

## Overview of Before-and-After Studies

The two purposes of Before-and-After Studies are to document the actual outcomes of major capital projects and to improve the methods that will be used to predict the outcomes of future projects. Each study considers the actual and predicted outcomes for a project in terms of its (1) physical scope, (2) capital cost, (3) transit service levels, (4) operating and maintenance (O&M) costs, and (5) transit ridership. Project sponsors may elect to add other outcomes of interest.

Since 2005, sponsors of projects receiving funds through the FTA discretionary capital-grant program have been required to prepare a Before-and-After Study if the project is:

- a New Starts or Small Starts project developed under SAFETEA-LU procedures; or
- a New Starts or Core Capacity project developed under MAP-21 procedures.

While Small Starts projects currently under development are not subject to the requirement, FTA strongly encourages sponsors of these projects to undertake and complete a study. Particularly for BRTs and streetcars, these studies will help to expand the base of knowledge of this emerging generation of projects and their development.

The requirement is implemented through an attachment to the grant agreement for the project or as a provision in the grant itself in the case of small projects funded through a single grant. With either approach, the project sponsor takes on the responsibility to prepare for and complete a Before-and-After Study as an element of the funded project. Delivery of a useful final report is necessary to close out the FTA grant(s) for the project.

Activities associated with a Before-and-After Study occur at several milestones across nearly the entire schedule for the planning, development, construction, and opening to service of major transit projects.

### Plan for the Study

Good practice calls for the project sponsor to develop a plan at the beginning of project development to organize work on the Before-and-After Study. While a final plan is not required until the grant agreement or grant for the project, study-related activities begin almost immediately in project development. These activities include the identification of staff that will be responsible for the study, development of a filing system and procedures to identify materials that will be archived, and the ongoing documentation and filing of predictions for archiving at the subsequent milestone. The plan describes the individual tasks, assigns responsibilities, and establishes a budget and a schedule. Sponsors may update the plan in coordination with FTA as tasks are accomplished or circumstances change during the development of the project. Because the plan is referenced in the grant agreement or grant, the sponsor and FTA must agree on a final plan before execution of the agreement.

### Archiving of predictions at decision milestones

As part of preparations to request an FTA decision on either advancement of a project into engineering or a funding recommendation, the project sponsor finalizes and archives the materials that have been selected to document the predictions of project outcomes. At milestones that are the second (or in some cases under SAFETEA-LU procedures, third) prediction milestone, the sponsor identifies differences between previous and current predictions, documents the causes of those differences, and suggests any lessons learned

that might have improved the predictions at the earlier milestone. This analysis is an important component of the archived information that will be used at the end of the study in final analyses, drawing of conclusions, and preparation of the final report. Timely assessment of differences in predictions across milestones provides insights that tend to become less available over time as memories fade, records are lost, staff leaves. Documentation and archives prepared at prediction milestones are not formal reports prepared for FTA. Rather, they are working materials addressed to the staff who will – several years hence – be working to conclude the study and prepare the final report. Better documentation of the predictions at each milestone will make their work more productive and support a better and more useful final report. FTA and its contractors review a draft of the milestone archive for accuracy and completeness. FTA retains a copy of the final milestone archive as back-up safekeeping. The sponsor's completion of the milestone documentation and archive is a check-list item for FTA's decisions on project advancement and funding recommendations.

#### Collection of data on actual conditions “before” implementation of the project

In contrast with the “prediction” milestones that preserve the sponsor's predictions of project outcomes, the “before” milestone deals only with data on actual conditions in the real world. The project sponsor collects data on transit service levels, operating and maintenance costs, and transit ridership before the project opens to service (or, if construction will substantially affect service and ridership, before construction begins). These data provide the basis for determining changes caused by the project (and perhaps by confounding influences as well) through comparisons with the “after” data. Because the project and its final costs do not exist at this point in time, the data do not include anything related to the project's physical scope or capital costs. The project sponsor collects and documents the data, prepares a milestone archive, and provides review and final copies to FTA.

#### Collection of data on actual outcomes “after” the project has opened to service

Data on actual outcomes of the project become available over time once the project has opened to service. The as-built scope of the project is usually clear – in detail sufficient for the purposes of the Before-and-After Study, at least – soon after opening. As claims are resolved, the capital costs become clear as well – again, sufficiently for the purposes of the study. Consequently, assembly of the appropriate data for these two outcomes can usually proceed soon after project opening. However, to provide time for transit ridership (and perhaps modifications to other transit services affected by the project opening) to mature, the nominal time-frame for collection of data on transit ridership is two years after project opening. As the data are assembled, the project sponsor documents the information, prepares a milestone archive, and provides review and final copies to FTA.

#### Analysis of actual outcomes and comparisons with predictions

Two different analyses are needed to address the two separate purposes of the study. The first documents the actual outcomes of the project – its scope and capital costs and its impacts on transit service, operating and maintenance costs, and transit ridership. Documentation of actual outcomes includes the development of observations and insights that may be useful to potential sponsors of other projects. The second compares the predictions made for the various milestones against actual project outcomes, explains the sources of any major differences, and suggests opportunities to improve technical methods and/or management procedures for future projects. Analyses of the physical scope and capital cost – along with initial drafts of their sections in the final report – can be done soon

after project opening. Deferring these analyses to coincide with the much-later timeframe for the analyses of transit service, O&M costs, and ridership serves no purpose and threatens to let the information and potential insights become stale obscure timely insights.

#### Preparation of the final report

To be readable and useful, the final report must be brief and well-focused on the findings and lessons learned. Reports of 15 to 20 pages are anticipated, with appendices as needed to provide the necessary details in support of the findings and lessons learned. The reports are organized around the five topics. Within each topic, the discussion is analytical – rather than chronological – first presenting actual outcomes and then examining the accuracy and usefulness of predictions prepared for milestone decisions during the development of the project. **Final reports are to be completed within 36 months of project opening.**

Because the tasks in a Before-and-After Study parallel the various stages in the development, construction, and opening of a major transit project, the nature and timing of the tasks may change as adjustments are made to the project, its predicted impacts, and its schedule. To capture the nature and causes of these changes requires ongoing effort to assemble and document the relevant materials and perhaps to update the plan, milestones, and schedule for the Before-and-After Study itself.

Timely coordination with FTA staff is essential to efficient work by the project sponsor in preparation for each milestone. Efficiency is important given that completion of the milestone work is a checklist item for the project to advance through project development, for grant agreements and single-year grants, and for FTA close-out of grants after the project is completed.

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