

THE
NEW ENGLAND
COUNCIL

**EMPLOYMENT IMPACTS of INCREASED HIGHWAY
INFRASTRUCTURE INVESTMENT**

DECEMBER 10, 2008

I. HISTORY

The stagnant residential real estate market and negative fallout from the sub-prime mortgage crisis, particularly reduced credit availability from banks and other lenders, has resulted in a dramatic drop in employment within the construction industry. According to the Bureau of Labor Statistics, the construction industry is experiencing its largest sustained decline in business within the last four decades. One million construction workers are currently unemployed, a 60 percent increase over the past year. The unemployment rate in construction reached 9.9 percent in September, the highest unemployment rate of any industrialized sector. The Department of Commerce Census Bureau released construction spending rates indicating that commercial construction spending decreased by 11.2%, communications construction spending decreased by 20.4% and residential construction spending decreased by 23.6% from October 2007 through October 2008.

At the same time, federal, state, and local jurisdictions have been warning of a critical need for transportation infrastructure modernization and replacement in the next six years and beyond, as roads, bridges, and other infrastructure, some of which was constructed more than 100 years ago, deteriorate or become obsolete.

Increasing the funds invested in our nation's transportation infrastructure to create or sustain employment has been used in the past to stimulate the economy and promote job growth. Congress relied on such transportation spending to offset the negative effects of the economic recessions of the 1960s, the mid 1970s, and the early 1980s. Public investment in transportation infrastructure is particularly effective in boosting the economy because it is directed at those industries - heavy construction, building materials, and durable goods manufacturing - that usually suffer the most during an economic downturn. The benefits extend to numerous other industries as well.¹

Industry representatives, policy experts and state officials have asked Congress to increase transportation infrastructure investment in some type of jobs creation/economic stimulus legislation. On October 20, 2008 Benjamin Bernanke, Chairman of the Federal Reserve Bank Board of Governors testified before the House Committee on the Budget that further economic stimulus legislation is warranted:

All that being said, with the economy likely to be weak for several quarters, and with some risk of a protracted slowdown, consideration of a fiscal package by the Congress at this juncture seems appropriate. Should the Congress choose to undertake fiscal action, certain design principles may be helpful. To best achieve

¹ Surface Transportation Policy Project, Transit, *Fixing Roads and Bridges Offer Greatest Job Gains*, Decoding Transportation Policy & Practice #11 at www.transact.org.

its goals, any fiscal package should be structured so that its peak effects on aggregate spending and economic activity are felt when they are most needed, namely, during the period in which economic activity would otherwise be expected to be weak. Any fiscal package should be well-targeted, in the sense of attempting to maximize the beneficial effects on spending and activity per dollar of increased federal expenditure or lost revenue ... (emphasis added).

Over the past ten years the Federal Highway Administration's (FHWA) Office of Transportation Policy Studies has calculated the employment generated from federal-aid highway projects. Initially conducted in 1997, these estimates have twice been updated, most recently in 2007.² The FHWA currently estimates that 34,779 jobs (11,921 construction oriented jobs; 5,405 supporting industry jobs; and 17,453 induced employment jobs) producing employment income of \$1.3 billion would be supported by each \$1.25 billion in highway capital expenditure (\$1 billion in federal aid equals 80% of the total project cost, including the 20% required state share increases the total to \$1.25 billion). Thus, one job is supported for every \$35,941 in federal and state spending on highway and bridge improvements.³

These employment figures are often used as a justification for including increased highway and bridge spending in any additional economic stimulus legislation taken up by Congress. Critics contend that, excluding short-term resurfacing and preservation projects, highway funds are spent slowly, with only 27% of a project, on average, expended in the first year. Thus, an increase in federal transportation spending, even if targeted for individual projects, would not have an immediate impact, with much of the positive economic benefits occurring years later. A 1986 study by the GAO determined that only one-third of the authorized infrastructure funds had been spent within one year of enactment of the 1983 jobs creation legislation, with only half of that amount spent within two years of enactment.⁴

² The 1997 analysis estimated that one billion dollars of federal-aid highway expenditures, combined with \$250 million from the states, supported 19,584 construction oriented jobs; 6,939 supporting industry jobs; and 21,052 induced employment jobs (47,575). The analysis also estimated that the jobs supported produced employment income of \$1.7 billion.

³ The lower estimates for 2007 are to be expected since they are based on more recent data reflecting increases in the cost of labor, asphalt, diesel fuel and other materials used in highway and bridge construction.

⁴ From page 6 of the written testimony of John Irons, PhD, Research and Policy Director of the Economic Policy Institute, submitted to the House Committee on Transportation and Infrastructure on October 29 of this year. See also GAO "*Emergency Jobs Act of 2003: Funds Spent Slowly, Few Jobs Created*", December 1986, cited by Dr. Irons in his testimony.

Earlier this year, however, the American Association of State Highway and Transportation Officials (AASHTO) identified 3,109 highway and bridge projects worth \$18.39 billion that could be awarded to contractors within 30 to 90 days and under contract (meaning construction could begin) within 180 days of enactment of legislation authorizing federal funding for those projects, assuming waiver of the required state match. Similarly, a survey of public transportation agencies by the American Public Transportation Association (APTA) identified 559 such “ready-to-go” projects worth \$8 billion.

With this FHWA data and recognizing that both an immediate and long term economic benefit would result from an increased investment in our highways, bridges and transit systems, the House of Representatives passed H.R. 7110, the “Job Creation and Unemployment Relief Act of 2008” in late September. The legislation provided \$61 billion in additional funding, including \$30 billion for programs within the jurisdiction of the House Committee on Transportation and Infrastructure. From that authorization, \$12.8 billion was for highways and bridges and \$4.6 billion for transit projects, to be distributed according to the existing statutory formulas.⁵

This increased investment would have the effect of almost immediately creating or sustaining hundreds of thousands of jobs. In fact, House Transportation and Infrastructure Committee staff has calculated that the \$30 billion authorization made available by H.R. 7110 would create or sustain more than 834,000 jobs.⁶

In its “Summary of Subject Matter” prepared for the Committee’s recent hearing on “Investing in Infrastructure: The Road to Recovery,” Committee Staff cited their reliance on “Federal Highway Administration’s model on the correlation between highway infrastructure investment and employment, and assumes waiver of State matching share of project costs for most programs, as proposed in H.R. 7110.”⁷

⁵ Federal surface transportation programs are currently authorized by the Safe, Accountable, Flexible, and Efficient Transportation Equity Act – A Legacy for Users (SAFETEA-LU) (P.L. 109-59). SAFETEA-LU reauthorized federal surface transportation programs through the end of FY 2009 and provided for \$286.4 billion over six years (or \$244.1 billion for the five years remaining in the authorization at the time of the bill’s passage). Nevertheless, H.R. 7110 gave priority to those projects where contracts could be awarded within 120 days of its enactment.

⁶ Committee on Transportation and Infrastructure *Staff Summary of Subject Matter*, October 28, 2008 p. 6, note 6, taking into account waiver of the 20% state included in that legislation.

⁷ *Ibid.*

II. METHODOLOGY

The FHWA is able to make estimates of the total number of jobs and employment income supported by federally funded highway improvement projects.⁸ These estimates include the direct employment of construction workers⁹ along with all of those workers who produce the inputs - steel, concrete, tar, lighting equipment, etc. – that are necessary to complete the project. The estimates also include the number of jobs that are supported by the consumer spending made possible from the employment income generated from those jobs supported by the project.¹⁰

The FHWA assigns the employment estimates to three categories. ***Construction oriented*** employment, often referred to as “direct” employment, includes everyone working for the general contractor and each subcontractor whose primary tasks are connected to that particular highway construction, along with all of the people employed by companies that produce the different materials and items, i.e. concrete, guardrail, lighting, etc. that are required to complete that specific project.

Supporting industry employment, sometimes called “indirect” employment, consists of the people working for companies further up the production chain, i.e. a job in a company

⁸ For the purpose of these estimates highway improvement Industries are New Route (New Construction), Relocation, Major Widening, Minor Widening, Restoration and/or Rehabilitation, Resurfacing, New Bridge, Bridge Replacement, Bridge Rehabilitation, Minor Bridge Rehabilitation, Bridge Deck Overlay, Safety/Traffic/TSM, Environment Related, Reconstruction with Added Capacity (adding lanes especially for HOV lanes), Reconstruction with No Added Capacity and Engineering Services.

⁹ Such as laborers, equipment operators, vehicle drivers, engineers, managers and supervisors.

¹⁰ In order to assess the employment impact of different types of road and bridge investments, the FHWA (with the Boston University Center for Transportation Studies and Battelle Memorial Institute) created JOBMOD, since updated to JOBMOD2, an economic model used to evaluate the economic impact of different highway infrastructure project types based on the expenditure of federal funds. The FHWA recognized that estimating the employment impacts of highway expenditures requires a complete accounting of all of the direct and indirect employment funded by those expenditures along with the spending patterns of the workers involved in that employment.

APTA also developed an analogous model to evaluate the effects of public transportation infrastructure investment on direct, indirect and induced employment with similar estimates. These investments typically consist of purchasing buses and rail cars as well as infrastructure construction and maintenance.

that provides the steel to the company that uses the steel to make a guardrail for the new highway is considered supporting industry employment.

Induced employment incorporates all of the jobs supported by the current consumer expenditures resulting from the wages paid to workers for jobs in construction oriented and supporting industry employment. In other words, it occurs when the income earned by workers in those two categories is spent in the economy, creating greater demand for consumer goods and services and in so doing generating additional new jobs. Since it is the construction project that ultimately makes this spending possible, the jobs involved in providing these consumer goods and services should also be included as project related employment impacts.

Thus, the FHWA conducts a thorough examination of all of the required construction oriented and supporting industry employment along with the spending patterns of those required workers to provide the most accurate estimates of the employment supported by federally funded highway improvement projects. It does so while taking into account the different construction inputs required and the corresponding differences in employment generated by the different types of highway improvements. Different project types require different materials and services that will ultimately affect the projects' employment supported estimates - e.g. one type of project may require much more labor, and therefore support more employment, than another type.

A. MODEL AND FORMULA

The model relies on the Input-Output analysis - a formula consisting of a set of interrelated linear equations that makes it possible to calculate the **construction oriented**, **supporting industry** and **induced** output¹¹ and employment impacts resulting from federal highway expenditures for each of the 14 specific highway improvement industries previously described (note 9, infra).

Based on the data collected by the FHWA, the formula distributes the federal highway improvement spending among the 14 highway improvement industries plus engineering services. It then calculates all of the **construction oriented** inputs required to complete the improvements (in the aggregate) funded by this spending, including the labor hours for direct construction and the labor hours required to provide all of the other necessary inputs (materials, computer specialist, etc.). It then distributes the relevant **construction oriented** inputs among the 491 industries that make up the United States economy¹² and

¹¹ Industry output equals the final product or service sold. For our purposes, completed highway improvements are the final output produced by federal expenditures. The output of one industry often becomes an input to another – this is always the case with construction projects - making the Input-Output analysis particularly relevant in this instance.

¹² The Department of Commerce divides all industry in the United States into 491 mutually exclusive categories.

calculates all of the labor hours required to actually produce those inputs, which equals the total labor hour requirements for the *supporting industry*. Using economic data provided by the Department of Commerce, the formula calculates the consumer goods and services purchased by all of the highway improvement project *construction oriented* and *supporting industry* labor and the labor hours necessary to produce those consumer goods and services to determine the overall *induced* effects.¹³

The hours of required labor per dollar of industry input allows the FHWA to calculate the employment income generated by highway improvement industry.¹⁴ By converting the hours of labor into 52 week periods the FHWA is able to calculate both the number and cost of each person year of employment created by the highway improvement project.

The formula, however, does not measure the actual number of people employed as a result of the expenditure, but the number of person years of employment supported by the federal spending and the income produced by that number of person years. This can be somewhat confusing since an expenditure that supports 1000 person years of employment could represent 1000 people employed for one year or 100 people employed for 10 years. It is therefore impossible to make projections into the future or to determine how many people are employed today because of spending over the past 5 years.

Whether or not new employment is actually created may depend on the time and place of the highway investment. During recessions, when there is less private construction activity and higher unemployment in the market for labor and for goods and services, a much larger proportion of the employment supported by the investment will be incremental, meaning aggregate, or total employment, would be expected to increase by the number of person years predicted by the FHWA. If there is low unemployment, it is more likely that many of those jobs will be diverted from other economic activities, meaning the new positions will be filled by workers leaving other jobs. In other words, many workers will not be going from unemployment to employment.

Nevertheless, highway construction is labor intensive and directly employs a number of people including laborers, equipment operators, vehicle drivers, engineers, managers and supervisors. Whenever there is high unemployment, each construction project creates a number of new jobs directly. It also creates a number of jobs indirectly because it requires materials such as steel, concrete, aggregates, lighting equipment etc. As described at length, labor is required to produce all of these inputs and to produce inputs to the production of these inputs.

¹³ See *JOBMOD2.1: A Comprehensive Model for Estimating Employment Generation from Federal-Aid Highway Projects, Technical Documentation* at www.fhwa.dot.gov/policy/otps/pubs/jobmod/index.htm.

¹⁴ Income includes both wage/salary income and benefits such as health care, pension and vacation pay.

B. DATA SOURCE

Much of the data used to estimate the economic impact of an increase in federal-aid highway expenditures is derived from FHWA Form 47, *Statement of Materials and Labor Used by Contractors on Highway Construction Involving Federal Funds*. The form must be filed for each highway project equaling or exceeding \$1 million in construction cost.

Completed by the state transportation agency and general contractor, it includes a project description consisting of the state and county where the project is located, “construction type codes”, whether it is urban or rural, and the start and completion dates. The length in miles for roadways and both miles and number for bridges is also included, as is the total project cost, total cost of materials and supplies, total labor hours and gross earnings, including labor for operation and maintenance of equipment.

FHWA’s Fiscal Management Information System (FMIS) tracks financial information for each federal aid highway project. It records the program under which it is authorized, the date it is approved, and the amount of federal funds. It, too, identifies the state, county, and rural/urban status of the project as well as several codes identifying the nature of the highway improvement. For ongoing projects it keeps track of federal transfers to date and the steps along a project life-cycle. For completed projects it includes the total cost and the federal share, as well as the date of completion.

III. PRIORITY NEW ENGLAND PROJECTS

To support the inclusion of New England transportation infrastructure project funding in any stimulus legislation, The New England Counsel asked each New England state’s Transportation Department or Executive Office to identify both the top three priority and total number of projects that could be under construction within 180 days if funding was received, along with the cost and estimated number of jobs created (full and part time employees who will be working on the project at the start of construction) for each project.

The six states provided the following information.¹⁵

¹⁵ Where states did not name priority projects the largest projects involving construction were used.

A. CONNECTICUT

1. Bridge - Reconstruction of Bridge #00340 o/Amtrak, Branford, Connecticut, (\$75,000,000)
2. Bridge - Replacement of Bridge #00135, Moses Wheeler on I-95 in Stratford - Foundation Breakout, (\$57,000,000)
3. Transit - New Haven Rail Yard - Independent Wheel True Facility, New Haven Line, (\$28,000,000)

Using the FHWA estimates, \$160 million total project expenditure would support some 4,452 jobs, or employment years.

B. MAINE

1. Interstate - Brunswick to West Gardiner, I-295 North Bound Rehabilitation (\$45,000,000)
2. Bridge - Kittery Memorial Bridge rehabilitation between Maine and New Hampshire – (\$42,000,000) (\$21 million from Maine and \$21 million from New Hampshire)
3. Transit - Trenton Intermodal Facility Construction (\$13,000,000)

Using the FHWA estimates, \$100 million (including New Hampshire share of \$21 million) total project expenditure would support some 2,782 jobs, or employment years.

C. MASSACHUSETTS

1. Transit - Red Line Traction (\$25,000,000)
2. Transit - Connecticut River Line (\$25,000,000)
3. Bridge - Double Track from West Acton to Willows and Work at Littleton Station (\$27,500,000)

Using the FHWA estimates, \$77.5 million total project expenditure would support some 2, 156 jobs, or employment years.

D. NEW HAMPSHIRE

1. Interstate – Salem-Manchester I-93 Exit Ramps and Bridges (\$30,000,000)
2. Interstate – Lebanon US 4 Bridge Replacement Advance Detour (\$4,500,000)
3. Bridge - Bedford-Manchester MAAR Ramps and Bridge Construction (\$12,500,000)

Using the FHWA estimates, \$47 million total project expenditure would support some 1,308 jobs, or employment years.

E. RHODE ISLAND

1. Interstate - West Main Road 1R-Coddington Highway to John Kesson Lane (\$3,800,000)
2. Interstate - 1R Nate Whipple Hwy. - Route 122 to MA S/L (\$4,500,000)
3. Bridge - Wyoming Bridge No. 43 & 44 (\$2,000,000)

Using the FHWA estimates, \$10.3 million total project expenditure would support some 287 jobs, or employment years.

F. VERMONT

1. Bridge – Culvert Linings and Replacements (\$12,000,000)
2. Highway – Paving/Resurfacing/Leveling (\$20,000,000)
3. Transit - Public Transit Capital Investments (vehicles, equipment, and facilities) (\$10,600,000)

Using the FHWA estimates, \$42.6 million total project expenditure would support some 1,185 jobs, or employment years.

G. NEW ENGLAND

Using the FHWA estimates, \$437.4 million total project expenditure among the six states combined would support some 12,170 jobs, or employment years.

IV. ALL NEW ENGLAND PROJECTS

ASSHTO has just updated its numbers from a more recent survey. The 50 states (including D.C.) now have some 5,148 “ready-to-go” highway and bridge projects worth more than \$64 billion. According to this survey, construction on the following Highway & Bridge projects within the six New England states could begin within 180 days of receiving federal authorization.

Connecticut - 5 projects at \$764.7 million

Maine - 44 projects at \$221 million

Massachusetts - 37 projects at \$220 million

New Hampshire - 27 projects at \$230.5 million

Rhode Island – 40 projects at \$100 million

Vermont - 17 projects at \$78.4 million

Total – 170 \$1,614.6 billion

Using the FHWA estimates, a \$1,614.6 billion in highway or bridge infrastructure expenditure would support some 44,923 jobs, or employment years, along with producing employment income of approximately \$1.6 billion.¹⁶

¹⁶ These calculations do not include transit, rail, or other non-highway and bridge related transportation infrastructure improvement spending. Thus, actual spending and job creation could be significantly higher for the region.

