



May 2014

PUBLIC TRANSIT

Length of Development Process, Cost Estimates, and Ridership Forecasts for Capital-Investment Grant Projects

Why GAO Did This Study

FTA provides funds to transit project sponsors to build new or extensions to existing fixed-guideway transit systems through the Capital Investment Grant program. This program funds New, Small, and Very Small Starts projects—funds that are based partly on the project's total estimated cost. For example, for New Starts, project capital costs exceed \$250 million or the program contribution exceeds \$75 million; for Small Starts, capital costs are less than \$250 million and the program contribution is less than \$75 million. The pre-construction development process for these projects includes various steps between the time when a project sponsor identifies the project to be funded and the formal award of FTA construction funds. During this process, the scope, capital cost, and ridership estimates can change.

The Moving Ahead for Progress in the 21st Century Act mandated that GAO biennially review these types of projects. This report describes (1) the length of the development process across these projects and the factors affecting the length, (2) capital cost-estimate changes throughout this process, and the factors contributing to the changes, and (3) how project sponsors forecast ridership, including support that FTA provides. GAO analyzed pertinent laws, regulations, agency guidance, and FTA data for the 32 New, Small, and Very Small Starts projects initiated and funded from 2005 to 2013, prior to recent changes in program processes. GAO interviewed FTA staff and project sponsors. DOT reviewed a draft of this report and provided technical comments, which were incorporated as appropriate.

View [GAO-14-472](#). For more information, contact David J. Wise at (202) 512-2834 or wised@gao.gov.

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What GAO Found

For the 32 New Starts, Small Starts, and Very Small Starts projects funded from 2005 to 2013 that GAO reviewed, the length of the development process varied substantially, from as little as 2 to as long as 14 years, based on GAO's analysis of data from the Federal Transit Administration (FTA) and project-sponsors. GAO found that the development process took 3 to 14 years to complete for New Starts projects, 3 to 12 years for Small Starts projects, and 2 to 11 years for Very Small Starts projects. The length of the process is generally driven by factors that are often unique to each project, including (1) the extent of local-planning activities prior to formal approval for funding, (2) the extent and availability of local and financial support, and (3) the extent of FTA oversight activities. For example, sponsors of 17 of the 32 projects GAO reviewed stated that activities to secure local funding contributed to the length of the development process. FTA has taken some steps to streamline this process. For example, in January 2012, FTA eliminated the requirement for the development of a hypothetical alternative that served as a basis of comparison to evaluate a proposed project.

GAO found that capital cost estimates for New Starts, Small Starts, and Very Small Starts projects during the development process generally did not change substantially prior to the award of federal funding. For 23 of the 32 projects GAO reviewed, the final cost estimated prior to receiving federal funding was within 10 percent of the original cost estimates. The remaining 9 projects varied by as much as 41 percent lower and 55 percent higher than the estimates used at the end of the development process. Several project sponsors told us that, when changes did occur, it was a result of changing market conditions and FTA's recommending that sponsors increase project costs to cover unforeseen events, among other factors. For example, officials at the Valley Transportation Authority, located in Santa Clara, California, stated that FTA recommended that it increase the project's cost by \$100 million to cover unforeseen events.

New and Small Starts project sponsors whom GAO interviewed generally forecast ridership using regional travel models prepared by metropolitan-planning organizations (MPO). Specifically, 8 out of the 9 New Starts project sponsors and 3 out of 4 Small Starts project sponsors GAO spoke with use these travel models. For example, for a Portland, Oregon, streetcar project, the project sponsor used travel forecasts prepared by the Portland MPO. The other New Starts and Small Starts project sponsors use actual transit-ridership data from surveys of regional transit riders; and a statewide travel model, respectively. On the other hand, FTA procedures permit sponsors of Very Small Starts projects to essentially demonstrate, through a detailed counting of riders of existing public transportation in the project's corridor, that the proposed project will service at least 3,000 transit riders on an average weekday. FTA has taken a number of actions to support the development of ridership forecasts. These include, among other actions, providing funding to state agencies and MPOs to help them collect travel data and develop forecasting procedures and providing technical support, such as reviews of final forecasts. GAO interviewed 13 New Starts and Small Starts project sponsors and most said that FTA's technical assistance, which includes reviewing the ridership forecasts, was generally helpful.

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Abbreviations

BRT	bus rapid transit
DOT	Department of Transportation
FFGA	full-funding grant agreement
FTA	Federal Transit Administration
LPA	locally preferred alternative
MAP-21	Moving Ahead for Progress in the 21st Century Act
MPO	metropolitan-planning organization
NEPA	National Environmental Policy Act of 1969, as amended
PCGA	project-construction grant agreement
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act—A Legacy for Users
STOPS	Simplified Trips-on-Project Software
TRB	Transportation Research Board
TRIMET	Tri-County Metropolitan Transportation District of Oregon
UTA	Utah Transportation Authority
VTA	Valley Transportation Authority (in Santa Clara, California)

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May 30, 2014

The Honorable Tim Johnson
Chairman
The Honorable Michael D. Crapo
Ranking Member
Committee on Banking, Housing, and Urban Affairs
United States Senate

The Honorable Bill Shuster
Chairman
The Honorable Nick J. Rahall, II
Ranking Member
Committee on Transportation and Infrastructure
House of Representatives

The Federal Transit Administration's (FTA) Capital Investment Grant program,¹ which includes the New Starts and Small Starts programs, provided, as we found in a 2012 report, about \$15.1 billion in federal capital funds over the past 8 fiscal years² to help many states, cities, and localities plan and build new "fixed-guideway" systems³ or extensions to

¹Under the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) the 49 U.S.C. § 5309 Capital Investment Grant program comprised three FTA funding-programs: Major Capital Investment (New Starts and Small Starts), Fixed Guideway Modernization, and Buses and Bus-Related Equipment and Facilities. Pub. L. No. 109-59, 119 Stat. 1144, 1573-1589 (2005). Given that this report utilizes program data during the time period of October 2005, through March 2013, discussion of programs in this report primarily reflects statutory provisions in place during that time and does not focus on various amendments made subsequently in July 2012 by the Moving Ahead for Progress in the 21st Century Act (MAP-21) Pub. L. No. 112-141, 126 Stat. 405 (2012).

²GAO, *Public Transit: Funding for New Starts and Small Starts Projects, October 2004 through June 2012*, [GAO-13-40](#) (Washington, D.C.: Nov. 14, 2012).

³"Fixed-guideway" systems use and occupy a separate right-of-way for the exclusive use of public transportation services, such as fixed rail and exclusive lanes for buses and other high-occupancy vehicles.

existing fixed-guideway systems.⁴ Since the early 1970s, the federal government has provided a large share of the nation’s capital investment through the New Starts program. The Safe, Accountable, Flexible, Efficient Transportation Equity Act—A Legacy for Users (SAFETEA-LU) created the Small Starts program for funding lower-cost fixed-guideway-system projects in 2005. FTA created the Very Small Starts project category for funding very low cost projects at the same time.⁵ While MAP-21 made certain revisions to the program, because this report covers projects under SAFETEA-LU prior to the implementation of MAP-21 changes, we focus on SAFETEA-LU related requirements.⁶ Although FTA has provided funding for New, Small, and Very Small Starts projects, these projects are designed and implemented by project sponsors, typically local transit agencies. The project sponsors often coordinate with local metropolitan-planning organizations (MPOs) in designing and implementing these projects, and FTA awards funding to project sponsors upon completion of the pre-construction development process,⁷ which includes a range of local policy development and decision-making activities, where the specific transit corridor and project are identified, and then refined as design progresses. FTA evaluates and rates the projects selected, and, ultimately, awards funding. The scope and estimates of capital costs and ridership can change as the local project sponsor refines the project before FTA awards funding.

The Moving Ahead for Progress in the 21st Century Act (MAP-21) mandated GAO to biennially review FTA’s processes and procedures for

⁴Under the MAP-21, revised definition, “new fixed guideway capital project” means (1) a new fixed-guideway project that is a minimum operable segment or extension to an existing fixed-guideway system; or (2) a fixed-guideway bus rapid transit project that is a minimum operable segment or an extension to an existing bus rapid transit system. 49 U.S.C. § 5309(a)(5).

⁵SAFETEA-LU created Small Starts to streamline the project-development process and the evaluation and rating criteria that apply to larger-dollar New Starts projects. FTA created an even more streamlined evaluation process for Very Small Starts.

⁶For the purposes of this report, unless otherwise provided, references to New Starts-related statutory, regulatory and other FTA requirements are to those provisions in place following the implementation of SAFETEA-LU related requirements and prior to the implementation of MAP-21-related requirements.

⁷We define the development process as the activities related to the development of a New Starts, Small Starts, or Very Small Starts project that occur between when a project sponsor selects the project and the formal award of construction funding through a grant agreement.

evaluating, rating, and recommending new fixed-guideway capital projects and core-capacity improvement projects and the Department of Transportation's (DOT) implementation of such processes and procedures.⁸ In this report, we focus on the 2005 through 2013 time period to identify (1) the extent to which the length of the development process varies across New Starts, Small Starts, and Very Small Starts projects and what factors affect the length of this process; (2) the extent to which capital cost estimates for New Starts, Small Starts, and Very Small Starts projects change throughout the development process, and what factors contribute to the changes; and (3) how project sponsors forecast ridership, including any support that FTA provides in helping them develop these forecasts.

To address all of these objectives, we reviewed and summarized relevant laws, such as SAFETEA-LU, FTA circulars, and policy guidance, as well as our body of work on the Capital Investment Grant Program. To determine the extent to which the length of the development process varied across New Starts, Small Starts, and Very Small Starts projects and the extent to which capital cost estimates for these projects changed throughout the development process, we collected and analyzed schedule milestone data and capital-cost estimate data from FTA on all 32 of the New Starts, Small Starts and Very Small Starts projects that had been: (1) approved to enter the preliminary engineering phase⁹ of the development process following the implementation of SAFETEA-LU in October 2005 and (2) awarded a grant agreement prior to the March 2013 implementation of the current surface transportation legislation, MAP-21. To verify and assess the reliability of the data compiled by FTA, we compared it to project data we received from project sponsors we interviewed. We resolved any discrepancies with the data with FTA headquarters staff, and we determined that the data were sufficiently reliable for the purposes of this report. To provide insight on the factors contributing to the project's timeline trends and challenges and the project's cost-estimate changes and to obtain information on how

⁸Pub. L. No. 112-141, § 20008, 126 Stat. 656, 674 (July 6, 2012). See, for example, GAO, *Public Transit: Funding for New Starts and Small Starts Projects, October 2004 through June 2012*, [GAO-13-40](#) (Washington, D.C.: Nov. 14, 2012); and GAO, *Public Transit: Requirements for Smaller Capital Projects Generally Seen as Less Burdensome*, [GAO-11-778](#) (Washington, D.C.: Aug. 2, 2011).

⁹During this phase, project sponsors refine the design of the selected project and its estimated costs, benefits, and impacts.

ridership forecasts are developed, we interviewed 23 project sponsors representing 30 of the 32 projects.¹⁰ The information obtained from these interviews is not generalizable to all New Starts, Small Starts and Very Small Starts projects. We also interviewed FTA officials to determine the support that FTA provides to help project sponsors develop ridership forecasts. Further details on our scope and methodology can be found in appendix I.

We conducted this performance audit from August 2013 to May 2014 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

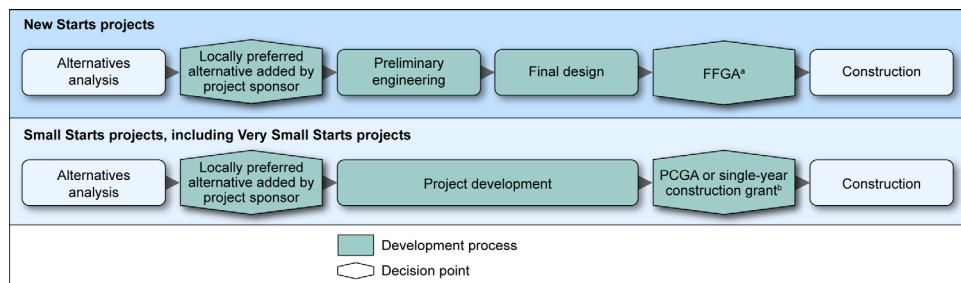
Under SAFETEA-LU, FTA's primary source of funding for new fixed-guideway capital projects or extensions to existing fixed-guideway-transit systems was the Capital Investment Grant program. Within the Capital Investment Grant program, project sponsors typically applied for funding as either a New Starts or Small Starts project. FTA's New Starts projects under SAFETEA-LU were defined as new fixed guideway or extensions to existing fixed guideway capital projects with a total capital cost of \$250 million or more or a Capital Investment Grant program contribution of \$75 million or more. The Small Starts program was created by SAFETEA-LU in 2005 to provide a more streamlined evaluation and rating process for lower-cost and less complex projects, defined as new fixed-guideway projects, extensions to fixed guideways or corridor-based bus projects whose estimated capital cost was under \$250 million and whose Capital Investment Grant program contribution was under \$75 million. Within the Small Starts program, as defined in SAFETEA-LU, FTA created a category for very low cost Small Starts projects, known as Very Small Starts. These projects must contain the same elements as Small Starts projects and also contain the following three features: (1) location in corridors with more than 3,000 existing riders per average weekday who will benefit from the proposed project, (2) have a total capital cost of less

¹⁰One project sponsor declined to be interviewed; and we were unable to contact one other after several attempts.

than \$50 million for all project elements, and (3) have a per-mile cost of less than \$3 million, excluding rolling stock (such as train cars, buses, etc). As part of the application process, sponsors of New Starts, Small Starts, and Very Small Starts projects are expected to identify local sources of funding to contribute to the project along with federal funding provided through both the Capital Investment Grant program and potentially other sources of federal funding.¹¹

The steps in the development process depend on whether a project is a New Starts project or a Small or Very Small Starts project (see fig.1).

Figure 1: Development Process for New Starts and Small Starts (Including Very Small Starts) Projects as Defined by the Safe, Accountable, Flexible, Efficient Transportation Equity Act—A Legacy for Users



Source: GAO.

^aFFGA = full-funding grant agreement.

^bPCGA = project-construction grant agreement.

- **New Starts.** Under SAFETEA-LU, sponsors of New Starts projects were required by statute to go through a planning and development process. In the alternatives analysis phase, project sponsors identified the transportation needs in a specific corridor and evaluated a range of alternatives to address the locally identified problems in that

¹¹In addition to the Capital Investment Grant program, federal sources for New Starts, Small Starts, and Very Small starts projects may include the American Recovery and Reinvestment Act of 2009 (Pub. L. No. 111-5, 123 Stat. 115 (2009), Federal Highway Administration Congestion Mitigation and Air Quality Improvement, or other FTA program funds. Project sponsors may use local sources of revenue, including, sales taxes, fees, concessions, etc., to pay the project's costs. In addition, financing mechanisms, such as bonds, or loans, may be used to pay for these projects costs as payments come due.

corridor.¹² Project sponsors completed the alternatives analysis phase by selecting a locally preferred alternative (LPA). Subsequently, during the preliminary-engineering phase, project sponsors refined the design of the locally preferred alternative and its estimated costs, benefits, and impacts. Further, under the National Environmental Policy Act of 1969 (NEPA), as amended, and implementing regulations, New Starts project sponsors were required to complete the NEPA environmental review process to receive Major Capital Investment program funding.¹³ When the preliminary -engineering phase was completed and federal environmental requirements are satisfied, FTA may approve the project's advancement into final design, if the project obtained an acceptable rating under the statutory evaluation criteria and met other readiness requirements.¹⁴ For a project to receive funding, FTA needed to recommend it for a full funding grant agreement (FFGA) in the President's budget.¹⁵

- *Small Starts.* Under SAFETEA-LU, the development process for Small Starts was condensed by combining the preliminary-engineering and final-design phases into one "project development" phase. When projects applied to enter project development, FTA evaluated and rated them according to the statutory criteria. Under SAFETEA-LU, there were fewer statutory criteria specified for Small Starts projects compared to New Starts projects. Either using annual appropriations or existing FTA appropriations that remain available, FTA provided

¹²A corridor is a largely linear geographic band defined by existing and forecasted travel patterns involving both people and goods. The corridor serves a particular travel market or markets that are affected by similar transportation needs and mobility issues.

¹³See Pub. L. No. 91-190, 83 Stat. 852 (1070), codified, as amended at 42 U.S.C. § 4321 et seq. See also, 40 C.F.R. § 1501.2; 23 C.F.R. Part 771. Under SAFETEA-LU, to gain approval for entry into preliminary engineering, a New Starts project must have been (1) selected as the locally preferred alternative at the completion of an alternatives analysis process, (2) included in the region's fiscally constrained long-term transportation plan, (3) rated acceptably under statutorily defined project justification and financial criteria, and (4) met other FTA readiness requirements including a demonstration by the project's sponsors that they had the technical capability to manage the project during the preliminary engineering phase.

¹⁴Under SAFETEA-LU, final design was the last phase of project development before construction and may include right-of-way acquisition, utility relocation, and the preparation of final construction plans and cost estimates.

¹⁵An FFGA establishes the terms and conditions for federal participation in a transit project

funding for Small Starts projects in one of two ways: through project-construction grant agreements (PCGA) or single-year construction grants when the Small Starts funding request was less than \$25 million.¹⁶ For a project to receive funding, FTA needed to recommend it in the President's budget.

- *Very Small Starts.* Very Small Starts projects also progressed through a single-project development phase and were evaluated and rated on the same project criteria as Small Starts projects. However, they qualified for automatic medium or better ratings, which required submittal of less data to FTA, because they had sufficient existing transit ridership in the corridor and met low cost parameters to "warrant" them for satisfactory ratings. FTA provided funding for Very Small Starts projects through PCGAs or single-year construction grants. For a project to receive funding, FTA needed to recommend it in the President's budget.

Under SAFETEA-LU, any transit project that fit the definition of a new fixed-guideway capital project or extension to an existing fixed-guideway project was eligible to compete for funding under the Capital Investment Grant program that provides funding for New Starts, Small Starts, and Very Small Starts projects. Such projects included:

- *Commuter rail*—systems that operate along electric or diesel-propelled railways and provide train service for local, short distance trips between a central city and adjacent suburbs.
- *Heavy rail*—systems that operate on electric railways with high-volume traffic capacity and are characterized by separated rights-of-way, sophisticated signaling, high platform loading, and high-speed, rapid-acceleration rail cars operating singly or in multi-car trains on fixed rails.
- *Light rail*—systems that operate on electric railways with light-volume traffic capacity and are characterized by shared or exclusive rights-of-way, or low or high-platform-loading, single or double-car trains, and overhead electric lines that power rail vehicles.

¹⁶A PCGA is a contract that sets the terms and conditions for Small Starts funding, as an FFGA does for New Starts funding.

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- *Streetcars*—systems that are similar to light rail, but distinguishable because they are usually smaller and designed for shorter routes, more frequent stops, and lower travel speeds.
 - *Bus rapid transit (BRT)*—bus systems that vary in design, but generally included service enhancements to attract riders and provide similar transit-related benefits as rail transit, characterized by improvements such as dedicated bus lanes, improved stations, improved vehicles, off-vehicle fare collection, special branding of the service, and frequent service, among other things.¹⁷

FTA's most recent authorization legislation, MAP-21, has made changes to the overall Capital Investment Grant program that provides funding for New Starts, Small Starts, and Very Small Starts projects, to consolidate and streamline the number of phases for New Starts and Small Starts projects and alter the definition of eligible bus rapid transit projects, among other things.¹⁸ In addition, the legislation removed the New Starts transportation-planning-related alternatives analysis requirement, and FTA's final rule implementing the MAP-21 changes provides that the new process will instead rely on the review of alternatives performed during the Metropolitan Transportation Planning and NEPA environmental-review processes.¹⁹ According to FTA officials, for New Starts projects MAP-21 requires that the first phase in the process, entitled "project development" must be completed within a 2-year time frame. MAP-21 also requires FTA to develop an expedited review process for determining the technical capacity of project sponsors to undertake the proposed project if they have recently and successfully completed at least one other

¹⁷This definition of bus rapid transit corresponds to the definition as described in implementing regulations prior to MAP-21. MAP-21 included a few changes that affected BRT. For example, MAP-21 defined BRT more narrowly and specifically than under SAFETEA-LU. Specifically, MAP-21 requires that BRT projects include features that emulate the services provided by rail, including defined stations rather than bus stops. In addition, MAP-21 made a distinction between BRT projects that are eligible for New Starts versus Small Starts funding.

¹⁸Pub. L. No. 112-141, § 20008, 126 Stat. 405 (2012). As noted previously, this report describes the project development process in effect from October 2005 through March 2013, prior to the implementation of changes from MAP-21.

¹⁹76 Fed. Reg. 1992 (Jan. 9, 2013).

New Starts project.²⁰ FTA has not yet implemented these changes fully, but has issued some guidance on how these changes will affect the program.²¹ FTA plans to conduct additional rule-making on MAP-21 topics in the future, though FTA officials told us that there is no firm date on when the various policy changes will take effect.

FTA and its project-management oversight contractors are to provide oversight during the development process. FTA maintains its headquarters in Washington, D.C., with 10 regional offices throughout the continental United States, and employs about 500 employees to oversee and provide funding for a variety of transit programs and initiatives, including for New Starts, Small Starts, and Very Small Starts projects. FTA and its contractors are to conduct oversight reviews throughout the project's planning and design as well as before FTA recommends a project for funding; these reviews are to include an evaluation of the project's risk, scope, cost, schedule, and project management plan, as well as the project sponsor's technical capacity and capability. Project sponsors also submit periodic updates to FTA on different aspects of major projects, such as the cost, expected schedule, and projected ridership of the project. In addition, proposed projects are required to complete the NEPA environmental review processes in order to receive federal funding.²² Specifically, NEPA and implementing regulations require, among other things, an environmental review document with information on alternative courses of action and a consideration of social,

²⁰MAP-21 requires the expedited technical capacity review process to be applicable to such applicants that (1) have achieved budget, cost, and ridership outcomes for the project that are consistent with or better than projections, and (2) demonstrated staff expertise and other resources necessary to implement a new project. 49 U.S.C. § 5309(c)(3).

²¹In a notice in the *Federal Register* published in March 2014, (70 Fed. Reg. 13462, (Mar. 10, 2014)) FTA stated that the agency will be completing future additional rulemaking and guidance documents related to MAP-21 provisions including: getting into and through the steps in the New Starts and Small Starts processes; warrants; expedited technical capacity reviews; and programs of inter-related projects, among other things. However, FTA has not yet determined when these activities will be completed.

²²49 C.F.R. § 611.7(c)(1)(i). For example, FTA Guidance on New Starts Policies and Procedures requires projects to have progressed beyond the NEPA scoping phase before entering into New Starts preliminary engineering. The scoping phase of a project is a requirement of the NEPA process focused on identifying significant issues related to a proposed federal action. Additionally, the scoping phase may include a determination of the range of alternatives to be addressed in NEPA documents.

economic, and environmental impacts of the proposed transportation improvement.²³

The Length of the Development Process for Projects Varies Substantially Depending upon Project-Specific and Local Factors

The length of the development process for New Starts, Small Starts, and Very Small Starts projects under SAFETEA-LU varied substantially. As discussed previously, the development process encompasses both local and federal activities that occur between when a project sponsor selects the locally preferred alternative and the formal award of funding through a grant agreement.²⁴ According to our analysis of FTA and project sponsor data, the length of the development process varied from as short as 2 years for a Small Starts project to as long as 14 years for a New Starts project and is generally driven by factors that are often unique to each project and local in nature. More specifically, these factors included the extent of local planning activities conducted prior to entering the Capital Investment Grant pipeline²⁵, the extent and availability of local and financial support, and the extent of FTA's oversight activities, among other factors.

Length of the Development Process Varies Substantially across Projects

Among the 32 transit projects we reviewed, we found significant variation in the length of time sponsors of New Starts, Small Starts, and Very Small Starts projects needed to complete the development process (see fig. 2). Specifically, for the approved projects we examined, the development process ranged from 2 years for a 6.8 mile Bus Rapid Transit project in Monterey, California, to over 14 years for a 30 mile commuter rail project in Denver, Colorado. The wide range of time needed to plan, design, and secure funding for these transit projects prior to construction is similar to the range of time that is generally considered necessary to plan and design other types of capital projects. For example, studies have

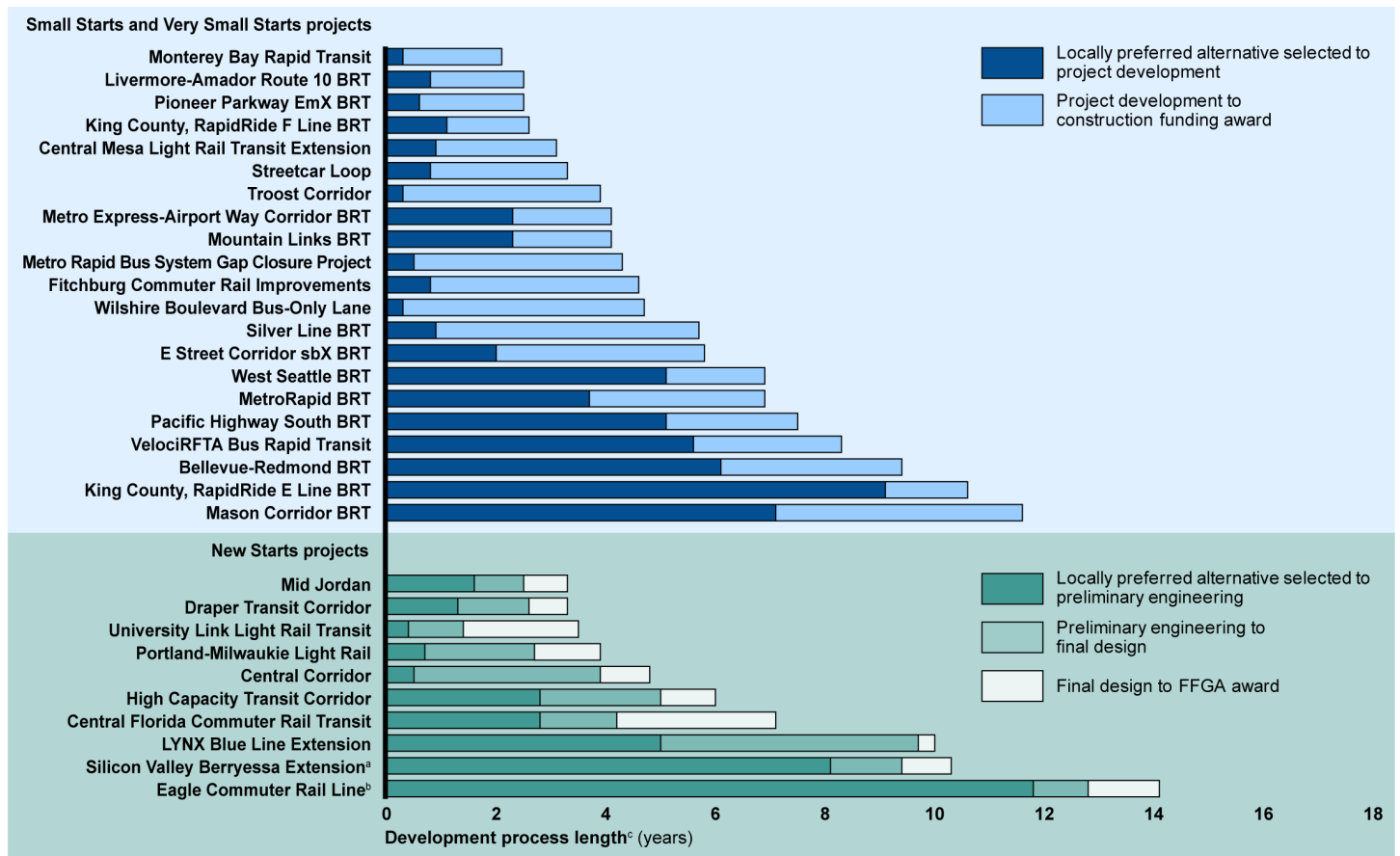
²³See e.g., 42 U.S.C. § 4332(c) (iii), 40 C.F.R. § 1501.2(c) requiring the application of the NEPA process including the study and development of alternatives to a proposed action. See also 23 C.F.R. Part 771.

²⁴FTA considered the federal portion of the development process under SAFETEA-LU to have begun when a project sponsor entered either the preliminary engineering (New Starts) or the project development phase (Small Starts and Very Small Starts).

²⁵Under SAFETEA-LU, FTA referred to New Starts projects in preliminary engineering and final design, as well as Small Starts and Very Small Starts projects in the project development phase, as being in the "pipeline" through which successful projects advance to receive funding.

suggested that for major highway projects the activities leading up to the construction of a highway may vary from 1 year for a minor project to 7 to 14 years for a major project.²⁶

Figure 2: Length of Development Process for Selected Funded New Starts, Small Starts, and Very Small Starts Projects, 2005–2013



Source: GAO analysis of FTA and project sponsor data.

Notes: Figure reflects data for 31 of 32 projects accepted into preliminary engineering (New Starts) or project development (Small Starts and Very Small Starts) on or after October 1, 2005, and awarded funding no later than March 31, 2013. Figure does not include data for Mid-City Rapid bus rapid transit project as we could not obtain data on the date the locally preferred alternative was selected. For more information on these projects, see appendixes II and III. BRT refers to bus rapid transit.

²⁶Congressional Research Service, *Accelerating Highway and Transit Project Delivery: Issues and Options for Congress*, R41947 (Washington, D.C.: Aug. 3, 2011).

^aThe Silicon Valley Berryessa Extension was originally approved for preliminary engineering in 2002 as a 16-mile project, but was withdrawn from the New Starts program in 2005. The project was re-admitted into preliminary engineering in December 2009.

^bThe Eagle Commuter Rail project was originally two separate projects—the East Corridor and the Gold Line—that eventually were combined into a single FFGA. The East Corridor locally preferred alternative (LPA) was selected in July 1997, while the Gold Line LPA was selected in January 2005. According to project sponsor officials, the East Corridor LPA was identified in July 1997, but final adoption by all parties did not occur until September 1998.

^cFor the purposes of this report, we define the development process as the activities related to the development of a New Starts, Small Starts, or Very Small Starts project that occur between when a project sponsor identifies the project that FTA is to evaluate for funding (known as the locally preferred alternative) and the formal award of construction funding through a grant agreement.

The variation across projects is attributable, in part, to conditions and factors specific to each project.

- For some projects, the development process was lengthy. For example, for the Eagle Commuter Rail Line project, the development process, beginning with the selection of the locally preferred alternative in 1997 until the project was awarded an FFGA, lasted over 14 years. Project sponsors stated that they did not pursue entry into preliminary engineering until after completing further investment studies that expanded the scope of the project in the early 2000s and securing funding through a local referendum in 2004. In addition, prior to entering the Capital Investment Grant pipeline, officials worked to finalize the technology for the project and secure approval from the project sponsor's board of directors. Officials stated that once the project was approved into the pipeline in 2009, the project progressed quickly through the remainder of the process, and the project sponsor secured an FFGA approximately two and a half years after acceptance into preliminary engineering.
- For sponsors of the Mason Corridor project, which successfully completed a Small Starts bus rapid-transit line from Aspen to Glenwood Springs, Colorado, the development process extended over 11 years as a result of challenges related to, among other things, securing funding for the project and obtaining agreement for the project among local stakeholders.

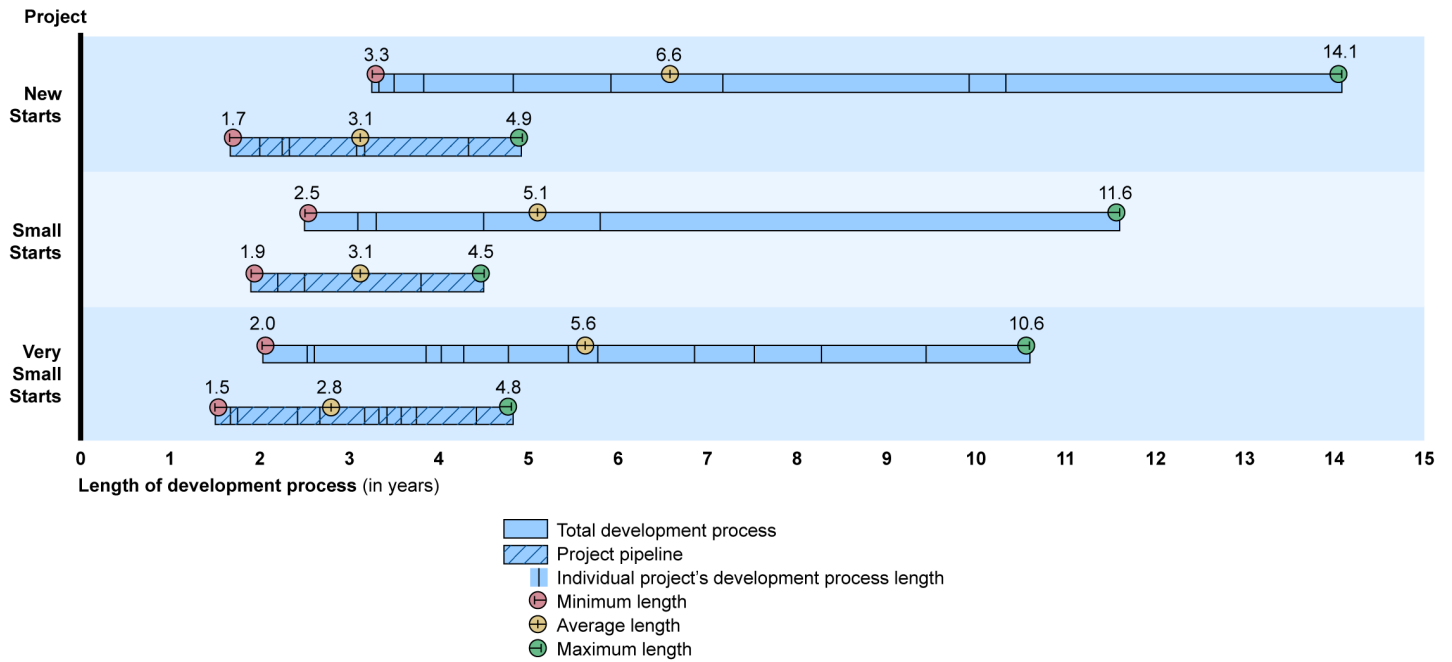
However, for other projects, the length of the development process was comparatively shorter. For example, the development process for the 7.3-mile, 10 station, Portland-Milwaukie light-rail New Starts project lasted about 4 years. In this case, project sponsors stated that they encountered no major obstacles during this time, though they noted that the process was extended by 6 months while the project sponsor identified additional local funds and reduced to project's scope in response to lower than anticipated federal funding for the project. We will discuss in more detail

the general types of factors that affected the length of the development process later in the report.

In general, larger projects, such as those that applied for funding as New Starts projects, required more time to progress through the development process than smaller projects, such as those that apply for funding as Small and Very Small Starts projects. On average, the development process was 17 months longer in duration for New Starts projects than for Small Starts projects and 12 months longer than for Very Small Starts projects. Specifically, according to our analysis of FTA and project sponsor data, we found that New Starts projects took about 3 to 14 years to complete the development process, Small Starts projects took about 3 to 12 years, while Very Small Starts projects took about 2 to 11 years. According to FTA officials, the length of the development process is unique for each project, and generally depended upon the project's specific characteristics, such as scope, corridor location, and availability of local funding, among other factors.

Some of the variability across the New Starts, Small Starts, and Very Small Starts projects resulted from activities that took place later in the process, after the locally preferred alternative was selected and before the project was formally accepted into FTA's pipeline. The "pipeline" is a sub-component of the overall development process and is defined as the period of time between when a project is accepted into the preliminary-engineering (New Starts) or project-development (Small and Very Small Starts) phase and the final award of construction funding by FTA. Depending on the project, the time between the selection of the locally preferred alternative and entry into the pipeline took as little as a few months to over a decade. According to project sponsors, activities during this period included revising the project scope, securing local funding, and preparing to enter into the project pipeline, among other things. Once a project was been accepted into the pipeline, we found that the length of the process was similar across all three project categories, and generally lasts from 2 to 5 years, and averages about 3 years (see fig. 3). However, within each of the three types of projects, the length of time in the pipeline for an individual project varied widely depending on the project's specific characteristics. Furthermore, as previously discussed, FTA officials stated it is difficult to characterize an "average" project, as each proposed transit project has its own unique project characteristics, physical-operating environment, and challenges.

Figure 3: Length of Development Process and Pipeline (in Years) for Selected New Starts, Small Starts, and Very Small Starts Projects, 2005–2013



Source: GAO analysis of FTA and project sponsor data.

Notes: Figure reflects data for 31 of 32 projects accepted into preliminary engineering (New Starts) or project development (Small Starts and Very Small Starts) on or after October 1, 2005, and awarded construction funding no later than March 31, 2013. Figure does not include data for Mid-City Rapid bus rapid transit project, as we could not obtain data on the date the locally preferred alternative was selected. For more information on these projects, see appendixes II and III.

For the purposes of this report, we define the development process as the activities related to the development of a New Starts, Small Starts or Very Small Starts project that occur between when a project sponsor identifies the project that FTA is to evaluate for funding (known as the locally preferred alternative) and the formal award of construction funding through a grant agreement. The pipeline, which is a sub-component of the overall development process, is defined as the period of time between when a project is accepted into the preliminary-engineering (New Starts) or project-development (Small and Very Small Starts) phase and the final award of construction funding by FTA.

While there was substantial variation in the length of the overall development process within and across transportation modes, the variation in the Capital Investment Grant pipeline duration was similar across the modes of the projects we reviewed. (See table 1.) For example, light rail projects required 3 to 10 years to complete the development process, while commuter rail projects required 5 to 14 years to complete this process. As previously noted, a portion of the variability in length of the development process was due to activities that occur after a locally preferred alternative is selected but before FTA accepted the project into the pipeline. However, projects generally required 2 to 5 years

to progress through the pipeline, regardless of the mode proposed by a project sponsors.

Table 1: Duration of Development Process for Selected New Starts, Small Starts, and Very Small Starts Projects by Mode, 2005–2013

	Number of funded projects	Duration of overall development process (years) ^a	Duration of Capital Investment Grant pipeline (years) ^b
Bus rapid transit	18	2 to 12	2 to 5
New Starts	-	-	-
Small Starts	3	3 to 12	2 to 5
Very Small Starts	15	2 to 11	2 to 5
Commuter rail	3	5 to 14	2 to 5
New Starts	2	7 to 14	2 to 4
Small Starts	1	5	5
Very Small Starts	-	-	-
Heavy rail^c	2	6 to 10	2 to 3
Light rail	7	3 to 10	2 to 5
New Starts	6	3 to 10	2 to 5
Small Starts	1	3	2
Very Small Starts	-	-	-
Streetcar^d	1	3	3

Source: GAO analysis of FTA and project sponsor data.

Note: Data is rounded to the nearest year. Table reflects data for 31 of 32 projects accepted into preliminary engineering (New Starts) or project development (Small Starts and Very Small Starts) on or after October 1, 2005 and awarded funding no later than March 31, 2013. Table does not include data for Mid-City Rapid bus rapid transit project, as we could not obtain data on the date the locally preferred alternative was selected. For more information on these New Starts and Small Starts projects, see appendices II and III.

^aThe development process was the activities related to the development of a New Starts, Small Starts, or Very Small Starts project that occur between when a project sponsor's identifies the project that FTA will evaluate for funding (known as the locally preferred alternative) and the formal award of construction funding through a grant agreement.

^bThe pipeline, which is a sub-component of the overall development process, is defined as the period of time between when a project is accepted into the preliminary-engineering (New Starts) or project-development (Small and Very Small Starts) phase and the final award of construction funding by FTA.

^cEach of the heavy rail projects approved by the Federal Transit Administration (FTA) was a New Starts project.

^dThis project was a Small Starts project.

Local Factors Substantially Affect the Length of the Development Process

Our review found that local factors, specific to each project, were generally the primary elements that determined the development process's length. Furthermore, our prior work has found that some of these factors—particularly obtaining project funding and community support—also commonly affect the length of time to complete other types of capital projects, including highway projects.²⁷

- *Local Financing:* Project sponsors noted that securing local funding, such as through local sales taxes and referendums, can be challenging. We previously found that local funding remains a substantial component of the overall funding for New Starts, Small Starts, and Very Small Starts projects.²⁸ Sponsors of 17 of 32 of the projects we reviewed stated that activities to secure local funding contributed to the length of the development process. For example, the project sponsor of the Mason Corridor BRT stated that securing local commitment was particularly challenging and extended the development process by about 7 years. The project sponsor selected a bus rapid transit as a locally preferred alternative in 2000, but was unable to secure local funding until 2007. The time needed to identify and secure local funding was a significant factor in extending the development process over 11 years, as federal funding for the project was contingent upon the project's sponsor securing a local funding source. Similarly, the project sponsor of the Mid-Jordan light rail project in Salt Lake City, Utah, stated that securing local funding for the project delayed its development by about a year. According to the project's sponsor, while it selected the locally preferred alternative in 2005, the project sponsor did not enter into preliminary engineering until 2007, when the project had secured funding through a local referendum in 2006 that increased the local sales tax.

²⁷GAO, *Highway Projects: Some Federal and State Practices to Expedite Completion Show Promise*, [GAO-12-593](#) (Washington, D.C: June 6, 2012).

²⁸See [GAO-13-40](#). Specifically, in that report, we found that for the 25 New Starts projects funded between October 2004 and June 2012, local funding exceeded total federal funding contributions, accounting for \$16.3 billion, or almost half, of \$33.8 billion of total project funding. Local funding for the 32 Small Starts and Very Small Starts projects approved over the same time period represented nearly one-quarter, or \$513 million of the \$2.1 billion used for overall project funding.

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- *Local Community Support:* The development process can also be extended as a result of efforts project sponsors undertake to secure local community approval for a project. Sponsors of 12 of the 32 of the projects we reviewed stated that community support for their project affected the length of the development process. For example, project sponsor officials who oversaw the development of a BRT project in Northern California stated that the major hurdle in the development of the project was overcoming some community opposition to the planned route that arose in 2008 after the selection of the locally preferred alternative. Specifically, the alignment of the project was scheduled to go through a residential area where residents had historically opposed the location of a bus route. According to the project sponsor, the change provoked some community opposition to the project, and as a result, the alignment of the project was modified. Officials estimated that the development process was extended by about 3 to 6 months. However, community support can take a significant amount of time to develop and sustain. For example, officials from the project sponsor overseeing the construction of the High Capacity Transit Corridor heavy rail project in Honolulu worked for 10 years—starting before the locally preferred alternative was selected—to develop support for the project.
 - *Stakeholder Coordination:* Coordinating with other local government agencies as well as other transportation providers can also be challenging and may affect the length of the development process. Specifically, for 8 of the 32 projects we reviewed, sponsors stated that the process of coordinating with other stakeholders extended the development process. For example, project sponsors overseeing the development of a light rail project in Charlotte, North Carolina, had to coordinate with local freight-rail operators and Amtrak to relocate service to minimize disruption to Amtrak’s existing service. The project’s design was modified as a result of these negotiations, which extended the project’s development nearly 7 months, according to the project’s sponsor. Project sponsor officials stated that they did not anticipate the complexity of the negotiations with the railroad operators and, accordingly, noted that earlier coordination with these operators might have accelerated the project timeline modestly.
 - *Environmental review.* The effect of a proposed project on the local environment, as well as steps required by law to mitigate environmental impacts from the proposed project, may also affect the duration of the development process. Specifically, under the NEPA environmental review process, project sponsors may measure the impact of different alternatives by the extent to which the alternative

meets the project's purpose and need, and is consistent with the goals and objectives of any local urban planning. The NEPA environmental review process also requires federal agencies to evaluate and in some cases prepare detailed statements assessing the environmental impact of and alternatives to major federal actions significantly affecting the environment. However, according to FTA officials and project sponsors, this process can be time consuming. Specifically, both FTA officials and project sponsors for 8 of the 32 projects we reviewed noted that the required NEPA environmental review process, may add time to the development process. For example, officials from one project sponsor stated that it took nearly two and a half years to complete the NEPA process.

- *Scope and configuration changes.* The factors described above may also result in revisions to the project's scope and configuration, which may in turn extend the development process. Revisions to a project's design ranged from minor alterations to pedestrian access to a project to changes to a project's proposed alignment or service route. Project sponsors for 7 of the 32 projects we reviewed identified changes in scope as a factor affecting the development process, which sometimes resulted from one of the factors described above. For example, for the Charlotte light rail project described above, in addition to the design changes arising from coordination with local stakeholders, recession-related reductions in the sales-tax revenue funding the project forced the project sponsors to further revise the project, thus extending the overall development process.

FTA Has Taken Steps and Identified Future Opportunities to Reduce the Duration of the Development Process

According to some project sponsors we interviewed, FTA assistance is generally helpful in completing the development process, though they noted that the duration of some oversight reviews can be lengthy. We have previously found FTA and its oversight approach have improved sponsor's management of their projects.²⁹ However, for 12 of the 32 projects we reviewed, project sponsors stated that some types of oversight reviews can be time-intensive and extend the development process, sometimes by weeks or months. For example, project sponsors for 2 of the 32 projects we reviewed cited FTA's risk assessment as a

²⁹GAO, *Public Transportation: Use of Contractors Is Generally Enhancing Transit Project Oversight, and FTA Is Taking Actions to Address Some Stakeholder Concerns*, [GAO-10-909](#) (Washington, D.C.: Sept. 14, 2010).

requirement that affected the length of the development process.³⁰ In addition, sponsors of 4 of the 16 Very Small Starts projects we reviewed speculated that some of the longer review times for smaller projects may have been a result of FTA's initial uncertainty in how it would implement the simplified review process for Very Small Starts projects. Conversely, one project sponsor noted that because much of the development process is driven by local factors, there was not much FTA could have done to accelerate the process.

Finding the right balance between protecting federal investments through project management oversight and advancing projects through the development process is challenging. We have previously found that a balance exists between expediting project development and maintaining the rigor and accountability over the development of New Starts, Small Starts, and Very Small Starts projects.³¹ Furthermore, we have previously found that FTA's oversight efforts help the agency ensure that a federally funded transit project's scope, schedule, and cost are well developed and that the project's design and construction conform to applicable statutes, regulations, and guidance.³² We also previously found that reviews may take longer than expected, because project sponsors sometimes provide information that is incomplete or inaccurate, resulting in additional review time and delays. While FTA has acknowledged that the process can be lengthy and frustrating, FTA has taken some steps over the last several years to further streamline the development process.

- In its January 2013 final rule implementing some MAP-21 changes, FTA eliminated the requirement for the development of a baseline alternative, removing the requirement to compare a proposed project

³⁰FTA's risk assessment review evaluates the reliability of the project sponsor's project scope, cost estimate, and schedule, focusing specifically on the uncertainty associated with project implementation and surrounding project conditions.

³¹GAO, *Public Transportation: Better Data Needed to Assess Length of New Starts Process, and Options Exist to Expedite Project Development*, [GAO-09-784](#) (Washington, D.C.: Aug. 6, 2009).

³²[GAO-10-909](#).

to a hypothetical alternative.³³ Project sponsors for 3 of 32 projects we reviewed stated that development of a baseline alternative was a time- and resource-consuming part of the development process.

- The January 2013 final rule also allows proposed projects to automatically receive a satisfactory rating on a certain rating and some evaluation criteria based on the project's characteristics or the characteristics of the project corridor. For example, for Small Starts projects, if the operating and maintenance cost of the proposed project is less than 5 percent of current system-wide operating and maintenance cost, the project qualifies for automatic medium or better rating on its local financial commitment evaluation. FTA officials told us that they plan to explore expanding the types of projects that may prequalify for automatic ratings.
- In September 2013, FTA introduced a new tool to assist project sponsors in estimating ridership on their projects. According to FTA officials, the tool, known as the Simplified Trips-on-Project Software (STOPS), may help to significantly shorten the time projects' sponsors need to develop ridership estimates. We will discuss ridership estimation for projects later in this report.

FTA estimates these changes could reduce the development process time for projects by six months or more.³⁴ In addition, FTA expects that as more MAP-21 requirements are formally implemented through the rule-making process, it may identify additional efficiencies in the development process.

³³78 Fed. Reg. 1992 (Jan. 9, 2013), The final rule became effective in April 2013. Under SAFTEA-LU, FTA required that the proposed project be evaluated against a baseline alternative. Within the New Starts program, the baseline alternative established a basis of comparison for project evaluation and provided a consistent framework for estimating the relative merits of proposed projects during project development. The baseline alternative was drawn from the alternatives defined during alternatives analysis. Under SAFTEA-LU, FTA required that the proposed project be evaluated against a baseline alternative.

³⁴Peter M. Rogoff, Administrator, Federal Transit Administration, *Statement on The Capital Investment Grants (New Starts) Program*, before the U.S. House of Representatives Subcommittee on Highways and Transit, 113th Cong., 1st sess., December 11, 2013.

The Majority of Capital Cost Estimates Did Not Change Significantly during the Development Process, and Changes That Did Occur Were due to Various Factors

We found that capital cost estimates for New Starts, Small Starts, and Very Small Starts projects during the development process generally did not change substantially prior to the award of federal funding.³⁵ Project sponsors told us that cost estimate changes occurred as a result of changing market conditions, FTA's application of additional project contingencies³⁶ and scope modifications, among others. However, most estimates did not change much from the initial capital cost estimated upon entry into the development process.

While Cost Estimates Changed Significantly for Several Projects, the Majority of Capital Cost Estimates Did Not

The majority of cost estimates of the projects we reviewed did not change significantly. For 23 of the 32 projects we reviewed, the original cost estimated upon entry into the Capital Investment Grant pipeline was within 10 percent of the final cost estimated prior to receiving federal funding. The original capital cost estimates for the remaining 9 projects varied by as much as 41 percent lower and 55 percent higher from the estimates used at the end of the development process. Of those projects, 4 were New Starts, 3 were Small Starts, and 2 were Very Small Starts projects. Figure 4 shows the range of cost changes for these projects.

³⁵We examined capital cost estimates that project sponsors developed and updated during the project development pipeline, which is defined as the period of time between when a project is accepted into the preliminary-engineering (New Starts) or project-development (Small and Very Small Starts) phase and the final award of construction funding by FTA.

³⁶Contingencies are set-aside estimated amounts that are included within the overall cost targets for a project. The amounts are designed to be used to overcome increases in cost that are due to potential risks, and for which no other mitigation measure is available.

estimates are necessary for the New Starts program for a number of reasons:

- to support decisions about funding one capital improvement project over another,
- to develop annual funding requests to Congress,
- to evaluate resource requirements at key project-development decision points, and
- to develop performance measurement baselines.

We plan to examine FTA's and project sponsors' implementation of best practices for developing and managing capital program costs in future work on the Capital Investment Grant program.

Several Factors Have Contributed to Cost Estimate Changes

Our review identified a number of factors that led to cost estimate changes during the development process, as described below. In some cases, a combination of factors contributed to cost estimate changes.

- *Economic and Market Conditions.* Nine project sponsors stated that economic conditions, such as the recession from 2007 to 2009, likely increased competition for some of its contracts and created a bidding environment favorable to the agency for reducing costs. For example, Livermore Amador Valley Transit Authority (located in Livermore, California) officials stated that because of the recession, companies submitted lower bids than initially anticipated on each of the four major construction contracts associated with the project. According to the officials, the project finished about \$4.5 million under its approved budget, due in large part to the recession. The Utah Transportation Authority (UTA) also stated that the recession affected the cost estimate over the development process. The officials said that the recession created competition that helped reduce the construction costs associated with these projects due to a reduced demand for construction and contracting services. However, these types of projects are also sensitive to changes in material prices. For example, right before FTA awarded the grant for the Mid-Jordan project, the cost of steel increased substantially, adding \$1.5 million to the cost of the overall project.
- *Contingency levels.* According to project sponsors, capital cost estimates for 6 projects increased as a result of FTA's risk and

contingency reviews. For example, officials at Valley Transportation Authority (VTA) (located in Santa Clara, California) stated that, as part of FTA's risk assessment review, the project-management oversight contractor recommended an increase in the contingency amount for the project by \$100 million. VTA officials further stated that contingency amounts fluctuated throughout the development process as the design of the project was further refined. We have previously found that FTA's risk reviews have helped to improve project sponsors' controls over project costs and provided FTA with a better understanding of the issues surrounding projects, such as the potential problems that could lead to cost increases.³⁸ FTA uses its reviews to analyze whether the project sponsor has included a sufficient level of contingency within their cost estimate.

- *Scope and Configuration Changes.* Project sponsors stated that the scope of 12 projects was reduced or increased significantly during the development process, changes that led to capital cost-estimate changes. For example, the Minneapolis Metropolitan Council stated that its project had a \$24 million increase from preliminary engineering to FFGA, and \$15.6 million of the increase in capital cost that was attributable to inclusion of three at-grade infill stations.
- *Refined Cost Estimate as Project Progressed:* Because the majority of project estimates were developed in the planning stage, they will continue to change as part of the development process. For example, the Denver Regional Transportation District stated that the capital cost estimate for their project decreased because as the project advanced through the project development process, the cost estimators had a better idea of the project's scope and design, which led to more accurate cost estimating. Generally, the more information that is known about a project, the more accurate and less variable the estimate is expected to be. We have previously found that cost estimates are based on many assumptions and are expected to change as project requirements are clarified.³⁹

³⁸[GAO-10-909](#)

³⁹GAO, *GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs*, [GAO-09-3SP](#) (Washington, D.C.: March 2009).

Project Sponsors Use Regional Travel Models to Forecast Ridership, and FTA Provides Funding and Technical support

Project Sponsors Generally Forecast Ridership Using Regional Travel Models

Project sponsors rely on support from MPOs to develop their ridership forecasts. According to FTA officials, most travel-forecasting procedures are maintained by MPOs. The MPOs produce travel forecasts as they prepare transportation plans for metropolitan areas and assess the plans' conformity with federal air-quality requirements. Based on a Transportation Research Board (TRB) study on metropolitan travel forecasting, MPOs estimate future travel demand and analyze the impacts of alternative transportation investment situations using computerized travel-demand-forecasting models. According to this study, forecasts derived from travel models enable policy makers to make informed decisions on investments and policies relating to the transportation system.⁴⁰ In a 2009 report, we found that these MPO travel models are complex and require inputs of extensive current information on roadway and transit system characteristics and operations, as well as current and forecasted demographic information.⁴¹ Creating and operating the models requires a high degree of technical training and expertise. However, we also found in 2009 that some MPOs face challenges in travel demand forecasting, including a lack of technical capacity and data necessary to conduct the complex transportation modeling required to meet planning needs.⁴² The TRB also noted that

⁴⁰TRB, *Metropolitan Travel Forecasting: Current Practice and Future Direction*, Special Report 288 (2007).

⁴¹See GAO, *Metropolitan Planning Organizations: Options Exist to Enhance Transportation Planning Capacity and Federal Oversight*, [GAO-09-868](#) (Washington, D.C.: Sept. 9, 2009).

⁴²[GAO-09-868](#).

MPOs face a much broader and more complex set of requirements and needs in their travel modeling.⁴³

By and large, New and Small Starts project sponsors whom we interviewed generally use the regional travel models of the project sponsor's local MPO to forecast ridership.

- Eight out of the nine New Starts project sponsors reported using MPO travel models. For example, officials from the Regional Transportation District (Denver, CO) said that the local MPO's (Denver Regional Council of Government) approved regional travel-demand model is used to develop the Regional Transportation District's ridership forecasts. Officials from the Utah Transit Authority (Salt Lake City, Utah) also used a regional travel model maintained by the Wasatch Front Regional Council—the MPO for the Salt Lake City area. The model incorporates information from highway usage, rail, and other mass transit ridership, as well as transit rider surveys. However, one project sponsor, Sound Transit (Seattle, WA) used the incremental method to forecast its ridership. This method essentially uses actual transit ridership data, which includes, among other data, observed origins and destinations of transit users and surveys of region-wide transit riders.
- Three out of four Small Starts project sponsors use travel models developed by the local MPO. For example, for the Portland, Oregon, Streetcar Loop project, the Tri-County Metropolitan Transportation District of Oregon (TRIMET) used travel forecasts prepared by the Portland Metropolitan Planning Organization. According to TRIMET officials, the model includes and is continually updated with employment and population data, as well as, data on roadway and transit routes. According to these officials, the MPO travel model is one of the more sophisticated ridership models for an urban area. One project sponsor used its statewide travel model to forecast ridership, instead of a local MPO travel model. According to the Montachusett Regional Transit Authority (Fitchburg, MA), it used a local travel model which was a component of the overall Massachusetts state travel model to forecast ridership.

⁴³TRB, *Metropolitan Travel Forecasting: Current Practice and Future Direction*, Special Report 288 (2007).

Project sponsors that use regional travel models to forecast transit ridership for New Starts and Small Starts projects are required to test the forecasts for accuracy against current data describing actual transit ridership, per FTA requirements. To implement this test, the travel models are used to prepare a forecast of current ridership using current population, employment, highway conditions, and transit service levels. According to FTA, comparisons of these current-year forecasts against current-year data demonstrate the extent to which the models grasp actual ridership patterns and support improvements to the models when errors are evident. When the models are able to pass the tests, they are then ready to make forecasts for the proposed project.

FTA procedures permit Very Small Starts project sponsors to document current transit volumes in the project corridor and thereby avoid the need to prepare ridership projections for the project. As previously mentioned, according to FTA, one of the key requirements for a Very Small Starts project is that at least 3,000 existing transit riders will use the proposed project on an average weekday. Through this requirement, FTA can ensure that the proposed project will have sufficient ridership and produce enough travel benefits to be considered cost-effective without having to do detailed travel forecasts or other complicated analysis to prove the project is justified. To adequately document the required number of existing transit riders, the sponsoring agency must conduct a detailed counting of riders of existing public transportation in the project corridor, and estimate the number of existing riders that will use the Very Small Starts project. FTA guidance requires that the counts be conducted on existing routes serving the project corridor that either:

- operate on the street segments where the Very Small Start will operate, or
- on streets parallel or nearby that will be rerouted to operate on the Very Small Starts street segments after the project is completed.
- For example, the Los Angeles County Metropolitan Transportation Authority (Metro) developed its ridership projections for its two Very Small Starts bus rapid transit projects we reviewed, based on actual experience with another bus rapid-transit service. According to Metro officials, in order to validate ridership projections, Metro used data collected from its Automatic Passenger Counter system on the existing bus rapid-transit service. Metro officials told us that automatic passenger counters are installed on every bus in its fleet to provide accurate passenger ridership data.

FTA has endorsed two alternative approaches for developing ridership forecasts that rely less on travel models and more on current data on actual travel patterns.

1. Incremental Methods rely on rider survey data to describe current transit ridership patterns. This method essentially focuses on changes in transit ridership caused by proposed projects and by growth in population and employment. According to FTA officials, in corridors where transit is well established, these incremental methods offer a quick, and possibly more reliable, ridership-forecasting approach.
2. Simplified Trips-on-Project Software package (STOPS) which FTA released in September 2013, is an approach that local agencies can use instead of, or in conjunction with, metro-area models. STOPS uses data from the Census Transportation Planning Package (currently from the 2000 decennial census) to replace some component models and provides already calibrated models of transit-versus-auto choice. For local agencies whose travel models are not ready to provide reliable forecasts for transit projects, STOPS offers an alternative that can avoid the need for project sponsors to perform data collection and model updates, processes that can sometimes take as long as 2 years to complete. Instead, using STOPS, developing ridership forecasts can take as little as 2 weeks.

We did not assess the adequacy of any of these travel models. However, the TRB study noted that there is no single approach to travel forecasting or set of procedures that is correct for all applications or all MPOs. Additionally, the study stated that FTA is to be commended for taking steps to ensure quality in the travel forecasting methods used for major project planning. In particular, the study noted that FTA's initiatives to ensure the quality of New Starts ridership forecasting have been useful in uncovering weaknesses and that FTA has taken a strong role in improving modeling practice.⁴⁴

⁴⁴TRB, *Metropolitan Travel Forecasting: Current Practice and Future Direction*, Special Report 288 (2007).

Uncertainties Create Challenges for Developing Ridership Forecasts

According to FTA officials, regardless of the approach project sponsors use to forecast ridership, all ridership forecasts have uncertainties. FTA officials identified at least two areas of uncertainty:

- *Data inputs that are forecasts.* Travel models require information on population, employment, household incomes, transit service levels, transit fares, highway capacity, and other influences on travel patterns. Consequently, ridership forecasts for future years are grounded in predicted future conditions rather than data on actual conditions. For distant years and in rapidly growing metro areas, uncertainties in these predictions can be large.
- *Optimism.* Sponsors and planners of new transit projects anticipate good outcomes. As a result, optimistic assumptions are common on such things as operating speeds, accessibility to stations, and the amount of new development within a given area. Travel models tend to compound this across-the-board optimism in many ways leading to forecasts that may be much more optimistic than any one of the inputs, and this optimism may lead sponsors to reject less-than-hoped-for ridership projections and search for ways to increase the projections.

Some project sponsors we interviewed also identified the following challenges affecting ridership estimates:

- The difficulty in developing accurate population and employment growth estimates.
- The unpredictability of gas price levels on ridership. For instance, higher prices will encourage higher ridership and a large decline in prices will discourage ridership. One project sponsor told us that the economy has a significant effect on ridership, and more specifically, the economy affects the price of gas and cost of parking, which in turn affects ridership.

FTA Supports the Development of Ridership Forecasts through Funding and Technical Support

FTA has taken a number of actions to support the development of ridership forecasts. These include the following:

Funding. According to FTA officials, the agency contributes funding to state agencies and MPOs to support, among many other activities, the collection of travel data and the development of travel-forecasting procedures. MPOs receive annual funding from both the Federal Highway

Administration and FTA, in addition to state matching funds. Nationally, FTA's share of this funding is about \$129 million for fiscal year 2014.

Technical support. FTA told us that, since the inception of the Capital Investment Grant program, it has filled at least one staff position with a nationally recognized expert in travel forecasting who is responsible for assisting project sponsors in the development of travel forecasts and for oversight of Capital Investment Grant project ridership forecasts. FTA has also allocated approximately two full-time staff to oversight activities. These activities include the following:

- Technical assistance in travel forecasting methods development. According to FTA, at the invitation of local agencies, FTA staff provides comments, participates in peer-review panels, and engages in ongoing discussions with local project sponsors and their contractors during the development of new travel forecasting procedures for metropolitan areas.
- Early reviews of methods and assumptions. FTA officials also stated that the agency encourages project sponsors and their contractors to meet with FTA staff early in the preparation of forecasts in support of proposed projects. These officials said that this early engagement identifies potential problems with forecasting methods and planning assumptions at a point in time when these issues can be dealt with efficiently—essentially avoiding late surprises when project sponsors have finished their forecasts.
- Reviews of final travel forecasts. Before a proposed project is approved for entry into preliminary engineering (New Starts) or project development (Small Starts), FTA staff review the travel forecasts submitted by project sponsors in support of these projects. Staff document any significant uncertainties found in the forecasts and make recommendations to FTA's Office of Planning and Environment regarding acceptance of the forecasts as sufficiently reliable for the agency's use in project evaluation and rating.

We interviewed 13 New Starts and Small Starts project sponsors, and a majority (7) said that FTA's technical assistance, which includes reviewing ridership forecasts, was generally helpful. For example, an official from the Metropolitan Council (Minneapolis and St. Paul, MN) told us that he has found it useful that FTA reviews its ridership forecasts for different projects. In particular, it can be very insightful to have FTA ask probing questions regarding forecasts, a process that gives project

sponsors a quality check on the veracity of their ridership-forecast numbers. In another example, officials from Valley Metro (Phoenix, AZ) told us that FTA provided them assistance for 9 months as the ridership forecasting was being developed, assistance that helped them deliver a credible document for evaluation and rating. Furthermore, another project sponsor said that the FTA team that reviewed its ridership projections was both thorough and timely with its reviews.

Requirement for testing of travel models. In 2007, FTA required that local travel models used to forecast transit ridership for New Starts and Small Starts project be tested for accuracy against current data describing actual transit ridership. According to FTA, the requirement ensures that local methods used to prepare ridership forecasts submitted to FTA have been demonstrated to have a basic grasp of current local transit ridership. FTA officials said that the 2013 policy guidance on the Capital Investment Grant program continues this requirement.⁴⁵

Agency Comments

We provided DOT with a draft of this report for review and comment. DOT provided technical comments, which we incorporated as appropriate.

We are sending copies of this report to interested congressional committees and the Secretary of the Department of Transportation. In addition, this report will be available at no charge on GAO's web site at <http://www.gao.gov>. If you or your staff have any questions or would like to discuss this work, please contact me at (202) 512-2834 or wised@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Individuals making key contributions to this report are listed in appendix IV.



David J. Wise
Director, Physical Infrastructure Issues

⁴⁵78 Fed. Reg. 2019 (Jan. 9, 2013)

Appendix I: Objectives, Scope, and Methodology

The Moving Ahead for Progress in the 21st Century Act (MAP-21) mandated GAO to biennially review FTA's processes and procedures for evaluating, rating, and recommending new fixed-guideway capital projects and core capacity improvement projects and the Department of Transportation's (DOT) implementation of such processes and procedures.¹ In this report, we identify (1) the extent to which the length of the development process varies across New Starts, Small Starts and Very Small Starts projects and what factors affect the length of this process, (2) the extent to which capital cost estimates for New Starts, Small Starts, and Very Small Starts projects change throughout the development process, and what factors contribute to the changes, and (3) how project sponsors forecast ridership, including any support that FTA provides in helping them develop these forecasts.

To address all of these objectives, we reviewed and summarized relevant laws, such as The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), FTA circulars and policy guidance, as well as our body of work on the Capital Investment Grant Program. To determine the extent to which the length of the development process varies across New Starts, Small Starts, and Very Small Starts projects and the extent to which capital cost estimates for these projects change throughout this process, we collected and analyzed project milestone data and cost estimate data (see apps. II and III) from FTA staff and analysis of FTA Annual Reports on Funding Recommendations for fiscal years 2008 through 2014. We included all 32 New Starts, Small Starts, and Very Small Starts projects that had been: 1) approved to enter preliminary engineering following SAFETEA-LU (October 2005) and (2) awarded a grant agreement prior to the implementation of MAP-21 (March 2013). To verify and assess the reliability of the data compiled by FTA, we compared it to project data we received from project sponsors we interviewed. We resolved any discrepancies with the data with FTA headquarters staff, and we determined that the data were sufficiently reliable for the purposes of this report.

To provide insight on the factors contributing to project's timeline trends and challenges and project cost-estimate changes and to obtain information on how ridership forecasts are developed, we interviewed 23

¹Pub. L. No. 112-141, 126 Stat. 656, 674 (July 6, 2012).

project sponsors representing 30 of the 32 projects.² Table 2 lists the New Starts, Small Starts, and Very Small Starts project sponsors we interviewed for our review. The information obtained from these interviews is not generalizable to all New Starts, Small Starts, and Very Small Starts projects. We also interviewed FTA officials to determine the support that FTA provides to help project sponsors develop ridership forecasts.

Table 2: New Starts, Small Starts, and Very Small Starts Project Sponsors Interviewed

Name of project sponsor	Location	Mode ^a	Project type
Capital Metro	Austin, TX	BRT	Very Small Starts
City of Charlotte	Charlotte, NC	LRT	New Starts
City of Ft. Collins	Fort Collins, CO	BRT	Small Starts
City of Honolulu	Honolulu, HA	HR	New Starts
Florida Department of Transportation	Orlando, FL	CR	New Starts
Kansas City Area Transportation Authority	Kansas City, MO	BRT	Very Small Starts
King County	Seattle, WA	BRT	Very Small Starts
Livermore Amador Valley Transit Authority	Livermore, CA	BRT	Very Small Starts
Los Angeles County Metropolitan Transportation Authority	Los Angeles, CA	BRT	Very Small Starts
Minneapolis Metropolitan Council	Minneapolis, MN	LRT	New Starts
Montachusetts Regional Transit Authority	Fitchburg, MA	CR	Small Starts
Monterey Salinas Transit	San Diego, CA	BRT	Very Small Starts
Northern Arizona Intergovernmental Public Transportation	Flagstaff, AZ	BRT	Very Small Starts
Ride UTA	Salt Lake City, UT	LRT	New Starts
Roaring Fork Transportation Authority	Roaring Fork, CO	BRT	Very Small Starts
RTD Fast Tracks	Denver, CO	CR	New Starts
San Diego Association of Governments	San Diego, CA	BRT	Very Small Starts
San Joaquin Regional Transit District	Stockton, CA	BRT	Very Small Starts
Santa Clara Valley Transit Authority (VTA)	San Jose, CA	HR	New Starts
Sound Transit	Seattle, WA	LRT	New Starts
The Rapid	Grand Rapids, MI	BRT	Very Small Starts
TriMet	Portland, OR	Streetcar, LRT	Small Starts
Valley Metro	Phoenix, AZ	LRT	Small Starts

²One project sponsor declined to be interviewed; and we were unable to contact one other after several attempts.

Source: GAO.

^aBRT = bus rapid transit; HR = heavy rail; CR = commuter rail; LRT = light rail transit.

We conducted this performance audit from August 2013 to May 2014 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: Key Milestone Dates and Cost Estimates for Selected New Starts Projects Reviewed by GAO (Dollars in Millions)

Project	Mode	Location	Date locally preferred alternative selected	Date and cost estimate when accepted into preliminary engineering	Date and cost estimate when accepted into final design	Date and cost estimate when full funding grant agreement awarded
Central Corridor	Light rail	St. Paul - Minneapolis, Minnesota	June 2006	December 2006	May 2010	April 2011
				\$932	\$957	\$957
Central Florida Commuter Rail Transit – initial operating segment	Commuter rail	Orlando, Florida	May 2004	March 2007	August 2008	July 2011
				\$602	\$357	\$357
Draper Transit Corridor	Light rail	Salt Lake City, Utah	August 2008	December 2009	April 2011	December 2011
				\$212	\$194	\$194
Eagle Commuter Rail Line	Commuter rail	Denver, Colorado	July 1997/January 2005 ^a	April 2009	April 2010	August 2011
				\$2,904	\$2,137	\$2,043
High Capacity Transit Corridor	Heavy rail	Honolulu, Hawaii	January 2007	October 2009	December 2011	December 2012
				\$5,348	\$5,126	\$5,122
LYNX Blue Line Extension	Light rail	Charlotte, North Carolina	November 2002	November 2007	July 2012	October 2012
				\$749	\$1,160	\$1,160
Mid Jordan	Light rail	Salt Lake City, Utah	October 2005	May 2007	April 2008	January 2009
				\$522	\$535	\$535
Portland-Milwaukie Light Rail	Light rail	Portland, Oregon	July 2008	March 2009	March 2011	May 2012
				\$1,472	\$1,490	\$1,490
Silicon Valley Berryess ^a Extension	Heavy rail	San Jose, California	November 2001 ^b	December 2009	April 2011	March 2012
				\$2,509	\$2,623	\$2,330
University Link	Light rail	Seattle, Washington	July 2005	December 2005	December 2006	January 2009
				\$1,720	\$1,646	\$1,948

Source: GAO analysis of FTA and project sponsor data.

Note: Dollars are rounded to the nearest million.

**Appendix II: Key Milestone Dates and Cost
Estimates for Selected New Starts Projects
Reviewed by GAO (Dollars in Millions)**

^aThe Eagle Commuter Rail project was originally two separate projects—the East Corridor and the Gold Line—that eventually were combined into a single FFGA. The East Corridor locally preferred alternative (LPA) was selected in July 1997, while the Gold Line LPA was selected in January 2005. According to project sponsor officials, the LPA was identified in July 1997, but final adoption by all parties did not occur until September 1998.

^bThe Silicon Valley Berryessa Extension was originally approved into preliminary engineering in 2002 as a 16-mile project, but withdrew from the New Starts program in 2005. The project was re-admitted into preliminary engineering in December 2009.

Appendix III: Key Milestone Dates and Cost Estimates for Selected Small and Very Small Starts Projects Reviewed by GAO (Dollars in Millions)

Project	Mode	Category	Location	Date locally preferred alternative selected	Date and cost estimate when accepted into project development	Date and cost estimate when funding awarded
Bellevue-Redmond Bus Rapid Transit	Bus rapid transit	Very Small Starts	King County, Washington	November 2001	December 2007	April 2011
					\$27	\$27
Central Mesa Light Rail Transit Extension	Light rail	Small Starts	Mesa, Arizona	September 2009	August 2010	October 2012
					\$199	\$199
E Street Corridor sbX Bus Rapid Transit	Bus rapid transit	Small Starts	San Bernadino, California	December 2005	December 2007	September 2011
					\$163	\$192
Fitchburg Commuter Rail Improvements	Commuter rail	Small Starts	Fitchburg, Massachusetts	March 2007	December 2007	September 2011
					\$150	\$159
King County, RapidRide E Line Bus Rapid Transit	Bus rapid transit	Very Small Starts	King County, Washington	November 2001	December 2010	June 2012
					\$48	\$48
King County, RapidRide F Line Bus Rapid Transit	Bus rapid transit	Very Small Starts	King County, Washington	November 2009	December 2010	June 2012
					\$37	\$48
Livermore-Amador Route 10 Bus Rapid Transit	Bus rapid transit	Very Small Starts	Livermore, California	February 2007	December 2007	August 2009
					\$22	\$22
Mason Corridor Bus Rapid Transit	Bus rapid transit	Small Starts	Fort Collins, Colorado	October 2000	November 2007	May 2012
					\$74	\$87
Metro Express-Airport Way Corridor Bus Rapid Transit Project	Bus rapid transit	Very Small Starts	San Joaquin, California	September 2006	December 2008	September 2010
					\$10	\$10
Metro Rapid Bus System Gap Closure Project	Bus rapid transit	Very Small Starts	Los Angeles, California	June 2006	December 2006	September 2010
					\$29	\$29
MetroRapid Bus Rapid Transit	Bus rapid transit	Very Small Starts	Austin, Texas	June 2005	February 2009	April 2012

Appendix III: Key Milestone Dates and Cost Estimates for Selected Small and Very Small Starts Projects Reviewed by GAO (Dollars in Millions)

Project	Mode	Category	Location	Date locally preferred alternative selected	Date and cost estimate when accepted into project development	Date and cost estimate when funding awarded
					\$47	\$48
Mid-City Rapid	Bus rapid transit	Very Small Starts	San Diego, California	^a	December 2007	August 2010
					\$43	\$45
Monterey Bay Rapid Transit	Bus rapid transit	Very Small Starts	Monterey, California	September 2008	December 2008	September 2010
					\$4	\$4
Mountain Links Bus Rapid Transit	Bus rapid transit	Very Small Starts	Flagstaff, Arizona	December 2005	December 2007	May 2011
					\$10	\$10
Pacific Highway South Bus Rapid Transit	Bus rapid transit	Very Small Starts	King County, Washington	November 2001	December 2006	May 2009
					\$25	\$25
Pioneer Parkway EmX Bus Rapid Transit	Bus rapid transit	Small Starts	Springfield, Oregon	May 2006	December 2006	November 2008
					\$37	\$41
Silver Line Bus Rapid Transit	Bus rapid transit	Very Small Starts	Grand Rapids, Michigan	January 2007	December 2007	October 2012
					\$37	\$35
Streetcar Loop	Streetcar	Small Starts	Portland, Oregon	July 2006	April 2007	October 2009
					\$127	\$128
Troost Corridor Bus Rapid Transit	Bus rapid transit	Very Small Starts	Kansas City, Missouri	September 2006	December 2006	July 2010
					\$31	\$31
VelociRFTA Bus Rapid Transit	Bus rapid transit	Very Small Starts	Roaring Fork Valley, Colorado	May 2003	December 2008	August 2011
					\$46	\$46
West Seattle Bus Rapid Transit	Bus rapid transit	Very Small Starts	King County, Washington	November 2004	December 2009	September 2011
					\$28	\$28
Wilshire Boulevard Bus-Only Lane	Bus rapid transit	Very Small Starts	Los Angeles, California	August 2007	December 2007	May 2012
					\$32	\$32

Source: GAO analysis of FTA and project sponsor data.

Note: Dollars are rounded to the nearest in million.

^aWe could not determine the date when the locally preferred alternative was selected for this project.

Appendix IV: GAO Contact and Acknowledgments

GAO Contact

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Staff Acknowledgments

In addition to the contact named above, Brandon Haller (Assistant Director), Antoine Clark, Catherine Colwell, Dwayne Curry, Geoffrey Hamilton, Terence Lam, Jason Lee, Karen Richey, Amy Rosewarne, Kelly Rubin, and Matt Voit made key contributions to this report.

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