



Appendix 6

Rail Issues and Opportunities

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Introduction

Passenger and freight rail services and infrastructure in Pennsylvania function within a broader state and national context. The purpose of Appendix 6 is to describe current trends and issues that relate to the rail network that need to be addressed to improve passenger and freight rail transportation in Pennsylvania.

Socioeconomic and Travel Trends and Projections

Freight and passenger rail movements will be greatly impacted by the future demographics in Pennsylvania and the state's economy. Current population and employment, the distribution of population and employment within the state, population and employment growth, and population and employment density all affect the demand for travel. No single mode of transportation will sufficiently serve the growing demand for the movement of goods and people in Pennsylvania. What is needed is a coordinated multimodal network, one where rail plays a crucial role. This section summarizes the economic and demographic issues that are particularly important to assessing the overall freight and passenger rail needs in the state.

Population Distribution and Density

Pennsylvania has a population of approximately 12.4 million, according to the U.S. Census Bureau. This population is highly concentrated in metropolitan areas. As shown in Figure 6-1, the population density of the urban and suburban areas is substantially higher than the majority of counties in the state.

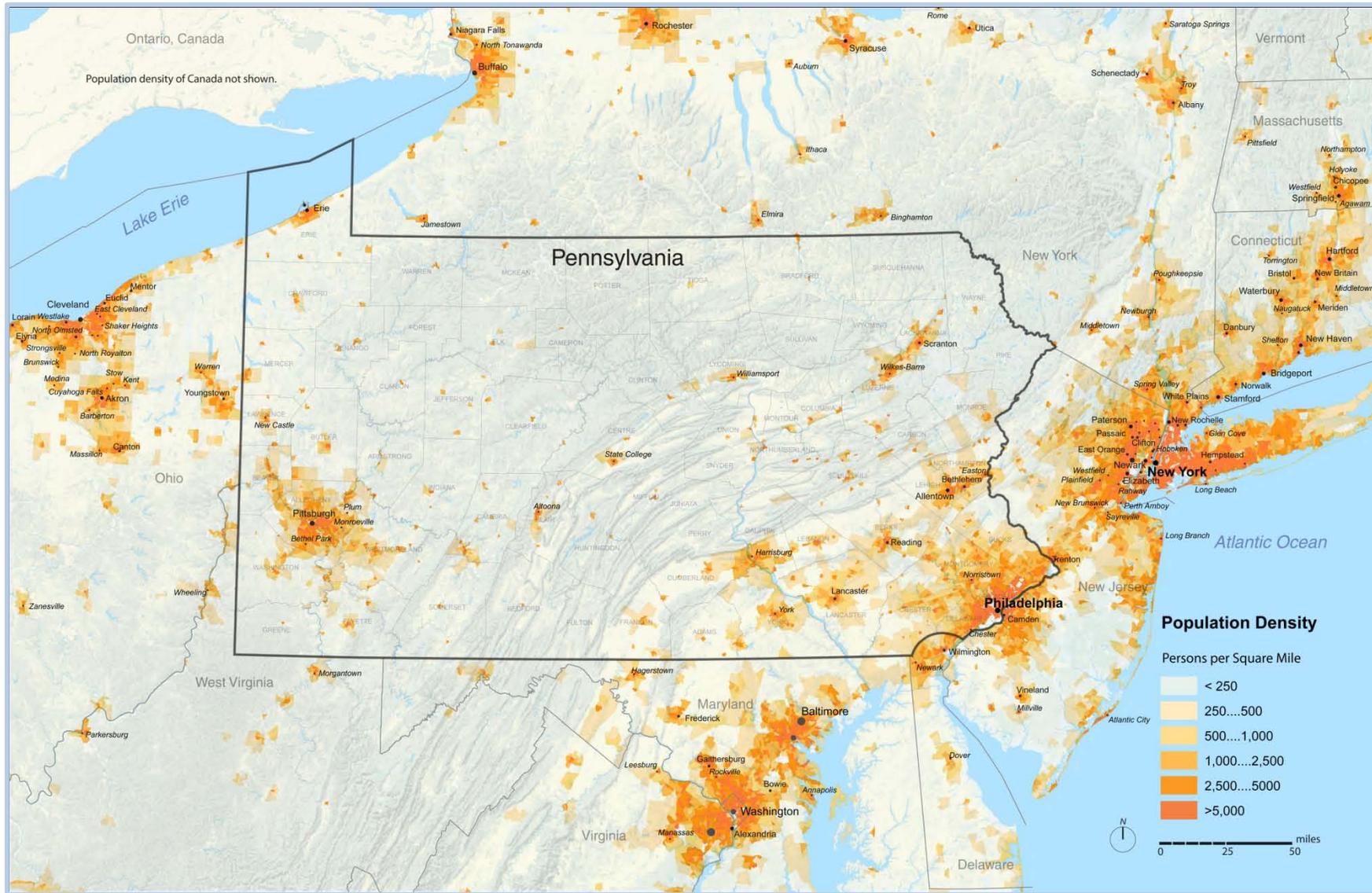
The Impact of Metropolitan Areas

The Brookings Institution states that, "Pennsylvania has eight of the nation's 100 largest metropolitan areas—Philadelphia, Pittsburgh, Harrisburg, Allentown, Scranton, and Lancaster, and the Pennsylvania portions of the Youngstown, Ohio, and the New York, New York metropolitan areas—which account for 70 percent of the state's population, 73 percent of the state's jobs, and 81 percent of the state's gross domestic product (GDP)." Furthermore, the Institution states that, "...all 16 of Pennsylvania's metros constitute 84 percent of the state's population, 87 percent of the state's jobs, and 92 percent of the state's GDP." Figure 6-2 depicts Pennsylvania's metropolitan areas and Table 6-1 presents data about these areas.

In summary, the vast majority of the state's residents live in metropolitan areas, which are estimated to produce 87 percent of the state's gross domestic product. For the rail system, this means that the primary job of the network will be to connect these metropolitan economies.



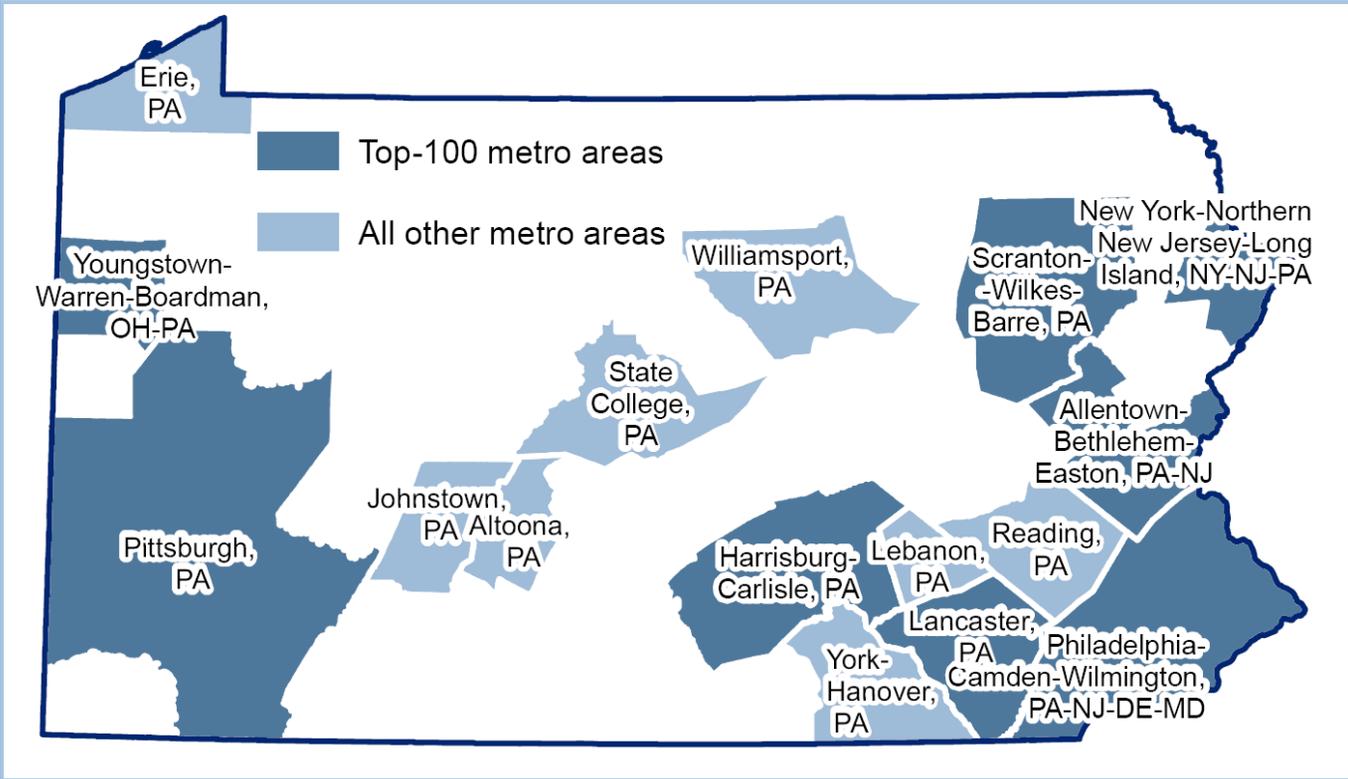
Figure 6-1: Population Density in Pennsylvania



Source: U.S. Census Bureau, 2000



Figure 6-2: Pennsylvania Metropolitan Areas



Source:
<http://www.brookings.edu/~media/Files/Projects/blueprint/statesbp/Pennsylvaniaapp.pdf>



Table 6-1: Pennsylvania Metropolitan Area Statistics

Rank*	Metro Area	Population		Jobs		GDP	
		Total	Share of State	Total	Share of State	Total (\$ in millions)	Share of State
6	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	3,878,904	31.3%	1,965,869	33.1%	207,432	42.7%
22	Pittsburgh, PA	2,381,671	19.2%	1,172,270	19.8%	102,053	21.0%
74	Harrisburg-Carlisle, PA	520,690	4.2%	335,412	5.7%	24,662	5.1%
68	Allentown-Bethlehem-Easton, PA	679,378	5.5%	306,679	5.2%	22,880	4.7%
89	Scranton-Wilkes-Barre, PA	550,539	4.4%	269,294	4.5%	17,052	3.5%
94	Lancaster, PA	489,936	3.9%	244,281	4.1%	17,481	3.6%
91	Youngstown-Warren-Boardman, OH-PA	119,115	1.0%	51,524	0.9%	3,119	0.6%
1	New York-Northern New Jersey-Long Island, NY-NJ-PA	56,180	0.5%	11,922	0.2%	772	0.2%
Total for Pennsylvania Metro Areas in the Top 100 Nationally		8,676,413	69.9%	4,357,251	73.4%	395,451	81.3%
123	York-Hanover, PA	408,182	3.3%	183,989	3.1%	13,418	2.8%
134	Reading, PA	396,236	3.2%	175,506	3.0%	12,946	2.7%
158	Erie, PA	280,184	2.3%	138,314	2.3%	8,258	1.7%
214	State College, PA	140,313	1.1%	89,028	1.5%	4,831	1.0%
264	Altoona, PA	126,572	1.0%	64,991	1.1%	3,641	0.7%
273	Johnstown, PA	147,804	1.2%	61,996	1.0%	3,470	0.7%
298	Williamsport, PA	118,102	1.0%	56,362	1.0%	3,411	0.7%
324	Lebanon, PA	125,429	1.0%	49,766	0.5%	3,130	0.6%
Total for all 16 of Pennsylvania's Metro Areas		10,419,235	84.0%	5,177,203	87.3%	448,556	92.3%

Source: <http://www.brookings.edu/~media/Files/Projects/blueprint/statesbp/Pennsylvaniaabp.pdf>

* Employment rank among all metro areas nationwide, based on Bureau of Economic Analysis 2005 wage and salary employment; rank is for entire metro which may include areas outside of the state. However, population, jobs, and GDP numbers include the in-state portions of the metros.



The Impact of Megaregions

According to the Passenger Rail Working Group of the National Surface Transportation Policy and Revenue Study Commission:

“Megaregions consist of large networks of metropolitan regions, each covering thousands of square miles and located throughout the country. Megaregions are defined by relationships with a common interest, which, in turn, form the basis for policy decisions. The five major categories of relationships are environmental systems and topography; infrastructure systems; economic linkages; settlement patterns and land use; and a shared culture and history”.¹

Moreover, the Regional Plan Association states that:

“The recognition of the megaregion as an emerging geographical unit also presents an opportunity to reshape large federal systems of infrastructure and funding, such as future surface transportation bills, the reorganization of Amtrak, housing and urban development authorizations, and farm policy. Just as the Interstate Highway System enabled the growth of metropolitan regions during the second half of the 20th century, emerging megaregions will require new transportation modes that work for places 200-500 miles across.”²

Megaregions in the United States are illustrated in Figure 6-3, prepared by the Regional Plan Association.

According to the map of emerging megaregions generated by the University of Pennsylvania 2004 Studio and the Regional Plan Association, Pennsylvania is part of two urban megaregions: the Northeast and the Great Lakes. As shown in Figure 6-4, in the northeast, the gradual merging of the economies of New York, Boston, Philadelphia, Allentown-Bethlehem, Baltimore, Washington, and others, creates a strong need for rapid, affordable, and sustainable travel modes. The existing commuter rail networks and the Northeast Corridor provide a foundation for further rail investment.

The Pittsburgh, Erie, and Youngstown-Warren-Boardman metropolitan areas are part of the Great Lakes megaregions, which extends the breadth of territory from Chicago to Buffalo and north into Canada. This region lacks the existing rail networks for intercity transportation to a larger degree than the northeast does, due to a lack of prior, significant investments in passenger rail.

An examination of traffic volumes on highways reveals the impact of megaregions. As shown in Figure 6-5 the majority of highway travel takes place within metropolitan areas, with strong flows between those metropolitan areas within the megaregions. In Pennsylvania, Philadelphia is firmly within the influence of the Northeast Corridor, with strong flows east and west to Washington, D.C., and New York City. However, interior cities also show a strong travel pattern to adjacent metropolitan areas. Harrisburg, the Lehigh Valley, and the I-80/Scranton corridor produce major travel volumes to and from the northeast major cities.

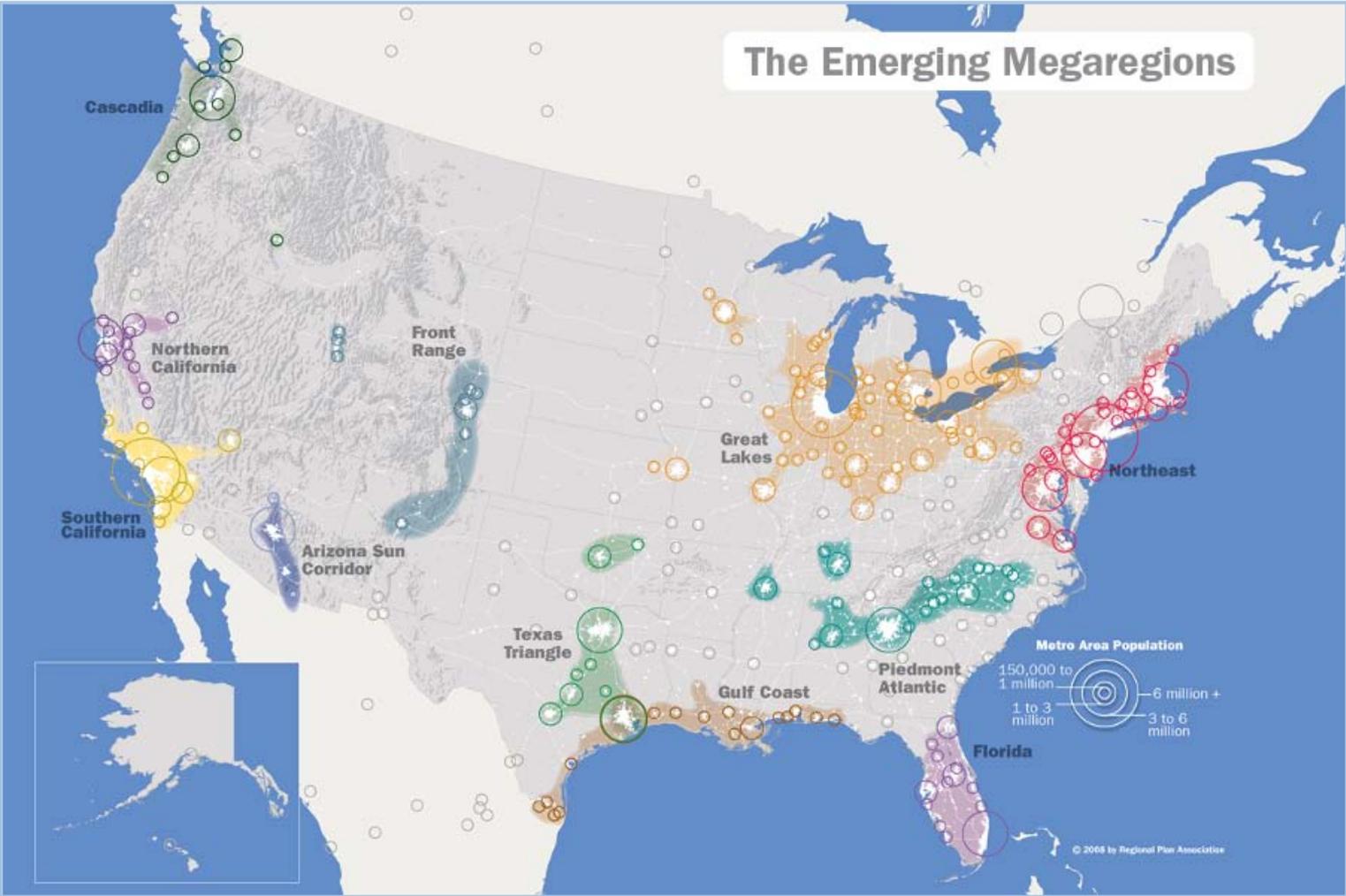
On the western side of the state, Pittsburgh is connected to Cleveland, Youngstown, and Cincinnati more strongly than it is connected to Philadelphia. Erie, of course, is connected strongly to Buffalo, Cleveland, and Pittsburgh. Highway volumes tend to demonstrate a strong travel pattern oriented toward travel within the megaregions.

¹ *Vision For The Future: U.S. Intercity Passenger Rail Network Through 2050*

² *Regional Plan Association, “America 2050: A Prospectus,” New York: September 2006.*



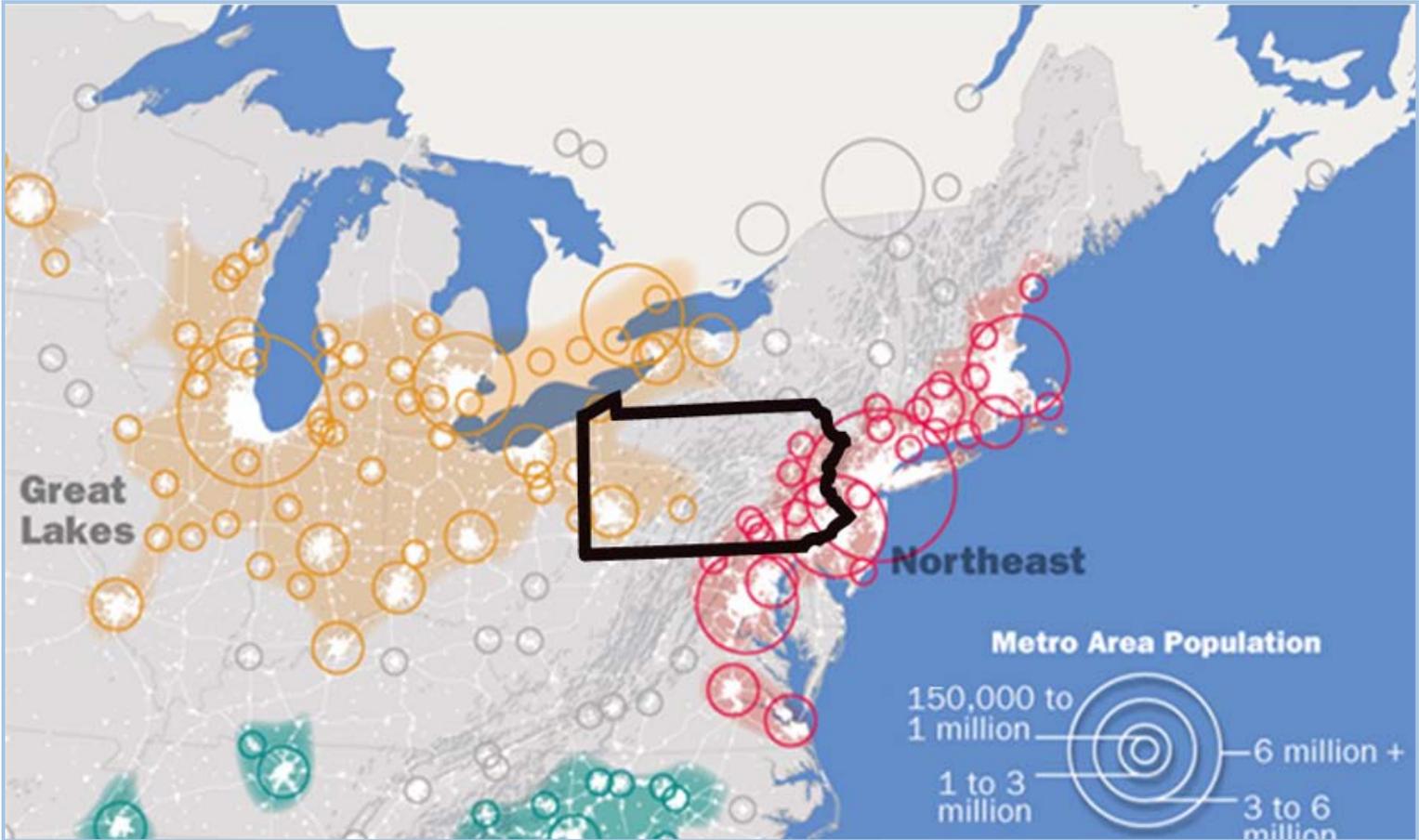
Figure 6-3: Map of Emerging Megaregions



Source: Regional Plan Association, University of Pennsylvania Studio, 2004



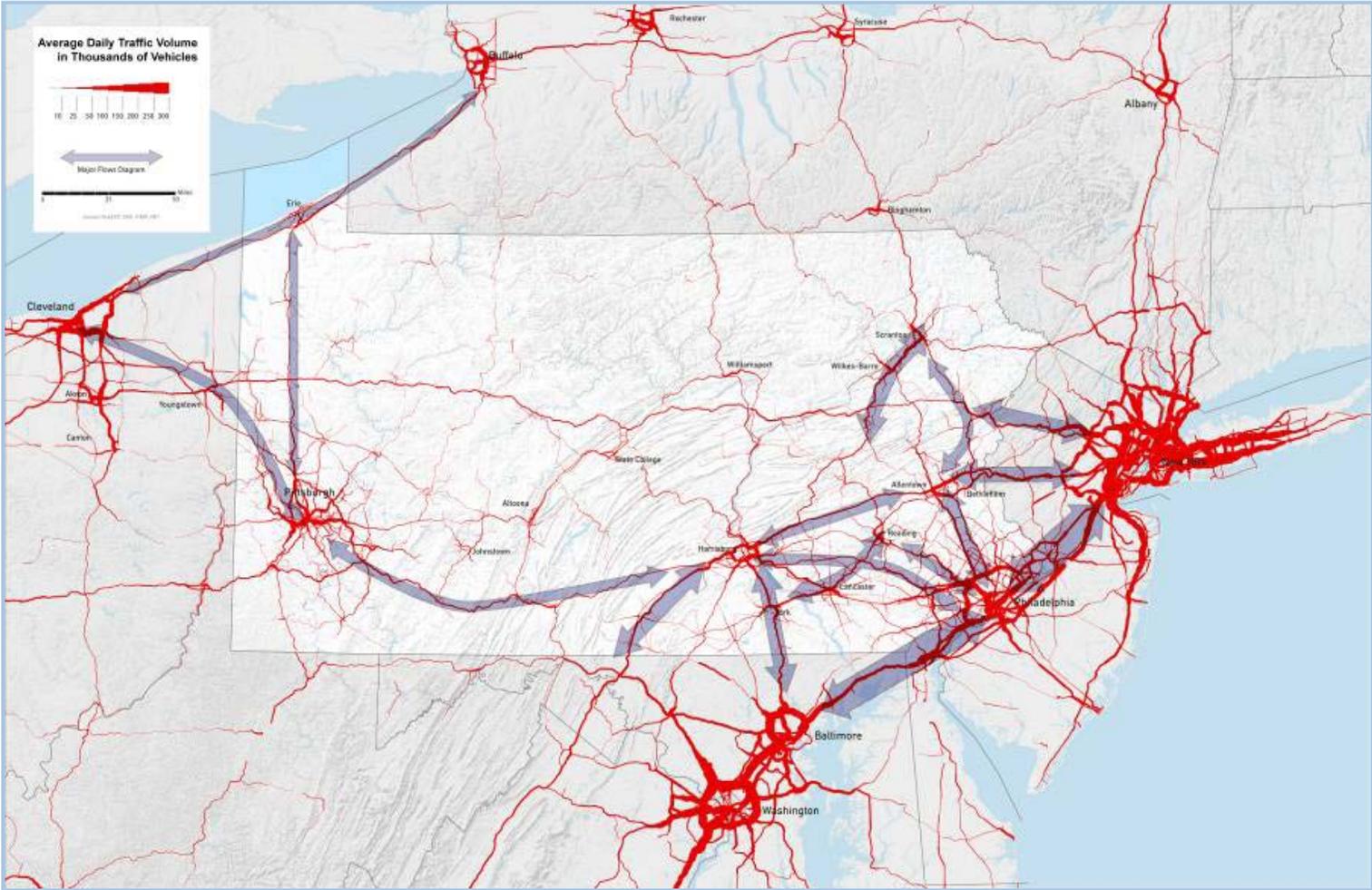
Figure 6-4: Map of Emerging Megaregions in the Northeast



Source: Regional Plan Association, University of Pennsylvania Studio, 2004



Figure 6-5: Average Daily Traffic Volumes on Highways



Source: Bureau of Transportation Statistics and Pennsylvania Department of Transportation



Existing Intercity Bus Service

Intercity bus service is an important component of the transportation network in Pennsylvania. Greyhound and Trailways generally provide express service between larger cities while several regional bus lines provide service to smaller towns throughout the state. In the eastern part of Pennsylvania, multiple operators provide daily commuter service to the New York City market. Figure 6-6 illustrates the location and frequency of intercity bus service in Pennsylvania.

Three routes between eastern Pennsylvania communities and New York City dominate bus travel in Pennsylvania: the I-95 corridor from Philadelphia, the I-78 corridor from the Lehigh Valley, and the I-80 corridor from Scranton and the Poconos. Sixty or more buses operate daily on each of these corridors, indicating a sizable travel market.

From Philadelphia to New York City, most of the service is operated by lower-cost bus service. Amtrak's prices are generally 400 to 500 percent higher for the same route. Some buses provide barebones service with curbside pickup while others provide roomy accommodation with free wireless internet and bathrooms on board.

The service along the I-78 and I-80 corridors has grown as a result of the continuing westward expansion of the New York City/Northern New Jersey residential and employment markets. Pennsylvania's fastest growing counties are located in these corridors due in part to residents looking for affordable housing at the fringes of the New York employment market. Most of these bus services are aimed at commuters who want an alternative to the high cost of driving, parking, and lost-productivity on congested highways.

Outside of the New York City markets, there is a network of bus lines connecting colleges, small towns, and big cities throughout most of the state. Many of these services operate only once or twice per day, providing an essential transportation service for non-drivers or those without access to a car. This type of service is critical to a large cohort of Pennsylvanians that will only grow as the population continues to age.

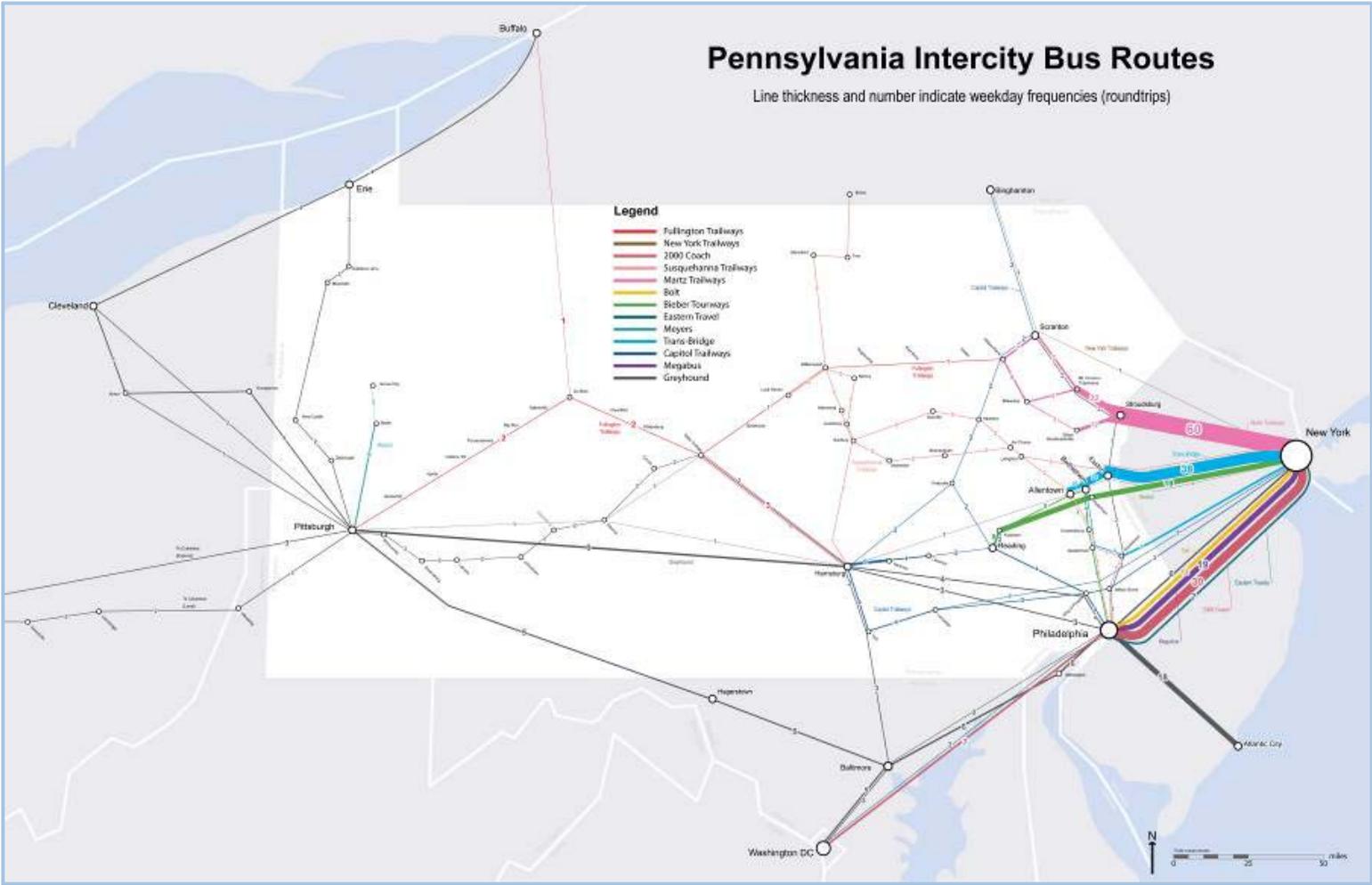
Commercial Air Service

Pennsylvania has several airports with scheduled commercial air service. These airports include one major international hub (Philadelphia), one "focus city" with significant domestic and limited trans-Atlantic service (Pittsburgh), a handful of airports with multiple flights to destinations across the east and Midwest (Harrisburg, Lehigh Valley), and four small airports with feeder service to regional hubs (Erie, Scranton as examples). Within Pennsylvania, there is significant passenger volume for flights between Philadelphia and Pittsburgh. However, most of the passengers originating at Pennsylvania airports are traveling to final destinations outside of the state.

As recently as the year 2000, US Airways operated over 500 daily departures to 110 destinations—many within Pennsylvania—from Pittsburgh. In the mid-2000s, US Airways downgraded its Pittsburgh operations from a hub to a "focus city" in several stages. By 2007, US Airways served only 21 destinations with 70 daily departures from Pittsburgh. Today, there are no direct flights between Pittsburgh and any Pennsylvania city other than Philadelphia. Passengers wishing to fly from Pittsburgh to any other destination in Pennsylvania must connect in Philadelphia or another hub outside of Pennsylvania.



Figure 6-6: Weekday Intercity Bus Frequencies in Pennsylvania





Airline service to small airports is expensive to provide because of the low volume of passengers to such destinations. Airlines justify such services by using these routes as feeders that bring passengers to line haul routes leaving from hub airports. Because of this operating model, fares for a trip to Philadelphia can be higher than fares to a destination that requires a connection in Philadelphia. Therefore, intercity travel options within Pennsylvania are usually limited to expensive flying or time-consuming driving. Both of these options can be easily impacted by congestion delays and poor weather conditions. Travelers in many Pennsylvania communities lack a rail option, which might provide a time and price-competitive alternative to driving and flying. Also, many travelers are unable or unwilling to drive long distances for a variety of reasons. Many of these communities need affordable options for travel other than private automobiles.

Future Growth in Pennsylvania: What is the Trend?

Two important documents were published in the past few years that describe the economic and growth potential for Pennsylvania. First, the most recent version of the *Annual Report on Land Use*, published in 2002 by the Pennsylvania Department of Community and Economic Development (DCED), provides a localized statewide analysis of population, employment, and land use trends. Second, in 2003, the Brookings Institution Center on Urban and Metropolitan Policy published *Back to Prosperity: A Competitive Agenda for Renewing Pennsylvania*. This in-depth, national perspective of Pennsylvania’s economic outlook provides a stark glimpse of the Commonwealth’s future if current trends continue.

DCED’s Annual Report on Land Use indicates that, although Pennsylvania’s population grew by 3.4 percent from 1990 to 2000, its rate of growth lagged significantly behind that of the nation overall.³ Table 6-2 shows the most recent population growth trends from 2000 to 2008. The report summarizes the current and potential condition of Pennsylvania’s economic and physical landscape by emphasizing seven key growth trends:⁴

1. Pennsylvania’s growth is stagnant compared to that of the nation.
2. Statewide, more citizens are migrating out of than into Pennsylvania.
3. People are migrating to Pennsylvania’s eastern and south central counties.
4. The growth occurring in eastern and south-central Pennsylvania is part of a regional growth corridor.
5. Growth in Pennsylvania’s western and northern tier counties is stagnant or declining.
6. Urbanized areas continue to experience population loss, while many traditionally rural areas are growing.
7. Fewer people are consuming greater amounts of land.

Looking at more recent data on population growth, growth trends 3 through 6 above regarding regional growth patterns are expected to persist over the next 30 years if current trends continue.

³ 2002 *Annual Report on Land Use*, Governor’s Center for Local Government Services, Pennsylvania Department of Community and Economic Development

⁴ *Ibid.*



Table 6-2: Pennsylvania Population Trend

Year	Population	Percentage Change
2000	12,285,041	The population has experienced a 1.3% increase, between 2000 and 2008.
2001	12,284,522	
2002	12,298,775	
2003	12,317,647	
2004	12,335,652	
2005	12,351,881	
2006	12,388,055	
2007	12,419,930	
2008	12,448,279	

Source: U.S. Census Bureau

Figure 6-7 illustrates population forecasts from 2007 to 2039 by county, developed by IHS Global Insight. As indicated on the map, the highest growth counties are located in the southeastern region adjacent to Philadelphia, Reading, and the Lehigh Valley. Somewhat less growth is also projected in the south-central and eastern central regions adjacent to Carlisle, Gettysburg, and Harrisburg. The growth in the southeast and south-central regions can be attributed to their position in the greater northeast regional growth corridor extending from Virginia Beach, Virginia, to Portland, Maine.

As indicated in the DCED growth trends, population forecasts for the western and northern tier counties in the state show stagnation or decline. Likewise, the urban centers of Philadelphia County and Allegheny County (Pittsburgh metropolitan region) indicate significant decline over the next 30 years.

The DCED report identifies five major factors that influence the negative growth trends:

1. Urban flight
2. Loss of farmland and open space to development
3. New highway construction
4. Population shifts
5. Regional economic decline

The DCED annual report concludes that:

“If we choose to do nothing, the trends described in this report will continue. People will continue to relocate from our urban areas to suburban and rural areas of the state. Costly new and improved highways will be required to accommodate more development in non-urban areas. We will continue to lose farm and forest lands to new development. Regions of the state that are in economic decline will likely maintain their descent, as people and businesses continue to move to newer, more prosperous areas.”⁵

Economic decline in Pennsylvania, stated as the fifth factor influencing negative growth trends by DCED, has been studied in detail by the Brookings Institution in their 2003 report, *Back to Prosperity: A Competitive Agenda for Renewing Pennsylvania*. Like the DCED report, this study documents development and growth trends in Pennsylvania since 1990, with the same negative conclusions. *Back to Prosperity* focuses more on overall economic trends in the state, including

⁵ 2002 Annual Report on Land Use, Governor’s Center for Local Government Services, Pennsylvania Department of Community and Economic Development



employment growth, and offers more in-depth analysis of regional trends, factors influencing the trends, existing assets, and strategies for renewal.

The DCED and the Brookings reports, plus the IHS Global Insight population forecasts draw similar conclusions about stagnant population growth and regional disparities. *Back to Prosperity* summarizes the overall economic situation in Pennsylvania in three points:

1. **Pennsylvania’s population is barely growing.** Only North Dakota and West Virginia grew more slowly since 1990.
2. **The state is spreading out—and hollowing out.** Population and jobs are not growing so much as shifting from urban centers to outlying suburbs.
3. **The state’s transitional economy is lagging.** Pay lags behind both the nation and the Mid-Atlantic states, and a large percentage of the population works in low-wage jobs.

Employment trends in Pennsylvania indicate that the state is not nationally competitive in terms of job growth. Employment increased by only 11.4 percent between 1990 and 1992, compared to a 19.9 percent increase nationwide.⁶

Within the state, employment growth varies across metropolitan regions. The Lancaster and Harrisburg metropolitan regions had the highest employment growth between 1992 and 2002 with 18 percent and 15.4 percent, respectively.⁷ The Scranton/Wilkes-Barre/Hazleton region had

only a 6.4 percent increase in the 10-year period. Between 1990 and 2000, the Cities of Pittsburgh and Philadelphia both lost employment by 6 percent and 8.5 percent, respectively.

Looking ahead, employment forecasts developed by IHS Global Insight indicate statewide employment growth of only 11.6 percent between 2007 and 2039. Figure 6-8 depicts employment forecasts by county.

As expected, the southeastern counties in the Philadelphia metropolitan region have the highest growth in the state; even the City of Philadelphia is forecasted to have an 11 percent increase in employment to 2039. The eastern and south-central regions are also expected to have significant employment growth. Most of the central, northern, and western counties are forecasted to have minimal growth or loss. The exceptions include Centre County (State College area), Erie, and strong growth in the Pittsburgh metropolitan area.

Both employment and population growth in these three regions can be attributed to several assets highlighted in *Back to Prosperity* and the DCED reports, including:

1. Regional centers of medicine and education
2. Major business and high-technology clusters
3. Location in the greater Northeast region growth corridor
4. Strong road and rail networks and other infrastructure
5. A wealth of restaurants, shops, entertainment, and sports facilities
6. Distinctive, human-scaled, and livable neighborhoods

Despite these positive regional assets and slow statewide growth, Pennsylvania is still sprawling outward and undermining the older cities,

⁶ *Back to Prosperity: A Competitive Agenda for Renewing Pennsylvania*, The Brookings Institution Center on Urban and Metropolitan Policy, Bureau of Economic Analysis

⁷ *Ibid.*



towns and boroughs—places that provide the above-mentioned assets needed to bolster competitiveness.

Still, the reports offer hope that not all is bleak for Pennsylvania. The state possesses enough social, natural, and economic assets to make it more competitive in the global economy, but state, regional, and local policies are not doing enough to capitalize on them. To get “back to prosperity,” the Brookings Institution recommends steering investment back to places with core assets and established infrastructure and leveraging the state’s education and health sectors. To do so will take a concerted effort to revise state planning and regulatory policies to promote smart growth. As concluded in the *Annual Report on Land Use*:

“If we choose to do something and plan for smart growth, we may be able to conserve and preserve more of our natural and historic resources, reinvigorate our urban areas and make them more attractive to citizens and businesses, and bring new prosperity to all regions of the Commonwealth.”

An Increasing Population of Senior Citizens

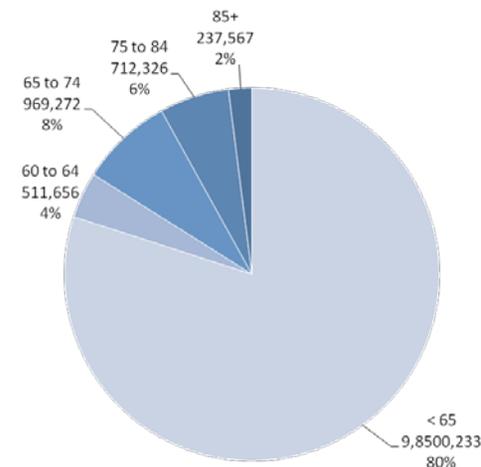
According to the Pennsylvania Department of Aging:

- **There are approximately 2.5 million Pennsylvanians over the age of 60, with more than 302,000 over the age of 85.** One in five older Pennsylvanians lives in or near poverty and more than 200,000 are identified as members of a minority group.
- **Twenty percent, or one out of every five people in the Commonwealth of Pennsylvania, is age 60 or older.** Pennsylvania has the third-highest percentage of people over age 60. Only Florida and West Virginia have higher percentages of 60 plus. Only four states have a higher number of older residents than Pennsylvania: California, Florida, New York, and Texas.

- **By the year 2020, Pennsylvania's 60 and older population is expected to be 25 percent of the total population**—more than 3 million people. Most of the “baby boomers” will be over age 60 by that time. The 65 and older population is projected to increase to 2.3 million and the 85 and older population to about 363,000.
- Over the next 10 years, the number of elderly age 60 and older is projected to increase by about 9 percent to 2.6 million people. The number of elderly ages 60 to 74 will increase by about 15 percent to 1.6 million; the number of people ages 75 to 84 will decrease by 11 percent to 623,000; and the number aged 85 and older will increase by more than 50 percent to 365,000.

The percent of the state’s population who were over 60 years of age in the year 2000 is shown in Figure 6-9.

Figure 6-9: Percent of Population Over 60 in the Year 2000



Source: Pennsylvania Department of Aging/U.S. Census



Conclusions - Socioeconomic and Travel Trends

A key element to promoting smart growth in Pennsylvania is to take advantage of the state's substantial rail networks and invest in land use strategies that support and encourage development in our rail-rich cities, towns, and boroughs. The current forecasts show the majority of growth is centered in the metropolitan areas in the eastern portion of the state, with some growth in the area of State College and the Pittsburgh region. The areas with more growth would benefit from rail infrastructure oriented towards "re-centering" growth focused in existing towns and cities.

For urban areas of the state that forecast declines, it is important to try and "bend the trend" upward through increasing the competitiveness of these areas. Rail investments in these areas, therefore, should consider whether the action will increase the ability of the area to maintain quality of life and economic competitiveness.

The trend of an increasing population over the age of 60 suggests a strong need for public transportation modes to provide options for people who find that driving becomes more difficult or impossible. Intercity transportation will also have to be affordable in order to allow for mobility by a population living on a fixed income.

The formation of urban megaregions creates the need for a fast web of intercity transportation to allow for an expanded area for business and personal travel. The state is split into two megaregions, the Great Lakes and the Northeast, and Pennsylvania should seek to develop the rail links to the major cities within each region. On the eastern side of the state, large flows of buses and vehicles in the I-95, I-78, and I-80 corridors suggest a strong market for passenger rail and improved public transportation. While the majority of travel takes place within

megaregions, high-speed rail could help to bridge the considerable gap between the Northeast and Great Lakes (as represented by Philadelphia and Pittsburgh).

Freight Rail System Issues

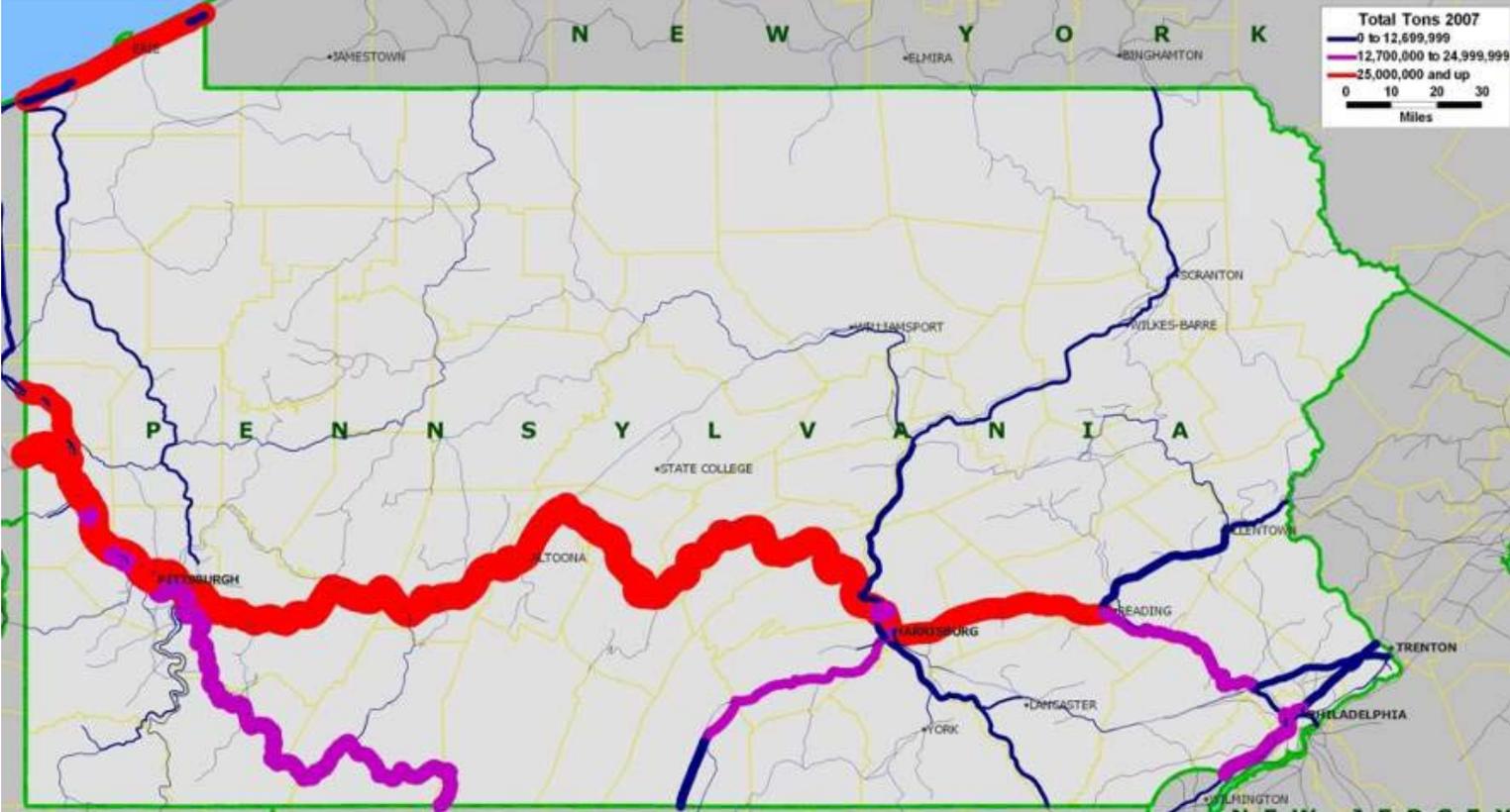
Some of the most significant factors influencing freight rail needs include the decline in bulk commodity movements, increases in international trade and containerized traffic, increases in secondary traffic from distribution centers to retail outlets, and the continued erosion of freight rail market share by the trucking industry.

Freight rail is affected by a similar set of demographic variables as passenger travel, but is somewhat more dependent on national economic trends and freight flows. And this can be seen in the nature of freight rail flows. "Through" freight rail traffic is the predominant type of freight rail traffic in the state. Well over half, 57 percent, of all freight rail units do not originate or terminate in Pennsylvania.

A graphical comparison of the 2007 and 2035 (forecast) freight flows for rail in Pennsylvania, presented in Figures 6-10 and 6-11, shows that rail has substantial nationwide activity. In 2007, the Pennsylvania freight rail network carried 201.6 million tons of freight and 4.2 million carloads, which is 10 percent of all freight rail tonnage and 13 percent of all units in the U.S. Freight rail shipments in Pennsylvania are projected to be a total of 246 million tons and 6.3 million carloads by 2035, which is a 0.7 percent compounded growth rate in tonnage and a 1.2 percent compounded growth rate in units. Growth over the next 25 years will come from domestic and international sources.



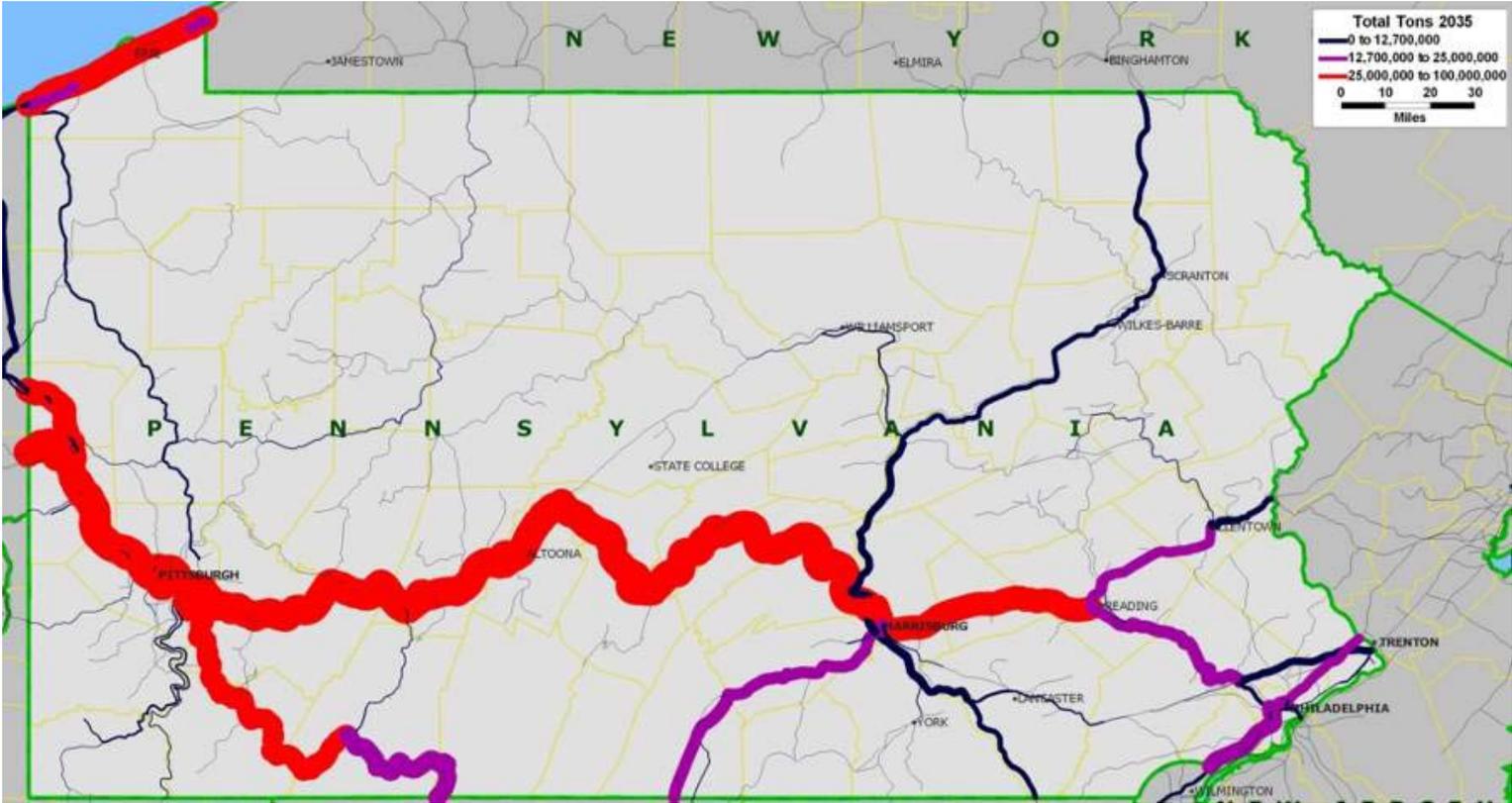
Figure 6-10: Pennsylvania Freight Rail Flows, 2007 (Tons)



Source: Pennsylvania Carload Waybill Sample 2007, U.S. Surface Transportation Board



Figure 6-11: Pennsylvania Freight Rail Flows, 2035 (Tons)



Source: Pennsylvania Carload Waybill Sample 2007, U.S. Surface Transportation Board; Forecast by IHS/Global Insight



It is anticipated that high-value containerized “truck” goods will grow at a higher rate while low-value bulk “rail” commodities will grow at a much lower rate, thus leading to an even greater disparity between the two shipping modes in the future, if key strategic investments are not made. Strategic investments in the rail network can improve service levels by removing chokepoints (such as bridges that cannot accommodate heavier cars, low-ceiling tunnels that prevent double-stacking, sharing track and signal systems with passenger service, single-line track, and at-grade highway/railroad crossings) allowing railroads to fairly compete for containerized and other non-bulk commodities.

Pennsylvania needs to plan today how to meet future freight flow demand and capture as much as possible on the freight rail network to minimize growth in highway congestion and meet state environmental and energy goals. A description of some of the critical issues facing freight rail in Pennsylvania is described below.

Intermodal Support Facilities

Intermodal transport will continue to become a larger element in the overall freight transport picture. Substantial growth is anticipated in goods that move intermodally. In this context, it is important that Pennsylvania continues to make investments which improve intermodal transfer, support the development of new truck-rail intermodal facilities at critical links on the network, and expand existing intermodal rail freight facilities. The combination of a significant number of short lines in Pennsylvania and the interest of truck companies in using rail for portions of trips is seen as a major opportunity for intermodal growth. Increases in containerized freight from the Far East, as well as traffic on inland ports, provides additional incentives to invest in intermodal facilities in Pennsylvania.

High Axle Loads

A key element in remaining competitive with other modes and reducing costs has been the increased use of high axle load cars with gross weights of 286,000 pounds (or 286k) and up to 315,000 pounds (or 315k). 286,000-pound railcars is the interline standard on the railroad system of the United States. For Class II and III railroads to accommodate this type of traffic, it is critical to make investments that return track structure to a state of good repair and that subsequent capital investments are planned to ensure the long-term serviceability of Pennsylvania’s railroad bridges (to replace or maintain the bridges in the future rail network). Heavy car loads also places more wear and tear on grade crossings.

Most Class I railroad tracks and bridges have been designed or reconstructed to carry railcars weighing 286k pounds, and some Class I lines accommodate railcars weighing up to 315k pounds. Older rail lines, including some Class I railroad secondary mainlines and branch lines and many of the short line and regional railroad tracks and bridges, were designed and constructed to carry railcars weighing up to 263,000 pounds. Formerly, the maximum weight car was 263,000 pounds and served as the standard. Track and bridge structures of some of Pennsylvania’s short line and regional railroads are in many cases insufficient to support heavier axle load railcars, and, furthermore, these smaller railroads are least able financially to improve their infrastructure. In some cases, the heavier, standard 286k pound cars can be operated over many lines designed for lighter cars, but usually at very low speeds.

In summary, upgrades to Class I railroad secondary mainlines and branch lines to accommodate 286,000-pound freight cars, and upgrades to short line and regional railroad tracks and bridges to accommodate 286,000-pound freight cars are needed.



State of Good Repair

Numerous rail issues have an impact on the efficiency of the rail network. Maintenance of rail infrastructure and bringing rail infrastructure up to a state of good repair is a key issue in Pennsylvania. With more railroads than any state in the nation, the maintenance and infrastructure renewal needs are immense in Pennsylvania. As mentioned, many of Pennsylvania's short line railroads require upgrade of infrastructure (track and bridges) in order to accommodate 286,000-pound railcars. Many of these smaller railroads are strapped financially just to maintain the existing infrastructure, let alone make the investments needed to be competitive in carrying the heavier railcars. Maintenance of at-grade highway-railroad crossings are problematic, especially for the short line railroads, which view maintenance of traffic control devices and crossing surfaces as a financial challenge, especially where crossing wear and tear is a function of heavy highway use, as opposed to rail use.

Clearances

Despite the current economic recession, the long-term forecast for goods movement is for significant growth. Thus, all modes of surface transportation must be made more efficient to include rail transportation. Removing impediments to efficient flows on freight rail, such as double-stack clearance, would improve rail and truck-rail capacity. For example, CSX's Southwest Corridor is not cleared for double-stack of all sized containers. This line is part of CSX's National Gateway Corridor Improvement Program.

Capacity Issues

Capacity issues in Pennsylvania relate to height restrictions at overpasses, rail beds that are capacity-constrained by weight limitations, and lack of right-of-way to accommodate new parallel tracks. Pennsylvania needs to ensure that the rail system can accommodate modern freight rail

configurations if it is to capitalize on its geographic advantage.

There are two major freight corridors under development by Class I railroads to add capacity to the freight rail network that will pass through Pennsylvania. Norfolk Southern is focused on developing the Crescent Corridor stretching from the Northeast to New Orleans and CSX is exploring the National Gateway Project connecting the ports in Virginia and North Carolina with manufacturing in the Midwest. The cost of upgrading the rail beds and bridges in these corridors surpasses the capital budgets of the railroads.

Line Haul Freight

The growth in rail traffic is expected to strain the current rail network. The primary issues are capacity and fluidity. Additional siding capacity and improved signal technology are needed.

Freight-Intercity Passenger Rail Issues

Amtrak operates the following intercity passenger services within Pennsylvania.

- **Keystone Corridor.** The Keystone Corridor is a 104-mile, state-supported Amtrak line between Harrisburg and Philadelphia. The corridor (to include the segment from Harrisburg to Pittsburgh) is a designated High-Speed Rail corridor. The service between Harrisburg to Philadelphia has experienced significant ridership growth.
- **Capitol Limited.** The Capitol Limited Service operates from Chicago through Pittsburgh to Washington, D.C., on a combination of CSX and Norfolk Southern track. There are two Pennsylvania stops on the Capitol Limited: Pittsburgh and Connellsville.



- **Pennsylvanian – Three Rivers.** The Pennsylvanian – Three Rivers Amtrak service operates daily from Chicago through Pittsburgh, Harrisburg, and Philadelphia to New York City. The service operates on both CSX and Norfolk Southern tracks to Harrisburg where it joins the Keystone Corridor.
- **Lake Shore Limited.** The Lake Shore Limited operates one time daily from Chicago through Erie, to Albany, where it splits to serve Boston or New York City. The service operates on CSX tracks across the Pennsylvania Northern Panhandle through Erie. The train’s only Pennsylvania stop is in Erie.
- **Northeast Corridor.** The Metroliner/Acela Express operating between Boston, New York, Philadelphia, and Washington, D.C., is the final intercity rail corridor in Pennsylvania. Amtrak operates the service on its own right-of-way at top speeds of 125 to 150 mph. This corridor is the heaviest used in the Amtrak system.

As noted above many Amtrak (passenger) services in Pennsylvania use the main lines of Class I (freight) railroads and these railroads are generally well-maintained. However, each corridor has unique physical characteristics and a mix of train operations that call for future investment in order to improve the compatibility of intercity rail and freight rail use of the right-of-way.

For example, currently, the western segment of the Keystone Corridor is served by Amtrak's Pennsylvanian Service operating one round trip per day with a travel time between Pittsburgh and Harrisburg of 5 hours, 29 minutes. Automobile travel time between the same locations is approximately 2 hours less than by train; thus, ridership growth is hindered due to the lack of modal competitiveness. The railroad line from Harrisburg to Pittsburgh is part of Norfolk Southern's Pittsburgh

Line, which consists of a double-track configuration within a right-of-way that could accommodate more tracks. This segment is heavily used for freight rail operating at varying speeds, which necessitates frequent crossovers by passenger rail service and limits the ability to schedule additional passenger rail service. The line west of Harrisburg is not electrified, prohibiting the extension of the Keystone Service’s all-electric trains directly to Pittsburgh. Improvements being contemplated to facilitate improved passenger service from Pittsburgh to Harrisburg include: possible full electrification, construction of additional passenger-only tracks, major interlocking improvements, concrete tie installation, and rolling stock acquisition. PennDOT will be undertaking a comprehensive study to examine the infrastructure needs in the western portion of the corridor to support additional passenger service.

Because the Northeast Corridor has such significantly high passenger train volumes, freight trains are restricted to a narrow window of operations, typically from about 12 p.m. to 6 a.m. each day. However, Amtrak has allowed operations outside of the “freight window” in certain circumstances through direct negotiation with the freight railroad operator. In addition, due to the significant maintenance and rehabilitation efforts conducted by Amtrak during these hours, freight is effectively limited to a single track of operation. The Northeast Corridor is an extremely busy corridor with significant congestion issues. Within Pennsylvania, Amtrak shares the Northeast Corridor with NJ Transit.





Freight-Commuter Rail Issues

The majority of SEPTA route miles are over SEPTA right-of-way (ROW). However, SEPTA does operate on 15 miles of CSX. Additionally, the Norfolk Southern (NS) line from Harrisburg to the Northeast Corridor between Philadelphia and Baltimore connects at Perryville, Maryland. NS uses this line heavily for movements to Baltimore and Washington.

Passenger Rail System Issues

On-Time Performance and Freight Interference

On-time performance (OTP) is a critical factor for the success of passenger rail service. Many passengers would be willing to take a train if the service was reliable, but chronically-late trains deter passengers. The Inspector General of USDOT has estimated that poor OTP costs Amtrak nearly \$100 million per year in lost revenue.

There are multiple factors that influence on-time performance including dispatching and train interference on Amtrak and host railroads, track and ROW maintenance work, equipment condition, and management of service. Amtrak trains tend to operate with very good OTP on Amtrak-dispatched tracks, but host railroads tend to not perform as well. There are a variety of reasons for such poor performance including congested ROW, poor dispatching, lack of adequate track capacity, and slow service speeds on routes that are primarily used for freight.

State of Good Repair

Many passenger trains operating today in Pennsylvania and the Northeast operate at speeds that are slower overall than in the 1950s. Some of this service reduction is due to congestion, but much of it can be traced to declining levels of track maintenance and a lack of signal system improvement over the years. By bringing rail lines back to a state of good

repair, many routes can be returned to high-speed, high-quality service in much the same way as the Keystone Corridor was improved to 110 mph electric service through infrastructure investment.

Funding and Affordability of Service

Passenger trains can be a very energy-efficient and cost-effective way to move large numbers of people with relatively little labor. These features should make rail an economical mode of transportation to operate, but that is not usually the case. Capital investment and ongoing maintenance of infrastructure and rolling stock are expensive costs for running a railroad. In contrast, other transportation modes generally have infrastructure costs covered through government funding, thus creating an uneven marketplace for transportation.

From a corporate standpoint, Amtrak is charged with turning a profit on its operations. Amtrak has not accomplished this yet, and there is disagreement over whether it is even possible. These factors affect fare pricing especially in corridors where demand is high. The highest fares per seat mile occur on trains between Philadelphia and New York. This impacts ridership levels and even revenue overall.

Thus, the Commonwealth has an interest in whether fares are set to optimize the public benefits of rail service at the appropriate level of public investment. Passenger rail service in Pennsylvania needs to be kept affordable in order to attract passengers to the mode of transport that is most beneficial to local communities and the environment.

Frequency

Frequency of train service is one of the biggest demand drivers for passenger rail service. Frequent service allows passengers to travel on their schedule, not the other way around. Outside of the Northeast



Corridor and Keystone Corridor, Amtrak services in Pennsylvania operate only once per day, which limits the ability of passengers to travel last-minute or take day trips to regional destinations on a whim.

Connectivity

One passenger rail line cannot serve every destination within a state. Passengers require the ability to connect to multiple rail lines in order for a passenger network to serve the needs of as many potential passengers as possible. In addition to connecting rail lines, passengers need to be able to reach destinations beyond the train station. Feeder buses, local transit, bike routes, and walkable station areas are critical to attracting as many passengers as possible to rail—even if it is only for a portion of the journey.

Bureaucratic Barriers to Improved Connectivity

Significant barriers to expanding connectivity exist. As an example, a private company recently launched a new intercity bus line between Pittsburgh and Harrisburg, stepping into the gap left by the withdrawal of direct air service. The “Steel City Flyer” was an express bus with a high level of passenger amenity that was positioned for business travelers. The goal was to build ridership in the corridor, potentially paving the way for more frequent rail service. However, several difficulties emerged which ultimately limited ridership and forced the service to shut down:

- The company could not obtain permission to become a Thruway bus connection for Amtrak and be listed in the Amtrak reservation system. This greatly reduced the ridership potential from connecting to the Keystone corridor.
- The company could not obtain access to the Harrisburg Intermodal Center, which is the Amtrak station and the intercity bus station, because it was blocked by existing bus lines that had

leases and objected to the new service.

- The bus service was not listed on PennDOT’s “Catch the Keystone” informational website, which does not provide information on connecting services.
- The company found that the economics of business travel favored employees driving their personal automobiles, because they are reimbursed at the IRS standard rates for driving. Thus, travelers would opt to drive, even though it was more expensive and less productive, because they had a direct financial reward for doing so.
- Thruway bus connections could increase ridership, but barriers to starting service must be removed to meet the potential.

Platform Design

The design of passenger rail platforms varies from station to station in Pennsylvania. Philadelphia’s 30th Street Station and Lancaster Station have only high platforms (four feet above the top of the rail) while most other large stations have a combination of high and low platforms. Outside of major stations in the Northeast, most intercity rail stations have low platforms. On the SEPTA network, most stations have low platforms, but the agency has a program to convert to high platforms over time.

Most passenger rail cars on the east coast are capable of using either high platforms or low platforms, but not with equal ease. This includes all equipment operated by SEPTA as well as Amtrak’s Amfleet and Viewliner equipment used on the Northeast Corridor, Keystone Corridor, Pennsylvanian, and Lake Shore Limited services. However, to change between low and high platform configurations currently requires a conductor to manually move the “trap” over the stepwell. This practice is



very antiquated by international standards, and results in less productive train crews and increased dwell time.

Amtrak's double-decker Superliner equipment—used on the Capitol Limited—is limited to western and southern regions of the United States and is only capable of serving low platforms.

High platforms are preferred for passenger rail operations in the northeastern part of the country because they enable quicker and safer boarding and exiting of trains because there are no steps. All doors can be opened in train-line fashion and passengers can move quickly across the gap. This reduces station dwell times and increases crew efficiency. It is particularly effective on busy corridors with many stations. Passengers with disabilities can easily board and disembark as well as passengers with bulky luggage, strollers, or bicycles. However, high platforms are much more expensive to construct than low platforms.

Outside of the northeast, however, many train designs accomplish level boarding by lowering the height of the car floor. For example, Superliner cars, multi-level commuter cars, TALGO tilting train sets, and others have lower entrances that minimize steps. However, these train car types will not be able to stop at high-level platforms. Thus, in the long term there is a strong equipment compatibility issue between the Northeast Corridor and other parts of the country. International practice also tends towards low platforms, although exceptions exist. Because Pennsylvania stations are served by both eastern and western rolling stock it will not be easy to create a standard platform height for service in Pennsylvania.

As currently proposed, the draft regulations for compliance with the Americans with Disabilities Act would require passenger trains to have level boarding for wheelchairs for the entire length of the train, and the ability to roll the chair throughout the train. This is a very stringent

standard that has no comparison in international practice or among other transportation modes. The technical challenges include reducing the gap between the platform and the train and making the aisles and gangways wide enough and smooth enough for a wheelchair to have free movement. Implementation could increase the costs for train stations and train equipment to such a point as to make some services infeasible, thus eliminating the option to travel by train at all.

There are several other obstacles to constructing an entirely high-platform network. High platforms can interfere with wide-plate freight cars which are wider than a standard freight car. For example, large transformers, aircraft or aeronautics components, steel products, and similar items may be too large to clear a high platform. Solutions currently used include gauntlet tracks that divert freight trains away from the platform and retractable/folding platform edges. Amtrak currently uses a gauntlet track on the Northeast Corridor at New Carrollton, Maryland. These solutions, however, incur additional costs and complicate operation of the rail system.

Federal Railroad Administration Crashworthiness Standards

The FRA's crashworthiness standards require passenger rail vehicles to have very "buff strength" or end to end compression. The intent is to make the vehicles sturdier in the event of a collision. Passenger trains must also have strong collision posts at the car ends to transfer the forces to the frame. These requirements result in passenger rolling stock that is very heavy and, therefore, costly to construct and inefficient in terms of energy and fuel consumption. The actual efficacy of the standards to increase safety is under debate. During the worst recent rail crash in Chatsworth, California, the leading passenger car was almost totally destroyed, despite very high buff strength. Also, there is concern that passengers within such cars are still subjected to very high crash forces



even if the car structure remains intact, because there is not a “crumple zone” to absorb forces, as exists, for example, in passenger cars.

The globalizing market for production of passenger rolling stock has led to two outcomes. First, there are very few American manufacturers remaining. The small market for FRA-compliant passenger rail vehicles over the past decades has reduced the level of product innovation in North America. Second, most rolling stock manufacturers have streamlined their product offering to cater to European and Asian markets with very different crashworthiness standards. These manufacturers have developed ready-made lines of rolling stock that can be purchased “off-the-shelf” and placed into revenue service after a relatively brief commissioning period. The FRA crashworthiness standards, to a large extent, have precluded American passenger rail operations from using these proven designs. Therefore, products for the American rail market have to be extensively tailored to FRA requirements and tested before they are approved for operation.

One reason that European and Asian rail operators operate light-weight vehicles is because their rail safety agencies focus on crash-avoidance (i.e., preventing crashes through signaling) instead of crash-mitigation (i.e., reducing the damage caused by crashes once they’ve happened). With the advent of new federal legislation requiring the installation of positive train control (PTC) on all railroads with passenger operations by 2015, there is now an opportunity for the FRA to revisit its guidelines. Bringing American standards in line with international best practices would allow American passenger rail operators to take advantage of the high-performance, off-the-shelf technology running in other countries.

Freight and Passenger Speed Compatibility

Passenger and freight trains have different operating characteristics. In

particular, the difference in speed between freight and passenger trains creates potential incompatibilities with infrastructure and also can reduce rail capacity.

One issue is the design of curved track. High-speed track is usually banked, or “super-elevated,” through a curve to cancel lateral outward forces (i.e., centrifugal forces). However, freight trains, especially heavy freight trains such as coal trains, are generally much slower than passenger trains. If a freight train passes through a super-elevated curve at a slow speed the train will transfer weight and force to the inside, lower rail of the curve. This wears the inside rail out much more quickly. Thus, freight railroads generally opt for much less super-elevation in curves. The introduction of faster passenger service on routes with many curves creates a compatibility issue between freight and passenger service. Potential solutions include increased maintenance, attempts to increase freight train speed (e.g., with more power added to the train), or separate tracks or routes for passenger and freight trains. Another factor is tilting passenger equipment, where the train tilts in the curve to cancel the centrifugal force. This can create “virtual” super-elevation allowing for faster speeds.

Track Maintenance Standards

Another issue is the track maintenance standard required for passenger service. High-speed track requires very tight tolerances that slower freight trains do not require. However, heavy freight traffic will tend to damage track. Track that falls out of specification will suffer reduced speeds or service outages. To keep the track within tolerances, additional maintenance is required above and beyond what is required for general freight service. As speeds progressively increase or as the amount of heavy freight traffic increases, the burden and cost of maintenance increases. Maintenance not only requires money, but also the time to



place the track out of service. Research into more robust track design is ongoing in the attempt to increase the strength of high-speed track to carry heavy freight. Research has also been performed to attempt to determine the marginal cost of additional track maintenance required for fast passenger rail service.

Speed of Freight and Passenger Rail Trains

Fast passenger trains mixed with slow freight trains can reduce line capacity. A fast passenger train will tend to overtake a slower freight train. Thus, freight trains are often routed to sidings where they must wait (which costs money and slows shipping schedules), or a significant amount of space must be reserved in front of the passenger train so that it has clear track ahead. At the same time, the passenger train tends to create an increasing gap behind it as it progresses. Some passenger trains are compatible with freight train speeds. For example, a train that stops relatively frequently and which has a moderate maximum speed will tend to average the same overall speed as a fast freight train. But an express train at a high speed will require far more track capacity than any other type of train. This is one reason why fast trains tend to require lines with very little or no freight traffic to operate efficiently.

These operational differences create issues in terms of investment priorities. In particular, these problems are most significant on routes owned by freight operators. In some corridors there may be opportunities to build separate infrastructure for passenger operations, but this would be a costly and time consuming exercise reserved for the highest-demand corridors.

Long-Range Timetable Planning

Long-range timetable planning can be used to guide efficient capital planning. By developing a detailed timetable for future operations,

planners can make better decisions about rolling stock requirements, passing tracks, interlocking configurations, new lines, platform arrangement, and other expensive capital projects. For example, a master timetable can help to precisely plan the location of overtakes or train meets, thus reducing the overall amount of additional sidings, crossovers, and main line track that is required to operate the system. Rather than overbuilding infrastructure to allow for any contingency or an unknown operating plan, timetable-driven planning can help to significantly reduce costs for design, engineering, and construction. Longer-term, this planning methodology allows for maximum utilization of the railroad's capital assets. One innovation in timetable-driven planning is the realization that a recurring timetable—for example, one that repeats every hour—may allow for much greater infrastructure productivity. This is because the predictability of the service allows for optimizing the infrastructure to perform its intended function with only the amount of capital investment required to actually operate the timetable.

Airport Congestion

Much of the air traffic that contributes to congestion issues at major airports is created by short-distance shuttles and feeder flights into hub airports. In March 2009, about 20 percent of the flights from Philadelphia International Airport were destined for locations less than 300 miles away. Many of these routes could be served by rail links. In some cases, rail service could actually provide much better overall service than the short-distance planes. For example, some feeder flights only operate a few times per day, whereas parallel rail service operates at least every hour. When passengers figure in the time it takes to travel to the airport, check-in, pass through security, and wait for flights, passenger rail can be a viable alternative to flying for trips of 100 to 500 miles—depending on the average speed of rail service. With intercity rail stations located at



airports, passenger rail can be an especially useful substitute for feeder flights that carry relatively few passengers but consume valuable airspace at congested airports. This also will help to reduce the overall environmental impact of aviation, which is the transportation mode that is most reliant on fossil fuels for the foreseeable future.

Air Quality

Greenhouse Gas Emissions Reduction Strategies

Transportation accounts for about one-third of greenhouse gas emissions. As a result, transportation needs to be part of the solution to global climate change. The prominent strategies to reduce greenhouse emissions include:

- Improve system and operational efficiencies.
- Reduce growth in VMT (vehicle miles traveled).
- Transition to lower greenhouse gas emissions fuels.
- Improve vehicle technologies.

The first two strategies are within the realm of PennDOT. First are the strategies to improve system and operational efficiencies—greenhouse gas emissions are highest when vehicles are sitting in traffic congestion or operating at stop and go conditions. Intelligent Transportation Systems (ITS) solutions and real-time traffic information are examples of the improvements that could be taken under this strategy. Second are the strategies that relate to reducing the rate in growth in VMT—through strategies that develop land use in more concentrated form, where walking, biking, and taking transit, including rail transit, become more feasible modes and are complemented by investments to support and make attractive the active use of those modes for transportation purposes. These strategies can also be applied to freight transportation so that freight-generating land uses are concentrated in areas with rail access so that more long-haul freight is moved by rail, reducing the rate in growth of truck VMT.

The remaining two strategies can be advanced by other agencies in Pennsylvania, such as the Department of Environmental Protection, as well as others. Furthermore, many of the initiatives associated with these strategies can gain access to funding through the Pennsylvania Energy Development Authority (PEDA) as described below.

Technology

Pennsylvania Energy Development Plan

Clean, advanced energy is a top priority for the Commonwealth of Pennsylvania. Rising oil, electricity, and natural gas prices; rapidly increasing worldwide demand for energy; growing political tensions associated with foreign energy resources; and concerns about the environmental impacts of traditional energy resources require the state to take aggressive steps to develop and use its indigenous energy resources. The



development of a robust, clean, advanced energy sector within Pennsylvania presents tremendous economic growth opportunities for the state. New advanced energy companies and projects can attract new investment to Pennsylvania, create high-tech jobs and stimulate technological innovation.

PEDA is one of the state's most versatile tools to help build this growing sector of the economy. The Authority is charged with developing an Energy Development Plan (EDP) for the allocation and distribution of financial and technical assistance. PEDA is empowered to use a variety of



financial tools to provide assistance to clean, advanced energy projects. PEDDA may award grants, loans, and loan guarantees; issue revenue bonds or notes; and enter into contracts to help finance worthwhile projects.

The 2008 EDP sets forth the agency’s energy policy objectives and criteria for advanced energy research and deployment projects. PEDDA offers funding for innovative, advanced energy projects and for businesses interested in locating or expanding their alternative energy manufacturing or production operations in the Commonwealth. PEDDA considers projects such as the manufacturing of alternative energy or energy efficiency equipment or materials; the development of innovative new alternative energy or energy efficiency technologies; the generation of alternative energy or the production of alternative fuels; or the implementation of energy efficiency/demand side projects.

PEDDA recognizes that the clean, advanced energy sector consists of many different kinds of companies, fuels, and technologies—and this includes clean, alternative fuels for transportation, including but not limited to bio-diesel, ethanol, hydrogen, and electricity. PEDDA can assist financially in deployment projects as well as research projects.

Land Use and Community Aspects

PennDOT’s Smart Transportation and Sound Land Use Implementation Plan

PennDOT has long recognized the relationship between land use and transportation. In concert with other state agencies and its planning partners throughout the Commonwealth, there is increasing recognition of the need to not only respond to land use trends, but to assume a position of policy leadership that includes infrastructure investments. Working in partnership with others is the key toward incorporating land use considerations into the transportation improvement process. PennDOT is working to increase outreach and support to municipalities, and strengthen the benefits from connecting local and regional plans. These partnerships are also being carried out on a statewide level. Together with the Departments of Community and Economic Development (DCED), Environmental Protection (DEP), Conservation and Natural Resources (DCNR), and Agriculture (PDA), PennDOT is working to improve the integration of transportation, land use, and economic development in Pennsylvania.

To further enhance the value of their investments and to take a policy leadership role, PennDOT developed Smart Transportation themes or principles. PennDOT’s efforts continue to be guided by Smart Transportation themes—a quality of life approach to transportation solutions which, similar to smart growth and sustainability, supports economic, social, and environmental goals. The 10 interrelated Smart Transportation themes are a part of PennDOT’s approach for keeping Pennsylvania’s transportation network on a sustainable path.

These 10 themes are:

1. Money counts.
2. Choose projects with high value to price ratio.



3. Enhance the local network.
4. Look beyond level-of-service.
5. Safety first, and maybe safety only.
6. Accommodate all modes.
7. Leverage and preserve existing investments.
8. Build towns and not sprawl.
9. Understand the context; plan and design within the context.
10. Develop local governments as strong land use partners.

PennDOT is utilizing Smart Transportation in capital planning and project development. In practice, implementing Smart Transportation means that projects will be:

- Planned in a way that considers a host of factors, not solely transportation priorities.
- Designed using a “rightsizing” approach that addresses real needs in an appropriate and sustainable manner.
- Developed within the context of larger community and regional initiatives.

The goal of Smart Transportation is to integrate the planning and design of streets and highways in a manner that fosters development of sustainable and livable communities.

PennDOT prepares a Sound Land Use Implementation Plan each year to guide and promote the Department’s land use-related actions and programs for that year and report on prior progress. Considerable progress has been made toward incorporating land use considerations into the Department’s programs, policies, and activities.

According to the 2008 Sound Land Use Implementation Plan, PennDOT is working to address five major categories of action:

- Refining the definition for Smart Transportation.
- Developing a communications plan and related tools.
- Developing a training program for staff and partners.
- Revising the Highway Occupancy Permit (HOP) process.
- Implementing the Linking Planning and NEPA strategy.

Specific activities were undertaken in 2008 which reflect the desire to incorporate Smart Transportation principles into everyday decision-making for both internal and external partners. Importantly, this included the development of the Smart Transportation Solutions Guidebook for use and thoughtful deliberation in all communities—rural, suburban, and urban—throughout Pennsylvania.

Smart Growth Planning Principles

As demographics, land capacity, and locational choices change, passenger rail opportunities support growth and development that promises to strike the balance between economic growth, environmental sustainability, and quality of life. Demographic shifts, an increasingly strong environmental ethic, increased fiscal concerns, and more nuanced views of growth are creating new markets for places with identity and choice that embody the following smart growth principles:

- A range of housing opportunities and choices
- Compact, walkable neighborhoods
- Distinctive, attractive communities with a strong sense of place
- Mixed land uses



- Preservation of open space and natural areas
- A variety of transportation choices

This last principle on providing a variety of transportation choices is a key element of smart growth that ties efficient land use to the extensive rail transit opportunities in Pennsylvania, a concept known as Transit-Oriented Development.

Transit-Oriented Development

Transit-Oriented Development (TOD) is generally described as higher density mixed-use development located within half a mile of transit facilities and routes. It is development designed to create connections between communities and transit in a way that encourages transit use, walking, and bicycling instead of creating dependence on the automobile.

Focusing development around transit facilities has become a significant way to improve quality of life, environmental sustainability, and economic growth. Specific benefits attributable to TOD include:

- Marketability
 - Changing demographics due to increasing demand for walkable communities near transit.
 - Increases real estate values in surrounding communities.
 - Attracts businesses and major employers.
 - Creates a sense of place.
- Sustainability
 - Accommodates growth while limiting sprawl.
 - Improves air quality by reducing Vehicle Miles Traveled (VMT).
 - Reduces dependence on foreign oil.

- Reduces infrastructure costs as compared to sprawl development.
- Mobility
 - Provides for travel options.
 - Encourages healthy travel modes, such as walking and biking.
 - Reduces traffic demand on key arteries.
- Accessibility
 - Improves mobility for non-drivers (elderly, youth, people with disabilities, and people with low incomes).
 - Provides housing choice.
 - Encourages socialization and community interaction.

Passenger Rail Station Typologies

Transit-Oriented Development is not “one size fits all.” Pennsylvania’s rail network serves a wide range of community types, and station area land use patterns follow a different model based on the local context. The rail station typologies described here recognize these important differences and identify patterns and performance measures that fit the appropriate community scale. The intent is not to define the typologies narrowly, but to help establish a vision for development in the districts surrounding stations. The cities and towns surrounding Pennsylvania’s existing and proposed rail stations are diverse, but the general characteristics of each station area can be captured in the following three primary station types:





- Downtown Centers
 - Hubs for a mix of transit services, such as passenger rail, bus, light rail, subways, and freight rail
 - Mix of residential, office, education, retail, entertainment, and cultural activities
 - Very high densities
 - Very limited parking, usually provided on-street or in structures.
 - High level of pedestrian activity
- Main Street Neighborhood
 - Older, dense boroughs, towns, and villages that developed along passenger and freight rail networks
 - Neighborhood-scale retail, services, and restaurants; historic town center
 - Historic development pattern with infill opportunities
 - Mostly small-lot, single-family housing with some small-scale apartments
- New Transit Village
 - Urban and suburban infill with a mix of retail, office, and residential
 - Residential is high-density townhomes and apartments
 - Retail is pedestrian-scale shops, services, and restaurants



- Uses are mixed and well connected by all modes of transportation
- Parking is limited and does not dominate the landscape

Freight Rail Typologies

Transit-Oriented Development is primarily associated with passenger facilities and includes a mix of residential, office, civic, and commercial uses. Industrial development does not typically come into play in a TOD, but the logistics industry and freight rail networks contribute to the overall economic health of Pennsylvania. The economic and environmental benefits of freight rail transport can be summarized as follows:

- The freight-rail system carries 16 percent of the nation’s freight by tonnage, accounting for 28 percent of total ton-miles.⁸
- A freight train can move a ton of freight 436 miles on a single gallon of fuel.⁹
- A single intermodal train hauls the load of 280 trucks.¹⁰
- Every \$1 of rail infrastructure investment generates a \$3 return to the economy.¹¹
- Rail is a preferred mode for hazardous materials shipments because of its positive safety record.¹²

⁸ Association of American Railroads (www.aar.org)

⁹ *Ibid.*

¹⁰ *Ibid.*

¹¹ *Ibid.*

¹² AASHTO, *Freight Rail Bottom Line Report*



While freight rail provides significant economic and environmental benefits, it is a fixed system with mobility limitations and will not replace trucking and port facilities. Instead, freight rail should be an integral part of a multimodal freight transport system that is connected to major transport and receiving facilities such as shipping ports, truck loading, and industrial parks. Like the aforementioned passenger rail station typologies, freight stations, or depots, have different typologies that can be generally applied and described as follows:

- Port – transfer of goods to receiving ships and transferring cargo; located in industrial areas at the edge of an ocean, river, or lake.
- Distribution Hub/Logistics Center – warehousing facilities stocked with products and goods to be re-distributed to retailers, wholesalers, or directly to consumers; hubs typically receive and ship more than 10,000 truckloads each year and can be up to 3 million square feet in size.
- Industrial Park – concentration of industrial and office uses in an area of about 100 acres or more.
- Intermodal Yard – utilizes freight trains, trucks, and ships together in one location to move goods from one place to



another; products that come to a port by ship might be transported to a manufacturing plant by truck or rail.

Sustainable Economic Opportunities with Rail Investment

The previous sections describe the current economic condition of the state of Pennsylvania and how, through smart growth initiatives such as concentrated development and investment in existing urban centers, the state can capitalize on its resources to bolster economic competitiveness. One of the most significant resources to capitalize on is the state’s extensive passenger and freight rail network. The opportunities available through rail investment that contribute to a thriving and sustainable economy are tied to strategic investment in facilities for different types of rail users, linking metropolitan economies, expanding investment in Pennsylvania’s older cities and towns, and expanding tourism and recreation access.

Rail User Types and Benefits

The following describes the four general rail user types and associated benefits that can be used as a guide to prioritize rail investment in targeted areas.

Commuters – use passenger rail on a daily basis to commute to jobs.

Benefits:

- Frequent users of the system.
- Significantly reduce Vehicle Miles Traveled.
- Mitigate daily peak-hour traffic congestion.
- Attract employment to commuter station locations.



- Encourage concentration of development around transit stations.

Intercity Travelers – use passenger rail on a semi-regular basis for business purposes.

Benefits:

- Semi-frequent users, especially business travelers.
- Reduces Vehicle Miles Traveled.
- Mitigates traffic congestion.
- Attracts employment to city centers.
- Attracts hotel/dining/entertainment facilities to city centers.
- Reduces carbon emissions as compared to auto or airplane travel.

Leisure Travelers – use passenger rail on a limited basis for tourism and recreation.

Benefits:

- Moderately reduces Vehicle Miles Traveled.
- Moderately reduces traffic congestion.
- Attracts hotel/dining/resort/entertainment facilities to towns and city centers.

Freight – used for the movement of goods to manufacturing centers, retail/wholesale distribution hubs, and shipping ports.

Benefits:

- Moderately reduces traffic congestion by reducing truck traffic.

- Moderately reduces Vehicle Miles Traveled by reducing truck traffic.
- Provides safer containment and transport for hazardous materials.
- Integrates well with other logistics facilities (ports, distribution).
- Attracts industry and jobs.

Linking Metropolitan Economies and Access to Jobs

Existing and proposed rail networks can link the growth regions in the state with the greater Northeast region. The proposed network is based primarily on the economic benefits of linking existing concentrations of population and employment, as well as regions that are forecasted to grow over the next thirty years. New intercity rail lines are proposed mostly in the southeastern and northeastern part of the state, linking the growing Philadelphia region to the Lehigh Valley, Scranton/Wilkes-Barre, and Pocono regions, which are increasingly being absorbed in the expanding New York employment market. In the western part of the state, as the employment market in the Pittsburgh metropolitan area grows, proposed linkages to the Cleveland and Columbus, Ohio, markets will be important to statewide economic growth.

Expanding Investment in Pennsylvania’s Cities and Towns

The importance of investing in Pennsylvania’s cities and towns is vital to the overall health of the state’s economy. As previously discussed, these special places possess the key assets—such as education and medical hubs, extensive infrastructure networks, historic character, walkability, and transit opportunities—that are essential for attracting jobs, residents, and visitors. Expanding passenger rail opportunities in cities and towns is an important part of attracting investment.



Tourism and Recreation Access

Tourism and recreation are an important part of the overall state economy. They boost tax revenues through increased retail sales and attracting investment in hotel, resort, entertainment, and dining facilities. By providing an alternative to congested roads during peak vacation travel times, such as weekends and holidays, improved rail access to tourist and recreation centers can help increase tourist activity while reducing traffic congestion. Providing rail linkages to the airports is also an important part of facilitating and attracting tourist activity.

Policies and Tools for Steering Smart Growth along Rail Corridors

Statewide Smart Transportation Initiatives and Programs

Recognizing that land use and transportation are inherently connected, PennDOT continues to partner with other state agencies to build upon the relationship between transportation and land use. PennDOT has made substantial, measured progress toward incorporating land use considerations into its programs, policies, and initiatives. Investing in freight and passenger rail connections, to promote reinvestment in cities and boroughs, is a key approach to this strategy. The following rail-related statewide funding and planning programs have been created to prioritize investment in rail planning:

- **Rail Freight Assistance Program (RFAP), Bureau of Rail Freight, Ports & Waterways.** Twenty-eight grants totaling \$8.5 million were awarded for rail freight rehabilitation and construction projects under the 2009 RFAP. The funded projects, when completed, are expected to help reduce the number of annual

truck trips on the state's highways.¹³

- **Transit Revitalization Investment District (TRID) Planning Study Funding, Center for Program Development and Management, Bureau of Public Transportation.** Act 238 of 2004 promotes community revitalization and transit ridership around existing and planned transit stations by stimulating public-private partners to encourage private sector investment within the designated TRID. PennDOT assists DCED in the review and funding of TRID applications. As of the date of this report, the state has funded nine TRID studies.
- **Intermodal Facilities Plan, Bureau of Public Transportation.** PennDOT is working with other local and federal partners to make public transit more accessible and coordinated with other modes. Two intermodal facilities projects, partially funded by PennDOT and USDOT—the County of Lackawanna Transit System (COLTS), Scranton Intermodal Facility, and the Hazleton Public Transit (HPT) Intermodal Facility—are currently underway.

¹³ PennDOT's 2008 Sound Land Use Implementation Plan: Building a Strategic Agenda for Smart Transportation



Tools for Implementing Smart Growth at the Local Level

Implementing rail service expansion, transit-oriented development, and intermodal freight facilities takes strategic planning and strong partnerships between federal, state, regional, and local governments, and private owners and investors. Public funding is limited and the land necessary to accommodate rail service investment, particularly in built-out reinvestment communities, is often expensive and mired in private property rights issues. Another obstacle to transit-oriented development and freight facilities is the local regulatory climate—which can deter these smart growth techniques with prohibitive zoning controls.

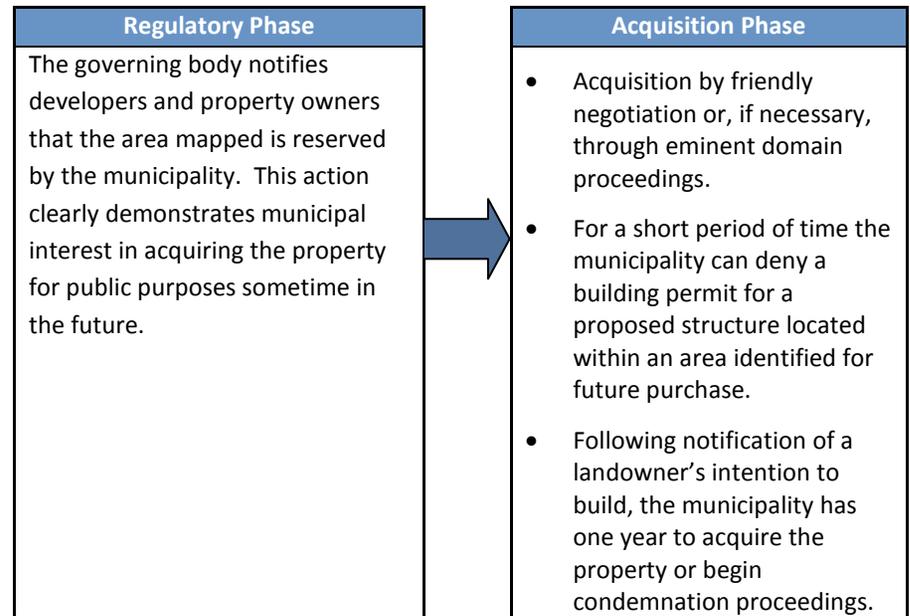
Two primary tools that communities can use to promote private investment in rail facilities and transit-oriented development include the following:

Official Mapping

An official map is an effective tool for reserving private property for public projects without an immediate public expenditure or invoking takings claims. An official map is both a map and an ordinance declaring which projected areas a community will eventually need and intends to acquire for public purposes, including transportation rights-of-way or easements. For large intermodal transit facilities, which require a significant amount of land, the official map can serve as a valuable tool. It is a legislative action exercised by a municipality and is one of the four land use ordinances under Pennsylvania law, including zoning, subdivision and land development, and Planned Residential Development (PRD)/Traditional Neighborhood Development Provisions (TND).

The official map must undergo an adoption process similar to zoning and subdivision and land development ordinances. The process of exercising an official map has two phases: Regulatory and Acquisition as shown in Figure 6-12.

Figure 6-12: Regulatory and Acquisition Phases





Transit-Oriented Development Overlay Zoning

Stimulating investment in transit communities can be accomplished by removing the regulatory barriers to development that supports transit use and supports compact, mixed uses with pedestrian amenities. Many communities have created special transit-oriented development overlay zoning districts within a ¼- to ½-mile walking radius to encourage development near transit. Permitted densities and the mix of uses vary depending on the character of the community. Residential densities should be high enough to support increased transit ridership; a minimum of 10 units per acre is typical. Integrating a mix of residential, retail, office, and civic uses is also a key factor in successful transit-oriented development.



Municipalities can use the TND provisions of Article VII-A to zone for transit-oriented development that is compatible with the surrounding area. The TND provisions are designed to encourage innovation and variety in development; provide better opportunities for housing, recreation, and access to services and employment; promote pedestrian- and transit-oriented development; and to foster a sense of place. Applications for a TND must be based on the comprehensive plan or on a statement of community development objectives. The municipality may also adopt by ordinance a manual of design guidelines to promote quality development that is compatible with the character of the community.