Chapter 5. Strategies and 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. The following list shows the variety of TSMO strategies identified for inclusion in these projects:

- Bridge De-Icing
- CCTV
- Dynamic Curve Warning
- DMS
- Integrated Corridor Management
- Queue Warning
- RWIS
- TIM Teams
- Traffic Signal Enhancements
- Variable Speed Displays

In total, 37 projects were identified which span the entire Central RTMC Region and each of the 8 planning partner regions.

Project Prioritization

With the diversity of TSMO strategies and locations, a ranking method was needed to attempt to prioritize and sequence the projects moving forward. Through discussion with the Steering Committee and Stakeholder Groups, a set of three main criteria were developed for this purpose. These criteria are as follows:

- Comparative Need
- Regional Impact
- Expected Benefit

Using the methodology described below, a score from 0-100 was assigned to each project for each of these categories.

Comparative Need

To determine the comparative need for each project, quantitative data on congestion and crashes, as found on the PennDOT One Map website, was utilized. Two pieces of congestion data were used, the Top Bottlenecks and the TomTom Travel Time Ratio. Top Bottlenecks that overlapped with a project area were

identified and their Bottleneck Delay Surrogate value was used to proportionally rank the project's bottleneck severity.

Bottleneck Delay Surrogate is a value based on the speed differential as compared to free flow speed, weighted by queue lengths, and estimated traffic volume. This is the value used to rank the Top Bottlenecks within One Map.

Travel Time Ratio is a similar value of actual travel time divided by free-flow travel time, as provided by the navigation company TomTom. Within One Map, this data is divided into four categories of severity from green (the lowest level) to red (the highest level). For the purposes of the ROP project ranking, a value was assigned to each of these categories and the value was applied to each project which overlapped with an identified TomTom area. Where multiple TomTom categories were called out in a single project area, the highest (worst) category was utilized.

The other data used in determining each project's need was crash cluster information. Rear-End, Intersection, Winter-Related, and Curved Road crash clusters were summed within each project area and this value was compared proportionally amongst the projects.

Based on discussion within the Steering Committee, the importance of congestion and crashes were relatively equal when determining comparative need, so the two congestion values and the one crash value were weighted evenly in the prioritization rankings.

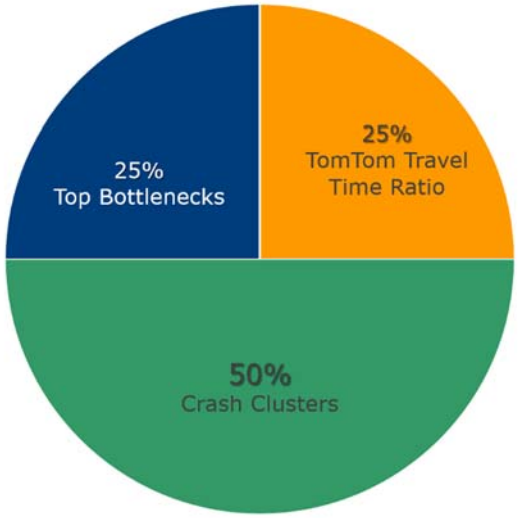

FIGURE 19: COMPARATIVE NEED WEIGHTING DISTRIBUTION

Regional Impact

The next criteria which was utilized in ranking projects was the regional impact. Previous ROPs were completed on a PennDOT District basis. With the move to a regional, RTMC-focused ROP, the focus area of this plan has greatly expanded to now cover three of the largest Districts within the Commonwealth. Because of this, the impact of each project should expand beyond its immediate surroundings and provide positives to the greater region.

To calculate a score based on regional impact for each project, the TSMO Roadway Tiering System was used to determine the priority for this criteria. The following table shows how scores (from 0-100) were assigned based on the tiering of each project roadway.

TABLE 26: REGIONAL IMPACT SCORING

Road Type	Tier	Criteria	Score
Limited Access (NHS)	1A	AADT > 75,000	100
	1B	AADT between 50,000 and 75,000	80
	1C	AADT < 50,000	60
Non-Limited Access (NHS)	2A	AADT > 25,000	60
	2B	AADT between 10,000 and 25,000	40
	2C	AADT < 10,000	20
Non-NHS	3A	AADT > 10,000	30
	3B	AADT between 2,000 and 10,000	10
	3C	AADT < 2,000	0

Two other factors were also included in scoring the regional impact of each project. First, if a project roadway is a parallel corridor to one of the region's interstates, it received the score of that interstate. This was done to enforce the importance of parallel corridors through the region, particularly during incidents which cause interstate closures. The other factor was an extra 10 points was included for any project which is proposed on one of the Corridors and Areas of Transportation Significance previously outlined in As noted earlier, the region has a predominately rural character. Major highway corridors serve to connect urbanized areas and industries within the region to population centers and markets in much wider areas. The following corridors were identified as serving these purposes for the Central RTMC Region.

Table 12.

Expected Benefit

The final criteria used to rank the projects included in this plan is expected benefit. While the first two categories are mostly quantitative, this rating is much more qualitative. A variety of source material was reviewed related to TSMO project benefits but stated benefits varied, sometimes significantly so and the sample sizes for most studies were quite small. Examples of source material examined include the Crash Modification Factors Clearinghouse (www.cmfclearinghouse.com) and the FHWA TSMO Benefit-Cost Compendium.

Because of this lack of comprehensive benefit information, a general rating was developed from "+" to "+++", with the latter demonstrating the most benefit and the former demonstrating the least benefit. In deciding on the benefit rating for each project, the studied source material was considered. These ratings were also reviewed with the stakeholder groups to ensure project benefits were fairly measured and a consensus was reached.

Overall Project Weighting

Once each project had received a 0-100 score for each of the listed criteria, the criteria were weighted together into one unified 0-100 score per project. After discussion with the Steering Committee, it was determined that, as with the various Comparative Need data, each of the 3 main criteria were of relatively equal importance and should therefore be weighted equally.

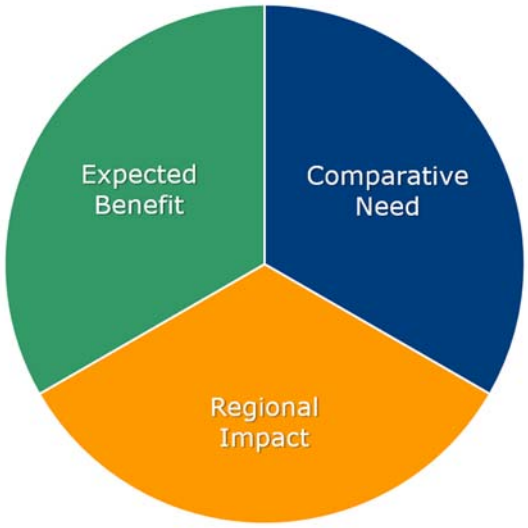

FIGURE 20: OVERALL PROJECT WEIGHTING DISTRIBUTION

To see the full list of projects with all of their associated prioritization data, please refer to **Appendix A**.

Project Sequencing

Once each project was assigned its scored and the full list of 37 projects could be compared against each other, they were divided into two groups, short-term projects and long-term projects. For the purposes of this study, short-term projects are those which could be completed in less than four years. Long-term projects are those which would likely need four or more years in order to be implemented. The prioritization scores were then used to rank each project within both of these two categories.

TABLE 27: SHORT-TERM PROJECT LIST

Project Number	Project Name	Location	Capital Cost	Annual O&M
ST-01	CSVT Integrated Corridor Management and TIM Team	US 11/US 15/PA-61/PA-147	$5,442,000	$62,000
ST-02	I-80/I-99 Existing CCTV Replacements	Various	$110,000	$6,000
ST-03	Breezewood Integrated Corridor Management	I-70/I-76 (PA Turnpike)/US 30	$155,000	$950
ST-04	I-80 ICM (147 to 158)	I-80/PA-144/PA-150	$3,679,000	$33,000
ST-05	US 22 Queue Detection	Eastbound US 22, near US 219	$66,000	$700
ST-06	I-80 CCTV Gaps	Various	$245,000	$2,000
ST-07	I-80 TIM Team	I-80 Corridor	$20,000	N/A
ST-08	US 219/Elton Road Queue Preemption	Southbound US 219 Off-Ramp at Elton Road	$60,000	$500
ST-09	Philipsburg Traffic Signal Improvements	Philipsburg Borough	$325,000	$1,800
ST-10	I-80 Existing HAR Replacements	Various	$1,100,000	$4,000
ST-11	Existing DMS Retrofit – Centre County	I-99/US 322, Port Matilda	$105,000	$3,800
ST-12	US 322, Philipsburg to I-99 ITS	US 322, west of I-99	$2,300,000	$19,500
ST-13	I-80 Slow Vehicle Warning	I-80, MM 111 to 120	$1,010,000	$11,500
ST-14	I-99 TIM Team	I-99 Corridor	$20,000	N/A
ST-15	US 322 Slow Vehicle Warning	US 322, Seven Mountains	$342,000	$3,000
ST-16	I-99 CCTV Gaps	Various	$700,000	$13,000
ST-17	Existing Bridge De-Icing Retrofit	Various	$610,000	$5,000
ST-18	I-99 RWIS	I-99 at Skytop	$245,000	$1,900
ST-19	US 15 to I-180 Dynamic Curve Warning	Southbound US 15, prior to I-180	$262,000	$2,100
ST-20	Central Region CCTV Gaps	Various	$462,000	$4,000
ST-21	Existing DMS Retrofit – District 9-0	Various	$352,000	$15,500
ST-22	Existing DMS Retrofit – McKean County	US 219, near Bradford	$105,000	$3,800
ST-23	US 22/322 RWIS	US 22/322, near Thompsontown	$135,000	$950
ST-24	PA-350 RWIS	PA-350, west of Bald Eagle	$135,000	$950
ST-25	Special Event Use of Portable DMS	Various	$250,000	$2,000

TABLE 28: LONG-TERM PROJECT LIST

Project Number	Project Name	Location	Capital Cost	Annual O&M
LT-01	I-80 ICM (Exit 232 to 241) + Parallel Corridor Improvements	I-80/US 11/PA-42, Bloomsburg	$4,402,000	$10,500
LT-02	I-80/I-99 Fiber Backbone	Various	$41,600,000	$70,000
LT-03	I-80 ICM (Exit 97 to 101) + Parallel Corridor Improvements	I-80/US 219/PA-255, DuBois	$604,000	$6,500
LT-04	I-180 Interchange Improvements	I-180, Williamsport	$76,000	$900
LT-05	I-99/US 322 ICM (Atherton Street)	I-99/US 322/SR 3014	$1,536,000	$15,000
LT-06	I-80 ICM (Exit 111 to 123)	I-80/PA-153/US 322/PA-879/PA-970	$550,000	$4,500
LT-07	I-80 ICM (Exit 173 to 185)	I-80/PA-64/PA-477	$1,169,000	$11,000
LT-08	PA-56 Traffic Signal Improvements	PA-56, near US 219	$755,000	$5,700
LT-09	US 220-Business Traffic Signal Improvements	US 220-Business/Plank Road	$3,100,000	$16,000
LT-10	Central Region Dynamic Curve Warning	Various	$1,775,000	$17,000
LT-11	PA-54 Traffic Signal Improvements	PA-54, Danville	$2,795,000	$7,000
LT-12	Central Region DMS Gaps	Various	$3,774,000	$45,000
LT-13	PA-36 Traffic Signal Improvements	PA-36, Roaring Spring	$185,000	$1,000
LT-14	US 6 Corridor ITS	Various	$2,581,000	$24,000
LT-15	PA-150 Traffic Signal Improvements	PA-150 (Hogan Blvd), near Mill Hall	$175,000	$1,500
LT-16	Sayre Traffic Signal Improvements	US 220 Ramps/SR 1069, Sayre	$210,000	$1,300
LT-17	PA-144 Truck Enforcement	PA-144, west of Centre Hall	$730,000	$6,000

Project Descriptions

Project descriptions have been developed for each of the projects listed above as part of this plan, with short-term projects provided in **Appendix C** and long-term projects provided in **Appendix D**. The information found in the descriptions includes:

- Project Description and Scope
- Stakeholders
- Estimated Schedule
- Estimated Costs
- Project Type
- Level of Effort
- Technology Components

- Prerequisites and Dependencies
- Performance Measures
- Benefits
- Other Considerations and Issues

Maps showing project locations within each planner partner region are included as **Appendix B**. Maps for each specific project area are also provided in **Appendix C** and **Appendix D**, accompanying their project descriptions as appropriate. These maps include approximate project limits and callouts for proposed device locations and other improvements included in the projects.

Estimated Project Costs

Estimated project costs include the capital cost as well as an annual O&M cost. Capital costs include construction and design costs. For most projects, design cost was assumed to be 12% of the construction cost. DMS projects included an estimated 18% construction cost due to the increased structural and geotechnical design work involved. O&M costs were generally assuming to be 1% of the construction cost of the recommended devices. **Table 29** shows the estimated capital costs and annual O&M costs for each planning partner, each PennDOT District, and for the combined Central RTMC Region.

TABLE 29: ESTIMATED TOTAL PROJECT COSTS

Organization	Capital Costs	Annual O&M Costs
Planning Partners		
Altoona MPO	$13,494,000	$57,500
Centre County MPO	$20,599,500	$139,500
Johnstown MPO	$1,265,000	$14,000
North Central RPO	$11,860,000	$48,500
Northern Tier RPO	$2,791,000	$25,500
SEDA-COG	$24,681,500	$127,000
Southern Alleghenies RPO	$9,224,000	$27,500
Williamsport MPO	$338,000	$3,000
PennDOT Districts		
District 2-0	$32,606,000	$208,500
District 3-0	$30,440,000	$139,500
District 9-0	$21,206,000	$93,500
Central RTMC Region	**$84,252,000**	**$441,500**