

Economic Impact from Maryland's Surface Transportation Spending

2007-2011

final report

prepared for

Maryland Transportation Commission

prepared by

Economic Development Research Group, Inc.

in association with

Cambridge Systematics, Inc.

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Economic Development Research Group, Inc.
2 Oliver Street
Boston, MA 02110

in association with

Cambridge Systematics, Inc.
4800 Hampden Lane, Suite 800
Bethesda, Maryland 20814

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Executive Summary

The Fiscal Context for Transportation Spending

Transportation spending is not an optional activity. Maryland's surface transportation system of highways and transit plays a vital role in the State's economy, enabling the efficient flow of people and goods to, from, and within the State. The State's residents depend on this system for commuting to work and for shopping, education and other personal activities. The State's businesses depend on this system to access its workforce, for incoming deliveries of materials and outgoing delivery of products to markets. Without adequate spending to maintain the facilities and operate the services, these household and business activities would over time become more difficult, more costly, more dangerous or impossible to sustain. And yet, with continuing changes in the State's population base and economic base, needs for new transportation investments to maintain and grow the State's economy continue to evolve.

Recognizing these factors, Maryland's transportation facilities and services are continuously maintained and improved through the development and implementation of the *Maryland Transportation Plan* (a long-range vision of the State's anticipated transportation needs), the Annual Attainment report (rating transportation system performance), and the annual *Consolidated Transportation Program (CTP)*, which lists and describes capital investments that are budgeted over a six-year period. The most recent CTP covering FY 2012-2017 reflects strategic choices by MDOT in light of a slow national economic recovery, shortfalls in Transportation Trust fund revenues, and uncertainty from Congress on reauthorization of the national transportation bill.

In today's economic climate, the financing of transportation investments and operations is challenging Maryland as well as other states around the country. That makes it important to consider the benefits of transportation investment decisions and their impacts on the State's economy, as well as the costs involved. Recommendations from the Governor's Blue Ribbon Commission on Transportation Funding are designed to help balance competing transportation system needs within a continued environment of financial constraint.¹

To further assist in public discussion of transportation spending, it is useful to understand the ways that this spending affects jobs and income within Maryland. Accordingly, the Office of Planning and Capital Programming at the Maryland Department of Transportation (MDOT) commissioned this study of the statewide economic implications associated with 2007-2011 surface transportation investments.

¹ The final report (November 2011) is available at www.mdot.maryland.gov/Planning/Blue_Ribbon/Documents/BRC_Final_Report_Nov_01_2011.pdf

It is important to note that there are two major categories of economic impact:

1. **Spending Effect** – Tracing how MDOT spending on jobs, materials, and services generates an immediate flow of dollars within the State's economy as well as a flow of dollars to businesses outside of the State, which is called *leakage*. This distinction is important in showing how a transportation agency's spending supports businesses, jobs, and worker income within the State.
2. **Productivity and Competitiveness Effect** – Calculating how a given transportation investment program can affect regional accessibility and mobility enough to change long-run operating costs and competitiveness for businesses in the State. This is only meaningful if compared to some realistic alternative scenario that would not improve system functionality.

This study focuses on the first of these categories – addressing how MDOT agency spending (SHA and MTA budgets, as well as WMATA support) flows through the State's economy and generates additional sales, jobs, and wages in Maryland. The second category of impact is more appropriate for analysis when there are choices concerning long-term system quality, maintenance, or major capacity or accessibility improvements and as such was not undertaken at this time. It should also be noted that the Maryland Transportation Authority (MDTA) was not considered in this study because it not part of the State's Transportation Trust Fund.

Beneficiaries of State Transportation Spending

Maryland state-level spending on surface transportation flows predominantly from three agencies: the State Highway Administration (SHA), the Maryland Transit Administration (MTA) and a portion of the Washington Metropolitan Area Transit Authority (WMATA) budget which is contributed by Maryland. While the fundamental justification for this spending is to address transportation needs of Maryland residents and businesses, it is notable that much of this spending also flows back to support jobs and worker payrolls in Maryland.

This is not the case with all forms of spending. For instance, when a resident buys a television or electronic appliance, a small portion of the money spent goes to retail and wholesale workers in Maryland while a larger portion goes to manufacturers in Asia. On the other hand, when money is spent to build and maintain highways and transit terminals, or to operate buses and trains, then a large share of the spending goes directly to Maryland workers for the simple reason that construction activities and transit operations require on-site workers. That aspect makes transportation investment a reasonable form of spending when short-term job stimulus is desired. A national study has confirmed that transportation investment supports more jobs than similar levels of spending on most other public investments.²

² *How Infrastructure Investments Support the U.S. Economy*, Political Economy Research Institute, University of Massachusetts, 2009. <http://www.peri.umass.edu/236/hash/efc9f7456a/publication/333/>

Spending on transportation facilities and operations also leads to broader impacts on Maryland jobs and wages. Besides directly hiring construction and transportation operations workers, transportation money is spent on purchases of materials and services, some of which are provided by Maryland-based suppliers. Examples include purchases of crushed stone, earthmoving, drainage systems, controls, electrical service, design/engineering, and repair services). Those supplier activities support additional jobs and wages that are referred to as “indirect” effects. Together, the direct and indirectly-supported jobs provide wages for Maryland workers, who spend some of their wages on consumer purchases that support yet more jobs at retail stores and consumer services businesses in Maryland (referred to as “induced” effects”).

This updated report by Economic Development Research Group and Cambridge Systematics traces the actual hiring and vendor spending patterns of SHA, MTA and WMATA (Maryland share) over the past five years, and shows how that spending leads to broader effects on jobs and wages in Maryland.

MDOT Surface Transportation Spending

MDOT’s combined highway and transit spending over the five-year period of 2007-2011 totaled approximately \$13.1 billion (expressed in inflation-adjusted, constant 2011 dollars). This included three major components:³

- The State Highway Administration’s (SHA) program of spending over the five years totaled \$5.5 billion (adjusted for inflation), including American Recovery and Reinvestment Act (ARRA) funds in the last three years. That included costs of SHA payroll, operations and maintenance, plus highway capital investments.
- The Maryland Transit Administration (MTA) spending totaled \$4.3 billion over that same period (adjusted for inflation). That included MTA’s capital projects as well as payroll and supplier purchases for operations and maintenance. It also included ARRA funds and MTA funding for local operating grants.
- Maryland’s contribution toward the operating budget and capital program of the Washington Metropolitan Area Transit Authority (WMATA) over the five-year period was \$3.2 billion (adjusted for inflation). That included Maryland funding of WMATA capital projects funds as well as the state match for federal funds.

Overall Impact on the Maryland Economy

By analyzing the pattern of state spending on transportation capital investment and operations, and by applying an economic model of Maryland, it is possible to trace the ways in which direct spending on transportation also leads to broader indirect

³ Additional highway spending is carried out by the Maryland Transportation Authority (MDTA), which is responsible for the state's toll facilities. However, that is not covered by this report because MDTA is self financing and is not part of the state’s Transportation Trust Fund (TTF).

(business supplier) and induced (wage respending) impacts on the State's economy. The analysis indicates \$13.1 billion of Maryland state transportation spending over the past five years generated a total of \$29.3 billion of business output within the state over that same period. This includes \$12.9 billion paid in wages flowing to Maryland workers, supporting an average of 34,805 jobs per year for the five-year period. (See table ES-1.)

Table ES.1 Summary of Total Impacts from MDOT Program Outlay Over 2007-2011
(Five Year Total, in Billions of Year 2011 Dollars)

Five-Year Total Impact	State Highway Administration	Maryland Transit Administration	WMATA ^a (Maryland Portion)	All Agencies
Total Spending Budget	\$5.5	\$4.3	\$3.3	\$13.1
Total Impact on State Economic Output	\$13.6	\$9.3	\$6.4	\$29.3
Associated Impact on Labor Income	\$6.7	\$3.1	\$3.0	\$12.9
Associated Job-Years Supported	77,644	50,523	45,854	174,021
Average Jobs each Year (of a 5-yr period)	15,529	10,105	9,171	34,805

^a WMATA: Washington Metropolitan Area Transit Authority.

These numbers also indicate that state spending on surface transportation largely stays within the State. The totals for all agencies show that, for every dollar of state spending on transportation, there is a two dollar increase in total statewide output, and ultimately \$0.98 that goes back to state residents in the form of wages. Those wages support a total of 13.3 jobs in Maryland, per million dollars of state transportation spending.

Economic Impact Ratios

The preceding ratios vary by agency. For instance, the ratio of impact on total state output per transportation dollar averages 2.0 but varies (among agencies in Table ES-1) from 1.8 to 2.3. And ratio of total jobs generated (per million dollars spent) averages 13.3 but varies from 11.6 to 14.0. The variation is due to differences in the capital/operating mix of expenditures among agencies, and differences in the types of labor, equipment and materials needed for infrastructure and operations of different modes. Differences in agency expenditure profiles are shown in the report.

It is important to avoid concluding that some modes will always have higher job generation ratios than others, for the simple reason that these ratios can and do vary over time, among programs and among agencies. For instance, it is clear that transit system operation generates more total jobs per million dollar of spending than transit capital investment. This occurs because transit system operation requires local drivers, while transit capital investment requires purchase of rolling stock that is not made in Maryland. However, spending money on operations without capital

investment is not a viable long-term option since bus and train systems cannot continue to operate reliably when equipment is kept well beyond its useful life.

Another factor to consider is that costs of labor, equipment and materials tend to increase over time due to inflation, so a million dollars of spending will support fewer jobs and miles of road construction as time goes on. That phenomenon holds for nearly any kind of spending. Yet it is possible for job generation ratios to increase if Maryland attracts more material, service and equipment suppliers in the future. And conversely, those ratios can fall if Maryland suppliers move out or outsource activities to out-of-state locations. For these reasons, it would be wrong to conclude that any particular type of transportation spending (capital vs. operations, or highway vs. transit) is systematically more desirable than another because of its job generation impact only. But it is reasonable to infer that strategic economic development can increase these ratios in the future.

Benchmark Comparisons

The transportation spending patterns reported in this study (covering 2007-2011) were compared to a prior study of Maryland's 1997-2006 transportation spending.⁴ The comparison showed that the capital investment share of highway spending has remained generally constant (accounting for 78 - 80% of spending), while the capital investment share of transit spending has dropped (from 47% to 31% for MTA, and from 41% to 25% for Maryland's share of WMATA).

The current capital investment ratios for transit in Maryland (25% - 31%) are in line with a national study that found capital investment now accounts for 29% of public spending on transit.⁵ That same study confirmed that spending on transit operations generates more jobs than the same level of spending on transit capital. However, it also noted that spending mix should be based on facility and service needs rather than job generation rates.

The finding of this study regarding the ratio of short-term Maryland jobs supported per million dollars of transportation spending was also compared with studies conducted in other states. In general, it is known that job impact ratios vary across the US, and increase with size of the study area and its economy (since large economies will include more in-state manufacturers and service providers and have less "leakage" of money to outside suppliers). This pattern is reflected in results of comparable ratios from studies in Virginia, Kansas, Massachusetts, California, Oregon and Wisconsin, which show ratios in the range of 14 to 18 jobs per million dollars of transportation spending. National ratios are even higher, ranging from 18 to 27 depending on the type of spending.)

⁴ *Economic Impact from Maryland's Surface Transportation Spending: 1997-2006*, Maryland Transportation Commission, 2006. <http://www.marylandroads.com/OPPEN/economy.pdf>

⁵ *Economic Impact of Public Transportation Investment*, American Public Transportation Association, 2009. www.apta.com/resources/reportsandpublications/Documents/economic_impact_of_public_transportation_investment.pdf

Impacts on Productivity and Competitiveness

Transportation investment does not merely generate business orders, wages and jobs in Maryland; it also enables transportation systems to be maintained and improved, which ultimately helps the State's productivity, competitiveness and long-term economic growth. Conversely, there can be a large "opportunity cost" associated with failure to sufficiently invest in the preservation and maintenance of transportation facilities and services, for two reasons: (1) deferred maintenance can lead to higher reconstruction costs later on, and (2) losing businesses due to deficient transportation will raise costs for attracting new business to replace them.

It is possible to demonstrate these longer-term effects by showing how maintenance and expansion projects affect household and business transportation costs, access to markets and competitiveness. However, this requires development of specific spending and project investment scenarios. A growing number of states are now addressing those issues through studies that show how implementing long-term transportation strategies will affect the economic well-being of state residents. Even without such a study, though, it is clear that Maryland is a crossroads for national and international commerce, with major highways and rail lines connecting to international air and sea ports, as well as to major cities in surrounding states. Given that position, the ability of Maryland to compete in a changing national and global marketplace will depend (to a significant degree) on its ability to maintain good transportation services and conditions for the movement of people and freight. This report, which focuses on documenting the economic consequences of state transportation spending, is one key step in the development of the case for Maryland transportation investment.

1.0 Introduction

1.1 BACKGROUND

Maryland's transportation system enables the flow of people and goods to, from, and within the State. Residents depend on this system for commuting to work and for shopping, education and other personal activities. Businesses depend on this system to access their workforce, for incoming deliveries of materials and outgoing delivery of products to markets. Without adequate spending to maintain these facilities and services, household and business activities in Maryland would over time become more difficult, more costly, more dangerous or impossible to sustain. And yet, with continuing changes in the State's population base and economic base, needs for new transportation investments to maintain and grow the State's economy continue to evolve.

Maryland DOT also generates jobs and economic activity through expenditures on activities that develop and maintain road, rail, air, and marine facilities, as well as through its financial support for the operation of public transportation services. The relationship is complex – a variety of different private providers and public agencies are responsible for these various activities and are involved in making expenditures and collecting revenues associated with them. The impact is also ubiquitous – together these transportation facilities and services touch every aspect of the state economy and the lives of all Maryland residents. There is virtually no element of the Maryland's economy that does not rely on the State's transportation system in order to function.

Maryland's transportation system investments are necessary for reasons of safety, efficiency, and economic competitiveness. They also provide a significant economic stimulus in creating jobs, boosting incomes, and spurring additional business activity. This study brings facts and figures behind these investments to light, to highlight the ways that this spending affects jobs and income within Maryland. It focuses on the economic impact of Maryland DOT spending to support the State's highways, transit systems, bikeways, walkways, and trails – Maryland's surface transportation system.

1.2 OBJECTIVE

This study focuses on the cumulative impact of the 2007-2011 capital and operating programs of the Maryland DOT, which includes the budget for its State Highway Administration (SHA), Maryland Transit Administration (MTA) and the subsidy it provides for the Washington Metropolitan Transit Authority (WMATA). It reflects changing priorities for both highway and public transit spending as presented in the Maryland Transportation Plan (a long-range vision of the State's anticipated transportation needs) and the annually updated

Consolidated Transportation Program (CTP), which lists and describes capital investments scheduled for construction over a six-year period. However, this study does not cover impacts of spending by the Maryland Transportation Authority (MDTA), since the MDTA operates toll facilities which not covered by Maryland DOT and are not part of the Transportation Trust Fund.

1.3 ORGANIZATION OF THE STUDY

This report is organized into six sections plus an appendix. This first section provides background information concerning the motivation and scope of this report. The next three sections cover the core analysis: Section 2.0 defines the economic impacts and methods used for analysis. Section 3.0 summarizes the highway and public transit spending budgets of Maryland DOT, which are the drivers of subsequent impacts on the economy. Section 4.0 then presents the analysis findings concerning the flow of dollars within the state economy and their implications for jobs and income within the State.

Section 5.0 provides a comparison of the relative size of public and private sector jobs in the State's transportation-related activities, including air and sea as well as surface (highway, transit, and railroad) modes. Section 6.0 discusses implications of the report findings.

2.0 Definition & Methodology for Evaluating Economic Impacts

2.1 TYPES OF TRANSPORTATION EXPENDITURES

The link between transportation investment and economic outcomes is multifaceted due to differences in the various types of expenditures and the types of economic outcomes. In general, we can distinguish *transportation expenditures* in terms of three categories:

1. **Development of New Facilities** - Including construction of right-of-way (e.g., highways, rail lines), terminals (freight and passenger), vehicles (trains, buses) and operating facilities (maintenance and traffic control equipment);
2. **Maintenance of Facilities and Equipment** - Including labor and materials needed for continued operation and upkeep (to preserve functionality and safety) of right-of-way, terminals, rolling stock, operating control facilities; and
3. **Operation of Services** - Including labor and materials needed for continued operation of bus-, rail-, truck-, or car-related transportation services as appropriate for transporting passengers and/or freight.

It is also important to distinguish public and private roles, which differ by mode. The development and upkeep of highway and roadway facilities is predominantly the responsibility of government, and the SHA carries out this responsibility for most major highways in the State, while local governments operate and maintain the local system. The MTA and WMATA operate most of the public transportation bus and all of the regional subway and light rail systems that Maryland residents use. County-run transit systems provide additional bus and shuttle services. However, Maryland's commuter rail system (MARC) operates on private railroad tracks through arrangements with Amtrak and CSX corporation. Trucking services, which use many public facilities to carry out their operations, are entirely the responsibility of private companies. While state funding of highway investments is focused primarily on capital projects, Maryland's funding for public transit includes a major emphasis on supporting continued operation of existing public transit services.

2.2 TYPES OF ECONOMIC IMPACTS

We can distinguish economic impacts in terms of two categories:

1. **Spending Effect** - Tracing how MDOT spending on jobs, materials, and services generates a flow of dollars within the state economy as well as a flow of

dollars to businesses outside of the State, which is called “leakage.” This distinction is important in showing how a transportation agency’s spending supports businesses, jobs, and worker income within the State.

2. **Productivity and Competitiveness Effect** - Calculating how a given transportation investment program can affect system regional accessibility and mobility enough to affect operating costs and competitiveness for businesses in the State. This is only meaningful if compared to some realistic alternative scenario that would not improve system functionality.

This study focuses on the first of those two categories - how MDOT agency spending (SHA and MTA budgets, as well as WMATA support) generates additional sales, jobs, and wages in Maryland. The second category of impact is more appropriate for analysis when there are choices to be made concerning long-term system quality, maintenance, or major capacity or accessibility improvements.

2.3 ELEMENTS OF SPENDING IMPACTS

While the primary justification for State transportation spending is to address the transportation needs of Maryland residents and businesses, it is also useful to trace how much of this spending actually flows back to support jobs and worker payrolls in Maryland.

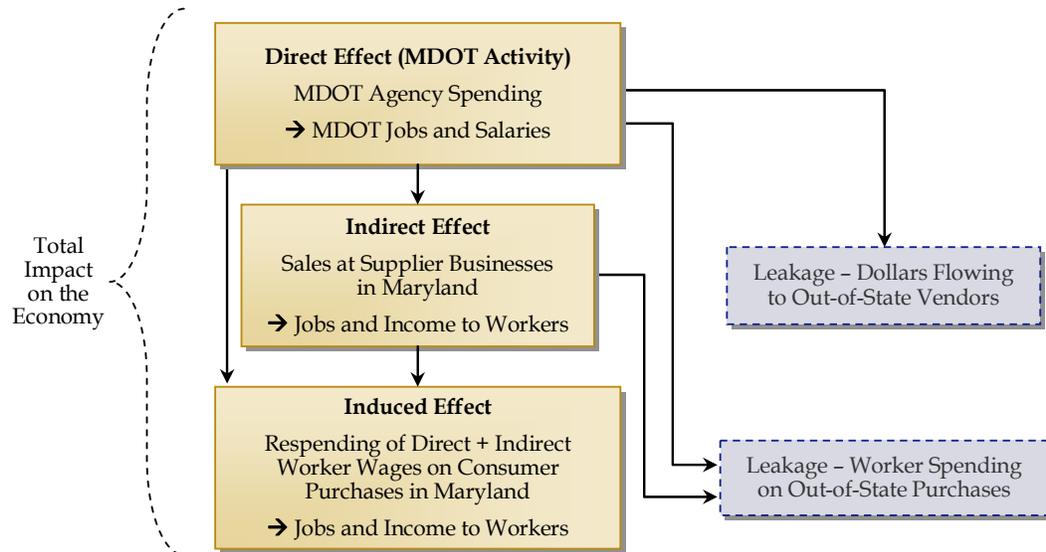
First, it is important to note that not all money spent in Maryland ends up supporting jobs and workers in the State. For instance, when a resident buys a television or electronic appliance, a small portion of the money spent goes to retail and wholesale workers in Maryland while a larger portion goes to manufacturers in Asia. On the other hand, when money is spent to build and maintain highways and transit terminals, or to operate buses and trains, then a large share of the spending goes directly to Maryland workers for the simple reason that construction activities and transit operations require on-site workers. That characteristic explains why transportation investment is a desirable target when short-term job stimulus is desired.

Economists define impacts of state transportation spending as a series of effects, depicted in Figure 2.1. They fall into three categories:

1. **Direct Effects** - Maryland DOT spending on highways (through the SHA) and on public transit (through the MTA and WMATA expenditures) supports: a) worker payroll and; b) orders to vendors for operations and maintenance materials and services; and c) orders to vendors for capital projects.
2. **Indirect Effects** - The extent to which direct spending on vendors supports Maryland suppliers and their workers, as well as other supporting businesses. An example is road construction that may involve purchases of engineering services, crushed stone and earthmoving services from Maryland-based suppliers. Expenditures which purchase out-of-state goods and services “leak” out of the state economy and are excluded from the benefits estimates (see Figure 2.1).

3. **Induced Effects** - Indirect effects are the portions of worker income, from the direct and indirect jobs occurring within Maryland, that are respent on consumer purchases and that support additional business activities within Maryland.

Figure 2.1 Generation of Economic Impacts Related to MDOT Activities



2.4 DATA SOURCES

Data for this study were derived from the current employment, payroll and operating and capital budgets of the State Highway Administration (SHA) and Maryland Transit Administration (MTA), as well as from previous and current budgets developed in Maryland’s annual *Consolidated Transportation Program* (CTP). For transit expenditures, the State’s share of capital and operating spending to support the Washington Metropolitan Area Transportation Authority’s (WMATA) transit system and the spending for the Maryland Transit Administration (MTA) were accounted for separately in this analysis.

The portion of spending that flows to Maryland businesses and the portion of payroll and jobs going to Maryland residents were estimated on the basis of data from Maryland DOT and a statewide IMPLAN economic model (described in the next subsection).

Additional information on statewide jobs associated with port, airport, and private transportation services is presented in Section 5.0, based on data from the U.S. Department of Commerce (County Business Patterns).

2.5 IMPACT ANALYSIS METHODOLOGY

Economic Impact Model. The indirect and induced economic impacts of investments in Maryland's surface transportation system were estimated using the IMPLAN statewide input-output model for Maryland. IMPLAN is one of the most widely used analysis tools for measuring or estimating the economic impacts associated with plant openings, closings, expansion, contraction and expenditures related to new construction, and ongoing operations of infrastructure and facilities. It shares three fundamental features also found in the other two commonly used economic impact tools within the United States (RIMS-II and REMI):

1. It is based on the *national input-output technology tables*, developed by the U.S. Department of Commerce, Bureau of Economic Analysis. This shows how each type of industry relies on a different mix of its own labor and supplies as well as those purchased from other industries.
2. It is calibrated to reflect *local economic patterns* (of employment, payroll, business sales, and markets sold to) occurring within Maryland. This provides a *default* measure (which can be overwritten with more localized data if available) for each industry that quantifies the extent to which spending benefits other Maryland businesses or households.
3. It distinguishes the *direct effects* from *indirect and induced (spin-off) effects* and measures them in terms of jobs, income, value added, and business sales (output).

The Maryland IMPLAN model was calibrated with region-specific industry data for 2009. Besides containing a three-digit North American Industry Classification System (NAICS) code-based industry database (describing employment, sales, productivity, average compensation), the main capability of the IMPLAN model resides in its input-output core. The core combines the structure of relationships between industries, between industries and types of final demands arising in Maryland, the extent to which local suppliers (or conversely import dependence) meet local product demands, and Maryland businesses' role in trade with the rest of the world.

Analysis Assumptions. Several assumptions are used in preparing the raw data from SHA and MTA for use in the IMPLAN model. The assumptions either: a) create more detail on the spending activities beyond what the raw data portrays; b) rescale dollar concepts (e.g., from nominal basis to 2011 constant dollar series); or c) capture how much of agency spending is fulfilled by Maryland businesses instead of imports. The principal assumptions are:

- All dollar figures are restated in constant year 2011 dollars, based on inflation factors derived from the *Finance – Cost of Construction Index* series (provided in the MDOT Memorandum dated May 7, 2010).
- Ninety-three percent of SHA workers, 94 percent of MTA workers, and 71 percent of the WMATA workers are residents of Maryland.

- SHA Capital Program spending data were detailed for the following activities: Planning/Engineering (P/E), Construction, and Right-of-Way (ROW). P/E activities included both private engineering contracting firms and MDOT employees. For new road capital projects, work on P/E activities by MDOT employees is included in the MDOT construction payroll category. Overall, about 18 percent of SHA capital spending went to P/E activities across all project types.
- MTA Capital Program spending data describes bus and rail vehicle purchases (from out-of-state) 27.7 percent, equipment purchases, 2.8 percent, and a category of “Other purchases,” 69.5 percent. This latter category was assigned predominantly to construction activities, 61.6 percent, miscellaneous professional services (engineering, legal, environmental consulting, other business services), 3.5 percent, wholesale, 2.5 percent, and manufacturing, 32.4 percent.
- Maryland funding towards WMATA’s Capital Program goes towards bus and rail vehicle purchases (from out-of-state) 27.7 percent, construction activities, 39.8percent, and equipment rehabilitation-repair, 32.5 percent.
- Maryland’s operating subsidy to WMATA is allocated to various spending categories in the same proportions as the overall WMATA operating budget (using the FY 2011 detail).
- The Maryland IMPLAN model is calibrated with industry-specific “regional purchase coefficients,” which describe the percentage of Maryland DOT vendor purchases that are supplied by Maryland businesses. These values are estimated on the basis of the State’s economic mix and structure, and can be replaced when actual MDOT vendor data indicate a different rate of in-state purchasing. Rail car and bus purchases tied to either the MTA or WMATA capital programs are assumed to be filled entirely by out-of-state manufacturers. Table 2.1 shows MDOT’s reliance on local purchases for select vendor industries. Each vendor category produces different amounts of additional spending or “spin-off” activity within the State.

Table 2.1 Key Categories of MDOT Suppliers and the Portion Provided by In-State Workers and Firms (2007-2011)

Select Vendors in Maryland	Capital			O&M	
	SHA	MTA	WMATA	SHA	MTA & WMATA
Engineering Services	90%	-	-	-	-
Construction – New Roads	100%	-	-	-	-
Construction – Drainage	96%	-	-	-	-
Construction – Road Repair	-	-	-	100%	-
Construction – Maintenance/Repair	100%	-	-	100%	100%
Construction – “Other Facilities”	100%	-	-	-	-
Construction – Structure Maintenance/Repair	-	100%	-	-	-
Construction – Tunnels	-	100%	100%	-	-
Wholesale	72%	72%	-	-	-
Transit: Operations and Maintenance	-	-	-	-	100%
Engine Equipment Manufacturing	-	100%	-	-	-
Bus Repair	-	-	3%	-	-
Communication Equip Repair	88%	-	-	-	64%
Electrical Equipment Repair	-	-	88%	-	-
Facility Support Services	-	-	-	-	51%
Vehicle Repair (Except Autos)	-	-	-	-	90%

Note: Entries denoted with “-” indicate zero allocation based on mapping broad program spending categories to NAICs.

3.0 Public Spending on Surface Transportation Facilities and Services

3.1 OVERVIEW OF SPENDING

This section describes the amount and composition of MDOT spending over the 2007-2011 period. It covers spending on capital investment, maintenance and operations of facilities and services. (Agency spending on right-of-way purchases, financing expenses and debt-servicing are excluded from this analysis since those expenditures denote a transfer of income/property, not additional demand for the Maryland economy to garner.)

Overall, MDOT's highway and transit spending over the five-year period totaled \$13.1 billion (expressed in inflation-adjusted, constant 2011 dollars). This included three major components:

- The State Highway Administration's (SHA) program of spending over the five years totaled \$5.5 billion (adjusted for inflation), including American Recovery and Reinvestment Act (ARRA) funds in the last three years. That included costs of SHA payroll, operations and maintenance, plus highway capital investments.
- The Maryland Transit Administration (MTA) spending totaled \$4.3 billion over that same period (adjusted for inflation). That included MTA's capital projects as well as payroll and supplier purchases for operations and maintenance. It also included ARRA funds and MTA funding for local operating grants.
- Maryland's contribution toward the operating budget and capital program of the Washington Metropolitan Area Transit Authority (WMATA) over the five-year period was \$3.2 billion (adjusted for inflation). That included Maryland funding of WMATA capital projects funds as well as the state match for federal funds.

The remainder of this chapter provides a breakdown of the composition of spending by each of these three agencies, focusing on the split between staff and worker payroll, expenditures for capital investment and expenditures for operations and maintenance. That is followed by more detailed breakdowns of capital project spending and operations spending by agency and program.

3.2 COMPOSITION OF SPENDING

The composition of the spending over 2007-2011 is shown in Table 3.1 and is portrayed by program area in Figures 3.1 to 3.3. Table 3.6 below provides additional information about labor expenditures for operations and maintenance

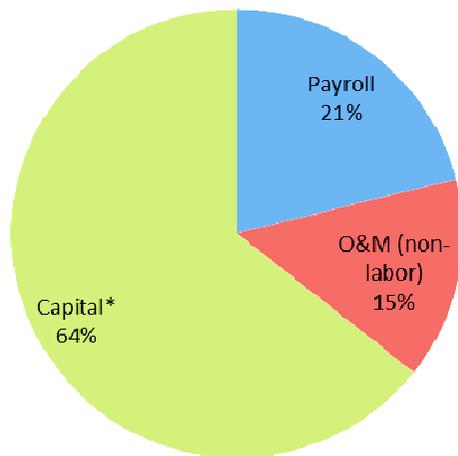
Table 3.1 MDOT Surface Transportation Spending
2007-2011, in 2011 Dollars (Thousands)

	(2007-2011) Five-Year Period		
	SHA	MTA	WMATA MD\$ ^b
Capital Projects	\$4,227,301	\$1,389,146	\$828,386
Operating	\$1,299,703	\$2,969,769 ^a	\$2,428,629
Total Expenditure	\$5,527,004	\$4,358,916	\$3,257,015
Annual Average Totals	\$1,105,401	\$871,783	\$651,403

^a Includes the \$0.48B in local operating grants.

^b Maryland support of WMATA operating expenses includes the operating subsidy and fare box revenues collected in-state.

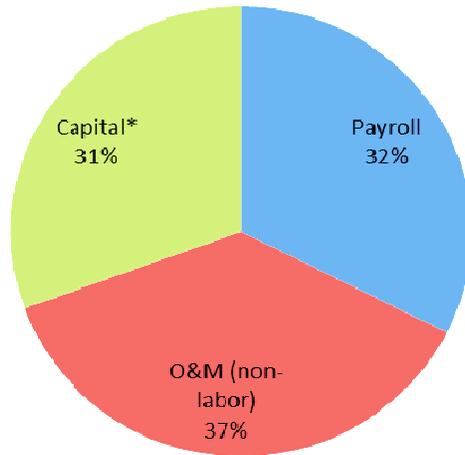
Figure 3.1 Profile of SHA Spending



Spending (Billions of Dollars)	Payroll	O&M (Non-Labor)	Capital ^a
SHA	\$1.17	\$0.80	\$3.56

^a Capital spending is net of SHA agency payroll.

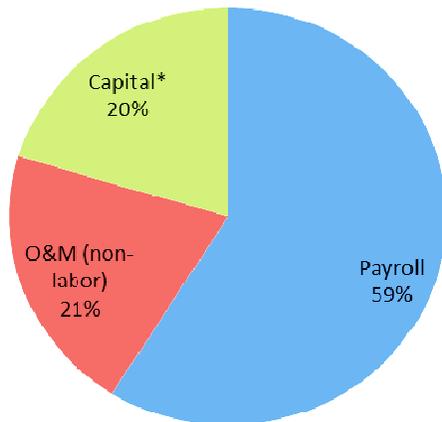
Figure 3.2 Profile of MTA Spending



Spending (Billions of Dollars)	Payroll	O&M (Non-Labor)	Capital*
MTA	\$1.41	\$1.62	\$1.33

*Capital spending is net of MTA agency payroll.

Figure 3.3 Profile of WMATA Spending



Spending (Billions of Dollars)	Payroll	O&M (Non-Labor)	Capital*
MD Operating Subsidy WMATA	\$1.92	\$0.68	\$0.66

*Capital spending is net of WMATA agency payroll.

Payroll data reflect total compensation, which includes fringe benefits. Fringe benefits include health benefits and retirement contributions. It is the take-home earnings for MDOT workers residing in Maryland that will drive consumer (household) spending impacts.

For non-labor spending by each agency, the impacts generated depend on how much of the initial MDOT purchases come from Maryland businesses. Table 3.2 shows the reliance on Maryland businesses to supply MDOT with the goods and services involved in investing in the surface transportation system.

Table 3.2 Portion of Vendor Spending Flowing within Maryland Economy

	SHA	MTA	WMATA
Nonwage Budget (Thousand 2011 Dollars) ^a	\$4,360,095	\$2,946,935 ^b	\$1,340,597
Amount Retained in Maryland	\$4,283,314	\$2,123,296	\$944,977
Percent Retained	98.2%	72.1%	70.5%

^a Projected budget portion pertaining to capital and operations and maintenance (O&M) activities for 2007-2011, in constant 2011 dollars.

^b Includes the \$0.48B in local operating grants.

Differences in an agency's mix of Capital and Operating & Maintenance spending will affect the reliance on in-state suppliers. The in-state spending related to SHA budget is 98 percent, and is between 70-72 percent for MTA and the MD contribution into WMATA's budget.

3.3 CAPITAL PROGRAM SPENDING

Details on the types of MTA and SHA capital projects undertaken between 2007-2011 are shown in Tables 3.3 and 3.4. These tables present the total investment and the allocation between Planning/Engineering activities (P/E) and Construction phases. For the MTA capital program, \$5.5 million is spent on P/E activities. For the SHA capital program, almost \$574 million is spent on P/E across all projects, and the remainder is for Construction.

Table 3.3 MTA Capital Project Spending
2007-2011, in 2011 Dollars (Thousands)

Agency	Total	Percent of Total
New Marc Vehicles	\$101,536	7.6%
Used MARC Vehicles	\$26,139	2.0%
New Buses	\$145,827	11.0%
Mobility Vehicles	\$26,099	2.0%
Lots Vehicles	\$69,186	5.2%
Capital Equipment	\$37,677	2.8%
Other Capital Expenditures	\$918,596	69.0%
Planning/Engineering	\$5,545	0.4%
Total	\$1,330,605	100.0%

The MTA capital spending was allocated to the following categories using MDOT's capital programming databases: bus/rail purchases, equipment purchases, and "other" purchases. The SHA capital program data segmented the P/E expense separate from "construction expenditure." The latter was allocated across different private-sector industries based on the type of capital project.

Where P/E activities were fulfilled by MDOT staff, that impact was measured through the SHA payroll analysis (to avoid a double-counting).

Table 3.4 SHA Capital Project Spending
Period of 2007-2011, in 2011 Dollars (Thousands)

Fund	Planning/Engineering	Construction	Total	Percent of Total
Primary Roads	\$52,117	\$309,200	\$361,317	10.2%
Secondary Roads	\$11,252	\$244,457	\$255,709	7.2%
Interstate	\$22,643	\$196,108	\$218,751	6.1%
Woodrow Wilson Bridge	\$32,432	\$314,014	\$346,445	9.7%
Environmental Preservation	\$9,841	\$14,899	\$24,740	0.7%
Enhancements	\$2,839	\$45,297	\$48,136	1.4%
Noise Barriers	\$4,698	\$23,218	\$27,915	0.8%
Rest Areas and Info Centers	\$2,771	\$13,444	\$16,215	0.5%
Access Controls	\$0	\$1,154	\$1,154	0.0%
Crash Prevention	\$701	\$23,309	\$24,009	0.7%
Pilot Program	\$0	\$378	\$378	0.0%
Guardrail End Treatment	\$129	\$23,921	\$24,050	0.7%
Ada Retrofit	\$390	\$24,924	\$25,313	0.7%
Communication	\$9	\$1,009	\$1,018	0.0%
Capital Equipment	\$2,587	\$29,341	\$31,928	0.9%
Statewide Planning and Research	\$88,448	\$7,790	\$96,238	2.7%
Environmental Compliance	\$8,319	\$12,595	\$20,915	0.6%
Drainage	\$23,995	\$38,238	\$62,233	1.7%
Emergency	\$491	\$4,225	\$4,716	0.1%
Safety and Spot Improvement	\$40,197	\$135,587	\$175,784	4.9%
Resurfacing and Rehabilitation	\$56,893	\$624,577	\$681,470	19.2%
Pedestrian Access To Transit	\$80	\$1,900	\$1,980	0.1%
Sidewalks	\$274	\$6,477	\$6,751	0.2%
Bridge Replacement/Rehabilitation	\$65,739	\$307,019	\$372,758	10.5%
Commuter Action Improvements	\$2,733	\$4,950	\$7,683	0.2%
TMDL Compliance	\$122	\$184	\$306	0.0%
Urban Street Reconstruction	\$6	\$380	\$386	0.0%
Community Safety and Enhancements	\$1,086	\$124,029	\$125,115	3.5%
Traffic Management	\$92,584	\$94,646	\$187,230	5.3%
C.H.A.R.T.	\$42,401	\$15,144	\$57,545	1.6%
Intersection Capacity Improvements	\$7,962	\$48,911	\$56,873	1.6%
Bicycle Retrofit	\$242	\$3,648	\$3,890	0.1%
Facilities			\$109,463	3.1%
Reimbursables			\$136,977	3.9%
Truck Weight			\$12,190	0.3%
Major IT Capital			\$29,811	0.8%
Total	\$573,981	\$2,694,971	\$3,557,394	100%

For Maryland's contribution towards the WMATA capital program, all project dollars were designated for Construction phase activities with the exception of project management and support under Program Management. Table 3.5 shows a breakdown of the estimated capital investments supported by Maryland contributions into WMATA.

Table 3.5 WMATA Capital Project Spending
Period of 2007-2011, in 2011 Dollars (Thousands)

WMATA Capital Detail	Total	Percent of Total
A. Infrastructure Renewal Program		
Rolling Stock Bus	\$133,941	21.5%
Rolling Stock Rail	\$2,857	0.5%
Passenger Facilities	\$71,647	11.5%
Maintenance Facilities	\$37,436	6.0%
Systems	\$33,077	5.3%
Track and Structures	\$50,989	8.2%
Info Technology	\$34,432	5.5%
Preventative Maintenance	\$50,864	8.2%
Urgent Capital Needs	\$16,194	2.6%
Subtotal	\$431,438	69.3%
B. Eight Car Train Capital Initiative		
Rail Cars	\$62,535	10.0%
Facilities	\$46,396	7.5%
Systems	\$46,661	7.5%
Subtotal	\$155,592	25.0%
C. Bus Improv. Cap. Initiative		
Buses	\$4,261	0.7%
Garage	\$10,831	1.7%
Customer Facilities	\$6,354	1.0%
Subtotal	\$21,446	3.4%
D. Program Management		
Program Management and Support	\$13,852	2.2%
Total	\$622,328	100%

3.4 OPERATIONS AND MAINTENANCE SPENDING

Table 3.6 shows the five-year totals on operations and maintenance spending over the 2007-2011 period. As shown in the table, public transportation operations and maintenance spending is larger than for the highway program. Conversely, and as previously discussed, highway capital outlays are higher than those for transit.

Table 3.6 SHA and Transit Spending on Labor and Vendors for Operations and Maintenance
2007-2011, in 2011 Dollars (Thousands)

	Five-Year Expenditure
SHA	
Labor Compensation – O&M Activities ^a	\$497,002
Contractual Services	\$409,487
Supplies and Materials	\$137,589
Other Operating Costs	\$255,625
Total	\$1,299,703
MTA	
Labor Compensation – O&M Activities ^a	\$1,353,754
Contractual Services	\$849,290
Supplies and Materials	\$39,086
Other Operating Costs	\$728,387
Total ^b	\$2,970,517
Maryland's Operations Subsidy to WMATA	
Labor Compensation – O&M Activities ^a	\$1,750,741
Major Contract Maintenance	–
Other Contractual Services	\$274,710
Other Operating Costs	\$403,179
Total	\$2,428,629

^a Labor compensation is for MDOT staff.

^b Includes Local Operating Grants.

4.0 Impacts on Maryland's Economy

4.1 OVERVIEW OF IMPACTS

By analyzing the pattern of state spending on transportation capital investment and operations, and by applying the IMPLAN economic model of Maryland, it is possible to trace the ways in which direct spending on transportation also leads to broader indirect (business supplier) and induced (wage respending) impacts on the State's economy. The analysis indicates \$13.1 billion of Maryland state transportation spending over the 2007-2011 period generated a total of \$29.3 billion of business output within the state over that same period. This includes \$12.9 billion paid in wages flowing to Maryland workers, supporting an average of 34,805 jobs per year for the five-year period.

The remainder of this chapter provides a breakdown of economic impacts by agency, with separate discussions of SHA, MTA and WMATA spending impacts on the Maryland economy. These results are a result of (a) the capital and operations spending patterns presented in Section 2, and (b) characteristics of the Maryland economy, as indicated by the economic model. A statewide summation of the total spending impact of all three agencies is then presented, and those results are benchmarked against prior Maryland studies and recent research conducted in other states.

4.2 SHA-RELATED ECONOMIC IMPACTS

Table 4.1 presents findings on the total economic impact of SHA spending on O&M and capital improvements over the five-year (2007-2011) period, which also includes American Reinvestment and Recovery Act (ARRA) dollars during the years of 2010 and 2011. The SHA budget, in the first row of the table, is presented in terms of output or purchases, payroll (a portion of the budget), and jobs supported by that payroll over the five-year period (expressed in job-years). The economic model analysis estimates the indirect and induced effects for the Maryland economy in terms of impacts on output, income, and jobs.

Direct Agency Effect - SHA's projected total budget over the five-year period from 2007-2011 is over \$5.5 billion (expressed in constant 2011 dollars). That includes over \$1.17 billion in labor costs for SHA workers, directly supporting approximately 3,197 jobs each year.

Total Economic Impact - Altogether, these results indicate that the SHA budget will lead to over \$13.5 billion of business sales in Maryland (supporting over \$6.7 billion of wages in Maryland) over the five-year period. Those wages will sup-

port 77,644 job-years, reflecting an average of 15,5294 Maryland jobs each year over that period.⁶

These results indicate that SHA’s capital spending generates the largest indirect and induced impacts for Maryland. This comes as no surprise, as we saw in Section 3 that labor-intensive capital projects constitute 64 percent of SHA’s outlays over five years. The total impact on jobs can be interpreted as follows: every SHA job is linked to, roughly speaking, another 3.9 jobs elsewhere in the Maryland economy (15,985 versus 61,658).

Figure 4.1 shows the industry distribution of additional Maryland jobs that are supported by SHA spending. These jobs result from the indirect multiplier effect (creating jobs at supplier businesses) and the induced multiplier effect (created as a result of respending of worker income). The results indicate that the service and construction sectors are the largest beneficiary of SHA vendor spending, through new road construction or road rehab activities, however, there are also impacts on trade (wholesale and retail trade), Transportation, Information, and Public Utilities (TIPU), and manufacturing.

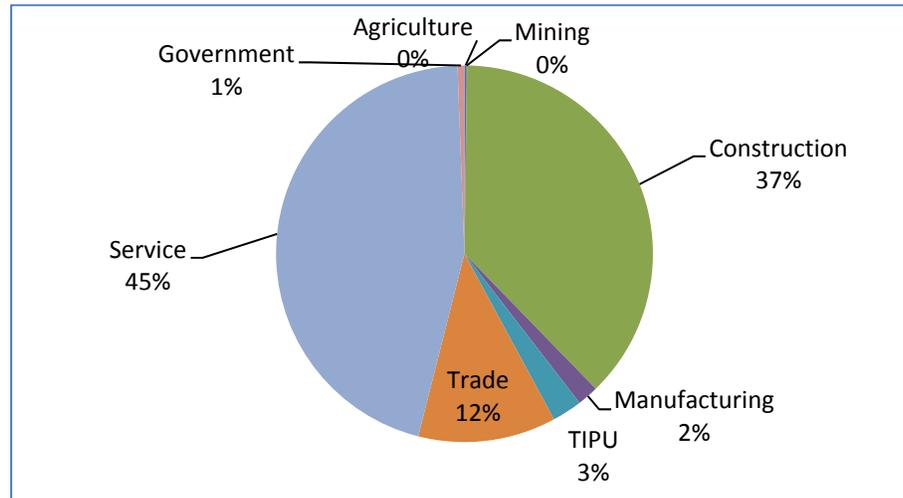
**Table 4.1 Total Impact on Maryland Economy from SHA Spending
2007-2011, in 2011 Dollars**

Category of Impact	Output	SHA Labor Income (Share of Output)	Jobs ^a
SHA Agency Budget (5 years)	\$5,527,003,978	\$1,166,909,301	15,986
Total Impact on Rest of MD Economy (5 yrs)			
Resulting from SHA Worker Wage Respending	\$780,035,573	\$269,982,113	6,539
Resulting from SHA Oper. & Maint. Spending	\$1,291,205,027	\$426,560,068	8,394
Resulting from SHA Capital Spending	\$5,975,453,651	\$4,880,955,084	46,725
Subtotal	\$8,046,694,251	\$5,577,497,265	61,658
Total Impact (5 years)	\$13,573,698,229	\$6,744,406,566	77,644

^a Value reflects total job-years.

⁶ References to jobs and job-years represent the employment supported by MDOT spending on SHA and MTA activities. These figures do not necessarily represent new workers entering the Maryland workforce each year.

Figure 4.1 Mix of Additional Maryland Jobs Created by SHA Spending



Non-SHA jobs =61,658

4.3 MTA-RELATED ECONOMIC IMPACTS

Table 4.2 presents the total economic impact of MTA spending for O&M and capital improvements over the five-year (2007-2011) period and ARRA dollars from 2009-2011. The MTA budget, in the first row of the table, is shown in terms of output, or purchases, payroll (a portion of the budget) and jobs supported by that payroll over the five-year period (expressed in job-years). The economic model analysis estimates indirect and induced impacts for the Maryland economy in terms of impacts on output, income, and jobs.

Direct Agency Effect - MTA's projected total budget over the five-year period from 2007-2011 is over \$4.3 billion (expressed in constant 2011 dollars). That includes \$1.4 billion of labor costs for MTA workers, which directly support 3,108 jobs each year.

Total Economic Impact - Altogether, these results indicate that the MTA budget will lead to almost \$9.3 billion of business sales in Maryland (supporting over \$3.1 billion of wages in Maryland) over the five-year period. The total impact on job-years (50,523) reflects an average of 10,105 Maryland jobs each year over the five-year period.

**Table 4.2 Total Impact on Maryland Economy from MTA Spending
2007-2011, in 2011 Dollars**

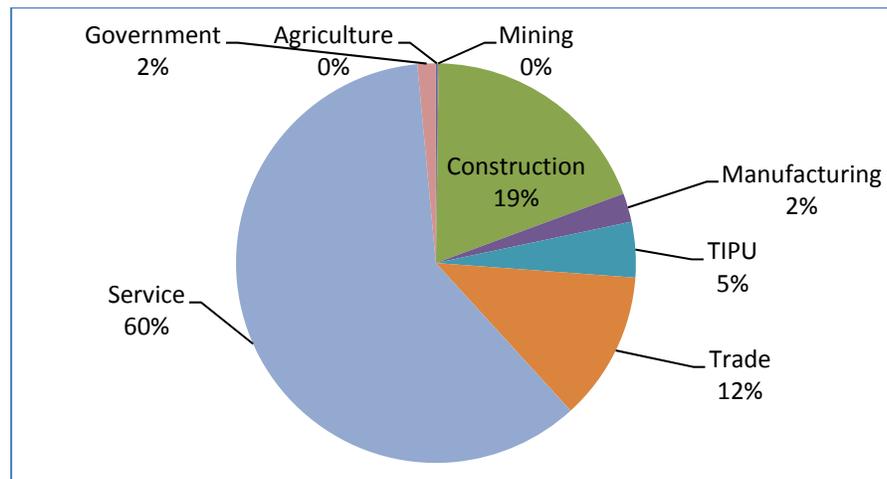
Category of Impact	Output	MTA Labor Income (Share of Output)	Jobs ^a
MTA Agency Budget (5 years)	\$4,358,915,716	\$1,411,980,464	15,541
Total Impact on Rest of MD Economy (5 yrs)			
Resulting from MTA Worker Wage Responding	\$957,851,714	\$331,526,952	8,030
Resulting from MTA Oper.& Maint. Spending	\$2,525,607,811	\$788,915,835	15,347
Resulting from MTA Capital Spending	\$1,459,270,972	\$596,826,001	11,605
Subtotal	\$4,942,730,497	\$1,717,268,788	34,982
Total Impact (5 years)	\$9,301,646,213	\$3,129,249,252	50,523

^a Value reflects total job-years.

MTA’s O&M spending produces the largest source of non-direct economic impacts (MTA capital purchases for rail rolling stock, buses and other capital equipment are imported and therefore constrains reliance on in-state jobs).

Each MTA job is tied to an additional 2.25 jobs elsewhere in the State. The businesses that are impacted by MTA spending are shown in Figure 4.2. Whereas the construction sector is assigned a large portion of SHA spending (40 percent of the total), the services sector is where the largest share of additional jobs impacts result due to MTA spending (56 percent). This follows from what is shown earlier in Figure 3.2 – namely that 66 percent of MTA’s annual spending covers labor payments and O&M, and these activities typically funnel dollars into services and retail/wholesale trade by virtue of how households spend their disposable income and that O&M activities involve contract services.

Figure 4.2 Mix of Additional Maryland Jobs Created by MTA Spending



Non-MTA jobs = 34,982

4.4 WMATA-RELATED ECONOMIC IMPACTS FOR MARYLAND

Table 4.3 presents findings on the total economic impact of MDOT's fare box revenue, the State's operating subsidy contribution to WMATA's O&M and capital improvements expenditures, the State's share of Federal contributions to capital over the five-year (2007-2011) period, and ARRA dollars in 2010 and 2011. The Maryland DOT portion of WMATA's budget, in the first row of the table, is presented in terms of output, or purchases, estimated payroll going to Maryland workers (a portion of the budget) and Maryland jobs supported by that payroll over the five-year period (expressed in job-years). The economic model analysis estimates indirect and induced effects impacts for the Maryland economy in terms of impacts on output, income, and jobs.

Direct Agency Effect - Maryland's WMATA fare box dollars and operating subsidy in large part pay for WMATA workers with Maryland addresses. The labor dollars, \$1.9 billion over five years (see Figure 3.3) when divided by WMATA's average personnel expense (inclusive of over-time) from WMATA identify 22,450 job-years within WMATA held by Maryland residents, reflecting an average of 4,490 jobs each year. The combined effect of capital program spending and operating subsidy and fare box revenues is almost \$3.3 billion for the five-year period.

Total Economic Impact - Altogether, these results indicate that the Maryland contribution of over \$3.3 billion on capital projects and operating subsidy (inclusive of fare box revenues) to WMATA will lead to \$6.4 billion of business sales in Maryland (supporting \$3.0 billion of wages for Maryland workers) over that five-year period. The total impact on job-years (45,854) reflects an average of 9,171 Maryland jobs each year.

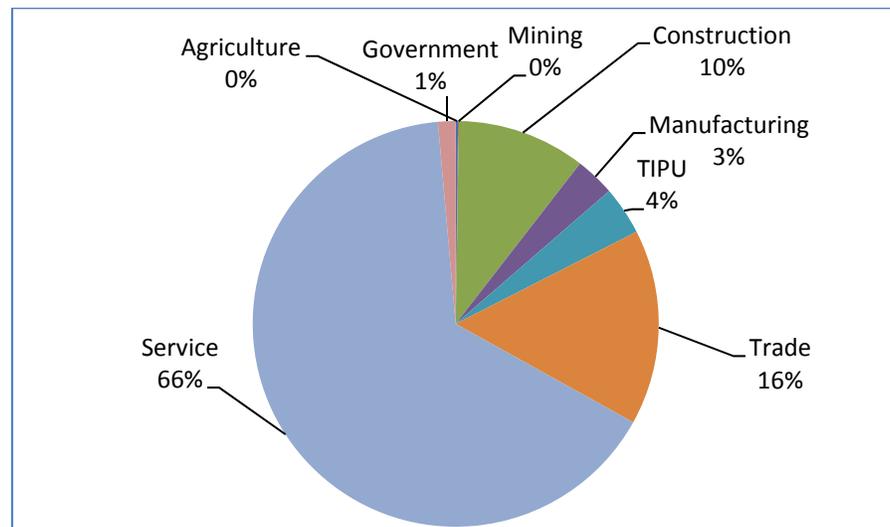
Table 4.3 Total Impact on Maryland Economy from Maryland's Share of WMATA Funding, 2007-2011, in 2011 Dollars

Category of Impact	Output	WMATA Labor Income (Share of Output)	Jobs ^a
WMATA Agency Budget (5 years)	\$3,257,015,349	\$1,916,418,267	22,450
Total Impact on Rest of MD Economy (5 yrs)			
Resulting from WMATA Worker Wage Responding	\$1,372,276,913	\$474,965,783	11,504
Resulting from WMATA Oper. & Maint. Spending	\$1,058,955,003	\$330,782,302	6,435
Resulting from WMATA Capital Spending	\$717,078,548	\$300,919,621	5,466
Subtotal	\$3,148,310,464	\$1,106,667,706	23,405
Total Impact (5 years)	\$6,405,325,813	\$3,023,085,973	45,854

^a Value reflects total job-years.

The business sectors that are affected by MDOT’s support of WMATA are shown in Figure 4.3. With similar emphasis on capital spending and O&M spending as MTA budgeting, the additional Maryland jobs supported by WMATA-related spending are primarily in the service industry, followed by trade, construction, and then distributed across the other industry sectors in a similar mix as for MTA spending.

Figure 4.3 Mix of Additional Maryland Jobs Created by MDOT Support of WMATA



Non-WMATA Jobs = 23,405

4.5 TOTAL ECONOMIC IMPACTS FROM ALL SURFACE INVESTMENTS

The total economic effects of Maryland DOT’s spending on surface transportation modes are shown in Table 4.4 and Figure 4.4. Altogether, these results indicate a direct spending budget of over \$13.1 billion over the 2007-2011 interval, leading to \$29.3 billion of business sales in Maryland, supporting \$12.9 billion of wages for Maryland workers. The total impact on job-years (174,021) reflects an average of 34,804 Maryland jobs each year.

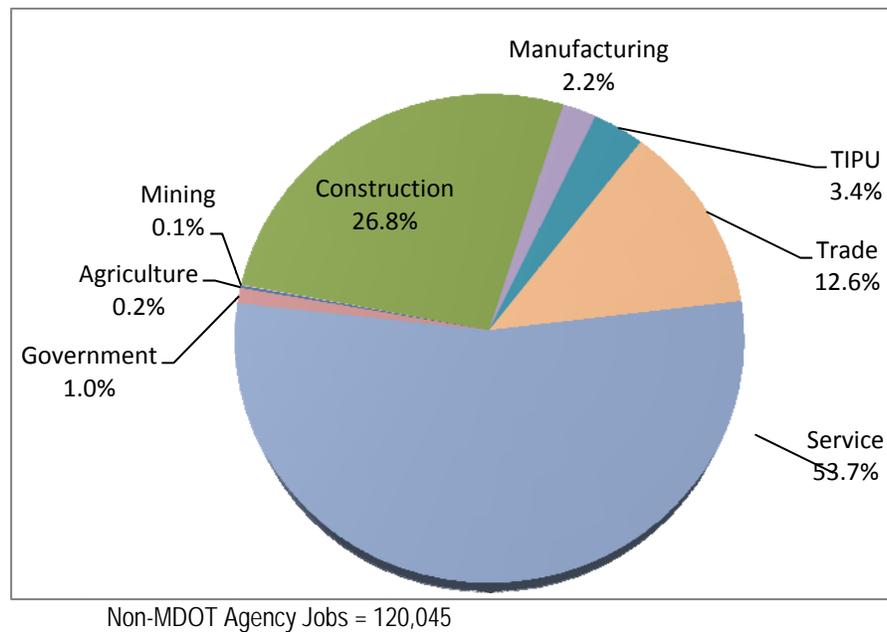
These numbers also indicate that state spending on surface transportation largely stays within the State. The totals for all agencies show that, for every dollar of state spending on transportation, there is a \$2.20 increase in total statewide output, and ultimately \$0.98 that goes back to state residents in the form of wages. Those wages support a total of 13.3 jobs in Maryland, per million dollars of state transportation spending.

Table 4.4 Total Impact on Maryland Economy from MDOT Surface Transportation Spending (SHA + MTA + Share of WMATA), 2007-2011, in 2011 Dollars

Category of Impact	Output	MDOT Labor Income (Share of Output)	Jobs ^a
MDOT Agency Budget (Five Years)	\$13,142,935,043	\$4,495,308,032	53,976
Total Impact on Rest of MD Economy (5 yrs)			
Resulting from MDOT Worker Wage Respending	\$3,110,164,200	\$1,076,474,848	26,073
Resulting from MDOT Oper. & Maint. Spending	\$4,875,767,841	\$1,546,258,205	30,175
Resulting from MDOT Capital Spending	\$8,151,803,171	\$5,778,700,706	63,797
Subtotal	\$16,137,735,212	\$8,401,433,759	120,045
Total Impact (5 years)	\$29,280,670,255	\$12,896,741,791	174,021

^a Value reflects total job-years.

Figure 4.4 Mix of Additional Maryland Jobs Created by MDOT Surface Spending Programs (SHA + MTA + Share of WMATA)



Interpretation of Economic Impact Ratios. The preceding ratios vary by agency. For instance, the ratio of impact on total state output per transportation dollar averages 2.2 but varies (among agencies in Table 4.4) from 1.8 to 2.3. And ratio of total jobs generated (per million dollars spent) averages 13.3 but varies from 11.6 to 14.0. The variation is due to differences in the capital/operating mix of expenditures among agencies, and differences in the types of labor, equipment and materials needed for infrastructure and operations of different modes, as previously discussed in Section 3.

It is important to avoid concluding that some modes will always have higher job generation ratios than others, for the simple reason that these ratios can and do vary over time, among programs and among agencies. For instance, it is clear that transit system operation generates more total jobs per million dollar of spending than transit capital investment. This occurs because transit system operation requires local drivers, while transit capital investment requires purchase of rolling stock that is not made in Maryland. However, spending money on operations without capital investment is not a viable long-term option since bus and train systems cannot continue to operate reliably when equipment is kept well beyond its useful life.

Caution should also be exercised in the way that these ratio numbers are to be used. They do confirm that much of the Maryland DOT spending on surface transportation does help to support jobs and business sales in the state economy. However, these findings should not be construed to indicate a benefit/cost relationship, since they do not account for long-term transportation user benefits accruing from this spending, nor do they indicate whether transportation spending generates more activity in the economy than alternative uses of the funds. However, a separate national study has confirmed that transportation investment tends to support more jobs than similar levels of spending on most other public investments.⁷

Another factor to consider is that costs of labor, equipment and materials tend to increase over time due to inflation, so a million dollars of spending will support fewer jobs and miles of road construction as time goes on. That phenomenon holds for nearly any kind of spending. Yet it is possible for job generation ratios to increase if Maryland attracts more material, service and equipment suppliers in the future. And conversely, those ratios can fall if Maryland suppliers move out or outsource activities to out-of-state locations. For these reasons, it would be wrong to conclude that any particular type of transportation spending (capital vs. operations, or highway vs. transit) is systematically more desirable than another because of its job generation impact only. But it is reasonable to infer that strategic economic development can increase these ratios in the future.

Benchmark Comparisons. The transportation spending patterns reported in this study (for 2007-2011) were compared to a prior study of Maryland's 1997-2006 transportation spending.⁸ The comparison showed that the capital investment share of highway spending has remained generally constant (accounting for 78 - 80% of spending), while the capital investment share of transit spending has dropped (from 47% to 31% for MTA, and from 41% to 25% for Maryland's share of WMATA).

⁷ *How Infrastructure Investments Support the U.S. Economy*, Political Economy Research Institute, University of Massachusetts, 2009. <http://www.peri.umass.edu/236/hash/efc9f7456a/publication/333/>

⁸ *Economic Impact from Maryland's Surface Transportation Spending: 1997-2006*, Maryland Transportation Commission, 2006. <http://www.marylandroads.com/OPPEN/economy.pdf>

The current capital investment ratios for transit in Maryland (25% - 31%) are in line with a national study that found capital investment now accounts for 29% of public spending on transit.⁹ That same study confirmed that spending on transit operations generates more jobs than the same level of spending on transit capital. However, it also noted that spending mix should be based on facility and service needs rather than job generation rates.

The finding of this study regarding the ratio of short-term Maryland jobs supported per million dollars of transportation spending (13.3) was also compared with studies conducted in other states. In general, it is known that job impact ratios vary across the US, and increase with size of the study area and its economy (since large economies will include more in-state manufacturers and service providers and have less “leakage” of money to outside suppliers). This pattern is reflected in results of comparable ratios from studies in Virginia, Kansas, Massachusetts, California, Oregon and Wisconsin, which show ratios in the range of 14 to 18 jobs per million dollars of transportation spending. National ratios are even higher, ranging from 18 to 27 depending on the type of spending.) The conclusion, then, is that economic impact numbers shown in this report are most likely conservative estimates.

⁹ *Economic Impact of Public Transportation Investment*, American Public Transportation Association, 2009. www.apta.com/resources/reportsandpublications/Documents/economic_impact_of_public_transp_ortation_investment.pdf

5.0 Importance of Maryland's Transportation Industries

5.1 BREADTH OF ECONOMIC ACTIVITY INVOLVED IN TRANSPORTATION

While the preceding analysis has focused on the State's (and apportioned Federal contributions) spending for highways and transit, it is important to note that private companies and local governments also play important roles in developing and operating services for those modes. In addition, both public and private organizations are involved in other modes of transportation, including railroad, aviation, and marine transport. All of these other modes and other public and private organizations also support transportation jobs in Maryland's economy. In this section, we examine the magnitude of additional jobs in Maryland that are involved in developing or operating transportation facilities and related services that depend on them.

Table 5.1 summarizes jobs that can be identified as directly related to transportation. It shows that there are nearly 71,800 jobs directly related to transportation within the State (this is the sum of *direct MDOT supported jobs*, *other public jobs* and *transport services industries*), of which the Maryland DOT highways and transit jobs accounts for 0.16 percent (approximately 10,795 jobs). While this is only a rough accounting, as reflected in the notes which follow, it indicates the broad nature of jobs involved in developing and operating transportation facilities services in the State. Including Maryland-held WMATA and Washington Local services jobs, direct employment in public sector highway and transit systems comprise 0.32 percent of the Maryland's 3.3 million jobs in 2010.

The accounting of public and private jobs involved in transportation includes the following elements (with limitations as noted):

- **Highways** – SHA jobs are included in the count of direct public jobs. There are also employees at local/county governments that build and maintain local roads, but they are not included here because we are not able to distinguish those local highway jobs from the total local government payroll without a detailed survey of local governments. Additional private providers of services using those highways and roads include trucking and warehousing/logistics companies and are reported by the U.S. Department of Commerce. There also are significant jobs within companies that operate their own car and truck fleets, but those jobs are not counted here since Maryland firm-level employment data would be needed and then segmented to count only those jobs that serve a strictly transport function within their company's SIC-or-NAICs classification.

- **Public Transit** – MTA and the Maryland portion of WMATA jobs are included in the count of direct public jobs and come under the funding of MDOT as the above analysis has emphasized. Also included are additional providers of public bus/van services that include school and work busses, charter bus and special needs transportation services. Those jobs in Maryland are reported by the U.S. Department of Commerce.
- **Railroads** – The development, maintenance, and operation of railroad services are provided primarily by private railroad companies. Those jobs in Maryland are collected by the U.S. Department of Commerce and included in total transportation jobs, but suppressed at the subsector level. Data from IMPLAN was used to estimate the portion of suppressed jobs that represent railroad employment.
- **Marine Transportation** – The Port of Baltimore is the State’s primary facility for long-distance marine transportation, although there are also other dock facilities elsewhere. A study of the economic impact of the Port (by Martin Associates in 2008) identified public jobs associated with the Maryland Port Administration as well as private sector jobs associated with vessel operations, cargo handling (longshoremen, stevedoring), marine cargo handling (freight forwarders, customs brokers), and terminal operations.
- **Aviation** – Baltimore/Washington International Airport (BWI) is the State’s major commercial airline facility, though there are 34 other airports serving commuter air services and general aviation. A 2007 study of the economic impact of BWI and statewide general aviation for MAA identified public jobs associated with BWI operation (airport administration, FAA, post office, customs), as well as private sector jobs associated with passenger airlines (aircraft fuel and maintenance services, air charter and cargo services, catering, terminal retailing).

These numbers are only an approximation of the full number of transportation jobs in Maryland. While they include some notable omissions (particularly local government jobs and private in-house fleet operation and maintenance), they also may reflect some double-counting of trucking and warehousing/logistics jobs that also operate at airport and marine port sites. Nevertheless, they indicate the broad range of transportation activities serving Maryland that lie outside of the Maryland DOT activities.

Table 5.1 Breakdown of Public and Private Jobs in Transportation-Related Sectors of the Economy (2010)

Mode	Key Public Agencies and Public Facilities	Direct MDOT Supported Jobs	Other Public Jobs in Transportation	Transport Services Industries
Highway	SHA (State Highway Administration)	3,197 ^b	–	25,068 ^g
Transit	MTA and WMATA	7,598 ^c	4,011 ^f	6,999 ^h
Subtotal		10,795	4,011	32,067
	Direct MDOT Supported Public-Sector Jobs in Highway and Transit (Percentage of state employment) ^a	0.32%		
Railroad	(Private Railroads)	0	–	2,563 ⁱ
Marine	Port of Baltimore	294 ^d	–	6,775 ^j
Aviation	BWI and Other Public Use Airports	610 ^e	–	14,642 ^k
Total		11,669	4,011	56,047
	Direct MDOT Supported Jobs in Transportation (Percentage)	0.16%		

Sources: County Business Patterns (2009), BEA REIS (2010), MTA, WMATA, MAA and MPA with EDR Group calculations.

^a Total Maryland Employment (2010) is 3,365,466 (BEA REIS).

^b Persons employed by the Maryland SHA (includes staff supported by operations and capital improvement budgets). Does not cover employees of local highway agencies, see Table 4.1.

^c Includes employees of MTA (3,013 with O&M functions *plus* MTA jobs with Capital program activities, approximately 3,108 combined) and Maryland's subsidized portion of WMATA jobs held by Maryland residents (4,490), see Tables 4.2 and 4.3.

^d Port figure includes only public agency jobs (for consistency with highway and transit accounting; See Exhibit II-1 in "The Economic Impacts of the Port of Baltimore, 2008" Martin & Associates for Maryland Port Administration).

^e Airport includes only public agency jobs (for consistency with highway and transit accounting); includes 470 public jobs at BWI Airport plus an estimated 140 jobs at general aviation airports in the State. (MAA report 2007).

^f Remaining portion of annual WMATA jobs for Maryland not covered by MDOT operating subsidy.

^g Includes trucking jobs (14,353) and related warehousing/logistics jobs (10,733) (REIS 2010).

^h Includes school and work bus (4,711), charter bus (436) and special needs bus services (1,852).

ⁱ Employees of private railroads, jobs based in Maryland (IMPLAN).

^j Includes marine shipping and related freight support services at Port of Baltimore public terminals. Private terminals support an additional 9,718 jobs ("The Economic Impacts of the Port of Baltimore, 2008" Martin & Associates for Maryland Port Administration).

^k Includes direct jobs at BWI Airport (11,697) and at general aviation airports (3,555), less 610 MAA jobs already accounted for (Maryland Aviation Administration Economic Impact Study, 2007).

6.0 Interpretation and Use of These Results

This report has quantified the base of jobs and vendor spending associated with Maryland DOT's budget for highway and public transit programs and described the implications of these expenditures for the rest of the statewide economy. It is important to understand the nature of these impacts since they shed light on the ways in which state transportation spending affects other elements of the state economy and helps to broadly support jobs for Maryland residents. This analysis has indicated that Maryland DOT spending on highways and public transit indeed generates significant economic activity within the State, totally aside from the value of the investments for supporting passenger and freight movement in the State.

Of course, transportation investment does not merely generate business orders, wages and jobs in Maryland; it also enables transportation systems to be maintained and improved, which ultimately helps the State's productivity, competitiveness and long-term economic growth. Conversely, there can be a large "opportunity cost" associated with failure to sufficiently invest in the preservation and maintenance of transportation facilities and services, for two reasons: (1) deferred maintenance can lead to higher reconstruction costs later on, and (2) losing businesses due to deficient transportation will raise costs for attracting new business to replace them.

It is possible to demonstrate these longer-term effects by showing how maintenance and expansion projects affect household and business transportation costs, access to markets and competitiveness. However, this requires development of specific spending and project investment scenarios. A growing number of states are now addressing those issues through studies that show how implementing long-term transportation strategies will affect the economic well-being of state residents. Even without such a study, though, it is clear that Maryland is a crossroads for national and international commerce, with major highways and rail lines connecting to international air and sea ports, as well as to major cities in surrounding states. Given that position, the ability of Maryland to compete in a changing national and global marketplace will depend (to a significant degree) on its ability to maintain good transportation services and conditions for the movement of people and freight. This report, which focuses on documenting the economic consequences of state transportation spending, is one key step in the development of the case for Maryland transportation investment.