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16. Abstract

This report documents an investigation into project costs and funding strategies that U.S. states and coalitions of states use to fund intercity passenger rail projects. Four states (California, North Carolina, Pennsylvania, and Virginia) and one multi-state corridor (the Pacific Northwest Corridor in Washington and Oregon) with documented histories of funding intercity passenger rail projects were selected for in-depth review. Factors that were considered in the case studies included: state-level funding sources, project costs, and estimated costs for future projects.

A secondary goal of this research was to develop project cost analysis tools, such as a cost-per-mile index, for use by state rail planners in evaluating proposed intercity passenger rail projects. The research team concluded that the development of universally applicable cost-per-mile indices for intercity rail was infeasible at present due to the great number of variables involved in rail construction and the relatively small sample size of recent, comparable projects. Variables involved include project-specific factors such as terrain type, drainage requirements, regional labor and material costs, signalization and communication upgrade requirements, and the condition/track classification/traffic levels of existing infrastructure. As a result, researchers developed example project cost data and model cost ranges by project type.

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FUNDING STRATEGIES AND PROJECT COSTS FOR STATE-SUPPORTED INTERCITY PASSENGER RAIL: SELECTED CASE STUDIES AND COST DATA

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INTRODUCTION

This research project examines the costs and funding strategies being used by several U.S. states and coalitions of states to fund intercity passenger rail projects. In-depth case studies of four states (California, North Carolina, Pennsylvania, and Virginia) and one multi-state corridor (the Pacific Northwest Corridor in Washington and Oregon) were conducted in order to provide insight into the funding sources and methods as well as the levels of funding that are required to undertake such projects. Each of the state-level programs selected for review have documented histories of funding intercity passenger rail projects, some for over a quarter century, while other states have much more recently become involved. Several of these states' intercity passenger rail programs have also been put forward by the United States Department of Transportation (US DOT) as examples for other states to emulate in its drive to reform the current national passenger rail system. Factors considered during this project include:

- state-level funding sources;
- project costs (actual costs for operational systems and estimated costs for future projects); and
- methods through which state funds are used to deliver these projects (i.e., public-private partnerships, matching of federal funds, pass-through funding to local agencies, etc.).

Chapter 2 discusses each of these factors in greater detail.

A second goal of this research was to gather information on intercity passenger rail project costs which state rail planners could use to make preliminary cost estimates or to evaluate cost estimates contained within third-party proposals for rail projects. Initially, the desired means to accomplish this goal was to develop simple cost analysis tools for projects (e.g., cost-per-mile indices) which could be readily applied across all project types for evaluation and planning. Upon investigation, the research team concluded that the development of universally applicable cost-per-mile indices for intercity rail was infeasible at present due to the great number of variables involved in rail construction and the relatively small sample size of recent,

comparable projects. Variables involved in calculation of such indices would include project-specific factors such as:

- terrain type;
- drainage requirements;
- regional labor and material cost differences;
- signalization needs and communication upgrade requirements;
- physical condition of the infrastructure; and
- initial track classification and operational characteristics (if upgrading an existing right of way or line).

As a result of this determination, and with the agreement of both the research team and the project monitoring committee, this report presents example project cost data and model cost ranges by project type. Chapter 3 discusses these variables and presents example project cost data from the case study programs.

BACKGROUND EXPLANATION OF PRIMARY INTERCITY PASSENGER RAIL PLANNING ISSUES

While many states have begun to be active in planning or financially supporting intercity passenger rail, there are a number of issues related to passenger rail that may not be familiar to many transportation planners. As a result, several underlying issues in the area of state-supported intercity passenger rail must be reviewed prior to examining other states' policy frameworks and funding mechanisms for intercity passenger rail projects. The explanations given below are intended only to provide a backdrop from which to assess the pros and cons of each state's policies and funding sources.

Defining State-Supported Intercity Passenger Rail

This research project examined programs that were both "state-supported" and "intercity" in nature. An understanding of both of these terms sets the framework for understanding the types of projects and programs examined in the Chapter 2 case studies.

State-Supported

For purposes of this report, the research team defined projects as state-supported if they included a strong financial and managerial role on the part of the state Department of

Transportation (DOT) or another closely related state agency. While other partners, such as Amtrak or a private railroad, may also remain heavily involved in funding or administration of the project, the state agency is actively involved and serves a key role in funding, managing, or decision-making on the program or individual projects.

Intercity Passenger Rail

It is very important to make a distinction between typical commuter rail projects and the intercity rail projects which were the focus of this research. The Federal Rail Passenger Service Act (RPSA) of 1970, which governs intercity rail service throughout the U.S., defines intercity rail service as "rail passenger transportation, except commuter rail passenger transportation *(1)*." It defines commuter rail transportation as "short-haul rail passenger transportation in metropolitan and suburban areas usually having reduced fare, multiple-ride, and commuter tickets and morning and evening peak period operation *(1)*."

The research team found these definitions to be instrumental in helping to select programs for study. By ruling out almost all commuter rail projects as "non-intercity" passenger rail, a more defined class of rail service was identified. In selecting programs or projects for the case studies, the following criteria were used. Projects were required to connect two or more cities using conventional Amtrak service (as described further below) or commuter rail-type service over existing freight tracks or rights-of-way. The distinction between the commuter-type service featured here and that in the RPSA definition is that the service connects more than one urban center.

For example, under this criteria, the Trinity Railway Express, which connects Dallas and Fort Worth, is considered a commuter rail system since it serves one urbanized area and is contained within a single Metropolitan Planning Organization (MPO); while the anticipated "commuter rail" between Austin and San Antonio could be considered (in this instance) as an intercity rail project due to the fact that it connects two distinct urbanized areas that are separated from one another by a distance close to 100 miles and each urban area has its own MPO. This is not an "exact" method but one which helped the research team to eliminate many single-city commuter rail projects from consideration while identifying several projects that are instructive to state transportation planners because they connect two or more urban areas.

Future planned projects for construction of high-speed rail (HSR) corridors and/or "higher-speed rail" routes supported by the states were also considered initially; however, the project's requirement to develop cost-per-mile indices later forced planned projects to be excluded in favor of completed (i.e., known cost) projects. In addition, the research team did not include light rail projects as well as other urban mass transit ("heavy rail" or subway) projects connecting two or more suburbs within a single urban area. Such systems are typically administered and funded through a single MPO or by a single urban public transit agency and not at the state level—excluding them from our scope as defined in the previous criterion. (An exception to this single urban area limitation emerged during our case studies when we identified situations in which a state may provide financial aid to a commuter rail system as part of a larger plan to improve track infrastructure for other intercity rail projects. The case study of Virginia discusses this situation in the next chapter.

Amtrak's Role in Intercity and Commuter Rail

In addition to defining the differences between commuter and intercity passenger rail transportation, the RPSA defined the National Rail Passenger Corporation or Amtrak as the only provider of intercity passenger rail service in the U.S. and gave Amtrak the exclusive right to operate over the private freight railroad lines of the U.S.—paying only the incremental costs associated with running their trains. This relieved the private railroad companies of the requirement to operate passenger trains at a loss when Amtrak began operations in 1971. Amtrak's nationwide operations at its start-up were a skeleton intercity passenger rail system using outdated equipment inherited from the private railroad companies' passenger fleets. The intercity routes that were to be continued under Amtrak operations were dictated by federal law and were a marked decrease in service from those routes that had been previously operated by the railroad companies, leaving many states desiring additional routes or increased frequencies of rail passenger service especially between major urban areas. (Amtrak has also subsequently contracted within many urban areas to operate local commuter rail services by providing Amtrak crews and/or maintenance workers. Such operations do not constitute intercity passenger rail service as described below and as such are not the focus of this research).

While the RPSA required Amtrak to operate as a for-profit government corporation, Amtrak has not been able to turn a profit over its 30-plus year history. Instead, Amtrak depends

greatly upon annual appropriations from the federal government to make up the differences between its operating costs and its revenues from farebox recovery, ownership of real estate, ancillary services (e.g. food sales, mail and express package, etc.) and trackage rights fees for the Northeast Corridor between Washington, DC, and Boston, MA, where freight railroads use Amtrak-owned tracks. Although many claim that Amtrak should no longer receive federal support, according to Amtrak, the approximately $30 billion in federal subsidies it has received during its existence, pale in comparison to the $1.89 trillion in federal funds that have flowed to the aviation and highway industries during the same time period (*2*).

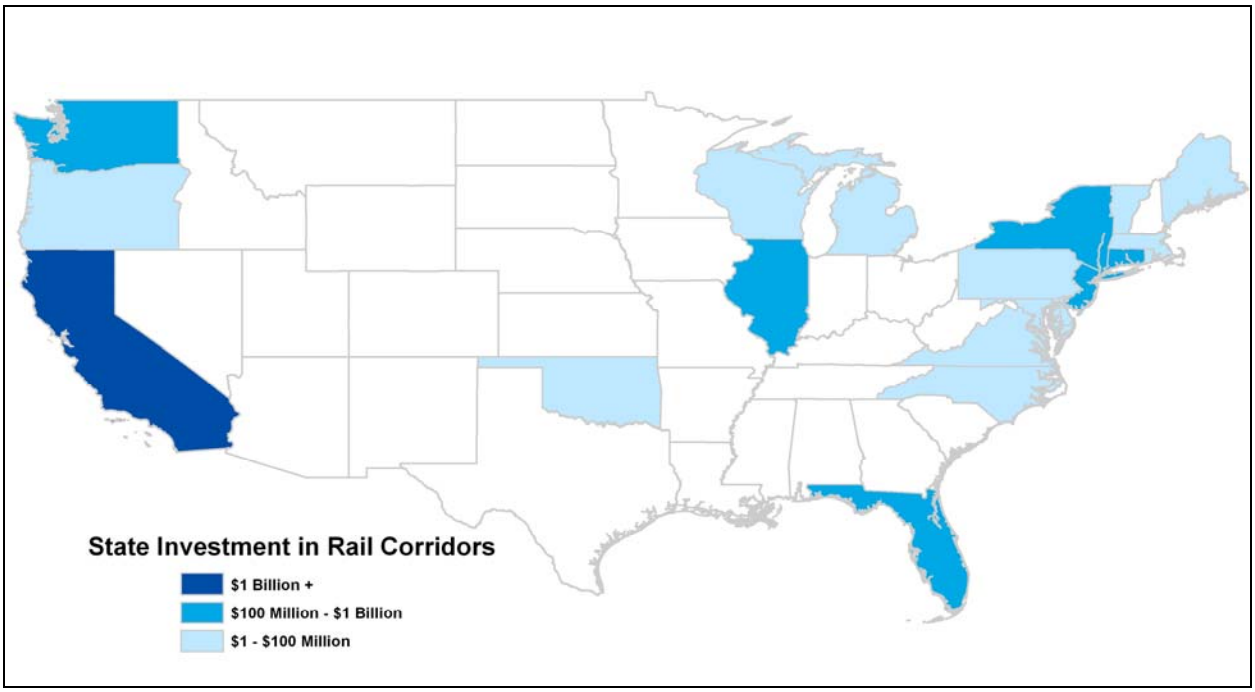
State-Supported Amtrak "403(b) Service"

In order to address the need for rail service over and above Amtrak's base route system, the RPSA enabled states and other government entities to contract with Amtrak to operate additional trains by paying Amtrak the increased costs that added trains required. This provision was in Section 403(b) of the original act leading to the slang term "403(b) service" to describe such operations. Because of Amtrak's exclusive operating rights over the freight railroads, these services often could be operated at a much more reasonable price through partnership with Amtrak than by the state seeking to add its own rail service through construction of additional routes or by contracting with another rail operator.

Figure 1 shows the recent funding history of state-supported corridor routes. An examination of Figure 1 shows that state investment in rail corridors is largely concentrated in areas along the East and West Coasts and the Upper Midwest where population is heavily concentrated along interurban transportation corridors. The RPSA states that Amtrak should "minimize (U.S.) Government subsidies by encouraging State, regional, and local governments and the private sector, separately or in combination, to share the cost of providing rail passenger transportation, including the cost of operating facilities (*3*)."

Each of the case studies in this project involve Amtrak participating with the states to provide improved intercity rail service through either a 403(b)-type or alternatively a "purchase of service" contract which calls for additional trains over existing rail routes. Due to the optional nature of participation in such contracts and the limited federal funding to support passenger rail, many states choose not to invest in improved Amtrak service—instead focusing upon development of improved highway systems. Much of this choice on investment of state

transportation dollars can be attributed to the favorable (80 percent federal-20 percent state and local) funding that the Federal Aid Highway program has provided during the last half of the 20th century and state transportation funding sources that are legally restricted to highway uses only.



Source: FY 2004-2008 Amtrak Strategic Plan, Available at: www.amtrak.com.

Figure 1. Map Showing State Support of Rail Corridors for the Period 1993-2003.

In FY 2003, Amtrak operated 20 state-supported routes in 13 states. The states that contract with Amtrak for additional service are California, Illinois, Maine, Michigan, Missouri, New York, North Carolina, Pennsylvania, Oklahoma, Oregon, Vermont, Washington, and Wisconsin. Total state payments to Amtrak were $126 million in 2002 and expected by Amtrak to increase to $136 million in FY 2003 (*4*). In 2001, the General Accounting Office (GAO) produced a report on Amtrak's state-supported corridor trains that delineated state support funding by route (*5*). Table 1 shows this information.

Table 1. State-Supported Amtrak Routes and Funding Amounts (FY 2001).

Amtrak Route	Sponsoring State(s)	State Support Amount ($ millions)
Adirondack	• New York	2.7
Ann Rutledge/Mules	• Missouri	6.1
Capitols	• California	18.4
Carolinian	• North Carolina	2.7
Cascades	• Oregon • Washington	16.3
Downeaster	• Maine	Service began late FY2001.
Ethan Allen	• Vermont	0.2
Heartland Flyer	• Oklahoma	4.6
Hiawathas	• Illinois • Wisconsin	5.1
Illinois Zephyr	• Illinois	2.8
Illini	• Illinois	2.4
International	• Michigan	3.7
Keystone	• Pennsylvania	2.8
Pacific Surfliner	• California	21.3
Pere Marquette	• Michigan	2.2
Piedmont	• North Carolina	3.3
San Joaquins	• California	19.5
State House	• Illinois • Missouri	3.8
Vermonter	• Vermont	1.5
	Total funding	**119.4**

Source: General Accounting Office, 2001.

Amtrak's FY 2004 Operating and Capital Budgets Executive Summary lists its FY 2004 budget from state and local sources at $131 million which accounts for approximately 7.9 percent of Amtrak's core revenues, which in turn makes up 86.1 percent of Amtrak's overall revenue (6). Based upon these figures, it appears that the Amtrak budget contribution from state-sponsored trains has remained relatively steady at approximately $130 million ± $5 million for the past several years. This makes state-supported rail a relatively small, but important piece of Amtrak's overall revenue at the present time. Amtrak would like to increase the amount of funding that it receives from states in exchange for more service; however, increased service comes at the price of requiring additional costs to Amtrak in terms of providing additional crews and rolling stock to meet the new operational requirements.

State Purchase of Rolling Stock

Several states have approached Amtrak seeking additional 403(b) service only to find out that Amtrak is unable to provide additional service due to limitations in the availability of additional rolling stock (i.e., locomotives and passenger coaches). Shortages of rolling stock throughout the Amtrak system have become a limiting factor in many such cases. These shortages are the result of limited long-term capital funding availability within Amtrak and its uncertain level of federal subsidization each year. In fact, recent money troubles at Amtrak have resulted in deferred maintenance, repair, and rehabilitation of some rolling stock in an effort to improve short-term profitability numbers. The lack of available rolling stock has sometimes necessitated state purchase of additional equipment so that Amtrak can increase its frequency of service. Several states have adopted this method as a means to facilitate the addition of the services they desire while also having tangible assets (e.g., the trainsets) which can be sold or leased to others if the services were to prove unsuccessful or were required to shutdown for other reasons.

State Investment in Freight Rail Infrastructure

Another successful method states use to invest in improving passenger rail service is to make capital investments in the freight rail infrastructure over which most Amtrak trains operate. As an additional benefit, freight rail service may also be enhanced through such capital expenditures, thereby improving the flow of both goods and passengers over the rails. Often in such projects, the freight railroads can be brought in as partners to assist in joint funding. These projects could be capacity improvements such as adding another track, replacing jointed rail with continuous welded rail, or improving the signal system to allow for generally faster rail service or they could be improvements that are focused more directly on improving passenger train speeds such as superelevation or straightening of curves.

Recent Amtrak Reform Efforts

The Amtrak Reform and Accountability Act (ARAA) of 1997 removed Amtrak's exclusive right to operate intercity passenger service but did not change Amtrak's unique right to reduced fees for freight rail access. In spite of the official change allowing other rail operators to enter the market, to date no other operators have begun to operate intercity routes due to the inherent economic obstacles associated with intercity rail operations. During the course of this

project, the Federal Railroad Administration (FRA) released a Federal Register notice announcing funding availability to further study whether Amtrak's current state-supported routes could be put out for "fair competitive bidding by both Amtrak and non-Amtrak operators (7)." The ARAA also required under federal law that Amtrak generate a profit by FY2002; however, the Amtrak Reform Council (ARC), which was established by the ARAA, determined in 2001 that Amtrak's finances were such that it would not be able to achieve this goal. Following this determination, the ARC released a set of recommendations for reforming Amtrak which were later incorporated by the Bush Administration and US DOT in formulating a policy for intercity passenger rail reform. On June 20, 2002, the U.S. Secretary of Transportation, Norman Mineta, on behalf of the Administration espoused the following "five principles" for future intercity passenger rail in the Passenger Rail Investment Reform Act which it submitted to Congress (8). The recommendations are as follows:

- Create a system driven by sound economics where prices and passengers drive service.
- Require that Amtrak transition to a pure operating company where passenger service operations and infrastructure ownership are separated.
- Introduce carefully managed competition to provide higher quality rail services at reasonable prices.
- Establish a long-term partnership between states and the federal government to support intercity passenger service.
- Create an effective public partnership, after a reasonable transition to manage the capital assets of the Northeast Corridor.

These principles have met with resistance from Amtrak management and from many in Congress who have alternate ideas and priorities concerning how to constructively reform the nation's intercity passenger rail system. New management put in place at Amtrak in 2002 has begun to make marked improvement in financial controls and reformed many of the institutional practices of the system's operations, but little progress toward changing the status quo regarding annual funding levels and the future of Amtrak has been made. Congress has failed to act upon any of the ARC's recommendations or put in place any reform elements in line with the five principles outlined above other than to give US DOT oversight over Amtrak's spending of its annual appropriation from 2003 onward (9).

In the first and fourth principles listed above, the federal government states that it is looking for additional financial commitment from states if they want to maintain or add additional passenger rail service. The model outlined by the US DOT is to transition to a system under which the federal government would fund capital improvements to the rail system in a partnership with the states similar to the Federal Aid highway system financing process; however, to date, the Administration has suggested a 50-50 federal-state funding split as opposed to the 80-20 federal-state funding split that exists for highway funding. Additionally, the proposed act would leave funding of intercity passenger rail operating deficits up to the states, focusing all federal funds toward capital improvements only. State government leaders who are charged with determining how to fund and implement intercity passenger rail transportation improvements in the future have expressed concerns over this plan.

In May 2004 the American Association of Highway and Transportation Officials (AASHTO) released policy document R12, *Intercity Passenger Rail: Principles and Objectives* which reiterates many of these concerns. This document, by AASHTO's Standing Committee on Rail Transportation (SCORT), outlines the desires of the SCORT membership (predominantly state DOT officials responsible for rail transportation) regarding future intercity passenger rail reform legislation. AASHTO estimates that the investment needs for intercity passenger rail corridors will be approximately $60 billion over the next 20-year period with $17 billion needed in the first six years (*10*). AASHTO's principles state that future reforms should accomplish the following:

- Ensure the level of federal responsibility necessary for sustainable financing and system integrity, quality and accountability.
- Establish a sound foundation for passenger rail service partnerships between the states and the federal government.
- Provide a stable and fiscally responsible system for funding rail passenger operating costs.
- Create a dedicated, sustainable source of funding for intercity rail passenger infrastructure improvements, to maintain, in partnership with the freight railroads and other stakeholders, a world-class rail transportation network fueling economic growth and development, and

- Incorporate sufficient flexibilities to enable the states to set their spending priorities and implementation timing based on their own unique circumstances, consistent with national rail transportation policy.

These principles show that the states are willing to take an expanded role in providing support for intercity passenger rail services if they are able to partner successfully with both the federal government and the private sector to meet operational and infrastructure challenges.

CHAPTER 2:
DETAILED CASE STUDIES

INTRODUCTION

This chapter discusses the five major case studies undertaken as part of this project. The initial part of the chapter describes the case study selection process and how the research team and the Project Monitoring Committee (PMC) came to agreement upon which five case studies to include. After discussing the selection process, case studies for four states (California, North Carolina, Pennsylvania, and Virginia) and one multi-state corridor (the Pacific Northwest Rail Corridor in Washington and Oregon) are presented.

It is important to observe that there is great variability in how each state or multi-state coalition handles several important factors. Each case study describes:

- the agency that is responsible for rail planning;
- the state(s) current state-supported intercity rail system;
- the state's rail funding history;
- the state-level funding sources and techniques that fund the state-supported routes; and
- future plans and potential funding strategies that are being considered.

CASE STUDY SELECTION

Selection Criteria

During the early months of this project, the research team conducted an initial assessment of all 50 states to determine what state-supported, intercity passenger rail projects to consider. As part of the literature review, an assessment of these projects and the level of financial information available on each project were considered. Based upon these results, several criteria were used to rank and select the projects that were then recommended to the TxDOT Project Monitoring Committee for further in-depth study. The factors involved in case study selection included:

- **Defining "State-Supported" Programs:** Projects were defined as including a strong financial and managerial role on the part of the state DOT or another closely

related state agency. While other partners, such as Amtrak or a private railroad, may also be heavily involved in funding or administration of the project, the state agency is the primary catalyst for action and decision-making on the project.

- **Defining the Scope of "Intercity Passenger Rail":** The project was required to connect two or more cities using either conventional Amtrak services or commuter rail-type services over existing freight tracks or rights-of-way. Future plans for high-speed rail and/or "higher-speed rail" routes supported by the states were also considered. Light rail projects as well as "heavy rail" and subway projects connecting two or more suburbs within a single urban area were not included. Such systems are typically administered and funded through an urban public transit agency and not at the state level—excluding them from our scope as defined in the previous criterion.
- **Selection of Operational vs. Planned Projects:** As a result of the need to develop cost indices in subsequent tasks of the project, the research team selected built and operational projects with known/documented costs rather than using planned projects and projected/estimated costs. During the literature review, a research study printed in the Journal of the American Planning Association was found that stated that projected costs for rail projects are typically underestimated by an average of 44.7 percent and highway projects were underestimated by 20.4 percent (*11*). While this was a single research study, its results suggest that the uncertainty associated with using projected rather than actual numbers should be avoided when anticipating later development of cost indices. Because of this, the research team selected five projects that were in various stages of operation for more in-depth study rather than passenger rail projects that were limited to being in their planning stages.
- **Relevance of Project Type to Currently Anticipated TxDOT Planning Needs:** The research team's recommendations also attempted to take into account the current and potential applicability of each project type to TxDOT's perceived planning needs in the next few years. This involved an assessment of currently planned intercity passenger rail projects in which TxDOT is involved as well as the types of projects that the research team expected to develop in that time-frame given TxDOT's present authority in rail projects.

As a result of this analysis, the Texas Transportation Institute (TTI) team sought to include the following elements in the five selected programs/projects:

- *Development of intercity commuter rail on existing freight tracks —*
  The project has similar characteristics to the current Austin-San Antonio Commuter Rail project.
- *Multi-state cooperation on development of higher-speed rail corridors —*
  The program has similar characteristics to current TxDOT development efforts with Oklahoma and Arkansas for the South Central Corridor and the Southern Rapid Rail Transit Commission states (Alabama, Louisiana, and Mississippi) for the Gulf Coast Corridor.
- *State funding of additional Amtrak routes and/or frequencies —*
  As discussed in Chapter 1, several legislative initiatives call for a greater state role in funding current Amtrak routes resulting in the need to analyze states that currently perform this role through the Amtrak 403(b) or similar programs.
- *Operation of intercity passenger rail over state-owned infrastructure —*
  Recent legislative changes have allowed TxDOT broader authority to own rail infrastructure making intercity projects that operate on state-owned tracks of particular interest.
- *State purchase of rolling stock —*
  Although TxDOT is prohibited under current state law from purchasing rail rolling stock, this method has proven popular as a method to increase frequency of service by providing equipment that Amtrak can use to operate intercity passenger rail service.
- *Data availability —*
  The TTI team based its selection of projects on those that seemed to have readily available financial statistics for further analysis in subsequent project tasks.

Case Study Recommendations

In compliance with the research project proposal, TTI's recommendations were to be discussed at a joint meeting of the project team and the PMC in December 2003. Based upon the criteria and the considerations listed above, TTI developed a ranked listing of state-supported

intercity rail programs which it suggested should be carried forward for further study. The research team recommended that the first five be selected for case studies. Based upon the request of the PMC, TTI's logic for selecting and ranking of the projects was also included. The following ranked list of recommendations was presented to the TxDOT PMC for review in November 2003:

1. **California DOT Passenger Rail Programs –**
   multiple routes of improved, higher-speed rail corridors connecting the major urban areas of the state, in operation for several years, high data availability, planning for further improvements and upgrades.
2. **North Carolina DOT Passenger Rail Programs –**
   state-owned rail infrastructure, Amtrak 403(b) passenger services, state-funded infrastructure projects to increase average speed of passenger rail services, strong state DOT role in planning and operations.
3. **Pacific Northwest Rail Corridor (Oregon and Washington State) –**
   multi-state corridor to improve rail infrastructure allowing higher-speed passenger rail, partnership between freight railroad and multiple state DOTs, state purchase of rolling stock.
4. **Pennsylvania DOT Rail Programs (Keystone Corridor) –**
   state partnership with Amtrak to improve existing rail line and service frequency, state operational and capital support to existing line through Amtrak 403(b) program, infrastructure grants/projects.
5. **Virginia Department of Rail and Public Transportation (DRPT) Rail Programs –**
   state level funding partnership with commuter rail projects such as Virginia Railway Express (VRE), planning for expansion of rail routes as part of multi-state HSR corridor (the Southeast High-Speed Rail Corridor or SEHSR), multiple Amtrak routes through state but not currently state supported (similar to Texas' current situation).

In addition to those top five programs, TTI presented nine alternate operational state-supported programs for consideration to the PMC as options for further study should they disagree with TTI's rankings or selection process. These included:

6. **New York State (Empire Corridor) –**
   similar to Pennsylvania Keystone Corridor but also includes state purchase and/or retrofit of Amtrak equipment.
7. **Maryland –**
   state-level transit administration operates commuter trains into both Washington, DC and Baltimore areas from outlying suburbs.
8. **Connecticut –**
   state-supported commuter rail that is extension to existing New York City Metropolitan Transit Authority (MTA) route.
9. **Delaware –**
   state-level transit administration operates commuter trains to the Philadelphia area from Delaware cities.
10. **Maine –**
    recently begun Downeaster service, Amtrak 403(b)-type extension of service north from Boston area to serve area that had not had rail service for many years.
11. **Michigan –**
    state support of Amtrak routes through 403(b) program.
12. **New Jersey –**
    state transit agency that receives funds from state DOT, operates commuter routes by contract to New York City MTA.
13. **Wisconsin –**
    state support through Amtrak 403(b) program routes.
14. **Alaska Railroad –**
    combined freight and seasonal passenger rail service, that is dissimilar to Texas applications due to the isolated, rural nature of most of its service area.

Additionally, several planned projects that could be considered, should TxDOT choose to disregard TTI's recommendation regarding non-selection of planned projects with only projected costs, were presented. These included several multi-state corridor initiatives such as the Midwest Regional Rail Initiative (MWRRI), the Southeast High-Speed Rail) Corridor, and the

Southern Rapid Rail Transit Commission (SRRTC) state compact as well as numerous single-state commuter rail and Amtrak support initiatives.

The TTI research team met with the TxDOT PMC in Austin during December 2003 to discuss TTI's recommendations for case studies and to discuss the PMC's final decision regarding which five states would be advanced. Although there was some concern expressed by members of the PMC that the selected programs overly represented states with long histories of financial support for intercity passenger rail while Texas is just beginning to consider such investments, the PMC ultimately made the decision to accept TTI's recommended rankings and California, Pennsylvania, North Carolina, Virginia, and the Pacific Northwest Corridor were approved. TTI then began to collect more data on each of those five programs. A case study of each of the programs follows.

CALIFORNIA

State Agency with Planning Authority

The Division of Rail within the California Department of Transportation (Caltrans) coordinates the state-supported intercity passenger rail program in the state of California. Caltrans is required by California state law to update its 10-year State Rail Plan for both passenger and freight rail every two years. Division of Rail personnel have developed an official vision statement for intercity rail in the state and several goals to achieve that vision which are directly related to the projects included in the State Rail Plan (*12*, p. ES-2). The vision and goals included in the 2003-2004 to 2013-2014 plans are the following:

Vision

- Provide relief to highway and airway congestion.
- Provide a rail transportation alternative to other transportation modes.
- Improve air quality, conserve fuel, and contribute to efficient and environmentally superior land use.

Goals

- Increase the intercity rail mode share by 2.5 to 3 times.
- Cut annual vehicle miles traveled in the state by 493 million miles (a reduction of 228 million annual vehicle miles traveled compared with 2002).

- Continue to cause a net annual decrease in pollution from hydrocarbons and carbon monoxide in the state.
- Continue keeping emissions below state and federal maximum allowable levels for all pollutants and pursuing funding for research and development into cleaner locomotive engines.
- Save the state a net of at least 10 million gallons of gasoline annually.
- Continue to support local and regional efforts to promote transit-oriented development.

These statements lay the groundwork for understanding the level and commitment of the State of California to providing intercity rail service to its citizens as a viable alternative for statewide transportation. This level of commitment did not occur quickly; instead it developed over time as the state incrementally invested in intercity rail projects and saw the benefits that could be achieved.

Currently Supported Operations

Caltrans supports intercity rail operations in three corridors. This support includes operations funding and capital improvement projects. The operating support payments from California made up 55 percent of all state payments of that type to Amtrak in 2002 and the routes provided 15 percent of Amtrak's total ridership nationwide and 46 percent of all corridor ridership outside the Northeast Corridor (*12*, p. 50). These routes are the Pacific Surfliner route, the San Joaquin route, and the Capitol Corridor route.

As Figure 2 shows, the Pacific Surfliner route serves the southern California coast between San Diego and San Luis Obispo, north of the Los Angeles Metro area. The San Joaquin route connects the Bay Area (Oakland) with the state capital area in Sacramento via Stockton and extends southward through the San Joaquin Valley to Bakersfield with connecting bus service on to Los Angeles. The Capitol Corridor connects San Jose and Oakland to the Sacramento area and on to Roseville and Auburn in the east.

Source: Caltrans Division of Rail, California State Rail Plan 2003-04 to 2013-14.

Figure 2. Basic Amtrak and State-Supported Intercity Rail Routes in California.

In addition to sponsoring these rail routes, the state also subsidizes an extensive feeder bus route system that is also shown in Figure 2. Caltrans pays any net operating losses to the contractors for the feeder buses serving its state-supported routes and views them as a means of building ridership for future service expansion (*12*, p. 47). Additionally, the state provides significant financial marketing support for each of its supported routes, totaling approximately $5 million each year. The state's marketing effort is supplemented by Amtrak with another $1.2 million (2002-2003 figure) which is divided among the routes. These funds cover mainly media advertising, but approximately $1 million annually goes to public relations, rail safety information campaigns, passenger information, and market research (*12*, p. 64).

State Funding History

Caltrans first became involved in state-level funding of intercity passenger rail projects in 1976 when it funded an additional daily train frequency between Los Angeles and San Diego through the Amtrak 403(b) program (*12*, p. 47). Amtrak had been running its San Diegan three times daily between the cities since it had taken over the national passenger operations in 1971, but the state desired the operation of an additional daily train. In subsequent years, the state also began providing operational support for the San Joaquin trains between Oakland/Sacramento and Bakersfield (where bus service carries passengers on to Los Angeles) and the Capitol Corridor trains which provide regional service in the Sacramento-Oakland-San Jose area. In 1998, Caltrans transferred management of the Capitol Corridor to the Capitol Corridor Joint Powers Authority (CCJPA) which provides more local control of operations on that route. Caltrans apportions a percentage of its funding on to CCJPA which is dependent upon these funds for all of its support outside those generated by the route itself.

In addition to subsidizing train operations, the state has provided over $1.75 billion in state funds of the total of $2.73 billion spent (or approximately 63 percent) from all sources in the state for intercity passenger rail capital projects (*12*, p. 36). This capital investment has included both rail infrastructure projects and the state purchase of additional rolling stock (locomotives and coaches) to enable more frequent rail service on the three state-supported routes. To date, California has purchased 15 EMD F-59 locomotives and 88 "California Car" coaches for use on its routes (*12*, p. 34). In combination with the 40 new passenger cars and 14 locomotives for the Pacific Surfliner recently purchased by Amtrak (*12*, p. ES-5), the State-

Amtrak partnership has been able to increase daily train frequencies in order to become more competitive with automobile travel along the routes that are served. Table 2 gives a history of California funding sources for intercity passenger rail.

Table 2. California Intercity Rail Capital Funding Sources by Year 1976-2007 (Projected) (*13*).

Funding Sources By Year							
Fiscal Year	**State**	**Local**	**Federal**	**Amtrak**	**Railroad**	**Other**	**Total**
1976-77	1,000,000			50,000			1,050,000
1977-78	113,904			113,904			227,808
1978-79							-
1979-80	138,228						138,228
1980-81	2,770,900	1,399,200					4,170,100
1981-82	5,573,118	6,751,491				1,250,000	13,574,609
1982-83	1,397,207			24,770,000			26,167,207
1983-84	5,902,490	2,507,136		148,579			8,558,205
1984-85	5,481,875	500,246		5,231,875			11,213,996
1985-86	17,736,189	276,063					18,012,252
1986-87	1,440,961	74,000	2,287,100			40,000	3,842,061
1987-88	7,720,700	4,144,000	1,380,000	954,689	805,000		15,004,389
1988-89	17,325,355	9,480,962	1,390,000	1,100,000	1,551,111		30,847,428
1989-90	29,412,162	12,937,303		1,500,000	2,017,700		45,867,165
1990-91	32,847,549	7,969,835		1,535,000		77,000	42,429,384
1991-92	157,894,094	25,213,119	2,000,000			25,000	185,132,213
1992-93	161,364,946	20,068,780	7,078,467	80,188,737		1,500,000	270,200,930
1993-94	174,949,087	26,645,925	10,487,420	12,507,675		940,508	225,530,615
1994-95	65,276,291	6,886,418	15,598,635	935,930	111,111	905,291	89,713,676
1995-96	55,032,690	5,738,469	3,014,373	25,325,883		9,767,111	98,878,526
1996-97	82,296,320	25,509,234	58,270,999	54,265,000	5,245,896		225,587,449
1997-98	30,193,295	6,823,035	9,269,813	132,481,768	27,467,456	5,304,000	211,539,367
1998-99	104,990,368	29,319,807	24,076,464	24,646,092	24,297,823	330,156	207,660,710
1999-00	92,404,946	14,011,426	32,639,833	17,534,598	21,087,697	331,592	178,010,092
2000-01	156,432,113	17,522,940	31,183,115	2,005,056	10,367,419	25,000	217,535,643
2001-02	283,635,497	12,489,833	12,721,932	11,000	1,000,000	15,000	309,873,262
2002-03	73,796,741	4,430,587	11,026,060	5,445,000	506,623		95,205,011
2003-04	95,416,950	8,283,949	2,884,839				106,585,738
2004-05	11,497,875		4,476,125				15,974,000
2005-06	48,069,375		995,625				49,065,000
2006-07	25,049,375		995,625				26,045,000
Grand Total	**1,747,160,601**	**248,983,758**	**231,776,425**	**390,750,786**	**94,457,836**	**20,510,658**	**2,733,640,064**

State-Level Funding Sources

Funding to support intercity rail in California comes from a variety of sources. Currently, the State of California and Amtrak share operational costs for the three state-supported routes, while the state is the main funding source for capital improvements directly related to intercity rail services. Additional capital funding support for rail projects is received from many sources including local governments which may pay for station improvements and the railroad companies who may also benefit from rail infrastructure projects (*12*, p. 19). California has also used federal grants and loans for rail capital improvements.

As stated previously, since California began supporting intercity rail in 1976, approximately 63 percent of the total capital investments in intercity rail projects in the state have been state-funded (*12*, p. 36). Of the state-level sources described below, the Public Transportation Account is the only one used for operational support while the others are used for a variety of intercity rail capital investment purposes. The California State Rail Plan outlines the funding sources available to Caltrans for intercity passenger rail projects. Each funding source is discussed below (*12*).

Public Transportation Account (PTA)

The PTA is the only source for intercity operating funds, but it is also a potential source for capital projects. In the 2001-2002 budget, the PTA provided $91 million in track improvement funding for the three routes supported by the state. The PTA has historically been funded by receiving 4.75 percent of the state's 7.0 percent tax on diesel fuel. In 1989, Proposition 111 was enacted which also allocated 4.75 percent of the 7.0 percent state sales tax on nine cents of the state 18-cent excise tax on gasoline sales (*12*, p. 29). This effectively means that the PTA receives approximately 0.3325 cent for every gallon of diesel and 0.1663 cent for every gallon of gasoline sold in California.

State Highway Account (SHA)

The SHA predominantly goes to support California's state highway system; however, a portion of the account has been set aside for rail projects that appear in the Statewide Transportation Improvement Program (STIP) documents approved by MPOs and the state. Between 1996 and 2002, the STIP program provided $486.6 million for intercity rail projects of which $321.1 million has been allocated as of 2004 (*12*, p. 30). This funding resulted as a combination of projects that appeared in the Regional Transportation Improvement Plans (RTIP) and a statewide Interregional Transportation Improvement Program (ITIP) which is programmed at the state level for projects that would benefit transportation needs through connecting two or more regions of the state. As a result of the state's current budget concerns, no new intercity rail or highway projects have been funded through the STIP process since January 2003. Instead, they remain on the pending projects list (*12*, p. 31).

Traffic Congestion Relief Fund (TCRF)

This funding source became available for intercity rail purposes following passage of a measure in 2000 by the California Legislature which established a detailed Traffic Congestion Relief Program (TCRP) that is funded from the TCRF. The TCRP included $206.5 million in specified capital projects for intercity rail. As of the time that the State Rail Plan was written, approximately $40.9 million of this funding had been allocated; however, California's recent state budget crisis had caused the governor's most recent budget to call for repeal of the designation of these funds—thereby calling into question whether these funds would remain available for rail projects. The TCRP's passage also transferred some gasoline tax revenue that had been going into the state's general fund directly into transportation improvements; however, the transfer of funds is delayed due to the state's budget crisis. Subsequently, Proposition 42 was passed in 2002 which made the transfer permanent beginning in the 2008-2009 budget cycle and stated that 20 percent of these funds must go to the PTA (*12*, p. 29).

State Bond Funds

The public approved two very substantial state bond proposals in 1990 which have provided program stability. The Passenger Rail and Clean Air Bond Act (Proposition 108) contained over $1 billion in rail transportation bonds of which $225 million was designated for intercity rail capital projects. The second bond act passed in 1990 was the Clean Air and Transportation Improvement Act of 1990 (Proposition 116) that included a one-time source of funding for rail and transit capital projects of $1.99 billion of which $382 million was specifically designated for intercity rail. According to the state's rail plan, by 2004 most of the funds from both of these bond programs had been allocated.

State General Funds

In addition to long-term bonding programs, Caltrans has also been able to benefit from several "one-time" appropriations from the state's general fund. Recent examples of this type of funding are evidenced by the appropriation of $17.5 million in the 1999-2000 budget and $50 million in the 2000-2001 budget by the California Assembly for intercity rail projects. In the latter case, $30 million was set aside for rolling stock purchase while $20 million was directed to track improvements along the San Joaquin route (*12*, p. 35). As noted above, the

state's current financial crisis has resulted in no such appropriations in the state's most recent budgets.

Local Funds

Local funds have been used to offset expenditures of state funds by using them to purchase or construct support facilities that cannot be as easily funded by existing state or federal level funding programs. For example, local STIP funding controlled by an MPO or other local funding sources at the city level may be used to construct or enhance stations that local government entities own. Additionally, grade crossing signal improvements and track improvements related to commuter rail projects that are funded at the local level can also benefit intercity rail operations. This has been especially true on California's Pacific Surfliner route where the Metrolink commuter rail in the Los Angeles area and the Coaster commuter rail in the San Diego area have invested for their own operations but the infrastructure upgrades have also facilitated better state-supported intercity rail operations (*12*, p. 32).

Federal Funds

Although they are not actually state level funds, a few federal level funding sources are passed along to the states which allocate them to specific public transportation projects. In California, funding from Federal Transit Administration (FTA) Section 5307 and Section 5309 funds have been used to assist in station projects that benefit intercity rail (*12*, p. 32). These funds are most often designated to local entities for specific projects in their project planning documents.

Amtrak Funds

As stated in Chapter 1, it is the responsibility of Amtrak to operate a national system of intercity passenger rail service. In California, Amtrak and the state have partnered to bring increased frequencies and improved service along the state-sponsored routes to augment the standard national system routes operated by Amtrak in the state. Amtrak's main funding assistance comes in the form of capital improvements to maintenance facilities and through the purchase of rolling stock. Between 1976 and 2003, Amtrak funded $390.8 million in capital improvements with approximately $299 million being rolling stock (*12*, p. 36).

In 2001, Amtrak published a 20-year plan for improving its rail service in California which includes a strategic plan for specific projects at several different timeframes. Caltrans agrees with Amtrak's near term (five-year) plans which call for Amtrak to spend $36.2 million for maintenance and track infrastructure entirely in the state and another $153.5 million on multi-state projects that will impact California. The largest portion of this latter funding (approximately $131.4 million) will go toward overhauling existing rolling stock equipment (*12*, p. 33). (It is important to remain mindful that these planned expenditures of Amtrak funds to support its intercity programs within California depend upon the annual funding levels that the U.S. Congress approves and therefore these expenditures will likely be reduced or delayed if annual funding levels fall short of those planned by Amtrak.)

Railroad Funds

Funding from the private freight railroad companies has also been used to make improvements to the routes which are state-supported. Each route travels largely over rail lines either owned by or operated over by private rail firms. Often when additional projects are undertaken which either add freight rail capacity or improve rail safety the state will ask the railroad company to participate financially in supporting the project since it will also benefit their operations. Between 1976 and 2003, the freight railroads contributed approximately $94.3 million to the total of $2.7 billion expended on the state's current intercity routes (*12*, p. 36).

Table 3 shows the state funding sources by year for California's Intercity Rail Capital Program.

Table 3. California State Funding Sources by Year (*13*).

STATE FUNDING SOURCES BY YEAR								
Fiscal Year	**PTA**	**SHA**	**Bond 108**	**Bond 116**	**General Fund**	**TCRF**	**Other**	**Total**
1976-77	1,000,000							1,000,000
1977-78	113,904							113,904
1978-79								-
1979-80	138,228							138,228
1980-81	2,770,900							2,770,900
1981-82	5,573,118							5,573,118
1982-83	1,397,207							1,397,207
1983-84	5,902,490							5,902,490
1984-85	5,481,875							5,481,875
1985-86	443,454						17,292,735	17,736,189
1986-87	1,440,961							1,440,961
1987-88	5,470,000						2,250,700	7,720,700
1988-89	8,399,477	4,959,781					3,966,097	17,325,355
1989-90	28,220,753	783,409					408,000	29,412,162
1990-91	16,587,294	2,080,000	14,180,255					32,847,549
1991-92	6,262,261	5,881,041	63,295,027	82,433,416			22,349	157,894,094
1992-93	8,665,301	9,302,467	48,764,966	94,243,752			388,460	161,364,946
1993-94	11,563,077	1,775,000	84,409,615	76,901,395			300,000	174,949,087
1994-95	9,890,668	1,720,801		53,624,822			40,000	65,276,291
1995-96	4,154,420	22,572,930		28,213,889			91,451	55,032,690
1996-97	4,626,705	43,067,489	6,663,000	27,939,126				82,296,320
1997-98	12,938,729	7,380,209		9,580,357			294,000	30,193,295
1998-99	1,822,276	61,291,389		41,876,703				104,990,368
1999-00	1,026,101	57,087,553	669,636	15,968,093	17,500,000		153,563	92,404,946
2000-01	6,883,273	76,897,080		8,446,760	30,000,000	32,605,000	1,600,000	156,432,113
2001-02	96,844,997	30,341,500		1,480,000		154,969,000		283,635,497
2002-03	6,112,565	45,941,000		15,618,176		525,000	5,600,000	73,796,741
2003-04	286,950	70,874,000		9,370,000		14,886,000		95,416,950
2004-05		7,982,875				3,515,000		11,497,875
2005-06		48,069,375						48,069,375
2006-07		25,049,375						25,049,375
Grand Total	**254,016,984**	**523,057,274**	**217,982,499**	**465,696,489**	**47,500,000**	**206,500,000**	**32,407,355**	**1,747,160,601**

Future Plans/Funding

The most current California State Rail Plan outlines plans to add five additional state-supported intercity passenger rail routes into service before 2014 (*12*, p. ES 12). These routes include:

- San Francisco to San Luis Obispo (and Los Angeles) via the Coast Route;
- Sacramento to Reno, Nevada;
- San Francisco to Monterey;
- Los Angeles to Coachella Valley (Palm Springs area); and
- Sacramento to Redding.

The California State Rail Plan includes two estimates (unconstrained and constrained) of needed capital funding for the next 10-year period. The unconstrained funding needs estimate

exceeded $3.7 billion considering only support for the existing routes plus the additional San Francisco to Los Angeles Coast Route and the San Francisco to Monterey routes. The constrained estimate of available funding for the same period was made at $595 million. This estimate assumed that $60 million annually would be available as STIP projects, although in recent years annual STIP funding has often exceeded this amount. Assuming that these two projections are correct, a difference of over $3.1 billion dollars between the constrained and unconstrained estimates would need to be met from another source. The state rail plan suggests that federal funds would need to be used to meet this need (*12*, p. 38). At present, funds for intercity rail projects are not available at the federal level although recent legislation has attempted to develop a federal funding source for intercity passenger rail through either bonding or tax incentives.

In addition to the conventional intercity rail projects discussed here, the state is also considering the implementation of a statewide high-speed rail system, but a public referendum on this system was recently delayed until 2006 due to the state's financial crisis. Assuming the public approves of the system, construction is now expected to begin in 2008. Other governmental agencies are studying magnetic levitation trains in the Los Angeles area between the airport and the downtown Union Station and another between Anaheim and Las Vegas, Nevada (*12*, p. ES 11).

PENNSYLVANIA

State Agency with Planning Authority

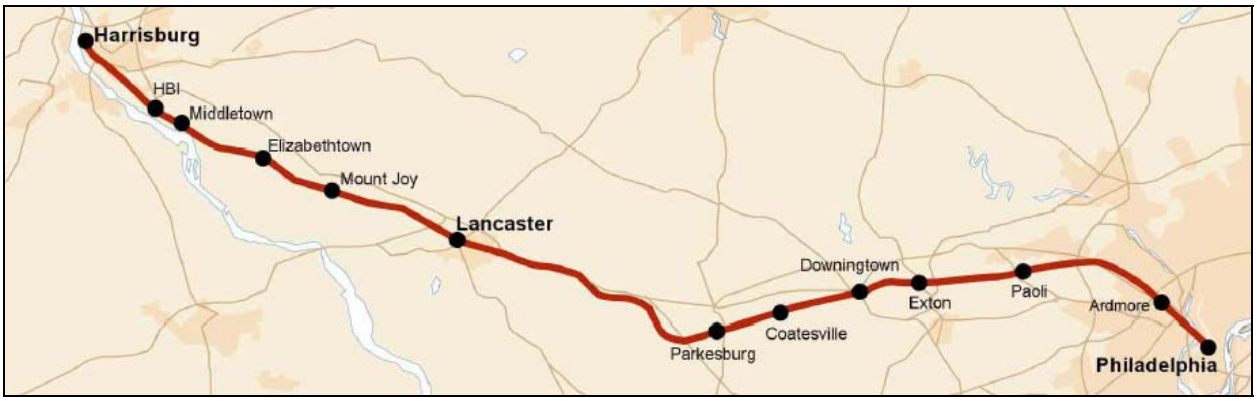
The state-supported intercity passenger rail program in the Commonwealth of Pennsylvania is planned and funded through the Public Transportation Division of the Pennsylvania Department of Transportation (PennDOT). Pennsylvania recently undertook several studies to determine the future direction of its passenger rail efforts. These studies include the *Pennsylvania Statewide Passenger Rail Needs Assessment* which was completed in 2001. This study identified several potential intercity passenger rail corridors throughout the state and discussed the infrastructure and funding needs of each one as well as laying out the necessary future policy framework to improve the state's current intercity passenger rail system (*14*).

Currently Supported Operations

At present, the only state-supported intercity rail route in Pennsylvania is over the Amtrak-owned corridor between Philadelphia and Harrisburg, the state's capital. The route is referred to as the Keystone Corridor. According to the statewide passenger report, "Pennsylvania's objective is to upgrade existing service along this line so that it is a model for intercity passenger rail service. PennDOT, in partnership with Amtrak, has made a commitment to invest in this line to enable it to be a showpiece of quality intercity passenger rail service (*14*, Corridor profile, p. 5)."

The Commonwealth of Pennsylvania sponsors additional frequencies of trains between the two major cities by Amtrak which also operates longer distance trains extending beyond the Keystone Corridor segment. The state has sponsored trains on the Keystone Corridor since 1971 when Amtrak was first formed, originally through a 403(b) agreement and now through a "purchase of service" agreement with Amtrak, covering the operational costs for additional frequencies each day. Currently eight local round trips and two daily cross-state trains traverse the corridor each day. At the state's current funding levels, it supports 44 of 118 weekly trains over the corridor, or approximately 37 percent of Amtrak's total operations on this segment (*15*, p. 49). The line, which roughly parallels the Pennsylvania Turnpike (I-76) and U.S. Route 30 between the two major end-point cities (*16*, p. 68), serves Lancaster County, a major tourism center, and nine other intermediate cities along its 104-mile corridor (*17*, p. A-11). The Southeast Pennsylvania Transportation Authority (SEPTA) also operates approximately 100 commuter trains per day (*14*) in the corridor from Philadelphia westward to just past Downingtown (*18*). Figure 3 shows a map of the Keystone Corridor.

A unique feature of this case study route is Amtrak's ownership of the infrastructure along this corridor. Amtrak has owned the rail infrastructure and right-of-way since 1976 following the bankruptcy and subsequent takeover of the Pennsylvania Railroad and other northeastern railroads in the mid-1970s by the federal government. In Philadelphia, the line connects with Amtrak's Northeast Corridor (NEC) which is the most heavily used passenger line in the U.S. The physical condition of the infrastructure on the Keystone Corridor has



Source: US DOT-FRA.

Figure 3. Keystone Corridor (*19*).

deteriorated greatly over the past few decades limiting track speeds and necessitating significant investment to bring the line up to a "state of good repair" (*19*, p. ES-4). The line has four tracks between Philadelphia and Paoli, two to three tracks between Paoli and Parkesburg, and is double-tracked from Parkesburg to Harrisburg. Approximately half (45 percent) of the corridor's track is jointed rail, limiting speed at many locations to a maximum of 70 miles per hour, and the remainder is capable of speeds up to 90 miles per hour (*19*, p. 2-2). A recent joint state and Amtrak effort to fund such efforts is discussed in the section on state funding below.

State Funding History

The Commonwealth of Pennsylvania has been involved in supporting Amtrak operations in this corridor since it first took over operations of passenger trains from the freight railroads in 1971. As stated above, Amtrak's ownership of the infrastructure began in 1976. Several funding sources have been used to provide both operations and capital funding for intercity rail projects since that time. Funds for both intercity rail operations support and infrastructure improvements in Pennsylvania come through the state's annual budget appropriations process which sets aside funding amounts which are then allocated by the Governor based upon recommendations from executive agencies such as PennDOT. For example, in October 2003, Governor Rendell awarded Amtrak a $3 million state grant as part of a statewide allocation of $125 million in public transportation improvement funds (*20*).

State-Level Funding Sources

Operating Funds

According to a recent PennDOT annual report on its intercity rail program, the state's financial commitments to support additional Amtrak operations have increased over time from several hundred thousand dollars per year in 1971 to almost $5.3 million per year in FY 2002-2003 (*4*, p. 49). The previous year's (FY 2001-2002) operating subsidy was $4.5 million dollars, showing an increase of approximately $800,000 in one year (4, p. 52). Today, several of Amtrak's daily trains passing over the corridor continue on to New York City after passing through Philadelphia; however, state financial support is limited only to the Harrisburg to Philadelphia portion of the route (*15*, p. 49).

Federal Grade Crossing Closure/Hazard Elimination

In addition to supporting Amtrak operations in the corridor, the Commonwealth has also worked with Amtrak to eliminate grade crossings that might interfere with higher-speed service over the line. The Keystone Corridor has relatively few remaining at-grade crossings with only three public, three private, and one pedestrian crossing on the route. In July 1999, the state received $500,000 from the FRA high-speed corridor hazard elimination [1103(c)] funds to design a grade separation and a bypass road that would eliminate the last three public crossings (*19*, p. ES-4).

Federal Transit Administration Funding

Each year, the state receives $7.5 million from the Federal Transit Administration for track repair and maintenance. The state also allocates FTA Section 5307 and Section 5309 Public Transportation funding to provide matching funds to other grants (*14*, p. 14).

State-Amtrak Funding Agreement

In July 2004, Amtrak and the Commonwealth of Pennsylvania completed and signed an agreement to jointly fund on a 50-50 basis a program of projects worth $145.5 million to upgrade the infrastructure along the Keystone Corridor. The agreement was originally to go into effect in 2000 for $140 million; however, Amtrak's financial difficulties over the past few years delayed

implementation and resulted in the parties rewriting the contract for $145.5 million in total projects. The initial work will consist of:

- replacing approximately 85 miles of wooden ties with concrete ties,
- replacing 30 miles of jointed rail with continuously welded rail,
- renewal of two interlockings,
- 33 miles of signal improvements, and
- renewal of the electrical catenary system along sections of track where maintenance has long been deferred (*17*, p. A-11).

The overall goal of the program is to reduce travel time between Harrisburg and Philadelphia from the current 2 hours to 105 minutes for local trains and 90 minutes for express trains by 2006 (*21*).

Future Plans/Funding

Future planning and the route's designation as a potential HSR corridor by the US DOT call for an extension of the Keystone Corridor westward from Harrisburg on to Pittsburgh (*16*, p. 69). Pennsylvania's *Passenger Rail Needs Assessment* outlines potential rail corridors through several parts of the state and contains a section on potential funding partnerships for intercity rail which includes a discussion of financing mechanisms such as:

- leveraging of funds,
- private participation,
- bond financing of annual appropriations,
- maximizing federal and local participation, and
- the need to address both operating and capital needs for the long term (*14*, p. 46).

NORTH CAROLINA

State Agency with Planning Authority

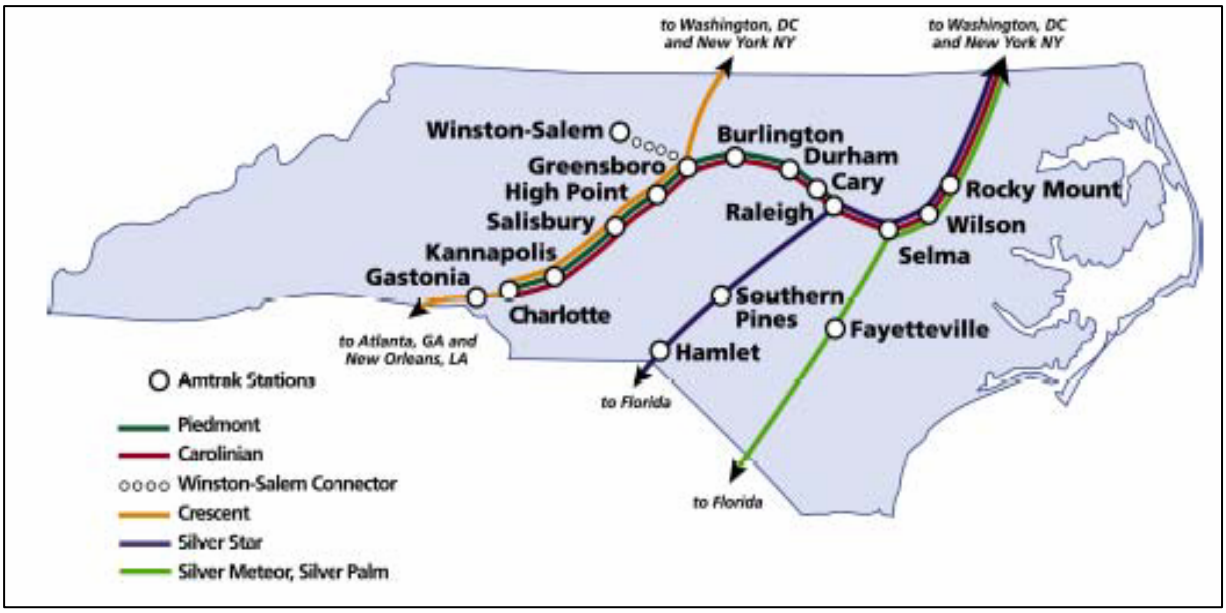
The state-supported intercity passenger rail program in the state of North Carolina is planned and funded through the Rail Division of the North Carolina Department of Transportation (NC DOT). The Rail Division is one of the major divisions within NC DOT, on an equal organizational level with the other modal divisions such as the highway and aviation

divisions. The *North Carolina Rail Plan 2000* states that "the Rail Division was created to help develop and maintain a safe and effective rail system and to enhance local and statewide economic development (*22*, p. 5)." NC DOT has also undertaken several studies that would expand intercity rail service to the eastern and western parts of the state not presently served by the routes described below.

Currently Supported Operations

NC DOT currently supports two intercity passenger rail routes, the Carolinian and the Piedmont, within the state in addition to four other Amtrak national system routes which operate through the state. The Carolinian provides daily service from Charlotte to Rocky Mount before continuing northbound to and from New York. Amtrak crews operate the Carolinian, and Amtrak provides the rolling stock for the service. The Piedmont provides daily round trip service between Raleigh and Charlotte with stops in Cary, Durham, Burlington, Greensboro, High Point, Salisbury, and Kannapolis. Amtrak crews operate the Piedmont; however, the equipment is provided (and was designed) by NC DOT (*22*, p. 22). Figure 4 shows these routes.

The costs for the in-state operations of these trains are reimbursed to Amtrak by the state, as well as Amtrak's administrative, station, and other costs. The state also promotes and advertises its intercity passenger trains and provides hosts which ride along on the trains to aid tourists and other riders (*22*, p. 22). In addition to this on-going service, the state contracts with Amtrak for a special train each year, the Rockingham Race Special, which carries riders from Raleigh and Cary to a special NASCAR race event at the North Carolina Speedway (*23*).



Source: NC DOT, *North Carolina Rail Plan 2000*, available at: http://www.bytrain.org/quicklinks/reports/railplan2001.pdf.

Figure 4. North Carolina Intercity Passenger Rail Map.

State Funding History

NC DOT has been involved in supporting preservation, promotion, and development of the state's railroad system since 1977 but did not sponsor intercity passenger rail service until May 1990 when service on the Carolinian began (*22*, p. 4). The Piedmont service began operation five years later in May 1995 (*22*, p. 22). Several rail task forces and/or commissions were formed at the state level during the late 1980s and early 1990s to determine the role of passenger rail for North Carolina's future. One of these studies determined that "highways alone could not accommodate North Carolina's anticipated growth and failing to address the growing transportation demand could jeopardize economic growth and opportunity in the state (*22*, p. 6)." The 1997 task force report further recommended that the state should:

- introduce two-hour rail passenger service between Charlotte and Raleigh;
- seek federal funding for high-speed rail passenger service in the Southeast;
- restore rail passenger service to western North Carolina and study the potential for service to eastern North Carolina; and
- provide a funding source to preserve rail corridors for future service.

Following these recommendations, the General Assembly of North Carolina appropriated $56 million for rail passenger service improvement over the next three fiscal years in order to implement these recommendations (*22*, p. 6).

A distinct advantage that North Carolina has in providing rail service along its existing state-supported routes is that the state owns much of the railroad infrastructure through its outright ownership of the North Carolina Railroad Company (NCRR). The 317-mile long NCRR is a Real Estate Investment Trust whose voting stock is now owned totally by the State of North Carolina (*24*). Prior to 1998, private stockholders held approximately 25 percent of the company stock, but, in that year, the General Assembly appropriated $71 million to buy out these stockholders placing the entire line from Charlotte to Morehead City completely under state control (*22*, p. 6). State ownership and control over much of the rail infrastructure over which the passenger routes exist allows NC DOT to have more power to schedule and make track improvements that benefit passenger rail and to add new routes along the NCRR as needed. In addition, the granting of trackage rights to freight rail service over the state-owned line generates a significant revenue stream that can be reinvested into further improvements as discussed in the state-level funding sources section below. NC DOT's strategy for improving freight rail has focused largely on funding capital improvements in the form of track and signal upgrades as well as the purchase of rolling stock to allow further service.

State-Level Funding Sources

North Carolina has three main state-level funding sources which it uses to provide intercity passenger rail service—the state's highway fund, the state's highway trust fund (HTF), and lease revenue generated by freight use of the NCRR. A description of each of these sources is outlined in detail in the state's rail plan (*22*, p. 7). They are:

Highway Fund

This state fund receives annual appropriations from the state's General Assembly which the state can use in improving both freight and passenger rail facilities. State rail plan figures indicate that the appropriation level for intercity passenger rail is approximately $2 million each year for operations funding, $1.75 million for environmental studies, $1.75 million for grade crossing improvements, and $10 million for infrastructure improvements. North Carolina's use

of "highway funds" for rail improvements is of interest because many states prohibit the use of highway funding for any other purposes.

Highway Trust Fund

North Carolina law allows up to $5 million per year of its HTF monies to be used for "economic alternatives to highway construction." HTF funds pay for a share of the Carolinian and Piedmont routes' operational, capital, and marketing expenses.

North Carolina Railroad Lease Revenue

Each year the Norfolk Southern Railroad pays the NCRR over $11 million in lease payments in order to operate trains over the NCRR route. Most of this amount is distributed to the state as a dividend on its stock owned in NCRR. Chapter 136, Section 16.6, "Continuing Rail Appropriations" of the North Carolina General Assembly General Statutes guarantees that 100 percent of the annual dividends will be returned to NC DOT for "railroad purposes." Railroad purposes are further defined in the statute as:

- track and signal improvements for passenger rail;
- rail passenger stations and multimodal transportation centers;
- grade crossing protection, elimination, and hazard removal;
- rail rolling stock cars and locomotives;
- rail rehabilitation; and
- industrial rail access.

A final stipulation placed upon these funds is that the NC DOT not use these funds to supplant Transportation Improvement Program (TIP) funded projects, but only to supplement them (*25*).

Use of Federal Funds

In addition to the three state funding sources listed, the state has applied federal funding to improve the state-supported routes through a variety of means. Next Generation High-Speed Rail Fund moneys have been used to conduct studies for the Southeast High-Speed Rail Corridor SEHSR including an Environmental Impact Statement (EIS) for the Charlotte to Washington, DC portion of the corridor. Transportation Enhancement funds have been used to restore train stations in many towns along the routes. HSR grade crossing hazard mitigation funds from the federal Transportation Equity Act for the 21st Century (TEA 21) [Section 1103(c)] have been

used for North Carolina's Sealed Corridor program which seeks to eliminate, separate, or mitigate, through the use of median barriers or four quadrant gates, grade crossings along the entire length of the line in order to minimize the chances of a train colliding with a crossing automobile (*22*, p. 7).

Future Plans/Funding

NC DOT plans to restore intercity passenger rail service to the western part of the state to serve the city of Asheville. This project was studied extensively in the early part of this decade, but state budget constraints have delayed service implementation forcing the state to restrict its efforts to provide station rehabilitation and rail safety improvements in anticipation of restored service. The state has also completed studies seeking to implement passenger service to Wilmington on the southeastern coast of the state as well as looking into adding HSR service along the Southeast High-Speed Rail Corridor which includes the state-owned NCRR route. NC DOT has also been involved in studies by local MPOs in the Raleigh-Durham (Triangle), Charlotte, and Winston-Salem-Greensboro (Triad) areas which are also located along the route currently served by the state-supported intercity routes (*26*).

VIRGINIA

State Agency with Planning Authority

The state-supported intercity passenger rail program in the Commonwealth of Virginia is planned and funded through the Rail Division of the Virginia Department of Rail and Public Transportation (VDRPT). The VDRPT is a separate state agency from the Virginia Department of Transportation (VDOT) which is charged by the state to plan for freight and passenger rail as well as non-rail modes of public transportation. VDRPT completed and published both a state rail plan and a rail needs assessment during 2004.

Currently Supported Operations

To date, the VDRPT has not directly funded any intercity passenger rail projects; however, they have been very involved in planning for future passenger rail service as well as acting as a pass-through and supervisory agency for the Commonwealth Transportation Board (CTB) to provide funding and other support to a successful commuter rail service, the Virginia

Railway Express (VRE), which serves northern Virginia and the metropolitan Washington, DC area. Figure 5 shows the VRE service routes.

VRE provides commuter service on an 80-mile system along two corridors connecting the northern Virginia suburbs with Washington, DC's Union Station. The VRE's DC-Manassas corridor is over the Norfolk Southern Railway Company (NS) line and the DC-Fredericksburg corridor is over a line owned by CSX Transportation (CSX). Amtrak owns the tracks near Union Station. Amtrak crews operate all the trains under VRE contract. The VRE operates as a typical commuter rail service, as defined in the Rail Passenger Service Act and as described in Chapter 1, with morning and evening peak services interspersed among freight trains and the national system Amtrak routes traversing the area. Reciprocal ticket-honoring agreements between Amtrak and VRE allow passengers from either to ride the other's trains, essentially allowing the VRE trains to function as additional Amtrak frequencies within VRE's service area (*27*, p. 3-25).

Because the VRE operates over the same rail line where VDRPT is interested in improving the basic Amtrak services up to high-speed rail standards, VDRPT's management of the state's investment in capital projects on the VRE line is, in effect, directly linked to improving intercity rail travel in the state. This corridor is also expected to become part of the SEHSR linking the Northeast Corridor routes of New England and the mid-Atlantic states with the states of North Carolina, South Carolina, and Georgia.

State Funding History

Amtrak operates over 20 trains daily through Virginia as part of its basic national system (*28*). The state of Virginia has not funded any additional Amtrak service to date; however, VDRPT has been active in studying means to extend the high-quality, frequent rail service experienced in the Northeast Corridor between Washington, DC, and Boston, MA, southward to Richmond, VA. In fact, the most recent VDRPT documents list the 184-mile route between Washington and Richmond with an eastern extension to Williamsburg and Newport News as part of the Northeast Corridor service although Amtrak ownership of infrastructure terminates in DC (*27*, p. 3-27). The main way in which the state has begun to improve this corridor is to develop a plan for making capital improvements to the freight rail track system (i.e., adding capacity, improving signaling and dispatching, etc.) over which the Amtrak trains operate.

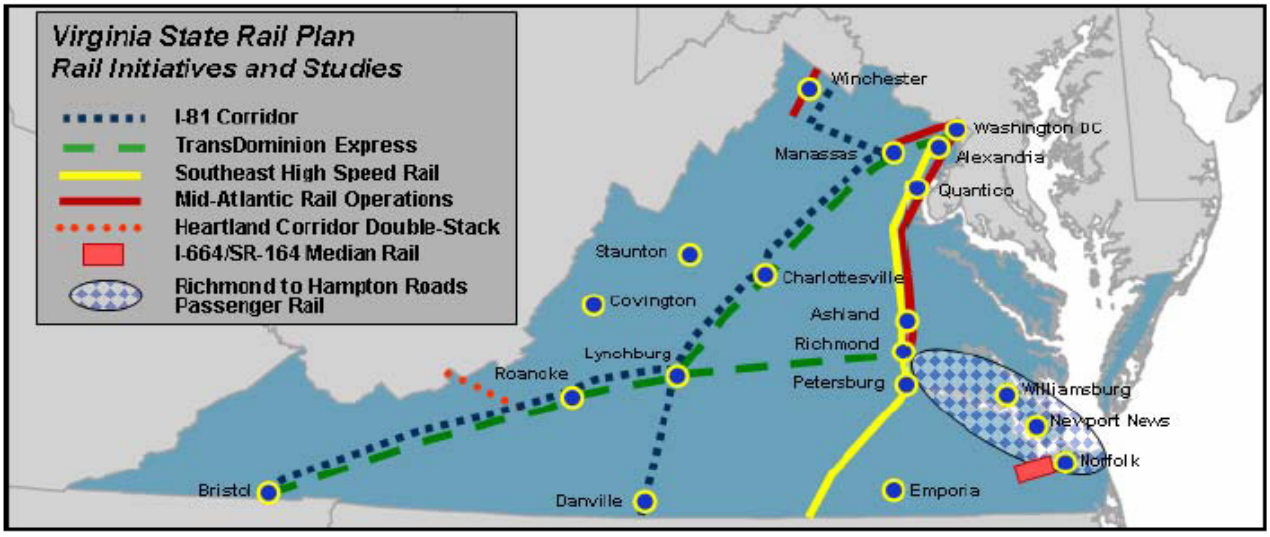
Source: VRE, System Map, available at: http://www.vre.org/service/systmmp.htm.

Figure 5. Virginia Railway Express System Map.

Since VRE and Amtrak operate over the same CSX freight line in the northeastern part of the state, many of the state's investments thus far have been focused upon projects that can be beneficial to VRE, intercity rail, and the freight railroads heading southbound out of the Washington, DC area. One recently completed project managed by VDRPT decreased the waiting time for passenger trains at "AF Interlocking" in Alexandria where the NS and CSX rail lines merge by over 47 percent using a combination of federal, state, local, and private railroad

funds (*29*). As Figure 6 shows, the state is in the midst of several passenger and freight rail studies which will determine the future direction of state assistance to the rail mode.

The Commonwealth of Virginia also provides funds each year to support VRE. Rather than being administered directly through the VDRPT, these funds flow from the Commonwealth Transportation Board (CTB) to the Potomac and Rappahannock Transportation Commission (PRTC) and the Northern Virginia Transportation Commission (NVTC), the MPOs which plan for transportation in each of the areas served by VRE's routes. PRTC and NVTC, in turn, grant the money to VRE where it is used to subsidize the trackage rights fees paid to the host railroads—CSX, NS, and Amtrak. In this way, the state basically pays the railroad companies for the trackage rights—thereby allowing the VRE to use its farebox revenues and other revenues for operations and capital projects. CTB funds to VRE are allocated annually and have been approximately $5-6 million over the past few years (*30*, p. SR-30).



Source: VDRPT, Virginia State Rail Plan 2004 Executive Summary, Available at: http://www.drpt.state.va.us/downloads

Figure 6. VDRPT Rail Initiatives and Studies.

State-Level Funding Sources

According to the 2004 Virginia State Rail Plan, "Virginia lacks a dedicated, steady source of funds to invest in rail." Transportation trust fund formula grants, a major state-level funding source for highways, transit, ports, and airports allocates zero percent to rail funding, leaving the state's freight and passenger rail funding sources limited to biennial appropriations

from the state's General Assembly which have been limited to between $5 million and $6 million annually through the CTB as described above and by special one-time appropriations (*31*, p. 125).

The prime example of such a one-time appropriation for intercity passenger rail is the $65.7 million in rail capital improvement funds that the General Assembly approved June 2000 for improvements to the CSX line between Richmond and Washington. Such appropriations focus upon increasing capacity and improving infrastructure that will reduce congestion for both goods and passengers in this heavily traveled rail corridor. Unfortunately, implementation of this initiative has been very slow as the VDRPT and CSX attempted to reach agreement and come to terms on how to carry out this program of work. The parties did not agree to a final contract until October 2004. Once the work is completed, CSX will be able to add 15 trains daily, VRE will be able to add four additional trains, and Amtrak will be able to add one additional train per day in the corridor (*32*).

The need for a long-term, stable funding source for rail was addressed by the Virginia General Assembly in early 2005 when they passed a bill authorizing 3% of the existing annual state vehicle rental tax to be diverted to a newly created Rail Enhancement Fund. This fund will provide approximately $23.2 million annually to be used for freight and passenger rail improvements (*33*). According to the legislation, projects using these funds are required to provide 30% in matching funds which must come from non-state sources. Potential sources for matching funds include railroads and local and regional governments. The bill creating the fund was signed by Governor Warner on June 17, 2005 and goes into effect on July 1, 2005 (*34*). Funding from the rental car tax source will be applied to the Rail Enhancement Fund beginning in its second year (*33*).

Future Plans/Funding

Intercity passenger rail projects being undertaken by VDRPT include its study of a statewide intercity passenger rail service called the Trans-Dominion Express (TDX). TDX would serve the westernmost part of the state, linking it by rail to both the northern Virginia area near Washington, DC, and to the Richmond area. The TDX would originate in Bristol, VA, and follow the current NS freight route to Lynchburg where the route would split with one line continuing on to DC roughly paralleling I-66 while the other continues eastward towards

Richmond where it joins the main north-south intercity passenger rail corridor through the eastern part of the state which parallels I- 95 (*30*, p. SR-21). The state budgeted approximately $9.3 million in state funds for TDX studies; however, funding sources for implementing TDX have not yet been identified. Total costs to upgrade the freight tracks for this service are estimated to be $313.8 million which breaks down in the following categories (*31*, p. 110):

- environmental and preliminary engineering studies – $9.3 million;
- stations, signals, storage tracks, etc. – $13.2 million;
- equipment leasing – $88 million; and
- track upgrades – $202.7 million.

Several of the projects contemplated for TDX improvements overlap with freight rail improvements being considered by the state for its I-81 corridor and could result in enhanced movement of both passengers and freight.

Virginia is participating with the state of North Carolina in studies related to the SEHSR route. The SEHSR would potentially link the Northeast Corridor with other designated federal HSR routes in the southern U.S. Figure 6 shows the TDX and SEHSR routes. Additionally, the state has studied the possibility of combining its rail functions into a Rail Development Authority which would be able to act more entrepreneurially to preserve and promote the state's rail system. Long-term unconstrained rail needs in the Commonwealth are estimated to be up to $2.7 billion through 2010 and up to $8.1 billion through 2025. Passenger-only and joint-passenger and freight needs make up 81 percent of this total (***Error! Bookmark not defined.***, p. SR-2).

PACIFIC NORTHWEST CORRIDOR (PNWC)

State Agencies with Planning Authority

The state-supported intercity passenger rail programs which support development and operations along the PNWC are the Rail Office of the Division of Rail and Public Transportation at the Washington State Department of Transportation (WSDOT) and the Rail Division of the Oregon Department of Transportation (ODOT). These two states are working jointly to make capital and operational improvements to the freight rail corridor between Eugene, OR, and

Vancouver, British Columbia (BC), via Seattle, WA. Achievements made by the states and Amtrak over the last decade include the following (*35*):

- improved tracks, signals, and grade crossings;
- enhanced safety;
- acquisition of five new European-style trainsets and six new locomotives;
- upgrades to seven stations completed with two more underway;
- increased local Amtrak service from one daily Seattle to Portland round-trip to three;
- restarted daily passenger service connecting Seattle and Vancouver, BC, and added a daily Seattle to Bellingham round-trip;
- extended two daily round-trips south to Eugene; and
- reduced Seattle-Portland, downtown-to-downtown travel times from four hours to the current three hours and 30 minutes.

Currently Supported Operations

The service consists of three segments—Eugene-Portland, Portland-Seattle, and Seattle-Vancouver, BC. Figure 7 shows the route. State purchases have included the purchase of several trainsets of advanced Talgo trains from Spain which have tilt-technology and other features allowing faster train speeds. The freight corridor over which the service operates is mainly Union Pacific (UP) in Oregon and Burlington Northern Santa Fe (BNSF) in Washington. ODOT sponsors two daily trains between Eugene and Portland while WSDOT sponsors three daily trains between Portland and Seattle, one daily train between Seattle and Vancouver, WA and one daily train between Seattle and Bellingham. The main focal point of PNWC efforts, however, is to reduce travel time along the corridor to be competitive with automobile travel through making the necessary infrastructure changes to achieve higher train speeds.

Source: Amtrak Cascades Service Route Map, available at: www.amtrak.com

Figure 7. Pacific Northwest Rail Corridor Map.

State Funding History

The states of Oregon and Washington began to work together in the early 1990s to improve the level of intercity rail passenger services along the existing Amtrak corridor in western Oregon and Washington. During the 10-year period between April 1994 and April 2004, the two states and Amtrak invested over $350 million into improvements along the corridor and to the trainsets which operate the Cascades routes.

State-Level Funding Sources

WSDOT has been involved in supporting expanded Amtrak service since the early 1990s using state public transportation funds. ODOT has been more restricted due to strict state funding regulations which have restricted its passenger rail investments to specific congressional earmarks and limited Congestion Mitigation Air Quality (CMAQ) air quality improvement funding until recently. ODOT also supports an intercity bus system which is designed to bring riders to the trains serving the PNWC.

The State of Washington has funded rail programs through a variety of funding sources in the past; however, the main source for funding at present is the state multimodal transportation account described below.

Multimodal Transportation Account

The 2001-2003 transportation budget included an appropriation of $40.3 million from the Multimodal Transportation Account for use in intercity passenger rail projects. This amount was used for:

- operations funding between Seattle and Portland,
- three EIS studies for proposed projects,
- planning and construction of passenger depots and other facilities, and
- to fund several small capital projects to improve schedule reliability (*36*).

Oregon state-level funding sources for intercity passenger rail have been more limited than those of Washington. To date the investment has been limited largely to federal earmarks and CMAQ funding. Beginning in 2003, however, the state began to appropriate general funds for the Willamette Valley rail project as described below.

General Funds

The state legislature appropriated $9.5 million to support the Cascades service from state General Funds (*37*, p. 3) for the first time during 2003. For 2004, the legislature maintained this level of funding; however, the source of over half of the funds changed. The state used General Funds for $3.9 million of the amount while directing a special one-time transfer of funds from the state's Environmental Quality Information Account (EQIA) to the Transportation Operating Account from which the remainder was funded. The EQIA generates its revenue from customized license plate sales (*38*).

Future Plans/Funding

WSDOT estimates that its funding levels will remain high in the years to come and hopes to improve service along the Seattle to Vancouver, BC, segment as British Columbia begins to invest more in infrastructure at the northern end of the Cascades route. ODOT estimates that $120 million in infrastructure (track and signal) needs are required to reduce passenger/freight conflicts and to increase speeds along the corridor between Portland and Eugene (*37*, p. 3). Funds are expected to come from continued state appropriations and federal earmarks; however,

since both of these funding methods are tenuous, the identification of a more stable long-term funding source is sought.

SUMMARY

Various State Agencies Involved

In most states, the state Department of Transportation is responsible for planning intercity passenger rail; however, this varies from state to state. In some, this function is housed within a separate public transportation agency or even in a "rail development authority" with more entrepreneurial authority to use economic development tools to encourage rail use and expansion.

Various Funding Sources/Methods/Levels

Each state makes use of funding from all sources made available to improve its intercity passenger rail program. Most states have built their programs, over time, using a variety of funding sources, rather than being built from a single funding source dedicated to intercity passenger rail. Investing in intercity rail improvements has taken place when funding became available for investment and at the levels which were authorized. This resulted in slowly building programs that could later grow and expand.

Various Project Types

The variety of project types undertaken by states to improve intercity passenger rail is large. Each state formulates its own goals and outlines projects and services designed to meet those goals. As a result, there is great variance in the types of projects and the methods used to implement state-supported rail programs.

CHAPTER 3:
PROJECT COST DATA

PROJECT COST VARIABLES

This research looks at several state-sponsored intercity rail programs with the goals of identifying proven funding methods and sources and extracting meaningful project cost data that planners could use to evaluate future intercity rail projects. While the case studies of four state programs and one multi-state corridor provided many options for funding sources and methods, the investigation into project costs failed to produce simple unit cost (e.g., cost/mile, etc.) factors that planners could readily apply to all projects. This finding was as a result of the many variables that determine project cost differences in any intercity passenger rail project. Table 4 shows examples of these variables.

Table 4. Project Cost Variables for Intercity Passenger Rail Projects.

Project Variables	Examples of Variability
Project type	• Upgrade of existing track • New track construction • Exclusive right-of-way or interaction with freight
Site conditions	• Soil type/preparation requirements • Drainage characteristics • Terrain/grade mitigation needs
Regional cost differences	• Labor costs • Materials availability/cost
Condition of existing rail infrastructure (prior to upgrade)	• Light density/deferred maintenance line • Heavily used mainline • Jointed rail or continuous welded rail • Required signal system upgrades
Freight traffic levels	• Near a container port generating heavy rail traffic • Along a transcontinental, capacity-constrained freight route
Operational factors	• Forecast ridership • Daily frequency of operations and time periods • Rail network congestion/chokepoints • Need for new dispatching training and/or facilities
Right-of-way/support structure costs	• Ratio of urban versus rural right-of-way • Upgrade or new construction of required stations and parking facilities
Rolling stock costs	• Locomotives • Coaches • Control-configured coaches • FRA Crashworthiness Compliant Diesel Multiple Units

Based upon the uncertainty introduced by these variables in project cost estimation and the literature review which determined that cost projections for planned rail projects were often off by over 40 percent, the project team chose to use data from completed projects rather than planned projects.

A secondary goal of this research project was to develop cost analysis tools, such as a cost-per-mile index, for use by state rail planners in evaluating proposed intercity passenger rail projects. The research team concluded that the development of universally applicable cost-per-mile indices for intercity rail was infeasible at present due to the great number of variables involved in rail construction and the relatively small sample size of recent, comparable projects. This finding is consistent with the results of two previous studies, the Federal Transit Administration's *Transit Capital Cost Index Study* and the Transit Cooperative Research Program's *Commuter and Light Rail Transit Corridors: The Land Use Connection*, which both state that calculation of accurate cost indices for commuter or intercity rail is "infeasible" and "less valid than for light rail" projects, respectively, due to these variables (*39*, p. 2) (*40*, p. F-13). As a result, researchers developed example project cost data and model cost ranges by project type.

COMPARISON AND GROUPING OF SIMILAR PROJECTS

In reporting project costs, the research team determined that it was not possible to produce accurate cost-per-mile indices using such a small sample of projects. Rather, it would be both more realistic and more useful to present example project costs grouped by type of project. By presenting example projects a range of costs could be determined. The research team decided, following consultation with the TxDOT PMC, that the best way to group project costs was to follow the four basic project cost categories laid out by the Federal Railroad Administration in their 2002 planning manual for intercity rail corridors (*41*, pp. 16-18). The four basic categories are:

- **Recapitalization –**
  repairs or replacement of life-expired capital assets that would be necessary under any circumstance to simply continue existing levels of service and operations.
- **Trip-time improvements –**
  items that are solely intended to reduce trip times for corridor passenger service.

- **Capacity-related improvements –**
  items that are required to increase the capacity of the corridor in order to allow increases in traffic by all users of the corridor.
- **Other projects –**
  corridor related projects that do not fall within any of the other categories.

Table 5 shows example projects in each category.

Table 5. FRA Basic Project Cost Categories and Example Projects.

Project Category	Typical Elements
Recapitalization	• Bridge replacements (undergrade and overhead) • Replacement of signal and communications cable • Replacement of right-of-way fencing • Replacement of station roofs, platforms, etc.
Trip-time Improvements	• Curve realignments • Concrete ties and welded rail installation • Grade crossing removal or improvements • Install a new cab signal system in order to operate at > 79 mph • Reconfigure a junction or station for higher speeds • Purchase higher-speed rolling stock • Install an electric traction system
Capacity Related Improvements	• New passing tracks • Additional main tracks • Interlocking reconfigurations • Additional station platforms • New or expanded maintenance facilities • Install high-level passenger platforms • Revise signal locations and aspects
Other Projects	• Purchasing new commuter rolling stock • Building new commuter stations • Constructing multimodal terminals • Constructing additional parking facilities • Improving freight clearances

Source: FRA *Railroad Corridor Transportation Plans: A Guidance Manual*, December 2002.

A number of recent projects, classified into these groups, are included as Appendix B of this report. The remainder of this chapter gives examples of projects and project costs from the case study states examined in this project.

PROJECT COST EXAMPLES FROM CASE STUDIES

CALIFORNIA

The State of California and Caltrans have a long history of funding intercity rail capital projects dating back to 1976. It published an extensive and detailed report outlining project costs and funding sources for the period from 1976-2003 in March 2004. This report is available online at http://www.dot.ca.gov/hq/rail/pubs/circp/2004circp.pdf. The research team selected several projects from the time period covered for which length and cost were known in order to compute the cost-per-mile figures shown in Table 6. As can be seen from the table, there is great variability in project cost even within projects of the same type.

PENNSYLVANIA

In 2004, the Commonwealth of Pennsylvania reached an agreement to jointly fund with Amtrak a $145.5 million upgrade program for the Keystone Corridor between Philadelphia and Harrisburg. The costs of this line are to be split evenly by state and Amtrak over the next 5 years although state budget restrictions and Amtrak's financial crisis may spread the improvements over a longer period. Since 1994, approximately $22 million has been spent on upgrading the line (*17*, p. A-11). The near-term project described in the case study in Chapter 3 includes:

- replacing approximately 85 miles of wooden ties with concrete ties,
- replacing 30 miles of jointed rail with continuously welded rail,
- renewal of two interlockings,
- 33 miles of signal improvements, and
- renewal of the electrical catenary system along sections of track where maintenance has long been deferred (*17*, p. A-11)

The project is expected to cost approximately $100 million with the remainder of the funds being spent on longer term projects.

Table 6. Sample Cost-per-Mile Indices by Project Type for California Intercity Capital Program.

Task	Cost-per-mile ($ millions/mile)
New Double Track	
Raymer-Burbank Double Track	1.77
Oceanside Double Track	5.00
Calwa-Bowles Double Track	3.27
Shirley-Hanford Double Track	5.65
Second Main Track	
Lincoln Avenue Double Track	3.25
CP Flores-CP O'Neil Double Track	2.78
Port Chicago-Oakley Second Track	1.93
Yolo Causeway Second Main Track	3.80
Third Main Track	
La Mirada to Basta Third Track	4.53
Fourth Main Track	
Santa Clara-San Jose Fourth Main Track	4.95
Passing Track	
False Bay Passing Track	3.13
Running Track	
Bakersfield Track & Signal Improvements	2.55
Sacramento-Emeryville Track & Signal Improvements	1.00
Siding	
Strathearn Siding	1.25
Irvine Siding	2.67
Poinsettia Siding	1.18

Source: Caltrans, California Intercity Rail Capital Program, March 2004.

NORTH CAROLINA

North Carolina has chosen to concentrate on projects which result in schedule improvements for the existing intercity passenger rail service. The projects listed below are concentrated on the Selma-Raleigh and Raleigh-Greensboro segments of the NCRR. As this part of the corridor comes up to standard, other projects are scheduled to begin between Greensboro and Charlotte. This phased plan results in better overall performance improvements as each

segment is enhanced before moving on to the next one. Costs listed are the state costs for each project.

Track Improvements between Raleigh and Selma – $2.7 million

- replaced crossties,
- resurfaced track,
- adjusted signal timing,
- increased superelevation of several curves to allow 59 mph (previously 49 mph) operations over this segment, and
- resulted in smoother ride and 5 minute reduction in travel time.

Lengthening of Three Passing Sidings – $1 million, $1.1 million, and $3.6 million

- *McLeansville* – upgraded 9,250 ft and added 1530 ft of length, replaced 10 mph turn-outs with 45 mph turn-outs;
- *Mebane* – upgraded 8,250 ft siding and added 3900 ft of length, replaced 10 mph turn-outs with 45 mph turn-outs; and
- *West Durham* – upgraded 6,500 ft siding and added more that 9000 ft of length, replaced 10 mph turn-outs with 45 mph turn-outs, straightened curve, constructed total of 12,500 ft of new track.

Reconstruction of Greensboro Interlocking – $3 million

- reconstructed interlocking where three railroad lines merge together near the Greensboro station;
- constructed a second track to the station to accommodate future passenger train capacity when station project is completed;
- replaced 20 mph turn-outs with 45 mph turn-outs; and
- results in time savings of 2.5 minutes and improved traffic flow

Greensboro to Cary Superelevation Projects – $2.1 million

- track improvement projects to straighten curves and superelevate over 100 curves on this route; and
- results in smoother ride for passengers and 4 minute time savings.

Revised Train Control Signals between Boylan and Fetner – $75,000

- modest investment in improved train signals enable eastbound trains to increase speed from 30 mph to 60 mph;

- saves 90 seconds between Cary and Raleigh; and
- sets stage for future $4 million bi-directional signal improvement project over that segment that will further increase track maximum speed to 79 mph.

VIRGINIA

As stated in Chapter 2, the Commonwealth of Virginia has chosen to support intercity passenger rail by investing in rail infrastructure projects that benefit both freight and passenger rail movement. To date the focus has been on the congested rail corridor in eastern Virginia which roughly parallels I-95. This route is viewed as an extension of the existing Northeast Corridor owned by Amtrak and has been designated as a future high-speed corridor by the federal government. Some examples of the projects undertaken in Virginia as well as some that are planned are listed below.

Completed Projects

Dispatch Consolidation – $91,000

- simplification of CSX dispatching between Washington Union Station and Arlington, VA; and
- decreased misrouting and increased average train speed.

AF Interlocking –
$14.4 million total cost, $3.7 million state-share (additional $9.2 million federal, $0.3 million local, and $1.2 million private railroad funds)

- improvements to interlocking where CSX and NS tracks join in Alexandria, VA;
- decreased delays through interlocking by 47 percent; and
- added capacity for additional frequencies.

Planned Projects

L'Enfant Third Main – $4.9 million state (estimated)

- construction of third main track near L'Enfant Plaza;
- will allow separation of freight and passenger trains; and
- will allow addition of additional midday VRE train.

Franconia Third Main – $11.5 million state (estimated)

- construction of 7.6 miles of third track between AF interlocking and Fairfax county. location; and
- will allow additional daily VRE train to Fredericksburg.

Arkendale Crossovers – $5.5 million state (estimated)

- install new crossovers in Stafford county; and
- with L'Enfant Project listed above will allow one additional daily VRE train.

Trans-Dominion Express

- proposed intercity passenger routes connecting Bristol, Roanoke, and Lynchburg to DC and Richmond;
- approximately $9.3 million in state funds approved for studies;
- Costs for capital improvements $36- to $47 million (preliminary); and
- Estimated operating costs by Amtrak – $5- to $7 million annually.

PACIFIC NORTHWEST CORRIDOR

The states of Washington and Oregon, in partnership with Amtrak, the private railroads, and the Canadian province of British Columbia, have worked together to make infrastructure improvements to the freight rail system and to invest in advanced passenger trainsets which have dramatically improved ridership along the Amtrak Cascades route over the last decade. Between 1991 and 2002, WSDOT invested over $121 million in track construction, new modern trains, road/rail safety improvements, station renovations, and rail line rehabilitation to support both passenger and freight rail in Washington. WSDOT has also spent more than $70 million on day-to-day operations of the state's intercity passenger rail service, the Amtrak Cascades. Further, the overall investment in passenger rail has leveraged over $400 million in direct investment from other sources *(42)*.

PNWC Capital Construction Projects

Engineering and Environmental Analysis- $71.7 million

These projects funded track and signal upgrades to improve safety, reduce travel times and add main line capacity for improved passenger service throughout the corridor.

Acquisition of Two Talgo Trainsets – $22.0 million

There are five Talgo trainsets in operation today—WSDOT owns two, Amtrak owns two, and Talgo, Inc. leases a fifth set to Amtrak, ODOT and WSDOT. (Note: WSDOT recently purchased the leased trainset from Talgo.)

Station Upgrades – $8.5 million

This cost includes $1.17 million for Pasco, Ephrata, Wenatchee, and Spokane, and $600,000 for King Street Station (Seattle) improvements in 1993.

Lease of First Talgo Trainset – $4.1 million

The first production Talgo trainset was leased by WSDOT from April 1994 through July 1996 before the other trainsets went into service.

CHAPTER 4:
CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

In conducting this project, the research team reached several conclusions based upon the case studies and the additional research into other intercity rail project costs in other parts of the U.S. These conclusions are listed below.

- Accurate per mile project cost estimates for intercity rail capital projects are very difficult to develop and depend upon many project-specific factors. Due to the high number of project variables, project costs instead fall into ranges that can be narrowed based upon known project characteristics.
- Operational funding requirements for state-supported intercity rail projects are largely independent of the length of the service route. Instead Amtrak now determines state operations cost for additional intercity passenger rail service based upon ridership, farebox recovery, and food sales on the route itself. Amtrak uses this Route Contribution Analysis "full-cost" methodology nationwide to determine these costs.
- The uncertainty of the future of Amtrak and how it will be reformed add to the uncertainty in determining future intercity passenger rail costs. The recent federal proposal to jointly fund future capital spending for intercity rail projects is promising; however, whether that funding is provided on a 50-50 federal-state basis or at a ratio closer to an 80-20 federal-state basis will be greatly influential upon how involved states may become in financing such projects.
- A funding needs assessment is required to determine the potential cost of passenger routes selected for implementation.
- Development of a functional state-sponsored intercity rail program takes both consistent funding and time for partnerships to mature.
- In order to develop a robust program, both a stable funding source and a long-term commitment by the state are necessary.

- State-supported intercity rail programs are more readily developed in states that have shown an emphasis on multimodal transportation planning and funding.

RECOMMENDATIONS

The research team recommends the following actions be taken at the state level if Texas is to consider increasing its investment in intercity passenger rail.

- A statewide study of potential intercity passenger rail routes and needs should be conducted. A survey of the condition of the statewide freight rail network is needed prior to making an assessment of intercity rail passenger costs for added service to any selected route. TxDOT has begun work with a consultant team to carry out this process along previously identified/federally designated high-speed corridors. Funding sources for accomplishing this task and partnership agreements with the freight railroads will also be needed in order to achieve a realistic assessment.
- TxDOT needs to identify and work closely with any potential project funding partners. These contacts should include federal, local government, and private sector partners.
- Texas should move toward identification and establishment of long-term state-level funding sources for intercity rail improvements.
- TxDOT should continue to expand its capacity for the development of plans for intercity passenger rail routes and projects that improve both passenger and freight rail flows.
- Present funding limitations on TxDOT rail activities should be reexamined including the prohibition against state purchase of rail rolling stock. State-owned rolling stock has proven successful in several of the case study states as a means to partner with Amtrak to operate improved passenger service.

This report also contains two appendices. Appendix A gives a short description of the intercity passenger rail programs of each U.S. state not selected as a case study for this report. Appendix B presents example project cost data categorized by FRA project type.

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APPENDIX A:
STATE SUMMARIES

ALABAMA

Currently, Amtrak operates two long-distance trains through Alabama, the Crescent (New York-Atlanta-Birmingham-New Orleans) and the Sunset Limited (Orlando-New Orleans-Los Angeles via Mobile). Amtrak in Alabama also services the cities of Anniston, Atmore, Birmingham, Mobile, and Tuscaloosa. In fiscal year 2003, Amtrak in the state of Alabama expended $6,852,379 for goods and services. The majority of this money went to Birmingham ($6,023,218) and Montgomery ($824,128) *(1)*.

Alabama is included in the designated Gulf Coast High-Speed Rail Corridor. The corridor has two designated routes, including the original segment between Houston, TX, through New Orleans, LA, and Mobile, AL, to Pensacola, FL, and eventually to Jacksonville, FL. The other segment is planned to travel from New Orleans, LA, to Atlanta, GA. Both segments currently have Amtrak long distance train service.

The Southern Rapid Rail Transit Commission (SRRTC), a coalition comprised of representatives from Louisiana, Mississippi, and Alabama, is the entity that coordinates planning for the corridor. Mostly funded by the SRRTC, several studies conducted for the corridor examine the current condition and future potential for the Gulf Coast High-Speed Rail Corridor. The long-term improvements for the entire corridor are estimated at $4.6 billion over the next 20 year period *(2)*.

ALASKA

The Alaska Railroad (ARRC) is state-owned and operated, serving both passengers and freight. The 611 total miles of track travel between the seaports of Whittier, Seward, and Anchorage to Fairbanks. Passenger service is supported by a fleet of 45 passenger railcars and several locomotives. For the year 2004, over $21 million is budgeted for passenger car upgrades, the purchase of eight new locomotives, and two bilevel dome coaches. In 2001, passenger ridership on the railroad was 501,138 (*3*). The Federal Railroad Administration indicates the Alaska Railroad does not receive operating subsidies from the federal government, but it does receive capital grants from both the FRA and the Federal Transit Administration. The FRA grant levels over the past several years include: $33.8 million in 2004, $39.5 million in 2003, and $30.0 million in 2002 (*4*).

ARIZONA

Amtrak currently operates three long distance trains through Arizona: the Southwest Chief, the Sunset Limited, and the Texas Eagle via the Sunset Limited. Total fiscal year 2003 ridership was 75,221 passengers. The stations located in Arizona include Benson, Flagstaff, Kingman, Maricopa, Tucson, Williams Junction, Winslow, and Yuma (5).

The Arizona Rail Passenger Association has created the Southwest Rail Corridor Coalition in order to lobby the government and the railroads to enhance the mobility through Arizona, with Phoenix acting as a major hub. Phoenix is currently not served by Amtrak service. The Southwest Rail Corridor Coalition proposes options that would provide rail service through Phoenix and also to increase service between the major Southern Arizona cities and Southern California. In 1998 Kimley-Horn Associates performed cost estimates for upgrades to the corridor. Several different options were proposed that ranged from an estimated $82 million (for rail line improvements necessary to route Amtrak through Phoenix) up to an estimated $487 million (for enhanced rail service between Tucson, Phoenix, Yuma, and Los Angeles) (6). In addition to the Southwest Rail Corridor, the Arizona Rail Passenger Association favors north-south commuter rail operations between the southern cities of Tucson and Phoenix and the northern city of Flagstaff and the Grand Canyon.

ARKANSAS

One long-distance Amtrak train travels through Arkansas. The Texas Eagle train travels daily from Chicago, IL, to San Antonio, TX, via Little Rock. In fiscal year 2003, the Texas Eagle served 20,789 passengers at stations located at Arkadelphia, Little Rock, Malvern, Texarkana, and Walnut Ridge. Mayor Patrick Henry Hays of North Little Rock chairs the Amtrak Mayor's Advisory Council (*7*).

The corridor between Dallas and Little Rock is designated as part of the South Central High-Speed Rail Corridor. According to AASHTO, Arkansas has invested $1 million already on this route, with an envisioned capital expenditure of $41.5 million needed in the future for signals and overpass projects. This estimate includes no infrastructure or equipment investments (*2*).

CALIFORNIA

Chapter 2 discusses California in detail.

COLORADO

Amtrak currently has two routes in Colorado that provide daily train service, the California Zephyr and the Southwest Chief. The Southwest Chief makes stops in Trinidad, La Junta, and Lamar en route from Chicago, IL, to Los Angeles, CA. The California Zephyr makes stops in Denver, Winter Park, Glenwood Springs, and Grand Junction en route from Chicago, IL, to San Francisco, CA. Ridership in fiscal year 2003 was 194,744 passengers (*8*).

There are major efforts in Colorado to examine the feasibility of relocating the north-south running freight rail lines east to the plains, with the major focus being lines through central Denver. The 204-mile Front Range corridor would also include passenger service linking the urban centers of Fort Collins, Denver, Colorado Springs, and Pueblo. The initial infrastructure estimates are $1.2 billion, which do not include any equipment costs (*2*).

CONNECTICUT

Connecticut experiences 46 daily Amtrak trains and maintains the 17th busiest station with New Haven (501,064 riders in FY2003). The vast majority of the Amtrak activities travel along the Northeast Corridor, but a shorter distance train, the Vermonter, also traverses the state (*9*). The Connecticut Department of Transportation (ConnDOT) provides subsidies for the Amtrak service within Connecticut (*10*). In addition, the state of Connecticut contracts with Amtrak to operate the Shore Line East (SLE) commuter service between New Haven and New London. ConnDOT provides "passenger equipment and funding for the operation and oversees Amtrak's performance as a service provider (*10*)." Funding to cover the operating deficit and station improvements is solely provided with state funds.

Connecticut is also served by the New Haven Line (NHL) commuter service between New Haven and Grand Central Terminal in New York, NY. For this service, ConnDOT contracts with the Metro-North Railroad through the Metropolitan Transportation Authority of New York. ConnDOT owns and is responsible for all capital improvements for the 106 miles of the NHL between New Haven and Greenwich. The rolling stock is jointly owned by ConnDOT (60 percent) and New York (40 percent) (*10*).

DELAWARE

With access to the Northeast Corridor and several additional Amtrak services, over 700,000 riders passed through the Newark and Wilmington stations. Wilmington was the 13th busiest station in the national Amtrak System in fiscal year 2003 (*11*). According to Amtrak the Delaware Department of Transportation (DelDOT) is scheduled to contribute $750,000 this year as part of a six-year agreement to match capital investments made on the Northeast Corridor in the state (*11*).

The long distance Amtrak trains through Delaware include the Crescent, Palmetto, Silver Meteor, and the Silver Star. The Crescent service travels from New York to New Orleans, while the other three travel from New York to Miami. In addition to the long distance trains, Amtrak operates the Carolinian, Federal, and Vermonter services through Delaware.

The sponsoring agency for passenger rail in Delaware is the Delaware Transit Corporation (DTC), which is a division of the Delaware Department of Transportation. The DTC, along with the Southeastern Pennsylvania Transportation Authority, operates a commuter rail service over Northeast Corridor tracks between Philadelphia, Wilmington, and Newark with Amtrak providing access. In Delaware's *State Rail Plan Update* several near and long-term plans include upgrades and expansion of passenger service in the state. A near-term project is an extension of Track A 1.8 miles along the Northeast Corridor to "reduce the impact on Amtrak operations of any future increase in service (*12*)." The estimated cost of this extension, which includes the cost of a new interlocking, with a 45-mile per hour turnout at the Northeast Corridor Track 1, is $8 million.

The *State Rail Plan Update* also mentions a study titled the "Greater Route 301 Major Investment Study" which examined the initiation of passenger service over Norfolk Southern-owned routes in Delaware. The study indicates the "preliminary capital cost estimates for the infrastructure for the Middletown/Wilmington via New Castle is $102.5 million, including reconstruction of the New Castle Industrial Track with a new bridge at the Christina River, and construction of a second track on the New Castle Secondary and the Delmarva Secondary (*12*)."

DISTRICT OF COLUMBIA

Washington DC's Union Station is the second busiest station in the Amtrak system with 3,570,920 passengers in fiscal year 2003. Approximately 95 trains per day travel into and out of Washington, DC on eight total services, including six long distance trains. Capitol Limited, Cardinal, Crescent, Palmetto, Silver Meteor, and Silver Star comprise the long distance trains; while the Carolinian and the Vermonter services comprise the two shorter distance trains (*13*).

Several commuter rail services serve Washington DC, including ones by the Virginia Railway Express and Maryland Rail Commission. In addition to the existing high-speed service from the Northeast Corridor, the Southeast High-Speed Corridor is planned to serve Washington DC. Descriptions of these commuter and high-speed rail services reside within the state descriptions.

FLORIDA

Amtrak operates five trains in Florida, which accounted for 883,366 riders in fiscal year 2003. Amtrak serves a total of 29 stations in Florida, with the major stations being Jacksonville, Miami, Orlando, and Sanford. The five services include the Auto Train, Palmetto, Silver Meteor, Silver Star, and Sunset Limited. Only the Auto Train, Palmetto, and Silver Star provide daily service to Florida (*14*).

Tri-County Commuter Rail Authority (Tri-Rail) operates a 72-mile commuter rail service between West Palm Beach and Miami through Dade, Broward, and Palm Beach counties. The service operates over the state-owned 81-mile South Florida Rail Corridor. A Double Track Corridor Improvement Program was developed to guide improvements along the route. According to the Florida Department of Transportation, the overall estimated investment for implementing the entire program is $596.2 million. The final phase of the improvement program is Segment 5, which includes double-tracking 43 miles of the corridor. The total estimated cost for this project alone is $456.5 million. To pay for the project, "$228.6 million is to be derived from the federal government, $127.9 million from the state, and $100 million to be generated from the issuance of revenue bonds (*15*)."

There are multiple high-speed rail activities occurring within Florida, including a statewide initiative established by a voter-approved amendment to the Constitution of the State of Florida in November 2000. Following the amendment, the Florida High-Speed Rail Authority Act created the Florida High-Speed Rail Authority (FHSRA) and developed the following system criteria:

- "The system shall be capable of traveling speeds in excess of 120 mph consisting of dedicated rails or guideways separated from motor vehicle traffic.
- The initial segments of the system will be developed and operated between St. Petersburg, Tampa, and Orlando, with future service to Miami.
- The authority is to develop a model that uses, to the maximum extent feasible, nongovernmental sources of funding for the design, construction, and operation of the system (*15*)."

The first segment chosen for implementation is between Tampa and Orlando. The Federal Railroad Administration states this segment could begin operations in 2007 with an

estimated investment of $2.4 billion. It is also noted that the FHSRA in January 2004 recommended the legislature provide $75 million per year for 30 years to implement the project between Tampa and Orlando (*16*).

The additional high-speed rail activity in the state involves connections to federally designated corridors. The Southeast High-Speed Rail Corridor is planned for multiple branches from Washington, DC, south through Virginia, North Carolina, South Carolina, Georgia, and terminating at Jacksonville, Florida. The Gulf Coast High-Speed Rail Corridor is planned between Houston, TX, through New Orleans, LA, Mobile, AL, to Pensacola. Future plans call for the corridor to extend from Pensacola to Jacksonville.

GEORGIA

Four Amtrak long distance trains operate through Georgia: the Crescent, Palmetto, Silver Meteor, and Silver Star. A total of 146,450 passengers passed through the five Amtrak stations located in Georgia, which includes Atlanta (91,891) and Savannah (41,248). Macon Mayor C. Jack Ellis participates in the Amtrak Mayor's Advisory Council *(17)*.

The Georgia Rail Passenger Program consists of a joint planning effort between the Georgia Department of Transportation, the Georgia Rail Passenger Authority, and the Georgia Regional Transportation Authority. The program includes seven commuter rail lines, seven intercity lines, and two federally designated high-speed rail corridors. In addition, HB 1348 (2000) added eight commuter and intercity lines not yet incorporated into the program. The program estimates the initial capital investment for the commuter rail routes as $2.1 billion and the intercity capital costs as $1.4 billion *(18)*.

The most advanced projects within the program are the Macon-Griffin-Atlanta commuter rail, the Atlanta multimodal passenger terminal, and the Athens-Lawrenceville-Atlanta commuter rail projects. The Macon-Griffin-Atlanta commuter rail project initially consists of 26 miles from Lovejoy to Atlanta and would use $106 million in currently available earmarked funds along with additional federal funds. Planned expansions to 2030 would cost an estimated $351 million, which includes track infrastructure, stations, maintenance facilities, and rail vehicles. The Atlanta multi-modal passenger terminal initial phase would accommodate several of the planned services into Atlanta at an estimated capital cost of $23 million, with full build-out costing an additional $320 million. The Athens-Lawrenceville-Atlanta commuter rail service, listed as a 72-mile service, is estimated to cost $373 million *(18)*.

The other services listed in the program include:

- Macon-Griffin-Atlanta intercity rail ($56 million estimated capital cost);
- Albany-Macon-Atlanta intercity rail (106 miles with estimated capital cost of $140 million);
- Savannah-Macon-Atlanta intercity rail ($294 million cost for 171 miles);
- Jacksonville, FL, intercity rail extension (91 miles with estimated capital cost of $131 million);
- Canton-Atlanta commuter rail ($251 million for 38-miles);

- Bremen-Atlanta commuter rail (53 miles estimated at $303 million);
- Augusta-Madison-Atlanta intercity and commuter rail (171-mile service estimated at $345 million);
- Senoia-Atlanta commuter rail ($194 million for 38-mile service);
- Greenville, SC-Gainesville-Atlanta intercity and commuter rail (154-mile service costing an estimated $470 million); and
- Columbus-Griffin-Atlanta intercity rail (78 miles at $405 million) (*18*).

The two federally designated high-speed rail corridors are the Gulf Coast High-Speed Rail Corridor and the Southeast High-Speed Rail Corridor. Georgia has undertaken a study examining improvements to the Southeast High-Speed Rail Corridor between Charlotte, NC, and Macon, which passes through Spartanburg, Greenville, and Atlanta. Improvements to this segment included projects to improve train speeds to 79 mph, 90 mph, and 110 mph. The estimated capital costs for the three scenarios are $171 million, $1.139 billion, and $1.356 billion, respectively (*19*). These dollar amounts are in 2003 dollars.

HAWAII

Rail planning activity in Hawaii consists of two light-rail projects: the Oahu Rail System and the Hawaiian Area Rapid Transit Beautiful Excursion Aerial Transport Proposal (HART-BEAT).

IDAHO

Only the Amtrak Empire Builder long distance train operates in Idaho. The service experienced 4403 riders through the Sandpoint station in fiscal year 2003. The Empire Builder travels daily between Chicago, IL, Minneapolis, MN, and Seattle, WA/Portland, OR (*20*).

ILLINOIS

Chicago is the hub of several long and short distance Amtrak train services and represents the fourth busiest Amtrak station with over 2.1 million passengers in fiscal year 2003. A total of nine long distance services operate through Illinois and all originate in Chicago. These include:

- California Zephyr;
- Capitol Limited;
- Cardinal;
- City of New Orleans;
- Empire Builder;
- Lake Shore Limited;
- Southwest Chief;
- Texas Eagle; and
- Three Rivers.

A total of 2.8 million passengers traveled into and out of Illinois stations in fiscal year 2003.

In addition to the nine long distance trains, the state of Illinois supports three daily train services operated by Amtrak. These are the State House (Chicago to St. Louis, MO), the Illini (Chicago to Carbondale), and the Illinois Zephyr (Chicago to Quincy). The Hiawatha train service is jointly supported by Illinois and the state of Wisconsin and operated by Amtrak daily between Chicago and Milwaukee, WI (*21*). Illinois currently subsidizes these Amtrak services with a $12.1-million contract (*22*).

Amtrak is working with the Association of American Railroads, the Federal Railroad Administration, and the Illinois Department of Transportation on "a comprehensive track improvement, signal enhancement, and grade crossing improvement project between Mazonia and Springfield on a 230-mile segment of Union Pacific Railroad-owned track. Amtrak is furnishing test trains and technical expertise for the project, which has been tested at 110 mph successfully. This project, when completed in 2005, will allow Amtrak's current six daily trains to travel at speeds as high as 100 mph, up from the current 79 mph, with the ultimate goal being a reduction in travel time between Chicago and St. Louis from the current five and a half hours to approximately four hours (*21*)."

A significant amount of planning is occurring for the Midwest Regional Rail Initiative (MWRRI), which is a nine-state effort to develop an implementation plan for a 3000 mile, high-speed rail system that is hubbed in Chicago. The plan is to develop the Midwest Regional Rail System (MWRRS) utilizing existing track for 110 mph high-speed rail operations. In addition to Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Nebraska, Ohio, and Wisconsin are also participating in the development of the MWRRS. According to the *Midwest Regional Rail System* study, the total capital investment is $4.1 billion, which includes $652 million for 66 trainsets (*23*). The following corridors spanning from Chicago include, with estimated total costs:

- Chicago-Detroit/Grand Rapids/Port Huron ($538 million);
- Chicago-Toledo-Cleveland ($724 million);
- Chicago-Indianapolis-Cincinnati ($394 million);
- Chicago-Champaign-Carbondale ($282 million);
- Chicago-Springfield-St. Louis ($285 million);
- Chicago-Quincy/Des Moines-Omaha ($487 million); and
- Chicago-Milwaukee-Minneapolis/Green Bay ($978 million) (*23*).

The Chicago area is currently served by an extensive commuter rail system operated by the Northeast Illinois Regional Commuter Railroad Corporation (Metra). The Metra system covers approximately 500 miles and serves 230 stations in the counties of Cook, DuPage, Lake, Will, McHenry, and Kane (*24*). In May 2003, the Federal Transit Administration provided $51 million in funding to Metra for three projects mostly focusing on service extensions and infrastructure improvements (*25*).

A major new initiative in the Chicago area is the Chicago Region Environmental and Transportation Efficiency Program (CREATE), which is designed to improve rail operations for both freight and passenger rail in the Chicago region. Chicago is one of the major freight rail hubs in the U.S. with over $350 billion moving through annually. As stated previously, Chicago also has an extensive passenger rail system including Amtrak and commuter rail services. The planned infrastructure improvements include:

- grade separations of six rail-rail crossings;
- grade separations of 25 highway-rail crossings; and
- improvements to rail connections, trackage, and crossovers.

The six rail-rail separations will reduce the conflict between passenger and freight trains. For passenger rail operations, the CREATE program will improve reliability, reduce travel times, and increase capacity. The CREATE program is a public-private partnership including local, state, and federal governments, and the freight and passenger railroads serving Chicago. The project is scheduled to take six years to complete at an estimated cost of $1.5 billion.

INDIANA

The four Amtrak long distance trains operating in Indiana include the Capitol Limited, Cardinal, Lake Shore Limited, and Three Rivers. A service between Chicago, IL, and Louisville, KY, with a stop in Jeffersonville called the Kentucky Cardinal was discontinued in July 2003. In fiscal year 2003 over 81,000 passengers traveled into and out of Indiana stations, with the three major stations located at Indianapolis, South Bend, and Waterloo. One shorter distance train, the Hoosier State, operates on the days that the Cardinal long distance train does not operate. Amtrak also indicates the Michigan corridor services from Chicago, IL operate through Indiana with stops at Hammond-Whiting and Michigan City (*26*). In an effort to preserve and create jobs, the Indiana Department of Transportation (IDOT) funded over $1 million for capital improvements at the Amtrak Beech Grove Maintenance Facility (*27*).

Indiana is part of the Midwest Regional Rail Initiative in cooperation with Amtrak, the Federal Railroad Administration, and eight other states. The system is hub-and-spoke design, with Chicago, IL acting as the major hub terminal. The overall MWRRI plan is to provide higher-speed trains primarily operating on existing rail corridors, with improvements benefiting both the freight and passenger operations. The most significant corridor for initial implementation in Indiana is the route from Chicago, IL, through Indianapolis to Cincinnati, OH, according to IDOT. Two additional corridors proposed in the plan include Chicago, IL-to-Cleveland, OH, and Chicago, IL-to-Detroit, MI.

A commuter rail service operates between Northern Indiana and Chicago, IL. The SouthShore Line is operated by the Northern Indiana Commuter Transportation District (NICTD) and has 12 stations located in Indiana. The NICTD owns approximately 130 miles of track and the rail equipment. Over 3.6 million riders utilized this commuter service in fiscal year 2000, according to IDOT (*28*).

IOWA

Amtrak operates two long distance trains through Iowa: the California Zephyr and the Southwest Chief. The California Zephyr train stops at Burlington, Mount Pleasant, Ottumwa, Osceola, and Creston; while the Southwest Chief train stops at Fort Madison. Total Iowa ridership in fiscal year 2003 was 47,442 passengers (*29*).

Iowa is one of nine Midwest states cooperating in the Midwest Regional Rail Initiative. The only corridor proposed through Iowa would operate between Chicago, IL, and Omaha, NE. There are three separate route alternatives that would traverse Iowa with potential stops at Quad Cities, Iowa City, and Des Moines. A 1998 study examining the three alternatives recommends that the Iowa Interstate Railroad route be developed to handle the "Moderate Scenario" (79/100-mph operations). This 479-mile alternative, including 314 miles in Iowa, would cost an estimated $263.93 million over the entire route, of which $195.55 are improvements to primarily benefit Iowa routes (*30*).

KANSAS

The Southwest Chief represents the only long distance Amtrak train through Kansas. It operates daily between Chicago and Los Angeles, with stops at Dodge City, Garden City, Hutchinson, Lawrence, Newton, and Topeka. The historic stations at Dodge City and Garden City were recently renovated at costs of $10 million and $1.2 million, respectively. According to Amtrak, the total Kansas ridership in fiscal year 2003 was 26,546 passengers (*31*).

At the directive of the Kansas Legislature, the Kansas Department of Transportation conducted a feasibility study to analyze the potential to expand Amtrak service in the state. The study, titled *Kansas Rail Feasibility Study*, performed an economic evaluation of six routes in the state. The only route achieving an operating ratio greater than 1.0 extended from Kansas City to Wichita, through Lawrence, Topeka, and Newton. Operating at speeds of 110 mph, the projected corridor costs were $219 million (in 1999 dollars) (*32*).

Investigations into commuter rail in Kansas revolve around two efforts focused in the Kansas City area. The first includes the potential for rail service from downtown Kansas City to the Olathe area, crossing through Wyandotte and Johnson counties. A major investment study completed in 1998 recommends the commuter rail option. A preliminary engineering study was completed in 2001. The second commuter rail effort in Kansas derived from the Mid-America Regional Council, which began a commuter rail feasibility study in 2000. The focus was on determining if commuter rail, operating on existing rail lines, would benefit the Kansas City regional transportation system. This multi-phased effort identified the Topeka-to-Lawrence-to-Kansas City corridor as the most promising line (*33*).

KENTUCKY

Two long distance Amtrak trains operate in Kentucky: the Cardinal and the City of New Orleans. Both services originate in Chicago. According to Amtrak, a third service, the Kentucky Cardinal, with service between Chicago and Louisville, discontinued service in July 2003. Including the Louisville ridership numbers, a total of 12,398 passengers passed through Kentucky stations in fiscal year 2003 (*34*).

In examining the Midwest Regional Rail System the *Kentucky Statewide Rail Plan* indicates the rail system will serve Louisville via Cincinnati, OH. The Commonwealth of Kentucky is not currently part of the MWRRI due to lack of funding but "reserves the right to reconsider its position if funding were to become available (*35*)."

An additional examination of passenger rail in Kentucky was the *Examination of I-75, I-64, and I-71 High-Speed Rail Corridors* published in 1999 by Wilbur Smith Associates. This study, discussed within the *Kentucky Statewide Rail Plan*, examined the potential for high-speed rail between Lexington, Louisville, and Covington. The estimated cost of the system was $5.48 billion (*35*).

LOUISIANA

Louisiana receives long distance train service by three Amtrak services, all of which pass through New Orleans. The Crescent operates daily between New Orleans, Atlanta, and New York; the City of New Orleans operates daily between Chicago, Memphis, and New Orleans; and the Sunset Limited operates tri-weekly between Orlando, New Orleans, and Los Angeles. With these services, over 182,000 passengers traveled into and out of Louisiana stations during fiscal year 2003 (*36*).

The federally designated Gulf Coast High-Speed Rail Corridor travels from Houston, TX, to New Orleans. Two routes travel from New Orleans, one to Atlanta, GA, and the other to Pensacola, FL. Studies conducted by the Southern Rapid Rail Transit Commission estimate the long-term improvements for the entire corridor at $4.6 billion over the next 20 years (*2*).

MAINE

Passenger rail service recently returned to Maine in December 2001, when the Downeaster rail service opened. Running four daily round-trips between Boston, MA and Portland, the service reached a ridership level at Maine stations of 185,023 riders in fiscal year 2003 (*37*). The 114-mile service, operated by Amtrak, operates over line owned by the Northern New England Passenger Rail Authority (NNEPRA). Created by the Maine legislature in 1995, the NNEPRA owns 78 miles of track between Plaistow, NH, and Portland and has spent $62 million to rehabilitate the track to accommodate the Downeaster service (*38*). An additional $6 million investment in infrastructure now allows the Downeaster to travel at 79 mph, and $4.5 million in scheduled improvements in spring 2005 will lead to another daily round-trip train (*39*). The annual operating subsidy to Amtrak is $2 million (*40*).

The corridor between Boston, MA, and Portland, currently served by the Downeaster, forms one of the Northern New England High-Speed Rail segments. The other travels from Boston, MA, to Montreal, Canada. Future plans to extend the existing service within Maine include traveling to Brunswick and west to Lewiston/Auburn. According to AASHTO, near-term expenditures are estimated at $52 million, while longer-term expenditures are estimated at $95 million. Equipment purchases make up $20 million of the long-term estimates (*2*).

MARYLAND

In addition to the services along the Northeast Corridor, Amtrak operates five long distance trains through Maryland. These include the Capitol Limited, Crescent, Palmetto, Silver Meteor, and Silver Star. Shorter distance trains operating through Maryland include the Carolinian and the Vermonter. The total Amtrak operations in Maryland account for approximately 90 trains per day and resulted in over 1.6 million riders into and out of Maryland stations in fiscal year 2003. The Baltimore station represents the 10th busiest station in the Amtrak system (*41*).

The state of Maryland also contracts with Amtrak to operate commuter trains for the Maryland Rail Commission. The MARC train system is made up of three major lines that all travel to Washington, DC:

- Brunswick Line – from Washington, DC to Martinsburg, WV, with a branch to Frederick;
- Camden Line – from Washington, DC to the Baltimore Camden Station; and
- Penn Line – from Washington, DC to the Baltimore Penn Station, with extension services to Perryville.

According to Amtrak, they and Maryland participate in a shared capital agreement; one that is expected to result in over $40 million in expenditures in the state of Maryland in fiscal year 2004 (*41*).

Maryland is also currently involved in investigating magnetic levitation (Maglev) service between Baltimore and Washington, DC. Project team members include the Maryland Department of Transportation, Washington, DC, Baltimore City, Baltimore County, and Maryland Transit Administration. The 40-mile project was named one of two finalists for future development by the Federal Railroad Administration's Maglev Deployment Program. If chosen, the project could receive as much as $950 million. The estimated cost of the project is $3.74 billion (2002 dollars), which includes the guideway, three underground stations, a maintenance facility, substations, transformers and other electrical distribution facilities, and three parking structures (*42*).

MASSACHUSETTS

Amtrak operations in Massachusetts include the Northeast Corridor, one long distance train (Lake Shore Limited), and two shorter distance trains (Downeaster and Vermonter). Combined, these services result in approximately 56 trains per day and over 1.8 million total Massachusetts ridership. Over one million of that is through the two Boston stations where the Boston South station is the eighth busiest station in the Amtrak system. Mayor Thomas Menino of Boston sits on the Amtrak Mayor's Advisory Council. In addition, Amtrak indicates they operate and maintain the 37.9-mile Massachusetts Bay Transit Authority (MBTA)-owned Attleboro Line, between Boston and the Rhode Island state line for high-speed service (*43*).

Boston is the major hub for the Northern New England High-Speed Rail Corridor. One segment of the corridor currently travels from Boston-to-Portland, ME (114 miles); while the other is planned to travel between Boston and Montreal, Canada (325 miles). The states of New Hampshire, Vermont, and Massachusetts completed a Phase I study for the Boston to Montreal segment. The study, published in April 2003, discussed institutional and policy issues, preliminary ridership projections, and inventory of current conditions. A Phase II study would analyze detailed operational characteristics and projected capital and operational costs and revenues (*44*).

MICHIGAN

Michigan currently receives daily round-trip Amtrak service on the Chicago to Detroit route from the Lake Cities, Twilight Limited, and Wolverine trains. Two additional Amtrak trains in Michigan are the International, which operates daily between Chicago, East Lansing, Port Huron, and Toronto, and the Pere Marquette, which operates daily between Chicago and Grand Rapids. Total Michigan ridership in fiscal year 2003 was 518,461 passengers. Dearborn Mayor Michael Guido actively participates on the Amtrak Mayor's Advisory Council (*45*).

Both the International, now called the Blue Water Line after Amtrak ceased operation to Canada, and the Pere Marquette receive support from the state of Michigan through the Amtrak 403b program. The state currently provides $7.1 million annually to Amtrak to support both lines, up from $2 million in 2000 and $5.7 million in 2001 (*46*). However, this subsidy appears to be a significant issue for the 2005 state budget due to the inclusion of a provision to provide equal funding levels to Amtrak and bus companies. Both of the state-supported routes experienced increased ridership between September 2003 and August 2004, with the Pere Marquette experiencing an 11 percent increase and the Blue Water Line experiencing a 7.7 percent increase (*47*).

The longest stretch of track owned by Amtrak outside the Northeast Corridor is the 97-mile segment between Porter, IN, and Kalamazoo, on the route between Detroit and Chicago. Amtrak owns one-third of the track, while Norfolk Southern and CSX railroads own the remainder (*47*). Amtrak, in partnership with the Federal Railroad Administration and the state of Michigan, has implemented a new train communication system along this segment that is currently under high-speed revenue service. The goal, according to Amtrak, is to reduce the travel time between Detroit and Chicago to three and a half hours versus the current six hours (*45*).

Michigan is one of the nine states participating in the Midwest Regional Rail Initiative. The major corridor serving Michigan is the Chicago, IL, to Detroit corridor, with extensions to Pontiac, Grand Rapids, Holland, and Port Huron. This corridor is considered one of the three leading corridors in the MWRRI. Current and near-term plans call for $640 million in capital improvements for the corridor. The $540 million in near-term improvements, which includes the extension routes, calls for $160 million in rolling stock and $380 million in infrastructure

investments. These improvements would lead to 10 daily trips, up from the current three, and operating speeds of 100 mph. The Michigan Department of Transportation would pay for the improvements if the MWRRI is implemented (*2*).

There has been an effort to study the potential for commuter rail service between Lansing and Detroit. In 1999, the Michigan Department of Transportation contracted with the Capital Area Transportation Authority (CATA) to commission a study of the service. CATA served as the lead agency and project director for the study, which was paid for with $100,000 of state funds, $500,000 of federal funds, and a local match of $25,000 paid for by CATA (*48*). The 98-mile segment would require $85 million before passenger service could begin, including $5 million for federal compliance, railroad negotiations, professional services, and start-up costs; and $80 million for capital costs for the construction of stations, rolling stock, maintenance facilities, and railroad infrastructure (*49*).

MINNESOTA

Amtrak service in Minnesota is limited to the Empire Builder long distance train that travels daily between Chicago, IL, St. Paul/Minneapolis, and Seattle, WA/Portland, OR. Total Minnesota ridership through the six stations was 159,209 passengers in fiscal year 2003. The busiest station is the Midway Station in St. Paul-Minneapolis with 116,967 passengers (*50*).

Currently, Minnesota is actively pursuing and planning for several passenger rail alternatives, including high-speed rail, the Midwest Regional Rail Initiative, and multiple commuter rail routes with Minneapolis-St. Paul as the hub. A feasibility study examining high-speed rail between the Minneapolis-St. Paul International Airport and Rochester International Airport was completed in January 2003. The selected route examined the costs and benefits for three technologies: non-electrified (150 mph), electrified (180 mph), and maglev (300 mph). The infrastructure costs for the 85-mile route varies from $768.7 million (150 mph) to $5.565 billion (300 mph). The total costs and the benefit/cost ratio for the three technologies are $1.568 billion and 1.35 (150 mph), $1.823 billion and 1.38 (180 mph), and $6.927 billion and 0.56 (300 mph) (*51*).

The high-speed rail segment between Minneapolis-St. Paul and Rochester could make up the rail operations for the MWRRI corridor between Chicago, IL, Milwaukee, WI, and Minneapolis. This MWRRI corridor includes an extension from Milwaukee, WI, to Green Bay, WI. The MWRRI vision for the 595-mile corridor is to provide 100-mph rail service over the route to Minneapolis and six daily round trips between Madison, WI, and Minneapolis and 10 round trips between Chicago, IL, and Madison, WI. AASHTO lists the near-term corridor needs as $230 million for rolling stock and $450 million for infrastructure improvements (*2*).

Commuter rail activities began when the 1997 Minnesota Legislature directed the Minnesota Department of Transportation to determine the feasibility of commuter rail service for the Minneapolis-St. Paul metropolitan area. The subsequent study found six corridors proved feasible out of 19 rail corridors studied. Those six corridors were divided into two tiers, with the Tier One corridors representing the highest priority. The three Tier One corridors are:

- Northstar Corridor (St. Cloud/Rice Area to Minneapolis),
- Red Rock Corridor (Hastings to Minneapolis through St. Paul), and
- Dan Patch Corridor (Minneapolis to Northfield).

The Northstar and Red Rock Corridors are now included into the *Metropolitan Council's 2025 Transitways Plan*, while the 2002 Legislature prohibited the Dan Patch Corridor from further work (*52*).

The Northstar Corridor represents the most advanced corridor and consists of an initial 40-mile line with six stations and eventually 82 total miles with 11 rail stations. The estimated cost for the entire corridor is $302 million, 50 percent of which is projected to come from the federal government (*53*). The federal money would be available if the local governments raise the remaining 50 percent, or $151 million. This is planned to include $123.2 million in state bonding and $27.8 million from local governments (*54*). The benefit/cost ratio for the corridor is estimated as 1.15, according to a March 2003 study (*55*).

MISSISSIPPI

Amtrak operates three long distance trains through Mississippi: the City of New Orleans, the Crescent, and the Sunset Limited. Combined total Mississippi ridership in fiscal year 2003 was 77,717 passengers. Mayor Susan Boone Vincent of Laurel participates on the Amtrak Mayor's Advisory Council (*56*).

Mississippi participates in the Southern Rapid Rail Transit Commission, which oversees and coordinates planning for the Gulf Coast High-Speed Rail Corridor. The corridor travels from Houston, TX, to New Orleans, before branching into two segments. One segment heads to Florida through Mobile, AL, while the other heads to Atlanta, GA, through Meridian. Each segment of the Gulf Coast High-Speed Rail Corridor currently has Amtrak long distance service.

MISSOURI

Two long distance Amtrak trains and three additional shorter distance trains operate in Missouri. The two long distance trains are the Southwest Chief and the Texas Eagle. The State House train travels between Chicago and St. Louis daily and is supported by the state of Illinois. The two other trains, the Ann Rutledge and Missouri Mule, travel between St. Louis and Kansas City on a daily round-trip schedule (*57*). The Missouri Mule and Ann Rutledge trains are both supported by the state of Missouri through the Amtrak 403(b) program. Recent state contributions for the services equaled $6.2 million. However, the Missouri Legislature has only budgeted $5 million for fiscal years 2003 and 2004. An additional $800,000 was distributed to Amtrak in April 2003, but the funding levels in the future for Amtrak remain unclear for Missouri (*58*). Without state contributions, the two services will be unable to financially continue.

The Midwest Regional Rail System locates passenger rail service between Kansas City and St. Louis, which is the route of the Missouri Mule and Ann Rutledge trains. The MWRRI estimates upgrades to the route to cost $332 million over the next 20 years. This would ensure operating speeds of 79 mph (*59*). This corridor would link with the segment between Chicago and St. Louis.

One project recently completed, with funding from the federal Surface Transportation Program and Amtrak, is a new $4.6-million passenger ticketing and boarding facility opened in Kansas City in 2002. According to Amtrak this new facility includes baggage check-in and ticketing counter, a 2000-square foot waiting room featuring five of the original wooden benches from the station's north waiting room, and an elevated walkway that leads to stairs and elevators providing access to the boarding area (*57*).

Lee's Summit's Mayor Karen Messerli is an active member of the Amtrak Mayor's Advisory Council.

MONTANA

Current Amtrak operations in Montana include the Empire Builder route, which travels daily from Chicago to Seattle, WA/Portland, OR, with stops at 12 Montana stations. Two of the stations are seasonal in nature: Browning (winter only) and East Glacier (summer only). Total Montanan ridership was 122,053 riders in fiscal year 2003 (*60*). A recent R.L. Banks & Associates study commissioned by the state of Montana indicates the Empire Builder contributes approximately $13 million annually in readily quantified benefits to the state, plus some additional secondary and tertiary benefits (*61*).

The *2000 Montana State Rail Plan Update* lists several efforts to increase passenger rail in Montana, including collecting transportation surveys, holding stakeholder groups, and receiving plans from passenger rail advocacy groups. Most of the interest revolves around providing rail service to the southern parts of Montana. The Montana/Wyoming Association of Railway Passengers proposed a new passenger rail system from Denver, CO, to Spokane, WA, passing through Missoula, Helena, Bozeman, Livingston, and Laurel (*62*).

NEBRASKA

Only one Amtrak long distance train traverses Nebraska. The California Zephyr runs daily from Chicago, IL, to Oakland, CA, through Denver, CO, and Salt Lake City, UT. Stations located in Nebraska include Hastings, Holdrege, Lincoln, McCook, and Omaha. Total Nebraska ridership was 37,084 passengers in fiscal year 2003 (*63*).

The Midwest Regional Rail Initiative considers Omaha a key destination on the rail network. The route to Omaha would travel from Chicago, IL, through Princeton, IL, Iowa City, IA, and Des Moines, IA.

The Nebraska State Legislature in 1999 created the Nebraska Transit and Rail Advisory Council, which commissioned a study completed in December 2003 titled, *Nebraska Transit Corridors Study*. The study analyzed the use of commuter rail, bus rapid transit, and a combination of both technologies to serve between Lincoln and Omaha, Fremont and Omaha, and Blair and Omaha. The only portion of rail considered was between Omaha and Lincoln. The estimated capital costs of the rail service are $79 million (*64*). The study evaluation indicated a less favorable option with commuter rail than the services solely utilizing bus rapid transit.

NEVADA

The California Zephyr long distance Amtrak train operates through Nevada, with stops at Elko, Reno, Sparks, and Winnemucca. Total Nevada ridership in fiscal year 2003 was 87,622 passengers (*65*).

In addition, Amtrak works with Key Holidays, a tour operator, to operate special trains between the San Francisco Bay Area, Sacramento, and Reno during the months of January, February, and March of each year. This service, known as "Fun Trains" and "Snow Trains" is designed to attract persons to winter-month activities near Lake Tahoe during winter months when other means of transport are often hindered or severed. Amtrak served an additional 25,330 passengers on these special trains (*65*).

According to Amtrak, "the Regional Transportation Commission of Southern Nevada is working with the states of Nevada and California, Amtrak, freight railroads, and marketing partners to study the feasibility and cost of five times a day intercity rail corridor service between Las Vegas and Los Angeles with a four-hour trip time (*65*)."

NEW HAMPSHIRE

Two shorter distance Amtrak trains operate within New Hampshire: the Downeaster and the Vermonter. The Downeaster operates four round trips between Portland, ME, and Boston, MA, and the Vermonter operates between Washington, DC, and St. Albans, VT. The fiscal year 2003 New Hampshire ridership for these two services was 83,784 passengers (*66*).

New Hampshire is part of the Northern New England High-Speed Rail Corridor, which has two branches, both of which travel through New Hampshire. The existing Downeaster service from Boston, MA to Portland, ME represents one component, while a second segment is planned from Boston, MA to Montreal, Canada, through Nashua, Concord, and Manchester (*2*).

NEW JERSEY

Approximately 110 Amtrak trains per day operate in New Jersey, predominately those on the Northeast Corridor. Five long distance and three shorter distance trains also operate within New Jersey. The five long distance trains include the Crescent, Palmetto, Silver Meteor, Silver Star, and Three Rivers, all of which provide daily services. Additional daily services include the Carolinian, the Pennsylvanian, and the Vermonter. Total New Jersey ridership was almost 3.8 million in fiscal year 2003, with Newark, Princeton Junction, and Trenton comprising over three million alone. According to Amtrak, Newark is the fifth busiest station, Princeton Junction is the ninth busiest station, and Trenton is the seventh busiest station in the Amtrak system. Mayor Sharpe James of Newark serves on the Amtrak Mayor's Advisory Council (*67*).

NJ TRANSIT operates the extensive commuter rail system in New Jersey. NJ TRANSIT is the nation's largest statewide public transportation system. The rail system consists of 11 commuter rail lines and two light-rail lines, with the commuter lines traveling over 530 miles of track, serving 161 stations, and accommodating almost 60 million passengers annually (*68*). NJ TRANSIT also operates lines into New York under contract with the Metropolitan Transportation Authority.

NEW MEXICO

The three Amtrak trains operating in New Mexico are the Southwest Chief, Sunset Limited, and Texas Eagle. Total New Mexico ridership was 92,307 passengers in fiscal year 2003. The stations in New Mexico are located in Albuquerque, Deming, Gallup, Lamy, Las Vegas, Lordsburg, and Raton. Amtrak indicates a $1-million renovation project on the 1900-era station located in Las Vegas was completed in 2003 (*69*).

Considerable interest exists in New Mexico to connect many of the major communities via commuter rail, especially those along the north-south running I-25 corridor that includes Albuquerque and Santa Fe. Approximately 50 percent of the state's population lives along this corridor. The current proposal for commuter rail service from Governor Bill Richardson would have service between Belen, which is about 30 miles south of Albuquerque and Bernalillo, which is about 16 miles north of Albuquerque. The service is planned to eventually extend north to Santa Fe, which is approximately 65 miles. Projected start dates for the first phase are November 2005 and fall 2008 for the extension to Santa Fe. The State Transportation Commission approved $75 million for the project in July 2004 (*70*). The service would operate over track owned and operated by Burlington Northern Santa Fe Railway, which signed a memorandum of understanding with the state in October 2004 regarding the service (*70*). In addition to the agreement with BNSF, the state is negotiating with Bombardier Transit for 10 passenger railcars to be used during the first phase. One source indicates the railcar purchase will cost $23 million (*71*).

NEW YORK

Approximately 140 trains operate daily in New York, including service by seven long distance trains and six shorter distance trains. The long distance trains include:

- Cardinal,
- Crescent,
- Lake Shore Limited,
- Palmetto,
- Three Rivers,
- Silver Meteor, and
- Silver Star;

while the shorter distance services include:

- Adirondack,
- Carolinian,
- Ethan Allen Express,
- Maple Leaf,
- Pennsylvanian, and
- Vermonter.

Combined, these trains served over 10 million passengers with the New York Penn Station representing the busiest Amtrak station (*72*).

The state of New York supports intercity rail by subsidizing the Adirondack service through the 403(b) program and the Empire Corridor through infrastructure and rolling stock investments. The Adirondack service travels from New York to Montreal, Canada, through Albany. The subsidy level from the New York Department of Transportation was $2.7 million in 2001 (*73*).

The Empire Corridor travels from New York through Albany to Buffalo, with several of the Amtrak services listed above travel over this corridor. The corridor consists of track owned by CSX Railroad between Buffalo and Poughkeepsie and Metro North Commuter Railroad and Amtrak over the 75-mile segment between New York City and Poughkeepsie. New York has actively improved the Empire Corridor since the 1970s, with service between New York City

and Albany operating at 110 mph since 1979. Through fiscal year 2001-2002, state and other investments totaled over $362 million, with the breakdown as follows:

- State Infrastructure Investment: $129 million,
- Other Infrastructure Investment: $185 million,
- State Equipment Investment: $23 million, and
- Other Equipment Investment: $25 million (*2*).

In an effort to upgrade the corridor the state chose to redirect $100 million of its TEA-21 Congestion Mitigation Air Quality funding for improvements (*2*). The Empire Corridor passes through all six of the non-attainment MPOs in New York.

In 1998, the state of New York unveiled a $185-million program to upgrade the Empire Corridor and the Turboliner trainsets. The program was a partnership with Amtrak and the New York Department of Transportation. A series of problems and delays led to virtually no improvements and a major conflict between the state and Amtrak. For infrastructure improvements, efforts to double-track a section was delayed because CSX would have to pay higher property taxes due to the improvements. A tax exemption for the company took two years to secure. The major issue at this point is the conflict between the state and Amtrak, both with infrastructure improvements and the planned improvements to the Turboliner trainsets scheduled to be upgraded to operate at the planned 125 mph. Since the program was signed, Amtrak has stopped investing in infrastructure other than those owned by Amtrak. *The New York Times* indicates the state and federal government have invested $70 million into the project, while Amtrak has invested almost nothing. Regarding the Turboliners, only three of the seven trainsets have been modified, and because of additional problems none are in service. Amtrak has since towed the three trainsets to Delaware for maintenance. However, state officials are accusing the railroad of stealing the Turboliners. With the program at a standstill, New York has filed suit against Amtrak for breach of contract. The lawsuit asks the railroad to "fulfill its contract or pay $477 million, which is the cost to run the trains over the next 15 years and the financial losses the state said it would incur with Amtrak's pulling out (*74*)."

In addition to the intercity passenger rail services, the two most utilized commuter rail operations exist in New York State. Operated by the Metropolitan Transportation Authority, the Long Island Rail Road (LIRR) and the Metro-North Railroad serve the New York City metropolitan region. The LIRR is the busiest commuter line in the U.S. The system comprises

over 700 miles of track and 124 stations. Operating 730 daily trains, the LIRR serves around 81 million passengers each year (*75*). The Metro-North Railroad is the second largest commuter railroad in the U.S. with 384 route miles and 775 miles of track. With 120 stations on the system, the Metro-North Railroad serves approximately 73 million passengers annually (*76*).

NORTH CAROLINA

Chapter 2 discusses North Carolina in detail.

NORTH DAKOTA

One long distance Amtrak train operates through North Dakota. The Empire Builder train, which travels from Chicago to Seattle, WA/Portland, OR, transported almost 83,000 passengers into and out of North Dakota stations in fiscal year 2003. According to Amtrak, ridership on the Empire Builder in North Dakota increased by approximately 22 percent. Fargo Mayor Bruce Furness participates on the Amtrak Mayor's Advisory Council (*77*).

OHIO

The four long distance Amtrak trains operating in Ohio include the Capitol Limited, Cardinal, Lake Shore Limited, and Three Rivers. The combined Ohio ridership was 129,580 passenger in fiscal year 2003. The two busiest Ohio stations were Toledo, with 52,252 passengers, and Cleveland, with 38,199 passengers (*78*).

There is considerable planning activity within Ohio for three high-speed rail projects, all of which would link to each other when fully completed. These projects include the Midwest Regional Rail Initiative, Cleveland-Columbus-Cincinnati High-Speed Rail Study (3C), and the Ohio & Lake Erie Regional Rail Ohio – Hub Study (Ohio Hub). All three studies focus on high-speed rail operating at 110 mph. Ohio joined the MWRRI in 2002, with both Cleveland and Cincinnati key destinations for the Midwest Regional Rail System. The corridor to Cleveland would travel from Chicago, IL, through South Bend, IN, and Toledo. The planned corridor to Cincinnati would travel from Chicago, IL, through Indianapolis, IN.

The Ohio Rail Development Commission (ORDC) has been the driving force for the 3C and the Ohio Hub studies. Completed in July 2001, the Cleveland-Columbus-Cincinnati High-Speed Rail Study examines a corridor from Cincinnati to Cleveland that travels through Dayton, Springfield, and Columbus over existing rail infrastructure. Incremental improvements for the corridor necessary to operate the service are estimated at $711 million, which includes $66.5 million for trainsets and would result in a benefit-to-cost ratio of 1.42 (*79*). The 3C corridor would connect with the MWRRS at Cincinnati and Cleveland.

The Ohio & Lake Erie Regional Rail – Ohio Hub Study is a multiple-route network of high-speed rail corridors with Cleveland as the hub. One of the major features of this system is the interconnection with other systems, such as the proposed Cleveland-Columbus-Cincinnati High-Speed Rail Corridor (which is actually included as part of this system), the proposed Midwest Regional Rail System, the Keystone Corridor in Pennsylvania, the Empire Corridor in New York, and the VIA Rail Corridor in Canada. The Keystone and Empire Corridors connect to the Northeast Corridor which runs along the East Coast between Boston and Washington, DC. The study indicates that combining all these systems would serve over 140 million people or about half the population of the United States (*80*).

With Cleveland as the hub, the four corridors examined in this study include:

- Cleveland – Columbus – Dayton – Cincinnati (the 3C HSR Corridor);
- Cleveland – Toledo – Detroit, MI;
- Cleveland – Pittsburgh, PA; and
- Cleveland – Buffalo, NY – Niagara Falls, NY – Toronto, Canada.

In total, the system consists of an 860-mile service with 32 stations in four states and Canada. The estimated capital investment requirements for the entire system are $3.3 billion, which includes $322 million for rolling stock *(80)*.

OKLAHOMA

Amtrak service in Oklahoma is from the Heartland Flyer train, which travels daily between Oklahoma City and Fort Worth, TX. The stops within Oklahoma include Ardmore, Norman, Oklahoma City, Pauls Valley, and Purcell. Total Oklahoma ridership was 48,841 passengers in fiscal year 2003 (*81*).

Amtrak operates the Heartland Flyer service under contract with the state of Oklahoma. Amtrak indicates Oklahoma contributed funds for capital upgrades to the BNSF tracks in Oklahoma. AASHTO indicates the annual state expenditures for the Heartland Flyer service are $6 million. In addition, the city of Ardmore undertook a $1.34-million renovation project on their station. Officials dedicated this project on June 12, 2003 (*81*).

Oklahoma is included in the South Central High-Speed Rail Corridor, along with Texas and Arkansas. The planned corridor stretches between San Antonio, TX, and Fort Worth, TX, before branching to Texarkana and Little Rock, AR, with one segment, and to Oklahoma City and Tulsa with the other segment. The segment between Oklahoma City and Tulsa is planned for 150-mile per hour service at an estimated cost of $801 million (*2*).

Additional passenger rail activities in Oklahoma seem to revolve around expansion to connect to additional nationwide systems. One option is to extend the South Central Corridor from Tulsa to Kansas City, MO, and connect with the Midwest Regional Rail System. The cost projections for this extension are $254 million (*2*). A proposal by State Senator Dave Herbert calls for an extension of the Heartland Flyer north to Newton, KS, where it could connect with an additional cross-country Amtrak service.

OREGON

As part of the Pacific Northwest Rail Corridor, Oregon is discussed in detail within Chapter 2.

PENNSYLVANIA

Chapter 2 discusses Pennsylvania in detail.

RHODE ISLAND

Over the Northeast Corridor, Amtrak operates approximately 34 daily trains and serves three Rhode Island stations. These stations include: Kingston, Providence, and Westerly. Total Rhode Island ridership in fiscal year 2003 was 528,584 passengers *(82)*.

Additional rail service in Rhode Island comes from the Massachusetts Bay Transportation Authority's (MBTA) Attleboro/Stoughton commuter line to Boston. Providence acts as the last stop on the route.

SOUTH CAROLINA

Amtrak operates the following four, daily long distance trains in South Carolina: Crescent, Palmetto, Silver Meteor, and Silver Star. The combined South Carolina ridership in fiscal year 2003 was 170,279 riders. The busiest station was Charleston with 60,311 passengers, followed by Florence (31,406) and Columbia (25,360) *(83)*.

The federally designated Southeast High-Speed Rail Corridor passes through Virginia, North Carolina, South Carolina, and Georgia. The two branches that traverse South Carolina travel from Charlotte, NC, to Atlanta, GA, through Greenville in the upper part of the state (Upstate Route) and from Raleigh, NC, to Savannah, GA, through Columbia in the center of the state (Central Route). In 1999, the South Carolina Transportation Commission passed a resolution to support the SEHSR but is interested in expanding the system to coastal communities such as Charleston and Myrtle Beach. Part of the corridor development in South Carolina includes improving grade crossings safety. South Carolina spent $5.9 million in grade crossing protection improvements over a 10-year period for the two routes *(84)*.

South Carolina has also investigated the use of abandoned rail rights-of-way for use for the SEHSR. One example of acquiring these abandoned lines is Greenville County's acquisition of three abandoned lines that could potentially be used to provide passenger rail service into downtown Greenville *(84)*.

The Upstate Route contains 205 miles of track in South Carolina, and the Central Route contains 122 miles of track. To obtain the desired 110 mph high-speed operations, estimated improvements are $145 million for the Upstate Route and $742 million for the Central Route *(85)*. These costs do not include rolling stock.

SOUTH DAKOTA

Amtrak currently does not serve South Dakota. There are no current state passenger rail initiatives.

TENNESSEE

Amtrak serves two stations, Memphis and Newbern-Dyersberg, with the City of New Orleans long distance train. This daily service resulted in a total ridership of 46,102 passengers in fiscal year 2003. Mayor Willie Herenton of Memphis participates on the Amtrak Mayor's Advisory Council (*86*).

The *Tennessee Rail System Plan* indicates that "the creation of a network of passenger rail lines linking Tennessee's major cities and towns to each other, as well as to regional destinations beyond the Volunteer State's borders, could form the backbone of a new ground-based transportation network (*87*)." Through the rail planning process, the four most promising corridors identified, with estimated capital costs, in the rail plan are:

- Memphis-Nashville ($93.7 million);
- Louisville-Nashville-Chattanooga ($144.3 million);
- Chattanooga-Knoxville-Bristol ($121.7 million); and
- Nashville-Knoxville-Bristol ($115.7 million) (*87*).

The capital costs include track and signal improvements, passing sidings, stations, rolling stock, and maintenance facilities. The corridor with the greatest calculated value and the highest benefit-to-cost ratio is the Louisville-to-Chattanooga corridor. For the corridor, the net present value is $80 million, and the benefit-to-cost ration is 1.29. The Memphis-to-Nashville (1.11) and Nashville-to-Bristol (1.07) corridors both provide viable opportunities. The Chattanooga-to-Bristol corridor produced a ratio of 0.64.

The Nashville area is currently examining commuter rail service. The five corridors connecting to downtown Nashville include:

- Northeast: Briley Parkway-Hendersonville-Gallatin;
- East: Hermitage-Mt. Juliet-Lebanon;
- Southeast: Hickory Hollow-LaVergne-Smyrna-Murfreesboro;
- South: Brentwood-Cool Springs-Franklin; and
- West: Belle Meade-Bellevue-Kingston Springs.

The East Corridor is in the most advanced planning stage. The 32-mile corridor between Nashville and Lebanon is estimated to cost $40 million. A $7.6-million contract to begin track

improvement was administered by the Regional Transportation Authority. Service on the corridor is set to begin in late 2005 (*88*).

TEXAS

Amtrak currently operates one corridor train and two long-distance trains in Texas. The Heartland Flyer is the corridor train, which operates daily between Fort Worth and Oklahoma City, OK through Gainesville. The long-distance trains are the Sunset Limited and the Texas Eagle. The Sunset Limited operates three times weekly between Orlando, FL, and Los Angeles, CA. The Texas Eagle operates daily between Chicago, IL, and San Antonio where it connects to the Sunset Limited for service to Los Angeles, CA (*89*).

Ridership in Texas for 2003 totaled 246,469. The major stations in Texas in terms of ridership include Fort Worth (64,247), San Antonio (44,682), Dallas (31,981), Longview (20,720), Marshall (19,661), and Austin (18,646). In fiscal year 2003, Amtrak expended $8,091,250 for goods and services in Texas, with the majority spent in Fort Worth ($4,004,147). A total of 197 people were employed by Amtrak in Texas, with wages totaling $7,794,059 in calendar year 2003. Fort Worth Mayor Kenneth Barr is an active member of Amtrak's national Mayor's Advisory Council (*89*).

Texas has developed a *Draft Texas Rail System Plan* that addresses freight and passenger rail within the state. Within the discussions related to Amtrak service, several potential service enhancements are discussed. These include:

- implementation of daily service on the Sunset Limited route and improvements to track for increased speed and improved reliability;
- rerouting of the Sunset Limited route from Houston to Dallas-Fort Worth to El Paso in order to reintroduce service between Houston and Dallas and add several mid-sized markets;
- development of a San Antonio-Laredo-Monterrey, Mexico service;
- creation of a passenger rail link between Dallas-Fort Worth and Meridian, MS; and
- implement service between Fort Worth to Denver, CO (*90*).

It should be noted that the likelihood of implementing these possible enhancements is undetermined. Several of these potential changes were proposed by Amtrak's previous management team and have not been pursued by its new leadership. Others are local initiatives to improve service to areas of the state where no current Amtrak service exists.

Texas currently has one operational intercity commuter rail service and two other planned services. The Trinity Railway Express (TRE) service is a joint effort between the Dallas Area Rapid Transit (DART) and the Fort Worth Transportation Authority (the "T"). The TRE service covers 35 miles between Dallas and Fort Worth, serving nine permanent stations and one special event station at the American Airlines Center. Ridership on the TRE reached 2.29 million in 2003 (*91*).

The most examined commuter rail service is scheduled between Georgetown, just north of Austin, and San Antonio, through the fastest growing region in the state. The feasibility study performed in 1999 concluded that "commuter rail in the corridor was both technically and financially feasible based upon the premise that a new, second track would be constructed for the commuter rail service in the existing Union Pacific freight rail right-of-way alongside the existing track for much of the corridor (*90*)." The estimated cost of the service was $475 million in 1998 dollars. The other commuter rail service under consideration is between Houston and Rosenberg. The 27-mile route would serve some of the fastest growing areas in the Houston metropolitan region, such as Sugar Land, Richmond, and Rosenberg.

Texas has two federally-designated high-speed rail corridors. The Gulf Coast High Speed Rail Corridor heads east from Houston to New Orleans, LA, where two separate branches stretch to Mobile, AL, and eventually to Jacksonville, FL, and Atlanta, GA. The second corridor is the South Central High Speed Rail Corridor. This corridor is planned to travel between San Antonio and Fort Worth before branching to Little Rock, AR, with one segment, and to Oklahoma City, OK, and Tulsa, OK, with the other segment. In Texas, these corridors follow the currently available Amtrak intercity passenger rail service.

Texas is moving forward in the implementation of the Trans Texas Corridor. This conceptual network consists of over 4,000 miles of transportation corridors crossing the state. Each corridor is planned to not only contain highway lanes that would separate vehicular traffic from truck traffic, but also six rail lines, with one line in each direction for high-speed rail, freight rail, and commuter rail (*90*). The initial concept designates several priority routes, which include corridors that have existing Amtrak service and that follow the federally-designated high-speed rail corridors.

UTAH

Amtrak's California Zephyr train serves Utah with daily service to the following stations: Green River, Helper, Provo, and Salt Lake City. The total ridership in Utah for fiscal year 2003 was 31,614 passengers, with Salt Lake City (25,886) representing the busiest Utah station (92).

The Utah Transit Authority is attempting to bring passenger rail to Wasatch Front with the purchase of 175 miles of railroad right-of-way from the Union Pacific Railroad for $185 million in 2002. The agreement between the state and UP allows for a perpetual easement on the rail lines for freight operations, exclusively by UP. The Utah Transit Authority long-term plans for commuter rail operations are between Brigham City to Payson. The first phase is a 40-mile service between Ogden and Salt Lake City with an estimated $350 – $450 million first phase cost (93).

VERMONT

The state of Vermont actively supports the operation of two Amtrak services: the Vermonter and the Ethan Allen Express. The Vermonter travels between Washington, DC, and St. Albans, while the Ethan Allen Express travels between New York, NY, and Rutland. The total ridership in Vermont for fiscal year 2003 was 70,507 passengers (*94*). Amtrak operates the two services with a contract through the Vermont Department of Transportation (VTrans), with annual funding from an annual state appropriation. According to VTrans "the annual subsidy is based on the state paying the fully allocated costs over and above the revenues generated by ticket and food and beverage sales on the trains. The net costs are determined through a process referred to as the Route Contribution Analysis (RCA) (*95*)." During a Vermont Rail Council meeting, the contract amount was stated as $2.3 million for fiscal year 2004 (*96*).

In addition to track upgrade support, several entities, including the Vermont Chambers of Commerce, support marketing both Amtrak train services. For the Ethan Allen Express service, Amtrak joins forces with several private ski resorts to provide transportation from New York to ski destinations in Vermont. Amtrak indicates that several resorts provide shuttle bus services from the train station in Rutland to the resorts (*94*).

Vermont is the lead entity studying the Northern New England High-Speed Rail Corridor segment between Boston, MA, and Montreal, Canada. The federally designated corridor also has a segment from Boston, MA, to Portland, ME. The Boston-to-Montreal segment consists of 325 miles of track that would travel through communities such as White River Junction, Burlington, and St. Albans.

VIRGINIA

Chapter 2 discusses Virginia in detail.

WASHINGTON

As part of the Pacific Northwest Rail Corridor, Washington is discussed in detail within Chapter 2.

WEST VIRGINIA

Amtrak operates two long distance trains daily, which serve nine West Virginia stations. The Capitol Limited and the Cardinal accounted for a total fiscal year 2003 ridership of 50,838 passengers. The Capitol Limited is a daily service between Washington, DC, Martinsburg, WV, Pittsburgh, PA, and Chicago, IL. The Cardinal is a tri-weekly service between New York, NY, and Chicago, IL, while passing through the southern part of the state *(97)*.

The Maryland Rail Commuter service operates weekdays between Martinsburg and Washington, DC. Other West Virginia stations include Harpers Ferry and Duffields.

WISCONSIN

Two Amtrak train services operate in Wisconsin. The Empire Builder is a daily long distance service between Chicago, IL, and Seattle, WA/Portland, OR, with stops at Columbus, Portage, Wisconsin Dells, Tomah, and La Crosse. The other service is the Hiawatha train, which runs seven round-trips daily between Milwaukee and Chicago, IL. The total Wisconsin ridership was 497,291 passengers in fiscal year 2003 (*98*). The Hiawatha service is a joint partnership with the state of Illinois under contract with Amtrak. Under the one-year contract that ended June 2004, the state of Wisconsin paid approximately $5.1 million for the Hiawatha service (*99*).

Wisconsin participates in development of the Midwest Regional Rail System. As previously stated, the MWRRS is a proposed 3000-mile passenger rail system with Chicago, IL, as the major hub. For Wisconsin the MWRRS would connect Chicago, IL, with Milwaukee, Madison, and St. Paul, MN, and Chicago, IL, with Milwaukee and Green Bay. Planned improvements include over $1.4 billion in infrastructure and rolling stock investments (*2*). Wisconsin is investigating expanding the MWRRS to include additional stops in Eau Claire, Menomonie, and Hudson in the West Central part of the state.

In addition to the intercity rail plans in the state, the Wisconsin Department of Transportation (WisDOT) describes five commuter rail corridors under study. Four of the five routes are envisioned as extensions of Chicago's Metra system (*99*). The other route studied is in the Greater Madison Metropolitan Area. Governor Jim Doyle addressed commuter rail planning by indicating "WisDOT shall administer a commuter rail transit system development grant program. The amount of a grant awarded shall be limited to an amount equal to 50 percent of the portion of the project cost in excess of the federal aid funding for the project, or 25 percent of the total project cost, whichever is less." During the 2003-2005 budget period, $400,000 was approved to fund commuter rail studies (*99*).

WYOMING

Amtrak currently does not serve the state of Wyoming. There are currently no state passenger rail initiatives.

APPENDIX B:
PROJECT COST EXAMPLES

PROJECT COST VARIABLES

This project examined several state-sponsored intercity rail programs with the goals of identifying proven funding methods and sources and extracting meaningful project cost data that planners could use to evaluate future intercity rail projects. While the case studies of four state programs and one multi-state corridor provided many options for funding sources and methods, the investigation into project costs failed to produce simple unit cost (e.g., cost/mile, etc.) factors that planners could readily apply to all projects. This finding was a result of the many variables that determine project cost differences in any intercity passenger rail project. Table B-1 shows examples of these variables.

Table B-1. Project Cost Variables for Intercity Passenger Rail Projects.

Project Variables	Examples of Variability
Project type	• Upgrade of existing track • New track construction • Exclusive right-of-way or interaction with freight
Site conditions	• Soil type/preparation requirements • Drainage characteristics • Terrain/grade mitigation needs
Regional cost differences	• Labor costs • Materials availability/cost
Condition of existing rail infrastructure (prior to upgrade)	• Light density/deferred maintenance line • Heavily used main line • Jointed rail or continuous welded rail • Required signal system upgrades
Freight traffic levels	• Near a container port generating heavy rail traffic • Along a transcontinental, capacity-constrained freight route
Operational factors	• Forecast ridership • Daily frequency of operations and time periods • Rail network congestion/chokepoints • Need for new dispatching training and/or facilities
Right-of-way/support structure costs	• Ratio of urban versus rural right-of-way • Upgrade or new construction of required stations and parking facilities
Rolling stock costs	• Locomotives • Coaches • Control-configured coaches • FRA crashworthiness compliant Diesel Multiple Units (DMU)

Based upon the uncertainty introduced by these variables in project cost estimation and our literature review, which determined that cost projections for planned rail projects were often off by over 40 percent, the project team chose to use data from completed projects rather than planned projects.

PROJECT COST RANGES

It is important to understand that all rail project costs fall into ranges rather than specific costs on a per mile basis due to the variability factors listed in Table B-1. A list exhibiting this range of costs was documented in the *Amtrak Cascades Plan for Washington State*, published in April 2000 by the Washington Department of Transportation. Chapter 6 included the following estimates for costs of different project types:

- *Grade Crossings* – capital costs of $300,000 or more (can vary significantly based upon site conditions).
- *Signalization/Communication* – upgrade to centralized traffic control estimated at $1 million/mile or more.
- *Sidings* – capital costs vary depending on site conditions, typically vary from $1-6 million/mile.
- *Rail Storage Facilities* – capital costs vary depending on site conditions, estimated range from several million dollars to more than $50 million.
- *Additional Main Line Tracks* – capital costs vary tremendously based upon site specific criteria, may range from $1-8 million/mile.
- *Crossovers and Turnouts* – vary depending on type of turnout, low-speed manually operated turnout may be as low as $80,000 while high-speed power-operated may be $550,000; crossover costs vary from $500,000 to $2 million.
- *Bypass Tracks* – vary greatly depending on specific site conditions, costs range from $1 million/mile to more than $10 million/mile depending on terrain, right-of-way, and other conditions.

COMPARISON AND GROUPING OF SIMILAR PROJECTS

In reporting project costs, the research team determined that it was not possible to produce accurate cost-per-mile indices using such a small sample of projects. Rather, it would be both more realistic and more useful to present example project costs grouped by type of project. By presenting example projects a range of costs could be determined. The research team decided, following consultation with the TxDOT PMC, that the best way to group example project costs was to follow the four basic project cost categories laid out by the FRA in its 2002 planning manual for intercity rail corridors (*100*, pp. 16-18).

The four basic categories are:

- **Recapitalization –** repairs or replacement of life-expired capital assets that would be necessary under any circumstance to simply continue existing levels of service and operations.
- **Trip-time improvements –** items that are solely intended to reduce trip times for corridor passenger service.
- **Capacity-related improvements –** items that are required to increase the capacity of the corridor in order to allow increases in traffic by all users of the corridor.
- **Other projects –** corridor related projects that do not fall within any of the other categories

The FRA gives examples of each of these projects in its publication, *Railroad Corridor Transportation Plans: A Guidance Manual*. Table B-2 shows example projects in each FRA project category. The remainder of this appendix presents and compares cost data from recent projects classified into the four major FRA categories based upon the examples given.

Table B-2. FRA Basic Project Cost Categories and Example Projects.

Project Category	Typical Elements
Recapitalization	• Bridge replacements (undergrade and overhead) • Replacement of signal and communications cable • Replacement of right-of-way fencing • Replacement of station roofs, platforms, etc.
Trip-Time Improvements	• Curve realignments • Concrete ties and welded rail installation • Grade crossing removal or improvements • Install a new cab signal system in order to operate at > 79 mph • Reconfigure a junction or station for higher speeds • Purchase higher-speed rolling stock • Install an electric traction system
Capacity-Related Improvements	• New passing tracks • Additional main tracks • Interlocking reconfigurations • Additional station platforms • New or expanded maintenance facilities • Install high-level passenger platforms • Revise signal locations and aspects
Other Projects	• Purchasing new commuter rolling stock • Building new commuter stations • Constructing multimodal terminals • Constructing additional parking facilities • Improving freight clearances

Source: FRA *Railroad Corridor Transportation Plans: A Guidance Manual*, December 2002.

EXAMPLE PROJECT COSTS BY FRA CATEGORY

Tables B-3 through B-6, one for each FRA project category, include example project cost data from the five project case studies as well as from other sources discovered during the literature search for the project. These examples provide information on project costs in each category. Note: Most of the projects listed have either been completed recently or are planned (estimated costs) in the near future using present dollars. The examples from the state of California were selected from the hundreds listed in the *California Intercity Rail Capital Program* report (*101*). Only California projects undertaken in FY 1999-2000 or later were listed here to avoid the problem of cost inflation for older projects.

Table B-3. Recapitalization Project Example Costs.

Project	State	Elements and Notes	Cost	Unit Cost
NC DOT Website				
Station Improvement – Cary	NC	Add second platform along adjacent track	$175,000	N/A
Station Rehabilitation – High Point	NC	Rehabilitate 1907 station; 80% federal enhancement funds, 10% local, 10% state	$6.82 million	N/A
Station Rehabilitation – Rocky Mount	NC	Rehabilitate existing historic station; purchase adjacent building for intermodal terminal; federal enhancement, FTA, state, and local funding	$6.3 million (federal) $630,000 (FTA) $630,000 (state) $1.44 million (local)	N/A
Station Rehabilitation – Salisbury	NC	Rehabilitate 1908 station; $3 million from private foundation funds, $1 million federal enhancement funds/NC DOT	$4 million	N/A
Station Rehabilitation – Selma	NC	Rehabilitate 1924 station; 80% federal enhancement funds, 10% local, 10% state	$3.42 million	N/A
Station Rehabilitation – Southern Pines	NC	Rehabilitate station to its 1942 appearance; 100% state funds	$800,000	N/A
Station Rehabilitation – Wilson	NC	Rehabilitate 1924 station; two-phase project using federal enhancement funds	Phase 1: $1.34 million Phase 2: $1.15 million	N/A
Amtrak State Fact Sheets	**State**	**Elements and Notes**	**Cost**	**Unit Cost**
Station Renovation – Dodge City				
Station Renovation – Garden City	KS	Rehabilitate historic station	$1.2 million	N/A
Station Renovation – Las Vegas	NM	Rehabilitate 1900 station	$1.0 million	N/A
Station Renovation – Ardmore	OK	Rehabilitate historic station	$1.34 million	N/A
Station Renovation – Richmond	VA	Rehabilitate/overhaul historic station for first passenger service in 28 years	$51.6 million	N/A
Station Renovation – Williamsburg	VA	Remodel 1935 station, waiting room, and ticket office	$1.6 million	N/A

Table B-3. Recapitalization Project Example Costs (continued).

California Intercity Rail Capital Program Report (*101*)	State	Elements and Notes	Cost	Unit Cost
Station Improvement – Van Nuys				
Station Improvement – Van Nuys	CA	Repair station roof leaks and paint walls	$21,952	N/A
Track Improvements – Ventura Cty	CA	Replace rail	$288,000	N/A
Track Improvements – Ventura Cty	CA	Replace ties	$553,420	N/A
Bridge Replacements – Ventura Cty	CA	Replace bridges	$214,000	N/A
Track and Signal Improvements – Moorpark-Burbank	CA	Replace worn and fatigued rail, renovate turnouts and subgrade, rehabilitate crossings	$1.49 million	N/A
Bridge Replacement – Northridge	CA	Replace wood bridge with steel bridge	$333,289	N/A
Track Improvements – Northridge	CA	Replace two turnouts	$240,000	N/A
Track Improvements – Northridge	CA	Replace track, weld, grind, and surface	$61,525	N/A
Track Improvements – Orange Cty	CA	Replace rail	$293,974	N/A
Track Improvements – Orange Cty	CA	Replace turnouts	$716,838	N/A
Track Improvements – Orange Cty	CA	Replace bridges	$3.8 million	N/A
Station Improvements – Emeryville	CA	Construct track and platform improvements to allow parallel passenger train movements at station	$4.9 million	N/A

Table B-4. Trip-Time Improvement Project Example Costs.

Project	State	Elements and Notes	Cost	Unit Cost
Mid-Atlantic Rail Operations Study (*102*)				
Highway-Rail Grade Separation	NJ	Overpass; trains currently block crossing before departure (estimated cost)	$12.0 million	N/A
Rail-Rail Grade Separation	PA	200+ daily trains through intersections (estimated cost)	$35.0 million	N/A
Harris County Freight Rail Grade Crossing Study (*103*)	**State**	**Elements and Notes**	**Cost**	**Unit Cost**
Highway-Rail Grade Separation – Federal Road				
Highway-Rail Grade Separation – FM 1960	TX	Overpass (estimated cost)	$15.1 million	N/A
Highway-Rail Grade Separation – Griggs/Mykawa/Long	TX	Overpass and underpass (estimated cost)	$57.7 million	N/A
Highway-Rail Grade Separation – Harrisburg Boulevard	TX	Overpass (estimated cost)	$16.0 million	N/A
Highway-Rail Grade Separation – Hirsch Road	TX	Overpass (estimated cost)	$8.9 million	N/A
Highway-Rail Grade Separation – Houston	TX	Underpass (estimated cost)	$13.7 million	N/A
Highway-Rail Grade Separation – Richey	TX	Underpass (estimated cost)	$30.8 million	N/A
Highway-Rail Grade Separation – Richmond Avenue	TX	Overpass (estimated cost)	$10.5 million	N/A
Highway-Rail Grade Separation – Shepherd Drive/Durham Drive	TX	Underpass (estimated cost)	$31.9 million	N/A
WSDOT Website (*104*)	**State**	**Elements and Notes**	**Cost**	**Unit Cost**
WSDOT – High-speed Crossovers – Titlow				
WSDOT – High-speed Crossovers – Tenino	WA	Will allow 60 mile per hour crossovers; along with other crossover upgrades, this project will allow for an additional daily round trip (estimated cost)	$3.875 million	N/A
WSDOT – High-speed Crossovers – Ketron	WA	Will allow 60 mile per hour crossovers (estimated cost)	$3.9 million	N/A
WSDOT – High-speed Crossovers – Centennial	WA	Will allow 60 mile per hour crossovers (estimated cost)	$3.875 million	N/A

Table B-4. Trip-Time Improvement Project Example Costs (continued).

California Intercity Rail Capital Program Report (101)	State	Elements and Notes	Cost	Unit Cost
Construct Passing Track – False Bay				
Track Realignment – Martinez	CA	Realign four existing tracks, construct additional switches and signals, add platform and pedestrian facilities	$2.2 million	N/A
Construct Running Track – Bakersfield	CA	Construct 2900 foot running track between new Bakersfield station and BNSF Bakersfield Yard	$1.4 million	$2.55 million per mile
New Ballast – Elmhurst to Albrae	CA	Install new ballast under double tracks	$196,053	N/A

Table B-5. Capacity-Related Improvement Project Example Costs.

Project **Virginia Rail Project Status Summary (*105*)**	State	Elements and Notes	Cost	Unit Cost
VRE – SRO to RO Third Main	VA	Approximately 1.0 mile of third track; can add two trains (estimated cost)	$3.9 million	$3.9 million per mile
VRE – L'Entrant Third Main	VA	Will allow for separation of passenger and freight trains; can add one additional midday train (estimated cost)	$4.9 million	N/A
VRE – Franconia Third Main	VA	7.6 miles; can add one additional train (estimated cost)	$11.5 million	$1.51 million per mile
VRE – AF Interlocking	VA	Completed Oct. 2001; added one additional train; decreased delays through AF Interlocking by 47%	$14.4 million	N/A
VRE – Arkendale Crossovers	VA	Can add one additional midday train (estimated cost)	$5.5 million	N/A
VRE – Ellet's Crossover	VA	To add two trains (estimated cost)	$6.8 million	N/A
VRE – Quantico Creek Bridge	VA	New 1800 foot long, 2-track bridge parallel to existing single-track bridge (estimated cost)	$21.1 million	N/A
WSDOT Website (*104*)	**State**	**Elements and Notes**	**Cost**	**Unit Cost**
WSDOT – Stanwood Siding				
WSDOT – Mt. Vernon Siding Upgrade	WA	Project will help provide faster, more frequent Amtrak Cascades service (estimated cost)	$3.8 million	N/A

Table B-5. Capacity-Related Improvement Project Example Costs (continued).

Mid-Atlantic Rail Operations Study (*102*)	State	Elements and Notes	Cost	Unit Cost
Double Track – P&H Branch Segment				
Double Track – Lehigh Line connecting track	NJ	Add 1.0 miles of double track (estimated cost)	$2.6 million	$2.6 million per mile
Double Track	NJ	Add 10.7 miles of double track (estimated cost)	$17.0 million	$1.59 million per mile
Double Track	NJ	Add 0.5 miles; elevated segment (estimated cost)	$20.0 million	$40 million per mile
Double Track	NJ	Add 20.6 miles of double track (estimated cost)	$46.0 million	$2.23 million per mile
Third Main	NJ	Add 6.0 miles of double track (estimated cost)	$39.0 million	$6.5 million per mile
Double Track	NJ	Add 1.5 miles of double track (estimated cost)	$4.2 million	$2.8 million per mile
Double Track	NJ	Add 4.0 miles of double track (estimated cost)	$10.1 million	$2.5 million per mile
Double Track	PA	Add 25 miles of double track (estimated cost)	$43.4 million	$1.74 million per mile
Double Track	PA	Add 16.5 miles of double track over three separate sections over 22.5 miles (estimated cost)	$61.8 million	$3.75 million
New Connection	PA	Will remove circuitous routing	$9.6 million	N/A
Double Track	MD	Add 6.6 miles of double track (estimated cost)	$124.5 million	$18.8 million per mile

Table B-5. Capacity-Related Improvement Project Example Costs (continued).

Nebraska Transit Corridors Study (*106*)	**State**	**Elements and Notes**	**Cost**	**Unit Cost**
Melia Siding – Track				
Melia Siding – Centralized Traffic Control	NE	Add 1.6 miles of CTC signaling to siding	$160,000	$100,000 per mile
Melia Siding – Total Cost	NE	Estimated total cost of 1.6 mile siding addition	$5.28 million	$3.299 million per mile
Ralston Siding – Track	NE	0.8 miles of siding track; includes 136-pound rail, ties, ballast, and OTM (estimated cost)	$592,000	$740,000 per mile
Ralston Siding – Centralized Traffic Control	NE	Add 0.8 miles of CTC signaling to siding (estimated cost)	$80,000	$100,000 per mile
Ralston Siding Total Cost	NE	Estimated total cost of 0.8 miles siding addition	$3.61 million	$4.514 million per mile
U.S. 90A Corridor Rail Feasibility Study (*107*)	**State**	**Elements and Notes**	**Cost**	**Unit Cost**
Maintenance Facility				
Guideway – Single-track Ballasted Bridge	TX	Estimated cost per linear foot of a single track ballasted bridge	$13,000	$13,000 per linear foot
Guideway – Double-track Ballasted Bridge	TX	Estimated cost per linear foot of a double track ballasted bridge	$18,000	$18,000 per linear foot
California Intercity Rail Capital Program Report (101)	**State**	**Elements and Notes**	**Cost**	**Unit Cost**
Signals Upgrade- San Luis Obispo				
Signals Upgrade- San Luis Obispo	CA	Extend CTC along double track section and replace single-direction crossover	$2.8 million	N/A
Siding Upgrade- Gaviota	CA	Upgrade siding with new power switches, CTC signal system, and rail	$1.9 million	N/A
Signals Upgrade- Ventura/LA County line	CA	Upgrade signals (funded by LACMTA)	$342,935	N/A

Table B-5. Capacity-Related Improvement Project Example Costs (continued).

Double Track- Raymer to Burbank	CA	Double track 9.5 miles with CTC	$16.9 million	$1.8 million per mile
Third Main Track – Bandini to DT Junction	CA	Construct 3 miles of third main track	$17.7 million	$5.9 million per mile
Double Track – Oceanside	CA	Construct 1.2 miles of double track by extending existing Oceanside siding	$6.0 million	$5.0 million per mile
Double Track- Port Chicago to Oakley	CA	Construct 17.6 miles of double track, improve signaling, install and replace crossings, and replace embankment material	$33.9 million	$1.93 million per mile
Double Track – Stockton to Escalon	CA	Construct second main track on concrete ties, panelized turnouts, relocate turnouts, realign existing tracks, relocate turnouts, extend necessary bridges, replace public crossings	$41.3 million	N/A
Double Track – Calwa to Bowles	CA	Construct double track and related signal enhancements for 8.5 mile segment	$27.8 million	$3.27 million per mile
Double Track – Shirley to Hanford	CA	Construct 5.8 mile segment of double track and related signal enhancements	$32.8 million	$5.65 million per mile
Double Track – Hanford to Guernsey	CA	Construct 7.1 mile segment of double track and related signal enhancements	$6.2 million	$0.87 million per mile
Double Track – Yolo Causeway	CA	Construct 6.0 mile segment of double track between Davis and West Sacramento across the Yolo Causeway	$22.8 million	$3.8 million per mile
Fourth Main Track – Santa Clara to San Jose	CA	Construct 4.8 miles of fourth main track with signal and station improvements	$23.8 million	$5.0 million per mile

Table B-6. Other Project Example Costs.

Project	State	Elements and Notes	Cost	Unit Cost
NC DOT Website				
Construct New Multimodal Terminal – Charlotte	NC	Acquire 27 acres; construct terminal to accommodate conventional and high-speed rail, local and regional bus, bicycle, and pedestrian traffic; realign existing tracks	$110-207 million (estimated)	N/A
Construct New Multimodal Terminal – Durham	NC	Build station in existing historic warehouse as part of commercial redevelopment project; provide for intercity bus, local bus, and taxi connections along existing tracks	$10-12 million (estimated)	N/A
Construct New Station – Kannapolis	NC	Build new station near the Kannapolis CBD; 90% state T2001 funds, 10% local	$2.67 million	N/A
Amtrak State Fact Sheets	**State**	**Elements and Notes**	**Cost**	**Unit Cost**
Construct New Ticketing and Boarding Facility – Kansas City				
Construct New Amtrak Auto Train Facility – Lorton	VA	Construct new facility for Amtrak auto train boarding/loading including 14,000 sq. ft. terminal and new drop-off and loading area for vehicles	$24 million	N/A
Harris County Freight Rail Grade Crossing Study *(103)*	**State**	**Elements and Notes**	**Cost**	**Unit Cost**
Locomotive				
Passenger Cars	TX	Estimated cost of commuter passenger car	$2 million	$2 million
New Station Construction	TX	Estimated cost of new station construction	$1.1 million	$1.1 million

Table B-6. Other Project Example Costs (continued).

U.S. 90A Corridor Rail Feasibility Study (107)	State	Elements and Notes	Cost	Unit Cost
Vehicles – Locomotive				
Vehicles – Cab Car	TX	Estimated cab car cost for commuter rail alternative	$1.9 million	$1.9 million
Vehicles – Coach	TX	Estimated coach car cost for commuter rail alternative	$1.5 million	$1.5 million
Vehicles – DMU Double Deck Trailer with Cab	TX	Estimated DMU double deck trailer with cab cost for DMU alternative	$2.9 million	$2.9 million
Transit Center – At-Grade	TX	Estimated cost of new at-grade transit center	$900,000	$900,000
Transit Center – At-Grade with Pedestrian Overpass	TX	Estimated cost of new at-grade transit center with pedestrian overpass	$1.9 million	$1.9 million
Transit Center – Elevated	TX	Estimated cost of new elevated transit center	$3.44 million	$3.44 million
Park and Ride – Surface	TX	Estimated surface cost per space for park and ride facility	$4,000	$4,000 per space
Park and Ride – Structure	TX	Estimated structure cost per space for park and ride facility	$10,000	$10,000 per space
Right-of-Way	TX	Estimated cost per square foot of right-of-way	$10	$10 per square foot

Table B-6. Other Project Example Costs (continued).

California Intercity Rail Capital Program Report (101)	State	Elements and Notes	Cost	Unit Cost
Station Improvement – Oxnard				
Station Improvement – Van Nuys	CA	Design and construct 300-space parking structure, passenger shelters, benches, and lighting; 36% State and 64% local funding	$4.4 million	N/A
Purchase Ticket Vending Machines	CA	Purchase joint-use Amtrak and Metrolink ticket vending machines using CMAQ funds	$4.25 million	N/A
Trespasser Barriers	CA	Purchase and install concrete trespasser barriers	$32,833	N/A
Pedestrian Bridge – Santa Ana	CA	Construct pedestrian bridge over double track and upgrade platform	$5.5 million	N/A
Construct New Parking Structure – Oceanside	CA	Construct 450-space parking structure	$10.4 million	N/A
Construct New Parking Structure – Emeryville	CA	Construct bus terminal and 337-space parking structure	$8.8 million	N/A
Construct New Parking Structure – Richmond	CA	Construct 800-space parking garage at station	$11.5 million	N/A
Construct New Station Access Facilities – Madera	CA	Construct two-lane road, parking lot, and platform for new station	$800,000	N/A
Construct New Station – Hercules	CA	Construct 600 ft by 15 ft wide center platform, parking structure, realign existing track, and install passenger shelters for new station	$6.0 million	N/A
Construct New Station – Oakland Colliseum	CA	Construct new station including shelters, lighting, landscaping, parking, etc. and needed signal changes	$4.6 million	N/A
Purchase rolling stock- cars	CA	Purchase 16 bi-level cars including 5 coach-baggage cabs, 7 coaches, 3 coach-café, and 1 custom-class car	$20.4 million	$1.3 million per unit avg.
Purchase rolling stock- locomotives	CA	Purchase 6 EMD-F59PHI locomotives	$12.1 million	$2.0 million per unit

EXAMPLE COSTS: CALIFORNIA INTERCITY RAIL FUNDING BY YEAR

The final section of this appendix presents information on how the State of California has allocated its funding to both operations support and capital projects during its history of support for passenger rail at the state level. Table B-7 and Figure B-1 show operations and capital expenditures and the total spent by the state in each fiscal year since 1976-1977. Note how operations spending has grown steadily as the program has expanded, however, capital spending spikes during periods following identification of new state-level funding sources (e.g., in the early 1990s following passage of the two rail bond programs).

Table B-7. California Intercity Rail Operating and Capital Funding by Year (*108*).

CALIFORNIA INTERCITY RAIL FUNDING BY YEAR			
Fiscal Year	**Operating**	**Capital**	**Total**
1976-77	$548,534	$1,000,000	$1,548,534
1977-78	$1,325,087	$113,904	$1,438,991
1978-79	$1,178,667	$0	$1,178,667
1979-80	$1,582,919	$138,228	$1,721,147
1980-81	$2,593,881	$2,770,900	$5,364,781
1981-82	$3,446,003	$5,573,118	$9,019,121
1982-83	$3,864,372	$1,397,207	$5,261,579
1983-84	$3,970,516	$5,902,490	$9,873,006
1984-85	$4,015,216	$5,481,875	$9,497,091
1985-86	$3,756,861	$17,736,189	$21,493,050
1986-87	$3,884,657	$1,440,961	$5,325,618
1987-88	$3,750,902	$7,720,700	$11,471,602
1988-89	$2,681,609	$17,325,355	$20,006,964
1989-90	$4,533,179	$29,412,162	$33,945,341
1990-91	$6,974,013	$32,847,549	$39,821,562
1991-92	$9,078,069	$157,894,094	$166,972,163
1992-93	$18,460,525	$161,364,946	$179,825,471
1993-94	$20,574,856	$174,949,087	$195,523,943
1994-95	$22,322,921	$65,276,291	$87,599,212
1995-96	$32,025,059	$55,032,690	$87,057,749
1996-97	$42,156,009	$82,296,320	$124,452,329
1997-98	$48,390,055	$30,193,295	$78,583,350
1998-99	$56,560,168	$104,990,368	$161,550,536
1999-00	$61,786,831	$92,404,946	$154,191,777
2000-01	$63,903,818	$156,432,113	$220,335,931
2001-02	$66,083,013	$283,635,497	$349,718,510
2002-03	$70,387,896	$73,796,741	$144,184,637
2003-04	$73,138,000	$95,416,950	$168,554,950
2004-05		$11,497,875	$11,497,875
2005-06		$48,069,275	$48,069,375
2006-07		$25,049,375	$25,049,375

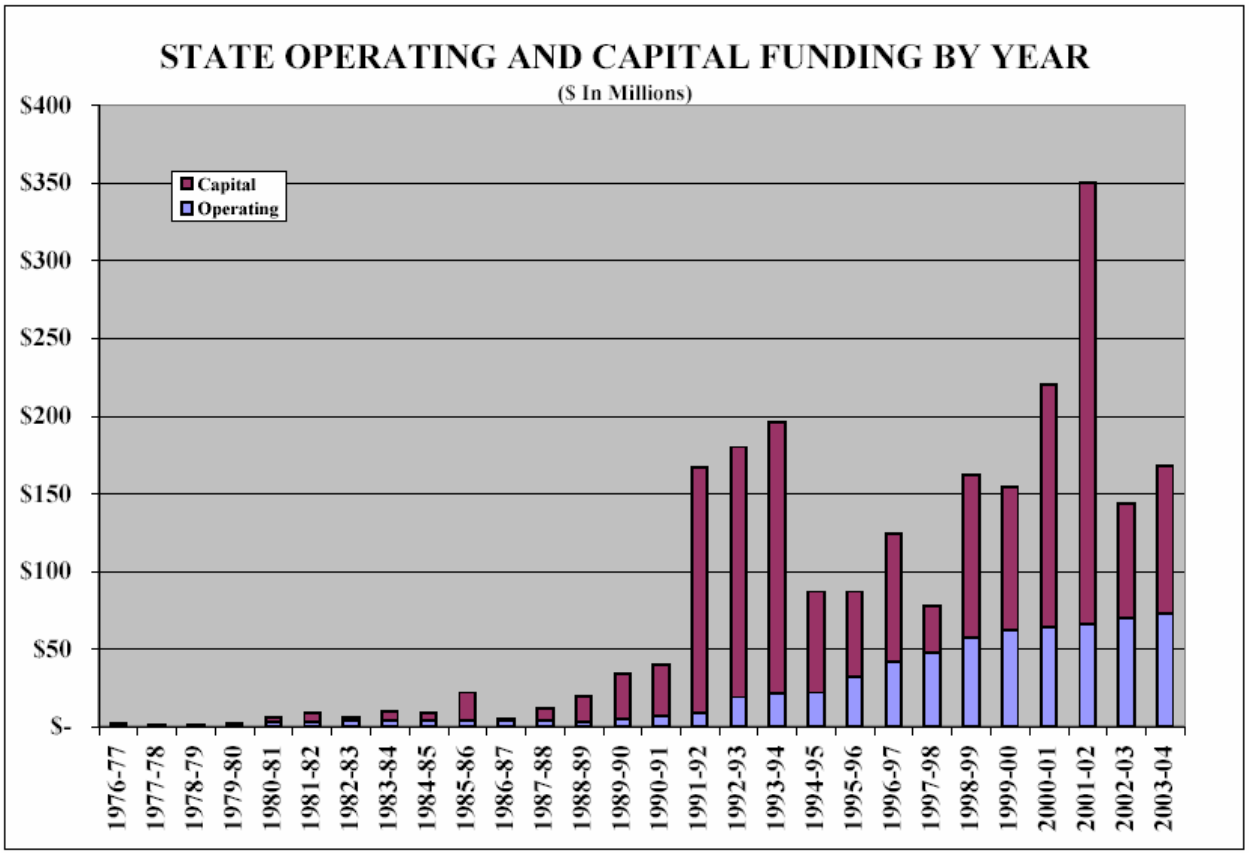

Figure B-1. California Intercity Rail Operating and Capital Funding by Year (*108*).

Chapter 2 of the main report details California's state-level funding programs.

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