor experience

Each criterion was ranked on a three-point scale: the higher the ranking, the more sensitive the road for that criterion. Once each of the roadways was evaluated, a composite score was calculated. The roads were then grouped into three categories representing the relative cultural and historic sensitivity. The roads with the highest cumulative score are considered the most sensitive to changes that may increase traffic volume or speed, or which may result in physical modifications required to increase traffic volume or speed. Roads with a cumulative score of 13 to 15 received a high sensitivity rating, a score of 10 to 12 received a moderate sensitivity rating, and a score of 9 or less received a low sensitivity ranking. Table 1.12 lists the Battlefield roadways by criteria and composite score. Figure 1.9 illustrates the road sensitivity of the Battlefield roadways.

Table 1.12
Battlefield Subarea Road Sensitivity Rating

Road Name	Association with Historic Period	Interpretive Value	Historic Integrity	Auto Tour Route	Visitor Experience	Cumulative Score	Sensitivity Level*
Brotherton Road	3	3	3	3	3	15	High
Glenn-Kelly Road	3	3	3	3	3	15	
Snodgrass Road (paved)	3	3	3	3	3	15	
Alexander's Bridge Road	3	3	2	3	3	14	
Battleline Road	2	3	3	3	3	14	
Dyer Road	3	3	3	2	3	14	
Glenn-Viniard Road	3	3	2	3	3	14	
Jay's Mill Road	3	3	2	3	3	14	
Poe Road	2	3	3	3	3	14	
Snodgrass Hill Road	2	3	3	3	3	14	
Wilder Road	3	3	3	2	3	14	
Dalton Ford Road	3	3	3	1	3	13	
LaFayette Road	3	3	2	3	2	13	
Reed's Bridge Road	3	3	2	3	2	13	
Thedford Ford Road	3	3	3	1	3	13	
Mullis Road	3	2	2	1	2	10	Moderate
Viniard-Alexander Road	3	2	2	1	2	10	
Vittetoe Road	2	2	3	1	2	10	
Vittetoe-Chickamauga Road	2	2	2	1	3	10	
Chickamauga-Vittetoe Road	2	2	2	1	2	9	Low
McFarland Gap Road	3	2	2	1	1	9	
Mullis-Vittetoe Road	2	1	3	1	2	9	
Snodgrass-Savannah Road	3	2	1	1	2	9	
Lytle Road	2	1	3	1	1	8	

*Road Sensitivity is based on cumulative score (High: 13 to 15; Moderate: 10 to 12; Low: 9 or less)

This page is a placeholder for

Figure 1.9

Battlefield Subarea Road Sensitivity.

Summary of Identified Issues and Needs

Based on the technical assessment and input from the public and stakeholders, the major issues and needs were synthesized and grouped into four themes:

- North-south mobility and connectivity to Chattanooga
- East-west mobility and mobility within Fort Oglethorpe
- Gateway linkages between the Chickamauga Battlefield and surrounding area
- Battlefield Subarea issues and needs

North-south Mobility and Connectivity to Chattanooga

A major issue within the Traffic Impact Study area is north-south mobility for residents making local trips and commuting to Chattanooga. The US 27 relocation to the western side of the Chickamauga Battlefield provided a higher classification roadway and greater mobility for north-south trips originating west and south of the Battlefield. Though the distance to travel on the US 27 relocation versus LaFayette Road (between the south and north junctions of US 27 relocation/LaFayette Road) is slightly greater, it takes less time to travel on the US 27 relocation. The divided, four-lane US 27 relocation provides much greater capacity than the former two-lane LaFayette Road/US 27 through the Battlefield.

For local mobility, the primary issue related to the US 27 relocation as indicated by stakeholders was safe access between the relocation and intersecting roads. Other north-south concerns included providing better movement east of the Battlefield and experiencing higher vehicular crash rates on Burning Bush Road.

For Chattanooga-bound traffic, improving through-movement at the SR 2/Battlefield Parkway, US 27 and LaFayette Road intersection is an issue now and into the future. The 2025 Chattanooga LRTP network model was used to help identify future congestion issues. The model indicated future congestion on:

- LaFayette Road from Battlefield Parkway north to 37th Avenue
- Schmidt Road/Dewberry Road/Hogan Road from McFarland Gap Road to Chickamauga Avenue
- Fant Drive from SR2/Battlefield Parkway to SR 146/Cloud Springs Road
- Three Notch Road from Battlefield Parkway to US 41

East-west Mobility and Mobility within Fort Oglethorpe

Needs related to mobility within Fort Oglethorpe and overall east-west mobility were identified. One concern of study area residents and the local business community is access to historic Fort Oglethorpe and the business district on LaFayette Road from the US 27 relocation. The US 27 relocation improved overall mobility for the study area, but travel patterns were impacted by the

relocation such that traffic volumes through Fort Oglethorpe's LaFayette Road business district have declined by half. On the other hand, there has been active commercial development along SR 2/Battlefield Parkway.

SR 2/Battlefield Parkway is the primary east-west arterial in the study area. It links Fort Oglethorpe to I-75. Much of the recent development in Catoosa County and Fort Oglethorpe has occurred on Battlefield Parkway. Maintaining mobility on Battlefield Parkway is a critical transportation and economic goal for the community. The 2025 Chattanooga LRTP network model indicated future congestion on Battlefield Parkway from Cedar Lane to east of I-75. Another east-west arterial with identified needs is SR 146/Cloud Springs Road, which has crash rates in sections exceeding the statewide average for its functional classification.

Gateway Linkages between Chickamauga Battlefield and Surrounding Area

Connections between the historic, cultural, and natural resources that are shared by the Battlefield and surrounding communities have not been fully developed. A desire exists to make better connections through enhanced visitor amenities, improved interpretation facilities, and multimodal transportation infrastructure. Exploring potential gateway strategies that invite regional, cultural and educational interests is important to balancing community and NPS objectives.

Battlefield Subarea Identified Issues and Needs

A variety of issues and needs were identified within the Battlefield Subarea. Overall, a fundamental conflict exists between the desire for Park visitors to interpret and enjoy the Chickamauga Battlefield and the excessive traffic and noise generated by non-Park traffic. Roads in the Battlefield are owned by the NPS. To better understand the nature of the roads within the context of the Park's management objectives, a sensitivity rating was developed with input from the NPS. Two-thirds of Battlefield Park roads were found to be very sensitive based on this assessment, which ranked their historic and cultural value.

Other needs cited within the Battlefield Subarea included a desire for improved facilities for non-vehicular Park users, additional access control of roadways within the Park, and improving the poor condition of Park roads. Also identified was a desire to expand the auto tour and interpretive opportunities within the Park. Some of the significant historic sites on the east side of the Park are missed by many visitors.

Improvement Strategy Development

Project Context for Strategy Evaluation

To fully understand the strategy development and evaluation process, the study was framed within the project's context. Though the study addresses two separate areas, the larger Traffic Impact Study area and the Battlefield Subarea, these components are intertwined and interdependent. Actions taken in one area generally impact the other and vice versa.

Major considerations with the study area included:

- Expansion of the Chattanooga urbanized area further into Walker and Catoosa Counties
- Fort Oglethorpe economic changes since the US 27 relocation was open to traffic
- Current and future local and regional mobility
- Resources of the Chickamauga Battlefield Unit of the Chickamauga and Chattanooga National Military Park
- Chickamauga Battlefield gateway resources

Expanding Chattanooga Urbanized Area Boundaries

The area surrounding the Chickamauga Battlefield has changed dramatically in the level of development intensity over the past few decades. Population and employment growth in the area set the context for the Traffic Impact Study effort. Between 1980 and 2000, over 20,000 people moved into Catoosa and Walker Counties. Accordingly, the 2000 Chattanooga urbanized area boundary continued to expand southward into the Traffic Impact Study area in Walker and Catoosa Counties, such that the urbanized boundary follows the western border of the Battlefield and as far south as Alexander's Bridge Road on the eastern border of the Battlefield. In the Catoosa County portion of the study area, the greatest population growth has occurred immediately north of the Chickamauga Battlefield, adjacent to SR 2/Battlefield Parkway and US 27/SR 1. In the Walker County portion of the study area, the greatest population growth has occurred to the north and northwest of the Chickamauga Battlefield. The growth in the study area has put greater demands on the transportation network.

Fort Oglethorpe Economic Changes

The City of Fort Oglethorpe has undergone changes in development and business patterns. Since the improvement of SR 2/Battlefield Parkway, business development has shifted away from the north-south oriented LaFayette Road business district to the east-west oriented SR 2 business district. National and regional chain businesses have settled on SR 2/Battlefield Parkway while businesses on LaFayette Road are primarily under local ownership. The shape of Fort Oglethorpe has also changed as it has continued to annex land eastward along SR 2. One indicator of these changes includes the development of Fort Oglethorpe's City Hall Complex off SR 2/Battlefield Parkway, with no direct street connection to the historic Fort Oglethorpe business district on LaFayette Road.

Local and Regional Mobility

Maintaining local and regional mobility is one of the goals of this study. As population has increased in the study area, traffic on local roads has also increased. Understanding area travel patterns and the roadway network system's capacity to accommodate trips now and into the future is essential to develop meaningful improvement strategies. Besides an increasing production of local trips in and around Fort Oglethorpe, Rossville and the City of Chickamauga, there is a major commute travel pattern between the study area and the greater Chattanooga area. One of the context issues for the Traffic Impact Study area is that it has become a bedroom community for the greater Chattanooga area, and there has been an increase in the number of residents commuting out of the study area for employment.

The refined Chattanooga travel demand model developed for this study was used to help identify areas that would likely experience traffic volume growth and congestion in the future (2025). A refined 2025 Long Range Transportation Plan (LRTP) Model was assumed to be the no-build against which capacity-adding strategies were evaluated. Volume-to-capacity ratios (V/C) were developed to identify locations that would likely be congested in the future. Based on model output, north-south routes leading towards Chattanooga will likely experience the greatest traffic congestion, and major east-west routes such as SR 2/Battlefield Parkway will also face traffic volume growth and congestion.

Resources of the Chickamauga Battlefield Unit of the CCNMP

The context for the Battlefield Subarea study is anchored in history and congressional mandate. Before the Chickamauga Battlefield existed as a National Military Park, it was the site of one of the bloodiest battles of the Civil War. The primary purpose of the Chickamauga and Chattanooga National Military Park "is to preserve the significant resources of the Civil War campaigns and battles of Chickamauga and Chattanooga and to educate the public about the events memorialized." Park management objectives particularly important to this study are those related to visitor experience and roads and transportation. The two visitor experience management objectives are:

- To provide a non-distracting, contemplative environment in order to enhance the visitors' educational and emotional experience.

- To develop the visitors' appreciation of the sacrifices of the soldiers in the battles and campaigns.

An additional objective regarding roads and transportation is:

- To provide a Park road and transportation system that assures access to Park resources and is consistent with the historic character of the roads.

Though the Chickamauga Battlefield's roads remain open to the public, non-Park destined traffic can conflict with visitor experience objectives. Through the data collected and analyzed for this study (license tag origin and destination survey and roadside interview survey), it was determined that, on average, over 80 percent of traffic currently on Park roads is destined for non-Park locations. So, a significant portion of existing traffic volume is generated by non-Park visitors.

Chickamauga Battlefield Gateway Resources

Cultural, historic, and natural features abound in the Traffic Impact Study area immediately outside the Chickamauga Battlefield. According to the *Chattanooga Area Civil War Sites Assessment*, six major sites related to the Civil War are located within the Battlefield's gateway corridors, including along McFarland Gap Road, LaFayette Road, Reed's Bridge Road, Alexander's Bridge Road, Lee and Gordon's Mill (off south LaFayette Road), and Lytle Road. Historic Fort Oglethorpe, immediately north of the Battlefield and west of LaFayette Road, is listed in the National Register of Historic Districts, and Lee and Gordon's Mill is a National Register Historic Site. The West Chickamauga Creek sub-basin encompasses much of the eastern half of the Battlefield and lands immediately east of the Battlefield's boundary. Impacts to the cultural, historic, and natural features must be considered within the framework of this study. Overall, a balance must be achieved between the various elements in the study area to attain a package of recommendations that has substantial benefits for both study area components.

Evaluation Process

Once issues and needs were identified, improvement strategies were developed. Thirty-six improvement strategies were proposed for the Traffic Impact Study area and the Chickamauga Battlefield Subarea. A planning-level screening analysis evaluated impacts against 15 different criteria. The impacts of each strategy on both the Traffic Impact Study area and Battlefield Subarea were considered. To provide a visual summary of the impacts, a comparative evaluation matrix was developed. The matrix listed each of the strategies grouped into four different categories: north-south mobility, east-west mobility, gateway linkages, and Battlefield Subarea. To summarize the impacts for each criteria, the matrix used symbols representing positive, negative, no impact or not applicable for each criteria. This was not a scoring exercise, rather a planning-level determination of whether the impacts for any given criteria were primarily positive or negative, or whether there were no impacts.

Evaluation Measurements

Fifteen evaluation criteria were used to assess the strategies: eight for the Traffic Impact Study area and seven for the Battlefield Subarea. The evaluation criteria are summarized here.

Traffic Impact Study Area Evaluation Criteria

Capacity – Vehicular through trips indicated by V/C ratios. Existing conditions were examined using current traffic volume data and the base 2003 refined Chattanooga travel demand model. The No-Build future condition was evaluated using the refined 2025 LRTP Chattanooga travel demand model. Facilities are considered congested when the V/C approaches or exceeds 1.0.

Operations – Ease of travel including travel time and delay at critical intersections. Intersection LOS analysis was conducted at key intersections in the study area. In addition, key intersections and roadways were evaluated through field review where needs and issues were identified.

Safety – Normalized crash rates compared against the statewide average for each roadway type. GDOT 2001 and 2002 crash data were reviewed. Crash rates were calculated to determine locations where safety issues exist.

Wayfinding – Readability, location and frequency of signage to capture roadway user attention in predominant travel patterns. Existing signage in the study area was assessed through field review.

Cost – An estimate of order-of-magnitude cost relative to other proposed strategies. During this phase of the study, only approximate costs based on planning judgment were utilized.

Economic Impact – Potential implications for economic activity within the community. This was based on planning judgment.

Environmental Justice – Positive or negative impacts on areas where there are concentrations of low-income (below the poverty level) and/or non-white persons and accessibility and implications for those areas. Mapped strategies were screened against identified locations of populations of low-income and non-white persons to help identify if environmental justice communities might be impacted.

Cultural and Natural Resources – Protection, enhancement, degradation, or loss of important cultural and natural features. Proposed strategies were screened against known historic, cultural and natural resources and features in the study area.

Battlefield Subarea Evaluation Criteria

Capacity – Vehicle through trips, V/C within the context of Park setting road functional classification. Capacity on Park roads differs from established capacity standards used for state and local roads. Capacity of the Park roads was lowered to reflect the Park context.

Operations – Ability to serve needs of various travel modes within context determined by Park setting and Park road functional classification. Intersection analysis and field review was conducted to assess traffic operations needs within the Battlefield.

Safety – Number of crashes occurring within the Park and roadway characteristics consistent with Park setting roads functional classification. Crash rates were calculated for major Park roads.

Wayfinding – Readability, location and frequency of signage to capture Battlefield Park visitor's attention. Existing signage was assessed through field review.

Cultural and Natural Resources – Protection, enhancement, degradation, or loss of important cultural and natural features. Improvement strategies were screened against known locations of cultural and historic features in the Chickamauga Battlefield.

CCNMP Park Policies and Goals – Supports or conflicts with the current CCNMP General Management Plan and relevant NPS policies, guidelines, studies and plans. Improvement strategies were screened against known Park policies and goals.

Visitor Experience – Enhances or detracts from the NPS desired visitor experience and associated interpretive programs and facilities.

For mapping and identification purposes, each strategy was assigned a sequential identification number by category during the strategy development phase as follows:

- North-south mobility strategies are numbered I-1 through I-9
- East-west mobility strategies are numbered II-1 through II-5
- Gateway strategies are numbered III-1 through III-7
- Battlefield Subarea strategies are numbered IV-1 through IV-15

Strategy Selection

The strategies were presented to the SPP on February 2, 2004, for review and comment. Following additional evaluation and review, a proposed list of strategies for the draft plan was developed. Five of the 36 strategies were dismissed because their impacts and burdens outweighed their benefits. The evaluation matrix with all the proposed strategies is shown in Table 1.13.

This page is a placeholder for

Table 1.13

Improvement Strategy Evaluation Matrix.

This page is a placeholder for

Table 1.13

Improvement Strategy Evaluation Matrix.

The 2025 recommended capacity-changing strategies were modeled in a final Build network to illustrate their impact on the 2025 No-Build network. The following projects were included in the 2025 Build model:

- Extension of US 27 from SR 2/Battlefield Parkway to SR 146/Cloud Springs Road (in Chattanooga 2025 LRTP)
- Widening of SR 146/Cloud Springs Road from LaFayette Road to US 41 (in Chattanooga 2025 LRTP)
- Widening of SR 2/Battlefield Parkway to six lanes from Cedar Lane to I- 75
- Conversion of Brotherton Road, Viniard-Alexander Road, and Jay's Mill Road from two-way to one-way within the Chickamauga Battlefield
- Gating entrances to the Chickamauga Battlefield at Lytle Road, Long Hollow Road, Wilder Road, Alexander's Bridge Road, and Jay's Mill Road

In order to ensure the future transportation system could accommodate increased visitation to the Chickamauga Battlefield, visitation was doubled in the Build alternative. When compared to the 2025 No-Build alternative, the results of the 2025 Build alternative indicate benefits for the Traffic Impact Study area and the Battlefield Subarea transportation networks. A summary of traffic volume reductions is shown in Table 1.14.

Table 1.14
Build Alternative Traffic Volume Reductions

Roadway	No-Build Volume	Build Volume	Comment
Traffic Impact Study Area			
McFarland Gap Road	8,100 vpd	3,600 vpd	
Reed's Bridge Road	7,300 to 10,200 vpd	3,500 to 5,800 vpd	
SR 2/Battlefield Parkway (west of LaFayette Road)	30,000 vpd	23,200 vpd	
LaFayette Road (between SR 2/Battlefield Parkway and SR 146/Cloud Springs Road)	40,600 vpd	30,400 vpd	
Battlefield Subarea			
LaFayette Road (northern section)	3,800 vpd	2,700 vpd	This decrease is largely due to the US 27 extension to SR 146/Cloud Springs Road.
LaFayette Road (southern section)	4,400 vpd	1,800 vpd	This decrease is largely due to the US 27 extension to SR 146/Cloud Springs Road.
Brotherton Road	1,000 vpd	10 vpd	
Viniard-Alexander Road	150 vpd	10 vpd	
Alexander's Bridge Road	200 to 1,000 vpd	0 to 200 vpd	
Jay's Mill Road	300 to 1,400 vpd	0 vpd	

Source: Refined Chattanooga MINUTP 2025 Model, Cambridge Systematics

It is important to note that the modeled volumes are average daily volumes and do not reflect peak visitation periods for the Chickamauga Battlefield which occur on summer weekends. In addition, the model does not reflect the impacts of either vehicle circulation created by the auto tour or vehicles making multiple stops within the Battlefield. Therefore, the actual volumes above are understated by the model within the Battlefield. However, it does appear that the Build alternative removes most through traffic from the Battlefield, leaving only those who are visiting the Battlefield. Model results indicate that if speeds were reduced through the Battlefield on LaFayette Road, virtually all through traffic would be removed from the Park.

Although in most cases traffic volumes decreased with the Build alternative, locations where traffic volumes increased within the Traffic Impact Study area include:

- SR 2/Battlefield Parkway (east of LaFayette Road) experienced a marginal volume increase due to the capacity addition created by widening SR 2/Battlefield Parkway from four to six lanes. This increased capacity will more than accommodate the minimal increase in volumes.
- US 27 relocation (south of McFarland Gap Road) volumes increased from approximately 22,600 vpd to 25,400 vpd. This increase occurred due to the improved connectivity from the US 27 extension to SR 146/Cloud Springs Road, and the increased capacity will more than accommodate the minimal increase in volumes.
- LaFayette Road (north of SR 146/Cloud Springs Road) volumes increased from approximately 33,200 vpd to approximately 38,600 vpd. This increase is due to the extension of US 27 to SR 146/Cloud Springs Road.

Overall, the Build alternative appears to benefit both to the Traffic Impact Study area as well as the Battlefield Subarea. The recommended strategies 2025 Build model V/C is shown in Figure 1.10. Model output maps are included in Appendix B.

This page is a placeholder for

Figure 1.10

2025 Recommended Strategies Network Volume-to-Capacity Ratios.

Strategies No Longer Under Consideration

Recommended plan strategies are discussed in Sections 2 and 3. The strategies that were dismissed in the screening process are briefly reviewed here.

Out of the strategies proposed for the Traffic Impact Study area and the Battlefield Subarea, five will no longer be considered. Strategy I-6 was redefined and included in the recommended plan strategies. The strategies no longer under consideration are:

- I-2: Extension of US 27 from SR 2/Battlefield Parkway to LaFayette Road/Chickamauga Avenue using Dewberry Road and Hogan Road.
- I-3: Widen LaFayette Road/Chickamauga Avenue from SR 146 to 37th Avenue in Chattanooga, Tennessee from four to six lanes.
- I-6: Widen Three Notch Road from US 41 to Boynton Road from two to four lanes and Red Belt Road from Burning Bush Road to US 27 from two to four lanes to facilitate north-south movement east of the Battlefield. (redefined)
- I-7: Construct a new two-lane minor arterial roadway from US 27 south of the Chickamauga Battlefield to SR 2/Battlefield Parkway near Beaver Road intersection, between the eastern Chickamauga Battlefield boundary and Burning Bush Road.
- II-3: Widen McFarland Gap Road from Mission Ridge Road to LaFayette Road from two to four lanes.
- IV-14: Increase speed limit on LaFayette Road.

More detail regarding these strategies' evaluation may be found in Appendix C.

Air Quality Analysis

Air quality impacts of the recommended plan of proposed strategies were assessed because part of the study area (Catoosa County) has recently been designated as air quality nonattainment for ozone. Previously, the Chattanooga region was in air quality attainment and, therefore, has not had to generate output statistics from the travel demand model to be input into an air quality model. As a result, steps were added to the travel demand model to generate congested speed, vehicle hours traveled (VHT), and vehicle miles traveled (VMT) by area type and facility type for the purposes of this study. The comparison of these three statistics demonstrates that the modeled recommendations for the Traffic Impact Study and Subarea Transportation Plan do not adversely impact air quality in the Chattanooga region.

Based on a review of VMT, VHT, and congested speeds, it can be determined that air quality is not adversely impacted with the proposed Build alternative. Both congested speed and VHT improve with the Build alternative. The increase in VMT is minimal. The results demonstrated a shift in congested speed and VHT from residential areas to commercial suburban areas and a shift in VMT from minor arterial roadways to principal arterial roadways. The air quality analysis is included in Appendix D.