



# Whiskey Road – Powderhouse Road Connector Study FINAL REPORT



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## ES Executive Summary

The City of Aiken and Aiken County requested assistance in developing a concept for right-of-way protection for one or more proposed corridors connecting Whiskey Road (SC 19) and Powderhouse Road to respond to growth south of Aiken. The Whiskey Road-Powderhouse Road Connector Study is part of a continuing effort to strengthen the roadway network in south Aiken along the Whiskey Road corridor. A similar study to select a corridor connecting Whiskey Road and Silver Bluff Road was conducted in 2003. The two connector corridors will add east-west connectivity while also relieving increasing congestion along the Whiskey Road corridor.

The study area is bounded by Pine Log Road to the north and the intersection of Whiskey Road and Powderhouse Road to the south. The approximately 1.71 square mile study area (approximately 1,097 acres) consists primarily of residential, commercial, school, church, and agricultural land uses, as well as undeveloped property.

With growth continuing at a steady rate, scarce and needed right-of-way should be secured as soon as possible to avoid skyrocketing real estate values as well as to enhance development partnership possibilities. Commencing in January 2005, the study included three initial stakeholder meetings, held January through June 2005, as well as a public information meeting on June 30, 2005. To complete the study, the City of Aiken and Aiken County established an Ad Hoc Joint City-County Steering Committee on the Whiskey-Powderhouse Connector (Committee) to guide the consultant team in reviewing and conducting technical analysis to determine the preferred alignment(s).

The need for a connector between Whiskey Road and Powderhouse Road exists to provide local and through traffic with improved east-west connections thereby reducing traffic on Pine Log Road, Whiskey Road and other collectors and local streets in the study area. Major routes in the study area have a poor level of service now and are forecast to be worse by 2030. The section of Whiskey Road between Pine Log Road and Powderhouse Road is the location of significant safety concerns, including a crash rate over the past three years that was four times the statewide rate. A reduction in congestion will likely result in lower crash rates.

The study was originally organized into four phases: Data Collection and Existing Conditions Review, Alternatives Identification and Preliminary Assessment, Selection of Preferred Alignment Location, and Recommendations and Final Report. Upon completion of the first three phases, the City and County determined that the consultant team would work with the Committee to develop the final report. The Committee met seven times between August 2005 and February 2006 to develop criteria, review alignment alternatives and their performance against the criteria, and review presentations from the consultant and property owners. The Committee also conducted a public meeting on April 27, 2006, to collect additional public input.

### Public Involvement

Public involvement and stakeholder participation opportunities were formally integrated at key milestones in the study. Stakeholder and public feedback has been fully considered in determining the need for a connector road from Whiskey Road to Powderhouse Road, as well as in evaluating potential alternatives to identify the most appropriate alignment. The study included seven meetings with the Committee and two general public meetings throughout its duration.



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Public information generated a significant number of comments and interest. One such comment resulted in the Committee's creation in order to help address concerns of the neighborhoods potentially impacted by the corridor. The Committee included representatives from the neighborhoods along Powderhouse Road and in the proximity of the study area.

## Study Goals

The initial study goal was to establish a preferred alignment, right-of-way, and cost estimate for a new road that allows for east-west travel between Whiskey Road and Powderhouse Road south of Pine Log Road, as well as a possible north-south connection between Pine Log Road and Whiskey Road and/or Powderhouse Road. The initial goals and objectives were modified by the Committee to include a broader review of connectivity, accessibility, property impact, traffic impact, cost, safety, and environmental impact in proximity to the study area. The goal became more to enhance current and future traffic circulation and safety in the south Aiken area without conducting a detailed traffic analysis of the full Whiskey Road corridor. As a result of the expanded scope of study, the Committee and the rest of the study team worked to develop an agreed upon methodology to evaluate a number of relevant factors to meet the community needs and interests.

The consultant team developed potential alternative alignments to achieve the project goal of connecting Whiskey Road and Powderhouse Road. In developing the alternatives, all available mapping of the study area was analyzed and extensive field reviews conducted. The identified constraint areas were subsequently mapped. From this information, various alternative alignments were selected. Several alternatives were further refined to respond to public comments. The alternative alignments currently under consideration are mapped in the full final report document.

## Selection Methodology

The Committee, working with the consultant, developed a list of criteria to evaluate each of the seven alignments. The proposed evaluation criteria are listed below:

- Property impact
- Connectivity
- Access issues
- Traffic impact
- Environmental impact
- Cost
- Safety

Objective and unbiased evaluation of alternatives required that each alignment be individually graded based upon the same evaluation factors. The specific methodologies for evaluating each factor are described in the full final report.

Right-of-way costs were developed based upon required right of way and unit costs for land in the area. Additional information regarding comparable property values and transactions was collected from the City and County to ensure proper cost estimates for property values. Each alternative was rated based upon its relative costs.



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While each evaluation criterion is important in evaluating each alternative alignment, some criteria were considered to be more important than others. To account for the relative importance of each criterion, each was assigned a weight by the Committee. The scores for each criterion were then weighted and summed by alternative to determine a total numerical value for each alternative.

The above analysis was developed to provide objective evaluation, scoring and weighting of the selected project evaluation criteria for each alternative. The Committee reviewed the alternative with the highest score to determine if a consensus exists for the preferred alignment. The alignment could be slightly altered to gain consensus among the Committee as long as the “common sense” tweaks do not appreciably affect the scoring. It is important that the scoring should not prevent minor, but essential, changes that may result in a stronger, more acceptable product.

The Committee, working with the study team, implemented the selection methodology and conducted another public meeting on April 27, 2006. The analysis incorporated an evaluation of seven alignment alternatives against the seven evaluation factors.

### Criteria Analysis

Committee members assumed the responsibility for conducting the property impact analysis. The methodology, similar to that utilized in the previous Silver Bluff Corridor Study, is fully described in the final report document. The connectivity evaluation criterion was defined as the ability and ease for citizens to travel from one destination to another within this sector of Aiken County. For each alternative, the ease and directness of each trip was evaluated.

Accessibility is the ability of a vehicle to enter, exit or cross a road. Accessibility was considered both internal to the primary study area, as well as to the adjoining street network. To analyze traffic impact, the travel demand model was applied to forecast 2030 traffic for the nine alignment alternatives and no build (no connector) networks. The forecast traffic reductions on Whiskey Road, Pine Log Road, and Powderhouse Road produced by each alternative alignment were calculated and compared. Environmental impact was evaluated resulting from the following environmental factors:

- Cultural/historic resources
- Waters of the United States
- Federally protected threatened and endangered species
- Farmland

Each alternative’s cost estimate is the sum of the individual cost estimates from the following factors:

- Paving
- Drainage
- Earthwork
- Erosion Control
- Signing and Marking
- Sidewalk
- Guardrail



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- Right of Way

The study team was able to evaluate each alignment’s likely improvement to crash experience based on the successful reduction of traffic at high accident locations. From this investigation and analysis, each alternative alignment was rated as to its contribution to improving traffic safety in the area.

### Weighting and Ranking

Each evaluation factor was scored, assigned a weighting based on the relative importance of each factor and ranked. Weighting ranged from highest, Traffic Impact (1.00), to lowest, Environmental Impact (0.40). Table ES-1 shows the ranking and weighting for each evaluation factor.

**Table ES-1  
Evaluation Factor Ranking by Criteria and Weight Summary**

<b>Evaluation Factor</b>	<b>Alt 1</b>	<b>Alt 2</b>	<b>Alt 3</b>	<b>Alt 4</b>	<b>Alt 5</b>	<b>Alt 6</b>	<b>Alt 7</b>	<b>Alt 8</b>	<b>Alt 8A</b>	<b>Weight</b>
Property Impact	3	5	1	2	4	6	7	6	6	0.73
Connectivity	4	4	3	2	6	5	1	5	4	0.87
Access	5	7	6	7	4	2	3	1	1	0.46
Traffic Impact	7	8	5	2	6	6	4	3	1	1.00
Environmental Impact	5	5	5	4	1	3	2	3	3	0.40
Cost	3	2	1	4	5	7	6	8	9	0.44
Safety	9	8	4	3	4	7	5	2	1	0.94
<b>Final Ranking</b>	<b>8</b>	<b>9</b>	<b>3</b>	<b>4</b>	<b>6</b>	<b>7</b>	<b>5</b>	<b>2</b>	<b>1</b>	

Table ES-1 summarizes the rankings for each alignment alternative against each evaluation factor. Alternatives 8A, 8 and 3 were ranked most favorably. The Committee could slightly alter rankings to gain consensus as long as the “common sense” tweaks do not appreciably affect the scoring. The scoring should not prevent minor, but essential changes that may result in a stronger, more acceptable product.



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### 1 Introduction

The City of Aiken, in conjunction with Aiken County, requested assistance in developing a concept to protect right-of-way for one or more proposed corridors connecting Whiskey Road (SC 19) and Powderhouse Road in order to respond to growth south of Aiken. The Whiskey Road-Powderhouse Road Connector Study is part of a continuing effort to strengthen the roadway network in south Aiken along the Whiskey Road corridor. A similar study was conducted in 2003 to select a corridor connecting Whiskey Road and Silver Bluff Road. The two connector corridors will add east-west connectivity while also relieving increasing congestion along Whiskey Road.

#### Background

The study area, as shown on Figure 1, is bounded by Pine Log Road to the north and the intersection of Whiskey Road and Powderhouse Road to the south. The approximately 1.71 square mile study area (approximately 1,097 acres) consists primarily of residential, commercial, school, church, and agricultural land uses, as well as undeveloped property. With growth continuing at a steady rate, scarce and needed right-of-way should be secured as soon as possible to avoid skyrocketing real estate values, as well as to enhance development partnership possibilities.

Initiated in January 2005, the study included three initial stakeholder meetings, held from January through June 2005, as well as a public information meeting, held on June 30, 2005. To complete the study, the City of Aiken and Aiken County established an Ad Hoc Joint City-County Steering Committee to guide the consultant team in reviewing and conducting technical analysis to determine the preferred alignment. Comprised of elected leaders from the City and County, as well as local citizens, the Committee was assigned the responsibility of directing the study in a manner that would produce a plan supportable by both the City and County leadership.

The Aiken County Council resolution that initiated this committee states: *County Council hereby requests that the City of Aiken work jointly with the county to appoint a nine-member ad hoc committee to study the location for a new connector road in the Whiskey Road / Powderhouse Road area. In order to sharpen the focus of this committee, the following Mission Statement was proposed: The ad hoc committee will provide recommendations to Aiken County and the City of Aiken regarding the location of roads in the Whiskey Road / Powderhouse Road area with the objective of relieving traffic congestion on the surrounding road network.*

To accomplish the objective, the consultant team worked closely with City staff, County staff and the Committee to conduct significant public involvement, technical analysis, and committee review/input to establish criteria for evaluation of potential alignment alternatives. Each proposed alignment was measured against the criteria to develop a recommended alternative.







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### Study Process

The study was originally organized into four phases:

- **Phase I – Data Collection and Existing Conditions Review.** Using existing data and information on current roadway conditions, local land use and development plans, and existing and proposed projects, existing and future travel conditions in the corridor were evaluated to identify transportation deficiencies and determine appropriate design criteria for evaluation of alignment alternatives.
- **Phase II – Alternatives Identification and Preliminary Assessment.** Feasible alignment alternatives responding to local community needs were identified and mapped using environmental and design evaluation factors. After each alignment alternative was mapped and analyzed, a description of benefits and constraints was prepared for review and comment by City staff and the public.
- **Phase III – Selection of Preferred Alignment Location.** Preliminary criteria were prepared, including a comparison of design constraints, to determine a realistic and cost effective alignment. Potential alignments avoided known physical, social and environmental constraints. Based on the results of the benefits/constraints analysis, as well as staff, stakeholder and public input, a recommended alignment was selected.
- **Phase IV – Recommendations and Final Report.** The recommended alignment that best met the established evaluation criteria was identified and a draft concept report prepared summarizing the overall study process for review and comment by stakeholders and the general public.

Upon completion of the first three phases, the City and County determined that the consultant team would work with the Committee to develop the final report. The Committee met seven times between August 2005 and February 2006 to develop criteria, review alignment alternatives and their performance against the criteria, and review presentations from the consultant and property owners. The Committee also conducted a public meeting on April 27, 2006, to collect additional public input.

An analysis was conducted on seven alternatives and a report was developed and submitted in April 2006. Upon further deliberations, a request to study two additional alternatives was made. The analysis of the two additional alternatives, 8 and 8A was conducted to supplement the April 2006 study. The scoring of all alternatives was recalculated to reflect the relative scores of the new alternatives included in the evaluation. Results are discussed in this final report.

### Need and Purpose

Southern Aiken is experiencing significant residential and commercial growth. The combination of growth in commuter traffic plus other growth factors has increased several types of trips on Whiskey Road, the only roadway connecting the south side of Aiken to downtown. Additionally, development has edged to the east, creating additional need for east-west connectivity.

The need for a connector between Whiskey Road and Powderhouse Road exists to provide local and through traffic with improved east-west connections, thereby reducing traffic on Pine Log Road, Whiskey Road, and other collectors and local streets in the study area. Major routes in the



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study area currently have poor levels of service and are forecast worsen by 2030. The section of Whiskey Road between Pine Log Road and Powderhouse Road also poses significant safety concerns, including a crash rate over the past three years that was four times the statewide rate. A reduction in congestion would likely result in lower crash rates.

The community consists largely of strip commercial development along Whiskey Road, with vacant land between Whiskey Road and Powderhouse Road. The northern end of the study area is developed as office and schools.

The purposes of the proposed connector are to:

- Reduce traffic on Whiskey Road, Pine Log Road, and other area routes
- Provide more direct local and through traffic with a facility that adequately serves current and future travel demand
- Provide the traveling public a safer driving environment.

Not only would a connector mitigate existing and future congestion, it would also allow responsible development in the area without creating additional congestion while also accommodating east-west flow both west of Whiskey Road and east of Powderhouse Road. The proposed connector would accomplish these purposes by providing an effective transportation corridor from Whiskey Road south of Pine Log Road to Powderhouse Road. Construction of a connector would also enhance the safety of the City of Aiken and Aiken County roadway system.



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## 2 Study Methodology

### Study Goals and Objectives

The initial study goal was to establish a preferred alignment, right-of-way, and cost estimate for a new road that allows for east-west travel between Whiskey Road and Powderhouse Road south of Pine Log Road, as well as a possible north-south connection between Pine Log Road and Whiskey Road and/or Powderhouse Road. For the recommended corridor to meet the initial goal, it must accomplish the following objectives:

- Relieve existing traffic congestion, particularly on Pine Log Road and Whiskey Road
- Improve traffic safety in the study area
- Accommodate alternative modes of travel, including bicycle and pedestrian facilities
- Achieve compatibility with existing and proposed land uses
- Minimize environmental and community impacts
- Minimize need for right-of-way
- Minimize costs
- Enhance connectivity west of Whiskey Road and east of Powderhouse Road
- Incorporate public input
- Meet federal, state, and local requirements

As stated previously, the initial goals and objectives were modified by the Committee to include a broader review of connectivity, accessibility, property impacts, traffic impacts, cost, safety, and environmental impacts in proximity to the study area. The goal became more to enhance current and future traffic circulation and safety in the south Aiken area without conducting a detailed traffic analysis of the full Whiskey Road corridor. As a result of the expanded scope of study, the Committee and entire study team worked to develop an agreed upon methodology to evaluate a number of relevant factors to meet the community's needs and interests.

### Study Area Constraints

The study area's approximately 1.71 square miles (approximately 1,097 acres) consists primarily of residential, commercial, school, church, and agricultural land uses, as well as undeveloped property. Constraints include the following:

- Existing Land Use/Community Facilities
  - Bonniview Estates (1940s-50s)
  - Elmwood Park (1940s-50s)
  - Churches and schools
- Historic Resources
  - No National Register of Historic Places
  - Three potentially eligible (Bonniview Estates, Elmwood Park, and rural agricultural property on Rogers Country Lane)



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- Archaeology
  - No properties in study area
  - Nine properties within one-mile radius of study area
- Section 4 (f) Resources
  - Historic resources in study area
- Sensitive Ecological Resources
  - United States Fish and Wildlife Service (USFWS) – Seven federally threatened or endangered species could potentially occur; none were observed
- Waters of the United States
  - Intermittent stream, two open waters, and two wetlands

### **Alternative Alignments to Be Evaluated**

The consultant team developed potential alternative alignments to achieve the project goal to connect Whiskey Road and Powderhouse Road. Working with the City of Aiken, the consultant team prepared design concepts of the ultimate sections recommended for the connector. Figure 2 shows the connector's agreed upon typical section to meet design requirements and transportation need. Two-lane sections will initially be constructed, with sufficient right-of-way available for the four-lane sections ultimately needed.

In developing the alternatives, the consultant analyzed all available mapping of the study area and conducted an extensive field review. The consultant subsequently mapped the identified constraint areas. From this information, various alternative alignments were selected. Several alternatives were further refined to respond to public comments. The alternative alignments considered are illustrated in Figures 3 through 11 on the following pages.

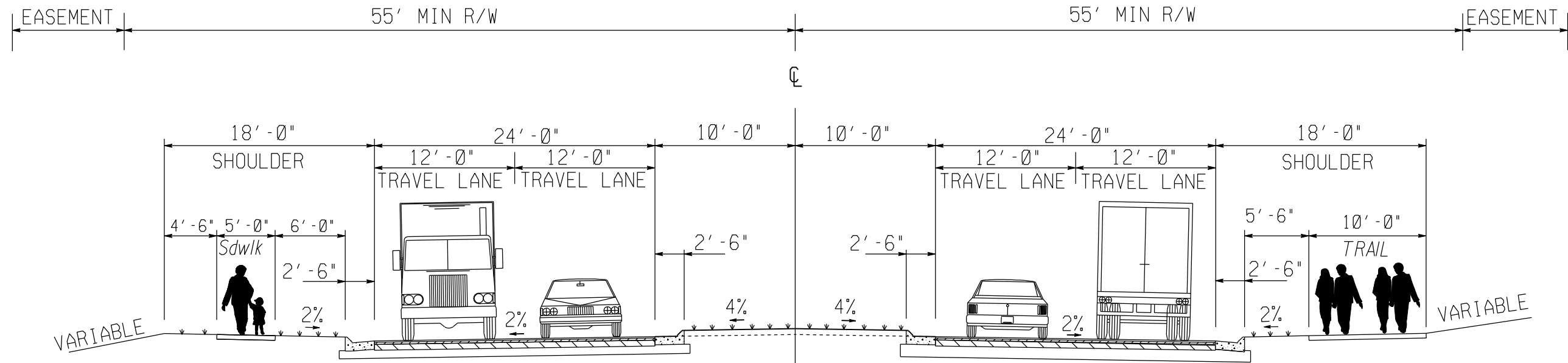
Each identified alternative was developed to meet the project goals. While all nine alternatives can be considered constructible, each has different characteristics. The evaluation methodology objectively rated the alternatives and ultimately led to selection of the best.

### **Factor Evaluation Methodology**

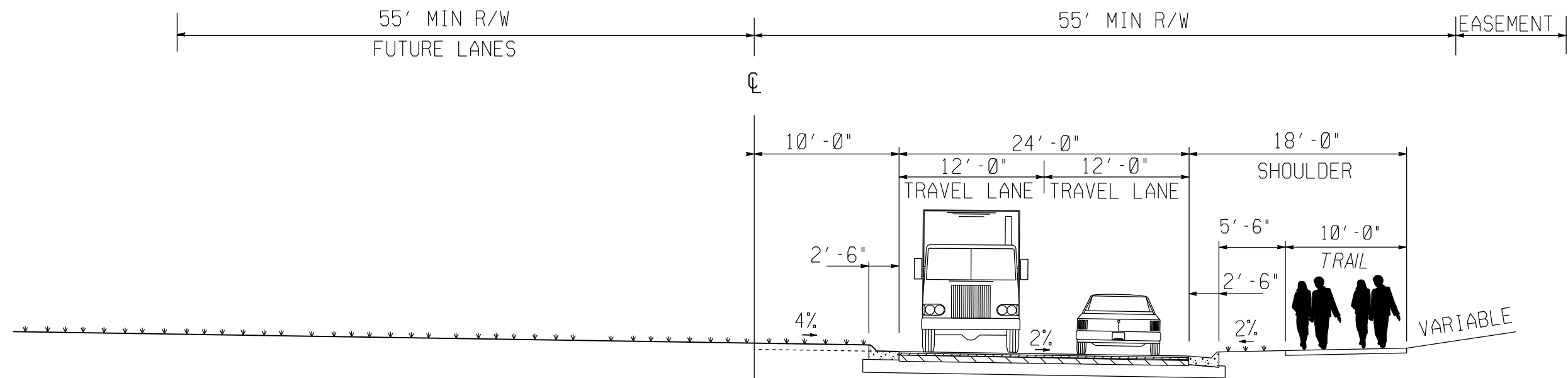
The alignment evaluation and selection methodology used in determining the best location and concept plan for the connector road was carefully considered by the consultant team and the Committee. The methodology, which was initiated by the consultant and accepted by the Committee, was used to evaluate each alternative and ultimately develop a consensus on a preferred alignment and concept plan. The evaluation and selection methodology used to review each alternative is described further in the following subsections.

# WHISKEY ROAD/POWDERHOUSE ROAD CORRIDOR STUDY

## FOUR LANE TYPICAL SECTION



## TWO LANE TYPICAL SECTION

























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### Evaluation Criteria

The Committee, working with the consultant, developed a list of criteria to evaluate each of the nine alignments. The proposed evaluation criteria were:

- Property Impact
- Connectivity
- Access Issues
- Traffic Impact
- Environmental Impact
- Cost
- Safety

These criteria were adopted by the Committee on September 9, 2005.

### Evaluation Methods

Objective and unbiased evaluation of alternatives required that each alignment be individually graded based upon the same evaluation factors. The specific methodologies for evaluating each factor are described in the following paragraphs.

#### Property Impact

The property impact evaluation criterion was used to estimate the relative impact each alternative alignment had on the quality of life of current property owners in the vicinity of each alternative. The methodology is summarized in the steps below:

- Identify all properties impacted by each alignment.
- Estimate the relative severity of impact on each property owner in four categories: view, noise, lifestyle, and dislocation.
- Assign a weight to each category proportional to the importance of the category of impact.
- Compute the impact on each property along each alternative route. For each property, multiply the estimated impact value of each category by the category's assigned weight and sum the results for each property.
- Compute the overall property impact for each alternative by summing all individual property impacts along each alternative.

As directed by the Committee, this approach is precisely the same as was conducted by the Whiskey Road-Silver Bluff Road Ad Hoc Committee. This evaluation criterion rating was conducted exclusively by the Committee.



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### Connectivity

The connectivity evaluation criterion was defined as the ability and ease for citizens to travel from one destination to another within this sector of Aiken County. Potential trips of significance used in this evaluation include trips between specific origins and destinations, as detailed below. Beside each trip is the assigned weight that reflected the relative importance of each trip.

- Internal to Internal
  - Target to schools (1)
  - Aiken Mall/East Gate Drive to schools (2)
  - Lowe’s to schools (1)
  - Dougherty Road to schools (2)
- External to Internal
  - Powderhouse Road/Athol Avenue to Target (3)
  - Powderhouse Road/Athol Avenue to Aiken Mall/East Gate Drive (3)
  - Powderhouse Road/Athol Avenue to Lowe’s (3)
  - Powderhouse Road/Athol Avenue to Dougherty Road (2)
  - Powderhouse Road/Athol Avenue to Wal-Mart (3)
  - Powderhouse Road/Athol Avenue to schools (3)
  - Powderhouse Road/Pine Log Road to Target (3)
  - Powderhouse Road/Pine Log Road to Aiken Mall/East Gate Drive (3)
  - Powderhouse Road/Pine Log Road to Lowe’s (3)
  - Powderhouse Road/Pine Log Road to Dougherty Road (2)
  - Powderhouse Road/Pine Log Road to Wal-Mart (3)
- External to External
  - Powderhouse Road/Pine Log Road intersection to Whiskey Road/Powderhouse Road intersection (10)

For each alternative, the ease and directness of each trip was evaluated, rated and multiplied by the weighting.

### Access Issues

Accessibility is the ability for a vehicle to enter, exit, or cross a road. Although the connector road will be classified as either a minor arterial or a collector road, it must serve the needs of local access while providing adequate throughput capacity. Therefore, each alternative was evaluated for its ability to maintain capacity while providing safe and efficient accessibility. Accessibility was considered internal to the primary study area as well as to the adjoining street network.

In evaluating access issues, a set of access control standards was developed and approved by the Committee. These standards were applied to each alternative alignment. Based upon both the access design internal to the study area, as well as access into the adjoining street network, each alternative was assigned a numerical rating relative to its ability to provide safe and efficient access.





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Points were assigned to alternatives for internal access based on the number of potential median breaks and signalized intersections internal to the study area. Points were assigned to alternatives for external access based on access to existing signalized intersections.

### Traffic Impact

The consultant applied the regional travel demand model to the study area under each alternative alignment scenario. Initially, the consultant calibrated the model for this subarea to replicate existing travel on the surrounding road network. The consultant then tested each alternative using today's travel demands. Subsequently, the Committee identified three future land use scenarios, including three different levels of development intensity. The consultant re-applied the travel model under each of these future conditions for all nine alternatives.

The consultant evaluated the traffic impact of each alternative alignment for both existing and future conditions. Each alternative alignment was rated based upon its success in reducing traffic on Whiskey Road, Pine Log Road, and Powderhouse Road.

### Environmental Impact

While each alternative alignment was developed to minimize its impact on the natural environment as well as area cultural and historic resources, each alternative had varying degrees of impact on the environment. The consultant team mapped all sensitive natural environmental resources in the study area. Each alignment was overlaid onto this environmentally sensitive areas map to evaluate impacted areas. Each alternative was objectively rated on its impact to environmental, cultural, and historic resources.

### Cost

The consultant prepared construction and right-of-way cost estimates for each of the nine alternative alignments for review and approval by the Committee. Construction costs were based on unit prices of recently bid roadways in the southern United States.

Right-of-way costs were developed based upon required right-of-way and unit costs for land in the area. Additional information regarding comparable property values and transactions was collected from the City and County to ensure proper cost estimates for property values. Each alternative was rated based upon its relative costs.

### Safety

Highway safety was identified as a major concern on Whiskey Road, Powderhouse Road, and Pine Log Road. The consultant identified locations on these facilities where accidents were experienced over the last two years, with complete data (2003 and 2004) as well as additional information regarding the severity, type of crash, and contributing factors.

Using the crash statistics collected on these roads, the consultant and Committee evaluated each alignment's likely improvement to crash experience based on the successful reduction of traffic at high accident locations. From this investigation and analysis, each alternative alignment was rated as to its contribution to improving traffic safety in the area.



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### **Evaluation Factor Weighting and Scoring**

While each of the evaluation criteria is important in evaluating each alternative alignment, some criteria were considered to be more important than others. To account for the relative importance of each criterion, each was assigned a weight by the Committee. Because the evaluation criteria were different, numerical results were reached through a scoring methodology that ensured objectivity and rigor. The scoring process followed four steps:

1. Ratings were assigned to each evaluation criteria.
2. Ratings were converted to a common basis by computing the average of the ratings for each criterion, subtracting the average from each rating, then dividing the difference by the average.
3. The scores for each criterion were multiplied by their assigned weight and summed by alternative to determine a total numerical value for each alternative.
4. Specific criteria (connectivity, access, traffic impact, and safety) with favorable positive ratings were reversed to negative to ensure that the most favorable score was the lowest.

### **Selection of Preferred Alignment Concept**

The above analysis was developed to provide objective evaluation, scoring and weighting of the selected project evaluation criteria. The Committee reviewed the alternative with the highest score and determined if consensus existed for the preferred alignment. The Committee could slightly alter the alignment to gain consensus as long as these “common sense” tweaks did not appreciably affect the scoring. It was important that the scoring did not prevent minor, but essential, changes that may result in a stronger, more acceptable product.

### **Public Involvement**

Public involvement and outreach was a vital and ongoing element of this study. Study stakeholders, including local governments, businesses, and the general public, provided input and feedback throughout the study through meetings and workshops.

Public involvement and stakeholder participation opportunities were formally integrated at key milestones in the study. Stakeholder and public feedback was fully considered in determining the need for a connector road from Whiskey Road to Powderhouse Road, as well as in evaluating potential alternatives to identify the most appropriate alignment. The corridor study provided 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 stakeholders, determine if those needs could be satisfied by a connector roadway, and provide information on a recommended alternative.

The approach to public involvement for the study was community-based and focused on providing information to two levels throughout the study process: the organized stakeholder group and the general public. Major stakeholder groups in the study area 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.



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### Structure for Stakeholder Involvement

An organized structure for public participation programs is important for ensuring that efforts to provide information on a study and obtain involvement from various stakeholders are cost effective and also reach the broad array of interests affected by the study. The structure for stakeholder involvement on the Whiskey Road-Powderhouse Road Connector Study was organized around the Joint City-County Ad Hoc Committee, composed of local government officials and planning agencies. The Committee, which provided guidance and general oversight, met with the consultant team on a regular basis throughout the study to discuss progress, provide direction, and review deliverables at key phases. A list of Committee members is provided in Appendix A.

### Stakeholder and Public Involvement Activities

The study included seven meetings with the Committee, as well as two general public meetings, throughout its duration. A summary of public outreach activities is shown in Table 1.

**Table 1  
Committee and Public Outreach Meetings Summary**

<b>Committee</b>	<b>Meeting Date</b>	<b>No. of Attendees</b>	<b>Purpose</b>
<b>Stakeholders Committee</b>	January 7, 2005		Kickoff
	March 7, 2005		Initial findings
	June 16, 2005		Pre-public hearing briefing
<b>Joint City-County Steering Committee</b>	August 10, 2005	20	Role of Committee and consultant team
	August 31, 2005	20	Potential alignment alternatives, evaluation factors, mission statement
	September 8, 2005	21	Work scope, analysis methodologies, meeting schedule
	October 25, 2005	22	Finalized factor evaluation methodologies and routes to be analyzed
	November 29, 2005	22	Property impact and connectivity factor discussion plus factor weighting
	December 13, 2005	20	Presentation of draft analysis
	January 31, 2006	35	Presentation from property owner plus revised alignment evaluation
	February 23, 2006	19	Safety analysis and schedule
	March 8, 2006	20	Safety analysis and schedule



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**Table 1**  
**Committee and Public Outreach Meetings Summary**

Committee	Meeting Date	No. of Attendees	Purpose
<b>Public Meetings</b>	June 30, 2005	66	Presentation of study and identification of issues, needs, and initial potential alignment alternatives
	April 27, 2006		Presentation of potential and recommended alignment alternatives

### Study Website

Maps, news releases, fact sheets and other relevant documents were placed on the City of Aiken website as appropriate. In addition, advertisements for public meetings were placed on the website and in local media outlets. Documents were timely, helping to generate public interest just before and during public meetings and the public comment period.

### Results

Public information generated a significant number of comments and interest. One result of the public comments was the creation of the ongoing Joint City-County Ad Hoc Steering Committee to help address concerns of the neighborhoods potentially impacted by the corridor. The Committee included representatives from the neighborhoods along Powderhouse Road and in the proximity of the study area.

### Environmental Justice Community Outreach

Title VI, Executive Order 12898 and Section 450 of the Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21) establish environmental justice requirements. The study planning efforts were sensitive to the importance of engaging environmental justice community members in the planning process. The project team identified environmental justice stakeholders in order to notify them of study activities, thereby ensuring that the concerns and needs of low-income and minority populations within or in proximity to the study area were considered. The federal regulations require that the planning process maintain sensitivity to possible impacts on communities. Recommendations were reviewed for their potential to impact communities in the area, including environmental justice communities.



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### 3 Inventory and Analysis of Existing and Forecast Conditions

To conduct the study, proper levels of data and analysis were required. Several of the key tools used for the technical analysis included the Augusta Regional Transportation Study (ARTS) travel demand forecast model that is maintained by the Georgia Department of Transportation (GDOT), crash data from the South Carolina Department of Public Safety, and Geographic Information System (GIS) shapefiles from the City of Aiken. The model was used to run the alignment alternatives against the scenarios requested by the Committee. Crash data was instrumental in developing the safety analysis. GIS data, particularly aerial photography, was used as the backbone of the analysis to create maps for analysis and public information.

#### Travel Demand Model

The GDOT-maintained ARTS model was used to forecast future traffic volumes based on the various alignments tested against three potential development scenarios. The development information used for testing included:

- Current socioeconomic data with no connector alternative, used to provide 2005 traffic volumes
- 2030 volumes for no build (no connector alternative) and each alternative against low, medium and high growth scenarios
  - Low growth: Current socioeconomic data plus 96 additional housing units in the study area
  - Medium growth: Current socioeconomic data plus 290 additional housing units in the study area
  - High growth: Current socioeconomic data plus 2,105 additional housing units in the study area

The results of the model runs were used in the traffic and safety analysis selection methodology.

#### Public Involvement Data

Information received during the public and stakeholder meetings served to enhance the study and ultimately initiated the creation of the Steering Committee to complete the report. Two public meetings, three stakeholder meetings, and nine Committee meetings were conducted throughout the study. The June 30, 2005, public meeting attracted 66 attendees, many of whom submitted written comment forms. Comments from the public meeting are provided below.

#### **Other Alignments for Consideration**

- Whiskey Road should hit Powderhouse Road near the intersection of Old Powderhouse Road and go to East Gate Drive.
- New connector road should continue across undeveloped land to the Banks Mill/Pine Log intersection to drain traffic going to the bypass or downtown.
- East Gate to the intersection of Banks Mill/Pine Long – make connector more north-south not east-west.



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- New connector road should begin at Powderhouse Road before the intersection with Old Powderhouse Road through undeveloped land to the intersection of East Gate Drive and Whiskey Road.
- Begin new connector road at intersection of Banks Mill Road and Pine Log Road through undeveloped land, across Powderhouse Road, Thoroughbred Run, and Athol Avenue to the intersection of Whiskey Road and Brookhaven Drive. This route would also allow connections to East Gate Drive at Powderhouse Road and to Corporate Parkway.
- A connector to Banks Mill Road along Citadel Drive or the power line right-of-way.
- Widening Powderhouse Road and extending to Banks Mill Road.
- Synchronize all the traffic lights, put in left turn signals along with the left turn lanes that already exist and create a right turn lane at entrances to all the major stores and businesses.
- Promote development along Route 1 and stop development on the south side.
- Program all of the left turn signals to come on **all** of the time.
- Continue Shannon Lane or Sharyn Lane to Corporate Parkway as an alternative.
- The most logical point to connect from Whiskey Road is East Gate Drive and the ideal point to connect onto Powderhouse Road is at Old Powderhouse Road.
- A connector from Route 302 to Whiskey Road via a new location road west of Powderhouse Road.
- A connector from Whiskey Road to Richland Avenue and downtown Aiken.
- A connector extending from Robin Road to Corporate Parkway continuing south across Athol Avenue to Whiskey Road at Brookhaven Drive. A second connection to Whiskey Road could be added between Beatty Lane and Oak Grove Road.
- By extending Thoroughbred Run west to connect with Corporate Parkway, connecting Corporate Parkway to Shannon Lane and continuing Corporate Parkway to Oak Grove Road (connecting Goode Lane and Harco Drive) would give a number of options to avoid Whiskey Road.

### Other Constraints for Consideration

- Drainage into Upper Three Runs.
- The headwater of Wise Creek, which is a tributary of Upper Three Runs Creek, is in the path of the proposed extension to Banks Mill Road.
- Certainly cannot connect to Dougherty. This would effectively destroy the residential area at that intersection.
- Any route chosen should cross in the least disruptive manner possible. This would ideally be the northwest corner of the McLean tract (80 acres) and the eastern boundary of the Ware tract (105 acres). Any route selected must allow for adequate road access to these tracts of McLean, Watson and Ware for future residential or commercial use.
- Bottleneck of northbound traffic at the Pine Log/Powderhouse intersection.
- There is a longstanding drainage problem in the area of Woodwardia Street.



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### Other Factors for Consideration

- Alternative 5 is too far south.
- Alternative 1 is too far north.
- Alternative 4 is not well aligned.
- The present zoning permits building of close to 4,000 homes. At two cars per household, the connector road becomes part of the problem not a solution. Keep the undeveloped land undeveloped.
- The zoning on either side of the connector needs to be carefully considered to avoid the creation of another Whiskey Road. It should be limited access and center median to ensure speedy and efficient travel from A to B.
- Alternative 3 and 4 would connect to Powderhouse Road at a very unsafe point: the base/crest of a hill.
- Alternative 1 would increase exit points out of Bonniview.
- Stay out of the neighborhoods to ensure the children have a safe place to play.

### Other Comments for Consideration

- Citadel Drive to Banks Mill Road to Pine Long Road or downtown is a major route and should be included in the area of concern.
- Consider Banks Mill Road impacts. Traffic objective is to get to Pine Log Road/downtown via Banks Mill Road.
- Concern over four lane, new construction interfacing with two lane existing.
- Concern over adding a traffic light to Pine Log Road at Centennial entrance.
- Powderhouse Road is already a defacto connector and truck route. Do not add any more traffic to it.
- Include a traffic study of Old Powderhouse and Citadel Drive (both east/west corridors to Banks Mill Road).
- Concerns from property owners in the study area regarding the potential impact on their property.
- Requests to avoid relocating homes.
- Requests to maintain current rural setting.
- Recommendation to create a corridor to link Whiskey Road with Richland Avenue.
- Request to protect downtown.
- Limit impact on Powderhouse Road.
- Make the eastern terminus at Old Powderhouse Road.
- Create synchronized left turn signals.
- Promote development along US 1.
- Prefer Alternatives 2 and 3.



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- Prefer Alternatives 3 and 4.
- Implement connector from Whiskey Road to Silver Bluff Road.

Each comment was carefully considered, resulting in establishment of the Steering Committee to conduct further study on the alignments and to try to reach a consensus on the corridor alignment.

### **Preliminary Analysis of the Environmental Data**

The project area was surveyed for environmental constraints that would affect project development. These constraints included sensitive land uses (e.g., churches, schools, parks, cemeteries), historic structures, archaeological resources, Section 4(f) resources (publicly owned properties), and sensitive ecological resources (jurisdictional waters of the United States and federally protected threatened and endangered species). The early identification of environmental constraints helps minimize environmental and community impacts.

### **Existing Land Use and Community Facilities**

The study area extends south of Pine Log Road between Whiskey Road and Powderhouse Road, terminating where the two roads intersect. Existing land use within the study area is mixed with retail/commercial businesses along Pine Log Road and Whiskey Road, single-family and multi-family residential, business/office park, institutional (schools and churches), and undeveloped agricultural/timber land. These large tracts of land are currently held in cotton and planted pine. The study area is surrounded by mostly residential land uses with supporting retail/commercial uses. Specifically, the Aiken Mall is located along Whiskey Road, across from the study area.

Two older, established single-family residential neighborhoods exist in the project area. The northern-most neighborhood, Bonniview Estates, is located along Whiskey Road and bound by Shannon Lane to the north and Beatty Lane to the south. This subdivision is comprised of smaller single-family homes that date from the 1940s and 1950s. The community appears to be mostly comprised of minority and potentially low-income populations. The neighborhood of Elmwood Park, located further south on Whiskey Road, is also comprised of smaller single-family homes that mostly date from the 1940s and 1950s, with parts that appear to have been constructed more recently. This community appears to include a mix of minority, non-minority, and some elderly residents. Project alternatives that would directly impact these neighborhoods should be avoided.

Several churches exist in the study area, located primarily along Whiskey Road and near Pine Log Road. Two schools, Kennedy Middle School and South Aiken High School, are located in the study area along Pine Log Road.

There are no public park lands located within the study area. However, Virginia Acres Park is located immediately to the north of the study area along Whiskey Road. Lastly, no cemeteries were observed in the field; however, one small unnamed cemetery is shown on the USGS 7.5 minute topographic map (Aiken, South Carolina quadrangle) within the study area. The presence of this cemetery should be field verified, and avoided if found to exist.

### **Historic Resources**

The requirements of Section 106 of the National Historic Preservation Act of 1966 and amendments thereto (NHPA) would apply to the proposed project if a federal action is required, including federal funds. No historic resources listed on the National Register of Historic Places





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(NRHP) were identified during the preliminary reconnaissance of the study area. However, three historic resources potentially eligible for listing on the NRHP were identified, including the Bonnaview Estates subdivision, the Elmwood Park subdivision, and a rural agricultural property located on Rogers Country Lane, north of the Lowe’s Home Improvement store on Whiskey Road. This property is at the end of the road and appears to be a late-19<sup>th</sup> century rural farm with a Central Hallway type house and associated outbuildings.

These findings are based on a preliminary field survey, and complete evaluation under the guidelines of Section 106 of the NHPA should be completed when an alternative for further study is selected. Coordination and consultation with the South Carolina State Historic Preservation Officer (SHPO) and other regulatory agencies would be conducted at this time.

### Archaeology

On February 4, 2005, a check of the South Carolina Institute of Archaeology and Anthropology Site Files was conducted for this project at the University of South Carolina in Columbia. The project area consists of a triangular-shaped tract bounded by Whiskey Road, Pine Log Road, and Powderhouse Road. No archaeological sites are located within the boundaries of the project area. A total of nine archaeological sites are located within a one-mile radius of the project area and are listed in Table 2. Eight of these sites are probably ineligible; 38AK631 is potentially eligible for the NRHP.

**Table 2**  
**Previously Identified Archaeological Sites within a One-Mile Radius of the Study Area\***

Site	UTMs	Site Type and Cultural Affiliation	NRHP Status Recommendation
38AK624	N 3710820 E 436030	Mid 19 <sup>th</sup> -mid 20 <sup>th</sup> century homesite artifact scatter	Probably not eligible
38AK625	N 3710720 E 435850	Late 19 <sup>th</sup> -early 20 <sup>th</sup> century homesite artifact scatter	Probably not eligible
38AK626	N 3710660 E 435680	Late 19 <sup>th</sup> -early 20 <sup>th</sup> century homesite artifact scatter	Probably not eligible
38AK627	N 3710570 E 435620	Late 19 <sup>th</sup> -early 20 <sup>th</sup> century artifact scatter-representing farmstead outbuilding	Probably not eligible
38AK628	N 3710550 E 435570	Late 19 <sup>th</sup> -early 20 <sup>th</sup> century homesite artifact scatter	Probably not eligible
38AK629	N 3710460 E 435400	Late 19 <sup>th</sup> -early 20 <sup>th</sup> century artifact scatter-representing farmstead outbuilding	Probably not eligible
38AK630	N 3710430 E 435330	Late 19 <sup>th</sup> -early 20 <sup>th</sup> century homesite artifact scatter	Probably not eligible
38AK631	N 3710370 E 435050	Late 19 <sup>th</sup> -early 20 <sup>th</sup> century farmstead complex	Potentially eligible
38AK632	N 3710250 E 434830	Late 19 <sup>th</sup> -early 20 <sup>th</sup> century farmstead complex	Probably not eligible

\*Source of information: South Carolina Institute of Archaeology and Anthropology at the University of South Carolina, Columbia.



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### Section 4(f) Resources

Section 4(f) refers to the temporary and/or permanent use and constructive use of publicly owned land, specifically significant recreation land, parkland, wildlife/waterfowl refuges and historic sites for transportation purposes. Section 4(f) resources in the project area include publicly owned parkland and significant historic resources (those listed or eligible for listing on the NRHP).

The only potential Section 4(f) resources identified within the study area would include the historic resources discussed previously (Bonniview Estates subdivision, Elmwood Park subdivision and the rural farm house on Rogers County Lane), and only if they are determined to be eligible for listing on the NRHP. The use of land from a Section 4(f) resource may be approved only if it can be demonstrated that there is no feasible and prudent alternative to the use of land from the resource and that the proposed action includes all possible planning to minimize harm to the property resulting from such use.

### Sensitive Ecological Resources

A preliminary survey identification of ecological resources between Whiskey Road, Pine Log Road, and Powder House Road was conducted on February 3, 2005. The South Carolina Department of Natural Resources (SCDNR) Heritage Trust Program species occurrence website; the US Fish and Wildlife (USFWS) protected species list for Aiken County; the appropriate US Geologic Survey (USGS) 7.5' topographic quadrangles; the appropriate Department of Agriculture Soil Survey; and the USFWS National Wetlands Inventory (NWI) maps were reviewed for baseline information.

During the field survey, an intermittent stream, two open waters, and two wetlands were identified within the proposed project area. No federally threatened or endangered flora species were identified during the field survey; however, marginally suitable habitat was observed for the relict trillium (*Trillium reliquum*).

### Site Conditions

The land uses along Whiskey Road, Powder House Road, and Pine Log Road included residential, religious facilities, business parks, schools, retail centers, mixed hardwood pine community, and agriculture. The single-family houses, schools, and church properties were characterized by maintained/manicured lawns with ornamental shrubs and flowers. The business parks and retail centers were characterized by large parking areas with minimal tree cover and landscaping. The agricultural areas were dominated by planted pine and seasonal row crops. The mixed hardwood pine community was dominated by southern red oak (*Quercus falcata*), water oak (*Quercus nigra*), loblolly pine (*Pinus taeda*), hickory (*Carya* spp.), southern magnolia (*Magnolia grandiflora*), blueberry (*Vaccinium* spp.), eastern red cedar (*Juniperus virginiana*), Chinese privet (*Ligustrum sinense*), and Japanese honeysuckle (*Lonicera japonica*).

### Federal Threatened and Endangered Species

Background information regarding known occurrences and potential occurrences of federally protected species was obtained from both the United States Fish and Wildlife Service (USFWS) and the South Carolina Department of Natural Resources (SC DNR) Heritage Trust Program web sites. The SCDNR Heritage Trust Program web site listed known occurrences in Aiken County for the following federally protected species: the shortnose sturgeon (*Acipenser brevirostrum*), smooth coneflower (*Echinacea laevigata*), bald eagle (*Haliaeetus leucocephalus*), red-cockaded



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woodpecker (*Picoides borealis*), harperella (*Ptilimnium nodosum*), and relict trillium. The SCDNR Heritage Trust Program web site listed known occurrences of federally protected species within the Aiken and New Ellenton, South Carolina quadrangles; the project is located in these quadrangles. The species identified are red-cockaded woodpecker and harperella.

Seven federally threatened and endangered species that could potentially occur or may occur in Aiken County according to the USFWS are the shortnose sturgeon, smooth coneflower, bald eagle, red-cockaded woodpecker, harperella, relict trillium, and wood stork (*Mycteria americana*). No federally protected flora or fauna were observed within the study area during the field surveys; however, marginal habitat was observed for the relict trillium.

### Waters of the United States

The study area was surveyed for jurisdictional waters of the US, including wetlands and streams, as required by the provisions of Executive Order 11990 and subsequent federal regulations. All areas within the project area that displayed one or more wetland characteristics were evaluated using the 1987 US Corps of Engineers (USACE) *Wetlands Delineation Manual*. The following wetland characteristics must be present to meet the USACE wetland definition:

1. Prevalence of hydrophytic vegetation;
2. Presence of hydric soils; and
3. Evidence of permanent or periodic inundation.

During the field survey, a total of five jurisdictional waters of the US, including an intermittent stream, two wetlands, and two open waters, were identified within the study area.

#### Wetland 1

Wetland 1, a forested wetland, was dominated by sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), and tulip polar (*Liriodendron tulipifera*). This wetland was a seasonally saturated and inundated wetland that was influenced by storm water run-off and flooding episodes from Open Water 3.

#### Open Water 2

This half-acre pond was 1 to 3 feet deep and had a mixed hardwood and pine buffer.

#### Wetland 3

Wetland 3, a forested wetland, was dominated by sweet gum, red maple, and tulip. This wetland was a seasonally saturated and inundated wetland that was influenced by storm water run-off.

#### Open Water 4

This eight-acre pond was approximately 1 to 10 feet deep and was buffered by residences and a mixed hardwood pine community.



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### Stream 5

Stream 5, an unnamed impaired intermittent waterway, flowed south over a sand, silt, and rip rap substrate to its confluence with Open Water 4. The streambed was approximately 5 to 6 feet wide and the unstable banks were 4 to 10 feet tall. Water depth was 6 to 12 inches. The stream bank was reinforced with rip rap.

### Permit Coordination Needs

A permit from USACE under Section 404 of the Clean Water Act would be required for any work that would impact any of the previously discussed wetlands, open waters, and stream. A permit from the South Carolina Department of Health and Environmental Control under Section 401 of the Clean Water Act would be required for all activities that require a 404 permit. A stream buffer variance and coordination with the USFWS may be required if longitudinal impacts occur to the stream or its buffer.

No federal threatened or endangered species were observed for any species known or potentially occurring in Aiken County. However, marginally suitable habitat for the relict trillium was observed within the mixed hardwood/pine community. The best survey time is during the flowering period from March to April.



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### 4 Analysis and Selection of Preferred Alternative

The Committee, working with the study team, implemented the proposed selection methodology prior to conducting another public meeting on April 27, 2006. The results of the selection methodology and additional public comments are provided in this section.

#### Evaluation Factor Analysis

The analysis incorporated an evaluation of nine alignment alternatives against seven evaluation factors. Each alternative was mapped and assigned a number. A methodology for conducting each factor analysis was adopted and implemented.

#### Property Impact

Committee members assumed the responsibility for conducting the property impact analysis. The methodology was similar to that utilized in the Silver Bluff Corridor Study. To complete the property impact evaluation, the following steps were conducted:

- All impacted properties were identified
- Severity of impact was evaluated based on the impact criteria: view, noise, lifestyle, and dislocation
- Values between 0 and 20 were assigned to each property for each impact criterion, with 0 being none and 20 being very serious
- Weights were assigned based on importance of impact
- Scores were created from spreadsheet calculations for each alignment based on the criteria and weights

Results are shown in Table 3, with further details provided in Appendix B.

**Table 3  
Results of Property Impact**

Alternative	Number of Properties	Rating	Ranking	Score
1	40	1,322	3	-0.11
2	39	1,389	5	-0.06
3	33	826	1	-0.44
4	63	1,265	2	-0.15
5	45	1,330	4	-0.10
6	83	1,754	6	0.18
7	138	1,943	7	0.31
8	83	1,754	6	0.18
8A	83	1,754	6	0.18

#### Connectivity

The connectivity evaluation criterion was defined as the ability and ease for citizens to travel from one destination to another within this sector of Aiken County. Potential trips of significance used in



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this evaluation include trips between specific origins and destinations, as detailed below. Beside each trip is the assigned weight that reflected the relative importance of each trip.

- Internal to Internal
  - Target to schools (1)
  - Aiken Mall/East Gate Drive to schools (2)
  - Lowe’s to schools (1)
  - Dougherty Road to schools (2)
- External to Internal
  - Powderhouse Road/Athol Avenue to Target (3)
  - Powderhouse Road/Athol Avenue to Aiken Mall/East Gate Drive (3)
  - Powderhouse Road/Athol Avenue to Lowe’s (3)
  - Powderhouse Road/Athol Avenue to Dougherty Road (2)
  - Powderhouse Road/Athol Avenue to Wal-Mart (3)
  - Powderhouse Road/Athol Avenue to schools (3)
  - Powderhouse Road/Pine Log Road to Target (3)
  - Powderhouse Road/Pine Log Road to Aiken Mall/East Gate Drive (3)
  - Powderhouse Road/Pine Log Road to Lowe’s (3)
  - Powderhouse Road/Pine Log Road to Dougherty Road (2)
  - Powderhouse Road/Pine Log Road to Wal-Mart (3)
- External to External
  - Powderhouse Road/Pine Log Road intersection to Whiskey Road/Powderhouse Road intersection (10)

For each alternative, the ease and directness of each trip was evaluated and given a rating from 0 to 5, with 5 reflecting the highest percentage of trips eliminated from Whiskey Road, Pine Log Road, and/or Powderhouse Road. The results of the connectivity analysis are summarized in Table 4, with the full spreadsheet included in Appendix C.

**Table 4**  
**Results of Connectivity Analysis**

Alternative	Rating	Ranking	Score
1	108	4	0.01
2	108	4	0.01
3	114	3	0.06
4	117	2	0.09
5	82	6	-0.23
6	95	5	-0.11
7	138	1	0.29
8	95	5	-0.11
8A	108	4	0.01



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### Access

Accessibility is the ability for a vehicle to enter, exit, or cross a road. Although the connector road will be classified as either a minor arterial or a collector road, it must serve the needs of local access while providing adequate throughput capacity. Therefore, each alternative was evaluated for its ability to maintain capacity while providing safe and efficient accessibility. Accessibility was considered internal to the primary study area, as well as to the adjoining street network.

In evaluating access issues, a set of access control standards was developed and approved by the Committee for application to each alternative alignment. Based upon the access design internal to the study area, as well as access into the adjoining street network, each alternative was assigned a numerical rating relative to its ability to provide safe and efficient access.

Points were assigned to alternatives for internal access based on the number of potential median breaks and signalized intersections internal to the study area. Points were assigned to alternatives for external access based on access to existing signalized intersections. The results of the access analysis are summarized in Table 5, with the full spreadsheet included in Appendix D.

**Table 5  
Results of Access Analysis**

Alternative	Rating	Ranking	Score
1	14	5	-0.25
2	12	7	-0.36
3	13	6	-0.30
4	12	7	-0.36
5	15	4	-0.20
6	23	2	0.23
7	21	3	0.13
8	29	1	0.55
8A	29	1	0.55

### Traffic Impact Analysis

To analyze traffic impact, the travel demand model was applied to forecast 2030 traffic for the nine alignment alternatives and no build (no connector) network. The alignments were run using three different development scenarios:

- Low growth: Current socioeconomic data plus 96 additional housing units in the study area
- Medium growth: Current socioeconomic data plus 290 additional housing units in the study area
- High growth: Current socioeconomic data plus 2,105 additional housing units in the study area

The forecast traffic reductions on Whiskey Road, Pine Log Road, and Powderhouse Road produced by each alternative alignment were calculated and compared. The traffic reductions in forecast traffic were rated, ranked and scored. The results of the traffic impact analysis are summarized in Table 6, with the full spreadsheet included in Appendix E.



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**Table 6**  
**Results of Traffic Impact Analysis**

Alternative	Rating	Ranking	Score
1	17,653	7	-0.24
2	14,973	8	-0.36
3	25,980	5	0.11
4	27,670	2	0.19
5	20,420	6	-0.13
6	20,443	6	-0.12
7	26,467	4	0.13
8	27,067	3	0.16
8A	29,403	1	0.26

### Environmental Impact

The team’s environmental subconsultant evaluated the impact of the nine alignment alternatives on the following environmental factors: cultural/historic resources, waters of the United States, federally protected threatened and endangered species, and farmland. Each alternative alignment was assigned a rating (0 to 5, least to greatest severity) based on its impact on each of the factors. The results of the environmental impact analysis are summarized in Table 7, with the full spreadsheet included in Appendix F.

**Table 7**  
**Results of Environmental Impact Analysis**

Alternative	Rating	Ranking	Score
1	10	5	0.18
2	10	5	0.18
3	10	5	0.18
4	9	4	0.07
5	6	1	-0.29
6	8	3	-0.05
7	7	2	-0.17
8	8	3	-0.05
8A	8	3	-0.05

### Cost

A variety of cost factors were identified and evaluated. Each alternative was assigned a cost estimate based on the sum of the cost estimates from the following factors: paving, drainage, earthwork, erosion control, signing and marking, sidewalk, guardrail, and right-of-way. The results of the cost estimate analysis are summarized in Table 8, with the full spreadsheet included in Appendix G.





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**Table 8**  
**Results of Cost Estimate Analysis**

Alternative	Rating	Ranking	Score
1	\$9,510,000	3	-0.16
2	\$9,190,000	2	-0.19
3	\$8,740,000	1	-0.23
4	\$10,300,000	4	-0.09
5	\$10,300,000	5	-0.09
6	\$13,440,000	7	0.18
7	\$12,890,000	6	0.13
8	\$13,450,000	8	0.18
8A	\$14,570,000	9	0.28

### Safety

Roadway safety was identified as a major concern on Whiskey Road, Powderhouse Road, and Pine Log Road. Locations on these facilities where accidents were experienced over the last three years were identified. A spreadsheet was created showing crashes occurring along each segment in 2003 and 2004, the two years with complete crash data. The spreadsheet was used to compute the crash rate for each segment. Using forecast traffic data, the potential reduction of crashes for each alternative alignment was computed.

As a result, the study team was able to evaluate each alignment's likely improvement to crash experience based on the successful reduction of traffic at high accident locations. From this investigation and analysis, each alternative alignment was rated as to its contribution to improving traffic safety in the area. The results of the safety analysis are summarized in Table 9, with the full spreadsheet included in Appendix H.

**Table 9**  
**Results of Safety Analysis**

Alternative	Rating	Ranking	Score
1	10.5	9	-0.33
2	10.2	8	-0.35
3	16.2	4	0.03
4	17.9	3	0.14
5	12.2	4	-0.22
6	11.6	7	-0.26
7	12.8	5	-0.2
8	24.0	2	0.52
8A	26.1	1	0.66

### Selection of Preferred Alternative

Each evaluation factor was assigned a weighting based on the relative importance of each factor. Weighting ranged from highest (traffic impact at 1.00) to lowest (environmental impact at 0.40). Table 10 shows the weighting for each evaluation factor.



# Whiskey Road – Powderhouse Road Connector Study

## FINAL REPORT



**Table 10**  
**Evaluation Factor Weighting Summary**

Evaluation Factor	Weighting
Property Impact	0.73
Connectivity	0.87
Access	0.46
Traffic Impact	1.00
Environmental Impact	0.40
Cost	0.44
Safety	0.94

Table 11 summarizes the weighted scores for each alignment alternative against each evaluation factor. The table also shows the numeric ranking for each alternative. The Committee could slightly alter an alternative to gain consensus among the Committee as long as the “common sense” tweaks did not appreciably affect the scoring. The scoring should not prevent minor, but essential, changes that may result in a stronger, more acceptable product.

**Table 11**  
**Results Summary**

Alternative	Property Impact	Connectivity	Access	Traffic Impact	Environmental Impact	Cost	Safety	Total
1	-0.08	-0.01	0.12	0.24	0.07	-0.07	0.31	0.59
2	-0.08	-0.01	0.16	0.36	0.07	-0.08	0.33	0.79
3	-0.32	-0.05	0.14	-0.11	0.07	-0.10	-0.03	-0.41
4	-0.11	-0.08	0.16	-0.19	0.03	-0.04	-0.13	-0.35
5	-0.07	0.20	0.09	0.13	-0.12	-0.04	0.21	0.40
6	0.13	0.10	-0.11	0.12	-0.02	0.08	0.24	0.56
7	0.23	-0.25	-0.06	-0.13	-0.07	0.06	0.19	-0.05
8	0.13	0.10	-0.25	-0.16	-0.02	0.08	-0.49	-0.62
8A	0.13	-0.01	-0.25	-0.26	-0.02	0.12	-0.62	-0.90

As Table 11 shows, Alternatives 8A, 8, and 3 have the best score total, as indicated by the lowest total score.



# Whiskey Road – Powderhouse Road Connector Study FINAL REPORT



## APPENDIX A

### The Whiskey Powderhouse Connector Road Joint City-County Ad Hoc Steering Committee



# Whiskey Road – Powderhouse Road Connector Study

## FINAL REPORT



### Committee Members

Aiken County  
Councilman Gary Bunker, Chairman  
Councilman Ronnie Young  
Councilman Scott Singer

City of Aiken  
Councilman Dick Smith  
Councilman Pat Cuning  
Councilman Don Wells

Citizens  
Marianne Pecoraro  
David Mason  
Joseph Ranke

Alternate  
Tony Sealy



**Whiskey Road – Powderhouse Road Connector Study  
FINAL REPORT**



**APPENDIX B  
Property Impact**

Whiskey Road - Powderhouse Road  
Connector Study

Property Impact  
Report  
(DRAFT)

Submitted to

Joint City - County Steering Committee

by

Property Impact Subcommittee

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## Draft Property Impact Study

### Introduction

The City of Aiken and Aiken County are collaborating on a study to determine the optimum alignment for a connector road between Whiskey Road and Powerhouse Road in south Aiken. The Study being done by Day Wilburn Associates, Inc. (DWA) is being guided by a Joint City - County Steering Committee. Seven draft alternatives have been presented by DWA. As part of the study a Subcommittee was established to assess the property impacts along the seven alternatives suggested. The Sub-Committee was to assess the impacts using the Whiskey-Silver Bluff road study as guide. The members of the Subcommittee members are:

Tony Sealy (Chairperson)  
Marianne Pecoraro  
Dave Mason  
Joseph Ranke

The Aiken County Planning Department (Stephen Strohming) provided the Subcommittee with drawings of the seven alternatives and the parcel numbers for properties within 500 ft of the routes. The Subcommittee at its first meeting, November 11, 2005, agreed to use the metrology Range and Weights used by the Whiskey-Silver Bluff study and started review of the properties on alternative 1,2 and 5. The results were recorded in a spread sheet similar to that used for the Whiskey-Silver Bluff study. Additional meetings were held on November 15th and 17th. All seven alternatives have now been reviewed. The study area and alternatives selected allow the following property groupings to be used;

1. All seven alternatives connect to South Centennial Blvd. Therefore all properties north of the connection to South Centennial Blvd. will add the same impact to each alternative. Adding the same impact number to each alternative will only increase the average impact number for each alternative. This provides no data for comparison and therefore these properties were not addressed in the study.
2. Alternative 7 requires some modifications to Powerhouse Rd. from Athol Ave to Whiskey Rd. Only minor modifications are to be required (no widening). This allowed all homes along the already paved portion to Powerhouse to be grouped in to two categories. Those homes within 150 feet and those within 500 feet. Each group was counted and the impact multiplied by the total for each category.

The comparison is based on the deviation from the average for each alternative and is shown on the attached chart.. Also, attached are copies of the evaluation guide used to address the property impacts and the spreadsheet data. After completing all seven alternatives, Alternative 3, has the lowest total property impact. This data when combined with the other study areas (Connectivity, Access, Traffic, Environmental, cost and Safety) will be used in determining the selected alternative.

## **Property Impact Methodology**

### **Objective**

Estimate the relative Quality of Life impact a connector road would have on current property owners in the vicinity of the Alternative.

### **Summary of methodology**

- 1) I.D. all properties impacted by each alternative
- 2) Estimate the severity of impact on each property owner in four categories; view, noise, life style and dislocation. Indicate the relative severity by assigning a value of 0 to 20 corresponding to none to very serious.
- 3) Assign a "Weight" to each category proportional to the importance of the category of impact.
- 4) For each parcel, multiply the value assigned to each category of impact by the weight assigned to each respective category and sum the results for each property ("Property Impact").
- 5) Add the "Property Impact" of all properties along each Alternative.

### **Type of Property (Use)**

UNDV	Undeveloped
FARM	Agriculture or Animal production
COM	Commercial non-farm business
RES	Residential property

### **Type of Impact Road has on property**

PLINE	ROW is along property line or existing ROW
NEAR	Boundary within 500 ft if ROW C Line
SPLIT	ROW divides property
TAKEN	Purchase of entire property required

### **Type of Impact**

		<b><u>Range</u></b>	<b><u>Weight<sup>1</sup></u></b>
View	Disruption or degradation of pleasant view from inside or outside normal living space	0-20	1
Noise	increase in noise in and around home	0-20	1
Life Style	Hindrance to normal recreation around the home (e.g. horseback riding, walking/jogging, entertaining). Consider the impact of reducing the size of the parcel.	0-20	1
Dislocation	Connector road takes primary residence, outbuilding or other structure.	0-20	1

<sup>1</sup> Weight agreed on by subcommittee (same as for Whiskey-Silver Bluff study)



## Property Impact Study

### Data Summary

Alternative No.	Number of Properties	Score
1	40	1322
2	39	1389
<b>3</b>	<b>33</b>	<b>826</b>
4	63	1265
5	45	1330
6	83	1754
7	138	1943

#### Attachments:

Evaluation Guide

Segment Impact Totals Chart (Data for Property Impact only)

Spreadsheet Data printout



**Whiskey Road – Powderhouse Road Connector Study  
FINAL REPORT**



**APPENDIX C  
Connectivity**

**TRIPS TO BE EVALUATED**

**CONNECTIVITY RATING**

**INTERNAL TO INTERNAL**

- 6. Target to Schools (Elementary on Pine Log, Middle and High on Centennial)\*
- 15. Aiken Mall/East Gate Dr to Schools\*
- 18. Lowe's to Schools\*
- 20. Dougherty Rd to Schools\*

**EXTERNAL TO INTERNAL**

- 22. Powderhouse/Athol to Target
- 23. Powderhouse/Athol to Aiken Mall/East Gate Dr
- 25. Powderhouse/Athol to Lowe's
- 26. Powderhouse/Athol to Dougherty Rd
- 27. Powderhouse/Athol to Walmart
- 28. Powderhouse/Athol to Schools
- 29. Powderhouse/Pine Log to Target
- 30. Powderhouse/Pine Log to Aiken Mall/East Gate Dr
- 32. Powderhouse/Pine Log to Lowe's
- 33. Powderhouse/Pine Log to Dougherty Rd
- 34. Powderhouse/Pine Log to Walmart

**EXTERNAL TO EXTERNAL**

- 36. Powderhouse/Pine Log intersection to Whiskey/Powderhouse intersection

**Rating**

**Scoring**

\*Assumes back access to schools

Weighting: 10 - External to external

- 3 - High: Estimated to be a relatively high number of vehicle trips occurring between these two trip ends
- 2 - Medium: Estimated to be a moderate number of vehicle trips occurring between these two trip ends
- 1 - Low: Estimated to be a relatively low number of vehicle trips occurring between these two trip ends

Weighting

	ALT 1		ALT 2		ALT 3		ALT 4		ALT 5		ALT 6		ALT 7	
	Rtg	Wtd	Rtg	Wtd	Rtg	Wtd	Rtg	Wtd	Rtg	Wtd	Rtg	Wtd	Rtg	Wtd
1	3	3	3	3	3	3	5	5	3	3	3	3	3	3
2	5	10	5	10	3	6	1	2	5	10	5	10	5	10
1	4	4	4	4	5	5	0	0	4	4	4	4	4	4
2	3	6	3	6	0	0	0	0	3	6	3	6	3	6
3	1	3	1	3	1	3	4	12	0	0	0	0	0	0
3	3	9	3	9	4	12	3	9	0	0	0	0	0	0
3	2	6	2	6	5	15	4	12	0	0	0	0	2	6
2	2	4	2	4	2	4	2	4	0	0	0	0	3	6
3	3	9	3	9	3	9	3	9	0	0	0	0	3	9
3	5	15	5	15	5	15	5	15	0	0	0	0	5	15
3	4	12	4	12	4	12	5	15	4	12	5	15	4	12
3	5	15	5	15	5	15	4	12	5	15	5	15	5	15
3	4	12	4	12	5	15	4	12	4	12	4	12	4	12
2	0	0	0	0	0	0	0	0	2	4	2	4	2	4
3	0	0	0	0	0	0	0	0	2	6	2	6	2	6
10	0	0	0	0	0	0	1	10	1	10	2	20	3	30
<b>Rating</b>	<b>44</b>	<b>108</b>	<b>44</b>	<b>108</b>	<b>45</b>	<b>114</b>	<b>41</b>	<b>117</b>	<b>33</b>	<b>82</b>	<b>35</b>	<b>95</b>	<b>48</b>	<b>138</b>

0.01

0.01

0.06

0.09

-0.23

-0.11

0.29

Rating reflects Directness of Travel, and likely reduction in use of Whiskey/Pine Log/Powderhouse Roads

5 - 81 to 100% of trip length eliminated from Whiskey, Powderhouse, and/or Pine Log

4 - 61 to 80% of trip length eliminated from Whiskey, Powderhouse, and/or Pine Log

3 - 41 to 60% of trip length eliminated from Whiskey, Powderhouse, and/or Pine Log

2 - 21 to 40% of trip length eliminated from Whiskey, Powderhouse, and/or Pine Log

1 - 1 to 20% of trip length eliminated from Whiskey, Powderhouse, and/or Pine Log

0 - 0% of trip length eliminated from Whiskey, Powderhouse, and/or Pine Log



# Whiskey Road – Powderhouse Road Connector Study FINAL REPORT



## APPENDIX D Access



# Whiskey Road – Powderhouse Road Connector Study

## FINAL REPORT



### Access

Alternative	Internal Access		External Access	Rating	Score
	Potential Median Breaks*	Signalized Intersections (WeightX2)	Access to Existing Signalized Intersections (WeightX2)		
1	10	2	2	14	-0.11
2	8	2	2	12	-0.24
3	9	2	2	13	-0.17
4	10	2	0	12	-0.24
5	11	2	2	15	-0.04
6	17	4	2	23	0.46
7	15	4	2	21	0.34

\*Two and four-lane sections were evaluated for potential future median breaks. Median breaks were assumed for every 660 feet on four-lane sections. Internal intersections of north-south and east-west connectors are assumed to be signalized.



# Whiskey Road – Powderhouse Road Connector Study FINAL REPORT



## APPENDIX E Traffic Impact

Whiskey-Powderhouse Road Connector Study  
Traffic Impact

<b>2030 Traffic</b>										
<b>SCENARIO 1</b>										
<b>Segment</b>	<b>No Build</b>	<b>ALT 1</b>	<b>ALT 2</b>	<b>ALT 3</b>	<b>ALT 4</b>	<b>ALT 5</b>	<b>ALT 6</b>	<b>ALT 7</b>	<b>ALT 8</b>	<b>ALT 8A</b>
Pine Log Between Whiskey and Two Notch	40180	36520	37500	35770	35710	35590	36570	35180	38410	38880
Pine Log Between Two Notch and Powderhouse	45970	42920	44220	40960	42560	41990	42130	41140	43960	45080
Whiskey Between Pine Log and Corporate Pkwy	38550	38120	37860	37540	37800	36860	36660	37220	34980	35250
Whiskey Between Corporate Pkwy and Dougherty	38550	33870	34120	34040	33200	32500	33060	32870	30580	30560
Whiskey Between Dougherty and East Gate	42020	40560	40200	37450	34170	38790	39200	39660	37770	37900
Whiskey Between East Gate and Powderhouse	33840	34250	33930	31830	33170	35420	36050	33600	35050	33620
Powderhouse Between Pine Log and Old PH	9690	9690	10410	10230	10490	12820	12950	9510	11500	11010
Powderhouse Between Old PH and Athol	6650	5730	5930	6620	5610	5130	3990	1220	5760	5730
Powderhouse Between Athol and Whiskey	6570	4820	5340	4690	4370	5240	4640	7450	6890	6070
<b>Total</b>	<b>262020</b>	<b>246480</b>	<b>249510</b>	<b>239130</b>	<b>237080</b>	<b>244340</b>	<b>245250</b>	<b>237850</b>	<b>244900</b>	<b>244100</b>
		15540	12510	22890	24940	17680	16770	24170	17120	17920
		17653	14973	25980	27670	20420	20447	26467	27067	29403
<b>Scenario Score</b>		<b>-0.18</b>	<b>-0.34</b>	<b>0.22</b>	<b>0.32</b>	<b>-0.06</b>	<b>-0.11</b>	<b>0.28</b>	<b>-0.09</b>	<b>-0.05</b>
<b>Composite Traffic Impact Score</b>		<b>-0.24</b>	<b>-0.36</b>	<b>0.11</b>	<b>0.19</b>	<b>-0.13</b>	<b>-0.12</b>	<b>0.13</b>	<b>0.16</b>	<b>0.26</b>
<b>Rank</b>		<b>8</b>	<b>9</b>	<b>5</b>	<b>2</b>	<b>7</b>	<b>6</b>	<b>4</b>	<b>3</b>	<b>1</b>
<b>SCENARIO 2</b>										
<b>Segment</b>	<b>No Build</b>	<b>ALT 1</b>	<b>ALT 2</b>	<b>ALT 3</b>	<b>ALT 4</b>	<b>ALT 5</b>	<b>ALT 6</b>	<b>ALT 7</b>	<b>ALT 8</b>	<b>ALT 8A</b>
Pine Log Between Whiskey and Two Notch	40760	36760	37740	36100	36040	35920	36920	35510	38790	38730
Pine Log Between Two Notch and Powderhouse	46770	43160	44460	41200	42830	42230	42430	41380	45120	45250
Whiskey Between Pine Log and Corporate Pkwy	39030	38520	38260	37950	38210	37270	37040	37630	35480	35140
Whiskey Between Corporate Pkwy and Dougherty	39030	34270	34530	34450	33630	32910	33430	33280	30720	30540
Whiskey Between Dougherty and East Gate	42450	40740	40380	37680	34350	38960	39590	39840	37820	37480
Whiskey Between East Gate and Powderhouse	34220	34820	34500	32380	33720	35990	36550	34130	35110	33840
Powderhouse Between Pine Log and Old PH	9840	10040	10710	10530	10790	13120	11510	11200	11550	11380
Powderhouse Between Old PH and Athol	6800	5860	6010	6700	5690	5210	4020	1220	5630	5790
Powderhouse Between Athol and Whiskey	6680	4900	5420	4770	4450	5320	4680	7510	6690	6200
<b>Total</b>	<b>265580</b>	<b>249070</b>	<b>252010</b>	<b>241760</b>	<b>239710</b>	<b>246930</b>	<b>246170</b>	<b>241700</b>	<b>246910</b>	<b>244350</b>
		18838	16510	13570	23820	25870	18650	19410	23880	21230
		23342								
<b>Scenario Score</b>		<b>-0.18</b>	<b>-0.33</b>	<b>0.18</b>	<b>0.28</b>	<b>-0.08</b>	<b>-0.04</b>	<b>0.18</b>		
<b>SCENARIO 3</b>										
<b>Segment</b>	<b>No Build</b>	<b>ALT 1</b>	<b>ALT 2</b>	<b>ALT 3</b>	<b>ALT 4</b>	<b>ALT 5</b>	<b>ALT 6</b>	<b>ALT 7</b>	<b>ALT 8</b>	<b>ALT 8A</b>
Pine Log Between Whiskey and Two Notch	46180	40010	40860	37620	39070	38950	40370	38540	39840	39500
Pine Log Between Two Notch and Powderhouse	49570	45610	46780	43520	45120	44550	45330	43700	47800	46760
Whiskey Between Pine Log and Corporate Pkwy	43940	42280	42020	41700	41960	41020	40460	41380	35290	35360
Whiskey Between Corporate Pkwy and Dougherty	43940	38030	38280	38200	37360	36660	36860	37030	31600	31850
Whiskey Between Dougherty and East Gate	46950	44760	44400	41650	38370	42990	43150	43860	37260	37760
Whiskey Between East Gate and Powderhouse	37980	39690	39370	37270	38600	40860	41130	39040	36270	34870
Powderhouse Between Pine Log and Old PH	11850	13430	13750	13570	13690	16020	16650	13490	12050	11500
Powderhouse Between Old PH and Athol	8810	7070	6870	7560	6410	5930	4100	1220	5720	5540
Powderhouse Between Athol and Whiskey	8730	6160	6780	5630	5170	6040	4740	8340	6710	5750
<b>Total</b>	<b>297950</b>	<b>277040</b>	<b>279110</b>	<b>266720</b>	<b>265750</b>	<b>273020</b>	<b>272790</b>	<b>266600</b>	<b>252540</b>	<b>248890</b>
		20179	20910	18840	31230	32200	24930	25160	31350	49060
<b>Scenario Score</b>		<b>-0.33</b>	<b>-0.39</b>	<b>0.01</b>	<b>0.04</b>	<b>-0.20</b>	<b>-0.19</b>	<b>0.01</b>		



**Whiskey Road – Powderhouse Road Connector Study  
FINAL REPORT**



**APPENDIX F  
Environmental Impact**





# Whiskey Road – Powderhouse Road Connector Study

## FINAL REPORT



### Environmental Impact

The environmental subconsultant (Edwards-Pitman Environmental, Inc.) evaluated the impact on the study area from the nine alternatives resulting from five environmental factors: cultural/historic resources, waters of the United States, federally protected species (T & E species), community/environmental justice impacts, and farmland. A score of 0 to 5, least to greatest severity, was assigned to each element. The resulting analysis is documented in the following table:

**Environmental Impact**

ALT	Cultural	Waters of US	T & E Species	Farmland	Rating	Score
1	5	0	0	5	10	0.17
2	5	0	0	5	10	0.17
3	5	0	0	5	10	0.17
4	4	0	0	5	9	0.05
5	0	1	0	5	6	-0.30
6	2	1	0	5	8	-0.07
7	1	1	0	5	7	-0.18

Alternatives 1, 2, 3, and 4 would take property from the late-19<sup>th</sup> century rural farm/Central Hallway house located on Rogers County Lane, north of the Lowe’s on Whiskey Road. This rural farm complex was identified as a historic resource that may be recommended eligible for listing on the National Register of Historic Places (NRHP) in the *Environmental Summary Report (March 2, 2005)*. This recommendation is a preliminary determination only, and a full survey has not been conducted, nor has the South Carolina State Historic Preservation Officer (SHPO) been consulted regarding a recommendation of eligibility. However, the worst-case scenario would be that the existing residence and the surrounding active farmland be considered an eligible historic resource and protected under the requirements of Section 106 of the National Historic Preservation Act (NHPA) and Section 4(f) of the US Department of Transportation legislation. Alternatives 4, 6, and 7 received a lower score than Alternatives 1, 2, and 3 because they impact lesser amounts of farmland associated with the agricultural complex. The rank is determined by the anticipated severity of adverse affect to the resource. Alternative 5 is the only alternative that would not affect this resource. If this resource were determined to be not significant (not eligible) or if a smaller historic boundary were recommended, then the rank of each alternative would likely change.

Alternatives 5, 6, and 7 were the only ones that would impact the stream in the northeastern study area. While this activity would require a Section 404 permit from the US Army Corps of Engineers, the severity of this impact is relatively minor. Therefore, a low score was assigned to this criterion.



# Whiskey Road – Powderhouse Road Connector Study

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The *Environmental Summary Report (March 2, 2005)* did not identify any federally protected threatened or endangered species or suitable habitats for such species in the study area. Therefore, none of the alternatives would impact this criterion.

A substantial amount of active farmland remains within the boundaries of the study area. Regardless of the alternative selected, any new road bisecting this study area would facilitate the eventual subdivision and change in land use from agriculture to some other land use. As evidenced by the surrounding area, any remaining farmland will succumb to development pressure. The severity of the impact is based on the anticipated loss of all the farmland once the infrastructure improvements (i.e., transportation) are implemented. This is considered a secondary impact of the proposed new road and each alternative was given the same rank of severity.



# Whiskey Road – Powderhouse Road Connector Study FINAL REPORT



## APPENDIX G Cost Estimate

Whiskey Road-Powderhouse Road  
Cost Estimate

Roadway Paving	Length (mi)	Pavement Width (ft)	Construction Cost	10% E&C	Subtotal Construction Cost	8% 2 year inflation	ROW	Total Cost Per Roadway Type	Total Cost
Alt 1-two lane	0.67	24	\$ 1,582,000.00	\$ 159,000.00	\$ 1,741,000.00	\$ 139,280.00	\$ 488,000.00	\$ 2,368,280.00	\$ 9,510,000.00
Alt 1-four lane	0.93	48	\$ 4,767,000.00	\$ 477,000.00	\$ 5,244,000.00	\$ 419,520.00	\$ 1,477,000.00	\$ 7,140,520.00	
Alt 2-two lane	0.45	24	\$ 1,110,000.00	\$ 111,000.00	\$ 1,221,000.00	\$ 97,680.00	\$ 328,000.00	\$ 1,646,680.00	\$ 9,190,000.00
Alt 2-four lane	0.99	48	\$ 5,065,000.00	\$ 507,000.00	\$ 5,572,000.00	\$ 445,760.00	\$ 1,520,000.00	\$ 7,537,760.00	
Alt 3-two lane	0.40	24	\$ 998,000.00	\$ 100,000.00	\$ 1,098,000.00	\$ 87,840.00	\$ 291,000.00	\$ 1,476,840.00	\$ 8,740,000.00
Alt 3-four lane	1.06	48	\$ 5,420,000.00	\$ 542,000.00	\$ 5,962,000.00	\$ 476,960.00	\$ 821,000.00	\$ 7,259,960.00	
Alt 4-two lane	0.32	24	\$ 829,000.00	\$ 83,000.00	\$ 912,000.00	\$ 72,960.00	\$ 233,000.00	\$ 1,217,960.00	\$ 10,300,000.00
Alt 4-four lane	1.34	48	\$ 6,821,000.00	\$ 683,000.00	\$ 7,504,000.00	\$ 600,320.00	\$ 975,000.00	\$ 9,079,320.00	
Alt 5-two lane	1.18	24	\$ 2,675,000.00	\$ 268,000.00	\$ 2,943,000.00	\$ 235,440.00	\$ 859,000.00	\$ 4,037,440.00	\$ 10,300,000.00
Alt 5-four lane	0.73	48	\$ 3,767,000.00	\$ 377,000.00	\$ 4,144,000.00	\$ 331,520.00	\$ 1,781,000.00	\$ 6,256,520.00	
Alt 6-two lane	1.79	24	\$ 3,988,000.00	\$ 399,000.00	\$ 4,387,000.00	\$ 350,960.00	\$ 217,000.00	\$ 4,954,960.00	\$ 13,440,000.00
Alt 6-four lane	1.17	48	\$ 5,967,000.00	\$ 597,000.00	\$ 6,564,000.00	\$ 525,120.00	\$ 1,392,000.00	\$ 8,481,120.00	
Alt 7-two lane	1.42	24	\$ 3,198,000.00	\$ 320,000.00	\$ 3,518,000.00	\$ 281,440.00	\$ 173,000.00	\$ 3,972,440.00	\$ 12,890,000.00
Alt 7-four lane	1.17	48	\$ 5,967,000.00	\$ 597,000.00	\$ 6,564,000.00	\$ 525,120.00	\$ 1,392,000.00	\$ 8,481,120.00	
Alt 7 Imp to S Powderhouse			\$ 300,000.00	\$ 30,000.00	\$ 330,000.00	\$ 26,400.00	\$ 75,000.00	\$ 431,400.00	
Alt 8-2lane	1.70	24	\$ 3,997,000.00	\$ 400,000.00	\$ 4,397,000.00	\$ 351,760.00	\$ 207,000.00	\$ 4,955,760.00	\$ 13,450,000.00
Alt8-4lane	1.17	48	\$ 5,970,000.00	\$ 597,000.00	\$ 6,567,000.00	\$ 525,360.00	\$ 1,392,000.00	\$ 8,484,360.00	
Alt8A-2lane	2.10	24	\$ 4,904,000.00	\$ 491,000.00	\$ 5,395,000.00	\$ 431,600.00	\$ 255,000.00	\$ 6,081,600.00	\$ 14,570,000.00
Alt8A-4lane	1.17	48	\$ 5,970,000.00	\$ 597,000.00	\$ 6,567,000.00	\$ 525,360.00	\$ 1,392,000.00	\$ 8,484,360.00	



**Whiskey Road – Powderhouse Road Connector Study  
FINAL REPORT**



**APPENDIX H  
Safety**

**2030 Forecast Crashes - Alternative 1, Scenario 1**

<b>Segment</b>	<b>Length (mi)</b>	<b>Existing ADT</b>	<b>2003 Crashes</b>	<b>2004 Crashes</b>	<b>Avg Crashes per year</b>	<b>Existing Crash Rate (crash/100MVT)</b>	<b>2030 NB ADT</b>	<b>2030 ADT</b>	<b>2030 ADT Diff</b>	<b>2030 VMT Diff (100MVT)</b>	<b>Est Reduction in 2030 Crashes</b>
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	38550	38120	-430	-0.00043946	-0.41836592
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	38550	33870	-4680	-0.0068328	-7.0104528
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	42020	40560	-1460	-0.00133225	-1.0684645
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	33840	34250	410	0.0017958	0.4722954
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	40180	36520	-3660	-0.0013359	-0.3126006
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	45970	42920	-3050	-0.01090985	-0.31638565
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	9690	9690	0	0	0
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	6650	5730	-920	-0.00416392	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	6570	4820	-1750	-0.00549325	-1.12611625
<b>Total</b>											<b>-9.78009032</b>

**2030 Forecast Crashes - Alternative 2, Scenario 1**

Segment	Length (mi)	Existing ADT	2003 Crashes	2004 Crashes	Avg Crashes Per Year	Existing Crash Rate (crash/100MVT)	2030 NB ADT	2030 ADT	2030		Est Reduction in 2030 Crashes
									2030 ADT Diff	VMT Diff 100MVT	
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	38550	37860	-690	-0.00071	-0.67133136
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	38550	34120	-4430	-0.00647	-6.6359628
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	42020	40200	-1820	-0.00166	-1.3319215
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	33840	33930	90	0.000394	0.1036746
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	40180	37500	-2680	-0.00098	-0.2288988
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	45970	44220	-1750	-0.00626	-0.18153275
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	9690	10410	720	0.00113	0.38647368
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	6650	5930	-720	-0.00326	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	6570	5340	-1230	-0.00386	-0.79149885
<b>Total</b>											<b>-9.35099778</b>

### 2030 Forecast Crashes - Alternative 3, Scenario 1

Segment	Length (mi)	Existing ADT	2003 Crashes	2004 Crashes	Avg Crashes Per Year	Existing Crash Rate (crash/100MVT)	2030 NB ADT	2030 ADT	2030		Est Reduction in 2030 Crashes
									2030 ADT Diff	VMT Diff 100MVT	
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	38550	37540	-1010	-0.00103	-0.98267344
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	38550	34040	-4510	-0.00658	-6.7557996
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	42020	37450	-4570	-0.00417	-3.34444025
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	33840	31830	-2010	-0.0088	-2.3153994
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	40180	35770	-4410	-0.00161	-0.3766581
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	45970	40960	-5010	-0.01792	-0.51970233
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	9690	10230	540	0.000848	0.28985526
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	6650	6620	-30	-0.00014	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	6570	4690	-1880	-0.0059	-1.2097706
<b>Total</b>											<b>-15.21458846</b>



### 2030 Forecast Crashes - Alternative 4, Scenario 1

Segment	Length (mi)	Existing ADT	2003 Crashes	2004 Crashes	Avg Crashes Per Year	Existing Crash Rate (crash/100MVT)	2030 NB ADT	2030 ADT	2030		Est Reduction in 2030 Crashes
									2030 ADT Diff	VMT Diff 100MVT	
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	38550	37800	-750	-0.00077	-0.729708
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	38550	33200	-5350	-0.00781	-8.014086
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	42020	34170	-7850	-0.00716	-5.74482625
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	33840	33170	-670	-0.00293	-0.7717998
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	40180	35710	-4470	-0.00163	-0.3817827
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	45970	42560	-3410	-0.0122	-0.35372953
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	9690	10490	800	0.001256	0.4294152
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	6650	5610	-1040	-0.00471	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	6570	4370	-2200	-0.00691	-1.415689
<b>Total</b>											<b>-16.98220608</b>

**2030 Forecast Crashes - Alternative 5, Scenario 1**

Segment	Length (mi)	Existing ADT	Avg Crashes			Existing Crash Rate (crashes/100MVT)	2030 NB ADT	2030 ADT	2030		Est Reduction in 2030 Crashes
			2003 Crashes	2004 Crashes	Per Year				2030 ADT	VMT Diff 100MVT	
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	38550	36860	-1690	-0.00173	-1.64427536
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	38550	32500	-6050	-0.00883	-9.062658
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	42020	38790	-3230	-0.00295	-2.36379475
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	33840	35420	1580	0.00692	1.8200652
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	40180	35590	-4590	-0.00168	-0.3920319
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	45970	41990	-3980	-0.01424	-0.41285734
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	9690	12820	3130	0.004913	1.68008697
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	6650	5130	-1520	-0.00688	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	6570	5240	-1330	-0.00417	-0.85584835
<b>Total</b>											<b>-11.23131353</b>

### 2030 Forecast Crashes - Alternative 6, Scenario 1

Segment	Length (mi)	Existing ADT	Existing Crashes		Avg Crashes Per Year	Existing Crash Rate (crashes/100MVT)	2030 NB ADT	2030 ADT	2030		Est Reduction in 2030 Crashes
			2003 Crashes	2004 Crashes					2030 ADT Diff	VMT Diff 100MVT	
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	38550	36660	-1890	-0.00193	-1.83886416
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	38550	33060	-5490	-0.00802	-8.2238004
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	42020	39200	-2820	-0.00257	-2.0637465
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	33840	36050	2210	0.00968	2.5457874
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	40180	36570	-3610	-0.00132	-0.3083301
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	45970	42130	-3840	-0.01374	-0.39833472
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	9690	12950	3260	0.005117	1.74986694
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	6650	3990	-2660	-0.01204	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	6570	4640	-1930	-0.00606	-1.24194535
Total											-9.77936689

**2030 Forecast Crashes - Alternative 7, Scenario 1**

Segment	Length (mi)	Existing ADT	2003 Crashes	2004 Crashes	Avg Crashes Per Year	Existing Crash Rate (crashes/100MVT)	2030 NB ADT	2030 ADT	2030		Est Reduction in 2030 Crashes
									2030 ADT Diff	VMT Diff 100MVT	
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	38550	37220	-1330	-0.00136	-1.29401552
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	38550	32870	-5680	-0.00829	-8.5084128
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	42020	39660	-2360	-0.00215	-1.727107
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	33840	33600	-240	-0.00105	-0.2764656
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	40180	35180	-5000	-0.00183	-0.42705
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	45970	41140	-4830	-0.01728	-0.50103039
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	9690	9510	-180	-0.00028	-0.09661842
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	6650	1220	-5430	-0.02458	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	6570	7450	880	0.002762	0.5662756
<b>Total</b>											<b>-12.26442413</b>

### 2030 Forecast Crashes - Alternative 8, Scenario 1

Segment	Length (mi)	Existing ADT	Avg Crashes			Existing Crash Rate (crashes/100MVT)	2030 NB ADT	2030 ADT	2030		Est Reduction in 2030 Crashes
			2003 Crashes	2004 Crashes	Per Year				2030 ADT	VMT Diff	
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	38550	34980	-3570	-0.00365	-3.47341008
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	38550	30580	-7970	-0.01164	-11.9387412
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	42020	37770	-4250	-0.00388	-3.11025625
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	33840	35050	1210	0.0053	1.3938474
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	40180	38410	-1770	-0.00065	-0.1511757
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	45970	43960	-2010	-0.00719	-0.20850333
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	9690	11500	1810	0.002841	0.97155189
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	6650	5760	-890	-0.00403	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	6570	6890	320	0.001004	0.2059184
<b>Total</b>											<b>-16.31076887</b>

**2030 Forecast Crashes - Alternative 8A, Scenario 1**

Segment	Length (mi)	Existing ADT	Existing Crashes		Avg Crashes Per Year	Existing Crash Rate (crashes/100MVT)	2030 NB ADT	2030 ADT	2030		Est Reduction in 2030 Crashes
			2003 Crashes	2004 Crashes					2030 ADT	VMT Diff 100MVT	
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	38550	35250	-3300	-0.00337	-3.2107152
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	38550	30560	-7990	-0.01167	-11.9687004
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	42020	37900	-4120	-0.00376	-3.015119
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	33840	33620	-220	-0.00096	-0.2534268
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	40180	38880	-1300	-0.00047	-0.111033
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	45970	45080	-890	-0.00318	-0.09232237
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	9690	11010	1320	0.002072	0.70853508
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	6650	5730	-920	-0.00416	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	6570	6070	-500	-0.00157	-0.3217475
<b>Total</b>											<b>-18.26452919</b>

**2030 Forecast Crashes - Alternative 1, Scenario 2**

Segment	Length (mi)	Existing ADT	Crashes		Avg Crashes per year	Existing Crash Rate (crash/100MVT)	2030 NB ADT	2030 ADT	2030		Est Reduction in 2030 Crashes
			2003 Crashes	2004 Crashes					2030 ADT Diff	VMT Diff (100MVT)	
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	39030	38520	-510	-0.00052122	-0.49620144
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	39030	34270	-4760	-0.0069496	-7.1302896
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	42450	40740	-1710	-0.00156038	-1.25142075
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	34220	34820	600	0.002628	0.691164
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	40760	36760	-4000	-0.00146	-0.34164
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	46770	43160	-3610	-0.01291297	-0.37447613
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	9840	10040	200	0.0003139	0.1073538
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	6800	5860	-940	-0.00425444	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	6680	4900	-1780	-0.00558742	-1.1454211
<b>Total</b>											<b>-9.94093122</b>

### 2030 Forecast Crashes - Alternative 2, Scenario 2

Segment	Length (mi)	Existing ADT	2003 Crashes	2004 Crashes	Avg Crashes Per Year	Existing Crash Rate (crash/100MVT)	2030 NB ADT	2030 ADT	2030		Est Reduction in 2030 Crashes
									2030 ADT Diff	VMT Diff 100MVT	
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	39030	38260	-770	-0.00079	-0.74916688
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	39030	34530	-4500	-0.00657	-6.74082
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	42450	40380	-2070	-0.00189	-1.51487775
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	34220	34500	280	0.001226	0.3225432
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	40760	37740	-3020	-0.0011	-0.2579382
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	46770	44460	-2310	-0.00826	-0.23962323
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	9840	10710	870	0.001365	0.46698903
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	6800	6010	-790	-0.00358	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	6680	5420	-1260	-0.00396	-0.8108037
<b>Total</b>											<b>-9.52369753</b>



### 2030 Forecast Crashes - Alternative 3, Scenario 2

Segment	Length (mi)	Existing ADT	2003 Crashes	2004 Crashes	Avg Crashes Per Year	Existing Crash Rate (crash/100MVT)	2030 NB ADT	2030 ADT	2030		Est Reduction in 2030 Crashes
									2030 ADT Diff	VMT Diff 100MVT	
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	39030	37950	-1080	-0.0011	-1.05077952
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	39030	34450	-4580	-0.00669	-6.8606568
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	42450	37680	-4770	-0.00435	-3.49080525
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	34220	32380	-1840	-0.00806	-2.1195696
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	40760	36100	-4660	-0.0017	-0.3980106
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	46770	41200	-5570	-0.01992	-0.57779281
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	9840	10530	690	0.001083	0.37037061
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	6800	6700	-100	-0.00045	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	6680	4770	-1910	-0.006	-1.22907545
<b>Total</b>											<b>-15.35631942</b>

### 2030 Forecast Crashes - Alternative 4, Scenario 2

Segment	Length (mi)	Existing ADT	2003 Crashes	2004 Crashes	Avg Crashes Per Year	Existing Crash Rate (crash/100MVT)	2030 NB ADT	2030 ADT	2030		Est Reduction in 2030 Crashes
									2030 ADT Diff	VMT Diff 100MVT	
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	39030	38210	-820	-0.00084	-0.79781408
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	39030	33630	-5400	-0.00788	-8.088984
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	42450	34350	-8100	-0.00739	-5.9277825
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	34220	33720	-500	-0.00219	-0.57597
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	40760	36040	-4720	-0.00172	-0.4031352
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	46770	42830	-3940	-0.01409	-0.40870802
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	9840	10790	950	0.001491	0.50993055
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	6800	5690	-1110	-0.00502	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	6680	4450	-2230	-0.007	-1.43499385
<b>Total</b>											<b>-17.1274571</b>

### 2030 Forecast Crashes - Alternative 5, Scenario 2

Segment	Length (mi)	Existing ADT	Avg Crashes Existing Crash Rate				2030 NB ADT	2030 ADT	2030		Est Reduction in 2030 Crashes
			2003 Crashes	2004 Crashes	Per Year	(crashes/100MVT)			2030 ADT	VMT Diff 100MVT	
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	39030	37270	-1760	-0.0018	-1.71238144
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	39030	32910	-6120	-0.00894	-9.1675152
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	42450	38960	-3490	-0.00318	-2.55406925
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	34220	35990	1770	0.007753	2.0389338
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	40760	35920	-4840	-0.00177	-0.4133844
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	46770	42230	-4540	-0.01624	-0.47094782
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	9840	13120	3280	0.005148	1.76060232
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	6800	5210	-1590	-0.0072	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	6680	5320	-1360	-0.00427	-0.8751532
<b>Total</b>											<b>-11.39391519</b>

**2030 Forecast Crashes - Alternative 6, Scenario 2**

Segment	Length (mi)	Existing ADT	Avg Crashes			Existing Crash Rate (crashes/100MVT)	2030 NB ADT	2030 ADT	2030		Est Reduction in 2030 Crashes
			2003 Crashes	2004 Crashes	Per Year				2030 ADT	VMT Diff 100MVT	
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	39030	37040	-1990	-0.00203	-1.93615856
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	39030	33430	-5600	-0.00818	-8.388576
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	42450	39590	-2860	-0.00261	-2.0930195
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	34220	36550	2330	0.010205	2.6840202
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	40760	36920	-3840	-0.0014	-0.3279744
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	46770	42430	-4340	-0.01552	-0.45020122
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	9840	11510	1670	0.002621	0.89640423
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	6800	4020	-2780	-0.01258	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	6680	4680	-2000	-0.00628	-1.28699
Total											-10.90249525

### 2030 Forecast Crashes - Alternative 7, Scenario 2

Segment	Length (mi)	Existing ADT	2030 Forecast Crashes		Avg Crashes Per Year	Existing Crash Rate (crashes/100MVT)	2030 NB ADT	2030 ADT	2030		Est Reduction in 2030 Crashes
			2003 Crashes	2004 Crashes					2030 ADT	VMT Diff 100MVT	
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	39030	37630	-1400	-0.00143	-1.3621216
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	39030	33280	-5750	-0.0084	-8.61327
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	42450	39840	-2610	-0.00238	-1.91006325
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	34220	34130	-90	-0.00039	-0.1036746
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	40760	35510	-5250	-0.00192	-0.4484025
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	46770	41380	-5390	-0.01928	-0.55912087
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	9840	11200	1360	0.002135	0.73000584
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	6800	1220	-5580	-0.02526	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	6680	7510	830	0.002605	0.53410085
<b>Total</b>											<b>-11.73254613</b>

### 2030 Forecast Crashes - Alternative 8, Scenario 2

Segment	Length (mi)	Existing ADT	2030 Forecast Crashes		Avg Crashes Per Year	Existing Crash Rate (crashes/100MVT)	2030 NB ADT	2030 ADT	2030		Est Reduction in 2030 Crashes
			2003 Crashes	2004 Crashes					2030 ADT Diff	VMT Diff 100MVT	
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	39030	35480	-3550	-0.00363	-3.4539512
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	39030	30720	-8310	-0.01213	-12.4480476
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	42450	37820	-4630	-0.00422	-3.38834975
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	34220	35110	890	0.003898	1.0252266
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	40760	38790	-1970	-0.00072	-0.1682577
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	46770	45120	-1650	-0.0059	-0.17115945
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	9840	11550	1710	0.002684	0.91787499
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	6800	5630	-1170	-0.0053	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	6680	6690	10	3.14E-05	0.00643495
<b>Total</b>											<b>-17.68022916</b>

**2030 Forecast Crashes - Alternative 8A, Scenario 2**

Segment	Length (mi)	Existing ADT	Existing Crashes		Avg Crashes Per Year	Existing Crash Rate (crashes/100MVT)	2030 NB ADT	2030 ADT	2030		Est Reduction in 2030 Crashes
			2003 Crashes	2004 Crashes					2030 ADT Diff	VMT Diff 100MVT	
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	39030	35140	-3890	-0.00398	-3.78475216
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	39030	30540	-8490	-0.0124	-12.7176804
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	42450	37480	-4970	-0.00454	-3.63717025
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	34220	33840	-380	-0.00166	-0.4377372
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	40760	38730	-2030	-0.00074	-0.1733823
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	46770	45250	-1520	-0.00544	-0.15767416
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	9840	11380	1540	0.002417	0.82662426
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	6800	5790	-1010	-0.00457	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	6680	6200	-480	-0.00151	-0.3088776
<b>Total</b>											<b>-20.39064981</b>

**2030 Forecast Crashes - Alternative 1, Scenario 3**

Segment	Length (mi)	Existing ADT	2003 Crashes	2004 Crashes	Avg Crashes per year	Existing Crash Rate (crash/100MVT)	2030 NB ADT	2030 ADT	2030		Est Reduction in 2030 Crashes
									2030 ADT Diff	VMT Diff (100MVT)	
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	43940	42280	-1660	-0.00169652	-1.61508704
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	43940	38030	-5910	-0.0086286	-8.8529436
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	46950	44760	-2190	-0.00199838	-1.60269675
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	37980	39690	1710	0.0074898	1.9698174
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	46180	40010	-6170	-0.00225205	-0.5269797
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	49570	45610	-3960	-0.01416492	-0.41078268
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	11850	13430	1580	0.00247981	0.84809502
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	8810	7070	-1740	-0.00787524	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	8730	6160	-2570	-0.00806723	-1.65378215
<b>Total</b>											<b>-11.8443595</b>



### 2030 Forecast Crashes - Alternative 2, Scenario 3

Segment	Length (mi)	Existing ADT	2030 Forecast Crashes		Avg Crashes Per Year	Existing Crash Rate (crash/100MVT)	2030 NB ADT	2030 ADT	2030		Est Reduction in 2030 Crashes
			2003 Crashes	2004 Crashes					2030 ADT Diff	VMT Diff 100MVT	
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	43940	42020	-1920	-0.00196	-1.86805248
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	43940	38280	-5660	-0.00826	-8.4784536
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	46950	44400	-2550	-0.00233	-1.86615375
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	37980	39370	1390	0.006088	1.6011966
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	46180	40860	-5320	-0.00194	-0.4543812
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	49570	46780	-2790	-0.00998	-0.28941507
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	11850	13750	1900	0.002982	1.0198611
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	8810	6870	-1940	-0.00878	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	8730	6780	-1950	-0.00612	-1.25481525
<b>Total</b>											<b>-11.59021365</b>

**2030 Forecast Crashes - Alternative 3, Scenario 3**

Segment	Length (mi)	Existing ADT	2003 Crashes	2004 Crashes	Avg Crashes Per Year	Existing Crash Rate (crash/100MVT)	2030 NB ADT	2030 ADT	2030		Est Reduction in 2030 Crashes
									2030 ADT Diff	VMT Diff 100MVT	
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	43940	41700	-2240	-0.00229	-2.17939456
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	43940	38200	-5740	-0.00838	-8.5982904
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	46950	41650	-5300	-0.00484	-3.8786725
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	37980	37270	-710	-0.00311	-0.8178774
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	46180	37620	-8560	-0.00312	-0.7311096
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	49570	43520	-6050	-0.02164	-0.62758465
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	11850	13570	1720	0.0027	0.92324268
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	8810	7560	-1250	-0.00566	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	8730	5630	-3100	-0.00973	-1.9948345
Total											-17.90452093

### 2030 Forecast Crashes - Alternative 4, Scenario 3

Segment	Length (mi)	Existing ADT	2003 Crashes	2004 Crashes	Avg Crashes Per Year	Existing Crash Rate (crash/100MVT)	2030 NB ADT	2030 ADT	2030		Est Reduction in 2030 Crashes
									2030 ADT Diff	VMT Diff 100MVT	
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	43940	41960	-1980	-0.00202	-1.92642912
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	43940	37360	-6580	-0.00961	-9.8565768
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	46950	38370	-8580	-0.00783	-6.2790585
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	37980	38600	620	0.002716	0.7142028
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	46180	39070	-7110	-0.0026	-0.6072651
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	49570	45120	-4450	-0.01592	-0.46161185
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	11850	13690	1840	0.002888	0.98765496
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	8810	6410	-2400	-0.01086	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	8730	5170	-3560	-0.01117	-2.2908422
<b>Total</b>											<b>-19.71992581</b>

### 2030 Forecast Crashes - Alternative 5, Scenario 3

Segment	Length (mi)	Existing ADT	Avg Crashes Existing Crash Rate				2030 NB ADT	2030 ADT	2030		Est Reduction in 2030 Crashes
			2003 Crashes	2004 Crashes	Per Year	(crashes/100MVT)			2030 ADT	VMT Diff 100MVT	
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	43940	41020	-2920	-0.00298	-2.84099648
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	43940	36660	-7280	-0.01063	-10.9051488
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	46950	42990	-3960	-0.00361	-2.898027
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	37980	40860	2880	0.012614	3.3175872
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	46180	38950	-7230	-0.00264	-0.6175143
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	49570	44550	-5020	-0.01796	-0.52073966
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	11850	16020	4170	0.006545	2.23832673
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	8810	5930	-2880	-0.01303	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	8730	6040	-2690	-0.00844	-1.73100155
<b>Total</b>											<b>-13.95751386</b>

### 2030 Forecast Crashes - Alternative 6, Scenario 3

Segment	Length (mi)	Existing ADT	Crashes			Existing Crash Rate (crashes/100MVT)	2030 NB ADT	2030 ADT	2030		Est Reduction in 2030 Crashes
			2003 Crashes	2004 Crashes	Avg Crashes Per Year				2030 ADT	VMT Diff 100MVT	
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	43940	40460	-3480	-0.00356	-3.38584512
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	43940	36860	-7080	-0.01034	-10.6055568
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	46950	43150	-3800	-0.00347	-2.780935
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	37980	41130	3150	0.013797	3.628611
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	46180	40370	-5810	-0.00212	-0.4962321
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	49570	45330	-4240	-0.01517	-0.43982792
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	11850	16650	4800	0.007534	2.5764912
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	8810	4100	-4710	-0.02132	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	8730	4740	-3990	-0.01252	-2.56754505
<b>Total</b>											<b>-14.07083979</b>

### 2030 Forecast Crashes - Alternative 7, Scenario 3

Segment	Length (mi)	Existing ADT	2030 Forecast Crashes		Avg Crashes Per Year	Existing Crash Rate (crashes/100MVT)	2030 NB ADT	2030 ADT	2030		Est Reduction in 2030 Crashes
			2003 Crashes	2004 Crashes					2030 ADT Diff	VMT Diff 100MVT	
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	43940	41380	-2560	-0.00262	-2.49073664
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	43940	37030	-6910	-0.01009	-10.3509036
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	46950	43860	-3090	-0.00282	-2.26133925
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	37980	39040	1060	0.004643	1.2210564
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	46180	38540	-7640	-0.00279	-0.6525324
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	49570	43700	-5870	-0.021	-0.60891271
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	11850	13490	1640	0.002574	0.88030116
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	8810	1220	-7590	-0.03435	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	8730	8340	-390	-0.00122	-0.25096305
<b>Total</b>											<b>-14.51403009</b>

### 2030 Forecast Crashes - Alternative 8, Scenario 3

Segment	Length (mi)	Existing ADT	Avg Crashes		Existing Crash Rate (crashes/100MVT)	2030 NB ADT	2030 ADT	2030		Est Reduction in 2030 Crashes	
			2003 Crashes	2004 Crashes				2030 ADT	VMT Diff		
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	43940	35290	-8650	-0.00884	-8.4159656
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	43940	31600	-12340	-0.01802	-18.4848264
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	46950	37260	-9690	-0.00884	-7.09138425
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	37980	36270	-1710	-0.00749	-1.9698174
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	46180	39840	-6340	-0.00231	-0.5414994
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	49570	47800	-1770	-0.00633	-0.18360741
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	11850	12050	200	0.000314	0.1073538
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	8810	5720	-3090	-0.01399	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	8730	6710	-2020	-0.00634	-1.2998599
<b>Total</b>											<b>-37.87960656</b>

**2030 Forecast Crashes - Alternative 8A, Scenario 3**

Segment	Length (mi)	Existing ADT	Existing		Avg Crashes Per Year	Existing Crash Rate (crashes/100MVT)	2030 NB ADT	2030 ADT	2030		Est Reduction in 2030 Crashes
			2003 Crashes	2004 Crashes					2030 ADT	VMT Diff	
Whiskey - Pine Log to Corporate	0.28	25700	24	26	25	952	43940	35360	-8580	-0.00877	-8.34785952
Whiskey - Corporate to Dougherty	0.4	25700	33	44	38.5	1026	43940	31850	-12090	-0.01765	-18.1103364
Whiskey - Dougherty to East Gate	0.25	28010	20	21	20.5	802	46950	37760	-9190	-0.00839	-6.72547175
Whiskey - East Gate to Powderhouse	1.2	22560	16	36	26	263	37980	34870	-3110	-0.01362	-3.5825334
Pine Log - Whiskey to Two Notch	0.1	23460	3	1	2	234	46180	39500	-6680	-0.00244	-0.5705388
Pine Log - Two Notch to Powderhouse	0.98	23750	3	2	2.5	29	49570	46760	-2810	-0.01005	-0.29148973
Powderhouse - Pine Log to Old PH	0.43	4660	2	3	2.5	342	11850	11500	-350	-0.00055	-0.18786915
Powderhouse - Old PH to Athol	1.24	4660	0	0	0	0	8810	5540	-3270	-0.0148	0
Powderhouse - Athol to Whiskey	0.86	4660	3	1	2	205	8730	5750	-2980	-0.00935	-1.9176151
<b>Total</b>											<b>-39.73371385</b>