

APPENDIX D:

ALIGNMENTS AND DESIGN LEVELS TECHNICAL MEMO



THIRD INFANTRY DIVISION HIGHWAY CORRIDOR STUDY

Task 7 Study Alignments and Design Levels Draft Technical Memorandum

1. Executive Summary

Section 1927 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) (P.L. 109-59) requires “a report that describes the steps and estimated funding necessary to designate and construct a route for the 3rd Infantry Division Highway,” extending from Savannah, Georgia to Knoxville, Tennessee, by way of Augusta, Georgia. The intent of this study is to develop planning level cost estimates for potential corridors connecting these urban areas. This information will be presented to Congress to fulfill the statutory language and present an overview of the steps necessary to construct such a corridor. The study is not intended to select an alternative for implementation; it will not necessarily lead to any further planning, design, right-of-way acquisition, or construction activities for any specific highway improvement.

This technical memorandum recommends initial study corridors and design levels for the 3rd Infantry Division Highway corridors along with supporting justification and the rationale for the recommendations. Input from the Expert Working Group (EWG) was considered during the development of the Alignments and Design Levels. The EWG is a panel of area transportation officials and federal resource agencies that helps guide the project. The EWG serves as a sounding board to weigh technical options, examine issues from multiple perspectives and, by drawing upon its collective experience, help the team solve problems. Tasks 8-9 in the study involve examining any corridors recommended for additional study in greater detail. This will include a geospatial analysis of land use and environmental features, socioeconomic, traffic and freight movements, consistency with local plans, and more.

Designers progressed through a four-step process to identify reasonable corridors which could satisfy the statutory language guiding the study and connect the four control points identified in **Figure 1**. The final, negotiated scope of work requires the identification of at least four alignment alternatives between Savannah and Lavonia and five alignment alternatives between Lavonia and Knoxville. At least one of the alignments for the entire corridor is required to meet Interstate design standards and at least one alignment should follow substantial portions of existing roadways. The four-step process was:

1. Develop preliminary corridor concepts for EWG discussion (see Appendix A)
2. Based on EWG input, develop study corridors (see **Figure 2** and discussion in Section 4)
3. Identify sensitive resources in the study area which could be considered “fatal flaws” to future corridor development
4. Screen study corridors against fatal flaw constraints to eliminate corridors that are not reasonable or feasible. Cost estimates and necessary project development steps will be prepared for any study corridors which pass this screening.

Four study corridors were developed by a team of design professionals to follow existing roadways where possible, to avoid major national resources (e.g. National Wildlife Refuges and National Parks) and major waterways to the extent possible, and to incorporate EWG input while connecting the metropolitan areas identified in the statutory language.

Initial Study Corridor	Description (see Figure 4)
Corridor A	Farthest west option, running along I-16 west out of Savannah, passing west of Augusta, passing east of Athens and Gainesville, and following the western boundary of the National Forests to I-75 at Cleveland
Corridor B	Follows the Savannah River Parkway from Savannah, running west of the Georgia/South Carolina state line, and following existing roadways through the National Forests and along the western boundary of the Great Smoky Mountains National Park to Knoxville
Corridor C	Follows the Savannah River Parkway from Savannah, following new and existing alignments through South Carolina from Augusta to west of Greenville, and cuts through the National Forests and the Great Smoky Mountains National Park on existing alignments
Corridor D	Northward path on existing alignments from Savannah to Columbia, following I-26 and US 25 north and west to Knoxville

The density of natural resources, the vast area protected by state or federal designations, and aggressive terrain features throughout the northern portion of the study area create numerous challenges to highway development. Regional residents and organizations have been outspoken about their desire to protect natural and cultural resources by limiting development. Fatal flaws were identified as impacts within the Great Smoky Mountains National Park (GRSM), extreme mountainous terrain, and failure to connect the control points.

A variety of perspectives suggest a western corridor provides the least objectionable option for the northern portion of the General Study Area (between Lavonia and Knoxville). Based on environmental constraints, constructability and engineering concerns, economic considerations, regional transportation connections, and public opposition, Corridor A from I-85 at Commerce, along the western boundary of the National Forests, to I-75 at Cleveland will be used for cost estimation. Other northern corridors would lead to greater impacts within the National Forests, would fall within the GRSM, and would face other terrain/geotechnical obstacles.

For the southern portion of the General Study Area (between Savannah and Lavonia), Corridors A, B, or B1 Bypass along the Savannah River Parkway are recommended for additional study. Either corridor

provides a comparable level of mobility and impacts which could provide a reasonable, feasible connection to a western corridor beyond Lavonia.

Three potential design levels will be evaluated for each corridor recommended for additional study.

- Interstate: 4-6 lanes with grade-separated interchanges and potential viaduct or tunnel sections
- Arterial: 4 lanes with at-grade intersections
- Super-2 Highway: 2-3 lanes with truck climbing and passing opportunities

The following sections work through the 4-step corridor identification and screening process in more detail.

2. General Study Area and Control Points

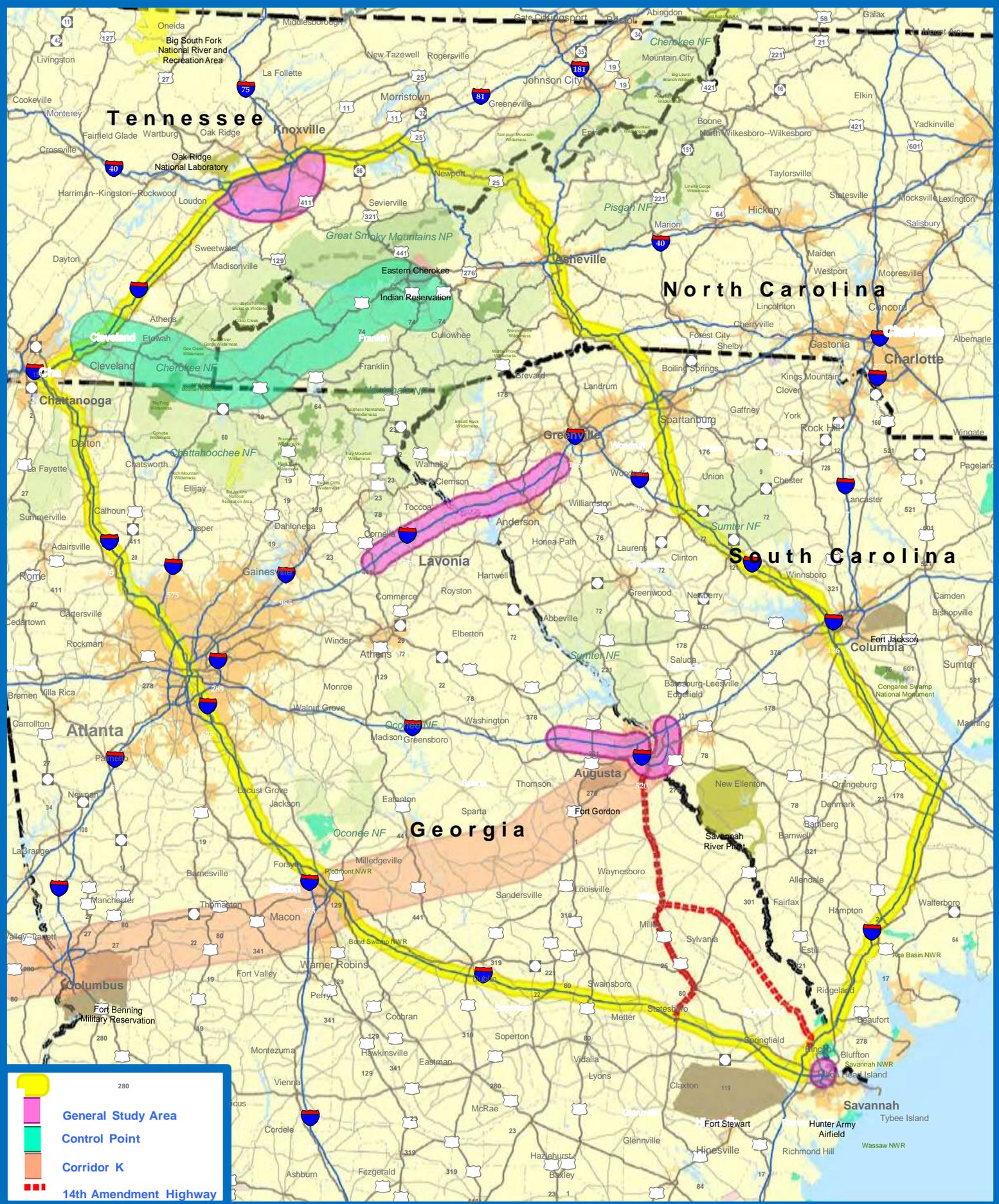
The General Study Area for the project is bounded by existing Interstate facilities. On the east, the General Study Area runs northeast on I-95 from Savannah to I-26; northwest on I-26 through Columbia and Asheville to I-40; then west on US 25 to I-40 to Knoxville. On the west, the General Study area runs northwest on I-516 to I-16 from Savannah to I-75 in Macon to Atlanta and north on I-75 to Knoxville. Separate studies to identify a future 14th Amendment Highway (southwest from Augusta) and Corridor K (an east-west link in southern Tennessee) are also underway. These two studies have been coordinated to a limited extent with the planning activities for the 3rd Infantry Division Highway study.

Within the General Study Area, Control Points were defined to serve as corridor “wickets” through which potential corridors must pass. The alignments of the corridors can vary significantly between Control Points, but all corridors should pass through the Control Points. The choice of Control Points was based on various considerations: stakeholder preferences, the location of economic development activities and major traffic generators, the location of military bases, logical points in accordance with logical termini definition, and others.

The following are descriptions of the four Control Points:

- **Savannah, GA** - A connection along I-516 between the US 80/US 17 interchange and the SR 25 Connector (West Bay Street) Interchange to better serve the key economic resources of Fort Stewart and the Port of Savannah.
- **Augusta, GA** – A corridor crossing I-520 around Augusta or I-20 from the western edge of Augusta to a point just to the west of Fort Gordon.
- **Lavonia, GA** – A connection along I-85 from west of the Greenville Bypass to the US 441 Interchange.
- **Knoxville, TN** –A connection to an existing limited access highway in Knoxville.

Figure 1 shows the established Control Points within the General Study Area, along with other key transportation facilities in the area such as Interstates, Corridor K, and the 14th Amendment Corridor.



Legend

- General Study Area
- Control Point
- Corridor K
- 14th Amendment Highway

Savannah River Parkway

THIRD INFANTRY DIVISION HIGHWAY CORRIDOR STUDY

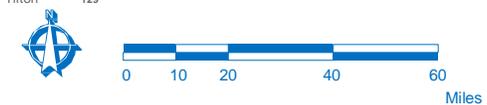


Figure 1

Control Points

3. Preliminary Corridors and EWG Input

At the second meeting of the EWG in December 2010, the project team presented four illustrative corridors to facilitate discussion among EWG members on the range of study alignment corridors. EWG members also identified potential issues to be considered in the corridor evaluation process. Additional information about the preliminary corridors and EWG feedback received is included in Appendix A.

EWG members offered a number of comments regarding sensitive resources that should be considered during the corridor development process. Corridors should avoid protected environmental resources: National Forest lands, federally designated Wilderness Areas, National Parks, National Wildlife Refuges, and critical endangered species habitats. Geologic concerns such as pyritic rock and mountain ranges are another issue to avoid when developing alignments. Major river crossings and the Savannah Nuclear Station should be avoided. The EWG suggested that a special cross-section should be developed for segments in sensitive areas, similar to the I-70 tunnel sections near Denver or the elevated viaducts along the Blue Ridge Parkway. Also, all potential corridors should be developed before any are eliminated, for example, a link that provides access to Atlanta. Any eliminated corridors will require supporting justification.

4. Study Corridors

Based on the known constraints and input from the EWG, four initial corridor options have been developed. Four study corridors were developed by a team of design professionals to follow existing roadways where possible, to avoid major national resources (e.g. National Wildlife Refuges and GRSM National Park) and major waterways to the extent possible, and to incorporate EWG input while connecting the metropolitan areas identified in the statutory language. Corridors are shown in **Figure 2**.

General descriptions of the corridors were presented in section 1. The following presents a more detailed description of individual segments of Corridors A, B, C, and D. In addition to the four primary routes, a series of small connectors form potential links between corridors. These connectors allow transitions from one corridor to another; for example, Segment AB forms a link between the southern portion of Corridor A and the northern portion of Corridor B.

For comparison, the distance between downtown Savannah (I-16/I-516 interchange) to downtown Knoxville (I-40/I-275 interchange) is 420 miles along the eastern boundary of the study area, following I-95 to I-26 to US 25 to I-40. Along the western boundary, the route is 460 miles, following I-16 to I-75. The distance between these points is 435 miles along Corridor A, 365 miles along Corridor B, 370 miles along Corridor C, or 385 miles along Corridor D. All distances in this memo are measured along the centerline of the corridor and do not account for horizontal/vertical curves that would occur in an actual roadway alignment.

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**Initial Study
Alternatives**

A corridor to/through Atlanta was not included in the list of options to be considered. Interstate and arterial links within the metropolitan area experience congestion and substantial delays. The 2005 Atlanta Regional Commission’s *Regional Transportation Plan* identified the majority of regional roadways in Dekalb, Cobb, Gwinnett, and northern Fulton Counties as congested based on travel times during peak periods. Previous proposals to create a new bypass north and east of Atlanta met with substantial local opposition and were dismissed from further development. In addition, the scope of work for the project identifies a control point at Lavonia, east of Atlanta, as an intermediate destination along the proposed corridor.

a. Corridor A

Corridor A between Savannah and Knoxville is made up of segments A1, A2B2, A3B3, A4, A5, A6 (west or east option), and A7. Connecting segment AB makes it possible to link segments A1, A2B2, A3B3, A4 to Corridor B further north. The following segments make up Corridor A; gray cells represent options branching off of the primary Corridor A corridor:

Segment	Description	Length
A1	Begins in Savannah, moving westward along the I-16 Jim Gillis Historic Savannah Parkway corridor. This section of roadway currently has four travel lanes.	48
	Turns northward at US 25/US 301 and runs through Statesboro. US 25/US 301 is currently a four-lane, controlled access, divided rural highway, transitioning to a five lane section with a center turn lane entering Statesboro. This segment follows the Veterans Memorial Parkway bypass around the western side of Statesboro.	14
	North of Statesboro, veers northwest along US 25 to Millen. This section of roadway is under construction currently to widen the route to a four-lane, divided highway.	24
A2B2	From Millen, continues north along US 25 to Waynesboro. This section of roadway is generally a four-lane, controlled access, divided rural highway. Through Waynesboro, the existing route has an urban cross section, with curbs, at-grade intersections and driveways, and turn lanes.	26
A3B3	North of Waynesboro, turns west on new alignment, creating a link south and west of Fort Gordon to I-20. The corridor interchanges with I-20 near Thomson, at the western edge of the Augusta Control Point.	35
	Continuing northbound across I-20, generally follows the US 78 corridor north towards Washington. The US 78 corridor is a two-lane highway.	18
A4	Follows the US 78 corridor northwest towards Athens. The US 78 corridor is a two-lane highway east of Crawford, and has two to three lanes from Crawford to Athens.	50
	East of Athens, turns northward around the city center. It then follows the US 441 corridor north to Commerce and I-85, connecting at the western end of the Lavonia Control Point. This section of roadway is generally a four-lane, controlled access, divided rural highway.	26

Segment	Description	Length
AB Connector	North of Segment A4, generally follows the US 441 corridor into the Chattahoochee National Forest. This section of roadway is a four-lane, controlled access, divided highway.	39
A5	Curves west from the US 441 intersection with SR 164 to Dahlonega on new alignment. This creates a new 40-mile highway link well north of developed areas in Gainesville.	32
A6 West	From Dahlonega to Ellijay, generally follows the SR 52 corridor along the southern boundary of the Chattahoochee National Forest.	32
	West of Ellijay, generally follows the US 76 corridor west and north to Chatsworth.	22
	At Chatsworth, turns northward and follows US 411 along the eastern side of the Chattahoochee National Forest, across the Georgia/Tennessee state line, and continues north to the intersection with US 64 east of Cleveland. US 411 has a five-lane cross section just north of Chatsworth, dropping to a two-lane cross section along the National Forest boundary.	25
	North of the US 64-US 411 intersection, continues northward on a new alignment, joining I-75 north of Cleveland. This segment follows I-75 from Cleveland to Sweetwater.	39
A6 East	At Dahlonega, turns northward to follow SR 60 through the Chattahoochee National Forest to the Tennessee/Georgia state line. This section of highway has two travel lanes and narrow shoulders.	44
	In Tennessee, follows SR 68 north through the Cherokee National Forest and on to I-75 near Sweetwater. Through this section, SR 68 is generally a two-lane highway.	51
A7	From Sweetwater, runs along the existing I-75 corridor, terminating at I-40 at the Knoxville Control Point.	24

b. Corridor B

Corridor B between Savannah and Knoxville is made up of segments B1, A2B2, A3B3, B4, B5, and B6. The B1 Bypass option provides an opportunity to bypass congested sections within Segment B1. Connecting segment BC makes it possible to link segments B1, A2B2, A3B3, B4, B5 to Corridor C further north. The following segments make up Corridor B; gray cells represent options branching off of the primary Corridor B corridor:

Segment	Description	Length
B1	Begins in Savannah, traveling northwest along SR 21/Savannah River Parkway to Millen. This section of SR 21 is a four-lane, controlled access, divided rural highway.	73
B1 Bypass	Begins in Savannah and exits the city along SR 21 and the Jimmy Deloach Parkway. West of I-95, the corridor travels north on new alignment west of SR 21/Savannah River Parkway to Springfield. This segment creates a new link, bypassing existing congestion along SR 21. North of Springfield, follows the Corridor B corridor described above.	75

Segment	Description	Length
A2B2	From Millen, continues north along US 25 to Waynesboro. This section of roadway is generally a four-lane, controlled access, divided rural highway. Through Waynesboro, the existing route has an urban cross section, with curbs, at-grade intersections and driveways, and turn lanes.	26
A3B3	North of Waynesboro, turns west on new alignment, creating a link south and west of Fort Gordon. The corridor interchanges with I-20 near Thomson, at the western edge of the Augusta Control Point.	35
	Continuing northbound across I-20, generally follows the US 78 corridor north towards Washington. The US 78 corridor is a two-lane highway.	18
B4	East of Washington, continues northwards on new alignment. It roughly follows SR 17 to SR 77 to I-85 at the Lavonia Control Point, just west of the Georgia/South Carolina state line.	61
	North of I-85, travels northwards on new alignment just west of the Georgia/South Carolina state line to US 23.	25
B5	Follows the US 23/US 441 alignment northward through the National Forests from west of Toccoa, Georgia to Franklin, North Carolina. US 23/US 441 is a controlled access four-lane highway along this portion of the route.	30
BC Connector	North of Franklin, continues northeast from segment B5 along the existing US 441 alignment and joins Corridor C at the Eastern Cherokee Indian Reservation.	30
B6	North of Franklin, generally follows SR 28 westwards to Tellico Road/Otter Creek Road to Wayah Road. SR 28, Tellico Road, Otter Creek Road, and Wayah Road are narrow two-lane roadways traveling through the National Forest.	20
	From Wayah Road, continues westward along US 129 through the National Forests, over the North Carolina/Tennessee state line, around the western edge of the Great Smoky Mountains National Park. US 129 is a two lane highway.	28
	Beyond the National Forest boundary, continues north along US 129 through Maryville then along I-140 to I-40 within the Knoxville Control Point. US 129 is a two-lane highway south of Maryville, transitioning to a four-lane, controlled highway between Maryville and Knoxville, and six lanes entering Knoxville from the south.	34

c. Corridor C

Corridor C follows Corridor A or B from Savannah to just south of Augusta. From there, Corridor C is made up of segments C1, C2, C3, and C4. Connecting segment CD South makes it possible to link segment C1 to Corridor D further north. Connecting segment CD North makes it possible to link segments C1 and C2 to Corridor D further north. The following segments make up Corridor C; gray cells represent options branching off of the primary Corridor C corridor:

Segment	Description	Length
C1	Begins just south of Augusta, connecting to the southern portion of either Corridor A or Corridor B. North of Waynesboro, continues northward along the US 25/Savannah River Parkway alignment to southern Augusta. This section of roadway is a four-lane, controlled access, divided rural highway.	11
CD South Connector	From US 25/Savannah River Parkway just south of Augusta, follows I-520 east around the city, along the Augusta Control Point to I-20.	20
	North of I-20, follows the existing SR 121 alignment through South Carolina to I-26. Beyond Augusta, SR 121 is a two-lane highway.	59
C2	South of Augusta, turns west and creates a western bypass of the city, passing on the eastern side of Fort Gordon. This link creates a connection to I-20 near the SR 388 interchange at the Augusta Control Point.	15
	Crosses I-20 in eastern Augusta and continues northwards on new alignment to US 221 at the southern tip of Clarks Hill Lake on the Georgia/South Carolina state line.	11
	Continues north generally following the existing US 221 alignment, which runs along the eastern side of Clarks Hill Lake and through Sumter National Forest. US 221 is a two-lane highway. The segment follows the US 221 alignment around the eastern side of Greenwood, South Carolina.	47
	From Greenwood, travels northwest along the existing US 178 corridor to Honea Path. US 178 has a five-lane section at Greenwood, which changes to a two-lane highway for most of this section of the route.	22
	North of Honea Path, creates a connection on a new alignment to I-85 between Greenville and Anderson, at the eastern end of the Lavonia Control Point. North of I-85, continues north on new alignment to near the US 178/US 123 intersection.	29
CD North Connector	Creates a new alignment from Segment C2 north and west of Greenville to I-26 south of Asheville, following Corridor D.	37
C3	Continues north along US 178 across the North Carolina/South Carolina state line to its northern end near Rosman, North Carolina on the eastern edge of the Nantahala National Forest. US 178 is a two-lane highway.	24
	North of Rosman, follows SR 215 through the Nantahala National Forest to the Blue Ridge Parkway, which is also a National Park. SR 215 is a two-lane highway with narrow shoulders.	12
	Continues northwest along the Blue Ridge Parkway. The Blue Ridge Parkway runs through the National Forest and is a two-lane highway with narrow shoulders. This segment follows its alignment to the intersection with US 441 at Cherokee, North Carolina.	29
C4	North of Cherokee, follows the existing US 441/Newfound Gap Road alignment through the Great Smoky Mountains National Park to Gatlinburg, Tennessee. Through the park, US 441 is a two-lane highway but is closed during winter months.	43

Segment	Description	Length
	At Gatlinburg, creates a new alignment to connect to I-40. The new route would pass east of developed areas around Sevierville then follows I-40 westward to the Knoxville Control Point.	20

d. Corridor D

Corridor D between Savannah and Knoxville is made up of segments D1, D2, and D3. Corridor D generally follows existing Interstates but does not intersect the Augusta or Lavonia Control Points. The following segments make up Corridor D:

Segment	Description	Length
D1	Begins in Savannah, traveling north on I-95 into South Carolina to US 321.	12
	Continues along US 321 until it reaches I-26 south of Columbia, South Carolina. US 321 has a two-lane cross section.	118
	Follows I-26 northward through Columbia to near Newberry. This segment of Interstate has a four lane cross-section.	40
D2	Follows I-26 along the eastern boundary of the General Study Area from Newberry, South Carolina to just south of Asheville, North Carolina. This segment of Interstate has a four lane cross-section.	85
D3	Around Asheville, transitions from the I-26 corridor to generally follow the US 25 corridor northward. The corridor continues north and east across the North Carolina/Tennessee state line to join I-40 near Newport. US 25 has a four-lane cross section while it runs near I-26, transitioning to a two-lane section moving westward.	73
	From Newport, follows the existing I-40 corridor north and west to the Knoxville Control Point. I-40 has four to six lanes west of Knoxville.	41

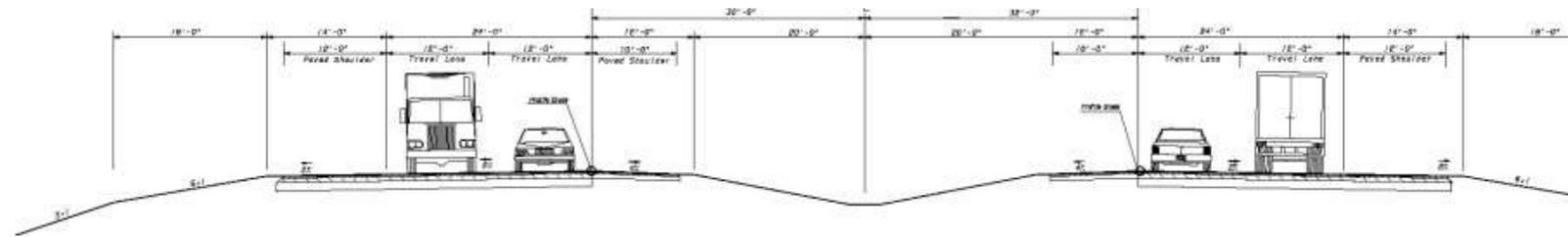
5. Design Levels

Per the scope of work and input from the EWG, three roadway design levels will be considered along the proposed corridors: Interstate, Arterial, and Super-2. At this conceptual level of detail, any design level could be applied to any corridor segment. Following the corridor screening process, recommendations will be developed regarding the most appropriate design level to apply to each segment recommended for additional study.

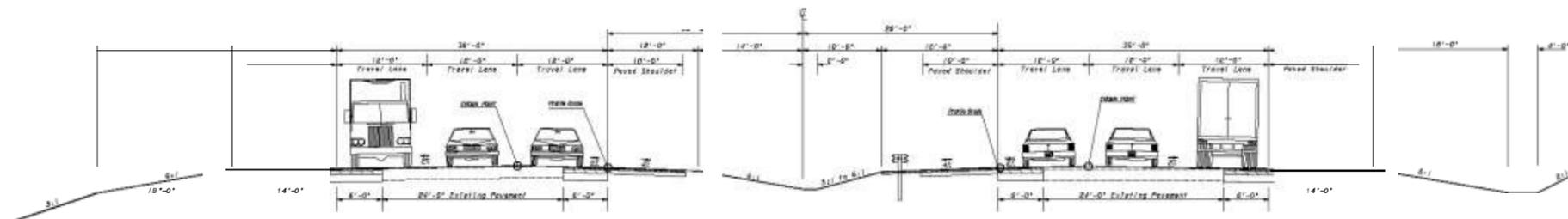
a. Interstate

The first design level complies with the typical design standards for an Interstate route. The actual cross section can vary depending on the width, design speed, type of median, and the terrain. Illustrative typical sections for the standard Interstate route are shown in **Figures 3 and 4**. **Figure 3** represents a 4-lane section on new alignment, which could be widened to 6 lanes in the future. **Figure 4** presents an existing 4-lane arterial conversion to an Interstate design level.

FIGURE 3
 INTERSTATE DESIGN LEVEL ON NEW ALIGNMENT

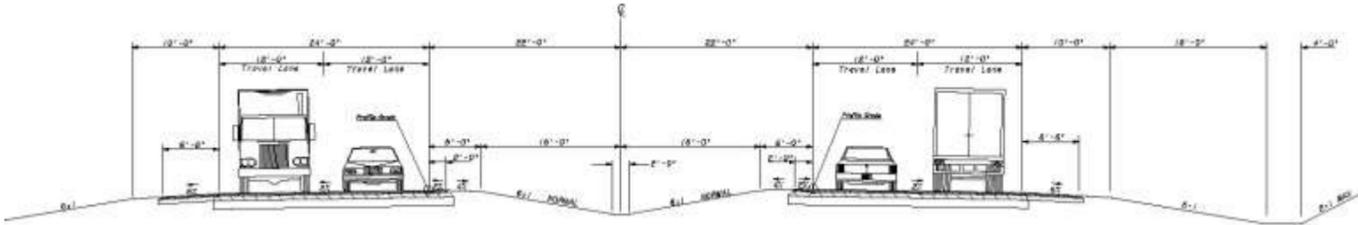


TANGENT SECTION
 4 LANES WITH A 64' MEDIAN
 rD.S. 65 MPH

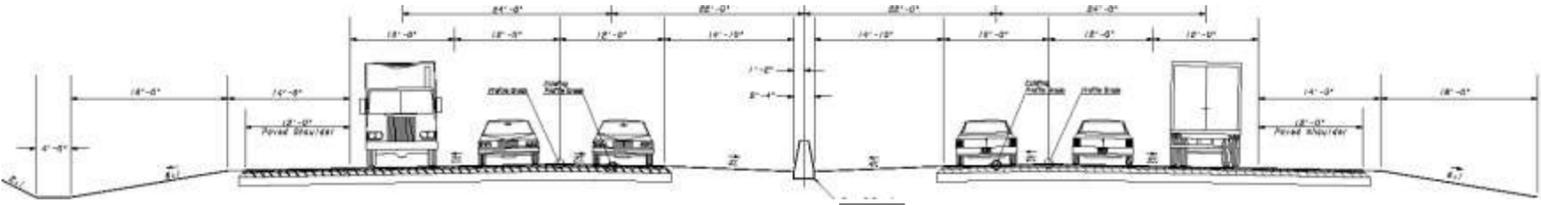


TANGENT SECTION FUTURE
 6 LANE WIDENING rD.S.
 65 MPH

FIGURE 4
 INTERSTATE DESIGN LEVEL CONVERSION FROM 4 LANE ARTERIAL



NORMAL CROWN
 EXISTING 4 LANE ARTERIAL WITH A 44' MEDIAN
 (D. S. 65 MPH)



TANGENT SECTION
 CONVERSION TO 6 LANE INTERSTATE WITH A 44' MEDIAN
 (D. S. 65 MPH)

Interstate System design standards require that an Interstate has no at-grade intersections. For this planning level of analysis, it is assumed that connections would be made through grade-separated interchanges. Smaller cross streets would either be terminated on either side of the proposed alignment or passed over/under the proposed facility.

A variation of this design level is a special Interstate section, specifically identified for areas of rugged terrain or in environmentally sensitive areas. The special Interstate design level incorporates elevated roadway sections on viaduct to minimize impacts. This cross-section would reduce the roadway footprint by reducing the need for cut/fill sections. It also helps to address concerns with rock slides, which are inherent due to the region's geology. The special Interstate section is shown on **Figure 5**. Connections would be planned with grade-separated interchanges.

Examples of the special Interstate design level are found on Interstates and parkways throughout the country: the 4,600-foot Cumberland Gap tunnel on US 25E near the Kentucky, Tennessee, and Virginia border; tunnels through the Allegheny Mountains along the Pennsylvania turnpike, I-70, and I-76; and I-70 through Glenwood Canyon. Special interstate sections may help eliminate the need for seasonal road closures through the GRSM or address existing landslide issues along I-40 and similar roadways.

b. Arterial

The second design level option is for a four-lane, divided highway with at-grade intersections, as shown on **Figure 6**. Grade-separated interchanges may be included at major arterial junctions with other arterial routes. Four-lane arterials typically have 60-70 mph design speeds with 12-foot lanes and full width paved shoulders. The actual width of the median can vary.

c. Super-2

The third design level option is for a two-lane highway with at-grade intersections, as shown on **Figure 7**. Super-2 highways start with standard two-lane cross sections and, as needed, a third lane is added for passing, truck climbing, turning, and other purposes. Research shows Super-2 highways are typically safer than two-lane highways and can be constructed at lower costs than traditional four-lane highways.

6. Sensitive Resources

Readily available data from a variety of online sources was assembled to provide an overview of environmental attributes within the study area. Appendix B contains a detailed segment-by-segment comparison of impacts at a planning level. **Table 2** provides a summary matrix of impacts.

a. Protected Lands

Geospatial data was assembled to identify large tracts of protected lands: National Forests, military installations, nature preserves, National Parks and Recreational Areas, state parks, federally designated Wilderness Areas, water bodies, and more. These areas are shown in **Figures 8** and **9**. Although these areas do not represent all of the constraints to highway development in the study area, they do represent the largest protected features.

FIGURE 5
SPECIAL INTERSTATE DESIGN LEVEL

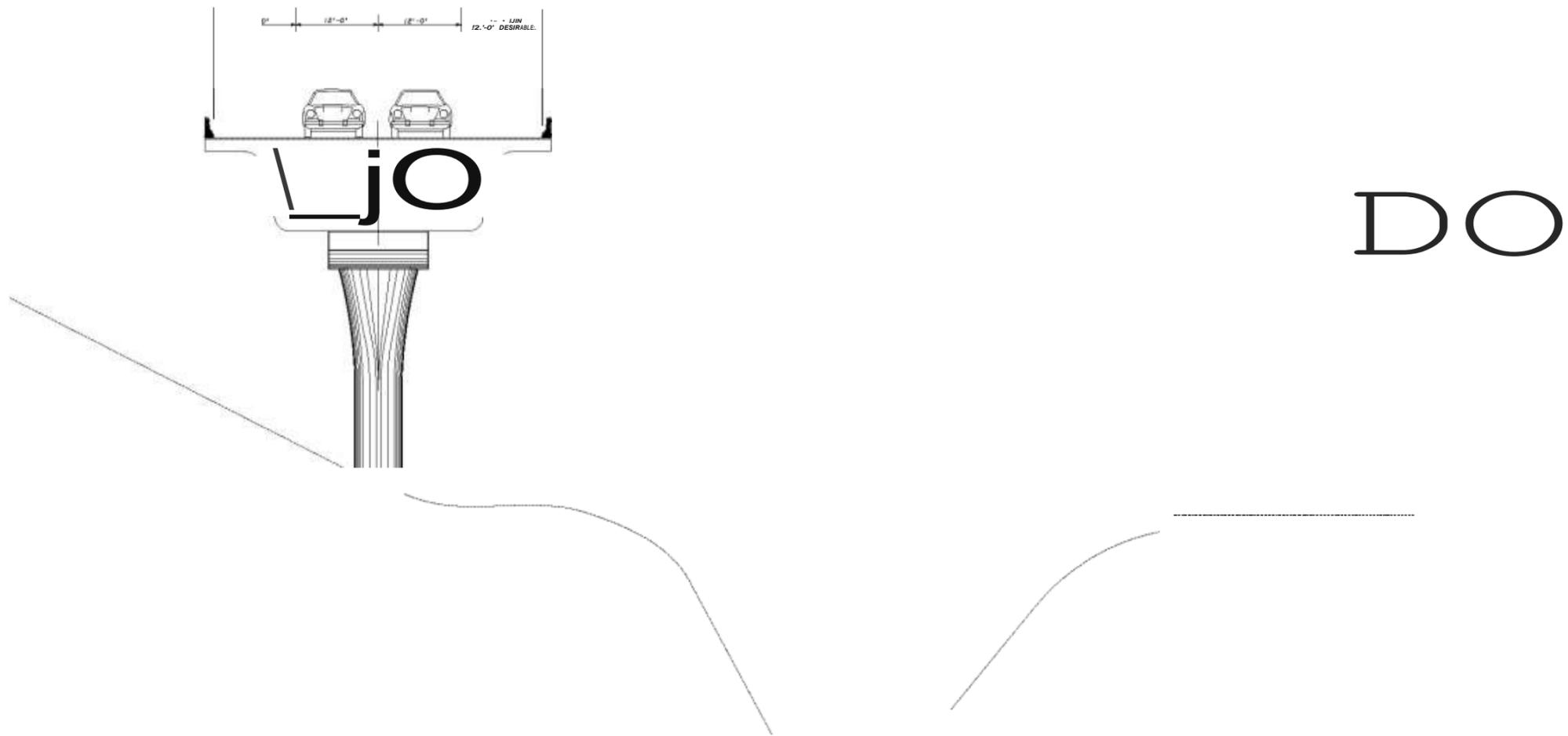
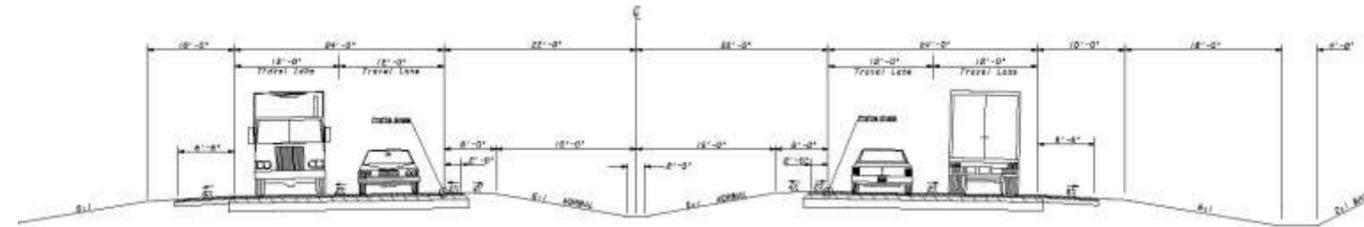
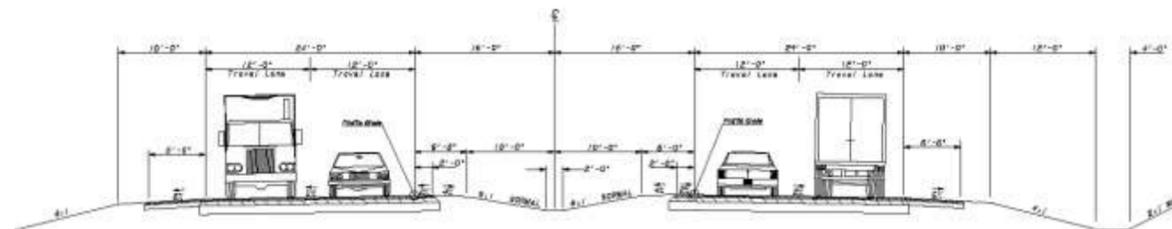


FIGURE 5
ARTERIAL DESIGN LEVEL

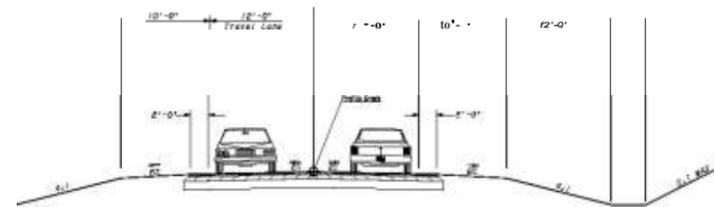


NORMAL CROWN
4 LANES WITH A 44' MEDIAN
(D.S. 65 MPH)

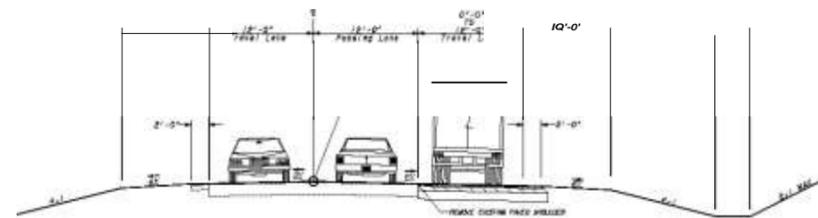


NORMAL CROWN
4 LANES WITH A 32' MEDIAN
(D.S. 55 MPH)

FIGURE 7
SUPER-2 HIGHWAY DESIGN LEVEL



TANGENT SECTION
2 LANES
rD.S. 55 MPH!



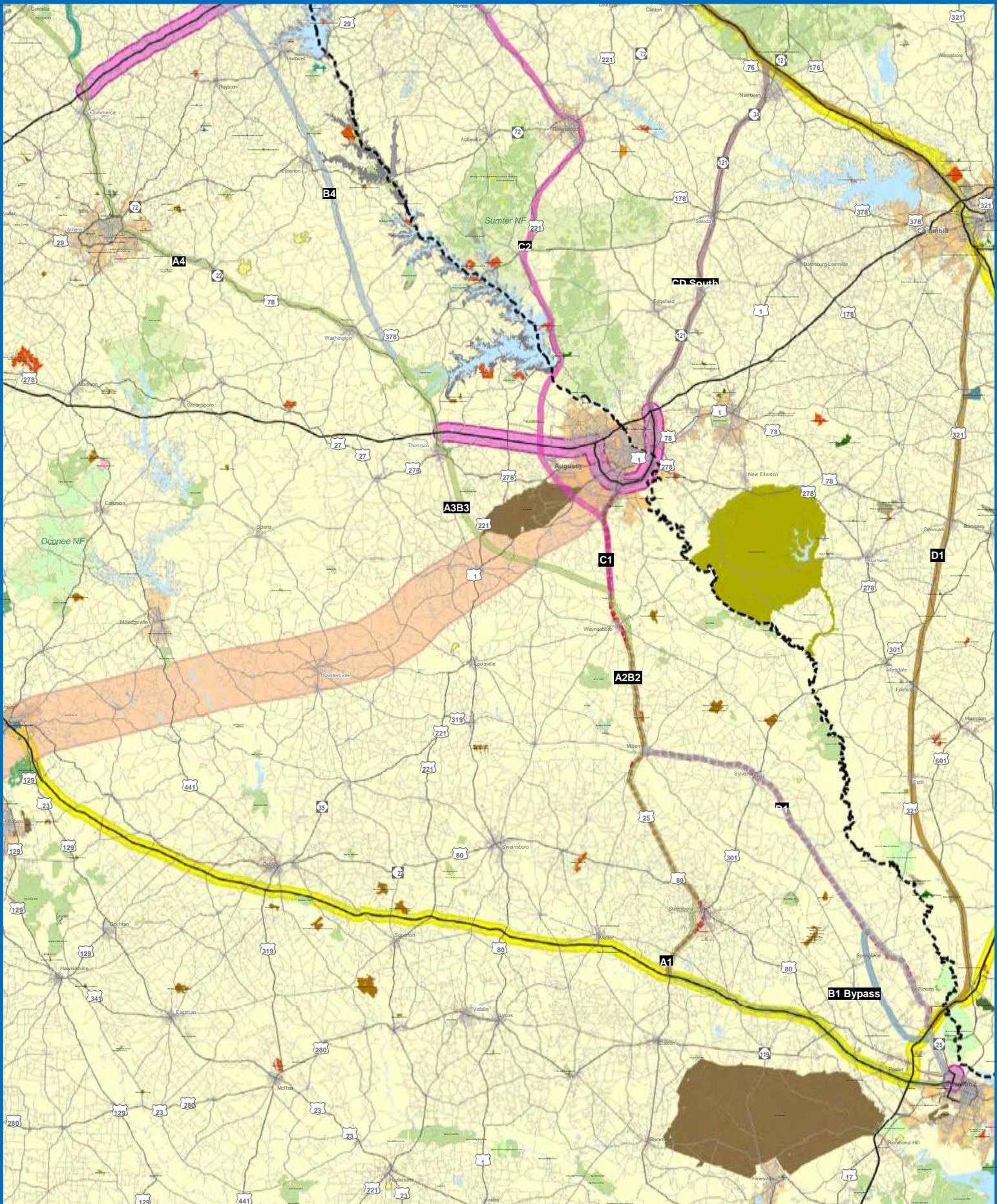
TANGENT SECTION
3 LANES
rD.S. 55 MPH!

Table 2: Comparison of Major Impacts by Corridor

	Corridor	Follows Existing Alignment	Transportation Network	Park Impacts	Distance in National Forests	Community Impacts	Wilderness / Wildlife Zones*	Terrain	GA Protected Mountains	Karst Potential	Landslide Potential	Other Features
Savannah to Augusta	Corridor A	Most (25% new)	Safety Issues in Savannah	1 adjacent	None	Likely	1 WMA adjacent	Level	No	Yes	Moderate to High	Clarks Hill Lake
	Corridor B	Some** (25-40% new)	Congestion Issues in Savannah, can be avoided following B1 Bypass corridor	1 adjacent	None	Likely	1 WMA adjacent	Level	No	Yes	Moderate to High	Clarks Hill Lake; Lake Louise
	Corridor C	Most** (10-30% new)	Potential congestion/safety issues in Savannah	1 adjacent	None	Likely	1 WMA adjacent	Level	No	Yes	Moderate to High	Fort Gordon; Clarks Hill Lake; Lake Louise
	Corridor D	All	Congestion Issues in Savannah	None	None	Likely	National Wildlife Refuge	Level	No	Yes	Moderate to High	Does not intersect Augusta or Lavonia Control Points
Augusta to Lavonia	Corridor A	All	Bypasses Congestion at Augusta and Atlanta	2 adjacent	None	Likely	None	Level	No	No	Moderate to High	Clarks Hill Lake
	Corridor B	Some (75% new)	Minimal impacts	None	None	Likely	None	Level	No	No	Moderate to High	Clarks Hill Lake; Lake Louise
	Corridor C	Most (30% new)	Bypasses congestion in Augusta**	1 adjacent	18 miles	Likely	None	Level	No	No	Moderate to High	Fort Gordon; Clarks Hill Lake; Lake Louise
	Corridor D	All	Minimal impacts	None	None	Likely	1 NHA adjacent	Level	No	No	Moderate to High	Does not intersect Augusta or Lavonia Control Points
Lavonia to Knoxville	Corridor A (West)	Most (20% new)	Safety Issues and Congestion in Knoxville; Spur to I-75; Link to Corridor K	None	1.5 miles	Likely	2 WMA along; 2 WMA adjacent	Moderate	Yes	Yes	High	Lake Zwerner dam; Carters Lake; Hiwassee River; Tennessee River
	Corridor A (East)	All	Link to Corridor K	None	53 miles	Likely	2 WMA along	Moderate	Yes	Yes	Moderate to High	Hiwassee River; Blue Ridge Lake; Tennessee River
	Corridor B	All	Link to Corridor K	3 adjacent including GRSM	79 miles	Likely	Gamelands; 1 NHA along; 5 NHA adjacent	Aggressive	Yes	Yes	High	Little Tennessee River; Tallulah Falls Lake; Appalachian Trail; Fort Foudon Lake; Tellico Lake; Chilhowee Lake; Calderwood Lake; Santeetlah Lake; Cheoah River
	Corridor C	Most (15% new)	Bypasses Congestion in Sevierville	20 miles in GRSM	29 miles	Likely	Black bear sanctuary; 7 NHA along; 7 NHA adjacent	Extremely Aggressive	No	Yes	High	Cherokee Reservation; Douglass Lake; French Broad River
	Corridor D	All	Potential to bypass Congestion in Asheville	1 adjacent	41 miles	Likely	Black Bear Sanctuary; 3 NHA along; 2 NHA adjacent	Aggressive	No	Yes	Moderate to High	Appalachian Trail, French Broad River, Douglass Lake

* NHA = Natural Heritage Area designated by North Carolina Natural Heritage Program; WMA = Wildlife Management Area (Georgia)

** Depending on whether existing SR 21 alignment or Bypass selected



THIRD INFANTRY DIVISION HIGHWAY CORRIDOR STUDY

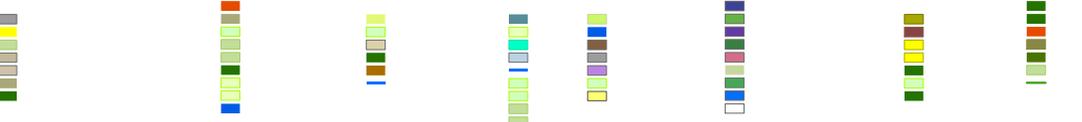
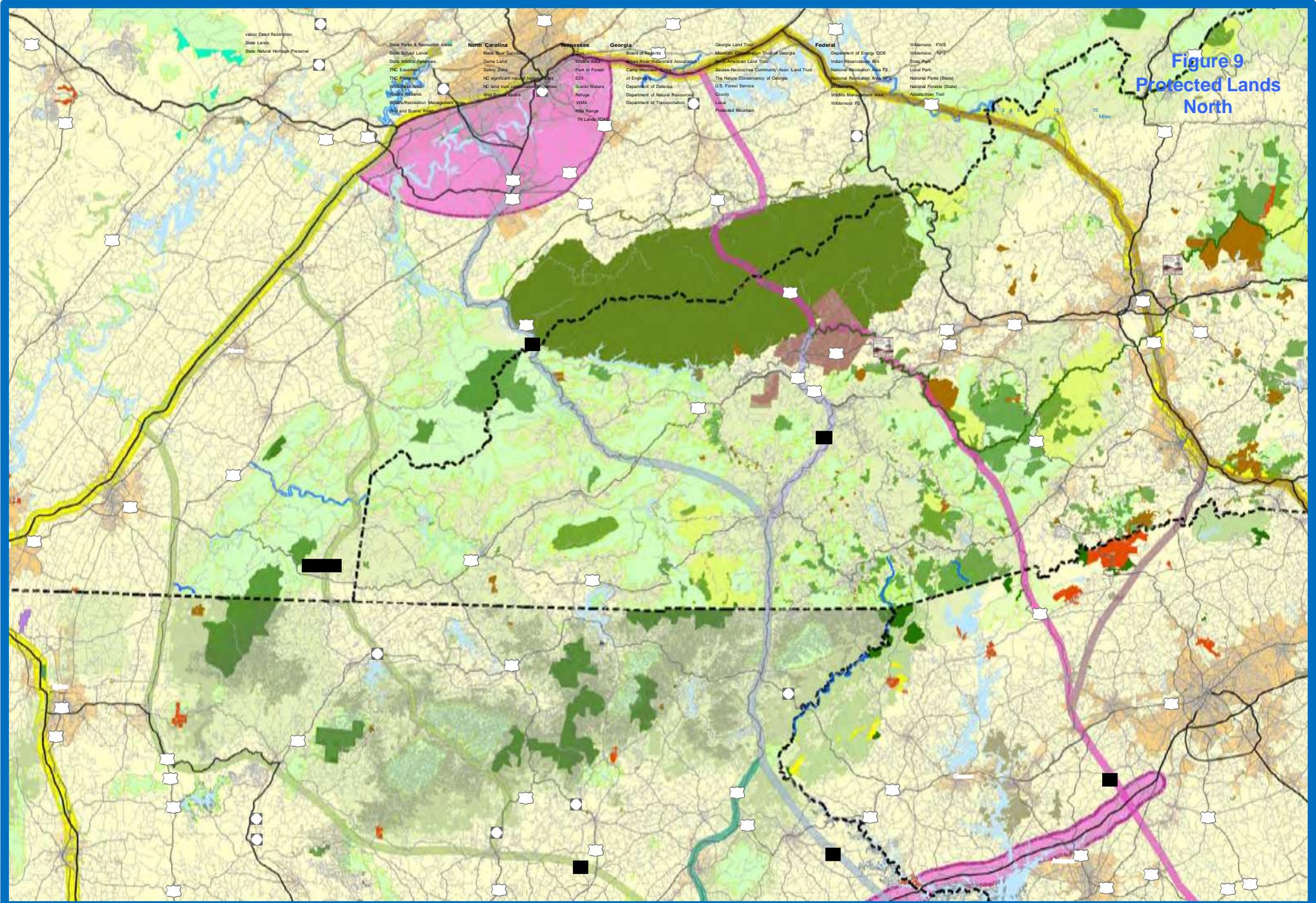
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| <p>South Carolina</p> <ul style="list-style-type: none"> Army Corps of Engineers Biological Reserve Conservation Easement Department of Defense (DOD) Ducks Unlimited Easement Federal Lands Forest Service (USFS) Local Land Trust Preserve/Easement National Historic Site National Wildlife Refuge (NWR) Private Conservation Easement State Lands State Natural Heritage Preserve State Parks & Recreation Areas State School Lands State Wildlife Reserves TNC Preserve Wildlife/Recreation Management Area | <p>Georgia</p> <ul style="list-style-type: none"> Land Trust Jensen-Cole County Board of Regents Broad River Watershed Association Corps of Engineers Department of Defense Department of Natural Resources Department of Transportation Ducks Unlimited Georgia Forestry Commission National Park Service Natural Resources Conservation Service Tall Timbers Land Conservancy The Nature Conservancy of Georgia U.S. Fish and Wildlife Service U.S. Forest Service | <p>Federal</p> <ul style="list-style-type: none"> Army Corps of Engineers DOD Department of Energy DOE Indian Reservations BIA National Recreation Area FS National Recreation Area NPS Wilderness Wildlife Management Area Wilderness FS Wilderness FWS Wilderness NPS State Park Local Park National Parks (State) National Forests (State) |
|---|--|--|



0 1 2 3 4 5 10 15 Miles

**Figure 8
Protected Lands
South**

Figure 9
Protected Lands North



At the scale shown, each corridor is one mile wide. Smaller features – individual buildings, wetlands, cemeteries, etc. – are not visible at this scale and can generally be avoided by shifting an alignment within the wider corridor. Therefore, a large number of these types of features are not presented for this level of detail.

b. Terrain and Geology

Aggressive terrain, particularly in the northern portion of the General Study Area, is another major constraint to development. **Figure 10** shows the corridors between the Lavonia and Knoxville Control Points on a topographic map. **Table 1** below summarizes elevations along the centerline of each of the northern corridors passing through the rugged terrain of the southern Appalachian Mountains.

Table 1 – Summary of Terrain and Elevations, Northern Corridors

Segment	Max Elevation	Min Elevation	Percent Length at Given Elevation (feet above sea level)			
			2,000-2,999	3,000-3,999	4,000-4,999	5,000+
A6 East	3,340	850	21%	1%	0%	0%
A6 West	2,510	680	4%	0%	0%	0%
B5	2,400	1,380	60%	0%	0%	0%
BC	3,420	1,850	79%	7%	0%	0%
B6	5,020	810	30%	7%	3%	0.05%
CD North	2,750	1,440	25%	0%	0%	0%
C3	6,170	930	25%	10%	21%	19%
C4	5,060	870	15%	15%	7%	0.2%
D3	2,900	920	40%	0%	0%	0%

According to data from the US Geological Survey, karst fissures exist in both the southeastern and northwestern portions of the General Study Area. As shown in **Figure 11**, areas of southern Georgia and South Carolina are identified as having fissures, tubes, and caves generally less than 1,000 feet long. **Figure 12** shows karst areas in eastern Tennessee and western Georgia, which are identified as having fissures, tubes, and caves generally greater than 1,000 feet in length.

Figure 13 shows landslide incidence and susceptibility based on US Geological Survey information. The majority of the study area north of Atlanta and Columbia is moderately to highly susceptible to landslides.

Figure 11
Karst Features in Southern Study Area



Source: NationalAtlas.gov

 General Study Area

Geology

Karst, Engineering Aspects

Source: [U.S. Geological Survey](http://www.usgs.gov)

Karst, Engineering Aspects

Fissures, tubes and caves over 1,000 ft (300m) long;
 50 ft (15m) to over 250 ft (75m) vertical extent

-  In metamorphosed limestone, dolostone, and marble
-  In moderately to steeply dipping beds of carbonate rock
-  In gently dipping to flat-lying beds of carbonate rock
-  In gently dipping to flat-lying beds of carbonate rock beneath an overburden of noncarbonate material 10 ft (3 m) to 200 ft (60 m) thick
-  In moderately to steeply dipping beds of gypsum
-  In gently dipping to flat-lying beds of gypsum

Fissures, tubes, and caves generally less than
 1,000 ft (300 m) long, 50 ft (15 m) or less
 vertical extent

-  In metamorphosed limestone, dolostone, and marble
-  In crystalline, highly siliceous intensely folded carbonate rock
-  In moderately to steeply dipping carbonate rock
-  In gently dipping to flat-lying carbonate rock
-  In gently dipping to flat-lying beds of carbonate rock beneath an overburden of noncarbonate material 10 ft (3 m) to 200 ft (60 m) thick
-  In moderately to steeply dipping beds of gypsum
-  In gently dipping to flat-lying beds of gypsum
-  In gently dipping to flat-lying beds of gypsum beneath and overburden of nongypsiferous material 10 ft (3 m) to 200 ft (60 m) thick
-  In carbonate zones in highly calcic granite (Alaska only)
-  In moderately to steeply dipping beds of carbonate rock with a thin cover of glacial till and frost-derived residual soil (Alaska only)

Figure 12
Karst Features in Northern Study Area

For legend, see Figure 13

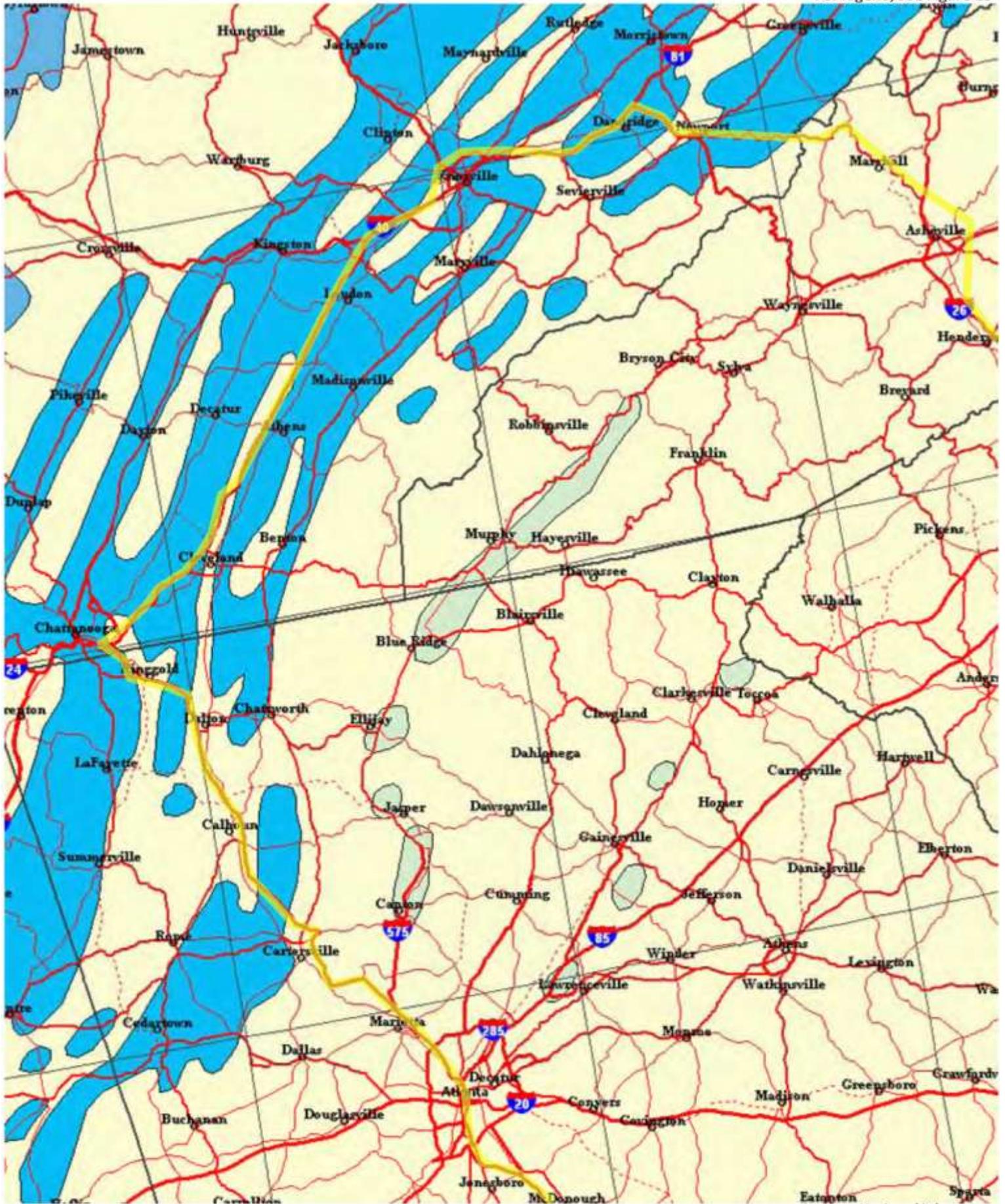
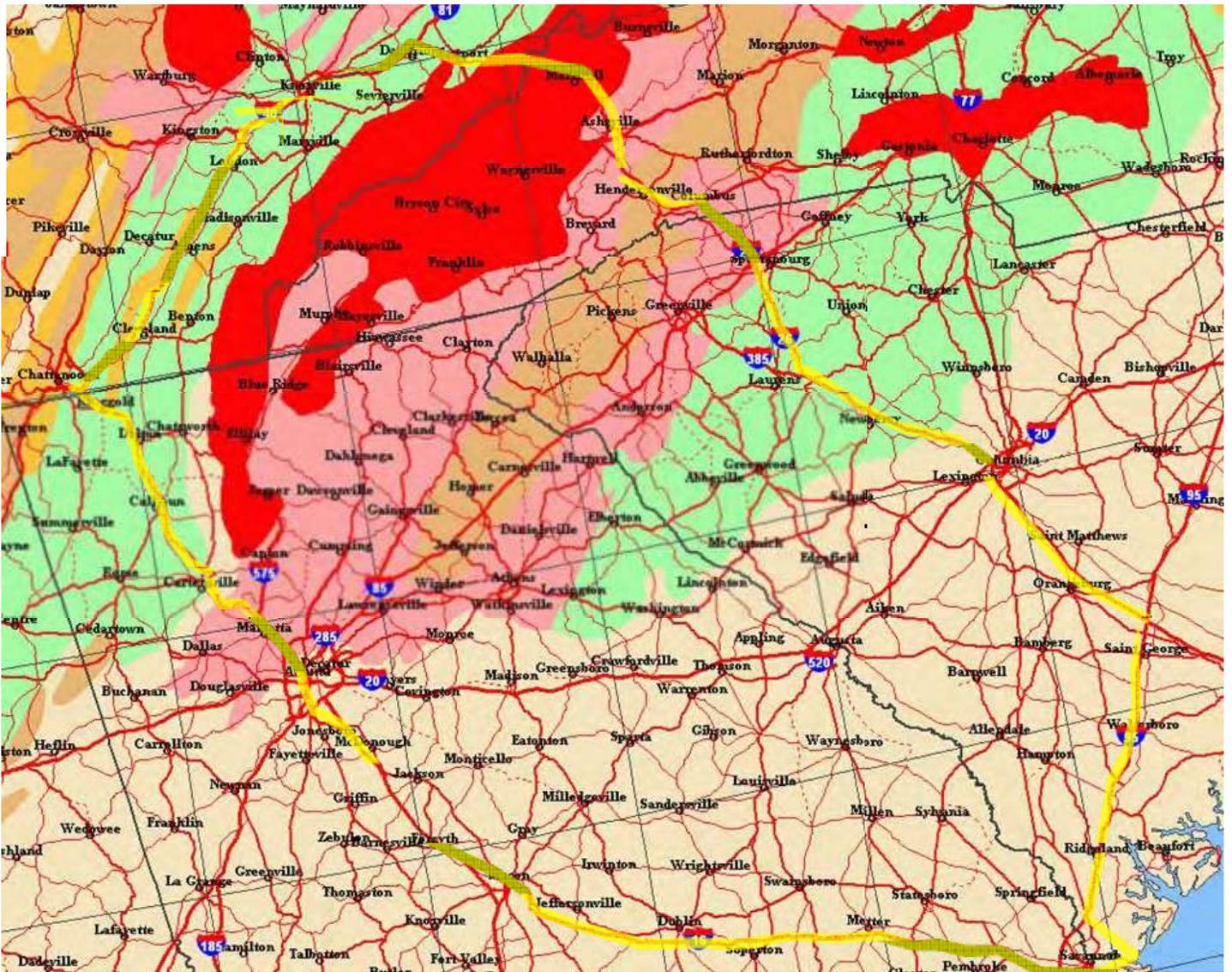


Figure 13
Landslide Incidence and Susceptibility



Source: NationalAtlas.gov

General Study Area

Geology

Landslide Incidence and Susceptibility
 Source: U.S. Geological Survey

- Landslide Incidence and Susceptibility
- Landslide Incidence
- Low (less than 1.5 % of area involved)
 - Moderate (1.5%-15% of area involved)
 - High (greater than 15 % of area involved)
- Landslide Susceptibility/ Incidence
- Moderate susceptibility/low incidence
 - High susceptibility/low incidences
 - High susceptibility/moderate incidence

Acid-bearing rock is another geological issue which may be found within the northern portion of the General Study Area. Pyrite is a crystalline mineral found in some areas of the Appalachian Mountains. Exposing the mineral to moisture and oxygen can lead to the formation of Acid Rock Drainage (ARD). ARD occurs naturally as part of the rock weathering process and represents a threat to the sustainability of rivers, streams and other freshwater systems; however, it can be exacerbated by highway construction activities. The potential for soil erosion and subsequent ARD due to disturbance is greatest in areas with rugged topography that require extensive cut/fill sections during construction. There are numerous options for addressing ARD - the most common practices include containment and neutralization at the point of disturbance and offsite containment and neutralization. The impacts of acid-bearing rock have been seen on a variety of projects, including the North Shore Road highway project within the GRSM. Construction of the highway was suspended in the 1970s, in part due to the environmental damage caused by the acidic rock encountered.

c. Population Demographics

Much of the study area population is low income. **Figure 14** shows the percentage of families living below the federal poverty limit at the county level. The majority of rural counties are identified as economically distressed according to the US Bureau for Economic Analysis and the US Bureau for Labor Statistics. Economically distressed counties have a per capita income less than 80% of the national level and an unemployment rate at least 1% greater than the national level. **Figure 15** identifies counties in the study area which qualify based on these designations.

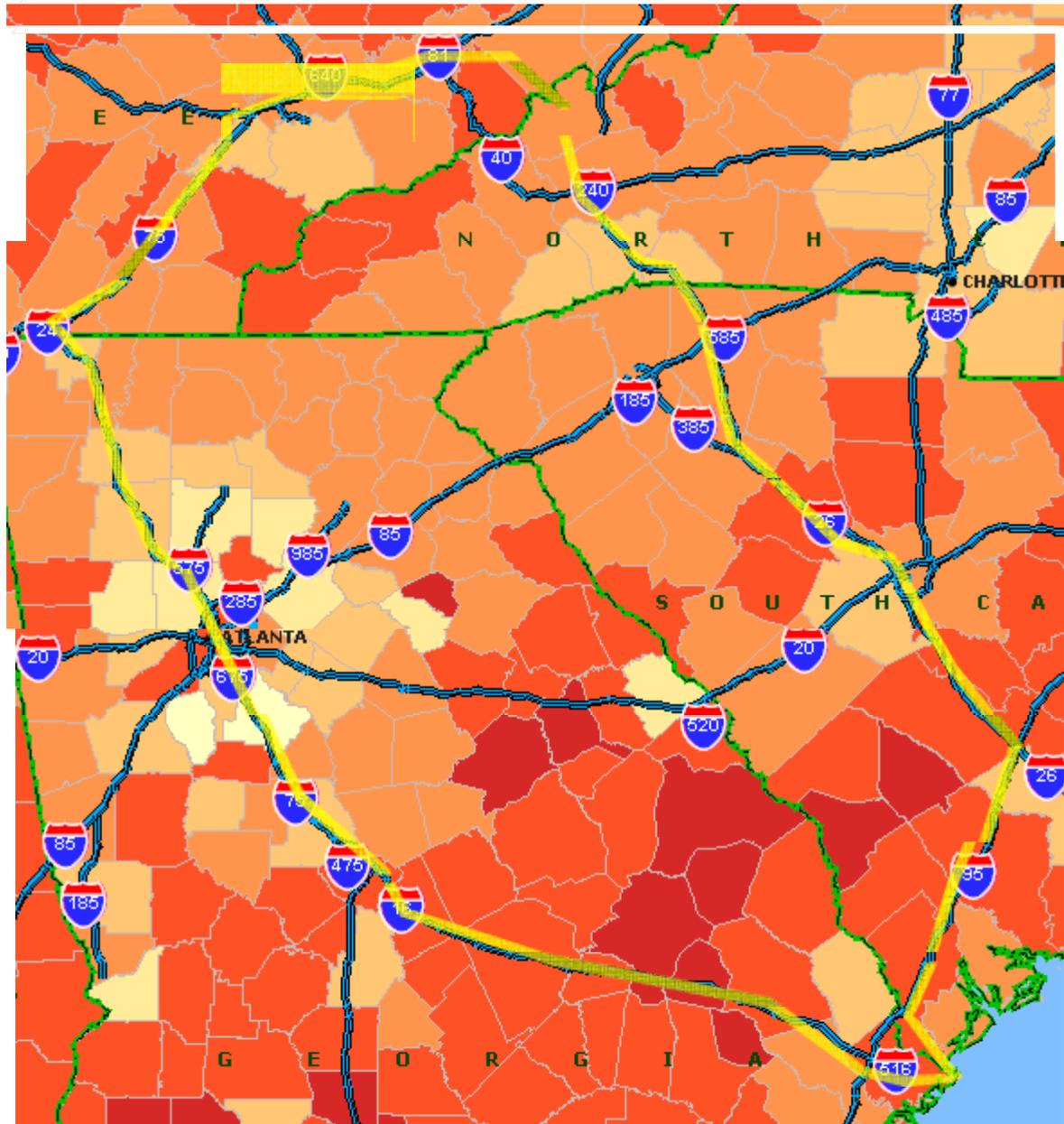
In the southern portion of the study area, a number of counties demonstrate above average minority population concentrations. **Figure 16** presents a map of minority concentrations at the county level, based on 2000 US Census information.

Environmental justice regulations and Executive Orders protect minority and low-income populations from experiencing disproportionate adverse impacts on federal projects. This information will have to be considered during future project development stages if any corridors are selected for implementation.

7. Corridor Screening

Initially four corridors were developed between Savannah and Lavonia and five corridors were developed between Lavonia and Knoxville, with an EWG recommendation that no more than one corridor pass through the GRSM National Park. These corridors will be screened against “fatal flaws” to identify significant obstacles to implementation which effectively make a corridor infeasible or unreasonable for further study. The density of natural resources, the vast area protected by state or federal designations, and aggressive terrain features throughout the northern portion of the study area create numerous challenges to highway development. A number of regional residents and organizations have been outspoken about their desire to protect natural and cultural resources by limiting development.

Figure 14
Families Below Poverty Level during 2000 Census



Source: hepgis.FHWA.dot.gov

General Study Area

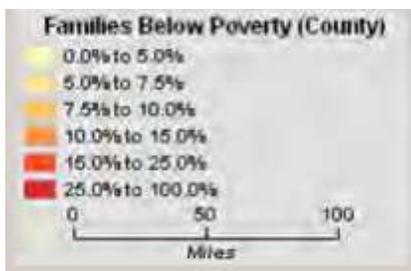
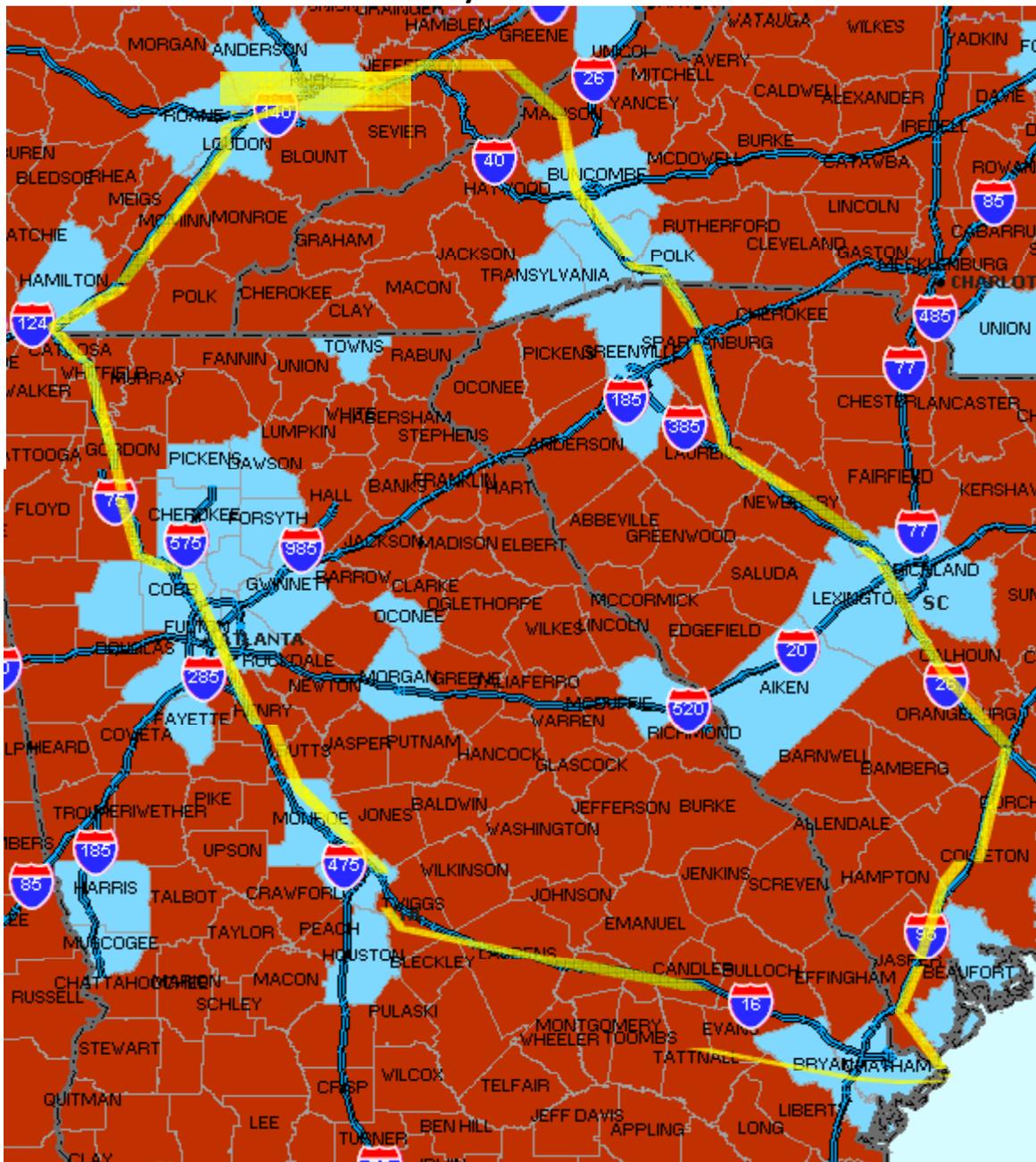


Figure 15
Economically Distressed Counties



General Study Area

Source: hepgis.FHWA.dot.gov

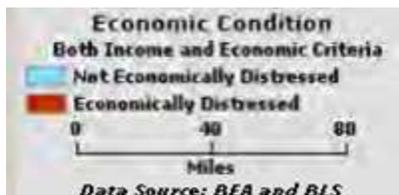
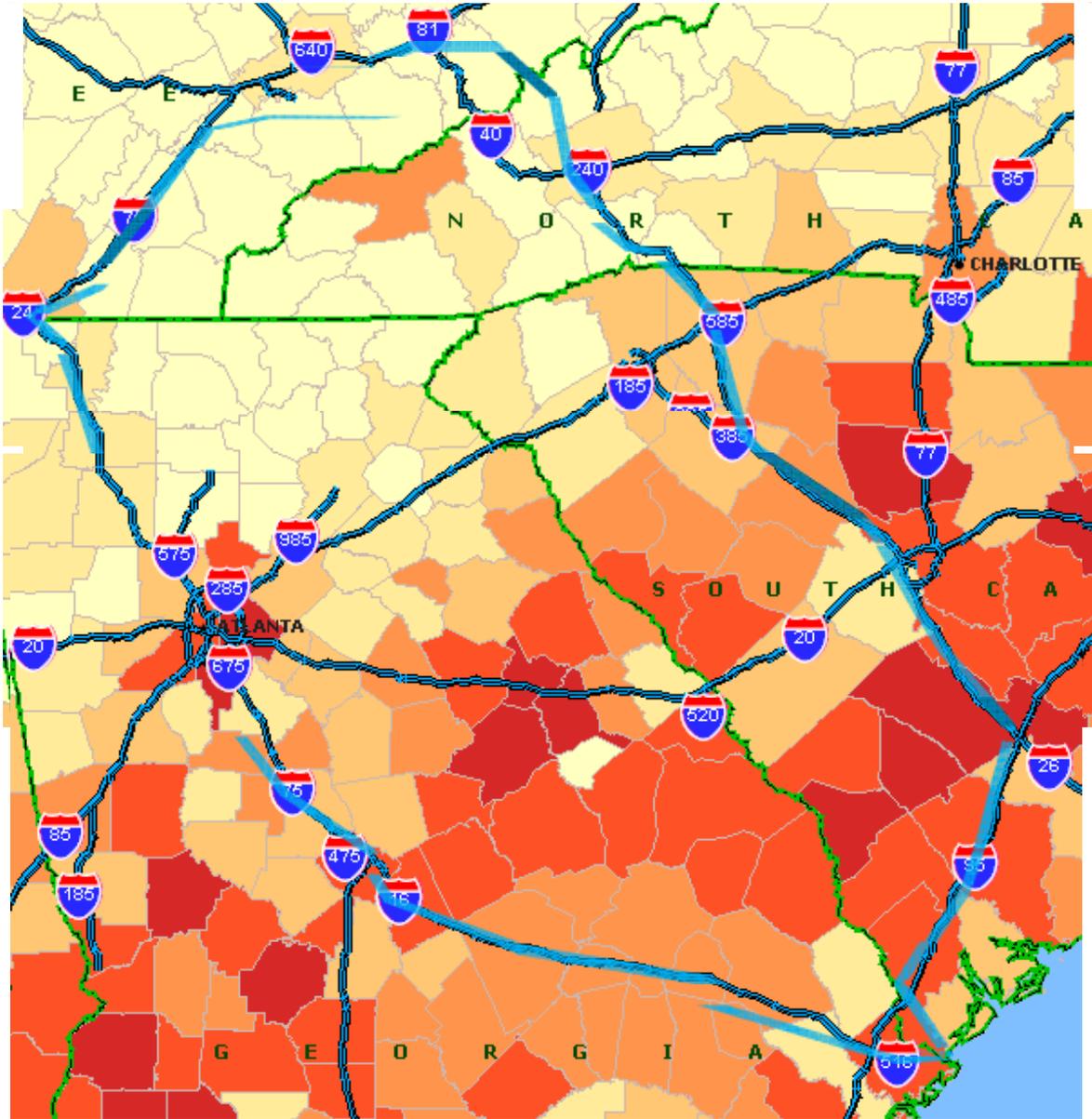


Figure 16
Minority Population Concentrations
During 2000 Census



General Study Area

Source: hepgis.FHWA.dot.gov



A variety of perspectives suggest a western corridor provides the least objectionable option for the northern portion of the General Study Area (between Lavonia and Knoxville).

a. Environmental Constraints

Impacts within a national park represent a fatal flaw. The GRSM is home to numerous federally threatened/endangered species and unique habitats; it has been designated as an International Biosphere Reserve and a World Heritage Site because of its unique natural resources. The Blue Ridge Parkway is also a National Park, which stretches over 450 miles through two states and is touted as “America’s Favorite Drive.”

From a high level environmental constraints perspective, Corridor A (including A6 West) impacts the fewest protected lands. This corridor avoids the Great Smoky Mountains National Park, unlike Corridors B or C. Because of the park’s wilderness areas, rich biodiversity, and protected status, transportation improvements within the park are strictly limited. According to 36 CFR I §5.6, commercial traffic is prohibited within the park. A 2010 *Environmental Assessment*¹ documents a proposal to add turn lanes to a popular picnic area along Newfound Gap Road was rejected because of the extent of impacts on character-defining features along the roadway. Work on the proposed North Shore Road was suspended decades ago due to environmental impacts; the 2007 *Environmental Impact Statement* supported a monetary settlement rather than completing the planned construction project because it would result in fewer impacts.²

Corridor C would impact the Blue Ridge Parkway National Park; it follows the length of the existing alignment for 45 miles between SR 215 and US 441. No other alternatives would impact this park.

Corridor A also has the fewest impacts within the National Forests: 1.5 miles through the forest, near the southwestern boundary compared to 40+ miles through the forests for other corridors. Other corridors result in fewer impacts to state parks, state wilderness/wildlife zones, areas within Georgia designated as Protected Mountains, or waterways. However, Corridor A provides the fewest National Forest impacts.

b. Constructability and Engineering

From a constructability perspective, mountainous terrain in the northwestern portions of the General Study Area provides another reason to favor a western corridor between Lavonia and Knoxville. Extremely aggressive terrain challenges are a second fatal flaw considered because of the associated cost and constructability concerns. Segments A5-A6 West-A7 have the fewest terrain challenges in the northern section, followed by A5-A6 East-A7 with the next fewest. Corridors B, C, and D pass through more aggressive terrain in the southern Appalachian Mountains and run perpendicular to the ridge lines.

¹ *Environmental Assessment, Great Smoky Mountains National Park*. Project PRA-GRSM 1B19. US Department of the Interior, National Park Service. July 2005. Available online at http://www.efl.fhwa.dot.gov/files/projects/environment_nfg_ea.pdf

² Per NPS briefing statement online at <http://www.nps.gov/grsm/parkmgmt/upload/North-Shore-Rd-3-15-10.pdf>

Corridor A also passes through fewer areas highly susceptible to landslides when compared to Corridors B, C, and D.

c. Economics

From an economic perspective, corridors which avoid mountainous terrain (Corridor A) are preferable. Mountainous terrain has a significant impact on cost, both for initial construction and continuing maintenance activities. Based on decades of experience and data from completed projects, the Tennessee Department of Transportation estimates that projects constructed in heavily mountainous terrain cost 2 to 5 times more than roadways constructed in mountainous or rolling terrain, respectively. Corridors B, C, and D are likely to be even more costly because the alignments bisect the mountain ranges rather than following the ridge lines. In today's era of financial constraint, economic feasibility is a major concern which deserves consideration when developing transportation projects.

d. Regional Transportation

The statutory language establishing the vision for the corridor specifies that the corridor connect Savannah, Augusta, and Knoxville. Any corridor which does not provide increased mobility and connectivity to all three of these urban centers is considered fatally flawed. Corridor D does not efficiently serve Fort Gordon or improve connectivity to the Augusta area.

Routes which bypass congested urban areas provide travel time savings by avoiding peak period delays. Reliability is a potential issue for routes through areas prone to landslides; I-40 in particular has been closed for several months in recent years to clean up slides.

From a regional transportation perspective, Corridor D provides minimal differences compared to the existing I-95 to I-26 corridor. Corridor D is 35 miles shorter than the existing I-95 to I-26 corridor between Savannah and Knoxville, an 8% savings compared to the existing route. However, it still travels through congested sections in Columbia and Asheville.

Corridor A provides a slightly shorter travel distance between Savannah and Knoxville (435 miles) than the existing I-16 to I-75 corridor (460 miles) and also bypasses major congestion and bottlenecks in the Atlanta area.

North of Augusta, Corridor B passes through largely undeveloped, rural areas. From a regional transportation viewpoint, it would not provide improved connectivity to any urban centers between Augusta and Knoxville.

Corridors A, B, and C each would provide opportunities to link to the proposed Corridor K and proposed 14th Amendment Highway, for an improved east-west mobility option.

e. Public Opposition

Based on experiences from previous projects located in eastern Tennessee and western North Carolina region, residents of the region are very attuned to environmental issues. Unofficial polls of North

Georgia residents during 2006-2007 indicate approximately 90% of respondents opposed development of a 3rd Infantry Division Highway corridor. During the development of the 2010 *Transportation Planning Report* for Corridor K, nearly 3,000 comments were received from members of the public, special interest/opposition organizations, and other agencies. The public expressed a similar level of concern on other recent regional projects as well: the Cades Cove Transportation Plan, the Foothills Parkway Study, and a design project along US 321 adjacent to GRSM. Dozens of public comments and letters have been received on the 3rd Infantry Division Highway Corridor Study to date, primarily through the project’s website. The vast majority of comments have expressed opposition to the project.

Residents tend to be adamant about maintaining the environmental integrity of the GRSM and National Forests in the region. Residents will expect careful consideration of the location and character of new or improved roadway needs and will expect projects to make every effort to avoid intrusion into sensitive areas when other alternatives are available. Otherwise, strong opposition can be expected, which could represent an obstacle to any of the corridors developed.

8. EWG Input and Next Steps

As summarized in **Table 3**, a variety of perspectives suggest a western corridor provides the least objectionable option for the northern portion of the General Study Area (between Lavonia and Knoxville). Based on environmental constraints, constructability and engineering concerns, economic considerations, regional transportation connections, and the likelihood to face public opposition, Corridor A from I-85 at Commerce, along the western boundary of the National Forests, to I-75 at Cleveland will move forward for additional study to develop cost estimates identified in Task 9 of the scope of work. Other northern corridors would lead to greater impacts within the National Forests, would fall within the established boundaries of GRSM National Park, would face other terrain/geotechnical obstacles, and/or do not provide access to the four areas identified as control points.

Table 3 – Summary of Fatal Flaw Screening

Corridor	GRSM Impacts	Terrain	Control Points
A	No	Moderate	Crosses 4
B	Possible	Aggressive	Crosses 4
C	Yes	Extremely Aggressive	Crosses 4
D	No	Aggressive	Crosses 2

For the southern portion of the General Study Area (between Savannah and Lavonia), Corridors A, B, or B1 Bypass along the Savannah River Parkway will also move forward for additional study to develop cost estimates. Either corridor provides a comparable level of mobility and impacts which could provide a reasonable, feasible connection to a western corridor beyond Lavonia.

The corridors, impacts, and design levels presented in this memo were presented to the EWG during the March 8, 2011 meeting. Comments focused on the content of this memo, the methodology for preparing cost estimates in the next task, and the extent of public involvement needed for this phase of the project. Specific to the alternatives, it was suggested that a No Build Alternative should be investigated, which would place signs along an existing interstate route to designate a Third Infantry Division Interstate. The team reiterated that different design levels can be applied to any single corridor alignment, creating a number of different alternatives. Design levels can vary by segment within each corridor as well; for example, a corridor could be designed as an interstate from locations X to Y and as an arterial from locations Y to Z.

Based on feedback from the EWG in March 2011, the northern portion of Corridor A West (north of Augusta) and the southern portion of Corridors A, B, and B Bypass will move forward for additional study. As described in the final negotiated scope of work, cost estimates will be prepared for these corridors for each of the design levels identified in section 5. Alternative scenarios advancing for cost estimates are summarized in **Table 4**. The team will also prepare an outline for the number of steps anticipated to construct each segment (development of planning products, necessary permits, scale of right-of-way acquisitions, etc).

Table 4 – Alternative Scenarios advancing for Cost Estimates

Corridor	Design Level
A West (entire length)	Interstate Design Level
A West (entire length)	Arterial Design Level, plus reusing existing Interstate segments
A West (entire length)	Super-2 Design Level, plus reusing existing Interstate and Arterial segments
A West (entire length)	Practical Solutions/Context Sensitive Design Option – involves reusing existing roadway alignments available today, with minor spot improvements
B/B Bypass (Savannah to Augusta)	Interstate or Arterial Design Level
No Build	Installing signage along existing route

Following a fourth and final EWG meeting, a comprehensive Corridor Feasibility Report will be prepared for FHWA that consolidates the information gathered throughout this study. This report will include cost estimates and project development steps and will form the basis for the informational report delivered to Congress to fulfill the statutory language.