Moving New Jersey’s Economy Forward:
Investing in New Jersey’s Transportation System

- Transportation Trust Fund
- Transportation Agency Consolidation
- Public Private Partnerships

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EXECUTIVE SUMMARY

This landmark study examines the economic impact of several different funding scenarios for the New Jersey Transportation Trust Fund on the state economy and key business sectors. It is the first ever report to quantify the optimal investment level for the New Jersey highway, bridge and transit system. It provides a benchmark for policymakers in the state to understand the importance of highway, bridge and transit capital investment to the citizens and businesses in New Jersey, as well as the positive benefits of consolidating New Jersey state transportation operations and attracting private capital investment.

This report examines three different funding scenarios, and both the short run economic activity from highway and bridge construction as well as the longer term impact on user costs and road conditions.

- In the baseline scenario, we analyze current funding levels supported by the New Jersey Transportation Trust Fund (TTF) as proposed in the 2014 ten-year capital plan and the implications to New Jersey businesses and drivers over the next decade. This includes average annual spending of $1.49 billion from the TTF, $1.46 billion in federal aid and $449.2 million in other funds. Combined with an estimated $1.78 billion in capital outlays from the New Jersey Turnpike Authority, total spending would average $5.18 billion per year over the next decade.

- In the second scenario, TTF funding levels would be higher at an average of $1.6 billion per year with $1.46 billion in federal aid and $449.2 million in other funds. Total capital spending, including $1.78 billion from the New Jersey Turnpike Authority, would average $5.29 billion.

- In the final scenario, total capital spending would average $5.69 billion per year. This would include an average of $2 billion in TTF outlays, $1.46 billion in federal aid, $449.2 million in other funds and $1.78 billion in capital outlays from the New Jersey Turnpike Authority.

The investment analysis for all funding scenarios is based on the HERS-ST model used by the U.S. Department of Transportation to analyze national investment levels as part of the biannual report to Congress “Status of the Nation’s Highways, Bridges, and Transit: Conditions & Performance.” It uses data from the New Jersey Department of Transportation (NJDOT) and the Federal Highway Administration (FHWA).

New Jersey businesses and drivers would save between $3.9 and $4.1 billion in travel time savings and operating costs each year compared to current conditions, based on the various funding investment levels. The percent of travel on roads in good condition would increase from 29.5 percent to as much as 64 percent.
Improvements in road conditions and traffic congestion mean that New Jersey drivers, on average, would have an additional 11 hours each year for their own interests, rather than sitting in traffic. Overall, the 571,585\textsuperscript{1} commuters who live in New Jersey would save almost 6.3 million hours a year. Improvements would reduce future roadway maintenance costs by as much as seven percent and reduce the costs associated with vehicle emissions and pollution by 36 percent when all improvements are fully implemented over a ten-year period.

The reduced congestion would improve these conditions while allowing New Jersey businesses and residents to increase their mobility. Vehicle miles traveled would increase by as much as 13 percent over the decade. Safety would increase also as better alignments and updated roadways would help protect New Jersey drivers.

But what are New Jersey businesses and citizens missing by not fully investing in the state’s transportation network? What are the user and business benefits of making significant investments to reduce travel time and improve conditions? How would key business sectors in the economy benefit from specific investments along key transportation corridors that move much of the state’s freight and commuters?

According to the analysis in the “Gold Standard” section of the report, total annual capital investment by the New Jersey DOT, New Jersey Transit and the New Jersey Turnpike Administration, including revenues from the federal-aid program, would need to average $10.3 billion annually from 2014 to 2023 to make all necessary improvements to the state’s highway, bridge and transit systems, nearly double the $5.6 billion in capital outlays in 2014. At this level of funding, New Jersey businesses and citizens would realize nearly $6.5 billion in annual savings. While it may be unrealistic to achieve this level of capital spending in environments of contracted Government resources and decreased transportation spending it is an important figure to note just how far New Jersey’s infrastructure investment has fallen behind.

There are significant challenges facing New Jersey and its highway and bridge infrastructure. According to data submitted by the New Jersey DOT to FHWA, the condition of over 66 percent of highways is considered “not acceptable” and 35 percent of bridges are classified as structurally deficient or functionally obsolete. The condition of New Jersey’s roadways impacts the safety and quality of life of its citizens.

New Jersey is Growing—Will Transportation Investment Keep Pace?

The condition of New Jersey’s roads and bridges is critical to the future economic growth of the state. FHWA estimates that the value of freight shipments from New Jersey businesses for both domestic and export markets will more than double from $755 billion in 2011 to over $1.5 trillion in 2040. New Jersey imports, traveling by all modes, will increase from $204 billion to $510.7 billion over the same time period. Most of these goods—70 percent—will be shipped

\textsuperscript{1}American Community Survey ‘Out-of-State and Long Commutes: 2011’ Table 4.
via truck over the state’s highway and bridge network.

New Jersey residents will also need a first-rate highway, bridge and transit infrastructure system in order to facilitate mobility. The number of residents in New Jersey is expected to increase from 8.8 million in 2010 to 9.2 million in 2020 and 9.6 million in 2030, according to the New Jersey Department of Labor and Workforce Development. Labor force growth is expected to increase to 4.8 million in 2020 and to nearly 5 million in 2030.

New Jersey workers have the second longest average commute in the United States at 33 minutes, according to the U.S. Census Bureau. This is 37 percent above the national average of 24 minutes. The nine additional minutes have significant consequences on worker productivity and quality of life. For the average worker, an extra nine minutes a day, five days a week, adds up to 37.5 hours over the course of a year. Collectively, New Jersey’s 3.9 million commuters are stuck in the car for the equivalent of an additional 35 million minutes every day.

Poor roadway conditions are a contributing factor in more than half—52.7 percent—of roadway fatalities, according to research by the Pacific Institute for Research and Evaluation (PIRE). Over 627 people lost their lives on New Jersey roads in 2011, according to the National Highway Traffic Safety Administration. The PIRE study estimates that road condition related crashes cost New Jersey $4.6 billion annually.

How will New Jersey create an environment to foster economic growth, enhanced personal mobility and increased quality of life? How much does New Jersey need to invest to support a first-rate highway, bridge and transit system? What are some of the options for reaching this optimal level of investment? These are all key questions that will impact the future of the state and the outlook for business.

Investment that Supports the New Jersey Economy

The firms and public agencies that design, build, maintain and manage New Jersey’s transportation infrastructure network— together with those who manufacture and produce the equipment, materials, supplies and services necessary for their work—compose the New Jersey transportation construction industry. Its impacts on the state’s economy are significant:

- **Annual Output Value**—Capital outlays from the Transportation Trust Fund and other sources for highway, bridge and transit will reach nearly $4 billion in 2014, according to the New Jersey DOT ten-year capital plan.

- **Annual Contribution to State GSP**—As the money invested in highway, bridge and transit industry employment and purchases for these TTF capital outlays moves through the state’s economy, it generates nearly $9.5 billion in total annual economic activity for the state—and contributes about $5 billion to New Jersey’s Gross State Product (GSP), or 1 percent of the total.

- **Creating & Sustaining New Jersey Jobs**—Total transportation construction spending in New Jersey supports the equivalent of 104,913 full-time jobs. This includes 52,264 direct jobs in transportation construction and related activities and 52,649 jobs induced, or sustained, by transportation construction industry employee, firm and agency spending throughout the state’s economy.
• **Return on Investment**—If total Vehicles Miles Traveled (VMT) on the federal aid system increased by 10 percent, this would lead to subsequent increases in toll revenues on the Turnpike, the Parkway and on bridges and tunnels, which will be filtered back into transportation agencies. In 2012, New Jersey collected $1.4 billion in toll and electronic toll revenues. That figure is expected to increase to $1.68 billion by 2017, but even a 5 percent increase in toll revenues from a 10 percent increase in VMT would lead to nearly a $70 million increase in collections.

Without the infrastructure built, maintained and managed by the New Jersey transportation construction industry, virtually all of the major industry sectors that comprise the New Jersey economy—and the New Jersey jobs they sustain—would not exist or could not function.

• **Deficient Bridges**—New Jersey has 6,566 bridges. FHWA reports 35.5 percent of these bridges are either “structurally deficient” (624 bridges) or “functionally obsolete” (1,710 bridges). This is well above the national average of 24 percent. Bridge owners estimate it will cost at least $6 billion to make needed bridge repairs in the state.

• **Road Safety**—The National Highway Traffic Safety Administration reports there were 586 fatal motor vehicle crashes, resulting in 627 fatalities in New Jersey during 2011. Of these, 4 percent of fatalities occurred on rural roads and 44 percent occurred on the National Highway System. Motor vehicle crashes are the number one cause of death and permanently disabling injuries for young Americans under age 21.

• **Commuting Patterns**—According to the U.S. Census Bureau, the average weighted commute one-way to work for New Jersey residents is 33 minutes, the longest in the nation. Getting there, 72.3 percent of commuters drive alone, 8.4 percent carpool and 10.8 percent take public transportation. Other employees walked, took a taxi or bicycled.

• **Freight Traffic**—Inter-state truck shipments along New Jersey’s highway and bridge network are vital to the economic growth of the state. New Jersey businesses shipped a total of $959.8 billion in freight in 2011. Of this total, 71 percent was shipped via truck. Truck traffic alone is expected to more than double by 2040.
reaching $1.4 trillion in value.

- **Transit Conditions**—The New Jersey Transit Corporation includes 996.8 directional route miles with 164 stations. The recommended annual investment target for New Jersey Transit of $1.2 billion, from the Statewide Capital Investment Strategy FY 2013 to 2022, would achieve a state of good repair, reliability of service and infrastructure rehabilitation. According to the Federal Transit Administration, New Jersey Transit’s infrastructure and rolling stock is generally in a state of good repair. In addition, New Jersey Transit has resumed pre-Sandy levels of service which signals the system is ready for further investment.
How much would New Jersey need to invest to support an efficient and safe highway network to maximize mobility and economic growth? What will happen to the highway network if there are no new revenues, and funding continues at current levels?

Highway, bridge and transit spending by the New Jersey DOT, New Jersey Transit and the New Jersey Turnpike Authority will be nearly $5.6 billion in 2014. This includes $1.2 billion in spending from the Transportation Trust Fund (TTF), nearly $1.6 billion in federal funds, $1.17 billion in other revenues and matching funds and $1.6 billion in capital outlays for the New Jersey Turnpike.

A sophisticated series of econometric models from the U.S. Department of Transportation (DOT), HERS-ST, allows us to analyze the changes in highway conditions, user costs and other key variables for roads that are part of the New Jersey National Highway System for various funding levels. In New Jersey, 83 percent of travel is on the federal-aid system modeled by HERS-ST.

Using HERS-ST, we can not only find the necessary levels to make all improvements to the road network in New Jersey, but can analyze the impact of not increasing investment—how will road conditions change over the next 10 years under current funding levels?

The results show that New Jersey is at a crossroads. Decisions that are made today about highway and bridge investment levels will have significantly different impacts on the course of the state over the next 10 to 20 years.

This report examines three funding scenarios for the TTF and New Jersey highway and bridge investment over the next ten years:

- The baseline scenario shows current funding levels supported by the New Jersey TTF as proposed in the 2014 ten-year capital plan. This includes average annual spending of $1.49 billion from the TTF, $1.46 billion in federal aid and $449.2 million in other funds. Combined with an estimated $1.78 billion in capital outlays from the New Jersey Turnpike Authority total spending would average $5.18 billion per year over the next decade.

- In the second scenario, TTF funding levels would be higher at an average of $1.6 billion per year with $1.46 billion in federal aid and $449.2 million in other funds. Total capital spending, including $1.78 billion from the New Jersey Turnpike Authority, would average $5.29 billion.

- In the final scenario, total capital spending would average $5.69 billion per year. This

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²Over 83 percent of all travel in New Jersey is on a core network of highways that are part of the federal-aid system. This includes highways on the National Highway System and urban and rural Interstates. Nearly 70 percent of NJDOT highway and bridge capital outlays are for work on the National Highway System, including $1.5 billion in actual construction work.
would include an average of $2 billion in TTF outlays, $1.46 billion in federal aid, $449.2 million in other funds and $1.78 billion in capital outlays from the New Jersey Turnpike Authority.

The overall system improvements in terms of increased safety, road conditions, operating costs and travel time would vary depending on the level of investment. By modeling each funding scenario, we are able to predict various levels of improvement on New Jersey’s key highway network. As expected, an increased level of investment will provide greater benefits for system users.

The level of these earnings is dependent upon the level of transportation investment chosen. Higher levels of transportation funding will lead to higher total earnings across key industries.

**Results of the Baseline Funding Scenario**

Under investment levels in the 2014 ten-year capital plan, New Jersey businesses and residents would experience improved road conditions and reduced costs, saving nearly $4 billion annually in operating expenses and travel time for travel on the National Highway System. Average maintenance costs would fall nearly seven percent, and the cost of emissions and pollution damage would decline by nearly 36 percent as traffic congestion eases.
Total capital spending over the ten-year period would reach $51.8 billion. This includes TTF expenditures for roads, bridges and transit, federal aid reimbursements, and capital spending by the New Jersey Turnpike Authority.

Conditions on the highways that comprise the National Highway System (NHS) in New Jersey would show significant improvement over the decade. The percentage of travel on roads rated in “good” condition would increase from 29.5 percent in 2014 to 59.1 percent in 2023. Nearly all travel, 82 percent, would be on roads considered “acceptable,” compared to 73.2 percent in 2014.

New Jersey businesses would experience cost savings from reduced travel time as trucks are able to reach their destinations with less delay. Travel time costs for the nearly 3.2 million trucks registered in New Jersey would decline by as much $1.4 billion annually for travel on federal aid highways as improvements are implemented.

Improved road conditions also means that truck drivers will spend less for maintenance and repairs. Total operating costs would decline by approximately $1.2 billion annually after improvements are made, representing a significant cost savings compared to current costs.

The average New Jersey driver would also see significant cost savings for travel on the NHS. There are currently six million registered drivers in New Jersey operating over 4.4 million registered vehicles, according to FHWA. These drivers would save nearly $844 million annually in travel time costs and $656.3 million in operating costs.

Based on the HERS-ST model, the mix of the most cost-beneficial projects that could be funded under the baseline scenario would increase mobility for all New Jersey drivers. Peak travel speed on urban interstates would increase nearly six percent. Average overall speed on rural roads would jump nearly 11 percent, allowing motorists to get to their destinations with less delay and congestion.

The average delay on rural roads because of incidents, congestion and other factors would decline 35 percent, with delays on urban roads dropping 9.6 percent. In total, New Jersey drivers would save over 60 million hours in travel time annually—that works out to an average of ten hours for every driver.

The optimal mix of projects at this spending level would include nearly $8.1 billion to resurface existing roadways and $3.6 billion in reconstruction work. Improvements would be made to over 8,400 lane miles of roadway and over 2,400 center-lane miles. During the reconstruction process, an additional 893 lane miles would be added to existing right of way. This would include an additional 173 lane-miles on existing urban interstates and 43 lane-miles added to rural interstates.

In addition to providing user and business benefits, the highway, bridge and transit construction activity under the baseline scenario would also support economic activity throughout the New Jersey economy. The average baseline funding level would support nearly 88,500 jobs throughout the state in all sectors, including manufacturing, retail trade, services, health care, tourism and food services and construction. These employees would earn nearly $3.7 billion in annual wages.

The purchases made by New Jersey construction firms, their suppliers and employees would support a total of $12.2 billion in economic output throughout all sectors of the economy. This would contribute over $6.4 billion annually to the
New Jersey GSP.

The degree of business savings is dependent upon the level of transportation investment chosen. Higher levels of transportation funding will lead to higher total business savings. The reduction in costs are also split between operating cost savings, such as maintenance and labor, and travel time cost savings, primarily captured in reduced time spent on New Jersey roads.

Further Improvements and Cost Savings—First Scenario Results

Under this scenario TTF funding levels would be higher at an average of $1.6 billion per year. With additional revenues from the federal aid program, other funds and the New Jersey Turnpike Authority, total capital spending between 2014 and 2023 would be approximately $52.9 billion. Although this funding level is just $1 billion above the baseline scenario, the additional spending has an impact on road conditions, demonstrating the incremental benefits of even a slight increase in investment.

Nearly 61 percent of travel would be on good roads, compared to the initial 29.5 percent. Under the baseline scenario, travel on federal aid roads in “good” condition would reach 59 percent. Before improvements, 73.2 percent of travel is on acceptable roads; after improvements, 82.4 percent of travel would be on acceptable roads.

Although the savings for travel time costs are similar to the baseline scenario, the improvement in road conditions means users will save more in operating costs.

New Jersey businesses would save an estimated $1.3 billion annually from improvements in truck operating costs, compared to $1.2 billion in the baseline scenario. New Jersey drivers would save $703 million annually, compared to $656 million in...
the baseline scenario.

The increased average speeds, mobility and reduction in incident and travel delays would result in over $1.4 billion in travel time savings for trucks and $843.8 million in similar savings for New Jersey drivers.

The average New Jersey driver would save nearly 10 hours annually from reduced congestion and incident delays. Average travel speeds would increase nearly 11 percent on rural roadways to 53 miles per hour, and average urban speeds would increase 2.1 percent to just over 43 miles per hour.

With the extra $1 billion in funding, more roadways would be improved. The optimal mix of projects at this spending level would include nearly $8.2 billion to resurface existing roadways and $3.7 billion in reconstruction work. Improvements would be made to over 8,700 lane miles of roadway and over 2,540 center-lane miles. During the reconstruction process, an additional 893 lane miles would be added to existing right of way. This would include an additional 173 lane-miles on existing urban interstates and 43 lane-miles added to rural interstates.

The highway, bridge and transit construction activity under the increased investment scenario would support over 90,330 jobs throughout the state in all sectors, including manufacturing, retail trade, services, health care, tourism and food services and construction. These employees would earn nearly $3.8 billion in annual wages.

The purchases made by New Jersey con-
struction firms, their suppliers and employees would support a total of $12.5 billion in economic output throughout all sectors of the economy. This would contribute over $6.5 billion annually to the New Jersey GSP.

The degree of passenger savings is dependent upon the level of transportation investment chosen. Higher levels of transportation funding will lead to higher total savings. The reduction in costs are also split between operating cost savings, such as maintenance, and travel time cost savings, primarily captured in reduced time spent on New Jersey roads.

Additional Increases in Funding—Second Scenario Results

The increase in funding for the TTF to $2.0 billion per year would provide further benefits and cost savings to New Jersey businesses and drivers. Under this scenario total capital spending between 2014 and 2023 would be approximately $56.9 billion. The additional investment would support additional projects, further increasing mobility and savings and improving road conditions.

New Jersey drivers would see a marked improvement in road conditions—nearly 64 percent of travel on the federal aid system would be on roads in “good” condition, compared to 29.5 percent before all improvements are made. A total of 83.2 percent of travel would be on roads rated “acceptable,” compared to 73.2 percent before. Maintenance costs would decline 6.6 percent and emissions costs would fall nearly 36 percent.

New Jersey businesses would save an additional $2.64 billion annually in truck travel costs after improvements are implemented. This includes nearly $1.6 billion in travel time costs, as average speeds increase and congestion eases. Improved road conditions would mean that operating costs for truck travel would fall by nearly $1.1 billion. New Jersey passenger car and truck drivers would save an estimated $937.5 million annually in travel time costs and an additional $703 million in operating costs.

In all, total user costs would decline by over $4.1 billion. This is additional money that would be put back into the state economy. Business owners could hire more workers, increase inventories, purchase supplies or make additional capital investments. New Jersey citizens would have more time and disposable income to purchase goods and services, spend time with their families or pursue other leisure activities.

The improvement in conditions and cost savings would occur as mobility increases for New Jersey businesses and residents. Total Vehicle Miles Traveled on the federal aid system would increase nearly 13 percent. Even with the additional travel, the safety improvements to the overall system mean that the injury rate for motor vehicle crashes would increase only 1.4 percent, and the fatality rate would increase by less than one percent.

The average New Jersey driver would save nearly 11 hours annually from reduced congestion and incident delays. Average travel speeds would increase nearly 11 percent on rural roadways to 53 miles per hour, and urban speeds would increase 2.5 percent to 43.2 miles per hour.

The optimal mix of projects at this spending level would include nearly $8.9
billion to resurface existing roadways and $3.8 billion in reconstruction work. Improvements would be made to nearly 9,300 lane miles of roadway and over 2,700 center-lane miles. During the reconstruction process, an additional 957 lane miles would be added to existing right of way. This would include an additional 197 lane-miles on existing urban interstates and 43 lane-miles added to rural interstates.

The increased investment levels would also support additional economic activity, with more construction work on highways, bridges and transit projects, including nearly 97,200 jobs throughout all sectors. These employees would earn over $4.0 billion annually.

The purchases made by New Jersey construction firms, their suppliers and employees would support a total of $13.4 billion in economic output throughout all sectors of the economy. This would contribute over $7.0 billion annually to the New Jersey GSP.
Transportation Investment is Key to Business Success

New Jersey’s highway, bridge and transit network is crucial to the success of the state economy—facilitating the shipment of nearly $500 billion in goods produced by New Jersey businesses, over $59.6 billion in output related to the state’s retail trade, tourism and service industries and $70 billion in international trade.

The efficient and safe movement of goods and people is critical to the economic competitiveness of New Jersey and the quality of life for its citizens. Every employee, customer and business pays a price when the system is congested, unsafe or in poor condition.

This chart shows the total jobs supported/created by the level of transportation investment chosen. Higher levels of transportation funding will lead to more jobs supported/created across key industries.

An increase in New Jersey highway and bridge investment would benefit the overall business community in two ways.

- The first benefit is from the reduced operating costs and increased market access New Jersey businesses will enjoy as a result of an improved highway network. These spillovers, or network effects, will benefit all businesses, but will be particularly important for those industries that rely more heavily on transportation, such as manufacturing, warehousing and storage, tourism and retail and wholesale trade.

- The second impact is the increase in demand for goods and services from the higher level of highway and bridge market
construction activity. As more construction work gets underway, highway and bridge construction firms and employees will buy more inputs, materials and other goods and services from local businesses. This will create jobs and economic activity throughout the economy.

The importance of a robust transportation network has been well documented by business analysts, economists and the research community. Overall estimates are that every $1 increase in the highway and bridge capital stock generates a total of 30 cents in business savings.4

Some of these specific benefits include:

- **Staying Competitive:** The overall business environment in the United States is changing, and there is likely to be a greater importance placed on logistics and global transportation networks.5 The value of truck freight shipments in New Jersey is expected to more than double from $685.9 billion in 2011 to $1.4 trillion in 2040. Truck shipments of New Jersey goods for export are estimated to increase from $71.8 billion in 2011 to $245 billion—an increase of over 240 percent.

- **Maximizing Port Investment:** The Port Authority of New York and New Jersey is making a significant investment to raise the Bayonne Bridge to ensure that the region remains competitive when an expanded Panama Canal opens. Allowing larger container ships into the region’s ports will result in an increased quantity of cargo and freight. A well-invested highway, bridge, and rail transportation network will be needed to realize the full benefits of the Port Authority’s investment.

- **Access to markets:** For New Jersey exporters, improved access to marine terminals at the ports of Newark and Elizabeth will help increase competitiveness and lower the cost of shipping goods. In 2011, New Jersey’s custom port districts traded a net 140,037 metric tons of containers, with Gloucester Port trading the largest share at 107,080 metric tons of containers. New Jersey businesses will also have greater access to the New York and Philadelphia financial markets, expanding their options for business capital.

- **Access to labor:** A better transportation system means that it is easier for employees to get to work and businesses may recruit from a larger pool of potential workers.

- **Increased Market Share & More Customers:** A good transportation system means that New Jersey businesses can reach a greater pool of customers. For example, if a pharmaceutical company can count on better roads for its employees and key product delivery and supply routes, the company may be able to increase employment and its market access to hospitals and other linked industries. Local industries will benefit from these larger markets and reduced transaction costs.6

- **Reducing production costs:** Economic studies show that reduced costs for inputs is one of the main business benefits from an increase in transportation investment. Typically businesses pay less for inputs

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3NCHRP Study 2-21, Weisbrod, Very, & Treyz.
5The Importance of Transport in Business’ Location Decisions.
6Ibid.
when they have access to larger markets.\textsuperscript{7}

- **Agglomeration Economies**: Firms benefit by locating near one another, even if they are competitors. This is known as the agglomeration of market activity. This happens because a group of firms will attract a greater number of suppliers and customers than one company alone. Lower transportation costs are a key factor for agglomeration, and will be important in attracting new firms to an area.\textsuperscript{8} Increasing returns to local industries can be anticipated in areas with intermodal linkages or intra-modally, as between major highways.

- **More efficient operations**: With an efficient transportation system, businesses can make better decisions about their products, inputs and workforce without worrying about poor roadways or congestion. Businesses respond in a variety of ways to congestion. Some businesses may change their mix of labor and capital, reduce the daily deliveries made by a driver or serve a smaller, more specialized market. All of these adjustments can mean a loss for business productivity and market share.\textsuperscript{9}

- **Selling more goods and services**: New Jersey businesses would increase their output of goods and services. Fully investing in the New Jersey highway and bridge system would generate an additional $3.7 billion

\textsuperscript{7}It is an industry standard to use elasticities of supply and demand for materials as a measure of the impact of a change in transportation infrastructure investment. Based on a study conducted by the Federal Highway Administration (FHWA), the output elasticity of materials is usually the largest. The elasticity of labor and capital inputs is the second largest.

\textsuperscript{8}Dr. Jean-Paul Rodrigue, Transport and Location, the Geography of Transport Systems.

\textsuperscript{9}Weisbrod.
in sales and output across all industries.

- **Increase in demand for inputs**: As the economy expands, businesses will purchase more goods from their suppliers and will increase their demand for private capital. This includes buying more vehicles, equipment, office supplies or even building new plants and factories.10

Chart 6 illustrates the total value added by industry sector, depending on the level of transportation investment chosen. Higher levels of transportation funding will lead to more value added across key New Jersey industries.

Consider the benefits to a business in New Jersey when the state makes highway and bridge improvements. The increase in construction activity will mean more demand for products and services in the local area. A local business would sell more of its products and may even hire additional employees to increase output. With an improved transportation network, local business on the many main streets in New Jersey could thrive.

The business will also have lower distribution costs because of the improved highways in the area. More customers will be able to reach the business, and the owner may be able to hire more talented, educated and skilled workers that live further away.

The increase in demand may also lead the business to expand, opening another store, plant or business location. Finally, the business will demand more inputs and raw materials from their own suppliers, creating economic ripple effects throughout the economy. It could also be the case that the business owner is able to purchase cheaper inputs because they have greater access to more markets.

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10The magnitude of the effect of highway capital on output will differ by industry, with the largest difference observed between manufacturing and non-manufacturing industries.
Impacts of Transportation Investment on Key New Jersey Industries

The New Jersey State Strategic Plan and the New Jersey Chamber Industry Cluster’s study identify eight key industries that are crucial to the future of the state’s economic development and growth. These industries include:

- Advanced Manufacturing
- Finance
- Health Care
- Life Sciences
- Technology
- Transportation, Logistics & Distribution
- Defense
- Tourism

The future success of each of these sectors is in part dependent on the state’s highway, bridge and transit network. How would increasing investment benefit each of these key sectors? And in turn, how will not investing in the state’s infrastructure network act as a deterrent for business expansion?

This section examines the unique aspects of each of these key growth industries and how they are dependent on transportation investment.

**Manufacturing Industry**

A robust transportation network is necessary to expand the state’s manufacturing sector and increase market activity in this industry, especially the advanced manufacturing firms concentrated in the metropolitan areas of Jersey City, Newark and New Brunswick.

The New Jersey advanced manufacturing sector is highly dependent on the state’s highway and bridge network. The value of freight shipments for machinery, electronic, motorized vehicle, transportation equipment, chemical, petroleum, pharmaceutical and related products that comprise the advanced manufacturing sector accounted for $34.5 billion net exports in 2011. This accounts for nearly half of New Jersey’s freight shipments. A total of $525.2 billion worth of goods traveled on New Jersey freeways in 2011.

Economic research has demonstrated the importance of a state’s highway and bridge network to the manufacturing sector: approximately $56.9 billion.

- **Agglomeration Economics:** Manufacturing firms benefit by locating near one another, even if they are competitors. This is known as the agglomeration of market activity. This happens because a group of manufacturing firms will attract a greater number of suppliers and customers than one company alone. Lower transportation costs are a key factor for agglomeration, and will be important in attracting new manufacturing firms.\(^{11}\) Although agglomeration is important for all businesses, it is especially important for the manufacturing sector.

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\(^{11}\)Dr. Jean-Paul Rodrigue, Transport and Location, the Geography of Transport Systems.
• **Business Logistics:** The New Jersey transportation system is the most important factor when considering the business logistics systems for manufacturers. A well-developed system will increase efficiency, reduce operation costs and promote service quality. Since transportation costs are an input to manufacturing, reducing those costs would make the industry more competitive.

• **Fostering Innovation:** Transportation infrastructure investment is closely linked with economic competitiveness. Research suggests that highway investment results in industry growth and innovation. Innovation results from infrastructure better supporting business activity. Infrastructure also attracts research and development firms for the large return on investment they offer.

• **Trade Specialization:** Research has shown that cities with more highways will specialize in the production of heavy goods, such as motor vehicles, ships and boats, railroad rolling stock, machinery and equipment. Studies estimate that a ten percent increase in a city’s stock of highways causes about a five percent increase in the weight of exports. Thus city highways are a comparative advantage for the production of heavy goods.

There are nearly 3,400 firms within New Jersey’s advanced manufacturing sector, with 18 firms alone employing over 100,000 workers. There are 443 manufacturing firms within the key industry categories alone, including pharmaceutical and medical manufacturing, medical equipment and supplies manufacturing, industrial machinery manufacturing and electronic instrument manufacturing.

About half of the manufacturing firms in the state (7,760 firms) are classified as small businesses, employing up to 100 workers. Another 30 percent of manufacturing firms (4,488 firms) employ up to 250 people. While larger firms may benefit proportionally more than small firms due to economies of scale, reducing the relative cost of transportation will benefit firms of all sizes. The businesses and industry employment are clustered along the major highways in the state, including I-80, I-195, I-287, and I-295 in Bergen, Burlington, Middlesex, Morris, Passaic and Union Counties. Manufacturing jobs are dispersed all over the state, following the major highways. Maintaining and improving this infrastructure will be crucial to growing the advanced manufacturing in New Jersey.

**Defense Industry**

The defense industry is primarily composed of manufacturing firms and is highly dependent on the state’s highway and bridge network. The value of freight shipments for various base metals, chemical products, electronics, logs, motor vehicles and precision instruments accounted for $38.34 billion of net exports in 2011. This accounts for roughly 40 percent of New Jersey’s freight shipments. About $426.7 billion in freight value related to the defense industry travelled over New Jersey roads and highways in 2011.

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12Tseng and Yue, The Role of Transportation in Logistics Chain.
13Bell 2012. In 2011, researchers at the University of Texas A&M found a critical link between the forecasted growth of the industry and investment in the transportation infrastructure system, using standard supply and demand analysis (Rosson 2011).
14Duranton, Morrow & Turner, “Roads and Trade: Evidence from the U.S.”
Economic research has demonstrated the importance of a state’s highway and bridge network to the defense sector:

- **Agglomeration Economies**: About half of the defense industry is composed of manufacturing firms, e.g., ship and boat building and small arms ammunition manufacturing. As noted in the previous section, there are significant agglomeration economies when manufacturing firms locate near one another.\(^{15}\)

- **Trade Specialization**: Research has shown that cities with more highways will specialize in the production of heavy goods, such as aerospace products, ship and boats, armored vehicles, and more. Studies estimate that a ten percent increase in a city’s stock of highways causes about a five percent increase in the weight of exports. Thus city highways provide a comparative advantage for the production of heavy goods.\(^{16}\)

There are 44 firms specifically within New Jersey’s defense industry, employing nearly 12,000 workers.

There are 44 firms specifically related to the defense industry in New Jersey, concentrated primarily in Burlington and Morris Counties, clustered around New Jersey military bases. These include broadcast and wireless communities equipment and the search, detection and navigation instrument industries. The businesses and industry employment are clustered along all the major highways in the state, including I-78, I-80, I-95, I-195, I-295 and I-287. Maintaining and improving transportation infrastructure is indelibly linked to the success of the fledgling defense industry in New Jersey.

**Finance Industry**

A robust highway and bridge network is necessary to expand the state’s financial sector and increase market activity in this industry, especially the financial firms concentrated in the metropolitan areas of Jersey City, Newark, and New Brunswick. The entire state, however, supports financial activity, especially counties located in the center and the south of the state.

Economic research has demonstrated the importance of a state’s highway and bridge network to the financial sector:

- **Access to Global Markets**: New Jersey’s financial firms are heavily dependent on connections to global markets via New York City financial firms. A transportation system that supports a functional financial services sector makes New Jersey firms less vulnerable to economic shocks and less vulnerable to losing their competitive edge compared to other emerging financial centers. In the aftermath of the 2008 recession, New York City turned toward fostering science and engineering campuses to support their financial services industry.\(^{17}\) New Jersey’s financial industry would also benefit from access to secondary markets, supported by a modern transportation infrastructure system.

- **Fostering Innovation**: Transportation

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\(^{15}\)Dr. Jean-Paul Rodrigue, *Transport and Location, the Geography of Transport Systems*

\(^{16}\)Duranton, Morrow & Turner, “Roads and Trade: Evidence from the U.S.”

infrastructure investment is closely linked with economic competitiveness. Research suggests that highway investment results in industry growth and innovation.\textsuperscript{18} Innovation results from infrastructure better supporting business activity. Infrastructure also attracts research and development firms for the large return on investment they offer.

There are 164 financial firms within the key industry categories alone, employing over 183,700 workers. These include intermediation services, securities and commodity contracts brokering and insurance agencies and brokers. About 43 of the financial firms in the state with employment information are classified as small businesses, employing up to 499 workers. At least one firm employs between 5,000 and 9,999 employees.

The businesses and industry employment are clustered along the major highways in the state, including I-195, I-287, and I-295 in Bergen, Burlington, Hudson, Mercer, Middlesex, Monmouth, and Morris Counties. Maintaining and improving this infrastructure will be crucial to growing the financial sector in New Jersey.

**Health Care Industry**

A robust highway and bridge network is necessary to sustain New Jersey’s health care industry and to support innovation which will give the state a competitive edge in the twenty-first century. Businesses related to health care cover the whole of the state, from the northeast to the southwest.

The New Jersey health care sector is very dependent on the state’s highway and bridge network. The value of freight shipments for machinery, electronics, motorized vehicle, pharmaceuticals, precision instruments, chemicals, plastic materials and related products that comprise the health care sector accounted for $48.5 billion in net exports in 2011. This accounts for about 40 percent of New Jersey’s freight shipments. A total of $445.3 billion worth of goods traveled on New Jersey highways in 2011.

Economic research has demonstrated the importance of a state’s highway and bridge network to the health care sector:

- **Patient Access:** Research demonstrates the importance of transportation for patient access to health care, ensuring that health care customers are not cut off from hospitals, clinics, pharmacies and other businesses in the health care sector is an industry priority.\textsuperscript{19} Transportation systems are also vital to connect health care firms to suppliers who bring in medicine and equipment, and to health care employees.

- **Intra-Industry Linkages:** The health care industry is heavily interlinked; private clinics are connected to hospitals which refer to specialists who outsource work to medical laboratories.\textsuperscript{20} All of these linkages must be supported by a web of functioning highways and roads which can maintain a 21st century health care system.\textsuperscript{21} This is especially true for New Jersey, whose health care system is spread all over the state. While the

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\textsuperscript{18}Bell 2012, In 2011, researchers at the University of Texas A&M found a critical link between the forecasted growth of the industry and investment in the transportation infrastructure system, using standard supply and demand analysis (Rosson 2011).


physical distance between a hospital and a rural clinic may appear short on a map, a critically underfunded highway system could mean the difference between life and death for patients.

• **Fostering Innovation:** Transportation infrastructure investment is closely linked with economic competitiveness. Research suggests that highway investment results in industry growth and innovation.\(^{22}\) Innovation in the health care market is critical for patient care and life-saving technologies, but it is also important for health care firms to remain linked to transmit knowledge and resources across sub-industries.

There are 276 health care related firms within the major health care industry categories, including physician and dental offices, outpatient care centers, medical laboratories and home health care services. There are 139 firms within New Jersey’s health care industry employing less than 499 employees. There are over 42,000 employees in the New Jersey health care industry overall.

The businesses and industry employment are clustered along the major highways in the state, including I-78, I-80, I-287, and I-295 in Bergen, Burlington, Camden, Essex, Mercer, Middlesex, Morris, Ocean, Somerset and Union Counties. Maintaining and improving this infrastructure will be crucial to sustaining the health care industry in New Jersey.

**Life Sciences Industry**

A robust highway and bridge network is necessary to sustain New Jersey’s life sciences industry and support innovation, which will give the state a competitive edge in the 21\(^{st}\) century. Businesses related to life sciences and pharmaceuticals are concentrated in the northeast of the state but follow the major highways down to the southwest, emphasizing the importance of a modern transportation infrastructure system to maintain industry connections across the state.

The New Jersey life sciences sector is highly dependent on the state’s highway and bridge network. The value of freight shipments for machinery, electronic, motorized vehicle, pharmaceuticals, precision instruments, chemicals, plastic materials, minerals and manufacturing related products that comprise the life sciences sector accounted for $48.9 billion net exports in 2011. This accounts for nearly half of New Jersey’s freight shipments, and over $516.8 billion in total value travelling on New Jersey highways.

Economic research has demonstrated the importance of a state’s highway and bridge network to the life sciences sector:

• **Agglomeration Economies:** Of the seven highlighted sub-industries within the life science industry, four are related to manufacturing. Manufacturing firms benefit by locating near one another, even if they are competitors. Lower transportation costs are a key factor for agglomeration, and will be important in attracting new manufacturing firms.\(^{23}\) It will also be an important factor in reducing costs for other life sciences industries who are buying from and

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\(^{22}\) Bell 2012. In 2011, researchers at the University of Texas A&M found a critical link between the forecasted growth of the industry and investment in the transportation infrastructure system, using standard supply and demand analysis (Rosson 2011).

\(^{23}\) Dr. Jean-Paul Rodrigue, Transport and Location, the Geography of Transport Systems.
selling to these industries, savings which will be passed on to the economy as a whole.

- **Business Expansion:** Reducing congestion has a demonstrable impact on shipping volume and on prices, with a 10 percent rate of return per year, as a conservative estimate.\(^{24}\) Lower transport costs also have a quantifiable effect on firm choices with respect to suppliers, and significantly increase the household incomes of those who live the furthest away.\(^{25}\)

- **Intra-Industry Linkages:** The life sciences industry is heavily interlinked; pharmaceutical and medical manufacturers are connected to medical and diagnostic laboratories which serve the druggists’ market.\(^{26}\) All of these linkages must be supported by a web of functioning highways and roads which can maintain a 21st century health care system.\(^{27}\) These industry linkages also extend to related industries in manufacturing and health care.

There are 139 firms within the major life sciences industry categories, including pharmaceutical and medical manufacturing, scientific research and development, and medical laboratories. About 106 of the life science related firms in the state are classified as small businesses, employing up to 499 workers. There are a total of 121,897 life science employees.

The businesses and industry employment are clustered along the major highways in the state, including I-78, I-80, I-287 and I-295 in Atlantic, Bergen, Burlington, Camden, Essex, Gloucester, Hudson, Hunterdon, Mercer, Middlesex, Monmouth, Morris, Ocean, Passaic, Somerset, Union and Warren Counties. Maintaining and improving this infrastructure will be crucial to sustaining life sciences industries in New Jersey.

**Technology Industry**

A robust highway and bridge network is necessary to sustain New Jersey’s technology industry. The development of technology is intricately linked to innovation in and access to other industries. In the early stages, access to local markets is supported through quality infrastructure, particularly that of highway and other transportation investments. Businesses related to technology are dispersed throughout the state, and the industry heavily overlaps with manufacturing, stressing the need to maintain transportation linkages between existing networks.

The New Jersey technology sector is highly dependent on the state’s highway, bridge and mass transportation networks. The value of freight shipments for machinery, metals, electronic, precision equipment, pharmaceutical and related products that comprise the technology sector accounted for $35.3 billion net exports in 2011. This accounts for nearly a third of New Jersey’s freight shipments. About $342.7 billion in value related to the technology industry travelled over New Jersey highways in 2011.

Economic research has demonstrated the importance of a state’s highway and bridge network to the technology sector:

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• **Access to Global Markets:** New Jersey’s technological firms are heavily dependent on connections to global markets via New York City. A transportation system that supports growth in technological services and technology manufacturing would buffer New Jersey against general economic shocks. The technology industry would also benefit from having low-cost access to New Jersey and New York’s financial firms, in order to finance and develop new waves of innovation.

• **Agglomeration Economies:** The majority of highlighted technology firms under consideration also fall under the manufacturing category and will benefit from agglomeration economies. The example of Silicon Valley in California illustrates the importance of connecting related firms within an industry; through competition, the industry sustains growth that spills over to the whole state.

• **Fostering Innovation:** Transportation infrastructure investment is closely linked with economic competitiveness. Research suggests that highway investment results in industry growth and innovation. Innovation results from infrastructure better supporting business activity, not only in technology manufacturing but in telecommunications and other technology services. Infrastructure also attracts research and development firms for the large return on investment they offer.

There are 298 technology related firms within the major industry categories, including architecture and engineering, computer systems design, electronic equipment repair and the wired telecommunications industries. About 228 of the technology related firms in the state are classified as small businesses, employing up to 499 workers. A total of 254,217 people are employed in the technology industry in New Jersey.

The businesses and industry employment are clustered along the major highways in the state, including I-78, I-80, I-195, I-287, and I-295 which run through Bergen, Camden, Middlesex, Morris, Passaic, Burlington, Essex, Monmouth and Somerset Counties. Maintaining and improving this infrastructure will be crucial to sustaining the technology industry in New Jersey.

### Transportation, Logistics and Distribution Industry

A robust highway and bridge network is necessary to sustain New Jersey’s transportation logistics and distribution industry and network, and to support business innovation which will give the state a competitive edge in the 21st century. Businesses related to this industry populate the entire state, with almost no county or region unaffected. Maintaining the transportation infrastructure of New Jersey is thus critical to the lifeblood of this industry.

The New Jersey transportation, logistics and distribution sector is tied directly to the success of the state’s highway and bridge network. The net export value of freight shipments for the transportation, logistics and distribution sector was $77 billion in 2011. Over $243.2 billion in value related to

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28 Dr. Jean-Paul Rodrigue, Transport and Location, the Geography of Transport Systems.
29 Bell 2012. In 2011, researchers at the University of Texas A&M found a critical link between the forecasted growth of the industry and investment in the transportation infrastructure system, using standard supply and demand analysis (Rosson 2011).
this sector travelled over New Jersey highways in 2011.

Economic research has demonstrated the importance of a state’s highway and bridge network to the transportation, logistics and distribution sector:

- **Inter-Industry Linkages:** The transportation, logistics and distribution industry provides a vital supply role for other industries in the state, shipping goods in and out of state and transporting goods within the state. The New Jersey transportation, logistics and distribution sector employs thousands of people. A modern transportation system enables continued business growth and expansion in this sector, and will support spillover effects to firms that especially rely on the transportation, logistics and distribution sector.

- **Spillover Savings:** In addition to the cost-reducing impact of reducing road roughness, increasing average speed, and reducing total user and travel time costs on firm costs in this sector, reducing congestion has a demonstrable impact on shipping volume and on prices, with a return of about 10 percent a year, as a conservative estimate.\(^{30}\) Lower transport costs also have a quantifiable effect on firm choices with respect to suppliers and relatively improve firm hiring ability. Reducing transportation costs within this sector will have a significant spillover effect to all industries in the state and can be expected to be reflected in relatively lowering the cost of goods within the state, for both consumers and businesses.\(^{31}\)

There are 778 firms related to transportation logistics and distribution in New Jersey, with most counties supporting more than 30 individual firms and the smallest—Salem County—supporting 22 firms. These include a wide range of micro-industries, from supply merchant wholesalers to trucking services to tourism related activities and freight transportation. It even includes the postal service and courier industry, without which New Jersey could not function. There are 620 businesses in the transportation, logistics and distribution sector that are classified as small businesses, employing up to 499 workers. There are 95 businesses employing over 1,000 people while five firms employ between 5,000 and 10,000 people.

While every county supports a large number of firms, the largest clusters can be found in the center of the state, where up to 43 percent of transportation, logistics, and distribution firms are located. The businesses and industry employment are clustered along all the major highways in the state, including I-78, I-80, I-287 and I-295. Maintaining and improving transportation infrastructure is indelibly linked to the success of the transportation distribution and logistics industry in New Jersey.

### Tourism Industry

A robust highway and bridge network is necessary to support New Jersey’s tourism industry and network, particularly to maintain access to the coasts and the southwest of the state. Businesses related to this industry dominate the entire state, with no county or region unaffected. Maintaining the transpor-

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The transportation infrastructure of New Jersey is therefore vital to the lifeblood of this industry and the state economy as a whole.

The New Jersey tourism industry is highly dependent on the state’s highway and bridge network. Net freight exports shipments for food, beverages, motorized vehicles, tobacco, textiles and related products that comprise the tourism sector are estimated at a total value of $11.2 billion for 2011. This accounts for about 20 percent of New Jersey’s freight shipments. Over $243.2 billion of value related to tourism travelled on New Jersey highways in 2011.

Economic research has demonstrated the importance of a state’s highway and bridge network to the tourism sector:

- **Inter-Industry Linkages:** The tourism industry is closely linked with the information technology industry. Information technology is used to advertise tourist locations and maintain supply linkages. The regular flow of tourists to tourist locations and businesses is tied to these linkages.

- **Access to Tourists:** Such linkages would be useless without a transportation system providing access to tourist locations and businesses. During high peak tourism travel times, congestion and poor road conditions can deter travel to tourism areas. The more time New Jersey residents and out of state visitors spend on the road means less time participating in the local economy. A first class transportation system ensures a first rate experience for tourists and maximizes revenue-generating opportunities for the state and businesses.

- **Business Expansion:** Several tourism firms in New Jersey employ thousands of people. However, the majority are local small businesses. A modern transportation system enables business growth, expansion, and increased seasonal hiring. Reducing congestion has a demonstrable impact on shipping volume and on prices, with a rate of return of about 10 percent a year, as a conservative estimate. Lower transport costs also have a quantifiable effect on firm choices with respect to suppliers and relatively improve firm hiring ability.

- **Emergency Management Operations:** A well-invested transportation system will ensure that coastal evacuation routes remain efficient and accessible during major storms. In addition, the proper transportation investments will ensure that road networks are resilient to future super storms. In 2013, New Jersey spent nearly $4 million on repairs from Hurricane Sandy with another $30 million to be spent in 2014. An estimated $250 million will be spent by 2021 before all repairs all completed. While these repairs negatively impact travel and increase congestion in the short-term, the damage to New Jersey infrastructure from Hurricane Sandy and other super storms have long-term economic costs to residents, tourists and businesses.

There are 239 firms specifically related to tourism in New Jersey, with every county well-represented. The state’s tourism industry supports a wide range of businesses, including coastal passage, scenic and sightseeing activities, travel agencies, museums,

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traveler accommodation and food service businesses. About 189 of the tourism firms in the state are classified as small businesses, employing up to 499 workers. Another 47 businesses employ over 1,000 people while 13 businesses employ over 10,000 people. The largest tourist business in the state employs nearly 33,000 people.

While every county supports many businesses related to tourism, the largest cluster stretches along the coast, all the way from Bergen County down to Cape May County. The businesses and industry employment are dependent on all major highways in the state, including I-78, I-80, I-95, I-287 and I-295.
Additional Economic Efficiencies from Agency Consolidation

The consolidation of key transportation agencies in New Jersey provides additional opportunities to facilitate cost savings and increase transportation investment levels. Over the past 15 years, four states have consolidated their Departments of Transportation with other state agencies in order to better address transportation needs. Texas, Massachusetts, North Carolina and Kansas have all brought their Turnpike Authorities under their Departments of Transportation, and New Jersey consolidated its Highway Authority under the Turnpike Authority. The degree of oversight and operational and financial autonomy within the new departments varies for each state, however in each case consolidation allows the state to streamline operations and manage the state’s transportation needs more efficiently.

Cost Savings from Consolidation
The consolidation of the New Jersey Department of Transportation with other agencies has the potential to produce significant economic benefits. The experiences of Massachusetts and New Jersey suggest that the New Jersey Department of Transportation’s consolidation with such agencies as the New Jersey Turnpike Authority, the New Jersey Trust Fund Authority, New Jersey Transit, the South Jersey Transportation Authority and Motor Vehicle Commission will likely produce significant savings and efficiencies, particularly in the areas of administration, operations and large-scale innovative projects.

Massachusetts recently underwent a successful consolidation of its state Department of Transportation and other agencies, and has achieved significant savings just four years later. In June 2009, Governor Deval Patrick signed “An Act Modernizing the Transportation Systems of the Commonwealth of Massachusetts,” merging the Executive Office of Transportation and Public Works (EOT), the Massachusetts Turnpike Authority (MTA), the Massachusetts Highway Department (MHD), the Registry of Motor Vehicles (RMV), the Massachusetts Aeronautics Commission (MAC) and the Tobin Bridge with the Massachusetts Department of Transportation (MassDOT). Additionally, the new MassDOT gained oversight over the Massachusetts Bay Transportation Authority (MBTA) and Regional Transit Authorities (RTA), and assumed responsibility for many of the bridges and parkways formerly operated by the Department of Conservation and Recreation (DCR). As of 2011, the Patrick administration predicted the merger would save $2 billion over the next two decades.

Combining Administrative Functions Creates Significant Savings
One of the largest benefits cited by Massachusetts was the consolidation of administrative functions, which allowed the new agency to eliminate redundancies across agencies. After its merger with other state agencies in 2009, MassDOT consolidated many of its administrative functions, including accounting and worker’s compensation. According to MassDOT Highway Division Administrator Frank DePaola, speaking three and a half years after the merger, most of the
approximately $500 million in savings were achieved through administrative consolidation. Some of the specific savings include:

- As part of its administrative consolidation, employees from the merged agencies were folded into the state retirement systems, eliminating the need for separate systems.
- Additionally, all organizations within MassDOT now share the same legal and public affairs, real estate and other offices. Initiatives completed just in the first three months after the consolidation resulted in an estimated $2 million in annual savings.
- Notably, consolidation of personnel in the Massachusetts merger has resulted in reduced insurance costs for the larger agency. In March 2012, MassDOT and the MBTA expected to save $30-$40 million once all MBTA employees were shifted onto the state’s Group Insurance Commission.

By March 2012, these initiatives and others like them had resulted in $130 million in operational efficiencies.

The streamlining of processes and departments as part of an agency consolidation will necessarily result in personnel reduction. For example, two years after the merger, MassDOT saw a net reduction of 31 employees. However, of the 457 new employees added since the merger, many were temporary; 313 of the new employees were assigned to work on an eight-year bridge repair program ending in 2016 and 72 were hired using federal stimulus money. Disregarding those temporary positions, Transportation Secretary Jeffrey Mullan estimated that he has cut the payroll by about 10 percent.

**Streamlining Makes Government More Efficient**

The streamlining and consolidation of operational activities and technologies has produced various efficiencies, particularly through technological consolidation, partnerships with other divisions and the physical consolidation of departments—housing departments under the same roof.

As of fiscal year 2011, MassDOT had achieved over $5 million in savings due to operational efficiencies. Key efforts to achieve these efficiencies included:

- The replacement of the existing 511 information news service
- The formation of a partnership with municipalities and state agencies to utilize rent-free locations for the Registry Division
- The development of a public-private partnership at the Registry Division to send out electronic courtesy notes for driver’s licenses and ID renewals.

**Consolidation Brings Innovative Opportunities and Resources**

The larger network, financial backing and pool of available data after consolidation grants an expanded agency the ability to pursue innovative projects that would not be possible with the limited resources and information of a smaller agency. After its 2009 consolidation, MassDOT created groundbreaking programs such as the MBTA’s real-time open data initiative and the Governor’s Accelerated Bridge program.

Through its open data initiative, the MBTA has released real-time location data for all of its bus routes and rail lines, providing the
public with the same information used by subway and bus dispatchers. Less than two months after opening the first phase of this initiative, with just five bus routes, developers had created more than a dozen applications including websites, smart phone applications, SMS text message services, and phone numbers. All of these applications were created at no cost to MassDOT or the MBTA.

Consolidation with other agencies, particularly MHD and DCR, has allowed MassDOT to streamline project delivery and significantly reduce construction time. The eight year $3 billion Accelerated Bridge Program has completed 138 bridge projects on bridges operated by the former MHD and DCR since 2008. An innovative component of the Accelerated Bridge Program, the Fast 14 I-93 Rapid Bridge Replacement Project, allowed MassDOT to replace 14 bridges in Medford between June and August 2011. By using Accelerated Bridge Construction techniques and materials, MassDOT was able to undertake this project with minimal impact to commuters and drastically reduce construction times; using conventional methods, it would have taken at minimum four years and long-term lane closures to replace all 14 bridges.

Additionally, consolidation enables departments to lower borrowing costs, providing a surer financial footing going forward. Massachusetts avoided $261 million in termination payments associated with interest rate swap agreements after the merger, due to an upgrade of the former MTA’s bond rating. This higher rating has resulted in lower borrowing costs, providing access to cheaper funding sources; additional opportunities to refinance existing debt at lower rates; and the ability to raise further funds for capital improvements.

**New Jersey’s Own Experience Suggests Success**

On July 9, 2003, the New Jersey Highway Authority, which owned and operated the Garden State Parkway, was consolidated under the New Jersey Turnpike Authority. Since then, the New Jersey Turnpike Authority has owned and operated both the New Jersey Turnpike and the Garden State Parkway.

A major reason for consolidation was the ability to address necessary projects on New Jersey’s key corridors that require the finances of a larger agency. Large-scale projects, even if they are sorely needed, can put undue financial strain on a smaller agency. This deficiency was highlighted in 2002, when the Highway Authority could not afford to make substantial necessary repairs to the deteriorating but highly trafficked Driscoll Bridge, and so the Turnpike Authority dedicated some of its capital funds to the $200 million rehabilitation and construction project. The New Jersey Highway Authority had been unable to raise tolls since 1988, leaving it with insufficient revenue to repair and replace road sections and bridges on the Garden State Parkway. Consolidating with the New Jersey Turnpike Authority allowed the new agency to pursue necessary repairs along both the New Jersey Turnpike and Garden State Parkway, and pursue joint capital planning for the benefit of the state as a whole.

The new Turnpike Authority has been able to strengthen the key transportation corridors in New Jersey. In 2003, vitally needed maintenance funds for the Garden State Parkway were allocated as a result of consolidation and refinancing efforts. Those funds allowed for ongoing maintenance projects totaling more than $250 million over the next seven years, including bridge improvements, road resurfacing and other infrastructure repairs.
In 2004, capital construction spending on the New Jersey Turnpike and Garden State Parkway exceeded $382 million.

In 2005, two major widening projects were announced in New Jersey—one on the New Jersey Turnpike and one on the Garden State Parkway.

The finances of the new agency greatly improved after consolidation—the assets and liabilities of the New Jersey Highway Authority were transferred to the Turnpike Authority at book value, resulting in $1.31 billion in balance transfers. This amount included $1.29 billion in construction funds, $9.97 million in the Revenue Fund, $2.01 million in the Stabilization Account, $1.51 million in the Debt Reserve Fund and $5.00 million in the Maintenance Fund.

In addition to financial consolidation, one of the biggest benefits from New Jersey’s merger was the operational streamlining and consolidation of administrative functions. Two years after consolidation with the Highway Authority, the Turnpike Authority had achieved over $8.2 million in administrative savings.

Six months after its 2003 consolidation, the New Jersey Turnpike Authority saw $3.9 million in operational savings. These savings were generated by the elimination of duplicative processes, the streamlining of technology and the reduction of personnel.

Just after its merger, 108 positions were eliminated from the combined New Jersey Turnpike Authority. By 2005, a total of 212 positions had been eliminated. These staff reductions translated directly into over $7 million in savings.

By eliminating 37 positions from the Garden State Parkway in the second half of 2003, the new agency was able to save $2.9 million.

In anticipation of consolidation, the Turnpike Authority eliminated 71 positions from its staff, resulting in $4.1 million in savings.

The expanded resources and operational breadth of a larger agency presented the Turnpike Authority with the opportunity to pursue new and comprehensive improvement projects. Just after its merger in 2003, the New Jersey Turnpike Authority began an unprecedented modernization effort to improve efficiencies, reduce costs and substantially advance incident management capabilities across the consolidated New Jersey Turnpike Authority. This modernization effort included the activation of a statewide fiber network, which created one of the largest and fastest state-owned data networks in the country. The use of fiber allows New Jersey to reduce costs through improved collaboration and the use of shared data and networking services. Less than two years after consolidation, an integrated technology platform was completely installed. Additionally, the standardization of E-ZPass collection operations across the New Jersey Turnpike and Garden State Parkway addressed operational and financial challenges that had endangered both agencies’ credit ratings. This standardization has also made it easier to implement programs such as a High Speed E-ZPass.

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States that have consolidated their Departments of Transportation with other agencies in the past 15 years include:

- **Texas:** In 1997, the Texas Turnpike Authority merged with the Texas Department of Transportation. The Texas Turnpike Authority is part of the Texas Turnpike Authority Division at the Texas Department of Transportation. It is responsible for feasibility studies, design, construction, operation, and maintenance of tolled turnpikes, bridges, and tunnels at locations with high traffic volume. In September 2011, TxDOT created the Toll Operations Division, which is dedicated to planning, building, and administering toll roads.

- **Massachusetts:** In June 2009, Governor Deval Patrick signed “An Act Modernizing the Transportation Systems of the Commonwealth of Massachusetts.” Effective November 1, 2009, this transportation reform legislation merged the Executive Office of Transportation and Public Works (EOT), the Massachusetts Turnpike Authority (MTA), the Massachusetts Highway Department (MHD), the Registry of Motor Vehicles (RMV), the Massachusetts Aeronautics Commission (MAC) and the Tobin Bridge with the Massachusetts Department of Transportation (MassDOT). Additionally, the new MassDOT gained oversight over the Massachusetts Bay Transportation Authority (MBTA) and Regional Transit Authorities (RTA), and assumed responsibility for many of the bridges and parkways formerly operated by the Department of Conservation and Recreation (DCR). As of 2011, the Patrick administration predicted the merger would save $2 billion over the next two decades.

- **North Carolina:** In July 2009, Governor Beverly Perdue signed a bill to consolidate the North Carolina Turnpike Authority (NCTA) under the North Carolina Department of Transportation (NCDOT). The NCTA was established in 2002, and staffing did not begin until 2005. The NCTA remains a separate entity under NCDOT, and is currently developing five projects which were authorized by the General Assembly in 2006. In 2011, the Ports Authority and TransPark were consolidated under NCDOT.

- **Kansas:** In 2013, the Kansas Turnpike Authority (KTA) was consolidated under the Kansas Department of Transportation (KDOT) with HB 2234. Subsequently, the KDOT Secretary of Transportation also serves as KTA’s Director of Operations.
Benefits of Public-Private Partnerships

According to the Federal Highway Administration (FHWA), public-private partnerships are defined as “contractual agreements formed between a public agency and a private sector entity that allow for greater private sector participation in the delivery and financing of transportation projects.”

Public-private partnerships (PPPs) are a funding option in the transportation financing toolbox. PPPs can be a supplement to other funding options in terms of paying for construction projects and can have a role in delivering infrastructure improvements. PPPs are currently authorized in 33 states and Puerto Rico, not including New Jersey.

Advantages of PPP Projects

There are several significant advantages of pursuing PPP projects. First, they can be a funding option for complex and large-scale projects. Potential PPP investors are particularly interested in pursuing sizable and expensive construction projects. Large and multi-year projects benefit private companies because they can provide states with up-front cash at the beginning of the project. Additionally, these firms ensure that the design and construction phases remain consistent throughout the duration of the project.

A second advantage is that PPP agreements can improve efficiency, cost-effectiveness, and the overall project delivery timetable of a project. Additionally, the public benefits from accelerated infrastructure improvements. For example, Indiana’s Ohio River Bridges-East End Crossing project was estimated to be completed $228 million under budget as well as 8 months early.

A third benefit of a PPP project is the ability to allocate certain risks traditionally borne by the public sector to the private sector. This allows for the ability to transfer long-term lifecycle risks to the private sector and allows them to innovate how best to meet performance standards spelled out by the public sector. The parties involved in a PPP project have the opportunity to evaluate and negotiate a variety of risks each will undertake throughout the life of a project agreement and how to place a monetary value on those risks.

Another significant benefit of PPP agreements is the potential for private sector infrastructure investment. The public benefits from accelerated improvements to infrastructure conditions or operations as well as from an influx of private capital in many cases. In exchange for risking their private capital and incurring long-term liabilities in operating and maintaining the asset, the private sector is justifiably looking for a return on its investment over a period of time.

More states continue to use PPPs, including New Jersey’s neighbor Pennsylvania. At the end of 2013, the Pennsylvania Department of Transportation (PennDOT) announced their plan to simultaneously replace 614 structurally deficient bridges in the state using Rapid Bridge Replacement Program PPPs. Payments to the bridge developers are expected to span 25 to 35 years, allowing Pennsylvania to smooth payments over an extended period while using state and federal transportation funds. Using the PPP approach, PennDOT will be able to replace its structurally deficient bridges more quickly and efficiently than it could otherwise.
PennDOT’s creative use of PPPs is a promising move for a state which leads the nation in the number of structurally deficient bridges, including bridges near large population centers. Although Pennsylvania has the largest percentage of structurally deficient bridges, New Jersey currently has 624 structurally deficient bridges—a similar figure to the total number of bridges Pennsylvania is replacing all at once. New Jersey could benefit from using a similar PPP Rapid Bridge Replacement Program to reduce the state’s backlog of structurally deficient bridges faster than the New Jersey Department of Transportation could do by itself.

Additionally, PPP agreements are addressed in Section 1534(d) of Moving Ahead for Progress in the 21st Century (MAP-21). There is also a new bipartisan effort in the House of Representatives, where the Congressional Caucus on Public-Private Partnerships is led by Congressman Mike Rogers (R-AL) and Congressman Gerry Connolly (D-VA).

**New Jersey’s Public-Private Partnerships**

Although New Jersey previously had enabling legislation for transportation PPPs, the statue allowing Design-Build-Operate-Maintain contracts (New Jersey Statute Ann. § 27:25-5) expired in 2003. At present, New Jersey does not have state-wide enabling legislation for transportation infrastructure projects. However, New Jersey has still engaged with several high-profile public-private partnerships and the Port Authority of New Jersey has the authority to pursue PPPs.

However, the Economic Stimulus Act of 2009 in New Jersey included provisions permitting PPPs for higher education facilities—for the design, building, financing, and operation. Currently, higher education PPP projects are presented to the New Jersey Economic Development Authority. These proposals require public and private entities as well as a project timeline and financial estimate for the given project.

The fact that New Jersey has decided to allow higher education facilities to engage in PPPs is significant. This could therefore potentially provide a window of opportunity to begin pursuing new PPP authorization for transportation infrastructure projects as well. Moreover, if New Jersey had enabling legislation for transportation PPPs, then the state of New Jersey would not need to individually approve each proposed project.

**Federal Role in Supporting PPP Projects**

The federal government supports PPPs through Private Activity Bonds (PABs) as well as through the “Transportation Infrastructure Finance & Innovation Act” (TIFIA) Program Loans.

Private Activity Bonds are tax-exempt bonds offered through the U.S. Department of Transportation that help to support PPP projects throughout the country. TIFIA is a credit assistance program that provides loans, loan guarantees, and letters of credit to projects that exceed $50 million and have revenue sources to repay the funds.

By having enabling legislation, New Jersey would be able to take advantage of these financing tools. Such regional projects as the Goethals Bridge and the Tappan Zee Bridge have received sizeable TIFIA loans that have allowed these projects to move forward. This could be a valuable source of new funding for transportation construction projects that would have a significant impact on the New Jersey economy.
New Jersey Privatization Task Force (2010)

In March 2010, New Jersey Governor Chris Christie (R) established the New Jersey Privatization Task Force—through Executive Order 17—which was tasked with reviewing how the state could pursue privatization opportunities in the future. In May 2010, the New Jersey Privatization Task Force submitted the final report to Gov. Chris Christie, and the members of the task force concluded that privatization efforts can reduce costs and also help to enhance the overall quality of the public sector’s services.

The New Jersey Privatization Task Force identified the Turnpike Authority and South Jersey Transportation Authority’s toll collection approach as a potential PPP opportunity and estimated that the state could save $35 million each year after it would be implemented. This project used manual toll collection methods, and the South Jersey Transportation Authority plans on implementing a new electronic toll program on the Atlantic City Expressway. The task force recommended to Governor Christie that this should include the private sector, and that private vendors should have the opportunity to submit Requests for Proposals (RFPs) to work on these toll road projects.

The task force also identified highway maintenance contracts as another area of opportunity to include private sector involvement. The task force members said that pursuing a long-term performance-based asset management approach would help with the state’s cost saving efforts.

PPP Examples in New Jersey

New Jersey has had several successful public-private partnerships despite lacking state-wide enabling PPP legislation. These public-private partnerships include light rail projects, airports, bridges, and the New Jersey Turnpike. For example, The New Jersey Turnpike Authority successfully privatized the Turnpike and Garden State Parkway’s service areas.

In 1996, The Hudson-Bergen Light Rail Line contract was secured as a public-private partnership between New Jersey Transit and the “21st Century Rail” for $1.1 billion. The contract ultimately increased to $1.9 billion, and the firm was in charge of designing, building, operating and maintaining the light rail system. Additionally, the agreement changed and the project scope increased—therefore, 21st Century Rail was in charge of operating and maintaining the system for 20 years. Today, this rail line is now owned by New Jersey Transit and currently run by the 21st Century Rail Corporation. This project was the first transit design-build-operate-maintain project in the United States. Despite the fact that New Jersey was actually a leader in PPP projects, the state has since fallen behind due to legislative inaction.

The New Jersey Privatization Task Force also praised the success of this PPP. The report states, “commencing operation in 2000, the project has met or exceeded its objectives and the contract with the vendor has been extended. The light rail line has been a catalyst for both residential and commercial development along the route and has played a significant role in the revitalization of Hudson County.”

The Atlantic City International Airport (ACA), developed by the South Jersey Transportation Authority (SJTA), is another well-known PPP project in New Jersey. While the ACA is now managed by The Port Authority of New York and New Jersey, the SJTA still contributes to the airport’s capital plan and airline incentive strategy. The New Jersey Task Force...
highlighted the overwhelming success of this public-private partnership: "the successful initiative has allowed for unprecedented growth of the airport, which serves as a key economic driver for the Southern New Jersey region."

In April 2013, the Port Authority of New York and New Jersey awarded a new PPP project for the replacement of the Goethals Bridge, which is located between New York and New Jersey. The Port Authority secured a $1.5 billion contract with the NYNJ Link Partnership in exchange for the design, build, finance, and maintenance of the bridge replacement.
The Gold Standard of Investment

The gold standard is the level of transportation funding which optimizes the benefits of transportation funding relative to the cost of the investment. Increasing investment that is less than the gold standard will yield a net benefit to New Jersey residents and businesses, while investment above the gold standard would be more than is strictly necessary.

Total annual capital investment by the New Jersey DOT, New Jersey Transit and the New Jersey Turnpike Authority, including revenues from the federal-aid program, would need to average $10.3 billion from 2014 to 2023 to make all necessary improvements to the state’s highway, bridge and transit systems, nearly double the $5.6 billion in capital outlays in 2014. At that level of investment, New Jersey drivers would save nearly $6.5 billion annually in travel time and operating costs compared to current conditions.

This level of investment would have profound impacts on the economy, competitiveness and quality of life in New Jersey. At the optimal level of funding, New Jersey would be able to complete all highway and bridge improvements where the benefit of the investment outweighs the cost. Investment in the New Jersey transit and turnpike systems would increase from current levels to keep pace with inflation.

By making all beneficial improvements, nearly all travel on the federal aid system, 89.1 percent, would be on roads in “good” condition, compared to 29.5 percent before improvements are made. Nearly 92 percent of travel would be on “acceptable” roads, compared to 73.2 percent.

New Jersey businesses would save over $3.1 billion in truck related costs, including $1.4 billion in operating and maintenance costs and $1.7 billion in travel time.

New Jersey drivers would save $1.1 billion in operating costs and $1.4 billion in travel time costs. Average speed on rural roads would increase nearly 12 percent to 53.5 miles per hour, and urban speeds would increase nearly 3.6 percent to 43.7 miles per hour. Drivers would save nearly 16.7 hours per year from reduced congestion and traffic delays. That is time that New Jersey citizens could spend at work or pursuing leisure activities rather than sitting in traffic.

The increased investment levels would also support additional economic activity with more construction work on highways, bridges and transit projects, including over 176,380 jobs throughout all sectors. These employees would earn over $7.4 billion annually.

The purchases made by New Jersey construction firms, their suppliers and employees would support a total of $24.4 billion in economic output throughout all sectors of the economy. This would contribute nearly $12.8 billion annually to the New Jersey GSP.

In addition to the jobs created by the construction activity, the mix of projects outlined by HERS-ST would benefit the key growth industries of New Jersey.

Manufacturing and Defense Industries

The highway and bridge construction activity from fully investing in the New Jersey
highway, bridge and transit investment alone would support increased output, jobs and earnings in the manufacturing sector:

- An additional 8,428 jobs would be supported or created.
- Those employees would earn $455.3 million in wages, which would be spent on additional goods and services throughout the economy, thereby stimulating more market activity.
- Output by manufacturing firms would increase by nearly $2.75 billion
- The value added by the manufacturing industry would increase New Jersey’s GSP by $986.1 million.\textsuperscript{35}

The manufacturing sector also includes the defense sector, which is primarily composed of manufacturing firms.

What would be some of the benefits of fully funding the New Jersey highway and bridge system? By fully investing in the New Jersey federal-aid highway system over the next 20 years:

- The average user costs on these highways would fall 7 percent over the period, with Bergen County, where 29 manufacturing firms are located, reducing user costs by over 11 percent.
- Average speed would increase by 6 percent, from 43 miles per hour to 45 miles per hour.
- Average road roughness would fall 67 percent, with Essex County, where 26 manufacturing firms are located, reducing road roughness by 79 percent.
- Total operating costs for all vehicles would fall by 10 percent and all travel time costs falling by 5 percent.
- Peak capacity would increase by 21 percent, with the largest gains in Bergen and Ocean Counties.

Counties where defense firms are primarily located would experience the following fall in user costs:

- The average user costs on these highways would fall 8 percent over the period, with Bergen County reducing user costs by 11 percent.
- Average speed would increase by 7 percent, from 43 miles per hour to 46 miles per hour.
- Average road roughness would fall 69 percent, and Camden and Ocean Counties (home to four defense industry firms) reducing roughness by over 75 and 62 percent.
- Total operating costs for all vehicles would fall by 11 percent and all travel time costs would fall by 6 percent.
- Peak capacity would increase by 22 percent.

\textsuperscript{35}Value added is the sum of all output in an industry less the cost of inputs. Total industry output is the sum of all sales in the sector. Therefore the sale of an input in the manufacturing sector would be counted as output, but that value would be subtracted from the total value of the final product it is used for. GDP measures the sum of all value added and final products in the economy.
Financial Industry

When fully implemented, the highway and bridge construction activity from fully funding New Jersey’s highway and bridge system would support increased output, jobs and earnings in the finance sector:

• An additional 4,586 jobs would be supported or created.

• Those employees would earn $312.9 million in wages, which would be spent on additional goods and services throughout the economy, thereby stimulating more market activity.

• Output by financial firms would increase by nearly $1.3 billion.

• The value added by the financial industry would increase New Jersey’s GSP by $757.9 million.\(^{36}\)

Health Care Industry

The highway and bridge construction activity from fully funding the New Jersey highway and bridge system would support increased output, jobs and earnings in the health care sector:

• An additional 10,965 jobs would be supported or created

• Those employees would earn $462.6 million in wages, which would be spent on additional goods and services throughout the economy, thereby stimulating more market activity

• Output by firms in the health care sector would increase by about $1 billion

• The value added by the health care industry would increase New Jersey’s GSP by $622.6 million.\(^{37}\)

What would be some of the outcomes of making all beneficial improvements to the New Jersey highway and bridge system? By fully investing in the New Jersey federal aid highway system over the next 20 years:

Average user costs on these highways would fall 6 percent over the period, with Bergen and Hudson Counties reducing user costs by over 11 percent.

• Average speed would increase by 6 percent, from 43 miles per hour to 45 miles per hour.

• Average road roughness would fall 59 percent, with most counties reducing roughness by over 60 percent and Hudson County reducing road roughness by 77 percent.

• Total operating costs for all vehicles would fall by 10 percent and all travel time costs would fall by 5 percent.

• Peak capacity would increase by 21 percent, with the largest gains in Hudson and Ocean Counties.

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\(^{36}\)Value added is the sum of all output in an industry less the cost of inputs. Total industry output is the sum of all sales in the sector. Therefore the sale of an input in the financial sector would be counted as output, but that value would be subtracted from the total value of the final product it is used for. GDP measures the sum of all value added and final products in the economy.

\(^{37}\)Value added is the sum of all output in an industry less the cost of inputs. Total industry output is the sum of all sales in the sector. Therefore the sale of an input in the health care sector would be counted as output, but that value would be subtracted from the total value of the final product it is used for. GDP measures the sum of all value added and final products in the economy.
What would be some of the benefits of fully funding the New Jersey highway and bridge system? By fully investing in the New Jersey federal aid highway system over the next 20 years:

• The average user costs on these highways would fall 6 percent over the period, with Bergen and Hudson Counties reducing user costs by over 11 percent.

• Average speed would increase by 6 percent, from 43 miles per hour to 45 miles per hour.

• Average road roughness would fall 68 percent, with several counties reducing roughness by over 70 percent.

• Total operating costs for all vehicles would fall by 11 percent and all travel time costs would fall by 6 percent.

• Peak capacity would increase by 21 percent, with Bergen and Somerset Counties increasing peak capacity by 30 percent.

**Life Sciences Industry**

The highway and bridge construction activity from fully funding the New Jersey highway and bridge system would support increased output, jobs and earnings in the professional, scientific and technical services sector over the next 20 years:

• An additional 9,997 jobs would be supported or created.

• Those employees would earn $560.7 million in wages, which would be spent on additional goods and services throughout the economy, thereby stimulating more market activity.

• Output by firms would increase by nearly $1.4 billion.

• The value added by the professional, scientific and technical services industry would increase New Jersey’s GSP by $952 million.\(^{38}\)

What would be some of the benefits of fully funding the New Jersey highway and bridge system? By fully investing in the New Jersey federal aid highway system over the next 20 years:

• The average user costs on these highways would fall 7 percent over the period, with Bergen and Hudson Counties reducing user costs by over 11 percent.

• Average speed would increase by 7 percent, from 43 miles per hour to 46 miles per hour.

• Average road roughness would fall 68 percent, with many counties reducing roughness by over 70 percent.

• Total operating costs for all vehicles would fall by 11 percent and all travel time costs would fall by 5 percent.

• Peak capacity would increase by 21 percent, with Hudson County, home to at least 17 businesses related to life sciences, increasing peak capacity by 43 percent.

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\(^{38}\)Value added is the sum of all output in an industry less the cost of inputs. Total industry output is the sum of all sales in the sector. Therefore the sale of an input in the life sciences sector would be counted as output, but that value would be subtracted from the total value of the final product it is used for. GDP measures the sum of all value added and final products in the economy.
Facilitating Economic Growth: The Benefits of Increasing New Jersey Highway & Bridge Capital Investment

Technology Industry

The highway and bridge construction activity from fully funding the New Jersey highway and bridge investment would support increased output, jobs and earnings in the information technology sector:

- An additional 2,305 jobs would be supported or created.
- Those employees would earn $149.7 million in wages, which would be spent on additional goods and services throughout the economy, thereby stimulating more market activity.
- Output by information technology firms would increase by nearly $648.4 million.
- The value added by the information technology industry would increase New Jersey’s GSP by $632.4 million.\(^{39}\)

What would be some of the benefits of fully funding the New Jersey highway and bridge system? By fully investing in the New Jersey federal aid highway system over the next 20 years:

- The average user costs on these highways would fall 7 percent over the period, with Bergen County reducing user costs by over 11 percent.
- Average speed would increase by 8 percent, from 43 miles per hour to almost 47 miles per hour.
- Average road roughness would fall 68 percent, with Camden County, one of the largest technology counties by firms, reducing roughness by 75 percent.
- Total operating costs for all vehicles would fall by 10 percent and all travel time costs would fall by 6 percent.
- Peak capacity would increase by 21 percent.

Transportation, Logistics and Distribution Industry

The highway and bridge construction activity from fully funding the New Jersey highway and bridge network would support increased output, jobs and earnings in the transportation, logistics and distribution sector:

- An additional 4,501 jobs would be supported or created.
- Those employees would earn $192.1 million in wages, which would be spent on additional goods and services throughout the economy, thereby stimulating more market activity.
- Output by transportation and warehousing firms would increase by nearly $678.4 million.
- The value added by the transportation and warehousing industry would increase New Jersey’s GSP by $352.1 million.\(^{40}\)

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\(^{39}\)Value added is the sum of all output in an industry less the cost of inputs. Total industry output is the sum of all sales in the sector. Therefore the sale of an input in the technology sector would be counted as output, but that value would be subtracted from the total value of the final product it is used for. GSP measures the sum of all value added and final products in the economy.

\(^{40}\)Value added is the sum of all output in an industry less the cost of inputs. Total industry output is the sum of all sales in the sector. Therefore the sale of an input in the transportation, logistics and distribution sector would be counted as output, but that value would be subtracted from the total value of the final product it is used for. GDP measures the sum of all value added and final products in the economy.
What would be some of the benefits of fully funding the New Jersey highway and bridge system? By fully investing in the New Jersey federal aid highway system over the next 20 years:

- The average user costs on these highways would fall 9 percent over the period, with Bergen and Hudson Counties reducing user costs by over 11 percent.
- Average speed would increase by 9 percent, from 43 miles per hour to nearly 47 miles per hour.
- Average road roughness would fall 70 percent, with Essex County—home to 41 transportation logistics and distribution firms—reducing roughness by over 79 percent.
- Total operating costs for all vehicles would fall by 12 percent and all travel time costs would fall by 7 percent.
- Peak capacity would increase by 25 percent, with Hudson County, home to at least 43 businesses related to life sciences, increasing peak capacity by 43 percent.

**Tourism Industry**
The highway and bridge construction activity from fully funding the New Jersey highway and bridge highways system would support increased output, jobs and earnings in the tourism sector, composed of the accommodation and food services sector and the arts, entertainment and recreation sector:

- An additional 10,057 jobs would be supported or created.
- Those employees would earn $187.9 million in wages, which would be spent on additional goods and services throughout the economy, thereby stimulating more market activity.
- Output by tourism firms would increase by nearly $519.4 million.
- The value added by the tourism industry would increase New Jersey’s GSP by $292.2 million.\(^1\)

What would be some of the benefits of a fully funded investment in the New Jersey highway and bridge system? By fully investing in the New Jersey federal aid highway system over the next 20 years:

- The average user costs on these highways would fall 6 percent over the period, with Bergen and Hudson Counties reducing user costs by over 11 percent.
- Average speed would increase by 6 percent, from 43 miles per hour to almost 46 miles per hour.
- Average road roughness would fall 67 percent, with Hudson County—home to 17 tourism businesses—reducing road roughness by 77 percent.
- Total operating costs for all vehicles would fall by 11 percent and all travel time costs would fall by 4 percent.

\(^{1}\)Value added is the sum of all output in an industry less the cost of inputs. Total industry output is the sum of all sales in the sector. Therefore the sale of an input in the tourism sector would be counted as output, but that value would be subtracted from the total value of the final product it is used for. GDP measures the sum of all value added and final products in the economy.
• Peak capacity would increase by 21 percent, with Hudson County increasing peak capacity by 43 percent and Ocean County increasing peak capacity by 34 percent.

The Cost of Maintaining the Status Quo

What are the implications for the New Jersey business community if the system is not improved? Traffic congestion would increase, road and bridge conditions would deteriorate and more New Jersey drivers would face unsafe highways.

Traffic congestion occurs when the number of vehicles on a roadway is greater than the road was designed to handle. Traffic is not able to move at speed, and the resulting slowdowns have a ripple effect along the roadway. Traffic congestion has adverse impacts on air quality, the quality of life and business activity. 42

Air quality is affected due to increased vehicle emissions from cars and trucks stuck in traffic. Poor air quality has an impact on the health of at-risk populations, including the elderly and small children. Personal time delays mean that commuters and other system users are behind the wheel rather than spending more time at work or at leisure, something that impacts their quality of life.

As more time on the roadways means less time for leisure and production, traffic congestion means additional costs associated with a reduced service area for their suppliers, customer markets and workforce. 43

A survey of business owners found that typical ways businesses deal with congestion include: 44

• Costs for additional drivers and trucks due to longer travel times
• “Rescue drivers” to avoid missed deliveries due to unexpected delays
• Loss of productivity due to missed deliveries
• Shift changes to allow earlier production cut off
• Reduced market areas
• Increased inventories
• Costs for additional crews and decentralized operations to serve the same market area
• Business that are local can absorb the cost or pass it on
• Trade-oriented businesses can respond by moving their operations

42 Ibid.
43 Impacts of congestion (Cost of Congestion to the Economy of the Portland Region).
Methodology and Sources

The FHWA HERS-ST model is used to estimate the investment needs for New Jersey on the National Highway System, using the same modeling techniques as those employed by the Federal Highway Administration when preparing the federal Needs and Conditions report on the nation’s transportation infrastructure.

HERS-ST selects a set of optimal improvements based on funding constraints, or can determine the cost of making all cost-beneficial improvements over a given time period to the state roads that are part of the federal aid system. Both approaches were used for the purposes of this study. All data used in the model is submitted by the New Jersey DOT to FHWA as part of the Highway Performance Monitoring System.

To calculate the total investment needed to support the optimal spending level modeled in HERS-ST, we assume that investment on the federal aid system will continue to represent 69.5 percent of total capital outlays, the historical average based on data from FHWA. Right of way and engineering costs are expected to be 25 percent of total capital outlays, also in line with historical averages. Additional estimates are made for bridge investment levels based on the backlog of work identified in FHWA’s National Bridge Inventory. New Jersey Transit and New Jersey Turnpike Authority capital outlays are expected to increase with inflation, at a rate of 2.3 percent per year.

The immediate impact of an increase in transportation construction spending is calculated using the U.S. Department of Commerce Regional Input-Output Modeling System (RIMS II). RIMS II is based on input output (I-O) tables. For a given industry, the I-O tables show the industrial distribution of inputs purchased and outputs sold.

Research shows that RIMS II multipliers are similar to other regional I-O models based on in-depth and often expensive surveys. According to the U.S. Department of Commerce, RIMS multipliers have been used to estimate such things as the regional impact of military base closings, tourist expenditures, new energy facilities, offshore drilling and the opening or closing of manufacturing plants and other facilities. These multipliers are also used frequently to analyze the impact of new construction projects, including transportation construction.

Industry output for New Jersey is the most recent data from the U.S. Bureau of Economic Analysis GDP estimates for the state, broken out by industry, for 2012.

The employment estimates are derived from several different sources. The information includes establishment and employment data for sole proprietorships and businesses identified as relevant to highway, street and bridge construction. The total direct employment number for suppliers is calculated using the percentage of an industry’s output that is related to highway, street and bridge construction, based on national input output tables from the U.S. Bureau of Economic Analysis. The private employment data is from the U.S. Census Bureau’s County Business Patterns and Nonemployer Statistics series. Government employee data is from the U.S. Census Bureau’s Annual State and Local Government Census. All payroll data has been adjusted for inflation to 2009 dollars using the Bureau of Labor Statistics Consumer
Induced employment is calculated according to the same method used by the U.S. Department of Transportation Federal Highway Administration (FHWA). FHWA estimates that every $1 billion invested in highway construction yields 27,823 jobs. Of that total, 13,861 are considered direct jobs for on-site construction and direct and indirect suppliers, and 13,962 jobs are induced. This study uses that ratio, calculating induced jobs based on the direct employment above.

All bridge information, including conditions, is from FHWA’s National Bridge Inventory.

Average commute times are from the U.S. Census Bureau. Fatality and crash information is from the National Highway Traffic Safety Administration.

State data on freight shipments is from the FHWA Freight Analysis Framework and is for 2011, the latest year that data is available. The freight value has been adjusted to 2013 dollars using inflation numbers from the U.S. Bureau of Labor Statistics.

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Supporting Studies

The overall economic benefits of highway investment to New Jersey’s economic activity are well documented in the economics literature. There are numerous studies that have found a positive correlation between transportation infrastructure investment and economic development. Although the exact impact of the investment has varied among studies, the fact that there is a positive relationship is widely accepted.\(^{45}\)

A study by Dr. Alicia Munnell of the Federal Reserve Bank of Boston concluded that states that invested more in infrastructure tended to have greater output, more private investment and more employment growth.\(^{46}\) Her work found that a one percent increase in public capital would raise national output by 0.15 percent.\(^{47}\) She further notes that the major impact of public capital output is from investment in highways and water and sewer systems. Other public capital investments, such as school buildings and hospitals, had virtually no measurable impact on private production.\(^{48}\) Munnell also concludes that public capital and infrastructure investment have a significant positive impact on a state’s private employment growth and private sector output.

Smith (1994) reached similar conclusions, estimating increasing investment in highway and capital stock would increase a state’s gross output by 0.121 to 0.127 percent. This means a $1 billion increase in New Jersey’s highway capital stock would increase state productivity between $1.21 million to $1.27 million.\(^{49}\)

Additional studies have found that transportation infrastructure investments have an impact on the attractiveness of local communities, which helps determine local economic activity and land values. In general, most studies find that locations close to large transportation infrastructure investment have higher land values.\(^{50}\)

M. Ishaq Nadiri of New York University and the National Bureau of Economics Research and Theofanis P. Mamuneas of New York University find significant cost structure and productivity performance impacts on the U.S. manufacturing industry as a result of highway investment. Their work shows that the rate of return on highway investment can be

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\(^{45}\) Economic studies have found output elasticities ranging from as high as 0.56 (Aschauer 1989) to a low of 0.04 (Garcia-Mila and McGuire 1992). This means that a one percent increase in highway investment would result in between 0.04 to 0.56 percent increase in output. Most of this variation is because studies have a different focus-looking at different types of investment measures and output at either the national, state or county level.

\(^{46}\) Munnell, Alicia, How Does Public Infrastructure Affect Regional Economic Performance, New England Economic Review, September/October 1990

\(^{47}\) Munnell’s elasticity for private capital is 0.31, so that a one percent increase in private capital would raise national output by 0.31 percent. This is in line with other studies of returns from private capital investment.

\(^{48}\) Munnell says she is not implying that government-provided education and health services have no effect on productivity, but rather “the stock of buildings ... may not be the best indicator of the quality of education services; teachers’ salaries, for example, might be a better measure.”

\(^{50}\) A synopsis of these studies are available in the Transportation Research Board’s Expanding Metropolitan Highways: Implications for Air Quality and Energy Use – Special Report 245, 1995.
greater than private investment. Some major findings include:\(^{51}\)

- Over the period 1950 to 1989, U.S. industries realized production cost savings averaging 18 cents annually for each dollar invested in the road system.

- Investments in non-local roads yield even higher production cost savings —estimated at 24 cents for each dollar of investment.

- Although the impact of highway investment on productivity has declined since the early 1970s and the initial construction of the Interstate, evidence suggests that highway infrastructure investments more than pay for themselves in terms of industry cost savings.

- The U.S. highway network’s contribution to economic productivity growth was between 7 and 8 percent over the time period 1980 to 1989.

- The net social rate of return on investment in the non-local road system during the 1980s was 16 percent, and the rate of return for the entire road network was 10 percent.\(^{52}\)

- This rate of return was significantly higher than the prevailing rate of return on private capital and the long-term interest rate during this time period.

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\(^{51}\)Summary provided by U.S. Department of Transportation, Productivity and the Highway Network: A Look at the Economic Benefits to Industry from Investment in the Highway Network.

\(^{52}\)The net social rate of return is an estimate of the benefits to private industries derived from the shared use of public highways.
References


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