



## CHAPTER 2 – DEVELOPMENT OF ALTERNATIVES

### 2.1 How were the Potential Alternatives Developed?

Alternative Evaluation Criteria were developed to define and prioritize the issues of concern during alternative development. The issues covered by the Alternative Evaluation Criteria were evaluated at different levels of detail over the course of the process, beginning at a very broad level and ending with more detailed evaluations. The primary and secondary needs of the project provided the initial guidelines for establishing the Alternative Evaluation Criteria. Categories of potential impacts were then added to the criteria. Utilizing the criteria would ensure that alternatives were developed that satisfy the project purpose and need, while at the same time attempt to conserve the natural environment, community values, and cultural resources by minimizing impacts to the natural and human environment. The Alternative Evaluation Criteria are detailed in the *Alternative Development Technical Memorandum* and include:

- Purpose and Need;
- Engineering criteria and constructability;
- Economics;
- Existing and future development;
- Indirect and cumulative impacts;
- Current and future land use;
- Traffic;
- Construction cost;
- Environmental factors;
- Socioeconomic issues;
- Infrastructure;
- Utility impacts;
- Use of existing transportation infrastructure; and,
- Toll Feasibility/Financial Feasibility.

The No-build Alternative is one of the alternatives under consideration in the NEPA Process. As its name indicates, it is the null alternative which evaluates the no construction option. This alternative allows the evaluation of the project study area in its current condition without potential impacts related to construction and operation of the proposed project. The No-build Alternative establishes a baseline of environmental and socioeconomic conditions against which all Build Alternatives can be compared.

Next, a computer model utilizing Geographic Information System (GIS) data was created to develop potential alignments. The Corridor Analysis Tool (CAT) is a computer program that allowed GIS data to be analyzed in a short period of time, allowing more time to be spent on interpretation, discussion, and comparison of potential corridors.

The CAT developed corridors through weighting the values that were assigned through interagency coordination, (refer to Section 2.1.1, page 5) for socioeconomic, engineering, environmental, and infrastructure resources in the project study area. The CAT uses a grid- or cell-based format. The program finds the corridor of least impact between the endpoints of each alignment (starting and ending points) and summarizes the impacts for each alignment corridor. The endpoints are set and the program developed a “least impact” line that connects the two points. Surrounding this line is a “suitability grid” that illustrates areas that are close to the best fit line and that are within a designated percentage (1 to 2 percent) of the least impact line. To ensure that the alignment would be functional as a roadway, the “least impact” line was adapted to accommodate a 75-mile per hour design speed using basic



design criteria. A more detailed explanation of how the CAT program operates can be found in the *GIS and Data Collection Activities Technical Memorandum*.

Multiple government agencies were identified as possible sources of GIS data and five information categories were identified that would be necessary to include in the CAT program. These categories were identified as socioeconomic/demographic, engineering, environmental, infrastructure, and physical/cultural. Reference materials were also obtained that validated the GIS data.

Numerous federal, state, and local agencies along with non-governmental organizations were contacted for their available GIS data (refer to Table 2.1, page 2-3). Approximately 877 GIS data layers and 482 tiles of aerial photography were collected from 21 sources. A detailed list of the data layers including the supplying agency, data coordinate system, date of publication, and date of receipt can be found in the *GIS and Data Collection Activities Technical Memorandum*.

Approximately 52 GIS layers were determined to be complete and accurate for possible inclusion in the CAT program (refer to Table 2.2, page 2-4).

The 52 potential data layers were organized into four categories entitled environmental, roadways, infrastructure, and demographic/socioeconomic. Each feature within the 52 potential data layers utilized by the CAT was assigned a numerical value, on a scale of one to ten (ten representing the most valuable, refer to Appendix B).

Some of the GIS features were designated as constraints, which meant the feature was removed from consideration by the CAT when generating alternative corridors. A potential alignment should not pass through a feature designated as a constraint. The following layers were designated as constraints:

- Intact Carolina bays;
- Mitigation Banks and Sites;
- Known Federal Threatened and Endangered Species Locations;
- Known State Threatened and Endangered Species Locations;
- Archaeology Sites Potentially Eligible, Eligible, or Listed on National Register of Historic Places;
- Historic Resources Potentially Eligible, Eligible, or Listed on National Register of Historic Places;
- SCDNR Heritage Preserves;
- Publicly-owned Parks (Federal, State, and Local);
- Hazardous Sites Listed on NPS/SPL;
- Landfills;
- Mines/Geologic Features;
- Airports;
- Schools; and,
- Cemeteries.



**Table 2.1**  
**Agencies Contacted Regarding GIS Data**  
**Interstate 73 EIS: I-95 to the Myrtle Beach Region**

Level	Agency
<b>National</b>	Federal Emergency Management Agency
	U.S. Census Bureau
	U.S. Department of Agriculture
	U.S. Environmental Protection Agency
	U.S. Geological Survey
<b>State</b>	S.C. Budget and Control Board
	S.C. Department of Commerce
	S.C. Department of Health and Environmental Control
	S.C. Department of Natural Resources
	S.C. Department of Parks, Recreation, and Tourism
	S.C. Department of Transportation
	S.C. Emergency Management Division
	S.C. Geodetic Survey
	S.C. Institute of Archaeology and Anthropology
	S.C. State Historic Preservation Office
<b>County</b>	Dillon County Government
	Horry County Government
	Marion County Government
	Marlboro County Government
	Pee Dee Council of Governments
	Waccamaw Council of Governments
<b>City</b>	City of Bennettsville
	City of Conway
	City of Dillon
	City of Marion
	City of Mullins
<b>Other</b>	City of Myrtle Beach
	Pee Dee Resource Conservation and Development Council
	The Nature Conservancy
	University of South Carolina - Columbia

The four categories were given an overall importance value that totaled 100 for the CAT program. They were given a value based upon the relative importance given to each category; environmental (50), roadways (10), infrastructure (20), and demographics/socioeconomic (20). The criteria weighting and constraints were then programmed into the CAT and used to generate preliminary Build Alternatives.

In addition, each state and federal resource and regulatory agency was given the opportunity to manually draw alternatives on a map. The impacts for these alternatives, along with those for the segments generated by the CAT, were then quantified. Overall, the CAT developed approximately 63 preliminary



**Table 2.2**  
**Possible GIS Layers for CAT Program**  
**Interstate 73 EIS: I-95 to the Myrtle Beach Region**

Layer
<b>ENVIRONMENTAL</b>
National Wetland Inventory Mapping (Wetlands and Uplands)
Little Pee Dee River in Dillon County
Soils
Mitigation Banks and Sites
Species of Concern
Federal and State Threatened and Endangered Species
Archaeology Sites
Historic Resources (Architectural)
National Historic Register Sites
Heritage Preserves
Parks (federal, state, and local)
Wildlife Refuges
Federal Lands (Over 640 acres)
Land Stewardship
Hazardous Sites
Landfills
NPDES Sites
Streams/Rivers/Lakes
Streams/Rivers/Lakes-Special Designation
Watersheds
Floodplain for Great Pee Dee River
Floodplains
Land cover
Mines/Geologic Features
<b>ROADWAYS</b>
Roads (Urban and Rural)
<b>INFRASTRUCTURE</b>
Railroads
Transmission Lines
Oil Pipelines
Bridges
Airports
Buildings (Industrial Vacant)
Dams (Hazardous)
Fire Stations
Administrative Buildings (Government)
Churches
Community Facilities
Health Facilities
Hospitals
Libraries
Mental Health Facilities
Schools
Cemeteries
Incorporated Areas
Municipalities
Sewer Infrastructure
Pipelines
Treatment Plants
Surface Withdrawal Locations
Storage Sites
<b>DEMOGRAPHIC/SOCIOECONOMIC</b>
Minority Areas/Density
Low Income Areas/Density
Population Density



build segments, which were combined to form 141 possible preliminary Build Alternatives (refer to Figure 2-1, page 2-7). The impacts were quantified for each of the 141 preliminary Build Alternatives and are summarized in the *Alternative Development Technical Memorandum*. In addition, a sensitivity test was performed on the CAT program to verify that the values for features used by the CAT to select paths were minimizing potential impacts to the environment (refer to the *Alternative Development Technical Memorandum* for more details).

### ***2.1.1 What is the Agency Coordination Team and what was their role in developing alternatives?***

The Agency Coordination Team (ACT) consisted of representatives from:

- Federal Highway Administration (FHWA);
- U.S. Army Corps of Engineers (USACE);
- U.S. Coast Guard (USCG);
- U.S. Environmental Protection Agency (USEPA);
- U.S. Department of Agriculture - Natural Resource Conservation Service (NRCS);
- U.S. Fish and Wildlife Service (USFWS);
- NOAA Fisheries (NOAA-NMFS);
- S.C. Department of Archives and History (SCDAH);
- S.C. Department of Commerce (SCDOC)
- S.C. Emergency Management Division (SCEMD);
- S.C. Department of Health and Environmental Control (SCDHEC);
- S.C. Department of Health and Environmental Control – Office of Ocean and Coastal Resource Management (SCDHEC-OCRM);
- S.C. Department of Natural Resources (SCDNR);
- S.C. Department of Transportation (SCDOT); and,
- S.C. Department of Parks, Recreation, and Tourism (SCPRT).

The purpose of the ACT was to help merge the NEPA and Section 404 (wetland) permitting process and to offer multiple opportunities for the agencies to be involved in the development of the project. These opportunities were spread throughout the EIS development process and included agency participation in the determination of the study area boundaries, purpose and need and analysis criteria, development of alternatives, selection of alternatives for further study, Preferred Alternative, mitigation of unavoidable impacts, and project design features. For more detailed information about the ACT, please refer to Chapter 4.



The agencies provided information pertinent to their particular areas of expertise throughout the EIS process. The ACT participated in the determination of the data layers used by the CAT. They also provided input on the features designated as constraints. ACT members assigned numerical values, on a scale of one to ten, to each feature in each data layer utilized by the CAT. They also set the weighting



for the layers. In addition, each agency was given the opportunity to draw alternatives on a map of the study area. The alternatives were then quantified using the CAT and the results provided to the ACT, along with the results from other segments generated by the CAT.

A field visit was conducted in May 2005 with the ACT to review areas of special interest to ACT members. Agency comments and data collected from the field visit were also used to modify the alternatives and to develop the indirect and cumulative impact analysis. To date, the ACT members have met a total of 18 times over the past 23 months.

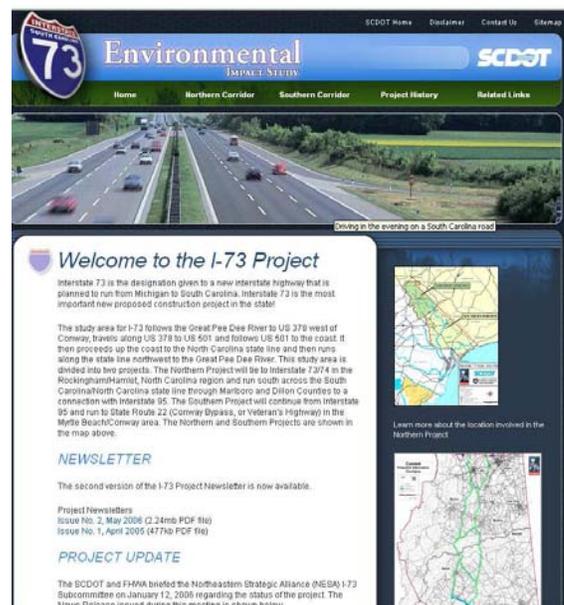
### 2.1.2 How was the public involved in developing the preliminary Build Alternatives?

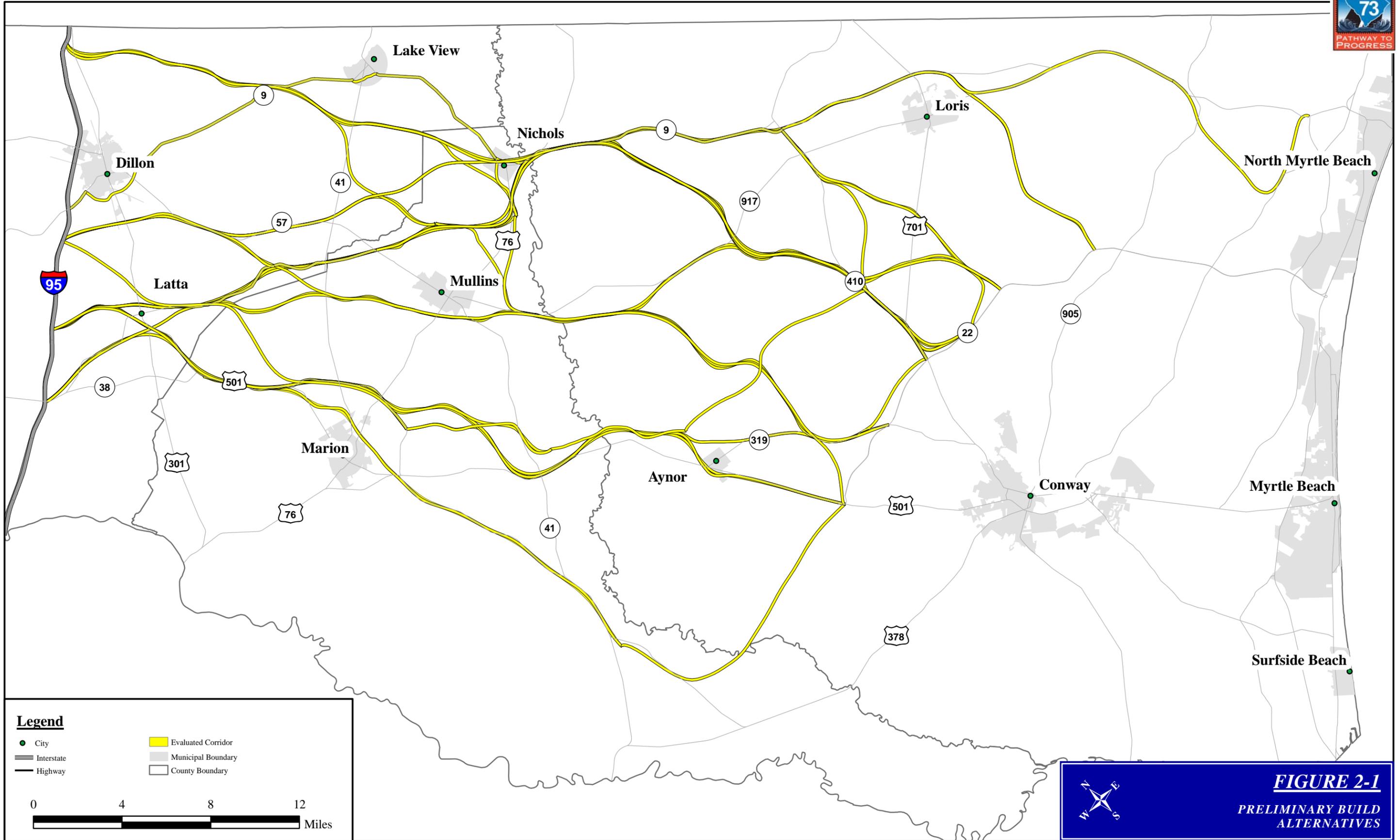
The public had opportunities for commenting on the project through scoping and information meetings, a telephone hotline, and a project website. Additional community information meetings were also held throughout the project study area in an effort to reach out to minority residents. Comments and recommendations that were gathered through coordination with the Stakeholder Working Group and the public were reviewed and taken into consideration during alternative development. Please refer to Chapter 4 for a detailed discussion of the public involvement process.



A Stakeholder Working Group was organized to create a forum for discussion with, transfer of information to, and to receive feedback from a diverse group of constituent representatives potentially impacted by the proposed project. Stakeholders were engaged in a series of meetings throughout the process and provided perspectives that represented the diverse demographics of the study area and various organizations and interest groups.

A project website was developed and updated periodically with new information and upcoming meeting times and locations. In addition, a toll-free telephone hotline was established for citizens without internet access to receive project updates and find out about upcoming meeting times and locations. The website and telephone hotline also allowed citizens to provide comments via email or in a recorded format, respectively. Furthermore, a project newsletter was available on the project website.





**FIGURE 2-1**  
PRELIMINARY BUILD  
ALTERNATIVES



Public Scoping Meetings were held at two locations at the initiation of the project. The scoping meetings were an informal, drop-in style format that allowed citizens to ask questions and receive information on an individual basis. A survey of issues, a comment card, and an informational brochure were distributed to each attendee. The informational brochure included a brief description of the project, the official website address, and the toll-free hotline number. The information comments received from the public were used to help develop the project purpose and need and the initial alternatives.

## **2.2 How were the 141 preliminary Build Alternatives evaluated?**

The Alternative Evaluation Criteria were used to compare the 141 preliminary Build Alternatives that could be created by different combinations of segments (refer to Figure 2-1, page 2-7). The alternatives were first screened using the Purpose and Need. The primary needs of system linkage and economic development were used as the first level of screening. For the project need to be fulfilled, the alternatives had to improve national and regional connectivity by providing a direct link between I-95 and the Myrtle Beach region, as well as enhance economic opportunities and tourism in South Carolina. Approximately seven preliminary Build Alternatives were eliminated for failure to satisfy these primary needs.

The secondary needs of the project were identified as hurricane evacuation, relief of local traffic congestion, and multimodal planning. It was determined that secondary needs of the project would be met indirectly by alternatives when the primary needs are fulfilled. Any Build Alternative would facilitate more effective evacuation of the Myrtle Beach region during emergencies, should reduce existing traffic congestion on roads accessing the Myrtle Beach region, and would help future provision of a multimodal facility within the interstate corridor. No preliminary Build Alternatives were eliminated due to failure to meet the secondary needs of the project.

The preliminary Build Alternatives were next evaluated against the potential impacts to the natural environment. A 600-foot corridor was initially used to quantify impacts because the typical section, as described previously in Chapter One (Section 1.2.2, page 1-2), had not been established when the preliminary Build Alternatives were developed by the CAT program. The 600-foot corridor was used because it was anticipated to provide adequate width to accommodate the proposed facility. Constraints were not impacted by any of the 141 preliminary Build Alternatives developed by the CAT. The following impacts were quantified by the CAT and compared in an effort to reduce the number of preliminary build alternative segments:

- Wetland acreage (classified as previously impacted or not impacted);
- Wetland value (determined by ACT-assigned valuation times acreage impacted);
- Upland acreage (total acreage);
- Species of concern;
- Infrastructure (i.e. churches or fire stations); and,
- Corridor length/cost (corridor length was used to estimate potential cost).



A detailed matrix of the segment impacts was completed. Competing segments, those that had the same start and endpoints, were compared and the segments with the highest impacts were eliminated. This resulted in reducing the number of preliminary Build Alternatives from 134 to 25.

### **2.3 How were the Reasonable Alternatives developed?**

A summary of the process, including information for each of the 63 preliminary build segments, the 141 preliminary Build Alternatives, how segments were eliminated, and the information on the remaining 25 preliminary Build Alternatives was presented to the ACT for their consideration (refer to Figure 2-2, page 2-10). The Project Team made recommendations as to the Reasonable Alternatives to be carried forward and evaluated in more detail. After extensive discussion and evaluation at the December 9, 2004 ACT meeting, the ACT reached a consensus on designating seven of the 25 as Reasonable Alternatives for further study. The reasons that some of the alternatives were eliminated are detailed in the *Alternative Development Technical Memorandum*.

#### ***2.3.1 How was the public involved in developing the Reasonable Alternatives?***

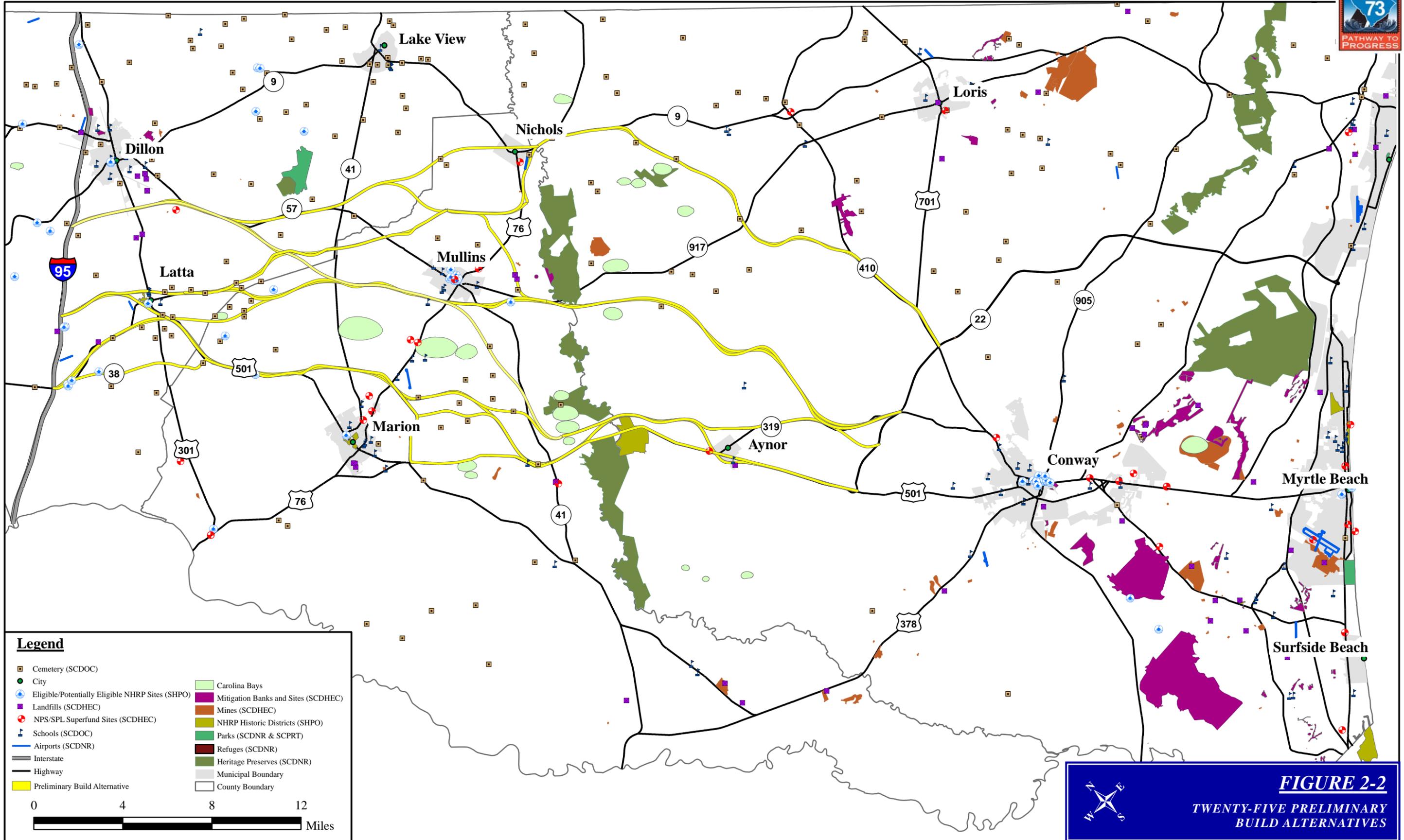
Following the designation of the seven Reasonable Alternatives by the ACT, the corridors were presented to the public for review and comment. Four public information meetings were held to present the Reasonable Alternatives. A public information meeting was held in each of the three counties within the project study area, with two held in Horry County (please refer to Chapter 4, Section 4.1.3, page 4-2, for a detailed discussion). Overall, approximately 1,259 people attended the public information meetings, and approximately 1,023 comments were received as a result of the four public information meetings. Each written comment was reviewed, and the written and the verbal comments heard at each of the public involvement meetings were used to re-evaluate the proposed alternatives. Modifications were made to the presented Reasonable Alternatives that reflect many of the comments. Some additional alternatives were also developed and evaluated as a result of comments received.

In addition to the public information meetings, community presentations were made to reach out to interested citizens from the study area. These meetings served to disseminate information about the project and gather input at the local and community level as to what was important about the project. Approximately 17 community presentations were made to 267 people.

#### ***2.3.2 What modifications were made to the Reasonable Alternatives based on input?***

Public and agency input resulted in the modification of alternatives to move away from communities such as Aynor, Cool Spring, Floydale, Galivants Ferry, Ketchuptown, Temperance Hill, and Zion. The alternatives were also modified to avoid two neighborhoods in the vicinity of Mullins and to minimize potential impacts to Aynor.

As a result of the public comments, and as part of the effort to continue to improve the alternatives to minimize impacts, the Reasonable Alternatives were again evaluated. The alternatives were once again divided into segments to study potential impacts and to be used to “assemble” the least impact alternatives.





Information regarding the wetland types, constraints, other layers evaluated by the CAT, existing communities, and public input was used to modify the segments to minimize impacts.

During the ACT coordination process, one concern expressed was that while the CAT designated alternatives represent the “best fit” corridor, there were several other wider corridors called suitability layers that could have similar impacts. The suitability grid illustrates the areas that were within 99.0 to 99.9 percent of the “best fit” corridor and those within 98.0 to 98.9 percent of the “best fit” corridor. Therefore, the suitability grids for each of the reasonable alternatives previously discussed were evaluated (refer to Figure 2-3, page 2-13).

Overall, approximately 108 individual segments were created or modified based on the suitability layers and public input (refer to Figure 2-4, page 2-14). The segments were compared using the Alternative Evaluation Criteria and the segments that had the highest impact were eliminated in favor of those with lower impacts. As explained previously, the Purpose and Need and then potential impacts were used to determine the best route for each portion of each overall alternative. The following impacts were quantified by the CAT and were taken into consideration to compare the segments:

- Wetland acreage (classified by previously impacted or not impacted);
- Wetland value (determined by ACT-assigned valuation and acreage impacted);
- Uplands;
- Species of concern;
- Infrastructure (i.e. churches or fire stations);
- Corridor length (used to estimate potential cost); and,
- Residential and business relocations.

The result was the development of segments that would avoid areas of concern (refer to Figure 2-4, page 2-14), for example, segments that would be farther west of Aynor (BG and AG1), farther east of Cool Spring (AT, AM2, AM3, and AM Mod1), farther west of Floydale (B2 and B4), farther north of Temperance Hill (J1, J2, and U2).

### *2.3.3 Were any new segments developed based on public comments?*

Approximately 12 new segments were developed that modified the corridor to cross the Little Pee Dee River southwest of U.S. Route 501, and two new segments were evaluated that followed the school district attendance zone boundary between Loris and Aynor (refer to Figure 2-5, page 2-15). In addition, Horry County, by resolution (refer to Resolution R-40-05, dated April 5, 2005, in Appendix C) had rejected “the Galivants Ferry crossing as a proposed route and asks South Carolina Department of Transportation to eliminate this route and replace it with this new southern route.”

The 12 new segments would be an average of 10 miles longer and would have an average of 235 acres of additional wetland impact than the corresponding segments in the seven Reasonable Alternatives designated by the ACT. The two alternatives that were designed to follow the school district attendance



zone boundary would be an average of four miles longer, with 124 acres of additional wetland impacts than the equivalent segments in the seven Reasonable Alternatives. These 14 segments were eliminated from further evaluation due to the high potential for environmental impacts and increase costs associated with them.

#### ***2.3.4 How were preliminary interchange locations designated?***

Initial criteria for developing preliminary interchange locations were proposed as follows:

- To provide access to primary roadway routes, i.e. Interstates, U.S. Routes, and S.C. Routes;
- Provide a minimum spacing of two miles between interchanges;
- Cost (ensure a reasonable expenditure of public funds);
- Provide a maximum spacing of eight miles between interchanges to provide system linkage, ease of maintenance, increased safety, and opportunities for economic development;
- Provide interchanges where higher traffic volumes warrant; and,
- Minimize impacts.

Preliminary locations of interchanges were taken into consideration to fully evaluate potential impacts to the categories listed previously, as well as potential impacts to communities and relocations. The Marion, Dillon, and Horry County planning and economic development agencies were contacted to solicit their preferences for potential interchanges. As an example, some interchanges in Horry County were placed at or near S.C. Route 23 (Nichols Highway) at the request of Horry County to improve the access to the Cool Spring Industrial Park.

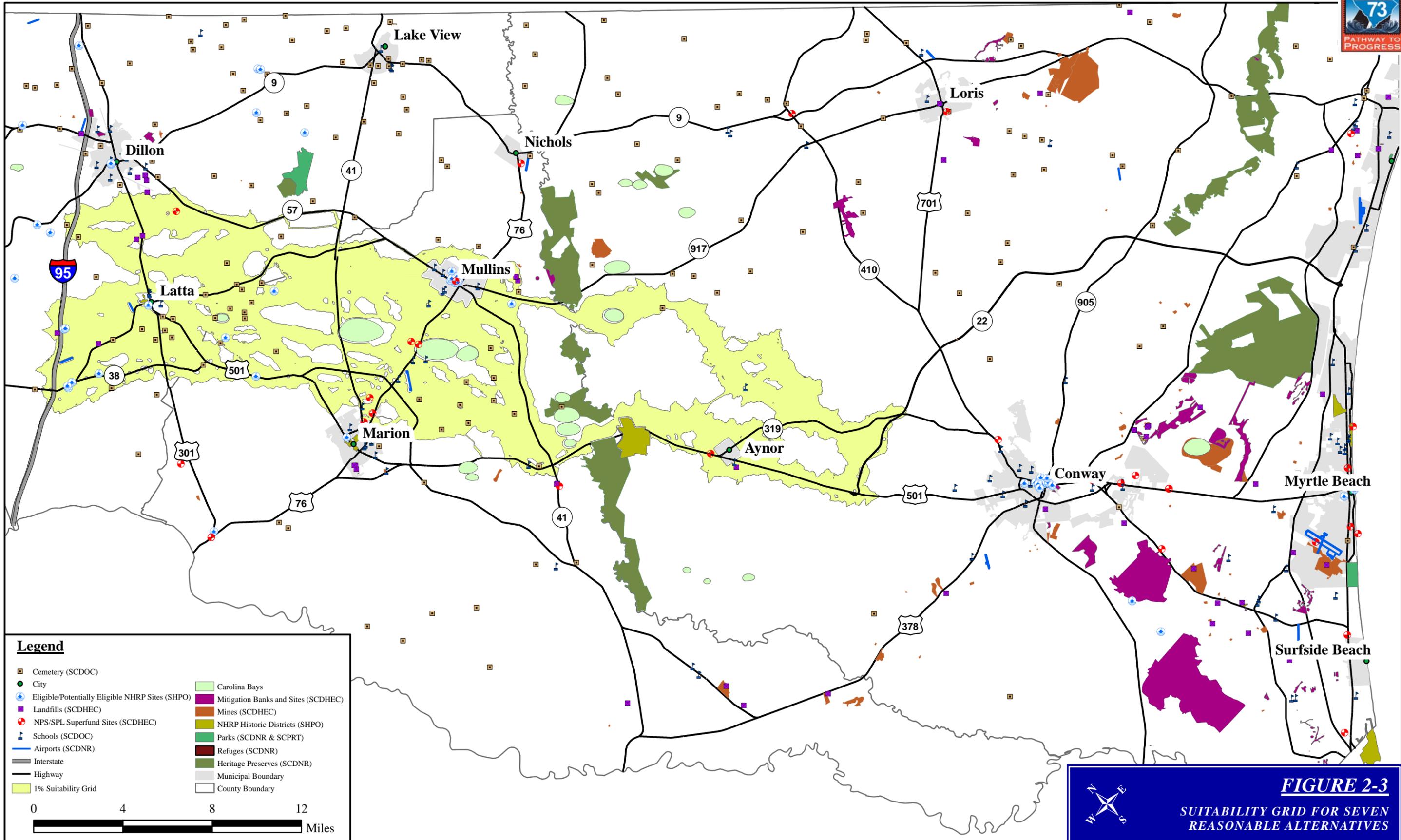
#### ***2.3.5 How were the modifications of the Reasonable Alternatives evaluated?***

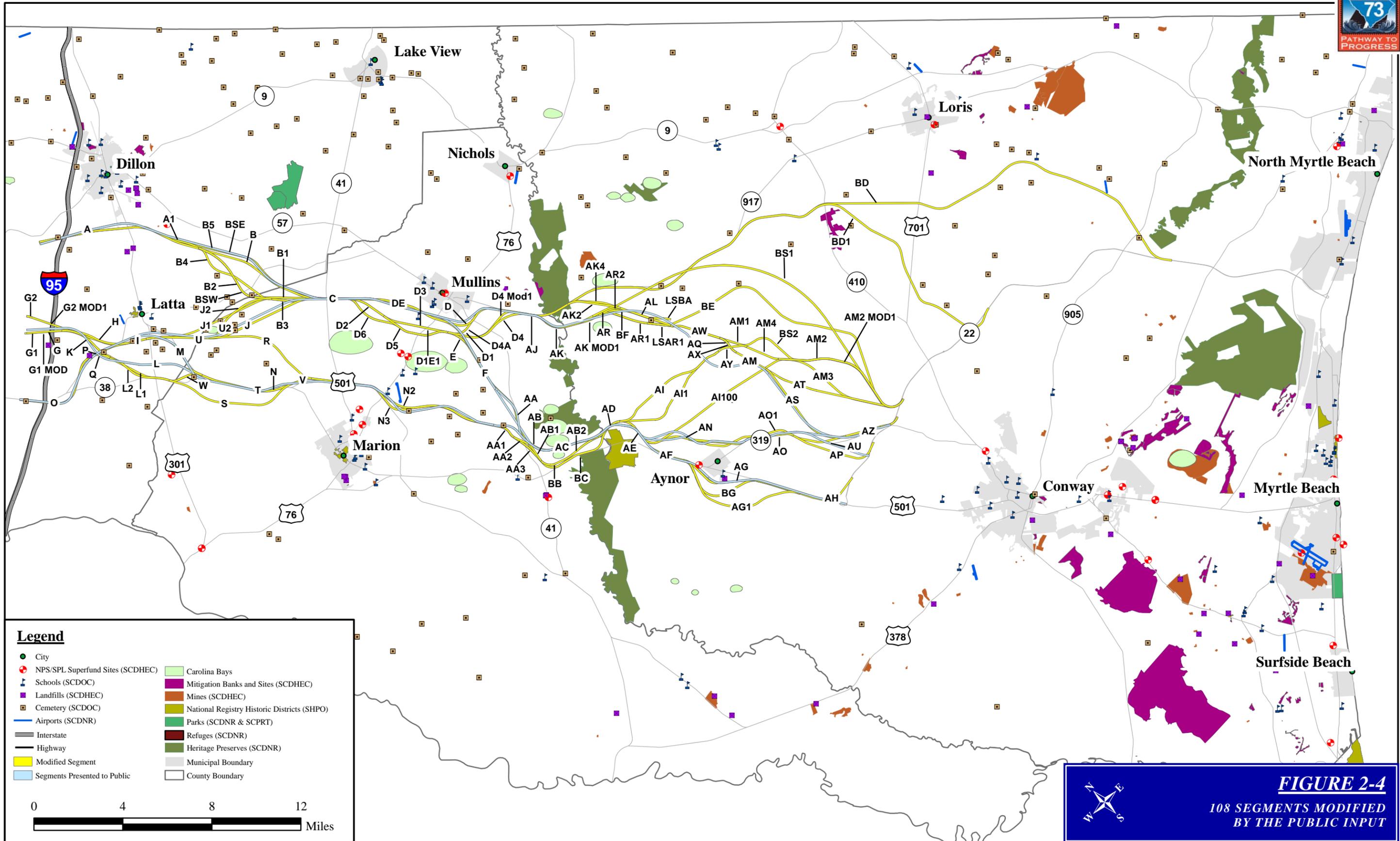
Segments that connected common ending points were compared against one another. Where the difference between the segments was clear cut, the segment that minimized overall impacts was chosen. The remaining segments were taken to the ACT for review. Following a detailed comparison of the segments, the ACT eliminated 36 segments from further evaluation based on potential community and environmental impacts. For additional information refer to the *Alternative Development Technical Memorandum*. Thirty-three individual segments remained that balanced environmental concerns and potential impacts to the public.

The 33 segments could be combined to form a total of 10 alternatives (refer to Figure 2-6, page 2-16). These 10 alternatives were evaluated and the results presented to the ACT for their consideration. The ACT reached a consensus on eliminating four of the 10 alternatives (September 7, 2005 ACT Meeting). Table 2.3, (page 2-17), presents the 10 alternatives and the reason for the elimination of four. This left six of the 10 alternatives to be evaluated further.

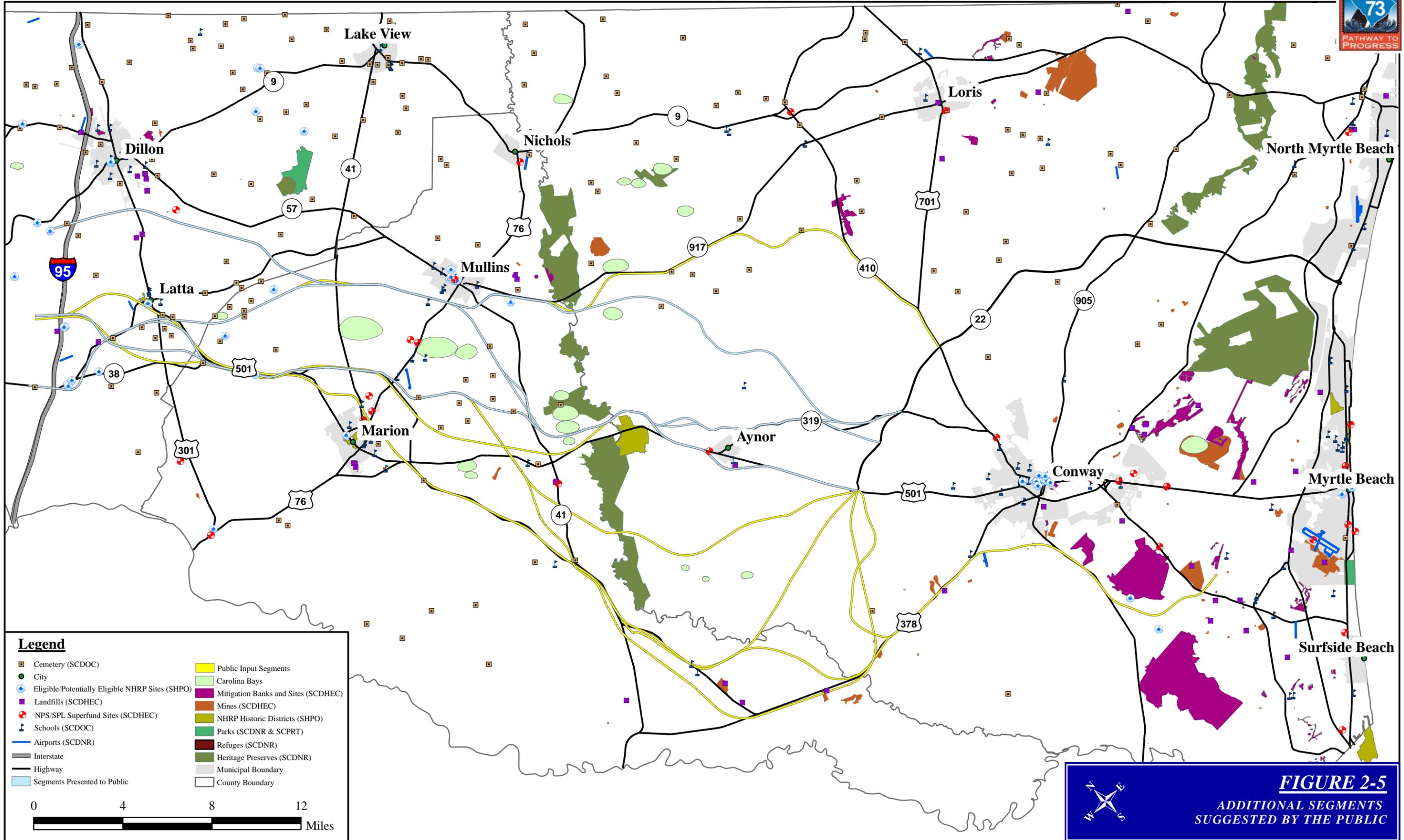
### **2.4 How were the six Reasonable Alternatives evaluated further?**

At this point, the Reasonable Alternatives were established. These were to be given greater scrutiny in the environmental evaluation. The evaluation was expanded to include the comprehensive list of categories. In addition, more specific data about each alternative, including preliminary construction





**FIGURE 2-4**  
108 SEGMENTS MODIFIED BY THE PUBLIC INPUT

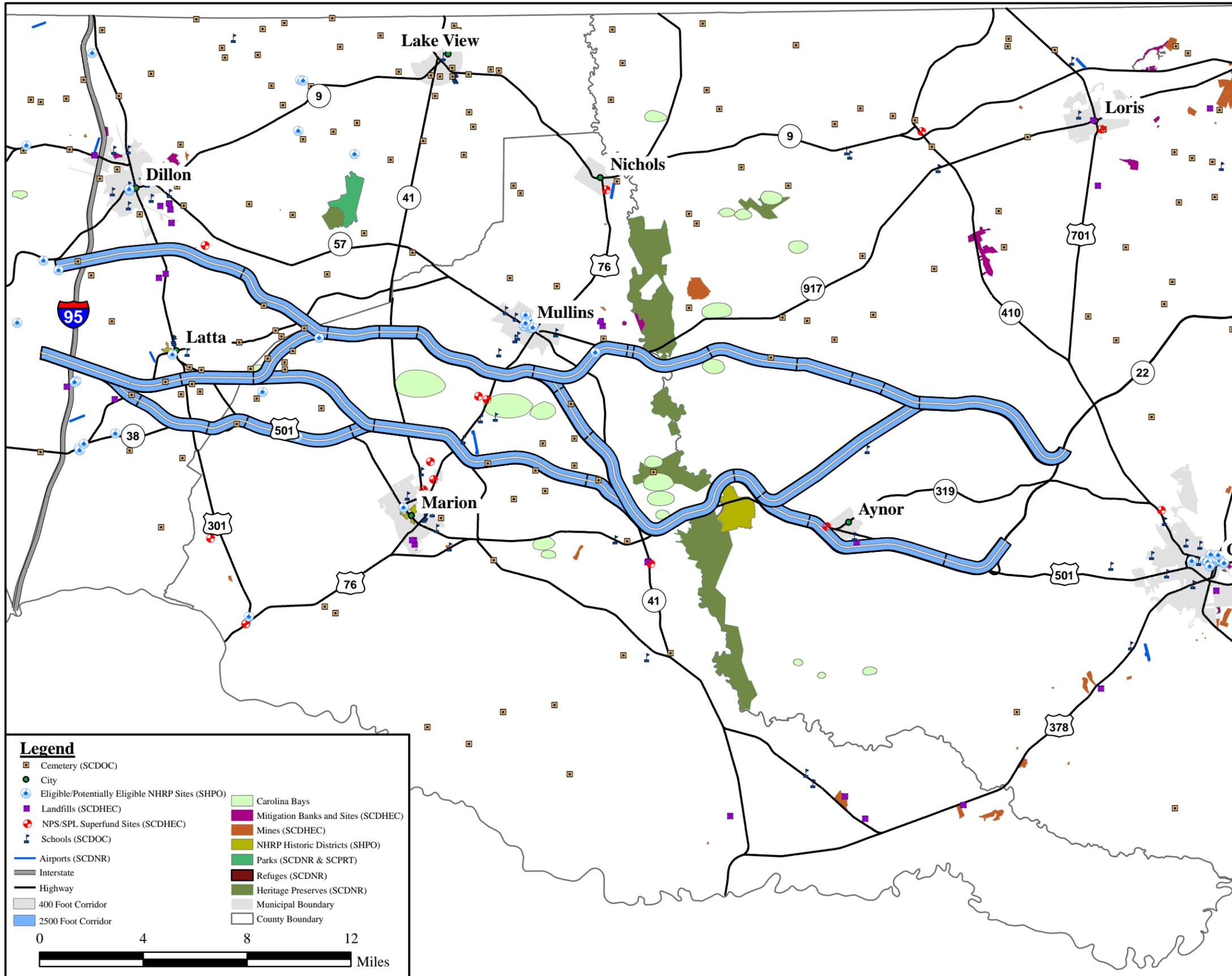


**Legend**

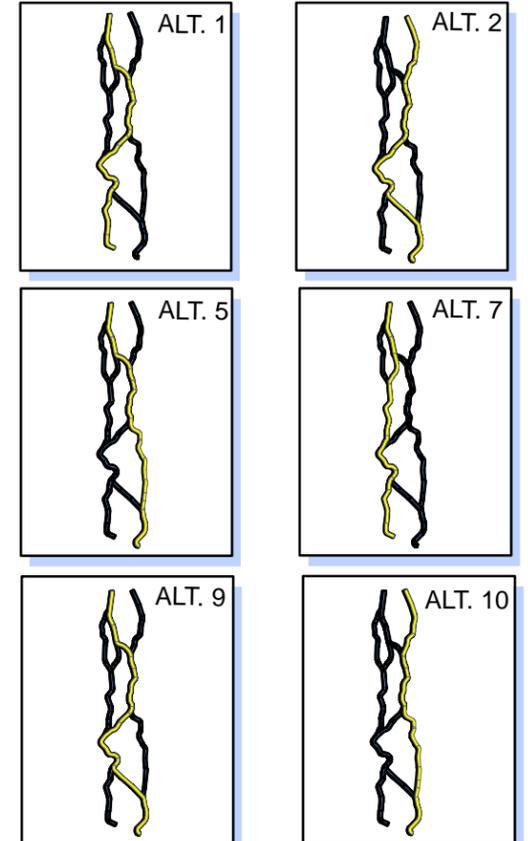
- Cemetery (SCDOC)
- City
- Eligible/Potentially Eligible NHRP Sites (SHPO)
- Landfills (SCDHEC)
- NPS/SPL Superfund Sites (SCDHEC)
- Schools (SCDOC)
- Airports (SCDNR)
- Interstate
- Highway
- Segments Presented to Public
- Public Input Segments
- Carolina Bays
- Mitigation Banks and Sites (SCDHEC)
- Mines (SCDHEC)
- NHRP Historic Districts (SHPO)
- Parks (SCDNR & SCPRT)
- Refuges (SCDNR)
- Heritage Preserves (SCDNR)
- Municipal Boundary
- County Boundary



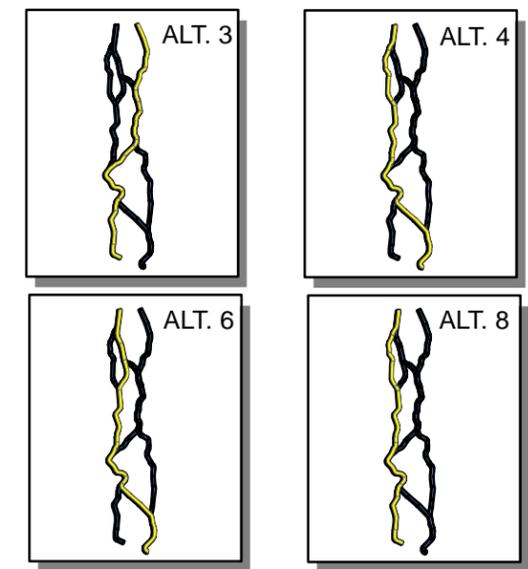
**FIGURE 2-5**  
ADDITIONAL SEGMENTS  
SUGGESTED BY THE PUBLIC



**REMAINING ALTERNATIVES**



**ELIMINATED ALTERNATIVES**



**FIGURE 2-6**  
10 ALTERNATIVES