



JERSEY DOT'S

"TURNING PROBLEMS INTO SOLUTIONS"

Tech Brief

Transportation: Impact on the Economy

FHWA-NJ-2009-015

September 2009

THE PROBLEM:

- NJDOT needs a convenient and reliable means of comparing the potential economic impacts of the transportation infrastructure improvement projects it funds through its Capital Plan.
- In light of the federal funding now available through AARA, the ability to efficiently evaluate and prioritize projects is a key component in effective deployment of these funds.

THE SOLUTION:

- Develop a set of software tools that will allow NJDOT to readily and easily evaluate *both* the short- and long-term economic impacts of its prospective projects.
- Provide NJDOT guidance on how to compare the potential short-term economic impacts of transportation investments across different prospective projects.
- Provide NJDOT with the know-how to readily and easily weigh the prospective long-term costs and benefits of the highway capacity enhancements resulting from its infrastructure investments.

THE APPROACH:

- We created two software tools and a set of accompanying guidelines to help NJDOT assess the potential economic impacts of its prospective infrastructure investments.
- The first tool is the Transportation Investment Impact Estimator (TIIE) to be used for evaluating short-term investment impacts:

The screenshot shows a web browser window with the title "NJDOT Economic Stimulus Impact Calculator". The page header includes the "STATE OF NEW JERSEY DEPARTMENT OF TRANSPORTATION" logo and the title "Transportation Infrastructure Impact Estimator". Below the header, there is a blue sidebar with a gear icon. The main content area is white and contains a form with the following fields: "Project Number", "Project Name", "Project Type" (a dropdown menu), "Project Location" (a dropdown menu), "Project Size" (a dropdown menu), and "Project Investment (in millions)". A "Calculate" button is located at the bottom of the form. The footer of the page includes "Record: 14 1 of 1", "No Filter", "Search", "Num Lock", and "Powered by Microsoft Office Access".

TIIE

- The second tool is NJCOST, which allows NJDOT to measure and compare the long-term costs and benefits of infrastructure investments that increase transportation capacity:

The screenshot shows the NJCOST web application interface. On the left, there is a sidebar with a "DATA VISUALIZATION" section containing "OD TRIPS" and "ANALYSIS" buttons. Below these is a "USER:" field and a "PROJECT NAME:" field. The main area is a map viewer showing a network of green lines representing transportation infrastructure. On the right, there is an "ANALYSIS" section with the following fields: "Analysis Method" (a dropdown menu), "Define Origin" (a text input field), "Define Destination" (a text input field), "Origin County" (a dropdown menu), "Destination County" (a dropdown menu), "Sample Size" (a text input field), and "Value of Time (\$/hr)" (a text input field with the value "7.6"). Below these fields are two buttons: "Clear Visualization" and "RUN ANALYSIS".

NJCOST

THE TIIE IS ABLE TO :

- Estimate the short-term economic impacts of transportation investments in New Jersey in terms of:
 - Employment
 - Income
 - Gross Domestic Product
 - State and local tax revenues
- Provide economic impact estimates both for total transportation investment amounts and on a per-million dollar basis.
- The TIIE can perform economic impact analysis for 14 different types of transportation infrastructure projects and generate impact estimates specific to project size and location within New Jersey.

NJCOST IS ABLE TO;

- Estimate the benefits (i.e., cost reductions) attributable to capacity improvements in terms of
 - Vehicle-operating costs
 - Travel time and congestion costs
 - Accident costs (vehicle damage, injury, death, traffic delay)
 - Environmental costs (pollution and noise)
 - Roadway maintenance costs
- Provide the necessary data for conducting cost-benefit analysis of the long-term economic impacts of transportation improvements.

HOW THEY WORK:

- The impact estimates generated by the TIIE are calculated using the R/ECON™ Input-Output Model of the New Jersey economy. The model was used to estimate the impacts of 14 types of transportation projects based on historical data on project expenditures provided by NJDOT.
- NJCOST is a GIS-based tool that uses *output* from the NJTRME as its input in order to estimate the various cost reductions resulting from highway capacity enhancements.

FINDINGS:

Short-Term Economic Impacts

- The TIE was used to estimate the aggregate short-term economic impacts of 208 road and bridge projects in the NJDOT Capital Plan for 2009-2018. These projects account for \$10.7 billion, or 55% of the total road and bridge expenditures contained in the plan and 32% of all expenditures stipulated in the plan when NJ Transit projects are included.
- The 208 Capital Plan projects analyzed with the TIE will have estimated economic impacts totaling:
 - 95,373 job-years (a job-year is one job lasting one year)
 - \$6.1 billion in income
 - \$7.9 billion in gross domestic product
 - \$174.7 million in state tax revenues
 - \$222.7 million in local tax revenues
- The TIE was also used to analyze the short-term economic impacts of NJDOT projects submitted for federal stimulus funding under the American Recovery and Reinvestment Act (ARRA). Thirty-one *state* projects representing \$679.5 million in investment, and 91 *local* projects representing \$152.5 million in investment were analyzed.
- The 31 *state* projects submitted for ARRA funding will have estimated economic impacts totaling:
 - 6,745 job-years (a job-year is one job lasting one year)
 - \$395.2 million in income
 - \$516.3 million in gross domestic product
 - \$11.1 million in state tax revenues
 - \$14.2 million in local tax revenues
- The 91 *local* projects submitted for ARRA funding will have estimated economic impacts totaling:
 - 1,338 job-years (a job-year is one job lasting one year)
 - \$85 million in income
 - \$110.5 million in gross domestic product
 - \$2.5 million in state tax revenues
 - \$3.2 million in local tax revenues

Long-Term Economic Impacts

- NJCOST was used to estimate the long-term benefit-cost ratios for five major roadway widening projects completed between 2004 and 2009 in northern New Jersey:
 - o An \$83.2 million, half-mile long road widening and bridge reconstruction on Route 17 in Bergen County was estimated to generate benefits (i.e., cost reductions) totaling \$5.7 billion (net present value in 2008 dollars) over a 25-year period, resulting in a cost-benefit ratio of 68.08.
 - o An \$87.4 million, 1.5-mile long roadway widening and extension project on Route 18 in Middlesex County was estimated to generate benefits (i.e., cost reductions) totaling \$5.15 billion over a 25-year period, resulting in a cost-benefit ratio of 58.95.
 - o A \$129.6 million, 1.4-mile long roadway widening and bridge reconstruction project on Route 35 in Middlesex County was estimated to generate benefits (i.e., cost reductions) totaling \$4.28 billion (net present value in 2008 dollars) over a 25-year period, resulting in a cost-benefit ratio of 33.05.
 - o A \$75.3 million bridge reconstruction on Route 1&9 in Union County was estimated to generate benefits (i.e., cost reductions) totaling \$6.36 billion (net present value in 2008 dollars) over a 25-year period, resulting in a cost-benefit ratio of 83.75.
 - o A \$61.1million, 2.9-mile long roadway widening and bridge reconstruction project on Route 1 in Middlesex County was estimated to generate benefits (i.e., cost reductions) totaling \$4.65 billion (net present value in 2008 dollars) over a 25-year period, resulting in a cost-benefit ratio of 76.21.

CONCLUSIONS AND RECOMMENDATIONS:

The analyses conducted for this study and summarized above demonstrate that targeted transportation infrastructure investments can have significant positive long- and short-term economic impacts for New Jersey. However, funding can not be provided for the entire multitude of projects of differing types, sizes and locations. Accordingly, this project has sought to provide NJDOT with a set of rigorous, objective and standardized tools and methodologies that will aid the agency in setting priorities for allocation of transportation infrastructure funding.

During the current recession, the immediate and justifiable focus of federal and state stimulus policies in transportation is to promptly boost overall economic activity. The resulting impacts of this stimulus spending – in terms of employment, income, gross domestic product, and tax revenues – can be estimated by the TIE, thereby providing a set of objective measures by which comparisons can be made across diverse projects. However, these impacts are one-time, short-run impacts; they persist only so long as the expenditures last and they stop with the end of the expenditures.

Beyond the immediate objective of invigorating an economy in recession, the fundamental purpose of transportation infrastructure investment is to enhance the competitiveness of the nation and the state and its businesses, provide for the efficient, safe, and reliable movement of people and goods, and improve the quality of life of individuals and families. As such, the ability to rank projects in terms of their monetary benefits versus their costs by evaluating a project's *long-term ongoing* outcomes can improve the efficacy of NJDOT's decisions and increase net public benefits.

While the one-time economic impacts are important, especially in the current deeply constrained economic environment, the rationale for public investments should properly rest on whether these investments are efficient over the course of a project's life. Therefore, having the ability to determine whether a given project is efficient (i.e., do the anticipated benefits to society exceed the project's costs to society?) and to determine a project's relative rate of return per dollar spent (i.e., its benefit to cost ratio) is a potent tool to justify allocating scarce public resources (state and federal) to transportation investments.

NJCOST provides a means of conducting consistent cost-benefit analysis of New Jersey's myriad transportation infrastructure projects. With NJCOST, NJDOT will be able to assess the long-term impacts of projects as they arise, estimating benefit-cost ratios and net benefit measurements that yield an objective comparison of a project's economic impact and efficiency. In addition, this analytical approach will allow NJDOT to provide an economic rationale for transportation investment. For example, in the allocation of federal funds, New Jersey will be able, via an objective and independent methodology, to demonstrate the efficiency of its proposed transportation projects.

NJDOT should consider, as a general policy, using the TIE program to estimate the one-time economic impacts of each transportation project initiated in a given year and report the cumulative impacts of all such projects in the annual accountability process of the Department. This will provide the public and the Department with a concise and accessible summary, measured in the common metrics of jobs and dollars, of the immediate economic effects of the Department's investment expenditures. This analysis should also be periodically done for the Capital Plan as anticipated projects change in number, scope, and location, and as the overall Capital Plan evolves over time.

NJDOT should consider using the NJCOST program, where applicable, to routinely provide an economic rationale for its use of public resources and to support its requests for federal transportation resources. NJDOT should consider using NJCOST to routinely prioritize and rank potential transportation projects according to their net economic benefit. This information can be an additional and important factor, within the Department's existing decision making protocols, to inform its decisions on the allocation of scarce public resources among competing uses.

FOR MORE INFORMATION CONTACT:

NJDOT Project Manager:	Edward S. Kondrath
Phone:	609-530-2058
Email Address:	ed.kondrath@dot.state.nj.us
University Principal Investigator:	Dr. Joseph J. Seneca
University:	Edward J. Bloustein School of Planning and Public Policy Rutgers, The State University of New Jersey
Phone:	732-932-5475 ext. 757
Email Address:	seneca@rci.rutgers.edu

A final report is available online at:

<http://www.state.nj.us/transportation/refdata/research/>

If you would like a copy of the full report, please FAX the NJDOT, Bureau of Research, Technology Transfer Group at (609) 530-3722 or send an e-mail to Research.Bureau@dot.state.nj.us and ask for:

Transportation: Impact on the Economy Study

NJDOT Research Report No: FHWA-NJ-2009-015