



2019

Regional Operations Plan



2019 Regional Operations Plan for Southwestern Pennsylvania



Southwestern Pennsylvania Commission

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Executive Summary

This Regional Operations Plan (ROP) has been developed to cover the Southwestern Pennsylvania Commission (SPC) region, an area that includes 10 counties and a population of 2.6 million across 7,112 square miles. This region includes PennDOT Engineering Districts 11 and 12, as well as 3 counties from District 10 (Armstrong, Butler, and Indiana). The Regional Traffic Management Center (RTMC) is located in Bridgeville, PA at the PennDOT District 11-0 office.

This document provides an update to the previous ROP which was completed in 2015.

This ROP has been compiled based on guidance from the *TSMO Guidebook, Part I: Planning*, a PennDOT document developed in 2018 which describes how to implement the statewide approach to Transportation Systems Management and Operations (TSMO). TSMO is a set of integrated strategies used to increase the reliability and mobility of existing roadway infrastructure without adding capacity. This is accomplished primarily in 3 ways: Incorporating state of the art intelligent systems, improving management of incidents and events, and encouraging modal shift.

The ROP will complement the statewide TSMO Program Plan by identifying the regional approach to traffic operations and sets the stage for regional implementation of TSMO strategies.

This document will help to enable the SPC region to:

- Meet federal requirements related to Intelligent Transportation System (ITS) planning (23 CFR 940)
- Incorporate statewide TSMO goals for operations planning at the regional level
- Utilize objectives-driven, performance-based planning processes for operations and congestion management planning
- Integrate/mainstream ITS and operations planning into the overall transportation planning process, per Federal Highway Administration (FHWA) guidance
- Identify and prioritize TSMO capital projects as part of the Transportation Improvement Program (TIP)
- Manage funds for the TSMO operations and maintenance (O&M) in future years

It is anticipated that this ROP will continue to be updated every 4 years. Similar to the Long Range Transportation Plan (LRTP), the ROP should, at a minimum, identify which projects could be undertaken within the first four years, aligning these projects for potential inclusion in the region's Transportation Improvement Program (TIP).

The planning process was led by a Steering Committee which included SPC, PennDOT Bureau of Maintenance and Operations (BOMO), PennDOT Districts 10-0, 11-0, and 12-0, City of Pittsburgh, Port Authority of Allegheny County, and the Federal Highway Administration (FHWA) Pennsylvania Division. This Steering Committee met four times throughout the process and helped review and refine the message and material to be presented to stakeholders. The Stakeholder Groups included PennDOT District Safety Engineers, PennDOT County Maintenance Departments, the Pennsylvania Turnpike Commission (PTC), county planning departments, transit agencies, and bicycle advocates. Stakeholder Groups met three times in each District for a total of nine meetings. Stakeholder meetings were used to present information on the ROP process and to receive valuable input from the assembled stakeholders on each phase of the plan's development.

A summary of the Long Range Transportation Plan (LRTP) is provided in this document, as well as a discussion of the regional demographics and key transportation elements. Significant transportation corridors are identified, including the region's Interstates, as well as most US routes, and a few of the most important Pennsylvania state routes.

A summary of existing conditions is provided within this document, including the current ITS elements, existing congestion and safety issues, and notable recently completed projects. Looking towards the future, a discussion of planned infrastructure and land use changes is included, as well as a list of major roadway projects under consideration.

The PennDOT One Map website, <https://gis.penndot.gov/OneMap> was heavily utilized in the development of this plan. The availability of extensive data on the region's operations was tremendously helpful in pinpointing existing congestion and safety issues, as well as identifying gaps in current ITS device coverage. These various hotspots were presented to the Steering Committee and Stakeholder Groups throughout the ROP process and refined based on input received at meetings.

Through data analysis and stakeholder input, a list of the region's transportation needs and operation issues was developed. These needs and issues were organized into the seven priority areas provided in the previous SPC ROP:

- Traffic Signals
- Traffic Incident Management
- Traveler Information
- Operational Teamwork/Institutional Coordination
- Multimodal Connectivity
- Freeway and Arterial Operations
- Freight Management

Projects were then developed for identified hotspots based on these issues and needs. Of particular focus in this ROP are Integrated Corridor Management (ICM) projects which seek to improve incident management and maximize use of available capacity on important parallel corridors. There are also a number of signal improvement projects and other ITS-related projects. A number of multimodal projects have also been identified, including improvements to transit operations and bicycle infrastructure that are anticipated to improve overall operations through encouraging mode change and an equitable transportation system for all users.

Projects were prioritized based on stakeholder input and discussion into "High Priority" and "Normal Priority" groups. The ROP Projects were then divided into short-term and long-term categories. Short-term projects were identified as those which could be implemented in less than four years. Long-term projects are those that would take four or more years. The following tables show the complete list of recommended projects for the SPC region.

High Priority Projects

Project #	Project	Priority Area	Stakeholders*	Planned Improvements
TS.01	Greensburg Operations Improvements	Traffic Signals	PennDOT 12-0	Traffic Signal Improvements, Queue Detection
TIM.01	Armstrong County Bridge De-Icing	Traffic Incident Management	PennDOT 11-0	Bridge De-Icing, RWIS, CCTV
TIM.02	PA-28 Freeway Service Patrol	Traffic Incident Management	PennDOT 11-0	Freeway Service Patrols
TIM.03	PA-28 TIM Team	Traffic Incident Management	SPC , PennDOT 11-0, Local Municipalities, Emergency Personnel	TIM Team
TI.01	Hogback Hill RWIS	Traveler Information	PennDOT 10-0	RWIS
TI.02	US 22 Corridor ITS/Signal Improvements	Traveler Information	PennDOT 10-0	CCTV, DMS, Traffic Signal Improvements
TI.03	US 422 Corridor ITS	Traveler Information	PennDOT 10-0	CCTV, Arterial DMS
TI.04	District 12-0 RWIS Expansion	Traveler Information	PennDOT 12-0	RWIS
TI.05	Western RTMC Expansion	Traveler Information	PennDOT 11-0	Traffic Management Center
MC.01	South Hills Village Smart Parking	Multimodal Connectivity	Port Authority of Allegheny County , PennDOT 11-0	Smart Parking System
MC.02	W. Carson St. Multimodal Improvements	Multimodal Connectivity	PennDOT 11-0 , Port Authority of Allegheny County	Transit Improvements and bike connection between South Side and West End
MC.03	Penn Ave. Transit Improvements	Multimodal Connectivity	City of Pittsburgh DOMI , Port Authority of Allegheny County	Transit Improvements, 40 th St. to Fifth Ave.
MC.04	Centre Ave. Transit Improvements	Multimodal Connectivity	City of Pittsburgh DOMI , Port Authority of Allegheny County	Transit Improvements, Washington Pl. to East Liberty Garage
FA.01	Bates St. Interchange Improvements	Freeway and Arterial Operations	PennDOT 11-0	Interchange Improvements
FA.02	I-79 Integrated Corridor Management	Freeway and Arterial Operations	PennDOT 12-0	Traffic Signal Improvements

* Primary stakeholder in **bold**

Normal Priority Projects

Project #	Project	Priority Area	Stakeholders*	Planned Improvements
TS.02	PA-356 Traffic Signal Improvements	Traffic Signals	PennDOT 10-0	Traffic Signal Improvements
TS.03	PA-8 Traffic Signal Improvements	Traffic Signals	PennDOT 10-0	Traffic Signal Improvements
TS.04	East End Signal Improvements	Traffic Signals	PennDOT 11-0	Traffic Signal Improvements
TS.05	PA-51 DOT Signal Pilot	Traffic Signals	PennDOT 11-0	Traffic Signal Improvements
TIM.04	I-79 Curve Warning	Traffic Incident Management	PennDOT 10-0	Dynamic Curve Warning
TIM.05	US 30 Curve Warning	Traffic Incident Management	PennDOT 12-0	Dynamic Curve Warning
TI.06	PA-28 ITS	Traveler Information	PennDOT 10-0	CCTV, DMS
TI.07	US 22 Bridge De-Icing	Traveler Information	PennDOT 10-0	Bridge De-Icing, RWIS, CCTV
TI.08	I-376 Corridor ITS	Traveler Information	PennDOT 11-0	CCTV, DMS
TI.09	PA-8 Arterial ITS	Traveler Information	PennDOT 11-0	CCTV, DMS
TI.10	US 22 (Monroeville) Arterial ITS	Traveler Information	PennDOT 11-0	CCTV, DMS
TI.11	I-70/US 40 Detour ITS	Traveler Information	PennDOT 12-0	CCTV, DMS
TI.12	Butler County Fiber Ring Deployment	Traveler Information	PennDOT 10-0, Cranberry Township	Fiber Deployment
OT.01	Key Bank Pavilion Event Management & Signal Improvements	Operational Teamwork/ Institutional Coordination	PennDOT 12-0, PennDOT 11-0	Traffic Signal Improvements
MC.05	Carnegie Smart Parking	Multimodal Connectivity	Port Authority of Allegheny County, PennDOT 11-0	Smart Parking System, Pedestrian Improvements
MC.06	Wilkinsburg Smart Parking	Multimodal Connectivity	Port Authority of Allegheny County, PennDOT 11-0	Smart Parking System
MC.07	Liberty Ave. Transit Improvements	Multimodal Connectivity	PennDOT 11-0, Port Authority of Allegheny County	Transit Improvements, Downtown to Aspen St.
MC.08	Kennywood Blvd./Browns Hill Rd. Transit Improvements	Multimodal Connectivity	PennDOT 11-0, City of Pittsburgh DOMI, Port Authority of Allegheny County	Transit Improvements, Browns Hill Rd./Hazelwood Ave. to Kennywood Blvd./Library St.
MC.09	E. Carson St. Transit Improvements	Multimodal Connectivity	PennDOT 11-0, Port Authority of Allegheny County	Transit Improvements, 10 th St. to 26 th St.

Project #	Project	Priority Area	Stakeholders*	Planned Improvements
MC.10	Second Ave. Transit Improvements	Multimodal Connectivity	PennDOT 11-0 , Port Authority of Allegheny County	Transit Improvements, Hot Metal St. to Hazelwood Ave.
MC.11	Healthy Ride E-Bike Deployment	Multimodal Connectivity	Pittsburgh Bike Share	E-assist bike sharing deployment
MC.12	“The Chute” to Eliza Furnace Trail Bike Connection	Multimodal Connectivity	City of Pittsburgh DOMI	Improve bike connection
MC.13	Brady St. to Heritage Trail Bike Connection	Multimodal Connectivity	City of Pittsburgh DOMI	Improve bike connection
MC.14	Butler St. Bike Connection	Multimodal Connectivity	City of Pittsburgh DOMI	Improve bike connection from Lawrenceville to Highland Park
MC.15	Penn Ave. Bike Connection	Multimodal Connectivity	City of Pittsburgh DOMI	Improve bike connection from Lawrenceville to East Liberty.
MC.16	East Allegheny Ped/Bike Improvements	Multimodal Connectivity	City of Pittsburgh DOMI , PennDOT 11-0	Improve ped/bike connections in the North Side Pittsburgh area near I-279 and I-579
FA.03	Campbells Run Queue Warning	Freeway and Arterial Operations	PennDOT 11-0	Queue Warning System
FA.04	Parkway North ICM	Freeway and Arterial Operations	PennDOT 11-0	Smart Parking System, Traffic Signal Improvements, Transit Signal Priority
FA.05	Veterans Bridge Junction Control	Freeway and Arterial Operations	PennDOT 11-0	Junction Control System

* Primary stakeholder in **bold**

In addition to the projects outlined above, a number of studies and initiatives were also developed as part of the ROP process. While specific projects could be determined for many of the issues and needs, others need further study to best to determine the correct mitigation to improve operations. Recommended studies can be found in the following tables.

High Priority Studies and Initiatives

Study	Priority Area	Stakeholders*	Notes
Downtown Pittsburgh Bridge Operations Study	Freeway and Arterial Operations	SPC , PennDOT 11-0, Port Authority of Allegheny County	Study to improve operations in the vicinity of the Downtown river crossings.
Parkway West ICM Study	Freeway and Arterial Operations	PennDOT 11-0	Study conversion of shoulders for flex lane or transit lane use. Identify other ICM needs.

* Primary stakeholder in **bold**

Other Recommended Studies and Initiatives

Study	Priority Area	Stakeholders*	Notes
Regional ITS Strategic Plan	Traveler Information	SPC , PennDOT	In addition to ITS device projects identified in this plan, conduct a regionwide study to determine any other remaining ITS coverage gaps and prioritize for future projects.
Indiana University of Pennsylvania (IUP) Special Events Traffic Management Study	Operational Teamwork/ Institutional Coordination	IUP , PennDOT 10-0	Improve ingress/egress to events at Kovalchick Convention and Athletic Complex.
Operations Center/Traffic Management Center Coordination	Operational Teamwork/ Institutional Coordination	SPC , PennDOT, PA Turnpike Commission, Port Authority of Allegheny County, Cranberry Township	Improve coordination between Western RTMC and PA Turnpike Traffic Operations Center, particularly for the I-76/I-376 loop, including incident management, construction detours, communications (fiber), device sharing, traveler information, and weather operations. Port Authority operations center and Cranberry Township TMC should also be included.
Person Trips Prioritization Study	Operational Teamwork/ Institutional Coordination	SPC	Determine feasibility of Roadway Tiering based on total person trips (including transit passengers, cyclists, etc.) instead of AADT.
Key Bank Pavilion Event Management Study	Operational Teamwork/ Institutional Coordination	Key Bank Pavilion , PennDOT 12-0	Improve ingress/egress to events at Key Bank Pavilion.
Birmingham Bridge Complete Street Study	Multimodal Connectivity	PennDOT 11-0	Improve safety of existing bike lanes. Consider protected bike lane infrastructure and possible vehicular lane reduction.
Existing Bike Trail Maintenance Initiative	Multimodal Connectivity	SPC	Initiative to ensure continued maintenance of bike trails throughout region.

Study	Priority Area	Stakeholders*	Notes
Regional Park-n-Ride Expansion Study	Multimodal Connectivity	SPC	Study possibilities for expanding existing sites or providing additional sites (coordinate with upcoming Regional Transit Coordination Study).
Park-n-Bike Campaign/Expansion	Multimodal Connectivity	SPC	Initiative to encourage commuters to transfer to bicycles at established trailheads.
Potential Transit Lane Study	Multimodal Connectivity	SPC , PennDOT District 11-0, City of Pittsburgh DOMI, Port Authority of Allegheny County	Study feasibility of other transit lane candidates not included in this report.
Wabash Tunnel Multimodal Use Study	Multimodal Connectivity	SPC , PennDOT District 11-0, City of Pittsburgh DOMI, Port Authority of Allegheny County	Study of alternate uses for tunnel, including possibility of conversion for bike usage.
West End/South Hills Potential Trail Network Study	Multimodal Connectivity	SPC	Study to determine potential trail network utilizing underused or unused right-of-way.
PA-28 Active Traffic Management Study	Freeway and Arterial Operations	PennDOT 11-0	Study flex lanes and other Active Traffic Management strategies.
Parkway North HOV Conversion Study	Freeway and Arterial Operations	PennDOT 11-0 , Port Authority of Allegheny County	Consider converting existing HOV lanes in the median of the Parkway North (I-279) to a Port Authority Busway or other use.
US 40 Road Safety Audit	Freeway and Arterial Operations	SPC	Road Safety Audit on US 40, east of Uniontown to Somerset County line.
Route 8 Corridor Operations Planning Study	Freeway and Arterial Operations	SPC	Study to improve operations along Route 8 between Wildwood and Bakerstown.
Western RTMC Region Truck Parking Study	Freight Management	SPC , PennDOT Central Office	Determine needs and locations for possible expansion of truck parking. Study possibility of installing Truck Parking Management System. Consider potential public-private partnership opportunities with private truck stop facilities. Coordinate with planned PennDOT Truck Parking Study.
Western RTMC Region Winter Truck Restriction Impact Study	Freight Management	SPC , PennDOT Central Office	Study impact of winter truck restrictions on parallel corridors and determine best practices for future winter operations.

* Primary stakeholder in **bold**

Acronyms and Abbreviations

Abbreviations/ Acronyms	Term
511PA	511 Pennsylvania Traveler Information System
AADT	Average Annual Daily Traffic
ACTA	Airport Corridor Transportation Association
BRT	Bus Rapid Transit
CCTV	Closed-Circuit Television
DDI	Diverging Diamond Interchange
DMS	Dynamic Message Sign
DVMT	Daily Vehicle Miles Traveled
FAST	Fixed Anti-Icing Technology
FHWA	Federal Highway Administration
FLM	First and Last Mile
FSP	Freeway Service Patrols
HAR	Highway Advisory Radio
HOV	High-Occupancy Vehicle
ITS	Intelligent Transportation System
IUP	Indiana University of Pennsylvania
LRTP	Long Range Transportation Plan
MAP-21	Moving Ahead for Progress in the 21 st Century Act
MPO	Metropolitan Planning Organization
NHS	National Highway System
O&M	Operations and Maintenance
OTMA	Oakland Transportation Management Association
PAAC	Port Authority of Allegheny County
PDP	Pittsburgh Downtown Partnership
PEMA	Pennsylvania Emergency Management Agency
PennDOT	Pennsylvania Department of Transportation
PTC	Pennsylvania Turnpike Commission
ROP	Regional Operations Plan
RPO	Rural Planning Organization
RTMC	Regional Traffic Management Center
RWIS	Road Weather Information System
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SPC	Southwestern Pennsylvania Commission
TIP	Transportation Improvement Program
TNC	Transportation Network Company
TOSF	Transportation Operations and Safety Forum
TSMO	Transportation Systems Management and Operations
TSP	Transit Signal Priority
UPMC	University of Pittsburgh Medical Center
WRTMC	Western Regional Traffic Management Center

Chapter 1: Overview of the Region

This Regional Operations Plan (ROP) has been compiled based on guidance from Pennsylvania Department of Transportation (PennDOT) Publication 851, *TSMO Guidebook, Part I: Planning*, which describes how to implement the statewide approach to Transportation System Management and Operations (TSMO). TSMO is a set of integrated strategies used to optimize the operational performance of existing infrastructure without adding capacity. The ROP complements the TSMO Program Plan by identifying the regional approach to traffic operations and sets the stage for regional implementation of TSMO strategies.

This document will help to enable the Southwestern Pennsylvania Commission (SPC) to:

- Meet federal requirements related to ITS planning
- Incorporate statewide TSMO goals for operations planning at the regional level
- Utilize objectives-driven, performance-based planning processes for operations and congestion management planning
- Integrate/mainstream ITS and operations planning into the overall transportation planning process, as per Federal Highway Administration (FHWA) guidance
- Prioritize and fund TSMO capital projects as part of the Transportation Improvement Program (TIP)
- Manage funds for the TSMO operations and maintenance (O&M) in future years

Synopsis of the Region

SPC covers the southwestern portion of Pennsylvania, an area that includes 10 counties and a population of 2.6 million across 7,112 square miles. This region includes PennDOT Engineering Districts 11-0 and 12-0, as well as 3 counties from District 10-0. The region includes the following counties: Armstrong, Butler, and Indiana within PennDOT District 10-0; Allegheny, Beaver, and Lawrence within PennDOT District 11-0; and Fayette, Greene, Washington, and Westmoreland within PennDOT District 12-0. The transportation network within the



SPC region consists of 25,000 linear miles, over 6,600 bridges, and 6 tunnels. The Regional Traffic Management Center (RTMC) for the Western Region is located in the District 11-0 office in Bridgeville, PA. The Southwestern PA region is shown in **Figure 1**.

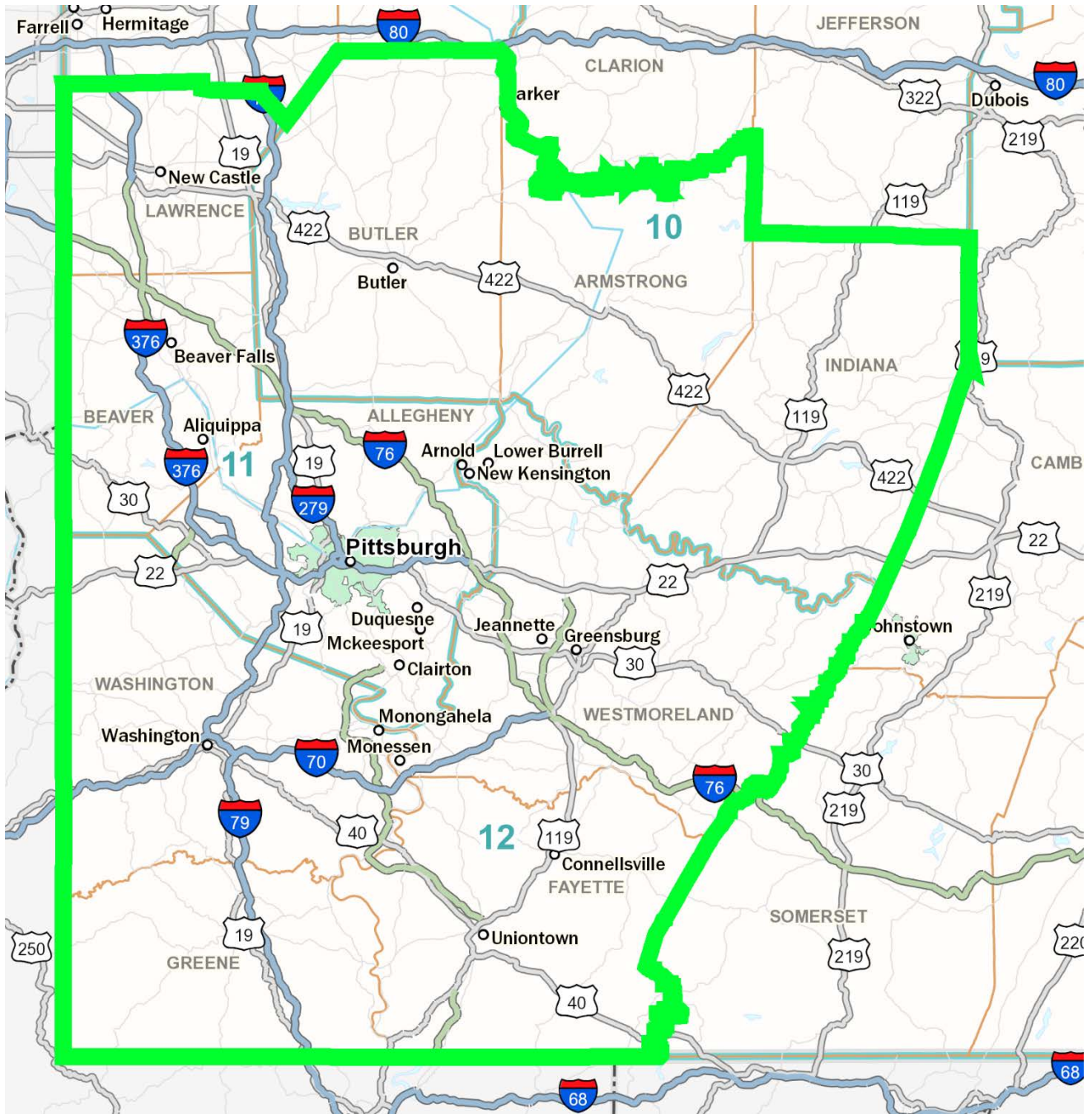


Figure 1: Southwestern Pennsylvania Region

The SPC region's terrain is defined mostly by the Allegheny Plateaus. The Allegheny Plateaus produce deep valleys and steep hillsides in the region. The steep slopes and rolling topography cause most of the population to be concentrated throughout the river valley communities. Nearly 78% of the region's population lives in the 15% of the land area that is classified as urban.

The City of Pittsburgh, located within this region, is home to many tourist attractions, conventions, and events which draw thousands of visitors to the area. The influx of tourists and visitors creates additional challenges for traffic management.

Key Regional Stakeholders

As part of an extensive outreach for this ROP update, SPC developed a ROP steering committee and ROP stakeholders group. The ROP stakeholders group consisted of key organizations that participate in transportation operations planning and implementation in our region. The following provides a listing of the 2019 ROP stakeholders invited to participate:

- FHWA
- PennDOT Central Office
- PennDOT District 10-0
- PennDOT District 11-0
- PennDOT District 12-0
- Allegheny County
- Armstrong County
- Beaver County
- Butler County
- Fayette County
- Greene County
- Indiana County
- Lawrence County
- Washington County
- Westmoreland County
- City of Pittsburgh
- Beaver County Transit Authority
- Butler Transit Authority
- Fayette Area Coordinated Transportation
- Freedom Transit
- Indiana County Transit Authority
- Mid Mon Valley Transit Authority
- New Castle Transit Authority
- Port Authority of Allegheny County (PAAC)
- Town and County Transit
- Westmoreland County Transit Authority
- Pennsylvania Turnpike Commission
- Airport Corridor Transportation Association (ACTA)
- Oakland Transportation Management Association (OTMA)
- Pittsburgh Downtown Partnership (PDP)
- BikePGH
- Bike Share Pittsburgh
- Allegheny County Airport Authority
- Pennsylvania Emergency Management Agency (PEMA), Western Area
- Port of Pittsburgh Commission
- Pittsburgh Parking Authority
- University of Pittsburgh
- Carnegie Mellon University
- Cranberry Township



The ROP steering committee was established by inviting specific stakeholder group members with extensive knowledge of our region's operations and those that could assist us with data gathering. A list of the 2019 ROP steering committee members that were invited to participate is provided in **Table 1**.

Table 1: Regional ROP Steering Committee

Organization Name	Organization Contact	Geographic Coverage	Roles/Responsibilities
FHWA – PA Division	Dan Walston	Statewide	Transportation Operations Program Manager
PennDOT Bureau of Maintenance and Operations	Doug Tomlinson dtomlinson@pa.gov	Statewide	Chief, Highway Safety and Traffic Operations Division
	Frank Cavataio facavataio@pa.gov		Managing statewide transportation management and operations
PennDOT District 10-0	Dave Tomaswick dtomaswick@pa.gov	Armstrong, Butler, Indiana	District Traffic Engineer
	Ernest Cascino ecascino@pa.gov		District Assistant Traffic Engineer
	Adam Marshall admarshall@pa.gov		District Assistant Traffic Engineer
PennDOT District 11-0	Todd Kravits tkravits@pa.gov	Allegheny, Beaver, Lawrence	District Traffic Engineer
	Frank Cippel fcippel@pa.gov		District Assistant Traffic Engineer
	Kathryn Power kpower@pa.gov		District ITS Engineer
PennDOT District 12-0	Bryan Walker brywalker@pa.gov	Greene, Fayette, Washington, Westmoreland	District Traffic Engineer
	Eric Bell erbell@pa.gov		District Assistant Traffic Engineer
	Emily Zarichnak emzarichna@pa.gov		District ITS Engineer
Port Authority of Allegheny County	Amy Silbermann asilbermann@portauthority.org	Allegheny County	Director of Planning
	Chuck Rompala crompala@portauthority.org		Manager, Road Operations
Allegheny County Economic Development	Ann Ogoreuc ann.ogoreuc@alleghenycounty.us	Allegheny County	Assistant Director, Mobility and Transportation Initiatives
City of Pittsburgh	Amanda Purcell amanda.broadwater@pittsburghpa.gov	Pittsburgh	City Traffic Engineer
SPC	Andy Waple awaple@spcregion.org	SPC region	Transportation Director
	Domenic D’Andrea ddandrea@spcregion.org		Manager, Operations and Safety
	Josh Spano jspano@spcregion.org		Transportation Planner
	Evan Schoss eschoss@spcregion.org		Transportation Planner

A summary of steering committee and stakeholder group activities is provided in **Table 2** and **Table 3**, respectively. Meeting minutes can be found in **Appendix A**.

Table 2: Summary of Steering Activities

Steering Round	Summary of Activities	Location	Date
1	<ul style="list-style-type: none"> Discussion of needs identified in previous ROPs Overview of material to be presented at stakeholder meetings Discussion of PennDOT One Map tool 	SPC Conference Center	January 16, 2019
2	<ul style="list-style-type: none"> Discussion of stakeholder meeting feedback Discussion of operational needs and issue Overview of material to be presented at stakeholder meetings 	SPC Conference Center	February 26, 2019
3	<ul style="list-style-type: none"> Discussion of draft ROP projects Overview of material to be presented at stakeholder meetings 	SPC Conference Center	May 8, 2019
4	<ul style="list-style-type: none"> Presentation of final ROP document Final review of ROP projects 	SPC Conference Center	June 26, 2019

Table 3: Summary of Stakeholder Activities

Stakeholder Round	Summary of Activities	Location	Date
1	<ul style="list-style-type: none"> Overview of TSMO, the previous regional ROP, and process for the current ROP Introduction to PennDOT One Map Breakout sessions discussing initial maps of One Map data including bottlenecks, crash clusters, planned events, tiering corridors, and multimodal infrastructure 	SPC Conference Center	January 30, 2019
2	<ul style="list-style-type: none"> Discussion of tools and strategies in TSMO Guidebook Breakout sessions discussing regional issues, needs, tools, and strategies that can be applied 	PennDOT District 12-0	March 14, 2019
		PennDOT District 11-0	March 14, 2019
		PennDOT District 10-0	March 15, 2019
3	<ul style="list-style-type: none"> Overview of types of proposed projects Breakout sessions discussing and reviewing draft ROP projects 	PennDOT District 12-0	May 30, 2019
		PennDOT District 11-0	May 30, 2019
		PennDOT District 10-0	May 31, 2019

Region's ITS and Operations Vision and Planning

SPC, the region's Metropolitan Planning Organization (MPO), adopted their latest Long Range Transportation Plan (LRTP), *SmartMoves for a Changing Region*, in June 2019. The plan was developed with the following regional vision: A world-class, safe and well maintained, integrated transportation system that provides mobility for all, enables resilient communities, and supports a globally competitive economy. To achieve the vision, the following investments, relative to the ROP, were identified:

- Investment for Maintaining Infrastructure Condition
- Investment for System Safety, Efficiency and Reliability
- Multimodal Investment for Community and Economic Development

The last (2015) Regional Operations Plan was incorporated into the LRTP process. By linking the ROP and LRTP, operational projects are institutionalized into the overall planning cycle. The operations objectives developed in the ROPs tie to the regional policy goals and strategies set in the regional LRTP. Four operations objectives were established to achieve the goal of efficient transportation system operations and management – mitigate recurring congestion, maintain mobility during planned events, minimize impact of unplanned events, and provide an efficient multimodal transportation system. Some of the projects aimed at following these objectives included:

- Oakland and Downtown Bikesharing
- Evacuation Plans and Procedures Developed
- Low Cost Road Surface Monitoring
- Adaptive Traffic Signalization Strategies
- Real Time Transit Rider Information

See **Appendix B** for a full status table of all of the previously recommended projects.

Chapter 2: Existing Regional Demographics and Transportation Elements

Existing Key Transportation Elements

Roadway Network

The roadway network in the SPC region includes Interstates, freeways, arterials, collectors, local, municipal, and other agency roads. Based on the PennDOT 2016 Highway Statistics, the SPC region contains 25,163 linear miles of roadway, making up 20.9% of the Commonwealth’s total linear mileage.

Table 4: Southwestern Region Linear Miles

County	PennDOT Linear Miles	Other Agencies Linear Miles*	Local County/ Municipal Linear Miles	Total Linear Miles	Total DVMT
Armstrong	655	14	1,151	1,820	1,496,917
Butler	6534	84	1,628	2,366	5,266,143
Indiana	797	38	1,270	2,105	2,040,941
District 10-0	2,105	137	4,049	6,291	8,804,001
Allegheny	1,178	42	4,565	5,785	22,876,659
Beaver	603	63	1,019	1,686	3,285,562
Lawrence	384	24	792	1,200	1,884,377
District 11-0	2,165	130	6,376	8,671	28,046,598
Fayette	759	92	1,303	2,153	2,769,970
Greene	567	6	930	1,503	1,419,181
Washington	1,089	41	1,746	2,876	6,082,949
Westmoreland	1,182	88	2,399	3,669	8,946,293
District 12-0	3,596	227	6,379	10,201	19,218,393
Total	7,867	493	16,804	25,164	56,068,992

*Other agencies include Turnpike toll roads and other state and federal agencies, such as state universities, national parks, etc.

Transit Service

Multiple transit systems serve this region. The following agencies provide fixed route and demand responsive transit service in the region:

Table 5: Southwestern Region Transit Service

Fixed Route Bus	Shared-Ride/Demand Response
Beaver County Transit Authority	ACCESS Transportation
Butler Transit Authority	Airport Corridor Transportation Association
Fayette Area Coordinated Transportation	Allied Coordinated Transportation Services
Heritage Community Transportation	Beaver County Transit Authority
Indiana County Transit Authority	Butler County Community Action
Mid Mon Valley Transit Authority	Fayette Area Coordinated Transportation
New Castle Area Transportation Authority	Greene County Transportation Department
Port Authority of Allegheny County (bus, incline, and light rail)	Mid-County Transit
Town and Country Transit (Armstrong County)	Washington County Transportation Authority
Washington County Transportation Authority	Westmoreland County Transit Authority
Westmoreland County Transit Authority	

The Mountain Line Transit Authority, although based outside of the SPC region, provides service from Morgantown, West Virginia, to Waynesburg, Washington, Pittsburgh's Greyhound Station, and Pittsburgh International Airport. In addition to these transit agencies, a variety of private intercity bus companies also provide service through the region, including:

- CoachUSA: commuter service from Cranberry Township and Warrendale to Downtown Pittsburgh.
- Fullington Trailways: intercity service from Harrisburg, State College, and DuBois to Downtown Pittsburgh and Pittsburgh International Airport (1 round trip per day).
- Greyhound Lines: operates a bus station in Downtown Pittsburgh with a number of intercity route options.
- Megabus: intercity service from Harrisburg, Philadelphia, and State College, as well as Morgantown, West Virginia, New York City and Washington, DC.



The Southwestern Pennsylvania region has over 100 Park-n-Ride lots with capacities ranging from 10 spaces to 2,200 spaces. These locations provide connections to public transit as well as meeting places for carpools and vanpools. Many of the locations fill up by 8:00 am on weekdays. Three of the locations (General Robinson Street, First Avenue, and South Hills Village) are garages. Structured parking is also planned for expansions of the Ross and Carnegie facilities. The capacity and utilization of these lots and garages can be viewed in **Figure 2**.

SPC PARK-N-RIDE LOCATIONS

FIGURE 2

LEGEND

PARK AND RIDE LOCATIONS

- 0-25% UTILIZATION
- 26-50% UTILIZATION
- 51-75% UTILIZATION
- 76-100% UTILIZATION
- OVER 100% UTILIZATION

LOT CAPACITY

- 0-200 SPACES
- 201-400 SPACES
- 401-600 SPACES
- 600+ SPACES

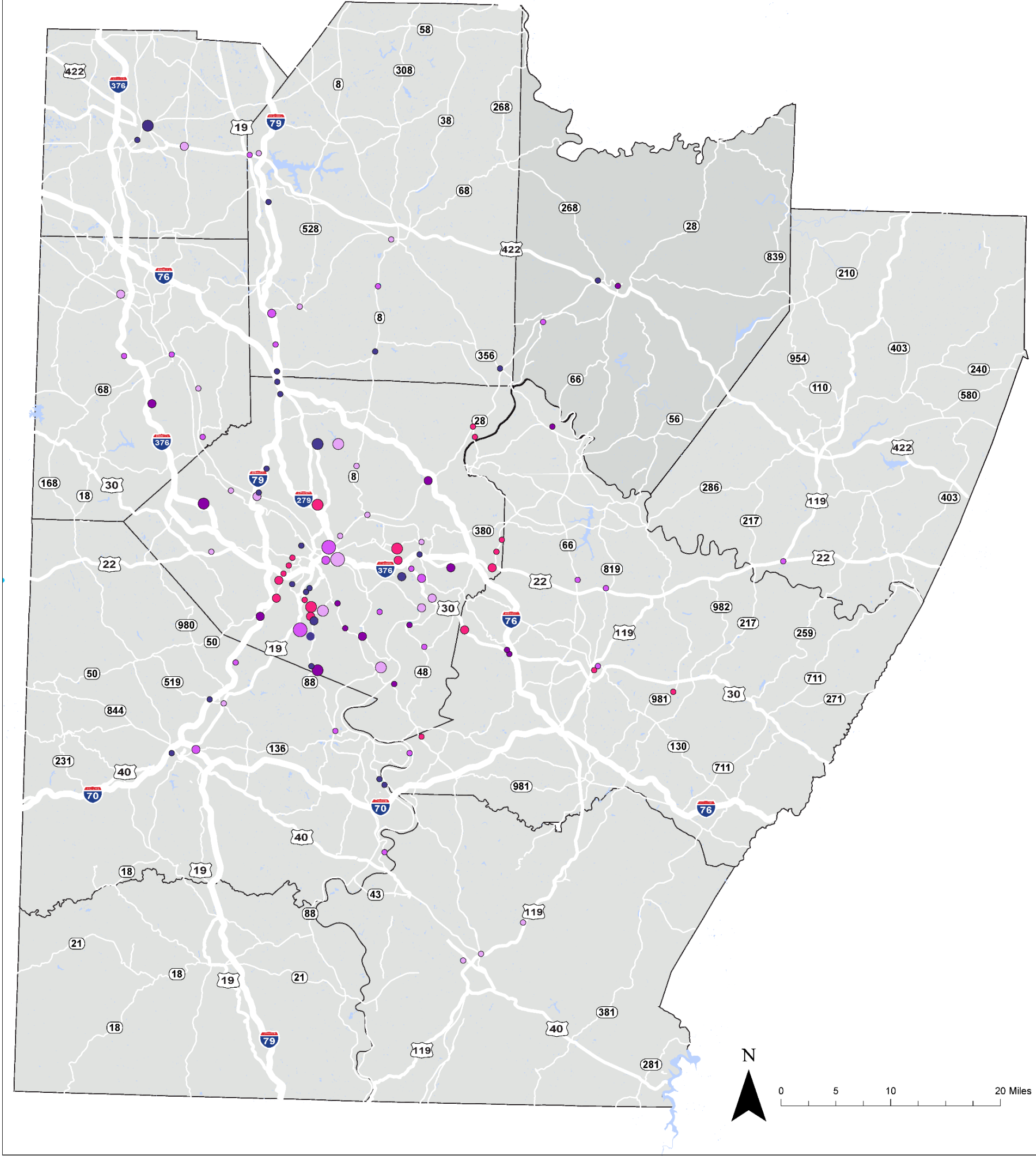


Figure 2: SPC Park-n-Ride Locations

In addition to the transit service listed above, there are two Amtrak trains that operate within the region. The *Pennsylvanian* line connects Pittsburgh to Harrisburg, Philadelphia, and New York, while also stopping at Greensburg and Latrobe. The *Capitol Limited* line connects Pittsburgh to Washington, D.C. to the southeast and Cleveland and Chicago to the west. *Capitol Limited* also services Connellsville, a city in Fayette County.

Active Transportation Network

Through long range planning and public engagement, SPC has seen a strong desire for safe and reliable multimodal transportation and development of sustainable active communities. Based on identification of this important theme, SPC has developed their first [Active Transportation Plan](#) and [Active Transportation Resource Center](#). The existing active transportation network within the region includes:

- 250 miles of local bike routes
- 326 miles of PA bike routes
- 122 miles of US Bike Route 50
- 3 miles of protected bike lanes
- 38 miles of bike lanes
- 50 miles of shared use markings
- 870 miles of trails
- 48 miles of designated PA water trail

Of particular note in the trail mileage is the 150-mile Great Allegheny Passage, which connects with the 184.5-mile C&O Canal Towpath at Cumberland, Maryland to provide a 334.5-mile trail between Pittsburgh and Washington, DC, free from traffic and motorized vehicles.



In addition, the City of Pittsburgh also has a bike share system called Healthy Ride. Healthy Ride has over 100 stations with 700 bikes in a growing network throughout the city. Current plans are to construct 71 more stations with the hopes of serving 170,000 people and increasing the service area to 16 square miles. **Figure 3** provides a map of the current Healthy Ride locations.

Airports

There are 22 public airports operating in the region. Pittsburgh International Airport is one of the major airports in the region and state. Others include:

- Allegheny County Airport
- Arnold Palmer Regional Airport (Regular Passenger Service)
- Bandel Airport
- Beaver County Airport
- Butler Farm Show Airport
- Finleyville Airpark
- Greene County Airport
- Greensburg – Jeannette Regional Airport
- Indiana County Airport
- Inter County Airport
- Joseph A Hardy Connellsville Airport
- Lakehill Airport
- McVile Airport
- Mount Pleasant/Scottsdale Airport
- New Castle Municipal Airport
- Pittsburgh – Butler Regional Airport
- Pittsburgh International Airport (Regular Passenger Service)
- Pittsburgh Monroeville Airport
- Pittsburgh Northeast Airport
- Rostraver Airport
- Washington County Airport
- Zelienople Municipal Airport

Ports

The region includes one major port – Port of Pittsburgh. The Port of Pittsburgh encompasses three major waterways – Allegheny, Monongahela and Ohio Rivers – and is the second largest inland port in the US.

Major Tourist Attractions

The region is home to many tourist attractions and other points of interest including those shown in **Table 6**.

Table 6: Southwestern PA Regional Attractions

Amusement Parks	Go Ape Treetop Adventure Idlewild and SoakZone Kennywood Park Sandcastle Waterpark
Caves and Mines	Laurel Caverns Tour-Ed Mine and Museum

<p style="text-align: center;">Sporting Events/Facilities</p>	<p>A.J. Palumbo Center Consol Energy Park Heinz Field Highmark Stadium Lernerville Speedway Oakmont Country Club Petersen Events Center Pittsburgh's Pennsylvania Motor Speedway PNC Park PONY League World Series PPG Paints Arena UPMC Events Center</p>
<p style="text-align: center;">Universities and Colleges</p>	<p>California University of Pennsylvania Carlow University Carnegie Mellon University Chatham University Duquesne University Geneva College Indiana University of Pennsylvania La Roche College Point Park University Penn State University - Beaver Penn State University - Fayette Penn State University - Greater Allegheny Penn State University - New Kensington Robert Morris University Saint Vincent College Seton Hill University Slippery Rock University of Pennsylvania University of Pittsburgh University of Pittsburgh - Greensburg Washington & Jefferson College Waynesburg University Westminster College</p>
<p style="text-align: center;">Entertainment and Special Events</p>	<p>Bedford County Fair Big Butler Fair Butler Farm Show Fayette County Fair First Night Pittsburgh Holiday Event Fort Armstrong Folk Festival Greater Pittsburgh Renaissance Festival Greene County Fair Hidden Valley Resort</p>

<p>Entertainment and Special Events</p>	<p>Indiana County Fair Key Bank Pavilion Lawrence County Fair Meadows Racetrack & Casino OpenStreetsPGH Peoples Gas Holiday Market Pittsburgh Earth Day Festival Pittsburgh Great Race Pittsburgh Marathon Pittsburgh Vintage Grand Prix Rivers Casino Seven Springs Mountain Resort Stage AE The ScareHouse Three Rivers Arts Festival Three Rivers Regatta Washington County Agricultural Fair Westmoreland County Fair</p>
<p>Parks and Recreation</p>	<p>Beaver County Conservation District Environmental Center Boyce Park Bradys Run Park Brush Creek Park Forbes State Forest Frick Park Hartwood Acres Highland Park Hillman State Park Hopewell Township Community Park I.S. & Gertrude Sahli Nature Park Keystone State Park Laurel Mountain State Park Laurel Ridge State Park Laurel Summit State Park Linn Run State Park McConnell's Mill State Park Monaca Riverfront Park Moraine State Park North Park Ohiopyle State Park Old Economy Park Pittsburgh Zoo & PPG Aquarium Point State Park Raccoon Creek State Park Ryerson Station State Park Schenley Park South Park Twin Lakes Park Yellow Creek State Park</p>

Others	Andy Warhol Museum Carnegie Museum of Art Carnegie Museum of Natural History Fallingwater Fort Ligonier Kentuck Knob Meadowcroft Rockshelter and Historic Village Monroeville Convention Center Nemacolin Woodlands Resort Pennsylvania Trolley Museum Phipps Conservatory and Botanical Gardens Senator John Heinz History Center Soldiers & Sailors Memorial Hall & Museum Woodville Plantation
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Major Employers

Figure 4 displays the number of employees in various industries, based on the 2012-2016 American Community Survey. Educational services, health care, and social assistance are the top industries in the region by a large margin. This group is led by a number of top universities as well as strong healthcare systems like the University of Pittsburgh Medical Center (UPMC) and the Allegheny Health Network (AHN), both of which have a significant presence in the region. In the figure, PennDOT District 10-0 data refers only to the counties within the SPC region.

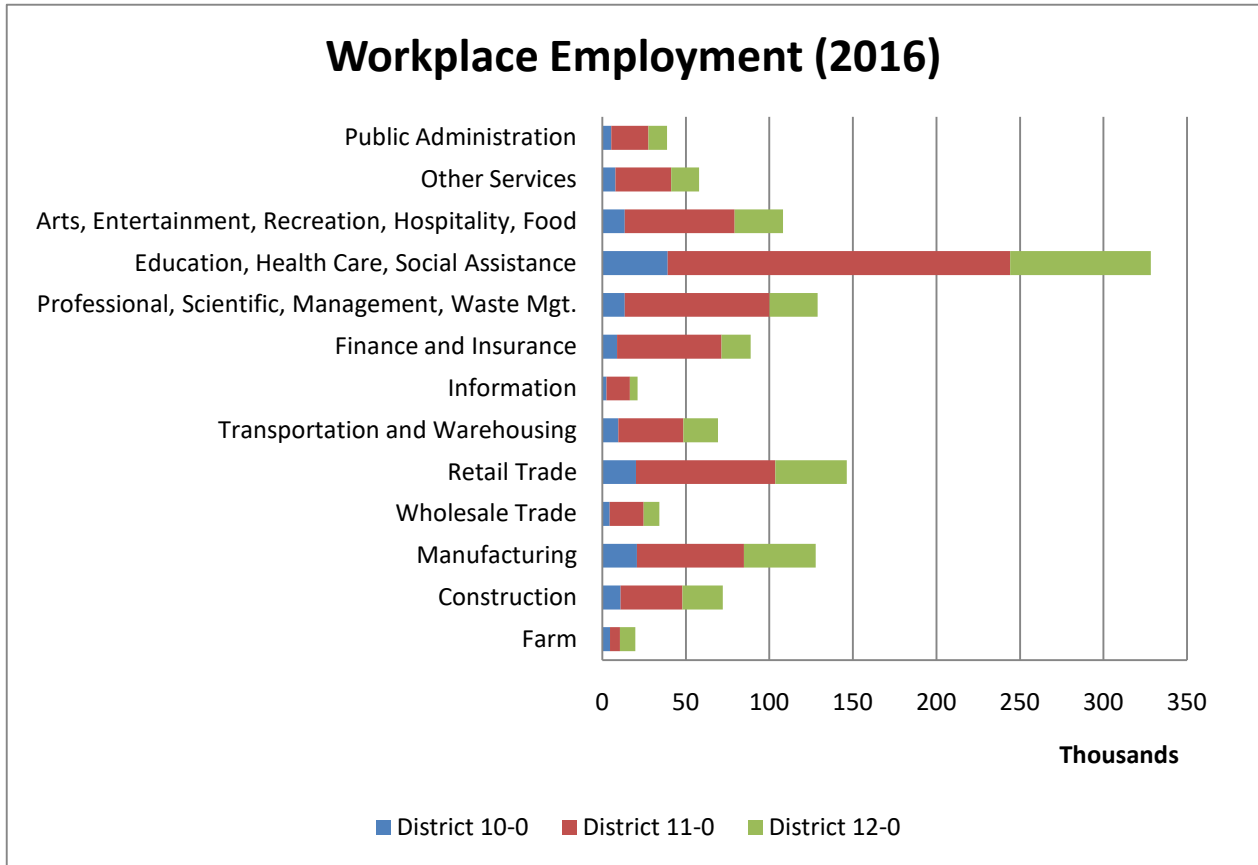


Figure 4: Major Industries in the Region

Demographics

The following tables, also based on the 2012-2016 American Community Survey, show the demographics and commuting patterns of the region. Data is based on workers' place of residence, not employment.

Table 7: County and PennDOT District Populations

County	Population	Percent of Regional Total
Armstrong	67,512	2.63%
Butler	185,974	7.24%
Indiana	87,491	3.41%
District 10-0	340,977	13.28%
Allegheny	1,230,360	47.90%
Beaver	169,205	6.59%
Lawrence	88,528	3.45%
District 11-0	1,488,093	57.94%
Fayette	134,229	5.23%
Greene	37,669	1.47%
Washington	208,269	8.1%
Westmoreland	359,377	13.99%
District 12-0	739,544	28.79%
Total	2,568,614	

Table 8: County and PennDOT District Commuting Pattern

County	Total Workers 16 & Over (Commuting)	% Commuters Driving Alone	% Commuters Carpooling	% Commuters Using Public Transportation	Mean Travel Time to Work (Minutes)
Armstrong	29,148	83.4%	9.5%	0.6%	28.9
Butler	90,237	84.4%	7.2%	0.7%	26.6
Indiana	37,239	80.0%	8.4%	0.6%	22.6
District 10-0	156,624	83.2%	7.9%	0.7%	26.1
Allegheny	606,306	72.1%	8.7%	9.2%	26.5
Beaver	80,263	82.2%	8.8%	2.0%	25.6
Lawrence	38,239	84.1%	8.8%	0.8%	22.8
District 11-0	724,808	73.9%	8.7%	8.0%	26.2
Fayette	53,049	85.3%	8.3%	0.4%	26.3
Greene	14,262	84.2%	9.1%	0.1%	26.5
Washington	97,094	83.1%	8.0%	1.4%	26.7
Westmoreland	169,974	84.4%	7.9%	1.1%	26.5
District 12-0	334,379	84.2%	8.0%	1.0%	26.5

While Allegheny County has a significantly higher percentage of public transit commuters than the region’s other counties, the alternate mode share increases even higher for the City of Pittsburgh. The Green Building Alliance organization recently released data from their second Make My Trip Count commuter survey, which captured over 20,000 Pittsburgh commuters’ travel habits and preferred modes of transportation. This survey showed that 38.5% utilize public transit while only 42.2% drive alone, within this District which includes the Downtown, Uptown, Oakland, and Northside neighborhoods of Pittsburgh.

TSMO Roadway Tiering System

As with any planning effort, it is important to define the scope of the roadway network. With input from statewide and District-level PennDOT representatives, as well as from planning partners, a roadway tiering system was developed by PennDOT to facilitate TSMO planning efforts. This tiering system is shown in **Table 9**.

Table 9: Roadway Tiering System

Road Type	Tier	Criteria
Limited Access (NHS)	1A	AADT > 75,000
	1B	AADT between 50,000 and 75,000
	1C	AADT < 50,000
Non-Limited Access (NHS)	2A	AADT > 25,000
	2B	AADT between 10,000 and 25,000
	2C	AADT < 10,000
Non-NHS	3A	AADT > 10,000
	3B	AADT between 2,000 and 10,000
	3C	AADT < 2,000





The intent of the tiering system is to organize the roadway network into groups with similar characteristics and operational needs. This helps to consistently define expectations for management and operations across the state. While the National Highway System (NHS) roadway types are higher-order roadways with higher traffic volumes and will generally receive higher priority for operations











planning and congestion mitigation, the tiering classifications are not intended to dictate specific solutions or level of funding.







Corridors and Areas of Transportation Significance


The major highway corridors identified in **Table 10** connect the core population centers of the region with each other as well as providing links to key areas outside of the area. Average Daily Traffic was retrieved from PennDOT’s One Map RMS data. Roads identified as part of the 511PA Core Network are ones that PennDOT has identified as having reliable speed data, road condition reporting, and traffic cameras.

Table 10: Corridors and Areas of Transportation Significance

Class	Route	County	Average Daily Traffic	TSMO Tier	511PA Core Network	Notes and Considerations
Interstate		Allegheny Beaver Butler Lawrence Westmoreland	25K – 48K 25K 25K 25K 35K – 48K	1C 1C 1C 1C 1C	Yes	<ul style="list-style-type: none"> East-west toll facility connecting Philadelphia and Ohio Significant regional commerce activity
		Allegheny Butler Greene Lawrence Washington	46K – 110K 27K – 64K 24K – 35K 24K 30K – 72K	1A, 1B, 1C 1B, 1C 1C 1C 1B, 1C	Yes	<ul style="list-style-type: none"> North-south Interstate connecting West Virginia and Erie, PA Significant regional commerce activity
		Allegheny	28K – 79K	1A, 1B, 1C	Yes	<ul style="list-style-type: none"> North-south auxiliary route connecting I-376 and I-79 Primarily serves as a main access route between Pittsburgh and its northern suburbs Reversible HOV lane from Perrysville Ave. Interchange to Bedford Ave. and Stadium Dr.
		Allegheny Beaver Lawrence	23K – 103K 15K – 37K 12K – 18K	1A, 1B, 1C 1C 1C	Yes	<ul style="list-style-type: none"> Auxiliary route connecting I-80 and I-76 Serves Pittsburgh and the surrounding areas Main access road to Pittsburgh International Airport Tolled route from US 422 to PA 51

Class	Route	County	Average Daily Traffic	TSMO Tier	511PA Core Network	Notes and Considerations
Interstate		Washington Westmoreland	24K – 56K 32K – 48K	1B, 1C 1C	Yes	<ul style="list-style-type: none"> East-west Interstate connecting Baltimore and Utah Co-designated as I-76 from New Stanton to Breezewood Significant regional commerce activity
		Allegheny	45K	1C	Yes	<ul style="list-style-type: none"> North-south auxiliary interstate within Pittsburgh Route connects Liberty Bridge and Boulevard of the Allies to I-279
US Routes		Allegheny Butler Greene Lawrence Washington	7K – 39K 5K – 37K 500 – 23K 2K – 4K 900 – 33K	1C, 2A, 2B, 3A, 3B 2A, 2B, 3A, 3B 2B, 3B, 3C 3B 2A, 2B, 2C, 3B 3C	Partial	<ul style="list-style-type: none"> North-south US highway running from Florida to Erie, PA
		Allegheny Indiana Washington Westmoreland	14K – 55K 11K – 22K 21K – 22K 19K – 31K	1C, 2A, 2B 2B 1C 2A, 2B	Partial	<ul style="list-style-type: none"> West-east US highway running from Cincinnati, OH to Newark, NJ
		Allegheny Beaver Westmoreland	4K – 32K 4K – 8K 4K – 48K	2A, 2B, 3B 3B 1C, 2A, 2B, 2C	No	<ul style="list-style-type: none"> East-west US highway running from Astoria, OR to Atlantic City, NJ
		Fayette Washington	3K – 32K 1K – 15K	1C, 2B, 2C 1C, 2B, 2C, 3B,3C	No	<ul style="list-style-type: none"> East-west US highway running from Silver Summit, UT to Atlantic City, NJ
		Fayette Indiana Westmoreland	2K – 32K 5K – 22K 4K – 28K	1C, 2A, 2B, 2C 1C, 2B, 2C 1C, 2B, 3B	Partial	<ul style="list-style-type: none"> North-south auxiliary route of US 19 Route runs from Kentucky to Sandy Township, PA
		Armstrong Butler Indiana Lawrence	8K – 22K 11K – 25K 6K – 14K 5K – 14K	1C, 2B, 2C 1C, 2B 1C, 2B, 2C 1C, 2B, 2C	No	<ul style="list-style-type: none"> Spur route of US 22 running from Cleveland, OH to Ebsenburg, PA
PA State Routes		Allegheny Butler	13K – 44K 4K – 24K	2A, 2B 2B, 2C	No	<ul style="list-style-type: none"> State highway running from Pittsburgh to Erie Also named the William Flinn Highway
		Allegheny Armstrong Butler	18K – 78K 3K – 17K 17K – 21K	1A, 1B, 1C 1C, 2C 1C	Partial	<ul style="list-style-type: none"> State highway running from Pittsburgh to Brockway, PA

Class	Route	County	Average Daily Traffic	TSMO Tier	511PA Core Network	Notes and Considerations
PA State Routes		Allegheny Fayette Washington	7K – 8K 12K – 21K 6K – 15K	1C 1C 1C	Partial	<ul style="list-style-type: none"> Tolled freeway linking I-68 in West Virginia to PA-51 in Jefferson Hills, PA Route is planned to link to I-376 near Monroeville, PA
		Allegheny Beaver Fayette Westmoreland	3K – 39K 6K – 26K 10K – 15K 14K – 22K	1C, 2A, 2B, 2C 1C, 2A, 2B, 2C 2B 2B	No	<ul style="list-style-type: none"> State highway that runs from Uniontown to the Ohio state line
		Allegheny	800 – 26K	2A, 2B, 3A, 3B, 3C	Yes	<ul style="list-style-type: none"> State highway located in the western suburbs of Pittsburgh Connects US Route 19 and PA 51 to I-376, US 22 and US 30
		Allegheny Beaver Lawrence	17K – 33K 4K – 24K 4K – 12K	1C, 2A, 2B 2B, 3B 3A, 3B	No	<ul style="list-style-type: none"> State highway connecting downtown Pittsburgh to the northwestern portion of the Pittsburgh metropolitan area
		Armstrong Westmoreland	2K – 14K 8K – 21K	3A, 3B 1C, 2B, 2C, 3A, 3B	Partial	<ul style="list-style-type: none"> North-south state highway connecting US Route 119 near New Stanton to US 6 in Kane Tolled route from US 119 to US 22
		Butler	600 – 51K	2A, 2B, 3B, 3C	No	<ul style="list-style-type: none"> State highway located in Butler County Connects between Cranberry Township and Buffalo Township Route is currently being widened to include Safety improvements, turning lanes and culvert replacement in Adams Township

Class	Route	County	Average Daily Traffic	TSMO Tier	511PA Core Network	Notes and Considerations
PA State Routes		Allegheny Washington	11K 11K	1C 1C	Yes	<ul style="list-style-type: none"> Partially completed tolled freeway in the southern and western suburbs of Pittsburgh Route will serve as a southern beltway around the metro Pittsburgh area upon expansion completion

I-79 runs approximately 110 miles through the region in the north-south direction. It carries the most traffic of any roadway in the region with an annual average daily traffic (AADT) of 110,000 vehicles in Allegheny County. I-376 is another major corridor in the region, connecting I-76 to I-80 and traveling through the City of Pittsburgh. The Interstate also serves as the main access road for the Pittsburgh International Airport.

US 22 is a main east/west non-Interstate highway through the region. US 22 runs from Cincinnati to Newark, NJ and provides connections from the eastern and western areas of the region to Pittsburgh, running as part of I-376 through the city.

Some of the major state routes include PA-28, PA-43, PA-60, PA-66, and PA-576. Also known as Mon-Fayette Expressway, PA-43 is a tolled freeway that connects from I-68 near Morgantown, West Virginia to PA-51 in Jefferson Hills, PA. An extension is planned which will eventually continue the roadway north, connecting with I-376 near Monroeville, PA.

Figure 5 displays a map of the significant corridors in the region.

Other areas of surface transportation significance include the Port Authority of Allegheny County’s East, West, and South Busways as well as their Light Rail System (the “T”). The Martin Luther King Jr. East Busway is 9.1 miles in length and has an approximate weekday ridership of 24,000. The South Busway is 3.9 miles in length and has an approximate weekday ridership of 10,000. The West Busway is 5 miles in length and has an approximate weekday ridership of 8,000. Port Authority’s Light Rail system is 26.5 miles in length and has an approximate weekday ridership of 25,000. These transit facilities provide a backbone for the transit network and connectivity to eastern, western and southern suburbs. These facilities are discussed further in Chapter 4 of this document.

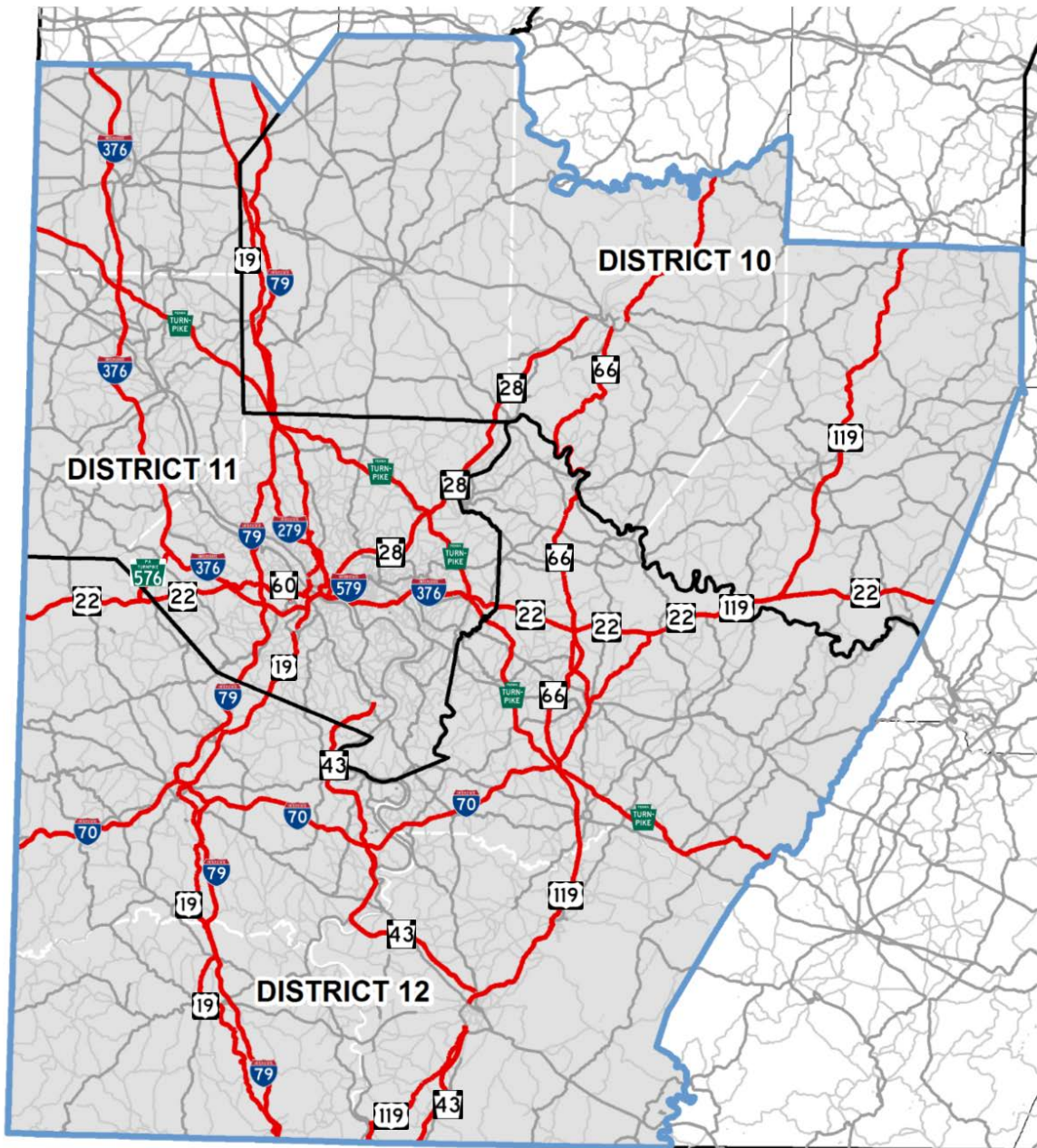


Figure 5: Southwestern Region Corridors of Significance

Regional TSMO Elements

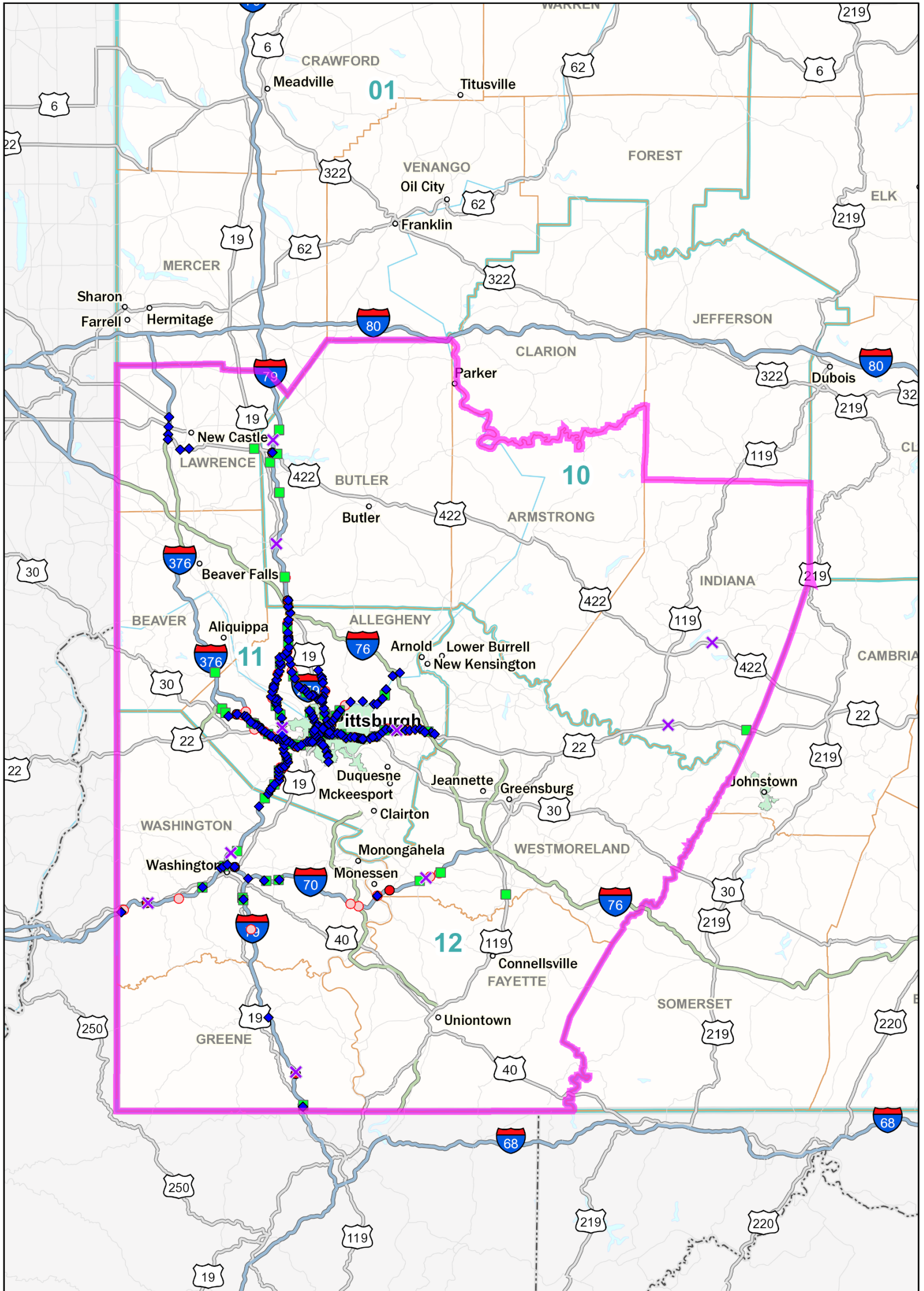
The SPC region has a growing number of ITS devices throughout the districts including Closed-Circuit Television (CCTV) cameras, dynamic message signs (DMS), highway advisory radios (HAR), and road weather information systems (RWIS). The Western Regional Traffic Management Center (WRTMC), located at the PennDOT District 11-0 offices in Bridgeville, PA, operates these devices. The WRTMC oversees the operations of the freeway and major arterial system through ITS devices, freeway service patrols, communication with emergency responder agencies, and close coordination with the other PennDOT Districts.

A summary of the PennDOT ITS devices in the region can be found in **Table 11** and a map showing the ITS devices is included as **Figure 6**. The data shown in the table below was provided by the PennDOT WRTMC and includes Clarion and Jefferson counties, two counties that lie outside of the Southwestern PA region and are part of PennDOT District 10.

Table 11: Southwestern PA Region ITS Elements

ITS Devices	District 10	District 11	District 12	Total
Bridge De-Icing	0	4	1	5
CCTV	5	247	21	273
DMS	30	48	12	90
HAR Sign	38	23	11	72
HAR Transmitter	12	10	5	27
RWIS	7	2	4	13
Traffic Signals	280	1675	522	2477

In addition to these PennDOT ITS devices, Cranberry Township has 24 CCTV cameras and 1 DMS utilized by their traffic operations center. Also, Automatic Vehicle Location (AVL) systems are used by PAAC, Beaver County Transit Authority, and Mid Mon Valley Transit Authority.

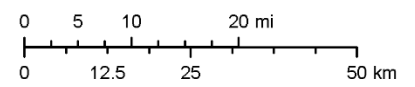


April 23, 2019

1:990,697

- ✕ RWIS Stations
- ◆ CCTV Cameras
- Dynamic Message Signs
- HAR Beacons

- HAR Transmitters
- ✚ Detectors
- ◻ SPC Region



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PennDOT

Figure 6: Southwestern Region ITS Devices

Chapter 3: Existing and Future Operations

TSMO Mapping

This section provides information documenting and summarizing the region's existing and future operations performance. Much of this data has been culled from PennDOT One Map, a web-based interactive GIS mapping application. Through this new website, PennDOT has aggregated traffic operations metrics, crash clusters, and many other data from a variety of sources. This powerful tool provides PennDOT and their planning partners with the ability to identify and investigate problem areas in a continuing process, planning for new and changing needs as they develop.

Existing Corridor Performance

Mobility

The SPC region is a diverse mix of urban, suburban, and rural areas, each with their own unique transportation issues. The heavily urban areas in and around Pittsburgh incur the heaviest recurring congestion, though other notable recurring congestion occurs in areas throughout the rest of the region, particularly at connections between signalized arterials and limited access roadways. Some of the most significant recurring congestion can be found on the following roadways:

- I-79/I-76 Turnpike Interchange, US 19, & PA-228 in Cranberry Township
- US 119 & US 30 corridors in Greensburg
- Parkway East (I-376) from Wilkinsburg to Downtown Pittsburgh
- Parkway West (I-376) from Robinson Town Centre to Downtown Pittsburgh
- US 19, West Liberty Ave; & SR 51 corridors in the South Hills

Measures of traffic congestion are calculated from third party probe data, which aggregates speed and travel time data from a sampling of vehicles throughout the roadway network. Two distinct measures of congestion are Bottleneck Rankings and TomTom Travel Time Ratios, which have been aggregated in One Map. Bottleneck Rankings are derived from the RITIS PDA Suite based on INRIX probe speed data, with a bottleneck occurring whenever the speed is less than 60% of the estimated free flow speed. These bottlenecks are ranked by delay, which is weighted by volume, queue length, magnitude of speed drop, and duration. This is a valuable piece of data but the following limitations should be kept in mind when analyzing bottleneck data:

- Free flow speeds are determined by INRIX, which in some cases might be based on limited data sets
- Low volume periods may use historical average speeds when there aren't enough probe vehicles
- Non-NHS roadways do not have volume data in RITIS, so delay cannot be calculated

To augment the bottleneck data, travel time ratio data was also considered, derived from anonymized data pulled from TomTom's navigation devices, in-dash systems, and apps. The travel time ratio compares actual travel times to free-flow travel times. This data is presented as four different tiers of severity within One Map.

The maps provided on the subsequent pages show both the Top 50 SPC Region Bottlenecks and the TomTom Travel Time Ratio displayed in some of the region's most congested areas. Note that the maps

do not represent the actual distance covered by the bottlenecks, only the length of the segment of road where the bottleneck occurred.

- Cranberry Township (**Figure 7**)
- Greensburg (**Figure 8**)
- Parkway East (**Figure 9**)
- Parkway West (**Figure 10**)
- South Hills (**Figure 11**)

One of the most effective ways to increase the capacity of these congested roadways is by shifting single-occupant vehicle trips to more efficient modes. The existing multimodal accommodations on these routes vary. Cranberry Township has a growing density of development but lacks in transit and other multimodal infrastructure that could help reduce its significant congestion. While a large number of jobs can be found in the immediate area of Cranberry, a number of residents also commute to Pittsburgh, but the only transit option for this commute is the CoachUSA commuter service. Also, jobs in Cranberry Township are inaccessible to many Butler County residents due to a lack of Butler Transit Authority routes connecting Cranberry to the City of Butler and other residents of the county. Cranberry has emphasized an inclusion of sidewalks and increased walkability within the township and should continue this effort, as well as continuing to develop safe, dedicated bike infrastructure.

The City of Greensburg experiences congestion on the US 30 and US 119 corridors in and around the city limits. Multimodal options are limited but some are available. Westmoreland Transit runs a number of routes through the city on both corridors, including local routes and commuter routes to Pittsburgh. There is also an Amtrak station for the *Pennsylvanian* route, which has one stop daily in each direction between Pittsburgh and New York City. Limited bike infrastructure is available in the area, though the Five Star Trail provides dedicated trail right-of-way from Greensburg to the south, generally paralleling US 119.

The other notable areas of recurring congestion in the region are located in and around the City of Pittsburgh. The Parkway East and West carry I-376 through the city and provide connections to Monroeville and the Pennsylvania Turnpike to the east and Pittsburgh International Airport to the west. PAAC provides a number of bus routes to support mobility along both of these routes, with the East and West Busway in particular providing dedicated transit right-of-way to support high ridership, which helps keep congestion on the Parkways from worsening. The East Busway runs from Swissvale to Downtown and the West Busway runs from Carnegie to West Carson Street, north of the West End Bridge. The Eliza Furnace and Great Allegheny Passage trail network runs parallel to the Parkway East from Greensburg to Downtown providing popular, dedicated right-of-way for active transportation commuters and for recreation.

The other area of congestion noted above in the Pittsburgh area is the South Hills, including US 19, SR 51, and West Liberty Avenue. The main transit asset in the South Hills is PAAC's light rail system which runs service from Library and from South Hills Village, though bus service is provided throughout the rest of the area, including along PA-51. Bicycle infrastructure is generally limited and Mount Washington restricts connections between the area and Downtown Pittsburgh. With a combination of crowded park-n-ride lots and available capacity on the light rail system, improved bike and pedestrian connections to light rail stations could positively impact mode share and reduce congestion on the main thoroughfares.

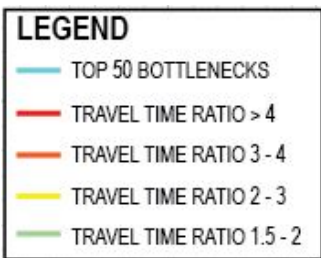
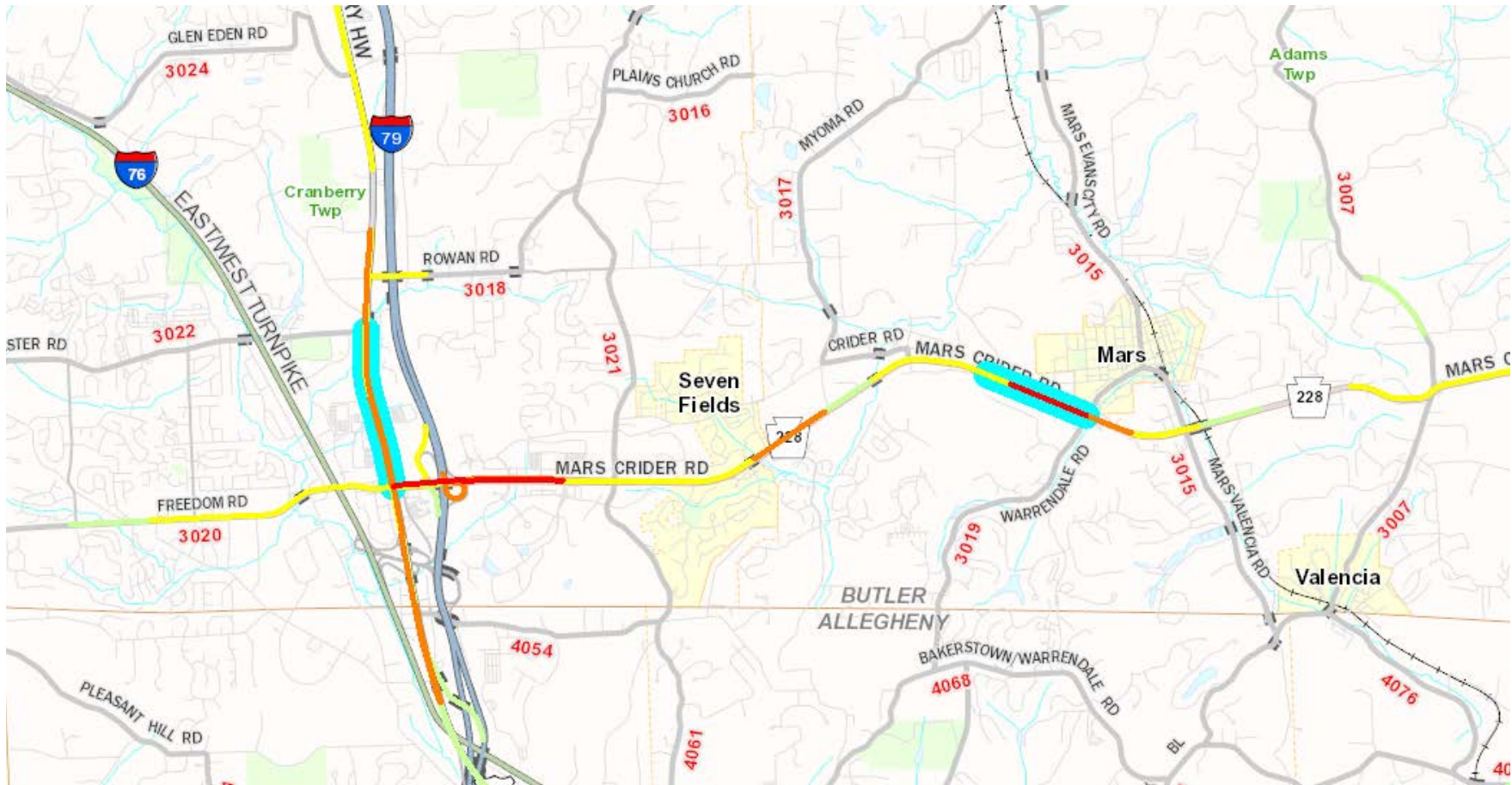


Figure 7: Cranberry Township Congestion Map



Figure 8: Greensburg Congestion Map

LEGEND	
—	TOP 50 BOTTLENECKS
—	TRAVEL TIME RATIO > 4
—	TRAVEL TIME RATIO 3-4
—	TRAVEL TIME RATIO 2-3
—	TRAVEL TIME RATIO 1.5-2

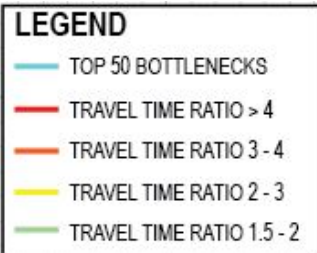
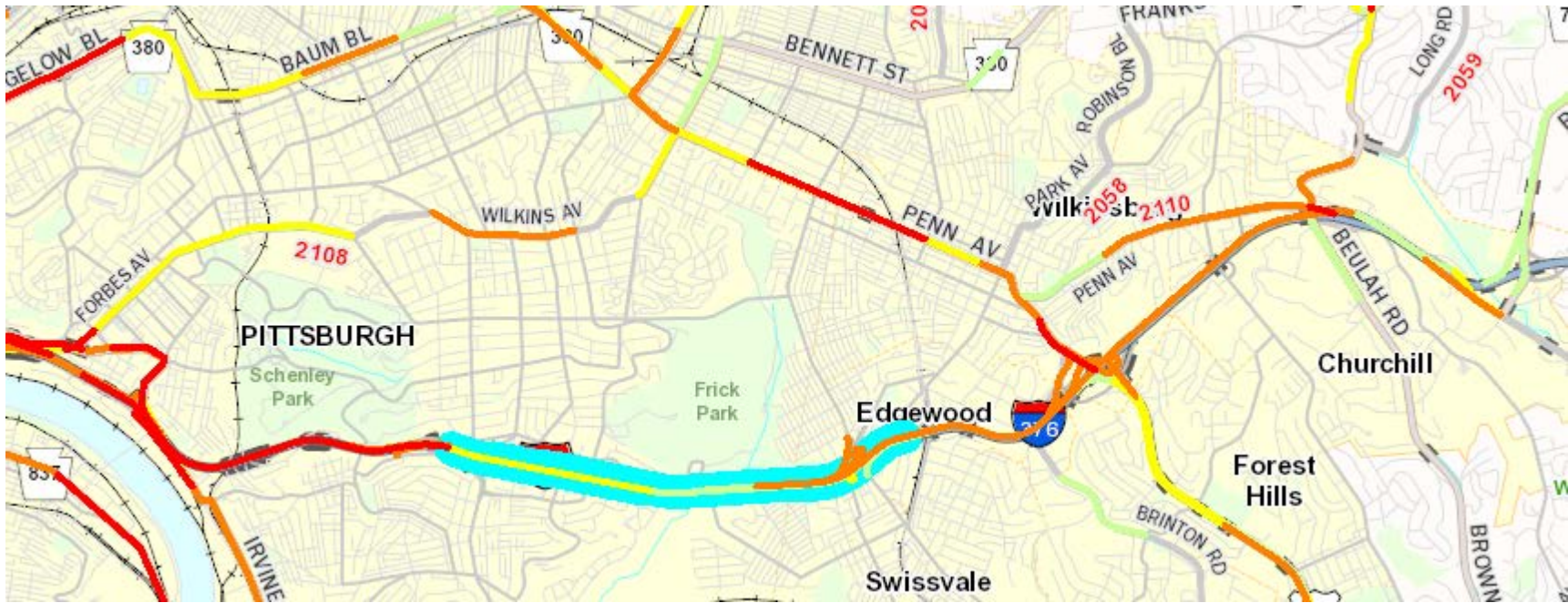


Figure 9: Parkway East Congestion Map

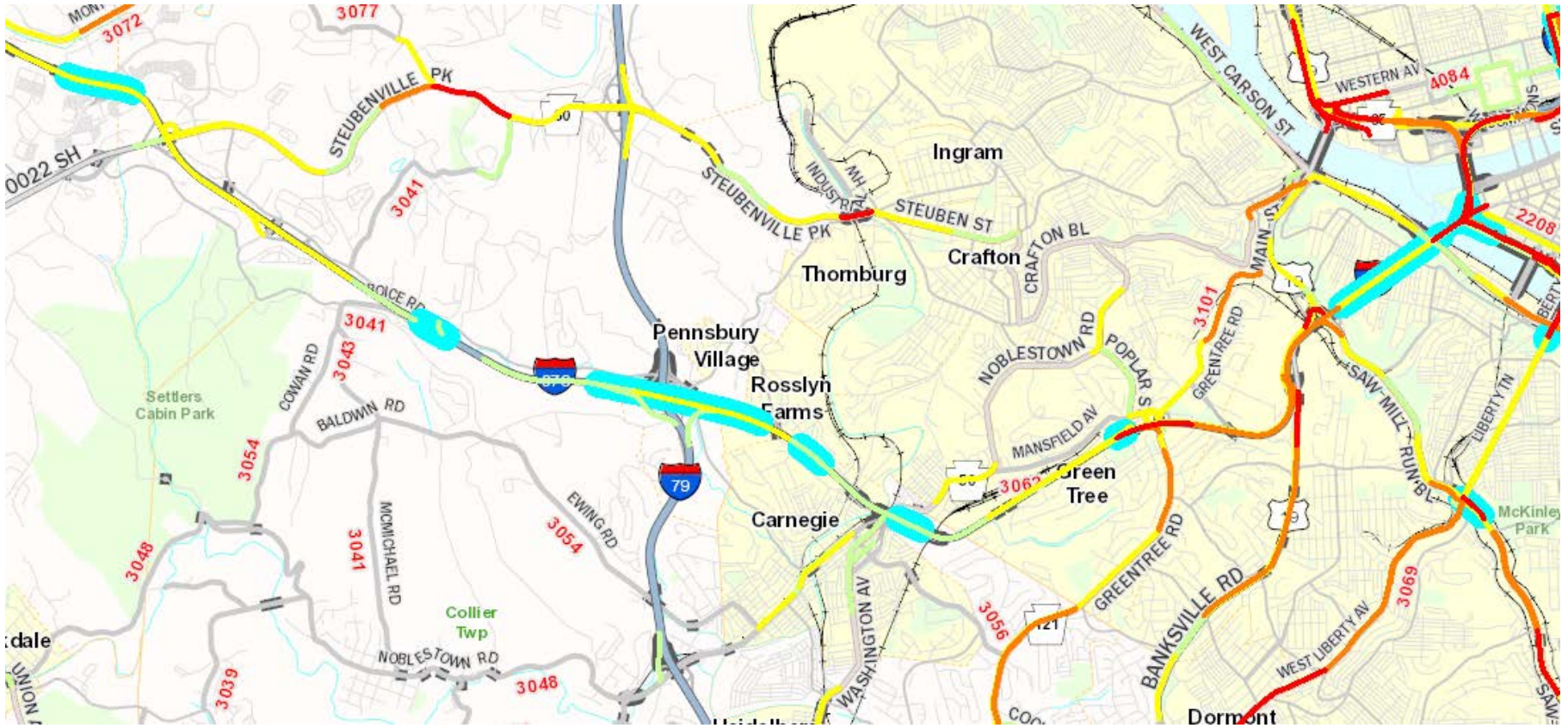
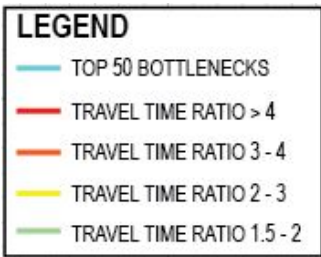


Figure 10: Parkway West Congestion Map



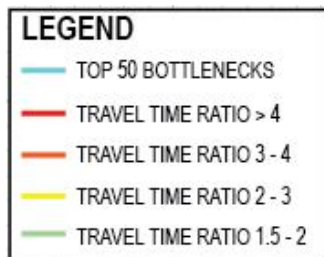
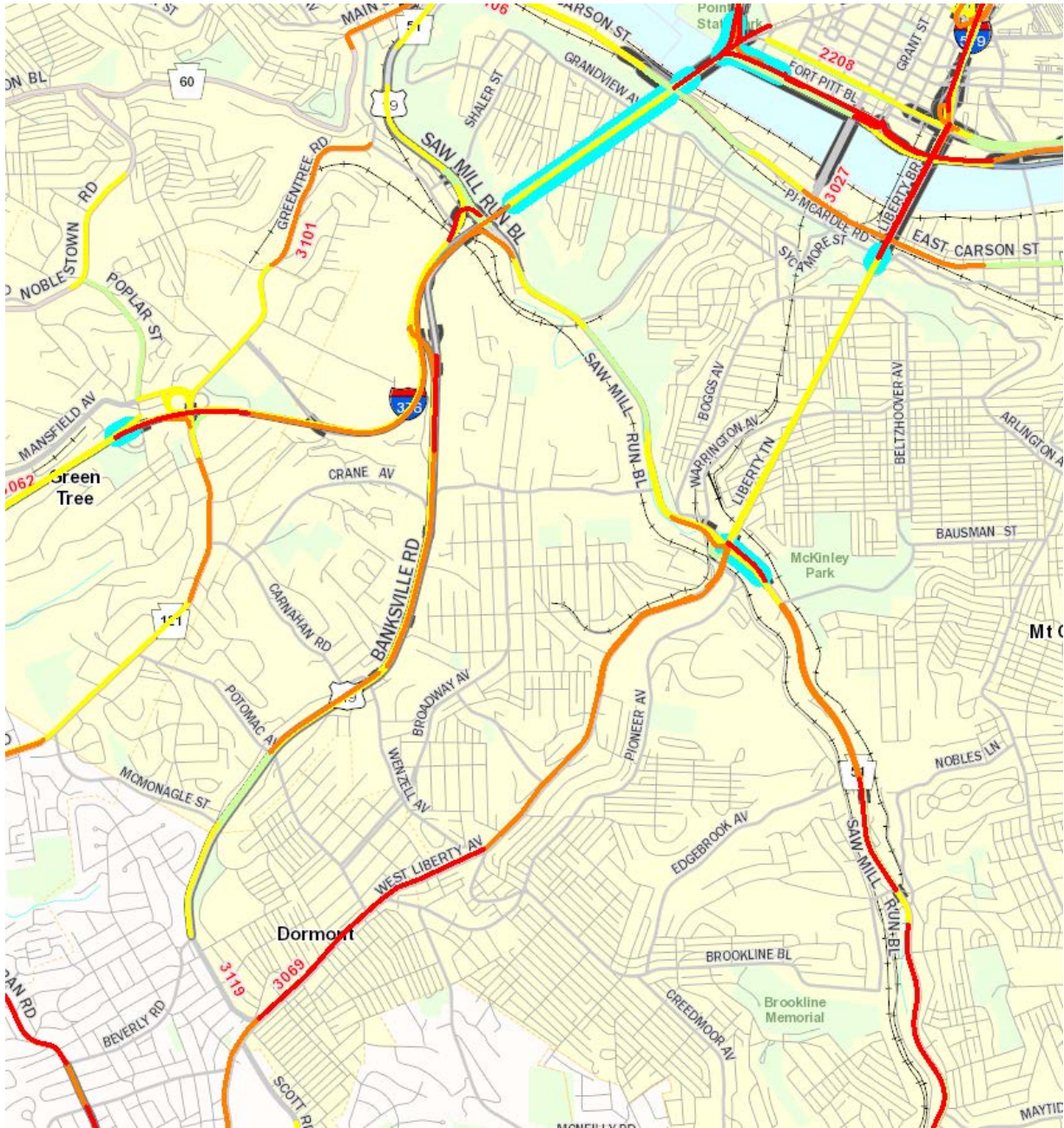


Figure 11: South Hills Congestion Map

Traveler Information and Situational Awareness

While much of the congestion in the urban and suburban areas of the region is recurring in nature, non-recurring congestion due to weather, incidents, and special events also has great impacts on mobility throughout the entirety of the region. In these cases, getting information to the operators in the WRTMC and to the travelers on the roadways is vital to minimize impacts. Allegheny County has a large number of ITS devices that assist in acquiring and disseminating important information during these events. Elsewhere in the region, these deployments are more sporadic, so situational awareness is more limited for the WRTMC and other operators and, as a result, it is more difficult to get information to affected travelers.

Recently, truck restrictions have been proactively placed on Interstates when winter storms are approaching. This is done to avoid trucks becoming stuck on the Interstates and causing dangerous long-term closures and trapped queues. However, many



trucks are diverting to arterials and causing operational problems during these events. Crucially, ITS deployments on these arterials are rare, so situational awareness of these events is difficult to achieve, and there are not easy ways to distribute traveler information on these routes.

The most notable special event traffic issues occur during events at Pittsburgh's Heinz Field and PNC Park, especially Steelers football games. Operational impacts are also seen during Pirates baseball games, University of Pittsburgh football games, and during concerts. The light rail system provides convenient access to the stadium area and the generally hub and spoke bus network delivers most routes into Downtown, allowing for a reasonable walk to and from the area. Given the stadium area's location along the Allegheny River, bike access is provided by the built-out trail network. The developing network of bike lanes through the city also provide access, particularly along the protected two-way cycle track on Penn Avenue. Bike and pedestrian access to stadium events is also encouraged through the temporary closures of the Roberto Clemente Bridge to vehicular traffic.

Other notable special events in the SPC region from a traffic perspective include:

- Key Bank Pavilion concerts in Burgettstown
- Pittsburgh Steelers camp in Latrobe
- Seasonal traffic for Nemaquin and other ski resorts in Fayette and Westmoreland Counties

Safety

Safety is a primary concern for SPC and operations improvements will not be instituted at the detriment to safety. Crash issues are a concern throughout the region and a frequent cause of congestion. Clusters of curved road crashes are widely spread throughout the region on winding rural roads as well as on interstates. Rear-end crashes and intersection crashes are noticeable in urbanized areas and along signalized arterial corridors. A few corridors with higher crash activity are:

- City of Butler, Butler County
 - PA-8, PA-68, and SR 3001 (Hansen Ave.)
- City of Washington, Washington County
 - I-70, I-79, and SR 4049 (Main St.)
- Downtown Pittsburgh, Allegheny County
 - I-376, I-279, I-579, and PA-65
 - Ft. Pitt Bridge and Tunnel, Liberty Bridge and Tunnel, Ft. Duquesne Bridge, West End Bridge
- East End Pittsburgh, Allegheny County
 - PA-8, PA-380 (Penn Ave., Fifth Ave., Washington Blvd., Baum Blvd.)

These corridors were identified based on crash data provided through PennDOT One Map. The data is based on source information from CDART, the Crash Data Analysis and Retrieval Tool. This is a web-based query tool that pulls together detailed information on reportable crashes. Reportable crashes are classified as incidents that result in an injury or where at least one of the involved vehicles must be towed from the scene. The latest CDART data is available in One Map; currently 2016 crash report data that is taken from the previous 5-year period.



Organizational Issues

Maintenance of existing ITS elements is vital to the success of the WRTMC and the ITS system throughout the region. This includes performing routine inspections, fixing problems in a timely manner when they do arise, and also ensuring that devices are replaced as they approach the end of their lifecycles.

Training in the operation of ITS equipment is also important. RTMC personnel receive training to operate and gather data from the various ITS devices at their disposal and maintenance personnel should also be familiar with the devices so that they can monitor and diagnose problems in the field.

Another important organizational aspect of operations is adherence to the various federal requirements. The following provides an outline of the various guidance and requirements provided by FHWA.

- SAFETEA-LU: Signed into law in 2005, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy For Users (SAFETEA-LU) provided guaranteed funding for highways, highway safety, and public transportation and was described, at that time, as the largest surface transportation investment in the nation's history. More detail on the law can be found at <http://fhwa.dot.gov/safetealu>, but the law does provide certain requirements to MPOs, including:
 - Congestion Management Process - SPC has developed a Congestion Management Process, per FHWA requirements, that provides information to planners, professionals, and others to understand the overall congestion climate in individual corridors and the region. This data helps SPC and other agencies to formulate congestion management strategies that maximize the impact of the available federal transportation funding.
 - Promoting "efficient system management and operation" is identified as one of eight planning factors in the law.
 - Management and operations strategies must be included in planning process to improve the performance of existing transportation facilities.
 - The Real-Time System Management Information Program was established nationally. It requires the capability to monitor, in real-time, the traffic and travel conditions of the major highways throughout the country and to share that data with state and local governments and with the traveling public.
- Map-21: The Moving Ahead for Progress in the 21st Century Act (Map-21) was signed into law in 2012 and provides surface transportation funding programs, including highway, transit, bike, and pedestrian programs. A key part of Map-21 (<https://www.fhwa.dot.gov/map21/>) is the emphasis on performance management and accountability for meeting defined performance goals. As such, performance measures are an important part of the ROP process and should be tied directly to the goals and objectives of the overall document, as well as to the specific projects outlined herein.
- The FAST Act: [Fixing America's Surface Transportation \(FAST\) Act](#) was signed into law in December, 2015. The FAST Act maintains focus on safety, keeps intact the established structure of the various highway-related programs we manage, continues efforts to streamline project delivery and, for the first time, provides a dedicated source of federal dollars for freight projects.

Recently Completed Projects

Within the SPC region, two major operational projects have been recently completed, the I-279 Reconstruction project in PennDOT District 11-0 and US 19/I-70 Diverging Diamond Interchange in PennDOT District 12-0. Additionally, multiple Adaptive Traffic Signal systems and ITS equipment installations have been completed as well.

Interstate Projects

The two-year I-279 Parkway Reconstruction project included concrete patching and overlay, preservation of 30 bridges and 49 overhead sign structures, repairs to 29 walls, ramp repairs, lighting improvements, HOV repairs, signage updates, guide rail and drainage improvements, and an anti-icing system installation on the McKnight Road interchange structures. The project also included several safety improvements such as lengthening of Madison Avenue, Veterans Bridge and Perrysville Avenue on-ramps. The project was completed in June 2019.

The US 19/I-70 Diverging Diamond Interchange (DDI) was part of PennDOT District 12-0's long-term improvement plan for I-70 in Washington County. The project consisted of the reconstruction of the US 19 (Murtland Avenue) Interchange, and also involved reconstruction and widening of I-70 from two lanes to three lanes. This is PennDOT's first-ever DDI and was recognized as one of the top 10 road projects in North America by Road & Bridges magazine in 2017.



Figure 12: US 19/I-70 Diverging Diamond Interchange, South Strabane Township

Adaptive Traffic Signal System Projects

The first adaptive signal system in the SPC region was completed in 2013 on US 19 from Marshall to McCandless. Since then, a number of other adaptive systems have been installed, including the following more recent projects:

- State Route 8 – Etna to Shaler: This adaptive traffic signal project consisted of 24 signals in four municipalities and was completed in May 2019.
- State Route 30 – Forest Hills: This adaptive traffic signal project consisted of 8 signals in two municipalities and was completed in May 2019.
- State Route 50 – Bridgeville – South Fayette: This adaptive traffic signal project consisted of 12 signals in two municipalities and was completed in May 2019.
- State Route 65 – Sewickley: This adaptive traffic signal project consisted of 3 signals in Sewickley Borough and was completed in June 2018.

- State Route 22/2048 – Churchill to Delmont: These were two adaptive traffic signal projects consisting of 34 signals in three municipalities and two PennDOT Districts (PennDOT District 11-0 and PennDOT District 12-0) and were completed in June 2018.
- State Route 4003, McKnight Road – McCandless – Ross: This adaptive traffic signal project consisted of 17 signals in two municipalities and was completed in September 2018.

Completed Adaptive Signal Projects

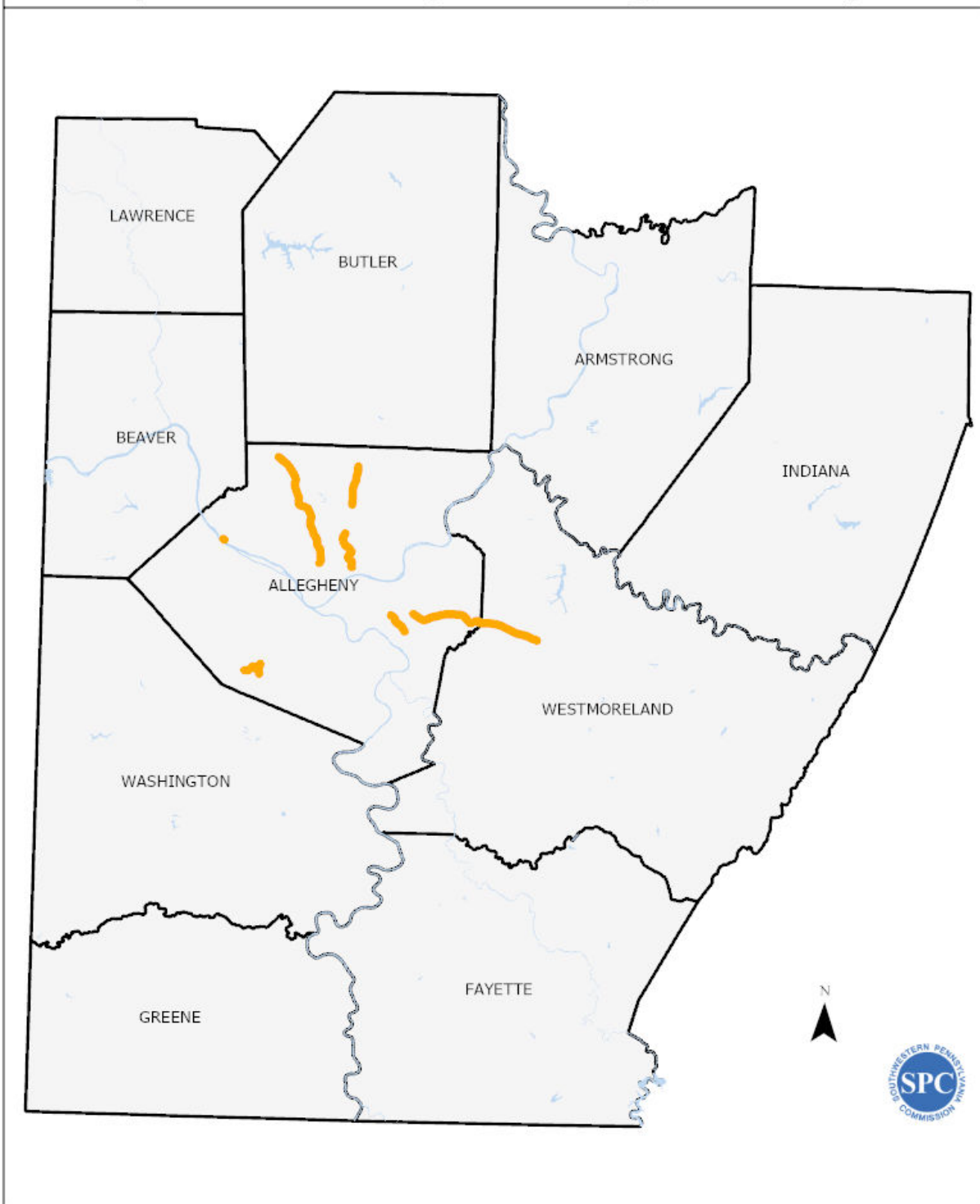


Figure 13: Completed Adaptive Signal Projects

ITS Projects

PennDOT District 11-0 has installed new fiber optic cable on I-79 in Lawrence County in preparation for future communications and ITS projects.

PennDOT District 12-0 has installed new fiber optic cable and several additional ITS devices on their various I-70 projects.

Planned Infrastructure Changes

State Route 228 “Balls Bend” – Butler County, PennDOT District 10-0

The proposed project is a widening and safety improvement project on SR 228 (Mars-Crider Road) in Middlesex Township. The project limits (1.6 miles) extend from approximately 0.25 mile east of Three Degree Road (western terminus) to the intersection of State Route 8 (Pittsburgh Road terminus). The project would straighten out a sharp curve near the intersection with Harbison Road, and widen existing SR 228 from two lanes (one lane in each direction) to four lanes (two lanes in each direction).

Freedom Road Crows Run – Beaver County, PennDOT District 11-0

The Freedom Road project includes realignment and roadway construction on Freedom Road between Route 65 in Conway Borough and Park Quarry Road in New Sewickley Township. The project enhances safety and addresses substandard roadway features and also includes bridge and structure replacement, utility and stream relocation, and wetlands mitigations.

Southern Beltway – Pennsylvania Turnpike Commission

The Southern Beltway (US 22 to I-79) project begins at the southern terminus of the Findlay Connector at the US 22 interchange and proceeds 13 miles southeast to an interchange with I-79 and a local connection at Morganza Road near the Allegheny/Washington County line. This new facility will be a cashless toll facility. All connections to and from I-79 will be open in 2022. As part of this project, I-79 Northbound will be widened from two to three lanes between the Southpointe Interchange and Alpine Road.

Mon Valley Expressway (Large to Monroeville) – Pennsylvania Turnpike Commission

This project will extend the current Mon Fayette Expressway system 14 miles north from PA-51 in Jefferson Hills through West Mifflin, Dravosburg, Duquesne, North Versailles, Turtle Creek, and Wilkins before connecting to the Parkway East (I-376) near Thompson Road in Monroeville. This project will complete the 68-mile system, allowing continuous travel from West Virginia north to an interchange with the Parkway East in Monroeville. The project will also encourage redevelopment of abandoned industrial sites, encourage revitalization of neighborhoods, and relieve local traffic congestion on roadways in the southern and eastern portions of Allegheny County.

Highland Park Bridge Interchange – PennDOT District 11-0

The project will address the existing bottleneck and congested traffic flow on SR 28 and other operational and safety issues within the SR 28/Highland Park Bridge and Freeport Road Interchange. It involves the reconstruction of SR 28 to reestablish two travel lanes in each direction through the interchange, construction of improved acceleration and deceleration ramps, bridge preservation work, and other operational and safety improvements. Noise walls are also being evaluated as part of the project. Construction is anticipated for Spring 2020.

Bus Rapid Transit – Port Authority of Allegheny County

The Bus Rapid Transit (BRT) service plan is designed for a “core” route that travels east-west between Downtown Pittsburgh and the Oakland neighborhood with three branches that go to Greenfield, Highland Park and through several Mon Valley communities. The network will include 7.4 miles of dedicated bus lanes serving 44 stations at 72 platforms. Due to the dedicated bus lanes and frequent operations, the BRT system will offer a faster and more cost-effective service for the Port Authority of Allegheny County riders.

Future Land Use Changes

Natural Gas

A large-scale ethane cracker plant is currently under construction in Beaver County, which would convert ethane produced from Marcellus Shale into ethylene for Royal Dutch Shell. This could lead to an uptick in drilling within the SPC region as well as the development of other ancillary business. The SPC region is in a prime location for a pipeline distribution network and other petrochemical, plastics, and other energy infrastructure and manufacturing throughout the quad-state area (Pennsylvania, Ohio, Kentucky, and West Virginia).

Freight

The economic vitality of Southwestern Pennsylvania depends on safely and efficiently moving people, goods, and materials into, through, and out of the region. The SPC freight transportation network includes the highway and Interstate network, including local bridges and roadways, as well as the region’s airports, rail lines, and waterways. A large portion of the nation’s population can be reached within a single day by trucking freight operators and Southwestern Pennsylvania is located in an important strategic position with several Interstates including I-79, I-70, and I-76 that serve national and international trade routes.

Anticipated Development

Growth areas in the SPC region include the I-79 Corridor (Allegheny County Line to City of Washington) in Washington County and US 19 and SR 228 in Butler County. In Beaver County, a 340-acre ethane cracker plant is being constructed. The Hazelwood Green site is primed for redevelopment and is located in the City of Pittsburgh along the Monongahela River in the neighborhood of Hazelwood. The site has a median target of 2.8 million square feet of mixed-use development that includes 1,050 dwelling units.

Infrastructure-Related Development

The I-579 Cap Urban Connector Project, located in the City of Pittsburgh, will consist of the construction of a new cap structure spanning over a portion of I-579 (Crosstown Boulevard). The project will significantly improve the safety of pedestrians and bicyclists, as well as provide new and improved links to public transportation at the nearby Steel Plaza subway station. The surface of the cap will provide a new 3-acre public open space that includes recreational and educational areas as well as rain gardens for storm water management. Once completed, the cap will provide a linkage from the old Civic Arena site to the Central Business District and encourage further redevelopment of the old Civic Arena site.

Chapter 4: Transportation Needs and Operational Issues

Through the previous ROP updates, a number of key priority areas have been identified for regional TSMO efforts. Currently, the seven identified priority areas are as follows:

- Traffic Signals
- Traffic Incident Management
- Traveler Information
- Operational Teamwork/Institutional Coordination
- Multimodal Connectivity
- Freeway and Arterial Operations
- Freight Management

Related to these categories, the tables in the following sections outline the specific transportation needs and operational issues throughout the region.



Traffic Signals

Traffic signals can improve the safety and efficiency of roadway networks for motorists, as well as for transit, cyclists, and pedestrians. However, poor signal timing and/or poor coordination between signalized intersections can negatively impact traffic flow and the effectiveness of the signals.

SPC's Regional Traffic Signal Program has been very successful in reducing vehicle delay and congestion, as well as improving travel times along the region's road network. The program provides technical assistance to municipalities as well as potential funding to assist in upgrading signal systems throughout the region. Now entering its fourth cycle of funding, the incredible value of traffic signal improvements can be seen in the 71:1 benefit/cost ratio produced in the first two program cycles.











Retiming Benefits		First Year Operations Benefits	First Year Safety Benefits	Total First Year Benefits
	897,635 vehicles travel these corridors on an average day	First Year Operations Benefit: \$176,453,451 Benefit Cost Ratio: 64:1	 The safety benefits to pedestrians included bringing over 300 intersections up to current standards by increasing the pedestrian intervals and installing 472 countdown pedestrian signals. This can help reduce in-vehicle pedestrian related crashes by 70% and provide a 111:1 benefit to cost for pedestrians. 28 Emergency Vehicle Preemption systems were also installed with this program, which helped reduce emergency response times by 14% to 23%.	Total First Year Benefit (Operations & Safety): \$195,519,248 Benefit Cost Ratio: 71:1
	7,340,754 reduced vehicle hours of travel			
	10,122,657 gallons reduced fuel consumption			
	523,239 kg reduced total CO pollutant emissions			
	99,455 kg reduced total NO pollutant emissions			
	118,684 kg reduced total VOC pollutant emissions			
	\$140,747 LED upgrade savings (energy & maintenance)			
	259,382,043 reduced number of stops			
	\$2,747,503 total life cycle project cost			

Figure 14: SPC Regional Traffic Signal Program Benefits

Another important funding mechanism for traffic signal improvements is PennDOT’s Green Light-Go. This is a municipal signal partnership program that provides state funds for the operation and maintenance of traffic signals along designated critical corridors on state highways.

Traffic signal funding is also provided by the Automated Red Light Enforcement (ARLE) program, established by Pennsylvania state legislature in 2002. Camera technology is used to monitor and automatically enforce red light running at signalized intersections. The net revenue of this program is then utilized for a state-administered competitive grant program focused on safety improvements, particularly at signalized intersections.

Through these funding sources and others, a number of traffic signal improvements can be implemented that provide improvements to traffic flow without roadway widening or other costly improvements.

- Optimization and coordination of signal timing
- Integrating signal systems across adjacent jurisdictions to improve arterial progression
- Adaptive traffic signal control to smoothly adjust timings to account for actual traffic volumes where volumes are less predictable
- Traffic responsive operations for corridors where traffic volumes fall into typical patterns, but the volumes vary daily

- Emergency vehicle preemption to halt general traffic movements so that emergency vehicles may pass through
- Removal of unwarranted traffic signals
- Monitoring traffic signals using automated traffic signal performance measures developed from high resolution data logs
- Transit Signal Priority (TSP), which provides special treatment to transit vehicles at signalized intersections
- Upgrading ADA ramps and pedestrian and bicycle signals which enhances safety

Traffic signals in Pennsylvania are currently owned by each individual municipality. This can create issues when operations and maintenance of signals varies along the same corridor that might run through a number of different municipalities. To combat this problem, PennDOT is currently planning to pilot state ownership of a small number of corridors where they could unify signal systems and provide consistent operations and maintenance.

Some of the corridors identified as needing signal improvements or other initiatives are shown in **Table 12**.

Table 12: Traffic Signal Improvement Needs

PennDOT District	Arterial	Location	Improvements Needed
10	US 22	East of Blairsville	Dilemma Zone Detection, LED “RED” Signal Ahead signs
10	SR 356	City of Butler	Equipment upgrade, command/control integration
10	SR 8	Center Township	Coordination, equipment upgrade
11	SR -8, SR 130, SR 380	East End, Pittsburgh	Command/control integration, performance metrics. Potential DOT ownership pilot for SR 8
11	SR 51	West End Bridge to Large, PA	Potential DOT ownership pilot
11	McKnight Road	US 19 (McCandless) to I-279	Potential DOT ownership pilot, Transit Signal Priority, Command/control integration
12	SR 18	US 22 WB Ramp, Burgettstown	Controller upgrades, performance metrics
12	US 30	Near Greensburg	Equipment upgrade, performance metrics
12	I-79 Parallel Corridors	North of Washington	Command/control integration, update vehicle detection and signal equipment

Traffic Incident Management

The ability to detect, verify, and respond to incidents throughout the regional transportation system is vital to maintain operations and minimize the impact of incidents. The central objective of traffic incident management is to improve the safety of emergency responders, crash victims, and other motorists. Additionally, good Traffic Incident Management reduces the duration and impacts of traffic incidents. Improved management of incidents can improve safety as well as mobility.

TIM Teams

Traffic Incident Management (TIM) is a multi-agency, coordinated effort to minimize the impact of traffic incidents so that traffic flow can be restored as safely and quickly as possible. TIM requires

planning and coordination between multiple entities, including local transportation departments, law enforcement, fire departments, emergency medical services, towing and recovery companies, and hazardous materials clean-up contractors. Each entity has its own diverse priorities and cultures that need to be addressed through a unified set of TIM strategies to better



interagency coordination and training. A successful TIM Team can lead to reduced incident response cost, decreased travel delay, and improved safety through faster, better organized incident clearance.

The SPC region currently has two active TIM teams; a Cranberry team and a Tunnels team. The Cranberry team focuses on I-79, I-76, SR 228, and US 19 in the vicinity of Cranberry Township. The Tunnels team covers the Squirrel Hill, Fort Pitt, and Liberty Tunnels, as well as the key bridges and major roadways in the urban core of Pittsburgh, including I-279, I-376, and I-579. Based on stakeholder discussions, there is a current need to expand the existing Tunnels team to also cover SR 28 in the Pittsburgh area.

Freeway Service Patrols

Freeway Service Patrols (FSP) involve roving tow trucks systematically patrolling freeways and providing free assistance to motorists. FSP can provide basic services such as towing, jump starts, furnishing fuel, and flat tire repair for disabled vehicles. FSP assistance can clear minor incidents from travel lanes to quickly reopen the roadway and minimize congestion and risk of secondary crashes. For major incidents, FSP can deploy temporary traffic control devices to divert traffic around incidents and increase safety at the scene prior to arrival of emergency services.

Currently, freeway service patrols are active during AM and PM peak hours in the Pittsburgh area on I-79, I-279, and I-376. The PTC also has their own FSP program, sponsored by State Farm insurance, covering the Turnpike roadways in the region. Additional need for FSP was identified on SR 28 in Allegheny County.

Safety Systems

While TIM Teams and Freeway Service Patrols are vital aids in improving response to traffic incidents, there are also a number of TSMO solutions that can reduce the occurrence of incidents in the first place. Some examples that could be beneficial in the SPC region include Bridge De-Icing, Dynamic Curve Warning, and Queue Warning systems.

Bridge De-Icing utilizes technology to prevent snow and ice accumulation on bridge decks during winter storms. PennDOT has utilized the Fixed Anti-Icing Spray Technology (FAST) system at various locations in the state. This system consists of a series of spray disks that deliver a freeze point depressant agent, in a pre-prescribed amount, determined by the roadway surface condition. Nearby Road Weather Information System (RWIS) locations are typically utilized to determine the current roadway surface

temperature and condition. RTMC personnel are notified when the system is activated. The latest bridge de-icing technology utilizes heating elements incorporated into the deck surface instead of the sprayer system. Electric resistance cables or pipes with heated liquid can be buried within the pavement to warm the bridge and reduce snow and ice accumulation. If possible, this type of technology could be incorporated when a bridge deck is already planned for reconstruction. Three bridges, which have a history of winter-related crashes, were identified as potential candidates for such a system:

- SR 28 over Buffalo Creek, Butler and Armstrong Counties (PennDOT District 10-0)
- US 422 over Allegheny River, Armstrong County (PennDOT District 10-0)
- US 22 over Conemaugh River, Indiana County (PennDOT District 10-0)

Dynamic Curve Warning systems provide feedback to vehicles approaching a horizontal curve at unsafe speeds. Vehicle speeds are detected upstream of the curve by radar or other ITS devices and trigger a controller that activates electronic sign elements and/or DMS to warn the speeding driver to slow down prior to the curve.

In most cases, Dynamic Curve Warning should be installed only after other, more low-cost, improvements have been installed and have not achieved the desired reduction in crashes. Low-cost improvements would include signage, delineation treatments, high friction surface treatments, and other similar solutions.

Currently a Dynamic Curve Warning system is planned for the S-bends on I-79 near Coraopolis. Other Dynamic Curve Warning needs were identified by evaluating curved road crash clusters within PennDOT One Map. These clusters were tiered and the highest ranking curved road crash locations were evaluated to determine if an ITS solution was warranted or if low-cost improvements should be attempted first. The following locations were found to be good candidates for Dynamic Curve Warning:

- I-79, near MM 91, Butler County (PennDOT District 10-0)
- US 30, east of Latrobe, Westmoreland County (PennDOT District 12-0)

Queue Warning systems alert drivers to downstream slow-moving traffic, especially in cases where the congestion would be unexpected. Queue warnings are typically delivered to motorists through Dynamic Message Signs (DMS), though some advanced ITS applications involve in-vehicle notification. While these systems can reduce crashes caused by congestion, they are also quite effective in reducing secondary crashes from occurring in the backups caused by an initial incident. A few potential areas of need for such a system were identified, including the following:

- I-376 Eastbound, Campbells Run Road to Carnegie, Allegheny County (PennDOT District 11-0)
- US 30 at US 119 Ramps, Westmoreland County (PennDOT District 12-0)

Traveler Information

Traveler information is vital to improving the efficiency of the transportation system. When drivers are notified of real-time operating conditions, they can make informed decisions. This leads to a better distribution of traffic across the roadway system and maximizes efficiency. Timely information can also keep queues from continuing to build when closures occur due to crashes or weather conditions, increasing safety for all road users.



The focal point of traffic operations and traveler information dissemination for the SPC region is the Western Regional Traffic Management Center (WRTMC) at the PennDOT District 11-0 offices in Bridgeville. Through the WRTMC, travelers can be informed of roadway conditions, incidents and crashes, construction and maintenance activities, and weather conditions. WRTMC operators utilize DMS and HAR to disseminate this traveler information. In addition, the information is also distributed via the 511 Pennsylvania Traveler Information System (511PA) website and smart phone application.

In recent years, the distribution of traveler information from third party developers has greatly increased. Now many drivers use apps such as Waze as part of their daily commuting habits. Despite this development, ITS devices still provide an easy and widely used source of traveler information.

ITS Device Gaps

Throughout Pittsburgh and Allegheny County, an extensive array of traveler information devices has already been installed and a network of CCTV cameras provides the WRTMC with reliable situational awareness. Deployment of ITS devices in the rest of the SPC region are much less frequent. While Allegheny County is the most populous county in the region, other important population centers exist throughout the rest of the region, and major interstates run through these areas. Because of this, filling ITS device gaps has been identified as a key component of the Traveler Information needs for this ROP. These gaps are sometimes aligned with particular problem areas identified in the review of congestion and safety data but other gaps were identified based on location of other devices and the need to fill in missing links in the ITS system, as coordinated through the stakeholder process. High-definition (HD) CCTV cameras are recommended, as are full-color DMS. **Table 13** shows some of the key ITS gaps identified.

Table 13: ITS Device Gaps

PennDOT District	Location	ITS Devices Needed
10-0	Kittanning Bypass (US 422), SR 28 at Hogback Hill	RWIS
10-0	US 422	CCTV, Arterial DMS
10-0	US 22, east of Blairsville	CCTV, Arterial DMS
10-0	SR 28 at SR 356 interchange	CCTV, DMS
11-0	I-376, Beaver and Lawrence Counties	CCTV, DMS
11-0	SR 8, Allegheny County	CCTV, Arterial DMS
11-0	US 22-Business, Monroeville	CCTV, Arterial DMS
12-0	I-70/US 40, east of Washington	CCTV, DMS
12-0	US 30, near Somerset County line	RWIS
12-0	US 40, near scenic overlook east of Uniontown	RWIS

In addition to the identified gaps, other identified traveler information needs include:

- **Western RTMC Upgrade:** The WRTMC in Bridgeville has now been in operation for over 20 years. With the expanding amount of ITS devices it controls and the increase in new technology available, the WRTMC should be upgraded or replaced to be able to successfully continue to manage traffic in Western Pennsylvania.

- Regional ITS Strategic Planning: while the table above lists some of the most important existing gaps in ITS devices, a robust region-wide gap study would be helpful to determine any remaining gaps and to prioritize a hierarchy for deploying devices in these gaps.
- Fiber Ring Deployment: Existing fiber is located on I-79 in the Cranberry area. A proposed fiber ring could be deployed to tie into this fiber via SR 228, SR 8, and US 422, helping to expand ITS and other technology in this growing area.

Operational Teamwork/Institutional Coordination

SPC values its partnerships with a broad range of transportation stakeholders and hosts meetings, workshops, training, and events throughout the year to encourage collaboration and information sharing amongst these partners. TIM Teams, as mentioned above, are a great example of the type of interdisciplinary collaboration led by SPC. Other examples of this type of teamwork and coordination can be found in SPC's Transportation Operations and Safety Forum (TOSF) and the Regional ITS Architecture update process.

The Transportation Operations and Safety Forum provides a central regional forum for coordinating operations and safety-related planning. This group meets multiple times a year to discuss various operations and safety issues and to listen to presentations on related topics. The TOSF is the driving force between the continued advancement and implementation of the ROP, as well as the Regional Safety Plan.

The Regional ITS Architecture was last updated in 2016 and provides a roadmap for transportation systems integration throughout the SPC region. It is developed from a highly cooperative effort between transportation agencies representing all of the region's transportation modes. The overarching framework developed through this process provides a glimpse at the various ITS-related relationships that span the region and all of the stakeholder agencies. The latest ITS Architecture can be found online here:

<https://local.iteris.com/spc/index.htm>

SPC should continue to maintain these various collaborative relationships and documents as they provide a multitude of positive impacts on transportation operations and safety in the region.

Through the stakeholder process, a number of potential study needs and potential initiatives were identified that would improve operational teamwork and institutional coordination in the region.

- IUP – Kovalchick Traffic Management: need to improve ingress/egress to events at Indiana University of Pennsylvania convention and athletic complex
- Key Bank Pavilion Traffic Management: need to improve ingress/egress to events
- Operations Center/Traffic Management Center Coordination: need to improve coordination and collaboration traffic management centers/operations centers, particularly between PennDOT and PA Turnpike, for incident management, construction detours, communications, device sharing, traveler information, and weather operations
- Person Trips Prioritization: determine feasibility of a Roadway Tiering-like system that would evaluate roadways on total person trips (including transit, cycling, etc.) instead of AADT

Multimodal Connectivity

The core philosophy of TSMO is to maximize the existing roadway capacity available to improve operations. With that in mind, enhancing non-single occupant vehicle mode choices can provide significant improvements. In addition to improving congestion, multimodal investment can also decrease fuel consumption, minimize the impacts of emissions thereby improving air quality, and provide economic development through an equitable transportation network.

In order for modes of transportation to be successful, connectivity between each mode should be safe, efficient, and convenient. SPC plans, programs, and supports transportation alternatives that include walking, bicycling, rail, bus transit, carpooling, vanpooling, and other options.

Since the release of the last ROP, on-demand transportation options have grown. This new growth in shared mobility includes Pittsburgh's bike share network, Healthy Ride, which has a growing network of bike stations throughout the city. Transportation Network Companies (TNCs) such as Uber and Lyft provide ride-hailing services, which can replace personal vehicle trips but can also have detrimental effects on transit ridership and congestion. Other shared mobility options have become popular in cities throughout the country and could come to the region in the future, including dockless networks of shared bikes and scooters.

A large variety of multimodal needs were identified in the stakeholder process, including:

- Bike trail maintenance
- Filling gaps between existing trails, bike lanes, and sidewalks
- Bike Share expansion
- Transit Signal Priority on key bus corridors
- Transit Lanes/Bus Rapid Transit (BRT)
- Smart Parking Systems
- Potential expansion of transit services (light rail, commuter bus and rail)

Bike Network Needs

Despite the challenging terrain in the Pittsburgh area, a growing bike network has been enthusiastically utilized by residents and visitors. Bike trails line much of the land adjacent to rivers and extend out from the city to the rest of the region, however, this network remains fragmented and is still very much a work in progress. An increasing number of bike lanes and protected bike lanes have also been installed in Downtown Pittsburgh, Oakland and other nearby neighborhoods. While this bike network is impressive, critical gaps still exist that would better connect the existing facilities. With a better connected, more complete network, many more people could potentially choose cycling as a transportation option in their daily commutes and recreational trips. Notable bike network gaps identified include:

- Birmingham Bridge (improve safety of existing bike lanes)
- Brady Street (Uptown/Oakland) to the Heritage Trail
- Butler Street, Lawrenceville to Highland Park
- W. Carson Street, Ft. Pitt Bridge to West End Bridge
- "The Chute" (Oakland/Greenfield) to the Eliza Furnace Trail
- Penn Avenue, Lawrenceville to East Liberty
- Surface streets near I-279/I-579 on Pittsburgh's North Side

The City of Pittsburgh is also planning to release a citywide bike plan in early 2020 that will include approximately 120 miles of proposed bike infrastructure, bring 50% of the city within walking distance of a bicycle facility, and propose facilities that would be designed for potential cyclists of all ages and abilities.

Another notable plan, the *Allegheny Riverfront Green Boulevard Strategic Plan*, was released by the Urban Redevelopment Authority in 2013. It lays out a vision of a strong bike (and transit) network that would connect Downtown Pittsburgh to Highland Park via the Strip District and Lawrenceville.

More generally speaking, future roadway projects in the region should consider and implement where possible Complete Street design standards. This policy and design approach requires streets to be planned, designed, and maintained to enable safe, convenient, and comfortable travel and access for users of all ages and abilities, regardless of mode of transportation. This allows for safe travel by cyclists, as well as those walking, driving automobiles, riding transit, or delivering goods. A well-designed Complete Street network has the capability to improve equity, access to jobs, economic development, and the environment, while also reducing congestion by discouraging less efficient modes of travel.

Another bike-related need is for expansion of Healthy Ride, Pittsburgh's Bike Share program. Due to the challenging terrain, certain neighborhoods have not been included in their existing rollout. A potential use of pedal assist electric bicycles (e-bikes) could allow expansion throughout more of the city, as well as welcoming more users who would be more inclined to try the service. These bikes have an integrated electric motor that provides pedal assist to the cyclist. This change would provide the city with an equitable, shared bike network and provide potentially impactful mode change.



E-bikes have proven to be a transformational component for cities addressing safety concerns from traffic violence, with increased use of e-bikes helping to address congestion, air quality, parking, and mode shift challenges. Early indicators from Los Angeles, Sacramento, Chicago, and Minneapolis show that cities and regions will be most successful if they implement public, electric-vehicle charging infrastructure to accommodate e-bikes and integrate that public hardware with existing transit offerings.

Other cycling-related needs discussed by the stakeholder group include:

- Park-n-Bike Campaign/Expansion: While the terrain in much of the Pittsburgh area can be challenging to cyclists, the areas along the rivers provide a generally flat and expansive trail system. Therefore, a number of commuters choose to drive to these trails and bike in to Downtown from there, providing some relief to the congested road network in the City. This “Park-n-Bike” approach to commuting should be formalized and promoted, with possible designated areas in Millvale, Manchester, Greenfield, and Homestead.
- Wabash Tunnel Alternate Uses: The Wabash Tunnel is an underutilized tunnel connecting the South Hills and SR 51 to the Station Square area and the South Side neighborhood of Pittsburgh. Alternate multimodal uses of the tunnel should be studied. Currently, Mount Washington is a natural barrier that restricts any reasonable bike routes connecting the South Hills area to Downtown, so this could provide a possible bike connection between these areas.
- West End/South Hills Potential Trail Network Study: Rights-of-way in the West End and South Hills are narrow and there are often only one or two streets that provide connectivity in the neighborhood, supporting all modes. To improve multimodal access in these neighborhoods, a study should be conducted to assess potential assets such as unused rail rights-of-way, bridges, tunnels, and existing or potential greenways.

Improving walking and cycling connections to T and Busway stations, as well as providing safe, secure bike parking facilities at stations, was another need discussed in the stakeholder process. This need will be looked into further as part of PAAC’s 2019 First and Last Mile Program Plan. This plan outlines a process for how the agency pursues and advocates for first and last mile (FLM) improvements. Focused on collaboration, best practices, and data-driven decision making, the First and Last Mile Program Plan includes a solutions toolbox and a thorough evaluation of the fixed-guideway stations in the system. The station evaluation identifies the strengths and weaknesses of multimodal connections to stations in order to prioritize fixed-guideway station areas for FLM improvements.

Transit Needs

PAAC owns and operates a light rail system connecting the South Hills to Downtown and the North Shore, as well as a strong bus network that makes great use of its busway system (East, West, and South) and PennDOT’s HOV Lane (North) to provide quick and dependable service to large swaths of the county on dedicated rights-of-way. In areas of the City of Pittsburgh, particularly Downtown, where the buses must share the road with passenger vehicle traffic, this reliability worsens due to intense congestion.

Due to this, a number of major corridors were identified to enhance the speed and reliability of bus service. This can be achieved through a variety of infrastructure improvements, including, but not limited to: dedicated transit lanes, queue jumps, transit signal priority (TSP), stop bumpouts, and real-time information systems for users (such as real-time parking capacity signage at highway exits for park-n-ride facilities).

TSP can either extend green time or shorten red time upon receiving a priority request signal from transit vehicles, allowing them to move more efficiently along corridors and provide faster, more reliable service. The first use of TSP in the SPC region is now planned for SR 51.

PAAC compiled an analysis of ridership and speed data that was used to identify other high priority corridors for transit infrastructure improvements, as seen in **Table 14**. Speed data was analyzed for the month of November 2018. Indexed speed was determined by proportionally analyzing each route as compared to the slowest studied corridor.

Table 14: TSP Corridor Prioritization

Corridor	Max Weekday Load (one direction)	PM Peak Outbound Slowest Segment Speed (mph)	Indexed Speed (reversed)	Ridership *Indexed Speed = Score
West Carson Street (SR 837)	6,600	8.20	3.00	19,800
Penn Ave	4,000	6.90	3.57	14,261
Centre Ave	4,400	7.80	3.15	13,877
Liberty Ave	5,200	13.50	1.82	9,476
Kennywood Blvd/8 th Ave (SR 837), Browns Hill Rd	2,300	10.80	2.28	5,239
East Carson Street (SR 837)	3,000	14.60	1.68	5,055
Second Ave (SR 885)	1,800	11.10	2.22	3,989
McKnight Road (SR 4003)	1,200	11.30	2.18	2,612

Commuter rail service and extension of the existing light rail system were identified as needs in the ROP stakeholder process. These possibilities will be looked at in more detail as part of the long range transit planning effort that PAAC proposes to initiate in Fiscal Year 2020. SPC has recently assisted a number of transit agencies with Transit Development Plans, including Mid Mon Valley Transit Authority, Butler Transit, Westmoreland County Transit Authority, and Freedom Transit. These plans discuss other transit-related needs for the respective agencies, providing recommendations for additional service opportunities and other improvements to efficiency and operations.



Other transit-related needs identified in the stakeholder process include:

- **Potential Transit Lane Study:** Dedicated bus lanes have been a very successful aspect of PAAC’s service. A study should be completed to identify other potential corridors (in addition to those listed in **Table 14**) where travel lanes could be converted for transit use or, where removing general travel lanes is prohibitive, queue jumps could be added to increase transit reliability and speed.
- **Parkway West Transit Lane:** In addition to the corridors listed in **Table 14**, potential bus-on-shoulder running should be examined west of Carnegie on the Parkway West. Currently the 28X

(Airport Flyer) bus route can utilize the West Busway for much of its route but must run with traffic along a congested portion of the Parkway West between Carnegie and the Airport. This slows bus speeds and reduces reliability for travel to and from the airport. A dedicated bus lane would greatly improve reliability and has the possibility to improve ridership and promote positive mode change, thereby reducing congestion as well.

Freeway and Arterial Operations

Freeways and arterials act as the backbone of the roadway network, transporting the majority of people and goods within and through the region. Reducing congestion and improving traffic flow along these routes is essential to facilitate the region's economic development. A number of TSMO-related strategies are available to improve operations on these important roadways, maximizing throughput and improving the flow of traffic.

Integrated Corridor Management

Integrated Corridor Management (ICM) is a strategy to improve the movement of people and goods through institutional collaboration and integration of existing infrastructure along major corridors. Transportation corridors often contain underutilized capacity such as parallel roadways, unoccupied seats in vehicles, and parallel transit services, which could be leveraged to maximize person throughput and reduce congestion.

Currently, an ICM pilot project is underway on the Schuylkill Expressway portion of I-76 that runs from Montgomery County into the City of Philadelphia. This capacity-limited Interstate section is an excellent testbed for a number of ICM strategies. A system of variable speed limit signs and a queue detection and warning system are now under construction. Other expected improvements include dynamic junction control, flex lanes, and ramp metering on I-76. PennDOT is also planning to take ownership of traffic signals along parallel corridors in order to manage signal timings and improve flow when traffic diverts from the Interstate. Meanwhile, other planned pursuits include increasing frequency of transit on parallel Regional Rail routes and making improvements to the Schuylkill River Trail to encourage cycling.

These types of ICM improvements are ideal for the congested corridors in and around the Pittsburgh area, in particular the Parkway East and West (I-376). This portion of Interstate is heavily congested but wide-scale widening is not practical due to the restraints of the Fort Pitt and Squirrel Hill tunnels, in addition to other geometric limitations. Fortunately, a large number of ITS devices are already in use and can be further enhanced. Some of the traffic signal systems on parallel corridors have already been improved and other improvements are planned. Most importantly, PAAC has strong bus service that can utilize the East and West Busways to provide efficient and reliable connections between Downtown Pittsburgh, Oakland, and suburban areas. Along the Parkway East, the Three Rivers Heritage and Eliza Furnace Trails provide a bike network that generally parallels the interstate from Greenfield into Downtown Pittsburgh.

Specific regional corridors that could benefit from ICM strategies are as follows:

- SR 28, Allegheny County (PennDOT District 11-0)
- Parkway North (I-279)/US 19/McKnight Road (PennDOT District 11-0)
- Parkway West/East (I-376) (PennDOT District 11-0)
- I-79/US 19, north of Washington (PennDOT District 12-0)

Freight Management

The economic vitality of Southwestern Pennsylvania depends on the safe and efficient movement of people, goods, and materials, into, through, and out of the region. The major Interstates and other aspects of the roadway network are important components of the regional freight network. The other network components include the airports, rail lines, and waterways. SPC released a Southwestern Pennsylvania Regional Freight Plan in 2016 that included the following strategic freight investigations:

- Define, assess, and develop a more comprehensive understanding of today’s multimodal freight transportation systems
- Identify future freight movement needs and opportunities through a horizon year of 2040
- Craft a strategic freight action plan that will assist in efforts to advance the coordinated use of the region’s overall transportation resources
- Build upon findings from Pennsylvania’s latest statewide LRTP, *PA On Track*, and the corresponding statewide *Comprehensive Freight Movement Plan*
- Consider federal freight planning revisions as defined by the *Fixing America’s Surface Transportation Act* (FAST Act)

Estimated freight mode shares for the SPC region are shown in **Figure 15**¹ for both existing 2011 and projected 2040.

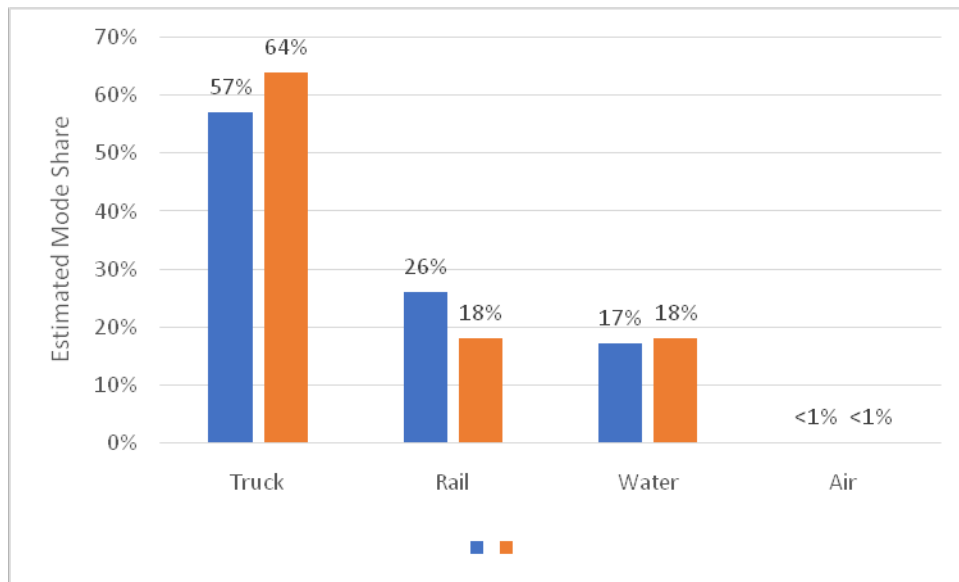


Figure 15: SPC Region Estimated Mode Shares

With the growth of truck-based freight movement, two areas of concern were identified in terms of operations planning: truck parking and winter truck restrictions.

The increasing truck traffic, combined with more stringent hours of service regulations on drivers, have resulted in a noticeable increase in illegal truck parking. Truck drivers at the end of their allowable daily hours find parking areas full and are forced to park on shoulders of ramps and other dangerous locations

¹ Southwestern Pennsylvania Commission. (2016, December 16). *Southwestern Pennsylvania Regional Freight Plan*. Retrieved January 8, 2019, from <https://spcregion.org/pdf/freight16/SWPA%20RgFP%20-%202016%20FINAL%20PLAN.pdf>

overnight. The Pennsylvania Turnpike Commission is currently planning to deploy a truck parking management system, initially in the central and eastern portions of the state, to detect available parking spaces and distribute that information to drivers so they can make smarter, safer parking decisions. A study of truck parking is needed to evaluate needs in the western portion of the state as well, both to analyze use of a similar truck parking system, as well as to evaluate where additional parking capacity is needed and can possibly be provided.







Another recent freight issue is the more proactive truck restrictions that have been instituted on Interstates throughout the state, as previously mentioned in the **Traveler Information and Situational Awareness** section. The impacts these restrictions have on parallel arterials as truck traffic shifts off of the Interstates should be analyzed to determine the best and safest course of action. A region-wide study of this issue would be beneficial so that policy revisions can be instituted for subsequent winter seasons.

Chapter 5: Strategies and Projects

ROP Projects

Based on the Transportation Issues and Operational Needs identified in the previous chapter, a set of projects were developed for inclusion in this Regional Operations Plan. Once the types of congestion were identified and classified for each area, the most appropriate TSMO tools and strategies were determined, thereby developing projects. PennDOT's TSMO Guidebook includes the following table, which provides a matrix for matching tools and strategies with the varying types of congestion.

Table 15: TSMO Solution Applicability

TSMO Solution	Causes of Congestion					
	Recurring Congestion		Unplanned Events		Planned Events	
	Bottlenecks 	Poor Signal Timing 	Traffic Incidents 	Inclement Weather 	Work Zones 	Special Events 
Bridge De-icing				X		
Closed Circuit TV Cameras (CCTV)	X		X	X	X	X
Dynamic Curve Warning			X	X		
Dynamic Message Signs (DMS)	X		X	X	X	X
Dynamic Rerouting	X		X		X	X
Flex Lanes	X		X		X	X
Freeway Service Patrols			X		X	X
Integrated Corridor Management	X	X	X	X	X	X
Junction Control	X		X		X	X
Managed Lanes	X					
Queue Warning	X		X		X	X
Ramp Metering	X		X			X
Road Weather Info. Systems (RWIS)				X		
Smart Corridor Initiatives	X	X	X	X	X	X
TIM Teams			X			X
Traffic Incident Detection			X			
Traffic Management Center	X	X	X	X	X	X
Traffic Signal Enhancements		X				
Transit Signal Priority		X				
Traveler Information	X		X	X	X	X
Variable Speed Displays	X		X	X	X	

A number of the strategies in the above table were included as part of the projects in this ROP, including:

- Bridge De-Icing
- Closed Circuit TV Cameras (CCTV)
- Dynamic Message Signs (DMS)

- Freeway Service Patrols
- Integrated Corridor Management
- Junction Control
- Queue Warning
- Road Weather Info. Systems (RWIS)
- TIM Teams
- Traffic Management Center
- Traffic Signal Enhancements
- Transit Signal Priority
- Traveler Information
- Variable Speed Displays

In addition to the strategies outlined above, other multimodal tools and strategies were also identified and included in ROP projects, including the following:

- Integrating transit information into Integrated Corridor Management projects
- Dedicated transit lanes, queue jumps, curb bumpouts and other physical improvements to prioritize transit movement
- Park-n-Ride planning, coordination, and expansion
- Expansion of bike lanes, trails, and other bike infrastructure
- Support of Bike Share programs
- Truck Parking Management Systems

In total, 44 projects were identified for inclusion in this document, spanning the entire SPC region. With such a diverse set of needs areas and project types, prioritization by a simple metric would be difficult. Therefore, in addition to the operational and safety data utilized to develop and evaluate projects, stakeholder input was utilized to help determine the highest priority projects. In the final stakeholder meetings, the stakeholder group was given a set number of sticker dots to apply to the projects they deemed to have the highest priority, marking them on a set of maps. This voting process, along with the open discussions during these breakout sessions, were used to classify each project as either high or medium priority. Projects were also classified by short-term or long-term, depending on the types of tools and strategies involved and the varying complexity and relative cost of the project.

Table 16 summarizes the high priority projects while **Table 17** summarizes the other identified projects. Where multiple stakeholders are listed, the bolded name is determined to be the primary stakeholder. For further detail on each project, please refer to **Chapter 6**. Maps of the projects are also provided in **Chapter 6** for each PennDOT District. For PennDOT District 11-0, three maps are included: Beaver/Lawrence Counties, Allegheny County, and a map focused on the City of Pittsburgh.

Table 16: High Priority Projects

Project #	Project	Priority Area	Stakeholders*	Planned Improvements
TS.01	Greensburg Operations Improvements	Traffic Signals	PennDOT 12-0	Traffic Signal Improvements, Queue Detection
TIM.01	Armstrong County Bridge De-Icing	Traffic Incident Management	PennDOT 11-0	Bridge De-Icing, RWIS, CCTV
TIM.02	SR 28 Freeway Service Patrol	Traffic Incident Management	PennDOT 11-0	Freeway Service Patrols
TIM.03	SR 28 TIM Team	Traffic Incident Management	SPC , PennDOT 11-0, Local Municipalities, Emergency Personnel	TIM Team
TI.01	Hogback Hill RWIS	Traveler Information	PennDOT 10-0	RWIS
TI.02	US 22 Corridor ITS/Signal Improvements	Traveler Information	PennDOT 10-0	CCTV, DMS, Traffic Signal Improvements
TI.03	US 422 Corridor ITS	Traveler Information	PennDOT 10-0	CCTV, Arterial DMS
TI.04	District 12-0 RWIS Expansion	Traveler Information	PennDOT 12-0	RWIS
TI.05	Western RTMC Expansion	Traveler Information	PennDOT 11-0	Traffic Management Center
MC.01	South Hills Village Smart Parking	Multimodal Connectivity	Port Authority of Allegheny County , PennDOT 11-0	Smart Parking System
MC.02	W. Carson St. Multimodal Improvements	Multimodal Connectivity	PennDOT 11-0 , Port Authority of Allegheny County	Transit Improvements and bike connection between South Side and West End
MC.03	Penn Ave. Transit Improvements	Multimodal Connectivity	City of Pittsburgh DOMI , Port Authority of Allegheny County	Transit Improvements, 40 th St. to Fifth Ave.
MC.04	Centre Ave. Transit Improvements	Multimodal Connectivity	City of Pittsburgh DOMI , Port Authority of Allegheny County	Transit Improvements, Washington Pl. to East Liberty Garage
FA.01	Bates St. Interchange Improvements	Freeway and Arterial Operations	PennDOT 11-0	Interchange Improvements
FA.02	I-79 Integrated Corridor Management	Freeway and Arterial Operations	PennDOT 12-0	Traffic Signal Improvements

* Primary stakeholder in **bold**

Table 17: Normal Priority Projects

Project #	Project	Priority Area	Stakeholders*	Planned Improvements
TS.02	SR 356 Traffic Signal Improvements	Traffic Signals	PennDOT 10-0	Traffic Signal Improvements
TS.03	SR 8 Traffic Signal Improvements	Traffic Signals	PennDOT 10-0	Traffic Signal Improvements

Project #	Project	Priority Area	Stakeholders*	Planned Improvements
TS.04	East End Signal Improvements	Traffic Signals	PennDOT 11-0	Traffic Signal Improvements
TS.05	SR 51 DOT Signal Pilot	Traffic Signals	PennDOT 11-0	Traffic Signal Improvements
TIM.04	I-79 Curve Warning	Traffic Incident Management	PennDOT 10-0	Dynamic Curve Warning
TIM.05	US 30 Curve Warning	Traffic Incident Management	PennDOT 12-0	Dynamic Curve Warning
TI.06	SR 28 ITS	Traveler Information	PennDOT 10-0	CCTV, DMS
TI.07	US 22 Bridge De-Icing	Traveler Information	PennDOT 10-0	Bridge De-Icing, RWIS, CCTV
TI.08	I-376 Corridor ITS	Traveler Information	PennDOT 11-0	CCTV, DMS
TI.09	SR 8 Arterial ITS	Traveler Information	PennDOT 11-0	CCTV, DMS
TI.10	US 22 (Monroeville) Arterial ITS	Traveler Information	PennDOT 11-0	CCTV, DMS
TI.11	I-70/US 40 Detour ITS	Traveler Information	PennDOT 12-0	CCTV, DMS
TI.12	Butler County Fiber Ring Deployment	Traveler Information	PennDOT 10-0, Cranberry Township	Fiber Deployment
OT.01	Key Bank Pavilion Event Management & Signal Improvements	Operational Teamwork/ Institutional Coordination	PennDOT 12-0, PennDOT 11-0	Traffic Signal Improvements
MC.05	Carnegie Smart Parking	Multimodal Connectivity	Port Authority of Allegheny County, PennDOT 11-0	Smart Parking System, Pedestrian Improvements
MC.06	Wilkinsburg Smart Parking	Multimodal Connectivity	Port Authority of Allegheny County, PennDOT 11-0	Smart Parking System
MC.07	Liberty Ave. Transit Improvements	Multimodal Connectivity	PennDOT 11-0, Port Authority of Allegheny County	Transit Improvements, Downtown to Aspen St.
MC.08	Kennywood Blvd./Browns Hill Rd. Transit Improvements	Multimodal Connectivity	PennDOT 11-0, City of Pittsburgh DOMI, Port Authority of Allegheny County	Transit Improvements, Browns Hill Rd./Hazelwood Ave. to Kennywood Blvd./Library St.
MC.09	E. Carson St. Transit Improvements	Multimodal Connectivity	PennDOT 11-0, Port Authority of Allegheny County	Transit Improvements, 10 th St. to 26 th St.
MC.10	Second Ave. Transit Improvements	Multimodal Connectivity	PennDOT 11-0, Port Authority of Allegheny County	Transit Improvements, Hot Metal St. to Hazelwood Ave.
MC.11	Healthy Ride E-Bike Deployment	Multimodal Connectivity	Pittsburgh Bike Share	E-assist bike sharing deployment
MC.12	"The Chute" to Eliza Furnace Trail Bike Connection	Multimodal Connectivity	City of Pittsburgh DOMI	Improve bike connection

Project #	Project	Priority Area	Stakeholders*	Planned Improvements
MC.13	Brady St. to Heritage Trail Bike Connection	Multimodal Connectivity	City of Pittsburgh DOMI	Improve bike connection
MC.14	Butler St. Bike Connection	Multimodal Connectivity	City of Pittsburgh DOMI	Improve bike connection from Lawrenceville to Highland Park
MC.15	Penn Ave. Bike Connection	Multimodal Connectivity	City of Pittsburgh DOMI	Improve bike connection from Lawrenceville to East Liberty.
MC.16	East Allegheny Ped/Bike Improvements	Multimodal Connectivity	City of Pittsburgh DOMI , PennDOT 11-0	Improve bike/ped connections in the North Side Pittsburgh area near I-279 and I-579
FA.03	Campbells Run Queue Warning	Freeway and Arterial Operations	PennDOT 11-0	Queue Warning System
FA.04	Parkway North ICM	Freeway and Arterial Operations	PennDOT 11-0	Smart Parking System, Traffic Signal Improvements, Transit Signal Priority
FA.05	Veterans Bridge Junction Control	Freeway and Arterial Operations	PennDOT 11-0	Junction Control System

* Primary stakeholder in **bold**

Studies/Initiatives

In addition to the projects outlined above, a number of studies and initiatives were also developed as part of the ROP process. While specific projects could be determined for many of the issues and needs, others need further study to best to determine the correct mitigation to improve operations.

Information on the recommended operations-based studies and initiatives can be found in **Table 18** and **Table 19**.

Table 18: High-Priority Studies and Initiatives

Study	Priority Area	Stakeholders*	Notes
Downtown Pittsburgh Bridge Operations Study	Freeway and Arterial Operations	SPC , PennDOT 11-0, Port Authority of Allegheny County	Study to improve operations in the vicinity of the Downtown river crossings.
Parkway West ICM Study	Freeway and Arterial Operations	PennDOT 11-0	Study conversion of shoulders for flex lane or transit lane use. Identify other ICM needs.

* Primary stakeholder in **bold**

Table 19: Other Recommended Studies and Initiatives

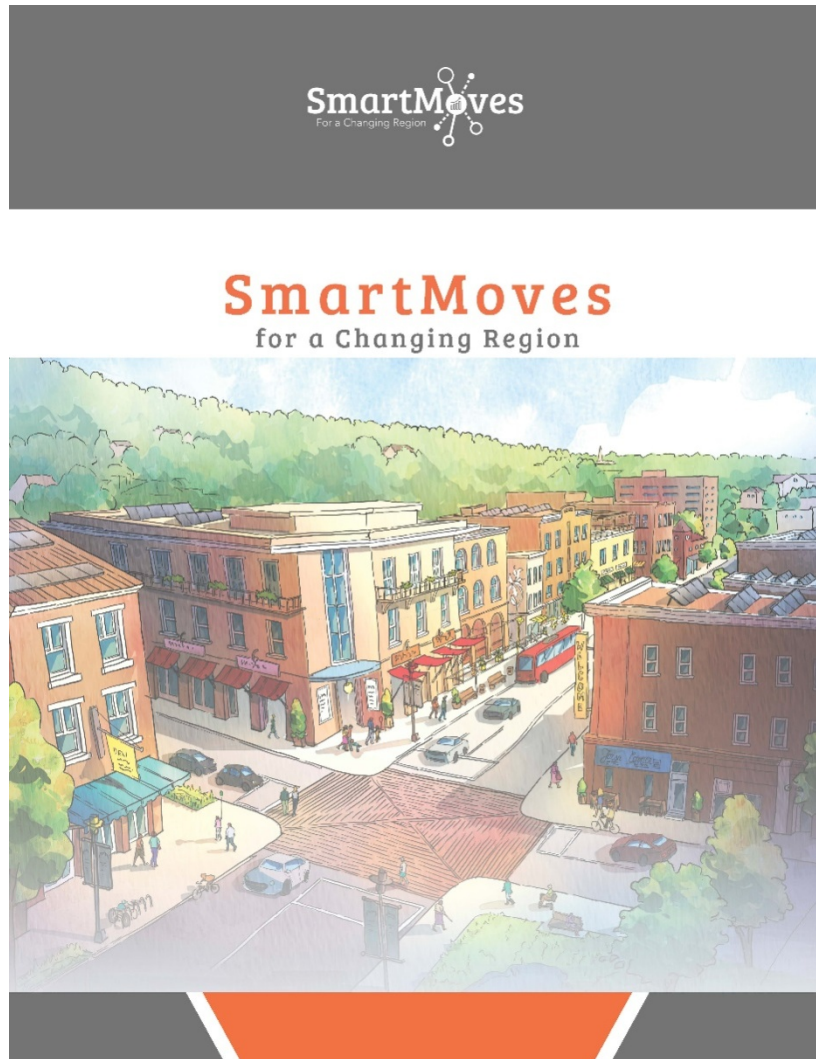
Study	Priority Area	Stakeholders*	Notes
Regional ITS Strategic Plan	Traveler Information	SPC , PennDOT	In addition to ITS device projects identified in this plan, conduct a regionwide study to determine any other remaining ITS coverage gaps and prioritize for future projects.
Indiana University of Pennsylvania (IUP) Special Events Traffic Management Study	Operational Teamwork/ Institutional Coordination	IUP , PennDOT 10-0	Improve ingress/egress to events at Kovalchick Convention and Athletic Complex.
Operations Center/Traffic Management Center Coordination	Operational Teamwork/ Institutional Coordination	SPC , PennDOT, PA Turnpike Commission, Port Authority of Allegheny County, Cranberry Township	Improve coordination between Western RTMC and PA Turnpike Traffic Operations Center, particularly for the I-76/I-376 loop, including incident management, construction detours, communications (fiber), device sharing, traveler information, and weather operations. Port Authority operations center and Cranberry Township TMC should also be included.
Person Trips Prioritization Study	Operational Teamwork/ Institutional Coordination	SPC	Determine feasibility of Roadway Tiering based on total person trips (including transit passengers, cyclists, etc.) instead of AADT.
Key Bank Pavilion Event Management Study	Operational Teamwork/ Institutional Coordination	Key Bank Pavilion , PennDOT 12-0	Improve ingress/egress to events at Key Bank Pavilion.
Birmingham Bridge Complete Street Study	Multimodal Connectivity	PennDOT 11-0	Improve safety of existing bike lanes. Consider protected bike lane infrastructure and possible vehicular lane reduction.
Existing Bike Trail Maintenance Initiative	Multimodal Connectivity	SPC	Initiative to ensure continued maintenance of bike trails throughout region.

Study	Priority Area	Stakeholders*	Notes
Regional Park-n-Ride Expansion Study	Multimodal Connectivity	SPC	Study possibilities for expanding existing sites or providing additional sites (coordinate with upcoming Regional Transit Coordination Study).
Park-n-Bike Campaign/Expansion	Multimodal Connectivity	SPC	Initiative to encourage commuters to transfer to bicycles at established trailheads.
Potential Transit Lane Study	Multimodal Connectivity	SPC , PennDOT District 11-0, City of Pittsburgh DOMI, Port Authority of Allegheny County	Study feasibility of other transit lane candidates not included in this report.
Wabash Tunnel Multimodal Use Study	Multimodal Connectivity	SPC , PennDOT District 11-0, City of Pittsburgh DOMI, Port Authority of Allegheny County	Study of alternate uses for tunnel, including possibility of conversion for bike usage.
West End/South Hills Potential Trail Network Study	Multimodal Connectivity	SPC	Study to determine potential trail network utilizing underused or unused right-of-way.
SR 28 Active Traffic Management Study	Freeway and Arterial Operations	PennDOT 11-0	Study flex lanes and other Active Traffic Management strategies.
Parkway North HOV Conversion Study	Freeway and Arterial Operations	PennDOT 11-0 , Port Authority of Allegheny County	Consider converting existing HOV lanes in the median of the Parkway North (I-279) to a Port Authority Busway or other use.
US 40 Road Safety Audit	Freeway and Arterial Operations	SPC	Road Safety Audit on US 40, east of Uniontown to Somerset County line.
SR 8 Corridor Operations Planning Study	Freeway and Arterial Operations	SPC	Study to improve operations along SR 8 between Wildwood and Bakerstown.
Western RTMC Region Truck Parking Study	Freight Management	SPC , PennDOT Central Office	Determine needs and locations for possible expansion of truck parking. Study possibility of installing Truck Parking Management System. Consider potential public-private partnership opportunities with private truck stop facilities. Coordinate with planned PennDOT Truck Parking Study.
Western RTMC Region Winter Truck Restriction Impact Study	Freight Management	SPC , PennDOT Central Office	Study impact of winter truck restrictions on parallel corridors and determine best practices for future winter operations.

* Primary stakeholder in **bold**

L RTP Projects

In addition to this Regional Operations Plan process, a simultaneous process has been ongoing to provide a new Long Range Transportation Plan for the SPC region. This plan, *SmartMoves for a Changing Region*, connects the Regional Vision to the region's official program of projects, programs, and actions. A large number of projects of varying types will be included in the document. This includes many bridge and paving projects, and it also includes many operations-based projects. **Appendix C** provides a list of these operations-related projects for reference in relation to the projects included in this ROP. For further detail, please refer to [SmartMoves for a Changing Region](#).



Chapter 6: Project Descriptions and Maps

ROP Coordination and Maintenance

The first Regional Operations Plans in Pennsylvania were published in 2007. Since then, SPC has continued to update their ROP every four years. This has led to continuity and continued momentum for introducing and completing operations-based projects in the region. It is intended that this process of updates should be continued every four years. Each update should include the status of any previous ROP projects, in addition to the discussion of current issues and needs, and the resulting additional projects to mitigate those issues and needs.



Connected and autonomous vehicles were generally not accounted for within this report. Despite its ongoing presence in the news and the very real advancements occurring, too much remains unknown with the future of these technologies. As this plan is revisited for future updates, the issue of regional planning for connected and autonomous vehicles should be examined again. Any guidance provided by PennDOT and other stakeholders should be incorporated into future updates of this document.

Another transportation trend not discussed in detail elsewhere in this plan is the rise of micromobility. This includes traditional bike share systems, but also emerging technology such as e-assist bikes, electric scooters, and electric skateboards. Electric scooters in particular have seen a rapid rise in usage in other American cities though they are currently not allowed by law in Pennsylvania. In future ROP updates, these types of mobility options will likely need to be considered as the transportation environment and the laws guiding it evolve.

PennDOT's own ROP documents had not been updated since the initial versions in 2007. Concurrent to SPC's process this year, PennDOT has begun the update process. Previous PennDOT ROP documents were completed for each District but will now be completed based on four regions: Western, Central, Eastern, and Southeastern. Each region is based on the RTMC coverage areas. Therefore, the SPC region will fall under PennDOT's Western RTMC ROP, which is anticipated to be finalized in Fall 2019. Given the overlapping ROP processes, PennDOT's Western RTMC ROP will incorporate the issues, needs, projects, and other information within this report into their own document which will also cover the Northwestern Region of Pennsylvania (PennDOT District 1-0, as well as Clarion and Jefferson Counties). PennDOT's Western RTMC ROP is expected to maintain the priorities outlined in this document as they are translated into the greater Western Region.

ROP Project Descriptions

TS.01: Greensburg Operational Improvements

FOCUS AREA: Traffic Signals

PRIORITY: High

PROJECT DESCRIPTION AND SCOPE: Upgrade signal controllers for US 30 traffic signals in vicinity of Greensburg to allow for Automated Traffic Signal Performance Measures. Also install Queue Detection for US 30 at US 119 ramps.

STAKEHOLDERS: PennDOT 12-0

ESTIMATED SCHEDULE: 1-3 years

Life Cycle: 10-15 years

ESTIMATED COSTS:

\$\$
(\$500k-\$2M)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): Traffic Signal Systems; Queue Detection System; DMS System

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Improved Travel Time Ratio; Reduction in Rear End Crashes; Reduced Bottleneck Delay Surrogate

BENEFITS: Improved traffic flow and reduced congestion along an important signalized corridor within the region. Also provide warning to drivers as they approach a congested interchange.

OTHER CONSIDERATIONS AND ISSUES: N/A

TS.02: PA-356 Traffic Signal Improvements

FOCUS AREA: Traffic Signals

PRIORITY: Normal

PROJECT DESCRIPTION AND SCOPE: Upgrade signal controllers on SR 356 corridor in Butler to allow for command/control functionality and performance measures.

STAKEHOLDERS: PennDOT 10-0

ESTIMATED SCHEDULE: 3+ years

Life Cycle: 10-15 years

ESTIMATED COSTS:

\$\$
(\$500k-\$2M)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): Traffic Signal Systems

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Improved Travel Time Ratio

BENEFITS: Improved traffic flow and reduced congestion along an important signalized corridor within the region.

OTHER CONSIDERATIONS AND ISSUES: N/A

TS.03: PA-8 Traffic Signal Improvements

FOCUS AREA: Traffic Signals

PRIORITY: Normal

PROJECT DESCRIPTION AND SCOPE: Upgrade signal equipment and improve coordination on SR 8 corridor in Center Township, Butler County.

STAKEHOLDERS: PennDOT 10-0

ESTIMATED SCHEDULE: 1-3 years

Life Cycle: 10-15 years

ESTIMATED COSTS:

\$\$
(\$500k-\$2M)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): Traffic Signal Systems

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Improved Travel Time Ratio

BENEFITS: Improved traffic flow and reduced congestion along an important signalized corridor within the region.

OTHER CONSIDERATIONS AND ISSUES: N/A

TS.04: East End Traffic Signal Improvements

FOCUS AREA: Traffic Signals

PRIORITY: Normal

PROJECT DESCRIPTION AND SCOPE: Upgrade signal controllers to allow for command/control functionality and performance measures on SR 8, SR 380, and SR 130 in the East End neighborhoods of Pittsburgh. Also consider bike and pedestrian improvements along these corridors.

STAKEHOLDERS: PennDOT 11-0

ESTIMATED SCHEDULE: 3+ years

Life Cycle: 10-15 years

ESTIMATED COSTS:

\$\$
(\$500k-\$2M)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): Traffic Signal Systems

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Improved Travel Time Ratio

BENEFITS: Improved traffic flow and reduced congestion along a series of important signalized corridors within the region.

OTHER CONSIDERATIONS AND ISSUES: N/A

TS.05: PA-51 DOT Signal Pilot

FOCUS AREA: Traffic Signals

PRIORITY: Normal

PROJECT DESCRIPTION AND SCOPE: Pilot PennDOT ownership of traffic signals along the SR 51 corridor south of Pittsburgh.

STAKEHOLDERS: PennDOT 11-0

ESTIMATED SCHEDULE: 3+ years

Life Cycle: N/A

ESTIMATED COSTS:

\$
(<\$500k)

PROJECT TYPE: Planning

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): Traffic Signal Systems

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Improved Travel Time Ratio

BENEFITS: Increased coordination and improved operations by streamlining ownership of traffic signal systems.

OTHER CONSIDERATIONS AND ISSUES: N/A

TIM.01: Armstrong County Bridge De-Icing

FOCUS AREA: Traffic Incident Management

PRIORITY: High

PROJECT DESCRIPTION AND SCOPE: Install bridge de-icing systems on SR 28 bridge over Buffalo Creek and US 422 bridge over Allegheny River. Install RWIS and CCTV camera at each location to provide weather information and to provide situational awareness.

STAKEHOLDERS: PennDOT 10-0

ESTIMATED SCHEDULE: 1-3 years

Life Cycle: 10-15 years

ESTIMATED COSTS:

\$\$
(\$500k-\$2M)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (*if applicable*): Bridge De-Icing System; RWIS System; CCTV System

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Winter Weather Crashes

BENEFITS: Improving safety and reducing incidents on bridge structures with known winter weather-related crash histories.

OTHER CONSIDERATIONS AND ISSUES: N/A

TIM.02: PA-28 Freeway Service Patrol

FOCUS AREA: Traffic Incident Management

PRIORITY: High

PROJECT DESCRIPTION AND SCOPE: Add SR 28, from Downtown to RIDC, to existing Freeway Service Patrol in Pittsburgh area. Extend hours throughout region.

STAKEHOLDERS: PennDOT 11-0

ESTIMATED SCHEDULE: 1 year

Life Cycle: N/A

ESTIMATED COSTS:

\$
(<\$500k)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Simple

TECHNOLOGY COMPONENTS (if applicable): N/A

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Improved Incident Response Time; Improved Incident Clearance Time; Reduction in Secondary Crashes

BENEFITS: Expanded coverage to improve response and clean up of incidents on SR 28 and throughout the region, improving safety and minimizing chances of secondary crashes.

OTHER CONSIDERATIONS AND ISSUES: Freeway Service Patrol contract is currently up for renewal, so expansion of service could be coordinated with the renewal effort.

TIM.03: PA-28 TIM Team

FOCUS AREA: Traffic Incident Management

PRIORITY: High

PROJECT DESCRIPTION AND SCOPE: Expand existing Tunnel TIM Team to include SR 28 from Downtown to RIDC.

STAKEHOLDERS: SPC; PennDOT 11-0; Local Municipalities; Emergency Personnel

ESTIMATED SCHEDULE: 1 year

ESTIMATED COSTS:

\$
(<\$500k)

Life Cycle: N/A

PROJECT TYPE: Planning

LEVEL OF EFFORT: Simple

TECHNOLOGY COMPONENTS (if applicable): N/A

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Improved Inter-Agency Communications; Improved Incident Response Time; Improved Incident Clearance Time; Reduction in Secondary Crashes

BENEFITS: Improved incident management and coordination, increasing safety for motorists and emergency responders.

OTHER CONSIDERATIONS AND ISSUES: N/A

TIM.04: I-79 Curve Warning

FOCUS AREA: Traffic Incident Management

PRIORITY: Normal

PROJECT DESCRIPTION AND SCOPE: Install Dynamic Curve Warning system on southbound I-79, near MM 91.

STAKEHOLDERS: PennDOT 10-0

ESTIMATED SCHEDULE: 1-3 years

Life Cycle: 10-15 years

ESTIMATED COSTS:

\$
(<\$500k)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): Dynamic Curve Warning System; DMS System

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Curved Road Crash Rate

BENEFITS: Reduce crashes, particularly at high speeds, in the area of this curve along I-79.

OTHER CONSIDERATIONS AND ISSUES: Low-cost improvements were installed approximately one year ago. Recent crash data should be analyzed to ensure problem persists and this project is still needed.

TIM.05: US 30 Curve Warning

FOCUS AREA: Traffic Incident Management

PRIORITY: Normal

PROJECT DESCRIPTION AND SCOPE: Install Dynamic Curve Warning system on eastbound and westbound US 30 between Latrobe and Ligonier.

STAKEHOLDERS: PennDOT 12-0

ESTIMATED SCHEDULE: 1-3 years

Life Cycle: 10-15 years

ESTIMATED COSTS:

\$
(<\$500k)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): Dynamic Curve Warning System; DMS System

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Curved Road Crash Rate

BENEFITS: Reduce crashes, particularly at high speeds, in a section of curves along US 30.

OTHER CONSIDERATIONS AND ISSUES: N/A

TI.01: Hogback Hill RWIS

FOCUS AREA: Traveler Information

PRIORITY: High

PROJECT DESCRIPTION AND SCOPE: Install 1 Road Weather Information System (RWIS) on SR 28 at Hogback Hill.

STAKEHOLDERS: PennDOT 10-0

ESTIMATED SCHEDULE: 1-3 years

Life Cycle: 10-15 years

ESTIMATED COSTS:

\$
(<\$500k)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): RWIS System

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Winter Weather Crashes; Improved Incident Response Time; Improved Travel Time Ratio

BENEFITS: Improve monitoring of weather and roadway conditions, particularly during winter weather. Improve plowing and winter maintenance response.

OTHER CONSIDERATIONS AND ISSUES: SPC operations/safety study planned to begin in Fall 2019 looking at SR 28 from Kittanning to I-80.

TI.02: US 22 Corridor ITS/Signal Improvements

FOCUS AREA: Traveler Information

PRIORITY: High

PROJECT DESCRIPTION AND SCOPE: Install CCTV cameras and DMS along US 22, east of Blairsville. Install safety improvements for signalized intersections, including dilemma zone detection and LED “RED” Signal Ahead signage. Install active Signal Ahead/Check Brakes system for downhill approach to signal.

STAKEHOLDERS: PennDOT 10-0

ESTIMATED SCHEDULE: 1-3 years

Life Cycle: 10-15 years

ESTIMATED COSTS:

\$\$
(\$500k-\$2M)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): CCTV System; DMS System; Traffic Signal System

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Rear End Crashes; Improved Incident Response Time

BENEFITS: Improve incident response, congestion monitoring, and traveler information along US 22 Corridor. Improve safety on signalized intersection approaches.

OTHER CONSIDERATIONS AND ISSUES: N/A

TI.03: US 422 Corridor ITS

FOCUS AREA: Traveler Information

PRIORITY: High

PROJECT DESCRIPTION AND SCOPE: Install CCTV cameras and Arterial DMS along US 422 near Indiana, Kittanning, and Butler, as well as on the major arterial approaches to US 422 in these locations (such as US 119, SR 28, and SR 8).

STAKEHOLDERS: PennDOT 10-0

ESTIMATED SCHEDULE: 1-3 years

Life Cycle: 10-15 years

ESTIMATED COSTS:

\$\$\$
(\$2M-\$10M)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): CCTV System; DMS System

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Travel Time Ratio; Improved Incident Response Time

BENEFITS: Improve incident response, congestion monitoring, and traveler information along US 422 Corridor.

OTHER CONSIDERATIONS AND ISSUES: N/A

TI.04: District 12-0 RWIS Expansion

FOCUS AREA: Traveler Information

PRIORITY: High

PROJECT DESCRIPTION AND SCOPE: Install Road Weather Information System (RWIS) on US 40 near scenic overlook east of Uniontown and on US 30 near the Somerset County line.

STAKEHOLDERS: PennDOT 12-0

ESTIMATED SCHEDULE: 1-3 years

Life Cycle: 10-15 years

ESTIMATED COSTS:

\$
(<\$500k)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): RWIS System

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Winter Weather Crashes; Improved Incident Response Time; Improved Travel Time Ratio

BENEFITS: Improve monitoring of weather and roadway conditions, particularly during winter weather. Improve plowing and winter maintenance response.

OTHER CONSIDERATIONS AND ISSUES: N/A

TI.05: Western RTMC Upgrade

FOCUS AREA: Traveler Information

PRIORITY: High

PROJECT DESCRIPTION AND SCOPE: Upgrade or replace, if necessary, elements of the existing Western RTMC in Bridgeville.

STAKEHOLDERS: PennDOT 11-0, PennDOT Central Office

ESTIMATED SCHEDULE: 3+ years

Life Cycle: 20-25 years

ESTIMATED COSTS:

\$\$\$
(\$2M-\$10M)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Complex

TECHNOLOGY COMPONENTS (if applicable): N/A

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Improved Incident Response Time; Improved Travel Time Ratio

BENEFITS: Provide additional space and updated technology capable of managing the Western Region's growing deployment of ITS devices. Upgrade would include personnel training and capability to monitor and control traffic signal networks.

OTHER CONSIDERATIONS AND ISSUES: N/A

TI.06: PA-28 ITS

FOCUS AREA: Traveler Information

PRIORITY: Normal

PROJECT DESCRIPTION AND SCOPE: Install CCTV camera and Arterial DMS at SR 28/SR 356 interchange.

STAKEHOLDERS: PennDOT 10-0

ESTIMATED SCHEDULE: 1-3 years

Life Cycle: 10-15 years

ESTIMATED COSTS:

\$\$
(\$500k-\$2M)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): CCTV System; DMS System

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Travel Time Ratio; Improved Incident Response Time

BENEFITS: Improve incident response, congestion monitoring, and traveler information along SR 28 Corridor.

OTHER CONSIDERATIONS AND ISSUES: N/A

TI.07: US 22 Bridge De-Icing

FOCUS AREA: Traffic Incident Management

PRIORITY: Normal

PROJECT DESCRIPTION AND SCOPE: Install bridge de-icing system on US 22 bridge over Conemaugh River. Install RWIS and CCTV camera location to provide weather information and to provide situational awareness.

STAKEHOLDERS: PennDOT 10-0

ESTIMATED SCHEDULE: 1-3 years

Life Cycle: 10-15 years

ESTIMATED COSTS:

\$\$
(\$500k-\$2M)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): Bridge De-Icing System; RWIS System; CCTV System

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Winter Weather Crashes

BENEFITS: Improving safety and reducing incidents on bridge structures with known winter weather-related crash histories.

OTHER CONSIDERATIONS AND ISSUES: N/A

TI.08: I-376 Corridor ITS

FOCUS AREA: Traveler Information

PRIORITY: Normal

PROJECT DESCRIPTION AND SCOPE: Install CCTV cameras and DMS along the I-376 Corridor in Beaver and Lawrence Counties, particularly in the vicinity of major interchanges.

STAKEHOLDERS: PennDOT 11-0

ESTIMATED SCHEDULE: 1-3 years

Life Cycle: 10-15 years

ESTIMATED COSTS:

\$\$
(\$500k-\$2M)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): CCTV System; DMS System

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Travel Time Ratio; Improved Incident Response Time

BENEFITS: Improve incident response, congestion monitoring, and traveler information along northern portion of I-376 Corridor.

OTHER CONSIDERATIONS AND ISSUES: N/A

TI.09: PA-8 Arterial ITS

FOCUS AREA: Traveler Information

PRIORITY: Normal

PROJECT DESCRIPTION AND SCOPE: Install CCTV cameras and Arterial DMS along SR 8 corridor in Allegheny County.

STAKEHOLDERS: PennDOT 11-0

ESTIMATED SCHEDULE: 1-3 years

Life Cycle: 10-15 years

ESTIMATED COSTS:

\$\$
(\$500k-\$2M)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): CCTV System; DMS System

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Travel Time Ratio; Improved Incident Response Time

BENEFITS: Improve incident response, congestion monitoring, and traveler information along SR 8 Corridor.

OTHER CONSIDERATIONS AND ISSUES: N/A

TI.10: US 22 (Monroeville) Arterial ITS

FOCUS AREA: Traveler Information

PRIORITY: Normal

PROJECT DESCRIPTION AND SCOPE: Install CCTV cameras and Arterial DMS along US 22 through Monroeville and surrounding area.

STAKEHOLDERS: PennDOT 11-0

ESTIMATED SCHEDULE: 1-3 years

Life Cycle: 10-15 years

ESTIMATED COSTS:

\$\$
(\$500k-\$2M)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): CCTV System; DMS System

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Travel Time Ratio; Improved Incident Response Time

BENEFITS: Improve incident response, congestion monitoring, and traveler information along US 422 Corridor.

OTHER CONSIDERATIONS AND ISSUES: N/A

TI.11: I-70/US 40 Detour ITS

FOCUS AREA: Traveler Information

PRIORITY: Normal

PROJECT DESCRIPTION AND SCOPE: Install CCTV cameras and DMS along I-70 and US 40 corridors for use during detours.

STAKEHOLDERS: PennDOT 12-0

ESTIMATED SCHEDULE: 1-3 years

Life Cycle: 10-15 years

ESTIMATED COSTS:

\$\$
(\$500k-\$2M)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): CCTV System; DMS System

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Travel Time Ratio; Improved Incident Response Time

BENEFITS: Improve incident response, congestion monitoring, and traveler information along I-70 and US 40 Corridors, particularly for use of US 40 as alternate route to I-70 during incidents.

OTHER CONSIDERATIONS AND ISSUES: N/A

TI.12: Butler County Fiber Ring Deployment

FOCUS AREA: Traveler Information

PRIORITY: Normal

PROJECT DESCRIPTION AND SCOPE: Expansion of fiber optic cable backbone network along SR 228, SR 8, and US 422, connecting to existing fiber on I-79 in Butler County.

STAKEHOLDERS: PennDOT 10-0

ESTIMATED SCHEDULE: 3+ years

Life Cycle: 25 years

ESTIMATED COSTS:

\$\$\$\$
(\$10M+)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Complex

TECHNOLOGY COMPONENTS (if applicable): Communications Infrastructure

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Number of Miles of Installed Fiber Optic Cable

BENEFITS: A fiber optic backbone along the region's Interstates and major arterials would increase connectivity and greatly increase the ability of PennDOT to expand their deployment of ITS and other technology.

OTHER CONSIDERATIONS AND ISSUES: N/A

OT.01: Key Bank Pavilion Event Management & Signal Improvements

FOCUS AREA: Operational Teamwork/Institutional Coordination

PRIORITY: Normal

PROJECT DESCRIPTION AND SCOPE: Install signal controller upgrades to allow for Automated Traffic Signal Performance Measures. Install DMS on US 22 approaching Burgettstown interchange.

STAKEHOLDERS: PennDOT 12-0, PennDOT 11-0

ESTIMATED SCHEDULE: 1-3 years

ESTIMATED COSTS:

\$
(<\$500k)

Life Cycle: 10-15 years

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): Traffic Signal System; DMS System

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Improved Travel Time Ratio

BENEFITS: Improve operations on US 22 and within Burgettstown area, particularly during ingress/egress to events at the Key Bank Pavilion.

OTHER CONSIDERATIONS AND ISSUES: N/A

MC.01: South Hills Village Smart Parking

FOCUS AREA: Multimodal Connectivity

PRIORITY: High

PROJECT DESCRIPTION AND SCOPE: Install Smart Parking System for South Hills Village Parking Garage. Provide notification of parking information on northbound I-79, either through existing DMS sign or a proposed sign if needed. Also install Arterial DMS on northbound US 19. Evaluate potential changes to pricing to encourage more usage.

STAKEHOLDERS: PennDOT 11-0, Port Authority of Allegheny County

ESTIMATED SCHEDULE: 1-3 years

ESTIMATED COSTS:

\$\$
(\$500k-\$2M)

Life Cycle: 10-15 years

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): Smart Parking System; DMS System

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Bottleneck Delay Surrogate; Improved Travel Time Ratio; Increased Usage of Park-n-Ride

BENEFITS: Positively impact mode share by encouraging drivers to park and utilize light rail in and out of congested Pittsburgh area.

OTHER CONSIDERATIONS AND ISSUES: N/A

MC.02: W. Carson St. Multimodal Improvements

FOCUS AREA: Multimodal Connectivity

PRIORITY: High

PROJECT DESCRIPTION AND SCOPE: W. Carson St. between Ft. Pitt Bridge and West End. Consider Transit Signal Priority and study possible transit lane, queue jump, and curb bumpout possibilities. Study possible improvements to provide missing bike connection between South Side and West End.

STAKEHOLDERS: PennDOT 11-0, Port Authority of Allegheny County

ESTIMATED SCHEDULE: 3+ years

ESTIMATED COSTS:

\$\$
(\$500k-\$2M)

Life Cycle: 5-10 years

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): Traffic Signal Systems

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Bottleneck Delay Surrogate; Increased Bus Speeds; Increased Bus Ridership; Increased Number of Bicyclists

BENEFITS: Positively impact mode share by improving transit operations and bike infrastructure. This is a key transit corridor as it provides a connection between Downtown and the West Busway. Bike infrastructure would also allow cycling from West End neighborhood, which is currently an area of high traffic stress.

OTHER CONSIDERATIONS AND ISSUES: N/A

MC.03: Penn Ave. Transit Improvements

FOCUS AREA: Multimodal Connectivity

PRIORITY: High

PROJECT DESCRIPTION AND SCOPE: Penn Ave., 40th St. to Fifth Ave. Consider Transit Signal Priority and study possible transit lane, queue jump, and curb bumpout possibilities.

STAKEHOLDERS: City of Pittsburgh DOMI, Port Authority of Allegheny County

ESTIMATED SCHEDULE: 3+ years

Life Cycle: 5-10 years

ESTIMATED COSTS:

\$
(<\$500k)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): Traffic Signal Systems

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Bottleneck Delay Surrogate; Increased Bus Speeds; Increased Bus Ridership

BENEFITS: Positively impact mode share by improving transit operations on key corridor.

OTHER CONSIDERATIONS AND ISSUES: N/A

MC.04: Centre Ave. Transit Improvements

FOCUS AREA: Multimodal Connectivity

PRIORITY: High

PROJECT DESCRIPTION AND SCOPE: Centre Ave., Washington Place to East Liberty Garage (Dahlem Pl.). Consider Transit Signal Priority and study possible transit lane, queue jump, and curb bumpout possibilities.

STAKEHOLDERS: City of Pittsburgh, Port Authority of Allegheny County

ESTIMATED SCHEDULE: 3+ years

Life Cycle: 5-10 years

ESTIMATED COSTS:

\$
(<\$500k)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): Traffic Signal Systems

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Bottleneck Delay Surrogate; Increased Bus Speeds; Increased Bus Ridership

BENEFITS: Positively impact mode share by improving transit operations on key corridor.

OTHER CONSIDERATIONS AND ISSUES: N/A

MC.05: Carnegie Smart Parking

FOCUS AREA: Multimodal Connectivity

PRIORITY: Normal

PROJECT DESCRIPTION AND SCOPE: Install Smart Parking System for Carnegie Park-n-Ride. Provide notification of parking information on eastbound I-376, either through existing DMS sign or a proposed sign if needed. Include pedestrian improvements outlined in West Busway Transit-Oriented Development Study.

STAKEHOLDERS: PennDOT 11-0, Port Authority of Allegheny County

ESTIMATED SCHEDULE: 1-3 years

Life Cycle: 10-15 years

ESTIMATED COSTS:

\$
(<\$500k)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): Smart Parking System; DMS System

PREREQUISITES AND DEPENDENCIES: Dependent on expanding existing overcapacity Park-n-Ride.

PERFORMANCE MEASURES: Reduced Bottleneck Delay Surrogate; Improved Travel Time Ratio; Increased Usage of Park-n-Ride

BENEFITS: Positively impact mode share by encouraging drivers to park and utilize buses in and out of congested Pittsburgh area.

OTHER CONSIDERATIONS AND ISSUES: Coordinate with proposed West End/South Hills Potential Trail Network Study for possible opportunities to improve access to the station, utilizing nearby rail right-of-way for trails.

MC.06: Wilkinsburg Smart Parking

FOCUS AREA: Multimodal Connectivity

PRIORITY: Normal

PROJECT DESCRIPTION AND SCOPE: Install Smart Parking System for Wilkinsburg Park-n-Ride. Provide notification of parking information on westbound I-376, either through existing DMS sign or a proposed sign if needed.

STAKEHOLDERS: PennDOT 11-0, Port Authority of Allegheny County

ESTIMATED SCHEDULE: 1-3 years

ESTIMATED COSTS:

\$
(<\$500k)

Life Cycle: 10-15 years

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): Smart Parking System; DMS System

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Bottleneck Delay Surrogate; Improved Travel Time Ratio; Increased Usage of Park-n-Ride

BENEFITS: Positively impact mode share by encouraging drivers to park and utilize buses in and out of congested Pittsburgh area. While this location is generally overcapacity during weekdays, it can be better utilized for special events on weekends (i.e. Steelers games).

OTHER CONSIDERATIONS AND ISSUES: This location is currently being considered for potential Transit-Oriented Development which would impact existing parking. Coordinate this project with that effort to ensure need for Smart Parking system in the future before implementation.

MC.07: Liberty Ave. Transit Improvements

FOCUS AREA: Multimodal Connectivity

PRIORITY: High

PROJECT DESCRIPTION AND SCOPE: Liberty Ave., Downtown to Aspen St. Consider Transit Signal Priority and study possible transit lane, queue jump, and curb bumpout possibilities. Improvements to the existing unprotected bike lanes from 34th Street to Baum Boulevard should also be considered as part of the project.

STAKEHOLDERS: City of Pittsburgh DOMI, Port Authority of Allegheny County

ESTIMATED SCHEDULE: 3+ years

ESTIMATED COSTS:

\$
(<\$500k)

Life Cycle: 5-10 years

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): Traffic Signal Systems

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Bottleneck Delay Surrogate; Increased Bus Speeds; Increased Bus Ridership

BENEFITS: Positively impact mode share by improving transit operations on key corridor.

OTHER CONSIDERATIONS AND ISSUES: N/A

MC.08: Kennywood Blvd./Browns Hill Rd. Transit Improvements

FOCUS AREA: Multimodal Connectivity

PRIORITY: High

PROJECT DESCRIPTION AND SCOPE: Browns Hill Rd./Hazelwood Ave. to Kennywood Blvd./Library St. Consider Transit Signal Priority and study possible transit lane, queue jump, and curb bumpout possibilities.

STAKEHOLDERS: PennDOT 11-0, City of Pittsburgh DOMI, Port Authority of Allegheny County

ESTIMATED SCHEDULE: 3+ years

ESTIMATED COSTS:

\$
(<\$500k)

Life Cycle: 5-10 years

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): Traffic Signal Systems

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Bottleneck Delay Surrogate; Increased Bus Speeds; Increased Bus Ridership

BENEFITS: Positively impact mode share by improving transit operations on key corridor.

OTHER CONSIDERATIONS AND ISSUES: N/A

MC.09: E. Carson St. Transit Improvements

FOCUS AREA: Multimodal Connectivity

PRIORITY: High

PROJECT DESCRIPTION AND SCOPE: E. Carson St., 10th St. to 26th St. Consider Transit Signal Priority and study possible transit lane, queue jump, and curb bumpout possibilities.

STAKEHOLDERS: PennDOT 11-0, Port Authority of Allegheny County

ESTIMATED SCHEDULE: 3+ years

ESTIMATED COSTS:

\$
(<\$500k)

Life Cycle: 5-10 years

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): Traffic Signal Systems

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Bottleneck Delay Surrogate; Increased Bus Speeds; Increased Bus Ridership

BENEFITS: Positively impact mode share by improving transit operations on key corridor.

OTHER CONSIDERATIONS AND ISSUES: N/A

MC.10: Second Ave. Transit Improvements

FOCUS AREA: Multimodal Connectivity

PRIORITY: High

PROJECT DESCRIPTION AND SCOPE: Second Ave., Hot Metal St. to Hazelwood Ave. Consider Transit Signal Priority and study possible transit lane, queue jump, and curb bumpout possibilities.

STAKEHOLDERS: City of Pittsburgh DOMI, Port Authority of Allegheny County

ESTIMATED SCHEDULE: 3+ years

ESTIMATED COSTS:

\$
(<\$500k)

Life Cycle: 5-10 years

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): Traffic Signal Systems

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Bottleneck Delay Surrogate; Increased Bus Speeds; Increased Bus Ridership

BENEFITS: Positively impact mode share by improving transit operations on key corridor.

OTHER CONSIDERATIONS AND ISSUES: N/A

MC.11: Healthy Ride (Pittsburgh Bike Share) E-Bike Deployment

FOCUS AREA: Multimodal Connectivity

PRIORITY: Normal

PROJECT DESCRIPTION AND SCOPE: Expand Healthy Ride through pilot of e-assist bicycles.

STAKEHOLDERS: Pittsburgh Bike Share

ESTIMATED SCHEDULE: 1 year

Life Cycle: 3-5 years

ESTIMATED COSTS:

\$
(<\$500k)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): Bike Share System

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Increase Usage of Bike Share

BENEFITS: Positively impact mode share by encouraging greater use of Bike Share system. Enable Bike Share to expand to areas which were previously inaccessible due to challenging terrain on standard bicycle.

OTHER CONSIDERATIONS AND ISSUES: N/A

MC.12: “The Chute” to Eliza Furnace Trail Bike Connection

FOCUS AREA: Multimodal Connectivity

PRIORITY: Normal

PROJECT DESCRIPTION AND SCOPE: Improve bike connection from Greenfield to Eliza Furnace Trail.

STAKEHOLDERS: City of Pittsburgh DOMI

ESTIMATED SCHEDULE: 1-3 years

ESTIMATED COSTS:

\$
(<\$500k)

Life Cycle: 5-10 years

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): N/A

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Bottleneck Delay Surrogate; Improved Travel Time Ratio; Increased Bike Usage

BENEFITS: Positively impact mode share by encouraging increase in cycling through improved infrastructure.

OTHER CONSIDERATIONS AND ISSUES: Coordinate with SR 885/Second Avenue Multimodal Corridor Study.

MC.13: Brady St. to Heritage Trail Bike Connection

FOCUS AREA: Multimodal Connectivity

PRIORITY: Normal

PROJECT DESCRIPTION AND SCOPE: Improve bike connection from Oakland/Uptown to Heritage Trail.

STAKEHOLDERS: City of Pittsburgh DOMI

ESTIMATED SCHEDULE: 1-3 years

ESTIMATED COSTS:

\$
(<\$500k)

Life Cycle: 5-10 years

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): N/A

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Bottleneck Delay Surrogate; Improved Travel Time Ratio; Increased Bike Usage

BENEFITS: Positively impact mode share by encouraging increase in cycling through improved infrastructure.

OTHER CONSIDERATIONS AND ISSUES: Coordinate with SR 885/Second Avenue Multimodal Corridor Study.

MC.14: Butler St. Bike Connection

FOCUS AREA: Multimodal Connectivity

PRIORITY: Normal

PROJECT DESCRIPTION AND SCOPE: Improve bike connection from Lawrenceville to Highland Park.

STAKEHOLDERS: City of Pittsburgh DOMI

ESTIMATED SCHEDULE: 1-3 years

Life Cycle: 5-10 years

ESTIMATED COSTS:

\$
(<\$500k)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): N/A

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Bottleneck Delay Surrogate; Improved Travel Time Ratio; Increased Bike Usage

BENEFITS: Positively impact mode share by encouraging increase in cycling through improved infrastructure.

OTHER CONSIDERATIONS AND ISSUES: Consider implementation of recommendations from *Allegheny Riverfront Green Boulevard Strategic Plan* where possible.

MC.15: Penn Ave. Bike Connection

FOCUS AREA: Multimodal Connectivity

PRIORITY: Normal

PROJECT DESCRIPTION AND SCOPE: Improve bike connection from Lawrenceville to East Liberty.

STAKEHOLDERS: City of Pittsburgh DOMI

ESTIMATED SCHEDULE: 1-3 years

Life Cycle: 5-10 years

ESTIMATED COSTS:

\$
(<\$500k)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): N/A

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Bottleneck Delay Surrogate; Improved Travel Time Ratio; Increased Bike Usage

BENEFITS: Positively impact mode share by encouraging increase in cycling through improved infrastructure.

OTHER CONSIDERATIONS AND ISSUES: N/A

MC.16: East Allegheny Ped/Bike Improvements

FOCUS AREA: Multimodal Connectivity

PRIORITY: Normal

PROJECT DESCRIPTION AND SCOPE: Improve pedestrian and bicycle access in North Side Pittsburgh area near I-279 and I-579.

STAKEHOLDERS: City of Pittsburgh DOMI

ESTIMATED SCHEDULE: 1-3 years

Life Cycle: 5-10 years

ESTIMATED COSTS:

\$
(<\$500k)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): N/A

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Bottleneck Delay Surrogate; Improved Travel Time Ratio; Increased Bike Usage

BENEFITS: Positively impact mode share by encouraging walking/biking through improved infrastructure.

OTHER CONSIDERATIONS AND ISSUES: N/A

FA.01: Bates St. Interchange Improvements

FOCUS AREA: Freeway and Arterial Operations

PRIORITY: High

PROJECT DESCRIPTION AND SCOPE: Interchange improvements and reconstruction at I-376 Exit 73 (PA-885, Oakland/Glenwood) at Bates Street.

STAKEHOLDERS: PennDOT 11-0

ESTIMATED SCHEDULE: 3+ years

Life Cycle: 25 years

ESTIMATED COSTS:

\$\$\$\$
(\$10M+)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Complex

TECHNOLOGY COMPONENTS (if applicable): N/A

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Bottleneck Delay Surrogate; Improved Travel Time Ratio

BENEFITS: Improve operations at congested interchange that provides access to Oakland Business District, UPMC, University of Pittsburgh, Carnegie Mellon University, as well as continuing development along Second Avenue.

OTHER CONSIDERATIONS AND ISSUES: Coordinate with potential road improvements included in Hazelwood Green development project.

FA.02: I-79 Integrated Corridor Management (District 12)

FOCUS AREA: Freeway and Arterial Operations

PRIORITY: High

PROJECT DESCRIPTION AND SCOPE: Traffic Signal Improvements, including updating vehicle detection and signal equipment, and adding command/control capabilities to signals, along US 19 and other signalized corridors paralleling I-79 north of Washington. Pilot PennDOT ownership of traffic signals along US 19 corridor.

STAKEHOLDERS: PennDOT 12-0

ESTIMATED SCHEDULE: 3+ years

Life Cycle: 10-15 years

ESTIMATED COSTS:

\$\$\$
(\$2M-\$10M)

PROJECT TYPE: Deployment/Planning

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): Traffic Signal Systems

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Bottleneck Delay Surrogate; Improved Travel Time Ratio

BENEFITS: Improving incident management and operations on parallel corridors, optimizing the available capacity adjacent to I-79. Increase coordination and improve operations by streamlining ownership of traffic signal systems.

OTHER CONSIDERATIONS AND ISSUES: N/A

FA.03: Campbells Run Queue Warning

FOCUS AREA: Freeway and Arterial Operations

PRIORITY: Normal

PROJECT DESCRIPTION AND SCOPE: Install queue warning system on eastbound I-376, from Campbells Run to Carnegie. Utilize existing DMS for display of generated queue warning messages as possible. Install additional DMS if needed.

STAKEHOLDERS: PennDOT 11-0

ESTIMATED SCHEDULE: 1-3 years

Life Cycle: 10-15 years

ESTIMATED COSTS:

\$
(<\$500k)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): Queue Detection System; DMS System

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduction in Rear End Crashes; Reduced Bottleneck Delay Surrogate

BENEFITS: Provide warning to drivers as they approach area of recurring congestion along I-376.

OTHER CONSIDERATIONS AND ISSUES: N/A

FA.04: Parkway North ICM

FOCUS AREA: Freeway and Arterial Operations

PRIORITY: Normal

PROJECT DESCRIPTION AND SCOPE: Install Smart Parking System for Ross Park-n-Ride. Upgrade signal equipment on US 19 and McKnight Road to allow for command/control functionality. Install Transit Signal Priority on McKnight Road. Pilot PennDOT Ownership of traffic signals along McKnight Road corridor.

STAKEHOLDERS: PennDOT 11-0, Port Authority of Allegheny County

ESTIMATED SCHEDULE: 3+ years

Life Cycle: 10-15 years

ESTIMATED COSTS:

\$\$\$
(\$2M-\$10M)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): Smart Parking System; Traffic Signal Systems

PREREQUISITES AND DEPENDENCIES: N/A

PERFORMANCE MEASURES: Reduced Bottleneck Delay Surrogate; Improved Travel Time Ratio; Improved Bus Speed

BENEFITS: Improving incident management and operations on parallel corridors, optimizing available capacity adjacent to I-279 (Parkway North). Improve bus operations, potentially increasing ridership and positively impacting mode share. Increase coordination and improve operations by streamlining ownership of traffic signal systems.

OTHER CONSIDERATIONS AND ISSUES: In addition to deployments outlined above, proposed studies related to these corridors include the McKnight Road Transit Lane Study and HOV Conversion Study.

FA.05: Veterans Bridge Junction Control

FOCUS AREA: Freeway and Arterial Operations

PRIORITY: Normal

PROJECT DESCRIPTION AND SCOPE: Install Junction Control System at northbound merge between I-579 and I-279.

STAKEHOLDERS: PennDOT 11-0

ESTIMATED SCHEDULE: 3+ years

Life Cycle: 10-15 years

ESTIMATED COSTS:

\$\$
(\$500k-\$2M)

PROJECT TYPE: Deployment

LEVEL OF EFFORT: Moderate

TECHNOLOGY COMPONENTS (if applicable): Junction Control System

PREREQUISITES AND DEPENDENCIES: N/A

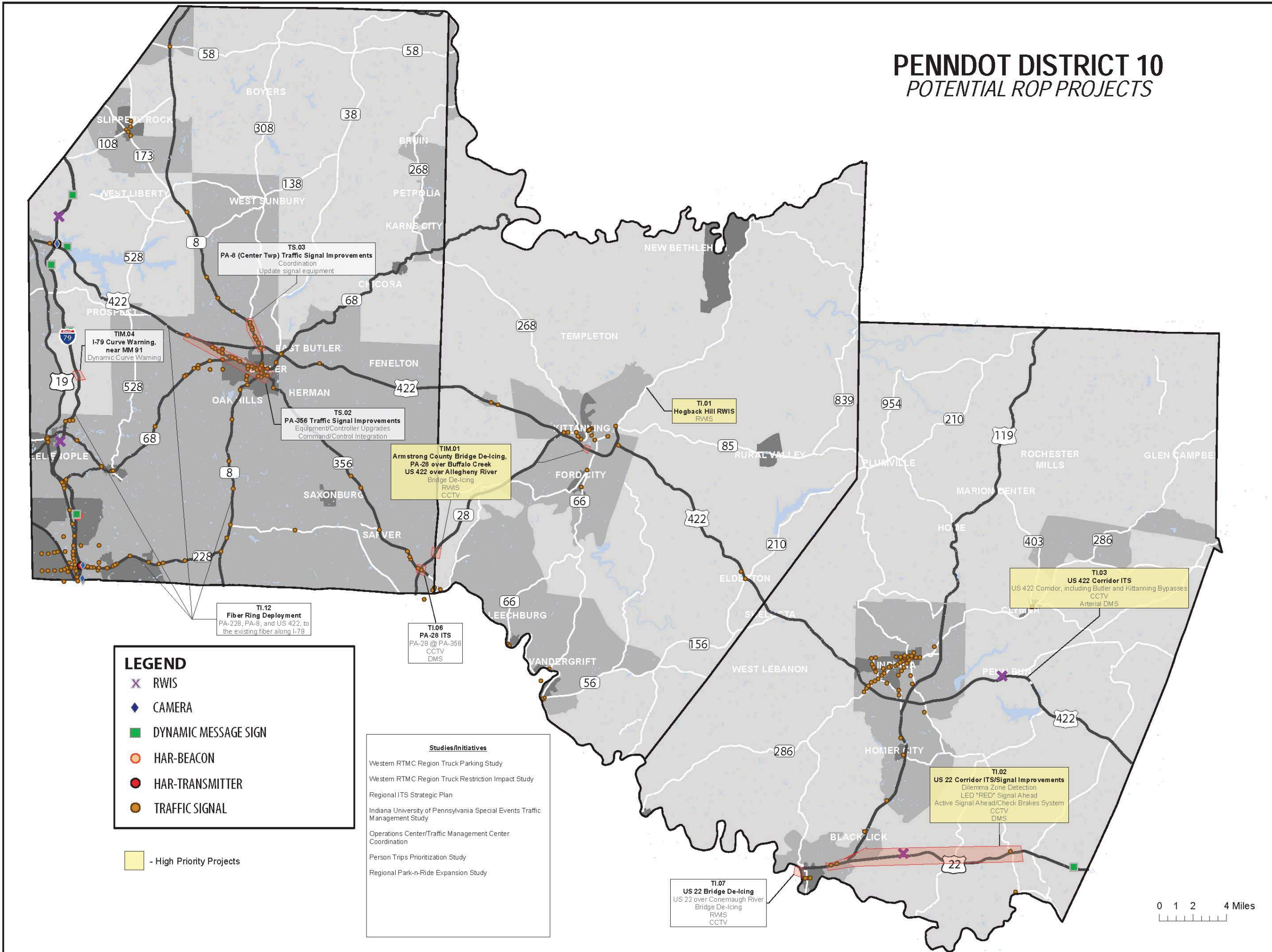
PERFORMANCE MEASURES: Reduced Bottleneck Delay Surrogate; Improved Travel Time Ratio

BENEFITS: Reducing peak hour queuing by actively managing available capacity.

OTHER CONSIDERATIONS AND ISSUES: N/A

ROP Project Maps

PENNDOT DISTRICT 10 POTENTIAL ROP PROJECTS



LEGEND

- ✕ RWIS
- ◆ CAMERA
- DYNAMIC MESSAGE SIGN
- HAR-BEACON
- HAR-TRANSMITTER
- TRAFFIC SIGNAL

■ - High Priority Projects

Studies/Initiatives

- Western RTMC Region Truck Parking Study
- Western RTMC Region Truck Restriction Impact Study
- Regional ITS Strategic Plan
- Indiana University of Pennsylvania Special Events Traffic Management Study
- Operations Center/Traffic Management Center Coordination
- Person Trips Prioritization Study
- Regional Park-n-Ride Expansion Study



PENNDOT DISTRICT 11 (LAWRENCE/BEAVER COUNTY) POTENTIAL ROP PROJECTS

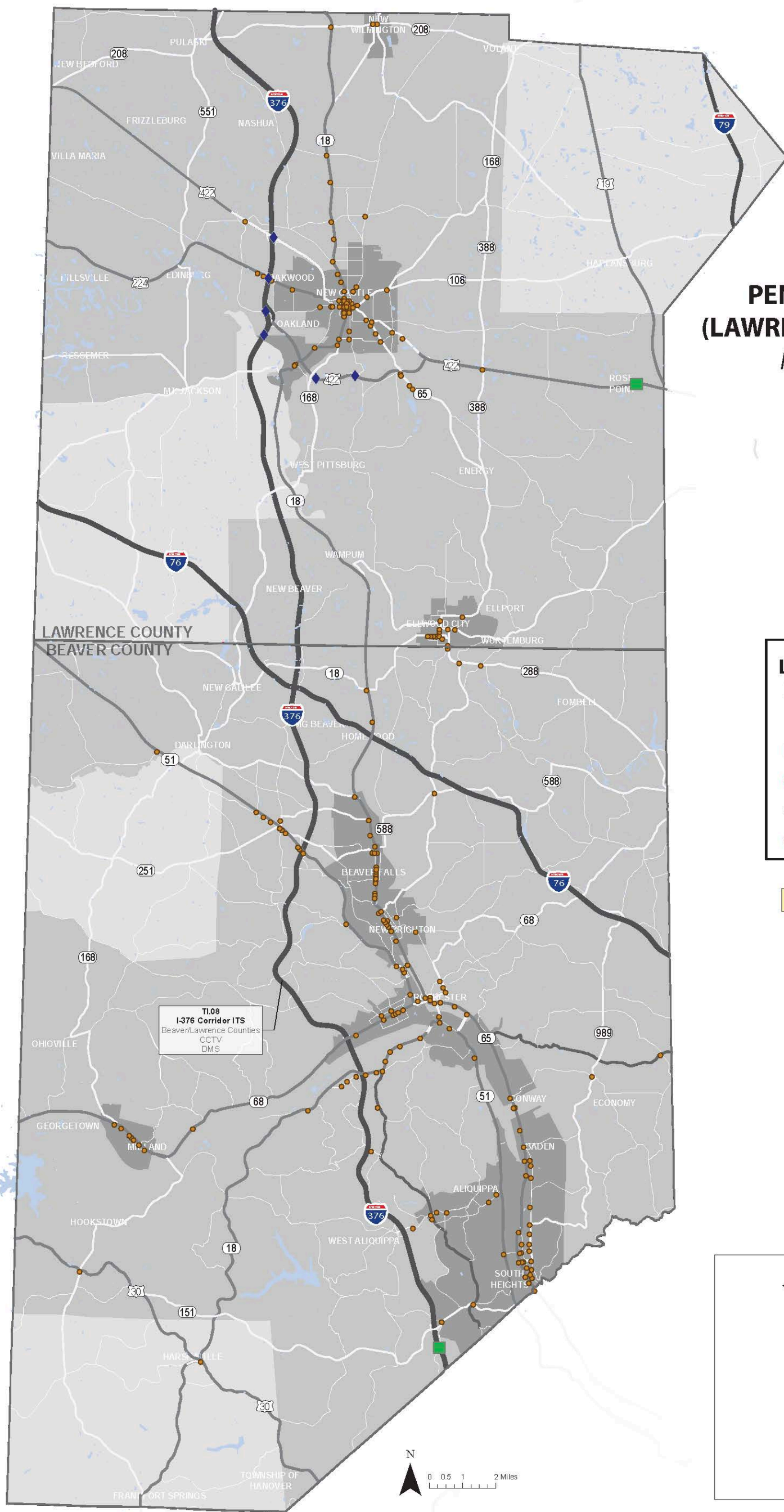
LEGEND

-  RWIS
-  CAMERA
-  DYNAMIC MESSAGE SIGN
-  HAR-BEACON
-  HAR-TRANSMITTER
-  TRAFFIC SIGNAL

 - High Priority Projects

Potential Studies/Initiatives

see Allegheny map for District 11-0 Studies/Initiatives



T1.08
I-376 Corridor ITS
Beaver/Lawrence Counties
CCTV
DMS

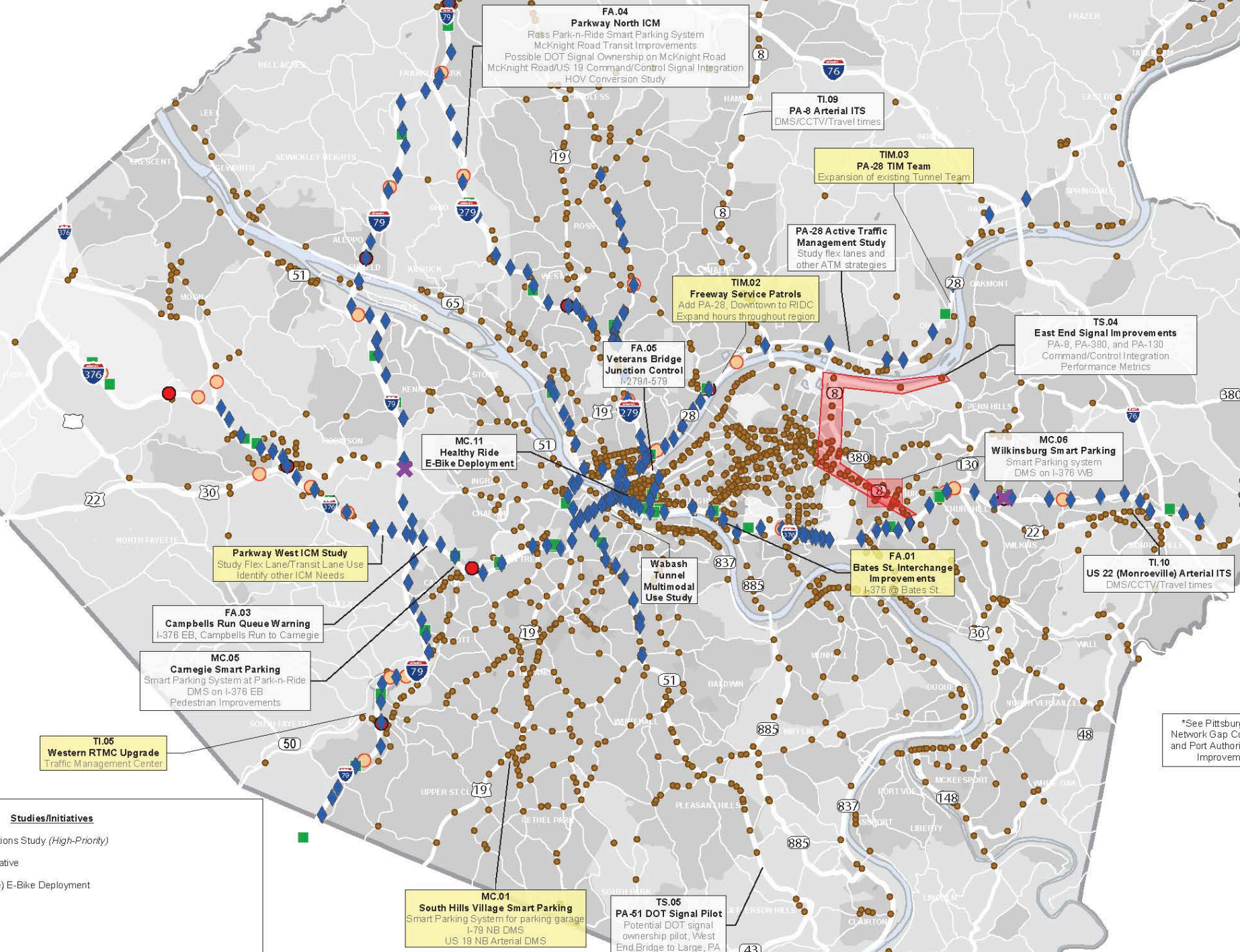
PENNDOT DISTRICT 11 (ALLEGHENY COUNTY) POTENTIAL ROP PROJECTS

LEGEND

- ✕ RWIS
- ◆ CAMERA
- DYNAMIC MESSAGE SIGN
- HAR-BEACON
- HAR-TRANSMITTER
- TRAFFIC SIGNAL

■ - High Priority Projects

*See Pittsburgh map for Bike Network Gap Connection Projects and Port Authority Transit Corridor Improvement Projects



Studies/Initiatives

- Downtown Pittsburgh Bridge Operations Study (High-Priority)
- Existing Bike Trail Maintenance Initiative
- Healthy Ride (Pittsburgh Bike Share) E-Bike Deployment
- Regional ITS Strategic Plan
- Potential Transit Lane Study
- Park-n-Bike Campaign/Expansion
- Person Trips Prioritization Study
- Regional Park-n-Ride Expansion Study
- Operations Center/Traffic Management Center Coordination
- West End/South Hills Potential Trail Network Study
- Birmingham Bridge Complete Street Study
- Route 8 Corridor Operations Planning Study
- Western RTMC Region Truck Parking Study
- Western RTMC Region Truck Restriction Impact Study
- Route 8 Corridor Operations Planning Study



PENNDOT DISTRICT 11 - PITTSBURGH AREA

POTENTIAL ROP PROJECTS

PA-28 Active Traffic Management Study
Study flex lanes and other ATM strategies

TIM.03
PA-28 TIM Team
Expansion of existing Tunnel Team

TIM.02
Freeway Service Patrols
Add PA-28, Downtown to RIDC
Expand hours throughout region

FA.05
Veterans Bridge Junction Control
I-279@-578

MC.16
East Allegheny Ped/Bike Improvements
Surface Streets near I-279@-578

MC.15
Penn Ave., Lawrenceville to East Liberty
Bike Connection

MC.14
Butler St, Lawrenceville to Highland Park
Bike Connection

TS.04
East End Signal Improvements
PA-8, PA-380, and PA-130
Command/Control Integration
Performance Metrics

MC.03
Penn Ave. Transit Improvements
Transit Signal Priority
Transit Lane/Queue Jump/Stop Bumpouts

MC.07
Liberty Ave. Transit Improvements
Transit Signal Priority
Transit Lane/Queue Jump/Stop Bumpouts

MC.02
W. Carson St. Multimodal Improvements
Transit Signal Priority
Transit Lane/Queue Jump/Stop Bumpouts
Bike Connection

MC.11
Healthy Ride
E-Bike Deployment

MC.04
Centre Ave. Transit Improvements
Transit Signal Priority
Transit Lane/Queue Jump/Stop Bumpouts

MC.06
Wilkinsburg Smart Parking
Smart Parking system
DMS on I-376 WB

MC.13
Brady St. to Heritage Trail
Bike Connection

FA.01
Bates St. Interchange Improvements
I-376 @ Bates St.

MC.09
E. Carson St. Transit Improvements
Transit Signal Priority
Transit Lane/Queue Jump/Stop Bumpouts

MT. WASHINGTON
Wabash Tunnel
Multimodal Use Study

MC.12
"The Chute" to Eliza Furnace Trail
Bike Connection

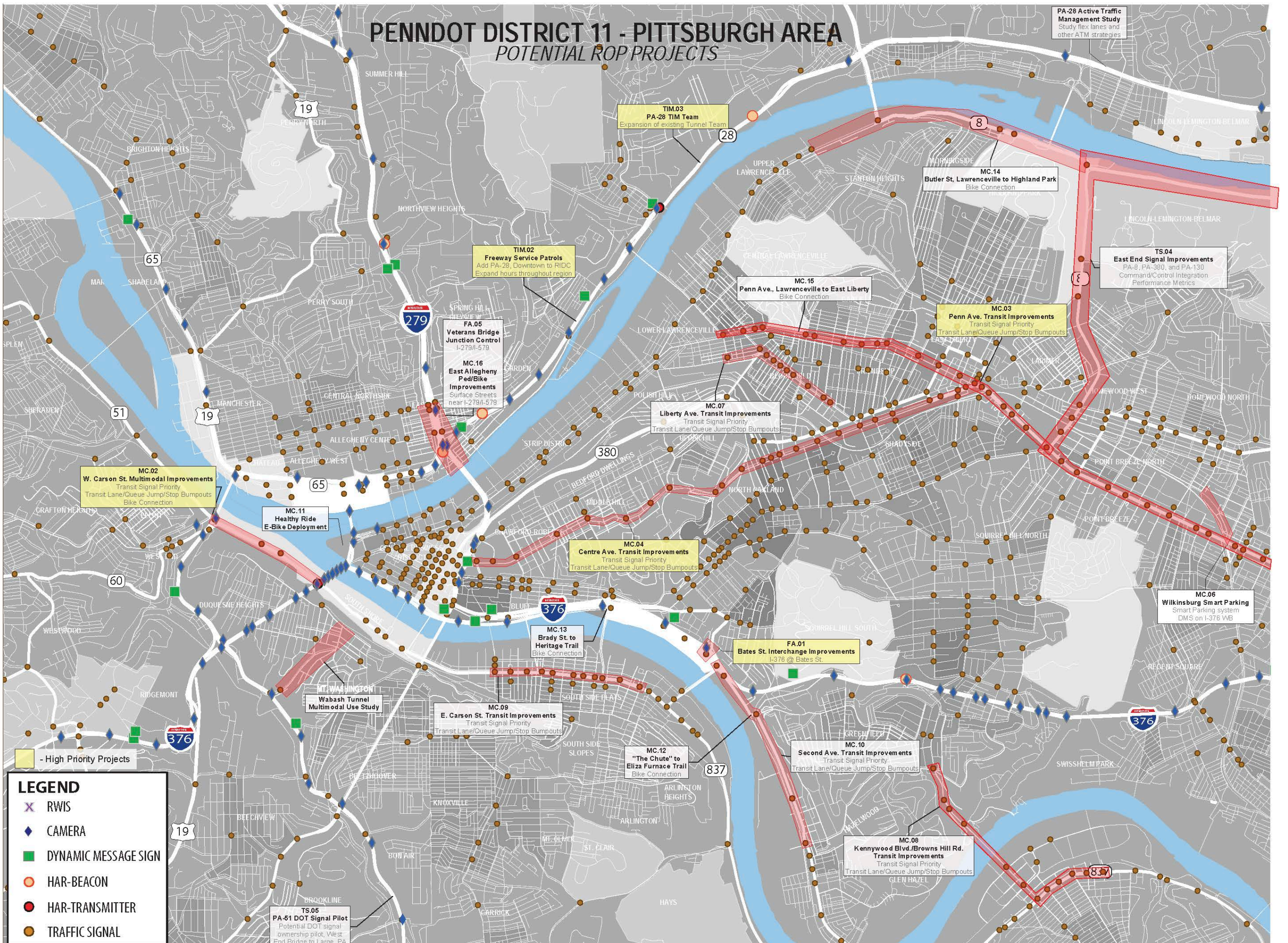
MC.10
Second Ave. Transit Improvements
Transit Signal Priority
Transit Lane/Queue Jump/Stop Bumpouts

MC.08
Kennywood Blvd./Browns Hill Rd.
Transit Improvements
Transit Signal Priority
Transit Lane/Queue Jump/Stop Bumpouts

TS.05
PA-51 DOT Signal Pilot
Potential DOT signal ownership pilot, West End Bridge to Large, PA

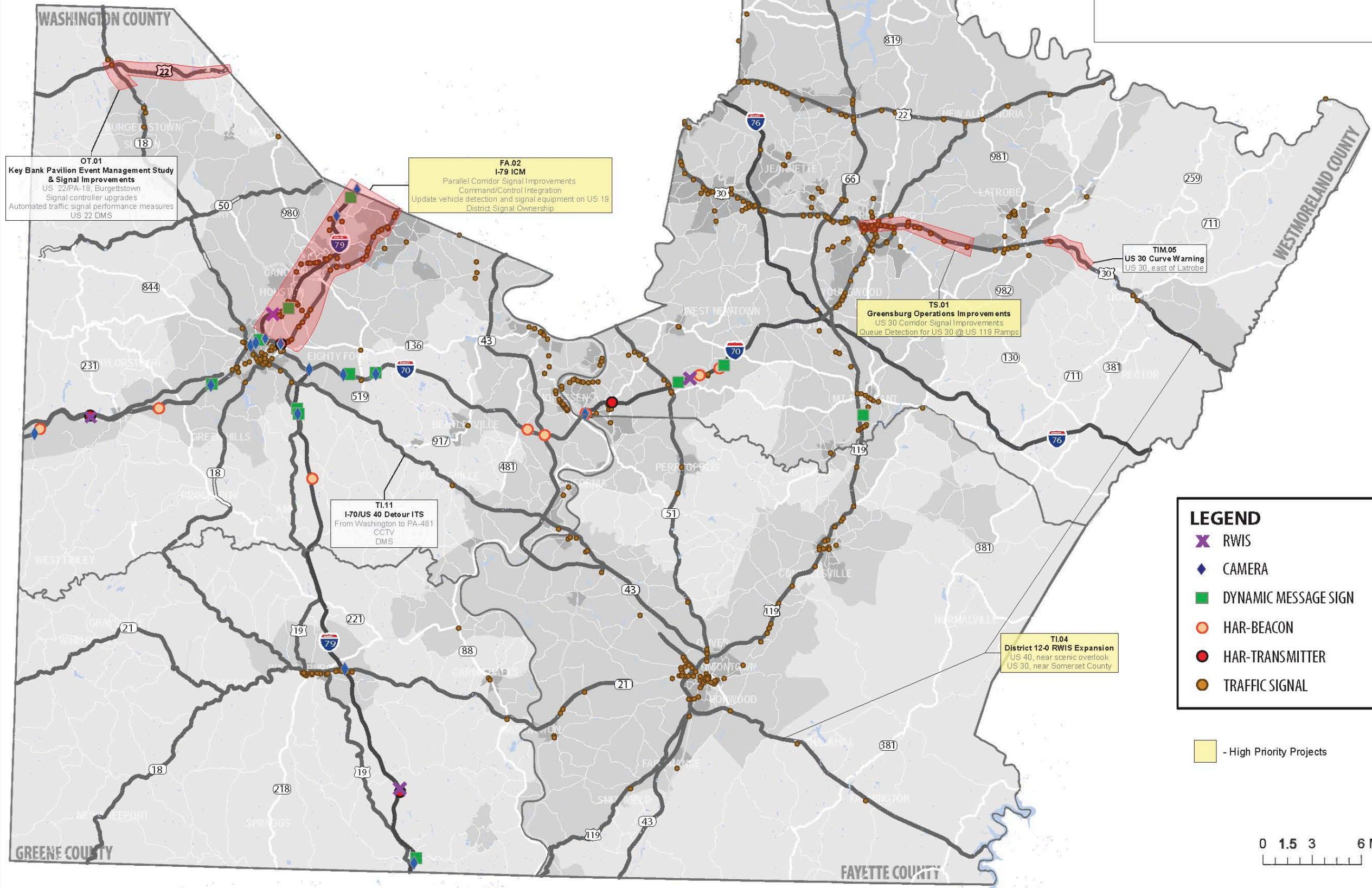
LEGEND

- High Priority Projects
- X RWIS
- ◆ CAMERA
- DYNAMIC MESSAGE SIGN
- HAR-BEACON
- HAR-TRANSMITTER
- TRAFFIC SIGNAL



PENNDOT DISTRICT 12 POTENTIAL ROP PROJECTS

- Studies/Initiatives**
- Western RTMC Region Truck Parking Study
 - Western RTMC Region Truck Restriction Impact Study
 - Operations Center/Traffic Management Center Coordination
 - Key Bank Pavilion Event Management Study
 - US 40 Road Safety Audit (Summit Inn to Youghiogheny River)
 - Regional ITS Strategic Plan
 - Person Trips Prioritization Study
 - Regional Park-n-Ride Expansion Study



OT.01
Key Bank Pavilion Event Management Study & Signal Improvements
US 22/PA-18, Burgettstown
Signal controller upgrades
Automated traffic signal performance measures
US 22 DMS

FA.02
I-79 ICM
Parallel Corridor Signal Improvements
Command/Control Integration
Update vehicle detection and signal equipment on US 19
District Signal Ownership

TS.01
Greensburg Operations Improvements
US 30 Corridor Signal Improvements
Queue Detection for US 30 @ US 119 Ramps

TIM.05
US 30 Curve Warning
US 30, east of Latrobe

TI.11
I-70/US 40 Detour ITS
From Washington to PA-481
CCTV
DMS

TI.04
District 12-0 RWIS Expansion
US 40, near scenic overlook
US 30, near Somerset County

LEGEND

- RWIS
- CAMERA
- DYNAMIC MESSAGE SIGN
- HAR-BEACON
- HAR-TRANSMITTER
- TRAFFIC SIGNAL

High Priority Projects

