THE NORTHWEST TENNESSEE REGIONAL PORT AT CATES LANDING: AN ECONOMIC ANALYSIS

FINAL REPORT

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Prepared for

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EXECUTIVE SUMMARY

Located in northwest Tennessee, the proposed infrastructural development of the Port of Cates Landing will alter economic dynamics in the three-county region (Dyer, Lake, and Obion). The three counties have long been affected by the flight of manufacturing companies. The proposed infrastructure investment of $20 million in the Port of Cates Landing will create a truly intermodal transportation system in the region, connecting area businesses to the Mississippi River and local and interstate highway systems (including the future I-69).

The Business and Economic Research Center (BERC) at Middle Tennessee State University has been retained by the Northwest Tennessee Regional Port Authority to assess the contributions of the proposed investment in the Port of Cates Landing to the economy of the three-county region and its surrounding areas.

The BERC's estimates include the (1) benefit-cost ratio and (2) regional economic impact of the proposed investment. In the absence of survey data, given the time constraints, the BERC used several methods to estimate first cargo volume and then the benefit-cost ratio and regional economic impact. Impact estimates were obtained using the IMPLANpro model.

Study Findings

The Study Region. The basic characteristics of the study region (Dyer, Lake, and Obion counties):

- Per capita income equivalent to 76.17 percent of U.S. per capita income
- Unemployment rate 1.7 percentage points higher than that of the U.S.
- Declining population (down 1.46 percent from 2000 to 2009)
- Poverty rate 4.49 percentage points higher than that of the U.S.

Benefit-Cost Analysis. The proposed investment of $20 million will generate the following long-term public benefits over the 20-year life cycle of the port:

- State of good repair (in present value, in 2010$) of $3.04 million (3% discount rate) or $2.15 million (7% discount rate)
- Economic competitiveness (in present value, in 2010$) of $73.58 million (3% discount rate) or $52.10 million (7% discount rate)
- Livability (in present value, in 2010$) of $7.86 million (3% discount rate) or $5.56 million (7% discount rate)
- Sustainability (in present value, in 2010$) of $20.52 million (3% discount rate) or $14.52 million (7% discount rate)
- Safety (in present value, in 2009$) of $98.54 million (3% discount rate) or $69.72 million (7% discount rate)
- Estimated benefit-cost ratio (BCR) of 4.64 (7% discount rate) or 6.06 (3% discount rate)

- Net present value (NPV) of $113 million (7% discount rate) or $170 million (3% discount rate)

Regional Economic Impact: The proposed $20 million investment will create a variety of economic opportunities for the area's population—some short-term, most long-term.

Short-term economic impact

- New jobs: 234
- Business revenue: $26.78 million
- Value added: $11.20 million
- Personal income: $8.27 million
- Federal taxes: $1.48 million
- State and local taxes: $0.49 million

Long-term economic impact

- New permanent jobs: 1,700
- Business revenue : $354.45 million
- Value added: $115.66
- Personal income: $77.80 million
- Federal taxes: $14.18 million
- State and local taxes: $7.86 million
- Related jobs retained in the region: 2,293

Implications of Study Findings for the Region. The findings suggest that the proposed investment will

- boost the local payroll by $45.5 million,
- reverse the declining population trends by creating employment opportunities in the region,
- reduce the unemployment rate by 4.9 percentage points, and
- reduce the poverty rate by 5.48 percentage points in the core region.

Conclusion. The study indicates that benefits to both the general public and the regional economy outweigh the cost of proposed investment. Given the nature of investment and the extent of economic distress in the study region, the findings of this study strongly recommend the proposed investment.

CUMULATIVE 20-YEAR PUBLIC BENEFITS (ALL MONETARY FIGURES ARE IN 2010 $)				
Port construction year			2011	
Benefit period			2012-2031	
M. Cumulative 20-Year Project Cost (in 2010$)				
Cost		Discount Rate		
	0%	3%	7%	Sensitivity Analysis: 10%
Total Cost	$36,591,647	$33,565,438	$31,034,920	$29,805,862
N. Benefits from Long-Term Outcomes (2012-2031)				
Long-Term Outcomes		Discount Rate		
	0%	3%	7%	Sensitivity Analysis: 10%
N1. State of Good Repair	$4,107,388	$3,039,575	$2,150,570	$1,720,796
N2. Economic Competitiveness	$99,362,619	$73,579,377	$52,101,843	$41,712,805
N3. Livability	$10,622,556	$7,860,969	$5,561,819	$4,450,335
N4. Sustainability	$27,722,560	$20,515,418	$14,515,137	$11,614,405
N5. Safety and Security	$133,161,670	$98,543,110	$69,721,548	$55,788,265
Cumulative Value (N1-N5)	$274,976,793	$203,538,449	$144,050,917	$115,286,606
Net Present Value (NPV)		**$169,973,011**	**$113,015,997**	**$85,480,744**
Benefit-Cost Ratio (BCR)		**6.06**	**4.64**	**3.87**

O. OTHER CUMULATIVE 20-YEAR BENEFITS (UNDISCOUNTED, 2010$)	
Ton-Miles Reduced from Highways	4,388,554,392
Truck VMT Reduced	141,634,086
Gallons of Fuel Saved	22,832,432
Gallons of Hazardous Material Spills Prevented	15,230
Number of Lives Saved	19.01
Number of Injuries Avoided	434.52
Tons of CO2 Eliminated	229,897
Tons of CO Eliminated	451
Tons of VOC Eliminated	33
Tons of PM Eliminated	42
Tons of NOx Eliminated	1,732

JOB CREATION AND ECONOMIC STIMULUS BENEFITS (ALL MONETARY FIGURES ARE IN 2010$)			
P. Short-Term Economic Impact			
	Direct	Indirect & Induced	Total
Jobs	173	61	234
Business Revenue (Millions of 2010 $)	$20	$6.78	$26.78
Value Added (Millions of 2010 $)	$7.54	$3.67	$11.20
Personal Income (Millions of 2010 $)	$6.21	$2.06	$8.27
Federal Taxes (Millions of 2010 $)			$1.48
State and Local Taxes (Millions of 2010 $)			$0.49
Q. Long-Term Economic Impact			
	Direct	Indirect & induced	Total
Jobs	972	728	1,700
Business Revenue (Millions of 2010 $)	$274.97	$79.48	$354.45
Value Added (Millions of 2010 $)	$70.85	$44.81	$115.66
Personal Income (Millions of 2010 $)	$48.93	$28.87	$77.80
Federal Taxes (Millions of 2010 $)			$14.18
State and Local Taxes (Millions of 2010 $)			$7.86
R. Retaining Potentially At-Risk Jobs in the Region	Core Region	Surrounding Region	Total
Related Jobs	1,063	1,230	2,293
S. Jobs due to Producers' Surplus			50

T. REGIONAL IMPLICATIONS OF THE PORT OF CATES LANDING

T1. Expected to reduce outmigration

T2. Expected to reduce unemployment rate by 4.9 percentage points in the core region

T3. Expected to reduce poverty rate by 5.48 percentage points in the core region

I. INTRODUCTION

Located in northwest Tennessee, the proposed infrastructural development of the Port of Cates Landing will alter economic dynamics in the three-county region (Dyer, Lake, and Obion). The three counties have long been affected by the flight of manufacturing companies. Currently, both the three-county region overall and the individual counties can be designated as "economically depressed areas" given the fact that their (1) historical unemployment rate has been higher than the U.S. average, (2) annual average population growth rate is zero or below, (3) per capita personal income is significantly lower than the U.S. average, and (4) manufacturing base has significantly eroded over the past decade.

The proposed infrastructure investment of $20 million in the Port at Cates Landing will create a truly intermodal transportation system in the region, connecting area businesses to the Mississippi River and local and interstate highway systems (including the future I-69).

The Business and Economic Research Center (BERC) at Middle Tennessee State University has been retained by the Northwest Tennessee Regional Port Authority to assess the contributions of the proposed investment in the Port of Cates Landing to the economy of the three-county region and its surrounding areas.

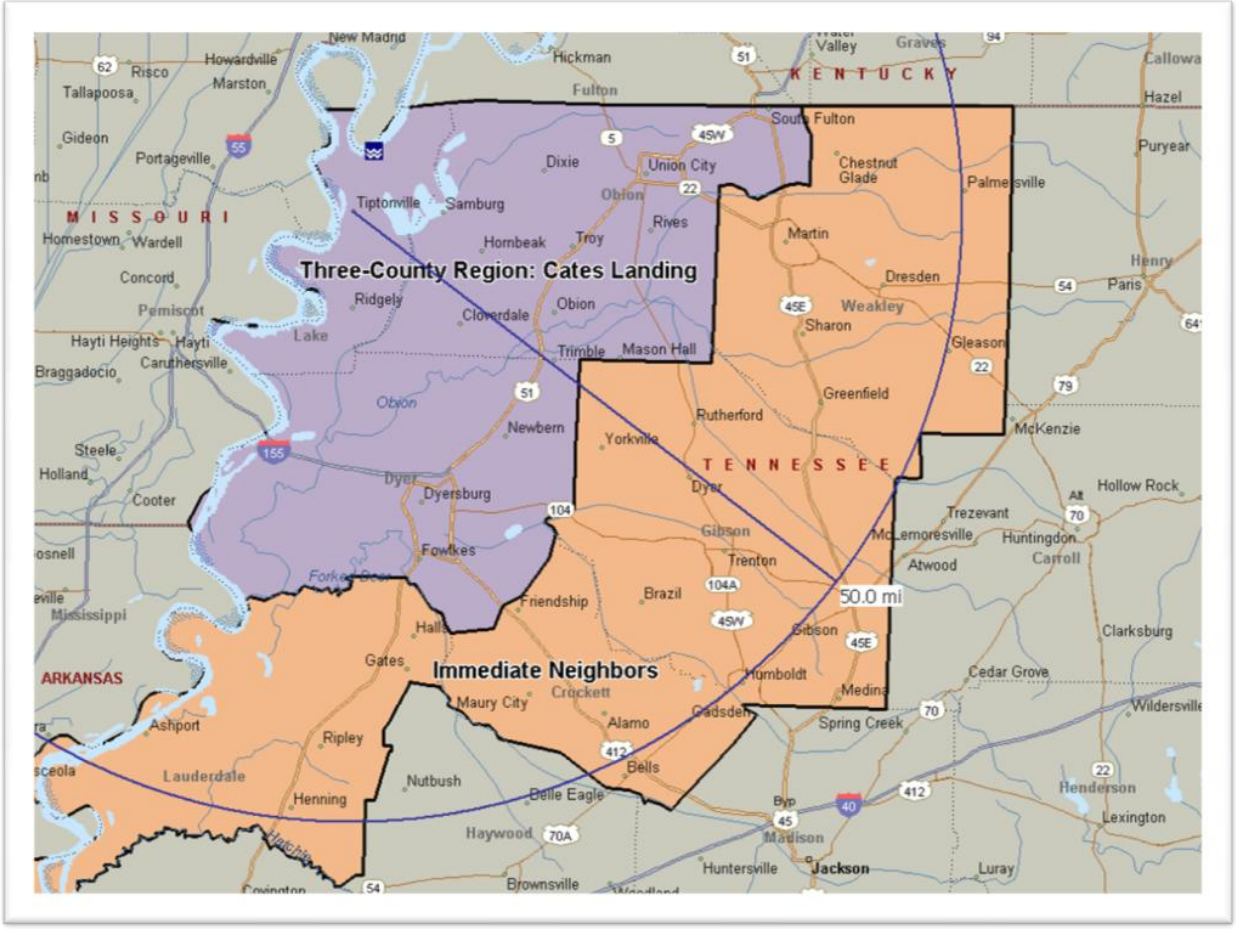
I. a. Study Area

The study area in this analysis consists of three counties in the northwest corner of Tennessee: Dyer, Lake, and Obion. Throughout this study, the following phrases are used interchangeably to denote the region:

- Three-County Region
- Study Region
- Core Study Area
- Core Study Region
- Core Region

These counties are labeled as "Three-County Region: Cates Landing" in Map 1. This study often refers to the "surrounding area," "immediate neighbors," or "surrounding region" interchangeably. The area labeled "Immediate Neighbors" in Map 1 represents the counties (Crockett, Gibson, Lauderdale, and Weakley) within a 50-mile radius of the Port of Cates Landing.

Map 1: Study Region and Its Surroundings



I. b. Project Background: NWTRP at Cates Landing

I.b.i. History

Established in 2001 and jointly sponsored by Dyer, Lake, and Obion counties, the Northwest Tennessee Regional Port Authority (hereafter NWTRP) is a public, nonprofit corporation whose purpose is to construct and operate a Mississippi River Port at Cates Landing in Northern Lake County. Given the socioeconomic challenges the northwest Tennessee counties have faced since the early 1990s, there have been numerous efforts by regional stakeholders to construct an intermodal port at Cates Landing. The terrain is particularly suitable for this purpose, as Cates Landing and the proposed adjacent industrial park are above the 100-year floodplain, which allows uninterrupted maritime services for area businesses.

These 20-year efforts have partially come to fruition as the NWTRP, local stakeholders, state and federal funding partners have spent nearly $15 million to complete engineering, planning, environmental permitting and compliance, site acquisition, and harbor construction. Phase I of the Port was completed by the Army Corps of Engineers in December 2009.

At various stages of Phase I of the port's construction, several studies were conducted indicating that, once completed, Cates Landing would have a measurable effect on regional socioeconomic dynamics. The following studies highlight the critical role an intermodal port at Cates Landing would play in the region's economic competitiveness.

- *Northwest Tennessee Regional Harbor* (2004) by U.S. Army Corps Engineers, Memphis District, http://www.mvm.usace.army.mil/environment/NW_TN_Harbor_Report.asp
- *Cates Landing Port Economic Impact Analysis* (2004) by Younger Associates LLC, http://www.portofcateslanding.com/documents/Feasibility%20Study%20Younger%20Associcates.pdf
- *A Review of Proposed State Funding of the Northwest Tennessee Regional Port and Industrial Park* (2004) by Sparks Bureau of Business and Economic Research, University of Memphis, http://www.portofcateslanding.com/documents/University%20of%20Memphis%20Feasibility%20Study%201.pdf

A study completed as recently as June 2009 by IHS Global Insights, Wilbur Smith Associates, and the University of Memphis, *The Memphis Regional Infrastructure Plan,* cited Cates Landing among the top five of 25 infrastructure recommendations. The purpose of this section is not to repeat the findings of these studies but to highlight their common conclusion: if built, an intermodal port at Cates Landing would make the highly distressed counties of northwest Tennessee economically viable in the face of increasing global economic competitiveness.

I.b.ii. Proposed Improvement

As summarized above, Cates Landing is ready for a complete build-out. Incorporating an open cell design, Cates Landing would use the latest innovative strategies to create a clean (conforming to Clean Ports USA guidelines) and operationally efficient intermodal port. Meanwhile, the proposed $20-million investment to complete Phase II of Cates Landing has the potential to touch many lives in this economically distressed corner of Tennessee. A review of the letters of interest sent to the Port Authority over the past 10 years suggests that the region has lost significant investment opportunities because of the lack of transportation infrastructure. What follows in the rest of this study is an assessment of the socioeconomic implications of the $20-million investment in Cates Landing to create a truly intermodal transportation system in the region.

I.c. Study Goals and Research Questions

This study has five major goals:

I. To provide a brief assessment of socioeconomic conditions in the three-county region (Dyer, Lake, and Obion) from a comparative perspective
II. To provide an assessment of public benefits of the proposed investment in Cates Landing
III. To describe and analyze the short-term economic impact of construction spending related to the proposed infrastructure investment in the Port of Cates Landing, including but not limited to basic and enhanced site development and infrastructure, terminal dock site development and infrastructure, harbor and navigation lighting, and energy efficient "green technology"
IV. To describe and analyze the long-term economic impact of the proposed development of the Port of Cates Landing on the region's economy
V. To provide a brief assessment of the implications of the port investment for socioeconomic dynamics in the region

In line with these five goals, this study seeks answers to the following major questions:

- What are the indicators of economic distress and how the study region is faring compared to the U.S.?
- Do public benefits from the port justify the $20-million investment?
- What are the regional impacts of the Port of Cates Landing?
- What are the implications of the Port of Cates Landing for the indicators of socioeconomic distress?

The rest of this study is organized as follows. The second section briefly introduces the indicators of socioeconomic distress in the region, highlighting primarily employment and unemployment, population growth, income, and poverty. The third section deals with the conceptual framework, study assumptions, and data. The fourth section provides the study findings, organized along three major themes: (1) long-term outcomes and benefit-cost analysis, (2) job creation and economic stimulus, and (3) related jobs. The fifth section looks at the implications of the proposed investment for indicators of socioeconomic distress. The sixth section summarizes the study.

II. STUDY REGION AT A GLANCE: INDICATORS OF SOCIOECONOMIC DISTRESS

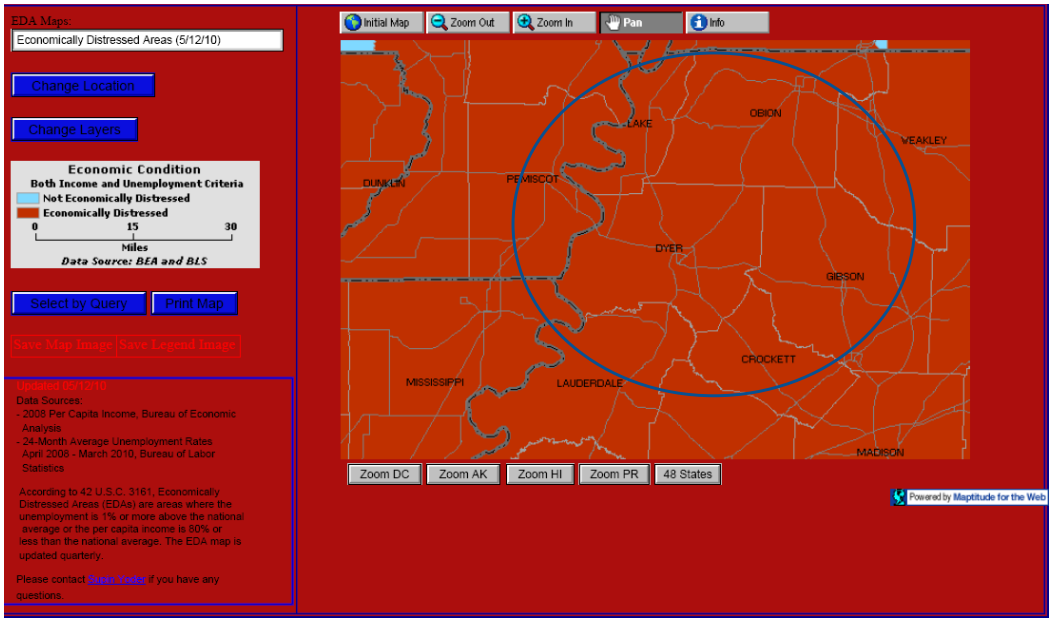
The counties in northwest Tennessee have undergone significant socioeconomic transformation over the past two decades: manufacturing jobs started gradually moving out of the study region, and outmigration followed. A review of commonly used socioeconomic indicators suggests that the study region and its surrounding counties are in economic distress. To illustrate the extent of the distress, this section deals with the following socioeconomic indicators: unemployment, population growth, per capita income, and poverty.

II.a. Study Region's General Characteristics

The counties in the study region are rural, based on the Census Bureau's criteria, as their population in 2009 was less than 50,000: Lake (7,303), Dyer (37,811), Obion (31,431), Crockett (14,492), Gibson (49,468), Lauderdale (26,471), and Weakley (33,459). An urbanized area is defined as "a continuously built-up area with a population of 50,000 or more" (www.census.gov). "Territory, population, and housing units that the Census Bureau does not classify as urban are classified as *rural*" (www.census.gov).

All affected counties in the study region are designated as economically distressed areas. The following map (Map 2) gives a quarterly snapshot of the study region's distress level (www.fhwa.dot.gov). The counties qualify for economically distressed area designation on both unemployment rate and per capita income grounds.

Map 2: All Counties Affected by the Port are Designated as Economically Distressed Areas



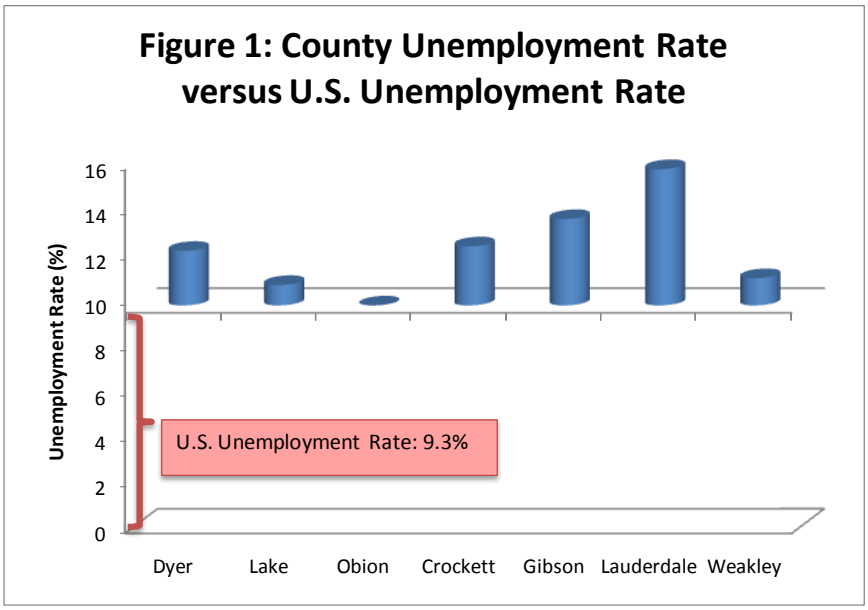
II.b. Employment and Unemployment

Table 1 and Figure 1 present the latest available data on labor force, employment, and unemployment. Compared to the U.S., all the counties in the core and surrounding region have an unemployment rate substantially higher than the U.S. average. The difference in unemployment rate between the area counties and the U.S. runs as high as 6.4 percentage points in Lauderdale County. At the regional level, the unemployment rate is 1.7 percentage points higher than the U.S. in the core region, 3.7 percentage points higher in the surrounding region, and 2.9 percentage points higher in the core and surrounding region combined.

Table 1: Unemployment Rate as of May 2010

Region	Labor Force	Employment	Unemployment	Unemployment Rate (%)	Percentage Point Difference from the U.S. Average
U.S.	153,866,000	139,497,000	14,369,000	9.3	
Core Region	**35,058**	**31,205**	**3,853**	**11.0**	**+1.7**
Dyer	17,277	15,179	2,098	12.1	+2.8
Lake	2,698	2,411	287	10.6	+1.3
Obion	15,083	13,615	1,468	9.7	+0.4
Surrounding Region	**53,685**	**46,703**	**6,982**	**13.0**	**+3.7**
Crockett	6,577	5,769	808	12.3	+3.0
Gibson	21,339	18,459	2,880	13.5	+4.2
Lauderdale	10,076	8,491	1,585	15.7	+6.4
Weakley	15,693	13,984	1,709	10.9	+1.6
Core and Surrounding Regior	**88,743**	**77,908**	**10,835**	**12.2**	**+2.9**

Source: BERC and BLS (www.bls.gov)



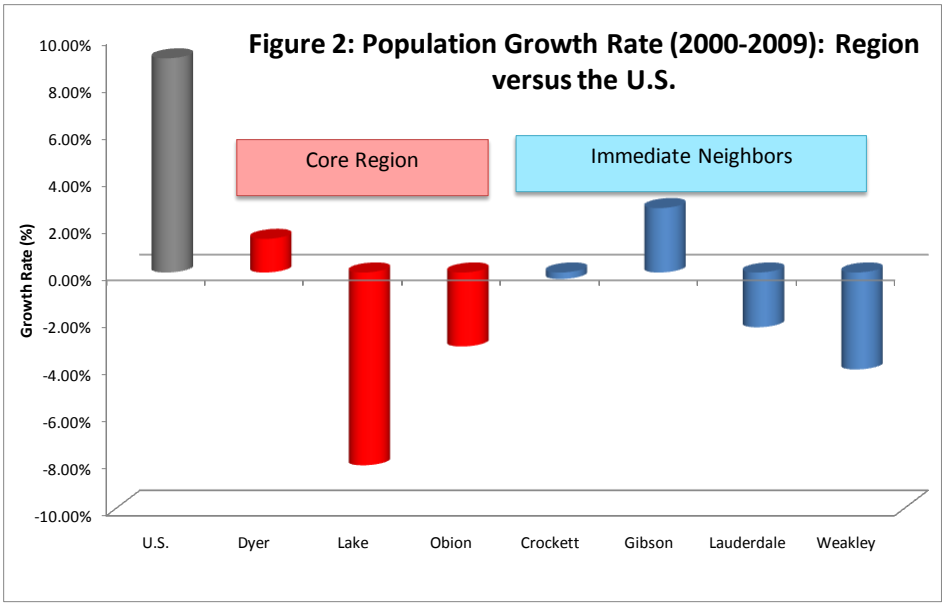
II.c. Population Growth

Used alone, unemployment rates may not reflect the true state of economic health. Unemployment rates should be used along with labor force or population data to make sense of a region's socioeconomic dynamics. For example, the unemployment rate in Lake County, where Cates Landing is located, is moderately higher than the U.S. average (+1.3 percentage points in Table 1). The primary reason for the relatively smaller unemployment rate for this county may be explained by the massive outflow of the working age population from the county in search of employment opportunities elsewhere. Table 2 and Figure 2 demonstrate the extent of the population flight from the core study region between 2000 and 2009. In this period, Lake County lost more than 8 percent of its population. In contrast, the U.S. population grew by more than 9 percent in the same period (a difference of about 17 percentage points).

Table 2: Population Estimates and Growth Rate

Region	2000	2009	Growth (2000-2009)
U.S.	281,421,906	307,006,550	9.09%
Core Region	**77,683**	**76,545**	**-1.46%**
Dyer	37,279	37,811	1.43%
Lake	7,954	7,303	-8.18%
Obion	32,450	31,431	-3.14%
Surrounding Region	**124,680**	**123,890**	**-0.63%**
Crockett	14,532	14,492	-0.28%
Gibson	48,152	49,468	2.73%
Lauderdale	27,101	26,471	-2.32%
Weakley	34,895	33,459	-4.12%
Core and Surrounding Region	**202,363**	**200,435**	**-0.95%**

Source: BERC and Census Bureau (www.census.gov)



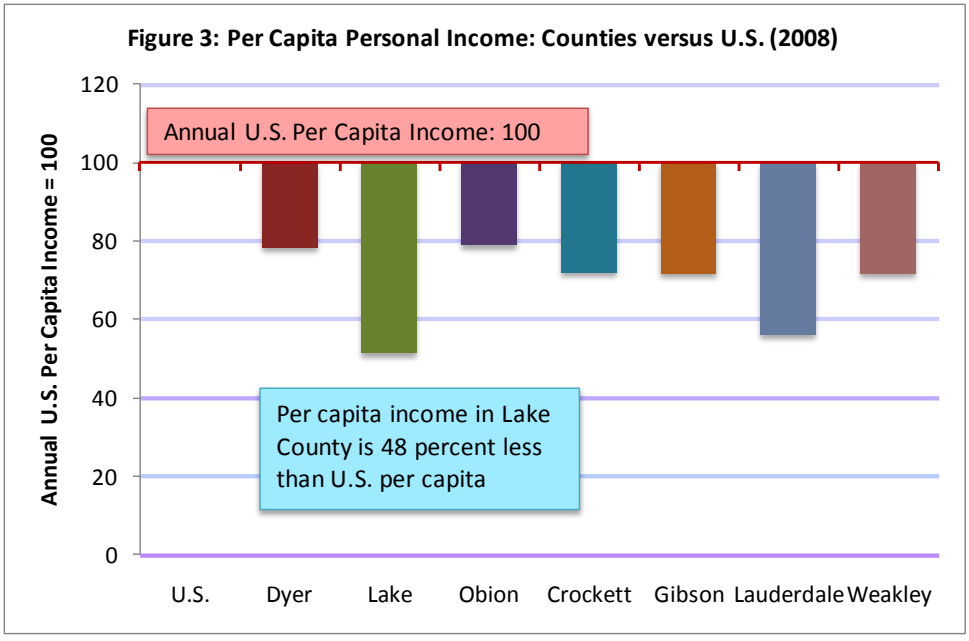
II.d. Income

Per capita income is another indicator commonly used as a measure of a community's economic distress. Per capita income in the study region is far below the U.S. average as shown in Table 3 and Figure 3. For example, per capita income in Lake County is equivalent to 52 percent of U.S. per capita income. In other words, per capita income in Lake County is 48 percent less than U.S. per capita income. Overall, the core study region has an average per capita income equivalent to 76 percent of U.S. per capita income in 2008. The surrounding region does not fare any better than the core region, as per capita income is 68 percent of U.S. per capita income. For the core and surrounding regions combined, per capita income remains at 71 percent of the U.S. average.

Table 3: Income

Region	Personal Income 2008 (in thousands)	Population 2008	Per Capita Income 2008	As Percent of U.S.
U.S.	$12,225,589,000	304,374,846	$40,166	100.00
Core Region	**$2,344,300**	**76,625**	**$30,594**	**76.17**
Dyer	$1,187,545	37,722	$31,481	78.38
Lake	$152,227	7,338	$20,745	51.65
Obion	$1,004,528	31,565	$31,824	79.23
Surrounding Region	**$3,395,148**	**123,589**	**$27,471**	**68.39**
Crockett	$419,116	14,460	$28,985	72.16
Gibson	$1,414,458	49,148	$28,780	71.65
Lauderdale	$600,698	26,602	$22,581	56.22
Weakley	$960,876	33,379	$28,787	71.67
Core and Surrounding Region	**$5,739,448**	**200,214**	**$28,667**	**71.37**

Source: BERC and BEA (www.bea.gov)



II.e. Poverty

Perhaps the poverty rate is the most telling indicator of socioeconomic distress. Lake County has the 12th highest poverty rate among more than 3,100 counties in the United States. Table 4 shows per capita transfer payments and poverty rate in the core and surrounding counties.

Table 4: Poverty and Transfer Payments (CA35 - Income Maintenance Benefits)

Region	Transfer Payments 2008 (in thousands)	Population 2008	Per Capita Transfer Payments 2008	Per Capita Transfer Payments As percent of the U.S.	Number of People below Poverty 2008	Percent of Population below Poverty 2008	Percentage Point Difference 2008
U.S.	$127,454,000	304,374,846	$419	100.00	39,108,422	13.20	
Core Region	**$63,124**	**76,625**	**$824**	**196.73**	**13,556**	**17.69**	**+4.49**
Dyer	33,501	37,722	$888	212.09	6,566	17.70	+4.50
Lake*	$6,943	7,338	$946	225.96	1,838	37.80	+24.60
Obion	$22,680	31,565	$719	171.59	5,152	16.70	+3.50
Surrounding Region	**$97,708**	**123,589**	**$791**	**188.80**	**22,963**	**18.58**	**+5.38**
Crockett	$11,231	14,460	$777	185.48	2,517	18.20	+5.00
Gibson	$38,494	49,148	$783	187.04	8,226	17.10	+3.90
Lauderdale	$26,383	26,602	$992	236.85	5,636	23.60	+10.40
Weakley	$21,600	33,379	$647	154.54	6,584	21.00	+7.80
Core and Surrounding Region	**$160,832**	**200,214**	**$803**	**191.84**	**36,519**	**18.24**	**+5.04**

Source: BERC, BEA (www.bea.gov) and Census Bureau (www.census.gov)

*Lake County has the 12th highest poverty rate among more than 3,100 counties in the U.S.

Per capita transfer payments reported in Table 4 refer to monetary transfers from the federal government that include food stamps, family assistance, and other income maintenance benefits. Supplemental Social Security benefits are not included.

Overall, Lake County receives twice as many per capita transfer payments as the U.S. average. This is clearly not surprising given the county's poverty rate. Nearly two-fifths (37.80 percent) of Lake County's population is below the poverty level. The poverty rate in Lake County is 24.6 percentage points higher than the U.S. average in 2008.

To summarize, the combined major indicators of economic distress paint the following regional picture. **Once the hub of the manufacturing sector, the counties in the study region have gradually lost their competitive edge.** In turn, this gradual erosion of the manufacturing base has put pressure on social dynamics leading to massive outmigration of the working-age population in search of better job opportunities. **Reversing the current trend requires significant investment in infrastructure improvements that will (a) make the region more competitive and (b) attract new or retain existing businesses, thereby stabilizing socioeconomic dynamics.**

Although major investment is necessary to make the study region globally competitive, it is not itself sufficient to generate large-scale intended outcomes. The nature of investment in the region matters as much as the amount. The next sections analyze an investment of about $20 million to

construct a truly intermodal transportation system. Once completed, the Port of Cates Landing is likely to have a profound impact across northwest Tennessee counties.

III. CONCEPTUAL FRAMEWORK, ASSUMPTIONS, AND DATA

Given the extent of socioeconomic distress in the study region, the proposed $20 million investment in the port is likely to positively transform regional socioeconomics. Measuring these socioeconomic contributions is challenging given the time frame of this study (May–August 2010) due to the lack of data regarding the operational phase of the port. Ideally, a survey of local businesses regarding the potential use of the port for cargo transportation is necessary to estimate the average volume of cargo the port would handle in a given year. Cargo volume data would allow us to derive marine-related employment figures. To overcome this challenge, the Business and Economic Research Center (BERC) has developed several assumptions using existing port impact studies and regional impact assessment models to calculate average marine-related employment figures in the study region. Box 1 summarizes the general assumptions and issues affecting the BERC's benefit-cost analysis and economic impact estimates.

Box 1: General Assumptions and Issues

I. The estimates of total cargo volume are model driven. The IMPLAN regional model is used to extract commodity flow data for the core and surrounding region.

II. A survey of potential port users is necessary to calculate the inbound/outbound cargo volume but was not available at time of this study.

III. The time frame for grant application does not allow us to conduct a comprehensive survey.

IV. Anecdotal data from the previous Army Corps of Engineers Study, the Northwest Tennessee Regional Port Authority, and a study by Younger Associates is used in making assumptions about potential port use by sector.

V. This study has two scenarios: 1. Current cargo movement (baseline), and 2. Cargo movement with the Port Authority.

VI. The first scenario (current) assumes a single-modal cargo movement (rail or truck), whereas the second scenario (with the Port) assumes an intermodal cargo movement (barge to rail, barge to truck, or vice versa).

III.a. Cargo Volume and Long-Term Job Creation

In the absence of survey data, the BERC has made several assumptions to derive total cargo volume systematically. Aiding our decisions were these databases, surveys, and studies:

- IMPLANpro economic impact model (www.implan.gov) for core and surrounding regions
- U.S. Census Bureau, 2002 Commodity Flow Survey (www.census.gov)
- BLS, CPI-U Transportation Cost Index (www.bls.gov)
- Congressional Budget Office, *The Economic Cost of Disruptions in Container Shipments*, 2006, (www.cbo.gov)
- Northwest Tennessee Port Authority business plans and other official documents (www.portofcateslanding.com)

- Freight Analysis Framework (FAF) (www.ops.fhwa.dot.gov/freight/freight_analysis/faf/index.htm)
- MARAD PortKit, MARAD, A. Strauss-Wieder Inc., and CUPR at Rutgers University (www.marad.dot.gov)

Based on the aforementioned data sources and studies, the BERC procedure includes the following steps to calculate inbound and outbound cargo volumes the port is likely to handle. Detailed information is in Appendix A.

Step 1: Extract commodity flow data by type of flow for each region from IMPLAN (www.implan.com).

Step 2: Using Commodity Price Index from the Bureau of Labor Statistics (www.bls.gov), estimate and adjust values from 2008 to 2010.

Step 3: Estimate average value per ton of commodity in rural Tennessee by using Freight Analysis Framework data from DOT.

Step 4: Foreign exports and intermediate goods imports are chosen as barge-eligible cargos. These commodities are more sensitive to changes in transportation costs.

Step 5: Adjust for shipment mode and bulk cargo. According to FAF data for rural Tennessee, trucks account for 90% of total shipment.

Step 6: Review and establish baseline cargo volume from previous studies. Review of previous studies based on limited numbers of shippers between 2001 and 2004 shows a cargo volume ranging from 400,000 to 1 million tons.

Step 7: Estimate price elasticity of barge transportation demand. In the absence of a comprehensive shipping survey, we estimated total shift in demand for barge operation using secondary sources.

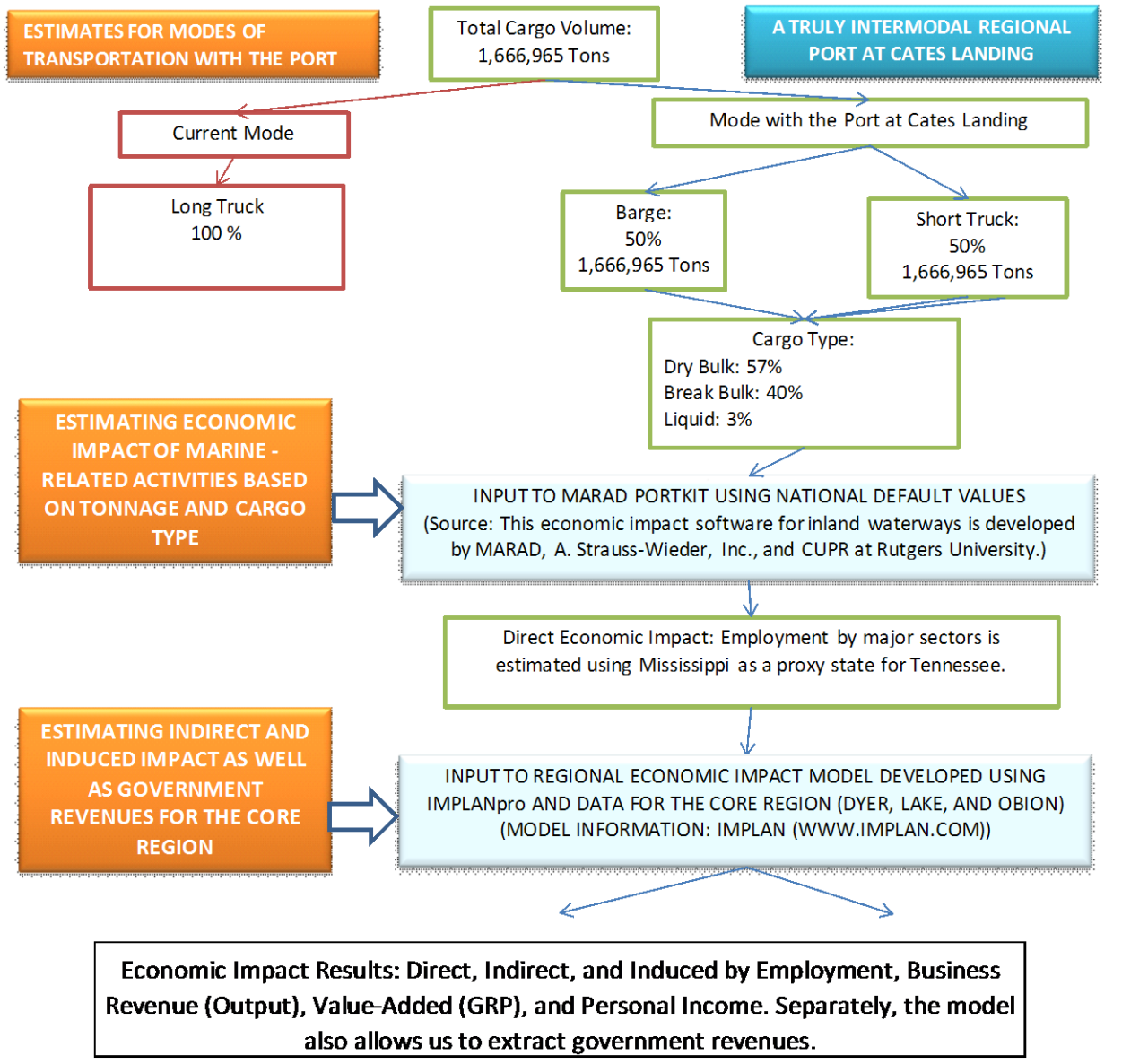
These estimates are for the freight volume currently transported by truck but likely to shift to the port once it becomes operational. Appendix A provides a step-by-step approach to calculating cargo volume for the port of Cates Landing.

After calculating current cargo volume by mode of transportation, the BERC then used the following steps (Chart 1) to calculate the economic impact of port operation and marine-related economic activities.

I. Identify the share of each mode of transportation in a truly intermodal transportation system similar to the one proposed at Cates Landing (truck to barge and vice versa). The trucks in the intermodal transportation system are short trucks as opposed to the long trucks in the current system. The port business plan is used to derive these estimates.
II. Use the port business plan to identify port cargo volume by cargo type (dry bulk, break bulk, and liquid).

III. Use the findings in steps I and II as inputs to MARAD PortKit. Use the national default values for cost per ton of handling cargo and Mississippi as a proxy state for Tennessee.
IV. From results in step III, extract the direct employment necessary to handle nearly 1.67 million tons of cargo volume.
V. Use direct employment figures identified in step IV as inputs to the IMPLAN regional model to calculate indirect and induced employment as well as business revenue, value added, personal income, and government revenues.

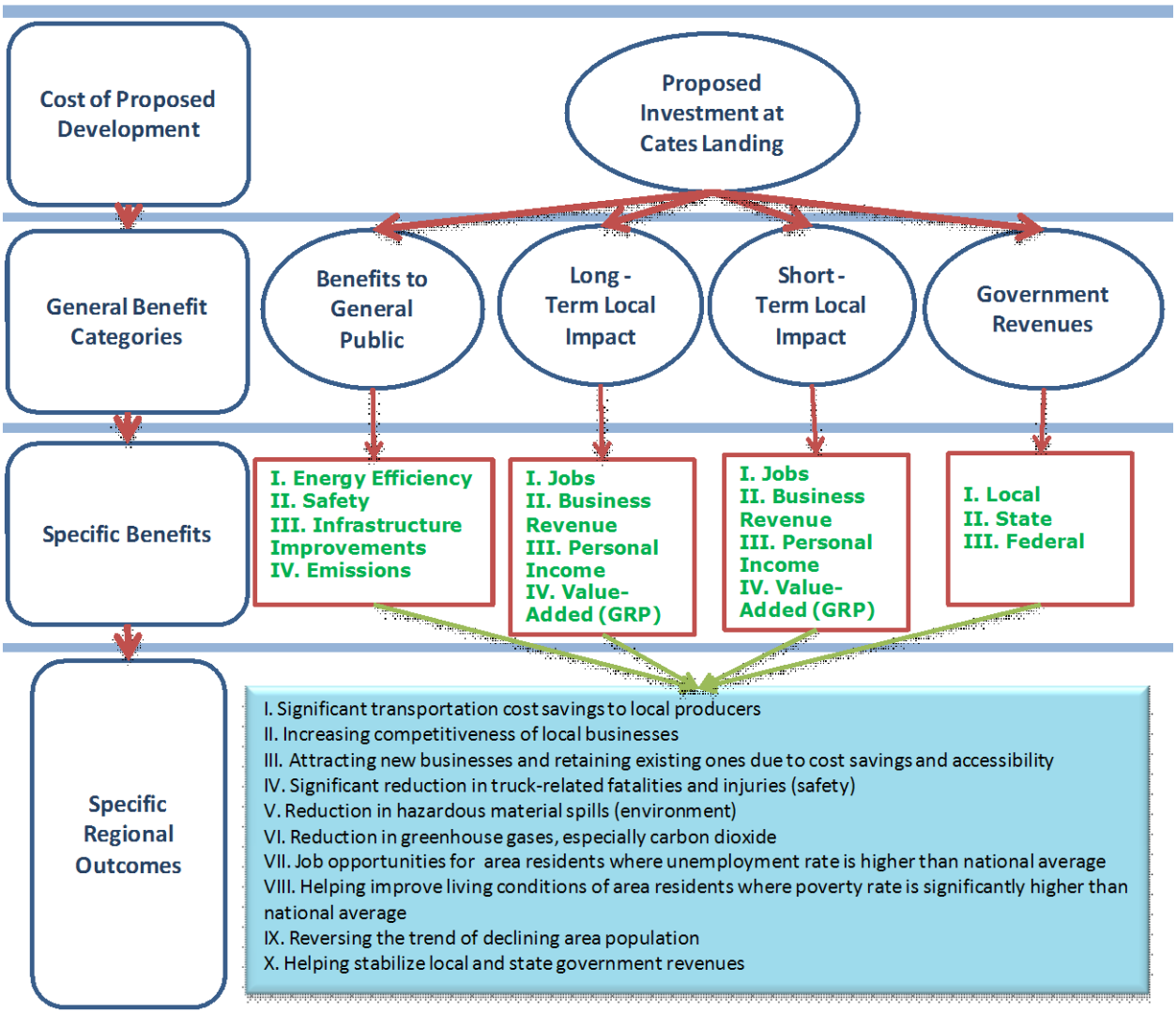
Chart 1: Estimating Long Term Employment Impact of the Port of Cates Landing: Conceptual Framework



III.b. Public Benefits and Local Impact

A truly intermodal transportation system in northwest Tennessee would have a wide range of impact on the study region. Chart 2 provides a detailed view of benefit categories and expected regional outcomes as a result of constructing and operating the port and adjacent industrial park.

Chart 2: Analyzing the Benefits of the Proposed Investment in the NWTRP at Cates Landing



III.c. Assumptions and Data

In calculating benefit-cost analysis and economic impact figures, the BERC has developed several assumptions regarding cargo volume, marine-related employment, transportation cost savings, major industry relocation, fatality reduction, injury reduction, and "related jobs." This section briefly reviews the assumptions made and the source of data. See Appendix B for a step-by step analysis of calculations.

III.c.i. Construction

Table 5 presents a breakdown of the proposed port-related construction spending in the core region. These figures are used as inputs in the IMPLAN regional model to generate short-term employment and other regional aggregate figures. A total of $20 million will be invested in the region to complete the port's construction.

Table 5:
Northwest Tennessee Regional Port at Cates Landing Construction
Phase: Construction Spending by Major Sectors
(Data Source: Northwest Tennessee Regional Port Authority)

I.	Port Site Preparation/Gravel/Gravel Base/Gravel Laydown	$5,850,073
II.	Paved Port Access Roads, Laydown Yard, Site Lighting	$2,058,562
III.	Terminal Dock and Fill	$11,334,491
IV.	Harbor Navigation Buoys and Harbor Lighting	$500,000
V.	Energy Efficiency Enhancement for "Green" Technology	$250,000
IX.	Grand Total	$20,000,000

III.c.ii. The Port of Cates Landing

The build-out scenario involving the port requires a series of assumptions regarding marine-related employment. As previously mentioned, the marine-related direct employment figures, primarily driven by total cargo volume that will flow through the port, are estimated using MARAD PortKit. The marine-related employment figures are obtained inputting the total cargo volume information to the MARAD PortKit using national default values for the cost of handling one ton of cargo. Table 6 presents direct employment figures by industry type. A total of 972 direct permanent jobs will be created across more than 10 sectors in the region's economy. This magnitude of job creation not only benefits area residents but also increases much-needed economic diversity in the study area counties.

Table 6: Northwest Tennessee Regional Port at Cates Landing
The Port Operation–Marine Related Employment Estimates
(Data Source: Direct employment figures extracted from the MARAD PortKit using 1.67 million tons of cargo valume)

The Port Operation-Marine Related	***Estimated Employment***
I. Agricultural Services	1
II. Petroleum and Coal Production	5
III. Railroad Transportation	4
IV. Trucking and Warehousing	240
V. Water Transportation	366
VI. Electric, Gas & Sanitary Services	1
VII. Wholesale–Nondurable Goods	13
VIII. Food Stores	3
IX. Personal Services	1
X. Business Services	315
XI. Health Services	1
XII. Government	22
Total Employment	972

III.c.iv. Basic Cargo Assumptions and Data

Following the steps in Box 1 and Charts 1 and 2, the BERC estimated total tonnage of foreign exports suitable for barge operation for the core and surrounding regions separately. Similarly, total tonnage of intermediate goods imports was estimated. Tables 7 and 8 below give first-year cargo volume estimates and annual forecasts for a 20-year life cycle of the port. Detailed estimates are in Appendix A.

Table 7: Demand for Barge Transportation

	Foreign Exports		Intermediate Goods Imports		Total	
	Value (2010 Million$)	Tons	Value (2010 Million$)	Tons	Value (2010 Million$)	Tons
Core Region Dyer, Lake, Obion	$67	264,109	$244	955,245	$312	1,219,353
Surrounding Region Crockett, Gibson, Lauderdale, Weakley	$23	88,239	$92	359,373	$114	447,612
Total Shipment (Inbound & Outbound)	$90	352,348	$336	1,314,617	$426	1,666,965

According to BERC estimates, total Cates Landing throughput is 1,666,965 tons. Throughput includes foreign exports and intermediate goods imports, for which transportation cost saving is critically important for businesses to remain globally competitive. As Table 8 shows, port cargo volume is expected to reach 1,843,569 by 2031. In this 20-year life cycle of the port, cumulative cargo volume is expected to be more than 35 million tons.

Table 8: Cargo Volume by Year (20 Years)

Year	Project Year	Cargo Volume[1]	Reduced Ton-Miles from Highways	Increased Ton-Miles for Barge	Reduced VMT	Gallons of Fuel Saved
2011	0					
2012	1	1,666,965	208,555,794	150,026,850	6,730,829	1,085,058
2013	2	1,675,823	209,664,059	150,824,093	6,766,597	1,090,824
2014	3	1,684,729	210,778,214	151,625,572	6,802,554	1,096,621
2015	4	1,693,681	211,898,290	152,431,310	6,838,703	1,102,448
2016	5	1,702,681	213,024,317	153,241,330	6,875,044	1,108,306
2017	6	1,711,729	214,156,328	154,055,655	6,911,578	1,114,196
2018	7	1,720,826	215,294,355	154,874,306	6,948,306	1,120,117
2019	8	1,729,970	216,438,429	155,697,308	6,985,229	1,126,069
2020	9	1,739,163	217,588,583	156,524,684	7,022,349	1,132,053
2021	10	1,748,405	218,744,849	157,356,456	7,059,666	1,138,069
2022	11	1,757,696	219,907,259	158,192,648	7,097,181	1,144,117
2023	12	1,767,036	221,075,846	159,033,284	7,134,895	1,150,196
2024	13	1,776,427	222,250,643	159,878,387	7,172,810	1,156,309
2025	14	1,785,866	223,431,683	160,727,981	7,210,926	1,162,453
2026	15	1,795,357	224,618,999	161,582,089	7,249,245	1,168,630
2027	16	1,804,897	225,812,625	162,440,736	7,287,768	1,174,841
2028	17	1,814,488	227,012,593	163,303,946	7,326,495	1,181,084
2029	18	1,824,130	228,218,938	164,171,744	7,365,428	1,187,360
2030	19	1,833,824	229,431,693	165,044,152	7,404,568	1,193,670
2031	20	1,843,569	230,650,893	165,921,197	7,443,916	1,200,013
Total		35,077,264	4,388,554,392	3,156,953,729	141,634,086	22,832,432

[1]Annual growth rate is based on annualized growth rate of cargo volume at the Tulsa Port of Catoosa in the past 20 years. Tonnage volume increased 10.62 percent between 1990 and 2009 with an annual average growth rate of 0.5 percent (www.tulsaport.com).

Note 1: A review of studies suggests that the Mississippi Corridor has better growth potential in bulk cargo movement than other major corridors, such as East Coast, West Coast, and Great Lakes. These studies suggest an annual growth rate of between 0.9 and 3.3 percent. For this analysis, a lower figure of 0.5 percent is used.

Note 2: The following studies were consulted for the purpose of forecasting:

(a) Maritime Administration, U.S. Department of Transportation (2008). *Impact of High Oil Prices on Freight Transportation: Modal Shift Potential in Five Corridors.* Technical Report.

(b) Regional Economic Development Center, University of Memphis (2005). *Market Opportunity Analysis for a Short Line Railroad Connecting Brownsville and Dyersburg , Tennessee.*

(c) Younger Associates. 2001. *Cates Landing Port Economic Impact Analysis.*

(d) IHS Global Insight. 2009. *Memphis Regional Infrastructure Plan.*

III.c.v. Assumptions Regarding Long-Term Outcomes

Critical for the benefit-cost analysis of the proposed investment are the long-term outcomes associated with port operation: (1) state of good repair, (b) economic competitiveness, (c) livability, (d) sustainability, and (e) safety. The assumptions and estimates regarding the long-term outcomes will be used to calculate the benefit-cost ratio. Table 9 below summarizes basic

calculations by the core and surrounding-area businesses. The calculations in the table are based on two scenarios:

- Current transportation system ("Current Transportation Mode") and
- Intermodal transportation system ("Transportation Mode with the Port")

The difference between the mode with the port and the current mode is used for all benefit types attributable to a shift in transportation from the current (single) mode to an intermodal system.

Some general assumptions are as follows:

- We assume that current cargo volume breakdown by mode for rural Tennessee holds for the study region: 90 percent truck and 10 percent rail.
- We assume that all trucks return 100 percent empty (load ratio of 0.5).
- Ton-miles per gallon figures used are from a national study done by Center for Ports and Waterways, Texas Transportation Institute, College Station, Texas.
- The Northwest Tennessee Regional Port Authority provided percentages of cargo types for the port.
- Box A includes the following calculations:
    - Tons = actual tons
    - Ton-miles = tons X distance (distance to/from Cates Landing)
    - Units = tons X tons per unit by mode
    - Vehicle Miles Traveled (VMT) = 2 X (distance to/from X tons)
    - Fuel (Gallons) = ton-miles/ton-miles per gallon

Table 9: Basic Assumptions for Societal Benefits

Distance to CL (From Dyersburg and Union City): 27.5 miles
Distance to Memphis (From Dyersburg and Union City): 96.5 miles
Distance to CL (From Weakley, Gibson, Crockett and Lauderdale): 50 miles
Distance to Memphis (From Weakley, Gibson, Crockett and Lauderdale): 95 miles

Current Transportation Mode		**A**			
Core Region	Tons	Ton-miles	Units	VMT	Fuel (Gallons)
Truck	9,090,488	1,754,464,184	727,239	70,178,567	11,319,124
Rail	1,010,054	97,470,211	9,182		236,005
Barge	0	0	0		0

Transportation Mode with the Port		**A**			
Core Region	Tons	Ton-miles	Units	VMT	Fuel (Gallons)
Long Truck	7,871,135	1,519,129,055	629,691	60,765,162	9,800,833
Short Truck	1,219,353	67,064,415	97,548	2,682,577	432,674
Barge	1,219,353	109,741,770	685		190,524
Rail	1,010,054	97,470,211	9,182		236,005

Current Transportation Mode		**A**			
Surrounding Region	Tons	Ton-miles	Units	VMT	Fuel (Gallons)
Truck	7,833,551	1,488,374,690	626,684	59,534,988	9,602,417
Rail	870,395	82,687,525	7,913		200,212
Barge	0	0	0		0

Transportation Mode with the Port		**A**			
Surrounding Region	Tons	Ton-miles	Units	VMT	Fuel (Gallons)
Long Truck	7,385,939	1,403,328,410	590,875	56,133,136	9,053,732
Short Truck	447,612	44,761,200	35,809	3,401,851	288,782
Barge	447,612	40,285,080	252		69,939
Rail	870,395	82,687,525	7,913		200,212

IV. FINDINGS

This section presents two types of findings: (1) benefits to the general public and benefit-cost ratio; and (2) job creation and economic stimulus. A few assumptions are in order:

- All dollar values are adjusted to 2010 value.
- Life cycle of the port is 20 years.
- Discount rates (3% and 7%) used are from TIGER II guidelines. This study also uses a discount rate of 10% for sensitivity analysis.
- The value of a statistical life (VSL) and injury severity levels as a fraction of VSL are from the U.S. Department of Transportation (DOT) per TIGER II guidelines.
- Grams of CO_2 emission per ton-mile and fatality rates, injury rate, and gallon spills per million ton-miles by mode of transportation are obtained from a study titled "A Modal Comparison of Domestic Freight Transportation Effects on the General Public" in 2007 (updated in 2009) by the Center for Ports and Waterways, Texas Transportation Institute, Texas.
- The BERC used local crash-severity data to calculate the percent of crashes by severity, and the number of injuries reduced in the study region is converted to DOT severity levels.

IV.a. Long-Term Outcomes

Based on total throughput of nearly 1.67 million tons, investment in the port is estimated to generate noteworthy benefits. The BERC estimates long-term public benefits for (a) state of good repair, (b) economic competitiveness, (c) livability, (d) sustainability, and (e) safety.

IV.a.1. State of Good Repair

The BERC monetized public benefits for *pavement and maintenance cost savings*. Once constructed, this brand new port will improve the transportation system in the region. The port at Cates Landing is cited as one of the top five infrastructure improvements for the greater Memphis region to maintain or improve regional competitiveness. A 2010 Federal Highway Administration (FHWA) assessment of the surface transportation maintenance requirement indicates that the nation needs to spend more than $80 billion annually for highway maintenance. According to FHWA data, nearly one-third of Tennessee's highways have a Present Serviceability Rating (PSR) of less than 2.5, suggesting they are in poor condition and need maintenance.

The port at Cates Landing would divert 1.67 million tons of cargo from long truck to short truck and barge. The resulting reduction of 141.6 million VMT would in turn create significant pavement and maintenance cost savings.

Using a conservative rate of $0.029 per VMT (vehicle miles traveled), the BERC estimates a public benefit from pavement and maintenance cost savings of between $3 million (3% discount rate) and $2.2 million (7% discount rate) over the port's 20-year life cycle. Step-by-step calculations

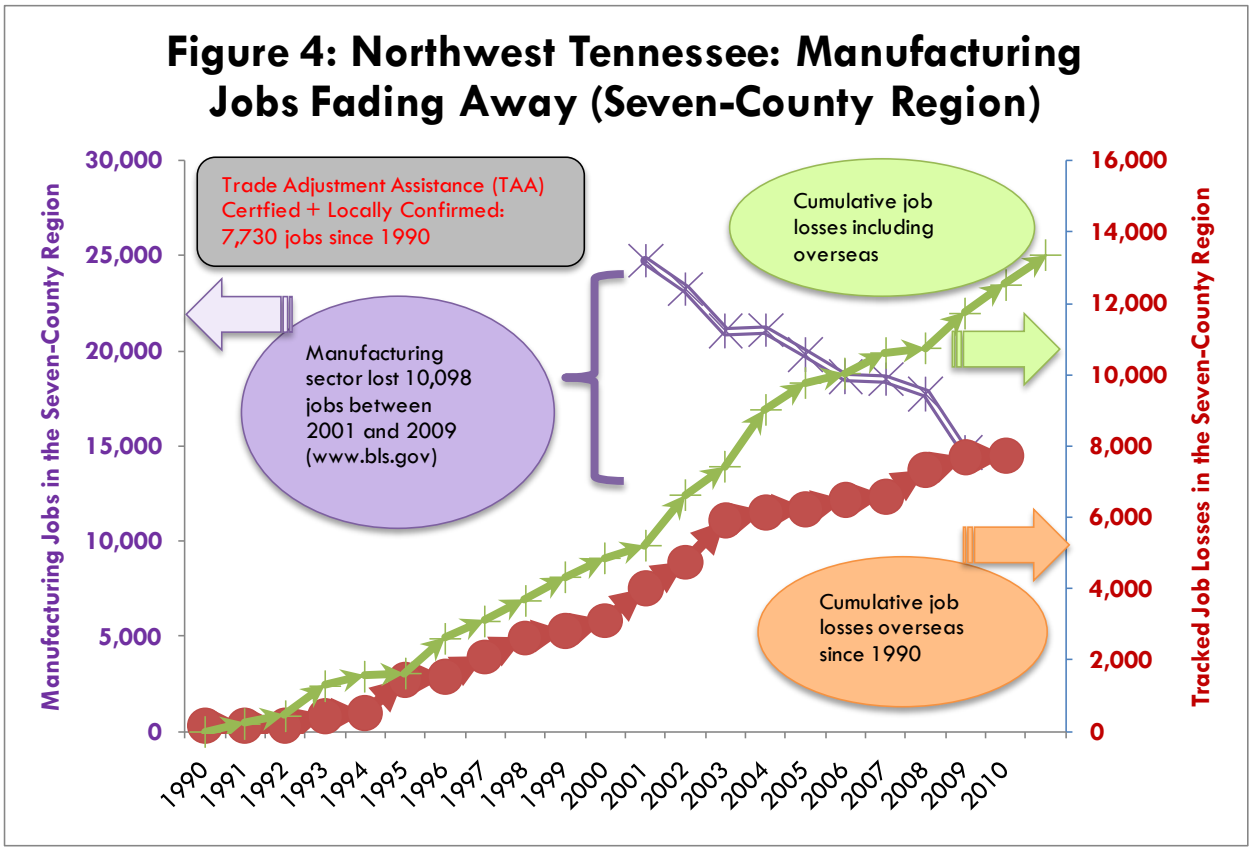
are provided in Appendix B, section J2. Table 10 provides annual estimates of pavement and maintenance cost savings over the 20-year life cycle.

Table 10: Long Term Outcome: State of Good Repair (Benefit Estimates)

Year	Project Year	Truck VMT Reduced	Undiscounted Pavement and Maintenance Savings ($0.029/VMT)	Discounted Pavement and Maintenance Savings 3%	7%	Sensitivity Analysis: 10%
2011	0					
2012	1	6,730,829	$195,194	$189,509	$182,424	$177,449
2013	2	6,766,597	$196,231	$184,967	$171,396	$162,175
2014	3	6,802,554	$197,274	$180,534	$161,034	$148,215
2015	4	6,838,703	$198,322	$176,207	$151,299	$135,457
2016	5	6,875,044	$199,376	$171,984	$142,153	$123,797
2017	6	6,911,578	$200,436	$167,862	$133,559	$113,141
2018	7	6,948,306	$201,501	$163,839	$125,485	$103,402
2019	8	6,985,229	$202,572	$159,912	$117,899	$94,501
2020	9	7,022,349	$203,648	$156,079	$110,771	$86,367
2021	10	7,059,666	$204,730	$152,339	$104,075	$78,932
2022	11	7,097,181	$205,818	$148,687	$97,783	$72,138
2023	12	7,134,895	$206,912	$145,124	$91,871	$65,929
2024	13	7,172,810	$208,011	$141,646	$86,317	$60,254
2025	14	7,210,926	$209,117	$138,251	$81,099	$55,067
2026	15	7,249,245	$210,228	$134,937	$76,196	$50,327
2027	16	7,287,768	$211,345	$131,703	$71,590	$45,995
2028	17	7,326,495	$212,468	$128,547	$67,262	$42,036
2029	18	7,365,428	$213,597	$125,466	$63,196	$38,417
2030	19	7,404,568	$214,732	$122,459	$59,375	$35,110
2031	20	7,443,916	$215,874	$119,524	$55,786	$32,088
Average		7,081,704	$205,369	$151,979	$107,528	$86,040
Total		141,634,086	$4,107,388	$3,039,575	$2,150,570	$1,720,796

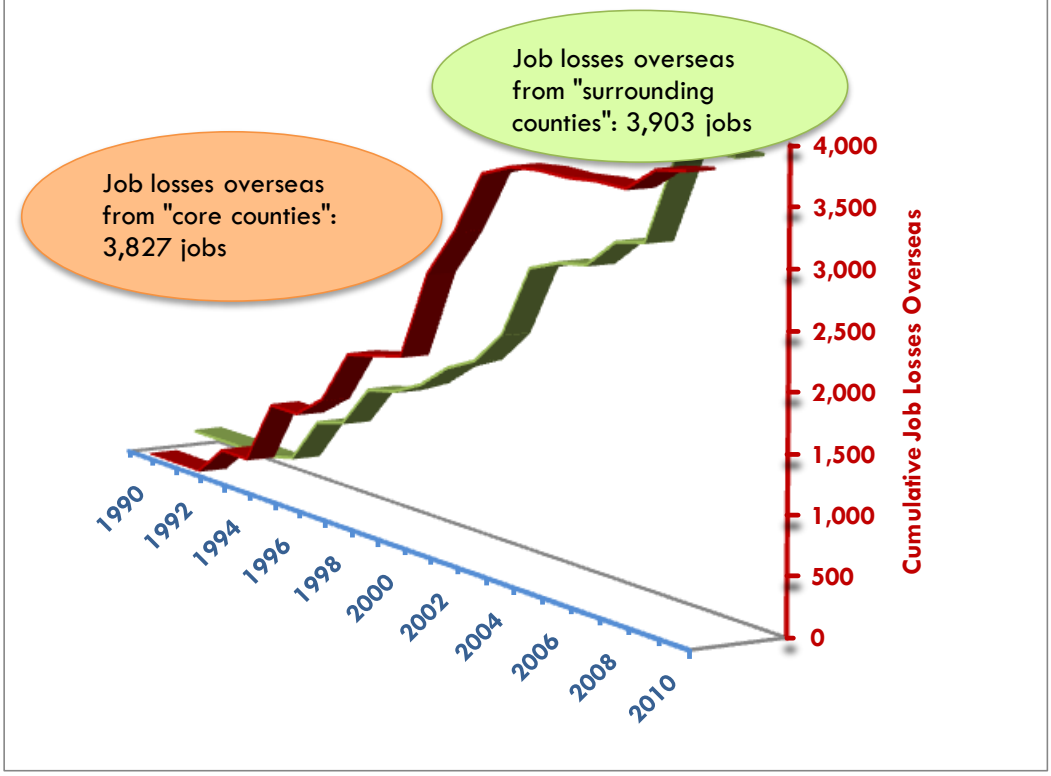
IV.a.2. Economic Competitiveness

The study region has been losing its competitive edge over the past 15 years. Job losses overseas accelerated dramatically in the decade. Figures 4 and 5 below show the extent of confirmed job losses overseas from 1990 to 2010. The study region lost 7,730 manufacturing jobs overseas since 1990. The job decline in the manufacturing sector has been increasing in recent years, as the study region lost 10,098 manufacturing jobs between 2001 and 2009.



As demonstrated in Figure 5, core and surrounding regions share the same fate.

Figure 5: Cumulative Job Losses Overseas by Core (Dyer, Obion, and Lake) and Surrounding Counties (Crockett, Gibson, Lauderdale, and Weakley)



How can the study region regain its competitive position? One way is to decrease transportation costs for producers. The study region is rich in natural resources. The increasing cost of transportation is likely to put pressure on the profit margins of many manufacturing and agricultural product shippers.

Once the port at Cates Landing becomes operational, the shippers in the study region are likely to benefit from transportation cost savings. The BERC estimates public benefits from transportation cost savings and indirect and induced effects on the economy.

Table 11 below presents annual social benefits due to improving economic competitiveness. Detailed calculations regarding economic competitiveness are provided in Appendix B, section J3. Over the port's 20-year life cycle, undiscounted fuel savings will be $67.7 million, and total transportation cost savings to producers will be $86.8 million. When producers invest their savings in the economy, additional jobs and income will be created. To capture this impact, the BERC used the IMPLAN model for the region to estimate average annual indirect and induced "value added." The cumulative 20-year value of indirect and induced value added is $12.6 million.

Table 11: Economic Competitiveness: 20-Year Monetized Public Benfits

		Annual Benefits (Undiscounted)				Tiger II Discount Rates		Sensitivity Analysis
Year	Project Year	Fuel Savings ($2010)	Transportation Cost Savings ($2010)[1]	Producers' Surplus: Average Value-Added: Indirect & Induced Only ($2010)	Undiscounted Total Benfits ($2010)	3%	7%	10%
2011	0							
2012	1	$3,218,282	$4,123,607	$629,562	$4,753,169	$4,614,727	$4,442,214	$4,321,063
2013	2	$3,235,384	$4,145,520	$629,562	$4,775,082	$4,500,973	$4,170,741	$3,946,349
2014	3	$3,252,577	$4,167,549	$629,562	$4,797,111	$4,390,036	$3,915,872	$3,604,141
2015	4	$3,269,861	$4,189,696	$629,562	$4,819,258	$4,281,848	$3,676,589	$3,291,618
2016	5	$3,287,237	$4,211,960	$629,562	$4,841,522	$4,176,339	$3,451,938	$3,006,204
2017	6	$3,304,705	$4,234,342	$629,562	$4,863,904	$4,073,443	$3,241,025	$2,745,547
2018	7	$3,322,267	$4,256,843	$629,562	$4,886,405	$3,973,095	$3,043,008	$2,507,499
2019	8	$3,339,921	$4,279,464	$629,562	$4,909,026	$3,875,231	$2,857,098	$2,290,097
2020	9	$3,357,669	$4,302,205	$629,562	$4,931,767	$3,779,789	$2,682,555	$2,091,551
2021	10	$3,375,512	$4,325,067	$629,562	$4,954,629	$3,686,709	$2,518,682	$1,910,224
2022	11	$3,393,450	$4,348,050	$629,562	$4,977,612	$3,595,933	$2,364,828	$1,744,623
2023	12	$3,411,482	$4,371,156	$629,562	$5,000,718	$3,507,403	$2,220,379	$1,593,383
2024	13	$3,429,611	$4,394,384	$629,562	$5,023,946	$3,421,063	$2,084,759	$1,455,258
2025	14	$3,447,836	$4,417,736	$629,562	$5,047,298	$3,336,859	$1,957,429	$1,329,111
2026	15	$3,466,158	$4,441,212	$629,562	$5,070,774	$3,254,737	$1,837,882	$1,213,903
2027	16	$3,484,577	$4,464,813	$629,562	$5,094,375	$3,174,646	$1,725,641	$1,108,684
2028	17	$3,503,094	$4,488,539	$629,562	$5,118,101	$3,096,535	$1,620,260	$1,012,589
2029	18	$3,521,709	$4,512,391	$629,562	$5,141,953	$3,020,355	$1,521,318	$924,825
2030	19	$3,540,424	$4,536,370	$629,562	$5,165,932	$2,946,059	$1,428,423	$844,671
2031	20	$3,559,238	$4,560,476	$629,562	$5,190,038	$2,873,598	$1,341,204	$771,466
Average		$3,386,050	$4,338,569	$629,562	$4,968,131	$3,678,969	$2,605,092	$2,085,640
Total (20-Year)		$67,720,994	$86,771,379	$12,591,240	$99,362,619	$73,579,377	$52,101,843	$41,712,805

[1]Based on one-way truck ton-mile

While these are substantial public benefits due to transportation cost savings, the port at Cates Landing would improve the region's economic competitiveness in several other ways:

- **The study region's economy would be more diverse.** The region currently does not have a "water transportation sector." Lake County, where the port is located, does not have a "manufacturing sector." With the port, these two sectors would be part of the study region's and Lake County's economy.

- **The port would help retain nearly 2,300 export-dependent jobs in the study region.** The steep decline in manufacturing jobs in recent years suggests that more jobs will be lost

overseas. According to BERC estimates, nearly 2,300 jobs may be retained in the region if transportation costs decline.

To further elaborate, the BERC estimated export-dependent jobs in both core and surrounding regions. The basic criterion used is that a sector must be exporting more than 20 percent of its output. Tables 12 and 13 provide estimates for "at-risk" jobs.

Table 12: The Northwest Tennessee Regional Port Authority at Cates Landing
Estimated Port-Related Jobs: Dyer, Obion, and Lake

Commodity	Employment	Foreign Exports (FE) (million $)	Share of FE in Total Export	FE Dependent jobs	Cates Landing Related Jobs
Tire manufacturing	2,373	$164.78	21.34%	506	192
Air conditioning, refrigeration, and warm air	427	$64.33	23.70%	101	38
Power, distribution, and specialty transformers	288	$35.30	67.70%	195	74
Switchgear and switchboard apparatus	279	$25.50	35.27%	98	37
Oilseed farming	1,229	$25.48	52.39%	644	245
Motor vehicle parts manufacturing	605	$24.17	12.93%		
Grain farming	1,767	$22.12	45.31%	801	304
Construction machinery manufacturing	105	$19.25	55.33%	58	22
Cotton farming	308	$18.10	85.69%	264	100
Other rubber product manufacturing	501	$17.46	9.62%		
Rubber and plastics hoses and belting	280	$16.24	28.03%	78	30
All other chemical product and preparation	136	$10.40	22.18%	30	11
Surgical appliance and supplies manufacturing	102	$8.67	19.93%	20	8
All other textile product mills	151	$8.04	16.45%		
Heating equipment (except warm air furnaces)	279	$8.00	11.64%		
Total	8,830	$467.83		2,796	1,063
Foreign Exports as Percent of Region's Total FE		61.28%			
Criteria for Related Jobs	20 percent foreign export dependency				
	Large amount of foreign export volume				
	Jobs are proportional to foreign export share.				
	Finally, related jobs are proportional to the share of non-containerized cargo exports.				
	Non-containerized is estimated at around 38% for total foreign exports.				
Total Related Jobs	**1,063**				

Table 13: The Northwest Tennessee Regional Port Authority at Cates Landing
Estimated Port-Related Jobs: Crockett, Gibson, Lauderdale, and Weakley

Commodity	Foreign Exports (FE) (million $)	Employment	Share of FE in Total Export	FE Dependent jobs	Cates Landing Related Jobs
Cotton farming	80.64	1,422	86.19%	1,226	466
Motor vehicle parts manufacturing	44.22	1,131			
Grain farming	29.99	2,272	46.07%	1,046	398
Oilseed farming	27.20	1,272	52.39%	666	253
Other aircraft parts and auxiliary equipment	26.24	101	88.82%	90	34
Switchgear and switchboard apparatus	23.68	280	35.30%	99	38
Alumina refining and primary aluminum product	16.89	223			
Ammunition manufacturing	13.80	561			
All other chemical product and preparation	11.82	142	24.98%	35	13
Power boiler and heat exchanger manufacturing	4.39	104	21.62%	22	9
Other plastics product manufacturing	4.18	160	31.98%	51	19
Mining and quarrying sand, gravel, clay	3.87	172			
Total	286.91	7,840		3,237	1,230
Foreign Exports as Percent of Region's Total FE	55.21%				
Criteria for Related Jobs	20 percent foreign export dependency Large amount of foreign export volume Jobs are proportional to foreign export share. Finally, related jobs are proportional to the share of non-containerized cargo exports. Non-containerized is estimated at around 38% for total foreign exports.				
Total Related Jobs	**1,230**				

IV.a.3. Livability

With the port, the public would benefit from reductions in congestion, accidents, and noise. Furthermore, decline in the use of environmentally hazardous materials would have important health implications. The BERC monetized only societal benefits from reductions in congestion, accidents, and noise. Detailed calculations and assumptions are in Appendix B, section J4.

Table 14 presents annual average societal benefits from reduction in congestion, accidents, and noise. Cumulative (20-year) undiscounted benefits from these three categories are estimated at around $10.6 million.

As previously highlighted, the study area is designated as an economically distressed area with significant outmigration and poverty rates. By bringing employment opportunities to the region through the port and subsequent business expansion, the communities in the region will become more “livable.”

Table 14: Long-Term Outcome: Livability Benefits		Social Benefits of Reduced VMT (Undiscounted)					Discounted Livability Benefits		
Year	Project Year	Congestion ($0.048/VMT)	Accidents ($0.026/VMT)	Noise ($0.001/VMT)	Reduced VMT	Undiscounted Total Benefits	3%	7%	Sensitivity Analysis: 10%
2011	0								
2012	1	$323,080	$175,002	$6,731	6,730,829	$504,812	$490,109	$471,787	458,920
2013	2	$324,797	$175,932	$6,767	6,766,597	$507,495	$478,362	$443,266	419,417
2014	3	$326,523	$176,866	$6,803	6,802,554	$510,192	$466,898	$416,468	383,314
2015	4	$328,258	$177,806	$6,839	6,838,703	$512,903	$455,707	$391,291	350,319
2016	5	$330,002	$178,751	$6,875	6,875,044	$515,628	$444,785	$367,636	320,165
2017	6	$331,756	$179,701	$6,912	6,911,578	$518,368	$434,125	$345,411	292,605
2018	7	$333,519	$180,656	$6,948	6,948,306	$521,123	$423,721	$324,529	267,418
2019	8	$335,291	$181,616	$6,985	6,985,229	$523,892	$413,565	$304,910	244,400
2020	9	$337,073	$182,581	$7,022	7,022,349	$526,676	$403,653	$286,477	223,362
2021	10	$338,864	$183,551	$7,060	7,059,666	$529,475	$393,979	$269,158	204,136
2022	11	$340,665	$184,527	$7,097	7,097,181	$532,289	$384,537	$252,886	186,564
2023	12	$342,475	$185,507	$7,135	7,134,895	$535,117	$375,320	$237,598	170,505
2024	13	$344,295	$186,493	$7,173	7,172,810	$537,961	$366,325	$223,235	155,828
2025	14	$346,124	$187,484	$7,211	7,210,926	$540,819	$357,545	$209,739	142,415
2026	15	$347,964	$188,480	$7,249	7,249,245	$543,693	$348,976	$197,060	130,156
2027	16	$349,813	$189,482	$7,288	7,287,768	$546,583	$340,612	$185,146	118,952
2028	17	$351,672	$190,489	$7,326	7,326,495	$549,487	$332,449	$173,954	108,713
2029	18	$353,541	$191,501	$7,365	7,365,428	$552,407	$324,481	$163,437	99,355
2030	19	$355,419	$192,519	$7,405	7,404,568	$555,343	$316,704	$153,557	90,803
2031	20	$357,308	$193,542	$7,444	7,443,916	$558,294	$309,114	$144,274	82,987
Average		$339,922	$184,124	$7,082	7,081,704	$531,128	$393,048	$278,091	$222,517
Total		$6,798,436	$3,682,486	$141,634	141,634,086	$10,622,556	$7,860,969	$5,561,819	$4,450,335

IV.a.4. Sustainability

With the port, there would be significant reductions in green house emissions. The BERC monetized the impacts of reductions in the following environmentally hazardous gases:

- VOC (Volatile Organic Components)
- CO2 (Carbon Dioxide)
- CO (Carbon Monoxide)
- PM (Particulate Matter)
- NOx (Nitrogen Oxide)

The BERC estimated societal benefits from the reduced dependency on foreign oil under "price shock value due to fuel savings." The reductions in hazardous material spills are estimated but not monetized. Table 15 provides reductions in environmentally hazardous gases, while Table 16 provides detailed discounted benefits. Step-by-step calculations for each category are provided in Appendix B, section J5.

Table 15: Benefit Estimates: Sustainability

		Emission (Tons)					Annual Benefits (Undiscounted)								
Year	Project Year	VOC (Tons)	CO2 (Tons)	CO (Tons)	PM (Tons)	NOx (Tons)	VOC ($2010)	CO2 ($2010)	CO ($2010)	PM ($2010)	NOx ($2010)	Reduced Ton-Miles from Highways	Increased Ton-Miles for Barge	Reduced VMT	Gallons of Fuel Saved
2011	0														
2012	1	1.57	10,925	21.43	2.01	82.29	$2,035	$229,432	$0	$481,846	$419,678	208,555,794	150,026,850	6,730,829	1,085,058
2013	2	1.57	10,983	21.54	2.02	82.73	$2,046	$230,651	$0	$484,407	$421,908	209,664,059	150,824,093	6,766,597	1,090,824
2014	3	1.58	11,042	21.66	2.03	83.17	$2,056	$231,876	$0	$486,981	$424,150	210,778,214	151,625,572	6,802,554	1,096,621
2015	4	1.59	11,100	21.77	2.04	83.61	$2,067	$233,109	$0	$489,569	$426,404	211,898,290	152,431,310	6,838,703	1,102,448
2016	5	1.60	11,159	21.89	2.05	84.05	$2,078	$234,347	$0	$492,170	$428,670	213,024,317	153,241,330	6,875,044	1,108,306
2017	6	1.61	11,219	22.01	2.06	84.50	$2,089	$235,593	$0	$494,785	$430,948	214,156,328	154,055,655	6,911,578	1,114,196
2018	7	1.62	11,278	22.12	2.07	84.95	$2,100	$236,845	$0	$497,415	$433,238	215,294,355	154,874,306	6,948,306	1,120,117
2019	8	1.62	11,338	22.24	2.08	85.40	$2,112	$238,103	$0	$500,058	$435,540	216,438,429	155,697,308	6,985,229	1,126,069
2020	9	1.63	11,399	22.36	2.09	85.85	$2,123	$239,369	$0	$502,715	$437,854	217,588,583	156,524,684	7,022,349	1,132,053
2021	10	1.64	11,459	22.48	2.11	86.31	$2,134	$240,641	$0	$505,387	$440,181	218,744,849	157,356,456	7,059,666	1,138,069
2022	11	1.65	11,520	22.60	2.12	86.77	$2,145	$241,919	$0	$508,072	$442,520	219,907,259	158,192,648	7,097,181	1,144,117
2023	12	1.66	11,581	22.72	2.13	87.23	$2,157	$243,205	$0	$510,772	$444,872	221,075,846	159,033,284	7,134,895	1,150,196
2024	13	1.67	11,643	22.84	2.14	87.69	$2,168	$244,497	$0	$513,487	$447,236	222,250,643	159,878,387	7,172,810	1,156,309
2025	14	1.68	11,705	22.96	2.15	88.16	$2,180	$245,797	$0	$516,215	$449,613	223,431,683	160,727,981	7,210,926	1,162,453
2026	15	1.69	11,767	23.08	2.16	88.63	$2,191	$247,103	$0	$518,958	$452,002	224,618,999	161,582,089	7,249,245	1,168,630
2027	16	1.69	11,829	23.20	2.17	89.10	$2,203	$248,416	$0	$521,716	$454,404	225,812,625	162,440,736	7,287,768	1,174,841
2028	17	1.70	11,892	23.33	2.19	89.57	$2,215	$249,736	$0	$524,488	$456,818	227,012,593	163,303,946	7,326,495	1,181,084
2029	18	1.71	11,955	23.45	2.20	90.05	$2,227	$251,063	$0	$527,276	$459,246	228,218,938	164,171,744	7,365,428	1,187,360
2030	19	1.72	12,019	23.58	2.21	90.53	$2,238	$252,397	$0	$530,078	$461,686	229,431,693	165,044,152	7,404,568	1,193,670
2031	20	1.73	12,083	23.70	2.22	91.01	$2,250	$253,738	$0	$532,894	$464,140	230,650,893	165,921,197	7,443,916	1,200,013
Total		33	229,897	451	42	1,732	$42,815	$4,827,836	$0	$10,139,289	$8,831,107	4,388,554,392	3,156,953,729	141,634,086	22,832,432

Table 16: Benefit Estimates: Sustainability

		Annual Benefits (Undiscounted)								Discounted Benefits		
Year	Project Year	VOC ($2010)	CO2 ($2010)	CO ($2010)	PM ($2010)	NOx ($2010)	Price Shock Value due to Fuel Savings ($0.170/Gallon)	Undiscounted Total Benefits ($2010)	Gallons of Fuel Saved	3%	7%	Sensitivity Analysis: 10%
2011	0											
2012	1	$2,035	$229,432	$0	$481,846	$419,678	$184,460	$1,317,450	1,085,058	$1,279,078	$1,231,262	$1,197,682
2013	2	$2,046	$230,651	$0	$484,407	$421,908	$185,440	$1,324,451	1,090,824	$1,248,422	$1,156,827	$1,094,587
2014	3	$2,056	$231,876	$0	$486,981	$424,150	$186,426	$1,331,489	1,096,621	$1,218,501	$1,086,892	$1,000,367
2015	4	$2,067	$233,109	$0	$489,569	$426,404	$187,416	$1,338,564	1,102,448	$1,189,297	$1,021,184	$914,258
2016	5	$2,078	$234,347	$0	$492,170	$428,670	$188,412	$1,345,678	1,108,306	$1,160,793	$959,450	$835,560
2017	6	$2,089	$235,593	$0	$494,785	$430,948	$189,413	$1,352,829	1,114,196	$1,132,973	$901,447	$763,636
2018	7	$2,100	$236,845	$0	$497,415	$433,238	$190,420	$1,360,017	1,120,117	$1,105,819	$846,951	$697,904
2019	8	$2,112	$238,103	$0	$500,058	$435,540	$191,432	$1,367,245	1,126,069	$1,079,316	$795,749	$637,830
2020	9	$2,123	$239,369	$0	$502,715	$437,854	$192,449	$1,374,510	1,132,053	$1,053,448	$747,642	$582,926
2021	10	$2,134	$240,641	$0	$505,387	$440,181	$193,472	$1,381,814	1,138,069	$1,028,200	$702,444	$532,749
2022	11	$2,145	$241,919	$0	$508,072	$442,520	$194,500	$1,389,157	1,144,117	$1,003,557	$659,979	$486,891
2023	12	$2,157	$243,205	$0	$510,772	$444,872	$195,533	$1,396,539	1,150,196	$979,505	$620,080	$444,980
2024	13	$2,168	$244,497	$0	$513,487	$447,236	$196,572	$1,403,960	1,156,309	$956,029	$582,594	$406,677
2025	14	$2,180	$245,797	$0	$516,215	$449,613	$197,617	$1,411,421	1,162,453	$933,116	$547,373	$371,671
2026	15	$2,191	$247,103	$0	$518,958	$452,002	$198,667	$1,418,921	1,168,630	$910,752	$514,282	$339,679
2027	16	$2,203	$248,416	$0	$521,716	$454,404	$199,723	$1,426,462	1,174,841	$888,924	$483,192	$310,440
2028	17	$2,215	$249,736	$0	$524,488	$456,818	$200,784	$1,434,042	1,181,084	$867,619	$453,981	$283,718
2029	18	$2,227	$251,063	$0	$527,276	$459,246	$201,851	$1,441,662	1,187,360	$846,825	$426,536	$259,296
2030	19	$2,238	$252,397	$0	$530,078	$461,686	$202,924	$1,449,323	1,193,670	$826,529	$400,750	$236,976
2031	20	$2,250	$253,738	$0	$532,894	$464,140	$204,002	$1,457,025	1,200,013	$806,719	$376,523	$216,577
Average		$2,141	$241,392	$0	$506,964	$441,555	$194,076	$1,386,128	1,141,622	$1,025,771	$725,757	$580,720
Total		$42,815	$4,827,836	$0	$10,139,289	$8,831,107	$3,881,513	$27,722,560	22,832,432	$20,515,418	$14,515,137	$11,614,405

According to BERC estimates and the Port Business Plan, the port would be economically sustainable given the volume of cargo it would handle. Table 17 provides revenue/expenditure estimates for the port and terminal operations given initial year cargo volume of 1.67 million tons.

Table 17: Port of Cates Landing

Revenue/Income Projection Summary

	Net Tons		Avg $/NT
Bulk	946,200	57%	$4.50/NT
Break-Bulk	664,000	40%	$7.50/NT
Liquid	49,800	3%	$1.50/NT
Total	1,660,000	100%	

Gross Revenue	$	9,312,600	100%
Labor/Benefits	$	4,004,418	43%
Equipment Lease	$	745,008	8%
Insurance/Utilities/Fees	$	558,756	6%
Equipment/Facility Maint	$	93,126	1%
Fuel/Supplies	$	279,378	3%
Outside Services	$	558,756	6%
Miscellaneous Exp	$	28,869	0%
Depreciation	$	1,490,016	16%
Total Costs	$	7,758,327	83%
Net Income fro Operations	$	1,554,273	17%
Other Income (Expense)	$	(838,134)	9%
Net Income	$	716,139	8%

IV.a.5. Safety

Following TIGER II guidelines, the BERC addressed safety benefits under two categories: (1) lives saved and (2) injuries prevented. Detailed calculations and assumptions regarding safety benefits are in Appendix B, section J6. Table 18 shows that diversion of long trucks from highways will save 19 lives and prevent 434 injuries. Monetized values are estimated using TIGER II guidelines.

Table 18: Long-Term Outcome: Safety Benefits

		Annual Benefits (Undiscounted)					Present Value (Discounted)		
Year	Project Year	Fatality Reduction (lives saved)	Injury Reduction (injuries prevented)	SVL Saved ($2010)	Value of Injuries Prevented ($2010)	Total Annual Benefits (Undiscounted)	3% Discount ($2010)	7% Discount ($2010)	10% Discount ($2010)
2011	0								
2012	1	0.90	20.65	$5,419,353	$908,844	$6,328,197	6,143,881	5,914,203	5,752,907
2013	2	0.91	20.76	$5,448,151	$913,674	$6,361,825	5,996,630	5,556,665	5,257,707
2014	3	0.91	20.87	$5,477,103	$918,529	$6,395,632	5,852,909	5,220,741	4,805,133
2015	4	0.92	20.98	$5,506,208	$923,410	$6,429,618	5,712,633	4,905,125	4,391,516
2016	5	0.92	21.09	$5,535,468	$928,317	$6,463,785	5,575,718	4,608,590	4,013,502
2017	6	0.93	21.20	$5,564,884	$933,250	$6,498,134	5,442,085	4,329,981	3,668,027
2018	7	0.93	21.32	$5,594,456	$938,209	$6,532,665	5,311,654	4,068,215	3,352,290
2019	8	0.94	21.43	$5,624,184	$943,195	$6,567,380	5,184,350	3,822,275	3,063,731
2020	9	0.94	21.54	$5,654,071	$948,207	$6,602,279	5,060,097	3,591,202	2,800,011
2021	10	0.95	21.66	$5,684,117	$953,246	$6,637,363	4,938,822	3,374,099	2,558,991
2022	11	0.95	21.77	$5,714,323	$958,312	$6,672,634	4,820,453	3,170,120	2,338,718
2023	12	0.96	21.89	$5,744,688	$963,404	$6,708,093	4,704,921	2,978,473	2,137,405
2024	13	0.96	22.01	$5,775,216	$968,524	$6,743,739	4,592,158	2,798,412	1,953,421
2025	14	0.97	22.12	$5,805,905	$973,670	$6,779,576	4,482,098	2,629,236	1,785,274
2026	15	0.97	22.24	$5,836,758	$978,844	$6,815,602	4,374,676	2,470,288	1,631,601
2027	16	0.98	22.36	$5,867,774	$984,046	$6,851,820	4,269,828	2,320,949	1,491,156
2028	17	0.98	22.48	$5,898,956	$989,275	$6,888,231	4,167,493	2,180,637	1,362,800
2029	18	0.99	22.60	$5,930,303	$994,532	$6,924,835	4,067,611	2,048,809	1,245,492
2030	19	0.99	22.72	$5,961,816	$999,817	$6,961,634	3,970,122	1,924,950	1,138,283
2031	20	1.00	22.84	$5,993,497	$1,005,130	$6,998,628	3,874,970	1,808,578	1,040,301
Average		0.95	21.73	$5,701,862	$956,222	$6,658,083	$4,927,155	$3,486,077	$2,789,413
Total		19.01	434.52	$114,037,233	$19,124,437	$133,161,670	$98,543,110	$69,721,548	$55,788,265

IV.a.6. Total Project Cost

The BERC used the following cost categories to estimate the project's total cost:

- Project cost (one time): $20 million
- Construction labor opportunity cost (calculations in Appendix B, section K1): $4.2 million
- Maintenance (dredging) and Port Operation (annual): $590,765

Table 19 provides detailed cost data by year.

Table 19: Total Cost of Constructing and Operating a New Port at Cates Landing (20-Year Period)							Discounted Total Cost ($2010)		
Year	Project Year	Cargo Volume[1]	Initial Costs ($2010)	Operations & Maintenance Costs ($2010)	Short-Term Labor Cost ($2010)	Total Cost (Undiscounted)	3%	7%	10%
2011	0		$20,000,000	$590,765	$4,185,582	$24,776,347	-$24,776,347	-$24,776,347	-$24,776,347
2012	1	1,666,965		$590,765		$590,765	-$573,558	-$552,117	-$537,059
2013	2	1,675,823		$590,765		$590,765	-$556,853	-$515,997	-$488,236
2014	3	1,684,729		$590,765		$590,765	-$540,634	-$482,240	-$443,850
2015	4	1,693,681		$590,765		$590,765	-$524,887	-$450,692	-$403,500
2016	5	1,702,681		$590,765		$590,765	-$509,599	-$421,207	-$366,819
2017	6	1,711,729		$590,765		$590,765	-$494,756	-$393,652	-$333,471
2018	7	1,720,826		$590,765		$590,765	-$480,346	-$367,899	-$303,156
2019	8	1,729,970		$590,765		$590,765	-$466,355	-$343,831	-$275,596
2020	9	1,739,163		$590,765		$590,765	-$452,772	-$321,337	-$250,542
2021	10	1,748,405		$590,765		$590,765	-$439,585	-$300,315	-$227,765
2022	11	1,757,696		$590,765		$590,765	-$426,781	-$280,668	-$207,060
2023	12	1,767,036		$590,765		$590,765	-$414,351	-$262,307	-$188,236
2024	13	1,776,427		$590,765		$590,765	-$402,282	-$245,146	-$171,124
2025	14	1,785,866		$590,765		$590,765	-$390,565	-$229,109	-$155,567
2026	15	1,795,357		$590,765		$590,765	-$379,190	-$214,120	-$141,424
2027	16	1,804,897		$590,765		$590,765	-$368,145	-$200,113	-$128,568
2028	17	1,814,488		$590,765		$590,765	-$357,423	-$187,021	-$116,880
2029	18	1,824,130		$590,765		$590,765	-$347,012	-$174,786	-$106,254
2030	19	1,833,824		$590,765		$590,765	-$336,905	-$163,351	-$96,595
2031	20	1,843,569		$590,765		$590,765	-$327,092	-$152,665	-$87,813
Average		1,753,863		$590,765		$1,742,459	-$1,598,354	-$1,477,853	-$1,419,327
20-Year Total		35,077,264	$20,000,000	$12,406,065	$4,185,582	$36,591,647	-$33,565,438	-$31,034,920	-$29,805,862

[1]Annual growth rate is based on annualized growth rate of cargo volume at the Tulsa Port of Catoosa in the past 20 years. Tonnage volume increased 10.62 percent between 1990 and 2009 with an annual average growth rate of 0.5 percent (www.tulsaport.com).

Note 1: A review of studies suggests that the Mississippi Corridor has better growth potential in bulk cargo movement than other major corridors, such as East Coast, West Coast, and Great Lakes. These studies suggest an annual growth rate of between 0.9 and 3.3 percent. For this analysis, a lower figure of 0.5 percent is used.

Note 2: The following studies were consulted for the purpose of forecasting:

(a) Maritime Administration, U.S. Department of Transportation (2008). *Impact of High Oil Prices on Freight Transportation: Modal Shift Potential in Five Corridors.* Technical Report.

(b) Regional Economic Development Center, University of Memphis (2005). *Market Opportunity Analysis for a Short Line Railroad Connecting Brownsville and Dyersburg , Tennessee.*

(c) Younger Associates. 2001. *Cates Landing Port Economic Impact Analysis.*

(d) IHS Global Insight. 2009. *Memphis Regional Infrastructure Plan.*

IV.a.7. Evaluation of Cost-Benefit Indicators

Tables 20 and 21 summarize monetized and non-monetized benefits of the proposed port at Cates Landing.

According to BERC estimates,

- Cumulative undiscounted benefits (20-year) of the port are estimated at $275 million.
- Cumulative discounted (3%) benefits are $203.5 million.
- Cumulative discounted (7%) benefits are $144 million.
- As a sensitivity measure, cumulative discounted (10%) benefits are $115.3 million.
- Net present value (NPV) of the port is $170 million at 3% discount rate; $113 million at 7% discount rate; and $85.5 million at 10% discount rate.

TABLE 20: CUMULATIVE 20-YEAR PUBLIC BENEFITS (ALL MONETARY FIGURES ARE IN 2010 $)

Port construction year			2011	
Benefit period			2012-2031	
M. Cumulative 20-Year Project Cost (in 2010$)				
Cost		Discount Rate		
	0%	3%	7%	Sensitivity Analysis: 10%
Total Cost	$36,591,647	$33,565,438	$31,034,920	$29,805,862
N. Benefits from Long-Term Outcomes (2012-2031)				
Long-Term Outcomes		Discount Rate		
	0%	3%	7%	Sensitivity Analysis: 10%
N1. State of Good Repair	$4,107,388	$3,039,575	$2,150,570	$1,720,796
N2. Economic Competitiveness	$99,362,619	$73,579,377	$52,101,843	$41,712,805
N3. Livability	$10,622,556	$7,860,969	$5,561,819	$4,450,335
N4. Sustainability	$27,722,560	$20,515,418	$14,515,137	$11,614,405
N5. Safety and Security	$133,161,670	$98,543,110	$69,721,548	$55,788,265
Cumulative Value (N1-N5)	$274,976,793	$203,538,449	$144,050,917	$115,286,606
Net Present Value (NPV)		**$169,973,011**	**$113,015,997**	**$85,480,744**
Benefit-Cost Ratio (BCR)		**6.06**	**4.64**	**3.87**

Benefit-Cost Ratio (BCR). Based on the discounted benefits and costs presented in Table 20, benefit-cost ratios (BCR) are:

- 6.06 at a 3% discount rate, suggesting every dollar of investment will generate six dollars worth of societal benefits
- 4.64 at a 7% discount rate, suggesting every dollar of investment will generate $4.64 dollars worth of societal benefits
- 3.87 at a 10% discount rate

Other Societal Benefits. Table 21 summarizes other societal benefits, some of which are not monetized. Notable benefits are that the port would

- reduce fuel dependency by generating 22.8 million gallons of fuel savings and
- prevent 15,230 gallons of hazardous material spills.

TABLE 21: OTHER CUMULATIVE 20-YEAR BENEFITS (UNDISCOUNTED, 2010$)

Ton-Miles Reduced from Highways	4,388,554,392
Truck VMT Reduced	141,634,086
Gallons of Fuel Saved	22,832,432
Gallons of Hazardous Material Spills Prevented	15,230
Number of Lives Saved	19.01
Number of Injuries Avoided	434.52
Tons of CO2 Eliminated	229,897
Tons of CO Eliminated	451
Tons of VOC Eliminated	33
Tons of PM Eliminated	42
Tons of NOx Eliminated	1,732

IV.b. Job Creation and Economic Stimulus

Job creation and retention are critical in the study region, where poverty and the unemployment rate are significantly higher than for the U.S. Furthermore, investment in the port would increase economic diversity in the region. For example, there are no manufacturing companies in Lake County, where Cates Landing is located. The port investment would attract several manufacturing companies to the area. Similarly, the region does not have any employment in water transportation. This would change with the port investment.

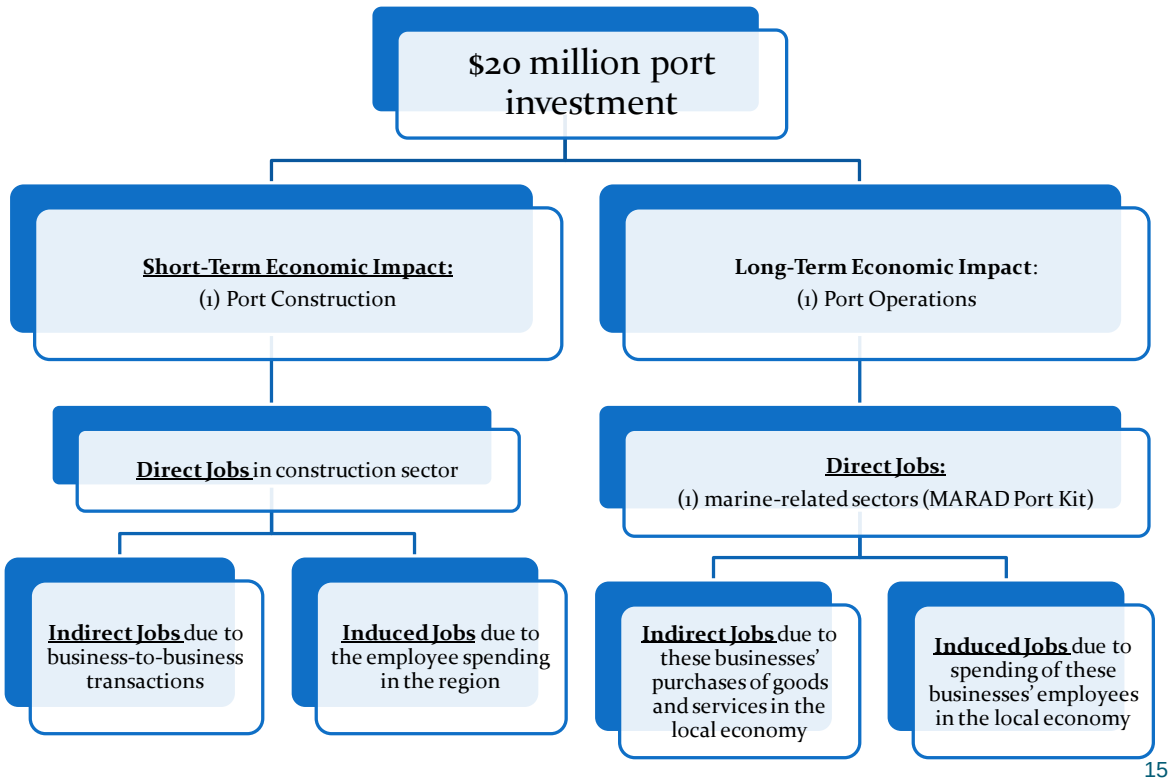
This section presents both short- and long-term economic impact results. To estimate short- and long-term economic impact of port construction and operation, the BERC constructed a regional economic impact model (for Dyer, Lake, and Obion counties) with the widely used economic impact software IMPLANpro. Economic impact figures generated by the IMPLAN model are divided into three sub-groups: direct, indirect, and induced (Chart 3):

- Direct impact—involves expenditures of businesses directly related to the operation of Cates Landing.

- Indirect Impact—involves business-to-business transactions in the regional economy triggered by the initial spending of businesses directly related to the port operation.

- Induced impact—involves the effect of employee spending on the regional economy.

Chart 3: The Concept of Economic Impact



IV.b.i. Port Construction

Short-run economic impact of the proposed investment. The proposed investment in the port will stimulate the regional economy by creating much-needed jobs. In the short run, construction spending of **$20 million would create 234 new jobs** in the region, total short-term business revenue of $26.78 million; gross regional product of $11.20 million; personal income of $8.27 million; federal taxes of $1.48 million; and local and state taxes totaling $0.49 million.

Permanent jobs and long term impact. In the long run, the proposed investment in Cates Landing would be a boon to the regional economy. The proposed $20 million investment **would create 1,700 new permanent jobs** in the region (Table 22). Given the nature of investment, the leverage ratio is very high: for every $20,552, one new permanent job would be created.

Considering other regional economic aggregates, the return to the proposed investment is quite handsome: for example, total business revenue (output) generated as a result of the proposed investment is $354.45 million with a business revenue/proposed investment ratio of 17.72, suggesting that for every dollar invested, $17.72 in new revenue would be generated in the region.

To summarize the findings for the long-term impact of the proposed investment in Cates Landing:

Every dollar of the proposed investment in Cates Landing would leverage:

- $17.72 in business revenues (output)
- $5.78 in gross regional product (value added)

TABLE 22: JOB CREATION AND ECONOMIC STIMULUS BENEFITS (ALL MONETARY FIGURES ARE IN 2010$)

P. Short-Term Economic Impact	Direct	Indirect & Induced	Total
Jobs	173	61	234
Business Revenue (Millions of 2010 $)	$20	$6.78	$26.78
Value Added (Millions of 2010 $)	$7.54	$3.67	$11.20
Personal Income (Millions of 2010 $)	$6.21	$2.06	$8.27
Federal Taxes (Millions of 2010 $)			$1.48
State and Local Taxes (Millions of 2010 $)			$0.49
Q. Long-Term Economic Impact	**Direct**	**Indirect & induced**	**Total**
Jobs	972	728	1,700
Business Revenue (Millions of 2010 $)	$274.97	$79.48	$354.45
Value Added (Millions of 2010 $)	$70.85	$44.81	$115.66
Personal Income (Millions of 2010 $)	$48.93	$28.87	$77.80
Federal Taxes (Millions of 2010 $)			$14.18
State and Local Taxes (Millions of 2010 $)			$7.86

- $3.89 in personal income
- $0.71 in federal tax revenues
- $0.39 in state and local revenues

In addition, every $11,765 of the proposed investment would leverage:

- One new permanent job

As previously mentioned, the port would likely retain much-needed export-dependent "at-risk" jobs in the region, where an estimated 2,300 jobs may now be considered "at risk." Furthermore, investing transportation cost savings would create business expansion in the region, resulting in an additional 50 jobs.

V. IMPLICATIONS OF PROPOSED INVESTMENT FOR THE REGIONAL ECONOMY: INDICATORS OF DISTRESS REVISITED

How do the short- and long-term impacts of the proposed port investment affect the indicators of distress in the study region? This section revisits some indicators of distress presented in section II.

V.a. Wages

Table 23 presents the impact of the proposed port investment on area wages. The upper portion shows actual average wages by county in 2008. Model-driven average wages and total payroll by short and long horizon are presented in the lower portion. The BERC included only direct jobs that would be leveraged by the proposed investment in the region. Of particular concern, long-term average wages are expected to be significantly higher than the regional average. Once the port becomes operational, total payroll for permanent direct jobs is expected to be $45.5 million with an average annual wage of $46,781. In the short term, total payroll would be $4.8 million with an average annual wage of $27,556. These wages are significantly higher than average wages in Lake County, where the port would be housed.

Table 23: Wage Impact of Proposed Short- and Long-Term Investment *
Northwest Tennessee Regional Port at Cates Landing

	Average Wage***	As Percent of the U.S. Average Wage
Core Region		
Dyer	$30,471	66.65%
Lake	$25,721	56.26%
Obion	$35,382	77.40%
Surrounding Region		
Crockett	$31,792	69.54%
Gibson	$29,849	65.29%
Lauderdale	$29,406	64.32%
Weakley	$29,532	64.60%
	Short-Term	Long-Term
	Construction	Operation
Direct Jobs**	173	972
Average Wage	$27,556	$46,781
Total Payroll	$4,767,188	$45,471,132

*Results are extracted from the regional IMPLAN model.
**Only direct jobs are included. Indirect and induced jobs and their payrolls were excluded from this calculation.
***Average wages are from BEA (www.bea.gov).

V.b. Unemployment

The impact of the proposed project on the unemployment rate is noteworthy: a reduction of 1.9 percentage points for the core and surrounding region and 4.9 percentage points for the core region (Table 24).

Table 24: Unemployment Rate with the Port at Cates Landing

	Current			With the Port at Cates Landing*	
	Unemployment Rates (%)			Unemployment Rates (%)	
Region	Labor Force	Unemployed	2010	Long-Term Port Impact	Implication
U.S.	153,866,000	14,369,000	9.3		
Core Region	**35,058**	**3,853**	**11.0**	6.10	-4.9 percentage points (or 56 percent decline in unemployment rate)
Core and Surrounding Region	**88,743**	**10,835**	**12.2**	10.30	-1.9 percentage points (or 16 percent decline in unemployment rate)

Source: BERC and BLS (www.bls.gov)

*The BERC does not assume an increase in population. *Ceteris paribus,* unemployed residents will have job opportunities; thereby the pool of unemployed will shrink.

V.c. Poverty

The critical impact of the proposed investment will be on poverty rates in the study region (Dyer, Lake, and Obion counties). According to our estimates in Table 25, the proposed development will reduce the poverty rate by one-third (5.48 percentage points to 12.21 percent) in the core region. In Lake County, where the port would be housed, we would expect a significant decline in the poverty rate from about 38 percent to at least the national average of 13 percent with the proposed investment.

Table 25: Poverty (NTRP at Cates Landing)	Current		With the Port at Cates Landing**	
			Poverty Rate (%)	
	Number of People below Poverty	Percent of Population below Poverty	Percent of People below Poverty Long Term	Implications
Region	2008	2008		
U.S.	39,108,422	13.20		
Core Region	**13,556**	**17.69**	12.21	-5.48 percentage points (or 31 percent decline in poverty rate)
Core and Surrounding Region	**36,519**	**18.24**	16.14	-2.10 percentage points (or 11.5 percent decline in poverty rate)

Source: BERC and Census Bureau (www.census.gov)

*Lake County has the 12th highest poverty rate among more than 3,000 counties in the U.S.

**Assuming an average household size of 2.47

VI. CONCLUSION

Cates Landing is located in the northwest corner of Tennessee along the Mississippi River. The terrain is well suited for yearlong barge operations because it is above the 100-year floodplain. Despite ongoing efforts and strong interest in the region, only Phase I of the port has been completed. Total public and private investment in the port has reached nearly $15 million so far.

Why is construction of the port important? The study region has lost its competitive edge in the manufacturing sector because of the relocation of companies overseas to reduce their cost of operation. Constructing an intermodal port at Cates Landing would change the business dynamics in the study region. It would not only retain existing manufacturing companies but also attract new companies to the region. Marine-related businesses themselves would employ a sizeable number of people. This expected virtuous cycle would then dramatically affect the quality of life in the region by significantly

- reducing the poverty rate,
- increasing per capita income, and
- reducing the unemployment rate.

In addition, the decline in population would be reversed, and government revenues would stabilize.

A shift in the transportation system from single-modal to intermodal would create efficiency, reduce fatalities and injuries, and prevent hazardous material spills and a certain portion of greenhouse emissions.

These expected benefits would be derived from the proposed $20 million investment. According to our estimates, **every dollar of the proposed investment would generate public benefits ranging from $4.64 (at a 3% discount rate) to $6.06 (at a 7% discount rate).**

The local economy would benefit handsomely from this investment.

- In the short run, the region would gain 234 new jobs.
- In the long run, the region would gain 1,700 new permanent jobs.

Given the extent of economic distress in the region, the proposed $20 million investment is well worth it. The findings of this study strongly recommend this level of investment in the port.

VII. WORKS CONSULTED and DATA SOURCES

In preparation of this study, we consulted numerous sources in a short period of time. What follows is a selection that benefited us substantially.

Bureau of Economic Analysis (www.bea.gov)

Bureau of Labor Statistics (www.bls.gov)

Census Bureau (www.census.gov)

Congressional Budget Office, *The Economic Costs of Disruptions in Container Shipments,* March 29, 2006

Center for Ports and Waterways, Texas Transportation Institute, *A Modal Comparison of Domestic Freight Transportation Effects on the General Public*, 2009, College Station, Texas

Economic Development Research Group, *Procedures for Assessing Economic Development Impacts from Transportation Investments,* June 30, 2000

Economic Development Research Group, *The Cost of Highway Limitations and Traffic Delay to Oregon's Economy*, March 20, 2007

HDL-HLB Decision Economics Inc., *Economic Assessment of a Roanoke Regional Intermodal Facility,* January 7, 2008

IHS Global Insight, Wilbur Smith Associates, and the University of Memphis, *The Memphis Regional Infrastructure Plan,* June 16, 2009, Memphis, TN

IMPLANpro, Economic Impact Model (www.implan.com)

MARAD Port Kit and Accompanying Manuals (2000)

Martin Associates, *The 2007 Economic Impact of the Port of Seattle,* February 10, 2009, and several other studies (www.martinassoc.net)

Northwest Tennessee Regional Port Authority (www.cateslanding.com)

Office of Management and Budget, *2009 Discount Rates for OMB Circular No. A-94,* December 12, 2008

Tennessee Department of Labor and Workforce Development (www.tennessee.gov/labor-wfd)

National Research Council, Transportation Research Board, *Estimating the Benefits and Costs of Public Transit Projects: A Guidebook for Practitioners,* 2002

National Research Council, Transportation Research Board, *Desk Reference for Estimating the Indirect Effects of Proposed Research Projects,* 2002

U.S. Army Corps of Engineers, http://www.mvm.usace.army.mil/environment/NW_TN_Harbor_Report.asp, August 2004

U.S. Department of Transportation, *Treatment of the Economic Value of a Statistical Life in Departmental Analysis,* A Departmental Memo, February 2008

U.S. Department of Transportation, *Freight in America: A New National Picture*, January 2006

Younger Associates, *The Economic Impact of the Port of Memphis,* 2005

APPENDIX A: PORT OF CATES LANDING: PROJECT SUMMARY

A. GENERAL ASSUMPTIONS		EXPLANATIONS
A1. The project involves diversion of long trucks to short trucks and barge		1. Current composition of commodity flows from the region involve long trucks (90%) and rail (10%). 2. The closest port is chosen as a reference area. This provides a conservative estimate as some trucks travel from region to New Orleans. 3. Distance to respective regions reflects the average of distance to each county seat calculated using publicly available mapping tools.
A2. Reference area: The Port of Memphis		
A3. Location of the Port of Cates Landing: Town of Tiptonville		
A4. Distances		
A41. From the core region (Lake, Dyer, Obion counties) to Memphis:	96.5 Miles	
A42. From Dyer and Obion to Cates Landing:	27.5 Miles	
A43. From Crockett, Gibson, Lauderdale, and Weakley (SR) to Memphis:	95 Miles	
A44. From the surrounding region (SR) to Cates Landing:	50 Miles	
A45. Barge operation: From Cates Landing to Memphis:	90 Miles	
B. AFFECTED REGION'S GENERAL CHARACTERISTICS		
B1. Economically Distressed Areas (all seven counties)		1. http://hepgis.fhwa.dot.gov/hepgis_v2/GeneralInfo/Map.aspx
B2. Rural Areas (all seven counties)		
B3. Experiencing outmigration due to loss of jobs		by both per capita income (BEA) and unemployment rate (BLS).
C. AFFECTED REGION'S SOCIOECONOMIC CHARACTERISTICS		
C1. Unemployment rate		1. C1 data reflects the latest available as of May 2010 from the Bureau of Labor Statistics (www.bls.gov). 2. C2 data is calculated from the Census Bureau reflecting changes between 2000 and 2009 (www.census.gov). 3. C3 data is from Bureau of Economic Analysis. The latest available data for counties is 2008 (www.bea.gov). 4. C4 data is from the Census Bureau small area poverty estimates at www.census.gov. The latest estimates are for 2008. 5. Lake County in the core region has the 12th highest poverty rate among 3,100 counties in the nation. 6. Core region includes Dyer, Lake, and Obion counties. 7. The Port of Cates Landing is located in Lake County. 8. Surrounding regions include Crockett, Gibson, Lauderdale, and Weakley counties and are within a 50-mile radius of Lake County.
C11. Core region's (Lake, Dyer, Obion counties) unemployment rate:	11.00%	
C12. Surrounding region's unemployment rate:	13.00%	
C13. Core and surrounding region's unemployment rate:	12.20%	
C2. Population Growth		
C21. Core region:	-1.46%	
C22. Surrounding region:	-0.63%	
C23. Core and surrounding regions:	-0.95%	
C3. Per capita income as percent of the U.S.		
C31. Core region:	76.17%	
C32. Surrounding region:	68.39%	
C33. Core and surrounding region:	71.37%	
C4. Poverty (percent of people below poverty)		
C41. Core region:	17.69%	
C42. Surrounding region:	18.58%	
C43. Core and surrounding regions:	18.24%	

APPENDIX A: PORT OF CATES LANDING: CARGO VOLUME ASSUMPTIONS

D. Estimating total cargo volume for the region

Step 1: Extract commodity flow data by type of flow for each region from IMPLAN (www.implan.com)

Step 2: Using Commodity Price Index from the Bureau of Labor Statistics (www.bls.gov), estimate and adjust values from 2008 to 2010.

Step 2.1: This process will give us the total value of commodity flows in 2010$.

Step 2.2: Total value of commodity flows is $15.3 billion.

Step 3: Estimate average value per ton of commodity in rural Tennessee by using Freight Analysis Framework data from DOT.

Step 3.1: Estimated value per ton in 2010$ is $811 (http://ops.fhwa.dot.gov/freight/freight_analysis/faf/).

Step 3.2: Use average value per ton data to estimate total tons of commodity flows to the affected regions.

Step 3.3: The affected regions account for 18.8 million tons of commodity flows.

Regions	Foreign Exports		Domestic Exports		Intermediate Goods		Finished Goods		Total Goods	
	Value (2010 Million$)	Tons	Value (2010 Million$)	Tons	Value (2010 Million$)	Tons	Value (2010 Million$)	Tons	Value (2010 Million$)	Tons
Core Region Dyer, Lake, Obion	$807	995,030	$3,144	3,877,004	$2,919	3,598,884	$1,322	1,629,624	$8,192	10,100,543
Surrounding Region Crockett, Gibson, Lauderdale, Weakley	$549	677,290	$2,404	2,964,576	$2,237	2,758,397	$1,868	2,303,682	$7,059	8,703,945
Total Shipment (Inbound & Outbound)	$1,356	1,672,320	$5,549	6,841,581	$5,156	6,357,281	$3,190	3,933,306	$15,250	18,804,488

E. Estimating Barge Eligible Cargo Volume

Step 4: Foreign exports and intermediate goods imports are chosen as barge eligible cargos. These commodities are more sensitive to changes in transportation costs (highlighted light blue columns).

Step 5: Adjust for shipment mode and bulk cargo: According to FAF data for rural Tennessee, trucks account for 90% of total shipment. Of total truck shipment, nearly 73 percent of tonnage and 23 percent of value are "bulk cargo." Since the Port of Cates Landing will handle only bulk cargo, we excluded "containerized cargo" from the analysis.

Total truck and bulk cargo adjusted commodity flows: 5.3 million tons and $1.4 billion.

Truck and Bulk Cargo Adjusted Commodity Flows

	Foreign Exports		Intermediate Goods Imports		Total	
	Value (2010 Million$)	Tons	Value (2010 Million$)	Tons	Value (2010 Million$)	Tons
Core Region Dyer, Lake, Obion	$167	653,735	$604	2,364,467	$771	3,018,201
Surrounding Region Crockett, Gibson, Lauderdale, Weakley	$114	444,979	$463	1,812,267	$577	2,257,246
Total Shipment (Inbound & Outbound)	$281	1,098,714	$1,067	4,176,734	$1,348	5,275,448

F. Estimating Demand for Barge Transportation at Cates Landing (Appendix A Continued)

Step 6: Review of the previous studies based on limited numbers of shippers between 2001 and 2004 shows a cargo volume ranging from 400,000 to 1 million tons:
(1) Northwest Tennessee Regional Harbor (2004) by U.S. Army Corps Engineers, Memphis District, at http://www.mvm.usace.army.mil/environment/NW_TN_Harbor_Report.asp.
(2) Cates Landing Port Economic Impact Analysis (2004) by Younger Associates, LLC, at http://www.portofcateslanding.com/documents/Feasibility%20Study%20Younger%20Assoicates.pdf.
(3) A Review of Proposed State Funding of the Northwest Tennessee Regional Port and Industrial Park (2004) by Sparks Bureau of Business and Economic Research, University of Memphis, at http://www.portofcateslanding.com/documents/University%20of%20Memphis%20Feasibility%20Study%201.pdf.

Step 7: In the absence of a comprehensive shipping survey, we estimated total shift in demand for barge operation using secondary sources.

Step 7.1: Estimate cost per ton-mile of shipment by mode (one way): Arkansas Waterways Commission estimates

Cost per ton-mile of shipping by mode (cents)		
Truck	5.35	Arkansas Waterways Commission
Barge	0.97	

Step 7.2: Estimate cost per ton of shipment from the affected regions to Memphis and calculate transportation cost savings by producers

	Cost per ton of shipment to Memphis (cents)		
	Current	with Port	Cost Savings by Producers
Core Region	516.28	240.73	-53.372
Surrounding	508.25	361.11	-28.951

With the Port of Cates Landing, producers from the core region will have 53.4 percent savings in transportation cost. The producers from the surrounding region will have about 29 percent savings in transportation cost.

Step 7.3: Estimate mode-switching rates by applying elasticity corresponding to 50 percent and 29 percent changes in transportation cost.

Mode-Switching Rates		
Change in Transportation Cost	Elasticity	Percent Change in Tonnage
50%	0.808	40.40%
30%	0.661	19.83%

Train and Wilson (2007), "Transportation Demands for the Movement of Non-Agricultural Commodities Pertinent to the Upper Mississippi and Illinois River Basin" (www.corpsnets.us).

According to a recent survey-based study by Train and Wilson (2007), a 50 percent change in transportation cost will result in a 40.4 percent shift from truck to other modes of transportation. Similarly, a 30 percent price change will result in about a 20 percent shift from truck to other modes of transportation.

Step 7.4: Apply the rates in step 7.3 to truck and bulk cargo adjusted commodity flows in step 5 to find estimated cargo volume of the Port of Cates Landing.

Demand for Barge Transportation						
	Foreign Exports		Intermediate Goods Imports		Total	
	Value (2010 Million$)	Tons	Value (2010 Million$)	Tons	Value (2010 Million$)	Tons
Core Region	$67	264,109	$244	955,245	$312	1,219,353
Dyer, Lake, Obion						
Surrounding Region	$23	88,239	$92	359,373	$114	447,612
Crockett, Gibson, Lauderdale, Weakley						
Total Shipment (Inbound & Outbound)	$90	352,348	$336	1,314,617	$426	1,666,965

Total shipment through the Port of Cates Landing is expected to be 1.67 million tons, worth $426 million.

G. Total Cargo Volume and Commodity Type (Appendix A Continued)

G1. Once the Port of Cates Landing becomes operational, it is expected to handle 1.67 million tons of bulk cargo.

G2. Distribution of bulk cargo per the Port of Cates Landing Business Plan as follows:

Dry Bulk	57%
Break Bulk	40%
Liquid	3%

G3. The regions are rich in natural resources. Type of commodities to be handled are:

Major Commodity Flows by barge at the Port of Cates Landing	
Exports	Imports
Cotton	Cotton
Forestry and Logging	Forestry and Logging
Manufacturing	Manufacturing
Scraps	Mining
Grains and Oilseeds	Scraps
	Grains and Oilseeds

H. Forecasting the Growth in Cargo Volume for 20-Year Life Cycle

H1: Annual growth rate is based on annualized growth rate of cargo volume at the Tulsa Port of Catoosa in the past 20 years. Tonnage volume at this port increased 10.62 percent between 1990 and 2009 with an annual average growth rate of 0.5 percent (www.tulsaport.com).

H2: A review of studies suggests that the Mississippi Corridor has better growth potential in bulk cargo movement than other major corridors, such as East Coast, West Coast, and Great Lakes. These studies suggest an annual growth rate ranging from 0.9 to 3.3 percent. For this analysis, a lower figure of 0.5 percent is used.

H3: The following studies were consulted for the purpose of forecasting:

(a) Maritime Administration, U.S. Department of Transportation. (2008). *Impact of High Oil Prices on Freight Transportation: Modal Shift Potential in Five Corridors.* Technical Report.

(b) Regional Economic Development Center, University of Memphis. (2005). *Market Opportunity Analysis for a Short Line Railroad Connecting Brownsville and Dyersburg , Tennessee.*

(c) Younger Associates. 2001. *Cates Landing Port Economic Impact Analysis.*

(d) IHS Global Insight. 2009. *Memphis Regional Infrastructure Plan.*

H4: Over the 20-year life cycle, the Port of Cates Landing will handle 35.8 million tons of cargo.

APPENDIX B: PORT OF CATES LANDING: PUBLIC BENEFITS (ASSUMPTIONS AND SUMMARY CALCULATIONS)

I. Assumptions Regarding Ton-Miles and Vehicle Miles Traveled (VMT)

I.1. We assume a load ratio of 0.5 for trucks.

I.2. Energy Efficiency

I.21. Barge operation is nearly four times more energy-efficient than truck.

Ton-Miles per Gallon	Tons per Unit	Ton-Miles/Gallon
Truck	25	155
Barge	1,750 (Liquid=3935)	576
Rail	110	413

Explanation

Information regarding modal comparison is obtained from a comprehensive study by Center for Ports and Waterways, Texas Transportation Institute (CPW TTI), "A Modal Comparison of Domestic Freight Transportation Effects on the General Public," updated on March 2009.

I.3. First-Year Volume Snapshot—Baseline (Current) versus Alternative (with Port)

I.31. Distance figures are from A4

Current Transportation Mode		**A**			
Core Region	Tons	Ton-miles	Units	VMT	Fuel (Gallons)
Truck	9,090,488	1,754,464,184	727,239	70,178,567	11,319,124
Rail	1,010,054	97,470,211	9,182		236,005
Barge	0	0	0		0

Transportation Mode with the Port		**A1**			
Core Region	Tons	Ton-miles	Units	VMT	Fuel (Gallons)
Long Truck	7,871,135	1,519,129,055	629,691	60,765,162	9,800,833
Short Truck	1,219,353	67,064,415	97,548	2,682,577	432,674
Barge	1,219,353	109,741,770	685		190,524
Rail	1,010,054	97,470,211	9,182		236,005

Current Transportation Mode		**B**			
Surrounding Region	Tons	Ton-miles	Units	VMT	Fuel (Gallons)
Truck	7,833,551	1,488,374,690	626,684	59,534,988	9,602,417
Rail	870,395	82,687,525	7,913		200,212
Barge	0	0	0		0

Transportation Mode with the Port		**B1**			
Surrounding Region	Tons	Ton-miles	Units	VMT	Fuel (Gallons)
Long Truck	7,385,939	1,403,328,410	590,875	56,133,136	9,053,732
Short Truck	447,612	44,761,200	35,809	3,401,851	288,782
Barge	447,612	40,285,080	252		69,939
Rail	870,395	82,687,525	7,913		200,212

1. Current transportation mode is baseline analysis.
2. Transportation mode with the Port is alternative scenario.
3. "Tons" are the total flow of cargo to/from the affected regions.
4. "Ton-miles" represent "tons x distance" adjusted by truck-load ratio.
5. "Units" are calculated as "tons/tons per unit" adjusted by truck-load ratio.
6. VMT=Vehicle Miles Traveled
7. VMT is calculated as "Units x Distance."
8. Fuel (gallons) is estimated as ton-miles / ton-miles (gallon) (I.21).
9. (A+B)-(A1+B1) gives us VMT saved and gallons of fuel saved.
10. Estimates for the subsequent years are based on cargo volume forecast as explained in H.

PORT OF CATES LANDING: PUBLIC BENEFITS ASSUMPTIONS (APPENDIX B CONTINUED)

Line 1	J. First-Year Public Benefits Calculations			Explanations (Sources)
Line 2	J1. Basic Parameters			
Line 3	*Cargo Volume (Tons)*	1,666,965		F Step 7
Line 4	*Reduced Ton-Miles from Highways (Ton-Miles)*	208,555,794		I3
Line 5	*Increased Ton-Miles for Barge (Ton-Miles)*	150,026,850		I3
Line 6	*Reduced Vehicle Miles Traveled (VMT)*	6,730,829		I3
Line 7	*Gallons of Fuel Saved (Gallons)*	1,085,058		I3
Line 9	J2. Long-Term Outcome: State of Good Repair			
Line 10	*Pavement and Maintenance Savings ($0.029/VMT)*	$195,194	0.029XLine 6	1. Memphis is a highly congested
Line 11				metropolitan area.
Line 12				2. Overall, there are nearly 400 miles
Line 13				of highways in Tennessee whose PSR ratings
Line 14				are less than 2.5.
Line 15				3. New port at Cates Landing will help
Line 16				relieve the pressure from highways.
Line 17				4. $0.029/VMT is estimated from DOT
Line 18				strategic plan 2010-2015.
Line 19				5. Plan calls for $85.2 billion rehabilitation
Line 20				investment for the 2.9 trillion vehicle miles
Line 21				traveled.
Line 22	J3. Long-Term Outcome: Economic Competitiveness			
Line 23	*Fuel Savings ($2.966/Gallon)*	$3,218,282	$2.966 X line 7	1. Energy information administration
Line 24	*Transportation Cost Savings*		($0.0535 X line 4/2)	(Midwest Region) (http://tonto.eia.doe.gov)
Line 25			Less ($0.0097 X line 5)	Diesel (cents per gallon) (week of August 9, 2010)
Line 26	*Producers' Surplus (Indirect and Induced*			2. Transportation cost savings are based on one-
Line 27	*Benefits of Cost Savings)*	$629,562		way truck ton-miles.
Line 28				3. Transportation cost savings are based on
Line 29				cost assumptions in F Step 71.
Line 30				4. Producers' surplus includes additional benefits
Line 31				due to transportation cost savings. We use
Line 32				IMPLAN to model indirect and induced effect.
Line 33				5. Producers' surplus includes indirect and induced
Line 34				"value added."

Line 36	J4. Long-Term Outcome: Livability (Appendix B Continued)			
Line 37	*Social Benefits of Accident Reduction (Truck)*		$0.026 X line 6	TIGER II Guidelines
Line 38	*Social Benefits of Congestion Reduction (Truck)*	$323,080	$0.048 X line 6	TIGER II Guidelines
Line 39	*Social Benefits of Noise Reduction (Truck)*	$6,731	$0.001 X line 6	TIGER II Guidelines
Line 40	J41. Not Monetized Public Benefits (Livability)			
Line 41	*Tons of Volatile Organic Components Reduced (VOC)*	1.57	0.02 grams X line 4	1. Grams per ton-mile for truck and barge
Line 42			Less 0.01737 X line 5	are from CPW TTI as referenced in section I.
Line 43	*Tons of Carbon Dioxide (CO2) Reduced*	10,925	64.96 gr. X line4	2. CPW TTI
Line 44			Less 17.48 gr. X line 5	
Line 45	*Tons of Carbon Monoxide (CO) Reduced*	21.43	0.136 gr. X line 4	3. CPW TTI
Line 46			Less 0.04621 gr. X line 5	
Line 47	*Tons of Particulate Matter (PM) Reduced*	2.01	0.018 gr. X line 4	4. CPW TTI
Line 48			Less 0.01164 X line 5	
Line 49	*Tons of Nitrogen Oxide (NOx) Reduced*	82.29	0.732 gr. X line 4	5. CPW TTI
Line 50			Less 0.46907 gr. X line 5	
Line 52	J5. Long-Term Outcome: Sustainability			
Line 53	*VOC Reduced*	$2,035	$1,300 X line 41	1. TIGER II Guidelines
Line 54	*CO2 Reduced*	$229,432	$21X line 43	2. TIGER II Guidelines
Line 55	*CO Reduced*	$0	$0 X line 45	3. TIGER II Guidelines
Line 56	*PM Reduced*	$481,846	$240,000 X line 47	4. TIGER II Guidelines
Line 57	*NOx Reduced*	$419,678	$5,100 X line 49	5. TIGER II Guidelines
Line 58	*Price Shock Value due to Fuel Savings*	$184,460	$0.170 X line 7	6. TIGER II Guidelines ($0.170 per gallon)
Line 59	J51. Not Monetized Public Benefits (Sustainability)			
Line 60	*Hazardous Material Spill Reduced*	724 gallons	6.06 gallons X (line4/	6. CPW TTI
Line 61			1,000,000) Less	
Line 62			3.60 gallons X (line5/	
Line 63			1,000,000)	

Line 65	J6. Long-Term Outcome: Safety (Appendix B Continued)			
Line 66	*Lives Saved*	0.9	4.351lives X (line 4/ 1,000,000,000) Less 0.028 lives X (line 5/ 1,000,000,000)	1. Lives saved for truck and barge operations per 1 billion ton-miles is from CPW TTI.
Line 67				
Line 68				
Line 69				
Line 70	*Lives Saved ($ SVL)*	$5,419,353	line 66 X $6,000,000	2. Statistical Value of Life (SVL) is from TIGER II Guidelines.
Line 71				
Line 72				3. SVL range is between $3.2 and $8.4 million.
Line 73				
Line 74				4. Recommended value is $6 million.
Line 75	*Injuries Prevented*	20.65	99.044 injuries X (line 4/ 1,000,000,000) Less 0.0450 injuries X (line 5/ 1,000,000,000)	5. Injuries per 1 billion ton-miles for trucks and barges are from CPW TTI.
Line 76				
Line 77				
Line 78				6. Severity-adjusted values from TIGER II Guidelines.
Line 79	*Injuries Prevented ($)*	$908,844	line 75 X severity-adjusted values	
Line 80				7. Police injury report in Shelby County is converted to DOT injury severity levels.
Line 81				

DOT severity levels

Line 82	Severity	Fraction of VSL	$ Value per Injury
Line 83	Minor	0.002	$12,000
Line 84	Moderate	0.0155	$93,000
Line 85	Serious	0.0575	$345,000
Line 86	Severe	0.1875	$1,125,000
Line 87	Critical	0.7625	$4,575,000
Line 88	Fatal	1	$6,000,000

Shelby County, TN Injury Data

Line 89	Year	Possible Injury	Non Incapacitation	Incapacitation
Line 90	Average (2005-08)	8084.75	3203.5	882.5
Line 91	Percent	0.664277058	0.26321	0.072509911
Line 92	Minor	0.5992	0.222	0.042
	Moderate	0.055	0.0312	0.016
	Serious	0.0095	0.009	0.011
	Severe		0.002	0.003
	Critical			0.0013
	Fatal			0.0004

Line 94	K. Job Creation and Economic Stimulus (Appendix B Continued)			
Line 95	K1. Construction Spending			
Line 96	*Short-term construction spending impact ($)*	$20,000,000		1. IMPLAN regional model for the core region (Dyer, Lake, and Obion counties) is used to calculate direct, indirect, and induced impact.
Line 97	*Short-term jobs*			
Line 98	*Direct*	173 jobs		
Line 99	*Indirect & induced*	61 jobs		
Line 100	*Total*	234 jobs		
Line 101	*Slightly higher than 217 jobs per TIGER II Guidelines*			
Line 102	*Construction Wages (as Cost)*	$4,767,188		
Line 103	*Construction Wages (Opportunity Cost)*	$4,185,582	line 102* (1-unemployment rate)	2. Shadow wage rate of 0.878 is calculated as "1-unemployment rate" due to high unemployment rate in the affected regions.
Line 104				
Line 105				
Line 106				
Line 108	K2. Port and Terminal Operation			
Line 109	*Long-term permanent jobs*			3. Direct jobs due to port and terminal operations are calculated using MARAD Report Kit by the U.S. Maritime administration using national default values and Mississippi as proxy state.
Line 110	*Direct jobs*	972 jobs		
Line 111	*Indirect & induced jobs*	728 Jobs		
Line 112	*Total jobs*	1,700 jobs		
Line 113				
Line 114				4. Direct jobs represent the jobs that are required to handle 1.67 million of cargo volume—Dry Bulk (57%), Break Bulk (40%), and Liquid (3%)—by barges and short trucks.
Line 115	K3. Additional Jobs Due to Producers' Surplus	50 Jobs		
Line 116				
Line 117	K4. Retaining Potentially "At-Risk Jobs" in the Region	2,293 jobs		5. We then used these direct jobs as input to the IMPLAN regional model to estimate indirect and induced jobs.
Line 118	*These jobs may be lost overseas given the historical losses of jobs overseas.*			
Line 119	*Improving economic competitiveness of the region may keep the jobs in the affected region.*			
Line 120				
Line 121				
Line 122				
Line 123				6. Since the region does not have a "water transportation sector," we created a new sector using value-added ratios from the Memphis region.
Line 124				
Line 125				
Line 126				
Line 127				

Line 129	L. Total Project Cost (Appendix B Continued)	
Line 130	*L1. Construction Spending (One time)*	$20,000,000
Line 131		
Line 132	*L2. Operations and Maintenance Cost (Annual)*	$590,765
Line 133		
Line 134		
Line 135		
Line 136	*L3. Construction Labor Cost*	$4,185,582
Line 137		
Line 138		

1. The requested grant amount is $20,000,000.
2. This money will be spent in 2011.
3. Operations include the management of the Port of Cates Landing. This figure does not include terminal operations.
4. Maintenance cost is annual dredging cost by the Army Corps of Engineers.
5. Opportunity cost for labor is calculated as in line 103.