Background
In order to integrate Transportation Systems Management & Operations (TSMO) solutions into the project planning process, PennDOT recognized the need to develop comprehensive and current Regional Operations Plans to align with their Regional Traffic Management Center (RTMC) regions. The ROPs play an important role in regional Long-Range Transportation Plan and Transportation Improvement Plan processes by helping to secure future capital funding for projects incorporating TSMO solutions. The Central RTMC ROP was the first of four plans to follow the PennDOT TSMO Strategic Framework. Existing intelligent transportation systems (ITS) and operations infrastructure, needs, vision and goals were identified to ultimately prioritize future operations focused projects and performance measures in harmony with regional, state, and federal policies.

The Central RTMC Region encompasses 24 counties, three PennDOT Districts and eight planning organizations and spans from the Maryland state line in the south to the New York state line in the north and from Somerset, PA in the west to Berwick, PA in the east. The planning process was started in January 2018 and the project was completed by December 2018. The PennDOT Central RTMC Team led the development of the ROP document, which addresses reliability, mobility, and congestion through a prioritized document of potential projects and initiatives related to traffic operations and ITS.

TSMO Planning, Strategies, and Deployment
The TSMO Program in Pennsylvania consists of three major elements: TSMO Strategic Framework, TSMO Program Plan (and associated Action Plan), and the TSMO Guidebook.

TSMO Strategic Framework
This framework is designed to make the case for TSMO in Pennsylvania to improve mobility and reliability, safety, and funding dedicated to operations. This document is intended to be used by PennDOT, planning organizations, and stakeholders, but should also be used as a public-facing tool to increase awareness on the benefits of TSMO. Each page of this document was designed so that it could be used as a standalone fact sheet to address the what, why, and current state of TSMO in Pennsylvania.

TSMO Program Plan
The approach is based on needs, strategies, and actions that were created during stakeholder outreach and are specific to the development and advancement of the TSMO program in Pennsylvania. The TSMO Program Plan also includes an Action Plan to advance each CMM dimension by delegating responsibilities to the PennDOT business areas. The plan also identifies what dimension it will advance, dependencies with other strategies, and a listing of additional resources needed to accomplish the strategy/action. This document is intended to be used by the PennDOT
Central Office and districts to help identify what actions are necessary from business areas and PennDOT units to advance the Capability Maturity Model (CMM).

TSMO Guidebook
This guide seeks to strengthen and provide a clear connection between planning processes such as the Congestion Management Process, Long Range Transportation Plan, Regional Operations Plans, and the Transportation Improvement Program. Both standalone TSMO projects as well as the implementation of TSMO solutions in other projects will benefit from a strong connection to the TIP, and, as a result, can be prioritized during project planning. The audience of this document includes the professionals responsible for transportation planning and operations within the state working for or on behalf of PennDOT, Metropolitan Planning Organizations (MPOs), Rural Planning Organizations, or local municipalities. It is intended that these stakeholders use this guidance document throughout the development and implementation of their transportation operations plans and programs.

COMMUNICATIONS PLANNING AND EXECUTION
The ROP included an extensive stakeholder process with three rounds of meetings in each of the three PennDOT district locations. A wide ranging group of stakeholders were involved, including the MPOs and RPOs, PennDOT District Safety Engineers, PennDOT County Maintenance Departments, the Pennsylvania Turnpike Commission, as well as local emergency responders, transit agencies, Penn State University, and the local National Weather Service office.

The goals of each round of meetings were as follows:
1. Discuss transportation issues and needs to focus on
2. Discuss potential TSMO strategies to mitigate these issues
3. Develop projects based on these issues/strategies

A steering committee was also utilized to guide the process and assist with overarching priorities for the region. This group included the PennDOT Bureau of Maintenance and Operations (BOMO), the PennDOT Districts, and the FHWA Pennsylvania Division. In addition to stakeholder feedback, much of the ROP process was guided by data. PennDOT recently released a publicly-facing website, One Map, which provides extensive data on the region’s operations through a GIS-based interface. This was used to pinpoint the existing congestion and safety issues to discuss during the first round of stakeholder meetings. Later, the determined project focus areas could be analyzed in more detail to determine the most applicable TSMO strategies. Looking forward, this data can be used as a benchmark to measure the effectiveness of the projects once implemented.

OUTCOMES, BENEFITS AND LEARNINGS
In total, 42 projects were determined for inclusion in the ROP document. This included 25 short-term projects (to be completed within four years) and 17 long-term projects. Of particular focus in this ROP are Integrated Corridor Management (ICM) projects which seek to improve incident management and maximize the use of available capacity on important parallel corridors, particularly for I-80. There are also a number of safety-related TSMO projects, including Dynamic Curve Warning systems, Queue Warning systems, and Variable Speed Displays. Projects were prioritized and ranked based on three categories: Comparative Need, Regional Impact, and Expected Benefit. Need was based on congestion and crash cluster data was available on the PennDOT One Map website.

Regional Impact utilized the TSMO Roadway Tiering system to quantify regional importance and impact of each project roadway. Finally, the benefit was developed as a qualitative measurement, based on a review of available TSMO benefit guidance, such as the Crash Modification Factor (CMF) Clearinghouse. The completed ROP will play an important role in regional long-range planning by helping to secure future capital funding for projects incorporating TSMO solutions. This will lead to more cost-effective, beneficial transportation improvements which will provide greater benefit to the safety and mobility of the region’s residents and visitors.

Moving forward with developing ROPs for the remaining RTMC regions in the state, a few lessons learned were identified to carry forward in the process. Chief among them was to increase focus on other modes of transportation such as rail, transit, bicycle, and pedestrians. As the TSMO philosophy is centered around maximizing available capacity, it is vital to provide improvements for more efficient modes than passenger vehicles. Other lessons included the importance of broad and diverse stakeholder groups, particularly when determining the operational issues of the region and gaining executive buy-in from the inception to ensure organizational support. Building strong relationships with planning partners also helps with buy-in and funding support so that the identified projects and their respective benefits can be realized and implemented moving forward.

FURTHER INFORMATION
Pennsylvania TSMO Program Plan:
NOCoE Knowledge Center: https://transportationops.org/knowledge-center