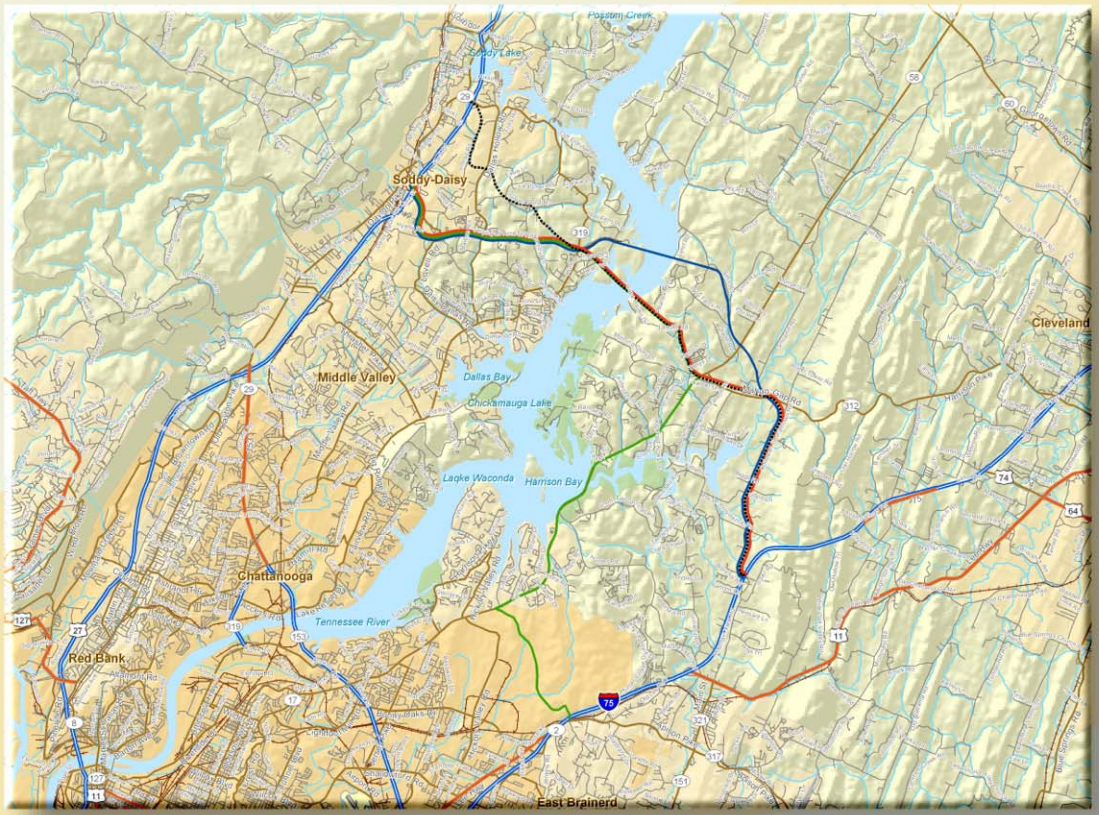
Final

Tennessee River Bridge
Hamilton County

Conceptual Toll Feasibility Report



ENGINEERS
PLANNERS
ECONOMISTS

WilburSmith
ASSOCIATES

TDOT Go

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Prepared For

Tennessee Department of Transportation

Prepared By

ENGINEERS
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ECONOMISTS
WilburSmith
ASSOCIATES

February 4, 2009

EXECUTIVE SUMMARY

Across the country, all levels of government are coming to grips with the fiscal challenges created by increased demand for new transportation infrastructure and the need to maintain the existing transportation networks within the constraints of existing funding mechanisms. In Tennessee, the public sector has financed transportation infrastructure through a combination of state and local taxes and fees and, for major projects, Federal funding derived from the allocation of the national motor fuel taxes. These resources have been combined to fund projects on a "pay-as-you-go" basis, meaning that projects have often been built in phases as funds became available over a period of years.

Currently, the state's gas tax revenues are virtually flat and the Tennessee Department of Transportation (TDOT) budget has been impacted by federal rescissions totaling nearly $238 million since December 2005. These issues coupled with rising construction costs have severely impacted the Department's ability to initiate any new projects. Tennessee is faced with the reality that critical projects may face years of delay before funding is available. Delaying these projects results in hidden costs associated with inflation and unrealized economic development, especially for projects delayed several years. In addition, delaying projects that reduce emissions or eliminate safety hazards has obvious negative impacts on the quality of life issues for Tennessee residents.

In recognition of these factors, TDOT retained the firm of Wilbur Smith Associates (WSA) to explore the potential for the use of tolls by the State to advance a proposed new route across the Tennessee River northeast of Chattanooga, Tennessee. WSA conducted a Sketch Traffic and Revenue Study for a potential tolling scenario, which culminates in the preparation of a Conceptual Toll Feasibility Report. The findings of this report should be considered conceptual in nature and are conditioned on the statements contained within this report.

In conducting this report, WSA performed three basic analyses: a Sketch Traffic and Revenue Study; an opinion of project costs; and a conceptual plan of finance, as discussed more fully within this report. WSA also began applying various quantitative and qualitative criteria to the route to help formulate conclusions concerning the toll feasibility of the scenario studied.

Based on the information contained within this report WSA believes that Alternatives 1 and 3 have the potential to be fully funded by toll revenues. As a result of this conclusion, WSA recommends that TDOT consider moving forward with the next level of analysis. Should TDOT decide to move forward, WSA recommends that any scope of services for the next phase should include or consider the following items:

- Concentrate future studies on Alternatives 1 and 3
- Work with the CHCNGA-TPO to refine the alignments of these two Alternatives in order to balance construction costs with revenue potential
- Work with CHCNGA-TPO to refine construction costs based on more developed alignments.

WSA would also recommend that this work include updating the CHCNGA-TPO travel demand model and long range transportation plan.

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INTRODUCTION

Determining the feasibility of a toll project is an iterative process. The first step is to screen a project, or projects, to develop an initial understanding of the potential traffic and revenue characteristics of that project. This step usually requires a Sketch Level Analysis and Sketch Traffic and Revenue Study, both of which are considered planning level studies and are designed to assist in furthering the normal planning process required by all transportation projects. Subsequent to a sketch level traffic and revenue study, additional analyses are conducted to consider potential revenues compared to potential project costs to determine whether the subject project is considered conceptually feasible. The conceptual feasibility study normally results in a series of recommendations to the developing agency regarding how, and if, the project should proceed.

At the request of the Tennessee Department of Transportation (TDOT), Wilbur Smith Associates (WSA) has completed a Sketch Traffic and Revenue Study and this Conceptual Toll Feasibility Report for a new route across the Tennessee River near Chattanooga, Tennessee. This study considered four alternate alignments for the new route and was conducted to facilitate the planning process required for the proposed transportation facility. Depending upon a number of factors inherent in the transportation planning process, modifications and updates may be needed as competing routes and modes are added to regional plans, project configurations change, and/or land use patterns evolve.

A basic premise of traffic and revenue forecasting is the stability of traffic demand models developed by appropriate transportation planning organizations. These travel demand models include socio-economic data, population growth patterns, and future year road networks that have evolved over years of planning. On July 15, 2008, shortly after this project began, Volkswagen announced that it had decided to locate a major manufacturing facility in the Chattanooga area. This would involve a reported investment of over $1 billion and employ approximately 2,000 individuals.

While this is a very good occurrence for the region, this event has altered the parameters used to develop the Chattanooga-Hamilton County North Georgia Regional Transportation Planning Organization (CHCNGA-TPO) travel demand model. It is a significant task both in terms of effort and time to model the socio-economic, land use, and resulting transportation needs that will result from the economic benefits to the region. Given the timing of the announcement, an updated travel demand model has not been approved by the CHCNGA-TPO in time for its inclusion in this study.

Consequently, the results of this study need to be tempered with the realization that the impact of the Volkswagen facility has not been incorporated into the official CHCNGA-TPO travel demand model and long range transportation plan. Such a major economic event could impact the results of this study. Should this potential toll project be approved for further study we would recommend updating the travel demand model.

Traffic and revenue studies, by themselves, do not determine project feasibility, though such studies are significant factors in undertaking such an analysis. As a result, subsequent planning steps are usually taken once a sketch level traffic and revenue study is completed and it has been determined that a project, or projects, has the

potential to be feasible as a toll facility. This planning process often incorporates an analysis of the project in the context of a regional or statewide transportation plan, major investment study, preferred alignment, environmental review, preliminary design and engineering, and the development of a Tier II plan of finance.

In addition to the traffic and revenue studies, WSA developed an opinion of project costs for each alternate. These estimates of project costs were used in analyzing the project's financial feasibility at this conceptual stage. Bonding capacity was estimated utilizing a traditional public toll authority financial model. These cost and bonding estimates (contained herein) are conceptual in nature and are provided as inputs into a screening process to help determine the direction that future planning efforts will take for the proposed project.

These three components – traffic and revenue, project cost analysis, and bonding analysis form the basis for the analysis contained within this Conceptual Toll Feasibility Report.

PROJECT DESCRIPTION

On April 25, 2008 the Tennessee River Bridge Committee met and requested that TDOT study four alternative alignments to cross the Tennessee River Bridge generally between US 27 in Soddy-Daisy, Tennessee and Harrison, Tennessee. The first three alternatives are set forth in the January 25, 2008 TDOT Tennessee River Bridge Feasibility Study. The fourth alternative, referred to by the Committee as Revised Route 4, was outlined in a May 2, 2008 letter to TDOT. All four alignments are presented below in Figure 1 and the individual alignments for the four alternatives are presented in Figures 2 through 5. A brief description of each of the four alternatives is presented below:

- **Alternative 1** – The western terminus of Alternative 1 is located at the interchange between US 27 and Sequoyah Road. Alternative 1 generally heads in a southeast direction and has an eastern terminus on Interstate 75 at approximately mile marker 13. Intermediate full access interchanges are assumed at Harrison Bay Road, SR 58, and Ooltewah-Georgetown Road. The total length of Alternative 1 is approximately 15 miles.
- **Alternative 2** – The western terminus of Alternative 2 is the same as Alternative 1. In general, Alternative 2 is slightly farther north than Alternative 1. Alternative 2, which is approximately 16 miles in length, follows the same alignment as Alternative 1 east of SR 58, and continues south to terminate on Interstate 75 at approximately mile marker 13.
- **Alternative 3** – From its western terminus to SR 58, Alternative 3 is the same is Alternative 1. At SR 58, Alternative 3 turns south onto SR 58 until turning east onto Enterprise Park Drive and terminating on Interstate 75 near mile marker 8. Alternative 3 is the most southern alternative and is approximately 20 miles in length.
- **Alternative 4** – Alternative 4 has a western terminus at the Hixson Pike interchange with US 27. It then travels in a southwest direction on new alignment to intersect with Sequoyah Road at the intersection with Hixson Pike. From the intersection of Sequoyah Road and Hixson Pike, Alternative 4 follows the alignment of Alternative 1 to terminate at a proposed interchange at mile marker 13 on Interstate 75. Alternative 4 has a total length of approximately 15.5 miles.

For the purpose of this study, each of the four alternatives was assumed to have an opening year of 2018 and was assumed to be constructed as specified in the January 25, 2008 TDOT Tennessee River Bridge Feasibility Study. This opening year date is based upon estimated timeframes for key development components including approximately 1 year for further tolling and financial analyses, 2 years for environmental document preparation and approval, and 2 years for design and construction documents. These timeframes are in agreement with TDOT planning estimates for project development, but are subject to refinement as the project develops.

All four alternatives were assumed to have portions of access controlled and non access controlled roadway. Design speeds varied according to the assumed access of each portion of the roadway. The controlled access portions of the roadway were assumed to be constructed at Interstate standards (70 miles per hour design speed). The non-access controlled sections of the alignment utilize existing roadways. No improvements to these existing

roadways were assumed, beyond those incorporated into the Chattanooga-Hamilton County North Georgia Regional Transportation Planning Organization (CHCNGA-TPO) Long Range Transportation Plan.

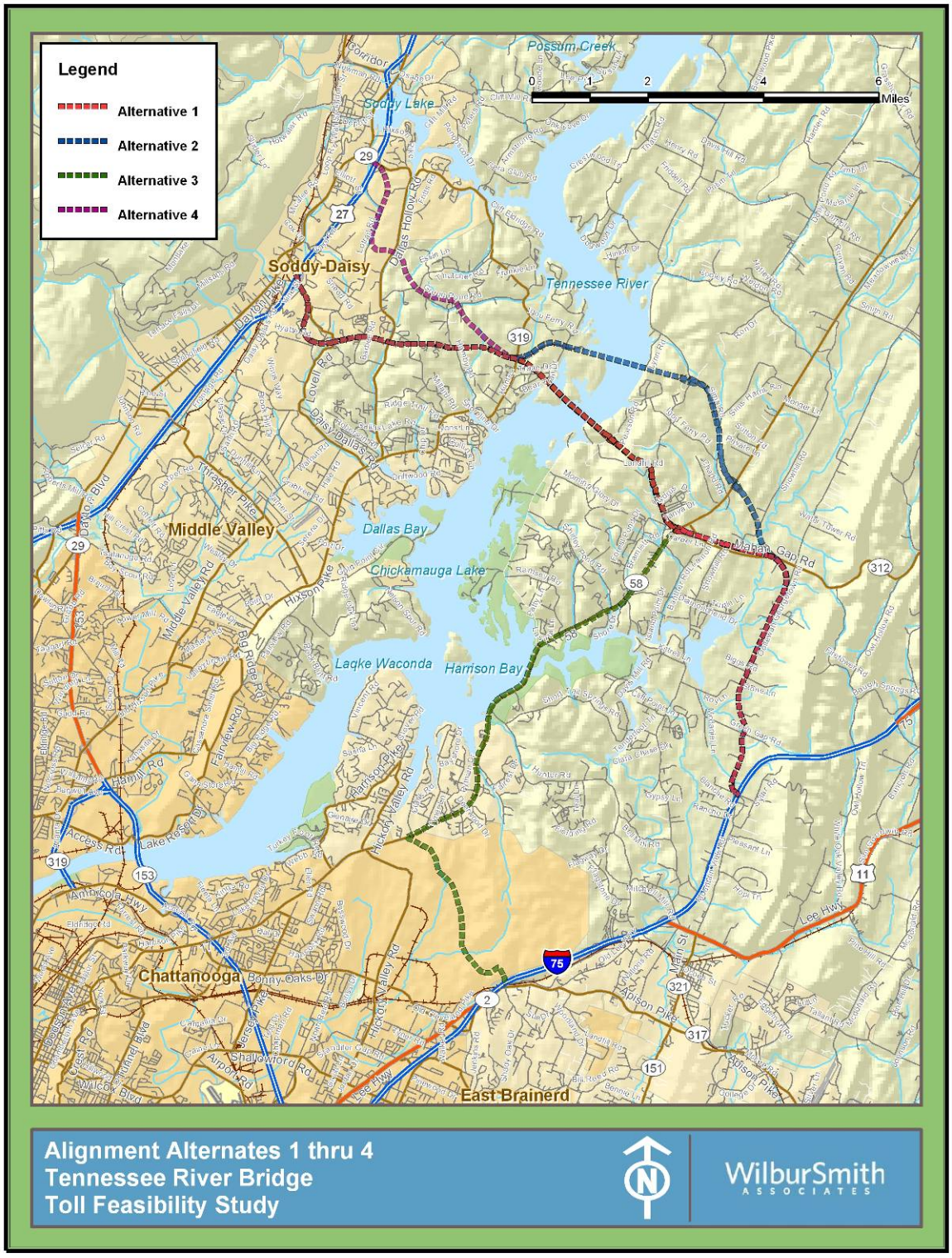

Figure 1
Alternatives Location Map

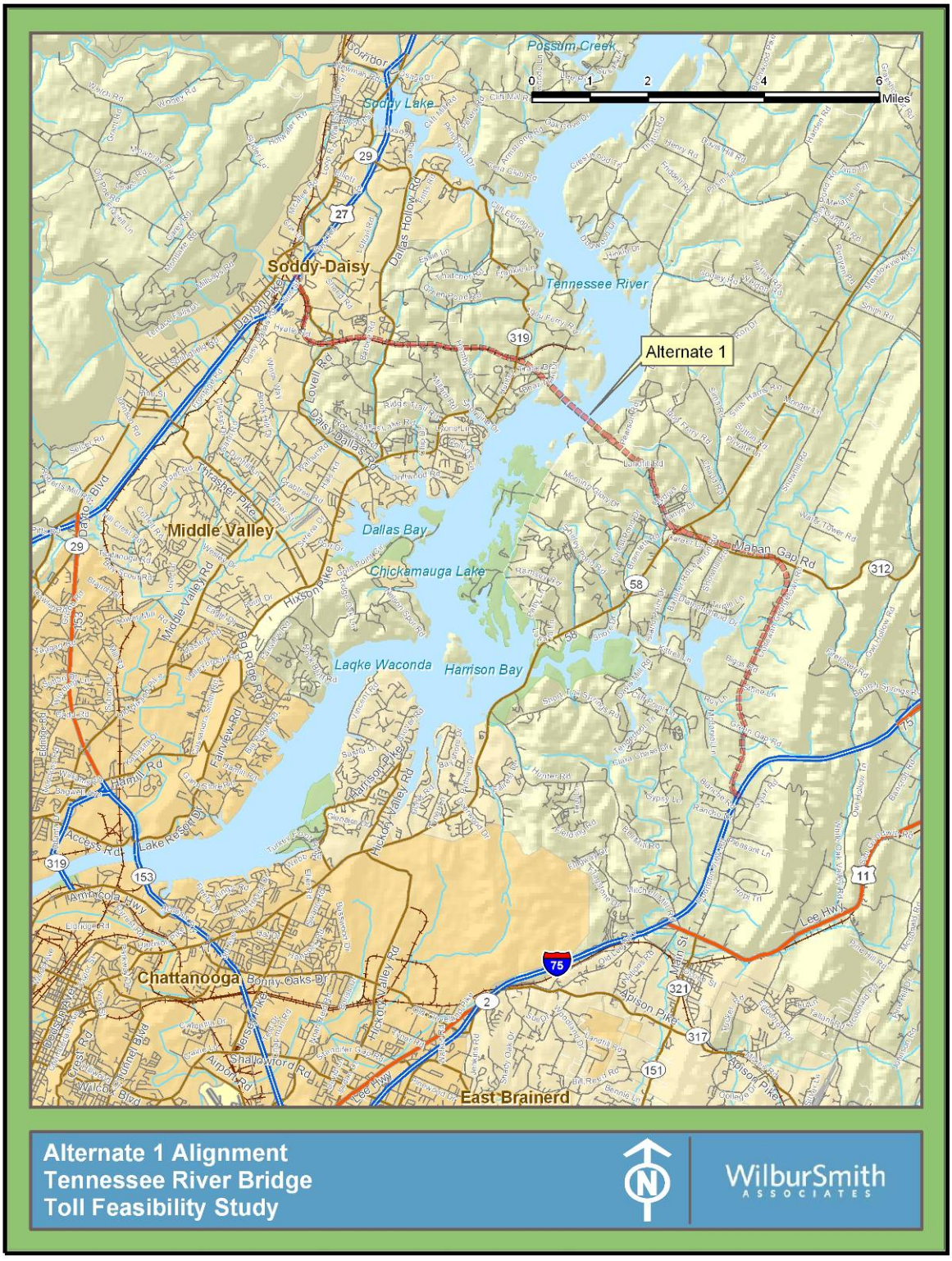

Figure 2
Alternative 1 Location Map

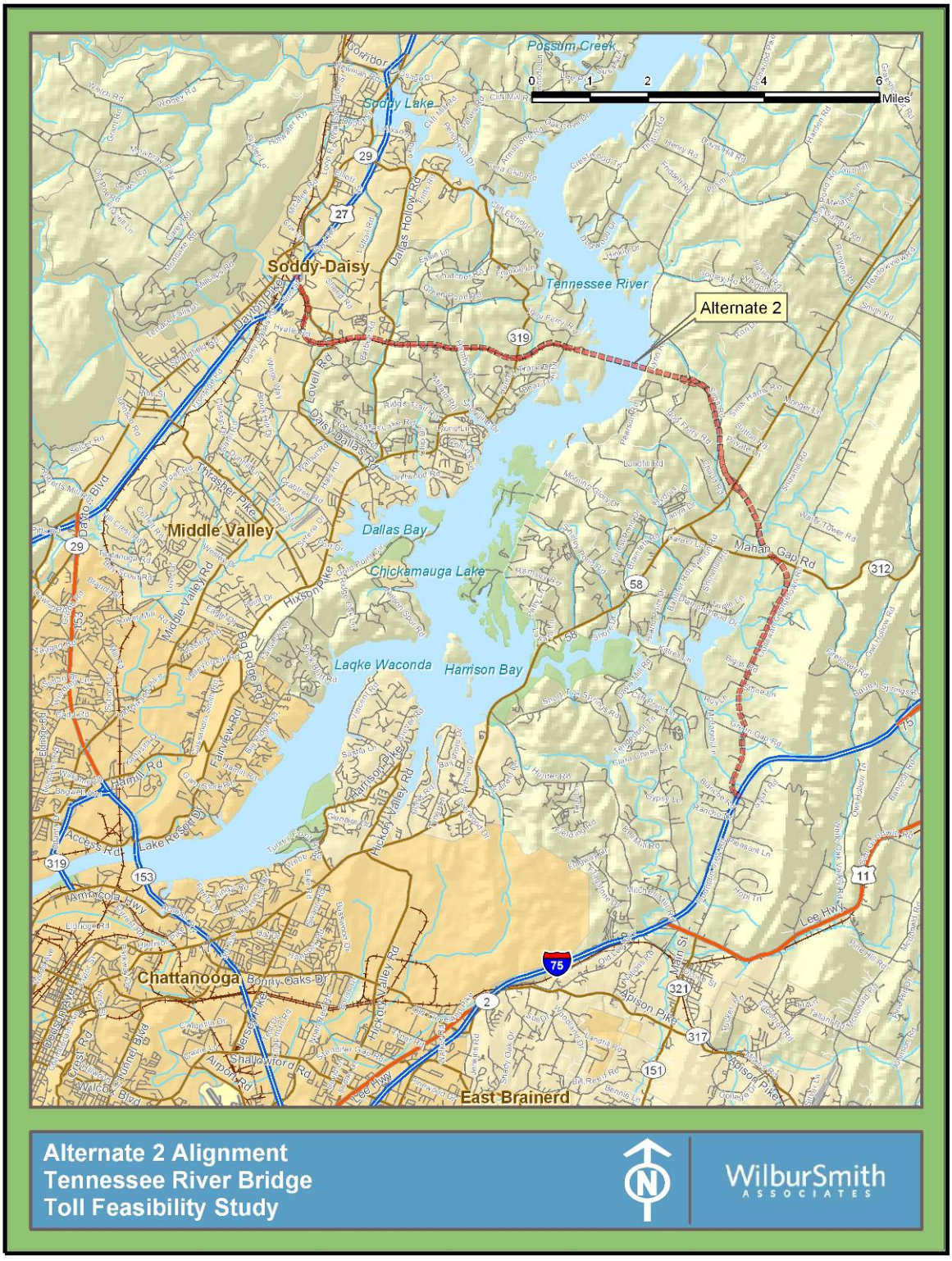

Figure 3
Alternative 2 Location Map

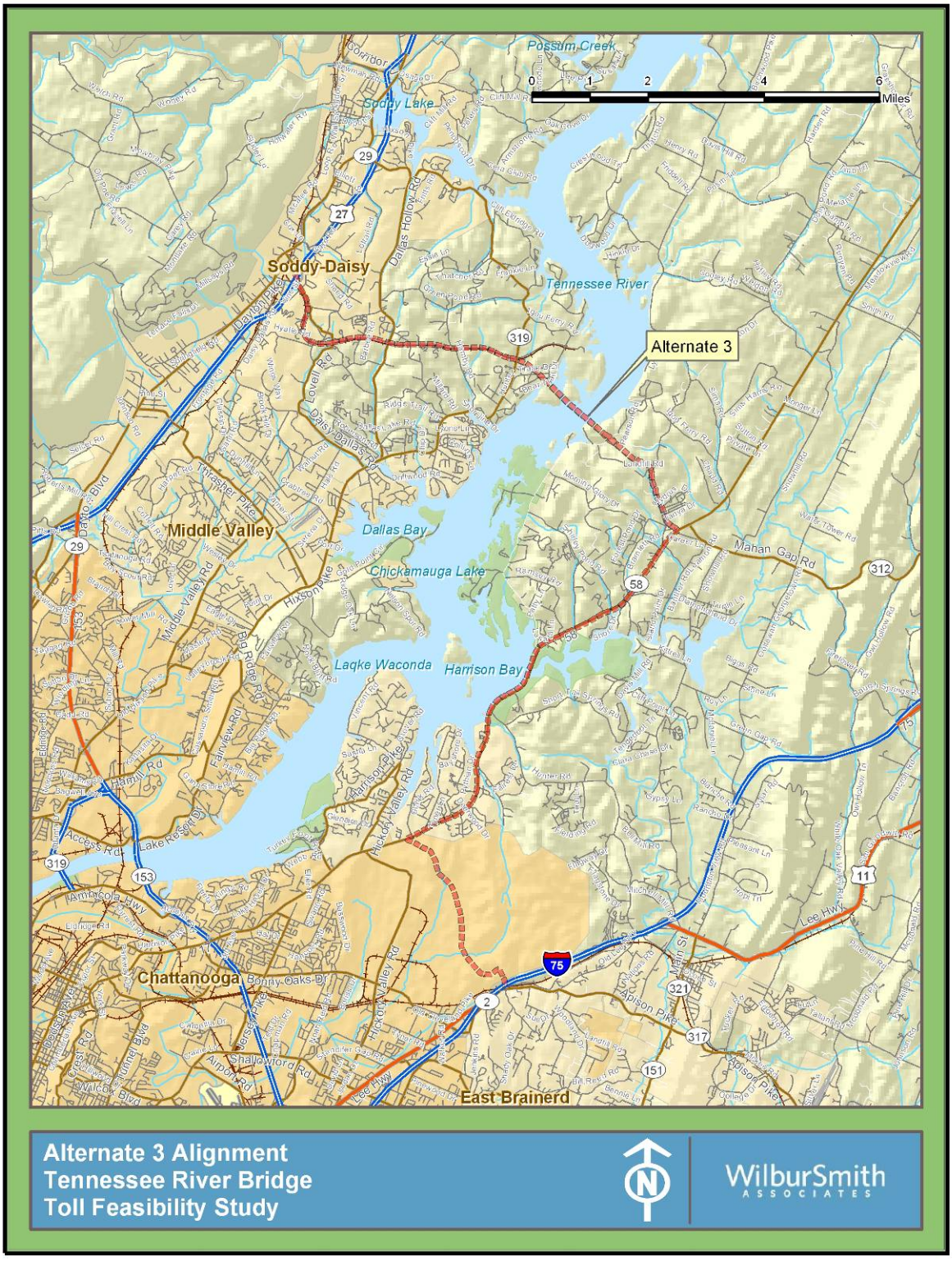

Figure 4
Alternative 3 Location Map

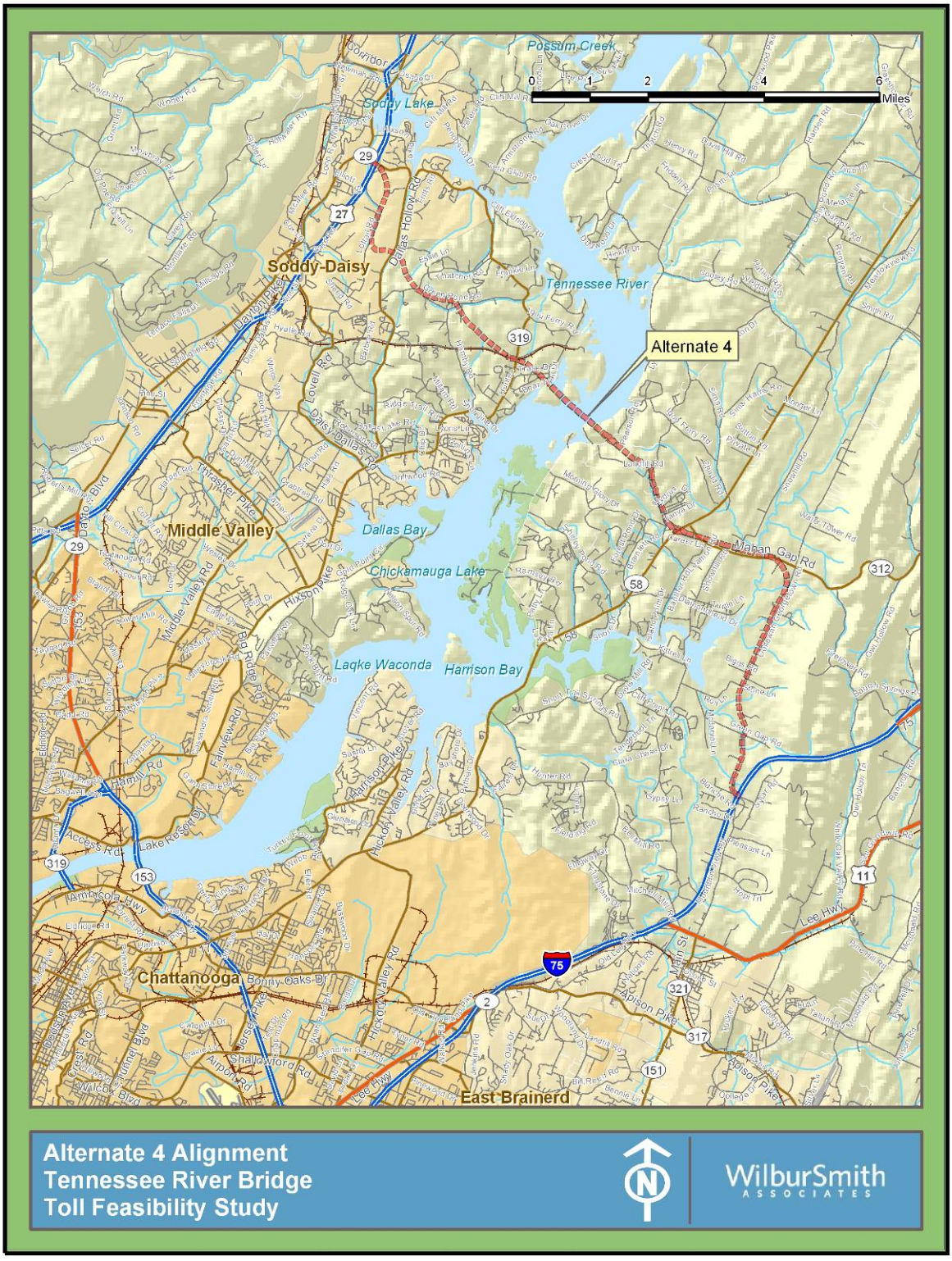

Figure 5
Alternative 4 Location Map

EVALUATION CATEGORIES

WSA has developed a checklist of items that could impact the feasibility of a new toll facility. These items are listed in *Table 1* and are organized around seven main categories. Each of these main categories contains multiple subcategories or criteria. To a great extent the items on the checklist are interdependent. It is important to note that the applicability and/or the weight given to a specific factor are dependent upon the characteristics and objectives of the toll project and the sponsoring agency. In the final analysis, toll projects, regardless if developed by a public entity or through a public private partnership, are essentially public assets and are subject to the public policy of the sponsoring entity.

Table 1

Regional Transportation System
- a) Traffic movements to be served
- b) Existing Alternative Routes
- c) Future planned networks
- d) Other planned transportation improvements

Environmental
- a) Major Investment Study
- b) Designation of preferred alignment
- c) Cost implications of mitigation requirements
- d) Projected timeline for environmental clearance
- e) Full EIS versus environmental assessment (FONSI)

Right-of-Way
- a) Number of takes
- b) Project costs
- c) Acquisition timetable
- d) 4F Issues
- e) Utility Issues

Construction/Engineering
- a) Uniqueness of engineering/construction requirements
- b) Required Permits
- c) Constructability
- d) Construction schedule
- e) Project Costs
- f) Bonding requirements

Corridor Socio-Economic Data
- a) Land use plans
- b) Population growth
- c) Projected non-residential activity
- d) Income Levels
- e) Household size

Traffic and Revenue
- a) Project configuration
- b) Project interconnectivity
- c) Value of time calculations
- d) Time/distance savings
- e) Corridor share
- f) Toll regimes
- g) Typical movements

Financial Considerations
- a) Project financial structure
- b) State/Local contribution
- c) Federal programs
- d) General Financial Market Conditions

As mentioned above, the applicability and/or weighting of any of the sub-categories contained in *Table 1* are dependent upon project-specific factors. This Conceptual Toll Feasibility Report is not intended to provide an extensive analysis of each of these characteristics. The type of analysis needed to determine a project's feasibility is more appropriately a part of the planning process for a project.

One of the functions of the planning process is to define what issues are relevant to a project and the respective weight of these issues. As such, this analysis will be focused on the major categories rather than trying to determine the applicability of each of the sub items.

Regional Transportation System

Toll facilities need to fit within the overall regional transportation system, which, in this case, is overseen by the CHCNGA-TPO. The project was originally part of a much larger "Chattanooga Bypass" which would have created a beltway from US-27 to I-75 near Exit 20 in Bradley County. The proposed Bypass, and by extension, this project is not included in the CHCNGA-TPO regional transportation plan due in large part to the lack of available funds from traditional sources. If the decision is made to move forward with one of the proposed alternatives, it will be necessary for the CHCNGA-TPO to take the necessary steps to include this within the regional transportation plan.

It is important to note that the CHCNGA-TPO is in the process of integrating the recently announced Volkswagen manufacturing facility into its travel demand model and its long range transportation plan. With a planned investment of over $1 billion and approximately 2,000 project jobs, this facility will significantly impact the region's socio-economic projections, population growth patterns, and future land use patterns. Consequently, it should be expected that the regional transportation plan will need to change to address the impacts of the Volkswagen plant.

It is a significant task both in terms of effort and time to model the socio-economic, land use, and resulting transportation needs that will result from the economic benefits to the region from the Volkswagen planned investment. Given the timing of the announcement, an updated travel demand model has not been approved by the CHCNGA-TPO in time for its inclusion in this study. Consequently, the results of this study need to be tempered with the realization that the impact of the Volkswagen facility has not been incorporated into the official CHCNGA-TPO travel demand model and long range transportation plan. Such a major economic event could impact the results of this study.

Environmental

Toll facilities are not exempt from applicable federal and state environmental review requirements. The environmental clearance process has a significant impact on the feasibility of any transportation project, but especially so in the case of a toll facility. In addition to the typical studies needed for the environmental process, toll projects need to study the economic impact of charging tolls on the facility.

TDOT has not started the environmental process for this project. As part of this study, field reconnaissance conducted by WSA did not identify any potential major environmental issues that are unique to these proposed alignments. As a result, WSA would expect that the environmental issues for this project will be similar to those experienced on other bridge projects involving new alignments crossing a significant body of water.

Right-of-Way

Right-of-way for transportation projects is typically acquired subject to eminent domain procedures. As such the right-of-way acquisition process is conducted according to well established federal and state laws and requirements. In rare cases, landowners will donate or "proctor" right-of-way for toll facilities in order to benefit from increased land values resulting from improved access provided by the facility.

This project is in the early planning phase right now. Once design for the project begins, preliminary plans must be developed and approved. Right-of-way plans will be developed after preliminary plans are completed and the project is better defined. Once right-of-way plans are complete, right-of-way acquisition will begin. While there are issues associated with acquiring right-of-way for this project, these issues appear to be typical for a project of this nature.

Construction and Engineering

For the purposes of this study, WSA developed conceptual level construction and engineering cost estimates for each of the four alternatives studied. These estimates are based on TDOT's cost estimate worksheet. This worksheet has been used for several years by TDOT in their planning office to develop engineering, right of way, and construction cost estimates for project planning purposes. The TDOT worksheet can only be used for estimating costs for the at-grade facilities that connect the bridges to the existing roadway infrastructure. In order to develop estimates for the bridge crossings and for grade separated interchanges, WSA utilized historical cost data for similar projects and a conceptual square footage estimating method.

Table 2
Project Costs
(Million $)

	Alternatives			
	1	**2**	**3**	**4**
Construction	$300.1	$364.9	$230.8	$428.6
Toll Systems	$ 4.8	$ 4.8	$ 4.8	$ 4.8
Estimated Project Cost	$304.9	$369.7	$235.6	$433.4

Each alternative includes a bridge crossing of the Tennessee River, segments of controlled access roadways which would be located on new alignments, and existing non-controlled access roadway segments. For purposes of this study, improvements to the existing roadways were limited to those improvements contained within the CHCNGA-TPO Long Range Transportation Plan and are assumed to be built and funded as set forth in that plan.

The roadway construction cost estimates are based on the following significant assumptions:

- The proposed routes are assumed to be in lesser developed areas or in areas where land uses are less intense. The proposed routes also contain various "area factors" depending on where the proposed corridors are located. This assumption is important due to the need to apply "area factors" to each of the corridors in the TDOT cost estimate worksheet.
- The terrain for each of the proposed corridors is assumed to be rolling except for Section U which is considered mountainous.
- It is assumed that engineering of the proposed route will begin in 2012 and end in 2013. The construction of the proposed route will begin in 2014 and be completed by the opening in 2018.

Three of the four alternative alignments utilize the same bridge location. The alignment utilized for the fourth crossing is longer and therefore has the higher cost. For purposes of this study each of the bridges are assumed to be concrete and steel girder structures with the appropriate approaches.

The bridge crossing for Alternatives 1, 3 and 4 are each assumed to have a bridge main span of 400 feet with in-channel approaches of 2,100 feet and dry approaches of 1,000 feet. Total bridge length, including approaches is estimated at 3,500 feet.

Alternative 2 is estimated to have a total bridge length of 6,100 feet. This includes a 400 foot bridge main span with in-channel and dry approaches of 4,700 and 1,000 feet respectively.

Project costs are based on 2008 estimates and inflated to year of expenditure. An annual inflation rate of 7.5% is applied to the project cost through 2010, and an annual 3% inflation rate is applied to the project cost from 2011 forward.

As part of this study, WSA developed an estimate of costs to construct the toll collection system for the project. These costs include items such as mainline structures and appurtenances, communications equipment, power systems, signage, both manual and electronic toll collection systems, vehicle detection and violation triggers, a violation enforcement system, lane and host processing, security access and control, and project delivery costs. It is important to note that the costs did not include utility infrastructure costs, additional warranties or maintenance, and pavement and pavement marking costs. Current 2008 costs were inflated by an assumed annual inflation rate of 2.5 percent to estimate opening year 2018 costs. The assumed 2.5 percent rate represents an assumption that those particular costs will rise at a slightly lower rate than the assumed general rate of inflation. After inflation, 2018 toll facility and system capital costs were found to be approximately $4.75 million, which is the same for all four alternatives.

It is important to note that these estimates exclude environmental, right-of-way, and engineering costs. The working assumption is that these developmental costs will need to be incurred prior to toll revenue debt being issued to pay for the project. These developmental costs would not be paid out of the proceeds generated by the toll revenue financing, but instead would be repaid from toll revenues in excess of operations and maintenance, debt services, and any required reserve requirements. Consequently, for purposes of this study these costs have been excluded from project costs.

Table 2 sets forth the estimated project cost for the project, and each of the associated scenarios. These estimates exclude environmental, right-of-way, and engineering costs. As the project becomes better defined during the normal planning process these project costs will need to be refined. Additional factors that could impact these estimates include mitigation costs, specific subsurface conditions, and materials costs.

Corridor Socio-Economics

The economic growth forecast for the study region is particularly important for a start-up toll facility such as the Tennessee River Bridge project. The configuration and alignment under study would provide significantly improved access for drivers with origins or destinations in communities such as Chattanooga, Cleveland, and Soddy-Daisy, Tennessee. As such, assessment of the projected economic activity is particularly important. This data creates the basis to judge the reasonableness of future demand for the toll facility. This future demand is a function of the levels of future congestion on alternative routes and estimates of the willingness and ability of the public to pay future tolls. Generally speaking, the larger the population, the greater the level of congestion on free routes and the greater the time savings offered by a toll facility. At the same time, higher levels of income result in increased values of time, which influence the optimal toll levels.

The socioeconomic forecast incorporated in the CHCNGA-TPO travel demand model was used in the analysis of the Tennessee River Bridge project. As part of the Sketch Traffic and Revenue Study, a review of both the historical and forecasted growth in the Chattanooga region was undertaken. Historical trend data was used to check the reasonableness of the forecasts prepared by the CHCNGA-TPO and incorporated in the travel demand model. Overall, from a historical trend perspective, the CHCNGA-TPO forecasts of population, household, and employment growth in the region seem reasonable based on historical trends.

We note that the CHCNGA-TPO is currently updating its economic growth forecasts to reflect the decision by Volkswagen to locate a manufacturing facility in Chattanooga. We expect that this facility will result in more robust growth forecasts.

Traffic and Revenue

Traffic and revenue reports consider known and measurable factors that influence the choices of tens of thousands of daily traveling decisions. Sophisticated models are built based on regional travel demand models that reflect socio-economic data, existing and future funded transportation networks, and actual travel time data that is used to determine current congestion levels on competing routes. For the purpose of the Sketch Traffic and Revenue Study, the following basic assumptions were made:

- The Tennessee River bridge project would open in its entirety to traffic in 2018, as a tolled facility.
- Roadway improvements included in the current TIP and the LRTP were assumed to be implemented, including any programmed widening of competing routes.
- Toll rates and toll plaza locations would be as shown in this report.
- No other competing facilities or additional capacity would be constructed during the project period, other than those currently included in the TIP or the LRTP.
- Economic growth in the project study area, and associated travel demand would occur as represented in the TPO's travel demand model used in this analysis.
- Motor fuel would remain in adequate supply and no national or regional emergency would arise that would abnormally restrict the use of motor vehicles. Toll increases will be applied in a manner as described in this report.
- The ratio of passenger car to commercial vehicle traffic and the distribution of commercial vehicles by axle classification will not vary significantly from the assumed distributions in the CHCNGA-TPO model.

Any significant departure from these basic assumptions could materially affect traffic and revenue potential for the proposed toll facility.

The proposed toll schedule was designed such that tolls are charged based on the vehicle type. In order to account for proportionately higher pavement wear and tear and maintenance costs associated with trucks as compared to passenger cars, commercial vehicle toll rates were assumed to be much higher than passenger car toll rates. The optimal 2018 passenger car toll rate was found to be $5.00 for each of the four alternatives. Based on commercial vehicle toll rate factors, two axle six tire vehicles were assumed to pay of toll of $7.50. The toll rate for three and four axle commercial vehicles was $11.25 while five axle commercial vehicles and larger were charged a toll rate of $20.00. All toll rates are in 2018 dollars and are assumed to be indexed to inflation at 3 percent per annum

reflecting the historical rate of inflation. As a result of inflation, the 2018 passenger car rate of $5.00 is equivalent to a toll rate of approximately $3.75 in current year dollars.

The toll collection configuration for each of the four proposed alternatives is the same, a single mainline toll plaza collecting a toll from patrons crossing the Tennessee River. Movements between the termini and intermediate interchanges which do not include a crossing of the river will not be charged a toll. Both cash and electronic toll collection (ETC) transactions were assumed to be accommodated at the toll plaza. Cash toll payments would be collected using cash machines, rather than toll collectors, to minimize cash toll collection costs. The mainline toll plaza was assumed to include eight total lanes with the inside four lanes dedicated to ETC.

The projected gross revenue, operating expenses, and net revenue for the Tennessee River Bridge are presented in *Tables 3* through *6*. More detailed discussion of the projections is contained within the Sketch Traffic and Revenue Study prepared by WSA and dated October 16, 2008.

Table 3
Alternative 1 Annual Net Revenue Stream

Year	Gross Toll Revenue ($,000)	O&M Costs ($,000)	Net Toll Revenue ($,000)
2018	$16,074	$1,469	$14,605
2019	$17,376	$1,526	$15,850
2020	$18,730	$1,588	$17,142
2021	$19,981	$1,653	$18,328
2022	$21,283	$1,723	$19,560
2023	$22,585	$1,776	$20,809
2024	$23,953	$1,832	$22,121
2025	$25,190	$1,887	$23,303
2026	$26,492	$1,945	$24,547
2027	$27,794	$2,005	$25,789
2028	$29,176	$2,068	$27,108
2029	$30,399	$2,130	$28,269
2030	$31,701	$2,195	$29,506
2031	$33,393	$2,263	$31,130
2032	$35,247	$2,333	$32,914
2033	$36,976	$2,402	$34,574
2034	$38,869	$2,475	$36,394
2035	$40,832	$2,550	$38,282
2036	$42,981	$2,629	$40,352
2037	$44,966	$2,706	$42,260
2038	$47,139	$2,786	$44,352
2039	$49,383	$2,869	$46,513
2040	$51,840	$2,956	$48,883
2041	$54,085	$3,041	$51,043
2042	$56,543	$3,130	$53,413
2043	$59,113	$3,222	$55,891
2044	$61,969	$3,320	$58,649
2045	$64,608	$3,415	$61,194
2046	$67,545	$3,515	$64,029
2047	$70,614	$3,619	$66,995
2048	$74,026	$3,729	$70,297
2049	$77,179	$3,837	$73,343
2050	$80,687	$3,950	$76,737
2051	$84,354	$4,068	$80,286
2052	$88,430	$4,193	$84,237
2053	$92,196	$4,314	$87,882
2054	$96,387	$4,443	$91,944
2055	$100,767	$4,576	$96,191
2056	$105,636	$4,717	$100,919
2057	$110,135	$4,855	$105,281

Table 4
Alternative 2 Annual Net Revenue Stream

Year	Gross Toll Revenue ($,000)	O&M Costs ($,000)	Net Toll Revenue ($,000)
2018	$15,148	$1,461	$13,687
2019	$16,304	$1,515	$14,790
2020	$17,508	$1,573	$15,936
2021	$18,616	$1,633	$16,983
2022	$19,772	$1,699	$18,074
2023	$20,928	$1,750	$19,178
2024	$22,145	$1,804	$20,341
2025	$23,240	$1,857	$21,384
2026	$24,396	$1,912	$22,484
2027	$25,552	$1,970	$23,583
2028	$26,781	$2,030	$24,752
2029	$27,864	$2,089	$25,775
2030	$29,020	$2,152	$26,869
2031	$30,521	$2,216	$28,305
2032	$32,171	$2,283	$29,887
2033	$33,706	$2,350	$31,356
2034	$35,391	$2,420	$32,972
2035	$37,141	$2,491	$34,650
2036	$39,063	$2,567	$36,496
2037	$40,838	$2,641	$38,197
2038	$42,787	$2,718	$40,069
2039	$44,805	$2,798	$42,007
2040	$47,021	$2,882	$44,139
2041	$49,050	$2,963	$46,087
2042	$51,280	$3,049	$48,230
2043	$53,610	$3,138	$50,472
2044	$56,200	$3,232	$52,969
2045	$58,594	$3,323	$55,271
2046	$61,257	$3,420	$57,837
2047	$64,041	$3,520	$60,521
2048	$67,135	$3,626	$63,509
2049	$69,995	$3,730	$66,265
2050	$73,176	$3,839	$69,337
2051	$76,502	$3,952	$72,550
2052	$80,198	$4,072	$76,126
2053	$83,614	$4,189	$79,425
2054	$87,414	$4,313	$83,102
2055	$91,387	$4,440	$86,947
2056	$95,803	$4,576	$91,227
2057	$99,883	$4,708	$95,175

Table 5
Alternative 3 Annual Net Revenue Stream

Year	Gross Toll Revenue ($,000)	O&M Costs ($,000)	Net Toll Revenue ($,000)
2018	$13,714	$1,448	$12,266
2019	$14,472	$1,495	$12,977
2020	$15,272	$1,545	$13,727
2021	$15,988	$1,596	$14,392
2022	$16,746	$1,650	$15,096
2023	$17,505	$1,695	$15,810
2024	$18,313	$1,742	$16,571
2025	$19,021	$1,788	$17,233
2026	$19,779	$1,836	$17,943
2027	$20,537	$1,886	$18,651
2028	$21,354	$1,938	$19,415
2029	$22,054	$1,990	$20,064
2030	$22,812	$2,044	$20,768
2031	$23,772	$2,100	$21,672
2032	$24,847	$2,158	$22,689
2033	$25,837	$2,216	$23,621
2034	$26,948	$2,277	$24,671
2035	$28,115	$2,339	$25,775
2036	$29,421	$2,405	$27,016
2037	$30,630	$2,471	$28,159
2038	$31,984	$2,539	$29,445
2039	$33,409	$2,610	$30,798
2040	$35,002	$2,685	$32,318
2041	$36,482	$2,758	$33,724
2042	$38,140	$2,836	$35,304
2043	$39,874	$2,916	$36,958
2044	$41,800	$3,000	$38,800
2045	$43,581	$3,083	$40,498
2046	$45,562	$3,171	$42,391
2047	$47,632	$3,261	$44,372
2048	$49,934	$3,355	$46,578
2049	$52,061	$3,449	$48,612
2050	$54,427	$3,547	$50,880
2051	$56,900	$3,648	$53,252
2052	$59,650	$3,755	$55,895
2053	$62,190	$3,859	$58,331
2054	$65,017	$3,970	$61,047
2055	$67,972	$4,084	$63,888
2056	$71,256	$4,204	$67,052
2057	$74,291	$4,322	$69,969

Table 6
Alternative 4 Annual Net Revenue Stream

Year	Gross Toll Revenue ($,000)	O&M Costs ($,000)	Net Toll Revenue ($,000)
2018	$16,693	$1,475	$15,218
2019	$17,970	$1,533	$16,437
2020	$19,300	$1,596	$17,705
2021	$20,525	$1,662	$18,863
2022	$21,803	$1,733	$20,070
2023	$23,080	$1,786	$21,294
2024	$24,424	$1,841	$22,583
2025	$25,635	$1,896	$23,739
2026	$26,912	$1,953	$24,959
2027	$28,190	$2,013	$26,177
2028	$29,548	$2,075	$27,473
2029	$30,744	$2,137	$28,608
2030	$32,022	$2,201	$29,821
2031	$33,694	$2,268	$31,426
2032	$35,532	$2,338	$33,194
2033	$37,246	$2,407	$34,838
2034	$39,128	$2,480	$36,648
2035	$41,083	$2,555	$38,528
2036	$43,230	$2,633	$40,597
2037	$45,217	$2,710	$42,507
2038	$47,400	$2,791	$44,609
2039	$49,661	$2,874	$46,787
2040	$52,145	$2,962	$49,183
2041	$54,424	$3,047	$51,377
2042	$56,929	$3,137	$53,792
2043	$59,516	$3,229	$56,287
2044	$62,391	$3,327	$59,065
2045	$65,049	$3,422	$61,627
2046	$68,005	$3,523	$64,482
2047	$71,096	$3,627	$67,469
2048	$74,531	$3,738	$70,793
2049	$77,706	$3,845	$73,860
2050	$81,238	$3,960	$77,278
2051	$84,930	$4,078	$80,852
2052	$89,033	$4,203	$84,830
2053	$92,825	$4,324	$88,501
2054	$97,044	$4,454	$92,590
2055	$101,455	$4,587	$96,868
2056	$106,357	$4,729	$101,628
2057	$110,887	$4,867	$106,020

Financial Considerations

Preliminary bonding capacity analyses were performed for each of the four proposed alternatives. The analysis was performed to estimate the amount of project costs that could be paid with proceeds from bonds supported from toll revenues. This analysis is based on the revenue numbers forecasted in the Sketch Traffic and Revenue Study and presented above in *Tables 3* through *6*. These analyses utilize a bond sizing model typical of financings for other toll roads within the United States that have been recently issued by public authorities.

Given the instability and uncertainty of the current credit markets, it is extremely difficult to estimate indicative interest rates. After talking with several investment bankers who specialize in these types of transactions, the consensus is that by the time debt on this project would be issued in 2013, the markets should stabilize.

It should be noted that the recent financial market turmoil has resulted in a significant reduction in the number of firms which have the ability to provide bond insurance, one of the financial mechanisms utilized to reduce effective interest rates paid on start-up, or greenfield, toll projects such as the proposed new crossing of the Tennessee River. Again, after discussion with participants in the capital markets, it was generally felt that by 2013 some form of risk transfer mechanism would be in place allowing for lower effective interest rates.

As a result of these conversations, the bonding capacity analysis contained herein relies upon rates very similar to those utilized in studies prior to the recent financial market turmoil. The actual direction of the credit markets and the availability of credit, and its associated costs, remains a significant unknown. Once the financial markets stabilize, the actual cost of credit could result in a material change in WSA conclusions on the toll feasibility of the proposed crossings.

Changes in financial market conditions are based upon factors outside the control of either WSA or TDOT.

Potential bonding capacity was calculated for both a net and a gross revenue pledge. Under a net pledge operations and maintenance are paid prior to debt services. This pledge provides comfort that the facility will be operated and revenues collected.

Under a gross revenue pledge, debt service is paid prior to operations and maintenance being paid. This results in an increase in bonding capacity. For a gross pledge to be financeable, TDOT or some other entity would have to guarantee to pay the operations and maintenance costs should toll revenue be insufficient to pay debt service and operations and maintenance. These costs would be subject to reimbursement from future revenue.

Table 7 sets forth the estimated bonding capacity for the four identified alternatives under both a net and gross revenue pledge scenario. These estimates are net of financing costs, capitalized interest, and a debt services reserve, typical costs and reserves which are either paid or funded out of proceeds from financings.

Table 7
Tennessee River Bridge Project
Bonding Capacity
(Million $)

	Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	Net Pledge	Gross Pledge	Net Pledge	Gross Pledge	Net Pledge	Gross Pledge	Net Pledge	Gross Pledge
Bonding Capacity	$306.5	$313.3	$273.9	$286.7	$222.1	$231.9	$305.4	$316.9
Financial Costs and Reserves	$ 70.2	$ 75.0	$ 60.7	$ 70.2	$ 52.8	$ 59.9	$ 69.3	$ 77.6
Net Bonding Capacity	$236.3	$238.2	$213.9	$216.5	$169.3	$172.0	$236.1	$239.3

The bonding capacity analyses were based on the following major assumptions:

- Project bonds are a combination of Current Interest Bonds and Capital Appreciation Bonds with 40 year maturities
- Both series of project bonds are issued at parity (i.e. both have equal claims to revenue)
- Project bonds have debt service coverage ratios of 1.75X for both series
- Both series have investment grade ratings
- All reserve funds are invested at 2% per annum
- Each project is open for traffic as indicated in *Tables 3 through 6*
- Interest is capitalized during the assumed construction period for each project
- Financing costs assumed to equal 2.5% of bond size
- Debt Service Reserve is funded at closing from proceeds and estimated to equal 10% of total bond size

The bonding capacity analysis is provided for planning purposes only and is not intended to supplant the analysis that will be required by a financial advisor or underwriter as part of the financing process. The analysis is based on prevailing market rates and conditions for similar revenue bond offerings as of the date of this report. Changes in financial market conditions and further refinements by a financial advisor could materially alter the results of the bond sizing model.

A project's financial feasibility is dependent upon total available funding sources being adequate to pay for project costs. *Table 8* sets forth the conceptual plans of finance for the Tennessee River Bridge project. These conceptual plans of finance are based on the estimated project costs shown in *Table 2*, revenue and operating costs set forth in *Tables 3* through *6*, and bonding capacities shown in *Table 7*.

Table 8
Tennessee River Bridge Project
Conceptual Plans of Finance

	Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	Net Pledge	Gross Pledge	Net Pledge	Gross Pledge	Net Pledge	Gross Pledge	Net Pledge	Gross Pledge
Sources								
Bonding Capacity	$297.0	$303.7	$267.4	$280.0	$215.8	$225.4	$298.5	$309.8
Investment Earnings	$ 9.5	$ 9.6	$ 6.5	$ 6.7	$ 6.3	$ 6.5	$ 6.9	$ 7.1
Public Contribution	$ 68.6	$ 66.6	$156.5	$153.2	$ 66.3	$ 63.6	$197.3	$194.1
Total Sources	$375.1	$379.9	$430.4	$439.9	$288.4	$295.5	$502.7	$511.0
Uses								
Project Costs	$304.9	$304.9	$369.7	$369.7	$235.6	$235.6	$433.4	$433.4
Financing Costs	$ 40.5	$ 44.6	$ 34.0	$ 42.2	$ 31.2	$ 37.4	$ 39.5	$ 46.6
Debt Service Reserve	$ 29.7	$ 30.4	$ 26.7	$ 28.0	$ 21.6	$ 22.5	$ 29.8	$ 31.0
Total Uses	$375.1	$ 379.9	$430.4	$439.9	$288.4	$295.5	$502.7	$511.0

Each of the line items shown in the conceptual plans of finance is discussed below:

Bonding Capacity: The amount of debt that can be supported from a given revenue stream

Investment Earnings: Interest and earnings on unused bond proceeds. Bond proceeds are held in trust and drawn down over time to pay for project costs

Public Contribution: Public funding needed to cover difference, if any, between net bonding capacity and project costs

Project Costs: Estimated engineering, construction, and toll system costs of a project

Financing Costs: Transaction costs of a financing paid to underwriters, bond counsel, rating agencies, etc. This line item includes interest paid to bondholders during the construction of a project

Debt Service Reserve: Reserve account funded out of proceeds of a bond offering to provide funds to cover unforeseen circumstances resulting in operational deficiencies

As shown in *Table 8*, on a conceptual level all four of the alternatives require public contributions, or other additional funding mechanisms in order to cover all project and financing costs. However, Alternatives 1 and 3 require the least amount of non-tolled funding at levels between $63 million and $69 million.

The January 25, 2008 Tennessee River Bridge Feasibility Study provided project cost estimates for each of the alignments identified within that study. Alignments 1, 2, and 3 are included in this study. As discussed above, on May 2, 2008 the Tennessee River Bridge Committee requested that a Revised Route 4 be analyzed. This revised route is included in this report at Alternative 4 and does not have a comparable route in the January 25, 2008 report.

The construction cost estimates contained within the January 25, 2008 report are significantly below those estimated by WSA and set forth in Table 2 above. A plan of finance utilizing these construction costs instead of those in Table 2, results in toll revenues being able to pay for Alternatives 1 and 3 without any non-tolled contributions. Alternative 2 would require less than $30 million in non-tolled contribution to cover construction costs.

Over the planning horizon of this study, each scenario generates substantial uncommitted revenues after the payment of toll operations and debt service. The uncommitted revenues range from approximately $550 million for Alternative 3 under a net revenue pledge to approximately $825 million for a gross pledge financing for Alternative 1. While there will be other project claims on this uncommitted revenue, most notably the funding of a reserve for capital replacement, these revenues could potentially provide TDOT with funds to repay any subordinated lending from another public source, including a repayment of any pre-financing, environmental, right-of-way, or engineering costs.

CONCLUSIONS AND NEXT STEPS

Based on the analysis contained within this Conceptual Toll Feasibility Report, it is WSA's conclusion that as studied, each of the four alternatives will require varying levels of public contributions or other additional funding mechanisms in addition to the revenues generated from tolls. However, these results do not take into account the new Volkswagen manufacturing facility that is currently being incorporated into the CHCNGA-TPO travel demand model and long range transportation plan. Given the information provided to date to WSA, this event should have a positive impact on the toll revenues.

We also note significant differences in estimated project costs between those done as part of this report and those performed as part of the January 25, 2008 Tennessee River Bridge Feasibility Study. Use of the estimates from the January 25, 2008 study would result in the conclusion that toll revenue could fund Alternatives 1 and 3.

Based on the information contained within this report WSA concludes that Alternatives 1 and 3 have the potential to be fully funded by toll revenues. As a result of this conclusion, WSA recommends that TDOT consider moving forward with the Tier II level of analysis. Should TDOT decide to move forward, WSA recommends that any scope of services for the next phase should include or consider the following items:

- Concentrate future studies on Alternatives 1 and 3.
- Work with the CHCNGA-TPO to refine the alignments of these two Alternatives in order to balance construction costs with revenue potential.
- Work with CHCNGA-TPO to refine construction costs based on more developed alignments.

WSA would also recommend that this work include updating the CHCNGA-TPO travel demand model and long range transportation plan.


ENGINEERS
PLANNERS
ECONOMISTS
WilburSmith
ASSOCIATES