Investigation of Economic Impacts of Florida's Highway Beautification Program

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Final Report

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Disclaimer

The opinions, findings, and conclusions expressed in this publication are those of the authors and not necessarily those of the State of Florida Department of Transportation.

Metric Conversion Chart

SI* (MODERN METRIC) Conversion Factors

APPROXIMATE CONVERSIONS TO SI UNITS

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
LENGTH				
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
AREA				
in2	squareinches	645.2	square millimeters	mm2
ft2	squarefeet	0.093	square meters	m2
yd2	square yard	0.836	square meters	m2
ac	acres	0.405	hectares	ha
mi2	square miles	2.59	square kilometers	km2

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
VOLUME				
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft3	cubic feet	0.028	cubic meters	m3
yd3	cubic yards	0.765	cubic meters	m3
NOTE: volumes greater than 1000 L shall be shown in m3				

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
MASS				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
TEMPERATURE (exact degrees)				
oF	Fahrenheit	5 (F-32)/9		
or (F-32)/1.8	Celsius	oC		

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
ILLUMINA TION				

fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m2	cd/m2

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
FORCE and PRESSURE or STRESS				
lbf	poundforce	4.45	newtons	N
lbf/in2	poundforce per square inch	6.89	kilopascals	kPa

APPROXIMATE CONVERSIONS TO SI UNITS

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
LENGTH				
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
AREA				
mm2	square millimeters	0.0016	square inches	in2
m2	square meters	10.764	square feet	ft2
m2	square meters	1.195	square yards	yd2
ha	hectares	2.47	acres	ac
km2	square kilometers	0.386	square miles	mi2

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
VOLUME				
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m3	cubic meters	35.314	cubic feet	ft3
m3	cubic meters	1.307	cubic yards	yd3

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
MASS				
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
TEMPERATURE (exact degrees)				
oC	Celsius	1.8C+32	Fahrenheit	oF

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
ILLUMINATION				
lx	lux	0.0929	foot-candles	fc
cd/m2	candela/m2	0.2919	foot-Lamberts	fl

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
FORCE and PRESSURE or STRESS				
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in2

*SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380.

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16. Abstract

In Florida, the state legislature allocates funds for highway landscaping projects each year. While highway beautification may enhance the driving experience of motorists and result in more environmentally sustainable road infrastructure, it is also presumed to provide monetary benefits by attracting private investment and contributing to the economy, both directly and indirectly. This study was commissioned by the Florida Department of Transportation (FDOT) to estimate the regional economic impacts of highway beautification expenditures within the State. Activities related to highway beautification generate economic impacts in the form of increased industry output (revenues), employment, income, and local and state government tax revenues. The results showed that total expenditures for highway beautification by the FDOT in all eight districts from 2008 to 2013, generated 2,112 full-time and part-time job-years, $245.2 million in output or revenue impacts, $147.6 million in value added contribution to GDP, $110 million in labor income impacts, $32.6 million in other property income impacts, and $5 million in indirect business taxes impacts. Simple annual average economic impacts of highway beautification expenditures in Florida from 2008 to 2013 amounted to $46 million in output impacts and $28 million in value-added impacts. The impact per dollar of investment was $1.53 in output, $0.92 in value added, $0.62 in labor income, and $0.03 in state and local taxes, while the employment impact was 13.2 jobs per million dollars of investment.

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Executive Summary

The Florida state legislature allocates funds for highway landscaping projects each year. While highway beautification may enhance the driving experience of motorists and result in more environmentally sustainable road infrastructure, it is also presumed to provide monetary benefits by attracting private investment and contributing to the economy, both directly and indirectly. This study was commissioned by the Florida Department of Transportation (FDOT) to estimate the regional economic impacts of highway beautification expenditures within the State. Activities related to highway beautification generate economic impacts in the form of increased industry output (revenues), employment, income, and local and state government tax revenues. The spending for highway beautification stimulates additional *indirect* and *induced* economic activity through economic multiplier effects. For example, *indirect effects* occur as landscaping contractors purchase materials and equipment from other businesses in the State, while *induced effects* occur when households of proprietors and employees of affected businesses purchase goods and services within the State for personal consumption. The combined *direct*, *indirect*, and *induced* impacts of an activity represent its total economic impacts. These impacts occur over the development period of highway landscaping projects, typically 18 to 24 months.

The total economic impacts of highway beautification expenditures by the FDOT were estimated using regional economic models for the state of Florida constructed with the *Impact Analysis for Planning (IMPLAN)* software. The results showed that total expenditures for highway beautification by the FDOT in all eight districts from 2008 to 2013, generated 2,112 full-time and part-time job-years, $245.2 million in output or revenue impacts, $147.6 million in value added contribution to GDP, $110 million in labor income impacts, $32.6 million in other property income impacts, and $5 million in indirect business taxes impacts. Simple annual average economic impacts of highway beautification expenditures in Florida from 2008 to 2013 amounted to $46 million in output impacts and $28 million in value-added impacts. Among districts, beautification expenditures in Florida's Turnpike Enterprise (FTE) from 2008 to 2013 generated the highest economic impacts of $51.4 million in output impacts, 403 full-time and part time jobs, $30 million in value added, followed by district 4 and district 6. Districts 4, 6 and FTE combined, accounted for 60 percent of the total output impacts and 62 percent of the total value-added impacts of highway beautification expenditures in Florida from 2008 to 2013. The impact per dollar of highway beautification investment was $1.53 in output, $0.92 in value added, $0.62 in labor income, and $0.03 in state and local taxes, while the employment impact was 13.2 jobs per million dollars of investment.

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Chapter 1 – Introduction

Landscaping of highway right-of-ways with appropriate trees, shrubs, flowers and groundcover plants is known as highway beautification. In Florida, the state legislature allocates funds for highway landscaping projects each year. While highway beautification may enhance the driving experience of motorists, it is also presumed to provide monetary benefits by attracting private investment and contributing to the economy, both directly and indirectly. Professionally landscaped and maintained highways also result in greener and more environmentally sustainable road infrastructure.

This study was commissioned by the Florida Department of Transportation (FDOT) to estimate the regional economic impacts of highway beautification expenditures within the State. Activities related to highway beautification generate economic impacts in the form of increased industry output (revenues), employment, income, and local and state government tax revenues. The spending for highway beautification stimulates additional indirect and induced economic activity through economic multiplier effects. For example, indirect effects occur as landscaping contractors purchase materials and equipment from other businesses in the State, while induced effects occur when households of proprietors and employees of affected businesses purchase goods and services within the State for personal consumption. The combined direct, indirect, and induced impacts of an activity represent its total economic impacts (Miller and Blair, 2009). These impacts occur over the development period of highway landscaping projects, typically 18 to 24 months.

This is the final project report, which also compares other studies of economic impacts of highway beautification in the United States, and other studies of economic impacts of infrastructure investment in Florida, with the specific findings on economic contributions of highway beautification expenditures in Florida during the past decade that were provided in interim project reports.

Chapter 2 – Regional Economic Impact Analysis Methodology

The total economic impacts of highway beautification expenditures by the Florida Department of Transportation (FDOT) were estimated using regional economic models for the state of Florida constructed with the *Impact Analysis for Planning (IMPLAN)* software (v.3) and associated 2011 regional data licensed from the IMPLAN Group LLC, Inc. *IMPLAN* is an input-output analysis/social accounting matrix (I-O/SAM) modeling system, which is a standard technique for estimating the broad economic impacts resulting from changes in specific economic activities in a regional economy (Miernyk, 1965; Miller and Blair, 2009). These economic models are based on regional and national accounting data for transactions between industries, governments, social institutions, employees, and households for a specific base year. *IMPLAN* models provide estimates of impacts on the regional economy from changes in final demand or purchases for final use, changes in earnings, or changes in employment. Final demand is the value of goods and services produced and sold to final users (households or institutions), which result in changes in industry purchases of goods and services from their input industries in the local economy, and changes in employee spending.

The secondary economic effects of given changes in output or employment are estimated by economic multipliers that represent the activity generated from intermediate purchases through the industry supply chain (indirect effects) and activity generated from employee household spending (induced effects). *IMPLAN* is a static equilibrium model, meaning that the estimated changes in output, earnings or employment have no time dimensions; however, it is usually assumed that the forecasted changes represent annual changes since the model in based on annual data. Spending that occurs outside the region under study represents a "leakage" of money that has no economic impact to the region. A glossary of terms related to economic impact analysis is provided in the appendix of the report.

Economic impacts are assessed through several measures either in the form of dollars or jobs. Industry output is the dollar value of goods and services produced or sold, and is equivalent to sales revenues plus changes in business inventories. Value added is a combined measure of various types of income, including labor income, other property income, indirect business taxes, and, capital consumption or depreciation, and is comparable to Gross Domestic Product. Labor income represents gross earnings by employees and business owners, including wages, salaries, and payroll benefits. Other property income is income from investments such as corporate dividends, royalties, property rentals, or interest on loans. Indirect business taxes include property, excise and sales taxes, but exclude income taxes. Employment represents full-time and part-time jobs (<u>not</u> full-time equivalents).

Parameters in the *IMPLAN* software and databases are derived from state and federal government statistics. Regional data are available for all U.S. states and counties, for 440 industry sectors classified by North American Industry Classification System (NAICS) and an additional 25 institutional sectors. Information is provided on industry output (revenues), employment, labor and property income, personal and business taxes, household and institutional commodity demand, inter-regional commodity trade (imports, exports), transfer payments (e.g., welfare and retirement pensions), personal savings and capital investments.

In this study, eight regional *IMPLAN* models were constructed based on Florida's transportation districts as shown in Figure 1. Each district model includes *IMPLAN* data for counties in each district and Florida's Turnpike Enterprise (FTE). The model for FTE representing the Florida Turnpike included all counties containing part of the Turnpike system. The *IMPLAN* models were constructed with 2011 *IMPLAN* data for Florida counties, and with trade flows estimated using econometric regional purchase coefficients (RPCs). All institutional accounts (households, state/local and federal governments, and enterprises) in the Social Accounting Matrix were treated as internal or endogenous to the model, but excluded changes in business inventories. Each category of expenditures for program funding or total highway beautification costs from 2008 through first quarter of 2013 was assigned to the appropriate IMPLAN industry sector, defined according to the North American Industry Classification System (NAICS) (Table 4).

Chapter 3 – Data and Analysis of Florida Highway Beautification Expenditures

This analysis is based on the data provided by the Florida Department of Transportation (FDOT) on highway landscaping (beautification) expenditure for each of the eight FDOT districts over the period July 2008 through May 2013 as shown in Table 1. Total highway beautification expenditures for all districts over this period were more than $209 million in nominal dollar terms. District 4 had the highest total expenditures over this period of $52.5 million, followed by district 6 ($36.2 million), FTE ($28.6 million), and district 7 ($24.7 million). Expenditures peaked in 2009 and 2013 at $43.9 million and $43.4 million, respectively.

Economic impact multipliers for employment, output, value added, labor income, other property income and indirect business taxes were estimated for each district and by relevant *IMPLAN* industry sectors. The multipliers are used to estimate the total economic impacts of each expenditure on the regional (district) economy, in this case, each district. A map of the FDOT districts is presented in Figure 1. Expenditures were deflated to constant 2011 dollars using the GDP Implicit Price Deflator (U.S. Bureau of Economic Analysis), as shown in Table 2 and Figure 2.

Table 1. Florida Department of Transportation highway beautification expenditures by district, FY 2008-13

District	2008	2009	2010	2011	2012	2013	TOTAL
01	2,899,221	772,823	2,215,200	2,038,764	1,231,047	2,683,836	11,840,891
02	1,566,634	2,204,555	3,073,472	2,002,213	5,710,842	5,979,154	20,536,870
03	2,547,480	1,961,319	2,502,730	1,456,487	3,501,355	4,505,685	16,475,056
04	10,626,807	10,079,328	10,120,437	10,903,388	6,749,698	4,063,256	52,542,914
05	1,838,507	3,400,278	410,579	2,137,891	4,352,337	4,891,455	17,031,047
06	9,092,177	7,987,317	3,788,763	7,192,887	5,382,688	2,806,439	36,250,271
07	4,430,551	4,412,461	215,089	3,326,859	4,443,009	7,900,338	24,728,307
FTE*	2,593,938	12,636,812	675,310	885,109	1,200,430	10,571,065	28,562,664
62**	427,656	455,313	471,411				1,354,380
TOTAL	36,022,971	43,910,206	23,472,991	29,943,598	32,571,406	43,401,228	209,322,400

*Florida's Turnpike Enterprise. **Unknown district

Source: Department of Transportation, Landscape Report from Fiscal Year 2008 to 2013, run date June 18, 2013.

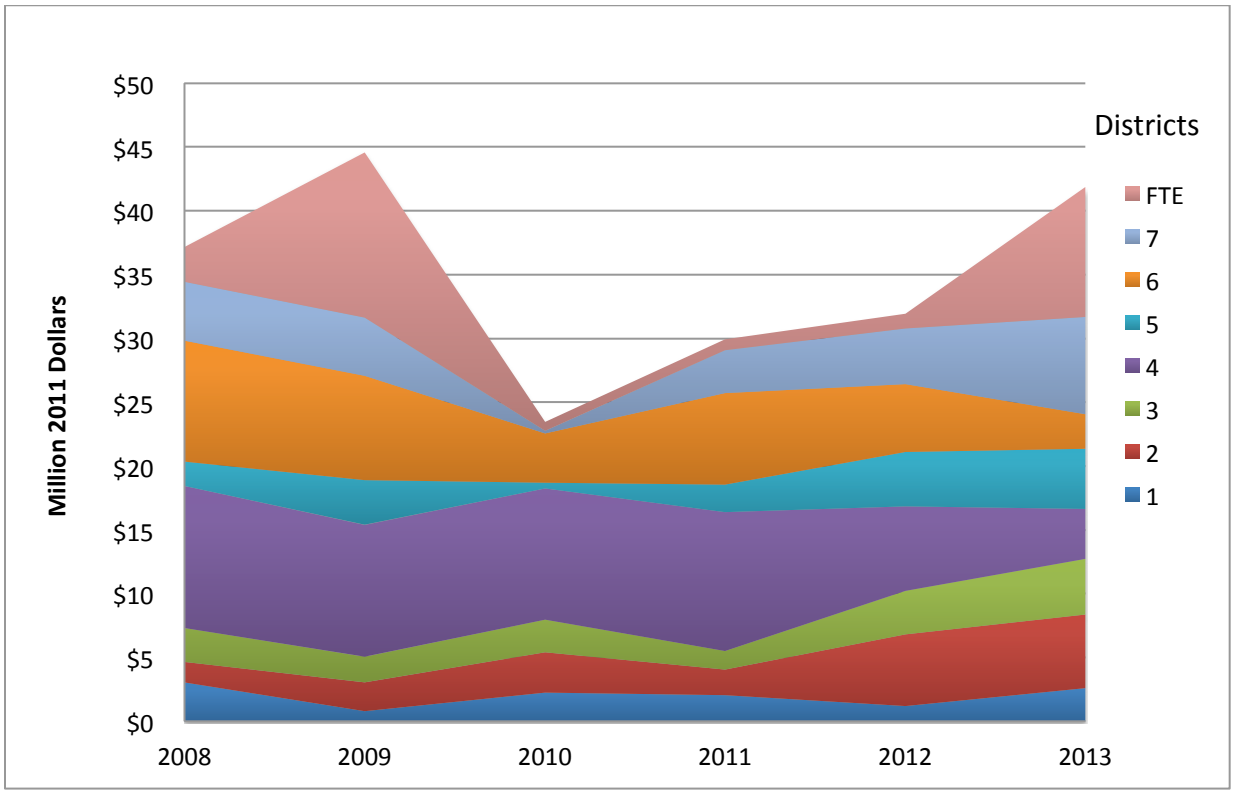
Figure 1. Map of the Florida Department of Transportation Districts

Table 2. Florida Department of Transportation highway beautification expenditures in constant 2011 dollars by district, FY 2008-13

District	2008	2009	2010	2011	2012	2013	TOTAL
01	3,027,530	792,776	2,258,455	2,038,764	1,207,006	2,589,486	11,914,017
02	1,635,968	2,261,473	3,133,486	2,002,213	5,599,316	5,768,957	20,401,413
03	2,660,223	2,011,957	2,551,599	1,456,487	3,432,978	4,347,288	16,460,532
04	11,097,112	10,339,561	10,318,052	10,903,388	6,617,885	3,920,413	53,196,411
05	1,919,873	3,488,068	418,596	2,137,891	4,267,341	4,719,496	16,951,265
06	9,494,565	8,193,537	3,862,744	7,192,887	5,277,571	2,707,779	36,729,082
07	4,626,632	4,526,384	219,289	3,326,859	4,356,242	7,622,602	24,678,008
FTE*	2,708,737	12,963,075	688,496	885,109	1,176,987	10,199,440	28,621,844
62**	446,583	467,068	480,616	0	0	0	1,394,267
TOTAL	37,617,222	45,043,900	23,931,333	29,943,598	31,935,326	41,875,462	210,346,841

*Florida's Turnpike Enterprise. **Unknown district.

Figure 2. Florida Department of Transportation highway beautification program expenditures by district, FY 2008-13



A sample of FDOT landscape project data with detailed landscape expenditure items was analyzed to profile the expenditure categories. The total expenditures in this data set amounted to nearly $36 million for all districts from 2008 to mid-2013, excluding "invalid" data. The expenditure items were assigned to *IMPLAN* industry sectors as shown in Table 3. These expenditures are summarized by *IMPLAN* sector in Table 4.

Table 3. Florida Department of Transportation expenditure items assigned to *IMPLAN* sectors

Cost Item	IMPLAN Sector #	*IMPLAN* Sector Description
Architectural, Building, New, Other Building	369	Architectural, engineering, and related services
Arrow Board / Advance Warning Arrow Panel	314	Sign manufacturing
Artificial Coverings /Rolled Erosion Control Products	149	Other plastic product manufacturing
Asphalt Concrete Friction Course, Inc Bit, Fc-5, Pg 76-22, pma	116	Asphalt paving mixture and block manufacturing
Barricade, Temporary, Type Iii, 6'	162	Concrete pipe, brick, and block manufacturing
Benches, Pre-Fabricated	202	Other fabricated metal manufacturing
Bicycle Parking Rack	202	Other fabricated metal manufacturing
Bollards	163	Other concrete product manufacturing
Borrow Excavation, Truck Measure	36	Construction of other new nonresidential structures
Chemical Treatment- Powdered, For Erosion Control	131	Pesticide and other agricultural chemical manufacturing
Clearing & Grubbing	39	Maintenance and repair construction of nonresidential structures
Clearing & Grubbing (Push Button Contract)	39	Maintenance and repair construction of nonresidential structures

Cost Item	IMPLAN Sector #	*IMPLAN* Sector Description
Concrete Class Ii, Substructure	161	Ready-mix concrete manufacturing
Concrete Curb, Special- Bridge Transition Block	161	Ready-mix concrete manufacturing
Concrete Curb, Type D	161	Ready-mix concrete manufacturing
Concrete Ditch Pavement, 6", Reinforced	161	Ready-mix concrete manufacturing
Concrete Slope Pavement, 6", Reinforced	161	Ready-mix concrete manufacturing
Delivery Of Salvageable Material To Fdot	335	Transport by truck
Directional Bore, 6" To < 12"	36	Construction of other new nonresidential structures
Directional Bore, Less Than 6"	36	Construction of other new nonresidential structures
Electrical Power Service, Overhead, Meter Furnished By Contractor	36	Construction of other new nonresidential structures
Electrical Power Service, Underground, Purchased Bycontractor From Power Company	36	Construction of other new nonresidential structures
Embankment	36	Construction of other new nonresidential structures
Fence Gate, Type B, Double, 6.1-12.0' Opening	202	Other fabricated metal manufacturing
Fence Gate, Type B, Single, 0- 6.0' Opening	202	Other fabricated metal manufacturing
Fencing, Special Type, 5.1-6.0', Special Features	194	Spring and wire product manufacturing
Fencing, Type B, 5.1-6.0', Standard	194	Spring and wire product manufacturing
Fencing, Type B, 5.1-6.0', W/ Barb Wire Attmt	194	Spring and wire product manufacturing
Fencing, Type B, 5.1-6.0, W/ Vinyl Coating	194	Spring and wire product manufacturing
Floating Turbidity Barrier	149	Other plastic product manufacturing
French Drain, 30"	260	Lighting fixture manufacturing
Gravel Fill	26	Mining and quarrying sand, gravel, clay, and ceramic and refractory minerals
Guardrail Removal	36	Construction of other new nonresidential structures
Guardrail -Roadway	202	Other fabricated metal manufacturing
High Intensity Flashing Lights, Temp, Type B	260	Lighting fixture manufacturing
Initial Contingency Amount, Do Not Bid	36	Construction of other new nonresidential structures
Inlet Protection System	201	Fabricated pipe and pipe fitting manufacturing
Inlets, Ditch Bottom, Type G, <10'	201	Fabricated pipe and pipe fitting manufacturing
Irrigation Sleeve, 2" Diameter	201	Fabricated pipe and pipe fitting manufacturing
Irrigation Sleeve, 4" Diameter	201	Fabricated pipe and pipe fitting manufacturing
Irrigation System	201	Fabricated pipe and pipe fitting manufacturing
Irrigation System Backflow Preventer	201	Fabricated pipe and pipe fitting manufacturing
Irrigation System Controller	268	Switchgear and switchboard apparatus manufacturing
Landscape Complete- Large Plants	6	Greenhouse, nursery, and floriculture production
Landscape Complete- Small Plants	6	Greenhouse, nursery, and floriculture production
Landscape Irrigation System	201	Fabricated pipe and pipe fitting manufacturing
Lateral Ditch Excavation	36	Construction of other new nonresidential structures
Light Pole Complete- Special Design, F&I, Double Arm Shoulder Mount, Aluminum, 15'	174	Aluminum product manufacturing from purchased aluminum
Light Pole Complete- Special Design, F&I, Single Arm Shoulder Mount, Aluminum, 15'	174	Aluminum product manufacturing from purchased aluminum
Lighting - Conduit, F&I, Under Existing Pavement Sawcut	201	Fabricated pipe and pipe fitting manufacturing
Lighting - Conduit, F&I, Underground	201	Fabricated pipe and pipe fitting manufacturing
Lighting - Pull Box, F&I, Roadside-Moulded	149	Other plastic product manufacturing
Lighting Conductors, F&I, Insulated, No. 10 Or <	272	Communication and energy wire and cable manufacturing
Lighting Conductors, F&I, Insulated, No.8 - 6	272	Communication and energy wire and cable manufacturing
Litter Removal	390	Waste management and remediation services
Lump Sum Contract, Alternative Bidding	36	Construction of other new nonresidential structures
Maintenance Of Traffic	387	Investigation and security services
Mobilization	36	Construction of other new nonresidential structures
Mowing	19	Support activities for agriculture and forestry
Optional Base, Base Group 09	26	Mining and quarrying sand, gravel, clay, and ceramic and refractory minerals
Patterned Pavement, Non-Vehicular Areas	36	Construction of other new nonresidential structures
Patterned Pavement, Vehicular Areas	36	Construction of other new nonresidential structures
Pavers, Architectural, Roadway	162	Concrete pipe, brick, and block manufacturing
Pavers, Architectural, Sidewalk	162	Concrete pipe, brick, and block manufacturing
Performance Turf	6	Greenhouse, nursery, and floriculture production

Cost Item	IMPLAN Sector #	*IMPLAN* Sector Description
Performance Turf, Sod	6	Greenhouse, nursery, and floriculture production
Plastic Erosion Mat, Trm, Type 2	149	Other plastic product manufacturing
Plastic Erosion Mat, Turf Reinforced Mat, Type 1	149	Other plastic product manufacturing
Portable Changeable Message Sign, Temporary	314	Sign manufacturing
Prepared Soil Layer, Finish Soil Layer, 12"	36	Construction of other new nonresidential structures
Prepared Soil Layer, Finish Soil Layer, 6"	36	Construction of other new nonresidential structures
Prepared Soil Layer, Organic Soil Layer, 6"	36	Construction of other new nonresidential structures
Pumping System	226	Pump and pumping equipment manufacturing
Regular Excavation	36	Construction of other new nonresidential structures
Regular Excavation (3-R Projects Only)	36	Construction of other new nonresidential structures
Reinforcing Steel- Substructure	171	Steel product manufacturing from purchased steel
Removal Of Existing Concrete Pavement	36	Construction of other new nonresidential structures
Sediment Barrier	145	Laminated plastics plate, sheet (except packaging), and shape manufacturing
Sidewalk Concrete, 4" Thick	161	Ready-mix concrete manufacturing
Sidewalk Concrete, 6" Thick	161	Ready-mix concrete manufacturing
Single Post Sign, F&I, Less Than 12 Sf.	314	Sign manufacturing
Single Post Sign, Install, Less Than 12 Sf.	36	Construction of other new nonresidential structures
Single Post Sign, Relocate	36	Construction of other new nonresidential structures
Single Post Sign, Remove	36	Construction of other new nonresidential structures
Soil Tracking Prevention Device	149	Other plastic product manufacturing
Staked Turbidity Barrier- Nylon Reinforced Pvc.	145	Laminated plastics plate, sheet (except packaging), and shape manufacturing
Super-pave Asphaltic Con., Traffic C	116	Asphalt paving mixture and block manufacturing
Temporary Barricade- Types I, Ii, Di, Vp., Drum, Or Lcd.	149	Other plastic product manufacturing
Temporary Guardrail	202	Other fabricated metal manufacturing
Traffic Control Officer	387	Investigation and security services
Trash Receptacle, Pre-Fabricated	190	Metal can, box, and other metal container (light gauge) manufacturing
Type B Stabilization	36	Construction of other new nonresidential structures
Wall, Rehabilitation	36	Construction of other new nonresidential structures
Well, To 250' Depth, 6" Casing	36	Construction of other new nonresidential structures
Work Zone Sign	314	Sign manufacturing

Table 4. Summary of Florida Department of Transportation highway beautification program expenditures (FY 2008-13) by *IMPLAN* sectors

IMPLAN Sector Number and Description	Expenditures	Percent of Expenditures	Percent of Expenditures excluding NA
6 Greenhouse, nursery, and floriculture production	$24,799,151	68.91%	70.18%
19 Support activities for agriculture and forestry	$250,267	0.70%	0.71%
36 Construction of other new nonresidential structures	$2,588,817	7.19%	7.33%
39 Maintenance and repair construction of nonresidential structures	$1,727,467	4.80%	4.89%
131 Pesticide and other agricultural chemical manufacturing	$63	0.00%	0.00%
145 Laminated plastics plate, sheet (except packaging)	$87,131	0.24%	0.25%
149 Other plastic product manufacturing	$341,635	0.95%	0.97%
161 Ready-mix concrete manufacturing	$235,724	0.66%	0.67%
162 Concrete pipe, brick, and block manufacturing	$63,373	0.18%	0.18%
163 Other concrete product manufacturing	$55,412	0.15%	0.16%
171 Steel product manufacturing from purchased steel	$35,266	0.10%	0.10%
174 Aluminum product manufacturing from purchased aluminum	$608,300	1.69%	1.72%
190 Metal can, box, and other metal container (light gauge) manufacturing	$42,244	0.12%	0.12%
194 Spring and wire product manufacturing	$7,939	0.02%	0.02%
201 Fabricated pipe and pipe fitting manufacturing	$3,090,576	8.59%	8.75%
202 Other fabricated metal manufacturing	$65,222	0.18%	0.18%
260 Lighting fixture manufacturing	$28,725	0.08%	0.08%
268 Switchgear and switchboard apparatus manufacturing	$5,000	0.01%	0.01%
272 Communication and energy wire and cable manufacturing	$229,068	0.64%	0.65%
314 Sign manufacturing	$99,700	0.28%	0.28%
335 Transport by truck	$17,800	0.05%	0.05%
369 Architectural, engineering, and related services	$12,001	0.03%	0.03%
387 Investigation and security services	$791,512	2.20%	2.24%
390 Waste management and remediation services	$151,848	0.42%	0.43%
Not available (NA)	$652,707	1.81%	
Grand Total	$35,986,949	100%	100%

Note: invalid projects were not included.

Selected *IMPLAN* multipliers used for estimating economic impacts of FDOT highway beautification programs by district and industry sectors are shown in Table 5, Table 6, and Table 7. Each multiplier represents the sum of direct, indirect, and induced effects. Multipliers for output, value added, labor income, other property income and indirect business taxes are denominated in dollars per

dollar output, while multipliers for employment are denominated in full-time and part-time jobs per million dollars output. Social Accounting Matrix (SAM) multipliers measure the direct, indirect and induced multiplier effects by treating households and governments as internal to the regional model, thus capturing the effects of re-spending by these institutions. Multipliers are derived by mathematical procedures from the input-output tables (Miller and Blair, 2009). Total output multipliers typically range from 2 to 3, meaning that for each one dollar change in spending or final demand, a total of $2 to $3 in industry sales are generated in the regional economy. Employment multipliers range from 0 to over 40, meaning that for each one million dollars of new spending, a total of 15 to 40 jobs will be created. A glossary of economic impact analysis terminology is provided in the appendix.

Table 5. Total employment multipliers by Florida Department of Transportation district and *IMPLAN* sector

Sector #	*IMPLAN* Sector Description	District 1	District 2	District 3	District 4	District 5	District 6	District 7	FTE*
6	Greenhouse, nursery, and floriculture production	12.7699	17.7505	13.5088	8.0676	13.4483	13.6075	26.4620	14.6618
19	Support activities for agriculture and forestry	45.6064	55.9642	60.9074	42.8507	43.7610	60.4654	50.3356	44.9643
36	Construction of other new nonresidential structures	15.7350	16.7653	15.9564	15.2858	16.8691	15.4143	16.5586	16.7628
39	Maintenance and repair construction of nonresidential structures	17.0485	17.7713	17.4281	16.3500	17.9693	16.6370	17.6641	17.7563
131	Pesticide and other agricultural chemical manufacturing	3.4414	3.5977	0.0000	3.7373	3.9016	3.5433	4.0552	4.3310
145	Machine shops	6.1896	6.7327	0.0000	6.5262	6.7575	0.0000	6.8891	7.2110
149	Plumbing fixture fitting and trim manufacturing	6.9538	7.4361	6.7586	7.3006	7.4629	7.2963	7.5496	7.8268
161	Ready-mix concrete manufacturing	9.2558	10.0300	8.5159	8.5169	9.7647	9.9252	10.3919	10.8660
162	Concrete pipe, brick, and block manufacturing	9.3876	9.8901	8.5334	8.9659	10.1310	9.6263	9.8564	10.5810
163	Other concrete product manufacturing	10.9242	11.7689	10.4433	11.3837	12.0111	11.4441	12.0861	12.6769
171	Steel product manufacturing from purchased steel	4.4346	5.5417	4.1425	4.8106	5.2912	5.1583	5.1094	5.5654
174	Aluminum product manufacturing from purchased aluminum	3.9374	4.4813	3.5519	4.1112	4.4076	4.2291	4.2718	4.7935
190	Metal can, box, and other metal container (light gauge) manufacturing	4.1928	4.9266	3.6701	4.3643	4.8042	4.4773	4.7642	5.2461
194	Spring and wire product manufacturing	7.8225	8.7546	7.4893	8.2542	8.6531	8.3317	8.5708	8.9704
201	Fabricated pipe and pipe fitting manufacturing	7.8187	8.9687	7.6296	0.0000	9.0217	8.5696	8.7702	9.3351
202	Other fabricated metal manufacturing	7.5575	8.3488	7.1903	7.8910	8.3527	8.2080	8.3812	8.7953
260	Lighting fixture manufacturing	7.4529	8.1270	6.8924	7.8443	8.1194	8.0602	8.4690	8.6776
268	Switchgear and switchboard apparatus manufacturing	5.9098	6.4825	0.0000	6.2842	6.6714	6.3557	6.7738	7.1038
272	Communication and energy wire and cable manufacturing	4.0912	4.6999	3.7914	4.3971	4.5616	4.3641	4.5369	4.8538
314	Sign manufacturing	13.5866	14.8035	14.5349	13.7797	14.9705	15.0002	14.8335	15.0236
335	Transport by truck	14.8178	15.6057	14.4261	14.9792	15.8020	15.6008	15.6575	16.1291
369	Architectural, engineering, and related services	18.3329	19.2891	16.3730	18.3756	18.3504	17.9664	17.8934	18.7959
387	Investigation and security services	33.9947	30.8990	31.0393	29.6328	33.4131	35.0828	30.9691	33.1639
390	Waste management and remediation services	10.3954	11.4434	10.0294	11.0471	11.3867	10.6941	11.5541	11.7912

*Florida's Turnpike Enterprise. Source: *IMPLAN* Data

Table 6. Total industry output multipliers by Florida Department of Transportation district and *IMPLAN* sectors

Sector #	*IMPLAN* Sector Description	District 1	District 2	District 3	District 4	District 5	District 6	District 7	FTE*
6	Greenhouse, nursery, and floriculture production	1.5405	1.5718	1.4305	1.5211	1.6054	1.6436	1.9368	1.7977
19	Support activities for agriculture and forestry	1.7280	1.9908	1.6872	1.8092	1.9262	1.8447	1.9190	2.0738
36	Construction of other new nonresidential structures	1.6333	1.8038	1.6247	1.7349	1.8223	1.7648	1.8920	1.9545
39	Maintenance and repair construction of nonresidential structures	1.6263	1.7949	1.6128	1.7179	1.7946	1.7641	1.8761	1.9216
131	Pesticide and other agricultural chemical manufacturing	1.3607	1.4011	0.0000	1.4305	1.4397	1.4114	1.4785	1.5448
145	Machine shops	1.3223	1.4411	0.0000	1.3866	1.4160	0.0000	1.4877	1.5416
149	Plumbing fixture fitting and trim manufacturing	1.3393	1.4317	1.3057	1.3810	1.4153	1.4196	1.4464	1.4931
161	Ready-mix concrete manufacturing	1.7004	1.8453	1.6290	1.6636	1.8091	1.8905	1.9537	2.0496
162	Concrete pipe, brick, and block manufacturing	1.6278	1.7669	1.5414	1.6838	1.7942	1.8046	1.8241	1.9462
163	Other concrete product manufacturing	1.5974	1.7452	1.5300	1.6503	1.7689	1.7188	1.8167	1.9245
171	Steel product manufacturing from purchased steel	1.3419	1.5762	1.3224	1.4168	1.5148	1.5021	1.4855	1.5648
174	Aluminum product manufacturing from purchased aluminum	1.2972	1.3730	1.2278	1.3201	1.3704	1.3459	1.3520	1.4681
190	Metal can, box, and other metal container (light gauge) manufacturing	1.3496	1.4987	1.2625	1.3759	1.4614	1.4053	1.4672	1.5571
194	Spring and wire product manufacturing	1.4463	1.5574	1.3695	1.5371	1.5618	1.5496	1.5867	1.6517
201	Fabricated pipe and pipe fitting manufacturing	1.4562	1.5913	1.3709	0.0000	1.5800	1.5508	1.5940	1.6429
202	Other fabricated metal manufacturing	1.4233	1.5338	1.3540	1.5116	1.5463	1.5102	1.5446	1.6265
260	Lighting fixture manufacturing	1.4314	1.5361	1.3651	1.5352	1.5721	1.5455	1.6156	1.6599
268	Switchgear and switchboard apparatus manufacturing	1.3890	1.4723	0.0000	1.4778	1.5187	1.4897	1.5388	1.6036
272	Communication and energy wire and cable manufacturing	1.2618	1.3791	1.2318	1.3289	1.3599	1.3242	1.3494	1.4115
314	Sign manufacturing	1.6254	1.7737	1.5760	1.7465	1.7895	1.7787	1.8396	1.9039
335	Transport by truck	1.6318	1.8120	1.5829	1.7423	1.7810	1.7925	1.8441	1.8921
369	Architectural, engineering, and related services	1.8228	1.9890	1.7433	2.0090	2.0134	2.0001	2.0634	2.1412
387	Investigation and security services	1.7212	1.8793	1.6797	1.8696	1.9096	1.8998	1.9556	2.0255
390	Waste management and remediation services	1.6267	1.7607	1.5866	1.7556	1.7537	1.7307	1.8424	1.8677

*Florida's Turnpike Enterprise. Source: *IMPLAN* Data

Table 7. Total value added multipliers by Florida Department of Transportation district and *IMPLAN* sectors

Sector #	*IMPLAN* Sector Description	District 1	District 2	District 3	District 4	District 5	District 6	District 7	FTE*
6	Greenhouse, nursery, and floriculture production	0.9854	0.9972	0.9128	0.9838	1.0273	1.0587	1.2263	1.1443
19	Support activities for agriculture and forestry	1.1501	1.2104	1.0249	1.2407	1.2903	1.1500	1.2596	1.3607
36	Construction of other new nonresidential structures	0.8380	0.9383	0.8041	0.9720	0.9644	0.9879	1.0238	1.0730
39	Maintenance and repair construction of nonresidential structures	0.8937	1.0054	0.8555	1.0164	1.0099	1.0369	1.0738	1.1122
131	Pesticide and other agricultural chemical manufacturing	0.4056	0.4211	0.0000	0.4388	0.4348	0.4360	0.4735	0.4990
145	Machine shops	0.4163	0.4989	0.0000	0.4502	0.4543	0.0000	0.5561	0.5765
149	Plumbing fixture fitting and trim manufacturing	0.5090	0.5464	0.4444	0.5030	0.5551	0.5603	0.5564	0.5882
161	Ready-mix concrete manufacturing	0.6463	0.7368	0.6197	0.7192	0.7277	0.7816	0.8039	0.8733
162	Concrete pipe, brick, and block manufacturing	0.6819	0.7856	0.6480	0.7922	0.7855	0.8365	0.8308	0.8969
163	Other concrete product manufacturing	0.7032	0.7888	0.6385	0.7299	0.7896	0.7828	0.8228	0.8917
171	Steel product manufacturing from purchased steel	0.2899	0.5174	0.4139	0.4132	0.4296	0.5962	0.4566	0.4807
174	Aluminum product manufacturing from purchased aluminum	0.2640	0.3796	0.2629	0.3054	0.3265	0.3286	0.3087	0.3590
190	Metal can, box, and other metal container (light gauge) manufacturing	0.3849	0.4780	0.3339	0.4317	0.4390	0.4234	0.4973	0.5159
194	Spring and wire product manufacturing	0.6556	0.6460	0.5588	0.7269	0.6921	0.7187	0.7373	0.7769
201	Fabricated pipe and pipe fitting manufacturing	0.6543	0.6292	0.5228	0.0000	0.6193	0.6592	0.6963	0.6662
202	Other fabricated metal manufacturing	0.6123	0.6247	0.5378	0.7024	0.6686	0.6137	0.6363	0.7020
260	Lighting fixture manufacturing	0.5282	0.5761	0.4951	0.6416	0.6645	0.5881	0.6096	0.6739
268	Switchgear and switchboard apparatus manufacturing	0.5792	0.6130	0.0000	0.6698	0.6449	0.6599	0.6428	0.6945
272	Communication and energy wire and cable manufacturing	0.2963	0.4093	0.2649	0.3575	0.3405	0.3089	0.3464	0.3784
314	Sign manufacturing	0.7908	0.8578	0.6529	0.9097	0.8676	0.8439	0.9158	0.9722
335	Transport by truck	0.7568	0.9062	0.6859	0.8618	0.8667	0.8639	0.9008	0.9364
369	Architectural, engineering, and related services	1.0359	1.1479	1.0251	1.2099	1.2154	1.2089	1.2663	1.3017
387	Investigation and security services	1.0759	1.2280	1.0773	1.2485	1.2184	1.1966	1.2825	1.3034
390	Waste management and remediation services	0.8714	0.9405	0.8267	0.9633	0.9442	0.9591	1.0086	1.0258

*Florida's Turnpike Enterprise. Source: *IMPLAN* Data

The expenditure profiles (Table 4) will be used to allocate cost data (Table 2) to the relevant *IMPLAN* sectors for the economic impact analysis. Table 8 shows the total expenditures for highway beautification from 2008 to 2013 in 2011 dollars by district and *IMPLAN* industry sector. Overall, district 4 had the highest expenditures of $42.7 million followed by district 6, at $28.7 million, and FTE at $28.6 million, from 2008 to 2013. Nearly 68 percent of highway beautification expenditures in all districts were determined to belong to *IMPLAN* sector 6 - Greenhouse, nursery, and floriculture production. The Fabricated pipe and pipe fitting manufacturing sector (*IMPLAN* sector 201) was the next largest expenditure category with 15 percent of the total.

Table 8. Total expenditures by Florida Department of Transportation district and *IMPLAN* sectors, FY 2008-13

IMPLAN Sector #	District 1	District 2	District 3	District 4	District 5	District 6	District 7	FTE*	Total All
					Thousand 2011 Dollars				
6	6,143.1	8,201.3	10,075.1	21,164.5	5,479.8	27,426.1	11,177.8	18,961.3	108,629.0
19	35.0	352.1	222.7	0.0	0.0	0.0	24.1	45.3	679.2
36	485.6	1,676.0	986.4	595.8	1,124.1	1,317.6	265.4	1,250.4	7,701.3
39	22.1	325.1	128.3	8,402.5	84.0	0.0	52.9	1,842.8	10,857.6
131	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.3
145	11.0	3.8	191.8	0.0	0.0	0.0	36.1	47.7	290.4
149	2.0	29.5	97.2	0.0	206.4	0.0	129.8	292.5	757.4
161	0.0	0.0	0.0	0.0	457.1	0.0	0.0	64.7	521.8
162	0.0	0.0	0.0	123.0	0.0	0.0	41.6	29.9	194.5
163	385.7	0.0	0.0	0.0	0.0	0.0	33.5	1,271.0	1,690.2
171	0.0	0.0	0.0	0.0	71.6	0.0	0.0	9.9	81.5
174	0.0	0.0	0.0	0.0	537.0	0.0	0.0	399.2	936.2
190	49.6	0.0	0.0	0.0	20.3	0.0	31.0	183.2	284.0
194	0.0	0.0	0.0	0.0	0.0	0.0	7.4	4.6	12.0
201	1,386.2	2,983.6	33.6	12,372.3	3,676.5	0.0	533.1	3,020.1	24,005.3
202	83.7	0.0	0.0	0.0	25.2	0.0	71.8	302.6	483.2
260	0.5	39.6	9.6	0.0	0.0	0.0	0.0	0.3	50.0
268	49.9	0.0	0.0	0.0	0.0	0.0	0.0	98.3	148.1
272	0.0	0.0	0.0	0.0	202.2	0.0	0.0	150.3	352.5
314	1.3	130.9	35.1	0.0	0.0	0.0	0.1	0.8	168.2
335	0.0	0.0	0.0	0.0	33.7	0.0	0.0	4.6	38.3
369	132.2	0.0	0.0	0.0	0.0	0.0	0.0	432.3	564.5
387	76.4	686.9	196.4	0.0	313.9	0.0	0.0	171.1	1,444.7
390	22.2	203.8	136.9	0.0	0.0	0.0	24.1	39.1	426.2
Total	8,886.5	14,632.5	12,113.2	42,658.1	12,231.8	28,743.7	12,428.8	28,621.8	160,316.4

*Florida's Turnpike Enterprise.

Chapter 4 – Results for Economic Contributions of Florida Highway Beautification Expenditures

Total economic impacts for highway beautification in Florida from 2008 to mid-2013 are summarized in Table 9. These results reflect the regional economic multipliers applied to highway beautification expenditures in constant 2011 dollars, by FDOT district and *IMPLAN* sector (Table 8). Total expenditures for highway beautification by the FDOT in all districts and FTE from 2008 to 2013, generated 2,112 full-time and part-time job-years, $245.2 million in output or revenue impacts, $147.6 million in value added contribution to GDP, $110.0 million in labor income impacts, $32.6 million in other property income impacts, and $5.0 million in indirect business taxes impacts.

Among districts, beautification expenditures in Florida's Turnpike Enterprise (FTE) from 2008 to 2013 generated the highest economic impacts of $51.4 million in output impacts, 403 full-time and part time jobs, $30 million in value added, followed by districts 4 and 6.

Table 9. Total economic impacts of Florida Department of Transportation highway beautification program expenditures by district, 2008-13

FDOT District	Output (M$)	Employment (Job-years)	Total Value Added (M$)	Labor Income (M$)	Other property Income (M$)	Indirect Business Taxes (M$)
1	$13.67	110	$8.04	$6.11	$1.68	$0.26
2	$23.94	252	$13.57	$9.81	$3.24	$0.52
3	$17.39	177	$10.74	$6.99	$3.45	$0.30
4	$47.87	318	$30.04	$21.19	$7.93	$0.92
5	$19.77	148	$10.23	$6.97	$2.85	$0.41
6	$47.40	394	$30.34	$22.83	$6.62	$0.88
7	$23.74	310	$14.68	$14.13	-$0.03	$0.58
*FTE	$51.39	403	$29.99	$21.99	$6.89	$1.11
Total	$245.16	2,112	$147.64	$110.03	$32.63	$4.98

* Florida's Turnpike Enterprise
Values in 2011 dollars. Employment represents fulltime and part-time jobs.

Figure 3 illustrates the total output and value-added impacts of highway beautification expenditures in Florida from 2008 to 2013 by district in 2011 dollars. Districts 4, 6 and FTE combined, accounted for 60 percent of the total output impacts and 62 percent of the total value-added impacts of highway beautification expenditures in Florida from 2008 to 2013. Simple annual average

economic impacts of highway beautification expenditures in Florida from 2008 to 2013 amounted to $46 million in output impacts and $28 million in value-added impacts.

Figure 4 shows employment impacts of Florida highway beautification expenditures by district. Employment impacts of these beautification expenditures followed a pattern by district very similar to that for output impacts. Districts 4, 6 and FTE combined accounted for 53 percent of the total employment impacts for all the transportation districts in Florida.

Figure 3. Total output and value-added impacts of Florida Department of Transportation highway beautification program expenditures by district, 2008-13

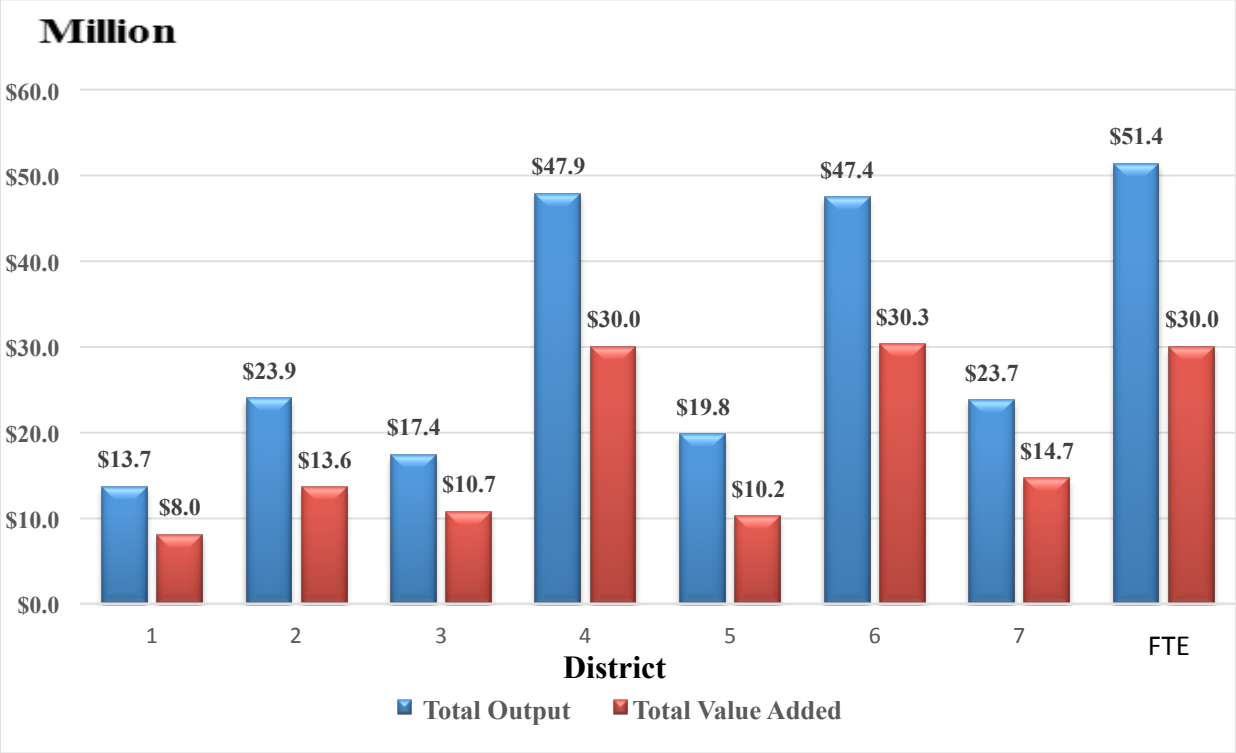
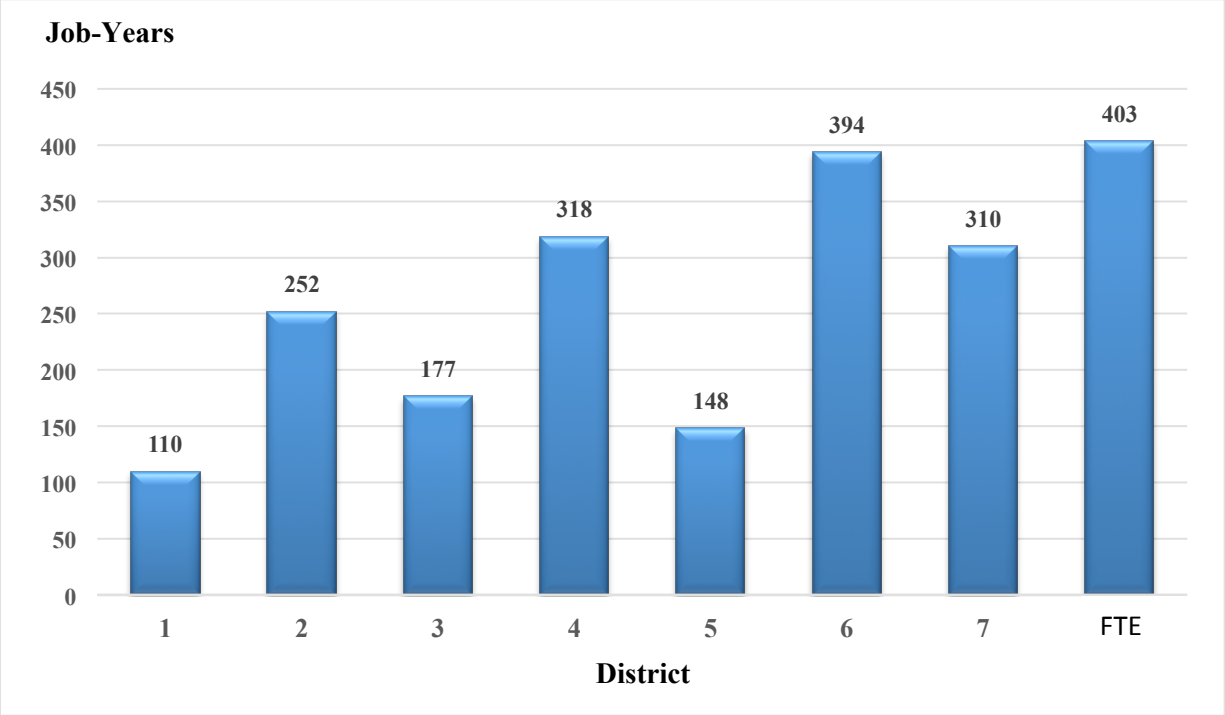


Figure 4. Total employment impacts of Florida Department of Transportation highway beautification program expenditures by district, 2008-13



Chapter 5 – Review of Economic Studies on Highway Beautification in the United States

Studies were reviewed from the literature on economics of highway beautification in the United States. The citation for each study is given below, followed by a brief summary of the findings reported.

Babcock, Michael, Edwin G. Olson, and Carlo D. Smith. Economic Analysis of Scenic Byways in Iowa, Kansas, Missouri, and Nebraska, Final Technical Report, http://www.intrans.iastate.edu/reports/scenic_byways_midwest.pdf

This study was a benefit-costs analysis of scenic byways in Iowa, Kansas, Missouri, and Nebraska in 1989-90. The analysis was based on survey of business firms and survey of byway users in the study states and on scenic road traffic counts. The results of this study provided a set of recommendations but no economic impacts measures.

Babcock, Michael W. Approximation of the Economic Impacts of the Kansas Comprehensive Transportation Program, Kansas Dept. of Transportation, Dec. 2004. ftp://ftp.mdt.mt.gov/research/LIBRARY/KS-04-5.PDF

This study estimated the impacts for "environmentally related" transportation expenditures in Kansas, includes other things besides landscaping, such as Safety, Traffic Operations, Traffic System Maintenance, and Traffic Services.

Collaborative Economics for the Great Valley Center. Corridor of Opportunity: Highway 99 as a Catalyst for Economic and Community Progress. March, 2005. http://www.coecon.com/assets/corridorofopportunity.pdf

The Highway 99 Task Force is a collaborative effort for improving the Route 99 corridor between Kern and San Joaquin Counties in California. No actual numbers are given since this report is a conceptual plan and justification for aesthetic improvements.

Gao, Xiaolu and Yasushi Asami. Economic Value of Urban Landscapes. CSIS Discussion Paper No. 67, Center for Spatial Information Science, University of Tokyo, Kashiwanoha, 5-1-5, Kashiwa, Nov. 2005. http://www.csis.u-tokyo.ac.jp/dp/67.pdf

HDR Decision Economics. Byways Economic Impact Tool: Blue Ridge Parkway Case Study, Aug. 2012. http://www.nado.org/wp-ontent/uploads/2013/02/BlueRidge_BywayEIT.pdf

This study estimated economic impacts of visitor spending, investments, and operational expenses related to the Blue Ridge Parkway, calculated using the Byways Economic Impact Tool.

Jensen, Gary. America's Byways Pay Off in Authentic Experiences, But How About Dollars? Public Roads, Publication Number FHWA-HRT-13-002, Jan. 2013. http://www.fhwa.dot.gov/publications/publicroads/13janfeb/05.cfm.

This paper provides a review of the general issue of measuring the benefits of scenic highways. A difficulty in many cases is comparing spending after the designation with that before, and how much additional spending takes place. It also provides a review of some previous studies of economic impacts and economic benefits.

Kissel, Carrie. Byways Economic Impact Tool. National Association of Development Organizations (NADO), July 16, 2012, http://www.nado.org/byways/

The author developed an Excel-based software program to help users estimate economic impacts of byways for their regions using information such as visitor counts and spending. The tool takes users through a process of inputting appropriate information and generates estimated impacts on investment, jobs, earnings, tax revenues and other measures. Four case studies are provided on the website. NADO was contacted to obtain a copy of the tool, but it does not run on 64 bit operating-system/computers.

Laverne, Robert J. and Kimberly Winson-Geideman. The Influence of Trees and Landscaping on Rental Rates at Office Buildings. Journal of Arboriculture 29(5), September 2003. http://www.actrees.org/files/Research/laverne_trees_and_rent.pdf

The authors used regression analysis to evaluate the empirical relationship between landscaping and lease rates in office buildings. They concluded that landscaping does have a positive impact on rental rates, although quality of the landscape materials also matters. As would be expected,

landscaping that is aesthetically pleasing provides an increase in office rental rates. Conversely, it was found that trees that provide a visual screen of the building negatively impact rental rates.

Liechty, Rachel S., Ingrid E. Schneider, and Brigid Tuck. Paul Bunyan Scenic Byway: Awareness, Impact on Quality of Life and Economy. University of Minnesota Tourism Center, December 2010. http://www.tourism.umn.edu/prod/groups/cfans/@pub/@cfans/@tourism/documents/asset/cfans_asset_290645.pdf

This study surveyed byway users about awareness of the byway, its impact on quality of life among residents, and its economic impact. A total of 337 respondents participated. Eight of ten residents were aware of the byway, and five of 10 travelers were aware of the byway. About nine percent of travelers visited the region specifically to use the byway, while five percent visited the region primarily because of the byway. Feeling safe was rated as the most important community attribute of the byway, followed by natural area preservation. An estimated 23,800 travel parties visited the region because of the byway in 2010, and spent a total of $21.6 million dollars. Estimated impacts were $21.2 million in output, 331 jobs, and $7.2 million in labor income.

McGurl, Vincent W. Economic Impacts of the Highway Beautification Act in Kentucky. Spindletop Research, Lexington, KY, Feb. 1967. www.ktc.uky.edu/files/2012/09/1967-Economic-Impacts-of-the-Highway-Beautification-Act-in-Kentucky.pdf

This study attempted to estimate the economic impact of loss of billboards and other road sign advertising that would occur from the implementation of the Beautification Act. It did not evaluate any specific landscaping activities.

Mok, Jeong-Hun, Harlow C. Landphair, and Jody R. Naderi. Landscape Improvement Impacts on Roadside Safety in Texas. Landscape and Urban Planning 78: 263–274, Nov. 2005. http://www.naturewithin.info/Roadside/RdsdSftyTexas_L&UP.pdf

This study tested the effect of landscape improvements on driver safety by comparing the rate of vehicle crashes before-and-after on 10 urban arterials or highway sites in Texas. The findings show a significant decrease in crash rate after landscape improvements at the 95% confidence level.

Pennsylvania Landscape and Nursery Association. The Return on Investment of Green Infrastructure Projects in the Urban Environment. Harrisburg, PA, 2007.

http://www.caes.uga.edu/center/caed/pubs/2007/documents/CR-07-06.pdf

Petraglia, Lisa, and Glen Weisbrod. A Review of Impact Studies Related to Scenic Byway Designation. Economic Development Research Group, Inc., March 2001.

The paper reviewed 20 studies conducted mostly during the 1990s, with a summary table comparing the topic, purpose, data collection methods, analysis methods, and findings. Results include averages values for a variety of spending and impact metrics.

Economic Development Research Group, Inc. A Tool-kit for Building a Scenic Byway Economic Impact Study, Boston, MA, 2001. http://www.edrgroup.com/pdf/sbyway-litrev-report.pdf

Sips, James L., A. Paul James, Joan Lindley, Terrie Campbell, Rob Gragg, and Clint Harbert. Scenic Byways: A Review of Processes, Administration, and Economic Impacts. Transportation Research Record 1599, Paper No. 971343. http://www.wsdot.wa.gov/NR/rdonlyres/B72D8B82-F8DB-43A3-A37F-A3B7789EE20C/0/ScenicBywaysReview_TRB1599.pdf

Veneziano, David, Zhirui Ye, Jim Fletcher, Jon Ebeling, and Frederica Shockley, 2009. Evaluation of the Gateway Monument Demonstration Program: Safety, Economic and Social Impact Analysis. Report prepared for the State of California, Department of Transportation, Landscape Architecture Program and Division of Research and Innovation, September, 2009. http://www.dot.ca.gov/hq/LandArch/research/docs/final_gateway_monument_eval.pdf

The report provides detailed analysis of safety, economic, and social impacts of city entranceway or gateway structures built to signify the beginning of five cities in California. Crash data from monument sites showed no patterns as being the result of its construction. Empirical Bayes analysis indicated that, on an individual basis no deterioration in safety occurred. When all sites were examined together, the number of crashes declined. Findings from the sales tax analyses and IMPLAN models suggested that the installation of gateway monuments had combined total economic impacts of $57 million in three communities in 2008-09. About two-thirds of telephone survey respondents believed that the monuments contributed positively to tourism promotion.

Wang, Y., Li, H., and Cui, P., 2007. The Impact of Character Differences of Highway Landscape on Aesthetic Perception. International Conference on Transportation Engineering, 2007, pages 2035-2040. http://ascelibrary.org/doi/abs/10.1061/40932%28246%29333

The study evaluated the impact of highway landscaping on aesthetic perceptions by users of a scenic expressway near Dali city, Yunnan Province, China. Using photographs and a questionnaire, four groups were invited to score 20 photographs representing five highway landscape categories. Results indicated that the average score for natural landscape aesthetic quality was higher than artificial landscapes, and that vivid elements such as colorful flowers received higher scores, as did landscapes with high continuity.

Wolf, Kathleen L. Freeway Roadside Management: The Urban Forest Beyond the White Line. Journal of Arboriculture 29(3), May 2003. http://archive.treelink.org/joa/2003/may/02wolf.pdf

This study was based on a national survey of pubic preferences and perceptions regarding forests and vegetation along urban freeways. Drivers responded to images depicting a range of roadside landscape treatments. The most preferred treatments were tree plantings that screened commercial buildings. The results suggest solutions for landscaping practices that create a pleasing appearance for drivers while still providing visibility for commercial properties. The survey also investigated public attitudes about roadside functions, uses, and public willingness to support roadside landscape spending. This research offers insights on how to incorporate urban forestry into the planning and management of high-speed urban transportation corridors.

Yates, Gabriela and Taylor Stein. Participant Perceptions of the Florida Scenic Highways Program Process in Four Designated Corridors. Florida Department of Transportation, July 2005.

http://www.dot.state.fl.us/research-center/completed_proj/summary_emo/fdot_bc354_37_rpt.pdf

A web-based survey was distributed to planning group participants for four scenic highway corridors that achieved designation at least 4 years prior to study. The authors concluded that the scenic highway program was (1) effective at preserving the character of unique areas, (2) contributed to desirable and appropriate promotion, 3) enhanced sustainable tourism opportunities, and (4) helped secure funding for preserving Florida's unique environments.

Unfortunately, only one study of highway improvements in other states is comparable to the present study for Florida (Babcock, Michael W., Approximation of the Economic Impacts of the Kansas Comprehensive Transportation Program, Kansas Dept. of Transportation, Dec. 2004). Most of the other studies did not use a regional input-output analysis methodology such as IMPLAN or were done before input-output analysis software was generally available. Most studies generally did not define the initial investment (expenditures), or classify the expenditures such that they that can be assigned to industry sectors, and the results were not presented as comparable measures.

The study by Babcock (2004) estimated the impacts for "environmentally related" transportation expenditures in Kansas, includes other things besides landscaping, such as Safety, Traffic Operations, Traffic System Maintenance, and Traffic Services. The study used multipliers for six categories of transportation improvements:

1. Resurfacing
2. Restoration and Rehabilitation; Reconstruction and Minor Widening
3. New Bridges and Bridge Replacement
4. Major and Minor Bridge Rehabilitation
5. New Construction; Relocation; Major Widening
6. Safety/Traffic Operations/Traffic System Management; Environmentally Related; Physical Maintenance; Traffic Services

The results of the study are summarized in Table 10.

Table 10. Economic impacts of highway improvements in Kansas (Babcock, 2004)

Highway Improvement Type	Value of Highway Contracts (Million Dollars)	Output Multiplier	Output Impact (Million Dollars)	Direct Wages and Salaries (Million Dollars)	Income Multiplier	Income Impact (Million Dollars)	Employment Multiplier (Jobs Per Million Dollars Spending)	Employment Impact (Full Time Equivalent Jobs)
Category 1	$639.8	2.671768	$1,709.4	$90.2	2.990495	$269.7	37.68	24,108
Category 2	$1,263.1	2.587211	$3,267.9	$279.1	2.346804	$655.0	42.26	53,379
Category 3	$248.2	2.374471	$589.3	$62.3	2.087858	$130.1	41.74	10,360
Category 4	$108.3	2.518010	$272.7	$41.9	1.725710	$72.3	54.44	5,896
Category 5	$476.0	2.468194	$1,174.9	$104.7	2.240519	$234.6	39.77	18,931
Category 6	$57.5	2.159928	$124.2	$10.8	2.123587	$22.9	34.12	1,962
Total	$2,792.9		$7,138.4	$589.0		$1,384.6		114,635

Chapter 6 – Studies on Infrastructure Development Programs in Florida

Studies were reviewed from the literature on economic impacts of general infrastructure improvements in the state of Florida. Four relevant studies were found. The citation for each study is given below, followed by a brief summary of the findings reported.

Economic Impacts of Florida's Transportation Investments, A Macroeconomic Analysis, Florida Department of Transportation, Sept. 2009

The economic impacts of the Florida Department of Transportation (FDOT) Work Program have been estimated for fiscal years (FYs) 2008/2009 through 2012/2013. The analysis included nearly all of Work Program expenditure (i.e., modes such as highway, rail, seaport, and transit). Table 11 summarizes the primary results. Economic benefits of the Work Program consist of personal user benefits, which arise from personal travel via highways or transit, including commuting, recreational and social trips, and increased personal income, which stems from business travel including person trips for business purposes and freight trips via truck, rail and water. With adjustments for the present value of future benefits, total benefits will be $139 billion, including $80 billion in personal travel user benefits and $60 billion in increased personal income. Total costs of $28.3 billion reflect the Work Program budget in 2008 dollars.

Table 11. Summary of benefits and costs of the Florida Department of Transportation Work Program (Billions of 2008 Dollars, 2009-2038)

Present Value of Personal Travel User Benefits	$79.7
Present Value of Increased Personal Income	$59.5
Total Economic Benefits	$139.2
Present Value of Work Program Budget Costs	$28.3
Estimated Benefit-Cost Ratio	4.92

The ratio of total benefits to costs is 4.92, meaning, on average, every dollar invested in the Work Program will yield about $4.92 in user benefits and additional productivity for the Florida economy between now and FY 2038. In parallel with increasing personal income and gross state product for Florida, the Work Program will create up to 62,000 jobs. About 40,000 of these jobs will be created in the first five years of the Work Program as transportation improvements are completed. Over the next five years, it is expected that the Work Program will increase gross state product by over

$11 billion through increased productivity. This is above and beyond the short term stimulus effect of capital spending, which is not accounted for in this analysis. The study showed a significant payoff from rail, seaport and transit improvements. Work Program investments will further increase capacity and service in these modes over the next five years.

Florida High Speed Ground Transportation Economic Benefit and Cost Impact Restudy and Public Transportation Financing and Subsidies by Mode in the United States, Tim Lynch, Center for Economic Analysis, Florida State University, August 1, 2002

Over the past three decades, more than a dozen high speed rail and magnetic levitation system economic benefit assessment and benefit-cost analysis studies have been completed by the State of Florida Department of Transportation, Florida university transportation research institutions, the U.S. Department of Transportation and internationally prominent private sector corporations and ridership consultants. The specific corridors and technologies evaluated, method of evaluation and time frames vary widely, but there is general agreement on their central conclusion: Benefits from implementing a version of high speed ground transportation across the most highly populated urbanized areas of Florida will, over time, generate benefits that are considerably in excess of system costs.

This study focused on four separate high speed ground transport studies completed over the past five years. For consistency, the results of these more recent 85-mile long central Florida St. Petersburg-Tampa-to-Orlando corridor studies were extended to the longer St. Petersburg-Tampa-Orlando-Miami approximate 325 mile corridor, and all costs and benefits were recalculated into 2002 dollar values. The standard 180 mph (or 150 mph in one case) HSR technology option from each study served as the base of this comparative analysis. Researchers also extended this analysis and calculated preliminary benefit and cost estimates for the Florida High Speed Rail Authority's "Florida Vision Plan". This plan envisions a statewide approximate 1,300-mile high speed ground transportation network eventually linking all the major urban areas of Florida.

The conclusions of these studies evaluating the 325 mile Tampa-Orlando-Miami urban areas are as follows with differences or range of values depending upon economic models used and number of years evaluated. Economic benefits of the project over its life were estimated at $39.2 to $51.5 billion in nominal dollars. Net Present Value (NPV) of the project ranges from $11.1 billion to $16.3 billion in 2002 dollars, with average NPV of economic benefits per linear mile ranging from $34 to $42 million. NPV of construction costs to build the HSR system range from $5.4 to $8.2 billion. Operational revenues exceeded operational costs and deferred a varying percentage of capital costs.

The number of permanent jobs created for Floridians varied from 5,380 to 41,267 over the life of the projects, and the average number of permanent jobs for Florida residents per corridor mile ranged from 16.6 to 127. The overall benefit/cost ratio over the life of the projects varied from 1.34 to 3.02.

Economic Impacts of Wildfire, John M. Diaz, SFE Fact Sheet 2012-7

Following the terrible wild-fire season in Florida in 1998, the U.S. Joint Fire Science Program funded a research project to evaluate the impacts of wildfires that occurred in the St. Johns River Water Management District (SJRWMD) of Florida and provide insight into what is necessary to recover from catastrophic wildfires. The 1998 wildfires burned more than 499,000 acres mostly on the east side of the state, destroyed or damaged 337 homes, and cost approximately $880 million (M), including $605M for timber losses, $100M for fire suppression costs, $25M for disaster relief, $12M in property losses and $138M in tourism spending losses.

Economic and Social Impacts of the Florida Film and Entertainment Industry Financial Incentive Program, *Preliminary Report Prepared for the Motion Picture Association of America*, MNP, March 2013

The Florida film and entertainment industry is a significant contributor to the state economy through the creation of jobs, generation of income for Florida residents and businesses, and tax revenues. In addition, film and entertainment production in Florida contributes to the visitor industry through the exposure of Florida productions to a global market. The Florida Film and Entertainment Industry Financial Incentive Program encourages the use of Florida locations for all facets of digital, film, and television production.

In 2012, a study was conducted on the impacts of the incentive program on the Florida economy and to state government revenue collections. The study concluded that the Florida film and entertainment industry is an important contributor to the State economy. However, the scope of the analysis only included production spending, and as a result, certain sources of economic impacts were not captured by this study. In a follow-up study, the economic impacts were assessed for film production spending and infrastructure spending, as well as film-induced tourism. Using the IMPLAN economic impact model and the production expenditure schedule used in the earlier study, MNP estimated the economic impacts arising from the $3.7 billion in qualified and associated non-qualified production spending in Florida that resulted from $296 million in funding beginning in 2011.

Estimates reported in the study are presented in Table 12, with tax revenues given in nominal dollars while all other measures are in constant 2005 dollars.

Table 12. Estimated economic impacts of film production spending in Florida

Production Expenditures ($2005 millions)	$3,769
Output (2005 $millions)	$6,235
Gross State Product (2005 $millions)	$3,631
Employment (Full Time Equivalent)	53,466
Labor Income (2005 $millions)	$1,984
State and Local Taxes (Nominal $millions)	$350

Chapter 7 – Comparison of Economic Contributions of Highway Beautification in Florida to Other States and Other Infrastructure Investments

Two studies from the literature were selected as representative of economic impacts of transportation improvement programs in other states (Babcock, 2004) and other infrastructure improvement in Florida for comparison to Florida highway beautification program spending. The results of these studies are compared to the present study in Table 13 in terms of initial investment, and economic impacts for output, employment, value added, labor income, and state and local taxes.

In order to better compare the results of these studies, which differ in overall scale, impacts were also expressed on a per dollar initial investment basis in Table 14. For the present study of highway beautification in Florida, the impact per dollar of investment was $1.53 in output, $0.92 in value added, $0.62 in labor income, and $0.03 in state and local taxes, while the employment impact was 13.2 jobs per million dollars of investment. The economic impacts of general transportation improvements in Kansas reported by Babcock (2004) had a much higher output impact per dollar of investment ($2.56) and employment impact per million dollars of investment (41 jobs), although the labor income impact per dollar invested was somewhat lower. The study of the film industry in Florida reported levels of economic impacts per dollar of investment slightly higher than for highway beautification, except for labor income.

These comparisons show that the economic impacts of different infrastructure investments can vary widely, depending upon the time periods, method of analysis, and region, due to differences in the underlying economic structure of the regions.

Table 13. Comparison of economic impacts for studies in the United States with Florida Department of Transportation highway beautification program

Study	Initial investments ($M)	Output impacts ($M)	Employment impacts (Jobs)	Value added impacts ($M)	Labor income impacts ($M)	State and local tax impacts ($M)
Highway Beautification Economic Impacts (present study)	160	245	2,112	148	110	5
Highway Improvements in Kansas (Babcock, 2004)	2,793	7,138	114,634	NA	1,385	NA
Film and Entertainment Industry in Florida	3,769	6,235	53,466	3,631	1,984	350

Table 14. Comparison of economic impacts per dollar initial investment for studies in the United States with Florida Department of Transportation highway beautification program

Study	Output impacts	Employment impacts (Jobs/$M)	Value added impacts	Labor income impacts	State and local tax impacts
Highway Beautification Economic Impacts (present study)	$1.53	13.2	$0.92	$0.69	$0.03
Highway Improvements in Kansas (Babcock, 2004)	$2.56	41.0	NA	$0.50	NA
Film and Entertainment Industry in Florida	$1.65	14.2	$0.96	$0.53	$0.09

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Appendix: Glossary of Economic Impact Terms

Employee compensation is comprised of wages, salaries, commissions, and benefits such as health and life insurance, retirement and other forms of cash or non-cash compensation.

Employment is a measure of the number of jobs involved, including full-time, part-time and seasonal positions. It is not a measure of full-time equivalents.

Exports are sales of goods to customers outside the region in which they are produced, which represents a net inflow of money to the region. This also applies to sales of services to customers visiting from other regions.

Final Demand represents sales to final consumers, including households and governments, and exports from the region.

Gross Regional Product is a measure of total economic activity in a region, or total income generated by all goods and services. It represents the sum of total value added by all industries in that region, and is equivalent to Gross Domestic Product for the nation.

IMPLAN is a computer-based input-output modeling system that enables users to create regional economic models and multipliers for any region consisting of one or more counties or states in the U.S. The current version of the *IMPLAN* software, version 3, accounts for commodity production and consumption for 440 industry sectors, 10 household income levels, taxes to local/state and federal governments, capital investment, imports and exports, transfer payments, and business inventories. Regional datasets for individual counties or states are purchased separately.

Impact or total impact is the change in total regional economic activity (e.g., output or employment) resulting from a change in final demand, direct industry output, or direct employment, estimated based on regional economic multipliers.

Imports are purchases of goods and services originating outside the region of analysis.

Income is the money earned within the region from production and sales. Total income includes labor income such as wages, salaries, employee benefits and business proprietor income, plus other property income.

Indirect business taxes are taxes paid to governments by individuals or businesses for property, excise and sales taxes but do not include income taxes.

Input-Output (I-O) model and Social Accounting Matrix (SAM) is a representation of the transactions between industry sectors within a region that captures what each sector purchases from every other sector in order to produce its output of goods or services. Using such a model, flows of economic activity associated with any change in spending may be traced backwards through the supply chain.

Intermediate sales are sales to other industrial sectors. The value of intermediate sales is netted-out of Total Value Added.

Local refers to good and services that are sourced from within the region, which may be defined as a county, multi-county cluster, or state. Non-local refers to economic activity originating outside the region.

Margins represent the portion of the purchaser price accruing to the retailer, wholesaler, and producer/manufacturer, in the supply chain. Typically, only the retail margins of many goods purchased by consumers accrue to the local region, as the wholesaler, shipper, and manufacturer often lie outside the local area.

Multipliers capture the total effects, both direct and secondary, in a given region, generally as a ratio of the total change in economic activity in the region relative to the direct change**.** Multipliers are derived from an I-O model of the regional economy. Multipliers may be expressed as ratios of sales, income, or employment, or as ratios of total income or employment changes relative to direct sales. Multipliers express the degree of interdependency between sectors in a region's economy and therefore vary considerably across regions and sectors. A **sector-specific multiplier** gives the total changes to the economy associated with a unit change in output or employment in a given sector (i.e., the **direct economic effect)** being evaluated. **Indirect effects**

multipliers represent the changes in sales, income, or employment within the region in backward-linked industries supplying goods and services to businesses (e.g., increased sales in input supply firms resulting from more nursery industry sales). **Induced effects multipliers** represent the increased sales within the region from household spending of the income earned in the direct and supporting industries for housing, utilities, food, etc. An **imputed multiplier** is calculated as the ratio of the total impact divided by direct effect for any given measure (e.g., output, employment).

Other property income represents income received from investments, such as corporate dividends, royalties, property rentals, or interest on loans.

Output is the dollar value of a good or service produced or sold, and is equivalent to sales revenues plus changes in business inventories.

Output-consumption ratio is the total industry output divided by the apparent consumption, for any given commodity or industry, and is a measure of the degree to which local demands are met by local production.

Producer prices are the prices paid for goods at the factory or point of production. For manufactured goods the purchaser price equals the producer price plus a retail margin, a wholesale margin, and a transportation margin. For services, the producer and purchaser prices are equivalent.

Proprietor income is income received by non-incorporated private business owners or self-employed individuals.

Purchaser prices are the prices paid by the final consumer of a good or service.

Region defines the geographic area for which impacts are estimated, usually an aggregation of several counties defined on the basis of worker commuting patterns.

Sector is an individual industry or group of industries that produce similar products or services, or have similar production processes. Sectors are classified according to the North American Industrial Classification System (NAICS).

Value Added is a broad measure of income, representing the sum of employee compensation, proprietor income, other property income, indirect business taxes and capital consumption (depreciation). Value added is a commonly used measure of the contribution an industry to regional economy because it avoids double counting of intermediate sales.