**Estimates of Jobs Created by Department of Transportation Programs
under the American Recovery and Reinvestment Act of 2009**

The American Recovery and Reinvestment Act of 2009 (ARRA) allocated $48.1 billion to the Department of Transportation (DOT) for infrastructure investment spending. This spending was intended both to create jobs in the short run and to improve the productivity of our transportation system in the long run. Section 1201 of ARRA directs DOT to estimate the direct, indirect, and total jobs created by the projects funded under the Department's allocation. Reports of jobs created are due to the Department from its grant recipients on May 18, 2009, August 17, 2009, February 17, 2010, February 17, 2011, and February 17, 2012.

Jobs are reported in three categories: direct jobs, indirect jobs, and total employment. Direct jobs are those jobs represented by people whose work is directly billed to the project. Indirect jobs represent employees working for producers of materials, equipment, and services that are used on the project, such as steel producers, producers of accounting services, and lessors of construction equipment. Total employment includes direct, indirect and induced jobs; induced jobs are those jobs created when employees go out and spend their increased incomes on consumer goods and services.

For the section 1201 reports, the Department has directed its grant recipients to report the number of direct job-hours (i.e., the number of people whose work is directly billed to DOT ARRA projects multiplied by the number of hours each person worked) generated by projects funded under the DOT ARRA programs from the enactment of the Act on February 17, 2009, to the reporting dates listed above. DOT staff review those data for possible errors and make corrections after consultation with the grant recipients. DOT then divides these job-hours by 2080 (the average number of working hours in a year – 40 hours per week times 52 weeks per year) to estimate the total number of job-years worked since the enactment of the Act. During the first year of the Recovery Act, we calculated direct jobs in job-months rather than job-years, because we thought that job-months was a more meaningful measure of employment when the program had only been in effect for a few months. Job-months can be converted into job-years by dividing by 12.

Indirect jobs are estimated for our section 1201 reports using an input-output model that estimates the amount of input materials and services, and the number of jobs created in producing those materials and services, based on the level of expenditures. Each section 1201 jobs report received from grant recipients also includes a report on federal expenditures on the project over the reporting period.

Estimates of total employment are also based on expenditure data, consistent with guidance from the Council of Economic Advisers (CEA). Total employment includes not only direct and indirect jobs, but also induced jobs. CEA estimates that total employment is increased by one job-year for every $92,000 in direct government spending. We therefore take the expenditure data and divide by $92,000 to estimate the total job-years of employment created.

DOT jobs data combine jobs created and jobs sustained. We concluded that there was no reliable way of distinguishing jobs created from jobs sustained, so they are reported together.

The different methodologies used to estimate different kinds of jobs each have their own advantages and disadvantages. The structural macroeconomic models, for example, that

the CEA used to estimate that each $92,000 of expenditure creates or sustains one job take into account the indirect effect of increased spending on raising wage rates in the economy and hence modestly reducing other forms of employment (though when unemployment is high, this effect is minimal). The input/output models we used to estimate indirect jobs do not take these indirect effects into account. On the other hand, the input/output models provide much more precise industry-specific estimates of employment effects than macroeconomic models, which make estimates for employment economy-wide.

The exact timing of our job estimates is also affected by the reporting procedures of DOT's different modal administrations. The Federal Aviation Administration, for example, instructs airports to report direct jobs based on valid invoices, while the Federal Transit Administration instructs grant recipients to report direct jobs regardless of whether they have been invoiced. In general, the Department treats an outlay as having occurred when the work has been done, the contractor has been paid by the grant recipient, the grant recipient has requested reimbursement from the Department, and the grant recipient has actually been reimbursed by the Department. There is thus some delay between when the work is actually done and when the outlay is recorded. Since the estimates of indirect jobs and total employment are based on records of outlays, the delay between when the work is actually done (and when the direct job-hours are recorded as having been worked) and when the indirect and induced jobs are recorded can create some lack of synchrony between the timing of the direct jobs and the timing of the indirect and induced jobs. However, this kind of disjuncture in timing of the different kinds of jobs can take place for reasons entirely independent of the artifacts of job reporting. The work needed to produce material inputs for a construction project may have taken place months before the materials were actually purchased and used. Alternatively, when demand for materials draws down inventories, the work required to replace those inventories may take place months after the construction work takes place. Similarly, consumer expenditures made by employees on a Recovery Act project (and hence induced jobs) may take place months or years after the work is done and the income earned. So there is inevitably a great deal of uncertainty about the timing of indirect and induced jobs, relative to that of direct jobs.