## 6.0 Introduction

The Georgia Department of Transportation has undertaken the Southwest Georgia Interstate Study to examine feasible opportunities for locating an interstate facility in southwest Georgia. The motivation for this work is the perceived need for greater accessibility as a means to promote growth and development in this region of the State. As detailed in the Technical Memoranda for other parts of the study such as the Stakeholder and Public Involvement Plan and the Existing Conditions report, the economy of this part of the State has not prospered to the same degree as other parts of Georgia or the nation as a whole. As a means to narrow the gap in economic performance between the Southwest Georgia study area and the balance of the state, interstate highway investment has been identified as a possible means to spur economic development in this corner of the State.

The analysis supporting the Benefit Cost Assessment considers two classes of benefits—User Benefits and Economic Development benefits. User benefits have economic value. User benefits include time savings, vehicle operating cost savings, and savings associated with increased safety; that is, accidents and fatalities that are avoided. Economic development benefits reflect the market changes to capitalize on the provision of this new infrastructure asset. There are several channels by which road investment may yield economic development impacts. First, by improving local employers' connection to markets, firms are able to reach a larger market for the same investment of time and travel cost. Expansion of the customer base provides the opportunity for greater hiring and associated payrolls that support spending in the local economy.

Second, by expanding local firms' accessibility to input markets, they may achieve productivity gains as they are able to access more specialized services and a larger range of goods suppliers at their existing location, making them more competitive. This creates the opportunity to expand market share and take on new workers; it also supports business retention as firms are economically successful at their Southwest Georgia location. Finally, by improving accessibility, firms which might not have located in the region before the road investment may not relocate or expand in Southwest Georgia given the expanded market. Similarly, households have improved access to job opportunities supporting incomes and spending in the local economy. Although the provision of transportation infrastructure does not cause economic growth, it is an essential ingredient in the growth equation that unlocks the potential of other regional assets and advantages and improves the economy's competitive position.

Construction benefits are omitted from the Benefit Cost ratio as they are one-time benefits that are expenditure driven. Fiscal benefits are omitted here as they are derived from the Economic Development benefits (earnings) benefits reported here. For example, income and sales taxes are

derived from earnings; to include both earnings and the tax revenues that are derived from them in the Benefit Cost ratio would be double counting.

The benefit cost ratio compares the combined value of all these types of benefits with the cost that it would take to achieve these benefits. If the ratio equals one, the benefits are just equal to the costs; this is the breakeven point. If the ratio is less than one, the benefits are less than the cost indicating that this is not a favorable investment unless there is some other non-quantifiable reason to make the investment. If the ratio is greater than one, the benefits exceed the cost and the investment yields a positive return. The higher the ratio, the more favorable the investment. For very large investments such as those contemplated here, a higher B/C ratio is desired given the number of uncertainties. A value of 1.5 is often used as a benchmark for larger projects.

Throughout the analysis described below, the design year is 2040 and a 25-year span of operation is applied in the analysis. Put another way, the alternative build scenarios assume that construction of the new road facility would be completed by 2015 and the new highway is available for use beginning in 2016, yielding a 25-year evaluation period spanning 2016 through 2040. **Both the stream of "benefits" and "costs" are discounted back to a present value at a discount rate of 7 percent,** providing a consistent comparison for the evaluation of the scenarios and a means to rank those alternatives that best achieve the project's economic development objectives. The cost estimates reflected in the B/C analysis differ from the "true" cost estimates discussed in Chapter 5, because they have been discounted by 7% per year over 25 years.

## 6.1 Project Assumptions

Increases in mobility and reductions in congestion provide benefits to users of the network. In order to compare the value of these user benefits to the value of investment needed to realize them, they are quantified in dollar terms, to the extent possible. In some cases, benefits are costs avoided, such as congestion, accidents, travel expenses, etc. The following represents the various categories of benefits (and costs avoided) to be included in this analysis:

- Travel time savings (difference in time and $ cost between use of the existing and new routes)
- Travel cost savings
- Value of incident reduction such as accidents

As noted above, the travel demand model provides the inputs for the user benefit analysis; the exhibit below summarizes the Vehicle Hours of Delay, the accidents avoided, and the change (increase) in Vehicle Miles Traveled associated with each of the alternatives for the 2040 design

year. The table below shows the changes associated with each build alternative relative to the E+C baseline.

A more detailed breakout by segment is provided in the Appendix G.

Table 6.1.1
Transportation Input Summary for the Study Area

| | E+C | Alt 1 | Alt 1 | Alt 2 | Alt 3 | Alt 3A | Alt 4 |
|---|---|---|---|---|---|---|---|
| **2040 Travel Time Savings VHD** | - | 902,750 | 845,000 | 1,833,000 | 1,059,750 | 1,007,500 | 1,185,000 |
| Auto VHD – Leisure | - | 454,792 | 427,354 | 922,737 | 535,991 | 511,668 | 596,872 |
| Auto VHD – Work | - | 194,911 | 183,152 | 395,459 | | 219,286 | 255,802 |
| | **E+C** | **Alt 1** | **Alt 1** | **Alt 2** | **Alt 3** | **Alt 3A** | **Alt 4** |
| **Accident Reduction 2040** | | | | | | | |
| PDO | - | 265 | 271 | 488 | 269 | 268 | 537 |
| Injury | - | 102 | 101 | 203 | 87 | 82 | 224 |
| Fatal | - | 1 | 0 | 3 | 0 | -1 | 5 |
| *Total* | - | *368* | *372* | *694* | *356* | *349* | *765* |
| | **E+C** | **Alt 1** | **Alt 1** | **Alt 2** | **Alt 3** | **Alt 3A** | **Alt 4** |
| **2040 Change in VMT** | - | (113,015,750) | (123,881,000) | (140,127,750) | (43,673,500) | (84,279,500) | (121,482,250) |
| Auto | - | (53,175,750) | (75,649,750) | (69,816,250) | (17,898,250) | (62,739,000) | (58,549,500) |
| Truck | - | (59,840,000) | (48,231,250) | (70,311,500 | (25,775,250) | (21,540,500) | (62,932,750) |

As the table shows, there is a reduction in vehicle hours of delay and in accidents, but an increase in vehicle miles traveled. This initially counterintuitive result reflects that the access controlled interstate facility permits higher speeds and safer trips relative to non-access controlled facilities, but that travelers driver longer distances in order to use the interstate facility, leading to a net increase in vehicle miles traveled. Although the magnitudes vary, this overall pattern holds for all of the build alternatives. The physical alignment, costs and traffic characteristics of these alternatives are described in detail in Section 4. As a consequence, the transportation benefits are mixed. VMT rises relative to the E +C baseline as travelers drive further to get on the new facility. The increase in VMT raises vehicle operating costs which is a negative benefit. Offsetting this, VHD falls as travelers save time by using the new facility. The value of time saved is a positive benefit. Similarly, the value of accidents avoided as drivers divert to safer roads is a positive benefit as well.

## 6.2 Project Costs

The project team identified nine component road segments that are combined to create the six major corridor alignments evaluated as part of this study. Table 6.2.1 below summarizes the project costs by segment, expenditure type, and by aggregate alignment. A description of how the segments combine to create the aggregate alignment alternatives is provided in the note below the table. All

costs are shown in 2008 dollars. Based on the project costs, every alternative considered would qualify as a national megaproject.

Table 6.2.1
Summary of Total Raw Project Costs by Segment and Alternative, 2008$

| | Length | Construction | PE (8% of Construction) | Right-of-Way | Utilities | Grand Total |
|---|---|---|---|---|---|---|
| **Segment** | | | | | | |
| Segment AC | 80.6 | 1,133,678,250 | 90,694,260 | 358,736,019 | 40,622,400 | 1,623,730,929 |
| Segment BC | 36.7 | 628,809,625 | 50,304,770 | 64,350,656 | 18,496,800 | 761,961,851 |
| Segment CD | 38.9 | 652,469,875 | 52,197,590 | 143,704,809 | 19,605,600 | 867,977,874 |
| Segment CE | 2.3 | 68,826,625 | 5,506,130 | 0 | 1,159,200 | 75,491,955 |
| Segment EG | 70.6 | 1,309,210,750 | 104,736,860 | 155,336,117 | 35,582,400 | 1,604,866,127 |
| Segment EF | 19.8 | 335,692,250 | 26,855,380 | 86,505,085 | 9,979,200 | 459,031,915 |
| Segment FH-West | 44.3 | 663,454,125 | 53,076,330 | 66,074,270 | 14,263,200 | 796,867,925 |
| Segment FH-East | 46.1 | 672,948,875 | 53,835,910 | 34,838,253 | 23,234,400 | 784,857,438 |
| Segment HI | 13.6 | 401,877,000 | 32,150,160 | 59,916,909 | 6,854,400 | 500,798,469 |
| | **Length** | **Construction** | **PE (8% of Construction)** | **Right-of-Way** | **Utilities** | **Grand Total** |
| **Alternative** | | | | | | |
| 1 | 162.4 | 2,613,023,000 | 209,041,840 | 539,996,266 | 81,849,600 | 3,443,910,706 |
| 1A | 160.6 | 2,603,528,250 | 208,282,260 | 571,232,284 | 72,878,400 | 3,455,921,194 |
| 2 | 153.5 | 2,511,715,625 | 200,937,250 | 514,072,136 | 77,364,000 | 3,304,089,011 |
| 3 | 118.5 | 2,108,154,375 | 168,652,350 | 245,610,903 | 59,724,000 | 2,582,141,628 |
| 3A | 116.7 | 2,098,659,625 | 167,892,770 | 276,846,920 | 50,752,800 | 2,152,115 |
| 4 | 119.5 | 1,786,148,125 | 142,891,850 | 502,440,828 | 60,228,000 | 2,491,708,803 |

Source: PBSJ
Note: Alternative 1 is comprised of segments AC, CE, EF, FH East and HI; Alternative 1A is comprised of segments AC, CE, EF, FH West and HI; Alternative 2 is comprised of segments AC, CE, and EG; Alternative 3 is comprised of segments BC, CE, EF, FH East and HI; Alternative 3A is comprised of segments BC, CE, EF, FH West and HI; and Alternative 4 is comprised of segments AC and CD.

## 6.3 User Benefit Estimation

This section describes how the user benefits are monetized.

### 6.3.1 Travel Time

The Travel Time benefits are broken into two components. Truck time is included in the VMT operating costs analysis as the truck operation is a commercial activity and the value of the delay is captured in the driver's labor cost. Auto time benefits, by contrast, are estimated based on the auto vehicle hours of delay that are avoided. These estimated travel time savings have been monetized by

following the most recent Revised Departmental Guidance for the Valuation of Travel Time in Economic Analysis (USDOT, 2003) and additional federal guidance. Based on Federal guidance the hourly value of time is $24.64 in (2007$). This value was escalated to a value of $25.59 (2008$) through application of the Consumer Price Index annual change.

The value of travel time saved by the region's travelers rises over time, achieving the maximum value in 2040. The analysis assumes that the benefits increase in equal increments over the 25 year time horizon ending in 2040. This stream of benefits is summed over 25 years and discounted at 7 percent. The final results for each alternative are shown in summary Table 6.4.1.3 at the end of this memo.

### *6.3.2 Travel Cost*

In contrast to travel time savings, the project alternatives will yield a net increase in automobile and truck VMT as travelers lengthen their average trips to reach the new facility. This translates into increased operating costs in terms of fuel, maintenance, depreciation, and tires. For autos, these savings vary by the size of the car. The average cost per mile is 54 cents, according to AAA's 2009 Edition of "Your Driving Costs". This total is comprised of depreciation, insurance, fuel, and maintenance costs. Truck operating costs per mile are $4.06 per mile based on data from "American Trucking Trends 2008-2009". The data are provided in 2006$ and are escalated for this analysis to 2008$ using PPI for General Freight Trucking.

The value of travel vehicle costs rises over time, achieving the maximum value in 2040. The analysis assumes that the increase is incurred in equal increments over the 25 year time horizon ending in 2040. This stream of benefits is summed over 25 years and discounted at 7 percent. The final results for each alternative are shown in the summary table below.

### *6.3.3 Safety*

The economic value of the accidents avoided is determined using research from the National Safety Council[1]. The Council publishes two sets of estimates. One set is for measuring the economic loss to a community resulting from past motor vehicle crashes. These losses are wage and productivity losses, medical expenses, administrative expenses, motor vehicle damage, and employers' uninsured costs. The Council cautions users, however, that these estimates of past losses are not appropriate for use in benefit cost analyses as they omit the value of what people are willing to pay for improved

[1] National Safety Council "Estimating the Costs of Unintentional Injuries, 2006" Available on the web at http://www.nsc.org/resources/issues/estcost.aspx

safety in order to live longer and to protect the quality of one's remaining life. In order to capture this important impact, the Council has developed a second set of motor vehicle cost estimates known as the "comprehensive cost" estimates for use in cost benefit applications. These comprehensive costs of motor vehicle costs include the economic cost components noted above (wage and productivity losses, medical expenses, administrative expenses, motor vehicle damage, and employers' uninsured costs) as well as a measure of the value of lost quality of life. The value of lost quality of life was developed by the Council through empirical studies of what people actually pay to reduce their safety and health risks.

The Council's last published estimates are for 2006. These were adjusted to 2008 dollars for consistent comparison with the project cost estimates. The Consumer Price Index for the South Region, published by the U.S. Bureau of Labor Statistics, was used for the conversion. As the CPI annual average for 2008 is not yet published, this analysis applied the 11-month average of the index as a proxy for the 2008 value. This is the most up-to-date data available at the time of this analysis.

Note that the average comprehensive costs shown in the exhibit below are on a per injured person basis as contrasted with a per crash basis. Thus, in the analyses discussed below, the costs are factored by an occupancy rate. National research has shown that vehicle occupancy rates vary by trip purpose—lower for commuting and rising for leisure and other non-work trips. The average occupancy rate across all trip purposes is reported as 1.6, according to data summarized from the 2001 National Household Travel Survey[2]. This is the factor that was applied to convert injury costs to accident costs. In addition, the National Safety Council provides values for three types of non-fatal injuries. Unit costs are escalated to 2008 dollars using US City Average CPI for all items. Injuries cost per person assumes the following distribution of injury accidents: 71.4% possible/minor injury, 23.8% moderate/non-incapacitating evident injury and 4.8% serious/incapacitating injury. The distribution of injuries by severity is based on GDOT Crash Analysis, Statistics, and Information Notebook 2008 data on "Motor Vehicle Crash Injuries" for 2006, p.5.

As with the other user benefit types, the value of accidents avoided rises over time, achieving the maximum value in 2040. The analysis assumes that the benefits increase steadily in equal benefits over the 25 year time horizon ending in 2040. This stream of benefits is summed over 25 years and discounted at 7 percent. The final results for each alternative are shown in the summary Table 6.3.3.1.

[2] Hu, Pat and Timothy Reuscher. December 2004. "Summary of Travel Trends: 2001 National Household Travel Survey," FHWA, US Department of Transportation: Washington, DC.

Table 6.3.3.1
Accident Cost Assumptions

| | Average Comprehensive Cost per Person 2006 | Average Comprehensive Cost per Person 2008 | Units | Average Number of Units per Accident | Total Cost per Accident |
|---|---|---|---|---|---|
| Property Damage Only | $ 2,300 | $ 2,388 | Persons | 1.6 | $ 3,821 |
| Injuries | $ 40,713 | $ 42,276 | Persons | 1.6 | $ 67,641 |
| Fatalities | $ 4,100,000 | $ 4,257,422 | Persons | 1.6 | $ 6,811,874 |

Source: National Safety Council, National Household Travel Survey, and Bureau of Labor Statistics.

## 6.4 Economic Development Benefits

Aside from the User Benefits that accrue to the study area as travelers use the new facility, there is also the possibility that additional economic development will be attracted to the area by the improved market access afforded by the road investment. This section estimates the most likely expansion of market attributable to the road investment. It also estimates the amount of new development that would be required for the road to break even strictly on Benefit Cost terms, setting aside the user benefits.

Highway accessibility is an important site selection criteria for expanding and relocating business; it tops the most recent list in the Area Development Corporate Survey of Site Selection factors (2008). As the table below shows, over 95 percent of respondents reported that highway accessibility was "very important" or "important" in the relocation decision. The survey does not distinguish between interstate, four-lane divided, or other highway types.

Table 6.4.1
2008 Ranking of Site Selection Factors

| Ranking | Factor | 2008 | 2007 |
|---|---|---|---|
| 1 | Highway accessibility | 95.4 | 96.9 (1) |
| 2 | Labor costs | 91.4 | 92.3 (2) |
| 3 | Occupancy and construction costs | 90.4 | 88.2 (5) |
| 4 | Tax exemptions | 88.6 | 82.8 (10T) |
| 5 | Energy availability and costs | 87.9 | 89.0 (3) |
| 6 | Availability of skilled labor | 87.7 | 88.7 (4) |
| 7 | State and local incentives | 87.2 | 83.4 (8) |
| 8 | Corporate tax rate | 85.3 | 83.8 (7) |
| 9 | Low union profile | 82.7 | 80.6 (13) |
| 10 | Available land | 82.0 | 85.4 (6) |

Source: Area Development Corporate Survey, January 2009

Note: Figures are percentages of respondents reporting that the factor is "very important" or "important." Values in parens in the 2007 column are the 2007 ranking. Tax exemptions tied with Proximity to major markets in 2007; in the 2008 survey this factor ranked 12th.

That said, highway accessibility is not the only important factor, underscoring that while highways accommodate growth, they do not cause it to happen. Transportation investment cannot overcome the economic disadvantages of a small labor pool, an unskilled or uneducated workforce, unreliable power or water supplies, nor can it attract industry where the requisite resources are not present[3].

Of the site selection factors noted in Table 6.4.1, the greatest deficit is in skilled labor. The Economic Research Service of the US Department of Agriculture identified 23 of the region's 32 counties as Low-education counties. The definition of such a county is one where 25 percent or more of working aged adult residents (ages 25-64) had neither a high school deploma or GED in 2000. The low level of educational attainment is an important factor for the region's outlook as it reduces the likelihood that investments in other types of capital, such as infrastructure, will enjoy a positive rate of return. The low rate of educational attainment present in the region tempers the outlook for the return on the economic development highway investment that is being considered as employers considering relocation to the region may question the skills and training of the workforce even if the highway investment improves market access.

The skill level of the region's labor force has been identified as a factor hindering its economic development in research at Georgia Southwestern State University[4]. Specifically, the study concluded that "southwest Georgia may lose any advantage it has if entry-level employee preparedness does not improve." (p.100). This conclusion was based on the results of a survey of Southwest Georgia employers where three quarters of respondents felt that employee skills had deteriorated or remained the same over the past three years, 50 percent of area businesses had some or great difficulty in finding qualified workforce to fill area manager positions, and 70 percent of area businesses had some or great difficulty finding qualified workers for clerical and administrative

[3] The factors ranked 2 through 5 in Table 1.4 are all business cost factors. The factors ranked 7, 8, and 9 are also cost related. In addition to already having interstate access on the eastern side of the study area and good four-lane highway connections in several locations, Southwest Georgia stands out in terms of its cost structure, scoring well on seven of the top ten site selection factors. Using the Albany and Columbus metropolitan areas as barometers of the region's cost structure—the rural areas are unlikely to have higher costs than the region's metro economies—southwest Georgia has among the lowest costs of doing business in the nation. Moody's Economy.com estimates that the cost of doing business in Albany (a weighted average of energy costs, taxes, office rents, and labor costs adjusted for productivity) is 89 percent that of the US average cost.

[4] John G. Kooti and Randall Valentine. 2006.. "Workforce Capacity and Employer Satisfaction in Southwest Georgia: A Case Study in Rural Economic Development Needs," *Journal of Business for Entrepreneurs*, Volume 6 Issue 1, pp. 84-101.In this study, the survey included employers in Clay, Crisp, Dooly, Macon, Marion, Quitman, Randolph, Schley, Stewart, Sumter, Talbot, Taylor, and Webster counties.

positions (p. 92). Reasons for the difficulty included deficient technical and computer skills (72 percent), oral and written communcation skills (76 percent), and reading and writing skills (60 percent).

### *6.4.1 Industries Likely to Benefit*

The initial step in estimating the economic development potential is to identify (1) those industries likely to benefit directly from the highway investment, and the (2) share of the industry likely to be most impacted. For example, goods-based industries are more likely to be impacted directly by road improvements because their production process yields a physical good that is shipped than service-based industries, all else held equal. That is not to say that services industries do not benefit from road improvements—but these benefits typically derive from the reduction of congestion and the ability to access workers and other specialized labor more readily; congestion is not currently nor projected to be a problem in the Southwest Georgia study area.

Consideration of the share of a particular local industry likely to be impacted is also important as some industry is typically serves a local market and is less likely to be impacted by the road improvement. Put another way, a region's economy can be divided into two parts: the local economic base and the export base. The local economic base serves local demand; the export base serves consumption outside the local area—an export to the economy beyond the study area. The identification of Southwest Georgia's export industries and the share that serves an economy beyond the local study area is estimated using Location Quotients. The Location Quotient compares an industry's share of the local economy to the same industry's share of the national economy. If the ratio equals "one" then the local share is equal to the national share—it is the share typically found nationwide. If the share is lower than "one" the region is considered an "importer" of the industry's good or service because it has invested less of its economy in the production of the good or service relative to the national average—the typical share found in the US. Thus, the region's residents must be purchasing these goods and services from producers outside their own local economy—importing these goods and services. Similarly, if the Location Quotient is greater than "one" the local economy is an exporting region for that industry—that is the economy has devoted a greater share of its economy to that particular industry and must be producing more than is needed for its own consumption.

In Southwest Georgia, the exporting industries are: farm, forestry, mining, utilities, manufacturing, retail trade, information, and management of companies. Government services are also exported but this analysis assumes that this industry's location is driven by factors other than highway access and it is not carried forward in the analysis.

The second column of Table 6.4.1.1 shows the share of the local industry devoted to exporting beyond the study area's demand.

## Table 6.4.1.1

### Summary of Employment Impacts by Exporting Industry

| | Total Employment Before Improvement | Share of Economy Exporting | Employment Influenced by Improvement | Alt1 | Alt 1A | Alt 2 | Alt 3 | Alt 3A | Alt 4 | RIMS | Alt1 | Alt 1A | Alt 2 | Alt 3 | Alt 3A | Alt 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 12.6% | 12.6% | 18.9% | 2.5% | 2.7% | 18.6% | | 7646 | 7646 | 11469 | 1496 | 1662 | 11302 |
| Total Employment | **487,296** | | **64,452** | **8123** | **8123** | **12,184** | **1,589** | **1,766** | **12,008** | | | | | | | |
| Farm employment | 14,750 | 0.48 | 7,099 | 895 | 895 | 1,342 | 175 | 194 | 1,323 | 1.7222 | 1541 | 1541 | 2311 | 301 | 335 | 2278 |
| Nonfarm employment | 472,546 | - | 0 | 0 | 0 | - | - | - | - | | | | | | | |
| Private employment | 370,845 | - | 0 | 0 | 0 | - | - | - | - | | | | | | | |
| Forestry, fishing, related activities, and other 3/ | 7,065 | 0.61 | 4,333 | 546 | 546 | 819 | 107 | 119 | 807 | 2.0507 | 1120 | 1120 | 1680 | 219 | 243 | 1655 |
| Mining | 3,367 | 0.21 | 715 | 90 | 90 | 135 | 18 | 20 | 133 | 2.2172 | 200 | 200 | 299 | 39 | 43 | 295 |
| Utilities | 5,034 | 0.69 | 3,481 | 439 | 439 | 658 | 86 | 95 | 649 | 2.7813 | 1220 | 1220 | 1830 | 239 | 265 | 1804 |
| Construction | 25,752 | - | 0 | 0 | 0 | - | - | - | - | | | | | | | |
| Manufacturing | 45,791 | 0.15 | 6,709 | 846 | 846 | 1,268 | 165 | 184 | 1,250 | 2.9 | 2452 | 2452 | 3678 | 480 | 533 | 3625 |
| Wholesale trade | 14,825 | - | 0 | 0 | 0 | - | - | - | - | | | | | | | |
| Retail trade | 56,623 | 0.08 | 4,695 | 592 | 592 | 888 | 116 | 129 | 875 | 1.4281 | 845 | 845 | 1268 | 165 | 184 | 1249 |
| Transportation and warehousing | 12,709 | - | 0 | 0 | 0 | - | - | - | - | | | | | | | |
| Information | 9,865 | 0.03 | 340 | 43 | 43 | 64 | 8 | 9 | 63 | 1.9985 | 86 | 86 | 128 | 17 | 19 | 127 |
| Finance and insurance | 17,691 | - | 0 | 0 | 0 | - | - | - | - | | | | | | | |
| Real estate and rental and leasing | 14,858 | - | 0 | 0 | 0 | - | - | - | - | | | | | | | |
| Professional, scientific, and technical services | 15,557 | - | 0 | 0 | 0 | - | - | - | - | | | | | | | |
| Management of companies and enterprises | 5,997 | 0.12 | 705 | 89 | 89 | 133 | 17 | 19 | 131 | 2.0526 | 182 | 182 | 274 | 36 | 40 | 270 |
| Administrative and waste services | 26,895 | - | 0 | 0 | 0 | - | - | - | - | | | | | | | |
| Educational services | 6,333 | - | 0 | 0 | 0 | - | - | - | - | | | | | | | |
| Health care and social assistance | 38,229 | - | 0 | 0 | 0 | - | - | - | - | | | | | | | |
| Arts, entertainment, and recreation | 6,032 | - | 0 | 0 | 0 | - | - | - | - | | | | | | | |
| Accommodation and food services | 31,482 | - | 0 | 0 | 0 | - | - | - | - | | | | | | | |
| Other services, except public administration | 26,740 | - | 0 | 0 | 0 | - | - | - | - | | | | | | | |
| Government and government enterprises | 101,701 | 0.36 | 36,375 | 4584 | 4584 | 6,876 | 897 | 997 | 6,777 | | | | | | | |
| Federal, civilian | 10,365 | 0.28 | 2,873 | 362 | 362 | 543 | 71 | 79 | 535 | | | | | | | |
| Military | 25,344 | 0.78 | 19,847 | 2501 | 2501 | 3,752 | 489 | 544 | 3,698 | | | | | | | |
| State and local | 65,992 | 0.21 | 13,655 | 1721 | 1721 | 2,581 | 337 | 374 | 2,544 | | | | | | | |
| State government | 19,335 | 0.28 | 5,318 | 670 | 670 | 1,005 | 131 | 146 | 991 | | | | | | | |
| Local government | 46,657 | 0.18 | 8,337 | 1051 | 1051 | 1,576 | 206 | 228 | 1,553 | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | Private Market Expansion | | 3539 | 3539 | 5308 | 692 | 769 | 5231 | | 7646 | 7646 | 11469 | 1496 | 1662 | 11302 |

Source: Bureau of Economic Analysis and AECOM calculations.

The second consideration is the degree to which the market for these industries would likely expand. This assessment is made based on the travel time savings derived from the Travel Demand Model. Actual market expansion will vary with individual locations throughout the region. The table below provides a typical short, medium and long trip savings for each of the alternatives. The average savings for each of the alternatives is applied as the market expansion factor. In other words, a shipper could travel 13 percent farther under the Investment Alternative 1, relative to the No Build for the same travel time. These expansion factors are applied to the export base to estimate the direct incremental employment gain associated with the market expansion.

Table 6.4.1.2
Typical Travel Time

| Trip Length | Travel Times (minutes) | No Build | Alt 1 | Alt 1A | Alt 2 | Alt 3 | Alt 3A | Alt 4 |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| Long Trip | Columbus to Valdosta | 203 | 179 | 179 | 139 | 198 | 198 | 168 |
| | *% diff relative to NB* | | 12% | 12% | 22% | 2% | 2% | 17% |
| Medium Trip | Columbus to Albany | 105 | 86 | 85 | 86 | 106 | 105 | 86 |
| | *% diff relative to NB* | | 18% | 19% | 18% | -1% | 0% | 18% |
| Short Trip | Albany to Tifton | 57 | 54 | 55 | 51 | 52 | 52 | 43 |
| | *% diff relative to NB* | | 5% | 4% | 11% | 9% | 9% | 25%` |
| | | | | | | | | |
| | Average % diff relative to NB | | 13% | 13% | 19% | 2% | 3% | 19% |
| | High | | 15% | 15% | 21% | 4% | 5% | 21% |
| | Low | | 11% | 11% | 17% | 0% | 1% | 17% |

Source: PBSJ
Note: Percentages are rounded in table.

The firms and production activity associated with these new workers will support demand for goods and services across a range of industries; sparking a secondary round of economic development. This will either be accomplished by new firms entering the market to fulfill the new demand or expansion of existing firms. This expansion is estimated through the application of RIMS II multipliers. The multiplier for each industry is applied to the direct export employment estimate associated with the highway investment to estimate the total impact by industry.

The RIMS II regional multipliers are obtained from the Bureau of Economic Analysis (BEA) within the U.S. Department of Commerce. Derived from the Regional Input-Output Modeling System, the so-called RIMS II multipliers measure the total change (direct + indirect effects) in output, employment, value added and earnings that results from an exogenous and incremental change to a particular industry. The RIMS II model provides economic impacts from investments and operations in the following forms:

- Total final-demand multipliers for output, earnings, value added, and employment
- Total direct-effect multipliers for earnings and employment

The earnings associated with highway induced employment in Southwest Georgia are estimated by applying the average wage for the region to the total jobs estimate. This stream of earnings assumed to grow over time over 25 years in equal increments until the total impact is reached in the design year of 2040. The stream of earnings is discounted at 7 percent and summed to achieve the total benefit.

The costs and benefit estimates associated with the Southwest Georgia Interstate Study were discounted because they occur in the future, over a period extending from 2010 to 2040. A dollar today is worth more than a dollar in the future, even if inflation is excluded, because today's dollar can be used productively in the ensuing years, yielding a value greater than the initial dollar. Future benefits are discounted to reflect this fact. The purpose of discounting is to put all present and future benefits in a common metric, their present value. The seven percent discount rate is recommended by the Office of Management and Budget for impact studies.

Of special note, two of the benefit cost ratios are negative. This is a very unusual result, and it is driven by the large negative impact of travel cost increases. Because people drive out of their way to use the new facility, their driving costs increase. At the same time, the positive benefits of accidents avoided, value of time saved, and economic development is not sufficient in these two cases to offset the increase in travel costs. In short, the negative impacts outweigh the positive ones in the case of Alternatives 3 and 3A, yielding a negative benefit cost ratio.

**Table 6.4.1.3**
**Summary of Benefits by Type and Alternative with Benefit Cost Ratio**

| | Alt 1 | Alt 1A | Alt 2 | Alt 3 | Alt 3A | Alt 4 |
|---|---|---|---|---|---|---|
| 2016-2040 Discounted Benefits (2008$) | | | | | | |
| Safety | $ 37.43 | $ 28.53 | $ 107.42 | $ 24.45 | $ 9.36 | $ 144.12 |
| Travel Time Savings | $ 49.77 | $ 46.77 | $ 100.98 | $ 58.66 | $ 55.99 | $ 65.32 |
| Travel Cost Savings | $ (813.53) | $ (708.82) | $ (967.77) | $ (342.31) | $ (363.46) | $ (859.83) |
| Economic Benefits | $ 885.23 | $ 885.23 | $ 1,327.85 | $ 173.20 | $ 192.44 | $ 1,308.61 |
| Total (all types) | $ 158.91 | $ 251.72 | $ 568.48 | $ (86.00) | $ (105.66) | $ 658.22 |
| Discounted Cost of Projects (2008$) | $ 2,735.92 | $ 2,745.46 | $ 2,624.85 | $ 2,051.31 | $ 2,060.85 | $ 1,979.47 |
| **Benefit Cost Ratio (without economic impact)** | -0.265 | -0.231 | -0.289 | -0.126 | -0.145 | -0.329 |
| **Benefit Cost Ratio (with economic benefits)** | 0.058 | 0.092 | 0.217 | -0.042 | -0.051 | 0.333 |

All benefits and costs are in millions discounted at 7 percent; benefits represent the sum of the 25 year stream. Estimation assumes benefits received equally over the 2016 to 2040 time period.

As Table 6.4.1.3 shows, no Benefit Cost ratio comes close to crossing the break even value of "one." This does not mean that the highway investment would not support economic development; rather it tells us that the projected amount of growth in this largely rural region is not sufficient to warrant the very large multi-billion dollar investment the project would require.

### *6.4.2 Breakeven Analysis*

There are many uncertainties in estimating the economic impact attributable to a highway investment in a rural area such as Southwest Georgia which already has interstate access in much of the study area. There are many unknowns – the largest of which is a firm relocation to the region. This would be an exogenous change to the region's economy and would not be captured in an economic model approach such as the one described above. Recognizing that there are many unknowns and that pinpointing the precise industry likely to be attracted to the region is not possible, this analysis adds an additional estimation. It estimates the magnitude of economic growth needed to justify the project cost and then evaluates the probability of attaining that market expansion. Thus, the analysis presents a "most likely" growth scenario based on modeling analysis and a higher "break even" growth scenario.

The project costs vary by alternative. For this break even analysis we assume that construction occurs over six years and that construction costs are distributed evenly over the six-year period. These costs are then discounted back at 7 percent to ensure an "apples" to "apples" comparison between project costs and benefits.

In order to obtain a Benefit / Cost ratio for just the economic benefits that falls in the range of 1.5 to 2.0, the project alternatives would have to yield $540 million in earnings in the opening year. Under these circumstances, the Benefit Cost ratio would be 1.53 for Alternative 1 (the lowest value) and range to a high of 2.1 for Alternative 4. At the region's average wage, this implies immediate job creation of nearly 15,000 jobs. Every year of delay beyond the opening year increases the amount of job creation required in subsequent years.

This is a high hurdle to cross, suggesting that an investigation of lower cost alternatives might be warranted. Returning to the site selection factors identified in Table 1.4, highway access was ranked highly, but interstate highway was not specified. Development officials may choose to consider a collaborative approach to economic development, where investments of different types are bundled together to mitigate the region's economic disadvantages. For example, road improvements to support a desirable employer in a targeted industry might be combined with workforce training

tailored to the needs of the employer, and tax incentives to permit the new industry to take hold in the region, demonstrating its success in which can be marketed to other employers in the industry or to related industries. In this instance, road investment is part of a package of policies and investments that address the region's economic disadvantages; transportation investment is not the sole investment[5].

In a follow up to a FHWA study of interstate's economic impact, the FHWA project manager writes that the data "leads to a conclusion that economic development success is related to the degree of access and connectivity improvement that the highway improvement provides as well as to the nature and strength of the non-highway economic development initiatives. It is also possible that the effects of improvements to highways without access control would not result in quite the effects of improvements to highways with access control."[6]

This latter observation suggests an evolution in thinking about how to use highway investment to foster growth. It suggests an incremental approach to highway improvements in locations where capacity is not a constraint such as in Southwest Georgia, and where the highway project's objective is economic development. Project sponsors might consider improvements to good quality non-interstate highways, investing in lower-cost access control improvements to achieve economic gains. The access control investments could be complemented by marketing the route as a commercial corridor, investments in ITS to serve freight and commercial traffic, and investments in complementary economic development policies to encourage workforce development and reliable non-transportation infrastructure. Such investments would be much lower in cost and would likely score more highly in terms of the benefit cost ratio.

[5] This finding argues for Georgia's strategy of encouraging its state departments to collaborate and consult to foster prosperity—for example encouraging the Department of Transportation to collaborate with the state's economic development agency which is presently occurring.

[6] FHWA 2005, cited above.