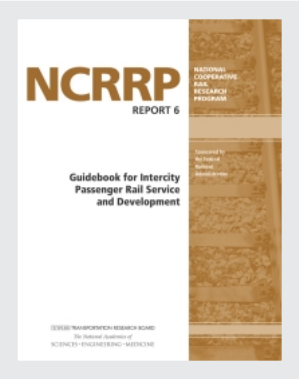

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NATIONAL COOPERATIVE RAIL RESEARCH PROGRAM

NCRRP REPORT 6

Guidebook for Intercity Passenger Rail Service and Development

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NATIONAL COOPERATIVE RAIL RESEARCH PROGRAM

The National Cooperative Rail Research Program (NCRRP) conducts applied research on problems important to freight, intercity, and commuter rail operators. Research is necessary to solve common operating problems, adapt appropriate new technologies from other industries, and introduce innovations into the rail industry. NCRRP carries out applied research on problems that are shared by freight, intercity, and commuter rail operating agencies and are not being adequately addressed by existing federal research programs. NCRRP undertakes research and other technical activities in various rail subject areas, including design, construction, maintenance, operations, safety, security, finance and economics, policy, planning, human resources, and administration.

NCRRP was authorized in October 2008 as part of the Passenger Rail Investment and Improvement Act of 2008 (PL 100-432, Division B). The Program is sponsored by the Federal Railroad Administration (FRA) and managed by the National Academies of Sciences, Engineering, and Medicine, acting through its Transportation Research Board (TRB), with program oversight provided by an independent governing board (the NCRRP Oversight Committee [ROC]) including representatives of rail operating agencies.

NCRRP carries out applied research on problems that address, among other matters, (1) intercity rail passenger and freight rail services, including existing rail passenger and freight technologies and speeds, incrementally enhanced rail systems and infrastructure, and new high-speed wheel-on-rail systems; (2) ways to expand the transportation of international trade traffic by rail, enhance the efficiency of intermodal interchange at ports and other intermodal terminals, and increase capacity and availability of rail service for seasonal freight needs; (3) the interconnectedness of commuter rail, passenger rail, freight rail, and other rail networks; and (4) regional concerns regarding rail passenger and freight transportation, including meeting research needs common to designated high-speed corridors, long-distance rail services, and regional intercity rail corridors, projects, and entities.

NCRRP considers research designed to (1) identify the unique aspects and attributes of rail passenger and freight service; (2) develop more accurate models for evaluating the impact of rail passenger and freight service, including the effects on highway, airport, and airway congestion, environmental quality, energy consumption, and local and regional economies; (3) develop a better understanding of modal choice as it affects rail passenger and freight transportation, including development of better models to predict utilization; (4) recommend priorities for technology demonstration and development; (5) meet additional priorities as determined by the advisory board; (6) explore improvements in management, financing, and institutional structures; (7) address rail capacity constraints that affect passenger and freight rail service through a wide variety of options, ranging from operating improvements to dedicated new infrastructure, taking into account the impact of such options on operations; (8) improve maintenance, operations, customer service, or other aspects of intercity rail passenger and freight service; (9) recommend objective methods for determining intercity passenger rail routes and services, including the establishment of new routes, the elimination of existing routes, and the contraction or expansion of services or frequencies over such routes; (10) review the impact of equipment and operational safety standards on the further development of high-speed passenger rail operations connected to or integrated with non-high-speed freight or passenger rail operations; (11) recommend any legislative or regulatory changes necessary to foster further development and implementation of high-speed passenger rail operations while ensuring the safety of such operations that are connected to or integrated with non-high-speed freight or passenger rail operations; (12) review rail crossing safety improvements, including improvements using new safety technology; and (13) review and develop technology designed to reduce train horn noise and its effect on communities, including broadband horn technology.

The primary participants in NCRRP are (1) an independent governing board, the ROC, appointed by the Secretary of the U.S. Department of Transportation with representation from freight, intercity, and commuter rail operating agencies, other stakeholders, and relevant industry organizations such as the Association of American Railroads (AAR), the American Association of State Highway and Transportation Officials (AASHTO), the American Public Transportation Association (APTA), and the National Association of Railroad Passengers (NARP) as vital links to the rail community; (2) TRB as program manager and secretariat for the governing board; and (3) the FRA as program sponsor. NCRRP benefits from the cooperation and participation of rail professionals, equipment and service suppliers, other rail users, and research organizations. Each of these participants has different interests and responsibilities, and each is an integral part of this cooperative research effort.

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The authors acknowledge the many individuals who contributed to this research by participating in the personal/phone interviews and assisting with input at industry conferences. Several rail agencies and state associations were instrumental in providing input throughout development of this guidebook. The authors also acknowledge the assistance of Linda Cherrington, Allan Rutter, and Cinde Weatherby of TTI, who served as project advisors throughout the term of the project.

FOREWORD

By Lawrence D. Goldstein
Staff Officer
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NCRRP Report 6: Guidebook for Intercity Passenger Rail Service and Development presents the resources, strategies, analytical tools, and techniques for use by public agencies and private entities to support all phases of planning and decision making in the development of intercity passenger rail service at state, regional, or multistate levels. Components of this guide address three major phases required to build and operate passenger rail: planning, design and construction, and operations. Further, it breaks down each primary phase into major required subtasks. With its comprehensive approach, this guide serves as a companion report to other NCRRP series reports: *Report 1: Alternative Funding and Financing Mechanisms for Passenger and Freight Rail Projects* and *Report 5: Developing Multi-State Institutions to Implement Intercity Passenger Rail Programs*.

Given that historical roles, funding, and public support for intercity passenger rail service development vary greatly among state and regional entities, a one-size-fits-all approach was not appropriate in developing this report and conducting the research. Instead, the research team approached development of this guide primarily as an effort to create a wide-ranging collection of existing resources related to intercity passenger rail service and development and performed limited new research to cover the most critical areas where existing written guidance did not exist. Gap area topics identified during the research are addressed in detail in the appendices.

The Contractor's Final Report, included as Appendix F, presents additional background information gathered during preparation of the guide: (1) a comprehensive resource matrix listing documents related to intercity passenger rail service and development; (2) generalized results extracted from interviews with public-sector representatives, Amtrak, and freight rail stakeholders; and (3) results of an online survey used to help build components of the guide. Live links in the resource matrix are accessible through the document via the TRB web page.

For more than 30 years, growth and innovation in our nation's rail system has been primarily and most successfully associated with the movement of freight. Since 2008, however, billions of federal and state dollars have been invested in intercity passenger rail, responding to opportunities and challenges arising from changing travel demand and other factors. In addition, recent legislation has placed new planning, operating, and financial demands on states and other transportation organizations, requiring them to take an increasingly active role in planning, developing, and managing intercity passenger rail services. Given changing demands, many state and local transportation agencies do not have (but are working to build) sufficient expertise and experience in passenger rail planning and operation.

Various strategies have been applied to planning and developing intercity passenger rail. Some tools exist to aid planning and decision making, but these strategies, tools, and

techniques are not always systematically applied. Although each rail service has particular circumstances and characteristics, certain components are transferrable and necessary for effective planning, development, and management. These components include, but are not limited to, (1) route definition and station locations; (2) operating characteristics, service goals, and performance measures; (3) stakeholder agreements and relationships; and (4) business plans to ensure high performance and maximum public benefit.

This guide was prepared by the Texas A&M Transportation Institute under the guidance of Curtis Morgan, with the assistance of a team of individual consultants who have long served as TRB committee leaders in the area of intercity passenger rail. It presents a comprehensive approach to intercity passenger rail planning elements, going well beyond previous studies. The guide fills several institutional gaps: (1) lack of a comprehensive, standardized approach to passenger rail planning and development; (2) limited dissemination of existing decision support tools; and (3) wide variation in the capability of transportation organizations to implement these strategies. As a result, organizations at all levels who are responsible for intercity passenger rail planning and development will benefit from this practical, comprehensive resource that identifies technical tools, procedures, and best practices to assist in the effective planning, development, and management of intercity passenger rail assets and investments.

CONTENTS

SUMMARY

Guidebook for Intercity Passenger Rail Service and Development

Although there are many existing resources that cover topics related to intercity passenger rail planning and development, some best practices are available only to the few public agencies and private entities successful in implementing intercity passenger rail services and some best practices have not been documented by a formal research study or otherwise shared within the broader community of those interested in intercity passenger rail development. *NCRRP Report 6* has been created and developed to enhance dissemination of these valuable resources so they may be put into practice. The overall objective of NCRRP Project 03-01 was to develop a guidebook to help public and private organizations plan, develop, and manage intercity passenger rail services. To complete this objective, NCRRP Project 03-01 researchers

1. Reviewed existing resources (e.g., policies, guidance documents, research studies, analytical tools, best practices, and other resources) used by public agencies and private entities to support intercity passenger rail service planning and development activities.
2. Identified and obtained feedback from potential users of the NCRRP Project 03-01 guidebook to determine topics where substantial gaps exist in the knowledge base concerning development and planning for intercity passenger rail.
3. Conducted limited new research in the form of targeted syntheses of selected topics in intercity passenger rail service and development to complement existing resources.
4. Generated a user-friendly guidebook outlining the strategies, tools, and techniques used by public agencies and private entities to support planning and decision making in development of intercity passenger rail service.

NCRRP Report 6 is a resource that can be put into use immediately by the passenger rail practitioner community in support of intercity passenger rail service planning and development. The report reflects a progression from initial consideration of establishing an intercity passenger rail program or service, to service planning and design, to operations and ongoing maintenance of the project, thus generally following the steps outlined in *NCRRP Report 5*, which lists four major stages (i.e., visioning, planning, design and construction, and operations and maintenance) as the conceptual framework for intercity passenger rail project development. Chapters of the guide describe program development phases under each stage as they relate to overall program development:

- **Visioning:**
  - **Chapter 1 (Introduction).** Summarizes the need for the guide and the passenger rail service development process.
  - **Chapter 2 (Intercity Passenger Rail Program Establishment).** Presents an overview of the activities to undertake in the initial program establishment phase.
- **Planning:**
  - **Chapter 3 (Project Feasibility/Service Development).** Addresses the tasks associated with the service planning phase.

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  - **Chapter 4 (Environmental Requirements).** Summarizes the tasks necessary to address environmental requirements in the planning phase.
- **Design and Construction:**
  - **Chapter 5** Discusses projects and considerations addressed during design and construction.
- **Operations and Maintenance:**
  - **Chapter 6 (Service Planning).** Summarizes activities and tasks associated with ongoing service operations.
  - **Chapter 7 (Ongoing Service Management).** Summarizes activities and tasks associated with ongoing service management.
- **Appendices.** Appendixes A through E provide full targeted synthesis discussions for the five areas selected by the panel, while Appendix F is the contractor's final report:
  - **Appendix A: Liability/Insurance Requirements Relating to Intercity Rail Passenger Service.** Examines liability issues associated with differing structures of intercity passenger rail operations, insurance requirements of host railroads, and potential problem areas/needs prior to and during service startup.
  - **Appendix B: Passenger Rail Investment and Improvement Act of 2008 (PRIIA) Section 209 Cost Formula Transparency, Costing Granularity, and Related Issues.** Offers additional guidance and understanding of the pricing policies/principles/processes under which individual service item costs are provided to include rail access and other costs from host railroads for service; documents ongoing negotiations to provide more information on each service component; and provides more information on its disaggregated, zero-based cost.
  - **Appendix C: Robust Service Delivery: Building Resilient and Dependable Passenger Rail Service.** Explains processes associated with providing robust intercity passenger rail service redundant/resilient enough to recover from adverse events and/or adding new frequencies or special event (non-routine) service as needed.
  - **Appendix D: Performance Measurement and Quality Assurance Techniques.** Describes existing and emerging tools, methods, and metrics that can be used by guidebook users to track and document performance of intercity passenger rail programs at the state/regional level to include performance tracking of both the host railroad and/or service operator as well as methods of tracking and promoting high-quality, customer-service-based, and best-practices-driven oversight/feedback/service improvement techniques by the state/rail authority.
  - **Appendix E: Role of the U.S. Surface Transportation Board Regarding Intercity Rail Passenger Service.** Describes and explains the emerging role of the U.S. Surface Transportation Board (STB) in regulation and oversight of new intercity passenger rail services; identifies when, how, and why STB approval must be sought in both planning initial service and making operational changes after service begins; outlines existing statutes; and discusses the inclusion of STB in the PRIIA Section 209 implementation process.
  - **Appendix F: Contractor's Final Report.** Describes the actions and methods used to gather information for the project and includes, as an annex, a table of existing and available reports identified during the literature review, which users may find useful as further reference into the areas discussed in this guidebook. Active hyperlinks to the referenced documents are included and should be accessible via the PDF of the report available on the TRB website.

CHAPTER 1

Introduction

Ongoing expansion and development of intercity passenger rail service in the United States continues to face challenges. Since 1970, intercity passenger rail services in the United States have been operated by the National Railroad Passenger Corporation (Amtrak). Although much progress has been made in modernizing the U.S. intercity passenger rail network, Amtrak relies on annual Congressional appropriations for its continued existence. In contrast, other modes of transportation—highways, transit, and aviation—have established federal roles and dedicated funding mechanisms for new construction, capital renewal, or operations. Until recently, no clear federal role in, or long-range plan for, developing a national intercity passenger rail network has been defined. Consequently, programs to develop new intercity passenger rail services have been initiated primarily by states or groups of states that have committed financial and other resources toward establishing passenger rail service on major travel corridors within their jurisdictions. Many successful passenger rail programs exist today as a direct result of these state-level initiatives. Many states, however, lack the resources and/or legislative mandate to conduct any type of planning activities for intercity passenger rail. Outside of the Northeast Corridor (NEC), intercity passenger rail services in the United States operate primarily on infrastructure owned by private freight railroad carriers, presenting unique challenges for the planning and development of publicly owned intercity passenger rail services.

The passage of the Passenger Rail Investment and Improvement Act of 2008 (PRIIA) established a new policy structure for developing intercity passenger rail in the United States. This act instituted mechanisms for the USDOT to establish partnerships and share funding of new rail services with states that want to sponsor such activities. Additionally, PRIIA created new requirements for states to develop formal plans for passenger and freight rail and obtain input from the general public, local governments, and freight railroads in developing the plans. Actual funding of new passenger rail projects began in earnest as a feature of the 2009 federal economic stimulus legislation and subsequent appropriations.

This guidebook is the most recent effort undertaken through TRB to provide user-friendly, nontechnical direction for state officials, rail service advocates, and other interested parties to the best sources of guidance on the wide range of issues associated with expanding or building a new passenger operation. It follows on the publication of two related guidebooks completed under the National Cooperative Highway Research Program (NCHRP): *NCHRP Report 657: Guidebook for Implementing Passenger Rail Service on Shared Passenger and Freight Corridors* (2010) and *NCHRP Report 773: Capacity Modeling Guidebook for Shared-Use Passenger and Freight Rail Operations* (2014). Additional TRB reports on rail transportation topics, including intercity passenger rail, are under way or recently have been published as part of NCRRP, which sponsored development of this guidebook. NCRRP reports on related topics of interest are referenced herein, as appropriate, as more thorough examinations of several of the areas briefly discussed. For ongoing NCRRP projects, project numbers are referenced.

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Purpose of This Guidebook

This guidebook documents best practices for those seeking to initiate or improve intercity passenger rail service. Detailed technical studies have been performed on many of the elements enumerated in this report so, where possible, the authors have provided links to reference documents and websites that offer the most current guidance. U.S. experience in developing modern rail service lags behind that of most of the developed world; technical guidance and policies are still evolving. This guidebook is designed to steer those seeking to develop intercity passenger rail service away from dead ends and policy cul-de-sacs so that energies expended can advance the state of efforts to build modern intercity passenger rail service in North America.

Planning and developing intercity rail service is different from transit rail services, which can range from light or heavy rail within the urban area to commuter or regional passenger rail service that primarily connects suburbs to the central business districts (CBDs) of major urban areas. This guidebook does not specifically address rail transit; however, many of the policies and practices (e.g., public outreach and environmental clearance requirements) may be similar. In most cases, rail transit is administered by either a local transit agency or a regional metropolitan planning organization (MPO). Although some state DOTs may be involved in such planning, intercity rail planning and development will be treated as a separate process in this guidebook.

Current federal funding structures assign state DOTs the primary leadership role for developing new intercity passenger rail services. Few states have the resources to carry out this task; most have just completed (within the past 5 years) their first formal statewide rail plans for service development initiatives. Traditional DOT staffing is weighted to the engineering discipline and the highway mode, reflecting the seven-decade emphasis of U.S. transportation investment in developing the highway system. Rail transportation, meanwhile, has been largely considered a private-sector function with the exception of the existing Amtrak intercity passenger rail system. Additionally, most recent knowledge and experience in developing and operating passenger rail service in the United States has focused on commuter rail or urban transit rail (light or heavy rail service) within or serving urban areas, rather than intercity passenger rail. Although these forms of passenger rail service share some aspects, significant differences in planning, funding, and operating intercity passenger rail service exist. These differences warrant the creation of this guidebook focusing on intercity passenger rail service.

The re-emergence of intercity passenger rail as a major target of public investment is a process less than a decade old. Readers should expect major changes in the next few years as state and federal agencies gain experience from implementing the first round of federally assisted projects and service rollouts under PRIIA and projects funded by grants from the American Recovery and Reinvestment Act of 2009 (ARRA). The effects of these projects are just beginning to be seen at the time this guidebook is being published. Follow-up legislation to replace the expiring PRIIA has also been introduced for consideration by Congress. It is unknown which policies related to intercity passenger rail will be continued or expanded in the next several years.

Why Should Intercity Passenger Rail Development Be Considered?

Traditionally, intercity passenger rail has received far less emphasis in the surface transportation planning and investment history of the United States than other modes of intercity travel. There are many reasons for this—some cultural, some political, and some reflecting the long-standing preference of Americans to own and operate private motor vehicles. This guidebook does not enumerate the many contributors to this history or prescribe policy changes that would lead to a greater emphasis on rail transportation. However, the biggest institutional contrast between the United States and other western countries that have invested in and continue to invest at much

higher rates in rail transportation is that the physical fixed plant of the rail network is held as a public asset in most other countries. Public ownership elevates the profile of rail and provides an automatic seat at the table when public resource allocations are considered for passenger mobility. Highways and airports enjoy this status in the United States; railways, with few exceptions, do not.

That private freight rail operators own most of the U.S. rail network produces a unique set of challenges for those proposing new passenger rail operations; many of these challenges are addressed in this guidebook. Growing interest in passenger rail results from various trends; the mix of interests and policy objectives that drive such interest vary corridor by corridor and region by region. Reasons for considering passenger rail are presented below. Those considering an intercity passenger rail project may draw from this list according to the specific needs and objectives of the stakeholders associated with a given corridor.

- **Mitigating the Growth of Highway Congestion.** Overall levels of service and mobility on the nation's system of major highways have deteriorated over the past 20 years as growth in vehicle miles traveled (VMT) has outstripped capacity additions to the highway network. Development of intercity passenger service over parallel rail infrastructure could increase capacity and mitigate congestion.
- **Accommodating Changing Lifestyle Preferences.** In recent years, a preference by many young adults for a more urban, walkable lifestyle has been well documented and shows no sign of reversing. The related reduction in vehicle ownership and return to core cities by this demographic bodes well for rail transportation. This return is fostered by rail systems that access urban centers. The change in demand is also affected by access to social media and the Internet and the ability to work while in transit. This change affects patrons' perception of the value of time—time is used productively, not lost—which affects mode choice. These same features drive increasing use of local transit, as well; taking advantage of the ridership potential of new intercity rail depends on strong connectivity to complementary public transportation modes.
- **Encouraging Economic Development/Changing the Relationship of Neighboring Urban Centers.** Passenger rail service can be developed as a tool to encourage discretionary travel among major cities and second-tier urban centers. For example, the *Downeaster* rail service between Brunswick, ME, and north Boston, MA, is an excellent example of a recently developed intercity passenger rail option that is supporting economic growth in the rail corridor that it serves. Begun in late 2001, the 145-mile route now supports five daily round trips, with patronage fairly evenly divided between Maine residents traveling south to Boston and Bay State residents and visitors traveling north to the attractions of Portland, Freeport, and Brunswick. Riders all along the route benefit from a new transportation option to either urban attractions or recreational activities.

Regular, reliable rail service can increase the attractiveness of smaller communities as residential bases for professionals and other core-city workers who seek more affordable or slower paced living options. Such changes in development or living patterns occur over many years and are the product of confidence that a new service offering will be available for the long term. Ridership models for rail service are not designed to address such effects; it is impossible, at the outset of such a service initiative, to reliably predict the growth of rail service use. In such circumstances, the integration of transportation investment approaches with regional economic development strategies is more important than traditional transportation planning tools that detail the relationship of competing surface transportation modes.

- **Providing Alternatives to Air Service.** Interest in rail service as an alternative to flying has grown during the past 15 years. Some reasons for this trend include
  - Despite the speed of modern jet aircraft, rail travel can often provide time-competitive service between cities in the 200- to 500-mile rail range. Increased security procedures at airports add to the total time an individual traveler must budget for a given journey involving air travel, increasing the distance for which alternative rail service is attractive and time competitive.

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  - Rail service is particularly attractive for trips between urban centers, given the location of most passenger rail facilities at the core of major urban markets. This strategic advantage for rail is a direct product of the development history of major cities where legacy railway infrastructure served as the primary intercity passenger transportation mode in the nineteenth and early twentieth centuries.
  - Most major airlines have developed service and operations models that focus on a few key hubs that serve as transfer points for passengers traveling to and from second-tier cities. The need to transfer and connect through such hubs adds to total trip scheduled times and increases the risk of delay for air travelers.
  - Commercial airline service to smaller urban centers has stagnated and, in some cases, shrunk over the past 10 years. The federal Essential Air Service Program has underwritten continued service to many communities threatened with a total loss of service by commercial carriers. In 2014, 163 communities saw air service partially underwritten by federal operating support with this program. Rail service to connect such communities to each other and to major regional centers may be a more viable long-term approach to preserve personal mobility.
- **Meeting Environmental Goals.** The carrying capacity of any given passenger rail alignment is a product of train size, speed, and frequency. Dedicated, electrified passenger train alignments in Asia and Europe routinely move passenger volumes equivalent to those handled by four- and six-lane freeway corridors. The two-track Paris–Lyons–Marseille Train à Grande Vitesse (TGV or high-speed intercity passenger train) alignment in France, for example, moves approximately 100,000 daily riders.

Numerous studies (including an ongoing NCRRP study) have attempted to compare energy use for passenger rail with that for motor vehicle and air service modes. Conclusions indicate a strong advantage for rail, but the energy consumption characteristics of a specific route should be considered as part of a specific corridor initiative. Corridor-specific elements that can affect the energy consumption comparison include level-of-service considerations on the corresponding highway network, the spatial distribution of passenger trips (e.g., center city vs. suburban origins/destinations), and the energy source for electric propulsion if the rail system is electrified.

The scalability of passenger rail capacity within a given double-track alignment should not be overlooked. Once established, a train service corridor can continue to build higher and higher ridership without a corresponding consumption of land. Trains can be lengthened and run more frequently, as the need arises, without expropriating an ever-larger swath of the landscape. This is in marked contrast to highway service capacity where lane additions and new construction are considered routine in order to address growing demand and level-of-service issues.

Guidebook Users

This guidebook is designed for the following users:

- **Public Policymakers.** Policymakers will better understand the role of rail transportation in the context of a multimodal surface transportation system and why intercity passenger rail development should be considered, in particular, along with the policy considerations that have driven increased interest in modern intercity passenger rail investment at the regional or statewide level.
- **State DOT Planners.** Such planners will be able to more quickly identify key elements of each stage of the service development process and use the provided links to obtain more detailed, current sources of guidance for addressing specific technical issues. The guidebook attempts to draw clear comparisons between planning for the rail and highway modes, given the highway background of many DOT personnel.

- **Host Freight Carrier Representatives.** Such representatives will gain a fuller understanding of the policy and planning context that guides state and other public-sector agency involvement in passenger rail initiatives.
- **Rail Service Advocates.** Such advocates will better understand the framework for developing new services and potential sources of public and private funding that can be used to make such systems a reality.

The Intercity Passenger Rail Service Development Process

Using This Guidebook

Developing intercity passenger rail service in a corridor lacking such service can be challenging and time-consuming. This guidebook addresses such scenarios and efforts to improve existing rail services; however, the latter generally benefit from the existence of established governance and funding regimes that more easily define the development process.

Despite the almost universal embrace of modern passenger rail technology by the developed world, many Americans question the need for investing in such systems in the United States. To address this concern, the guidebook includes a typology to frame the various considerations associated with a decision to plan, fund, and build intercity rail service (see Chapter 2).

A national policy of developing new intercity rail service is less than a decade old. Despite the emergence of a federal role in funding and planning for such systems, states play the lead role in identifying, justifying, and funding the operation of intercity rail. This guidebook identifies current best practices for most of the tasks associated with these initiatives, recognizing that practices will evolve as state agencies become more experienced. Included are references to additional detailed technical guidance that may need to be updated in response to the changing environment. The guidebook complements other recent TRB publications dealing with rail service development:

- *NCHRP Report 657: A Guidebook for Implementing Passenger Rail Service on Shared Passenger and Freight Corridors.* (2010)
- *NCHRP Report 773: Capacity Modeling Guidebook for Shared-Use Passenger and Freight Rail Operations.* (2014)
- *NCRRP Report 1: Alternative Funding and Financing Mechanisms for Passenger and Freight Rail Projects.* (2015)

Intercity Passenger Rail Project Timelines

There is limited experience on which to base the launch of new U.S. intercity passenger rail operations. Still, some general observations and gross estimates concerning the time required to develop such operations are worth noting. The typical relative timelines are described below and shown in Figure 1-1:

- **New Passenger Service in a Greenfield Alignment.** Securing a greenfield alignment through purchase and condemnation is, by itself, costly, litigious, and time-consuming, often taking a decade or more even after specific decisions are made as to the exact location. While planning and design can occur simultaneously with the corridor acquisition process, another 5 years for procuring fixed-plant construction and systems testing in the U.S. environment should be factored in.
- **New Passenger Service on an Existing Freight Rail Corridor.** Launch of a new service along or on a mainline freight rail corridor will require lengthy negotiations, detailed analysis, and

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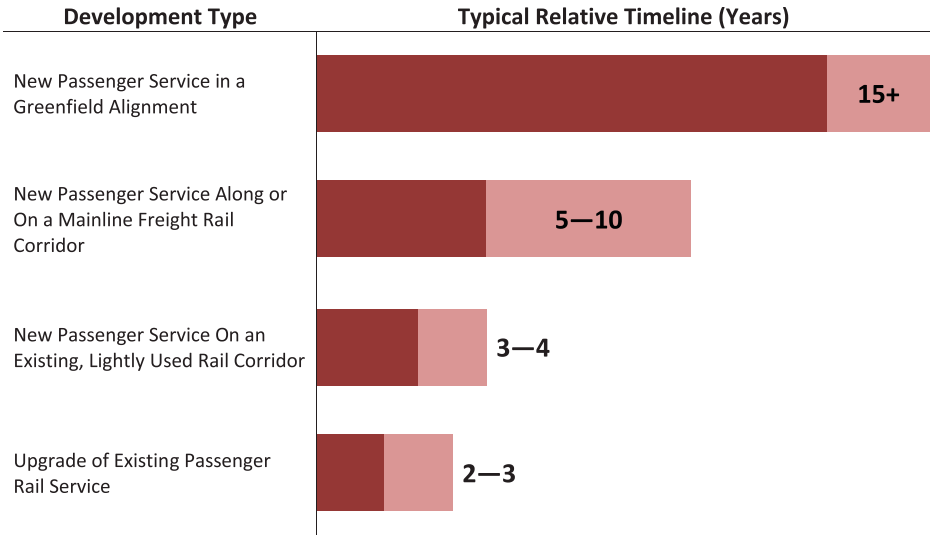

Figure 1-1. Typical relative timelines for intercity passenger rail project types.

sizable public rail capacity investments in order to avoid adverse effects on the service capability of the freight franchise. A 5- to 10-year horizon for launch of operations is a reasonable goal.

- **New Passenger Service on an Existing, Lightly Used Rail Corridor.** The best physical scenario for the launch of a new service is one in which an existing, lightly used rail corridor suitable for infrastructure upgrade to accommodate the passenger operations is under consideration. Corridor owners in such situations are often anxious to see injections of new capital improvements and may be able to tailor rail freight operations to occur outside the principal passenger service hours. Given adequate funding, it may be possible to launch such an operation in 3 to 4 years.
- **Upgrade of Existing Intercity Passenger Rail Service.** The time required to upgrade existing intercity passenger rail service varies widely, but it can be reasonably short if the specific improvements have previously been evaluated and prioritized as the product of a detailed, multiphase, long-term plan. A 2- to 3-year service target after funding is committed to the corridor owner (i.e., freight rail company) may serve as a reasonable target.

Much of the time included in these estimates accounts for conduct of required planning, environmental, and engineering studies—not just negotiations and construction. Each phase is discussed in more detail later in this guidebook.

Key Participants in the Development Process

Key participants in most intercity passenger rail development projects are often as follows:

- **State DOTs.** Under current federal policy, state DOTs are required to play the leading role in developing and managing new intercity services. This structure can be a challenge where states have little or no history in planning or managing rail passenger service and/or where a specific intercity alignment crosses state lines.
- **Rail Corridor Owners.** Most proposals for intercity service involve potential use of privately owned rail freight corridors. Complex management, capacity investment, and liability issues dominate negotiations for terms of access for passenger rail service providers.
- **Federal Railroad Administration (FRA).** FRA is the administering agency for any federal project funds and also must approve the safety elements and regulatory conformance for proposed services. Rail safety regulation is a federal responsibility, so FRA must be involved, even for intrastate projects that do not rely on federal funding.

- **National Railroad Passenger Corporation (Amtrak).** Amtrak is the dominant provider of intercity passenger rail service in the United States, leveraging its unique statutory right of access to a significant part of the U.S. freight rail system. As a result of its statutory role, Amtrak also often serves as the front-line service design negotiator with host freight carriers as new services are considered.
- **Rail Service Advocacy/Promotional Groups.** Various groups of individuals and organizations advocate for developing improved passenger rail services in a broad range of geographic areas. One such group, the National Association of Rail Passengers (NARP), includes state and regional chapters that organize specific initiatives—through the political structure—that support supplemental programs and projects to develop rail service. Other groups exist at state and local levels to promote the general development of alternative travel modes or to advocate for specific initiatives or projects.
- **Third-Party Technical Experts.** Many state DOTs and other project sponsors lack the technical expertise and experience to plan and implement developing intercity passenger rail services. Third-party organizations (including private consulting firms, university-based researchers, and other experts) participate in the development process by assisting with planning and implementation activities or serving in a review or oversight role, as appropriate.
- **General Public.** Providing avenues for public involvement is important for building consensus, promoting transparency, and developing a shared vision for the transportation system. Sponsors of intercity passenger rail projects should include opportunities for the general public to review and provide feedback on initiatives and proposals. Specific instances where public involvement may be required or beneficial to the development process are noted in this guidebook.

Other state and federal agencies and/or private entities may also be included in the process, depending on the particular circumstances; state or federal legal requirements; and specific conditions related to the physical or operational characteristics of an individual intercity passenger rail service. For example, a service that crosses from one state into another may have to meet additional requirements. *NCRRP Report 5: Developing Multi-State Institutions to Implement Intercity Passenger Rail Programs* documents how such projects can be implemented most efficiently.

Organization and Use of This Guidebook

Detailed technical guidance on development of intercity passenger rail has been and continues to be developed. This guidebook provides a general description of the development process and directs users to sources of additional information on specific intercity passenger rail service development topics. Given the evolving efforts to develop intercity passenger rail service, realistically, there will be a need to update these sources.

The guidebook begins with a discussion of the initial steps to develop intercity passenger rail programs. It also addresses feasibility and environmental issues, service development requirements, and operational phases. This guidebook will be useful to various agencies, including those entering the intercity passenger rail arena for the first time as well as those that have a longer history in planning for and providing intercity passenger rail and are further along in their development process. The guidebook is built for use as a reference on an as-needed basis, and it refers the user to other existing studies. Users should consult FRA/TRB and other sources for future versions of regulations and guiding authority that may be promulgated.

The guidebook has the following chapters:

- **Chapter 1: Introduction.** This chapter summarizes the scope and purpose of the guidebook, and its appendixes, which includes the final report and a table of existing published resources.

- **Chapter 2: Visioning: Intercity Passenger Rail Program Establishment.** This chapter summarizes the steps for establishing an intercity passenger rail service program and the potential structures/guidance for doing so.
- **Chapter 3: Planning: Project Feasibility/Service Development.** This chapter summarizes key studies and other issues associated with determining the feasibility of intercity passenger rail services.
- **Chapter 4: Planning: Environmental Requirements.** This chapter presents intercity passenger rail planning issues associated with implementation of the National Environmental Policy Act of 1969 (NEPA) for passenger rail projects and describes current processes.
- **Chapter 5: Design and Construction.** This chapter summarizes key measures taken during the design and initial construction of an intercity passenger rail project.
- **Chapter 6: Operations and Maintenance: Service Planning.** This chapter summarizes contracting practices, working with host railroads, right-of-way (ROW) preservation and maintenance, and other planning issues that may be faced once intercity passenger rail service begins.
- **Chapter 7: Operations and Maintenance: Ongoing Service Management.** This chapter describes issues such as fare policy and ticketing, station operations, weather effects, and other factors affecting daily operations that are of interest to the intercity rail planning agency.
- **Appendixes—Targeted Syntheses and the Contractor's Final Report.** Appendixes A through E are targeted syntheses on topics not well documented. The topics were selected by the project panel based on input from the literature review, initial interviews of implementing agency personnel, and a survey of potential guide users. Appendix F describes the actions and methods used to gather information for the project and includes, as an annex, a table of existing and available reports identified during the literature review, which users may find useful as further reference into the areas discussed in this guidebook. Active hyperlinks to the referenced documents are included and should be accessible via the PDF of the report available on the TRB website.

Clarification of Terms

A few terms used throughout the guidebook are defined here to avoid confusion in later discussion:

- **Intercity Passenger Rail.** There is often confusion between commuter rail service in and around urban areas and intercity passenger rail service. Making a formal technical distinction between intercity and commuter rail service is difficult because some commuter rail services operate between multiple suburban cities to bring commuting passengers to the urban core. Commuter rail, for this guidebook, generally operates at distances of less than 100 miles, typically features peak travel periods during morning and evening rush hours, and is primarily patronized by those traveling regularly to and from their places of employment. Intercity passenger rail services are those normally used by people traveling to another urban center for visits of 1 or more days and may be seen as competitive with long-distance auto travel or air service. From a funding perspective in the United States, commuter rail projects draw from FTA funding programs in competition with other forms of bus and rail transit public transportation. Intercity passenger rail projects, on the other hand, are typically funded through appropriations (irregular to date) for handling by FRA under the terms of the 2008 PRIIA.
- **High-Speed Rail (HSR).** Use of the term high-speed for U.S. passenger rail initiatives has proven confusing, given the wide breadth of interpretation for labeling intercity passenger rail service speeds around the world. New, world-class rail service startups in the developed world generally include operating speeds of at least 250 km/hour (155 mph) and range up to 350 km/hour (220 mph). These are sometimes called "true HSR" or "world-class HSR."

Only two recent U.S. rail service initiatives, California High-Speed Rail and the Texas Central Railway project (Dallas–Houston) contemplate service speeds in this range. Amtrak's current Acela Express service in the NEC operates on a few segments at speeds up to 135 mph and on limited sections of ROW at 150 mph in revenue service. As a result, Acela is considered HSR by both its operator, Amtrak, and the regulatory agency, FRA. State-sponsored services in Michigan and Illinois both have limited but rapidly expanding sections of 110 mph and are considered excellent U.S. examples of what is termed "higher-speed rail (HrSR)." Amtrak has announced plans to speed up additional sections of the NEC to operate more closely with international HSR standards when necessary enabling infrastructure improvements can be funded. On most conventional or shared-use corridor services, tracks and/or ROWs are shared with mainline freight rail operations, and passenger service speeds beyond 90 mph are generally considered impractical. Large U.S. rail freight operators typically resist any proposals above this speed. When the term high-speed rail is used, be aware that it can have various connotations.

- **Positive Train Control.** PRIIA requires rail carriers or service sponsors to install an operations safety overlay system, known as positive train control (PTC), on most passenger service routes. PTC prevents over-speed conditions by slowing the train automatically if it exceeds track speeds, provides warnings and enforces stop requirements should an engineer violate a track clearance signal, and protects track worker safety zones irrespective of train operator error. Development and installation of the new systems have been plagued by technical challenges, which prompted railroad infrastructure owners to seek a delay of full implementation beyond the original December 31, 2015, deadline in PRIIA. Legislation passed in October 2015 extended this deadline to December 31, 2018, to give more time to Class I railroads and intercity and commuter railroads to complete their PTC system design and implementation on required tracks. PTC system requirements will add to the cost of new service initiation in corridors not already equipped with such technology.

CHAPTER 2

Visioning: Intercity Passenger Rail Program Establishment

This chapter describes the state rail planning process and the steps necessary to establish an intercity passenger rail program at the state DOT level. The chapter includes a description of the most current practices in developing state rail plans (SRPs) issued by FRA, a discussion of the decision to establish a state- or regional-level intercity passenger rail program, an introductory description of how to fund or finance an intercity passenger rail program, and an overview of the public involvement processes involved at this stage of program development. The chapter concludes with a discussion of how the decision to establish an intercity passenger rail program can affect overall state transportation goals.

Developing State Rail Plans

The Passenger Rail Investment and Improvement Act of 2008 (PRIIA) established a national policy and planning framework for intercity passenger rail service and development. Section 303 of PRIIA requires that states develop SRPs to establish a statewide rail policy and address a broad range of issues related to freight and passenger railroad services in the state. PRIIA also requires that FRA agree to an SRP and that any infrastructure projects funded through FRA capital grant programs be included in an adopted SRP through a joint process between the state and FRA. FRA provided further guidance in 2013 on the elements and suggested format for creating SRPs that would comply with FRA requirements to receive future federal funding for intercity passenger rail and other rail infrastructure improvements.

This section describes the role of the SRP in the intercity passenger rail service and development process. PRIIA and subsequent FRA requirements for SRP content are discussed, including strategies for outreach to public and private stakeholders and the role of performance measurement in the SRP process.

SRP Development Process Summary

The SRP development process can directly support developing intercity passenger rail service in a state given that completion and FRA acceptance of an SRP make the state eligible for future federal grants related to intercity passenger rail. Through the state rail planning process, states can

- Formally establish a common vision, informed through robust public outreach and stakeholder input, for developing intercity passenger rail service in the state.
- Use performance-based planning to link the vision for intercity passenger rail service with specific goals and objectives for the service and specific metrics to evaluate progress toward the vision, goals, and objectives.
- Develop a program of long- and short-term infrastructure investments necessary to achieve the vision for intercity passenger rail service in the state.

Purpose of the State Rail Planning Process

The state rail planning process enables states to develop a unified vision for intercity passenger rail policy and provides a forum for obtaining feedback from public and private stakeholders on the vision for intercity passenger rail service in the state. The SRP can also be used to develop the state's vision for intercity passenger rail service and to document the infrastructure, funding needs, and challenges associated with implementing a passenger rail program. SRP elements also document areas necessary for FRA and other agencies to consider in future funding decisions.

SRP Requirements

Requirements for developing SRPs are described in Section 303 of the PRIIA legislation, which has been codified in 49 U.S.C. §22705. On September 17, 2013, FRA issued its *State Rail Plan Guidance* document explaining the process to be followed in developing SRPs and the minimum content requirements for SRPs to be in compliance with PRIIA (FRA 2013). Highlights of the FRA SRP guidance are presented in this section with specific discussion related to the role of the SRP in intercity passenger rail service and development activities. Many states have been engaging in state rail planning activities, including the development and frequent update of an SRP, for many years. However, the specific PRIIA requirements for SRP content, FRA authority for approval of a state's SRP, and the connection between project inclusion in an SRP and eligibility for FRA capital grant funds are new requirements that need to be addressed by states in SRP updates. FRA SRP guidance also presents the detailed requirements that must be followed for FRA to provide acceptance of the state's SRP document as complying with the SRP requirements. FRA's acceptance indicates compliance and review—not official approval of the projects and plans included there. States and other entities wishing to implement intercity passenger rail service are encouraged to review the FRA guidelines in more detail to ensure full compliance with legal requirements for SRPs.

PRIIA requires that states must establish or designate a state rail transportation authority (SRTA) to develop SRPs and set policy for freight and passenger railroads within state boundaries. PRIIA also requires that states establish or designate a state rail plan approval authority (SRPAA) with responsibility to review and approve the SRP. The FRA guidance allows for the SRTA and the SRPAA to be the same entity or official. Many state DOTs have established specific offices or divisions that take on these roles to administer rail-related activities for the DOT. Additional discussion of administrative options and responsibilities for state DOT rail programs can be found in the Administrative and Institutional Options section of this chapter.

Typical Rail Plan Content

The required standard format for SRPs as described in the FRA final *State Rail Plan Guidance* (FRA 2013) is as follows:

Executive Summary
1. The Role of Rail in Statewide Transportation (Overview)
2. The State's Existing Rail System
   - 2.1. Description and Inventory
   - 2.2. Trends and Forecasts
   - 2.3. Rail Service Needs and Opportunities
3. Proposed Passenger Rail Improvements and Investments
4. Proposed Freight Rail Improvements and Investments
5. The State's Rail Service and Investment Program
6. Coordination and Review

Technical Appendix

The FRA guidance provides specific requirements for developing SRP content in compliance with the regulatory framework of the PRIIA legislation. Key highlights of SRP content requirements pertaining to the intercity passenger rail service and development activities are discussed in the following sections of this chapter.

Public Involvement in SRP Development

Public involvement is essential in developing all transportation plans, including SRPs. A comprehensive process involves the general public, affected organizations, public agencies at all levels of government, and other stakeholders. Such involvement allows the SRP to be informed by the viewpoints of all relevant parties and supports a proactive approach to identifying issues in developing the state's railroad system. Throughout this guidebook, discussion of specific public involvement at each stage of development is included.

Public and Stakeholder Involvement

PRIIA requires states to involve public and private stakeholders in developing and reviewing SRPs. As defined by PRIIA, stakeholders must include all freight and passenger rail (intercity and commuter rail) carriers and transit authorities operating in, or affected by, rail operations within the state, as well as all units of local government, and metropolitan areas. Stakeholders should also include major shippers, freight and passenger rail organizations, rail labor organizations, intercity bus operators, airlines, airport authorities, port authorities, chambers of commerce, tourism organizations, and other public or private entities interested in improving rail services and multimodal integration within the state. Involvement of freight railroad carriers is particularly relevant to developing intercity passenger rail services in locations where services are expected to use infrastructure or other facilities owned by freight railroad companies.

FRA requires that stakeholders must be notified and given the opportunity to provide input on the SRP as it is being prepared and on the draft plans produced. After notification, the public and stakeholders must have a reasonable time for review and comment on the draft materials. Some states have adopted formal plans for public involvement in developing transportation planning documents; these state-level practices should be followed in developing the SRP where applicable. Local and regional stakeholders (e.g., MPOs) also have established public outreach and feedback mechanisms that may be beneficial to obtaining public input for the SRP. Some innovative practices for involving the public and affected stakeholders in SRP development include an expert advisory panel or committee, an Internet-based survey of key stakeholders, or a web-based virtual public meeting.

Interagency Coordination

Planning activities for intercity passenger rail service and development should include outreach to all affected public agencies at the state, regional, and local levels. FRA notes that SRPs are an important part of a comprehensive and coordinated approach to identifying and addressing the mobility needs of passengers and freight in a state (FRA 2013). PRIIA requirements for SRPs direct states to coordinate developing the SRP with other statewide and nonmetropolitan planning activities. The goals and objectives for the state's railroad system should support the broader goals and objectives for developing the transportation system in the state. Furthermore, SRPs should coordinate with metropolitan transportation planning activities to the extent that components of the SRP affect transportation developments within urbanized area boundaries. Finally, when intercity passenger rail corridors cross state boundaries, states should coordinate SRP development activities with adjacent states. (See *NCRRP Report 5* for more information on the process and institutional structures for multistate corridor development.)

Performance Measurement in State Rail Planning

PRIIA requirements for SRPs direct that states should complete a performance evaluation of passenger rail services operating in the state, including a description of possible improvements to those services and strategies to achieve those improvements. To comply with this requirement, FRA's *State Rail Plan Guidance* indicates that this performance evaluation should be found in Chapter 2 of the SRP (FRA 2013). The performance evaluation should include all passenger rail services operating in the state, including interstate and intrastate services. At a minimum, the evaluation should report the performance of passenger rail services in the state with respect to the performance metrics established by FRA and Amtrak under the requirements of PRIIA Section 207. The final metrics developed under PRIIA Section 207 were published in May 2010; quarterly reports on the performance and service quality of intercity passenger train operations can be accessed via the FRA website.

Some states may have additional specific requirements for performance evaluation in the SRP. For example, the *California State Rail Plan* notes that the California State Government Code requires a performance evaluation of state-supported passenger rail routes and lists specific financial and operational metrics that are to be evaluated (AECOM 2013). Appendix 1 of FRA's *State Rail Plan Guidance* provides a list of data requirements corresponding to each major element of the SRP format described earlier.

One of the key benefits of completing an SRP is that the process permits all stakeholders to provide input on the vision, goals, and objectives for the state's railroad system, including intercity passenger rail services operating in the state. The performance evaluation requirement for SRPs enables states to undertake a comprehensive and detailed evaluation of passenger rail services in the state and to link the performance of the state's passenger rail system to the established goals and objectives. This performance-based process for planning and decision making for transportation has been established for other modes since the early 1990s and reinforced with numerous provisions for performance-based planning found in the most recent long-term surface transportation bill, Moving Ahead for Progress in the 21st Century (MAP-21), which was approved in 2012 (FRA 2013).

Linking a passenger rail development strategy with performance targets established in an SRP can benefit a state rail program by supporting improved decision making and more efficient allocation of resources. Performance evaluation can be used by states to establish performance targets for intercity passenger rail services operating in the state or track progress toward already-established performance targets. Additionally, the evaluation can assess the contribution of passenger rail toward meeting statewide performance objectives. Additional details on the performance metrics established by PRIIA Section 207 and other innovative practices in performance measurement in developing SRPs is provided in Appendix D.

Role of SRPs in Intercity Passenger Rail Service Development

Under FRA's required standard format for SRPs, Chapter 5 of an SRP is the state's rail service and investment program (RSIP). The RSIP is a key component of the SRP, describing the state's long-term vision for rail service and its role in the statewide multimodal transportation system. The RSIP lays out the state's long-range vision for the passenger rail system in the state with a 20-year time frame and identifies the highest priority needs for funding in the immediate short-range (4-year) program period (FRA 2013). The RSIP enables states to outline the vision for intercity passenger rail service in the state. The vision should include a map depicting the proposed long-term vision for the state's passenger rail network, including intercity, commuter corridors, and potential communities where stations could be located. The RSIP should also include a list of infrastructure projects that would be required to achieve the vision and a description of

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the potential effects of the proposed rail program on the state's transportation system. The RSIP should include an economic analysis of the program, including capital and operating expenditures and the potential public and private economic benefits that may accrue from the investment program.

Deciding to Establish a State-Level Intercity Passenger Rail Program

A decision by a state to develop a formal intercity rail program generally occurs only after consensus among state executive branch officials and legislators that a specific corridor project or system of such corridors should be pursued. Unlike many highway expansions, extensions, or additions to the state network, the decision to pursue intercity passenger rail investment is often controversial in the United States and is considered supplemental to the traditional or regular programs for highway network enhancements. Few state DOTs have invested the staff resources to manage a major rail development program. States that elect to move forward with such a program are faced with a choice of recruiting staff with rail experience or relying heavily on outsourced consultant services for the biggest share of the technical work associated with developing a new rail service corridor. Minimum staffing requirements for the rail department or division of a DOT are established under PRIIA for those jurisdictions seeking a share of federal funds for their project.

Administrative and Institutional Options

Key initial decisions for intercity rail sponsors as they select their administrative management structure for governing intercity passenger rail programs are

- The degree of autonomy the rail program should enjoy from other, more routine DOT functions.
- The breadth of Amtrak's role in operating and managing the service.

Since the passage of PRIIA in 2008, state rail sponsors have been given broad latitude (through PRIIA Section 209) to outsource various elements of rail service rather than to rely on Amtrak for all rolling stock, onboard services, fare policy, marketing, and so forth. As the costs for various program elements become more transparent, it becomes easier for train sponsors to shop and compare while also more directly shaping the attractiveness of the service product through these decisions. During the course of NCRRP Project 03-01, the long-term scope and depth of this outsourcing trend has continued to evolve. Although the process is now more transparent to states as purchasers of Amtrak services, the overall costs of Amtrak service on state-sponsored corridors has generally increased—especially in some states with long histories of partnering with Amtrak.

Two observations may be made about the choices for rail program structures based on operations:

- Several of the most successful regional train services already operate with a high level of regional management and control by the service sponsors (e.g., the Boston–Brunswick, Maine *Downeaster*; Oregon and Washington State's *Cascades* trains between Vancouver, British Columbia, and Eugene, Oregon; and the highly patronized, high-frequency *Capitol Corridor* operation in northern California). Management staffing, service monitoring, and direct interface with host corridor owners is more robust in each of these examples than is typical for many Amtrak-operated trains elsewhere.
- A decision to directly manage most service elements for a rail corridor operation moves the rail program management role by the state DOT or other public oversight agency ever further away from that typically assigned to DOT functions and would appear to be an argument for at least some level of autonomy from daily, engineering-focused DOT activities.

A discussion of the desire for more specific granularity in costs associated with Amtrak's services following PRIIA Section 209 implementation is provided in Appendix B.

Funding Intercity Passenger Rail Programs

Given that the critical issues of funding needs and potential resources are the focus of other NCRRP studies and reports, this guidebook summarizes these topics. *NCRRP Report 1: Alternative Funding and Financing Mechanisms for Passenger and Freight Rail Projects* offers an in-depth discussion of funding and financing of rail projects. Useful information on dedicated state funding programs for intercity passenger rail will be provided in the soon-to-be-published report from NCRRP Project 07-03, "Inventory of State Passenger and Freight Rail Programs." Other NCHRP, TCRP, and ACRP projects related to funding and financing of major infrastructure projects may have examples that could be adapted for use in intercity passenger rail project development. The annex to Appendix F lists available documents by project delivery phase and type of project.

Typical Intercity Passenger Rail Program Funding Needs

This section describes the four general types of funding required to develop an intercity passenger rail program. Given that the scope of funding requirements depends on the types and scope of the projects being considered in each case, this section addresses broad areas/types of funding rather than attempting to quantify potential dollar amounts.

The four broad types of funding required to establish an intercity passenger rail program are as follows:

- **Planning/Design.** This category includes funding needs related to the planning, design, and approvals phase of planning studies for new or significantly improved intercity passenger rail service. Some states or designated service-sponsoring agencies have identified and sometimes pre-budgeted the resources necessary for planning and design. Other states must specifically seek this funding on an as-needed project basis from either agency funds or through special appropriations at the state level.
- **Capital Investment.** Capital requirements exist for construction of fixed infrastructure facilities (e.g., ROW purchases, track, signaling, stations, and maintenance facilities) and, in some cases, for rail rolling stock. This type of capital expenditure is generally the largest initial cost and will vary from state to state and project to project by scope and type of service planned, frequency of service desired, and type of vehicles chosen to perform the service. Infrastructure costs for additional capacity on existing corridors can be an added cost. Construction costs and operational testing prior to service commencing would also be included. Investment in recently mandated rail operational safety systems (e.g., PTC) also may be necessary, depending on the project location.
- **Operations and Maintenance.** In state-supported systems, most states partner with Amtrak to provide desired corridor service (for corridors < 750 miles in length) based on a fee schedule that was somewhat standardized following passage of PRIIA Section 209 in 2008 and subsequent negotiations/discussions between Amtrak and states. Final, specific procedures to implement PRIIA Section 209 provisions remain under negotiation and development between states and Amtrak. In almost all cases, an ongoing operating subsidy to cover potential difference between operating revenues and costs will be required, as experienced in other modes. In contrast, on a few marginally self-sufficient HSR systems overseas, operating revenues are reported to exceed operating costs. Use of non-Amtrak, private rail operations companies is being explored under PRIIA provisions; however, until final cost structures are fully negotiated and documented, it is unclear if this option would provide appreciable cost savings without

drop in quality of service—especially in regard to shared track operations with freight rail companies.

- **Long-Term Maintenance/Capital Spending.** Additional capital or capitalized maintenance expenditures for ensuring a state of good repair (SOGR) of all the dedicated equipment and facilities will also be required. Even on the few routes where operational revenues may exceed operational costs, the difference is not sufficient to cover required long-term maintenance, replacement, and upgrade costs. Therefore, the need for routine capital investment in maintenance and desired capital asset improvements should be considered as a required funding element when considering development of an intercity passenger rail program.

Typical Sources of Funding and Financing

There are a range of potential grant capital and operating funding sources at multiple levels of government, but in the United States there is a small number of true government financing opportunities. *NCRRP Report 1: Alternative Funding and Financing Mechanisms for Passenger and Freight Rail Projects* provides an in-depth discussion of funding and financing programs for rail projects, including intercity passenger rail projects and programs. The summary description that follows gives a broad overview of issues and priorities that should be considered in developing financial planning and resources for an intercity passenger rail program.

The terms funding and financing are often confused by the public and many in government positions, but these terms represent different aspects of a given infrastructure project. Funding refers to the potential revenue streams/sources that can be used to pay for a specified project. As explained in *NCRRP Report 1,* sources of passenger rail funding are likely to include but may not be limited to

- Net operating revenue streams
- Ancillary revenues from operation
- Non-repayable capital grants or ongoing operating subsidies specifically funded from various taxes, fees, or other (transportation or general) user charges

For most U.S. intercity passenger rail projects, an independent ongoing operating funding stream will be required because the sum of farebox and other ancillary revenues (e.g., lease of station facilities) usually is insufficient to cover the direct operating cost of the service and results in a net external funding requirement to fill the ongoing net operating financial gap.

Financing for intercity rail projects typically includes mechanisms or tools to pay for the construction of a project before the project produces revenues. Financing in simple terms is a means of spreading out initial capital investment if full outright capital funding sources are unavailable up front. Financing mechanisms can be used to spread either a portion or the entirety of the upfront capital requirement over time. As explained in *NCRRP Report 1,* financing mechanisms typically include various forms of debt, equity, and capital leases.

Financing creates a future financial obligation and does not replace funding availability. In practice, financing—even creative financing—cannot solve an underlying funding problem. Many large infrastructure projects frequently rely on a creative combination of public and private financing sources, but highways, at least in the United States, primarily rely on traditional public sources such as long-term bonds and fuel tax revenues. A more complete discussion of these issues is provided in *NCRRP Report 1.*

Funding Sources

Many states that have been supporting intercity passenger rail for several years have relied on their state legislatures to annually appropriate funding to meet their needs for Amtrak

state-sponsored matching operating funds as well as for larger state-funded capital investment projects. These operating appropriations have become generally well understood, anticipated, and recognized—particularly for the long-standing programs. With the implementation of PRIIA Section 209, and the new requirement for all states to pay the full operating subsidy (as opposed to a portion of the total in the past), continued state appropriations at the higher level have become a major issue of contention, particularly in times of tight state budgets. These provisions are discussed in more detail in Appendix B.

Several of the newer entries into state-sponsored intercity service have had to make compelling cases to justify their initial (and now increasing) capital grant and/or operating subsidy requirements. Some have found alternative or supplemental sourcing for their operating funding, including local/regional taxes (typically from a percentage of gas or sales tax already approved but currently dedicated to other forms of public transportation), contributions from served communities (from general tax revenues, likely real estate based), and similar sources.

To meet capital requirements of new service or service upgrade investments, many states have been able to justify the full amount (or a state match for partially federally funded projects) through special or earmarked appropriations by their state legislatures, especially for projects that provide visible and measurable local job creation or locally valued service benefits. (This is difficult for some states, however, given that state legislatures may only meet periodically and the window for requesting such an appropriation may not coincide with the cycles of funding availability for federal or other funding programs.) There also are examples of cities/municipalities providing capital funding for a new or refurbished passenger rail station and of private entities (e.g., a major retailer, university, or housing developer) funding a new station in anticipation of increased value through improved rail access to their business/trade facility.

To identify potential funding sources for portions of intercity passenger rail needs, several states have explored or considered some of the creative financing approaches more commonly used for funding urban or regional rail transit systems, but with relatively limited actual application up to this point. Among these are local tax increment financing (TIF) districts where an incremental additional property tax levy is applied to specifically defined areas closely surrounding stations that generate an increase in the value of the properties above their previous values. Other techniques may include sales of naming rights of stations, other buildings, or even the entire passenger service; sales of advertising space in stations or onboard trains; or rail car wrap advertising featuring sponsor logos and graphics on the outside of rail cars.

Over the years, the available federal-level capital grant funding for intercity passenger rail programs has fluctuated and there has never been a consistent and predictable annual source of federal dollars. Against this long-standing history of limited federal capital support for intercity passenger rail, the 2009/2010 High-Speed Intercity Passenger Rail (HSIPR) Program, as part of the overall ARRA financial stimulus package, along with its substantial federal capital commitment availability, helped to jumpstart a wide range of intercity passenger rail projects at typical conventional speeds (up to 79 mph) and higher speed (up to 150 mph), and one true HSR project (150+ mph). Due to political contingencies, the actual appropriated annual capital funding for this program dropped dramatically in subsequent years and has been effectively zeroed out in appropriation legislation, leaving these projects delayed or in question.

Financing Mechanisms

As detailed in *NCRRP Report 1,* the potential for return-based financing of intercity passenger rail capital cost is limited because conventional and even some high-speed passenger rail services that may cover their own operating costs do not typically generate an operating surplus large enough to address these infrastructure costs. That said, in recent years several financing plans

have been successfully implemented. These have involved rolling stock acquisition with the debt repayment covered by a portion of clearly available operating revenue, effectively converting the capital cost to an operating expense for the debt service. Another similar mechanism is the use of financing for fixed-facility new investment or upgrade, with the debt repaid from committed tax revenue streams, effectively spreading the (still ultimately publicly funded) capital cost over a longer time and replacing the need for a one-time grant to meet the entire project capital costs.

Role of Private Financing

Scarcity of public funds for infrastructure construction and renewal in the United States has driven interest in using private capital sources to finance projects in every transportation mode. Passenger rail advocates and sponsors are encouraged to explore the possible use of private capital sources, but they should exercise caution in managing public expectations as to what private financing can achieve. Specific items to be aware of include

- The fundamental economic value of a project does not change as a result of a shift in sources of capital from the public to private sphere. Money borrowed to build a new system must be repaid. In cases where the benefit stream from the new operation is sufficient to amortize the initial capital financing over a reasonable period of time, private financing is relatively straightforward.
- Conventional passenger rail systems do not typically generate sufficient farebox revenue from riders to cover operating costs or to amortize the initial investment in rolling stock and infrastructure.
- Many highly capitalized, modern HSR systems in Europe are reported by their sponsors to be *farebox adequate* (i.e., generating sufficient passenger revenue to cover all direct operating expenses including capital asset depreciation). Initial infrastructure investment is still, however, reliant on public finance and support.
- Although passenger rail opponents often point to this funding shortfall, highway and airport infrastructure also receive substantial public investment, both initially and over time, and those investments are not fully recovered from the users of those facilities.
- In limited, exceptional cases, some intercity rail programs may justify a substantial share of initial private investment by using the real estate value created at station locations and properties served by the rail service. For example, the currently planned All Aboard Florida private intercity passenger rail project relies heavily on such development by a private rail company that already owns the corridor with substantial rail assets already in place, effectively reducing the overall initial infrastructure investment required.
- Value-capture financing mechanisms vary widely by political jurisdiction. As an example, some states prohibit, via statute, TIF vehicles that are a common feature of public support for major projects in other locations.

NCRRP Report 1 provides a full discussion of funding and finance options available to rail systems developers as discovered from projects worldwide.

CHAPTER 3

Planning: Project Feasibility/ Service Development

This chapter covers the elements of planning for intercity passenger rail service after establishment of an intercity passenger rail program and after identification of funding sources and authority to undertake a project has been completed. This chapter includes sections on identification of initial projects, network design and route selection considerations, and coordination of planning with host railroads and state/federal agencies. The chapter ends with sections on service development plans and how to support a service feasibility study.

Project Identification and Initiation

This section describes the typical process carried out by a state DOT or other implementing public-sector agency tasked with initiating an intercity passenger rail program and identifying the initial project or projects that should be undertaken by the agency. Typically, states beginning an intercity passenger rail program are not starting without an identified need for additional intercity passenger travel capacity between the major urban centers. In many cases, freight rail corridors (either operating or abandoned) connect these urban centers, and these corridors are seen as a way to provide alternative transportation in the form of intercity passenger rail service. Some states may have traditional intercity passenger rail routes that may no longer be in operation or operated by Amtrak daily (or even 2 or 3 times weekly), which the implementing agency would like to see increased so as to enhance desirability and thereby improve ridership numbers and shift highway traffic from congested roadways.

Specific corridor feasibility studies to identify such opportunities often precede the creation of a state rail program or have taken place as part of the SRP process described earlier. This section describes four aspects of this phase:

- Integration of state intercity passenger rail corridor planning with states' long-range transportation plans
- Importance of documenting desired projects in the SRP
- Identification of specific state funding sources
- Coordination with regional plans

Integration of Intercity Rail Planning with State Long-Range Transportation Plans

SRPs are required by FRA to show how intercity passenger rail and other rail projects are integrated with long-range transportation planning for the other transportation modes. Rail planning for passengers could address general intercity passenger demand identified in statewide planning studies and might even be included in alternative analysis for specific highway projects previously conducted by the state.

Once an SRP is completed, the results should be incorporated to appear along with other modal plans in the comprehensive state long-range transportation plan. Prioritization and implementation of intercity passenger rail options will vary from state to state, depending on several factors. Many states do not have significant funds available for rail projects, and their state transportation funding authority may be limited to highway-only expenditures. In other cases, the attractive 80-20 or 90-10 federal-state matching fund rates afforded to many federal highway funding programs do not readily match up with federal rail programs, which have been proposed, in some cases, at a less attractive 50-50 funding rate.

Such restrictions often mean that it is financially unattractive for states to invest in rail projects compared with highways or other modes with higher matching rates—even if the state has complete flexibility in modal funding. As future funding programs emerge at the state and federal level, if rail and other alternative modes are given equity in terms of flexibility and matching rates, perhaps rail projects, including intercity passenger rail projects, will better compete for transportation funding. Planners at state DOTs and other implementing agencies responsible for rail planning must work with leaders and planners within their agency or at associated state agencies to ensure that intercity passenger rail development and planning are considered along with highways and airport funding for intercity travel needs.

Project Documentation in SRPs

As outlined in FRA's *State Rail Plan Guidance* (2013), a project must be documented as part of a state's SRP in order to receive federal funding. This requirement is similar to the long-time requirement for highways to be listed and prioritized in a state's transportation improvement program to be eligible to receive federal highway funds. Descriptions of the proposed project and its prioritization, along with other similar projects, are aspects that should be covered. Because this is a relatively new requirement, some states whose rail plans were completed before the 2013 FRA guidance have received funding without complying with this requirement. New projects are expected to be mandated to comply with this provision of the guidance.

Identification of Specific Funding Sources

In the FRA guidance, another new requirement for future projects is that they have an identified source of funding for future operations and ongoing, long-term capital replacement needs to ensure long-term maintenance, SOGR, and upgrades. Without these sources of funding specifically identified, state-supported intercity passenger rail services will have difficulty in succeeding and thriving; however, even in states with a long history of state-funded corridors, intercity passenger rail funding is often appropriated on an annual, biennial, or other state funding cycle with no long-term legislative commitment to a specific funding level. This leaves state DOTs in a difficult position of promoting intercity rail service development when funding is mercurial and inconsistent, subject to political changes and infighting, and often lower than is needed to ensure long-term service provision and SOGR. States without such commitments to long-term funding in support of intercity passenger rail will likely receive less federal funding in the future as this requirement is implemented.

Coordination with Regional Plans

One of the first activities that an agency developing plans for intercity passenger rail should undertake is the study of regional transportation plans in the urban areas that will be connected by the proposed/potential service. Often, urban planning documents or regional highway plans do not include great detail on the intercity transportation needs that will be addressed by intercity

rail; however, regional transit plans and especially urban rail transit system layouts are useful in initial planning for intercity service. By understanding where transit hubs, both rail and bus, are located in relation to the existing highway, railway, and airport connections, an implementing agency can make better decisions on proposed frequency, desired operating performance (i.e., conventional or HSR), desired station locations (where needed stations do not exist), and related factors. Local land use patterns and proximity to social traffic generators such as sports stadiums and medical facilities can also be important drivers in attracting ridership and are described in such studies. State DOTs should work with regional transit agencies and MPOs to coordinate planning within urban areas to ensure that intercity and local/regional transit options work together to the benefit of both.

Network Design/Route Selection

Few elements of a new rail service are more important than the selection of a route to efficiently serve key markets while maintaining service velocity that will attract intercity passengers from competing modes. FRA insists that service proponents assess the merits of multiple historic service routes between a given pair of cities, even when the immediate prospects for initiating service appear to favor a given alignment. This is understandable on at least one level—current or recent Amtrak service may use a certain route for reasons unrelated to the route's long-term suitability for high-quality, frequent passenger operations. Long-term service goals may, in fact, conflict with use of a route that is considered as the best maintained today if the current high level of maintenance is the product of robust and growing rail freight traffic that may lead to future rail line congestion and decreases in passenger rail performance.

Another consideration is the need to balance the interests of communities along a given potential route. A line connecting two major cities will often generate most of its traffic from the endpoint stations even while traversing intermediate communities. Therefore, project sponsors must balance the need for broad political support with the need to keep overall transit times competitive. Adding to these difficulties is that there is a service penalty along a corridor whenever intermediated communities must be served. The service penalty associated with an intermediate stop is higher for diesel-powered service (the norm for North America) than for trains using electric traction due to far slower acceleration back to top operating speeds.

Defining and Optimizing a Project Route

In addition to regional and local community input, several quantitative factors should be considered to help rank alternatives and contribute to the selection of the best route. Major cost-related factors often include capital cost, operations and maintenance (O&M) cost, forecast ridership and revenue, resultant subsidy requirement, and broad evaluation of funding sources to cover ongoing net costs.

Typical route alternative studies will include estimation of the following key capital cost categories:

- Track and related ROW infrastructure upgrade requirements
- Additional sidings or double/multiple track to ensure sufficient capacity for existing/future freight and the proposed passenger service
- Acquisition of any land not already owned for corridor infrastructure improvements
- Improvements to or introduction of advanced automated signaling, including PTC requirements
- Electrification (e.g., power supply, overhead catenary systems, and substations) if the proposed service is to be electric powered
- New stations or upgrades/expansion of existing stations as appropriate

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- Acquisition of appropriate rolling stock (e.g., locomotives and cars) unless planning to lease equipment, if available, from existing Amtrak or other operator equipment pools
- Other major capital cost items as appropriate

Typical major components of ongoing O&M costs to be studied include the following:

- Direct train and engine (T&E) labor cost, including spare staff and related costs
- Fuel and energy costs, including delivery and administration
- Station operating costs (e.g., maintenance, utilities, and potential staffing)
- Onboard service (OBS) labor cost and supplies, including administrative and commissary support
- Ongoing ROW maintenance cost, possibly shared with a host railroad if operated in conjunction with freight
- Administrative and overhead operating costs
- Marketing, sales, revenue management, and related operating costs

Ridership/revenue modeling is discussed in greater detail in a subsequent section, but the critical quantitative measures for use in the subsidy requirement comparison of alternative routes are as follows:

- Forecast passenger ticket revenues
- Additional projected revenues from food and beverage or premium services
- Other transportation-related revenue
- Total operating revenue equaling the sum of the above
- Projected ridership related to the estimated revenue

In most cases, a route design consultant, working with the state sponsor, will develop a matrix of quantitative measures comparing several viable route alternatives to help rank and prioritize route selection on an objective, quantitative basis. Equally important, however, will be the feedback from all potential stakeholders (e.g., planning agencies, municipal governments, and public hearing input), which may outweigh the purely quantitative comparison in the matrix. Various ranking methods exist that can be used to color code (e.g., red-yellow-green) the non-quantifiable views of stakeholders on specific qualitative factors so as to be able to include these in matrix form. Regardless, the ultimate selection and route recommendation need to represent a fair balance of stakeholder qualitative preferences and quantifiable economic facts.

Select Best Practice Examples in Restoring Service to Historic Passenger Rail Corridors

In addition to outright new greenfield ROWs, which are rare as a primary corridor for new, conventional, or higher speed (i.e., HrSR) state-sponsored service, most typical corridors studied and selected for implementation are on existing shared freight lines. These corridors can range in physical condition and level of use from minimal service and low (pre-upgrade) track condition (e.g., FRA Track Class I) up to high-quality, high-density Class I mainline infrastructure, typically already at FRA Track Class IV. There are pros and cons in each of these situations.

If a new service is operating for low-density freight rail traffic, although it will require at least minimal introductory track and infrastructure upgrades and likely introduction of a new automated signaling system, it will usually not create serious conflicting capacity problems for its—typically—shortline or regional host railroad. On a highly maintained, high-density Class I freight railroad line, although the infrastructure and signaling might be able to safely accommodate passenger rail service without major upgrades, there is likely a serious threat to freight capacity and fluidity. This may lead to the host railroad's requirement to build substantial additional capacity (e.g., a second or third main track) or to a request for building a parallel, mostly

separate, dedicated passenger line in the adjacent ROW, if space and budgets permit. Recent requirements to upgrade or add a PTC system will need to be considered with the provision of passenger service.

Four broad categories of freight lines can be defined in regard to their history of past passenger service over the same line. This categorization is based on their history of passenger service since the formation of Amtrak in 1971. The categories are as follows:

- **Category 0.** Freight routes that had discontinued their passenger service prior to the mass discontinuances on April 30, 1971, in conjunction with the creation of Amtrak.
- **Category 1.** Freight routes that had some remaining passenger services until the mass discontinuance of privately operated passenger trains on April 30, 1971, but no passenger service since the introduction of Amtrak.
- **Category 2.** Freight routes that became part of the initial Amtrak Basic Network system on May 1, 1971, but were subsequently discontinued due to budget-related cost-cutting actions.
- **Category 3.** Freight routes that, either since Amtrak inception or through subsequent intercity route additions/modifications, host passenger operations with Amtrak.

Each category has its own challenges and opportunities and, to some degree, has good examples of current state-sponsored service application as described below.

Category 0—Service Discontinued Prior to Amtrak Inception

There are several examples of good state-sponsored services on routes where passenger service had been discontinued prior to the April 30, 1971, Amtrak inception-related abandonments. The NCDOT-sponsored Charlotte–Raleigh *Piedmont* service operates two local intrastate trains as well as the Charlotte–Raleigh portion of the Charlotte–Raleigh–Washington, DC–New York Penn Station *Carolinian* through route. Similarly, the frequent service and rapidly growing Northern New England Passenger Rail Authority (NNEPRA)-sponsored Brunswick–Portland–Boston *Downeaster* Service was introduced on a freight-only line whose last passenger services had been discontinued several years before Amtrak's inception.

Category 1—No Passenger Service Since Amtrak Inception

There are also several good examples of state-sponsored, short-distance services that use portions of former passenger routes that were discontinued by private operators on April 30, 1971, and not continued by the initial Amtrak network. All three of Amtrak's current successful international services to Canada were re-added to the system after varying lengths of hiatus. New York's Montreal–Albany–New York Penn Station *Adirondack* and Toronto–Buffalo–Albany–New York Penn Station *Maple Leaf* services—as well as Oregon and Washington's Vancouver–Seattle–Portland (Oregon) *Cascades* service—fall into this category. California's Sacramento–Oakland–San Francisco–Bakersfield *San Joaquin* service is another example of a major, multi-frequency corridor on which there was no passenger service since the May 1, 1971, introduction of Amtrak but where service levels have since grown. Starting with an early, single daily state-sponsored round trip, this corridor has grown to a high-volume operation consisting of six daily round trips.

Category 2—Service Discontinued after Amtrak Inception and Restored by State Action

Several successful and long-running state-sponsored services began in the late 1970s/early 1980s as part of a legislative incentive for states to assume responsibility for service restoration over portions of routes that had been discontinued after inception of the Amtrak national system. Examples of state DOT-sponsored services that began with this program include Missouri's Kansas City–Saint Louis Missouri *River Runner* and Pennsylvania's Pittsburgh–Harrisburg–Philadelphia–New

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York Penn Station *Pennsylvanian.* Both of these operate on portions of the discontinued National Limited route. Another example is Oklahoma-Texas' Oklahoma City–Fort Worth *Heartland Flyer* along a portion of the discontinued *Lone Star* route. Over the years, several states have also explored (but not implemented) restoring service over segments of other major discontinued historic, long-distance routes. These include the *North Coast Hiawatha, Floridian*, *Desert Wind,* and *Pioneer* routes.

Category 3—Freight Routes Where Intercity Passenger Service Has Been Added Post-Amtrak Inception

There have been several successful short-distance service introductions (as well as other routes considered but not implemented) on short point-to-point corridors overlapping portions of existing long-distance Amtrak routes. Among the most visible and successful is the California Capitol Corridor Joint Powers Authority (CCJPA)-sponsored San Jose–Oakland–Sacramento high-frequency *Capitol Corridor,* overlapping the legacy Amtrak *Coast Starlight* route that provided one round trip per day in the basic system. At least minimal service remained (two to three daily round trips)—even in the original Amtrak network—on what is now the highly successful, frequent San Diego–Los Angeles (currently 12 daily round trips) California's *Pacific Surfliner* service corridor. In addition to sponsoring multiple additional frequencies between the original terminal cities, the state added a successful, multiple-frequency extension between Los Angeles and Santa Barbara with one daily round trip all the way to San Luis Obispo, using the access rights principle of overlapping an existing intercity Amtrak route, in this case the Amtrak *Coast Starlight.*

Coordination with Railroads and Other State/Federal Agencies

Coordination with host railroad companies should occur as part of any project planned on, adjacent to, or interacting with a freight railroad and as necessary to avoid having railroad executives and others learning of proposals regarding potential shared use of their ROWs from the media or other outside sources. Public agencies are free to study or propose services as they wish, but it is recommended that any study be preceded by an initial contact with the relevant corridor owner(s) as early as possible in any study process in order to begin establishing trust among potential partners and to coordinate messaging regarding the study process and outcomes to the public and the outside world. In discussing coordination with railroad companies, it is important to be aware of the distinction between STB classifications based on rail company revenues. Class I railroads are large, multistate systems; Class II railroads are regional railroads; and Class III are local/terminal railroads. (These classifications should not be confused with FRA track classifications. For example, FRA Track Class I classification signifies very poor condition or excepted track that may only be operated below 10 mph.)

Establish Discussions with Host Railroads Regarding Shared-Use Corridor Issues

NCHRP Report 657: Guidebook for Implementing Passenger Rail Service on Shared Passenger and Freight Corridors includes a thorough description of the process and challenges associated with developing passenger rail operations on previously freight-dedicated rail alignments. Freight rail corridor owners have little natural incentive to collaborate with sponsors of passenger rail proposals and may present the following objections:

- Service speeds (operational speeds) for passenger trains exceed, often by a wide margin, those of typical mainline freight operations. The practical effect of this differential is that

the capacity consumption of a given passenger train far exceeds that of a typical freight train operating in the same alignment.
- The scale of liability issues for passenger service is greater than for most freight operations.
- Precisely scheduled passenger services impose a level of discipline on discrete sections of the large-scale freight handling that host carriers may view as incompatible with the large proportion of on-demand freight trains they operate.

NCHRP Report 657 describes mitigation approaches to each of these challenges. State DOT or other public agency sponsors may encounter reluctance by freight rail service providers to engage in new proposals for shared use of existing freight rail infrastructure or even the same ROW corridor.

The first point of contact in the host carrier world, for a state agency, is often the freight rail carrier's government affairs representative for the region in question. Depending on circumstance, the specific project discussion may then be turned over to local rail operating authorities or to the passenger rail specialists within the company who address passenger rail proposals from a corporate perspective. Most freight carriers prefer to be engaged early in the planning process. Other factors to keep in mind at this stage of project development regarding host rail carriers include

- The work of public planning officials and consultants is, by definition, open to public scrutiny and covered extensively in the media. Freight rail carriers would rather be involved early to help guide potential choices rather than do damage control with the media after the fact.
- Local planning agencies seldom have the large-scale network perspective of rail operations that guide Class I freight railroad carrier strategies. The host carrier can provide early guidance on the most and least feasible corridor alternatives for a new passenger rail service.
- Service and capacity analysis associated with the introduction of passenger service is costly and time consuming and draws on resources often in short supply across the industry. Early engagement improves the opportunity for solid analysis to be completed in a timely manner and before public expectations have been set for a new operation.

Once host carriers are engaged, understanding the roles and communication processes that will underlie the new partnership between rail service planning agencies and the host railroad should occur as quickly as possible. All parties should acknowledge and respect the different perspectives and incentives at play in the public-sector and private-carrier worlds; those differences will not disappear but can be managed if recognized up front. This may often be done through adoption of a simple written memorandum of understanding or memorandum of agreement rather than a more formal or legal process at this early stage of development.

Two other recent reports may prove useful to those considering a shared-use service scenario consideration for the first time:

- *NCFRP Report 27: Web-Based Screening Tool for Shared-Use Rail Corridors* details a web-based analysis framework that can serve as a first-cut/triage support instrument for identifying rail corridors that may be worthy of progressing to more detailed and costly evaluation for potential shared-use freight and passenger rail service and for ruling out those corridors where freight rail traffic levels or physical infrastructure limitations may constrain use for passenger rail.
- *NCHRP Report 773: Capacity Modeling Guidebook for Shared-Use Passenger and Freight Rail Operations* provides information on the fundamental principles and drivers of rail capacity and the various tools available to support progression to more formal capacity analysis.

Coordination with Other State Agencies (e.g., Land Planning)

DOT and other agency planning officials more effectively position future passenger rail service for a given state or combination of states through engagement and coordination with other

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public agencies. Those agencies planning service in a corridor that crosses state lines face special challenges and opportunities in managing the political process and in coordinating required state and local funding matches that are part of any federally supported corridor development programs. *NCRRP Report 5: Developing Multi-State Institutions to Implement Intercity Passenger Rail Programs* identifies best practices in coordinating projects across state lines. Other types of public agency engagements that should be considered include the following:

- Economic development agencies may have or can develop complementary strategies to focus new development or population concentration to station nodes that could reduce overall reliance on personal auto use. Similarly, county- and MPO-based economic development offices should be engaged in early consideration of new transportation choices.
- Seeking buy-in from individual state (or multiple states) and local land use planning officials can prove critical as a specific passenger rail project takes shape. Not everyone enjoys the prospect of seeing increased train traffic move through their communities, particularly if the town in question is too small to warrant a station stop on its own. Planning officials should discourage development on rail-adjacent land parcels that is incompatible with more frequent or HrSR operations.
- Host freight carriers may be concerned that the transformation of an alignment to include passenger operations will lead to higher density residential development and changes to zoning of parcels adjoining the tracks currently available for rail freight service. To address this concern, public agency economic development and land use planning protocols should acknowledge the need to protect the ability of rail freight carriers to play their role without residential or other incompatible land uses associated with passenger rail development inadvertently limiting future freight rail expansion and shifting of even more freight to the highway mode.

Coordination with Federal Agencies

Although many intercity passenger rail projects result from studies or initiatives at the state, regional, or local levels, coordination with federal agencies, especially those involved with transportation, is vital throughout the intercity passenger rail development process. The three most important transportation agencies involved are FRA, FHWA, and STB.

FRA

Rail projects that include federal funding often must be coordinated through FRA for intercity rail and/or FTA for commuter rail. The distinctions between commuter and intercity rail may, at times, appear to be arbitrary and confusing. Typically, commuter rail initiatives rely on FTA appropriations and are sponsored by a transit agency or MPO. Intercity rail projects that use federal funds authorized through PRIIA must be led, according to statute, by the state DOT. Regardless of the funding source, safety approvals for conventional rail service always fall under the jurisdiction of FRA.

FHWA

FHWA plays a role with respect to highway-rail grade crossings and other highway-related issues associated in particular with new corridor construction. In exceptional cases, FHWA has been assigned overall project leadership for a rail improvement project given short-term resource constraints within the federal DOT. FHWA may also be assigned the overall leadership role for a multimodal corridor project that involves a combination of new highway and rail track construction.

STB

STB plays a high-level policy role in the rail mode. Even if located entirely within a state, STB is involved if the transportation or facilities employed are part of the interstate railroad network.

STB also will become directly involved with a specific passenger rail project if there is a dispute about intercity access rights to a host carrier alignment or as a product of disputes with Amtrak and its obligations under PRIIA.

Service Development Planning

FRA-funded passenger rail projects (either totally new service or significant upgrade of existing service) require a supporting service development plan (SDP) that outlines the planning, implementation, and eventual actual operational characteristics of the project. The July 1, 2010, *Federal Register* provides broad general guidance on the current FRA HSIPR Program (U.S. Federal Register 2010). Appendix 2 of that document provides additional information on stages of project development, including Appendix 2.1, covering a broad range of possible issues to be explored in service development program planning specific to HrSR and HSR. It begins with a definition of the SDP for an HSIPR service development program whose prime objectives are to

- Demonstrate the purpose and need for new or improved HSIPR service
- Analyze alternatives for the proposed new or improved HSIPR service and identify the alternative that would best address the identified purpose and need
- Demonstrate the operational and financial feasibility of the proposed alternative
- Describe, as applicable, how the implementation of the HSIPR service development program may be divided into discrete phases

Contents/Requirements of a Service Development Plan

Current FRA HSIPR guidance lists 10 major topical areas that may be included in an SDP (it is not a requirement to include all topic areas listed for every potential or proposed service). These topic areas are as follows:

1. Purpose and Need
2. Rationale
3. Identification of Alternatives
4. Planning Methodology
5. Demand and Revenue Forecasts
6. Operations Modeling
7. Station and Access Analysis
8. Conceptual Engineering and Capital Programming
9. O&M Costs and Capital Replacement Forecast
10. Public Benefits Assessment

More recently, as part of its FY14 Grant Application Solicitation guidelines, FRA issued a guidance document for use by states or other organizing entities on the broader service development planning process and specific timing and contents (level of detail) for a particular project's SDP. This now includes the option that a "proposed intercity passenger rail Service Development Program may be divided into discrete phases" (FRA 2014). Further into the document, in Section 3, is a detailed outline for structuring an SDP along with a comprehensive list of elements that could be included in an optimal SDP.

Ridership and Revenue Forecasting

Given the rarity of intercity passenger rail startups over the past half century, little empirical data exists to support projections for ridership and revenue for service proposals in additional

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locations. The state of the art for such modeling is less mature than that applied to urban transit and commuter rail proposals. Conventional rail service at typical North American train operation speeds is seldom faster than travel on the corollary interstate highways—provided the latter is in a free-flowing state. In some cases, rail service may succeed as a result of congestion or other operational challenges of the highway network. In other cases, passengers are attracted to rail due to the value of time available during the trip experience for productive activity (e.g., reading, working, or sleeping), which cannot typically be enjoyed (at least by the driver) in car-based travel.

Finally, ridership and revenue modeling may be simpler for true HSR proposals where major competition primarily comes from commercial air travel. It is easier to project diversions from one commercial transport mode to another than to project abandonment of auto travel to train travel. Also, the market value of those trip diversions can rely on much more solid data, reflecting current travel fares.

Ridership and Revenue Models

Ridership and revenue models that are accurate and have an appropriate level of detail (also known as demand models) are critical to intercity passenger rail service planning, financial feasibility assessment, benefit assessment, and environmental analysis. Three different levels of detail are used in these types of models. These are as follows:

- **Screening-Level Demand Models.** Appropriate for preliminary/screening environmental impact statement (EIS) analysis.
- **Corridor-Level Demand Models.** Tier 2 (corridor-level [e.g., 20–30%] engineering/design EIS).
- **Investment-Level Demand Models.** Detailed investment-worthy demand models that would be required as a precondition for public-private partnership (PPP) agreement where private investors assume revenue risk or for large, totally publicly funded projects.

As a result, the term demand modeling can describe methods ranging from a relatively simple, generic broad screening evaluation to a corridor-specific model developed in great detail with all factors based on the route being examined. The three major levels of detail used in demand modeling are described in the following sections.

Screening-Level Demand Models: What They Can and Cannot Do

A screening-level demand model, such as FRA's CONNECT model, is a sketch-level HSR planning tool designed for preliminary feasibility studies. It is best used to assess which cities to include in the network, how to configure the network, and which general levels of service are appropriate for each corridor. CONNECT forecasts *sketch-level* ridership, revenue, operating costs, capital costs, and other associated indicators. FRA's CONNECT can produce estimated ridership results for specific years 2020, 2030, 2040, or 2050 based on the data and projected growth rates supplied to the model. By design, CONNECT is preset to produce a low, medium, and high estimate for all future-year outputs. This type of model is most often used to determine whether further analysis is warranted.

In general, a screening-level model like FRA's CONNECT is best used to compare alternatives and should not be relied on for absolute results with the precision required even for Tier 1 EIS studies and definitely not for actual investment decisions. Among the most specific limitations of such a screening-level model is the use of broad metropolitan statistical areas (MSAs) as the zones for trip production and attraction, rather than much narrower/smaller travel analysis zones (TAZs). Therefore, these models do not offer the resolution necessary to evaluate the ridership or cost implications that would result from more narrowly defined changes in alignment or the specific number of or location of a station or stations within an individual MSA.

Corridor-Level Demand Models

To provide more accurate and detailed ridership and revenue demand model results, it is often necessary to develop a corridor-specific model, some of whose essential elemental components include the following:

- Detailed socioeconomic activity forecasts for MSAs and smaller intermediate communities along the corridor
- Estimation of the total current/future travel demand, by specific origin-destination (O/D) pair, at a more detailed level than for screening-level models, along the corridor for all existing modes (auto, air, intercity bus [if relevant], intercity rail [if relevant])
- Analysis of known improvements planned for the existing modes, primarily auto and air
- Development of a corridor-specific mode-choice split, based on assumed value-of-time utilities
- Assessment of corridor-specific feeder/distribution systems (including existing and planned public transit, where applicable) for the larger stations along the corridor
- Assumption (or estimation) of an induced travel factor representing net new additional trips that may be taken as a result of improved access (faster total trip times/lower total cost/greater available frequency), as has been observed in successful European and Asian HSR systems

Investment-Level Demand Models

When a proposed project is near the point of final funding assessment and actual construction commitment, a more refined and precise revenue/ridership forecast, in the form of an investment-level demand model, may be needed. Although more costly and time consuming to perform, this model will go into greater depth so as to narrow the range of uncertainty in forecast performance. The need for (minimum) revenue production attainment is critical in those PPP projects where the private investor agrees to assume at least a portion of the revenue (producing) risk.

Among the likely key areas for additional depth or breadth of data to provide more accurate results are the following:

- Use of a further disaggregated zone system (e.g., use of sub-TAZs) on the O/Ds (up to four times more zones) to make the resultant forecast much more accurate
- Collection of more refined (larger data set) raw data to understand existing travel demand (primarily detailed auto O/Ds)
- Disaggregation of existing travel O/D data to time-of-day specifics to provide more accurate total and time-of-day travel demand
- Analysis of more detailed alternatives for access/egress analysis for all potential rail stations rather than just for major urban areas

Ridership and Revenue Study Reviews

In part because there can be so much variability in the range of (or ultimately demonstrated accuracy of) demand model results, it is frequent practice to have an independent panel of experts review all demand model forecasts. This process can be facilitated by the sponsoring agency (e.g., state DOT studying a new intercity corridor) or possibly by the study's funding source agency, if different (e.g., FRA convening the independent review). One recent review was that performed on earlier demand model results for the California High-Speed Rail Authority as it transitioned to a substantially revised business plan. Among the critical issues raised in this review was the distinction between higher ridership achievable in a ridership-maximizing fare policy assumption versus the lower ridership (but higher revenue) that would be generated using a revenue-maximizing fare policy.

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Supporting Feasibility Studies

The choices of location, mode, and design of rail transportation initiatives have effects that extend well beyond the marginal changes in personal mobility. Projecting these broader changes and developing a coordinated, multidisciplinary approach to maximize benefits to a corridor or region can build political support for a project and may reveal value-capture opportunities that help address the financial hurdles facing major public infrastructure investments. Establishing project feasibility (and various conditions affecting that feasibility) through conduct of appropriate studies is essential.

Economic Analysis

A list of key socioeconomic effects can be analyzed quantitatively so as to help justify investment in new intercity passenger rail systems. Although some significant benefits (e.g., time savings and mode diversion from auto to rail so as to reduce pollution and congestion) are more pronounced in higher or true high-speed service, such benefits can still be significant in a well-designed conventional speed system. Many of the current PRIIA Section 209 participating state sponsors of intercity passenger rail service have performed such economic analyses (either by their internal staffs or by employing consultants) to help justify new services or specific ARRA/HSIPR-funded capital improvement projects.

Some generally agreed-on important areas for quantitative estimation follow. Included are some simple examples of model calculations (note: this list is not in order of importance or likely magnitude).

- **Potential Positive Local Economic Impacts.** Economic impacts for key cities along the route, including detailed calculation of net job creation during planned construction and direct job creation after the start of revenue service. An example of a simple model for calculating construction period job creation would be a simple linear tool that uses estimated construction cost by corridor sub-segment, average labor percentage of (comparable) construction expenditures, and average construction wages to determine the annual direct employment generation, and then uses a regionally appropriate multiplier constant to calculate estimated secondary job creation during construction.
- **Potential Economic Improvement.** General improvement in the overall economy and resultant potential local tax generation for key cities along the route, such as sales, property, and similar local taxes.
- **Potential Quantified User Benefits.** For riders who divert from other modes, primarily from automobiles. These benefits may include but are not limited to quantified value of time, quantified accident reduction—fatality reduction and non-fatal accidents, and quantified consumer surplus). An example of a simple model for quantified accident reduction after revenue service would be a simple linear tool that starts with forecast ridership by city pair for diverted auto riders, derived calculated passenger-miles, auto VMT avoided (based on average occupancy per car), and differential accident and fatality rates for automobiles vs. HSR (assuming almost no accidents for HSR), and then uses accepted average monetized value per type of accident incident avoided.
- **Non-user Quantified Collateral Benefits.** Examples include time savings due to reduced congestion, accident reduction (fatal and serious injury), and further time saved through reduction at freight grade crossings resulting from project-created grade separations and closures.

Strategic/Business Planning

A wide range of economic and financial elements are necessary inputs to a strategic/business plan for a new intercity passenger rail service, whether the anticipated operation is conventional,

higher speed, or true HSR. Several states/sponsoring agencies have suggested, and FRA appears in recent state rail planning guidance to be receptive to, a level of detail in a draft business plan that is proportional to the magnitude and ultimate cost of the proposed investment.

FRA suggests that business plans in support of a full SDP prior to funding commitment and investment include some quantitative consideration of the following factors:

- Total capital cost and proposed sourcing of funds
- Estimated annual operating costs
- Corridor-level demand forecast (ridership and revenue)
- Resultant forecast operating profit/loss statement based on revenue and O&M cost
- Financing plan if capital is not assumed to be grant funding
- Public (socioeconomic) benefit assessment and benefit/cost analysis
- Net present value assessment if assuming to use blended financing (e.g., PPP)

Public Involvement During the Feasibility/Service Development Stage

FRA prescribes a clear, ongoing public outreach protocol for any Tier 1 (service-level) or Tier 2 (project/corridor-level) EIS evaluating proposed new intercity passenger rail service. This includes but is not limited to wide circulation of background materials explaining options under possible consideration to the communities that the proposed passenger rail project would serve, or through which it would operate, and using electronic media, structured live public meetings, open-access virtual/Internet public meetings, write-back comment mechanisms, and so forth. Depending on the study size and length, there may be multiple sequences of such outreach meetings, starting with the early information-gathering stage, continuing through the screening and narrowing options phase, and ultimately covering the recommended option(s). Public outreach is typically accomplished as a collaboration of the sponsoring agency (e.g., state DOT) and its consultant(s). In most cases, FRA participates in the meetings; FRA always reviews all relevant presentation materials.

Build Consensus/Public Support

A strong regional consensus and broad public support are needed for every proposed intercity passenger rail service. In some cases, the likely project champion is the initial sponsoring agency (e.g., state DOT, MPO, or specially established multistate intercity rail compact). In other cases, the consensus builder may evolve and transition to be led by an individual city/metropolitan area or a grassroots-led citizen support group. The importance of developing the broadest possible support base becomes evident as project opposition begins its movement, opposing a particular project on fiscal, sensitive location, or supposed environmental harm arguments. Much potential opposition and spreading of misinformation can be avoided by the public agency keeping a current and ongoing flow of accurate information about the proposed project or study to the public.

CHAPTER 4

Planning: Environmental Requirements

In the United States, environmental law and policy is guided by NEPA, subsequent amendments to NEPA, and executive orders, which combined require an environmental review process for all federal actions. Federal actions include transportation projects that receive grant or loan funding through federal programs or projects that require permits or regulatory approval from federal agencies.

In general, the purpose of the environmental review process is to identify and evaluate the environmental impacts of a proposed action (e.g., an intercity passenger rail project) against feasible alternative actions (e.g., alternative investment) and a no-build or no-action alternative. Identification of environmental impacts and potential measures necessary to mitigate adverse effects is also required. The environmental review process also enables public agencies and other affected entities to comment on proposed actions. Finally, public involvement in the environmental review process enables citizens to provide input on proposed alternatives, ensuring all affected populations can contribute to developing intercity passenger rail projects.

FRA is responsible for implementing federal environmental laws and policies related to the nation's railroads. Most projects and activities supporting intercity passenger rail service and development in the United States are likely to require some level of environmental review. The process for conducting an environmental review for actions under FRA jurisdiction is described in FRA's *Procedures for Considering Environmental Impacts* (FRA 1999), available on FRA's website. This chapter summarizes FRA environmental review requirements and documentation options, key resources for identifying and analyzing the environmental impacts of proposed intercity passenger rail projects, and approaches for public involvement and interagency coordination in the environmental review process.

Overview of the FRA Environmental Review Process

The FRA environmental review process is described in the agency's *Procedures for Considering Environmental Impacts,* published in the *Federal Register* on May 26, 1999 (FRA 1999). The procedures describe the environmental analysis and documentation required for sponsors of intercity passenger rail projects to comply with federal environmental laws and regulations. This section describes the documentation required for compliance with FRA environmental regulations and provides guidance on implementing the environmental process for intercity passenger rail service and development activities.

Documentation Options for Environmental Compliance

FRA environmental procedures outline three types of outcomes that could result from the environmental review process: categorical exclusion (CE), environmental assessment (EA),

or EIS. Each type of action has a specific set of documentation requirements, which must be approved by FRA prior to implementing a proposed action.

Categorical Exclusion (CE)

A categorical exclusion is a designation assigned to a specific type of action that has been determined to not have a significant effect on the human environment. Categories of actions defined as CEs and can be processed as such are listed in the FRA environmental impacts procedures. Actions that may qualify as CEs include administrative and design activities, improvements or maintenance of existing rail equipment and facilities, acquisition of rolling stock, and other work activities performed within existing railroad ROW. Guidance and documentation requirements for processing actions as CEs can be found on the FRA website. However, FRA notes that actions that may qualify as CEs based on the environmental procedures may not be eligible to be processed as CEs if significant environmental impacts may result from the action (FRA 1999).

Environmental Assessment (EA)

For a project not classified as a CE, the project sponsor is required to prepare an environmental assessment. An EA is a preliminary evaluation of the environmental impacts of a proposed project and identification of any adverse effects. Upon preparation, the EA is submitted to FRA for review. If FRA determines that a proposed project has no significant environmental impacts or if appropriate mitigation measures are incorporated into the project to deal with any adverse effects, the EA will serve as the basis for a finding of no significant impact (FONSI) to be issued by FRA, allowing for the project to be executed.

Environmental Impact Statement (EIS)

If an EA determines that a proposed project is likely to result in significant or adverse environmental impacts, the project sponsor will be required to prepare an EIS for the proposed project. An EIS is a comprehensive document that identifies all foreseeable environmental impacts and proposed mitigation strategies for adverse effects and documents all public involvement activities. The FRA environmental procedures state that an EIS should be prepared for all major FRA actions significantly affecting the quality of the environment. The procedures further note that any construction of new major railroad lines or new major facilities or any change that will result in a significant increase in traffic normally requires preparation of an EIS. Upon completion of an EIS, FRA will issue a record of decision (ROD) approving the content of the EIS and the proposed plan to mitigate the adverse effects. Similar to a FONSI, the ROD authorizes a project sponsor to implement the project as described in the ROD.

Implementing the Environmental Analysis Process

Any investment in new or existing intercity passenger rail service will likely require some level of environmental review. The scope of the environmental analysis for intercity passenger rail service development depends on the magnitude of the proposed service and the number of individual projects necessary to implement the proposal. To assist project sponsors with implementing an appropriate level of environmental analysis, FRA distinguishes between two levels of analysis: a service-level NEPA analysis and a project-level NEPA analysis (FRA 2009). For large-scale transportation projects, including intercity passenger rail service development initiatives, the environmental analysis is typically implemented in the form of a tiered approach with service-level analysis followed by project-level analysis, allowing for the studies to be undertaken in more manageable phases (FRA 2009).

Service-Level NEPA Analysis

A service-level NEPA analysis considers broader questions related to the role of passenger rail in an intercity corridor and the associated environmental impacts. Typically, a service-level NEPA analysis will examine alternatives for the type of service(s) being proposed, including cities and stations served, route alternatives, service levels, operation types (speed and motive power), ridership projects, and major infrastructure investments needed to implement different service options. A service-level NEPA is appropriate for large corridor programs where the role of passenger rail in an intercity corridor and the operational strategy to achieve certain outcomes related to the role of passenger rail needs to be defined. A service-level NEPA analysis will also identify the individual infrastructure projects needed to implement different levels of rail service but will not evaluate the environmental impacts of such projects in great detail. A service-level NEPA analysis may take the form of an EA or an EIS. Furthermore, FRA determines that a service-level NEPA analysis may be implemented as a Tier 1 environmental analysis for large corridor programs where the environmental issues are too large or complex to be addressed in one document or the program is multiphase or future phases are unknown (FRA 2009).

Project-Level NEPA Analysis

A project-level NEPA analysis considers the environmental impacts of implementing a specific project associated with developing intercity passenger rail service in a particular location. The project-level analysis focuses on the detailed environmental impacts of projects and can be documented as an EA, EIS, or CE. A project-level NEPA analysis is typically conducted only after a service-level NEPA analysis has been completed, affirming the role and direction of intercity passenger rail in a particular corridor. A project-level NEPA analysis is typically equivalent to a Tier 2 environmental analysis document. A Tier 2 environmental study may address project-level issues for a series of projects for an individual corridor project; however, each project must be addressed with the necessary detail to allow FRA to reach a decision about the environmental impacts of each action. Table 4-1 provides additional details comparing the service-level and project-level NEPA analyses.

Typical Content of an EA or EIS

The typical content of an EA or EIS is outlined in the FRA environmental analysis procedures. Key elements of the EA or EIS content include the following:

- Statement of the purpose and need for the project. The purpose and need statement should address the rationale for pursuing the project. The purpose and need for a project may be linked to the project's contribution toward achieving certain stated goals for intercity passenger rail (e.g., this project will support reliable passenger train operations by improving on-time performance and reducing delays). Numerical analysis may also be presented in the purpose and need (e.g., this project is expected to improve on-time performance from 70% to 80% in the corridor).
- Description of all reasonable and feasible alternative courses of action that could satisfy the purpose and need as defined previously. Final environmental documents should state which alternative is the proposed action. Alternatives that should be examined include alternative routing for passenger trains (including new ROW) and alternatives not currently within FRA authority (e.g., highway projects). The no-build alternative, incorporating relevant projects already programmed, should also be included.
- Description of the affected environment, including a list of all states, counties, and metropolitan areas likely to be affected by the proposed action.
- Analysis of the environmental impacts of the proposed action, all possible alternative actions, and the no-action alternative. This analysis should be conducted for all alternatives, even if

Table 4-1. Details of service-level and project-level NEPA analyses (Federal Railroad Administration 2009).

		Service-Level NEPA	Project-Level NEPA
What are the possible FRA decision documents?	EA	1. Finding of No Significant Impact (FONSI) or 2. EIS required if significant impacts identified	1. Finding of No Significant Impact (FONSI) or 2. EIS required if significant impacts identified
	EIS	Record of Decision (ROD)	ROD
	CE	N/A	Approval by FRA typically through worksheet.
What steps are generally required to complete service or project NEPA documents? Note: Combined service-project NEPA documents require completing all steps.	Planning and Project Development	Completion of a Service Development Plan (SDP) including • Rail service alternatives and preferred type • Route alternatives stations • Service levels/ frequencies • Capital project needs • Ridership/revenue forecasted • Operating costs estimated	Preliminary project description and purpose and need statement including • Project location and site • Specific improvements • Cost estimates and operating concept • Project design options
	Engineering	Conceptual engineering to approximately 5% related to the SDP and supporting programmatic environmental analysis	Preliminary engineering to 30% and a full project description required to support site-specific environmental analysis
	Environmental Analysis	Landscape-level data collection and impact analyses are required. Overall air and noise effects from train operations are considered	Site-specific impact analysis and field work support full compliance with NEPA and other laws and provide for permits
	Public Involvement Process	Permitting agency involvement may be limited for Tier 1 documents. Permitting agencies should be informed of the preparation of the Service NEPA document. Public circulation of a Service NEPA document may be required prior to an FRA decision. For Service EAs this may occur beyond the application date, which may delay a selection decision.	Extensive early and continuing permitting agency involvement is necessary to ensure that Project NEPA will support permit issuance, including historic preservation Section 106, Endangered Species Act, and Clean Water Act permitting. EAs for large projects or controversial actions require public circulation.

only to state that no impact is expected. Additional details on the effects considered in an environmental analysis for intercity passenger rail projects can be found in the following section.

- Description of the public involvement process undertaken, including a list of the agencies and organizations contacted, a description of the public hearings/meetings conducted, and a detailed description of how the project sponsor addressed the comments received during the public involvement process.

Environmental Impacts Analysis

One critical element of the environmental analysis process for intercity passenger rail service development projects is the analysis of environmental impacts expected to result from the proposed action and any alternative actions. FRA's *Procedures for Considering Environmental Impacts* provides

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an exhaustive list of the specific effects to be considered as part of an environmental analysis (FRA 1999). These effects include the following:

- Air quality
- Water quality
- Noise and vibration
- Solid waste disposal
- Ecological systems
- Impacts on wetland areas
- Impacts on endangered species
- Flood hazards and floodplain management
- Coastal zone management
- Use of energy resources
- Use of other natural resources (e.g., water, minerals, or timber)
- Aesthetic and design quality impacts
- Impacts on transportation
- Possible barriers to the elderly and handicapped
- Land use, existing and planned
- Impacts on the socioeconomic environment
- Environmental justice
- Public health
- Public safety, including any impacts due to hazardous materials
- Recreational opportunities
- Locations of historic, archeological, architectural, or cultural significance
- Use of Section 4(f)-protected properties (e.g., public parks, refuges)
- Construction period impacts

Analysis of environmental impacts typically includes an identification of the affected environment (i.e., the location of the impacts), the environmental consequences (i.e., the impacts), and proposed mitigation. The analysis of environmental impacts for an intercity passenger rail project should be focused on the areas of significant impact, including beneficial and adverse effects, direct and indirect effects, and the cumulative effect of these effects in the short and long term. Additional considerations for identifying and analyzing specific effects are summarized as follows:

- **Noise and Vibration.** The alternatives should be assessed with respect to applicable federal, state, and local noise and vibration standards. FRA has published guidance and software tools for analyzing the noise impacts of rail operations. FRA noise models require a basic operating plan (train speed, frequency, number of locomotives and train cars) as input. This information would likely be obtained from the details of the alternatives or from a service development plan.
- **Impacts on Transportation.** Environmental analysis should assess the effects of rail development on both passenger and freight transportation by all modes incorporating local, regional, national, and international perspectives as appropriate. Effects during the construction period and long-term effects on vehicular congestion should also be discussed. Estimates of such effects developed during the ridership forecasting process should be used to estimate the effects on vehicular congestion resulting from mode shifts from personal vehicle to passenger rail. For improvements on existing rail service routes, passenger surveys can be used to establish the percentage of passengers diverted from automobile and estimate the resulting congestion impacts.
- **Socioeconomic Environment.** The effects on jobs, including the number and kinds of available jobs likely to be affected by each alternative, should be assessed. Also discussed should be the

potential for community disruption or cohesion, the possibility of demographic shifts, and effects on local government services and revenues.

- **Environmental Justice.** Environmental analyses should address environmental justice considerations as required by Executive Order 12898 (EPA 2014) and the USDOT Order on Environmental Justice (FHWA 2012). The analysis should consider if the adverse effects of passenger rail projects are disproportionately borne by certain population groups protected by environmental justice regulations. However, these population groups may also be the beneficiaries of passenger rail service improvements; this should also be noted in the environmental justice analysis.

Public Involvement in the Environmental Review Process

Public participation in the environmental review process helps ensure that decisions are made in consideration of and to benefit public needs and preferences. FRA environmental procedures state that citizen involvement is encouraged at every stage of the environmental analysis of a proposed FRA action (FRA 1999). A public involvement program supporting the environmental analysis of a proposed intercity passenger rail project should be wide enough in scope to allow all affected parties (e.g., public agencies, organizations, and the general public) adequate opportunity to review and provide comment on draft environmental documents.

Project sponsors should work with FRA to identify a list of parties who may be affected by the project. This list should include federal, regional, state, and local public authorities; environmental groups; businesses; and labor and community organizations that may have an interest in the project. Draft environmental documentation (EA or EIS) should be formally circulated to the complete list of affected parties. The draft documents should be posted to the sponsoring agency's website and provided as hard copies in local libraries in the affected area. Availability of the draft documents should be widely publicized by way of an official agency press release and advertisements in local newspapers of general circulation.

In addition to circulating and promoting public feedback on draft environmental documents, it is typical practice for environmental studies to include one or more public hearings in which project sponsors present information about proposed projects and solicit public feedback. Public hearings provide additional opportunity for the general public to participate in the environmental process for intercity passenger rail projects, particularly in locations where the general public may not have been able to access information about the proposed projects through other mechanisms. Public hearings are typically held in locations near the affected project area at times convenient to attract a strong level of participation (e.g., evening hours). Announcements promoting the details of public hearings should be distributed through the same channels as notifications about the availability of draft environmental documents discussed above. Additionally, the draft environmental documents should be available to the public for at least 30 days before the hearings. At a minimum, state-level practices for public involvement in the environmental analysis process must always be followed.

Project sponsors should use various strategies to involve the general public in the environmental analysis process for intercity passenger rail service development projects. Innovative public involvement techniques include

- Use of agency social media outlets to circulate information and promote participation in public hearings and meetings
- Outreach in languages common among the population living in the affected area
- Development of web-based content to provide information and feedback mechanisms as part of a virtual public meeting concept

Additional information on public involvement practices for environmental analysis can be found in a comprehensive report on public involvement techniques published by FHWA's Transportation Planning Capacity Building Program (USDOT n.d.). Comments and feedback received through the public involvement process should be reported in the environmental documentation, and project sponsors should state how comments were addressed in the final documentation. Environmental documentation should also include a list of the public agencies and private organizations consulted in the process, as well as a list and summary of the public hearings and meetings conducted.

Interagency Coordination

Intercity passenger rail projects will involve a wide collection of local, state, and federal agencies throughout the project life cycle. Good interagency coordination can unify the project vision and identify potential arrangements, financial requirements, and planning and development activities needed to achieve the vision. The following sections briefly discuss the agencies that may be involved with intercity passenger rail projects.

Coordination with Other State Agencies

A comprehensive, coordinated state rail planning effort is important in providing initial coordination among state, regional, and local agencies. Usually undertaken by the rail planning entity within the state DOT, the SRP and rail plan activities serve as an opportunity to identify projects and develop relationships among agencies likely to be involved in project development and operations. Coordination should also occur with the state agency in charge of addressing highway-rail grade crossing safety. Intercity passenger rail station development and operation often involves the local communities in which the stations are located. Depending on the particular project, additional state or local agencies (e.g., relating to environmental or historic preservation) may be involved. Finally, intercity passenger rail services that cross state boundaries necessitate coordination with adjacent states and/or agencies that represent multiple states.

Coordination with Federal Agencies

Sponsors of new intercity rail service should take care to engage with all federal agencies with clear or potential jurisdiction over a project so that communication protocol is defined early in the development process and to avoid late-stage, unexpected delays. Rail service sponsors should also be aware that policy differences with respect to NEPA compliance continue to exist between projects administered by FRA, FHWA, and FTA. Experience with one type of project (e.g., an FTA-funded rail commuter line) does not establish a direct precedent for an intercity passenger rail service project.

FRA

FRA is responsible for implementing federal environmental laws and policies on the nation's railroads, which is a component of the many aspects of FRA's active support for developing the nation's intercity passenger rail system. In terms of passenger rail, the FRA Office of Railroad Policy and Development (1) provides financial assistance, quantitative analysis, environmental research, project reviews, research and development, and technical assistance and (2) supports development of intercity passenger rail policy (Federal Railroad Administration n.d.). Also, FRA states that as projects for new or improved passenger rail service advance through the planning stages, technical expertise and guidance is provided for systems, rail line, station, rolling stock design, and environmental documentation. The Office of Railroad Policy and Development

implements the Americans with Disabilities Act of 1990 (ADA) and the Rehabilitation Act of 1973 as they relate to movement of passengers by rail in the United States (FRA 1999).

FHWA

Coordination with FHWA is likely to occur in relation to highway-rail grade crossings, where it provides (1) safety standards for the design of roadways at grade crossings and specifications for types and placement of traffic control devices and (2) administers the federal funding program for upgrading crossing warning systems and other safety measures.

Surface Transportation Board (STB)

During planning for a new railroad passenger service, it is essential to consult with STB staff. Although housed within USDOT, STB is a separate federal agency having general jurisdiction over construction, acquisition, operation, abandonment, or discontinuance of railroad transportation facilities and responsibility over some other surface transportation modes. STB's rail jurisdiction exists regardless of whether the transportation is to occur among points in two or more states or entirely within one state. Accordingly, STB review of a new intercity passenger rail proposal should be sought in order to avoid a violation of law.

STB is empowered to exempt certain rail transportation from its regulation. Such an exemption can be obtained if one of the following conditions is met:

- Regulation is not necessary to carry out national transportation policy and the transaction or service is of limited scope.
- Regulation is not necessary to protect (freight) shippers from market abuse.

The final outcome of an exemption request depends on the specific facts, so the sponsor of a new passenger rail service should seek the services of a transportation attorney to process the matter with STB. Even when a new service obtains exemption from STB's construction and operation requirements, the environmental impact of the proposed service must be analyzed. In many instances, FRA becomes the lead agency in the environmental review, with STB participating as a cooperating agency, rather than STB taking the lead role. As part of its final action on a proposal, STB often attaches conditions to avoid or minimize the potential adverse environmental consequences of the project or to lessen effects on freight rail transportation.

The activities of STB are financed in part by the fees it charges for various types of filings and services. State DOT officials and passenger rail agency planners should be aware of these fees when considering overall costs of establishing an intercity passenger rail program. At the outset, some of the fees may seem high, so they should be taken into account when developing a project budget. Depending on the agency, legal costs (e.g., STB filing fees) may or may not be charged under the rail program of a specific DOT or passenger rail agency, but may instead be accounted for under general legal department fees. Examples of STB filing fees charged for railroad licensing functions follow:

- Application for certificate authorizing the extension, acquisition, or operation of a line of railroad: $7,700.
- Filing of notice of exemption: $1,900.
- Filing of petition for exemption: $13,400.
- Filing of application or a petition for exemption involving construction of a rail line: $79,700.

The complete schedule of STB filing fees is contained in STB's regulations (see Code of Federal Regulations (CFR) at 49 CFR §1002) and should be consulted before any filing is submitted. Given that these fees change over time, the most current CFR fee schedule should be referenced

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before any STB filing. STB does not charge for brief, informal inquiries. However, it has a schedule of fees for record search, review, copying, certification, and related searches. Consult 49 CFR §1002.1. In some situations, the charge depends on the grade level of the employee conducting the work. There also are exceptions (e.g., educational use or where disclosure of the item would contribute to the public understanding of the workings of government).

Resources

- FRA Southwest Multi-State Rail Planning Study.
- *NCRRP Report 5: Developing Multi-State Institutions to Implement Intercity Passenger Rail Programs.*
- NCRRP Project 07-03: Inventory of State Passenger and Freight Rail Programs.
- *NCHRP Report 657: Guidebook for Implementing Passenger Rail Service on Shared Passenger and Freight Corridors.*

CHAPTER 5

Design and Construction

Careful design and construction of a major transportation improvement is critical to its long-term success. Although this is true for all transportation modes, it is even more critical for intercity rail projects. Intercity rail will be considered a novelty in some U.S. regions given that few current residents may have experienced regular, high-quality intercity passenger rail service such as that provided in previous generations. Fixed physical rail facilities are long-lived, with some asset classes lasting 30 years or more, so they must be designed and implemented properly. Design flaws can be difficult and costly to remedy should faulty design or construction occur. This chapter summarizes the roles of providing agencies and what agencies should focus on as projects reach this phase of development.

Overview of Intercity Passenger Rail Project Types

The scale and quality of an intercity rail investment is best determined through a careful comparison of alternative scenarios, which produce their own cost and benefit streams. Large new public infrastructure projects have become a rarity in the United States over the past 20 years. For rail, the result has been that many service proposals generally rely on the use of existing rail or other ROWs at lower service speeds and frequencies than would be possible with the targeting of dedicated, fully integrated passenger rail alignments. The following sections describe considerations for design and construction of new rail systems by type of development approach.

New Alignment

Development of a greenfield or totally new, dedicated passenger rail alignment opens the door to much higher service speeds, train frequency, and engineering design focused on the optimum specifications for passenger operations. Although common in most of the developed world, development of truly new rail alignments in North America has been rare. Current examples of new alignment projects in the United States include the rural sections of the California High-Speed Rail project and the proposal for Houston–Dallas HSR service as sponsored by the Texas Central Railway. Even in the case of the Texas Central Railway, the proposed *new* alignments under study tend to parallel existing rail or power line ROWs to minimize effects on private-sector landowners and potentially decrease costs of acquisition.

Traditional rail engineering attempts to minimize vertical curvature in order to reduce the motive power requirements to propel heavy, traditional rail equipment. For example, many freight rail routes follow river courses, despite numerous curves, because the river valleys create pathways for minimum track grades. Dedicated high- and higher speed passenger rail alignments, in contrast, can accommodate steeper vertical grades but must minimize horizontal curvature. High specification HSR alignments have gradual, sweeping curves with radii as long as 7 kilometers (over 4 miles).

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Cost estimates for this type of rail development are, ironically, easier to develop than the examples cited below, given the close analogies to developing modern new highway alignments. However, the time for gaining ROW access rights and the cost to build greenfield rail corridors make this the most expensive approach to developing new intercity passenger rail service.

New, Dedicated Track on Existing Freight or Passenger Rail Alignments

An intermediate approach to new passenger service capacity is to build track dedicated to such operations next to existing freight rail track. Many mainline rail corridors, particularly in the western United States, are 100 feet wide and can host new main tracks without a costly and controversial taking of land from numerous adjacent landowners. Track curves are likely to remain as a limiting factor on passenger train speed, but these restrictions can be mitigated somewhat by including higher curve super-elevation (i.e., banking) than would be permissible in a shared track environment with freight rail operations.

Freight rail corridor owners may express concerns over the effective cutoffs of potential service to new customers located on the passenger track side of the alignment. Freight railroads may also require a wide separation of passenger tracks from the freight service alignment for safety and liability reasons wherever passenger trains will operate in excess of 90 mph. The result of such policies means that the existing freight line may need to be repositioned to one side within the existing ROW with the new dedicated passenger track installed in the corridor, thereby increasing the costs of this option. Freight rail companies may also seek to be compensated for what they consider the loss of future expansion capability for increased freight rail service.

Generally, the dedicated track, shared alignment approach to building new passenger rail service is more expensive than the shared track approach described below. As passenger traffic levels build, however, stakeholders should revisit the shared track design assumptions or explicitly consider at the outset the speed and frequency levels for passenger service that will make it more economical in the long run to build and dedicate specific tracks for those activities.

Shared Track Operation

Initiation of passenger rail services on shared track will probably require engineering upgrades and/or capacity enhancements to an existing freight service line. Freight tracks that are already maintained to an engineering standard suitable for passenger service are usually in mainline corridors operating close to service capacity. Introduction of new trains generally will require new investment in the fixed physical plant of the corridor.

Determining the appropriate level of new investment to safeguard both passenger and freight rail service quality is often the most contentious element of a shared-use negotiation. Freight rail service providers generally insist on a through, simulation-based capacity assessment that allows for timely service recovery from unplanned events. The new configuration should also accommodate or permit phasing to allow for increased handling of passenger and freight operations. *NCHRP Report 773: Capacity Modeling Guidebook for Shared-Use Passenger and Freight Rail Operations* describes shared-corridor capacity principles and modeling techniques.

Lower density freight rail alignments, primarily operated by shortline and regional freight carriers, may have the service capacity to accommodate passenger trains without major new track facilities. In most cases, however, substantial upgrades to the engineering conditions of the line will be needed to accommodate the service speeds needed for competitive passenger operations. Grade crossing safety improvements are also likely to be required. A political advantage of using such corridors is that existing freight rail owners may welcome the partnership as providing

a new source of capital upgrade funding. The density of traffic may also be such that business from freight clients can be easily handled at night, taking advantage of the regular diurnal pattern of reduced passenger travel during those periods.

Grade Crossing Safety and Design

Highway-rail grade crossings pose inherent hazards to the operation of trains, as well as motor vehicles, nonmotorized vehicles, and pedestrians. Passenger trains present a unique set of challenges in terms of safety at grade crossings. As train speeds increase, the elapsed time between when a motorist first sees the train and when the train is occupying the crossing decreases. Highway-rail grade crossings located on a passenger rail corridor should either be closed, grade separated, or equipped with automatic gates. Pedestrian safety at highway-rail grade crossings and at crossings in or near passenger stations should be addressed as part of an overall hazard analysis.

Hazard Analysis

The FRA's *Collision Hazard Analysis Guide: Commuter and Intercity Passenger Rail Service* highlights the need for passenger rail operators to conduct a collision hazard analysis that identifies potential hazards and hazard mitigation strategies (FRA 2007). As indicated in the document, "A hazard analysis is performed to identify hazardous conditions for the purpose of their elimination or control. A hazard analysis for a complete system may include several analysis techniques applied throughout the life cycle of the product—from initial concept and design through the final disposal of the system" (FRA 2007). For new-start properties, FRA recommends beginning the hazard analysis process early and applying appropriate analysis techniques during the project planning and design phase. Grade crossings are part of the system, and the hazards to be considered in the hazard analysis include collisions between trains and vehicles, as well as between trains and pedestrians. Appendix C of the referenced FRA document includes an example grade crossing assessment checklist.

Safety Enhancement Guidance and Regulations

The United States has almost 130,000 public highway-railroad grade crossings along routes used primarily for freight rail operations, but also for light, commuter, and intercity passenger rail services (FRA 2011). The implementation of a dedicated funding program in the early 1970s helped reduce highway-rail grade crossing collision fatalities by approximately 71% between 1975 and 2013. This reduction was accomplished mainly through (1) the installation of active warning devices (e.g., lights and gates that warn motorists of approaching and present trains), (2) closing or consolidating redundant or unnecessary grade crossings, and (3) public safety education programs. The *Manual on Uniform Traffic Control Devices* (MUTCD) provides guidance on the traffic control devices that can be used at highway-rail grade crossings, including those on the pavement, signs, and signal systems. It also contains guidance on supplemental devices that can be used in combination with standard devices to further enhance safety.

Title 49, Part 213 of the CFR outlines the Track Safety Standards governing railroad operations in the United States. Among the regulations contained in 49 CFR §213 is the definition of the FRA classes of track and maximum speed requirements associated with each track class. The regulations in 49 CFR §213.347 are particularly relevant to intercity passenger rail and HSR operations. This section states the requirements of automotive or railroad crossings at grade for train operations at Track Class 6 and higher (maximum speed 110 mph and above). Table 5-1 outlines these requirements.

Table 5-1. U.S. federal regulations for HSR grade crossings.

Track Classification	Maximum Operating Speed	Grade Crossing Requirements
Track Class 6 and below	110 mph	No specific requirements in 49 CFR §213.347.
Track Class 7	125 mph	Trains may operate over highway-railroad grade crossings if an FRA-approved barrier system exists and is functioning.
Track Class 8	160 mph	All highway-railroad or railroad-railroad grade crossings prohibited.
Track Class 9	200 mph	

Source: 49 CFR §213.347, Automotive or Railroad Crossings at Grade.

No specific requirements exist for grade crossings up to Track Class 6 operations (maximum speed 110 mph). Nevertheless, advanced technologies (e.g., four-quadrant gates or incremental train control systems) are being deployed on certain corridors in Illinois and Michigan where 110 mph passenger train operations are active. Additionally, although there is no specific regulation prohibiting highway-railroad grade crossings of Track Class 7 tracks (train operating speeds of up to 125 mph), the rule requires the track owner to submit a complete description of any proposed warning/barrier system to FRA and prohibits operation in the absence of FRA approval of the system and the functionality of all elements thereof.

FRA's *Highway-Rail Grade Crossing Guidelines for High-Speed Passenger Rail* (2009) notes that existing regulations (summarized in Table 5-2) are not the only considerations necessary to meet the safety challenges associated with high-speed passenger rail operations. The stated purpose of the document is to "provide supplementary guidance useful to those planning high-speed passenger services and to FRA as guidance for the negotiation of funding agreements and for the administration of the Track Safety Standards." Table 5-2 summarizes that guidance.

Sealed Corridors

FRA's *Highway-Rail Grade Crossing Guidelines for High-Speed Passenger Rail* mentions that, for speeds less than 80 mph, standard and supplemental safety devices should be used to maintain safety

Table 5-2. Summary of highway-rail grade crossing guidelines for high-speed passenger rail (FRA 2009).

Description	Conventional Passenger Rail	Emerging HSR	HSR Regional	Additional HSR
Max. Speed mph	**0–79**	**80–110**	**111–125**	**Above 125**
Public highway-rail grade crossings, generally	Automated warning; supplementary measures where warranted	Sealed corridor; evaluate need for presence detection and PTC feedback	Barriers above 110 mph, see §213.247 Presence detection tied to PTC above 110 mph	None above 125 mph
Private highway-rail grade crossings, generally	Automated warning or locked gate preferred; cross-buck and stop or yield sign where conditions permit	Automated warning with gates; or locked gate (interlocked with signal system at higher speeds)	None or as above	None above 125 mph

Figure 5-1. Four-quadrant gate installation on intercity passenger rail line.

at highway-rail grade crossings along lines used for passenger systems. For speeds up to 110 mph, the concept of a "sealed corridor" is presented. A sealed corridor is a comprehensive strategy to minimize access to the railroad corridor, both for vehicles and pedestrians (Metrolink 2009). These enhanced installations include four-quadrant gates, median treatments, and paired one-way streets with gate arms extending across all lanes of travel, designed to prevent vehicles from driving around lowered gate arms.

Figure 5-1 shows a four-quadrant gate installation on a line with passenger rail service. The two gates on each side of the highway-rail grade crossing provide a barrier for motorists so as to prevent unsafe maneuvers. The sealed corridor concept has been implemented along the federally designated Southeast HSR Corridor in North Carolina between Raleigh and Charlotte (North Carolina Amtrak n.d.). The North Carolina sealed corridor has improved or closed 189 of the 208 grade crossings along the 173-mile corridor. A report by FRA in 2009 indicated that the North Carolina sealed corridor was effective at reducing accident risk at these crossings and that this risk reduction could be sustained as the North Carolina DOT continues to expand its intercity passenger rail program in this corridor (Bien-Aime 2009).

Quiet Zones

Train horns are effective protection devices in alerting vehicles and pedestrians of an arriving train at a grade crossing, but they may present undesirable conditions to the community that surrounds the crossings. FRA's final rule, "The Use of Locomotive Horns at Highway-Rail Grade Crossings," describes a process to authorize and create a quiet zone so as to maintain safety while responding to community concerns over train horn noise (Metrolink 2009). Quiet zones require FRA approval, and crossings in a quiet zone are subject to supplemental safety measures designed to provide an equivalent level of safety at a crossing. Supplemental safety measures may include four-quadrant gates, medians or other channelization devices, one-way streets, or crossing closure. 49 CFR §222 states the federal regulations pertaining to FRA's final rule.

Education and Enforcement

The three main components in enhancing grade crossing safety are engineering, education, and enforcement. Although engineering often receives the most attention, education and enforcement play major roles in improving safety and reducing the likelihood of a collision between a train and vehicle or pedestrian. It is good practice to regularly update education and enforcement activities along corridors with existing passenger rail services and in passenger stations. With the increased frequency of trains and likely higher operating speeds of the passenger trains compared to freight trains, it is especially important to educate the public to new passenger rail services. Such education

can consist of broad publicity campaigns and/or targeted efforts (e.g., presentations at adjacent schools or messages in stations). Enforcement of applicable transportation and trespassing laws can improve safety by deterring unsafe behavior on and around railroad tracks.

Pedestrian Grade Crossings

Pedestrians cross railroad tracks at highway-rail grade crossings and at or near passenger stations. Although design elements used for vehicles (e.g., channelization, signs, and warning lights) apply to pedestrians, pedestrians differ from vehicles and present special challenges.

In *Guidance on Pedestrian Crossing Safety at or near Passenger Stations,* the FRA recommends performing a hazard analysis to evaluate the risk associated with the movement of pedestrians at or near passenger stations (FRA Office of Safety 2012). The hazard analysis process and resulting improvements will increase safety for pedestrians where they interact with the system. The FRA document also includes guidance for implementing treatments designed for pedestrians to safely cross the rail system; treatments include structures, such as overpasses, signage, and pavement markings. Part 8 of the MUTCD, which covers traffic control devices for railroad and light rail transit (LRT) grade crossings, including specific devices for pedestrians, provides additional guidance. TRB's TCRP has several documents related to pedestrian and other nonmotorized user safety related to interaction with rail systems. Many of the treatments are described in *TCRP Report 175: Guidebook on Pedestrian Crossings of Public Transit Rail Services.*

An added consideration for pedestrians is compliance with the Americans with Disabilities Act (ADA) requirements. Treatments and other efforts to improve pedestrian safety should also accommodate the wide array of potential users, according to ADA standards. The FRA's *Guidance on Pedestrian Crossing Safety at or near Passenger Stations* provides guidance on providing safe access for all users (FRA Office of Safety 2012). Review of this guidance, along with requirements published by the United States Access Board, should occur during the planning, design, and construction phases.

Resources

The following resources provide additional information on highway-rail grade crossings:

- FHWA *Manual on Uniform Traffic Control Devices.*
- FHWA *Railroad-Highway Grade Crossing Handbook.*
- FRA *Collision Hazard Analysis Guide: Commuter and Intercity Passenger Rail Service.*
- FRA *Highway-Rail Grade Crossing Guidelines for High-Speed Passenger Rail.*
- FRA *Guidance on Pedestrian Crossing Safety at or Near Passenger Stations.*
- *TCRP Report 175: Guidebook for Pedestrian Crossings for Public Transit Rail Services.*
- SCCRA *Highway-Rail Grade Crossings: Recommended Design Practices and Standards Manual.*
- Operation Lifesaver—Rail Safety Education.
- United States Access Board Guidelines and Standards.
- Tools:
  - FRA Office of Safety Analysis Website.
  - FRA GradeDec.Net—System for Highway-Rail Grade Crossing Evaluation Tool.
  - FRA Quiet Zone Calculator.

Passenger Rail Stations

The station is where the passenger and the intercity passenger rail line intersect. On the most basic level, a passenger rail station consists of a platform area, next to the train tracks, that serves as a designated location for passengers to board or depart trains. Supporting elements may

include a posted train schedule, guidance or warning signage, an automated ticketing machine, and parking facilities. Often, a station includes a building, ranging in size from a large multimodal transportation hub to a small enclosed shelter. Station buildings may be historic rail stations that have been restored to modern standards or may be completely new buildings.

Station design is critical to the success of an existing or proposed intercity passenger rail system. A station and its supporting facilities must be large enough to handle expected passenger demand (projected out to 20 years); otherwise, overcrowding will limit the attractiveness of the service. Similarly, the availability of strong local transportation connections can promote intercity passenger rail use by facilitating first-mile and last-mile trips. Beyond connecting passengers with trains, a passenger rail station can have amenities (e.g., retail shops or restaurants) and can serve as a hub for local transportation services (e.g., transit or taxis). In some cases, passenger rail stations may spark growth and development in the immediate area around the station.

Station Design

The selection of passenger rail station locations includes two distinct aspects: the location of stations along a passenger rail line (i.e., communities to be served by a rail line) and the location of the station within a community. Station locations are subject to several—sometimes conflicting—demands, as follows (FRA 2005):

- Stations must be readily accessible to where people live and work.
- Too many stations will lengthen trip times excessively.
- Too few stations will make it more difficult for riders to use the rail system.
- Station sites need to cater to both business and leisure travel.

If the project represents an upgrade of existing passenger rail service, many of these station location decisions are inherited from the existing service. If entirely new intercity passenger rail service is under consideration, many of these limitations are relaxed and greater flexibility is available in terms of the location of station stops along the line and stations within a community.

The first aspect of passenger rail station location—the location of station stops along a line—is typically examined early in planning. Whether an existing line is used or new rail lines are to be constructed, the spacing of stations along a passenger rail line should be frequent enough to capture available ridership without imposing large travel time penalties associated with service to an excessive number of stations. Ridership forecasts and sensitivity analysis will provide important information on how the addition of a station stop might affect travel time and the resulting demand. Most feasibility studies in the United States present ridership estimates for different proposed schedule scenarios or patterns of station stops along a line. Political considerations may also play a role in the selection of station stops along a line.

After the rail corridor in a community through which an intercity passenger rail service will pass has been identified, the second aspect of station location—determining the location of the station within the community—can occur. The following factors should be considered when evaluating the location of intercity passenger rail stations in a community (Schneider 1993):

- Provision of facilities/services for connecting modes not available at site
- Revisions to existing connecting services required
- Proximity to major facilities and destinations
- Effect on current railroad operations at existing station
- Potential funding sources and costs
- Development/redevelopment and tax base enhancement potential
- Neighborhood impacts
- Metropolitan urban form and socioeconomic impacts

FRA developed the following general guidelines for siting rail corridor passenger stations (FRA 2005):

- Each city with a station should have the station in or near the CBD. This is mandatory for larger MSAs with populations of 150,000 or more. Central locations are desirable for smaller cities, as well.
- One or more suburban stations need to be provided in the larger metropolitan areas with easy access to the local primary road system.
- Every effort should be made to have each station serve as a regional intermodal passenger terminal for all forms of regional and local transportation systems.

Within a community, stations must be readily accessible to locations where people live and work, catering to both business and leisure travel. If existing rail stations are to be used, adequate parking, facilities for passenger drop-off/pick-up, traffic flow along the roadways next to the station, and security of the station facilities need to be considered. This is particularly true if a significant increase in rail service (and accompanying increase in activity) is expected. Considerations for new station locations include the availability of adequate land for the station, compatibility with existing or proposed land uses around the station, and distance between the proposed station site and major attractions in the community. Integration with local transit options and compatibility with regional transportation plans, if applicable, should also be considered for both existing and new stations.

Access/Intermodal Issues

Adequate facilities for intermodal connectivity between intercity passenger rail services and other transportation modes are essential. The types of intermodal interfaces that may be necessary at an intercity passenger rail station include (AREMA 2011):

- Automobile Modes:
  - Park-and-ride
  - Drop-off passengers (i.e., kiss-and-ride)
  - Pick-up passengers
  - Motorcycles/scooters
  - Taxis
  - Van pools
- Nonmotorized Transportation Modes:
  - Pedestrian/walk-in traffic
  - Bicycle traffic
- Other Public Transportation Systems:
  - Buses and trolleys
  - Paratransit services
  - Subway systems
  - Light rail systems
  - Commuter rail systems
  - Intercity passenger trains
  - Airports
  - People movers
  - Ferries/marine taxis

The quality of the interface between passenger rail services and local transportation modes is important to support the provision of a door-to-door trip without using a vehicle. FRA recommends that all new and existing public transport lines be routed directly to the rail station and that transfer times be minimized by coordinating local transit schedules with the arrival and

departure schedules for the train (Office of Railroad Policy and Development 2011). Station context is also relevant in the design of intermodal interfaces at passenger rail stations (AREMA 2011). In CBD areas, nonmotorized modes will be prevalent as pedestrians and bicyclists access the station from high-density developments nearby. Consequently, the quality and adequacy of the connections between the street and the train platform areas will be vital. Adequate connections between the street level and train platform area are also important for passengers accessing the station via street-level transit modes (e.g., light rail, trolley, or bus). In suburban, exurban, or rural community stations, intermodal interfaces between passenger rail services and automobiles will be important. Adequate parking facilities and adequate driveways for passenger drop-off/pick-up movements are essential for rail stations in these areas.

With respect to station access planning, *TCRP Report 153: Guidelines for Providing Access to Public Transportation Stations* outlines an eight-step station access planning process and provides a spreadsheet-based station analysis tool for assessing various station access alternatives. Although written as guidance for rail transit stations, many of the principles in this TCRP report apply to intercity passenger rail stations. Table 5-3 lists the eight access planning process steps and examples of best practices for each step.

Table 5-3. Summary of *TCRP Report 153* eight-step station access planning process (Coffel et al. 2012).

Step	Examples of Best Practices
1. Identify the need	Organize agency thinking/planning up front. Fully understand issues from multiple perspectives. Recognize external (non-transit agency) problems.
2. Establish a collaborative environment	Identify and include all stakeholders. Acknowledge inter-relatedness of various stakeholder groups. Establish shared goals for transportation, environment, and economic development. Understand the traveler's perspective.
3. Develop objectives and principles	Address concerns of multiple stakeholders. Recognize the commonalities between different stations. Develop a standard set of access goals and objectives that can be applied throughout the system. Identify opportunities and constraints.
4. Establish evaluation criteria	Develop criteria related to a range of objectives, including ridership, costs, and local impacts. Limit evaluation criteria to a manageable number (typically fewer than 10). Establish data collection program to support evaluation criteria.
5. Build a rich set of appropriate options	Address existing and future needs. Consider station access and ridership in route alignments and station designations. Integrate community design into station development. Coordinate station access design with land development. Consider a wide range of improvements.
6. Predict outcomes and apply criteria	Improve sensitivity of travel demand models to transit access improvements. Use quantitative tools to assess transit-oriented development and parking replacement. Engage economic and land-use forecasters. Develop a strategy to measure emissions. Use advanced service coverage measures to more comprehensively understand market.
7. Determine trade-offs, negotiations, and choice	Involve MPOs in regional decision making. Develop balance sheets to illustrate costs and benefits for multiple stakeholders. Work with adjacent transit agencies to develop integrated fare structure and service plans. Refine concepts to build consensus.
8. Implementation and monitoring	Provide dedicated funding for access improvements. Collect data and monitor the results of any improvements to inform future decisions.

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Access and circulation patterns should be as simple, obvious, and safe as possible. All station facilities should provide adequate accessibility for all potential users, according to ADA accessibility requirements. Safety of users while accessing the platforms, boarding the trains, and crossing any tracks at grade crossings is a critical consideration.

Land Use Planning

Potential benefits of intercity passenger rail are those associated with station-area development. For stations located outside the city center on vacant land, development can fill in the space around the station. If a passenger rail station is located within the city, development is usually in the form of redevelopment of the existing land.

The FRA's *Station Area Planning for High-Speed and Intercity Passenger Rail* encourages dialog among federal, state, regional, and local partners on better integration of passenger transport and land use (Office of Railroad Policy and Development 2011). The FRA report identifies three station area planning principles:

- **Location.** Optimize the station location
- **Transportation.** Maximize station connections with other transportation modes
- **Development.** Shape the station through urban design; focus infill development around the station

The report includes recommended strategies that support each of these principles and will help create places that are inviting and enhance the economy and sustainability of the region.

Resources

The following are resources for passenger rail station locations and station-area development:

- FRA *Corridor Transportation Planning Guide.*
- FRA *Station Area Planning for High-Speed and Intercity Passenger Rail.*
- Network Rail Guide to Station Planning and Design.
- UIC *Toolbox for the Design and/or Renovation of Major Interchanges.*
- *TCRP Report 153: Guidelines for Providing Access to Public Transportation Stations.*
- FRA *Guidance on Pedestrian Crossing Safety at or Near Passenger Stations.*
- *TCRP Report 175: Guidebook for Pedestrian Crossings for Public Transit Rail Services.*
- Caltrain Stations and Facilities Guidelines.
- United States Access Board Guidelines and Standards.
- Amtrak Guidelines for Stations.
- American Railway Engineering and Maintenance-of-Way Association (AREMA) Manual for Railway Engineering.
- Tools:
  - FRA Station Area Planning Summary Checklist.
  - WSDOT's *Handbook for Corridor Capacity Evaluation* (Chapter 11—Accessibility Evaluation Methodology).
  - *Station Access Planning Spreadsheet Tool* (available on the TRB website as part of *TCRP Report 153*).

Rolling Stock

Rolling stock for short-distance PRIIA Section 209 intercity passenger rail service (i.e., corridor routes) typically consists of locomotives and various types of trailing coaches, although there is a recent rebirth in consideration of self-propelled (diesel multiple unit [DMU] or electric

multiple unit [EMU] vehicles) for special (likely low-density service) circumstances. In most current (and near-term planned) state-sponsored services, it is likely that locomotives are diesel powered and coaches are standard coach-class seating cars with a few food service (cafe or dinette mini-kitchen-equipped) cars and optional premium/business class cars (or split cars with a portion dedicated to business class) included in some trains.

Since the closure of the last two major U.S.-owned passenger car manufacturing companies (Budd and Pullman) in the 1980s, several European and Asian rolling stock manufacturing companies have intermittently purchased or leased U.S. manufacturing facilities to set up plants to assemble/build passenger rail cars for U.S. customers, but most of this stock has been designed for use in commuter/regional rail service, rather than for regular intercity service. Only recently, as an indirect result of the successful PRIIA Section 305–inspired Next Generation Corridor Equipment Pool, has this trend shown signs of change. A joint California/Midwest order for such new short-distance intercity cars prompted Nippon Sharyo USA to open a large new plant in Rochelle, IL. Its financial commitment for this construction and assembly line facility was likely only possible because of the availability of sufficient ARRA/HSIPR funding to assure a contract for 130 cars capable of 125 mph. In a separate but related vein, CAF USA opened a plant in Elmira, NY, to fulfill an Amtrak order for 130 single-level long-distance intercity cars to replenish/replace aging intercity cars in the Amtrak fleet. Both manufacturers are known to have made these sizable investments with the hope and expectation of future U.S. orders.

Amtrak is subject to a statutory Buy America provision applicable to direct purchases of rolling stock using federal funds. This statute is found in 49 U.S.C. §24305(f). Accordingly, Amtrak can only purchase unmanufactured goods mined or produced in the United States and manufactured goods substantially made from other domestic goods. This requirement is administered by FRA and Amtrak. As with other Buy America statutes, exceptions exist (e.g., purchases under $1 million), and the availability of waivers is based on such factors as price differential, non-availability of domestic product, and public benefits of railroad passenger service. FRA considers a manufactured product to be in compliance if it has 50% domestic content and final assembly is performed in the United States.

FRA also administers separate Buy America provisions applicable to non-Amtrak projects using federal grants. For a full discussion of the Buy America provisions applicable to rail projects, see *NCRRP Legal Digest 1: Buy America Requirements for Federally Funded Rail Projects.*

Fleet Design/Planning

A key element of SDP planning of a new intercity passenger operation is determining the planned frequency, running time, minimum turnaround time, average train peak ridership, level of onboard amenities, and so forth—all of which drive the selection of fleet vehicle type and total requirements (fleet sizing). Reasonably well-established, simple tabletop estimating tools are available to plan for total fleet requirements, including protect or reserve stock (i.e., spares for special circumstances or replacements during maintenance). Using these tools should generate a reasonably precise estimate for the total number of each type of car needed to be procured for a given service level.

Traditionally, North American short-distance intercity fleets have been single-level cars; however, since California's successful introduction of double-deck cars on its *Pacific Surfliner*, *San Joaquin*, and *Capitol Corridor* services, interest in this type of car has increased, especially because of the significantly increased seat capacity per unit. The 130 new cars on order for California and multiple Midwest services represent a second generation of the original California double-deck cars.

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Procurement of Rolling Stock

In recent years, the biggest challenge for a potential state DOT customer in procuring rolling stock was to find a willing rolling stock supplier (given the high cost of developing specialized tools, molds, jigs, and so forth, for a relatively small total fleet of equipment). Until the passage of PRIIA and the stimulus funding that followed led to a rebirth of a U.S.-centered passenger car manufacturing industry, little or no new long-distance passenger rolling stock was being procured in the United States. This was critical if the attempted procurement had a high percentage requirement of U.S. content as defined in the Buy America Act.

PRIIA Section 305 resulted in the joint development of standards for the design of next-generation passenger rail cars. Industry analysts and advocacy groups believe there will be a sustainable and predictable demand stream for passenger equipment to maintain or expand the range of U.S. intercity equipment suppliers. States or organizing entities must be aware that, depending on the timing and size of their anticipated fleet, it may not be possible to find an available U.S. builder. The probable solution, if conditions permit, would be to develop a specification that is shareable with another entity to allow increasing the order size to a level large enough to be of interest to the supplier industry. As more intercity rail service develops, more agencies can cooperate to make joint-buys to increase the numbers bought and reduce per-unit costs.

Management of Construction Activities

The public agency sponsor of intercity passenger rail may be called on to manage construction contracts related to intercity passenger rail facilities, including managing engineering studies, identifying construction and contracting issues, and coordinating public outreach and information efforts during the construction period. The following sections discuss these responsibilities.

Management of Engineering Studies

Approaches and levels of capability in managing engineering studies vary greatly, as the research team discovered and clarified during interviews with representatives of state DOTs and other PRIIA Section 209 purchasing entities. Similarly, state sponsors can oversee engineering studies ranging from small, site-specific investments (e.g., new station; limited track infrastructure improvement) to broad-reaching, high-cost, corridor-long integrated track, signaling, rolling stock projects (e.g., the multiyear, billion-dollar-plus Illinois DOT Chicago to St. Louis Higher-Speed Rail Project).

One of the unique challenges of managing engineering studies for new or increased passenger rail operations on shared-use mainline freight host railroads is the requirement placed by most Class I railroads to participate directly in the analysis. Some host railroads even insist that the railroad conduct the study at the expense of the state agency. Opportunities exist for Amtrak to lead or even conduct passenger rail engineering studies based on experience with all of the host Class I railroads.

Most of the states that have participated in sponsoring large or multiple Amtrak services for many years have developed skilled, specialized in-house engineering and related procurement staff who can select and manage studies of all sizes. Others, with less continuing need for such skills or because of budget constraints, can oversee smaller projects but need to hire consulting firms for larger programs or projects. One of the more popular approaches is the use of indefinite delivery/indefinite quantity contracts, which preselect qualified consultant teams that are ready to deploy on a project-specific, as-needed basis.

Construction Issues

In addition to the broad range of construction management issues endemic to all significant infrastructure projects, there are some complex concerns to be addressed when such projects are built on or close to an active railroad. All work performed along a rail ROW, including that within certain broad, predefined distance limits, must be carefully coordinated with railroad operations, and all contractors are subject to stringent FRA roadway worker protection safety training requirements.

Several of the Class I railroads and some of the larger regional railroads have "force account" agreements (involving their track construction and maintenance employees) that may require exclusive use of the railroad's own staff, rather than independent contractors for any work on their property. In a few instances, sponsoring states (or Amtrak on their behalf) have been able to circumnavigate this restriction if the host railroad's staff is so heavily committed for an extended period that it would not be able to meet the construction timeline requirements of a particular project.

Contracting Issues (Disadvantaged Business Enterprise/Local Contractor Use)

Depending on the funding source, issues such as employment of disadvantaged business enterprise (DBE) and women's business enterprise (WBE) organizations as well as Buy America rules can apply to the establishment of a new rail system. Federal and state requirements also must be taken into account.

Projects receiving funding through the USDOT in excess of $250,000 generally must award a certain percentage of the project work to certified DBE contractors. Such certifications are handled through state agencies. Likewise, federal or state project sponsors will require that a certain percentage of project work be subcontracted to WBE entities. To be certified as such, a business must be at least 51% female owned and managed by women. In addition, some states have specific provisions for publicly funded contracts (e.g., a requirement that prevailing wage rates [union scale] be paid to all crafts working on the project).

Historically, the federal Buy America requirements pertained to rolling stock. Over the years, the rules have evolved regarding covered subjects, percent of U.S. content, place of assembly, and basis for obtaining waivers. An entity planning a new project must determine the applicability of the current requirements. *NCRRP Legal Digest 1: Buy America Requirements for Federally Funded Rail Projects* presents a full review of Buy America Act provisions.

Public Outreach/Information During the Construction Phase

Developing and implementing a broad-based and effective public outreach/information plan for the entire construction phase of a new (or significantly improved) passenger rail system is essential. Although effective, well-planned communications can help to significantly reduce the negative effects on a surrounding community, there are likely to be unavoidable inconveniences during construction. The most typical construction disruption challenges to be explained to the community are

- Street closures or grade crossing closures
- Noise that may be heard multiple blocks beyond the direct source
- Dust and dirt (probably blown at least a full block beyond the site)
- Changes to schedules of existing passenger rail (if route overlaps current service)
- Possible temporary cancellation of existing service
- Potential effects on parallel (or crossing) fixed-route public transit

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Depending on the type of neighborhood and magnitude of the construction, there are many options for providing public information, ranging from the fully traditional to the new high-technology options:

- Printing notices in all local and regional news print media
- Posting advance-print flyers visibly near the site (e.g., on utility poles)
- Providing news blurbs to local radio and TV stations for public service announcements
- Providing electronic push notices in conjunction with local community e-media
- Setting up project-specific social media sites (e.g., Facebook and Twitter)
- Establishing a small storefront project marketing office to provide maps, narrative, and so forth.

Communication with the public will evolve rapidly, so implementing agencies must constantly review practices and update plans and activities to address needs.

CHAPTER 6

Operations and Maintenance: Service Planning

The responsibilities of a sponsoring public agency planning intercity passenger rail do not end after planning, design, and construction are complete. Providing oversight, performing service quality assurance functions, and acting as a liaison between the traveling public (individual citizens) and the operator continues throughout the life of a service arrangement. Sponsoring agencies must initially define an operations structure and desired features, including detailed aspects (e.g., onboard amenities). This chapter discusses decisions about operations contracting, ROW maintenance, and rolling stock considerations.

Contracting for Passenger Rail Service

Amtrak is the primary provider of intercity passenger rail services within the United States. With passage of PRIIA, the federal role for intercity passenger rail services is evolving to require sponsoring states to assume most costs and much of the management associated with state-sponsored trains. PRIIA Section 209, in particular, assigns most variable costs associated with such services to sponsoring states. As part of this new structure, however, states are granted flexibility in contracting out some or all of the elements of intercity train operations. Amtrak is only one of the potential contract suppliers of train crews, rolling stock, onboard services, and so forth. As a practical matter, it is difficult for most states to assume the management roles historically handled by Amtrak.

This section of the guide discusses potential contracting best practices and performance management of contract services. Appendix B contains relevant related discussions on the practical application of PRIIA Section 209 formulas with respect to cost transparency and granularity.

Contracting Best Practices

Since the first full year of introduction of PRIIA Section 209 implementation, beginning in late FY 2014, states and other (multistate) contracting entities have had an opportunity to contract out some or all of the menu of services formerly provided by Amtrak (either grandfathered operations from the historic basic-system network or previously contracted services under the 403(b) act, in which only partial subsidy reimbursement was required). As of late 2015, no state has fully outsourced its service to a non-Amtrak provider other than in test or pilot cases. Amtrak's unique statutory rights of access to the lines of private freight rail carriers give sponsoring agencies a powerful incentive to maintain at least some level of Amtrak involvement in current and future services.

In the first arrangement of its type, Indiana DOT has contracted with Iowa Pacific Holdings (IPH) for most of the service elements of the tri-weekly Chicago-Indianapolis *Hoosier State* train.

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IPH provides rolling stock, onboard service and amenities, and marketing support for the train. The operations crew (engineer and conductor) remain as Amtrak employees, and trains operate over the lines of various track owners and dispatch territories under pre-existing Amtrak contract provisions. The new service structure began August 2, 2015.

Few additional states have contracted out specific service elements and taken advantage of the newly available unbundled procurement approach. Specifics of these outsourced agreements are discussed in detail in Appendix B. With each subsequent year, following the recent completion of the first full (fiscal) year of unbundled procurement under PRIIA Section 209 provisions, it will become evident what works well and what does not. At least some of the successful, long-standing contracting practices proven in operation of North American commuter rail service will be explored and emulated by state DOTs and other implementing agencies for short-distance intercity passenger rail. Several of the contract operators of commuter rail have publicly expressed interest in potentially bidding for specific state-sponsored intercity passenger rail services. One large contractor was close to formalizing such a deal with a state, even before the effective start of the new PRIIA Section 209 rules, but was unsuccessful.

Among current observed best contracting practices discussed in Appendixes A through E are the following:

- NNEPRA's use of an independent onboard food and beverage service provider, including provision of unique foods and its own service employees, thereby eliminating the cost of Amtrak commissary services and Amtrak OBS attendants.
- Washington State and Oregon DOTs' joint contract with Talgo to provide and maintain unique Spanish-designed tilting trainsets (for complex legal reasons, this contract is administered technically as a subcontract to their Amtrak contract).
- North Carolina DOT's purchase of secondhand equipment and custom remanufacturing to its own specifications, including provision of a one-of-a-kind cafe car with specialized food and beverage vending machines, thereby eliminating the rental cost of an Amtrak cafe car and the costs of Amtrak commissary services and OBS attendants.
- CCJPA's use of dedicated (employed by parent agency Bay Area Rapid Transit [BART]) call center staff to provide specialized Capitol Corridor train information and reservations, thereby eliminating the allocated shared cost of Amtrak reservations and sales personnel.

Performance Management of Contract Services

Among the states (or other designated entities) that contract with Amtrak for provision of short-distance intercity passenger rail under the general provisions of PRIIA Section 209, approaches and degrees of in-house capability vary widely. Several of the states or designated contracting agencies, especially those with long-standing services and contract agreements, have developed sizable staffs, with solid institutional knowledge on how best to manage (and evaluate the effectiveness of performance) in such contracts. Some of the newer, or smaller, state-sponsored programs, have limited resources and, hence, limited staffing available to oversee and measure performance. These states or entities typically have to be either more accepting of Amtrak's own offering of performance measures or, alternatively, seek long- or short-term outside technical assistance, from experienced consultants.

In addition to the actual train financial- and service-related quantitative performance measures typically included in a quality index (e.g., on-time performance [OTP], ridership, passenger revenue, subsidy requirement, and stated customer satisfaction), the sponsoring state or agency also manages and measures many broader contract performance issues (e.g., degree of Amtrak management attention to the specific corridor, responsiveness and availability of Amtrak when technical or administrative problems arise, and degree to which Amtrak is perceived as flexible

in response to special requests by the sponsoring entity). Since the full operational net cost of service has become the sole responsibility of the state under the PRIIA Section 209 formula, several states anticipate an increasing need to actively manage, with continued cooperation from Amtrak, to find ways to improve productivity while reducing net cost to the state.

Risk Management

Risk management for intercity passenger rail operations entails developing a safety program, investigating accident and injury claims, controlling claims and litigation, and determining the types of insurance to be procured and the levels of coverage.

Safety must be the primary consideration in all railroad operations. Some operators have a department devoted to safety issues and reporting to a vice president or chief executive officer. Those charged with handling claims must work closely with the safety staff; some operations have one department perform both functions.

A railroad claims department deals with accident investigation and the settlement of claims for personal injury or property damage by passengers, third parties, or trespassers. Claims department personnel must understand how a railroad functions, be able to interact well with the company's employees at all levels of the organization, and have the following: expertise with investigation techniques, sensitivity to injuries suffered by claimants, and ability to negotiate fair settlements. Finally, personnel must be able to organize the company's evidence and assist litigation counsel for those cases that cannot be settled and must go to trial.

In many organizations, the risk management area also is responsible for placing or recommending insurance coverage. This can include decisions on how large of a deductible (self-insured retention) the agency can support and the maximum level of coverage desired. Once those decisions have been made, the risk management staff will recommend the various layers of coverage and the extent to which each layer should be handled by commercial insurance, self-insurance, or an insurance captive or pooling arrangement.

Resiliency Planning

One of the key elements of developing an operational plan for an intercity passenger rail project is to ensure that the operations are robust enough to continue when faced with obstacles (e.g., bad weather, failure of rolling stock, or switching or other track problems). Seemingly minor events (e.g., the failure of an air conditioning unit on a passenger car on a hot summer day or a heater during the winter months) can have a large effect on future ridership and service use. Having plans in place to handle such contingencies is essential to building passenger confidence and commitment to continue riding even after an adverse event occurs. Appendix C presents material on the need for resiliency in planning and operation of intercity passenger rail service and has sections on the following topics:

- Defining resiliency in the context of passenger rail service
- Planning resilient service
- Managing resiliency

In each of these sections, factors are discussed in detail. For example, in the section on defining resiliency, the effects of weather factors, track failure, rolling stock failure, and grade crossing/trespasser incidents are described. The section then describes the need for intercity passenger rail agencies to anticipate various potential responses in each type of scenario and be ready to respond/maintain/recover service quickly. The need for coordination with other emergency management agencies in responding to events that affect rail service is also discussed.

Contracting for Operations

Several options exist for operation of a new intercity passenger rail service. Public agencies have the theoretical choice of

- Contracting with Amtrak to operate the service
- Contracting with a freight railroad or other private passenger rail operating company
- Self-operating the service either directly or through a subsidiary

As described in Chapter 2 and Appendix B, there have been frustrations involved in establishing PRIIA Section 209 Amtrak cost formula granularity in determining the total cost charged to states for services, and choosing an appropriate contract operator may be even more complex than in the past. During early PRIIA Section 209 implementation, a few states (or multistate/alternate purchasing entities) were considering ways to maintain their level of service, but at a cost lower than could be offered by Amtrak under the new standard formula full-costing arrangement. Conversely, the one or two states that have attempted to unbundle and contract for only portions of their service from alternate (i.e., non-Amtrak) service providers have experienced unanticipated (and limiting) regulatory constraints from FRA or others. Regarding the option of the freight rail owner operating the intercity passenger rail service, there is little recent indication of interest or even willingness among any of the Class I railroads to become a direct contract operator of intercity passenger rail. The likelihood of states or similar entities attempting to directly operate intercity passenger rail, especially on lines owned by others and shared with freight, appears to be low, due to both liability and existing (and likely expanded) FRA regulatory requirements for operator safety requirements and certification.

Contracting with Amtrak

Contracting with Amtrak provides numerous advantages. First, the carrier operates a nationwide rail passenger service and has the expertise to plan and operate passenger trains. It also has the legal right to use freight railroad facilities on an avoidable cost basis and has the expertise to negotiate business terms with the Class I railroads. Other advantages of using Amtrak as the service provider include a nationwide information and reservation system, an online ticket purchasing system, a liability insurance program, its ownership of heavy equipment repair shops for rolling stock, and the support organization needed for operation of rail passenger service. As an existing rail carrier, Amtrak is familiar with and in compliance with the unique federal statutes applicable to railroads and the requirements of various regulatory agencies. In some situations, Amtrak may be able to furnish equipment, although this is rare today due to a shortage of new equipment resulting from previous years of limited federal passenger rail funding. As funding increases and new equipment is purchased by Amtrak, this may become more of a possibility.

In some cases, sponsoring agencies and Amtrak have had conflicts. Examples include allocation of overheads and cost of operations, leading to attempts to find alternative management and operating arrangements such as contracting with a willing freight railroad or alternate operator such as Herzog or Connex. A freight railroad, such as BNSF Railway, may be willing to operate passenger service over its own lines. This would provide an experienced operator with qualified employees to conduct the actual operations while allowing the sponsoring agency to establish fare and other policies, sell the tickets, and arrange for contracting out some aspects of the service.

Contracting with an Alternative Service Provider/Private Operator

A private passenger rail operator can furnish many aspects of a passenger service while allowing the sponsor to set the policies. The South Florida Regional Transportation Authority (Tri-Rail) operation presents an example of how a service can be unbundled. Tri-Rail contracts

with one entity to operate the trains, another to handle ticket sales and station functions, another to maintain the locomotives and coaches and clean the cars, and another to maintain the tracks and signals. Thus, a rail service can be performed by one entity or divided among several organizations with coordination by the sponsor. However, unless it owns or leases the rail line, the sponsor will have to obtain trackage rights from the infrastructure owner, and this must be completed by arms-length negotiation given that only Amtrak has the statutory right to use rail lines.

Direct Operation of Passenger Rail Service

Direct operation presents another alternative. When Congress mandated that Consolidated Rail Corporation (Conrail) exit the passenger rail business, most of the large eastern commuter rail service agencies (e.g., Southeastern Pennsylvania Transportation Authority [SEPTA], New Jersey Transit [NJ Transit], and New York's Metropolitan Transportation Authority [MTA]) had a choice of direct operation or contracting with an Amtrak subsidiary. Although such large operations can undertake direct operation, this is a questionable alternative for a smaller operation.

An entity contemplating direct operation must consider the complications of becoming a rail carrier. These include compliance with the unique statutes applicable to railroads (e.g., the Railway Labor Act, Railroad Retirement Act, Federal Employers' Liability Act and numerous rail safety statutes, and regulations of FRA and other agencies). Unless the sponsor owns or leases the rail line, arrangements will have to be made to secure operating rights from the owner. Direct operation is practical only for a relatively large operation, not for a service involving a few daily trains.

Because of abuses regarding assistance and payments to railroads during the late 1800s and early 1900s, some states have laws that might be interpreted as prohibiting state operation of railroads. Another aspect of this is the state's legal ability to indemnify a railroad operator from tort liability. If a state law is interpreted as preventing either direct operation or indemnification of railroad operations, these laws may need to be replaced or amended. New legislation may have to be enacted to enable the establishment of new passenger rail services, as recently implemented in both Minnesota and Florida.

Working with Host Railroads

A common feature of the best-performing U.S. intercity passenger rail operations is a resource commitment by service sponsors and host corridor owners to intensive monitoring and sharing of data as related to all aspects of train performance. The collection and sharing of data creates an objective foundation for root-cause analysis of recurring service problems, and avoiding having to rely on anecdotes when problems arise.

The strength of the service partnership is a product of regular communication and interaction among the host carrier, the passenger service sponsor, and other important stakeholders. At the outset of a new service, significant time in face-to-face meetings may be required to develop trust; as the relationship matures, teleconferencing and other tools to share data and solve problems may suffice for most routine matters.

Other steps that should be considered include the following:

- Define the level, frequency, and nature of interface among organizations up front, as part of the initial contract to establish service.
- Ensure that data collection on service performance is appropriate and transparent and that the means of collecting such data is vetted by all parties. A traditional source of performance reporting for Amtrak trains is the conductor delay report. Other parallel and complementary sources of service performance data are generally required to define the root cause of train service issues.

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- Define, in advance, responsibilities for public communication and interface with the media to avoid conflicting story lines and public disputes that can carry over into the political arena. This is particularly important in the context of emergency response or other service disruption scenarios.
- Publicly acknowledge the role of all partners in making the service work. These acknowledgments strengthen the sense of ownership in the quality of train operations and translate into higher levels of commitment throughout the organizations of the host railroad, train service operator (if different), and passenger rail sponsor.
- Participate in formal joint planning of infrastructure renewal and upgrade programs, identifying opportunities to support a strong physical plant while minimizing effects on the traveling public. Shifting work from peak travel periods or choosing a given season of the year to perform track upgrades may reduce the overall passenger service impact of such programs. Freight carriers typically do not plan capital work with passenger trains in mind; time invested by passenger service sponsors participating in the planning of such work is generally time well spent.

The best-performing intercity corridors are backed up by a web of relationships, experiences, and trust that bridges the wide gap between the cultures of a for-profit entity and public transportation service providers. Such an environment speeds decision making; facilitates long-term planning; and ensures a timely, well-articulated response to emergent or unplanned service situations.

Maintenance of Rights of Way

One of the primary concerns of implementing agencies should be to ensure the proper maintenance and safety of the ROW selected for the rail service, generally known as maintenance of way (MOW). In shared-use corridors, the owning or host Class I or shortline railroad typically retains the responsibility for MOW and is compensated by the implementing agency for additional maintenance costs incurred by adding of intercity passenger trains. In situations where the track and infrastructure are owned by the implementing agency, the MOW functions are typically handled in one of three ways:

- Performing the MOW functions with trained, in-house personnel
- Contracting the MOW functions to an independent third-party rail maintenance company
- Contracting the MOW functions to the contracted operations company

There are advantages and disadvantages to each of these potential methods; however, the administrative, management, and training costs of having in-house personnel and the expense/time required to develop expertise in this area tend to drive state DOTs and other implementing agencies to contract for these functions with experienced private providers. Sometimes MOW is included in the operator's bundle of services or can be broken out as a separate contract.

Maintenance of Equipment

To ensure a safe, comfortable ride and provide more reliable, on-time service, high-quality maintenance of equipment (MOE) is essential for ongoing passenger rail operations. Most state-sponsored services rely on Amtrak to provide and maintain their rolling stock (locomotives and passenger cars). One of the potential benefits of Amtrak equipment-pool sourcing is the likely greater ability to obtain replacement cars quickly if there is a problem with the initially assigned set, and also a reasonable opportunity to deploy extra cars for surges in demand or to meet the needs of special events. Unfortunately, much of the single-level fleet typically available is primarily Budd-built Amfleet cars that are up to 40 years old, while Bombardier-built Horizon cars are just

under 30 years old. Despite multiple cosmetic and mechanical upgrades, they still are perceived by passengers (and the sponsoring state entities) as dated.

Several of the larger operations, most notably California state-sponsored Amtrak service, are equipped with a modern, dedicated fleet of state-owned but Amtrak-maintained equipment. In the case of California, this includes a shared pool for the two northern California-based services, the *Capitol Corridor* and the *San Joaquin,* and a separate, dedicated pool for the southern California-based *Pacific Surfliner.* California and a group of Midwest states are awaiting a new fleet of Transportation Investment Generating Economic Recovery (TIGER)-funded, U.S.-built Siemens locomotives and Nippon Sharyo double-deck cars to expand (in the case of California) or replace (in the case of Illinois/Michigan/Wisconsin) existing equipment. It is likely that all of these new units will be maintained for the respective states at existing Amtrak-owned MOE facilities.

Best Practices

One best practice in maintaining equipment is to contract with a rolling stock provider to maintain its product after delivery and placement into service. By far the largest fleet of independently maintained rolling stock for state-sponsored intercity passenger rail service is the highly successful and well-liked Spanish Talgo train fleet, providing virtually all of the capacity for the *Cascades* route in Oregon and Washington State (Eugene/Portland/Seattle/Vancouver, British Columbia). The Talgo rolling stock is unique in many ways (e.g., the permanently coupled articulated equipment sets, patented passive tilt mechanism to allow comfortable passage through curves at speeds higher than conventional equipment, and single-axle wheelset suspension rather than typical two-axle trucks). Since the introduction of these sets, Washington State DOT (in conjunction with partner agency Oregon DOT) has entered into a successful lease-purchase-maintain contract with Talgo Industries to maintain these unique cars, given the greater expertise Talgo has in the peculiarities of this equipment.

As part of the performance/reliability agreement, Talgo typically assigns a qualified mechanical person to each trainset during its operation to ensure full performance and to be able to make specific (relatively) minor repairs en route. Through rigid preventive maintenance, the Talgo trainsets have a high level of actual availability and are rarely pulled out of service. For institutional (and, more recently, legal) reasons, the Washington State and Oregon DOT contracts with Talgo are technically administered by Amtrak, with Talgo Industries being a subcontractor to Amtrak. From a regulatory and oversight perspective, the *Cascades* service in the Pacific Northwest can still be considered a fully bundled, rather than partially unbundled, service.

Equipment Review/Evaluation

Because any state-sponsored service is no better than the perception by riders of the comfort and reliability of its rolling stock, many sponsoring agencies pay constant close attention to the condition of their passenger cars and place high priority on maintaining good quality. In addition to the publicized new equipment delivery for California and a group of Chicago-hub Midwest states funded through a USDOT TIGER grant, several other state sponsors are exploring options to obtain either more modern/attractive or more cost-effective equipment to improve their services. Examples include

- Oklahoma DOT, in conjunction with its *Heartland Flyer* co-sponsor Texas DOT, worked with Amtrak to convert this state-sponsored route's locomotive to burn biodiesel rather than conventional diesel fuel. Separately, these states have explored the marketplace for new, short-distance-specific passenger cars to possibly replace the Amtrak-provided (and state-reimbursed) Superliner cars in use.

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- Vermont DOT, lead state sponsor of the *Vermonter* service hosted by Vermont, Massachusetts, and Connecticut, considered procuring its own self-propelled DMU cars or DMUs to replace the conventional Amtrak-provided Amfleet rolling stock. Because DMUs are self-propelled and do not require a locomotive, they consume less fuel for short train lengths, and Vermont (along with its operator, Amtrak) envisioned the possibility of providing two daily round trips, instead of one, at little additional subsidy requirement. Although this deal was not implemented, in part because of the dwindling sales of the proposed manufacturer, there is some reconsideration of the concept with the recent appearance on the North American market of FRA-compliant Nippon Sharyo DMU. This new car is in use on Toronto's Union-Pearson Express premium airport-to-downtown rail line and will soon be introduced on the Sonoma-Marin Area Rail Transit (SMART) commuter line in California.

CHAPTER 7

Operations and Maintenance: Ongoing Service Management

The intercity passenger rail implementing agency will have activities and concern areas as ongoing matters during all phases of operation. The level of state or implementing agency involvement in these matters may vary. The research in this project found that agencies that were more involved in these types of decisions and details had more successful operations, higher overall ridership, and more satisfied customers. State legislation may limit the degree to which the implementing agency invests in "owning" its corridor service and remaining involved in these types of operational and financial decisions.

This chapter discusses the following:

- Fare policy and ticketing
- Revenue management
- Passenger services and amenities
- Marketing and outreach
- Expanded/extended service considerations
- Ongoing funding and financial monitoring
- Multiple intercity services management
- Ongoing legal/risk issue management
- Station operations and amenities

Fare Policy and Ticketing

Issues surrounding fare policy and ticketing services can often become part of the contract negotiations between a sponsoring agency and the service provider. Although they are related topics, a more meaningful discussion on operational fare policy and ticketing procedures can be provided by covering each area separately.

Fare Policy

Debate about and understanding of fare policies for short-distance, state-sponsored intercity passenger rail services have been evolving since the early days of Amtrak 403(b) services. Historically, and throughout the early years of such services, fares tended to be simple, distance based, and typically consisted of a relatively low boarding fee added to a cents-per-mile charge. In that era, a fare for a given city pair was a fixed, preset price. Sample fares (or even the whole fare matrix) were printed in the timetable.

A few routes began to venture into variable, but still preset, pricing by offering lower off-peak and higher peak fares. For simplicity of message and the desire to offer unreserved (i.e., fully

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interchangeable/non-train-specific) tickets for their services, a small number of highly successful PRIIA Section 209 routes still offer a single preset price for each city pair. Notable among these services are two of the most heavily patronized California short-distance services, the Sacramento–Oakland–San Jose *Capitol Corridor* and the Santa Barbara–Los Angeles–San Diego *Pacific Surfliner*. The former offers only one class of service, so it has a simple fare policy, while the latter offers both coach and business class seating, where premium seats are priced roughly $10 above their coach counterparts.

Most of the other current Amtrak-operated, state-sponsored services use an effective, if somewhat complicated, variable pricing yield-management system, which is only possible in conjunction with an all-reserved-seats policy. Patterned after the earlier successful application of all-reserved service on its own formerly unreserved NEC trains, this system require reservations and purchase for a specific train in advance of departure, with fares for a given O/D set at a wide range of prices or "fare buckets." Fares generally purchased far in advance or on lightly traveled sections of routes are priced much lower than fares for the same O/D purchased closer to departure or on almost full segments. Some NEC trains and most state-sponsored trains offer a walk-up (or even onboard purchase) fare equal to the current price in effect for that particular train on that day. Surcharges may exist for onboard transactions.

Ticketing

The discussion of yield management provides a logical transition to the related topic of ticketing practices. At its beginning, Amtrak offered traditional computer-printed (or even handwritten) tickets for its own and state-sponsored trains. The next advancement, almost 20 years ago, was the introduction of automated, computer-assisted ticket vending machines (TVMs), marketed as Quik-Trak machines. The current generation of these machines can also create reservations and print out previously reserved (or prepaid) tickets, using a credit/debit card for identification of the customer and payment. Quik-Trak TVMs have been important for state-sponsored services to be able to sell (vend) tickets at the many unstaffed stations and reduce staffing requirements at staffed stations. Several of the more recently introduced state-sponsored services have been able to lower their station costs by designing stations to be unstaffed stations, with only janitorial or station-host assistance for most of their smaller, intermediate stations. There are even examples where the less populous endpoint station of a route is unstaffed.

The most recently introduced (and well-received) Amtrak ticketing advancement is eTicketing, in which the actual revenue value of the ticket is electronically stored and then cancelled when used. This new system works for both printed paper eTickets and virtual (i.e., paperless) tickets that can be displayed by customers using a square barcode on their smartphone. Amtrak conductors can now quickly and easily scan the barcode square of a passenger's paper eTicket or smart device using a customized network-integrated iPhone, replacing the cumbersome task of onboard staff punching a paper ticket and then collecting it and turning it in for revenue accounting after the end of the trip.

Because the revenue value is effectively treated as point of sale and the value cancellation is performed electronically (rather than by punching and counting paper tickets), this system has improved productivity and reduced labor costs for Amtrak and its state-sponsoring customers. In less than 2 years, Amtrak has transitioned all of its ticketing, including complex long-distance train tickets, to this eTicket process. Most of the prototyping and early development of the high-tech approach to revenue collection occurred on state-sponsored routes that volunteered. These routes may offer opportunities for testing additional technologies in the future.

Revenue Management

Some successful, high-frequency, high-volume corridors have chosen to provide open, unreserved seating, giving passengers more flexibility to switch from one train to another and avoid the incremental contracted cost for reserved seats. The downside of open seating is the potential for an individual train to be oversold, resulting in standees or, denied boarding, coupled with the potential loss of demand pricing. Demand pricing based on yield management can offer a range of prices for a seat on a particular train. Examples of unreserved state-sponsored corridors include the Sacramento–San Jose *Capitol Corridor,* the San Francisco–San Diego *Pacific Surfliner*, and the Chicago–Milwaukee *Hiawatha Service.*

On several specific services, especially in corridors where there is good potential for business or other upscale travel, a business class service is provided, either in half of a split coach/cafe/business section car or, in a few cases, using an entire dedicated car (e.g., San Francisco–San Diego *Pacific Surfliner;* Eugene–Portland–Seattle–Vancouver *Cascades* service; or the New York–Washington, DC–Raleigh–Charlotte *Carolinian*). Besides somewhat more spacious seating, most business class services include small additional amenities (e.g., free newspapers and free, self-service, non-alcoholic beverages; on the *Pacific Surfliner,* the service includes an attractive, distinctive snack package that includes several small nonperishable food items). Because of the perceived high labor cost of a dedicated attendant, none of the state-sponsored, business class services include an extra onboard service attendant. The lack of an attendant prevents the provision of higher yielding, more elaborate parlor cars or special first-class services like the NEC Acela Express First Class program (which offers hot food, at-seat service, and alcoholic beverages)—services provided on select short-distance corridor routes in the past.

Passenger Services and Amenities

Various basic passenger services and optional amenities can be incorporated into a state-sponsored intercity passenger program. In almost all cases, the trade-off is whether a particular service addition will generate additional revenue value versus the cost of its provision. For most PRIIA Section 209 services, this decision is further affected by states' perception that Amtrak's allocated cost for extra amenities is relatively high and, hence, often greater than the probable additional attracted revenue value.

Most typical state-sponsored, Amtrak-operated passenger services offer the basic service of all-reserved coach-class seats and a simple, self-service cafe car staffed by one attendant who offers snacks, light meals, and various beverages. After initial deployment on select routes, free onboard Wi-Fi is becoming the nationwide standard for short-distance, Amtrak-operated corridors. This addition is important on a competitive basis because most of the highly rail-competitive intercity curbside bus companies have been providing free Wi-Fi since their beginning a few years ago. In recent years, in response to state desires to reduce costs, a few of the short (2-hour or less one-way trip) corridors now operate with coaches only and no food service car (e.g., New York–Albany short-turn *Empire* service trains; Chicago–Milwaukee *Hiawatha* service trains). The same is true for some longer distance trains (e.g., the Indianapolis–Chicago *Hoosier State,* whose trip is nearly 5 hours long with only four round trips per week). The unique new (and initially successful) contract that Indiana DOT has implemented with IPH (Iowa Pacific) for private provision of rolling stock, onboard service, and marketing (while Amtrak continues to maintain the basic T&E/contract railroad access elements) has now restored full food and beverage service to the *Hoosier State* train. Feedback indicates that the onboard amenities offered by Iowa Pacific are much more attractive and numerous than those offered on comparable Amtrak OBS-provisioned trains.

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Marketing and Outreach

Approaches to marketing of intercity passenger rail services vary from state to state and depend on how involved the implementing agency is in overseeing and managing the service. State DOTs involved in intercity passenger rail for a long time may have trained staff that handle marketing or work with Amtrak or other private operators providing the service to promote its use to the public. Some states have hired outside marketing professionals (on a contract basis) to assist with this task—especially during the initial launch of a new service or service frequency expansion in an existing corridor.

Other state DOTs and implementing agencies depend solely on Amtrak or an alternative operator to provide marketing to encourage increased ridership. These tasks (and performance measures for acceptable fulfillment of them) are generally outlined in detail in the contract for service between the implementing agency and the operations service provider. Marketing by a new state DOT just becoming involved in intercity rail service may be minimal or limited by funding availability. On the other end of the spectrum, implementing agencies focused solely on intercity passenger rail provision (e.g., NNEPRA, CCJPA) are most likely to be hands-on in both providing ideas and instituting actions to promote and market their service. In all cases, techniques for soliciting and managing customer feedback and using customer feedback to improve the quality of service must be developed. Some techniques for using passenger surveys and other customer feedback methods are discussed further in Appendix D.

Expanded/Extended Service Considerations

For short-distance corridors on which there is an existing (presumably governed by PRIIA Section 209) intercity passenger rail service, the issues surrounding planning and implementation of service expansion (i.e., increased frequency) or service extension (i.e., new service beyond existing endpoints) involve many of the same challenges. In general, depending on the service agreement in place, it may be less challenging, and likely require much less lead time, to only increase frequency rather than extend onto (presumably) freight-only territory. To help set the framework and recognize some likely challenges, the following narrative will first address frequency increase and then discuss service extension.

Service Expansion/Frequency Increase

If Amtrak is the current contract service provider, the state sponsor will likely seek guidance directly from Amtrak on the estimated fixed-facility capital cost requirement for increased use of host railroad capacity and the anticipated increase in annual operating subsidy payment. Although Amtrak has indicated its preference to perform such studies for its existing (and potential) state-sponsor customers, some states have preferred to seek the assistance of a consultant, in the expectation this might present more unbiased results. In the final analysis, the nature and level of new infrastructure investment will need to be defined through a tri-party consensus involving the host corridor owner, Amtrak, and the public funding agencies.

Depending on current and planned future equipment use, the frequency increase might also require dedication of one or more additional sets of rolling stock (locomotive and cars). If Amtrak is the current equipment provider for the service, it will assign more cars and locomotives as necessary from its pool (if available) and charge the state accordingly. If the state owns or leases its own equipment, it will have to take steps to purchase or lease additional rolling stock, if necessary. In contrast to other transportation modes, vehicles available for lease or purchase over the short term are limited in supply. Service sponsors are well advised to plan 3 to 5 years in advance of intended deployment schedules for such rolling stock.

One of the most significant challenges in providing increased passenger rail frequency on any shared-use, host-freight-railroad-owned corridor is negotiating the (likely) non-negligible cost of infrastructure capital improvements to provide capacity for the added service. Because of the recent dramatic increase in freight traffic on almost all major Class I lines, most freight carriers have become even more protective of their existing capacity (even if there is some room for freight growth). Notwithstanding these ever-present challenges, several of the highly visible and successful state-sponsored, Amtrak-operated, short-distance corridors have succeeded in incrementally adding multiple frequencies to their routes over the years. Among those with the largest number of frequency improvements are the three intra-California corridors: the Sacramento–Oakland–San Jose *Capitol Corridor,* the Oakland–Sacramento–Fresno–Bakersfield *San Joaquin* service, the Santa Barbara–Los Angeles–San Diego *Pacific Surfliner* service; and the Oregon and Washington State DOT-sponsored Eugene–Portland–Seattle *Cascades* corridor.

Investment in new service capacity associated with a planned increase in service frequency is best handled through an initial, multiphase, fixed-plant and service capacity analysis. A thorough, multiphase analysis that establishes a public record defining needed investments at different service levels will save time, smooth the political process, and speed up private-sector negotiations as service improvements are rolled out.

The host railroad capacity issues are likely to become much more complex if speed improvements are requested in conjunction with a proposed frequency increase. A couple of the larger ARRA/HSIPR-funded HrSR construction projects encountered extreme difficulty in reaching successful multiparty agreements (state/Amtrak/FRA/host railroad) over the FRA-mandated stipulation to include quantitative performance measures in the capacity/speed investment commitment. Many of the complex issues of negotiating access and capacity agreements are discussed in *NCHRP Report 657: Guidebook for Implementing Passenger Rail Service on Shared Passenger Freight Corridors.* Substantial additional information on the technically complex issue of capacity modeling is discussed in *NCHRP Report 773: Capacity Modeling Guidebook for Shared-Use Passenger and Freight Rail Operations.*

Service Extension (Beyond Existing Endpoint)

Similar to the situation involving frequency increase, if Amtrak is the current provider, the state sponsor may seek guidance directly from Amtrak on the ability to access the new route segment for the extension and the estimated fixed-facility capital cost for its use. Amtrak, the state itself, or an outside consultant may estimate the forecast revenue/ridership gain, incremental operating cost, and anticipated increase (or possibly decrease) in annual operating subsidy.

Depending on equipment use, the route extension may require dedication of one or more additional sets of rolling stock (locomotive and cars). A couple of successful short-distance corridor extensions were premised largely on the recognition that the existing equipment was sufficient to meet the needs of the extension, improving overall use and producing more revenue from the same fleet. Two noteworthy examples of state-sponsored service extensions possible with existing equipment are NNEPRA's (relatively recent) extension of the Boston to Portland *Downeaster* to Brunswick, Maine, and Michigan DOT's past extension of the Chicago to Detroit *Wolverine* Service to Pontiac, Michigan.

In some cases, additional equipment may be necessary for the extension. If Amtrak is the current equipment provider, it might be able to assign more cars and locomotives from its pool, if available, and charge the state accordingly. If the state owns or leases its own equipment, it will have to purchase or lease additional rolling stock.

Geographic service extensions raise most of the same capacity and service issues with host freight carriers as increases in frequency. If a given extension merely lengthens the run of trains over lines

without major intermediate terminals or freight rail clients, the estimates of needed new capacity may be fairly straightforward and can rely on revisions to the technical modeling tools used in the baseline service analysis. If the proposed lines of the extension involve major urban centers, freight rail terminals, or online freight rail clients, the complexity of the negotiation and the associated new capital investments may prove to be a bigger challenge for the passenger service sponsor.

Recent unplanned increases in energy-related rail traffic and the associated disruptions to the freight rail service network have made carriers even more wary of new passenger service introductions. In most cases, service sponsors may expect freight corridor owners to demand that the service sponsors fully absorb the capacity investment costs of new train services, regardless of the current intensity of use for a given line.

An exception to this principle is the use of light-density branch line or regional freight corridors typically operated by smaller freight rail carriers. Such freight rail operators may welcome new passenger operations as a means of tapping public funds for infrastructure upgrades. Generally, such operators can service their freight clients by exploiting the normal diurnal falloff of passenger service demand during overnight periods.

Ongoing Funding and Financial Monitoring

NCRRP Report 1 presented alternative funding and financing mechanisms for passenger and freight rail programs in detail, so the discussion in this section will be limited to specific examples of ongoing funding challenges facing long-standing or more recently introduced state-sponsored passenger rail services.

As described in the Funding Intercity Passenger Rail Programs section of Chapter 2, under PRIIA 209, once a new short-distance, intercity passenger rail service is established, it is the full responsibility of state DOTs directly (or their designated organizing/purchasing entities within a state or multiple states, such as CCJPA in California or NNEPRA in Massachusetts and Maine) to fund the net losses of these services. Most legacy rail service states (or related entities) that have been operating (and hence subsidizing) intrastate passenger rail for many years, going back to the co-subsidized 403(b) programs, typically have well-established internal programs and sufficiently staffed departments to administer and monitor ongoing funding.

A new significant challenge in many cases, however, is the relatively recent requirement to cover 100% of the allocated losses (Amtrak-allocated operating costs less route revenues) rather than a specified or negotiated percent of the total, as was the practice until implementation of PRIIA 209. As a result of this PRIIA 209-mandated 100% subsidy requirement, and the recently adopted revised Amtrak route cost allocation formula (discussed in greater detail in Appendix B), even some states with long-standing agreements for service have experienced difficulty in gaining commitments from their legislatures (or whatever other funding source they have historically used) to meet the full amount required. In the funding development plans for FY 2016 service, at least two of the largest and best-established state-sponsored programs are facing serious challenges in obtaining full budget commitments to maintain the current levels of service and may be forced to reduce service.

Similar challenges are being faced by some of the newer, smaller state-sponsored operations, which from startup have been required to provide funding for the full loss of their service. A few of these states have limited staffing available to manage and monitor the funding, but more importantly they do not have the internal human infrastructure to adequately defend the case to justify continued (or in some cases cost-formula-based increased) budget authority for their service(s). In some cases, states have initially relied on short, if multiyear (i.e., 2- or 3-year), pre-committed budgets. When the initial budget authority runs out, there is a risk of serious

frequency reduction or outright termination of service if new (future-year) appropriations cannot be provided by their legislatures.

Multiple Intercity Services Management

Many new implementing agencies face a tough transition in management when growth in intercity transportation demand or ridership leads to the need to provide additional service along another line or in another part of the state. When this happens, the two lines may compete against each other for resources from the implementing agency/state DOT or at the state legislative level. As a result, the complexity of the implementing agency's planning responsibilities will increase to include making sure that both the established and new services are planned and managed properly. Conditions (e.g., shared corridor on one line but not on the other) may require that one line be operated or staffed in a differing manner—making this task even more difficult. Managing more than one service may also mean that the implementing agency staff (and associated personnel costs) must increase to handle the additional workload.

Within a defined region, it is generally best for two or more lines serving the same market to be operated as a system and share resources between lines rather than be operated independently. One corridor service might bring additional ridership to the other, leading to overall system health, even though the new segment may be operating at a loss when considered independently. This may not be true in all cases, however. Where a new service might threaten an established service's financial health, care must be taken to ensure that financial measures are in place to keep the initial service whole. Care must be taken to ensure that any new service additions are fully studied and that all potential scenarios are considered.

Ongoing Legal/Risk Issue Management

Legal and risk issues run the gamut of the entire spectrum of railroad operations. An attorney working for a passenger railroad operator becomes involved with countless issues (e.g., real estate, injury and death claims, advertising copy review, contract negotiation, commercial litigation, and labor relations). If the carrier has its own police department, the lawyers also become involved in the field of criminal law.

Usually, managing this work is in the hands of the responsible agency's general counsel. He or she is responsible for the legal affairs of the company or agency. Some organizations use outside law firms for most legal work, while others develop an in-house legal staff with the necessary skills to handle most activity. Use of in-house staff generally is more economical than retaining outside lawyers and offers the advantage of a staff known to and trusted by the various internal departments with whom they must work. Their familiarity with the rail operations and practices minimizes the learning curve for review of a problem.

The personal injury claims function often is carried out by a separate department reporting to the general counsel. That department needs a staff capable of investigating claims and negotiating settlements with the hope of avoiding litigation. Once a lawsuit is instituted, both the legal and claims staffs must work together to marshal the railroad's case and protect its interests.

Station Operations and Amenities

As with all passenger rail services, station operations and overall image for state-sponsored, short-distance services are an important contributing element to success because the station creates the first actual impression of the service and may also be an auxiliary marketing tool to

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non-travelers accompanying a passenger. Depending on size of city, frequency of service, and average anticipated passenger volume, state-sponsored passenger rail stations can range from a minimum of a short platform, signage, lighting, and possibly an external shelter but no formal enclosed structure, to a large, staffed, multi-room, climate-controlled building with ticket windows, possibly staff office space, a small restaurant or at least substantial food vending machines, other small tenants, and so forth. Where possible and appropriate, several states or cities along state-sponsored routes have expanded these stations into multimodal transportation centers, frequently co-served by intercity bus, local transit bus, other fixed guideway transit (LRT or streetcar), and so forth.

For these larger stations, several states with long-standing state-sponsored short-distance service programs (e.g., Illinois, Michigan, New York, California, Oregon, and Washington) have invested substantial capital in upgrading old or building new stations for their service. Depending on size and location, amenities added to older, legacy railroad-operated historic stations or provided in new stations include modern climate-control systems, improved lighting, more comfortable seating, modernized rest rooms, and new or improved parking. Few state-sponsored passenger rail stations provide in-station Wi-Fi service, even though many of the services provide full onboard train Wi-Fi capability. In fact, other than at key NEC stations, few Amtrak stations provided Wi-Fi at the time of this publication; however, this service is likely to be added over the next few years.

One of the critical amenity/cost trade-offs for states to consider is whether the station will be formally staffed, namely by agreement-covered Amtrak employees for live ticketing and information. Because of the relatively high cost of maintaining live ticketing, except for the largest volume stations, many states have chosen to only provide Amtrak self-service Quik-Trak TVMs and then rely on non-labor-agreement-covered, lower-paid custodial staff to open and close and maintain the station. Another cost-containment option used in some specific locations is to only provide live, staffed ticket agents during limited hours (e.g., for one shift, presumably when the demand is greatest) and then retain the option of ticket purchase through automated machines for other hours.

Although there is a substantial capital and operating cost savings when providing only a minimalist platform/shelter station or even a small, but never staffed, climate-controlled building, there are definite drawbacks from the passenger perspective for limiting services. For those stations with insufficient security to locate an automated TVM, passengers who have not prepurchased tickets will have to rely on the cumbersome process of purchasing tickets onboard from the conductor. For many of the tech-enabled customers, this has become much less of a challenge in the last few years with the availability of Internet sales, smartphone ticket apps, and so forth. On some of the lesser patronized routes, many of the stations, if not all, are unstaffed, with the sole exception of the main urban endpoint terminal.

There is also still a real potential comfort/safety challenge during harsh or severe weather for passengers to wait for a train, especially should the train be delayed. If being dropped off (or even if self-parking and traveling), some customers will seek shelter in their own vehicle while awaiting a train during bad weather. Unfortunately, not all customers have that option (e.g., those being dropped off by a taxi or bus at platform side).

Intermodal Connectivity

The importance of intermodal connectivity to short-distance intercity passenger rail is not a new concept, but it has gained significant recognition and understanding in the last few years. To improve access to and from passenger rail stations (i.e., the first mile and last mile of a trip), ease and availability of direct connections to other modes is critical. Many state sponsors have worked

with their respective local and regional transit counterparts to develop good station-related infrastructure-enabling connectivity and with coordinated transit schedules and operations.

One of the most important reasons to maintain and expand good intermodal connectivity is that it represents a true win-win opportunity, typically adding more revenue and ridership to both the served intercity passenger route and the local transit operator. The perceived convenience of the connection (both physical access and frequency/coordination of schedules) in the eyes of the potential user plays a key determining role in the utility of the connection. Unfortunate counter examples are those situations in which intercity passenger rail service is infrequent and the times it does serve an otherwise well-designed and planned facility occur when there is no local transit offered or when the transit schedules are so disparate that the wait time for connecting services renders the connection effectively useless.

Northeast Examples

Long before the current public assumption of financial responsibility for intercity passenger rail service, there have been many excellent examples of well-designed and -operated intermodal connecting facilities. Boston's historic South Station and reconstructed Back Bay Station at the far northern end of the NEC both have direct underground connections to local subway service and cross-platform connections to the south portion of Boston's commuter rail network. Access to the north portion of the commuter rail network requires a subway transfer. South Station also is connected by covered walkways to a large publicly funded intercity bus terminal, located directly above the outer limits of several of the train platforms. New York's Penn Station has direct underground connections to multiple local subway lines as well as in-station connections to the extensive Long Island Rail Road (LIRR) and NJ Transit commuter rail networks. Philadelphia's 30th Street Station provides excellent indoor connections from the local SEPTA Regional Rail (frequent electric commuter rail) to a wide range of urban and suburban destinations as well as direct train service to the Philadelphia Airport. Since the inception of the modern DC Metro, Washington's Union Station enjoys a direct underground connection to an adjacent subway station. Washington, DC's Union Station also offers good connections to all routes of the two Washington-area commuter rail networks: the Maryland Commuter Rail Train Service (MARC) and the Virginia Railway Express (VRE). As in Boston, with the assistance and cooperation of local planning authorities, Union Station now has a direct link to Washington's intercity bus terminal, located on one level of the Union Station Parking Garage.

West Coast Examples

There are also good major infrastructure examples of intermodal connections between intercity rail and transit in the western United States. Los Angeles Union Passenger Terminal (LAUPT) has gained direct connections to the region-wide, new-start Los Angeles (LA) Metrolink Commuter Rail network. LAUPT also has an underground connection to the LA Metro subway and an attractive indoor, aboveground walkway access to the LA Metro LRT. Furthermore, LAUPT is directly connected to a major bus transit center, located at the adjacent Gateway Plaza serving multiple LA Metro transit local and express bus routes, LA DOT DASH Circulator Shuttle routes, and the nonstop "Fly Away" motor coach express shuttle to Los Angeles International Airport.

Seattle's King Street Station provides direct access to Sound Transit's Sounder regional commuter trains and nearby access to a station of the Sound Transit LRT System, including subway service to Downtown Seattle and elevated service to Sea-Tac Airport. San Diego's historic Atchison, Topeka, and Santa Fe Station has convenient cross-platform connections to both the North County Transit District's (NCTD's) Coaster commuter rail and the LRT network of San Diego's Metropolitan Transit System (MTS). MTS city buses and airport shuttle routes stop just outside the station.

Among state-sponsored services, especially in California, Oregon, and Washington, there is a plethora of excellent examples of new intermodal connections, mostly with local/regional bus transit, enabled by expansion or reconfiguration of existing stations and designed as integral elements of new stations. Almost every station on the three California-sponsored Amtrak corridor routes—the *Capitol Corridor, San Joaquin* service, and *Pacific Surfliner* service—have some degree of direct connection to locally operated bus transit. Many of these stations also have dedicated loading space and fixed signage to support the extensive Amtrak Thruway Express intercity bus network, which is an integral part of California's state-sponsored passenger rail network. This bus network is operated under contracts overseen by Caltrans to provide dedicated connections to state-sponsored trains, providing critical links between O/Ds otherwise not possible by rail, or allowing connection service beyond the endpoints of the rail routes, where traffic density or rail infrastructure would not allow for passenger rail service.

Midwest Examples

The primary passenger rail hub for Midwest intercity passenger routes, Chicago Union Station (CUS), has not enjoyed good local transit intermodal access. Notwithstanding, it provides excellent transfer capability to the several Metra commuter rail lines that use CUS as their Chicago terminus. Although several major, frequent local bus routes operate nearby or terminate in the street outside the entrance to CUS, the nearest subway and elevated railway stations are a few blocks away, with difficult access for those with heavy luggage or any disability.

Several facilities under construction are designed to provide significantly improved intermodal connections in other Midwest cities. In Detroit, the New Center intercity passenger rail station was recently designated as the northern terminus of the M-1 RAIL urban circulator modern streetcar, currently under construction. After many years of planning and design issues, the new St. Louis Gateway Transportation Center is an intermodal passenger rail bus station that is well connected to the local MetroLink LRT transit system.

Examples Elsewhere

In addition to the facilities highlighted above, intermodal connections between intercity passenger rail service and other transit modes are being developed at several new publicly sponsored facilities and stations. Such examples indicate that intermodal connectivity is seen as key in many of the newer services and incorporating these connections is becoming the industry standard. Examples of such development are also spread throughout the south and southwest where rail service has been scarce until recent years.

One of the key intermediate stations of the downtown Oklahoma City Streetcar (now under construction) is the former Santa Fe Station, the northern terminus of the state-sponsored Amtrak *Heartland Flyer* passenger train. At the *Heartland Flyer's* southern terminus in Fort Worth, there is a substantial Fort Worth intermodal station, including multiple Fort Worth Transit Authority (The T) local bus routes, a newly introduced bus rapid transit route, connections to the Trinity Rail Express commuter rail to Centreport station (with bus connections to the Dallas–Fort Worth [DFW] Airport) and downtown Dallas, and a planned commuter rail line known as TexRail with service directly to DFW Airport and several northeastern Fort Worth suburbs.

At Denver's Union Station, a key intermediate stop on the Amtrak *California Zephyr,* both eastbound and westbound schedules provide good times for easy transfer to Denver's regional transportation district (RTD) local services. These include LRT service; the RTD free-ride 16th Street Bus Shuttle to Downtown Denver; a large express commuter bus terminal located directly under the platforms; and, in the near future, RTD electric commuter rail to Denver International Airport and various suburbs.

As the cited examples show, making sure that intercity passenger rail service is integrated into the overall transportation system and supported by local transit links is vital to ensuring high levels of ridership. Providing a service without planning these connections is unwise and likely will lead to failed or ineffective service.

Planning for and Responding to Adverse Weather Events (Snow, Floods, Etc.)

Planning and operations of a successful state-sponsored intercity passenger rail program should include careful consideration of planning for and responding to various potentially serious climate/weather events (e.g., major snowstorms, hurricanes, tornadoes, and floods). Persistent extreme temperatures can also affect rail operations adversely. With extreme heat, the risk for rail thermal expansion rises and may result in the host railroad issuing slow orders for specific tracks or track segments, which could affect operational schedules. In extreme cold, rail breaks could occur due to thermal contraction, resulting in tracks being out of service. Long-term severe cold that freezes the ground below the tracks may also result in additional maintenance requirements if the entire track structure moves when thawing occurs.

The current predominant intercity passenger rail service operator, Amtrak, and all of the major Class I host railroads generally already have natural disaster preparation and recovery plans in place. States or other regional/multistate/joint power authority entities that sponsor the larger PRIIA Section 209 passenger rail programs are advised to have their own coordination and communication plans for natural disaster periods and good interaction with their primary contract operator and host railroad.

Examples of some of the most highly visible and much discussed events of this type in the last few years include:

- Flooding of rolling stock storage and maintenance yards and tunnels during Hurricane/Super Storm Sandy.
- Significant amounts of snow accumulation and ROW blockages in Massachusetts.
- ROW wipeouts and closures due to storm-induced mudslides in the Pacific Northwest.
- ROW destruction and closure after tornadoes in the Midwest.

Although several of the mentioned events affected both commuter and regional rail services and others affected primarily intercity passenger routes, ultimately, the state-level sponsor of any passenger rail service, most often the DOT, should be prepared to respond to all such occurrences.

Based on the successes of some intercity operations and lessons learned from failure in the abovementioned incidents, suggestions for dealing with these types of disasters follow:

- **Plan Early.** When there is a reasonable probability of serious oncoming severe weather, coordinate and communicate with the contract operator and/or the involved host railroads as far in advance of the occurrence as possible.
- **Announce and Market the Plans to the Public.** Provide as early and as detailed as possible plans for reduced or cancelled service using all of the traditional methods (i.e., radio spots, TV news, and print news) and more recently available Internet (e.g., web posts), push notifications, and social media (e.g., Twitter and Facebook) tools. If the plans need to change, make sure the most current information is available through all channels. Some customers will gravitate to traditional outlets; others (e.g., millennials) rely almost exclusively on the newer social media avenues.
- **Protect Rolling Stock and Other Movable Assets.** Several commuter/regional rail authorities limited locomotive/coach car/EMU flood damage with insightful relocation of sizable pools of

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equipment to higher ground yards or even use of high-ground running tracks for temporary storage rather than risking submerging in flood waters.

- **Keep Trains Moving (as long as safely possible).** In major snow events, most notably in high-frequency corridors with sufficient density of service, one of the best traditional methods to keep a line open is running trains at a frequent enough interval to prevent disruptive snow buildup levels. Because this is less and less possible in the contemporary operating environment (e.g., limited availability of crew and rolling stock and liability risks of getting stranded), the alternative is to safely and as securely as possible lay up the trainsets when no longer operable and have a large and strong enough fleet of rail-based snow removal equipment (as practiced by major western U.S. and Canadian freight railroads) to clear the ROW after the end of the storm. Either approach (or some route-specific combination) should be planned in advance as a key element of the larger weather/snow-preparedness plan.
- **Prearrange Potential Transportation Alternatives.** For those site-specific, relatively short disruptions (e.g., after a severe tornado on a segment of track), it is productive for the state or authority to have prearranged on-demand contracts with local alternate mode providers, most likely intercity motor coach operators (either common carrier or charter). This may help facilitate a much quicker implementation of a bus bridge or temporary, even point-to-point, bus substitute service.
- **Prepare for the Unexpected.** A good operating plan allows for relatively flexible response because each weather emergency is unique, requiring onsite leadership to respond quickly and appropriately, modifying the plan as necessary to address emerging conditions.

Following these principles and those highlighted in Appendix C should aid the implementing agency in managing and preparing for event-based and ongoing weather effects to service.

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Abbreviations

ADA	Americans with Disabilities Act of 1990
Amtrak	National Railroad Passenger Corporation
AREMA	American Railway Engineering and Maintenance-of-Way Association
ARRA	American Recovery and Reinvestment Act of 2009
CBD	central business district
CCJPA	Capitol Corridor Joint Powers Authority
CE	categorical exclusion
CUS	Chicago Union Station
DMU	diesel multiple unit
EA	environmental assessment
EIS	environmental impact statement
EMU	electric multiple unit
FONSI	finding of no significant impact
HrSR	higher-speed rail
HSIPR	High-Speed Intercity Passenger Rail
HSR	high-speed rail
LAUPT	Los Angeles Union Passenger Terminal
LRT	light rail transit
MBTA	Massachusetts Bay Transportation Authority
MOE	maintenance of equipment
MOW	maintenance of way
MPO	metropolitan planning organization
MSA	metropolitan statistical area
MUTCD	*Manual on Uniform Traffic Control Devices*
NCTD	North County Transit District
NEC	Northeast Corridor
NEPA	National Environmental Policy Act of 1969
NNEPRA	Northern New England Passenger Rail Authority
O/D	origin-destination
PPP	public-private partnership
PRIIA	Passenger Rail Investment and Improvement Act of 2008
PTC	positive train control
ROD	record of decision
ROW	right-of-way
RSIP	rail service and investment program
RTD	regional transportation district
SDP	service development plan
SEPTA	Southeastern Pennsylvania Transportation Authority

SOGR	state of good repair
SRP	state rail plan
SRPAA	state rail plan approval authority
SRTA	state rail transportation authority
STB	Surface Transportation Board
Tri-Rail	South Florida Regional Transportation Authority
UTA	Utah Transit Authority
VMT	vehicle miles traveled

APPENDIX A

Liability/Insurance Requirements Relating to Intercity Rail Passenger Service

Liability, indemnification, and insurance issues are some of the most difficult to resolve when a line of railroad is shared by both freight and passenger trains. When a new passenger service is being proposed for operation over an existing freight railroad, the owner of the facilities often takes the position that it must be indemnified and defended for any and all incidents that would not have occurred "but for" the presence of the passenger service. Even in the event that the accident was caused by the freight railroad's own negligence (e.g., a derailment due to a track defect) the passenger agency would be required to absorb the costs of judgments and settlements for personal injury, property damage, and death. While some view this as unfair, many freight operators believe this is part of the price that must be paid for the use of their railroad for an operation not part of the mission or normal business of the owner. Moreover, they contend, the stockholders should not have to assume or share in any such risk.

The approaches to liability and indemnification issues range from full and complete indemnification of the owning railroad regardless of cause to a no-fault arrangement where each operator assumes responsibility for its own employees, equipment, and passengers with some apportionment of third-party liability.

Freight/Passenger Agreements

Throughout the United States numerous methods have been devised to handle these issues, often dependent on the bargaining power of the parties, the local situation, and laws of the state in which the service is to be operated. For example, a freight railroad might be willing to lease or sell a line with relatively light traffic to a public agency to remove it from the tax rolls or to obtain the benefit of publicly financed capital improvements while retaining some passenger liability as part of the bargain. Sometimes the desire to eliminate passenger service deficits have made freight railroads more willing to assume some passenger liability in order to make a deal to transfer the deficits to a public agency. This was of some significance when such entities as Penn Central, Boston & Maine, and CSX had legal obligations to operate passenger service, but it is largely of historical interest today.

Most agreements between freight carriers and the sponsors of passenger service contain no-fault provisions for at least a portion of the liability. This arrangement avoids protracted argument and potential litigation over which entity *caused* a particular accident and establishes responsibility for defending lawsuits brought by third parties. The situation of a passenger and freight operator each seeking to blame the other before a jury in a lawsuit brought by an injured third party is undesirable and should be avoided if at all possible.

Federal Legislation

In 1997, Congress developed a partial solution to the conflicts related to liability insurance by enacting a provision for limitations on rail passenger transportation liability (see 49 U.S.C. § 28103). This provision mandates that the total allowable award to all rail passengers for all claims arising from a single accident is limited to $200 million. Punitive damages are restricted and any that might be allowed are to be included within the $200 million ceiling. The statute is broad and applies to all rail passenger services, even including excursion or museum train operators and owners of private rail cars. It mandates that Amtrak maintain self-insurance and/or insurance coverage of at least $200 million per accident or incident. This mandate applies only to Amtrak and does not extend to any other passenger rail operators. The statute also specifically authorizes passenger rail service operators to make agreements for the allocation of claims responsibility.

The referenced statute begins, "Notwithstanding any other statutory or common law or public policy . . . ," thereby preempting state tort laws that would enable a greater recovery. While it does not cover liability to railroad employees or to third parties (e.g., trespassers or persons injured in a grade crossing accident), the limitation on passenger liability should assist rail operators in the event of a disaster. However, plaintiffs in the 2008 head-on collision between a Metrolink passenger train and a Union Pacific freight train in Chatsworth, California, have argued that the liability ceiling is grossly inadequate. Metrolink and Connex Railroad (Metrolink's operator at the time) have offered the $200 million in full settlement of all passenger claims. The litigation is still pending, so the final outcome will not be known for some time.

Given that Amtrak is required to carry insurance coverage up to the maximum limitation, this together with Amtrak's rights to use rail lines based on avoidable costing, enhances the attractiveness of Amtrak as operator for a new service. An agency proposing to have service operated by an entity other than Amtrak cannot use the Amtrak insurance program and so must look to other options.

During late November 2015, Congress enacted the Fixing America's Surface Transportation (FAST) Act—a new multiyear transportation funding authorization act—this act was signed into law on December 4, 2015. Section 11415 of this statute increases the ceiling for damages arising from an Amtrak accident in Philadelphia on May 15, 2015, from $200 million to $295 million. The law also provides that the Secretary of Transportation is to adjust the $200 million cap for inflation from a base beginning date of December 2, 1997. Accordingly, aside from the May 2015 accident, the amount of the cap applicable at any point in time since that date is was unknown when *NCRRP Report 6* was completed. This is likely to create confusion in determining the amounts of insurance needed as well as the costs of coverage in the future as the exact claim ceiling will increase or decrease with inflation.

One possible way to obtain insurance coverage is for the passenger service to be included in the freight railroad's liability insurance program in situations where the freight railroad operates the passenger service. The freight railroad's premiums would be allocated based on an agreed-on formula. Such an arrangement was used in the original agreements among Penn Central, New York's Metropolitan Transportation Authority (MTA), and the State of Connecticut for operation of service on the New Haven Line and the subsequent agreement between MTA and Penn Central for Grand Central Terminal and the Harlem–Hudson Lines, and it has been used in other situations. However, the trend is for freight railroads to request separate insurance coverage for the two services.

The clearest way to resolve the insurance issue is for the passenger entity to obtain the amount of insurance requested by the owning railroad. Since that can be up to $200 million (or now higher) of coverage, this often is impossible. Short of that, the public agency can use whatever bargaining power it may have to negotiate a lower acceptable level of coverage, something that may be possible depending on the parties involved and the nature of the operation. Other insurance-type solutions are explored in the separate insurance discussion later.

State Legislation

Depending on the location and the state, legislation can provide a remedy. Some states have laws prohibiting indemnification of a private entity (e.g., a freight railroad) from negligence. Given that negligence usually is the basis for lawsuits arising from accidents, any private railroad faced with such a statute would be most reluctant to undertake a passenger operation. If the public is to obtain rail passenger service in a state having such a law, the legislature will have to consent to enact changes to enable the operation. Although it could be argued that such laws are preempted by 49 U.S.C. §28103, this is not clear given that that statute is intended to protect passenger rail sponsors by imposing a ceiling on liability and does not create new rights to be the basis of recovery by plaintiffs. Moreover, as noted below, Minnesota and Florida have not seen fit to rely on the argument that Section 28103 preempts state sovereign immunity laws.

The laws of some states give a partial "sovereign immunity" to operations by or for state agencies. New York, Minnesota, and Florida recently have enacted laws to create a more favorable climate for freight railroads involved with commuter train operations.

New York

New York's law governing the MTA, the LIRR, and the Metro-North Railroad provides an example of special conditions based on the concept of sovereign immunity. The statute provides that "as a condition to the consent of the state to such suits against the authority," the action must be commenced within 1 year and 90 days from the date of the accident (see New York Public Authorities Law §1276), a much shorter statute of limitations than the 3-year statute of limitations for tort claims that otherwise would be applicable (see NY CPLR §214).

Florida

To facilitate operation of the new SunRail commuter service in the Orlando area, Florida enacted a series of laws to authorize its DOT to enter into agreements to protect, defend, indemnify, and hold harmless the freight rail carrier from any liability cost and expense, including that of commuter rail passengers, regardless of whether the damage was caused by the negligence of the freight rail operator (see Florida Statutes § 341.302). A somewhat similar provision accords protection to Amtrak. The statute contains complex provisions as to which operations are covered and how the statute will apply under various scenarios (e.g., if there should be a collision between a commuter train and a freight train). The purchase of insurance and establishment of a self-insurance fund to cover the risks are authorized. The law covers two territories that the state purchased from CSX Transportation, namely (1) Miami to West Palm Beach, used for the Tri-Rail operation; and (2) the Sanford to Poinciana area used for the SunRail service. One paragraph provides that the assumption of liability or the purchase of insurance or establishment of self-insurance funds shall not constitute a waiver of any defense of sovereign immunity for torts and that such defense shall continue to be available for the state or any other entity operating on such a rail corridor (see Florida Statutes § 341.302[17]).

Minnesota

During 2013, the Minnesota Legislature enacted a law authorizing the State Commissioner of Transportation to enter into contracts with railroads for passenger service. It further provides:

> Notwithstanding any law to the contrary, a contract with a Class I railroad for any passenger rail service . . . may also provide for the allocation of financial responsibility, indemnification and the procurement of insurance for the parties for all types of claims or damages. (Minnesota Statutes § 174.636)

Although the immediate reason for the enactment of this statute was to cover the Northstar commuter rail service, the language would enable the state to enter into a contract with any Class I railroad to enable intercity passenger service in Minnesota.

Examination of Federal-Level Indemnification

A federal approach somewhat different from Section 21803 could be the enactment by Congress of a law similar to the Price-Anderson Act, which can limit the liability of nuclear power plant operators (see 42 USC § 2210[c]). Under certain conditions, the Nuclear Regulatory Commission is authorized to indemnify its licensees for public liability for nuclear accidents in excess of the required insurance coverage. The aggregate indemnity for all persons indemnified cannot exceed $500 million per incident.

A further complication is presented when there are allegations of gross negligence or willful misconduct by one of the parties. State laws differ, but courts have been reluctant to impose liability on public agencies or Amtrak when the misconduct of a freight railroad reaches the level of gross negligence.

This type of argument was presented in the litigation arising from the tragic collision between Amtrak and Conrail trains at Chase, Maryland, on January 4, 1987, which, along with the subsequent Chatsworth, California, accident, was one of the worst rail passenger accidents in modern history. Sixteen people were killed and more than 350 injured in that accident that occurred when three Conrail freight locomotives entered the path of a high-speed Amtrak passenger train. The Conrail crew had ignored numerous safety rules, decommissioned safety devices, ignored signals, and had recently used marijuana; indeed, the Conrail engineer had pled guilty to manslaughter by locomotive in the Maryland courts and had been sentenced to 5 years' imprisonment. Amtrak brought a declaratory judgment action against Conrail seeking a determination that Amtrak was not required to indemnify Conrail for the reckless, wanton, willful, or grossly negligent acts involved, nor for punitive damages.

After taking testimony regarding the history and drafting of the Amtrak-Conrail agreement, the U.S. District Court for the District of Columbia found that the parties did not manifest a clear intent to cover indemnification for accidents caused by gross negligence, recklessness, or wanton and willful misconduct, and accordingly that the language that otherwise would have required Amtrak to indemnify Conrail is unenforceable because of public policy (see *National R. R. Passenger Corp. v. Consolidated Rail Corp.,* 698 F.Supp. 951, 972 [D.D.C. 1988]).

Conrail appealed to the U.S. Court of Appeals for the DC Circuit, which set aside the declaratory judgment on the grounds that the dispute first should have been submitted to arbitration pursuant to the contract's arbitration clause that the lower court had declined to enforce (see *National Railroad Passenger Corporation v. Consolidated Rail Corporation,* 892 F.2d 1066 [DC Cir. 1990]). The matter later was settled with Conrail paying some $94 million. The lesson here is that if gross negligence is to be covered by an indemnification provision there must be clear and specific language to that effect.

In one of the proceedings involving Amtrak's institution of passenger rail service between Boston, Massachusetts, and Portland, Maine, the STB, citing the Conrail cases, held that Amtrak cannot be required to indemnify the owning freight railroad for its own gross negligence or willful or wanton misconduct as that would be contrary to public policy that should encourage safe railroad operations. The opinion also stated that the public policy against such indemnification is well grounded in our statutory framework and general insurance law precedent (see *Application of the National Railroad Passenger Corp. under 49 U.S.C. 24308(a)—Springfield Terminal Railway Company, Boston and Maine Corporation and Portland Terminal Company,* Finance Docket No. 33381 [STB served May 29, 1998]).

Insurance

Railroad insurance programs generally employ a relatively high self-insured retention (deductible) on the theory that low-level claims can be handled as operating costs but insurance coverage is needed for catastrophic-type accidents that could materially affect the entity. The matter of adequacy of coverage depends on the nature and extent of the operation (i.e., the risk involved). An agency having strong financial resources can afford a higher self-insured retention than a financially weaker agency. "First-dollar coverage" (i.e., with no self-insured retention) tends to be quite expensive but does offer the advantage of the insurance carrier's investigation, settlement, and defense services.

Railroad insurance programs are established with layers of coverage so as to minimize the risk to any insurance carrier or group. For example, a program not using first-dollar coverage could look like this:

- $0 to $5,000,000—Self-insured retention.
- $5,000,001 to $15,000,000—Commercial insurance market.
- $15,000,001 to $85,000,000—Coverage through its own insurance entity (i.e., a captive).
- $85,000,001 to $200,000,000—Lloyds Bank and commercial market in several layers.

A large operation could establish its own insurance "captive" to handle catastrophic risks. Smaller rail services could join together to establish a captive or pooling arrangement to handle their high limit needs. Historically, captives were based off shore (e.g., in Bermuda), but today they are permitted under the laws of some states.

Determination of the premiums for passenger rail transportation insurance is based on many factors and depends on the individual characteristics of the operation. These factors can include

- Frequency, speed, and other operating characteristics of train operations.
- Nature of other operations on the same trackage.
- Number of passengers handled daily, weekly, monthly, and yearly.
- Details of the physical plant, often verified by underwriters' inspection.
- Details of the railroad's safety program and employee training.
- Loss experience and claim reserves during the past years.
- "Layer" of coverage involved (i.e., the higher layers have less exposure because claims are unlikely to reach such levels).
- Trends of jury verdicts for accident cases in the area.
- Extent to which the sponsoring agency enjoys some type of "sovereign immunity."
- Federal or state laws authorizing or limiting punitive damages in tort cases.
- Number of highway-rail grade crossings and descriptions of the nature of traffic and crossing protection devices at each one.

Summary

Responsibility for liability, indemnification, and insurance are some of the most vexing problems where two types of rail services share the same trackage and facilities. Although these issues have prevented the establishment of some services, the problems usually are resolved by a no-fault type of agreement backed by agreed-on insurance coverage that can include a pooling arrangement and partial self-insurance. Congress has assisted in resolving this matter by limiting liability to all passengers arising out of one accident to a maximum $200 million. Likewise, some states have enacted laws to cover their individual situation and the rail passenger services they desire to support. There is no one-size-fits-all solution. Finally, if the subject of gross negligence is to be included within the purview of an indemnity, the language must be carefully drafted to specifically cover it and the indemnity must be permitted under the applicable state laws.

APPENDIX B

PRIIA 209 Cost Formula Transparency, Costing Granularity, and Related Issues

As described in several sections of the main guidebook text, the Passenger Rail Investment and Improvement Act of 2008 (PRIIA) included multiple mandates to improve planning, operation, and safety of intercity passenger rail services in the United States. PRIIA Section 209 specifically and subsequent implementation has mandated that sponsoring states or other sponsoring entities must reimburse Amtrak (or an alternate provider) for the full cost of their respective short-distance services. PRIIA Section 209 regulations also specifically allow states and other sponsors to unbundle various aspects of passenger rail service and contract with independent entities for specific services.

To help states reach agreement with Amtrak on costs to be charged if purchased from Amtrak, PRIIA Section 209 also mandated that an improved cost allocation model be developed and applied to help determine more accurate costs for sponsor reimbursement. The complexity of this costing formula, related issues, and the resultant implications for each of the states or sponsoring entities has led to substantial concern and potential dispute by several of the states in the initial years of application. This appendix presents some of the fundamental areas of dispute and creative solutions achieved by some of the sponsoring entities in their contracts with Amtrak.

Primary Findings

Grandfathered 403(b) States Are Among the Most Sensitive

Prior to the initial actual implementation of PRIIA Section 209 on October 1, 2013, several key states providing Amtrak-operated, state-sponsored service enjoyed a "grandfathered" status for their historically 403(b) services. As background, the original Rail Passenger Service Act (enabling Amtrak, the National Railroad Passenger Corporation) included a Section 403(b), which specified terms under which states or other government entities could contract with Amtrak and pay part of the avoidable loss in a cost-sharing arrangement. This percentage of avoidable loss defined the subsidy requirement for a particular state's service. Over the years until PRIIA 209, Amtrak had been allowed to determine specific state-by-state agreements on the percentage of coverage, with several states at least initially covering as little as 50%. Separately, PRIIA 209 mandated a consistent and uniform application of its new full-cost formula, so several states did not have to pay any ongoing operating subsidies for some existing intrastate service because these trains were historically considered elements of the basic national Amtrak system. However, several of these unique circumstances were offset by a quid-pro-quo in which these states made substantial capital investments in fixed facilities and/or rolling stock for these routes, comparable to or even greater than the equivalent 403(b) avoidable loss operating subsidy requirement.

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Examples of trains that states had previously enjoyed without any direct operating subsidy requirements are as follows:

- Many of New York State's New York City–Albany–Niagara Falls *Empire* service frequencies.
- The three Michigan Chicago–Detroit–Pontiac *Wolverine* service trains.
- Three of Illinois' Chicago–Springfield–St. Louis *Lincoln* service trains.

Because the new PRIIA Section 209 formula now clearly (and equitably) puts all short-distance trains (under 750 miles) into the financial responsibility of the sponsoring states, application of the formula places a greater incremental burden on those states that had enjoyed a "free ride" than the many new-start state corridors that always required a percentage copayment for operating losses. Two examples of services where the states/supporting agencies have a history of paying only partial costs are the Northern New England Passenger Rail Authority's (NNEPRA's) Boston–Portland–Brunswick *Downeaster* serving Massachusetts, New Hampshire, and Maine; and California's Capitol Corridor Joint Powers Authority (CCJPA) Sacramento–Oakland–San Francisco *Capitol Corridor* trains.

From multiple interviews and inferences, states facing the largest increase in annual subsidy requirements in the recent PRIIA implementation restructuring have been among the most sensitive, and frequently, most vocally concerned.

Instituting a Costing Formula Common to All State/Operating Entity Customers Is a Fundamentally Fair Principle, but Unintentionally Resulted in Winners and Losers

Most states would objectively agree that initiating a uniform, predetermined, unbiased costing formula for use by all states and other operating entities (e.g., joint powers authorities or multi-state entities) is a fair and equitable principle. Unfortunately, in practice, this concept has led to some states feeling they are "losers" in relative terms when compared to other states, which they perceive as "winners." For those states that had long-standing established Section 403(b)/state-sponsored service relationships with Amtrak, it was common practice to negotiate specific deals unique to that state/entity (some involving proprietary agreements) annually or biannually. States that operated a combination of historically national system and historically 403(b) services had similar annual (or occasionally multiyear) costing agreements. The new PRIIA formulaic cost assignment process announced in 2010 (and developed jointly by Amtrak, a working group of affected states, and the FRA) for full initial implementation on October 1, 2013, allows limited or no individual flexibility—there are no more special deals. Several of the states involved in the working group as well as the larger States for Passenger Rail Coalition were frustrated with the process leading to the first-year implementation and thought the initial agreement did not necessarily meet their individual best needs.

Use of an Allocation Model Based on Prior Cost to Forecast Future Cost When Anticipating a Significantly Changed Level of Service Raises Concerns

Both in the initial interview process and follow-up targeted synthesis discussions, a cost estimating topic that arose multiple times in various contexts was the use of the new Amtrak Performance Tracking (APT) Cost Allocation model to estimate future costs for service, especially in those cases where the state or purchasing entity was planning to adjust the service level in the upcoming year. Amtrak and the purchasing states recognize that, even though APT represents a clear improvement in allocation method over its predecessor Route Profitability System (RPS) and resultant improvement in cost accuracy, it is still a (prior) cost allocation model rather than

a (future) cost forecasting model. Several states believe their future financial needs planning could be better met by a specific model focused on forward-looking forecasting rather than back-looking allocation. This is of particular concern among states planning for frequency or larger service-level changes under consideration for the upcoming year.

Cost Categories with Broad Acceptance

Experience to date indicates a limited number of cost categories, especially among "direct costs," that receive broad general acceptance. Because key direct costs (e.g., fuel and power, train and engine [T&E] crew, onboard service [OBS] labor, and host railroad access fees) can at least be relatively simple and clearly historically assigned to routes and specific trains, these categories generate the least frustration or disagreement between Amtrak and state customers in cost contract negotiations.

The general sense of agreement is limited primarily to (relatively) stable, unchanging levels of service, where the forecast (anticipation) of future year's cost is based on the prior year's cost plus and unit-cost-based or known labor-agreement-escalation-based increase. As with the other cost categories where there is greater general debate, the states are not comfortable with Amtrak's ability to accurately forecast direct costs for substantial changes in levels of service (e.g., planned increase or decrease in frequency).

Cost Categories Generating Conflict

These contentious cost categories are mostly those based on unit-use allocation and cost outputs of Amtrak's relatively new APT cost allocation model. Some of the specific issues raised by interviewees about several of these cost categories are described below.

Shared-Station Costs

There are two fundamental concerns the interviewed states and purchasing entities expressed about their allocated amounts of shared-station costs. The first concern, applicable to stations served only by Amtrak trains, is the output variable (e.g., passenger trips) used to allocate and split costs between the subject state-sponsored trains in the state contract from other trains at that station, especially if some of them are basic-system long-distance trains that involve more costly use-per-person of station facilities (e.g., if checked baggage is used). The second concern, applicable primarily to large urban stations that serve non-Amtrak commuters, is the predetermined split of the overall total station cost between Amtrak-passenger-related and commuter-passenger-related use.

Amtrak believes (and states do not generally contest) that the recently introduced APT cost allocation model does a reasonably good job of distributing actual station costs to specific Amtrak trains using the station, including algorithms to differentiate use by short-distance and long-distance passengers. Conversely, the larger and contentious issue of cost distribution occurs at large, joint-use stations, among the most complex of which is New York's Penn Station (heavily used by Amtrak, New Jersey Transit [NJ Transit], and Long Island Railroad [LIRR] passengers). The gross total Amtrak cost for the station is predetermined through contractual agreements between Amtrak and the several commuter systems sharing use of the station. It is that (predetermined) total Amtrak dollar amount that is then used as input to APT, which then allocates the state-portion vs. the national-system portion. Affected states in this situation perceive that there may be issues in the larger (predetermined) split between commuter agencies and Amtrak rather than the APT split between long-distance intercity and state-sponsored, that could result in the states having to pay more than they believe to be an accurate and fair share.

Recognizing the complexity of the distribution formulas, and the observation that there is no clearly right or wrong answer, it is likely that the most satisfying result the states are likely to achieve will be through continued detailed interactive discussions and negotiation with Amtrak as the shared-station cost figure is developed for each annual (or longer term) PRIIA 209 operating contract.

Commissary/OBS Supplies Costs

With the few exceptions discussed elsewhere, most state-sponsored trains use Amtrak-provided food and beverage service and are charged for the commissary and OBS supply costs. For this category, there appears to be little argument among the parties over the relative allocation of cost to a particular train or service. The concern widely expressed in state interviews was the wish that Amtrak management could either find a way to reduce the overall total commissary/OBS supply cost, or conversely, improve the food/beverage product quality to help justify its high cost.

Marketing/Advertising/Sales Promotion Costs

Some states and purchasing entities, especially those that have been providing state-sponsored services for many years, have gradually developed their own successful and independent advertising and promotional programs for their trains. These can include locally printed and circulated expanded timetables, promotional flyers, and co-advertising with other entities. The perception at some of these states is that they should not have to additionally contribute (financially) to Amtrak's general marketing and awareness campaigns. Other states, including some of the newer and smaller scale operators, do not choose to do their own promotion and have no generic problem with the cost associated with marketing and sales promotion. In these states' case, the biggest concern is that Amtrak may not provide enough focus on their particular service to have a meaningful positive effect on ridership.

Reservation and Sales Office Call Center Costs

Akin to the observations on state concerns about shared-station costs, the primary issue of concern with the allocation of reservation and sales office (RSO) costs to states is that of proper split between (presumed simpler and shorter) calls related to short-distance, state-sponsored trains and (longer, more complicated) calls for overland/long-distance trains. Although some state-sponsored trains offer (slightly enhanced) business class cars, most of the services are a simple, one-class Point A to Point B ticket, with relatively simple, quick script of availability and fare, possibly ending with making a reservation. Conversely, RSO calls for long-distance trains can be complex, involving multiple choices of routing, types of onboard space (e.g., describing the attributes of different types of sleeping car rooms), day of week (for less-than-daily services), and so forth. Despite Amtrak's RSO call center time-use surveys, and resultant adjustments to the APT allocation, some of the states still think they are overcharged for this function.

Police Costs

Although this is a relatively small actual cost item, the topic is raised because of the varying comments received from various state sponsors during the interviews. Several operators of relatively lightly patronized rural trains along routes with minimal station facilities and little expectation of crime commented that they rarely (if ever) saw an Amtrak police officer and did not perceive any need for this service, and therefore did not think they should be charged. Conversely, other operators believed that they need and value any degree of security/protection they can procure and gladly pay for the provision of Amtrak police services.

General and Administrative/Overhead Costs

Treatment of overhead and general and administrative (G&A) costs in practically every allocation formula (historic or forecasting) is frequently an area of dispute and debate. In the context of being inherently contentious, the treatment and resultant cost in the Amtrak PRIIA 209 formula does not induce an undue amount of concern for most states. Notwithstanding, several states or contracting organizations indicated a strong desire for greater transparency and an annual recalculation of the respective percentages, in the expectation that more elements of Amtrak's overall G&A/overhead costs would be entirely "off books" to state-sponsored, short-distance trains.

Equipment Provision and Maintenance Costs

For the many states that have chosen Amtrak to provide rolling stock and motive power for their services (as opposed to purchasing or leasing their own), one of the most significant ongoing cost categories is the Provision of Equipment (Capital Recovery) and Maintenance category. In essence, this account becomes a quasi "rent," given that Amtrak owns the pool of rolling stock, and states effectively are required to compensate Amtrak for the prior purchase (capital depreciation) and the ongoing maintenance of equipment (MOE) cost. Proper costing of the depreciation and/or opportunity cost of state use of Amtrak rolling stock is a complex topic that would require separate economic analysis. A few states have noted that the combined equipment cost accounts for roughly half of their total PRIIA 209 payment to Amtrak.

The new APT cost allocation model in use attempts to be much more understandable to state customers and deploys direct assigned unit-use to allocate equipment cost to trains and routes. Many states are relatively comfortable with its transparency but not necessarily with the actual dollar outcome. Other states have difficulty with both the logic and the ultimate resultant cost. Amtrak is correct to point out that it provides a positive extra service by having a larger common equipment pool available, supported by this Provision of Equipment (Capital Recovery) and Maintenance charge. If an unexpected last-minute failure should be experienced by a small state-owned dedicated fleet, alternative equipment might not be available to be pressed into service, but (at least at the larger Amtrak facilities) Amtrak would be able to provide an emergency substitution. Similarly, Amtrak's pool would likely be better positioned to meet extra requirements for weekend or holiday peaks.

A Few States/Operating Entities Have Resolved Problems with a Particular Cost by Either No Longer Providing a Service Element or Procuring from Alternate Sources

As of the end of the first full year of PRIIA Section 209 "full-state-funding" service contracts, no state had substituted outright an alternate qualified provider for Amtrak for its basic operation. One state was close to confirming a change of basic provider as of the beginning of the second (fiscal) year, October 2014, but various issues postponed this implementation until sometime in 2015.

Conversely, at least a half-dozen states/contracting entities have chosen to seek an alternate provider for one or more specific cost categories, taking advantage of the unbundled procurement approach, or they have chosen to not offer (and hence not purchase) service for a select function.

Alternate Provision of Food and Beverage Service

In large part because the NNEPRA's *Downeaster* is a stand-alone service route (not directly connected to other Amtrak service) operated out of Boston's North Station, and a newly added

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state-sponsored train, when introduced in the early 2000s, it was able to avoid Amtrak commissary and OBS labor costs by directly purchasing service from an independent local provider. Consistent customer survey responses and general comments show that this has worked well for the NNEPRA, providing a somewhat more locally focused range of products, and at retail prices slightly lower than for comparable items in Amtrak-operated cafe cars. NNEPRA Management note that, although this is a negative concession (i.e., the NNEPRA must pay an incentive to the independent food and beverage (F&B) provider for this service), it still costs the agency less than a comparable service provided by Amtrak and arguably results in greater customer satisfaction.

Such a service, although hypothetically possible under the PRIIA Section 209 rules, would be difficult (if not impossible) to re-create on a route that had historically provided food and beverage service by Amtrak using Amtrak Service Workers Council (ASWC) unionized OBS employees. One attempt to reintroduce food service formerly provided by ASWC on Empire Service trains between New York and Albany almost a decade ago failed in less than 1 week. Amtrak attempted to deploy staff and supplies from a nationally well known, outside independent sandwich chain as vendor to provide the service, but ASWC opposition was so vocal and effective that the demonstration was abandoned.

Discontinuing Provision of F&B Service

For a few select very-short-distance routes, some states have chosen to not offer any onboard F&B service to reduce total subsidy requirement and avoid the commissary and OBS labor costs. Examples are the WisDOT–sponsored Milwaukee–Chicago *Hiawatha* service trains; the INDOT-sponsored Indianapolis–Chicago *Hoosier State* service (until the recently implemented INDOT-sponsored contract for private, independent provision of premium OBS); and New York State's New York–Albany *Empire* service trains. The shortest of the Michigan-sponsored trains operating Chicago to Grand Rapids had done the same for several years, but restored basic AmCafe service to improve customer satisfaction and provide consistency across state-sponsored Amtrak service.

Providing (Limited) F&B Service Using Vending Machines

Although wholly unsuccessfully when tried elsewhere at least twice in the past, the state of North Carolina appears to have found a way to provide reliable (if somewhat limited) F&B service on its Charlotte–Raleigh *Piedmont* service trains. Because of the limited menu options provided and the lack of direct labor, this service may be the lowest cost option of any non-zero F&B service.

Providing Independently Sourced Call Center Service

The CCJPA in California has uniquely (among contracting entities) chosen to provide its own call center service, using dedicated staff of the jointly administrated agency, Bay Area Rapid Transit (BART). This selection, in conjunction with the decision to keep all *Capitol Corridor* trains unreserved, has significantly reduced the CCJPA's cost by eliminating Amtrak-provided information and reservation services requiring Amtrak RSOs. Amtrak has observed that there is still some potential for confusion (CCJPA information has a different phone number than the standard Amtrak 800 number) and a small number of calls must be redirected (one way or the other) (e.g., if a CCJPA *Capitol Corridor* customer wants to connect to another Amtrak route).

States Purchasing Their Own Equipment

By procuring their own (purchased or leased) equipment, a few states have avoided the somewhat contentious quasi-rent Amtrak charges for use of its pooled equipment for state-sponsored

service. Among the most substantial and long-standing independent equipment arrangements is the State of Washington and State of Oregon joint ownership of dedicated Talgo Trains for service in the Eugene–Portland–Seattle–Vancouver *Cascades* service. The states have a long-term agreement with Talgo, including a full, high-standard, preventive maintenance program, allowing virtually all of the fleet to be available for revenue assignment at peak times. Although the first generation of these highly popular, European-styled, tilting trains required FRA waivers because of their lighter weight and buff strength, the most recent version is fully FRA compliant.

Another example of state-owned rolling stock, in this case also including motive power, is the NC DOT's dedicated fleet for the Charlotte–Raleigh *Carolinian* service. NCDOT purchased and then fully remanufactured to its own specifications a small, dedicated fleet of secondhand passenger coaches and locomotives. In doing so, it has controlled costs and also have been able to reflect their unique identity in a special paint scheme and customized interior configuration (including cafe cars with the above-discussed unique onboard F&B vending machines). There is also a recently implemented INDOT-sponsored contract for private, provision of rolling stock for the *Hoosier State* service.

The Recent Deterioration of On-Time Performance (OTP) of State-Sponsored Services Is a Growing Concern

States and sponsoring agencies have always been concerned about their relatively limited ability to influence and help improve the OTP of the services they purchase from Amtrak. Some have worked jointly with Amtrak and host operating freight railroads to identify and then fund worthwhile spot improvements to relieve bottlenecks and chokepoints. Some larger state programs have developed ongoing joint OTP analysis and oversight teams with Amtrak and respective host freight railroads to review performance and identify ways to address problems quickly, either through schedule adjustments or spot capital improvements.

Although states/contracting agencies had already been concerned by and involved in OTP management, there has been a significant recent increase in the need for proactive steps as unprecedented freight traffic growth has led to substantial deterioration in passenger train performance and timely arrivals. Furthermore, some of the states have noted that they now feel an even greater need to take action because they have a larger direct financial stake in the operation, given the full operating loss requirement imposed by PRIIA Section 209. The unrelated coincidence of significantly increased freight traffic/decreased passenger OTP and states newly assuming 100% of their services' operating losses has put extra pressure on rail managers to demonstrate proactive involvement to help solve the problems and find ways to improve their OTP.

Conclusions

The evolution of the annual/biannual PRIIA Section 209 contract negotiations between states and Amtrak (or potentially other providing operators) is a work in progress. The process for the second full year, which took effect October 1, 2014, although still contentious, was achieved somewhat more smoothly than the first year and the more recently concluded agreement taking effect October 1, 2015, resulted in even less contention. Amtrak is attempting to provide more transparent and detailed information to its state customers, while the states are becoming better prepared to ask more specific questions as they understand the process better.

Among the clearest and most universal messages from states and purchasing entities is the desire to understand Amtrak's APT more fully and to work with Amtrak to modify some specific allocation formulas to address specific concerns. States believe they would benefit from a new variable operating cost (and revenue) forecasting model for what-ifs and requested hypothetical

changes in level of service on specific state-sponsored routes. Notwithstanding, Amtrak can and does perform this analysis for specific (large) changes when requested by states, (e.g., for outright new routes or non-negligible increases/decreases in train frequency).

It is also possible that FRA, in its dual role of Amtrak oversight and co-negotiator in Amtrak/state contract partnerships, could independently commission development of new cost forecasting models, in much the same way as it contracted with the Volpe Center to develop the APT cost allocation model to replace the RPS for route accounting.

APPENDIX C

Robust Service Delivery: Building Resilient and Dependable Passenger Rail Service

Convincing Americans to leave their cars behind in favor of passenger service is a challenge in many parts of the United States. In some regions, an entire generation has grown up without ready access to high-quality, reliable train service. Convenient schedules, reasonable transit times, and comfortable equipment can each contribute to ridership growth, but service reliability is equally important in achieving ridership goals. This discussion outlines considerations and action items related to service resiliency for those charged with building competitive rail service.

Defining Resiliency in the Context of Passenger Rail Service

Rail service may be thrown off schedule for various reasons, some of which can be anticipated while others are impossible to foretell weeks or even days in advance:

- **Weather.** Heavy snow, ice, and rainfall may not only affect the rail network's physical structure, but may also affect availability of service staff and train operations personnel (e.g., personnel may be unable to access their on-duty locations). Rail operations are generally better able to cope with adverse winter weather conditions than other surface transportation modes, but this advantage goes unleveraged if requisite railway staff is missing. Degraded railway signaling functions may also cause train operations to ether cease or operate under far slower, more restrictive protocols.
- **Track Failure.** Inadequate train maintenance and inspection protocols, extreme weather conditions, acts of nature (e.g., earthquakes), or other unplanned events may cause track to fail, trains to derail, or service to be suspended over a given route. A particular challenge for rail operations (as compared to highway travel) is the lack of available alternative routes between given city pairs. Even where such routes exist, capacity and service considerations probably will severely limit opportunities to dispatch a passenger train over a different routing.
- **Rolling Stock Failure.** Faulty locomotives or passenger coaches may be set out for repair once a defect is discovered, (preferably) at the end of a given run or occasionally in the middle of a specific train trip. Passenger trips may be disrupted and service capacity is reduced until equipment is replaced or restored to service. Freight rail equipment failures also directly affect passenger service in shared-use corridors, given the limits of the track network.
- **Grade Crossing Incidents.** Collisions between trains and motor vehicles at railway grade crossings cause death and severe injury to hundreds of Americans each year. Beyond the direct human toll, such incidents inflict a psychological burden on railway operating personnel and affect service on trains using the line in question. Railway trespasser fatalities, which continue to climb even as grade crossing motor vehicle fatalities have declined, are a growing area of concern. The service impacts for grade crossing and trespasser incidents are similar, given the needs for emergency personnel, site evaluation, and investigative reconnaissance.

A resilient rail operations system that can respond quickly and effectively to the items noted above will be better positioned to provide desired service at times of unusual demand (e.g., for sporting events and festivals) and to fill a critical role in emergency transport (e.g., evacuations) where the same may be wanted as an element of civil defense or emergency management strategy.

Planning a Resilient Service

Service resiliency begins with an appreciation by rail service sponsors that robust scheduling and the ability to recover from unplanned events requires advance consideration and support of necessary resources. Extra assets devoted to such use come at a cost. It is the role of rail management and public policymakers to find the appropriate balance of efficient use of scarce resources while meeting the service standards demanded by patrons and the public at large. The following are necessary components of planning for resilient service:

- **Host Carrier Protocols.** Most startup passenger rail services involve the use of shared rights of way and trackage with freight rail operators. The relationship and protocols that govern the day-to-day interface between the passenger operations and the host freight carrier are critical to rapid service recovery when the rail network, for whatever reason, is under duress. Contingency plans that carefully outline the responsibilities of each party and the technical standards that define emergency conditions are essential. As infrastructure partners, both the passenger service sponsor and the host carrier should expect to contribute additional resources in support of restoring service to normal conditions.
- **Special Service Trains.** Passenger service sponsors may seek to run extra trains in response to festivals, sporting events, or seasonal travel patterns. The easiest answer for any host carrier representative when approached for permission to operate a special movement is no. Defining future potential requests for such operations in advance can help the host carrier assess the feasibility of such a request or to suggest alternatives. Such advance preparation improves the likelihood of receiving approval for the special train.
- **Capacity Planning.** *NCHRP Report 773* provides a broad discussion of the major elements of rail capacity planning as well as elements that may be considered in planning a new service. Testing the reaction of the service network to different types of disruption, through a service model, can help to geographically isolate areas of vulnerability and suggest mitigation strategies. Corridor passenger operations, for example, often benefit from the construction of specially assigned staging tracks just upstream from congested terminal areas as a means of quickly making full use of corridor capacity to move traffic as soon as such capacity becomes available.
- **Infrastructure and Capital Programs.** *NCHRP Report 657* includes a case-study description of the capital renewal and infrastructure maintenance practices put in place for California's *Capitol Corridor* to make service more reliable. Service is made more robust through application of three key principles:
  - *Diurnal scheduling.* Most routine trackwork takes place during overnight hours so as not to disrupt daily passenger operations.
  - *Load leveling.* Capital renewals and change-out of major track components are planned and implemented at approximately the same rate from year to year, avoiding the far more onerous service impacts that would accompany a more traditional, 7-year track renewal approach.
  - *Engineering cushion.* Track is maintained to a higher engineering specification than would be strictly required for the volume and speed of trains. Due to this planned cushion, most track defects, as discovered, are sufficiently small to avoid the need for temporary speed restrictions. Off-specification conditions may be corrected as part of regular overnight work programs without affecting scheduling integrity. A robust fixed-plant infrastructure directly contributes to a robust and resilient train operation.

- **Rolling Stock Considerations and Strategies.** Few passenger rail sponsors can maintain large reserve rolling stock fleets. Optimally, reserve cars should be stored indoors to minimize weather-related deterioration and the possibility of defacement or tampering. Restoring cars to service after a long period of dormancy requires thorough inspection and testing. Some agencies have succeeded in keeping some reserve cars on hand using the following strategies:
  - *Strategic storage of old equipment.* Purchases of new rolling stock to replace those in existing service mean that storage or purposeful strategic mothballing of the older equipment is possible. The value of this reserve capacity must be weighed against the net liquidation proceeds of disposing of the old cars to third-party purchasers. Passenger car safety standards are continually evolving, and old equipment may not meet contemporary standards when the old cars are considered for a return to service.
  - *Sharing of reserve equipment.* If geography permits, sharing or pooling of reserve rolling stock capacity with other rail operators may provide a cost-effective approach to meeting this need.
  - *Leasing equipment from third parties.* Passenger cars may be leased from third-party suppliers. The limited nature of rail operations in many regions of the United States has not encouraged the development of a robust leasing industry, but this situation may improve as more rail service is developed.
- **Formal Contingency Plans.** Effective response to emergency or unusual demand circumstances is not a matter of chance. The time and energy invested in developing formal, documented protocol to be triggered in such circumstances, particularly as between host carriers and passenger service sponsors, are resources well spent. Although the content of such plans may vary, they should at minimum incorporate the following key elements:
  - Technical definitions and responsibilities for triggering the plan.
  - Names and backup contact information for those charged with managing emergency operations.
  - Coordination of emergency response providers.
  - Communications responsibilities and roles, particularly regarding the press and the general public audience. Specific procedures for content development and signoff by stakeholders. (Conflicting messages to the press and public can derail a partnership quickly.)
  - Commitments for train dispatch priorities and tailoring of service levels to respect the needs of all stakeholders.
  - Payment provisions for work undertaken beyond the base contract.

Managing Resiliency

Ensuring service resiliency is an ongoing process, one that relies both on regular reviews of routine performance and thoughtful post-audits of service response to unusual circumstances. Emergency service plans and protocols should be routinely examined and either reconfirmed or adjusted as circumstances change. Difficult circumstances place everyone under stress; planning the appropriate responses in advance (or at least defining how such responses will be determined) mitigates stress at the time of acute need.

APPENDIX D

Performance Measurement and Quality Assurance Techniques

This appendix describes original research performed by the NCRRP 03-01 research team on performance measurement and quality assurance techniques for intercity passenger rail service and development activities. This appendix includes the following specific topic areas:

- Overview of the performance-based transportation planning process.
- Performance measurement applications for statewide planning activities for intercity passenger rail service and development.
- Performance measurement applications for intercity corridor planning activities for intercity passenger rail service and development.
- Quality control/quality assurance tools and techniques for the ongoing management of existing intercity passenger rail services.
- Recommended performance management strategy for an intercity passenger rail program.

Performance-based planning and management techniques can be applied at any point along the spectrum of activities associated with intercity passenger rail service and development. Examples of performance measurement used for intercity passenger rail service and development activities in the United States are presented in this appendix. Benefits of using a performance-based process are also presented throughout as applicable.

Not covered in this appendix are the performance metrics and measurement issues for agreements between intercity passenger rail operators and the host railroads that own the infrastructure over which most U.S. passenger rail services operate. Readers interested in these topics are referred to *NCHRP Report 657: Guidebook for Implementing Passenger Rail Service on Shared Passenger and Freight Corridors* and *NCHRP Report 773: Capacity Modeling Guidebook for Shared-Use Passenger and Freight Rail Operations* for a detailed discussion of strategies for developing performance metrics for host railroad agreements in shared-use corridor operations.

Performance-Based Transportation Planning

In recent decades, many transportation agencies have adopted a performance-based strategy for developing and supporting decisions related to transportation planning. This section summarizes the performance-based transportation planning process and potential applications of performance-based practices in intercity passenger rail service and development activities. The U.S. FHWA *Performance-Based Planning and Programming Guidebook* (FHWA 2013) provides guidance to transportation agencies on implementing a performance-based transportation planning process.

Overview of Performance-Based Transportation Planning Process

FHWA defines performance management as a strategic approach that uses performance data to support decisions to help achieve desired performance outcomes (FHWA 2013). In the context of transportation planning, a performance-based process refers to the application of performance management techniques within the transportation planning and programming process to achieve desired performance outcomes for the transportation system. Figure D-1 shows a framework for a performance-based planning process.

Key elements of a performance-based planning process and the broad questions considered in each element include the following:

- Strategic Direction—Where do we want to go?
- Planning Analysis—How are we going to get there?
- Programming—What will it take to achieve the vision?
- Implementation and Evaluation—How did we do?

Developing a strategic direction involves setting a vision for the transportation system element under study and developing goals and objectives to support that vision. A goal is a broad statement that describes a desired end state, while an objective is a specific, measurable statement that supports the achievement of a goal. A planning analysis is undertaken to identify performance trends and targets for each performance measure and to develop a list of investment priorities based on the established strategic directions. A target is a specific level of performance desired to be achieved within a certain timeframe. Programming involves selecting specific investments to include in a formal transportation plan, such as a state rail plan. During the implementation and evaluation phase, performance data are monitored and analyzed to determine the progress toward each performance target that was expected to be influenced by the specific investments. Reporting of the outcomes is also an important task.

FHWA reports the following benefits of using a performance-based approach to transportation planning and decision making (FHWA 2013):

- Improved investment decision making
- Improved return on investments and resource allocation

Figure D-1. Performance-based planning process framework (FHWA 2013).

- Improved system performance
- Increased accountability and transparency
- Demonstrated link between funding and performance.

Applications for Intercity Passenger Rail Service and Development

A performance-based process for planning and decision making for transportation has been established for other modes since the early 1990s and reinforced with numerous provisions for performance-based planning found in the 2012 surface transportation bill, Moving Ahead for Progress in the 21st Century (MAP-21) (FRA 2013). As support for intercity passenger rail service and development increases, state DOTs and other public agencies supporting rail services must consider how to prioritize investments and choose projects that support a shared vision for passenger rail service. Additionally, decision making for investments involving the use of taxpayer funds should be transparent, and a clear link between the use of public resources and progress toward a shared vision for passenger rail service should be demonstrated. A performance-based planning process as described in the previous section can support a wide range of activities associated with planning and decision making for intercity passenger rail service and development, including the following:

- **Statewide Rail Planning.** A performance-based approach to statewide planning for intercity passenger rail service can support the development of an SRP document incorporating a vision for rail service in the state, a performance-based evaluation of rail service, and a program of projects to achieve the stated vision. Some states have established performance targets and data reporting mechanisms independent of the state rail plan. Finally, states may use a performance-based approach to prioritize intercity corridors for passenger rail development.
- **Rail Corridor Planning.** Generally, a broad range of performance measures related to the financial, operational, and service quality of existing intercity passenger rail routes is regularly available from Amtrak (or another service operator). These metrics can be used for corridor-specific planning and decision-making purposes, or to report information about route performance to the general public. Additionally, some states conduct passenger surveys at regular intervals to gather information about passenger characteristics, satisfaction, and preferences. Such surveys have been helpful in supporting planning and development activities for rail services.
- **Ongoing Service Management.** With respect to daily management of intercity passenger rail services, numerous metrics are available on the performance of the rail service from the perspective of the customer. Additionally, some states have adopted innovative approaches for quality assessment of passenger rail services. These measures and approaches can be used for maintaining accountability for service operators and corrective actions for deficiencies in the service delivery.

Performance Measurement for Statewide Rail Planning

At the statewide level, a performance-based planning process can be used to support tasks including developing SRP documents, goal-setting and reporting of performance data for passenger rail service in a state, and decision making for corridor investment strategies. Various statewide planning activities for intercity passenger rail could benefit from a performance-based approach. One of the key benefits of incorporating a performance-based planning process in completing an SRP is that the process allows for all stakeholders to provide input on the vision, goals, and objectives for the state's railroad system, including intercity passenger rail

services operating in the state. The performance evaluation requirements for SRPs offers states the opportunity to (1) undertake a comprehensive and detailed evaluation of passenger rail services in the state and (2) link the performance of the state's passenger rail system to the established goals and objectives. Linking a passenger rail development strategy with performance targets established in an SRP can benefit a state rail program by supporting improved decision making and more efficient allocation of resources. Performance evaluation can be used by states to establish performance targets for intercity passenger rail services operating in the state or track progress toward already-established performance targets.

Additionally, the evaluation can assess the contribution of passenger rail toward meeting statewide performance objectives. Making performance data available to the public is also a key element of a performance-based approach to support transparency and accountability. Several options for reporting performance data are discussed in the following subsections. A performance-based approach can also be used to conduct a high-level analysis of statewide intercity corridors to determine which corridor(s) should be targeted for additional investment in passenger rail. The following section describes performance-based applications for statewide intercity passenger rail planning activities.

Performance Analysis in State Rail Plan Documents

The Passenger Rail Investment and Improvement Act of 2008 (PRIIA) established a national policy and planning framework for intercity passenger rail service and development. Section 303 of PRIIA requires that states develop SRPs to establish a statewide rail policy and address a broad range of issues related to freight and passenger railroad services in the state. The PRIIA requirements for SRPs direct that states should complete a performance evaluation of passenger rail services operating in the state, including possible improvements to those services and a description of strategies to achieve those improvements (FRA 2013). The performance evaluation should include all passenger rail services operating in the state, including interstate and intrastate services. As part of the performance evaluation, states have incorporated basic passenger rail performance measures such as ridership, revenue, on-time performance, and delay metrics.

PRIIA Section 207 Performance Metrics

Section 207 of the PRIIA legislation required FRA and Amtrak to jointly develop performance metrics and minimum standards for measuring the performance and service quality of intercity passenger train operations. On May 12, 2010, FRA and Amtrak jointly issued *Final Metrics and Standards under Section 207 of the Passenger Rail Investment and Improvement Act of 2008* to comply with the Section 207 requirements (FRA 2010). Section 207 outlined several required metrics and also provided FRA and Amtrak with the option to add new measures as necessary. The final metrics were jointly developed by FRA and Amtrak after extensive consultation with the STB, rail carriers, states, Amtrak employees, labor groups, and rail passenger organizations. The metrics include specific measures associated with the financial performance of rail services, on-time performance, train delays, service quality, and public benefits. The FRA *State Rail Plan Guidance* notes that the performance evaluation requirements for SRP development should, at a minimum, use the PRIIA Section 207 metrics as part of the evaluation (FRA 2013). States that have completed SRPs since the release of the PRIIA Section 207 metrics have incorporated the metrics into the SRP performance evaluation. Additional details on the PRIIA Section 207 performance metrics and quarterly reports from FRA and Amtrak on the performance of Amtrak routes are available from the FRA website (FRA 2010).

Other Performance Metrics in SRPs

Some states may have additional specific requirements for performance evaluation in the SRP. For example, the *California State Rail Plan* notes that the California State Government Code Section 14036 requires a performance evaluation of state-supported passenger rail routes. The statute outlines specific content requirements for the SRP and lists specific analysis requirements for revenue-related performance measures, expenses, ridership, and fare policies of the state-sponsored intercity passenger rail routes and feeder bus services. Additional details can be obtained from the *California State Rail Plan,* Section 5.3 (AECOM 2013).

Statewide Performance Targets and Reporting

One common application of a performance-based transportation planning process at the statewide level is developing specific goals, objectives, and performance targets for the state's transportation system. Some states have used a performance-based approach to develop performance measures and performance targets for intercity passenger rail as a component of the state's transportation system. This section presents three examples of states that have used performance measures for intercity passenger rail as part of a statewide performance reporting framework.

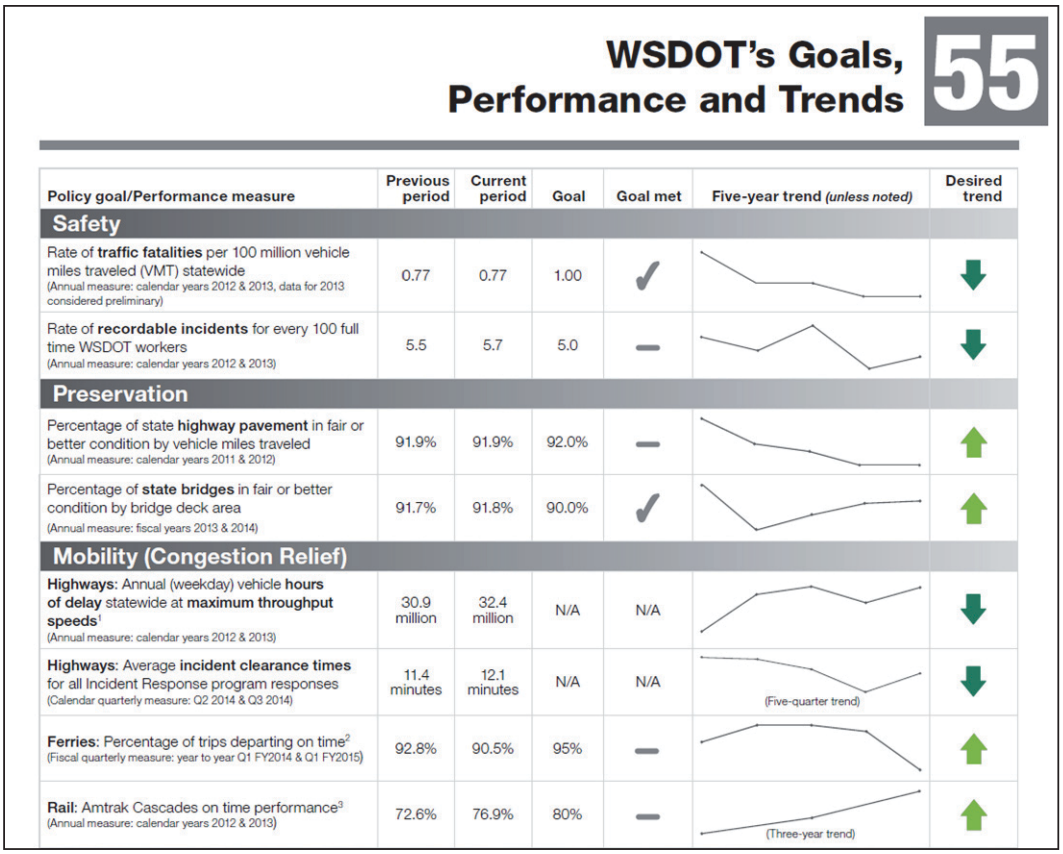
Washington State DOT (WSDOT) Gray Notebook

Since 2001, WSDOT has published a quarterly performance report, *The Gray Notebook. The Gray Notebook* is a nationally recognized performance reporting mechanism used by WSDOT to maintain accountability and transparency and provide updates to the public on key initiatives in the state (WSDOT n.d.). *The Gray Notebook* reports several performance statistics and provides quarterly updates for the Amtrak Cascades route, a state-supported intercity passenger rail corridor between Seattle, Washington, and Portland, Oregon, with extensions to Vancouver, British Columbia, and Eugene, Oregon. Figure D-2 depicts an excerpt from the November 2014 edition of *The Gray Notebook* showing the performance trends and targets for the on-time performance of the Amtrak Cascades (WSDOT 2014). The summary report shows the performance measure for the previous and current reporting periods as well as the goal (80% on-time performance, in this example). An indication of whether the goal has been met, the 5-year performance trend, and the desired trend are also given graphically, rather than numerically, for ease of understanding. WSDOT uses the on-time performance metric as an indicator of how passenger rail supports mobility and congestion relief in the state.

Michigan DOT (MDOT) Systems Performance Measures Report

MDOT publishes a system performance measures report to provide data on the condition and performance of Michigan's publicly owned transportation system. The report was first published as a web-based interactive report in 2007 and is updated at least twice annually. MDOT clarifies that publicly owned refers to assets owned, maintained, or financed (in whole or in part) by MDOT. MDOT's involvement with intercity passenger rail includes financing the operation of three Amtrak routes (Wolverine, Blue Water, and Pere Marquette) and recent acquisition of a portion of the rail corridor between Kalamazoo and Dearborn along the Chicago–Detroit corridor. MDOT's "2014 System Performance Measures Report" incorporates goals for intercity passenger rail service in the state and associated performance measures (MDOT 2014).

MDOT reports that the goal for passenger rail service in the state is to "preserve existing intercity passenger rail transportation services" and provides the number of daily train miles and total annual ridership as two measures to evaluate progress toward this goal. For total annual ridership, the performance target is to maintain ridership trends on Michigan's state-supported



WSDOT's Goals, Performance and Trends 55

Policy goal/Performance measure	Previous period	Current period	Goal	Goal met	Five-year trend *(unless noted)*	Desired trend
Safety						
Rate of **traffic fatalities** per 100 million vehicle miles traveled (VMT) statewide (Annual measure: calendar years 2012 & 2013, data for 2013 considered preliminary)	0.77	0.77	1.00	✓		↓
Rate of **recordable incidents** for every 100 full time WSDOT workers (Annual measure: calendar years 2012 & 2013)	5.5	5.7	5.0	–		↓
Preservation						
Percentage of state **highway pavement** in fair or better condition by vehicle miles traveled (Annual measure: calendar years 2011 & 2012)	91.9%	91.9%	92.0%	–		↑
Percentage of **state bridges** in fair or better condition by bridge deck area (Annual measure: fiscal years 2013 & 2014)	91.7%	91.8%	90.0%	✓		↑
Mobility (Congestion Relief)						
Highways: Annual (weekday) vehicle **hours of delay** statewide at **maximum throughput speeds**[1] (Annual measure: calendar years 2012 & 2013)	30.9 million	32.4 million	N/A	N/A		↓
Highways: Average **incident clearance times** for all Incident Response program responses (Calendar quarterly measure: Q2 2014 & Q3 2014)	11.4 minutes	12.1 minutes	N/A	N/A	(Five-quarter trend)	↓
Ferries: Percentage of trips departing on time[2] (Fiscal quarterly measure: year to year Q1 FY2014 & Q1 FY2015)	92.8%	90.5%	95%	–		↑
Rail: Amtrak Cascades on time performance[3] (Annual measure: calendar years 2012 & 2013)	72.6%	76.9%	80%	–	(Three-year trend)	↑

Figure D-2. Excerpt from WSDOT's* The Gray Notebook *performance report, November 2014.

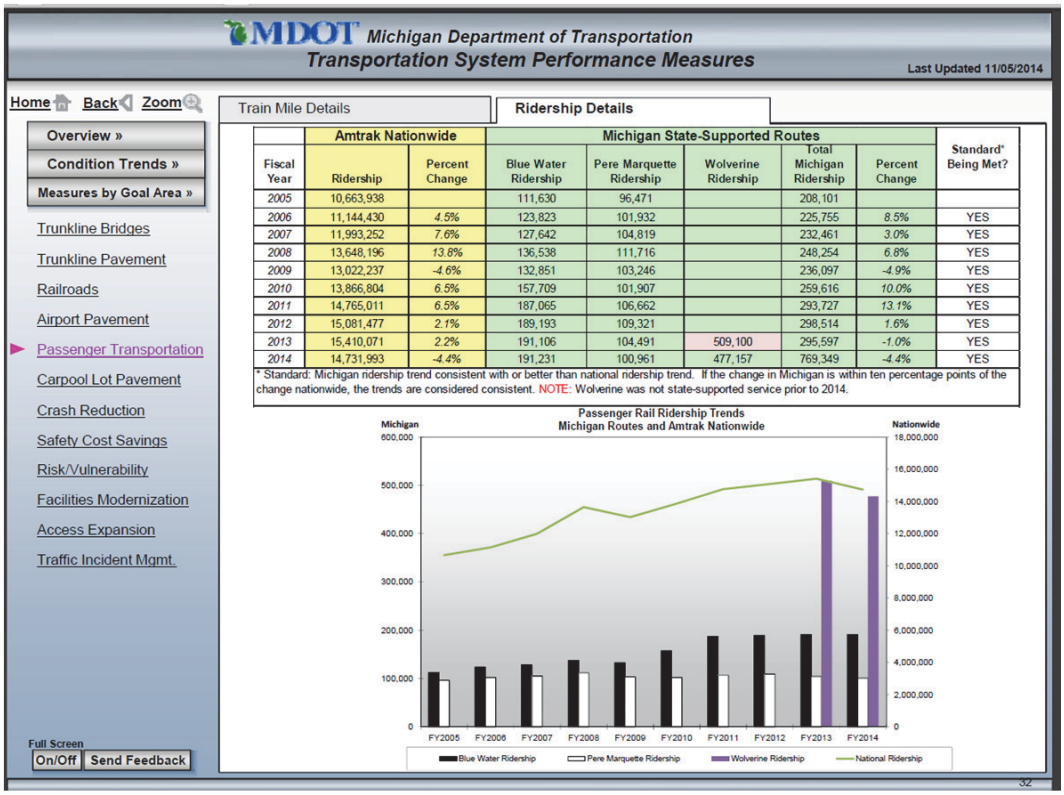
trains consistent with national ridership trends, defined as within 10% of national ridership trends. MDOT reports progress toward this goal as depicted in Figure D-3.

Missouri DOT (MoDOT) Tracker

MoDOT uses a tool known as the MoDOT Tracker to report performance of the agency and assess progress toward service delivery. The MoDOT Tracker is built around seven tangible results statements developed by the agency, describing the outcomes that the public expects to see from MoDOT activities (MoDOT 2015). Intercity passenger rail performance is tracked under the tangible result, "Operate a Reliable and Convenient Transportation System," and the specific indicator of use and connectivity of modes of transportation including aviation, rail, ferries, and urban transit. The purpose of the measure is to track the passenger use of modes other than highways in Missouri. For intercity passenger rail, total ridership and ridership by quarter for the St. Louis–Kansas City *Missouri River Runner* route is tracked. Figure D-4 shows an excerpt from the October 2014 MoDOT Tracker performance report of intercity rail passengers (MoDOT 2014).

Performance Measurement for Rail Corridor Development

In states where there is no or limited existing intercity passenger rail service, an important task in developing a statewide intercity passenger rail program is the selection of intercity corridors for passenger rail investments. In general, this process involves analyzing major



MDOT Michigan Department of Transportation
Transportation System Performance Measures
Last Updated 11/05/2014

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Trunkline Bridges
Trunkline Pavement
Railroads
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Passenger Transportation
Carpool Lot Pavement
Crash Reduction
Safety Cost Savings
Risk/Vulnerability
Facilities Modernization
Access Expansion
Traffic Incident Mgmt.

Full Screen On/Off Send Feedback

Train Mile Details | Ridership Details

Fiscal Year	Amtrak Nationwide Ridership	Amtrak Nationwide Percent Change	Michigan State-Supported Routes Blue Water Ridership	Pere Marquette Ridership	Wolverine Ridership	Total Michigan Ridership	Percent Change	Standard* Being Met?
2005	10,663,938		111,630	96,471		208,101		
2006	11,144,430	4.5%	123,823	101,932		225,755	8.5%	YES
2007	11,993,252	7.6%	127,642	104,819		232,461	3.0%	YES
2008	13,648,196	13.8%	136,538	111,716		248,254	6.8%	YES
2009	13,022,237	-4.6%	132,851	103,246		236,097	-4.9%	YES
2010	13,866,804	6.5%	157,709	101,907		259,616	10.0%	YES
2011	14,765,011	6.5%	187,065	106,662		293,727	13.1%	YES
2012	15,081,477	2.1%	189,193	109,321		298,514	1.6%	YES
2013	15,410,071	2.2%	191,106	104,491	509,100	295,597	-1.0%	YES
2014	14,731,993	-4.4%	191,231	100,961	477,157	769,349	-4.4%	YES

* Standard: Michigan ridership trend consistent with or better than national ridership trend. If the change in Michigan is within ten percentage points of the change nationwide, the trends are considered consistent. NOTE: Wolverine was not state-supported service prior to 2014.

Passenger Rail Ridership Trends
Michigan Routes and Amtrak Nationwide

Michigan: 600,000 / 500,000 / 400,000 / 300,000 / 200,000 / 100,000 / 0
Nationwide: 18,000,000 / 16,000,000 / 14,000,000 / 12,000,000 / 10,000,000 / 8,000,000 / 6,000,000 / 4,000,000 / 2,000,000 / 0

FY2005 FY2006 FY2007 FY2008 FY2009 FY2010 FY2011 FY2012 FY2013 FY2014

Blue Water Ridership | Pere Marquette Ridership | Wolverine Ridership | National Ridership

32

Figure D-3. Excerpt from MDOT "2014 System Performance Measures Report".

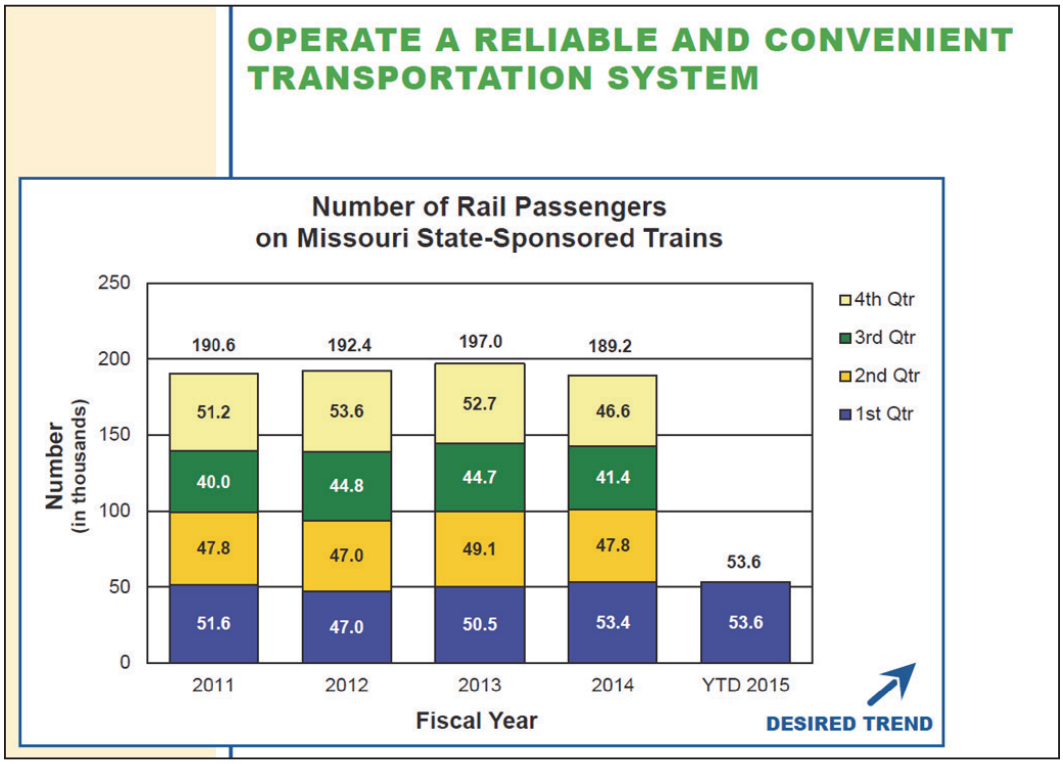

Figure D-4. Excerpt from MoDOT Tracker report, October 2014.

D-8 Guidebook for Intercity Passenger Rail Service and Development

statewide travel corridors using high-level screening and prioritizing techniques. Such analysis is typically supported by broad performance measures selected to assist with identifying corridors where implementing intercity passenger rail may support broader statewide goals for mobility and/or ease of implementation. This section discusses two examples of the use of performance measures in the screening and prioritizing process for intercity passenger rail corridors on a statewide basis.

Minnesota

As part of the *2010* "Minnesota Comprehensive Statewide Freight and Passenger Rail Plan," the Minnesota Department of Transportation (MnDOT) conducted a performance assessment of intercity corridors around the state to determine the needs and focus areas for passenger rail projects (MnDOT 2010). With consultant support, MnDOT developed a comprehensive list of performance measures for passenger rail corridor evaluation, from which a smaller list of measures was selected for use in the rail plan performance assessment (Cambridge Systematics Inc. 2009). As part of the performance assessment, 11 distinct intercity corridors were evaluated for potential for intercity passenger rail service. Figure D-5 shows the performance metrics MnDOT used in developing its passenger corridors performance assessment. The measures reported reflect the performance of intercity passenger rail toward several broad categories of performance for the rail system, overall connectivity, impact on the environment, and financial performance. Both quantitative and qualitative measures were used.

The performance assessment reported the estimated performance levels of each of the 11 corridors with respect to the established criteria in tabular format. MnDOT also reported the results of the performance assessment in graphical format using three metrics: capital cost, ridership, and farebox recovery percentage. Figure D-6 is a graph of the performance assessment for the base scenario as defined by MnDOT. Graphs of performance for three indicators of success reveal clusters of intercity corridors that perform similarly on the assessment. In the MnDOT example, the two corridors to Chicago are expensive to implement but generate significant ridership and farebox recovery. The corridor to St. Cloud is relatively lower cost and could generate strong ridership and farebox returns. The two corridors to Duluth and Rochester are expensive to implement but provide good ridership, albeit with limited farebox recovery. The remaining corridors in the bottom left of the chart are relatively inexpensive but also do not generate substantial ridership and financial performance.

Category	Measure
System Performance	**Ridership.** Total ridership by corridor and scenario (Vision Phase I, Phase II, and Passenger build-out).
	System efficiency. Average riders per train.
System Condition	*Impacts cost estimate, not directly considered in performance analysis.*
Connectivity and Accessibility	**System accessibility.** Total number and percent of Minnesota residents outside of the Twin City metro area with access to the rail system.
Safety and Security	*Not evaluated for passenger investments.*
Environmental	**Environmental impact.** Qualitative assessment of the impact of new track or right-of-way on the environment.
Financial/Economic	**Cost.** Cost of implementing each scenario.
	Cost per rider. Total cost per passenger (over a 30-year period).
	Qualitative cost-effectiveness. Summary of overall benefits achieved by scenario relative to total cost.

Figure D-5. Corridor performance assessment variables, 2010 MnDOT state rail plan.

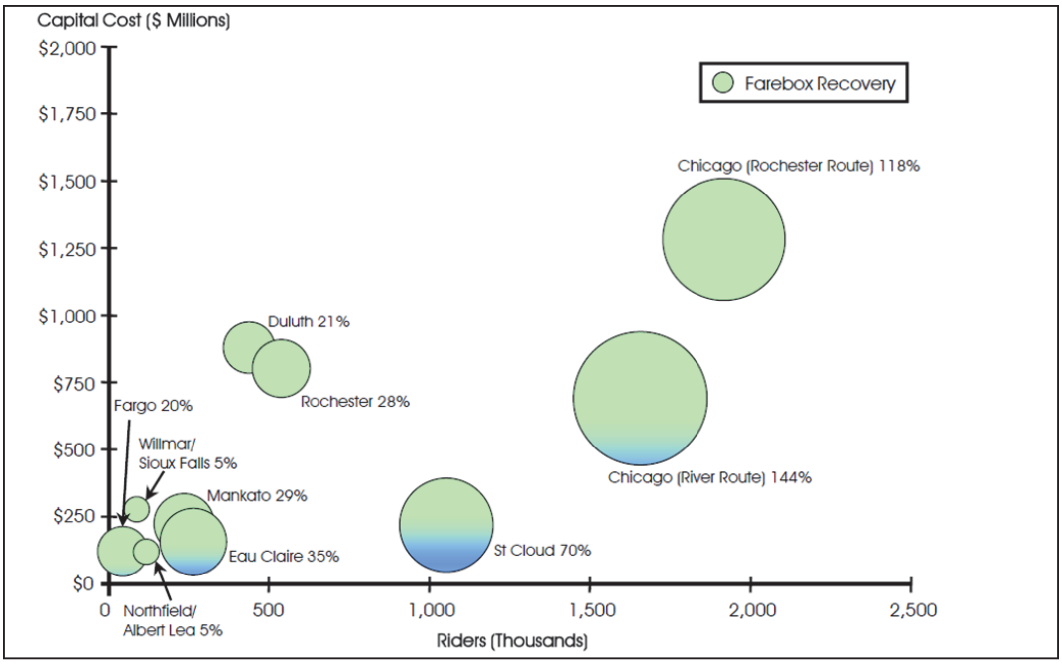

Figure D-6. Graphical display of performance assessment, 2010 MnDOT state rail plan.

Texas (TxDOT)

TxDOT sponsored a research study to examine the potential development of an intercity rail or express bus passenger transit system in the state. The study was conducted by researchers at the Texas Transportation Institute (TTI) through the TxDOT annual statewide research program (Morgan et al. 2010). The project identified 18 intercity travel corridors across the state and developed a performance-based ranking analysis to prioritize the corridors in terms of suitability for further development of passenger rail or express bus service. Researchers developed metrics incorporating corridor-level measures of population, potential intercity travel demand, and intercity travel capacity.

Table D-1 lists each criterion used in the Texas corridors evaluation. The criteria listed were analyzed using a weighted sum analysis, and an overall score for each of the 18 corridors was

Table D-1. Evaluation criteria used in TxDOT intercity corridors prioritization study.

Category	Criteria
Population & Demographics (P)	Number of core-based statistical areas (CBSAs) along corridor.
	Total population of CBSA counties along corridor, 2000.
	Growth in total population of CBSA counties along corridor, 2000–2040.
	Total population per mile of the corridor, 2000.
	Percent of total corridor population age 65 and older, 2040.
	Total employees, 2005.
	Total enrollment at public or private universities along corridor, Fall 2006.
Intercity Travel Demand (D)	Average corridor AADT, 2006.
	Percent annual growth in average corridor AADT, 1997–2006.
	Air passenger travel between corridor airports, 2006.
	Percent annual growth in air travel between corridor airports, 1996–2006.
Intercity Travel Capacity (C)	Average volume-capacity ratio on subject highways in corridor, 2002
	Average percent trucks on subject highways in corridor, 2002.
	Load factor on corridor flights, weighted by boarding passengers, 2006.
	Average number of corridor flights per day, 2006.

calculated, allowing for prioritization of corridors for further analysis. TxDOT used the results from this study to justify the need for additional planning funds for HSR development studies in the highest priority corridors and was awarded more than $20 million from the FRA for planning, environmental, and preliminary engineering activities (FRA 2010).

Performance Measurement for Ongoing Service Management

On a broader statewide or regional level, a performance-based approach to planning activities for intercity passenger rail service and development can be useful for creating SRPs and other high-level analyses of how intercity passenger rail fits into the picture for a state's transportation system. On the level of an individual intercity corridor, performance measurement can be used for a broad range of tasks, including corridor-specific planning and decision-making purposes or to report information about route performance to the general public. This section describes metrics that can be used by state DOTs and other sponsors of passenger rail services to evaluate the performance of specific routes and corridors and the application of passenger surveys to collect data to support corridor planning activities.

Corridor Performance Measures

A broad range of performance measures related to the financial, operational, and service quality of existing intercity passenger rail routes are generally available from Amtrak (or another service operator) on a regular basis. Typical metrics available include ridership, ticket revenue, food and beverage (F&B) revenue, on-time performance, total delay and sources of delay, and customer satisfaction index (CSI) scores. Ridership and revenue data are generally available by city pair, which can be extracted further to estimate the total station activity (boardings and alightings) for each station in a corridor. As previously discussed, Section 207 of the PRIIA legislation required FRA and Amtrak to jointly develop performance metrics and minimum standards for measuring the performance and service quality of intercity passenger train operations (FRA 2010). The metrics include specific measures associated with the financial performance of rail services, on-time performance, train delays, service quality, and public benefits. Quarterly reports on the performance of the entire Amtrak system and specific routes with respect to the PRIIA Section 207 performance metrics are available from the FRA website (FRA 2010). These reports can provide detailed performance information for specific routes and can be reported combined with other reports to form a complete picture of the operating, financial, and customer satisfaction performance for individual routes within the jurisdiction of a state DOT or other public agency.

For corridor planning purposes, regularly reviewing and analyzing performance data can support activities related to corridor-specific intercity passenger rail service and development activities. Typical corridor planning applications are as follows:

- **Ridership Data.** Monthly data and trends can identify growth in demand for rail services and can be used to estimate when/if additional seats are needed on a route or for specific trains. Station-level activity data can be used to assess the size and adequacy of station facilities (e.g., platforms, waiting areas, and parking/circulation areas).
- **Revenue Data.** Data can be used to identify trends for passenger preferences for different service classes (coach or business class) or if specific product offerings in the F&B services are more popular among certain trains or passenger segments.
- **On-Time Performance/Delay Data.** Data can be used to identify locations along an intercity passenger rail route where delays of a particular type occur frequently. In some cases, delay data will indicate the need for physical infrastructure improvements at certain locations to maintain target levels of reliability. Understanding the on-time performance and delay issues

for a route can be helpful in identifying specific projects that should be included in a SRP short-term infrastructure program.
- **Customer Satisfaction.** Data can be used to identify specific problems that may exist and initiate corrective action if warranted. For example, if CSI data reveal specific issues with the cleanliness of the seating areas, service sponsors may work with the operator to identify specific facilities that have cleanliness issues or implement new procedures for regular cleaning.

Passenger Surveys

To supplement the operational and CSI data supplied by the service operator, some state DOTs and other public agencies that sponsor intercity passenger rail services conduct surveys of passengers onboard trains to gather information about passenger characteristics and preferences. Onboard passenger surveys typically collect details about the passenger's trip origin and destination, mode of travel and travel time to/from the boarding/alighting station, trip purpose, and demographic information. Questions regarding customer satisfaction with onboard services and station facilities are typically included. Additionally, a question about how the passenger might have traveled for the current trip if rail service were not available or did not exist is often included. Such questions, with responses which include "Would Not Make Trip" as a potential option, can provide insight into the contribution of intercity passenger rail toward broader policy goals of reducing congestion in an intercity corridor or providing critical mobility options for corridor residents (Sperry and Morgan 2011).

Onboard passenger surveys have been helpful in supporting planning and development activities for intercity passenger rail corridors. One example of the use of onboard passenger surveys to support corridor planning and development activities is the passenger survey program of the Capital Corridor Joint Powers Authority (CCJPA) used on the *Capitol Corridor* route in northern California. The CCJPA conducts passenger surveys onboard its trains twice a year to develop ridership profiles and assess the performance of Amtrak as the service provider. CCJPA also posts the key findings and trends from each survey to its website, along with other monthly and annual corridor performance reports (Capitol Corridor Joint Powers Authority Periodic Reports). In its FY 2014–2015–FY 2015–2016 Business Plan Update, the CCJPA used rider profile data and survey responses on alternative travel mode to estimate the automobile vehicle miles traveled (VMT) removed from regional freeways and the corresponding reduction in carbon dioxide emissions resulting from the *Capitol Corridor* service (Capitol Corridor Joint Powers Authority Business Plan). Such information can be valuable for corridor planning and to justify requests for financial support made during the legislative budgeting process.

A review of state practices involving passenger surveys found that the CCJPA is unique in its approach to conducting quarterly passenger surveys. Other states that regularly conduct passenger surveys, notably Michigan and Wisconsin, attempt to obtain onboard passenger surveys once every 4 to 5 years. Such surveys can be funded through regular agency budget or through the state research program as part of a larger research study. This frequency is probably more realistic for most state DOT passenger rail programs; however, frequency of data collection can affect the value and effectiveness of the data obtained through the surveys. Data from onboard passenger surveys can support a wide range of intercity passenger rail planning and service development activities. Some applications from practice are as follows:

- **State Rail Planning.** Data from passenger surveys on Amtrak intercity passenger rail routes in Oklahoma and Wisconsin were incorporated in subsequent SRPs developed by those states to describe the role and impact of passenger rail in the state.
- **Economic Analysis.** Passenger survey data from intercity passenger rail routes in Maine (Economic Development Research Group Inc. 2005), Michigan (Taylor, Singh, and Isely 2009; Sperry, Taylor, and Roach 2013), and Oklahoma (Sperry and Morgan 2011) were used to

develop estimates of the economic impacts of rail service in those states. Data used included specific spending patterns and the benefits accrued to passengers by using the train instead of other modes.

- **Environmental Analysis.** Passenger survey data from the *Hiawatha* service route in Wisconsin were used by the WisDOT as part of the environmental assessment and service development plan for service improvements.
- **Environmental Justice.** Passenger surveys and profile data can identify the proportion of rail passengers from special population groups, including minority, low-income, and/or elderly passengers, and passengers from zero-vehicle households. Survey data can assess how passengers from these groups might travel if rail were not an option and indicate the extent to which passenger rail provides these groups with essential mobility services.

Performance Data Reporting

A performance-based process includes making data on performance measures and targets available to the public as a way to maintain accountability and transparency in decision making. Amtrak's monthly performance reports and the quarterly reports required by PRIIA Section 207 are available from the websites of Amtrak and FRA. Some state DOTs and other agencies that sponsor intercity passenger rail service have also developed regular performance reporting mechanisms or data portals where the general public can access corridor-specific performance data. One example previously discussed is the *Capitol Corridor* performance data reports available from the CCJPA website. Similar reporting exists for performance data for intercity passenger rail services in Washington/Oregon (WSDOT *Hiawatha* Service Annual Performance Reports) and Maine (NNEPRA *Downeaster* Annual Reports). MDOT's Transportation Management System provides a web-based data portal for accessing ridership and on-time performance data for all Amtrak passenger rail services operating in the state (MDOT n.d.). Daily on-time performance data are available by station and individual train. Ridership data can be accessed for each corridor and station on a monthly and annual basis. Data are updated by MDOT staff monthly, with new data available with a 1-month lag.

Quality Assurance Programs

The mandate of PRIIA Section 209 has resulted in more state DOTs and other public agencies becoming more involved with the daily management of intercity passenger rail services within their jurisdictions. Because the PRIIA Section 209 regulations allow states and other sponsors to unbundle various aspects of passenger rail service and contract with different entities for different service features, additional scrutiny of the quality of contract operations is desired. Some states have adopted innovative approaches for conducting quality assessments for intercity passenger rail services. The two states that jointly manage the Amtrak *Cascades* service, Oregon and Washington, have adopted a service assessment program to maintaining accountability for service operators and corrective actions for deficiencies in the service delivery. Sample service assessment forms were provided to the research team by the NCRRP 03-01 project panel. As part of this research, researchers inquired with the Oregon and Washington State DOT rail offices regarding the application of these forms.

Feedback from the state DOTs indicate that the Amtrak *Cascades* service assessment program consists of state DOT employees riding the trains at least twice a month and viewing the operations and product delivery from the viewpoint of the customer (i.e., the passenger). Rolling stock and station facilities are evaluated for first impressions, cleanliness, and ease of use. The quality of the onboard services, including staff interactions, clarity of onboard announcements, quality of the food and beverage service, restrooms, cleanliness, and Wi-Fi connectivity are also assessed.

The forms are completed by DOT personnel and copies are forwarded to the service operator. One DOT rail staff member noted that the service assessment process was effective at identifying needed repairs in the rolling stock and providing corrective action. It was also noted that the service operator was aware of the service assessment activities and it was believed that the service assessment activities were improving the quality of service delivery by providing oversight and holding the operator more accountable for performance. A customer-service focus was noted as an essential requirement for managing a service assessment program. Finally, it was emphasized that the delivery of intercity passenger rail service is dependent on the general public's perception of the value and the ability to maintain and repeat high standards of service delivery and that the service assessment program was critical to maintaining the high standards.

Recommended Performance Measurement Strategy

This appendix has summarized the benefits of a performance-based process for planning and managing intercity passenger rail services and has provided examples of performance-based applications in use across the United States. Based on these best practices in use, a framework for the ideal strategy for the collection, reporting, and application of performance data to support an intercity passenger rail program can be formulated. The need for a performance-based approach is more important than ever, given an increased emphasis on accountability and transparency in the expenditure of public resources. Additionally, the requirements of PRIIA Section 209 have resulted in increased management and decision-making responsibilities for state DOTs' involvement with intercity passenger rail routes.

A recommended performance-based approach for a state DOT involved with funding or managing intercity passenger rail service should, at a minimum, include the following:

- Developing a vision for intercity passenger rail service in the state and selection of performance metrics/targets that will track progress toward achieving the vision. The vision could be developed as part of the SRPs or through a public outreach process allowing for all stakeholders to contribute to the vision.
- Developing and publishing monthly and annual statistical summaries of the passenger volumes, financial metrics, and operational performance of intercity passenger rail routes under purview of the agency. Such data are available from Amtrak or another operator. Summaries should be posted to the agency website to allow for general public access. Charts or other figures showing trends in key statistics should be developed and presented in the summary. If performance targets have been adopted, progress toward these targets should be clearly noted. Examples of best practices for data reporting and presentation were presented in this appendix.
- Ensuring regular quality assurance checks of the passenger rail service by agency staff. Suggested procedures for performing these checks were described previously in this appendix. Agency staff should evaluate the condition of the rolling stock and station facilities and the quality and value of the onboard services. A regular program of quality assurance provides the agency with important information about daily operations of the service and raises the level of accountability for the service operator. Examples of quality control checks undertaken by state DOT staff in Oregon and Washington were discussed in this appendix.
- Conducting regular onboard passenger surveys by the agency sponsoring the passenger rail service. Surveys allow passengers the opportunity to provide feedback on various aspects of the service and the agency to gather information about passenger demographics and other trip characteristics, such as trip purpose and alternative travel mode. Surveys should be conducted once annually at a minimum or quarterly for heavy-traffic routes. Survey data can be used for long-range planning or to communicate the role of passenger rail in an intercity corridor to the general public or elected officials.

APPENDIX E

The Role of the U.S. STB Regarding Intercity Rail Passenger Service

The Surface Transportation Board (STB, or "Board") is a federal regulatory agency created by the Interstate Commerce Commission (ICC) Termination Act of 1995 (see Pub. L. No. 104-88, 109 Stat. 805 [1995]). Many, but not all, of the functions of the former ICC were transferred to the STB.

Pursuant to 49 U.S.C. § 10501, the STB has general jurisdiction over railroad transportation in the United States between a place in a state and a place in the same or another state as part of the interstate rail network. The statute further provides that STB's jurisdiction over the construction, acquisition, operation, abandonment, or discontinuance of spur, industrial, team, switching, or side tracks or facilities, even if the tracks are located entirely in one state, is exclusive and preempts conflicting provisions of federal or state law. This provision was enacted primarily to prevent state and local regulatory agencies from engaging in this type of regulation and to ensure a uniform scheme throughout the nation.

Notwithstanding the broad general jurisdiction referenced above, the Board has been directed to exempt certain rail transportation from its jurisdiction. Congress mandated that the Board shall exempt a person, class of persons, or a transaction or service on finding that its regulation is not necessary to carry out national transportation policy AND either (1) the transaction or service is of limited scope or (2) the application is not necessary to protect shippers from the abuse of market power. Many passenger service matters fall within the purview of this exemption regardless of whether they involve interstate or intrastate service.

Accordingly, when a new intercity passenger service is contemplated, the sponsors need to know whether STB authority should be sought to construct and/or operate the line. When the matter appears questionable, the usual procedure is to file a notice or petition for exemption with the STB, along with a motion to dismiss on the ground that the Board's regulation is not necessary to carry out the national transportation policy and that the transaction is of limited scope. That is the safest course to follow because engaging in a regulated transaction without STB authorization or exemption could violate the statute.

Role in Intercity Passenger Rail Service

The Board is involved with intercity passenger rail issues in addition to the initial question of construction/operation of the line or service. However, the precise role played by the Board depends on whether the service is operated by Amtrak or some other entity. The provisions applicable to Amtrak include intercity services operated by Amtrak under financial support contracts with states or other public entities. They would not apply to a non-carrier's acquisition of rail property for a service that ultimately may be operated by Amtrak under contract. A separate discussion follows for the STB's role regarding Amtrak and non-Amtrak operations.

Amtrak Operations

The statuary scheme governing Amtrak's rights and duties are codified in various sections of Title 49 of the U.S. Code. Although modified in many respects over the years, the basic law dates to 1970. The provisions governing Amtrak's use of services and facilities of other railroads are found at 49 U.S.C. § 24308 (Including railroads and regional transportation authorities that did not join or enter into contracts with Amtrak back in 1971. See *Metro-North Commuter R.R. v. Interstate Commerce Commission et al.*, 792 F.2d 278, 294 [2d Cir. 1986]). Amtrak is empowered to enter into contracts for use of rail facilities or services, the terms of which agreements are to include a penalty for untimely performance. If the parties cannot agree on the terms, Amtrak may petition the STB for an order (1) directing that the requested services and/or facilities be furnished and (2) fixing the terms of use and the compensation to be paid by Amtrak. Section 24308(a)(2)(B) mandates that quality of service shall be a major factor in determining the extent to which such compensation shall be greater than the incremental costs of using the facilities and providing the services.

Amtrak has legal entitlement to use facilities of other railroads on an incremental cost basis. No other rail passenger operator enjoys such rights. The rights of access and the system of incremental costing are said to be major advantages of employing Amtrak for passenger train operation.

Amtrak's rights in this area were interpreted by the Board in several decisions arising out of the plan of the NNEPRA and Amtrak to reestablish intercity passenger rail service between Boston, Massachusetts, and Portland, Maine. In its rulings the Board resolved disputes as to what costs should be deemed incremental, the extent to which capital improvements were needed for the new service, and the basis for performance incentive payments. It also held that Amtrak's access rights are exclusive and cannot be transferred to another entity (e.g., *Application of the National Railroad Passenger Corp.—Springfield Terminal Railway Company, Boston & Maine Corporation and Portland Terminal Company,* STB Finance Docket No. 33381, decided May 28, 1998).

The Board's traditional roles regarding Amtrak and its operations can be summarized as follows:

- Directing rail carriers to provide services and facilities to Amtrak and fixing the costs (generally incremental) to be paid for such services and facilities.
- Protecting Amtrak's statutory preference over freight trains using any rail line, junction, or crossing in the absence of certain findings by STB.
- Directing rail carriers to allow higher speeds as well as the operation of additional Amtrak trains and to fix the compensation therefore (prior to the Passenger Rail Investment and Improvement Act of 2008 [PRIIA], below, the Secretary of Transportation [Sec. DOT] performed most of this function).
- Ruling on complaints by Amtrak objecting to a proposed downgrading of a rail facility and determining the costs payable by Amtrak to continue maintaining the utility of the facility (49 U.S.C. 24309; previously a function of Sec. DOT).
- Ruling on Amtrak requests to exercise eminent domain to acquire rail property interests and to fix the basis of compensation. (This ruling was upheld by the Supreme Court of the United States. See *National Railroad Passenger Corp. et al. v. Boston & Maine Corp. et al.,* 503 US 407 [1992].)

PRIIA Changes

The Passenger Rail Investment and Improvement Act of 2008 (122 Stat. 4907 *et seq.*—October 16, 2008) gave the Board additional rights and duties. Those sections of that law having an effect on STB and related to intercity passenger rail are summarized below.

Sections 207 and 213

Perhaps the most controversial of the changes, these provisions mandate that Amtrak and FRA develop appropriate metrics and standards for measuring the performance and service quality of intercity passenger train operations. Such factors as cost recovery, ridership per train mile, onboard services, on-time performance, minutes of delay, and delays incurred on the lines of each rail carrier are to be considered. The standards and metrics are to be developed in consultation with the STB, rail carriers, states, employees, and groups representing passengers. Section 213, "Passenger Train Performance," provides that if a train's performance is below a certain level, Amtrak, a host freight railroad or an intercity passenger railroad (presumably non-Amtrak), or an entity for which Amtrak operates service, can file a complaint with the STB, which then is required to institute an investigation. If the Board finds the host railroad to be at fault, money damages can be awarded along with a mandate for measures to ensure future compliance.

The Association of American Railroads challenged the constitutionality of these provisions in the U.S. District Court for the District of Columbia. Although the District Court judge upheld the ruling, the US Court of Appeals for the DC Circuit reversed, holding the provision to be unconstitutional in that it impermissibly delegates regulatory authority to Amtrak (see *Association of American Railroads v. U.S. Department of Transportation et al.,* DC Circuit, decided July 2, 2013). The crux of the problem was that FRA and Amtrak were said to be put on an equal footing and government regulatory power cannot be delegated to a private entity. In defending Section 207, the government took the position that in view of the substantial federal involvement and unique powers vested in it, Amtrak is not a private corporation. Citing the Congressional mandate that Amtrak be operated as a for-profit corporation and "is not a department, agency or instrumentality of the United States Government" (see 49 U.S.C. § 24301[a]), the court observed that as a for-profit corporation, Amtrak has every incentive to strive to maximize its own financial benefit rather than the common good. The case is pending in the Supreme Court of the United States with a decision expected in 2015.

By decision rendered on March 9, 2015, the Supreme Court held that, for the purpose of determining the validity of the metrics and standards, Amtrak is a governmental entity. In reaching its conclusion, the court reviewed the unique ties between the federal government and Amtrak, including the fact that Amtrak has received federal funding during each year of its existence. The decision was unanimous with one justice writing a concurring opinion and another filing a lengthy opinion concurring in the judgment. The case was sent back to the DC Circuit Court of Appeals for consideration of other possible issues that had not been raised in the Supreme Court (see *Department of Transportation et al. v. Association of American Railroads,* 575 U.S. ___[2015]).

The National Association of Railroad Passengers (NARP) and others interested in railroad passenger service had filed an *amicus curiae* brief urging reversal. They argued that the Court of Appeals' finding that Amtrak is a private entity is erroneous and point out that the on-time performance of Amtrak long-distance trains has declined since the decision. In that regard, Amtrak recently filed a complaint with STB seeking an investigation of Canadian National for causing "unacceptable train delays on the Chicago to Carbondale corridor." On November 17, 2014, Amtrak filed another complaint asking the STB to institute an investigation of alleged substandard performance of the Capitol Limited between Washington and Chicago by Norfolk Southern and CSX Transportation. In a decision served on April 7, 2015, the Board ordered mediation of the dispute under Board supervision (see *National Railroad Passenger Corp.—Investigation of Substandard Performance of the Capitol Limited, Docket NOR 42141-0, STB served April 7, 2015*).

Section 209

This provision directs Amtrak, in consultation with states and certain other entities, to develop and implement a single, nationwide standardized method for establishing and allocating the

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operating and capital costs for state-supported trains. Subsection (c) provides that if Amtrak and the states cannot agree, STB shall determine the appropriate method and require the full implementation of this method within 1 year of the determination.

Section 212

Among other aspects, this section provides for a NEC Infrastructure and Operations Advisory Commission. One of the commission's duties is to develop a standardized formula for determining and allocating costs, revenues, and compensation for NEC commuter rail passenger transportation based on certain criteria (e.g., no cross-subsidization). Any commission member *may* petition the STB to assist in reaching an agreement through nonbinding mediation. Moreover, if Amtrak and the public agencies providing commuter passenger service fail to implement new agreements in accordance with the previously agreed-on timetable, the commission *shall* petition the STB to determine the appropriate compensation and to enforce its determination on the parties involved.

Section 214

Section 214 mandates FRA to develop a pilot program to permit rail carriers over which Amtrak operates to petition to be considered as the passenger rail service operator on a specified route in lieu of Amtrak. Both the owning-carrier and Amtrak may submit bids with the winner selected by the FRA, which may require performance to be at the standards developed pursuant to Section 207. If the selected rail carrier ceases to operate the route or fails to adhere to the required standards, FRA, in collaboration with STB, shall take action to enforce the contract, including substituting another operator and re-bidding the contract.

Section 217

If a state selects an entity other than Amtrak to operate an intercity rail passenger route, it is authorized to make an agreement with Amtrak for use of Amtrak facilities and equipment or to have certain services (e.g., equipment maintenance) provided by Amtrak. If the parties cannot agree, the STB is empowered to direct the provision of Amtrak facilities, equipment, and/or services and to determine the reasonable compensation, liability, and other terms. Such determination is to be made within 120 days of submission of the dispute, but only on findings that the facilities, etc., are needed by the state and that Amtrak's other services will not be impaired.

Section 401

Section 401 provides for nonbinding mediation by the STB in disputes for use of trackage and services of a rail carrier by a public agency sponsoring commuter rail passenger transportation. It also authorizes such STB mediation in situations where a public agency seeks an interest in a railroad right-of-way for construction and operation of a segregated fixed guideway facility to provide commuter rail passenger transportation. Originally the sponsors of this provision wanted it to extend to busways, but the commuter rail language was used. Presumably this could apply to construction of either standard commuter rail or light rail facilities parallel to the freight railroad's trackage.

Non-Amtrak Operations

Rail carriers or other entities seeking to operate intercity rail passenger service do not possess the statutory powers enjoyed by Amtrak. In most situations such entities must engage in arms-length negotiations with owners of the tracks and facilities needed for passenger service operation. The willingness of freight railroads to involve themselves in passenger train operations depends on numerous factors, including capacity to handle additional trains, potential payments by the

passenger provider, relief from passenger liability, and implementation of capital improvements that can benefit both entities. The approaches taken by U.S. freight railroads toward new passenger service proposals vary in level of acceptance. The process of considering such proposals, however, is one of voluntary negotiation, not the exercise of legal rights.

Other Related STB Powers that Affect Intercity Passenger Rail Service

STB has statutory roles to play with regard to construction, acquisition, abandonment, and operation of railroad lines. STB's abandonment role is not typically relevant in discussions of planning and development of intercity passenger rail projects and is not covered here. Construction, acquisition, and operation will be discussed separately in the following sections.

Construction

In recent years, proposals for construction of new railroad lines for intercity passenger service have related primarily to plans for high-speed rail (HSR) operations. Decisions have been rendered regarding proposed services in California, between California and Nevada, and within Florida. Each is discussed below.

California/Nevada

The first of these cases involved a new high-speed railroad line between Victorville, CA, and Las Vegas, NV, proposed by DesertXpress Enterprises, LLC ("Desert"). To aid in its planning, Desert petitioned for a declaratory order that its project falls within the Board's exclusive jurisdiction and, accordingly, that the preemption of most state or local laws would attach. After reviewing the legislative history and applicable cases, the Board found that Desert would be operating as a common carrier providing passenger rail transportation to the general public for compensation. Accordingly, STB has exclusive jurisdiction over the planned new track, facilities, and operations and the Federal preemption attaches (*DesertXpress Enterprises, LLC—Petition for Declaratory Order,* FD 34914 [STB served June 27, 2007]). In its decision the Board noted that courts have found two broad categories of state and local actions covered by the preemption: (1) any form of permitting or preclearance that could be used to deny the railroad the ability to conduct its operations or proceed with Board-authorized activities and (2) actions that would have the effect of preventing or unreasonably interfering with railroad transportation.

The second Desert case arose from the efforts of the sponsors of a competing proposal (a Maglev operation within the same general territory) to reopen the initial decision on the grounds that the Desert proposal is not within STB's jurisdiction. In its 18-page opinion discussing the numerous issues presented, the Board declined the invitation to reopen (see *DesertXpress Enterprises, LLC—Petition for Declaratory Order*, FD 34914 [STB served May 7, 2010]). The more significant of these issues were (1) changed circumstances and (2) erroneous application of the phrase "as part of the interstate rail network." Item 1 was dealt with by stating that the subsequent organization of a competing project does not change the STB's jurisdiction over the DesertXpress project.

The Board devoted a lengthy discussion to the issues raised in Item 2. In short, the competitor was arguing that to be part of the interstate rail network, an operation must carry freight or be connected to a railroad that does carry freight. The Board pointed out that this phrase was added by Congress to provide an expansion of previous jurisdiction that did not apply to purely intrastate transportation. Under present law such transportation is covered if related to interstate commerce. But in any event, that phrase is not involved here because the statute clearly confers

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jurisdiction over rail transportation between a place in one state and a place in another state, the situation at hand. The following quote from the Board's opinion is instructive:

> In short, Congress retained after the [ICC Termination Act] the requirement . . . that a person must obtain authority to construct and operate a railroad line that will be used to transport passengers in interstate commerce, and that provision applies to a passenger rail line (other than used by Amtrak, local transit or a street railway), whether or not any freight would be transported over the line or the line would connect to an existing rail line on which freight is transported. Nowhere in the statute or its legislative history has Congress defined the interstate rail network as essentially or exclusively freight-based. Petitioners' efforts to read such a restriction into the statute where none exists on its face are unpersuasive. Indeed, the plain language of the statute, as well as the public policy behind federal regulation of interstate transportation, militates against that interpretation. (p. 17)

The following year the Board-authorized construction and operation of the proposed high-speed passenger *DesertXpress* line over the 190 miles between Victorville and Las Vegas. (See *DesertXpress Enterprises, LLC et al.—Construction and Operation Exemption—In Victorville, CA, and Las Vegas, NV,* FD 35544 [STB served October 25, 2011].) This was implemented by granting an exemption from the formal approval requirements on findings that the detailed application procedures are not necessary to carry out the national transportation policy and that the proposal is of limited scope. Protection of freight shippers was not at issue, given that no freight service was contemplated.

In its decision, the STB cited the advantages of the project, including reduction of traffic congestion, provision of an environmentally friendly transportation option, elimination of air travel constraints, and a beneficial effect on the economies of both Nevada and California.

The exemption from STB's construction and operation requirements does not exempt this or similar projects from an environmental analysis. Indeed, the National Environmental Policy Act (NEPA) requires analysis of the environmental effects of proposed federal actions and that the public be informed of those effects (see *Baltimore Gas & Elec. Co. v. Natural Res. Def. Council et al.,* 462 US 87 [1983]). The law requires agencies to take a hard look at the potential environmental impacts, including a reasonable range of alternatives that must include a no-action alternative.

STB is required to consider significant potential beneficial and adverse environmental impacts in deciding whether to authorize a railroad construction project as proposed, deny the project, or grant or exempt it with conditions, including conditions to mitigate the environmental impact. In this case, as in numerous others, FRA became the lead agency in the environmental review with STB participating as a cooperating agency along with three other federal agencies (i.e., Bureau of Land Management, FHWA, and the National Park Service). Public meetings were held and draft, supplemental draft, and final EISs were issued. The final EIS enumerated the environmentally preferred alternative for the route, facilities, and technology, all subject to 146 mitigation measures to avoid or minimize potential adverse environmental impacts of the project. These included measures to protect desert birds and wildlife, to reduce noise and visual impacts, and to avoid or minimize adverse effects to cultural and paleontological resources, as well as requirements for Tribal monitoring of construction. The grant of the exemption was made subject to those measures.

California

As part of its plans for construction and operation of a high-speed passenger railroad between San Francisco and Los Angeles–San Diego, the California High-Speed Rail Authority has filed several exemption petitions with the STB. Insofar as relevant here, the first pertained to construction of a 65-mile line between Merced and Fresno (see *California High-Speed Rail Authority—Construction Exemption—In Merced, Madera and Fresno Counties, Cal.* FD 35724 [STB served

June 13, 2013]), while the second covered construction of a 114-mile extension from Fresno to Bakersfield (see *California High-Speed Rail Authority—Construction Exemption—In Fresno, Kings, Tulaire and Kern Counties, Cal.* FD 35724 [Sub-No. 1] [STB served August 12, 2014]). As with the DesertXpress cases, the STB's Office of Environmental Analysis worked with FRA to review the potential environmental impacts, including the requisite hard look at the alternatives for both phases of the project. In both cases, the Board granted the petitions for exemption, subject to enumerated conditions for mitigation of potential environmental consequences.

Some of the arguments raised by the parties in both cases are noteworthy. First, the California authority took the position that STB lacked jurisdiction because the project would be located entirely within California and would provide only intrastate passenger rail service with no plans for through-ticketing to points outside the state. Although the plan entails sharing existing rail lines in the Los Angeles and San Francisco areas, the authority argued that this does not confer jurisdiction on the Board. In finding the proposal to be part of the interstate rail network, the Board observed that the plan is for Amtrak to operate over the line, at least on an interim basis, with through-ticketing and nationwide connections and that the blended approach will entail use of facilities of other railroads at both ends of the line. Finally, there will be interconnectivity with Amtrak at seven or more jointly used stations. Once again, the Board cited the provision of the ICC Termination Act, giving it jurisdiction over intrastate rail transportation operated as part of the interstate rail network. As outlined above, the proposal was held to be a part of that network.

Other objections raised by opponents included allegedly improper segmentation and the argument that a full application, rather than an exemption petition, should be used for the project. The segmentation argument relates to the fact that this case dealt with but 65 miles of a planned 800-mile system. While recognizing that fact, the Board opined that the Fresno-Merced section can be used by Amtrak even before other parts of the high-speed system become operational. The Application v. Petition argument was based on the theory that such a large project must be made the subject of a fully documented application, rather than an exemption petition. In that regard the Board pointed out that Congress has enacted a presumption that new rail construction projects are in the public interest and are to be exempted unless the application process is necessary to carry out the national transportation policy and there is a danger of market power abuse (see *Alaska Survival v. STB,* 705 F.3rd 1073 [9th Cir., 2013]). The State of California has determined that there is a need for HSR in this area and that significant public benefits will flow from it. The application process is not necessary to carry out national rail transportation policy and there is no danger of market power abuse. Moreover, both STB and FRA have conducted thorough environmental reviews and have identified mitigation measures to be required. The Board also noted that rail passenger operations are among the most environmentally friendly modes of transportation.

An exemption also was granted in the second case, involving the 114-mile line between Fresno and Bakersfield. Here, again, the Board was a cooperating agency for the preparation of a project-specific EIS. Some opponents argued that the full application process should be required because of funding problems and judicial proceedings pending in the California state courts. Citing *Alaska Survival, supra,* the Board held that the law does not prohibit an exemption proceeding when the viability of the proposal is being questioned. The exemption was approved, subject to environmental conditions, including use of a specified environmentally preferred route.

Florida

A different conclusion was reached regarding proposed construction and operation of a new higher speed rail passenger service within the state of Florida (*All Aboard Florida—Operations LLC and All Aboard Florida—Stations—Construction and Operation Exemption—In Miami, Fla. and Orlando, Fla.,* FD35680 [STB served Dec. 21, 2012]). All Aboard Florida (AAF), an affiliate

of the Florida East Coast Railway (FEC), plans to establish and operate a new higher speed service between Miami and Orlando, a distance of about 230 miles. Approximately 200 miles of line, between Miami and Cocoa, would be on the existing FEC freight line—in some locations alongside and in others by use of the same trackage. Although the existing FEC line is single track, the plan contemplates installing a second track in many locations. The segment between the existing FEC line in Cocoa and Orlando would be newly constructed, primarily on rights of way leased from public agencies.

AAF contended that STB lacked jurisdiction over the proposed construction and operation, given that the project will be entirely within the state of Florida and not "part of the interstate rail network." AAF pointed out that there will be no connection or through-ticketing with Amtrak or any other interstate carrier and that, although some trackage will be shared with FEC, the project does not entail any freight movements. Observing that whether an intrastate passenger service is part of the interstate rail network is a fact-based determination, the Board concluded that the proposed operation will not be part of that network. The facts cited in support of the conclusion were (1) the passenger service is purely intrastate in nature, (2) the location of a station at the Orlando airport does not make the service part of the interstate rail network, and (3) the joint use and dispatching of the 200-mile FEC corridor between Miami and Cocoa does not change the result. The Board also cited a Court of Appeals decision upholding a decision of the former Interstate Commerce Commission that an intrastate scenic passenger railway does not trigger ICC jurisdiction by use of tracks owned by an interstate freight railroad (*Magner-O'Hara Scenic Ry. v. ICC,* 692 F.2d 441, 443 [6th Cir. 1982]).

The *All Aboard Florida* decision was 2-1 with Vice Chairman Mulvey dissenting. His opinion pointed to the facts that the operation will be an intercity train service, not a tourist or scenic train, that much of the operation will be within the existing FEC interstate freight railroad right-of-way, and that the terminus at the Orlando airport seems designed to serve passengers in interstate commerce. He also criticized the majority for relying on cases decided under former law before the ICC Termination Act specifically granted the STB jurisdiction over purely intrastate service (see 49 U.S.C. § 10501(a)(2)(A) and (b)(2)). His approach would be to review the case under the normal criteria for exemption from regulation and join in the environmental review being conducted by FRA.

Acquisition of Railroad Lines

In recent years there have been numerous cases involving acquisition of existing rail lines for passenger service operations. Usually such purchases are by public agencies that will sponsor, but not operate, the new passenger service. The leading case on this topic, *Me. Dep't, of Transp.—Acquis. & Operation Exemption—Me. Cent. R.R.* (8 I.C.C.2d 835 [1991]), was decided by the Interstate Commerce Commission in 1991 and has been followed by both the ICC, STB's predecessor agency, and STB since that time. The basic holding was that the sale of the physical assets of a railroad line by a carrier to a public agency does not make that agency a rail carrier if certain conditions are met. These include a requirement that the seller retain a permanent, exclusive freight rail operating easement, together with the common carrier obligation on the line, and that the sale terms protect the selling carrier from undue interference with the provision of common carrier rail freight service.

Two more recent cases will be discussed. The first involved a proposal of the New Mexico Department of Transportation (a non-carrier) to acquire approximately 297 miles of line in New Mexico and Colorado from the BNSF Railway Company (see *New Mexico Department of Transportation—Acquisition Exemption—Certain Assets of BNSF Railway Company,* FD 34793 [STB served Feb. 6, 2006]). The proposal contemplated operation of commuter rail passenger

service by a yet-unknown operator while freight service and intercity passenger service would continue to be provided over the trackage by BNSF and Amtrak, respectively. Given that BNSF would retain freight common carrier rights and Amtrak would continue intercity passenger rail service, the Board determined that the real estate transaction does not require its approval.

A more recent case, *Florida Department of Transportation—Acquisition Exemption—Certain Assets of CSX Transportation, Inc.,* FD 35110 (STB served Dec. 15, 2010), involved the Florida Department of Transportation's acquisition of 61.5 miles of railroad line as part of a plan to provide commuter rail service to the Orlando area. Because opponents of the proposal argued that the *Me. Dep't. of Transp.* case, *supra.,* was incorrectly decided, the Board conducted a detailed review of the arguments. The objections were (1) the physical assets of a rail line cannot be separated from common carrier rights and obligations, (2) that sale to a non-carrier requires Board exemption or approval when the purchaser plans to maintain and dispatch the line, and (3) the case is contrary to the precedent of an earlier ICC decision involving the sale of a railroad line in New York City.

With regard to the first two objections, the Board noted many years of holdings that sale of a rail line to a non-carrier does not constitute "the sale of a railroad line" where the existing carrier retained a permanent and unconditional easement to conduct common carrier freight operations and the right to maintain and improve the line. The freight rail easement is recognized at law as a bona fide property interest frequently used in the rail industry. The seller would have remedies open to it in the event of improper dispatching or maintenance by the purchaser. The third objection contended that the earlier holdings conflict with prior ICC and court decisions involving purchase of a railroad line in Staten Island, New York, by New York City for operation by a subsidiary of the state's Metropolitan Transportation Authority (MTA). Back in 1970, the ICC had authorized MTA's acquisition of the entire property interests in the line and the grant by MTA of trackage rights back to the selling carrier while MTA would maintain the line. Some years later that arrangement was challenged, with the result that the ICC and Second Circuit Court of Appeals held this transaction to have made MTA a rail carrier with a residual obligation to handle freight service should the selling carrier default (see *Bhd. of Locomotive Eng'rs v. Staten Island Rapid Transit Operating Auth.,* 360 ICC 464 [1979]); *Staten Island Rapid Transit Operating Auth. v. ICC,* 718 F.2d 533 [2d Cir. 1983]). The Board distinguished the *Staten Island* case from the case at hand given that Florida DOT is acquiring only the physical assets with CSX retaining a permanent easement and common carrier duty to operate the freight service.

The lesson of these cases is that when a public agency acquires a rail line as a non-carrier, the selling railroad must reserve a permanent easement for freight service and to protect its obligations to Amtrak. The Board noted that reasonable restrictions on freight operations to protect commuter service are permissible. It also referenced a 1988 transaction whereby FL DOT acquired a 67.5-mile CSX line between West Palm Beach and Miami without ICC review. While stating that this alone would not make the state a rail carrier, by not seeking formal STB review, the buyer runs the risk that it will be found to have violated the statute.

Operating Matters

In several recent cases the Board has dealt with long-distance, tour-type passenger trains to be provided by non-rail entities and operated by others over the lines of rail carriers. One such case involved the so-called Florida Fun Train that ran between the Miami area and the Orlando area (see *Fun Trains, Inc.—Operation Exemption—Lines of CSX Transportation, Inc. and Florida Department of Transportation,* FD 33472 [STB served March 5, 1998]). Fun Train had obtained overhead trackage rights to operate entertainment-type excursion trains. Such rights were subject to the rights of Amtrak to operate intercity passenger service, Tri-Rail to operate commuter

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passenger service within its service area, CSX to operate freight trains, and "the rights of others to operate high-speed passenger service." Amtrak supplied the locomotives and operating crews for Fun Train. Holding that the operations would be under CSX's complete control, that there would be no transfer of common carrier obligations or interference with Amtrak or CSX freight trains, the Board found that the proposed operations are not subject to its jurisdiction.

Several years later the Board reached what would appear to be the opposite conclusion in a case involving a land cruise seasonal vacation tour operation with no set schedules (see *American Orient Express Railway Company LLC—Petition for Declaratory Order,* FD 34502 [STB served Dec. 29, 2005]). Petitioner, American Orient Express, owned vintage rail cars, diners, and sleepers, and sold tickets for various itineraries to the public on a one-way basis. While the trains were operated by Amtrak using Amtrak locomotives and crews, American Orient employed the onboard service staff such as waiters, cooks, and attendants.

Applying the proposed operations to the statutory scheme, the Board first concluded that Petitioner does provide transportation of passengers by rail as part of its package. Considerable discussion was devoted to the issue of whether American Orient is a common carrier, a term referring to an entity that holds itself out to the general public as engaged in the business of transporting persons or property from place to place for compensation. While American Orient claimed to not hold itself out to the general public, the Board observed that it does hold itself out to the subset of the public to which it markets its services. Citing cases holding that cruise ships and tour bus operators are deemed common carriers, the STB concluded that American Orient's somewhat similar operations fall within that category.

After finding that American Orient is a rail common carrier subject to its jurisdiction, the STB exempted it from licensing regulation for its operation. The ultimate outcome was similar to that of the Fun Train case.

Service for Local Governmental Agencies

Congress has specifically exempted public transportation service provided by, or by a rail carrier under contract with, a local governmental authority from STB jurisdiction. The currently effective provision is found at 49 U.S.C. § 10501(c)(2). When the Massachusetts Bay Transit Authority, a local entity, sought to change operators of its rail commuter network, the proposed new operator, Massachusetts Bay Commuter Railroad Co. (MBCR), petitioned the STB for a declaratory order that it would be exempt from the Board's jurisdiction. In its decision (see *Massachusetts Bay Commuter Railroad Company, LLC—Petition for Declaratory Order,* FD 34332 [STB served June 5, 2003]), the Board observed that although MBCR meets the definition of a common carrier railroad, it is exempt from STB jurisdiction given that its entire operation is to be performed under contract with a local governmental authority. This applies even if the service is operated between two or more states.

Until recently, one open question was whether STB action would be required for the abandonment of trackage and facilities used for a rail passenger operation by or for a local governmental authority. The answer came in a decision involving the removal of the last 460 feet of track at the end of NJ Transit's Princeton Branch (see *New Jersey Association of Railroad Passengers and National Association of Railroad Passengers—Petition for Declaratory Order—Princeton Branch,* FD 35745 [STB served July 25, 2014]). Because the line was used exclusively for passenger service with no common carrier freight obligation, it was held to be covered by the local governmental authority exemption. Notwithstanding that its trains connect with Amtrak and other carriers and—indeed, that some of them operate into other states—the Board held that the service NJ Transit operates over its entire system is not subject to STB jurisdiction. Presumably if common carrier freight service were provided on the branch, NJ Transit could change or eliminate the passenger

service, but the freight carrier would need STB action to abandon the line. But that was not the situation here.

Summary of STB Role in Non-Amtrak Matters

The following conclusions may be drawn from the above analysis of the STB's emerging role in intercity passenger rail service covered in this appendix:

- Both interstate and intrastate passenger service are subject to STB jurisdiction if operated as part of the interstate rail network.
- STB regulation can attach to a passenger-only operation even if not connected to other railroads.
- A purely intrastate project can be deemed part of the interstate rail network and thus subject to STB regulation if interconnected to and/or interchanging passengers with other carriers or using joint facilities. Conversely, such a project may not be part of the network if there are no connections or interchanging of passenger with other carriers.
- Issues relating to funding or economic viability of a project do not prohibit the granting of an exemption by STB. Any decision to exempt a project is permissive only and does not mandate that the project be built or operated.
- A public entity's purchase of rail assets does not *ipso facto* make that agency a rail carrier; however, the seller must retain or properly extinguish (through discontinuance authority from the STB) its rights to honor its obligations to provide common carrier freight service and to serve Amtrak.
- Commuter rail operations funded by state or local governmental agencies are statutorily exempt from STB jurisdiction.

APPENDIX F

Contractor's Final Report

Summary

Increased demand for intercity rail travel and funding availability for rail projects have stimulated interest in intercity passenger rail among state, regional, and local public agencies. Regulatory requirements and policies found in the Passenger Rail Investment and Improvement Act of 2008 (PRIIA), for example, have required public agencies to assume greater roles and responsibilities for passenger rail development, such as the development of a state rail plan. In many cases, public agencies lack the expertise and resources to perform many of these roles.

FRA, public agencies, and industry organizations have created myriad resources to assist with developing intercity passenger rail service. Additionally, comprehensive research studies expected to be generated by the NCRRP, as well as existing studies from other TRB Cooperative Research Programs, have examined or are expected to address many topics of pressing importance to the practice. Public agencies and private entities involved with planning and implementing intercity passenger rail service have developed creative solutions or innovative practices that improve the efficiency of service delivery or increase ridership. Many of these innovative best practices are only documented anecdotally.

Even though the body of knowledge supporting intercity passenger rail service and development has expanded in recent years, there is no existing unified compendium of information documenting available resources and best practices for intercity passenger rail planning and development.

The goal of NCRRP Project 03-01 was to generate a comprehensive guide describing the resources, strategies, analytical tools, and techniques used by public agencies and private entities to support planning and decision-making in the development of intercity passenger rail service. The guide developed in this research allows for wide dissemination of these valuable resources into practice. Some topics have limited or no coverage within the published literature. Some best practices that offer valuable insight into successful implementation of passenger rail service exist within public agencies and private entities. Therefore, existing resources were supplemented with limited new research in the form of targeted syntheses on select topics where substantial gaps exist within the knowledge base (these are included in *NCRRP Report 6* as Appendixes A through E).

These activities led to the creation of a user-friendly comprehensive guide that outlines strategies, tools, and techniques that can be used by public agencies and private entities to support planning and decision-making in the development of intercity passenger rail service. The guide is a valuable document to support intercity passenger rail service planning and development activities and can be put into use immediately by the passenger rail practitioner community.

Chapter 1: Introduction

Scope

The scope of NCRRP Project 03-01 was to generate a comprehensive guide describing the resources, strategies, analytical tools, and techniques used by public agencies and private entities to support planning and decision-making in the development of intercity passenger rail service. While a one-size-fits-all approach is not appropriate for intercity passenger rail service development, a comprehensive guide describing existing resources and best practices is nevertheless valuable to support the intercity passenger rail service planning and development across the United States by various organizations.

The guide developed during this research allows for wide dissemination of these valuable resources into practice. Some topics have limited or no coverage within the published literature. Some best practices that offer valuable insight into successful implementation of passenger rail service exist within public agencies and private entities. However, some of these best practices have not been formally documented. Therefore, existing resources were supplemented with limited new research in the form of targeted syntheses on select topics where substantial gaps exist within the knowledge base (these are included in *NCRRP Report 6* as Appendixes A through E).

Objectives

As stated in the original project problem statement, the objective of NCRRP Project 03-01 was to develop a guide to assist public and private organizations as they plan, develop, and manage intercity passenger rail services. In order to achieve that objective, the following activities were completed:

1. Conduct of a comprehensive review of existing resources (policies, guidance documents, research studies, analytical tools, best practices, and other resources) used by public agencies and private entities to support intercity passenger rail service planning and development activities.
2. Identification and collection of feedback from potential users of the NCRRP 03-01 guide to determine topics where substantial gaps exist in the knowledge base.
3. Conduct of limited new research in the form of targeted syntheses of selected topics in intercity passenger rail service and development to complement existing resources.
4. Generation of a user-friendly comprehensive guide outlining the strategies, tools, and techniques used by public agencies and private entities to support planning and decision-making in the development of intercity passenger rail service.

The guide is designed to support intercity passenger rail service planning and development activities and is a resource document that can be put into immediate use by the passenger rail practitioner community.

Approach

NCRRP Project 03-01 consisted of five tasks:

- **Task 1—Conduct Literature Review.** The objective of Task 1 was to review existing literature to compile resources (policies, guidance, research studies, analytical tools, and best practices) used by public agencies and private entities involved with planning and implementing intercity passenger rail service. This task generated a matrix describing available resources by type and function in the intercity passenger rail service and development process.
- **Task 2—Conduct Outreach to Potential Guide Users.** The objective of Task 2 was to identify and perform outreach to potential users of the guide. It was essential for the centerpiece

product from the NCRRP 03-01 project, the guide, to be as responsive as possible to the needs of its target audience. Feedback from potential guide users in terms of the technical content as well as format and layout of the guide was critical to the success of the final product.

- **Task 3—Identify Potential Synthesis Topics, and Submit Draft Annotated Guide Outline and Interim Report.** The objectives of Task 3 were to develop a list of potential synthesis topics to be examined in Task 4, submit the draft annotated guide outline for panel review and approval, and submit the interim project report for panel review and approval. Potential synthesis topics were developed based on the results from Tasks 1 and 2.
- **Task 4—Conduct Targeted Syntheses of Specific Topics.** The objective of Task 4 was to conduct up to six targeted syntheses of specific topics in intercity passenger rail service planning and development in order to address gaps in the existing resources. The targeted syntheses were conducted to provide information on important topics but where the comprehensive resources or documentation that exists for other, better-documented subjects was not available.
- **Task 5—Prepare Final Guide and Final Report.** The objective of Task 5 was to prepare the final intercity passenger rail service and development guide and the final report for NCRRP Project 03-01.

This appendix presents the method used to develop the guide; information is provided in the following chapters:

- **Chapter 1: Introduction.** This chapter presents the research objective along with an overview of the tasks completed to develop the guide.
- **Chapter 2: Literature Review.** This chapter presents the approach undertaken to document the existing resources available on the various intercity passenger rail service planning and development topics.
- **Chapter 3: Outreach to Potential Guide Users.** This chapter summarizes the outreach plan undertaken to achieve the objectives of Task 2 and presents the findings of the outreach efforts.
- **Chapter 4: Targeted Syntheses.** This chapter presents the background and summary of the targeted syntheses (provided as Appendixes A through E) created to provide information on topics that are critical to intercity passenger rail service planning and development but lacking within existing resources.
- **Chapter 5: Summary.** This chapter summarizes the work performed for the NCRRP Project 03-01.

Chapter 2: Literature Review

This chapter describes the efforts to identify and document existing literature in order to compile resources (policies, guidance, research studies, analytical tools, and best practices) that are used by public agencies and private entities involved with planning and implementing intercity passenger rail service. The approach to document existing resources was to develop a matrix outlining the steps required for intercity passenger rail service development and the resources available for each step.

Framework of Existing Resources

Given the scope of NCRRP Project 03-01, content was generated primarily from existing resources. The types of resources used to support planning and decision-making for intercity rail service and development included

- Existing **policy and legal frameworks** for intercity passenger rail in the United States, defined under the Passenger Rail Investment and Improvement Act of 2008 (PRIIA), as well as applicable federal and state laws and regulations related to intercity passenger rail.

- **Guidance documents** issued by FRA, other government agencies, and industry organizations (e.g., AASHTO Standing Committee on Rail Transportation [SCORT], APTA, or the American Railway Engineering and Maintenance-of-Way Association [AREMA]) to support rail service development by interpreting statutory requirements or documenting best practices.
- Completed, ongoing, or pending **research studies** sponsored by the TRB Cooperative Research Programs, federal or state agencies, or independent entities.
- Comprehensive or sketch-level **analytical tools** developed by public or private entities to provide quantitative support for planning and decision-making.
- **Best practices** or specific case studies of successful approaches or tools used by public agencies and private entities throughout the intercity passenger rail industry that have limited or no documentation describing their effects. Such resources also include procedures or checklists established by states or other operators to ensure service quality standards are being achieved. By extension, identification of best practices also encompasses an assessment of what not to do or other practices that have been shown to not be effective at achieving rail passenger service goals.

The level of public accessibility and depth of topical coverage of these existing resources can be characterized as follows:

- Comprehensive documentation exists or is forthcoming.
- Existing resources are adequate, but some knowledge gaps exist or existing resources are limited to specific topics not immediately applicable to passenger rail issues.
- Best practices exist in the industry; however, documentation is limited.

Using this framework to understand and inventory the existing body of knowledge allowed for an objective evaluation of existing resources to allocate project resources to focus on the most critical areas of need.

Intercity Passenger Rail Service Development Process

The three major phases of the process of planning and development for intercity passenger rail service are planning, design and construction, and operations. Table F-1 shows an outline of these three phases and major subtasks typically undertaken within each phase. In addition

Table F-1. Steps and major subtasks in service development.

Planning	Design & Construction
• Network Design/Route Selection	• Right-of-Way Design
• Environmental Analysis/Public Outreach	• Right-of-Way Acquisition
• Ridership & Revenue Forecasting	• Fleet Design
• Economic Analysis	• Fleet Planning/Procurement
• Shared-Use Corridor Issues	• Cost Estimating
• Station Planning	• Safety Issues
• Service Development Planning	• Grade Crossings
• Strategic/Business Planning	• Construction Issues
• Build Consensus/Public Support	
Operations	**Ongoing Program Management**
• Operation of Passenger Rail Service	• State Rail Plan
• Maintenance of Right-of-Way	• Funding & Finance
• Maintenance of Equipment	• Institutional Arrangements
• Fare Policy/Ticketing	• Legal Issues
• Revenue Management	• Performance Management
• Passenger Services & Amenities	• Contracting
• Marketing & Outreach	• Risk Management

to these three phases, ongoing management of a passenger rail program (which could include projects in any of the three phases) is also an important component of the process.

The range of available resources for intercity passenger rail service and development reflects a broad spectrum of technical needs, unique circumstances, and service characteristics associated with the many different intercity passenger rail services in the United States. The resources available to support intercity passenger rail service and development have increased in recent years as interest in intercity passenger rail and other forms of rail transit has increased. In many subject areas, the depth of topical coverage within the existing resources has grown, providing users with comprehensive coverage of some issues. The role of NCRRP Project 03-01 in developing a unified guide to the resources available for public agencies and private entities to use in planning, developing, and operating intercity passenger rail service is essential to preserve this knowledge base and provide a foundation on which to build future efforts.

Table F-2 lists examples of the different types of published resources and analytical tools available to support intercity passenger rail service development planning. Topics in the most pressing areas of need have been the subject of comprehensive studies via TRB research programs or collaborative efforts among FRA and the states. These studies have generated documentation of the most critical issues, potential solutions, and best practices. For example, many existing and proposed intercity passenger rail services operate on freight railroad–owned tracks in a shared-use environment. It is not surprising, therefore, that comprehensive resources have been developed (e.g., *NCHRP Report 657* and *NCHRP Report 773* or several recent NCRRP reports) to assist

Table F-2. Examples of existing resources by resource type.

Resource Type: Policy & Legal Frameworks
• PRIIA Section 209: State-Supported Routes—Cost Methodology • FRA Procedures for Considering Environmental Impacts • Americans with Disabilities Act • 49 CFR Part 238: Passenger Equipment Safety Standards
Resource Type: Guidance Documents
• Final State Rail Plan Guidance (FRA 2013) • Station Area Planning for High-Speed and Intercity Passenger Rail (FRA 2011) • Railroad Corridor Transportation Plans: A Guidance Manual (FRA 2005) • HSIPR Best Practices: Ridership and Revenue Forecasting (United States Department of Transportation [USDOT] Office of Inspector General [OIG] 2011) • State Rail Planning Best Practices (AASHTO 2009) • AREMA Manual of Railway Engineering (AREMA 2011) • Guidance on Pedestrian Crossing Safety at or near Passenger Stations (FRA 2012) • Highway-Rail Grade Crossing Guidelines for High-Speed Passenger Rail (FRA 2009) • High-Speed Passenger Rail Safety Strategy (FRA 2009) • Estimating Maintenance Costs for Mixed High-Speed Passenger and Freight Rail Corridors (FRA 2004)
Resource Type: Research Studies
• *NCHRP Report 657: Guidebook for Implementing Passenger Rail Service on Shared Passenger and Freight Corridors* (TRB 2010) • *NCHRP Report 773: Capacity Modeling Guidebook for Shared-Use Passenger and Freight Rail Operations* (TRB 2014) • *TCRP Report 153: Guidelines for Providing Access to Public Transportation Stations* (TRB 2012) • Amtrak Fleet Strategy: Building a Sustainable Fleet for the Future of America's Intercity and High-Speed Passenger Railroad (Amtrak 2010) • High Speed Railway System Implementation Handbook (International Union of Railways [UIC] 2012)
Resource Type: Analytical Tools or Notable Practices/Procedures/Checklists
• FRA CONNECT Tool—Network Ridership and Cost Analysis Tool (FRA 2014) • Ridership and Revenue Forecasting Models (Various) • Economic Impact Assessment Models (Various) • On-Board Passenger Surveys, Customer Satisfaction Surveys/Indices (Various)

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planners and decision-makers with various aspects of shared-use corridor matters. Comprehensive guidance on best practices for state rail planning programs has also been developed by AASHTO, and additional NCRRP projects are expected to address specific issues in funding and financing as well as multi-state governance of passenger rail programs.

The role played by individual states (through the state DOT rail division or other regional- or state-level passenger rail agency) in developing resources to support intercity passenger rail service and development cannot be overstated. Some states, for example, have several decades of experience with planning intercity passenger rail services and have developed strong practices in the areas of service planning, project delivery, and program management. State-led innovations have been critical to generating ridership growth on Amtrak's state-supported corridor route segment. Many of the innovative practices developed at the state level have been documented in existing guidance and research studies; however, many best practices have limited supporting documentation.

Beyond the contributions of individual states, states have collaborated to produce essential resources for passenger rail service and development. These collaborations have resulted in progress in areas such as operating cost methodology, stakeholder agreements for passenger rail service, and fleet design and procurement.

Outside of innovations being developed at the state level, another major factor influencing the availability and adequacy of existing resources is the organization(s) most responsible for leading each task. FRA has taken the lead in developing guidelines for safety and environmental impacts to address broad issues in those areas. Passenger rail operators, including Amtrak and other private operators, have expertise in the operational aspects of intercity passenger rail service. Industry organizations such as AASHTO SCORT, APTA, AREMA, and the Association of American Railroads (AAR) are also critical sources of valuable resources. The consulting community has been integral in developing resources and expertise for passenger rail service and development, with notable contributions in ridership and revenue forecasting, right-of-way design, cost estimating, and construction matters. Finally, the research community (via TRB's Cooperative Research Programs and other programs) has emerged as a useful source of objective and timely information to support rail planning and development. An essential role of the NCRRP Project 03-01 guide is to serve as a tool for the dissemination of these existing resources and tools.

Resource Matrix

The approach to documenting existing resources was to develop a matrix outlining the steps required for intercity passenger rail service development and the resources available for each step. The matrix lists resources according to the three major phases of the process of planning and development for intercity passenger rail service. These phases and subtasks are summarized in Table F-1. For each phase and subtask, the resources are divided according to the resource type. The full matrix is in the annex, with a sample provided in Table F-3.

Chapter 3: Outreach to Potential Guide Users

This chapter documents the findings from the outreach efforts undertaken for the NCRRP Project 03-01 guide. The purpose of the outreach task (Task 2) was to obtain feedback from potential NCRRP Project 03-01 guide users on various topics related to the content and format of the guide to ensure that the guide meets the current needs of potential guide users.

The NCRRP Project 03-01 guide user outreach plan consisted of three parts: (1) direct outreach to potential guide users at a major industry conference, (2) an Internet-based survey of potential

Table F-3. Sample of the resource matrix.

Development Steps	Policy & Legal Frameworks	Guidance Documents	Research/Consultant Studies	Analytical Tools	Notable Practices/ Procedures/Checklists
Planning					
Environmental Analysis/Public Outreach	• FRA Procedures for Considering Environmental Impacts (*Federal Register* Notice) • FTA Environmental Impact and Related Procedures (*Federal Register*)	• FRA HS Ground Transportation Noise/Vibration Assessment • FRA HSIPR NEPA Guidance • UIC High Speed Railway System Implementation Handbook • Guidance for Implementation of FTA's Categorical Exclusions (23 CFR §771.118) • Guidelines on the Use of Tiered Impact Statements for Transportation Projects	• NCRRP Report 3: Comparison of Passenger Rail Energy Consumption with Competing Modes • TCRP Synthesis 89: Public Participation for Transit • UIC HSR Energy and Emissions • UIC Energy Consumption and CO_2 Emission of World Railway • UIC Railway Noise in Europe • NCHRP 25-25 (80): Potential Use of Social Media in the NEPA Process	• FRA Categorical Exclusion Worksheet • FRA Noise/Vibration Model • FRA Horn Noise Model • FRA Review Checklist • NCHRP 25-25 (80): Social Media Tools Matrix	• SEHSR • Illinois DOT • Texas-Oklahoma Passenger Rail Study • California High-Speed Rail • All Aboard Florida • Northern Lights Express • Desert Express • NY Empire Corridor

guide users, and (3) in-person interviews with a subset of appropriate officials of those entities that are potential guide users. In the original work plan, only the outreach at the conference and the interviews were envisioned and planned. The Internet-based survey was added during the project to solicit more input from potential guide users. This chapter discusses these three efforts and the resulting findings.

Outreach at Industry Conference

The first part of the outreach plan consisted of direct outreach to potential NCRRP Project 03-01 guide users at the 2013 AASHTO SCORT Annual Meeting, September 22–25, 2013, in Columbus, Ohio. The direct outreach took place as a workshop during the regularly scheduled meeting program. The workshop consisted of two parts: an initial presentation from the research team to the full group of workshop attendees followed by an opportunity for attendees to discuss specific items of interest and needs with members of the research team.

The initial workshop presentation given by the research team included an overview of

- The NCRRP 03-01 project goals and work plan
- Existing documents and resources already identified by the research team
- The kind of information being sought from the workshop participants

The presentation included instructions on how each attendee could submit comments during the remainder of the workshop.

After the initial workshop presentation, the workshop attendees were asked to write their comments down and take them to one of four topically defined stations where they could interact with research team members and put their comments on poster-type presentation boards. The station input was used to gather the following information from attendees:

- Assessment of any pertinent resources that might need to be added or that had been missed by the research team
- Identification of any in-house resources, tools, or checklists used by potential guide users

NCRRP 03-01 SCORT Workshop Survey

Which of the following best describes your employer?
☐ Public Agency (Currently Sponsors Passenger Train Service)
☐ Public Agency (Does not Sponsor Passenger Train Service)
☐ Public Agency (Direct Operator of Passenger Train Service)
☐ Private Operator of Passenger Train Service
☐ Freight Railroad
☐ Federal Railroad Administration
☐ Consultant
☐ Supplier
☐ Academic/Research Organization
☐ Trade Association
☐ Other (*Please Specify*):
_____

What format would you prefer for the NCRRP 03-01 passenger rail service and development guidebook?
☐ Bound Hard Copy of Guidebook
☐ Loose-Leaf Hard Copy for Binder Guidebook
☐ Downloadable PDF Guidebook
☐ Interactive Web-Based

Figure F-1. SCORT workshop blue index card.

- Identification of possible topics where original research or additional documentation of best practices would be needed as part of the guide

The attendees were given large blue index cards on which to indicate their employer/affiliation type and their preferred format for delivering the information contained in the NCRRP Project 03-01 guide. Figure F-1 is an example of the NCRRP Project 03-01 SCORT workshop blue index card questions.

The first question on the SCORT blue index card related to the participants' type of employer—there were ten different categories and an option to specify a category not included. The second question asked participants which format they would prefer for the NCRRP Project 03-01 guidebook. Both questions resulted in multiple answers by some participants.

The main purpose of the first question was to document the diversity of backgrounds of those participating in the workshop. Overall, 55 blue cards were collected during the workshop. Each employer type category was represented, with the highest response being public agency (currently sponsors passenger train service), at 14 responses. Public agencies not currently sponsoring passenger train service and consultants were the next highest responses, with ten selections each. Table F-4 shows the number of responses broken down by employer type.

Table F-4. SCORT workshop blue index card employer type.

Employer Type	Selections*
Public Agency (Currently Sponsors Passenger Train Service)	14
Public Agency (Does Not Sponsor Passenger Train Service)	10
Public Agency (Direct Operator of Passenger Train Service)	1
Private Operator of Passenger Train Service	1
Freight Railroad	4
Federal Railroad Administration	3
Consultant	10
Supplier	5
Academic/Research Organization	1
Trade Association	3
Other: Attorney, Military, Union, Insurance Broker for Railroad Contractor, and Information Service for Railroad Contractor	7
Total Selections	**59**

*Some respondents selected more than one option.

Table F-5. SCORT workshop blue index card guidebook format.

Guidebook Format	Selections*
Bound Hard Copy of Guidebook	5
Loose-Leaf Hard Copy for Binder	10
Downloadable PDF Guidebook	40
Interactive Web-Based Guidebook	24
Total Selections	**79**

*Some respondents selected more than one option.

A total of 79 responses were received for the second question because participants provided multiple answers. As shown in Table F-5, 64 of the responses indicated electronic or online versions of the guidebook would be desired; 15 responses indicated a hard copy report as the desired report format.

The second portion of the workshop interaction with SCORT attendees involved the setup of four stations in which participants could provide written input and discuss the topic with NCRRP Project 03-01 team members. The four stations related to phases of implementation found in developing intercity rail programs:

- Planning
- Design and Construction
- Operations
- Ongoing Program Management

Each station setup consisted of two presentation boards on easels—one for identified references and resources related to the station topic and a second for comments related to needed guidance. Participants could attach self-sticking notes with comments to provide input on the appropriate board. The most pertinent responses from the workshop stations are presented in Table F-6.

Table F-6. SCORT workshop station responses.

Planning
• Show locations in process where we will need to negotiate multimodal cooperation. This would be for multimodal facilities or other areas where the process may branch to other agencies. • We need a public process for least cost planning, demonstrating the most cost-effective phasing of a project. • Get FRA on the team from the beginning, even if they are not a funding partner for the NEPA study.
Design and Construction
• Be prepared to establish a way to pay the railroads to participate early, and it will make the project progress smoother/less adversarial/gain more useful input. • Have a "plan warehouse" and communications that track through a single portal for shared documents between the private sector rail companies and public entities. This allows the ability to keep track of who "has the ball." • There are significant differences between track infrastructure (track systems) optimized for freight and that optimized for passenger service.
Operations
• Provide electric outlets on-board trains. • Offer bicycle lockers at stations. • Provide front line employee training to improve service experience of passengers. • Reserved vs. non-reserved service and yield management. • Improve tools and software for scheduling. • Better explain rail capacity modeling (e.g., RTC)—improve understanding of how it is used and how assumptions affect outputs/capital projects.
Ongoing Program Management
• Tax implications on host railroads. • Alternatives for governance of multi-state corridors, operations, and planning—entities, agreements, roles, etc. • Performance measurement. • Regulatory approval procedures for passenger services.
Additional Captured Comments
• Help state DOTs to come up with "actionable items" in their State Rail Plans.

Internet-Based Survey of Potential Guide Users

The second part of the outreach plan consisted of an Internet-based survey of potential guide users. The survey solicited information and feedback from a wide range of potential guide users. The survey asked respondents about the following:

- Types of resources used for intercity passenger rail service and development
- Any in-house resources, tools, or checklists used by potential guide users
- Possible topics where original research or additional documentation of best practices would be needed as part of the guide
- Preferred formats for delivering the information contained in the NCRRP Project 03-01 guide

Recruiting individuals to participate is a challenge with implementing an Internet-based survey. The research team communicated with leaders of several passenger rail-focused organizations to solicit their cooperation in distributing the Internet survey to members via an e-mail blast or posting on the organization's website. Invitations to participate in the survey were distributed to AASHTO SCORT members and TRB's AR010 Intercity Passenger Rail Committee members and friends. This distribution focused on long-term professionals familiar with the existing regulatory and financial constraints within the intercity passenger rail field.

The survey was posted and opened for responses at http://www.railsurvey.org/NCRRP for approximately 4 weeks from July 29 through August 25, 2014. Reminder emails were also sent halfway through the open period seeking additional participation. Content of the survey is discussed below.

Internet Survey Questions

The Internet survey was divided into several groupings of questions. The initial questions (see Figure F-2) related to the external resources used in performing intercity passenger rail service and development. The first question asked about external resources and how often they are used. A list of resources was provided for review along with the opportunity to write in additional external resources. Figure F-3 contains Questions 4–6, which asked about internal resources used by the respondents. Internal resources were defined as materials created by the respondent's own agency or company for reference or direction. Following these sets of questions, there were several questions intended to assist in identifying gaps in the available internal and external resources as a means for clarifying needs for the targeted syntheses task (Task 4) of the overall project work plan. Figure F-4 shows the two questions (Questions 2 and 3) that followed the external resources and one question (Question 7) that followed the internal resources set of questions on the content and quality of the existing resources indicated by the respondent.

Following the questions related to external and internal resources, three questions focused on the desired characteristics of the guidebook itself. Figure F-5 shows Questions 8–10, which asked for input on how the guidebook could be of value and the preferred format of the guidebook, as well as any additional comments regarding the guidebook.

The final three questions asked for participant background information (see Figure F-6). The employer type options provided match the categories collected at the SCORT conference, with the one difference being a split in the freight railroad category into host and non-host railroad categories.

Internet Survey Responses/Analysis

There were 23 completed online surveys, with each question averaging 22 responses. An Internet-based survey provides more control over whether a respondent can select only one option or multiple options. Many of those surveyed answered each question and selected more than one

External Resources

1. Thinking about the resources you use for your work, how often do you use the following resources in your passenger rail service and development activities?

	Frequently	*Occasionally*	*Very Infrequently*	*Never*
AASHTO State Rail Planning Best Practices (2009)	☐	☐	☐	☐
Amtrak Fleet Strategy (2012)	☐	☐	☐	☐
APTA Manual for the Development of System Safety Program Plans for Commuter Railroads (2006)	☐	☐	☐	☐
AREMA Design Standards	☐	☐	☐	☐
FRA Collision Hazard Analysis Guide, Commuter and Intercity Passenger Rail Service (2007)	☐	☐	☐	☐
FRA Guidance on Pedestrian Crossing Safety at or Near Passenger Stations (2012)	☐	☐	☐	☐
FRA Methodology for Determining the Avoidable and Fully Allocated Costs of Amtrak Routes (2009)	☐	☐	☐	☐
FRA Mixed-Use Corridors Maintenance Costs Study (2008)	☐	☐	☐	☐
FRA Rail Corridor Planning Guidance (2005)	☐	☐	☐	☐
FRA State Rail Plan Guidance (2013)	☐	☐	☐	☐
FRA Station Area Planning for High-Speed and Intercity Passenger Rail (2011)	☐	☐	☐	☐
GAO-06-820R Active Commuter Rail Agency Service Contracts (2006)	☐	☐	☐	☐
NCHRP 657 Shared-Use Implementation Handbook (2010)	☐	☐	☐	☐
NCHRP RRD 313 Cost-Allocation Methods for Commuter Rail, Intercity Passenger Rail, and Freight Rail Operations on Shared-Use Rail Systems and Corridors (2007)	☐	☐	☐	☐
OIG HSIPR Best Practices: Public Benefits Assessment (2011)	☐	☐	☐	☐
OIG HSIPR Best Practices: Ridership and Revenue Forecasting (2011)	☐	☐	☐	☐
TCRP LRD 1 Strategies to Facilitate Acquisition and Use of Railroad ROW (1994)	☐	☐	☐	☐
Transportation Research Record (TRR) Journal	☐	☐	☐	☐
UIC High Speed Railway System Implementation Handbook (2012)	☐	☐	☐	☐

1b. What other resources to you use frequently for guidance on passenger rail service and development?

_____

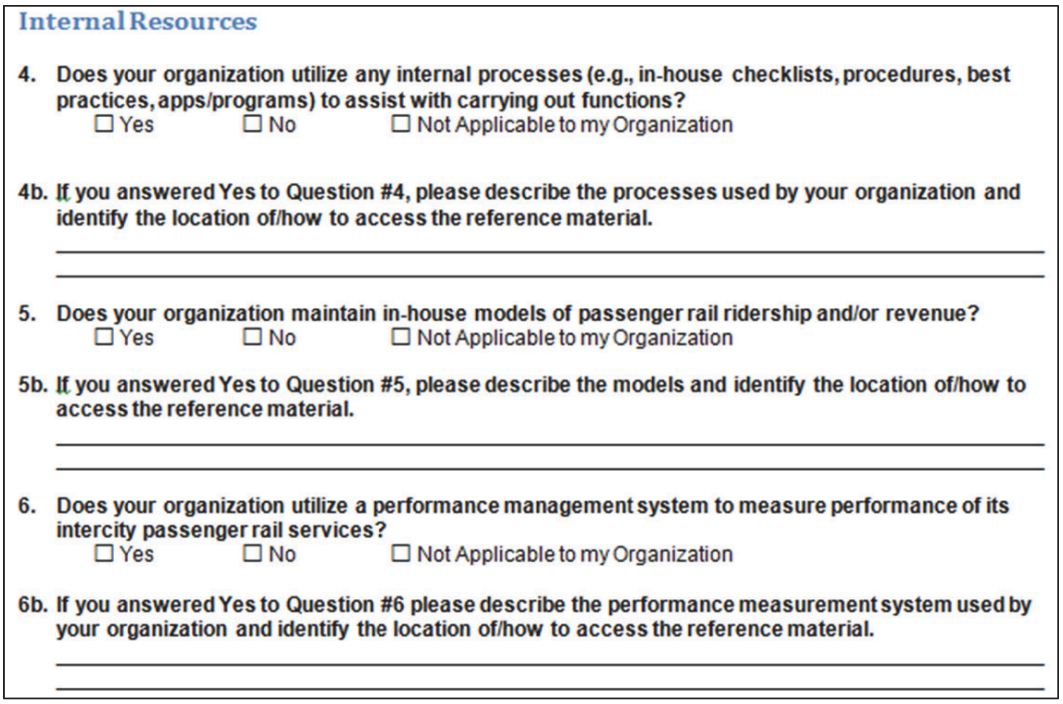
_____

Figure F-2. Internet survey external resource questions.

option. Where applicable, this is noted in the tables and discussions below regarding responses. A dash in any table indicates that no respondents selected that answer.

Of the 22 surveys in which the question on employee type and longevity was answered, only six of the employer type categories were represented in the Internet survey. Table F-7 shows these responses by category and the number of years in that role. Twelve of the 22 participants were with public agencies: 7 for agencies that sponsor and manage a passenger train service and 5 for agencies that manage but do not sponsor a service. Table F-7 also provides information on the other survey participant employer type; however, respondents to the survey did not include a participant from a freight railroad.

Largely, the participants were experienced in their jobs, with 17 of the 22 respondents listing experience levels greater than 5 years. The public agencies were evenly divided between the lesser experienced participants and those with experience levels greater than 10 years. For all of the other categories, the participants had over 5 years of experience.



Internal Resources

4. Does your organization utilize any internal processes (e.g., in-house checklists, procedures, best practices, apps/programs) to assist with carrying out functions?
☐ Yes ☐ No ☐ Not Applicable to my Organization

4b. If you answered Yes to Question #4, please describe the processes used by your organization and identify the location of/how to access the reference material.

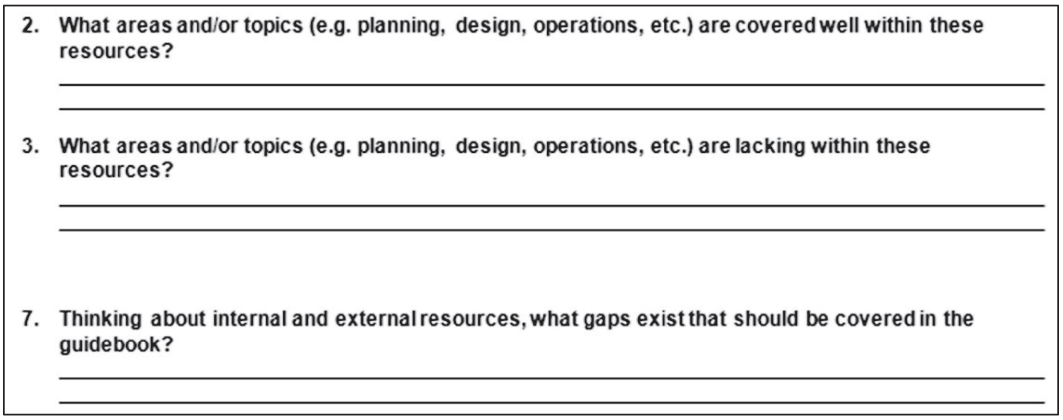
5. Does your organization maintain in-house models of passenger rail ridership and/or revenue?
☐ Yes ☐ No ☐ Not Applicable to my Organization

5b. If you answered Yes to Question #5, please describe the models and identify the location of/how to access the reference material.

6. Does your organization utilize a performance management system to measure performance of its intercity passenger rail services?
☐ Yes ☐ No ☐ Not Applicable to my Organization

6b. If you answered Yes to Question #6 please describe the performance measurement system used by your organization and identify the location of/how to access the reference material.

Figure F-3. Internet survey internal resource questions.

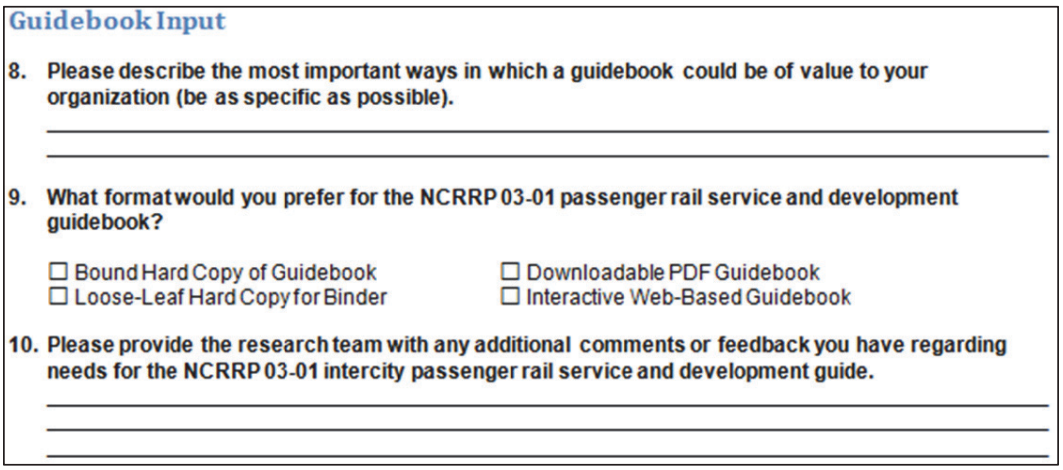


2. What areas and/or topics (e.g. planning, design, operations, etc.) are covered well within these resources?

3. What areas and/or topics (e.g. planning, design, operations, etc.) are lacking within these resources?

7. Thinking about internal and external resources, what gaps exist that should be covered in the guidebook?

Figure F-4. Internet survey gap analysis questions.



Guidebook Input

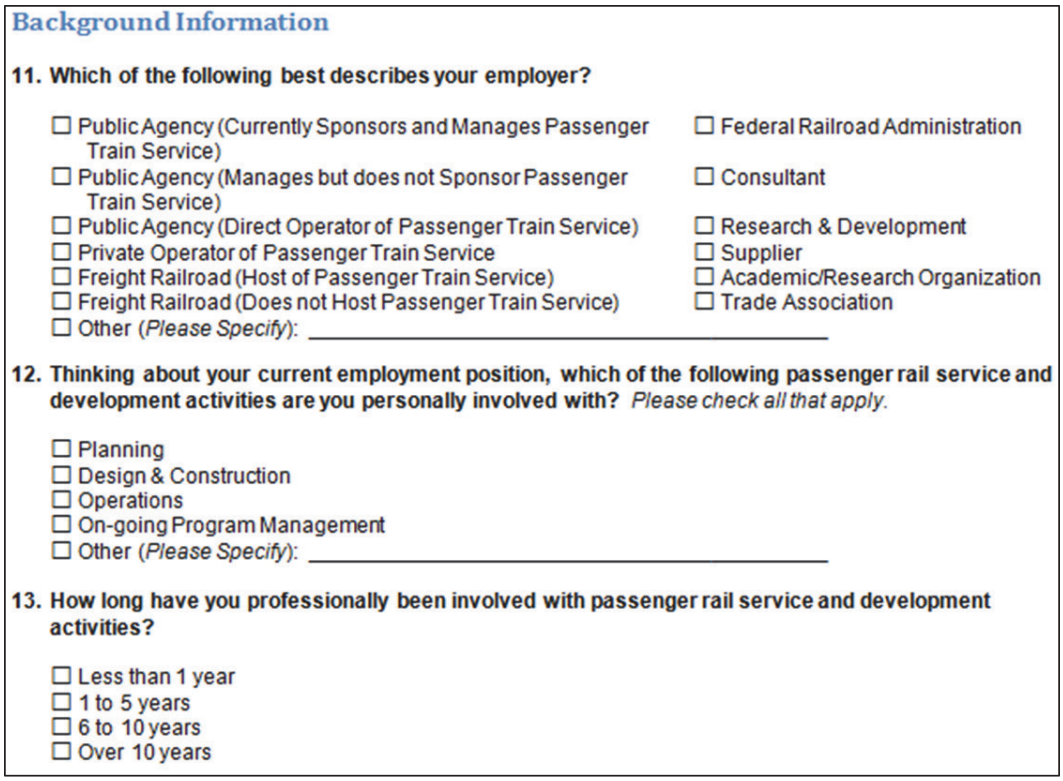
8. Please describe the most important ways in which a guidebook could be of value to your organization (be as specific as possible).

9. What format would you prefer for the NCRRP 03-01 passenger rail service and development guidebook?

☐ Bound Hard Copy of Guidebook ☐ Downloadable PDF Guidebook
☐ Loose-Leaf Hard Copy for Binder ☐ Interactive Web-Based Guidebook

10. Please provide the research team with any additional comments or feedback you have regarding needs for the NCRRP 03-01 intercity passenger rail service and development guide.

Figure F-5. Internet survey guidebook input questions.



Background Information

11. Which of the following best describes your employer?

- ☐ Public Agency (Currently Sponsors and Manages Passenger Train Service)
- ☐ Public Agency (Manages but does not Sponsor Passenger Train Service)
- ☐ Public Agency (Direct Operator of Passenger Train Service)
- ☐ Private Operator of Passenger Train Service
- ☐ Freight Railroad (Host of Passenger Train Service)
- ☐ Freight Railroad (Does not Host Passenger Train Service)
- ☐ Other (*Please Specify*): _____
- ☐ Federal Railroad Administration
- ☐ Consultant
- ☐ Research & Development
- ☐ Supplier
- ☐ Academic/Research Organization
- ☐ Trade Association

12. Thinking about your current employment position, which of the following passenger rail service and development activities are you personally involved with? *Please check all that apply.*

- ☐ Planning
- ☐ Design & Construction
- ☐ Operations
- ☐ On-going Program Management
- ☐ Other (*Please Specify*): _____

13. How long have you professionally been involved with passenger rail service and development activities?

- ☐ Less than 1 year
- ☐ 1 to 5 years
- ☐ 6 to 10 years
- ☐ Over 10 years

Figure F-6. Internet survey background information questions.

Table F-8 compares the employer type for both the Internet survey and SCORT workshop blue index cards. Between the two efforts, each possible category was represented by responses. The three most represented employer types were public agency (currently sponsors passenger train service), public agency (does not sponsor passenger train service), and consultant.

Table F-9 presents the responses to the participants' position activities, with the question allowing participants to select more than one option. A total of 45 selections were distributed across the four position activity categories. Planning received the most responses with 16, followed by operations with 10, and design and construction and ongoing program management each receiving 7 selections. In terms of experience levels, each category was well represented across the three experience levels.

Table F-7. Internet survey employer type and experience.

Employer Type	Level of Experience*			Total
	1 to 5 yrs	6 to 10 yrs	Over 10 yrs	
Public Agency (Currently Sponsors and Manages Passenger Train Service)	3	1	3	**7**
Public Agency (Manages but Does Not Sponsor Passenger Train Service)	2	1	2	**5**
Federal Railroad Administration	–	1	1	**2**
Consultant	–	–	5	**5**
Research & Development	–	–	1	**1**
Academic/Research Organization	–	1	–	**1**
Other: State DOT	–	1	–	**1**
Total	**5**	**5**	**12**	**22**

*Respondents could only select one option.

Table F-8. Comparison of employer type between Internet survey and SCORT workshop.

Employer Type	SCORT Blue Card	Internet Survey	Combined
Public Agency (Currently Sponsors Passenger Train Service)	14	7	**21**
Public Agency (Does Not Sponsor Passenger Train Service)	10	5	**15**
Public Agency (Direct Operator of Passenger Train Service)	1	–	**1**
Private Operator of Passenger Train Service	1	–	**1**
Freight Railroad	4	–	**4**
Federal Railroad Administration	3	2	**5**
Consultant	10	5	**15**
Supplier	5	–	**5**
Academic/Research Organization	1	2	**3**
Trade Association	3	–	**3**
Other: Attorney, Military, Union, Insurance Broker for Railroad Contractor, Information Service for Railroad Contractor, State DOT	7	1	**8**
Total	**59**	**22**	**81**

One of the major purposes of the Internet survey was to identify external sources currently used by potential users of the guidebook. The Internet survey provided a list of 19 sources that were selected by the research team because their content related to the different stages of intercity passenger rail service development. Table F-10 contains the most used external resources, defined as sources in which respondents indicated they used the external resource frequently or occasionally. The numbers shown in Table F-10 are out of 22 selections per resource. Four of the top seven external resources are products of FRA. Amtrak's fleet strategy document and AREMA's design standards also were selected from the list by respondents. The most used external resource was TRB's *Transportation Research Record* series.

In addition to the resources listed in the survey, respondents could write in other external resources that they use frequently. These included noise/vibration impact assessment studies; Amtrak reports and statistics; various additional FRA reports; and design guides (e.g., AREMA freight rail company design standards). Table F-11 presents a breakdown of the most used resources based on the position activities of each respondent.

Table F-9. Internet survey position activities and experience.

Position Activities	Level of Experience*			Total
	1 to 5 yrs	6 to 10 yrs	Over 10 yrs	
Planning	4	4	8	**16**
Design & Construction	2	–	5	**7**
Operations	2	2	6	**10**
Ongoing Program Management	3	2	2	**7**
Other: All of the Above, Environmental Impact Assessment, Funding, Policy Counsel, and Testing	1	1	3	**5**
Total	**12**	**9**	**24**	**45**

*Respondents could select more than one option.

Table F-10. Internet survey most utilized external resources.

External Resources	Frequently or Occasionally
TRR Journal	12
FRA Rail Corridor Planning Guidance (2005)	9
FRA State Rail Plan Guidance (2013)	9
Amtrak Fleet Strategy (2012)	7
FRA Station Area Planning for High-Speed and Intercity Passenger Rail (2011)	6
FRA Methodology for Determining the Avoidable and Fully Allocated Costs of Amtrak Routes (2009)	6
AREMA Design Standards	5

Three of the Internet survey questions asked respondents about internal resources, including internal processes to assist in carrying out functions, in-house models of passenger rail ridership and/or revenue, and performance management systems to measure performance of services. Table F-12 summarizes the descriptions provided in the survey. These are descriptions of the types of tools that professionals use that are internal to their agencies and in some cases are proprietary. This provides a valuable window into the inner workings of agencies that could be replicated by peers or modified for expanded use.

Following the external and internal resource questions, the survey included several questions related to lacking information within external resources and gaps that might exist within external and internal resources. Table F-13 summarizes the discussion from the participants on areas missing within existing resources.

As can be seen from the responses, there was great variety, ranging from specific needs to the general comment that every aspect of intercity passenger rail development was lacking information and needed documentation or guidance.

Table F-14 presents the input provided during both surveys on the desired format for the guidebook. As with the SCORT workshop blue index card, over 75 percent of the selections by respondents called for online or electronic formats as part of the desired guidebook formatting.

Table F-11. Internet survey most utilized external resources by position activities.

External Resources	Planning	Design & Construction	Operations	Ongoing Program Management
TRR Journal	8	3	6	3
FRA Rail Corridor Planning Guidance (2005)	6	3	3	3
FRA State Rail Plan Guidance (2013)	7	5	4	5
Amtrak Fleet Strategy (2012)	4	1	4	3
FRA Station Area Planning for High-Speed and Intercity Passenger Rail (2011)	11	4	7	6
FRA Methodology for Determining the Avoidable and Fully Allocated Costs of Amtrak Routes (2009)	6	3	5	3
AREMA Design Standards	4	3	2	2

F-16 Guidebook for Intercity Passenger Rail Service and Development

Table F-12. Internet survey internal resource responses.

Internal processes to assist in carrying out functions
• Contract procurement to document control to invoice and budget control • Design guidelines and policies • Environmental review checklists (online) • Forecasting demand and public benefits (in-house and proprietary) • Standard data request forms for rail projects that help to start with modeling environmental effects • Recent updates and expansion of passenger service quality assurance efforts
In-house models of passenger rail ridership and/or revenue
• Proprietary passenger/commuter/high-speed rail model that generates a predicted revenue stream over 10 years • Proprietary ridership, and ridership/passenger-mile based economic benefit forecasting models • High-level ridership and operations simulations to make basic verification checks • Industry standard model • Custom ridership/revenue models • Considerable amounts of analyzing ridership, revenue, and other performance and financial operational data that could be utilized for estimating future operational conditions
Performance management system to measure performance of services
• Delay minutes per 10,000 miles ridership and passenger miles compared to various data metrics • Track monthly revenue, ridership, customer satisfaction, city pairs, etc. in database • Industry adopted measures of performance and largely must rely on Amtrak for much of the data • Ridership and on-time performance

Table F-13. Internet survey lacking information and gaps responses.

Lacking Information and Gaps
• Every aspect • Step-by-step process to start an intercity passenger rail service • Needs to indicate how not to invalidate the process with FRA/DOT • Planning for intercity passenger rail if not a state DOT • Guidelines throughout the process for resources (people, effort, etc.) required for different sized operations • Challenges associated with Amtrak operating on freight rail lines (terms, conditions, and corresponding costs) • Detailed operating cost data and methods for identifying operating expenses • Funding options • Process/checklist for preliminary evaluation of potential passenger rail routes and extension proposals (first cut tool)

Table F-14. Guidebook format for Internet survey and SCORT conference.

Guidebook Format	SCORT Blue Index Card*	Internet Survey*	Combined
Bound Hard Copy of Guidebook	5	5	**10**
Loose-Leaf Hard Copy for Binder	10	8	**18**
Downloadable PDF Guidebook	40	18	**58**
Interactive Web-Based Guidebook	24	13	**37**
Total Selections	**79**	**44**	**123**

*Respondents could select more than one option.

In-Person Interviews with Officials of Entities That Are Potential Guide Users

The third part of the outreach plan was a series of in-person and/or conference call interviews with appropriate officials from stakeholders in the intercity passenger rail planning and development process by one or more members of the research team. These in-person interviews occurred over several months between December 2013 and March 2014 and included organizations such as freight railroads, federal regulatory agencies, state DOTs, and operators of passenger rail services. Each interview was guided by a set of questions developed by the research team prior to the interview and provided to the interviewees.

The following sections summarize the major discussion points for each question presented to railroads and intercity passenger rail service providers/implementation agencies. The content within the tables is presented to give an idea of the responses without identifying the persons interviewed or their affiliation so as to protect confidentiality. More detailed responses were available to specified research team members for analysis and to those who conducted the interviews.

The comments included in the following tables reflect the experiences and opinions of the interviewees. Any adverse or negative opinions of regulating agencies, specific freight railroads, or other intercity passenger rail stakeholders do not reflect the opinions of the research team, the panel, TRB, or NCRRP. The opinions of interviewees have been provided as information to potential guide users and served as a resource in developing the guidebook and selecting targeted synthesis topics. The responses reflect the opinions at the time of the interviews for this project in 2014 and may have changed since then.

Railroad Briefings/Responses

The research team had interviews with four operating railroads for the research study. Table F-15 presents generalized responses for each question. To maintain confidentiality, responses are presented as bullets with specific identifiers removed from the responses.

Intercity Passenger Rail Service Providers/Implementation Agencies Briefing/Responses

Four intercity passenger rail service providers, prospective intercity passenger rail service providers, and implementation agencies engaged in providing intercity passenger rail service were briefed on the project and asked for input on various questions. Table F-16 presents the generalized statements/responses to each question. To maintain confidentiality, responses are presented in bullets with specific identifiers removed.

Chapter 4: Targeted Syntheses

This chapter documents the identification and selection of the targeted synthesis of topics. The targeted syntheses were conducted to provide information on critically important research topics for which comprehensive resources or documentation are lacking. The final synthesis topics were identified by the panel as being those of most importance at the time of this project. These synthesis topics were deemed important so that a guide user with little or no experience, one starting from scratch, could have a better feel for gaps in established guidance and "know what they don't know." The synthesis information allows the users to avoid reinventing the wheel in the areas that are covered in the selected research/guidance topics. Some topics lack documentation by virtue of being new—e.g., new legislation, new situations/conditions, etc.—while others are areas where practitioner experience has not been summarized. The developed

Table F-15. Questions and summarized responses from the railroad briefings.

Question 1. Interest in development of new passenger rail services has grown considerably over the past 10 years. Generally the USDOT expects the states to play the leading role in developing new services. In your experience, what could states do better in their discussions with your company concerning potential shared use of your lines?
• Contact the railroad early in the process. One railroad has modified their thinking about the discussion process and now believes it to be a mistake to not be involved in the earliest phases of consideration of a new rail service. They used to wait for a more formal project definition and sponsor, only to then expend considerable energy explaining the limits of their network capabilities and ruling out unpalatable options. They now distribute passenger rail policy guides to all of the states within their service territory in an effort to provide some early framing of possibilities for new services. • Understand the complexity of railroad liability and indemnification issues. States, in general, fail to understand the concepts, costs, and level of exposure borne by host carriers in participating in a passenger service operation. Statutory limits are required to provide carriers sovereign immunity akin to that enjoyed by public agencies. Absent such provisions, carrier exposure to punitive damages, in particular, is a significant deterrent for consideration of new shared-use scenarios. • Public agencies within a state should speak with one voice when exploring joint use of a given segment of track. The railroad has no interest (and is poorly positioned) to arbitrate the best or most qualified passenger rail service partner. In most circumstances, the state DOT will be best positioned to assume the consolidated role. In some states, commuter agencies, counties, MPOs, and the state all vie for capacity on common alignments. • State DOTs need to staff their offices with railroad professionals. Highway planners are poorly positioned to understand railway service issues. Freight carriers often waste considerable time and energy educating DOT staff on the basics of railway infrastructure and service. Absent such staffing, qualified railroad consultants can play a mitigating, if imperfect, role. • Become educated on the ongoing operations and cost obligations associated with passenger rail service. Although rail assets are relatively long-lived, they wear out, and the public agency sponsor should program necessary asset replacements as a service is carried out. Also recognize the need for program management resources to ensure appropriate levels of interface and problem-solving investments that may arise as a service is implemented. • Develop mode-neutral asset investment protocols that enable alternative modal investment alternatives to be evaluated on a concurrent and equal basis, allowing the rail mode to play its most natural and cost-effective role. Some rail investments are layered on top of a traditional highway investment program, leading to unnecessary duplication of facilities. • Public agencies should come to the table with realistic expectations about the ability of a freight host carrier to facilitate high service levels for passenger trains. • Railroads need incentives to cooperate in both project development and service delivery. If there is no financial upside for the freight railroads, a real partnership is unlikely to develop.
Question 2. To date Amtrak has been the principal U.S. provider of intercity passenger rail services. How are discussions organized concerning prospective rail services between your railroad, Amtrak, state sponsors, and the Federal Railroad Administration? Are the roles of each party clear? What improvements in project coordination would you suggest for future such efforts?
• FRA should be more hands on with Amtrak in creating a common set of technical requirements. • Current arrangements are working well. FRA, in particular, has advanced in the 5 years since they became responsible for project funding and oversight. Project coordination is working well, and some states have matured in their understanding of rail network issues. Good personal relations between key stakeholders are essential to facilitate communication, develop trust, and improve the ability of all parties to understand the multiple perspectives involved in optimizing key project elements. • FRA has advanced in their program management and funding role. Their traditional role in overseeing safety has proved to delay projects regularly; specific project decisions are taking far too long. • Roles of state sponsors and FRA have become clearer over time. Many of the projects funded under ARRA had been in development for many years, so the development of specific PRIIA (Passenger Rail Investment and Improvement Act of 2008) guidance came mid-stream and tended to cause a lot of re-work. FRA should either engage further upstream in the project development discussions or issue more specific technical guidance to avoid re-work of project details.

Table F-15. (Continued).

• Federal agency roles seem somewhat muddled between FTA and FRA and should be streamlined. One example is safety oversight for commuter and intercity trains which is led by the two agencies separately, despite obvious areas of overlap in both functional jurisdiction and physical facilities. • Amtrak's role is counter-productive; they do not have the mindset to play a constructive, consultative role in developing new services. Amtrak layers on demands for project features but brings no funding to the table.
Question 3. Under PRIIA, states are required to develop and periodically refresh statewide rail plans. Are you satisfied with your level of involvement in developing these plans? Do the plans influence your internal strategic planning? What is the impact of the statewide plans on your own stance regarding intercity passenger rail proposals?
• States are frequently frustrated with the current mandatory planning regimen. Class I freight carriers are unwilling to discuss most elements of their network strategies, thereby frustrating efforts to develop a holistic rail strategy document for the state. Specific project initiatives are what drive the interest in statewide rail plans, with the corollary interest in ensuring eligibility for federal rail grants in support of those projects. One railroad plans to use the formal planning process to push the concept of evaluating potential public rail investments in the broad context of potential modal tradeoffs for both freight and passenger mobility challenges. • Statewide rail plans have no influence on railroad corporate strategies or priorities. The official plan exercise has become a ritual intended to ensure federal funding eligibility for future projects; funding identification and prioritization of projects is often lacking. As most intercity rail projects are multi-state in nature and rely heavily on federal funding, it appears to be a force fit to have these initiatives be primarily vetted through a state-by-state process. A true federal rail service plan is needed. • One railroad sees no value in the current state rail planning process. Planning exercises fall into two categories; in the first, direct input from the freight carrier is not sought. Some planners do engage with the railroads, asking intrusive questions and seeking detailed data that railroads consider proprietary and are unwilling to share. Statewide plans are developed to ensure qualification for FRA funding, but fail to set priorities in a manner that would inform the freight carriers or the public at large.
Question 4. What is your experience with FRA guidance on new intercity passenger rail projects? Is the content and mode of delivery of such guidance appropriate? How might it be improved to facilitate project delivery for future rail initiatives?
• FRA should develop formal project principles to inform all stakeholders of the federal policy priorities and frame the project-specific technical guidance that will be required for project execution. • FRA should engage earlier in the project development process to avoid re-work or explanations of technical project decisions further downstream. • FRA guidance and project management capabilities have improved in recent years. FRA is also much more sophisticated in their understanding of what various stakeholders are in a position to commit to as part of a full funding agreement. One thing FRA could give to states would be a more explicit description of the project delivery process so that states and other sponsors could start with realistic expectations as to the timing and level of effort associated with bringing a new service to fruition. States would also benefit from a fuller understanding of the range of technical personnel and resources that must be engaged to ensure the safety and success of even a short-term or trial service initiation. • Continuing confusion exists between FTA and FRA roles. Role reconciliation is required. • Safety and reliability reviews are far too slow and result in project delays. The FRA role in ensuring level-of-service capabilities, while legitimate, is seen as far too detailed and into the weeds beyond what is productive. • Federal procurement practices should be revised to streamline processes and position project procurement managers to take advantage of existing host railroad scale and cost efficiencies. Requiring that elements of the federally funded track upgrades be purchased separately escalates the cost of such purchases. • Permitting delays also are having a significant impact on project durations and cost.

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Table F-15. (Continued).

Question 5. What are the best models for ongoing coordination and monitoring of service delivery? How have these evolved and what improvements for the future might you suggest?
• Coordination mechanisms vary widely according to the nature of a specific service and the complementary processes of the relevant sponsoring agency. It is also challenging to predict the effect of a new investment on network rail service given that the improvement and new train operations will reset the nature of the network operation far beyond the geographic boundaries of the project itself. The same is true in the highway planning environment. For this reason, all parties should have an open mind about service standards and expectations and be willing to re-visit same once an operation has been up and running for a period of time. • The best approach is to provide incentives for excellent service and bring a problem-solving approach to review meetings. Amtrak's penalty-based system is seen as the worst example, in part because causes of delay are seldom subject to rigorous analysis and secondly because there is no real upside for providing excellent service. Service incentive payments are so small as to have no influence on a railroad's dispatch policies. It is important that passenger rail sponsors have access to resources that may contribute to necessary fixes when service problems arise. • For one railroad, current, internal coordination works reasonably well and might imply that fee-for-service arrangements, managed by host railroads could provide some advantages, provided all parties respected the importance of both the freight and passenger elements of the network operations. • Develop strong partnering and collaboration protocols that appropriately recognize host carrier issues and approach service challenges from a problem-solving perspective. Resource dedication and proper staffing is key to that success.

Table F-16. Questions and summarized responses from the intercity passenger rail service providers/implementation agencies.

Question 1. Interest in expansion or development of new passenger rail services in the US has grown considerably in the last decade with the USDOT (FRA) designating states to lead the role of planning and funding these expanded/new services. Notwithstanding the potential for other operators and alternate delivery mechanisms, Amtrak remains the principal US provider of these intercity passenger rail services. Do you feel there are identifiable areas for improvement in the Amtrak-State DOT interactions and can you discuss them?
• One entity believes that there is room for improvement in Amtrak's transparency in costing information; flexibility in scheduling for special circumstances/events; and provision of more disaggregated (i.e., train/station-specific) on-time performance (OTP) information. • There are always opportunities for improvement, most especially in the area of refined and more disaggregated cost data. • There is a wide range of staffing levels and degree of understanding of critical issues across states. Some of the most challenging circumstances occur in working with states that are new to the concept of contracting for intercity passenger rail service. One problem observed is that states attempt to do their own studies with under-prepared in-house staff, by hiring consultants, or even going directly to host railroads without having the ability to fully understand or critique the results. This can lead to states either being turned off by excessively high consultant or railroad estimated costs or the equally frustrating outcome of states moving full speed ahead in the false expectation that costs will be much lower than they are.
Question 2. In the context of planning and implementing new Intercity Passenger Rail services, could you comment on the several existing documents and tools our research team has identified in the NCRRP 03-01 Resources Matrix which may have been supplied to you in advance of today's discussions? Specifically are there any existing useful resources of which you are aware that we have omitted? Also, are there any particular tools you believe would be a useful addition to help resolve/expedite planning of new services?
• Two potential tools would be helpful in planning, managing, and modifying passenger service. The first would be a more granular, i.e., disaggregated, zero-based costing formula for use in budgeting new or expanded service. This tool would allow Amtrak to provide its state partners with better, more detailed information as they consider which service elements to purchase from Amtrak vs. other potential providers. The second tool which could help contracting states improve reliability would be more detailed and timely station/train-specific OTP data from host railroads, to provide early warning of potential problems and help suggest opportunities to remedy.

Table F-16. (Continued).

• Amtrak's Ridership Forecasting Model is an excellent tool for estimating intercity demand (revenue/ridership/yield) in the current US travel marketplace. • For estimating capacity, the licensed Berkeley "Rail Traffic Controller" (RTC) is a useful tool. • The Amtrak "Train Performance Calculator" (TPC) model is useful in stringing accurate schedules and related timetables, including speeds, geometry considerations, specific rolling stock and locomotives, etc. • Amtrak maintains a library of Infrastructure Capital Costs that includes examples of a wide variety of (largely state-sponsored, FRA co-funded) rail improvement projects. It can use these examples to better estimate and calibrate costs for future projects. • Some STB-related resources may exist that are not included in the matrix. • One of the potential issues of interest is the degree to which there is a difference in the Environmental Impact Statement (EIS) requirements (alignment/engineering standards/public feedback process/etc.) for a fully privately funded project vs. the more typical publicly funded passenger rail projects. • Several recently crafted "Multi-party Service Outcome Agreements" (SOAs) have been reached (after extended debate and negotiation in some cases). Generally in support of FRA HSIPR or TIGER Grants, these SOAs, involving FRA, Amtrak, states, and Host RRs (and specific to an individual FRA-funded project), provide a wealth of information on the challenges (and successful resolutions) of host railroad performance commitments to Amtrak and state(s) in trade for accepting FRA funding for substantial infrastructure/capacity upgrades.
Question 3. During your recent (2013) intense negotiations with the 17 state partners for cost sharing of PRIIA 209 short-distance services, were there any lessons learned or specifically any identifiable potential better tools to help in future similar negotiations?
• The implementation of PRIIA 209 state cost sharing is a work in progress, to address relatively new legislation, and the degree of sophistication in state partners varies widely. It is anticipated that state understanding and preparedness will improve with each consecutive year. • One of the problems observed is turnover of state representative staffs, necessitating education and re-training in the specifics of dealing with passenger rail contracts. • The biggest single issue observed in these recent negotiations was continuing dissatisfaction among states with Amtrak's provision of sufficiently detailed variable costs associated with proposed service level options. Notwithstanding the introduction of the new Amtrak Performance Tracking (APT) cost allocation system replacing the old Route Profitability System (RPS) cost allocation system, several states were still not pleased. This was challenging if a state asked Amtrak to estimate costs for a specific frequency, staffing level, or station change, and the resulting estimated cost did not appear to be adjusted proportionally. • One of the biggest challenges in the recently completed negotiations between Amtrak and the several state partners was the relatively limited ability of Amtrak to provide detailed cost variability information to reflect what-ifs as states considered changes in frequency, level-of-service, or carving out elemental components of the service package. Amtrak tried to use their existing systems to the best of their ability, but appear to need a more definitive variable cost-estimating/allocating model. It was observed that even the newer APT Cost Model that replaced the legacy RPS Cost Model is still largely an allocation-oriented rather than a true bottom-up cost forecasting model.
Question 4. Under PRIIA states are required to develop and periodically refresh statewide rail plans. Are you satisfied with your participation and level of involvement in development of these plans? Do the plans influence your own internal strategic planning? Is your entity typically invited to comment on Drafts of these plans before publication?
• The state rail planning process tends to be more of a general visioning exercise than one with the development of a detailed service development plan (SDP) for existing or potential passenger rail service. • There is a wide range of levels of detail in long-range passenger rail planning from one state to another. One entity believes that FRA might set more stringent (suggested minimum) standards defining the level of detail on passenger rail that states should include in rail plans/updates. • One entity feels the state has effective interactivity with them and its other related contracting entities as it expands and updates its State Rail Plan. It always includes the planned growth of the state's several passenger rail corridors in its plan.

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Table F-16. (Continued).

Question 5. What is your experience and degree of satisfaction with existing FRA guidance on new intercity passenger rail projects? Is the content and mode of delivery of such guidance appropriate? How might it be improved to facilitate project delivery for future rail initiatives? Are there any specific "gaps" that your entity could suggest we explore in our ongoing work?
• The FRA should clarify and provide more specific guidance on what needs to be included in a Passenger Rail SDP. One suggestion would be to offer proposed formats/levels of detail that differentiates the effort in proportion to the size of the proposed new/expanded service. It is suggested that creative right-sizing of SDPs could save resources, while still providing appropriate levels of information for the particular service in consideration. • One entity indicates it has more experience with FRA guidance on improving/expanding intercity passenger rail projects, as exemplified in the several recent HSIPR-funded upgrade programs. In these programs the guidance and delivery have worked reasonably well. The biggest single challenge has been the FRA mandate for a 20-year commitment by a host railroad for the multi-party SOAs. • FRA in the last few years has been fortunate to be able to administer multiple large capital grants including the PRIIA, TIGER, and HSIPR Programs. Initially, FRA did not have sufficient staff to manage the distribution and oversight of such large projects but has made major strides recently. • FRA was not well prepared to establish and oversee the Environmental Review and Approval Process, and ended up developing its own EIS Guidelines, largely similar to, but not identical to those employed by FHWA and FTA. This has resulted in quite a large amount of time-consuming work for the recipient states. Although, over time, the FRA EIS Guidance and related direction has been refined, there is still room for streamlining and improvement.
Question 6. What are the best models and tools for ongoing coordination and monitoring of service performance of the Host Railroads? Can you comment on the various types/formats of incentive elements and related data requirements in current Amtrak-Host Railroad agreements?
• This is a complex area. Effective monitoring and tracking of host railroad performance is critical to improving actual passenger train performance and central to the fundamental agreements between host railroads and the service provider. • It is difficult to develop an effective monitoring/incentive program for OTP when there are multiple operators in a short route, each with their own separate dispatching and responsibilities. • Specific service OTP measurements can allow for customized incentives based on the corridor's performance. • To ensure early recognition of any potentially developing performance problems, regular meetings between the service provider, local Amtrak management (if applicable), and a locally focused railroad representative can review performance and identify any problems. Proposed solutions and recommended actions can be mutually agreed upon. • One of the recent developments in OTP reporting and tracking is real-time delay report inputting by train conductors, using a sophisticated, new iPhone app, allowing them to report the length/cause of delay virtually as it happens.
Question 7. Do you believe that the current PRIIA language (and practical application) provide sufficient guidance and mechanisms to truly allow "alternate delivery" of short-distance passenger rail service (where technically feasible) either directly by a host railroad or a fully-qualified 3rd party provider? Are any additional planning tools necessary to help enable this concept (where applicable)?
• As costs increase each year, especially with the new PRIIA 209 full state payment requirements, it is always worthwhile to explore all means of controlling cost, including alternate providers. As the ability to unbundle service provision is improved (especially if Amtrak could provide better variable cost information on each category) it could be a good idea to find individual functions to out-source and save costs. • From the discussions with other states and corridors during recent PRIIA funding negotiations, it would seem that the most useful new tool would be a viable Budget Planning (i.e., cost-estimating) tool with better ability to vary cost than current Amtrak methodology. Both a screening level tool for broad analysis (e.g., varying frequency or route) and a detailed, disaggregated level for estimating specific adjustments (e.g., train slots or varying amenities) would be helpful to the contracting states.

syntheses are incorporated within the guide either as supplemental information to a topic or as stand-alone topic briefings.

The research team and project panel selected synthesis topics using an iterative process. Based on the conclusions from the literature review and the outreach efforts, the research team developed a list of six potential topics.

- **Liability/Insurance Requirements**—examine the liability issues associated with differing structures of intercity passenger rail operations, insurance requirements of host railroads, and potential problem areas/needs prior to and during service start-up.
- **State/Rail Authorities' Desire for More Granularity in Breakdown of Costs/Distinct Service Menu Options under PRIIA Section 209**—provide additional guidance and understanding on the pricing policies/principles/process under which individual service item costs are provided; document ongoing negotiations to provide more information on each service component and its disaggregated, zero-based cost.
- **Process and Costs for Adding Frequencies/Special Event Services**—explain processes and expected costs associated with adding a new frequency or special event (non-routine) service; cover both planning needs and service costs (e.g., operations and staffing).
- **Access Costs/Shared ROW Issues/Host Railroad Service Performance Tracking Tools**—explain host railroad access cost structure and operational needs, as well as flexibility and priority in scheduling over shared track/right-of-way; examine methods of tracking host railroad performance and use of incentives to increase on-time performance.
- **U.S. Surface Transportation Board (STB) Role/Requirements for Intercity Passenger Rail**—describe and explain the emerging role of the STB in regulation and oversight of new intercity passenger rail services, as well as when, how, and why STB approval must be sought in both planning initial service and making operational changes after service begins; outline existing statutes.
- **Detailed Service Development Plan Guidance**—provide more detail on what is required for FRA SDP requirements for varying service proposals, recommending establishment of general and/or specific requirements under most recent planning guidance for a given type of intercity passenger rail service (i.e., not one-size-fits-all).

During the June 24, 2014, panel meeting, the proposed topics were discussed, and five final topics were selected:

- **Liability/Insurance Requirements**—examine the liability issues associated with differing structures of intercity passenger rail operations, insurance requirements of host railroads, and potential problem areas/needs prior to and during service start-up.
- **State/Rail Authorities' Desire for More Granularity in Breakdown of Costs/Distinct Service Menu Options under PRIIA Section 209**—provide additional guidance and understanding for guide users of the pricing policies/principles/process under which individual service item costs are provided to include access and other costs from host railroads for service; document ongoing negotiations to provide more information on each service component and its disaggregated, zero-based cost.
- **Processes for Ensuring Redundancy/Resilient Service and Capacity for Special Event Services**—explain processes associated with providing robust intercity passenger rail service that is redundant/resilient enough to recover from adverse events and/or for adding new frequencies or special event (non-routine) service as needed; cover both planning needs and service costs (operations, staffing, etc.).
- **Performance Measurement/Quality Assurance**—describe existing and emerging tools, methods, and metrics for guide users to track and document performance of intercity passenger rail programs at the state/regional level to include performance tracking of both the host railroad

and/or service operator as well as methods of tracking and promoting high-quality, customer-service-based, best-practices-driven oversight/feedback/service improvement techniques by the state/rail authority.

- **U.S. Surface Transportation Board Role/Requirements for Intercity Passenger Rail**—describe and explain the emerging role of STB in regulation and oversight of new intercity passenger rail services, as well as when, how, and why STB approval must be sought in both planning initial service and making operational changes after service begins; outline existing statutes; discuss the inclusion of STB in the PRIIA §209 implementation process.

Chapter 5: Summary

Intercity Passenger Rail Service and Development Guide

The chapters are presented progressively from initial consideration of establishment of an intercity passenger rail program or service, to service planning and design, to operations and ongoing maintenance of the project. This structure generally follows the progression steps shown in Figure F-7, as outlined in NCRRP Project 07-02, which lists four major stages as the conceptual framework for intercity passenger rail project development. Chapters of the guide describe phases under each stage as they relate to overall program development.

The guide is organized into the following stages and corresponding chapters:

- **Visioning:**
  - **Chapter 1: Introduction.** Provides an overview of the need for the guide and overview of the passenger rail service development process.
  - **Chapter 2: Initial Intercity Passenger Rail Program Establishment Phase.** Presents an overview of the activities to undertake in the initial program establishment phase.
- **Planning:**
  - **Chapter 3: Service Planning Phase—Feasibility/Service Development.** Addresses the tasks associated with the service planning phase.
  - **Chapter 4: Planning Phase—Environmental Requirements.** Provides an overview of the tasks necessary to address environmental requirements in the planning phase.
- **Design & Construction:**
  - **Chapter 5: Design & Construction Phase.** Discusses projects and considerations addressed during the design and construction phase.
- **Operations & Maintenance:**
  - **Chapter 6: Operations Phase—Ongoing Service Operation.** Summarizes activities and tasks associated with the ongoing service operations.
  - **Chapter 7: Operations Phase—Ongoing Service Management.** Summarizes activities and tasks associated with the ongoing service management.
  - **Appendices—Targeted Syntheses.** Includes full targeted synthesis discussions for the five areas selected by the panel.

Figure F-7. Stages in NCRRP 07-02 conceptual framework for intercity passenger rail.

Research Findings

The scope of NCRRP Project 03-01 was to generate a comprehensive guide describing the resources, strategies, analytical tools, and techniques used by public agencies and private entities to support planning and decision-making in the development of intercity passenger rail service. While a one-size-fits-all approach is not appropriate for intercity passenger rail service development, a comprehensive guide describing existing resources and best practices is valuable to support intercity passenger rail service planning and development across the United States by various organizations.

The research team approached the creation of an intercity passenger rail service and development guide primarily as an effort to create a comprehensive collection of existing resources related to intercity passenger rail service and development. Many existing resources provide comprehensive coverage of certain topics related to intercity passenger rail planning and development, and it was the intent of the research team to ensure that the resulting guide allows for wide dissemination of these valuable resources. The researchers also recognized that some topics have limited or no coverage within the published literature. Furthermore, although some best practices that offer valuable insight into successful implementation of passenger rail service exist within public agencies and private entities, some of these best practices have not been formally documented in a research study or other resource. Therefore, existing resources were supplemented with limited additional research in the form of targeted syntheses on select topics where substantial gaps exist within the knowledge base.

These activities led to the creation of a user-friendly comprehensive guide that outlines strategies, tools, and techniques that public agencies and private entities can use to support planning and decision-making in the development of intercity passenger rail service. The guide is a valuable document to support intercity passenger rail service planning and development activities and serves as a resource that can be put into use immediately by the passenger rail practitioner community.

ANNEX: RESOURCE MATRIX

Note: Many of the resource documents listed here include hyperlinks to the actual document on the Internet.

Development Steps	Policy & Legal Framework[a]	Guidance Documents[b]	Research/Consultant Studies[c]	Analytical Tools[d]	Notable Practices/ Procedures/Checklists[e]
Planning					
Network Design/Route Selection	• PRIIA Section 208: Methodologies for Amtrak Route and Service Planning Decisions	• FRA Rail Corridor Planning Guidance (Section II) • AASHTO State Rail Planning Best Practices Guide (Chapter 8) • UIC High Speed Railway System Implementation Handbook • Air Rail Links • ACRP 118 Integrating Aviation and Passenger Rail Planning	• TTI/TxDOT 6467: Identification of Priority Rail Projects for Texas • TTI/TxDOT 5930: Potential Development of an Intercity Passenger Transit System in Texas • MWRRI Route Studies • SEHSR Route Studies • UIC Optimal Speed Study	• FRA Network Analysis Model • FRA Sketch-Planning Capacity Analysis Model • FRA CONNECT Model • NCFRP 27: Web-based Screening Tool for Shared-Use Corridors • ACRP 118: Integrating Aviation and Passenger Rail Planning—Air/Rail Diversion Model	
Environmental Analysis/Public Outreach	• FRA Procedures for Considering Environmental Impacts (*Federal Register* Notice) • FTA Environmental Impact and Related Procedures (*Federal Register*)	• FRA HS Ground Transportation Noise/Vibration Assessment • FRA HSIPR NEPA Guidance • UIC High Speed Railway System Implementation Handbook • Guidance for Implementation of FTA's Categorical Exclusions (23 CFR §771.118) • Guidelines on the Use of Tiered Impact Statements for Transportation Projects	• NCRRP Report 3: Comparison of Passenger Rail Energy Consumption with Competing Modes • TCRP Synthesis 89: Public Participation for Transit • UIC HSR Energy and Emissions • UIC Energy Consumption and CO_2 Emission of World Railway • UIC Railway Noise in Europe • NCHRP 25-25 (80): Potential Use of Social Media in the NEPA Process	• FRA Categorical Exclusion Worksheet • FRA Noise/Vibration Model • FRA Horn Noise Model • FRA Review Checklist • NCHRP 25-25 (80): Social Media Tools Matrix	• SEHSR • Illinois DOT • Texas-Oklahoma Passenger Rail Study (ongoing) • California High-Speed Rail • All Aboard Florida • Northern Lights Express • Desert Express • NY Empire Corridor
Ridership & Revenue Forecasting		• OIG HSIPR Best Practices: Ridership and Revenue Forecasting • UIC Demand Forecasting Guidelines • UIC High Speed Railway System Implementation Handbook	• Desert Express Draft EIS—Appendix B Ridership Forecast Review • CAHSR Ridership and Revenue Forecasts • Review of "Bay Area/California High-Speed Rail Ridership and Revenue Forecasting Study" • NCRRP 03-02: Intercity Passenger Rail in the Context of Dynamic Travel Markets • UK Comparing Rail Forecasting Approaches • Network Rail Long Term Planning Process: Long Distance Market Study Draft for Consultation • TCRP 166: Characteristics of Premium Transit Services that Affect Choice of Mode	• Amtrak Ridership Model • FRA Ridership Models • Third-Party/Consultant Models • In-House Ridership Models • FRA CONNECT Model • TCRP 167: Making Effective Fixed-Guideway Transit Investments: Indicators of Success • FTA STOPS model • ACRP 118: Integrating Aviation and Passenger Rail Planning—Air/Rail Diversion Model	• Checklists in OIG Best Practices: Ridership and Revenue Forecasting • California HSR Peer Panel • Other Peer Review Panels
Economic Analysis	• 49 U.S.C. §22701: State Rail Plans—Definitions	• FRA Methodology for Determining the Avoidable and Fully Allocated Costs of Amtrak Routes • USDOT B/C Analysis Guidance • USDOT Value of Time Guidance • UIC High Speed Railway System Implementation Handbook • OIG HSIPR Best Practices: Public Benefits Assessment • OIG HSIPR Best Practices: Operating Costs Estimation	• Ohio Hub PR Economic Impact Study • CAHSR Economic Impact Analysis Report • California High-Speed Rail Economic Benefits and Impacts in the San Francisco Bay Area • Economic Impacts of Amtrak Intercity Passenger Rail Service in Michigan • Measuring the Benefits of Intercity Passenger Rail: A Study of the Heartland Flyer Corridor	• FRA HSIPR B/C Guidelines	• Public Benefits Checklists in USDOT OIG Best Practices: Public Benefits Assessment

Development Steps	Policy & Legal Framework[a]	Guidance Documents[b]	Research/Consultant Studies[c]	Analytical Tools[d]	Notable Practices/ Procedures/Checklists[e]
Shared-Use Corridor Issues	• PRIIA Section 212: Northeast Corridor Infrastructure and Operations Improvements—Allocation Formula	• FTA Safe Transit in Shared Use • TxDOT 0-5022-P1 Passenger Rail Sharing Freight Infrastructure Primer • APTA Commuter Rail New Start Handbook	• NCHRP 657: Shared-Use Implementation Handbook • TCRP Report 130: Shared Use of Railroad Infrastructure with Noncompliant Public Transit Rail Vehicles • TCRP 52: Joint Operation of LRT or DMU Vehicles with Railroads • TCRP RRD 43: Supplementing and Updating TCRP 52 Joint Operations of LRT or DMU Vehicles with Railroads • TCRP RRD 47: Germany's Track-Sharing Experience • TRB EC058: Shared-Use Corridors • TCRP 145: Reinventing the Urban Interstate • Best Practices in Shared-Use High-Speed Rail Systems (Mineta) • NCHRP RRD 313: Cost-Allocation Methods for CR, IPR, and Freight Rail Operations on Shared-Use Rail Systems and Corridors • UIC Operating High-Speed Lines Carrying Mixed Traffic • TxDOT 0-5022-1: Public Support of Passenger Rail Sharing Freight Infrastructure • Economic Effects of Vertical Separation in the Railway Sector • GAO-09-282: Many Factors Influence Liability and Indemnity Provisions, and Options Exist to Facilitate Negotiations • GAO-04-240: Information and Guidance Could Help Facilitate Access Negotiations • NCHRP 773: Capacity Modeling Guidebook for Shared-Use Passenger and Freight Rail Operations	• RTC Model for Shared Use Corridor Capacity • NCFRP 27: Web-Based Screening Tool for Shared-Use Corridors	• CCJPA: Amtrak/UP • NNEPRA: Amtrak/Pan Am • WA/OR: Amtrak Cascades/BNSF • IDOT: Amtrak Illinois
Station Planning	• Americans with Disabilities Act, 1990 • ADA Standards for Transportation Facilities • ADA Accessibility Guidelines for Buildings and Facilities (ADAAG) • Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way	• FRA Rail Corridor Planning Guidance (Section II-A) • FRA Station Area Planning • FRA Pedestrian Crossing Safety • Amtrak Guidelines for Stations • Network Rail Guide to Station Planning and Design • UIC Toolbox for the Design and/or Renovation of Major Interchanges • TCRP 153 Guidelines for Providing Access to Public Transportation Stations • TCRP 175 Guidebook on Pedestrian Crossings of Public Transit Services	• GAO-15-70: Multiple Factors Influence Extent of Transit-Oriented Development • HSR/ICPR TOD Reports	• WSDOT's Handbook for Corridor Capacity Evaluation • TCRP 153: Station Access Planning Tool	• Downeaster • Other State Practices • FRA Station Area Planning Summary Checklist • Caltrans Station Guidelines • Amtrak Great American Stations Website
Service Development Planning	• FRA HSIPR Notice of Funding Availability: FY 2010 Service Development Programs—Appendix 2 Additional Information on Stages of Project Development	• UIC High Speed Railway System Implementation Handbook • APTA Commuter Rail New Start Handbook	• Florida East Coast Amtrak Service Development Plan		• NEC Future Rail Investment Plan • SEHSR SDP • Ohio Statewide Rail Plan—Appendix B: Commuter Rail Checklist
Strategic/Business Planning	• PRIIA Section 210: Long-Distance Routes		• Amtrak Annual Business Plans • RMRA High-Speed Rail Feasibility Study Business Plan • TCRP 166: Characteristics of Premium Transit Services that Affect Choice of Mode		• CCJPA Business Plan • California HSR Business Plans • Other State Practices

Development Steps	Policy & Legal Framework[a]	Guidance Documents[b]	Research/Consultant Studies[c]	Analytical Tools[d]	Notable Practices/ Procedures/Checklists[e]
Build Consensus/Public Support		• AASHTO State Rail Planning Best Practices Guide (Chapter 3) • APTA Inventory of Criticisms of High-Speed Rail • APTA Case for Business Investment in High-Speed Rail • Amtrak Government Affairs Publications	• NARP Guidance on Support-Building • TCRP Synthesis 89: Public Participation for Transit		• Advocacy Group Practices
Design & Construction					
Right-of-Way Design	• 49 CFR Part 213: Track Safety Standards	• AREMA Design Standards • Freight Railroad Design Standards	• UIC Design of HSR Lines for 300+ km/h State of the Art		• Standards in FRA-Funded HSIPR
Right-of-Way Acquisition	• 49 CFR Part 1152: Rail Line Abandonment • 49 CFR Part 1180: Railroad Acquisition, Control, Merger, Consolidation Project, Trackage Rights, and Lease Procedures • Alaska Statute 42.40: Alaska Railroad Corporation Act	• STB Overview: Abandonments & Alternatives to Abandonments	• NCHRP Synthesis 374: Preserving Freight and Passenger Rail Corridors and Service • TCRP LRD 1: Strategies to Facilitate Acquisition and Use of Railroad ROW • TTI/TxDOT 6268: Abandoned Rail Corridors in Texas • TCRP LRD 6: Requirements That Impact the Acquisition of Capital-Intensive Long-Lead Items, ROW, and Land for Transit		• North Carolina (NCRR) • New York (CSX) • Michigan (NS) • California (SP/UP) • Texas (RI/SP)
Fleet Design	• PRIIA Section 305: Next Generation Corridor Train Equipment Pool • FRA Accessibility Standards Applying to Passenger Rail Cars • 49 CFR Part 229: Railroad Locomotive Safety Standards • 49 CFR Part 238: Passenger Equipment Safety Standards	• PRIIA Section 305 Next Generation Equipment Committee Report—Equipment Ownership, Maintenance, and Management	• Amtrak Fleet Strategy • FRA Technical Criteria and Procedures for Evaluating Crashworthiness of Alternatively Designed PR Equipment for Use in Tier 1 Service • FRA Passenger Train Emergency Systems: Review of Egress Variables and Egress Simulation Models	• Equipment Manufacturers Materials	• California Designs • Wisconsin Talgo Designs • California/Amtrak Joint HSR • New Amtrak Individual HSR Procurement
Fleet Planning/Procurement	• State-Level Statutes for Passenger Rail Equipment Ownership • 49 CFR Part 238: Passenger Equipment Safety Standards	• NCRRP LRD 1 Buy America Requirements for Federally Funded Rail Projects	• Amtrak Fleet Strategy • FRA High-Speed and Intercity Passenger Rail Testing Strategy • Network Rail Network RUS Passenger Rolling Stock		• North Carolina • California • Midwest/California • Washington/Oregon Talgo • California/Amtrak Joint HSR
Cost Estimating	• PRIIA Section 209: State-Supported Routes—Cost Methodology	• OIG HSIPR Best Practices: Operating Costs Estimation • OIG HSIPR Best Practices: Operating Costs Toolkit • FRA Methodology for Determining the Avoidable and Fully Allocated Costs of Amtrak Routes • FRA Rail Corridor Planning Guidance (Section IX) • AREMA Cost Standards • UIC HSR Costing Standards	• FRA Mixed-Use Corridors Maintenance Costs Study • TTI/TxDOT 4723: Funding Strategies and Project Costs for State-Supported Intercity Passenger Rail • JRC Estimating Maintenance Costs for Mixed Higher Speed Passenger and Freight Rail Corridors • UIC Relationship between Rail Service Operating Direct Costs and Speed • NCHRP RRD 313: Cost-Allocation Methods for CR, IPR, and Freight Rail Operations on Shared-Use Rail Systems and Corridors	• Third-Party/Consultant Data	• Checklists in OIG HSIPR Best Practices: Operating Costs Toolkit
Safety Issues	• 49 CFR Part 213: Track Safety Standards • 49 CFR Part 236 Subpart I: Positive Train Control Regulations • 49 CFR Part 238: Passenger Equipment Safety Standards • FRA System Safety Program (*Federal Register* Notice of Proposed Rulemaking)	• FRA HSR Safety Strategy • FRA Collision Hazard Analysis Guide for Passenger Rail Service • Formulating a Strategy for Securing High-Speed Rail in the United States • Promoting Security and the Feeling of Security vis a vis Third-Party Violence in the European Rail Sector	• Volpe Center HrSR/HSR Studies • APTA Manual for the Development of System Safety Program Plans for Commuter Railroads	• TTCI Test Facility Reports	• Safety Review Checklists

Development Steps	Policy & Legal Framework[a]	Guidance Documents[b]	Research/Consultant Studies[c]	Analytical Tools[d]	Notable Practices/ Procedures/Checklists[e]
Grade Crossings	• 49 CFR Part 234: Grade Crossing Signal System Safety and State Action Plans • FRA Train Horn/QZ Rules • 49 CFR Part 222: Use of Locomotive Horns at Public Highway-Rail Grade Crossings • ADA Standards for Transportation Facilities • ADA Accessibility Guidelines for Buildings and Facilities (ADAAG) • Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way	• FHWA Grade Crossing Handbook • FRA HSR Grade Crossing • FRA Compilation of Pedestrian Safety Devices • FRA Guidance on Pedestrian Crossing Safety at or Near Passenger Stations • FHWA Manual on Uniform Traffic Control Devices (MUTCD) • SCCRA Highway-Rail Grade Crossings: Recommended Design Practices and Standards Manual • TCRP 175 Guidebook on Pedestrian Crossings of Public Transit Services	• NCDOT Sealed Corridor Studies • NCHRP 755: Comprehensive Costs of Grade Crossing Crashes	• Priority Index Calculation Tools • FRA GradeDec • FRA Quiet Zone Calculator	• Grade Crossing Review Checklists • Illinois DOT Grade Crossing Plan (Chicago-St. Louis HrSR) • Utah DOT Pedestrian Grade Crossing Flow Charts and Diagnostic Team Check List
Construction Issues		• UIC High Speed Railway System Implementation Handbook			• State Best Practices
Operations					
Passenger Rail Service Operation	• Amtrak • 49 CFR Parts 209-223, 225-229, 231-244: FRA Rail Safety Requirements • PRIAA Sect. 217: Access To Amtrak Equipment and Services	• UIC High Speed Railway System Implementation Handbook • OIG HSIPR Best Practices: Operating Costs Estimation • NCHRP 773 Capacity Modeling Guidebook for Shared-Use Passenger and Freight Rail Operations • ACRP 118 Integrating Aviation and Passenger Rail Planning	• FRA Work Schedules and Sleep Patterns of Train and Engine Employees in Passenger Operations • Iowa Pacific • All Aboard Florida • X-Train (LVS/LAX) • Z-Train (LVS/LAX)	• WSDOT's Handbook for Corridor Capacity Evaluation	• Commuter Rail Contracting
Right-of-Way Maintenance	• 49 CFR Part 213: Track Safety Standards	• AREMA Standards • Amtrak NEC ROW Standards • UIC Guidelines for the Application of Asset Management in Railway Infrastructure Organisations	• FRA Mixed-Use Corridors Maintenance Costs Study • UIC Maintenance of High Speed Lines • UIC Monitoring Track Condition to Improve Asset Management • UIC Relationship between Rail Service Operating Direct Costs and Speed		• Illinois • CCJPA/UP Maintenance
Equipment Maintenance		• Amtrak Maintenance of Equipment Standards Documents	• UIC Relationship between Rail Service Operating Direct Costs and Speed • FTA Managing Railcar Maintenance		• State-Specific Procedures • CCJPA
Fare Policy/Ticketing	• Amtrak	• Amtrak Studies on E-ticketing Implementation • ACRP 118 Integrating Aviation and Passenger Rail Planning	• TCRP Synthesis 96: Off-Board Fare Payment Using Proof-of-Payment Verification		• Downeaster • CCJPA
Revenue Management		• SNCF Yield Management Plan • SNCF "Lo-Cost" HSR TGV		• Revenue Management Tools	• State Best Practices • TEMPO—Texas Eagle • Acela Express (Cpy Cnstr)

Passenger Services & Amenities	• PRIIA Sections
	  ○ 208: Methodologies for Amtrak Route and Service Planning Decisions
	  ○ 209: State-Supported Routes
	  ○ 213: Passenger Train Performance
	  ○ 222: On-Board Service Improvements
		• Amtrak OBS Guidance Documents
		• UIC OBS Stds
			• TCRP Synthesis 104: Use of Electronic Passenger Information Signage in Transit
			• TCRP Report 92: Strategies for Improved Traveler Information
			• TCRP 166: Characteristics of Premium Transit Services that Affect Choice of Mode
					• State Best Practices
					• Amtrak Interactive Train Locator Map

Marketing & Outreach			• TCRP Synthesis 99: Uses of Social Media in Public Transportation • TCRP Synthesis 105: Use of Market Research Panels in Transit		• State Best Practices
Ongoing Program Management					
State Rail Plan	• 49 U.S.C. §227: State Rail Plans • FRA State Rail Plan Guidance • FRA Notice of Availability of Final State Rail Plan Guidance	• AASHTO State Rail Planning Best Practices Guide (Full)	• TTI/TxDOT 6467: Identification of Priority Rail Projects for Texas	• FRA Samples in National Rail Plan Documents	• State Best Practices

Development Steps	Policy & Legal Framework[a]	Guidance Documents[b]	Research/Consultant Studies[c]	Analytical Tools[d]	Notable Practices/ Procedures/Checklists[e]
Funding & Finance	• Alaska Statute 42.40: Alaska Railroad Corporation Act	• AASHTO State Rail Planning Best Practices Guide (Chapter 9)	• Virginia Senate Joint Resolution 63 (now Senate Document 14) • Virginia 2008 Statewide Rail Resource Allocation Plan • Virginia Funding Strategies for State Sponsored Intercity and High Speed Passenger Rail • APTA HSR Tax Credit Paper • TTI/TxDOT 4723: Funding Strategies and Project Costs for State-Supported Intercity Passenger Rail • NCRRP 07-01: Alternative Financing Approaches for Passenger and Freight Rail Projects • NCRRP 07-03: Inventory of State Passenger and Freight Rail Programs • MI DOT Passenger Rail Plan • CalTrans State-Sponsored Service Plans		• CCJPA • NNEPRA • WA/OR Cascade Corridor
Institutional Arrangements	• PRIIA Sections o 203: Establishment of Improved Financial Accounting System o 204: Development of 5-Year Financial Plan o 205: Restructuring Long-Term Debt and Capital Leases o 206: Establishment of Grant Process o 207: Metrics and Standards o 208: Methodologies for Amtrak Route and Service Planning Decisions o 209: State-Supported Routes o 214: Alternate Passenger Rail Service Pilot Program • 49 U.S.C. §21: Alaska Railroad Transfer • Alaska Statute 42.40: Alaska Railroad Corporation Act		• FRA Southwest Multi-State Rail Planning Study • NCRRP 07-02: Developing Multi-State Institutions to Implement Intercity Passenger Rail Programs • NCRRP 07-03: Inventory of State Passenger and Freight Rail Programs • MWRRI Study • NCHRP 657: Shared-Use Implementation Handbook • NCHRP RRD 313: Cost-Allocation Methods for CR, IPR, and Freight Rail Operations on Shared-Use Rail Systems and Corridors		• Midwest Interstate Passenger Rail Compact • WSDOT-ODOT Amtrak Cascades Partnership Contracts
Legal Issues	• Rail Passenger Service Act ("Amtrak Statute") • ICC Termination Act of 1995 (establishes STB and its jurisdiction) • Federal Employers' Liability Act • Railroad Retirement Act • Railroad Unemployment Insurance Act • Railway Labor Act • Numerous Railroad Safety Laws (Hours of Service Act, etc.) • Americans with Disabilities Act • Other Federal Statutes • Alaska Statute 42.40: Alaska Railroad Corporation Act	• NCHRP 657 Shared-Use Implementation Handbook • NCRRP LRD 1 Buy America Requirements for Federally Funded Rail Projects	• NCRRP 12-01: Legal Aspects of Rail Programs • TCRP LRD 39: Competition Requirements of the Design/Build, Construction Manager at Risk, and PPP Contracts • GAO-04-240: Information and Guidance Could Help Facilitate Access Negotiations	• Decisions of Courts, ICC, and STB • Applicable FRA Regulations	• Amtrak and Commuter Rail Contracts
Performance Management	• PRIIA Section 207: Metrics And Standards • PRIIA Section 213: Passenger Train Performance		• Via Rail PM White Paper • Oregon DOT—Transportation Performance Measures for Outcome Based System Management and Monitoring	• Amtrak Performance Tracking • On-Board/Customer Surveys • Customer Satisfaction Index • Amtrak Status Maps	• NNEPRA Performance and Ridership Spreadsheets • WSDOT & ODOT Amtrak Cascades Service Assessment Forms

Development Steps	Policy & Legal Framework[a]	Guidance Documents[b]	Research/Consultant Studies[c]	Analytical Tools[d]	Notable Practices/ Procedures/Checklists[e]
Contracting	• 49 U.S.C. §24403: Intercity Passenger Rail Service Corridor Capital Assistance—Project Management Oversight		• SHRP2-R16-RR-1: Improving Project Agreement Process • TCRP LRD 43: Contractual Means of Achieving High-Level Performance in Transit Contracts • GAO-06-820R: Active Commuter Rail Agency Service Contracts • GAO-09-282: Many Factors Influence Liability and Indemnity Provisions, and Options Exist to Facilitate Negotiations • GAO-04-240: Information and Guidance Could Help Facilitate Access Negotiations	• Commuter Agency Outsourcing Procedure Tools	• DBE/Local Contractor Requirements
Risk Management	• 49 U.S.C. §28103: Law Enforcement—Limitations on Rail Passenger Transportation Liability • 49 U.S.C. §28504: Commuter Rail Mediation—Applicability of Other Laws • Various State Laws Purporting to Limit Tort Liability for Public Agencies	• OIG HSIPR Best Practices: Operating Costs Estimation • FRA Methodology for Determining the Avoidable and Fully Allocated Costs of Amtrak Routes	• TCRP Report 130: Shared Use of Railroad Infrastructure with Noncompliant Public Transit Rail Vehicles • Managing Risk on the Railway Infrastructure • Risk Assessment for Rail Transportation Projects		• Amtrak and Commuter Rail Operating Agreements

[a] Existing **policy & legal framework** for intercity passenger rail in the U.S., currently defined under the Passenger Rail Investment and Improvement Act of 2008, as well as numerous other federal statutes and regulations applicable to intercity passenger rail. State laws and regulations also apply to some aspects of the service.

[b] **Guidance documents** issued by the FRA, other government agencies, and industry organizations (e.g., AASHTO SCORT, APTA, or AREMA) to support rail service development by interpreting statutory requirements or documenting notable practices.

[c] Completed, ongoing, or pending **research/consultant studies** sponsored by the TRB Cooperative Research Programs, federal or state agencies, or consultants on behalf of proposed intercity passenger rail projects.

[d] Comprehensive or sketch-level **analytical tools** developed by public or private entities to provide quantitative support for planning and decision-making.

[e] **Notable practices** or specific case studies of successful approaches or tools used by public agencies and private entities throughout the intercity passenger rail industry that may have limited or no documentation describing their impacts. Such resources also include procedures or checklists established by states or other operators to ensure service quality standards are being achieved. By extension, identification of "notable practices" also encompasses an assessment of "what not to do" or other practices that have been shown to not be effective at achieving rail passenger service goals.

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Abbreviations and acronyms used without definitions in TRB publications:

A4A	Airlines for America
AAAE	American Association of Airport Executives
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACI–NA	Airports Council International–North America
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FAST	Fixing America's Surface Transportation Act (2015)
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HMCRP	Hazardous Materials Cooperative Research Program
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
MAP-21	Moving Ahead for Progress in the 21st Century Act (2012)
NASA	National Aeronautics and Space Administration
NASAO	National Association of State Aviation Officials
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
PHMSA	Pipeline and Hazardous Materials Safety Administration
RITA	Research and Innovative Technology Administration
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
TCRP	Transit Cooperative Research Program
TDC	Transit Development Corporation
TEA-21	Transportation Equity Act for the 21st Century (1998)
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation

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