



Keystone High-Speed Rail System (Source: Texas A&M Transportation Institute)

The Keystone high-speed rail system is a partially-operational high-speed rail system containing 353 miles of routes in two segments wholly contained within the Commonwealth of Pennsylvania, connecting Philadelphia, Lancaster, Harrisburg, and Pittsburgh. The Philadelphia to Harrisburg segment of the Keystone high-speed rail system is one of only a handful of U.S. corridors with an *Operational* high-speed train segment, with maximum train speeds reaching 110 mph in selected areas along

the segment. The Harrisburg to Pittsburgh segment of the Keystone high-speed rail system is currently in the *Planning/Environmental* stage. The entire Keystone high-speed rail system is part of the federally-designated Keystone High-Speed Rail Corridor. High-speed inter-city passenger rail service in both segments is based on incremental improvements to existing freight railroad or Amtrak-owned rights-of-way.

SYSTEM DESCRIPTION AND HISTORY

System Description

The Keystone high-speed rail system consists of two segments, as summarized below.

Keystone High-Speed Rail System Segment Characteristics

Segment Description	Distance	Segment Status	Designated Corridor?	Segment Population
Philadelphia, PA, to Harrisburg, PA	104 Miles	Operational	Yes	7,034,263
Harrisburg, PA, to Pittsburgh, PA	249 Miles	Planning/Environmental	Yes	3,269,123

The Philadelphia, PA, to Harrisburg, PA, segment is 104 miles in length and includes major communities such as Lancaster and Elizabethtown along the route. High-speed rail service (the Amtrak Keystone Service) is currently operational in this segment, with all-electric trains and speeds reaching up to 110 mph in selected areas. Amtrak owns the entire 104-mile route between Philadelphia and Harrisburg, and operation of the Keystone Service route and infrastructure improvements are financially-supported by the Commonwealth of Pennsylvania Department of Transportation (PennDOT). The total population of the 12 communities served by the Keystone Service along this segment was 7,034,263 in 2010.

The Harrisburg, PA, to Pittsburgh, PA, segment is 249 miles in length and includes major communities such as Altoona and Johnstown along the route. The total population of communities along this segment that are currently served by Amtrak service was 3,269,123 in 2010. Proposed high-speed rail service on this segment is based on incremental improvements to the existing Norfolk Southern Railroad freight railroad right-of-way between the Harrisburg and Pittsburgh.

System History

Planning for high-speed intercity passenger rail in the Keystone high-speed rail system dates back to the mid-1960s with the passage of the *High Speed Ground Transportation Act of 1965* and initial efforts led by the Commonwealth of Pennsylvania to implement high-speed ground transportation in the state. One major event that advanced development of high-speed rail in the Philadelphia to Harrisburg corridor occurred in the Spring of 1976, when ownership of the 104-mile segment was transferred from the Penn Central Transportation Company to Amtrak (by way of Conrail). Between the mid-1970s and late 1990s, various attempts to implement high-speed rail service in the corridor were advanced as far as the feasibility study stage. In March 2004, the Federal Railroad Administration, in conjunction with PennDOT and Amtrak, released a technical monograph for transportation planning in the Philadel-

phia to Harrisburg railroad corridor. The monograph outlined the improvements for the Philadelphia to Harrisburg segment that would improve rail service along the segment and also better-integrate the segment with the Northeast Corridor mainline via the connection in Philadelphia.

In the late 1990s, PennDOT and Amtrak initiated the Keystone Corridor Improvement Program along the Philadelphia to Harrisburg corridor. The Keystone Corridor Improvement Program was implemented at a cost of \$145.5 million, with the costs equally split between PennDOT and Amtrak (\$72.75 million each). The goals of the improvement program were to reduce travel time, increase service frequencies, raise the maximum train speeds to 110 mph, and deploy new electric-powered trains along the corridor. In fall 2006, all-electric train service operating at a top speed of 110 mph was inaugurated on the Philadelphia to Harrisburg segment. Currently, the Keystone Corridor is the only electrified intercity passenger rail service in the U.S. outside of the Northeast Corridor. A new project, the Keystone Corridor East High Speed Phase II project, is underway that is expected to eliminate the remaining grade crossings along the Philadelphia to Harrisburg segment and increase the maximum train speed from 110 mph to 125 mph.

Although much of the focus for high-speed intercity passenger rail planning in the Keystone high-speed rail system has been on the Philadelphia to Harrisburg segment, various proposals for high-speed rail in the state have also incorporated the Harrisburg to Pittsburgh segment in an effort to create a statewide rail corridor. Despite this, however, implementation of high-speed rail in the Harrisburg to Pittsburgh segment has proceeded at a much slower pace. In February 2005, a report examining the feasibility of inaugurating passenger rail service between Harrisburg, Altoona, and Pittsburgh was completed for PennDOT and Norfolk Southern Corporation. The main purpose of the study was to determine the impacts of the proposed passenger service on Norfolk Southern freight train operations and to identify and estimate the costs of specific



Amtrak Keystone Service High-Speed Train Operating between Philadelphia and Harrisburg
(Source: RRPictureArchives/Mike Thomas)

infrastructure improvements that would be necessary to mitigate those impacts. In October 2009, Amtrak released a report that examined the feasibility of adding a second daily round trip on the Pennsylvania route between New York City and Pittsburgh via Philadelphia and Harrisburg. In February 2011, PennDOT initiated the Keystone Corridor West High Speed Rail Project to identify near-term solutions for improving rail travel in the Harrisburg to Pittsburgh segment of the Keystone high-speed rail system.

Federally-Designated Corridors

The entire Keystone high-speed rail system summarized here is part of the federally-designated Keystone High-Speed Rail Corridor. The Keystone High-Speed Rail Corridor between Philadelphia and Harrisburg was one of six federally-designated corridors authorized by the *Transportation Equity Act for the 21st Century* (TEA-21) in December 1998. In October 2000, the Keystone High-Speed Rail Corridor was extended to Pittsburgh.

Existing Intercity Passenger Rail Service

Existing intercity passenger rail service in the Keystone high-speed rail system includes the Amtrak Keystone Service, which operates between New York, Philadelphia, Lancaster, and Harrisburg, and the Amtrak Pennsylvanian, which operates between New York, Philadelphia, Harrisburg, and Pittsburgh.

Source: 2010 U.S. Census, High-Speed Rail Projects in the United States: Identifying the Elements of Success Part 2, Technical Monograph: Transportation Planning for the Philadelphia-Harrisburg “Keystone” Railroad Corridor, Commonwealth of Pennsylvania ARRA High-Speed Rail Funding Applications, Amtrak Fact Sheet Fiscal Year 2011: Commonwealth of Pennsylvania, P.R.I.I.A. Section 224 Pennsylvania Feasibility Studies Report, Keystone West Passenger Train Study, Federal Railroad Administration, Amtrak System Timetable Fall 2011/Winter 2012

ESTIMATED SYSTEM COSTS AND FUNDING SOURCES

Estimated System Costs

Feasibility studies provided capital cost estimates for the Keystone high-speed rail system. The estimated capital costs on a per-mile basis are shown below.

Projected Funding Sources

The total cost of the Keystone Corridor Improvement Project (April 2002 to October 2006), more than \$145 million, was equally split between PennDOT and Amtrak (the owner of the infrastructure). Designation of specific funding sources for additional HSR corridor development or improvement has not been made other than the studies described in the next section.

Since the inauguration of 110 mph high-speed train service between Philadelphia and Harrisburg in 2006, ridership on the Amtrak *Keystone Service* route has increased 45 percent.

Recent Funding Awards

The Commonwealth of Pennsylvania received more than \$67 million from the Federal Railroad Administration for high-speed intercity passenger rail improvements in the existing Keystone high-speed rail system. These awards included four grants totaling \$66,450,000 from the *American Recovery and Reinvestment Act of 2009* funds for various improvement projects to eliminate grade crossings and increase rail capacity on the Philadelphia to Harrisburg segment. The Commonwealth also received a grant in the amount of \$750,000 from the FY 2009 high-speed rail appropriations for a feasibility study, service development plan, and a programmatic NEPA document for the Harrisburg to Pittsburgh segment (the “Keystone West” corri-

dor), which the Commonwealth matched with a \$750,000 commitment from its passenger rail funds.

Source: High-Speed Rail Projects in the United States: Identifying the Elements of Success Part 2, Technical Monograph: Transportation Planning for the Philadelphia-Harrisburg “Keystone” Railroad Corridor, Commonwealth of Pennsylvania ARRA High-Speed Rail Funding Applications, Amtrak Fact Sheet Fiscal Year 2011: Commonwealth of Pennsylvania, Northeast Corridor Infrastructure Master Plan, Keystone West Passenger Train Study, Federal Railroad Administration

TRANSPORTATION SYSTEM IMPACTS

Ridership

The Amtrak Keystone Service route (New York – Philadelphia – Lancaster – Harrisburg) is the only all-electric high-speed rail service in operation in the U.S. outside of the Northeast Corridor mainline. For the 12-month period ending September 30, 2011, the Amtrak Keystone Service route carried 1,342,507 passengers, an increase of 3.5 percent over the 1,296,838 passengers carried by the route during the same period ending September 30, 2010. These ridership figures include the portion of the Keystone Service route between New York City and Philadelphia, which falls outside the Philadelphia to Harrisburg segment of the Keystone high-speed rail system. PennDOT notes that ridership on the Keystone Service has increased 45 percent since the completion of the Keystone Corridor Improvement Project in October 2006. Furthermore, PennDOT estimated that ridership on the Keystone Service would increase to more than 1.76 million annual passengers by 2030 with the travel time improvements that would result from the Keystone Corridor East High Speed Phase II project.

The 2009 Amtrak Pennsylvania Service study examined a conventional-speed extension of the existing Keystone

Keystone High-Speed Rail System Capital Cost Estimates

Segment Description/Study Name/Year	Maximum Speed/ Scenario	Estimated Capital Cost per Mile (\$ Millions)
Philadelphia to Harrisburg		
• Keystone Corridor Improvement Project Phase 1 (2006)	Upgrade existing service from 110 mph	\$1.4 (Actual)
• Northeast Corridor Infrastructure Master Plan (2010)	Upgrade from 110 mph to 125 mph	\$8.0
• Keystone Corridor Improvement Project Phase 2 (2011)	Upgrade from 110 mph to 125 mph	\$3.1
Harrisburg to Pittsburgh		
• Keystone West Passenger Train Study (2005)	Two additional 79 mph trains	\$0.4



Pittsburgh, Pennsylvania

Service route in the form of one additional daily train from Harrisburg to Pittsburgh and one additional daily train from Harrisburg to Altoona. Amtrak estimated that the implementation of both proposed trains would attract more than 180,000 passengers to the route. No detailed ridership forecasts for the Harrisburg to Pittsburgh segment of the Keystone high-speed rail system (the “Keystone West” corridor) were provided with PennDOT’s application for FRA high-speed rail funding; however, the on-going Keystone Corridor West High-Speed Rail Project is expected to provide ridership estimates for expanded rail service in this segment.

Mode Choice

In its March 2011 request for FRA funding for the Keystone Corridor East High Speed Phase II project, PennDOT noted that the ridership increases stimulated by the travel time improvements expected from the project would attract trips from automobiles to rail, reducing congestion, delay, and fuel use on heavily traveled highway corridors. The increase in rail ridership resulting from the project is

estimated to generate annual vehicle miles traveled (VMT) savings of more than 59.6 million miles by 2030, with corresponding annual reductions in emissions as follows: VOC, 7189.68 kg; NOx, 6918.52 kg; CO, 202617.19 kg; and SO2, 484.02 kg. Similar estimates for the Keystone West corridor program were not developed.

Connectivity with Other High-Speed Rail Systems

The two segments of the Keystone high-speed rail system connect to two other U.S. high-speed rail systems: the Northeast high-speed rail system in Philadelphia, PA; and the Ohio Hub high-speed rail system in Pittsburgh, PA. Each of these systems are described in other system summaries in this series.

Source: Amtrak Media Relations: Amtrak Fiscal Year 2011 Ridership and Revenue, Commonwealth of Pennsylvania ARRA High-Speed Rail Funding Applications, Amtrak Fact Sheet Fiscal Year 2011: Commonwealth of Pennsylvania, P.R.I.I.A. Section 224 Pennsylvania Feasibility Studies Report

GOVERNANCE

Intercity passenger rail planning and implementation activities in the Keystone high-speed rail system are coordinated by the Commonwealth of Pennsylvania Department of Transportation. PennDOT has worked closely with Amtrak, the owner of the Philadelphia to Harrisburg segment, to implement high-speed rail service and under-

take significant improvement projects for the benefit of the Keystone Corridor for more than 20 years. PennDOT has also completed joint studies with Amtrak and Norfolk Southern Corporation examining the Harrisburg to Pittsburgh, western segment.

BIBLIOGRAPHY

Plan the Keystone Project Website

URL: <http://www.planthekeystone.com/index.html>

Plan the Keystone: Keystone Corridor West Project Website

URL: <http://www.planthekeystone.com/kestonewest.html>

Amtrak Fact Sheet, Fiscal Year 2011: Commonwealth of Pennsylvania

URL: <http://www.amtrak.com/pdf/factsheets/PENNSYLVANIA11.pdf>

High-Speed Rail Projects in the United States: Identifying the Elements of Success Part 2

Prepared by the Mineta Transportation Institute, November 2006

URL: <http://transweb.sjsu.edu/mtiportal/research/publications/documents/06-03/MTI-06-03.pdf>

Note: Pages 53 – 86 of this report reviews a detailed history of the various proposals for high-speed rail in the Philadelphia to Harrisburg segment as well as the recent Keystone Corridor Improvement Program, also in that segment.

Technical Monograph: Transportation Planning for the Philadelphia-Harrisburg “Keystone” Railroad Corridor

Prepared for the U.S. Department of Transportation and the Federal Railroad Administration by Parsons Transportation Group, March 2004

URL: <http://www.fra.dot.gov/Elib/Document/2752> (Volume 1, Main Report) <http://www.fra.dot.gov/Elib/Document/2753> (Volume 2, Appendices)

Date Accessed: March 28, 2012

Keystone West Passenger Train Study

Prepared for the Norfolk Southern Corporation and the Pennsylvania Department of Transportation by The Woodside Consulting Group, Inc., February 2005

URL: <ftp://ftp.dot.state.pa.us/public/bureaus/PublicTransportation/Keystonestudyvol1.pdf>

Date Accessed: March 28, 2012

P.R.I.I.A. Section 224 Pennsylvania Feasibility Studies Report

Prepared for the U.S. House of Representatives’ Committee on Transportation and Infrastructure and the U.S. Senate Committee on Commerce, Science, and Transportation by Amtrak, October 2009

URL: <http://www.amtrak.com/ccurl/96/928/PennsylvaniaServiceStudies.pdf>

Date Accessed: April 25, 2012

The Northeast Corridor Infrastructure Master Plan

Prepared by The NEC Master Plan Working Group, May 2010

URL: <http://www.amtrak.com/ccurl/870/270/Northeast-Corridor-Infrastructure-Master-Plan.pdf>

Date Accessed: April 25, 2012