ATTENTION: If you speak another language, language assistance services can be made available to you. Call 717-705-1478.

Somali:

Vietnamese:
LƯU Ý: Nếu quý vị sử dụng ngôn ngữ khác, các dịch vụ hỗ trợ ngôn ngữ sẽ được cung cấp. Vui lòng gọi số 717-705-1478.

Korean:
주의: 영어 이외의 다른 언어를 사용하는 경우 717-705-1478 을 통해 언어 지원 서비스를 이용할 수 있습니다.

Russian:
ВНИМАНИЕ: если вы говорите на другом языке, вам может быть оказана языковая помощь. Обратитесь в информационно-справочную службу по телефону 717-705-1478.

Ukrainian:
УВАГА: якщо ви розмовляєте іншою мовою, вам може бути надана мова допомога. Зверніться до інформаційно-довідкової служби за телефоном 717-705-1478.

Polish:
UWAGA: Jeśli mówisz w innym języku, możesz skorzystać z pomocy językowej. Zadzwoń pod numer telefonu: 717-705-1478.

French:
ATTENTION : Si vous parlez une autre langue, des services d'assistance linguistique peuvent être mis à votre disposition. Appelez le 717-705-1478.

Simplified Chinese:
请注意：如果您说另一种语言，我们可以为您提供语言援助服务，请致电 717-705-1478。

Traditional Chinese:
请注意：如果您说另一种语言，我们可以为您提供语言援助服务。请致电 717-705-1478。

Arabic:
تنبيه: إذا كنت تتحدث لغة أخرى، يمكننا توفير خدمات المساعدة اللغوية. اتصل بالرقم 717-705-1478.

Spanish:
ATENCIÓN: Si habla otro idioma, habrá servicios de asistencia de idiomas a su disposición. Solo tiene que llamar al 717-705-1478.
Transportation is critical to our economic vitality and well-being. We see that theme across history, and it holds true today in a time of transformative change. Now, enabled by technology and driven by data, our transportation system can become more efficient, responsive, sustainable, resilient, and equitable than ever before. The 2045 Long-Range Transportation Plan (LRTP) charts a future that Pennsylvania is creating together.

Transportation agencies provide facilities and services essential to everyday life. As such, we must be able to react effectively to abrupt changes and urgent situations, such as those thrust upon us by the COVID-19 pandemic and the relentless impacts of a warming climate. The Pennsylvania Department of Transportation (PennDOT) makes investments in roadways, bridges, public transit, and other infrastructure that last decades, and must do so with a strategic perspective that considers big-picture outcomes for the Commonwealth’s transportation system and its users.

The plan’s goals are inspiring and were developed based on broad engagement with diverse stakeholders, the public and underrepresented interests, which is the cornerstone of the planning process. This resulted in wide-ranging and impactful feedback, so much so that a major goal and objectives specific to equity are a key part of the LRTP.

Our ability to achieve these goals—even with the extensive collaboration with our partners and stakeholders—depends upon securing adequate resources. Implementing the proposals recently put forward by the Transportation Revenue Options Commission will be essential for advancing much of this plan.

Under any funding scenario, collaborating with other agencies, other levels of government, the private sector, planning partners, and the public is vital to making positive, systemwide improvements. I am pleased with the diverse engagement that has occurred with such partners, with the aim of collaborative implementation to accomplish common purposes.

Transportation is about fostering opportunity. We must make wise investments in our infrastructure and services that yield great returns, opening opportunities for all Pennsylvanians. As stewards of the statewide transportation system, that mindset is at the heart of this plan and our commitment to implementing its strategic actions and initiatives. We are embracing new tools, skills, processes, and perspectives to accomplish this plan.

We respectfully request your assistance in reviewing the Draft Plan. The feedback you provide will ensure we continue to advance a diverse, equitable, and inclusive path forward for years to come.

Tell Us What You Think.

Yassmin Gramian, P.E.
Secretary
Pennsylvania Department of Transportation

---

LRTP Strategic Directions Summary

The plan’s six goals and objectives are listed below. They are discussed in more detail beginning on page 48.

**SAFETY**

Enhance safety and security for both motorized and non-motorized modes throughout Pennsylvania’s transportation system.

- Continue to promote behavioral change through existing initiatives with partners and stakeholders in order to promote safe habits for users of all modes.
- Reduce the rate and frequency of fatal and serious injury crashes for all modes of travel.
- Expand the collection of safety data and explore funding sources for safety and data analysis for use in systemwide planning, programming, and project development.
- Strengthen security across transportation modes in collaboration with public and private stakeholders.

**MOBILITY**

Strengthen transportation mobility to meet the increasingly dynamic needs of Pennsylvania residents, businesses, and visitors.

- Improve system efficiency and reliability.
- Provide and prioritize multimodal transportation choices to meet user needs, expand mobility options, and increase multimodal system capacity and connectivity.
- Improve public transportation awareness, access, and services throughout Pennsylvania.
- Implement transportation and land use standards and tools that result in complementary development.
- Adapt to changing travel demands, including those associated with e-commerce and post-COVID-19 pandemic changes.
- Work with private-sector partners to establish data standards for mobility services and their applications (e.g., Uber and Lyft, carsharing services, bikeshares, etc.).

**EQUITY**

Improve transportation access and equity throughout Pennsylvania.

- Evaluate transportation equity issues across Pennsylvania.
- Develop measurable goals and metrics for equitable transportation in collaboration with key stakeholder groups.
- Establish equity and access strategies in partnership with stakeholder organizations and groups that correspond to the identified measurable goals.
- Improve equity and accessibility through ADA improvements and modal choice.
- Develop education, awareness, and training initiatives that strengthen transportation professionals’ knowledge and skills to effectively address equity issues.
**RESILIENCE**

Strengthen Pennsylvania transportation’s resilience to climate change and other risks and reduce transportation’s environmental impacts.

- Employ resiliency measures/actions to ensure long-term system stability.
- Evaluate projects for expected climate change impacts and reevaluate projects with focus on resiliency.

**PERFORMANCE**

Improve the condition and performance of transportation assets.

- Leverage technology and operations enhancements to improve transportation system efficiency.
- Continue to integrate enhanced asset management approaches and methods into the planning and programming project selection decision-making process.
- Enhance the availability and quality of real-time travel information, especially in emergency and inclement weather events and for construction/work zones.
- Expand and/or build upon existing technical assistance and education to local communities and regional Planning Partners.
- Improve environmental stewardship during and before project construction.
- Develop a wider range of public transportation performance measures including value-based, quality-of-life measures.

**RESOURCES**

Structure transportation funding and finance approaches that allocate sufficient resources for system safety, maintenance, preservation, and improvement.

- Advance a funding strategy including new mechanisms to ensure resource levels sufficient to meet transportation system needs. Ensure all modes of transportation are considered when allocating resources and prioritizing projects.
- Adapt to and manage accelerating change (e.g., mainstreaming innovation, institutional adjustments, people skills, and knowledge management).
- Streamline planning and public involvement processes.
- Improve planning and analytical tools to adapt to changes impacting transportation, including the implementation of a data repository and information exchanges within PennDOT (between Bureaus/Divisions, between Central Office and Districts, etc.).
# Table of Contents

## Context: What, Why, How, and Who

8
Long-Range Transportation Plan Essentials
Public and Stakeholder Involvement

## Existing Conditions and Trends: Where We Are Now

14
Highlights by Mode
Additional Trends and Opportunities

## Strategic Directions: Where We Need to Be

48
Goals and Objectives

## Implementation: How We Will Get There

56
Overview
Actions and Accountability
Implementation Partners and Projects
Transportation Performance Management
Implementation Resource: Transportation Planning Data Repository

### Appendices (penndot.gov/planning)

Appendix A: Transportation Planning Background
Appendix B: Public and Stakeholder Involvement
Context:
What, Why, How, and Who

SECTION CONTENTS
Long-Range Transportation Plan Essentials
Public and Stakeholder Involvement
Long-Range Transportation Plan Essentials

The statewide long-range transportation plan (LRTP) establishes a direction for Pennsylvania’s transportation system, for a 20-year planning horizon. That direction is expressed as the goals and objectives that will guide our programs and project investments. Analyzing the long-term implications of various issues at the statewide level helps toward achieving those goals.

This 2045 PA LRTP has been developed alongside a PA Freight Movement Plan (FMP), available at penndot.gov/planning. The two plans complement each other, establishing a comprehensive direction for enhancing the movement of people and goods within and through the state.

The statewide LRTP does not include specific projects, such as bridge replacements or major road improvements. These projects are developed regionally by the state’s metropolitan and rural planning organizations (MPOs/RPOs), known as PennDOT’s Planning Partners. Each Planning Partner develops a regional LRTP in step with the statewide direction.

Similarly, functional and modal plans, such as the Freight Movement Plan and Statewide Active Transportation Plan, also align with the overall statewide direction, applying its principles in more detail to one aspect of Pennsylvania transportation.

LRTP Elements

- Interstate Highway System
- Non-Interstates Roadway Network
- Bridges
- Traffic Operations
- Freight
- Public Transportation
- Passenger Rail
- Active Transportation
- Aviation
- Connected and Automated Vehicles (CAV)

PennDOT produces modal and functional plans that related to the LRTP, including:

- Active Transportation Plan
- Aviation System Plan
- Freight Movement Plan
- State Rail Plan
- Strategic Highway Safety Plan
- Regional Operations Plans

More background on Pennsylvania transportation planning—history and process—is provided in Appendix A, available at: penndot.gov/planning
Transportation Planning Process

Long-range planning is one of three key phases of transportation improvement. Plans guide development of Transportation Improvement Programs (TIP) established at the regional level. The TIP projects are also included in the statewide 12-Year Program (TYP), which is updated every two years.

In the off-year, the State Transportation Commission (STC) and Transportation Advisory Committee (TAC) compile a Transportation Performance Report (TPR), which serves as a report card on the transportation system and helps direct future programming to achieve plan goals.

The update of both the LRTP and 12-Year Program include extensive outreach to the public and transportation stakeholders to ensure that public perspectives are considered as part of the process.
Public and Stakeholder Involvement

Many voices throughout the Commonwealth provided the foundation for effective development and successful implementation of Pennsylvania’s 2045 LRTP. The scope and scale of outreach conducted for the LRTP was greater than for any previous plan. The users of the statewide transportation network provide an essential perspective in helping to shape the strategic direction of the plan.

To capture transportation system needs and concerns across Pennsylvania, input was solicited in various forums and incorporated at key points during plan development. In addition to statewide public outreach and stakeholder engagement, extensive “in-reach” was a key element of the stakeholder engagement process. PennDOT units and partnering agencies and organizations were engaged to ensure that current and future initiatives would be properly reflected and supported by the LRTP’s implementation plan.

### Engagement Highlights

<table>
<thead>
<tr>
<th>Public Outreach</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Surveys Completed</td>
<td>7,400</td>
</tr>
<tr>
<td>Public Forum Views</td>
<td>1,905</td>
</tr>
<tr>
<td>E-News Contacts</td>
<td>2,700</td>
</tr>
<tr>
<td>Social Media Posts</td>
<td>11</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stakeholder Engagement</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPOs and RPOs Engaged</td>
<td>24</td>
</tr>
<tr>
<td>State Transportation Commission &amp; Transportation Advisory Committee Presentations</td>
<td>8</td>
</tr>
<tr>
<td>Freight Focus Group Meetings by Mode</td>
<td>5</td>
</tr>
<tr>
<td>Statewide Virtual Freight Forum Registrations</td>
<td>225</td>
</tr>
<tr>
<td>Equity &amp; Diversity Workshops Attendance</td>
<td>25</td>
</tr>
<tr>
<td>PennDOT Planning Network e-Blasts</td>
<td>9</td>
</tr>
<tr>
<td>State Planning Board</td>
<td>49</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PennDOT In-reach &amp; Interagency Collaboration</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive Interviews</td>
<td>35</td>
</tr>
<tr>
<td>PennDOT Bureau/ District Personnel Engaged</td>
<td>&gt;40</td>
</tr>
<tr>
<td>Partnering Agency Interviews &amp; Presentations</td>
<td>5</td>
</tr>
</tbody>
</table>
Statewide Virtual Freight Forum

The major milestone for the stakeholder engagement process was the Statewide Virtual Freight Forum. It convened stakeholders from across the state and nation to learn about the dynamic freight industry, explore current trends, and offer feedback and input on instead of direction for the future.

Key themes emerging from the forum were:

- **Multimodal freight networks** are essential for moving finished goods and raw materials.
- Challenges such as **truck parking** will become more significant as our reliance on goods movement continues to grow.
- Emerging trends and technologies such as **automated vehicles**, the explosive growth of **e-commerce**, and changing supply-chain patterns will require substantial adaptation.
- It is imperative to make our transportation facilities more resilient in light of **changing climate**.
- We must strive to meet the transportation needs of all Pennsylvania communities and citizens with **equity** as the abiding value.

**Executive Interviews: Key Themes**

Several common themes emerged from interviews of agency executives at the start of the planning process, including:

- Transportation and land use connection
- Emerging technology
- Asset management
- Equitable solutions for diverse populations from urban to rural areas
- Multimodal and intermodal connections
- Transportation's impact on quality of life
- Stronger connections between planning and programming
- Funding to support plan outcomes
- Implementation and accountability

**Municipal Collaboration**

The following organizations offered local government viewpoints during statewide plan development:

- Pennsylvania State Association of Boroughs
- County Commissioners Association of Pennsylvania
- Pennsylvania State Association of Township Supervisors
- Pennsylvania Municipal League
- Pennsylvania State Association of Township Commissioners
STC Public Survey

Public feedback was obtained through an online public survey and public forum hosted by the STC for the 2023 12-Year Program update. Extensive outreach and promotions were launched through the STC website, including e-mail blasts to thousands of stakeholders, a targeted social media campaign offered in Spanish and Mandarin—the two most-spoken languages in Pennsylvania after English, traditional media outreach, and outreach in partnership with stakeholders.

PennDOT will continue to use the STC public survey process to inform the 12-Year Program and future LRTP updates. Future surveys will include recurring questions (to draw important comparisons and trends, over time) as well as new questions to obtain the public’s pulse on Pennsylvania’s changing transportation conditions.

A complete summary of engagement and outreach is provided in Appendix B, available at: penndot.gov/planning

Survey Results: Transportation Priorities

7,400 respondents completed a public survey and ranked their transportation priorities in the following order:

1. **Road Pavement**
   - Repairing, restoring, reconstructing, and maintaining state and local roads

2. **Bridges**
   - Repairing, replacing, and maintaining state and local bridges

3. **Traffic Flow**
   - Adding new lanes, constructing new roads, and using technology to improve traffic flow

4. **Interstate Highways**
   - Prioritizing Interstate reconstruction investments with numerous specific projects identified

5. **Walking**
   - Accessible and connected walking routes

6. **Public Transportation**
   - Accessible and frequent public transportation options that cover an extensive service area and cross regions

7. **Passenger Rail**
   - Intercity and commuter rail service with out-of-state connections

8. **Bicycling**
   - Safe routes and facilities throughout the state

9. **Freight**
   - Modern highways, railways, airports, and ports to support the economy

10. **Aviation**
    - Modern facilities, operations, and a wide range of commercial airline choices
Existing Conditions and Trends: Where We are Now

SECTION CONTENTS

Highlights by Mode

Trends and Opportunities
Pennsylvania is also more racially diverse. By 2050, the state’s non-white population is expected to increase 13 percent, while the white population is expected to decline by the same rate. Pennsylvania’s youth are more diverse than the state’s adult population (20 and over).

Planning Implications

• Despite being a “slow growth” state, Pennsylvania is a large consumer market in the Northeast, with strong demand for travel by people and freight on its transportation system. Ongoing changes in demographics will affect where and how transportation infrastructure and services must adapt to accommodate demand. Serving the mobility and access needs of urban and rural residents and businesses will continue to be an important challenge.

• The confluence of a growing number of older Pennsylvanians, coupled with a greater desire of Millennials and Generation Z (born between 1997 and 2012) for good connections to community destinations, affordable homes, and mixed-use development sites with residences, workplaces, shopping, and restaurants in close proximity, means that local communities will need to place a greater emphasis on walkability, and adopt zoning that encourages and helps facilitate multimodal approaches to address transportation needs.

• Technology continues to change at an accelerating rate, and at a pace that has been further propelled by the COVID-19 pandemic (e.g., home package delivery). The “creative disruption” of the pandemic spurred the adoption of technology, particularly by younger generations, and will continue to fuel an ongoing evolution in the development of connected and automated vehicles, embrace of e-commerce, and interest in “smart city” projects.
Figure 1: Population Change, 2010 to 2020

US Census

Population Change

- 10% to 15%
- 5% to 10%
- 0% to 5%
- -5% to 0%
- -10% to -5%
- -15% to -10%
Figure 2: Forecasted Population Change, 2020 to 2050

Population Change

-25% to -20%
-20% to -10%
-10% to 0%
0% to 10%
10% to 20%
20% to 30%

Woods & Poole
Trends & Issues

• Pennsylvania is served by 1,870 linear miles of Interstate highway – the fourth-largest network of Interstates in the nation (Figure 3).
• Interstates comprise only 6 percent of total state-owned roadway mileage yet accommodate 24 percent of all traffic volume. Moreover, these highways account for only 12 percent of total crashes (2019).
• Interstates registered 44 percent of all of Pennsylvania’s work zone fatalities in 2019.
• Much of Pennsylvania’s Interstate system was constructed more than 50 years ago and is in need of major rehabilitation or replacement.
• Further, much of the Interstate system will be over 80 years old at the end of the LRTP horizon year of 2045. Pavement reconstruction efforts are insufficient due to funding constraints, adding to the backlog of needs. Interstate funding in general has remained relatively flat since 2007 (Figure 4).
• Following federal asset management requirements, PennDOT has adjusted its programming philosophy to make greater levels of investment in the Interstate system. From a present-day level of approximately $450 million annually, funding is expected to grow to $1 billion by 2028. The level of Interstate funding has remained relevant consistent since 2007.
• While program planning for the Interstates was originally carried out regionally by MPOs and RPOs, PennDOT centralized planning functions for the Interstates in 2007 so they could be addressed as one strategic asset. PennDOT formed an Interstate Steering Committee (ISC) in 2015 to oversee the Interstate Management Program. The ISC includes representation from PennDOT’s Center for Program Development and Management (CPDM), Bureau of Maintenance and Operations (BOMO), Bureau of Project Delivery (BPD), and the 11 PennDOT Engineering Districts.
• The ISC is currently documenting its decision-making processes as the means to review and potentially improve the procedures for project prioritization.

• MAP-21 and the FAST Act established Performance Based Planning & Programming (PBPP) and Transportation Asset Management Plan (TAMP) requirements. These requirements are driving PennDOT to move toward Lowest Life-cycle Cost asset management approaches, which prioritize timely repairs versus fixing the worst infrastructure first. PennDOT completed its current TAMP in June 2019.

Planning Implications

• The improvement needs of Pennsylvania’s Interstate system are far greater than the funding available. Even with the projected ramp-up in funding to $1 billion annually by 2028, the state will continue to fall short of what is needed to keep the system in a state of good repair. It is estimated that $1.2 billion is needed per year to address cyclical asset management needs on the Interstate Highway System.
• Increased funding will be needed for:
  o The current backlog of assets needing improvement
  o Modernization (fiber network, ITS expansion, operational improvements, safety and guiderail upgrades, all-weather pavement markings)
  o Strategic Investments – selected capacity improvements, interchanges, truck climbing lanes
• The Secretary’s Discretionary Funding on the Interstate system allows projects to advance that are vitally important to maintaining and improving Interstate infrastructure.
• P3 (Public-Private Partnership) project delivery is a tool that can augment resources for the Interstate program.
• Interstate maintenance and related improvements are currently funded at only half the level necessary to keep with a desired preventive maintenance cycle. Further, by having to direct more funds to the Interstate program, resources are diverted from the rest of PennDOT’s road and bridge network (Figures 5 and 6).
Figure 4: Pennsylvania Interstate Funding History (Millions $)
Figure 5: Forecasted Interstate Bridge Condition (by Deck Area)

Figure 6: Forecasted Interstate Pavement Condition

Source: PAMS, based on EOY 2018 RMS segment-level data
Non-Interstate Roadway Network

Trends & Issues

- Pennsylvania has a large and aging network of roadways. There are more than 120,000 linear miles of roadway in Pennsylvania—nearly 40,000 of which are owned, maintained, and operated by PennDOT; the rest of the extensive road network is primarily owned and maintained by local government.
- The extensive needs for improving the local system of roads and bridges is also a major problem that was addressed in the TROC funding proposal.
- Roadways are the backbone of Pennsylvania’s transportation system, particularly in its more rural areas where National Highway System routes provide essential access (Figure 7).
- The state’s roadway network accommodates approximately 281.5 million miles of travel, daily. Total demand for travel has remained relatively constant over the past decade.
- PennDOT has organized its highways into several Business Plan Network (BPN) classifications, including: National Highway System (NHS) Interstate; NHS Non-Interstate; Non-NHS with ADT > 2,000; and Non-NHS with ADT < 2,000. The percentage of highway pavements in poor condition increases for each lower class BPN.
- The Federal Highway Administration (FHWA) in February 2019 certified 423.79 miles of roadway as Critical Urban and Critical Rural Freight Corridors (CUFCs and CRFCs), making them eligible for National Multimodal Freight Network (NMFN) funding.

Planning Implications

- PennDOT is moving away from prioritizing roadway improvements from a “worst first” approach in favor of a “lowest life-cycle cost” method. This approach is aimed at making improvements when needed to extend roadway life. Lowest life-cycle cost places greater emphasis on timely maintenance for system preservation. Lowest life-cycle cost is especially important in the context of limited resources.
- The extensive needs for system maintenance has resulted in fewer capacity-adding projects. Nonetheless, PennDOT is moving forward on several major roadway projects, including: US 322 widening in Delaware County; and the Central Susquehanna Valley Transportation (CSVT) Project in Northumberland, Snyder, and Union counties.
- The move toward “lowest life-cycle cost” will extend the life of Pennsylvania’s bridges and pavements, but will also result in an increase in the total mileage of poor pavement. Even now, pavement conditions are transitioning from good to fair as roadways deteriorate faster than they can be repaired (Figure 8).
- FHWA’s November 2017 approval of Pennsylvania’s first statewide freight plan pre-dated the certification of CUFCs and CRFCs. PennDOT will need to collaborate with the state’s MPOs and RPOs on CUFC and CRFC designs as shipping patterns and demand changes. Use of PennDOT’s forthcoming transportation planning data repository will be a useful resource as part of this initiative.
- Funding is inadequate to keep pace with rehabilitation and replacement projects needed to keep the system in optimal condition. Moreover, the increased age of Pennsylvania’s roads and bridges minimizes the benefit of continual preservation treatments. PennDOT’s $8.8 billion annual budget must more than double - to approximately $18.15 billion - to adequately address transportation system needs.
Figure 7: Pennsylvania NHS Routes
• As population and industry continually shift in location and density across Pennsylvania, changes in land use patterns should be monitored to plan for potential shifts in highway and bridge needs.
  ○ Continued coordination between county planning agencies and MPO/RPO officials will help to ensure that highway and bridge needs are clearly articulated in county comprehensive plans—fostering a needed transportation and land use connection.
  ○ Local governments, through comprehensive plans, zoning, and subdivision and land development, can promote a mix of uses to encourage fewer transportation trips, reducing pressure on the existing highway and bridge network. Municipal adoption of access management ordinances can also ensure land use changes consider efficient transportation ingress/egress to new developments.
  ○ With the continued rise in e-commerce, and freight activity in general, there is an increased need to store and deliver consumer goods. This has resulted in the expansion of warehouse and distribution facilities, particularly in the state’s eastern and central regions. Communities should continue to plan in ways that take these transportation intensive uses into account as early as possible rather than having to react which also forces costly transportation improvements. Present resource constraint if not addressed with additional funding will make it increasingly difficult to “follow” such developments with the supporting transportation infrastructure.
  ○ In the wake of COVID-19, county and local government leaders should begin to assess how community land uses might change, impacting the highway network. The pandemic accelerated trends such as e-commerce, the movement away from denser urban cores to single-family homes in suburban and rural areas, and rising vehicle ownership.

• There are 22 scenic byways throughout the state. The Brandywine Valley Byway in Delaware County received national designation in 2021 and is now one of three national scenic byways in Pennsylvania. Despite the lack of federal funding for byways initiatives, PennDOT released an updated guidance manual in 2021 and has begun work on implementing an interagency action plan for promoting the byways program. The program is envisioned to expand beyond its historically highway-only-based focus.

• The present funding shortfall poses a dilemma that must soon be resolved. As greatly limited resources are prioritized to the Interstate System to the greatest extent possible, other roads and bridges receive even lesser funding. This trade-off is untenable and not sustainable. A level of sufficient investment must be established to ensure that Non-Interstate Roads and Bridges do not fall into an overall state of disrepair.

For more detail on Trucking, Rail Freight, Ports and Waterways, and Air Cargo, please see the Freight Movement Plan, available at: penndot.gov/planning
Figure 8: Forecasted NHS Pavement Condition

Source: PAMS, based on EOY 2018 RMS segment-based data
## Trends & Issues

- There are more than 25,400 bridges in Pennsylvania greater than 8 feet in length, representing over 115 million square feet in deck area.
- As of Fall 2021, the number of state-owned bridges rated "poor" was just under 2,500—less than half the number of poor bridges a decade earlier. This trend reflects a focused effort by PennDOT to reduce the backlog of bridges needing repairs by using both traditional funding sources and non-traditional means, such as Public-Private Partnerships (P3s).
- The condition on average of locally owned bridges over 20 feet long is also improving, but due to the sheer number and age of local bridges needing improvement, and extreme funding constraints, this continues to be a major challenge for communities.
- Pennsylvania has made significant progress in bridge construction to reduce the number of weight-restricted bridges. Initiatives such as the Rapid Bridge Replacement Project, which replaced 558 bridges through P3s, have successfully reduced the number of these bridges.
- The percentage of poor bridges steadily increases across all lower-order business plan networks, because the structures are deteriorating faster than they can be repaired or reconstructed under current funding constraints. Given the age of Pennsylvania’s bridges, barring a funding breakthrough this trend is forecasted to continue through 2030 (Figure 9).
- As mentioned in the previous section, PennDOT has organized its roadways and bridges into several Business Plan Network (BPN) classifications, including: NHS Interstate; NHS Non-Interstate; Non-NHS with ADT > 2,000; and Non-NHS with ADT < 2,000. All BPNs have less than 10 percent of bridge deck area rated poor, and bridges on non-NHS routes have larger share of deck area that is considered good than NHS routes. More than 75 percent of Interstate deck area is fair; only 19 percent is considered good. (Figure 10).

## Planning Implications

- The number of bridges rated poor has decreased significantly in recent years. However, there is inadequate funding to continue this “worst-first” method of prioritization. Transitioning to "lowest life-cycle cost"-based project selection will help keep good bridges from becoming poor and yield additional years of service from existing poor structures, but does not address the funding need gap directly.
- With uncertainties over future funding levels and a widening dip in purchasing power, funding gaps continue to widen.
  - To help address funding shortfalls, counties and local governments can continue to plan and zone for land use that leverages existing transportation assets. This will reduce the need for new highway and bridge infrastructure, helping to manage transportation costs.
  - Further, local governments will likely need to make greater use of tools such as impact fees, transportation development districts, or developer agreements to help fund new highway and bridge construction.
### Figure 9: Forecasted Poor Bridges by Business Plan Network (by Deck Area)

![Forecasted Poor Bridges Chart](chart.png)

### Figure 10: Bridge Condition by Business Plan Network

<table>
<thead>
<tr>
<th>BPN</th>
<th>Description</th>
<th>Total Count</th>
<th>Total Deck Area (SF)</th>
<th>% Good by Deck Area</th>
<th>% Fair by Deck Area</th>
<th>% Poor by Deck Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NHS Interstate</td>
<td>2,205</td>
<td>29,930,489</td>
<td>19%</td>
<td>75%</td>
<td>6%</td>
</tr>
<tr>
<td>2</td>
<td>NHS Non-Interstate</td>
<td>4,952</td>
<td>44,243,042</td>
<td>29%</td>
<td>66%</td>
<td>5%</td>
</tr>
<tr>
<td>3</td>
<td>Non-NHS with Average Daily Traffic (ADT) ≥ 2,000</td>
<td>6,847</td>
<td>23,323,118</td>
<td>35%</td>
<td>59%</td>
<td>7%</td>
</tr>
<tr>
<td>4</td>
<td>Non-NHS with ADT &lt; 2,000</td>
<td>11,411</td>
<td>18,402,349</td>
<td>39%</td>
<td>51%</td>
<td>10%</td>
</tr>
</tbody>
</table>

*Source: Bridge ≥8’ Data: BMS2 as of 6/30/2020*
PennDOT entered into agreement with some municipalities to manage local bridge bundle packages, with PennDOT handling consultant selection, design, construction, and inspection. This has helped improve local bridge conditions.

Additionally, the State Transportation Commission approved a Local Small Bridges Study report in 2021. The study included recommendations to help create increased capacity and incentives to facilitate uniformity in local small bridge (i.e., less than 20 feet in length) asset management.
YOUR PENNSYLVANIA At-a-Glance

Pennsylvania is still one of the most populous states in the nation, RANKING 5th IN SIZE.

Pennsylvania’s economy, were it a single country, would be the 25th-largest in the world, just behind Belgium and Taiwan.

Pennsylvania is served by 1,870 LINEAR MILES of Interstate – the FOURTH-LARGEST NETWORK of Interstates in the nation.

The state’s roadway network accommodates approximately 281.5 MILLION MILES OF TRAVEL, DAILY.

The Commonwealth has 11 BicyclePA ROUTES

Pennsylvania’s first nationally-designated bicycle route, U.S. Bicycle Route 50, a 163-mile bicycle route was designated in May 2017, making Pennsylvania the 25th state to join the developing U.S. Bicycle Route System (USBRS).

There are over 25,400 BRIDGES in Pennsylvania GREATER THAN 8 FEET IN LENGTH, or nearly 117 million square feet of deck area.

There are approximately 655 AVIATION FACILITIES across Pennsylvania.

These include 128 licensed public-use airports, including three heliports and two seaplane bases, as well as 243 private-use airports and 284 private-use heliports.

13 MILLION
2020 population

29
Traffic Operations

Trends & Issues

- Improving transportation operations can be a cost-effective way to improve capacity and improve traffic flow. As Pennsylvania continues to operate within an increasingly constrained funding environment, there will be the need to emphasize improving operations (handling more trips on the existing system) over capacity-building (such as adding lanes and building new roads).

- PennDOT has developed a TSMO Program (Transportation Systems Management and Operations) defined as programs that “advance projects and services designed to get the safest and most efficient use out of the existing and planned roadway network” (FHWA, Planning for Operations Program) and is currently implementing it. PennDOT maintains four TSMO regions (Figure 11).

- There are more than 13,800 traffic signals in Pennsylvania, which are primarily owned, maintained, and operated by over 1,200 municipalities. Signal equipment that is properly timed and maintained helps improve travel efficiency reduces the cost of signal operation/maintenance over time.

- There were 18,959 traffic incidents on Pennsylvania roadways in 2019, with an average incident clearance time of 95 minutes. Both the number of incidents and the average clearance time have increased in recent years.

- PennDOT has been updating Regional Operations Plans (ROPs) for each TSMO region that identify Intelligent Transportation Systems (ITS) and operations infrastructure needs, visions, and goals. Additionally, the Commonwealth is working to establish a statewide fiber optic network that will accommodate improved ITS solutions for traffic operations.

Planning Implications

- The gains that PennDOT has achieved in recent years related to signals and ITS investments could slow or reverse based on the current funding environment. Challenging state and local funding scenarios will likely limit the ability of municipalities and PennDOT to maintain and upgrade their traffic signals and ITS devices.

- Pennsylvania can expect more commercial vehicles on the road and an increased number of trucking distribution centers. This growth will require additional accommodations such as parking areas, queuing zones, and longer traffic signal phases to account for the slower acceleration and deceleration of heavy trucks.

- Emerging technologies may significantly alter how the state’s transportation system operates and designed over the next 25 years. Some examples of emerging technology include integrated corridor management, connected ITS infrastructure, connected vehicle “platoons,” and highly autonomous and/or connected public transit and private automobiles.

- As population and industry shift in location and density across Pennsylvania, changes in land use patterns should be monitored to plan for potential shifts in transportation demand.

- With uncertainties in revenue and a decline in buying power, funding gaps for TSMO continue to widen. TSMO strategies (and planning for operations in design and construction decision-making) can help funding stretch further than traditional capital infrastructure investments.

Figure 11: Pennsylvania’s TSMO Regions
There are over 13,800 traffic signals in Pennsylvania, which are primarily owned, maintained, and operated by over 1,200 municipalities. Enhanced traffic signal performance helps improve travel efficiency and highway safety.

Broadband is now the modern-day form of transportation

Planning Implications (cont’d)

• There are many uses for fiber that go beyond connected and automated vehicles, e.g., access to work, school and telemedicine for rural hospitals. The introduction of fiber can bring immediate benefits even as the technology matures and develops. Indeed, transportation and communication continue to merge in many new ways.

• An area that will be important to understand as it relates to technological advances includes curb side management. As the economy moves toward more e-commerce, the use of parking lanes and public right-of-way adjacent to businesses may change in very dynamic ways from what we are accustomed to.

• Freight movement will be heavily impacted by improvements in traffic operations and technology, as advancements will improve operating efficiencies and address operator hours of service requirements. We may see some freight in the future being moved by automated vehicles for long-haul driving, with human drivers for the first- and last-mile. The Interstate system will be the easiest network for automation to work on.
Public Transportation

Trends & Issues

• All 67 Pennsylvania counties are served by at least one mode of public transportation, provided by 57 transit agencies (Figure 13).

• Four distinct types of services are available to transit users: fixed-route bus, shared-ride demand-response bus, intercity bus, and passenger rail. Each mode has unique operating characteristics, customer needs, and funding sources.

• Act 44 of 2007 required the Pennsylvania Turnpike Commission to make annual payments of $450 million to the Pennsylvania Public Transportation Trust Fund. Those payments will be reduced to just $50 million annually, beginning in 2022 posing a serious challenge for public transportation.

• Public transportation usage across the nation has decreased in each of the last four years, even before the COVID-19 pandemic. While overall ridership in Pennsylvania has followed that trend, 15 transit agencies in Pennsylvania have experienced ridership growth. This trend could reverse in the future due to numerous factors including federal policy and changing demographics.

• PennDOT’s Intercity Bus Program subsidizes a variety of services through several carriers, providing opportunities to travel into and outside of the state providing Intrastate and Interstate travel options (Figure 14).

• With nearly 384 million trips taken in FY 2018-19, fixed-route urban transit represents the majority of the passenger trips provided in Pennsylvania each year (Figure 15). The overwhelming majority (93%) of these trips are provided by the two largest transit agencies, the Southeastern Pennsylvania Transit Authority (SEPTA) serving the Philadelphia region, and Port Authority of Allegheny County (PAAC) in Pittsburgh.

• Pennsylvania has one of the most comprehensive shared-ride demand-response programs in the nation. However, during the four-year period ending FY 2018-19, shared-ride trips declined by nearly 1.1 million trips (Figure 16). This loss can be primarily attributed to declining income from the Medical Assistance Transportation Program (MATP) and lower ridership by “younger” senior citizens.

• Pennsylvania’s transit agencies have an annual economic impact from $3.8 billion. This direct, indirect, and induced activity supports more than 32,000 jobs with $2.1 billion in employee compensation. Operating activity also generates $76 million in annual tax revenue for the Commonwealth.

• A significant portion of transit funding in Pennsylvania is provided through state-level programs and subsidies. In addition to programs like the senior shared-ride program and the Persons with Disabilities mobility program, Pennsylvania Acts 44 and 89 provide significant revenue streams for fixed-route operations and capital projects, respectively.

• Transit agency performance is a PennDOT emphasis area as provider of grants. Emerging from Act 44 of 2007, four performance criteria were identified to measure the efficiency and effectiveness of transit agencies: Passengers per Revenue Vehicle-Hour (RVH), Operating Cost per RVH, Operating Revenue per RVH, and Operating Cost per Passenger. The following statewide trends have been observed:
  ○ Total Act 44 passenger trips decreased 22.4 percent between FY 2018-19 and FY 2019-20.
  ○ Revenue vehicle-miles decreased 9.5 percent between FY 2018-19 and FY 2019-20.
  ○ Overall, vehicle revenue-hours decreased 8.3 percent between FY 2018-19 and FY 2019-20.
Figure 13: Transit Systems

Transit Type

- Urban Transit
- Rural Transit
- Urban and Rural Transit
- No Fixed Route Operator
- Agency Overlap

PennDOT BPT Report, 2019
Planning Implications

- Federal funding for public transportation has increased slightly over the past five years as MAP-21 funding transitioned to the FAST Act funding program. This funding increase has helped on capital projects, but not operating costs.

- State funding for public transportation is essential and will need to increase as well to help support the mobility needs and the many associated benefits. The July 2021 TROC proposal addresses the public transportation funding problem.

- To increase efficiency, reduce operating expenses, enhance customer service, and improve consistency, many transit agencies and local municipalities have been working toward consolidation of transit systems. Such measures will help improve operating efficiencies and system viability. To date PennDOT has conducted consolidation studies covering 40 counties.

With nearly 384 MILLION TRIPS taken in FY18-19, fixed-route urban transit represents the majority of the passenger trips provided in Pennsylvania each year, and most of these trips (93%) are provided by the Southeastern Pennsylvania Transit Authority (SEPTA), and Port Authority of Allegheny County (PAAC).
Figure 17: Community Transportation Systems
Passenger Rail

Trends & Issues

- Intercity passenger rail service in Pennsylvania is primarily provided by the National Railroad Passenger Corporation, known as Amtrak. Additionally, the Southeastern Pennsylvania Transportation Authority (SEPTA) Regional Rail system, and NJ Transit's Atlantic City Line provide regional commuter rail services among communities in the Philadelphia metropolitan region and between Atlantic City and Philadelphia, respectively.

- Amtrak operates 13 service lines on five corridors in Pennsylvania that range from high-speed service along the Amtrak-owned Northeast Corridor (NEC) to daily long-distance service along the Capitol Limited route through the southwestern corner of the state (Figure 18). Port Authority of Allegheny County (PAAC) also provides light rail services to areas surrounding the City of Pittsburgh and Allegheny County.

- Total boardings and alightings (exits at the destination) for Amtrak’s 24 Pennsylvania stations for FFY 2019 were 6.67 million (Figure 19). Ridership from Pennsylvania has risen by more than 700,000 trips over the past five years. These trends are expected to continue across all Pennsylvania Amtrak stations as ridership is projected to grow by 1.4 million (21 percent), climbing from 6.7 million in FFY 2019 to 8.1 million in FFY 2025.

- The SEPTA Regional Rail system offers commuter rail service in the five-county Philadelphia region (in addition to Trenton, NJ; West Trenton, NJ; Newark, DE; and Wilmington, DE), operating 13 service lines across 280 route-miles. In FY 2019, SEPTA reported an annual Regional Rail ridership of 34,190,970 (a decrease of 0.5 percent from FY 2018) and average weekday regional rail ridership of 119,000.

- According to ridership projections prepared by the Delaware Valley Regional Planning Commission (DVRPC), the SEPTA Regional Rail network is projected to grow by 8,730 person-trips (7.3 percent) and by 9,176 passenger-miles (5.2 percent) from 2020 to 2045. Funding for improvements to accommodate the projected growth will be critically important for users, traffic congestion, and environmental reasons.

- Both Amtrak’s and SEPTA’s major stations facilitate intermodal connections with local bus and light rail transit options. Amtrak has operating agreements with commuter (SEPTA and NJ Transit) and freight (CSX and Norfolk Southern) rail operators throughout Pennsylvania for shared use of rail infrastructure.

- Ridership demand declined by nearly 30 percent during FY 2019-20 due to the COVID-19 pandemic. Amtrak’s Keystone Service between Harrisburg and New York via Philadelphia was suspended for several weeks as a pandemic public safety measure. Ridership on SEPTA’s Regional Rail was nearly wiped out by the pandemic—as of August 2021, it was approximately 20 percent of where it was, pre-pandemic.
Figure 18: Amtrak Service Lines

Amtrak Service Lines

PENNSYLVANIAN

Connellsville, Pittsburgh, Erie

Exton, Paoli, Tyrone, Latrobe, Altoona, Lewistown, Huntingdon, Greensburg

Altoona, Lewistown, Huntingdon, Greensburg

Erie, Philadelphia

PennShare

Lake Shore Limited

Northeast Corridor

Capitol Limited

Track Ownership

- Norfolk Southern
- Amtrak
- CSX
- Other Rail
- Amtrak Stations
Planning Implications

• Population growth across the nation is concentrating in urban areas of all sizes, not just the largest metro areas. This growth encompasses people of all ages who have instead of demonstrate higher rates of ridesharing and lower vehicle ownership rates and may choose passenger rail for their intercity travel needs. Agencies such as SEPTA and the Port Authority of Allegheny County (PAAC) will need to be responsive to this growing customer base to remain viable. The July 2021 Transportation Revenue Options Commission proposal includes revenue sources that can expand public transportation funding.

https://www.penndot.gov/about-us/funding/Pages/TROC.aspx

• Higher-density, mixed-use development associated with transit systems, i.e., transit-oriented development, has been a focus of community and economic development planning in Pennsylvania’s small- to mid-size rail-served urban areas, though it is far outpaced by low-density, auto-dependent residential development at the edge of existing development.

• The State Rail Plan identifies an investment of capital projects totaling $5.0 billion between 2021 and 2045. In addition, there are $1.0 billion worth of “vision projects” for which implementation dates are yet to be determined.

The Delaware Valley Regional Planning Commission (DVRPC) projects that the SEPTA Regional Rail network with grow by 8,730 PERSON TRIPS (7.3 percent) and by 9,176 PASSENGER MILES (5.2 percent) from 2020 to 2045.
Trends & Issues

- Active transportation (walking and bicycling accommodation) provides affordable, environmentally friendly modes of transportation and recreational opportunities for Pennsylvanians and visitors.

- Pennsylvania’s active transportation network and recreation spaces link communities, connect children to the outdoors, and serve as economic engines for small towns and big cities looking to attract tourists. Improved and expanded bicycle and pedestrian facilities also support improved community health outcomes and ensure flexibility and resiliency in the face of climate change.

- The COVID-19 pandemic highlighted the need for better walking and bicycling infrastructure as demand for active transportation options increased. According to the Pennsylvania Environmental Council, when tracking the use of 67 trails, parks and natural areas around the state, activity spiked by as much as 200 percent during March and April 2020 over the same period a year earlier.

- The Commonwealth has 11 BicyclePA routes (Figure 20). Pennsylvania’s first nationally designated bicycle route, U.S. Bicycle Route 50, is a 163-mile bicycle route designated in May 2017.

- Results from a 2018 public survey for PennDOT’s Active Transportation Plan showed that 30 percent of respondents found it “challenging” or “very challenging” to walk in their community, while 58 percent found it challenging or very challenging to ride a bicycle in their community. Additionally, most respondents indicated that physical infrastructure such as separated bicycle lanes, sidewalks, and a connected non-motorized network was needed for them to consider walking or bicycling more frequently.

Planning Implications

- PennDOT and its state, regional, and local partners must coordinate efforts and leverage existing and new resources to improve the current policies, legislation, funding, and infrastructure intended to support active transportation.

- Public health and public interest will continue to translate into growing support for investments that expand active transportation.
Figure 20: BicyclePA Routes
Figure 21: DCNR Trails and Trail Gaps
Planning Implications

• With estimates of a near-doubling of passenger and cargo numbers by 2036, airport infrastructure improvements are needed, and can be expected to support airport job growth.

• Regarding commercial activity, Philadelphia International Airport (PHL) could face major operational challenges. While the introduction of larger aircraft may result in the consolidation of flight schedules, the airport’s airspace remains congested. General aviation and reliever airports in southeastern Pennsylvania help reduce congestion in and around the PHL airspace and minimize delays for non-commercial activity.
  ○ Three constrained general aviation service airports—Doylestown, Heritage Field, and Brandywine—should be upgraded where possible to continue meeting regional demand, especially because aircraft operations in Eastern Pennsylvania are forecasted to grow faster than the state’s average.

Trends & Issues

• There are approximately 655 aviation facilities across Pennsylvania. These include 128 licensed public-use airports, including three heliports and two seaplane bases, as well as 243 private-use airports and 284 private-use heliports.

• Of the public-use airports, 15 are commercial service airports (Figure 22), which are also used for air freight; the remaining 113 are general aviation airports offering on-demand air transportation service.

• According to the 2019 Interim Aviation Economic Impact Study, Pennsylvania’s commercial and general aviation airports provide an annual economic impact of $28.5 billion to the state. As would be expected, the state’s 15 commercial airports generate the most output, at approximately $26.7 billion (Figure 23).

• In 2018, there were 21.7 million air carrier enplanements in Pennsylvania—a 10-year increase of 0.9 percent.

• The COVID-19 pandemic has had both a public health and economic impact, drastically reducing operations in 2020. The full impact and recovery timeline of this public health emergency is not yet known though it may be longer than previous recoveries due to its worldwide impact.

• Although forecasts indicate a rise in based aircraft and operations, there is sufficient capacity system-wide to accommodate future growth.

• Of the three factors that have influenced statewide airport operations and development, namely increasing fuel costs, protection of airspace and runway approaches, and community disposition toward airport development, PennDOT’s Bureau of Aviation has been active in promoting airport hazard zoning. A 2020 review of Pennsylvania Bureau of Aviation data found that compliance has increased to 47 percent of affected municipalities.

• Air cargo revenue ton miles increased both domestically and internationally between 2009 and 2019, by 36.5 percent and 105.5 percent, respectively (Figure 23).
Figure 22: Commercial Public-Use Airports

- Erie International/Tom Ridge Field
- Bradford Regional
- Venango Regional
- DuBois Regional
- University Park
- Williamsport Regional
- Pittsburgh International
- John Murtha Johnstown-Cambria County
- Altoona-Blair County
- Harrisburg International
- Lehigh Valley International
- Lancaster
- Philadelphia International
- Wilkes-Barre/Scranton International

Use Classification
- Commercial Aviation/Paved Runways

US DOT Open Data
## Figure 23: Economic Impact of Commercial Airports in Pennsylvania, 2019

<table>
<thead>
<tr>
<th>Airport</th>
<th>Economic Impact, 2019</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philadelphia International Airport</td>
<td>$16,561,963,000</td>
<td>62.0%</td>
</tr>
<tr>
<td>Pittsburgh International Airport</td>
<td>$7,011,038,532</td>
<td>26.2%</td>
</tr>
<tr>
<td>Harrisburg International Airport</td>
<td>$1,017,571,000</td>
<td>3.8%</td>
</tr>
<tr>
<td>Lehigh Valley International Airport</td>
<td>$547,725,000</td>
<td>2.1%</td>
</tr>
<tr>
<td>Wilkes-Barre/Scranton International Airport</td>
<td>$452,138,000</td>
<td>1.7%</td>
</tr>
<tr>
<td>All other commercial airports</td>
<td>$1,126,827,000</td>
<td>4.2%</td>
</tr>
<tr>
<td><strong>Total Estimated Economic Impact</strong></td>
<td><strong>$26,717,262,532</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>
Connected and Automated Vehicles (CAV) and Technology

Trends & Issues

• There are many initiatives currently underway that aim to prepare for the introduction of Connected and Automated Vehicles (CAVs) to the nation’s and Pennsylvania’s roadways. These initiatives include research and testing of Highly Automated Vehicles (HAVs), public outreach and education, and developing legislation to govern the safe operation of these vehicles.

• PennDOT is responsible for many CAV initiatives and is a leader in the national effort to develop standards and practices through its participation in multiple USDOT and national committees, and through initiatives such as PennSTART, the Statewide Connected and Automated Vehicle Strategic Plan, and the Smart Belt Coalition.

• In addition to personal vehicles, other roadway user types such as freight are rapidly transitioning to a more automated fleet of vehicles. The freight sector is likely to be the earliest adopter of the technology due to the cost savings and driver shortages. As a national hub for freight movement, improvements in freight transportation will be directly beneficial to the Commonwealth.

• Pennsylvania’s first automated vehicle legislation, Act 117 of 2018, allows for the platooning of up to three vehicles on public roadways. Platooning could potentially increase the amount of freight moved by a single driver by allowing for the driver to operate a fleet of up to three trucks.

• In addition to managing the research and testing of HAV technology, PennDOT has also convened three PA Autonomous Vehicle Summits to explore the future potential of automated vehicles.

• Beyond CAV, PennDOT has been recognized for other technological advances through awards such as the operational excellence award for the Automated Work Zone Speed Enforcement and the best use of technology award for the Shaler Street Bridge Replacement in Pittsburgh.

Planning Implications

• An increase in new technologies on roadways will change physical aspects of the nation’s transportation network and operations such as traffic patterns, land use, travel volumes, curbside management, use hours of vehicles, and roadway design. Future PennDOT guidelines and publications will need to accommodate these changes.

• The Pennsylvania Automated Vehicle Strategic Plan (2018) outlines four pilot projects that are advantageous to implement in the short-term future to assist with the shift toward automation. These pilots will need to be implemented to better understand the changes that will be needed to adapt our current transportation system to a more automated future.

• A number of potential challenges emerge as widespread implementation of new technologies could completely change traffic infrastructure needs and traffic patterns. Some challenges include significant funding needs, ownership and maintenance, timing of implementation, and accessibility. By conducting research and establishing initiatives, PennDOT is preparing for these impacts.

As of August 2021, there is no legislation allowing autonomous vehicles to operate on PennDOT roadways. However, PennDOT has produced guidance for vehicle testers to safely experiment with their products with a human driver behind the wheel. Development of legislation can be a long process that can impede implementation of new technologies.
Trends and Opportunities

Federal Policy
In line with increasing federal system performance measures and standards (discussed in the Implementation chapter), federal asset management requirements are shifting the way in which PennDOT prioritizes roadway and bridge repairs. Historically a “worst-first” approach applied available funding to fixing infrastructure that was extremely deteriorated—and thus by necessity deferring minor repairs on roads and bridges that were in better shape. PennDOT is required to establish a Transportation Asset Management Plan that manages assets in a minimal practical cost. PennDOT has applied that approach through the TAMP to establish a lowest life-cycle cost approach. That means making timely minor repairs to newer infrastructure to help it last longer and delay or prevent the need for more expensive rehabilitation or replacement. PennDOT supports this asset management approach. However, absent a funding solution that provides adequate resources, it can be expected that the percentage of non-NHS (lower volume) roads and bridges in poor condition will increase.

Technology
Transportation Systems Management and Operations (TSMO) aims to enable the existing roadway system to handle more vehicles, primarily using technology such as Intelligent Transportation Systems. PennDOT’s Regional Operations Plans and a Commonwealth fiber optic network support advances in this area.

Pennsylvania’s 13,800 traffic signals play a major role in how smoothly traffic pulses through an area, with modern, properly timed signals greatly enhancing traffic flow and reducing operations costs. Although TSMO strategies provide excellent value, uncertainties in revenue streams and decreased buying power due to inflation continue to widen funding gaps for TSMO.

Connected and automated vehicles (CAV) are a technology area with tremendous implications for physical aspects of the nation’s transportation network and operations such as traffic patterns, land use, travel volumes, curbside management, use hours of vehicles, and roadway design. There are also safety concerns as the technology develops. PennDOT is a leader in the national effort to develop standards and practices through its participation in multiple U.S. Department of Transportation (USDOT) and national committees, and through initiatives such as PennSTART, the Statewide Connected and Automated Vehicle Strategic Plan, and the Smart Belt Coalition. Commonwealth research and policy needs to keep pace to encourage innovation while supporting public safety.

Climate Change
Extreme weather events present significant and growing risks to the safety, reliability, and sustainability of transportation infrastructure and operations. PennDOT has initiated a multi-phase effort aimed at better anticipating the consequences and potential impacts of extreme weather events and identifying funding priorities and strategies to improve transportation system resiliency. Efforts have included a statewide vulnerability and risk assessment and a pilot study to evaluate possible methods and procedures for incorporating future precipitation scenarios as part of the PennDOT design process. Integration of risk assessments and resilient design procedures, and partnership with the Pennsylvania Emergency Management Agency (PEMA), will continue to be a focus for long-term planning.

Regional Differences
Although Pennsylvania’s population growth has been relatively flat for several decades, its total population of 13 million makes it a major consumer market for goods and services, with the associated demand for demand for access and mobility services. The state sometimes has been viewed as “two Pennsylvanias,” with growth occurring in the southeastern and southcentral regions, and population declines seen in the western regions. The state has one of the largest rural populations in the nation, and has been becoming older and more racially diverse. The state’s residents have also been shifting away from established urban cores in favor of outlying suburban areas.

Fairly investing in transportation improvements throughout Pennsylvania requires an understanding of the needs and concerns of the state’s many different population groups as well as regional characteristics and priorities. This underscores the importance of a cohesive statewide direction with flexible regional implementation by the MPOs and RPOs.
Modernizing Transportation Funding
Fundamental changes are needed in the way Pennsylvania pays for transportation improvements, maintenance, and other programs: the revenue sources need to be fair and sustainable, and the funding amount needs to be adequate to meet the needs of our vast and aging multimodal transportation system and keep pace with inflation. As of FY 2021-22, it is estimated that PennDOT’s $8.8 billion budget would need to more than double to adequately address the Commonwealth’s transportation system needs.

Further, approximately 75 percent of PennDOT’s highway and bridge funding comes from federal and state gas tax revenue, which continues to decline. Fuel economy improvements and the transition to alternative fuels and electric vehicles—positive trends in themselves—will continue to reduce gasoline and diesel consumption, and, therefore, the revenue from state and federal fuel taxes. PA Act 44 of 2007 and PA Act 89 of 2013 provided some needed infusions of predictable funding to shore up transportation statewide, particularly our public transportation systems. However, these acts only addressed part of the funding need.

The reductions in travel due to COVID-19—which greatly affected fuel tax revenue and public transportation fare revenue nationwide—worsened the funding situation. Federal COVID-19 relief funding helped keep public transit agencies operational and prevented a complete shutdown of the highway and bridge construction program.

Pennsylvania Governor Tom Wolf established the Governor’s Transportation Revenue Options Commission (TROC) by Executive Order in February 2021. The Governor tasked TROC with developing a comprehensive, strategic proposal for addressing the state’s multimodal transportation funding needs. In August 2021, TROC submitted its strategic funding proposal for consideration by the Wolf Administration and the Pennsylvania General Assembly. The proposed new and updated revenue sources would close the state-level transportation funding gap in phases. The TROC report also acknowledged the unfunded transportation need at the local government level—$3.9 billion per year, growing to $5.1 billion by 2030—and emphasized the need for mechanisms to expand local and regional investment. The TROC proposal is available at https://www.penndot.gov/about-us/funding/Documents/TROC-Final-Report.pdf.
Strategic Directions: Where We Need to Be

SECTION CONTENTS

Goals and Objectives
Goals and Objectives

The LRTP’s goals and objectives set a course for PennDOT and its partner organizations to carry out their respective programs with the long-term direction in view.

Transportation planning is an ongoing process used to shape future policies, investments, and priorities associated with moving people and goods.

Goal statements express what is essential to accomplish over the planning horizon. The goals align with national planning priorities and requirements, while also reflecting concerns and opportunities expressed by regional planning partners, local governments, and the general public.

Objectives are more specific, defining how each goal will be accomplished. They consider the starting point (existing conditions) as well as current trends and opportunities. Starting on the next page each goal is presented. Note that Related Progress and Performance measures associated with each goal are also listed.
Enhance safety and security for both motorized and non-motorized modes throughout Pennsylvania’s transportation system.

Promoting safety—reducing the number of crashes, injuries, and fatalities on the transportation system—is an overarching goal and central to PennDOT’s mission. Security involves strengthening the system against criminal and terrorist activity to protect people, physical assets, and information technology systems.

Infrastructure design, management, and maintenance are major factors in enhancing safety, but do not solve issues such as dangerous driving behavior. The reduction of fatalities and serious injuries on Pennsylvania’s roads requires systematic efforts and the cooperation of many organizations—public, private, non-profit, and educational—as well as individual responsibility.

Further reinforcing PennDOT’s commitment to safety are federal performance standards that require regional and statewide safety data tracking and systematic progress toward improvement targets.

PennDOT is currently updating its 5-year Strategic Highway Safety Plan (SHSP), to be completed in December 2021. The plan will identify and evaluate promising practices that promote responsible driver behavior.

Looking ahead, safety planning is changing rapidly as we prepare for connected and automated vehicles, and will address issues such as distracted driving but introduce other challenges. In terms of security, all areas of life are seeing increased vulnerability to cyberattacks; thwarting such activity to safeguard our transportation system is as important as reducing physical crashes on our highways.

Safety planning is changing rapidly as we prepare for connected and automated vehicles, address the many dimensions of distracted driving, and other challenges.

**Safety Objectives**

**A-1**
Continue to promote behavioral change through existing initiatives with partners and stakeholders in order to promote safe habits for users of all modes.

**A-2**
Reduce the rate and frequency of fatal and serious injury crashes for all modes of travel.

**A-3**
Expand the collection of safety data and explore funding sources for safety and data analysis for use in systemwide planning, programming, and project development.

**A-4**
Strengthen security across transportation modes in collaboration with public and private stakeholders.

**Related Progress and Performance Measures**

- Change in highway fatalities (number and rate)
- Change in serious injuries (number and rate)
- Change in non-motorized fatalities and serious injuries
- Change in number of work zone crashes
- Change in Airport Hazard Zoning compliance
- Total number of at-grade rail crossings eliminated
Strengthen transportation mobility to meet the increasingly dynamic needs of Pennsylvania residents, businesses, and visitors.

Mobility means the relative ease with which people and goods are able to reach their destinations. It reflects a well-developed system with roadways ranging from limited-access highways to local streets to provide system access as well as swift travel. Mobility includes mode choice and convenient connections between modes, which helps provide flexibility in cases of disruptions or changing demand. Mobility considers the distinct challenges of both urban and rural populations, and ensures the system is usable for people of all abilities. It addresses congestion to keep traffic—including freight—flowing smoothly while keeping our communities great places to live.

Our transportation network of roads, bridges, public transportation, airports, rail, and waterways was developed over decades to provide a high level of mobility. The billions of dollars invested in Pennsylvania’s transportation network make it possible for most residents to access employment, healthcare, education, shopping, and many other destinations and purposes. Over the 20-year planning horizon we will need to adapt to changing travel patterns as well as public demand for more mode choice. This LRTP goal emphasizes the dynamic nature of user needs. As such, PennDOT, its planning partners, and others will be challenged like never before to align transportation facilities, services, and programs to the mobility requirements of the public, a changing economy, and technological change.

### GOAL B

#### MOBILITY

**Mobility Objectives**

- **B-1** Improve system efficiency and reliability.
- **B-2** Provide and prioritize multimodal transportation choices to meet user needs, expand mobility options, and increase multimodal system capacity and connectivity.
- **B-3** Improve public transportation awareness, access, and services throughout Pennsylvania.
- **B-4** Implement transportation and land use standards and tools that result in complementary development.
- **B-5** Adapt to changing travel demands, including those associated with e-commerce and post-COVID-19 pandemic changes.
- **B-6** Work with private-sector partners to establish data standards for mobility services and their applications (e.g., Uber and Lyft, carsharing services, bikeshares, etc.).

### Related Progress and Performance Measures

- Incident clearance time
- Transit ridership change
- Keystone Corridor ridership change
- Congestion/Travel Time
- Travel time reliability
- Rate of Interstate/Non-Interstate reliability
- Progress – local traffic signal evaluation improvement
GOAL C  

EQUITY

Improve transportation access and equity throughout Pennsylvania.

Our infrastructure investments and policies have not always been aligned to address racial inequities, impacting generations of people of color and posing challenges in mobility and access for minority communities that persist. Equity also has rural and other dimensions as well. In a transportation context, access and equity refer to a system that is fair, accessible, and useful for everyone, regardless of location, race, physical ability, income level, age, or other geographic or demographic characteristics.

Our nation and our state have high levels of transportation access that would have been unimaginable to previous generations. Nevertheless, transportation barriers remain. The social unrest of 2020, concurrent with the stress of the COVID-19 pandemic, underscored that many issues remain related to diversity, equity, and inclusion that must be addressed. Transportation has an essential role in making such advances.

According to the Transit Cooperative Research Program report Critical Issues in Transportation 2019, nearly 17.5 million workers live in households that lack cars or have more workers in the household than vehicles. Nearly 40 million Americans have some form of disability, almost 16 million of whom are age 35 to 64. All of these equity issues are compounded in urban and suburban areas with limited public transportation and rural areas that lack public transportation entirely. Moreover, the population is aging: the 49 million citizens currently over age 65 (15 percent of the population) will increase to 73 million (21 percent of the population) by 2030.

We must endeavor to make steady improvement with our partners and stakeholders to systematically understand the extent and specific dimensions of access and equity issues and take actions to alleviate the problems. This is not only a social ideal, but is also a practical investment—the benefits of connecting people with jobs and healthcare far exceed the costs.

Equity Objectives

C-1  Evaluate transportation equity issues across Pennsylvania.

C-2  Develop measurable goals and metrics for equitable transportation in collaboration with key stakeholder groups.

C-3  Establish equity and access strategies in partnership with stakeholder organizations and groups that correspond to the identified measurable goals.

C-4  Improve equity and accessibility through ADA improvements and modal choice.

C-5  Develop education, awareness, and training initiatives that strengthen transportation professionals’ knowledge and skills to effectively address equity issues.

Related Progress and Performance Measures

- Equity task force established
- Transportation Equity Summit convened and extent of follow-up
- Extent of recommendations acted upon from PennDOT’s "Dismantling Systemic Racism and Inequity" (DSRI) report
- Number and percentage of ADA-accessible stations along Keystone Corridor
- Extent of diversity on transportation advisory bodies over time (e.g., STC, TAC, Municipal Advisory Committee, modal advisory boards, regional transportation advisory committees and boards)
Strengthen Pennsylvania transportation’s resilience to climate change and other risks and reduce transportation’s environmental impacts.

FHWA defines resilience as “the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions.” In Pennsylvania, the top transportation system resilience concerns are flooding, rock and mud slides, and the results of other severe weather events such as winter storms. Accidents such as hazardous materials releases and bridge strikes can also cause sudden and serious disruptions.

Resilience also applies to dramatic transportation fluctuations wrought by pandemics or other crises, either global or on a smaller scale. The economic and social costs of transportation system disruption are widely recognized and demonstrate that a proactive approach to resilience is a wise investment.

Nationally, policy changes and technological advances may help our transportation system minimize damage, adapt, and be restored quickly after a disruption. As a backdrop to such broader change, transportation system operators of all modes will find themselves having to advance resiliency strategies and address other potential risks. Integration of risk assessments and resilient design procedures will continue to be a focus for long-term planning.

Resiliency is a growing issue nationally. FHWA carries out a vital coordination role including its Resiliency research program. The national objectives for that program underscore the importance of including resiliency as a LRTP goal. The national objectives address tools and techniques for addressing resiliency issues related to severe weather, fuel efficiency, and energy security.
GOAL E

PERFORMANCE

Improve the condition and performance of transportation assets.

Transportation assets in Pennsylvania include not only roadways and bridges but other modal transportation elements such as city buses and rail stations. The challenge in keeping infrastructure in a state of good repair and performing as designed is the disconnect between the scale and age of Pennsylvania’s infrastructure and its level of funding over the past many decades (discussed under Goal F: Resources). Pennsylvania’s transportation system is more extensive and older than most states, and the transportation system is presently in great need of repair and improvement.

Asset management is a top priority nationally and for PennDOT. It is defined as a series of well-timed preservation activities that extend the life of an asset such as a bridge, maintain the asset at a higher performance level for longer, and lower the total cost of improvements over the asset’s life-cycle.

FHWA and the Federal Transit Administration have promulgated asset management regulations to advance national policy for achieving and sustaining a state of good repair for all transportation assets. PennDOT has made great strides with asset management over the past decade. The performance objectives are geared toward building on the progress to date across partners, modes, levels of government, etc.

Performance Objectives

- **E-1** Leverage technology and operations enhancements to improve transportation system efficiency.
- **E-2** Continue to integrate enhanced asset management approaches and methods into the planning and programming project selection decision-making process.
- **E-3** Enhance the availability and quality of real-time travel information, especially in emergency and inclement weather events and for construction/work zones.
- **E-4** Expand and/or build upon existing technical assistance and education to local communities and regional Planning Partners.
- **E-5** Improve environmental stewardship during and before project construction.
- **E-6** Develop a wider range of public transportation performance measures including value-based, quality-of-life measures.

Related Progress and Performance Measures

- Percentage of NHS Interstate pavement in good condition/poor condition
- Percentage NHS Non-Interstate pavement in good condition/poor condition
- Percentage total bridge deck area in good and/or poor condition
- Development of outcome-oriented Transit Performance Measures
GOAL F

RESOURCES

Structure transportation funding and finance approaches that allocate sufficient resources for system safety, maintenance, preservation, and improvement.

The LRTP is developed to guide project programming decisions for the Commonwealth for a 20-year planning horizon. However, the plan’s goals cannot reasonably be achieved without sufficient resources for repairing and improving the transportation system—all modes.

Governor Tom Wolf’s establishment of TROC by a February 2021 executive order (https://www.penndot.gov/about-us/funding/Pages/TROC.aspx) reflects that the funding need is great and that we are at a crossroads in generating the resources to keep the system in a state of good repair. Our transportation funding and finance system, heavily reliant on gas taxes, is increasingly antiquated in light of various factors, including the increasing adoption of electric vehicles.

While finances are the most critical resource need, this goal also considers staff knowledge and skills needed organizationally to meet present and future transportation challenges and opportunities. This will place a steadily increasing premium on professional development, skills-building, and enhanced partnering and collaboration for knowledge-sharing—especially in light of resource constraints.

Resources Objectives

- Advance a funding strategy including new mechanisms to ensure resource levels sufficient to meet transportation system needs. Ensure all modes of transportation are considered when allocating resources and prioritizing projects.
- Adapt to and manage accelerating change (e.g., mainstreaming innovation, institutional adjustments, people skills, and knowledge management).
- Streamline planning and public involvement processes.
- Improve planning and analytical tools to adapt to changes impacting transportation, including the implementation of a data repository and information exchanges within PennDOT (between Bureaus/Divisions, between Central Office and Districts, etc.).

Related Progress and Performance Measures

- TROC strategic funding proposal implemented in its entirety or modified
- TROC annual funding targets – extent to which targets are being achieved
- Extent and variety of public-private partnerships across modes
- Qualitative assessment of mileage-based user fee (MBUF) preparation and readiness
- On-time, on-budget project delivery rate
- Establishment of asset management training for Districts and MPOs/RPOs
- PennDOT Connects progress and results as reflected in periodic progress reports
Implementation: How We Will Get There

SECTION CONTENTS

- Overview
- Actions and Accountability
- Implementation Partners and Projects
- Transportation Performance Management
- Implementation Resource: Transportation Planning Data Repository
Overview
Implementation is about putting the LRTP to work—translating Pennsylvania’s desired big-picture, long-range transportation direction into real, tangible progress over the next five years. At that point the LRTP will be updated to adjust to changing conditions.

The overarching principles for plan implementation are:

- Accountability
- Flexibility and adaptation
- Information-sharing, especially in support of stakeholder collaboration
- Strengthening the Planning–Programming–Performance linkage

Actions and Accountability
PennDOT will maintain and periodically update an Action Plan that includes the strategic actions and initiatives for advancing the goals and objectives covered in the previous section. Actions are defined at a level to be assigned, scheduled, tracked, and collaborated on with other organizations.

For this 2045 LRTP update, the Action Plan was developed and refined primarily through “in-reach” meetings with a cross-section of PennDOT managers and program leaders. Broad involvement in shaping the Action Plan ensures that the actions consider and appropriately reflect work that is already underway or planned. It also builds ownership of and commitment to the Action Plan by those on the front lines of implementation.

Certain LRTP actions sustain initiatives already ongoing at PennDOT, such as continuing efforts to enhance work zone safety. Other LRTP actions double-down on initiatives that require more emphasis, such as expanding PennDOT’s contingency planning and preparations for weather-related and other emergencies. Some LRTP actions line up PennDOT to meet longer-range needs, such as training the next generation of the state’s workforce in areas related to traffic operations and connected and autonomous vehicles. Other actions are important first steps in understanding needs, such as efforts related to assessing transportation equity issues across the state.

The Action Plan includes various progress indicators and performance measures. The plan and associated progress will be reviewed twice a year and reported on annually to PennDOT leadership. Basic summaries of plan implementation progress will be provided to the STC, TAC, and other stakeholder groups such as the Planning Catalyst Team, which served as a steering committee for LRTP development.

PennDOT’s Program Management Committee will conduct periodic reviews of the Action Plan and specific goals, objectives, and initiatives aimed at maximizing and optimizing plan implementation.

A cornerstone of LRTP stakeholder engagement was a series of plan development workshops held with four Pennsylvania local government associations. Each workshop included association leadership, staff, and a cross-section of their members. The objective for the workshops was to identify and prioritize planning issues from the local perspective.

Clearly, with challenges and opportunities such as improved transportation and land use planning the time is uniquely opportune for this collaborative long-range planning and plan implementation focus. Local government is key to and an asset for the implementation of the Long-Range Transportation Plan and the Freight Mobility Plan as well.

After the four workshops, a joint session was held to review the results and to identify those topics and issues most promising for collaboration through the implementation of the plan.

State-local collaboration efforts will be periodically identified for PennDOT and local government collaboration, along with MPO and RPO participants, starting with calendar year 2022.
Implementation Partners and Projects

The LRTP represents Pennsylvania’s highest-level transportation plan—setting the broad long-term directions as an overall compass for project investments, program and service delivery, and other initiatives, and supporting compliance with federal planning requirements. PennDOT’s Deputy Secretary for Planning will oversee various efforts to ensure that there is a coordinated effort to integrate the LRTP with:

- PennDOT’s Strategic Plan
- Modal plans – aviation, rail freight, intercity rail, transit, ports, etc.
- Functional plans – technology, asset management, etc.
- Regional LRTPs and freight plans
- Regional modal plans such as public transportation plans

The LRTP will be implemented in collaboration with PennDOT’s various regional partners (Figure 24). This promotes collaboration, joint problem-solving, and resource optimization. Specific projects such as a roadway widening or bridge replacement are identified, prioritized, and programmed (placed on a list of funded projects) at the regional level by MPOs and RPOs. They develop regional LRTPs with project lists and establish Transportation Improvement Programs (TIPs)—the list of funded projects expected to be undertaken within the next four years. These regional efforts should generally align with the statewide direction but not be prescribed by a centralized approach. This recognizes the necessity and practicality of customized solutions for each of Pennsylvania’s unique regions.

Broad state direction is provided through financial guidance to help guide program development by MPOs and RPOs. This helps to ensure a generally consistent procedural approach statewide—again without being project-prescriptive. It is anticipated that future financial guidance will incorporate the direction of the LRTP as part of the overall framework. In a similar manner, PennDOT uses the goals and objectives of the LRTP to help frame its longer-term budgetary and financial horizon planning.

Project selection is also shaped by transportation performance management targets, described in the following section.
Figure 24: Planning Partner Regions
Transportation Performance Management

Ultimately, plan implementation success is measured by how well the transportation system works. Measures of various aspects of system performance in turn guide future planning and project investments to ensure Pennsylvania is making progress toward its goals.

Transportation performance management (TPM) is a federally required approach to prioritizing transportation investment that is focused on results—measurable, strategic improvements to the transportation system.

TPM involves setting measurable performance goals for the transportation system, tracking progress, and directing funds to projects that best achieve those goals. In a funding environment where needs consistently exceed available funding, a TPM approach is essential to maximize the benefits of every dollar spent.

The federal government established TPM requirements in its transportation funding legislation. Both the Moving Ahead for Progress in the 21st Century Act (MAP-21) and the Fixing America’s Surface Transportation (FAST) Act include performance management requirements to ensure that federal transportation funds are invested efficiently toward achieving national goals. The United States Congress established the following national performance goal areas:

- Safety
- Infrastructure condition
- Congestion reduction
- System reliability
- Freight mobility
- Environmental sustainability
- Reduced project delivery delay (getting roadway and other improvements built faster)

FHWA was responsible for determining a way of measuring current conditions and progress toward each of those goals. FHWA established the national transportation performance measures shown below.
The national TPM approach is implemented through the states and their regional and local partners. Pennsylvania has long utilized a comprehensive planning and programming process, with a focus on collaboration among PennDOT, FHWA, and Planning Partners at the county and regional levels. This foundation is used to implement TPM and Performance-Based Planning and Programming (PBPP). Performance-based planning aims to make the transportation investment decision-making process both informed and accountable. Key elements of TPM and PBPP include managing performance data, selecting performance targets, monitoring progress in meeting targets, and defining ways to integrate performance measures into the transportation decision-making process.

To support the integration and monitoring of the National Performance Measures, PennDOT produces biennial reports to FHWA documenting progress in meeting defined targets. A Pennsylvania Statewide Dashboard documents performance according to each of the national measures.

Through the STC, PennDOT produces a biennial Transportation Performance Report (TPR) on progress made in safety, mobility, preservation, accountability, and funding. This report card provides an assessment of performance ratings and recent trends for each of the measures. Information and insights from these measures are used to inform the development of PennDOT’s 12-year and 4-year programs (TYP and STIP, respectively). PennDOT continues to enhance methods to track and share statewide transportation performance. The LRTP will be used to modify the performance measures in future iterations of the TPR.

PennDOT continues to work with regional and local partners to improve ways to apply TPM. PennDOT has developed PBPP Procedures and Procedural Guidance for the development of the regional MPO/RPO TIPs. This includes formalizing methods to directly consider the performance measures in project identification and prioritization.

For long-range planning, PennDOT continues to support its regional planning partners with the integration of performance measures into each MPO/RPO LRTP. PennDOT works with MPOs/RPOs to ensure their LRTP:

- Describes the performance measures and performance targets used in assessing the performance of the transportation system.
- Includes a System Performance Report that (1) Evaluates the condition and performance of the transportation system with respect to performance targets, and (2) Documents the progress achieved by the MPO/RPO in meeting the targets in comparison to performance recorded in past reports.
- Integrates the goals, objectives, performance measures, and targets described in all the plans and processes required as part of a performance-based program.

PennDOT has also launched development of a TPM Resource Toolbox to support PennDOT and MPOs/RPOs with the integration of the federal performance measures into the transportation planning process. The toolbox includes Q&A channels; handouts with guidance on TPM implementation, best practices, and case studies; and ideas for communicating the TPM measures to the public. The TPM Resource Toolbox is regularly updated based on the needs and questions of PennDOT and planning partner staff.

The LRTP will be useful in updating the performance measures of the Transportation Performance Report. New measures may result from this plan.
Implementation Resource: Transportation Planning Data Repository

PennDOT and its partner MPOs and RPOs use a variety of data to forecast and plan for future transportation system needs and priorities. PennDOT is working to develop a data repository to support regional and local Planning Partners across the state. The effort is aimed at identifying the best available data sources, processing data into easy-to-use products, sharing data in an organized manner, and updating the data on a periodic schedule. Initial efforts will focus on data that can support solutions to our most frequently asked transportation planning questions.

Some of the most important data needs relate to infrastructure (bridges and pavement), freight, and land use. PennDOT has already initiated efforts to develop data products that help address planning questions across these topic areas. This includes developing maps highlighting the density of employment by employment type. Other priority data products (referred to as the “Core Metrics”) will focus on better understanding the national transportation performance measures and mapping of innovative data sources such as cellular and GPS travel time and origin–destination data.

The data repository is envisioned to be an evolving resource that will address new data sources and changes to our future transportation planning needs and questions. It is expected to become available to the state’s MPOs and RPOs in 2022, and will be an important resource for regional planning and LRTP implementation.

Data Categories to be Addressed by PennDOT’s Data Repository

- Freight
- Infrastructure
- Traffic Demand
- Travel Time
- Land Use
- Origin-Destinations
- Transit
- Active Transportation
- Safety
- Equity
- Air Quality
- Tourism-Recreation
12-Year Program (TYP) – PennDOT’s listing of statewide transportation projects over a 12-year period; guided by the goals of the LRTP and updated every two years.

Active Transportation – Any non-motorized mode of transportation, including bicycling, walking, or wheeling.

Airport Hazard Zoning – Zoning regulations required by Pennsylvania Act 164 entitled the "Airport Zoning Act"; required adoption by local municipalities within an airport hazard area to maintain compatible neighboring land uses and to protect the safety of pilots, aircraft, people, and property.

Americans with Disabilities Act (ADA) of 1990 – A civil rights law that prevents discrimination of individuals with disabilities in employment, transportation, communications, access to government services, and other public accommodations.

Asset Management – Defined by FHWA as a strategic and systematic process of operating, maintaining, and improving physical assets, with a focus on both engineering and economic analysis based upon quality information, to identify a structured sequence of maintenance, preservation, repair, rehabilitation, and replacement actions that will achieve and sustain a desired state of good repair over the life-cycle of the assets at minimum practicable cost.

At-Grade Railroad Crossing – An intersection where a highway crosses railroad tracks at the same level.

Bike-shares – A shared transportation service in which bicycles are made available for shared use to individuals on a short-term basis for free or at low cost.

Bridge Asset Management System (BAMS) – PennDOT software that assists both engineers and planners by providing a recommended list of projects, based on individual or regional input and needs, in accordance with federally mandated lowest life-cycle cost (LLCC) methodology. Bridge condition forecasts are generated over 12 years based on current condition data housed in PennDOT databases and the improved conditions expected as a result of future projects.

Bridge Deck – The roadway or walkway surface of a bridge.

Carsharing – An on-demand, membership-based shared vehicle service that allows a driver to rent a vehicle for short periods of time as needed (usually hourly or daily).

Commercial Service Airport – Defined by the Federal Aviation Administration as a publicly owned airport that receives scheduled passenger service and has at least 2,500 passenger boardings each calendar year.

Connected and Automated Vehicles (CAV) – Connected vehicles enable safe, interoperable communications among vehicles, roadside infrastructure, and others. Automated vehicles have varying capability levels, ranging from no automation to full driving automation. Definitions for all automated vehicle levels and additional information on CAV can be found in the Pennsylvania Automated Vehicle Strategic Plan.

Dismantling Systemic Racism and Inequity Report (DSRI) – A report developed by PennDOT in 2021 to assess internal diversity and inclusion efforts, understand structural racism in transportation generally, and evaluates programs and initiatives in which PennDOT can achieve greater equity.

E-commerce – Commercial transactions conducted electronically on the Internet.

Equity – The fair distribution of impacts (benefits, costs) and resources. In transportation, it means providing affordable, accessible, and inclusive transportation services and programs and creating and supporting a quality transportation system that works for everyone.

Essential Air Service (EAS) – A program enacted by the U.S. government that maintains commercial air service in small communities affected by the Airline Deregulation Act of 1978. Without EAS, residents of small communities would have to spend many hours to access a larger, "hub" airport for travel, medical care, and other services.

Federal Highway Administration (FHWA) – Federal agency responsible for overseeing the use of Federal funds for a variety of roadway, bridge, and other transportation programs; One agency of the U.S. Department of Transportation.
Fiscal Year – a one-year period, commonly used by governments and companies for financial reporting and budgeting. The federal fiscal year is October 1 through September 30.

Fixing America’s Surface Transportation (FAST) Act – The federal transportation reauthorization bill passed by the Obama Administration in 2015; authorized over $305 billion to fund surface transportation programs across fiscal years 2016 through 2020.

Fixed-Route Transit – Defined by the Federal Transit Administration as services provided on a repetitive, fixed schedule basis along a specific route with vehicles stopping to pick up and deliver passengers to specific locations; each fixed route trip serves the same origins and destinations.

Intelligent Transportation Systems (ITS) – A broad range of wireless and traditional communications-based information and electronic technologies that advance transportation safety and mobility through integration into transportation infrastructure and into vehicles.

Interstate Highway System – A continuous network of controlled-access highways in the contiguous 48 U.S. states that serve as part of the National Highway System.

Land Use – The human use of land; a representation of economic and cultural activities (e.g., agricultural, residential, industrial, recreational, mining, etc.) that are practiced in a given place.

Lowest Life-cycle Cost (LLCC) – A process designed to maximize the life of an asset at the lowest cost through a risk-based prioritization of preservation, rehabilitation, and reconstruction.

Metropolitan Planning Organization (MPO) – Planning organizations responsible for regional transportation planning and programming for all modes of transportation in urbanized areas with a population of over 50,000.

Mileage-Based User Fee – A user charge based on miles driven in a specific vehicle (i.e., cents per mile) as opposed to the current excise tax on fuel consumed, as defined by the Mileage-Based User Fee Alliance.


National Highway System (NHS) – A federally-designated highway system that consists of roadways important to the nation’s economy, defense, and mobility. The subsystems of the NHS include Interstates, Principal Arterials, Strategic Highway Network (STRAHNET), Strategic Highway Network Connectors, Intermodal Connectors.

Non-Motorized Transportation – To travel by means other than a motorized vehicle including by foot, bicycle, or horse.

PA Act 44 of 2007 – An act passed by the Pennsylvania legislature in July 2007 that established a framework to assess transit agency performance through a formal review process.

PA Act 89 of 2013 – An act passed by the Pennsylvania legislature in 2013 as a one-time comprehensive transportation funding package, providing $2.3 billion in additional funding for road projects, bridge repairs, and public transportation improvements.

Pavement Asset Management System (PAMS) – PennDOT software that assists both engineers and planners by providing a recommended list of projects, based on individual or regional input and needs, in accordance with federally mandated lowest life-cycle cost (LLCC) methodology. Pavement condition forecasts are generated over 12 years based on current condition data housed in PennDOT databases and the improved conditions expected as a result of future projects.

PennDOT Connects – PennDOT’s approach to enhance local engagement and improve transportation-project planning, design, and delivery. This policy was launched in December 2016 and expands PennDOT’s requirements for engaging local and planning partners by requiring collaboration with stakeholders before project scopes are developed and ensures community collaboration happens early in the process. It certifies that each project is considered in a holistic way for opportunities to improve safety, mobility, access, and environmental outcomes for all modes and local contexts.

PennDOT Districts – PennDOT’s eleven field offices throughout the state responsible for administrating project development, design, construction, and maintenance activities within their geographic region.
PennDOT Program Management Committee (PMC) – An administrative group within PennDOT, chaired by the Secretary of Transportation, which includes all Deputy Secretaries, representatives of the District Offices, and the Federal Highway Administration. The Center for Program Development and Management supports this group by developing agendas and making presentations and PMC approval is required to fund and initiate the development of specified phases of a given project.

PennSTART – In Spring 2018, PennDOT, the Pennsylvania Turnpike Commission, and Penn State University partnered to develop PennSTART, a state-of-the-art training and testing facility to address the transportation safety and operational needs of Pennsylvania and the Mid-Atlantic Region. When completed, PennSTART will address safety training and research needs in six key areas: traffic incident management (TIM); connected and automated vehicles; tolling and intelligent transportation systems (ITS) technology; work zones; commercial vehicles; and transit vehicles.

Performance Based Planning and Programming (PBPP) – The Moving Ahead for Progress in the 21st Century Act (MAP-21) and subsequent Fixing America’s Surface Transportation (FAST) Act require State DOTs, Transit Operators, and MPOs to establish and use a performance-based approach to transportation decision making. This includes tracking performance measures, setting data-driven targets for each measure, and selecting projects to help meet those targets. The FAST Act also requires that the TIP include a description of its anticipated effect toward achieving the established performance targets, linking investment priorities to those performance targets.

Performance Measures – Operational characteristics, physical conditions, or other appropriate parameters used as a benchmark to evaluate the adequacy of transportation facilities and estimate needed improvements.

Performance Targets – A quantifiable level of performance or condition, expressed as a value for the measure, to be achieved within a time period.

Private Use Airport – An airport that is accessible to private users only and not open to the public.

Project Delivery – The process that takes a project concept from the planning and programming stage, though the design process (including environmental, utility, railroad, and right-of-way clearances, as required), to the completion of a constructed project

Project Development – The development and implementation of a project and its progress through a number of phases (or stages).

Public-Private Partnership (P3) – A contractual agreement between a public entity and a private entity (or another public entity) in which the public entity transfers the responsibility for engineering, construction, operation, financing, and/or maintenance (or any combination) of a transportation project or facility to the private sector for a defined period of time.

Public Transportation Trust Fund – Created as part of PA Act 44 of 2007 to provide money to transit agencies for capital and operation assistance; funded by sales tax, PA Turnpike funding, other use taxes and fees that are not constitutionally protected for highway funding.

Public Use Airport – An airport that is open to the general public and can be owned publicly or privately.

Rapid Bridge Replacement Program – a program that replaced 558 structurally deficient bridges across Pennsylvania under a design-build-finance-maintain (DBFM) public-private partnership (P3) arrangement between PennDOT and Plenary Keystone Partners.

Real-Time Travel Information – Current travel condition information that can be used to monitor and manage traffic in terms of road safety, congestion, regulatory compliance, and supply chain information.

Regional Operations Plan (ROP) – A plan which lays out the strategic transportation operations program for the region, including specification of regional projects. The program delineated in the ROP is to be implemented and mainstreamed in transportation planning documents and day-to-day activities.

Resiliency – The ability to adapt to, recover from, and respond to—and bounce back quickly from threats to physical infrastructure and operations and threats of cybersecurity, terrorism, and all hazards.

Rural Planning Organization (RPO) – An organization that identifies local transportation needs, conducts planning, assists local governments, and supports the statewide transportation planning process in non-metropolitan regions of the state. RPOs can be designated as a method for formalizing the engagement of officials from areas with a population size less than 50,000 as they incorporate rural transportation needs in the statewide transportation planning process.
Security – Freedom from intentional harm and tampering that affects both motorized and non-motorized travelers, and may also include natural disasters.

State of Good Repair – A condition sufficient for the asset to operate at a full level of performance.

State Transportation Commission (STC) – Established by state law to address transportation program priorities, evaluate and determine the condition and performance of the statewide transportation system, and to set transportation policy direction; consists of fifteen members: the Secretary of Transportation (chairman), the chairman and minority chairman of both the Senate Transportation Committee and the House Transportation Committee; and ten public members appointed by the Governor.

Transportation Advisory Committee (TAC) – A body that advises the Secretary of Transportation and the State Transportation Commission on transportation issues in Pennsylvania, including the determination of goals and the allocation of resources among the alternate modes in the planning, development and maintenance of programs and technologies for transportation systems. The committee which is composed of representatives of government, industry, labor and education, was mandated by PA Act 120 of 1970.

Transportation Revenue Options Commission (TROC) – A commission established by Governor Tom Wolf in March 2021 to investigate comprehensive funding recommendations for Pennsylvania’s transportation network.

Transportation Improvement Program (TIP) – A plan established by the MPOs and RPOs which consists of a prioritized list of projects or project segments to be carried out within the next four years after adoption. It is updated every two years.

Transportation Performance Management (TPM) – A strategic approach that uses system information to make investment and policy decisions to achieve national performance goals.

Transportation Systems Management and Operations (TSMO) – A way to address reliability, mobility, and congestion by implementing various strategies that utilize existing infrastructure; rather than just expanding capacity.

Travel Time Reliability – Measurement of unexpected delay; the consistency or dependability in travel times, as measured from day-to-day and/or across different times of the day.

United States-Mexico-Canada Agreement (USMCA) – A free trade agreement between the United States, Canada, and Mexico that went into effect on July 1, 2020 and replaced the North American Free Trade Agreement (NAFTA). The trade deal phased out tariffs on many goods passing between the three countries.

Vehicle Miles Traveled (VMT) – A measure of total travel, by all vehicles.
PLANNING CATALYST TEAM

Bob Bini, AICP
Lancaster County Planning Commission

Mike Boyer
Delaware Valley Regional Planning Commission

Becky Bradley, AICP
Lehigh Valley Planning Commission

Cecile Charlton
Delaware County Transportation Management Association

Jessica Clark
PennDOT Program Center

Roger Cohen
PennDOT Senior Policy Advisor to the Secretary

Lyndsie DeVito
PennDOT District 1-0

Steve Fisher
PennDOT District 4-0

Jon Fitzkee
Lebanon County Planning Department

Brian Hare, PE
PennDOT Program Center

Robert Henry
GVF Transportation Management Association

Jan Huzvar
PennDOT Press Office

Mike Keiser, PE
PennDOT Acting Deputy Secretary for Highway Administration

Chris King
PennDOT District 3-0

Tom Klevan
Southwestern Pennsylvania Commission

Vanessa Koenigkramer
PennDOT District 5-0

Amanda Leindecker
PennDOT District 5-0

Hugh McGowan
PennDOT Program Center

Emma Pugh
PennDOT District 4-0

Jeff Rai
PennDOT District 5-0

Mike Rebert, PE
PennDOT District 5-0

Shane Rice
PennDOT Policy Office

Michael Rimer, AICP
PennDOT Program Center

David Rostron, PE
PennDOT District 5-0

Karen Russell
PennDOT Program Center

Larry Shifflet
PennDOT Deputy Secretary for Planning

Matt Smoker
Federal Highway Administration

Stephanie Spang
PennDOT District 11-0

Anne Stich
PennDOT District 9-0

Harold Swan
PennDOT District 10-0

Michelle Tarquino
PennDOT Multimodal

Joshua Theakston
PennDOT District 12-0

Mark Tobin
PennDOT Program Center

Nick Mackereth
Department of Community and Economic Development

Scott Vottero, PE
PennDOT District 5-0

Brian Wall
PennDOT Bureau of Planning and Research

Andy Waple, AICP
Southwestern Pennsylvania Commission

Angela Watson, AICP
PennDOT Bureau of Rail, Freight, Ports, and Waterways

Emily Watts
PennDOT Policy Office

Tom Zilla, AICP
Centre Regional Planning Agency