



North/West Passage

Project 8.2: Concepts for Rural TMC/TOC Operations

Summary Report

August 2014

1. Introduction

The I-90/I-94 corridor between Washington and Wisconsin is predominantly rural with some large urban centers in Washington, Minnesota and Wisconsin. There is a broad range of transportation management approaches used throughout the corridor. Those states with large urban centers have developed extensive traffic management center (TMC) facilities to manage congestion and mobility. Some of the states have statewide-oriented transportation operations centers (TOC) facilities to manage activities that tend to be oriented toward a mix of mobility and safety. Still other states have no formal TMC/TOC facilities and manage statewide operational functions from a coordinated point. With this range of management approaches, there are inherent challenges for coordinating traveler information and operations activities during major events along I-90/I-94. Some of those challenges include different hours of operation, changing points of contact depending on time of day, and staff from diverse functional areas (e.g. maintenance, traffic operations, law enforcement).

There is a significant amount of guidance on and models for urban TMC/TOC operations but very little for rural facilities. The purpose of the [Concepts for Rural TMC/TOC Operations](#)¹ project is to:

- Define the unique needs of a rural TMC/TOC operational concept, and
- Determine what existing guidance or models could be used to support the enhancement of TMC/TOC operations among North/West Passage states.

This summary report presents a summary of the research on TMC/TOC guidance, rural TMC/TOC operational needs, select operational concepts, state action plan highlights and ideas for future collaboration among the North/West Passage states.

2. Research Summary

A variety of TMC/TOC guidance materials have been developed over the past two decades to assist transportation agencies with establishing, operating and maintaining TMC/TOC facilities. Most notably, the [Transportation Management Center Pooled Fund Study](#)² has developed several such materials. The program was established in 2000 to assemble regional, state and local transportation management agencies and the Federal Highway Administration to identify and address human-centered and operational issues that are common among TMC operators and managers. The TMC PFS has addressed issues related to operations planning and program management; operator training, procedures and task allocation; system design, implementation and maintenance; performance monitoring; contracting and procurement practices; and, interagency relations. The materials produced from these and individual agency efforts were reviewed for their applicability to rural TMC/TOC operations in the following areas.

- Development and establishment of a TMC/TOC facility with emphasis on assessing needs and developing operation concepts,
- Operations with emphasis on the services provided and hours of operation,
- Staffing with emphasis on the necessary skill sets and position descriptions, and
- Performance with emphasis on measuring the value and effectiveness of TMC/TOC operations.

2.1. Development and Establishment

Transportation Management Center Concepts of Operation Implementation Guide³ (FHWA, 1999)

Although this guide was developed nearly two decades ago the process of developing a concept of operations remains relatively unchanged. It offers guidance that assists with planning, designing, implementing, operating and maintaining a TMC. The examples are slightly dated and very focused on urban centers where freeway, arterial and transit management are high priorities. The guidance itself is focused on supporting the development of a concept of operations that can be used for outlining functions, building consensus, training and clarifying interactions. The content is broken into sections on types of centers; setting the stage for developing a center; developing a concept of operations; and, resources for additional information.

Freeway Management and Operations Handbook⁴ (FHWA, 2003, 2006, 2011)

Chapter 14 of the handbook provides a high-level overview of TMC services and processes for planning, designing, commissioning and managing a TMC. It includes a description of the considerations for the physical design of a center – space planning, physical attributes, lighting, acoustics, heating/cooling and operator workstations. Although no specific guidance is provided for rural TMC/TOC facilities, this chapter offers a list of the physical design characteristics that must be considered for any center.

Enhancement of Statewide Operations Concept of Operations Study⁵ (Montana, 2007)

This document is the fourth in a series of technical memoranda written for the Montana Department of Transportation to enhance statewide operations. It presents a concept of operations and implementation plan for a Statewide Operations Center. The document identifies the internal and external stakeholders to be involved in center operations. The functionalities that the center would assume are described in a high-level fashion. A physical location and description of the center is outlined. The rationale and anticipated benefits of implementing a center are presented, along with a proposed approach for deploying a center. Although this document is specific to Montana, it provides a framework for evaluating the need for a TMC/TOC.

Traffic Operations Center Concepts for South Dakota⁶ (South Dakota, 2006)

This report summarizes research and recommendations for the development of a TOC in South Dakota. The research identified functionality needed to support traffic operations within South Dakota and in coordination with bordering states. It assessed traffic operations functions, systems and processes currently employed or planned by state and local agencies. Finally, it developed a strategic deployment plan for establishing and maintaining traffic operations control functionality

appropriate to South Dakota's needs. The strategic deployment plan included descriptions of capabilities, identification of needed resources and infrastructure support, and estimates of costs and benefits. The resulting concept for statewide traffic operations consisted of a statewide center in Pierre, with regional centers in Sioux Falls and Rapid City, and virtual center capabilities for additional remote access. Similar to the document referenced above for Montana, this document is specific to South Dakota yet it provides another framework for evaluating the need for a TMC/TOC.

2.2. Operations, Staffing and Performance

Handbook for Developing a TMC Operations Manual⁷ (TMC PFS, 2005)

Primer for Handbook for Developing a TMC Operations Manual⁸ (TMC PFS, 2005)

The handbook describes the development of a TMC operations manual in the context of the integrated, interdependent world of ITS systems. It describes why operations manuals are important; it identifies the activities and participants needed to produce and update a manual; and it provides a checklist of topics that can jump start the development of a manual. Although the case studies in the handbook are urban focused (northern Virginia and Orlando, Florida) the development process described and the content outlined for an operations manual could still be applied to rural TMC operations.

The companion primer is an additional resource that could be applied to both urban and rural TMC operations. It outlines a series of questions and answers about TMC operations and the value of an operations manual. It briefly highlights the steps for developing and the content of a TMC operations manual. The primer could serve as a resource for introducing the concept of an operations manual (or even the general concept of a TMC) to stakeholders and decision makers.

TMC Staffing and Scheduling for Day-to-Day Operations⁹ (TMC PFS, 2006)

This document provides managers, supervisors, human resource personnel and private contractors who are responsible for TMC staffing and scheduling decisions with a reference that addresses the concepts, methods, processes, tasks, techniques, and other issues related to work analysis, scheduling, and staff planning. Methods for analyzing aspects of work are covered, including job analysis, workload analysis and demand analysis. General scheduling practices are discussed, from who should have the responsibility for scheduling employees to manual methods for generating a schedule. Several chapters address issues associated with shiftwork and offer strategies associated with adjusting to a work schedule for employees and employers. The final chapter covers how to create a staffing plan and planning for emergencies. Although a few urban centers are referenced (Georgia, Tennessee and Arizona) as examples in the document, it is not specifically focused on staffing for urban TMCs as much as it is focused on staffing for any center that involves staffing across various shifts and duties.

TMC Business Planning and Plan Handbook¹⁰ (TMC PFS, 2005)

The handbook serves as a guide for applying business planning techniques to establish a long-range business plan for a TMC. Although not every TMC may develop a business plan, one of its greatest values is the role it can play in helping agencies link ITS programs to regional objectives and funding sources. This is what differentiates a business plan from systems engineering and other ITS planning processes. If properly implemented, a business plan can establish legitimacy for sustainable funding,

near-term needs and long-term programs through ongoing performance measurement and reporting of outcomes. In this way, it is a valuable tool for communicating with policy makers, partners and executives.

[ITS Benefits, Costs, Deployment and Lessons Learned Desk Reference](#)¹¹ (USDOT, 2011)

Chapter 8 of this document highlights benefits, costs, deployment and lessons learned for TMCs. General benefits include: improved traffic management, advisory strategies and control actions; improved timeliness and accuracy of information provided to the traveling public; increased efficiency of maintenance operations; more effective use of personnel and resources; and enhanced institutional, procedural, and operational integration and coordination. Most of the references noted as examples are associated with urban centers; however, the Utah DOT statewide TMC is referenced as an example and productivity benefits associated with winter maintenance through the center are highlighted.

[Integration of Emergency and Weather Elements into Transportation Management Centers](#)¹² (FHWA, 2006)

This document explores the state of practice for integrating emergency and weather related services into TMCs. In addition to offering insight on specific concepts or services that may be considered for a TMC, the document identifies the type and level of integration as well as pros and cons for each concept. Potential benefits and challenges are also noted. The document may serve as a resource for determining the type and value of integrating weather elements in a rural TMC/TOC.

2.3. Other information

[Impacts of Technology Advancements on Transportation Management Center Operations](#)¹³ (TMC PFS, 2013)

This report offers guidance to TMCs and transportation management agencies on how to better position themselves operationally in anticipation of future technology changes and advancements. Some of the top eight trends of TMC operations identified in the report are more urban oriented. For example, active transportation and demand management and accommodating tolling or pricing operations are primarily issues for urban TMCs. However, there are some trends that are applicable to rural centers – performance monitoring and management, automation tools and crowdsourcing for traveler information. Individual strategies are presented to assist TMC managers with addressing these trends. The strategy descriptions include successful practice examples and key references.

[A Guidebook for Virtual TMC Development](#) (TMC PFS, *Anticipated Release Summer 2014*)

The purpose of this project is to develop a guidebook that provides technical guidance and recommended practices to support planning and development of a virtual TMC. This guidebook is intended to serve as a detailed reference that addresses the concepts, methods, processes, tasks, techniques, and other related issues for practitioners to consider associated with business planning and technical/technology implementation for a virtual TMC. The guidebook is expected to be released by the TMC PFS in summer 2014.

In summary, there are a number of resources available to support the development, operations, staff and performance aspects of TMCs. The resources highlighted in this report are fairly neutral in the processes they describe although the examples referenced are primarily urban. The TMC PFS will also remain a good resource but is admittedly focused on issues related to urban centers.

3. Rural TMC/TOC Operational Needs

This project was undertaken with recognition that there are unique needs for rural TMC/TOC operations. After reviewing existing guidance for its applicability for rural TMC/TOC development and operations, needs among the North/West Passage states were identified. First, the states with existing TMC/TOC facilities were asked to identify their needs in terms of their interaction with those North/West Passage states without centers. Next, the North/West Passage states considering the development of TMC/TOC facilities – Montana, North Dakota and South Dakota – were asked what challenges within their state could be addressed by a center and what challenges in relation to cross-jurisdictional coordination could be addressed by a center. The needs are summarized in Table 1 and although these needs do not represent all of the needs for a specific center, they can serve as a foundation of needs that could be built upon in a concept of operations or further scoping effort for a specific state. Additionally, general descriptions of the operational environment in Montana, North Dakota and South Dakota are provided below to offer further context for the needs that were identified.

3.1. Montana

MDT primarily relies on one staff person as their point of contact for traffic operations. That person works closely with district staff to gather and disseminate information, provide response and manage field devices. Limiting a key point of contact to one specific individual creates challenges in that the person must routinely be available 24/7 during major events. Although the department has attempted to hire back-up staff, training and retaining candidates have been significant issues for traffic operations. In 2007, the MDT explored options for establishing a statewide operations center but has not since pursued further implementation. There are two other issues unique to traffic operations in the state. Montana has an exceptional volume of overdimension or “mega” loads traveler on their roads and as a general practice they do not often close roads. These factors contribute to a higher number of events that require coordination, frequently 24/7, among traffic operations and district staff.

3.2. North Dakota

NDDOT currently uses a three-person calling tree to manage traffic operations. This staff works closely with district operational staff and together they manage field devices, provide incident response as needed, and gather/disseminate information to travelers. Their needs for rural TMC/TOC operations are heightened by recurring seasonal flooding in the Red River Valley, as well as recent increases in oil field traffic statewide. Today, there are approximately 9,000 oil well sites in the state. The number of sites is expected to grow to 60,000 in coming years. This has caused and will continue to cause an increase in overall traffic, heavy vehicle traffic, and hazardous material incidents. Additionally, flooding happens nearly every spring in the eastern and north central parts of the state. This requires day and night operations to monitor road conditions, provide response and maintain information for travelers.

3.3. South Dakota

Similar to Montana, SDDOT mainly relies on one staff person as their point of contact for traffic operations. As such, there are similar challenges during events that require response outside of business hours. Some of the more unique major events in South Dakota include extreme winter weather road conditions and the Sturgis Motorcycle Rally. The Rally is a planned event that has occurred annually for the past 73 years. A temporary, small-scale TMC is typically established for the event with staff from the SDDOT district office and the South Dakota Highway Patrol. SDDOT also completed research in 2006 that identified and assessed traffic operations in the state. The research identified options for establishing a statewide TMC/TOC and a network of regional and virtual center capabilities. Some of the specific goals identified for improving traffic operations included better coordination among agencies and offices, more uniform procedures and better planning. More recently, the department completed a Transportation Systems Management and Operation (TSM&O) capability maturity self-assessment. One of 10 actions recommended under the Systems and Technology category encouraged further evaluation of TMC/TOC alternatives and development of a concept of operations for South Dakota.

Table 1 Fundamental Rural TMC/TOC Operational Needs

States need...	North/West Passage States with Centers	North/West Passage States without Centers		
		North Dakota	South Dakota	Montana
1. A single point of contact during events (e.g. weather, special events, incidents)	X	X		X
2. A point of contact to be available 24/7	X	X		X
3. A point of contact for TMC/TOC operations position vs. specific individual	X			X
4. The ability to discuss impacts with point of contact	X			
5. The ability to have two-way communication during events	X			
6. A high-level knowledge of what resources may be available to share	X			
7. Other states to not send traffic toward places where it can't pass through or be held	X		X	X
8. A centralized coordination and resource management point for state emergency operations		X		
9. To centralize operational activities such as district coordination, traveler information and device management during events (e.g. weather, special events, incidents)		X	X	X

States need...	North/West Passage States with Centers	North/West Passage States without Centers		
		North Dakota	South Dakota	Montana
10. Consistency across systems and operations			X	
11. To receive timely and accurate data about construction, incidents and road weather conditions		X	X	
12. To disseminate timely and accurate information about construction, incident and road weather conditions		X	X	X

4. Rural TMC/TOC Operational Concepts

After identifying the states’ needs for rural TMC/TOC operations, a series of operational concepts were identified among other rural centers throughout the country. This section presents summaries of the operational concepts to illustrate how the states’ fundamental needs could relate to the various concepts. Additional reference information is also provided for the states to make further inquiries about specific concepts as they choose to proceed with their own TMC/TOC development.

The initial operational concepts were presented in detail during a meeting held in Cheyenne, Wyoming. The primary purpose of the meeting was to review research findings and facilitate peer exchange of key practices among rural TMCs/TOCs in the North/West Passage corridor. Wyoming was chosen as the meeting location to allow a more in-depth presentation and physical tour of their **consolidated statewide** TMC operational concept. Minnesota and Idaho also presented their TMC/TOC experiences remotely via webinar during the meeting. Minnesota described their **regional** multi-center approach to statewide operations through nine centers and explained what led to MnDOT later discontinuing the approach. Idaho described the **contracted inter-agency** partnership arrangement they have with Idaho Department of Health and Welfare to provide TMC/TOC services throughout their state.

Although each of these three states has a different operational concept, they provide some of the same services. They also provide several unique services based on the needs of their state. Table 2 summarizes the services provided by each of these centers as examples of the services that may be provided by a rural TMC/TOC.

Table 2: Examples of Rural TMC/TOC Services

Service	State		
	Wyoming	Minnesota	Idaho
Conduct incident management	X	X	X
Operate ITS field equipment (e.g. CCTV, DMS, HAR, RWIS)	X	X	X
Dispatch maintenance forces	X	X	X
Dispatch freeway service patrol			X

Service	State		
	Wyoming	Minnesota	Idaho
Dispatch state police		X	X
Dispatch emergency services			X
Collect/integrate/disseminate road conditions or forecasts	X	X	X
Disseminate traveler information	X	X	X
Manage warning and active safety systems (e.g. snow gates)		X	X
Coordinate with neighboring states	X		X
Support commercial vehicle movement and inspections	X		X
Coordinate hazardous material incident response			X
Coordinate strategic national stockpile	X		
Operate variable speed limit system	X		
Manage Wyoming Authorized Travel program	X		
Manage citizen reporting program	X		X

The remainder of this section provides additional information about each of these operational concepts and then maps rural TMC/TOC needs against each of the concepts. Additional information was gathered from research and the Alaska Department of Transportation & Public Facilities (DOT&PF) statewide transportation operations center concept exploration report.

4.1. Consolidated Statewide Center

A consolidated statewide center consists of one facility typically located in a prominent geographic area of a state. The centralized approach to managing transportation needs tends to drive greater consistency in how operations are managed and how information is shared with travelers. It also offers the opportunity for one statewide point of contact for coordinating major events with other jurisdictions. Statewide centers often manage a broad range of transportation operations, some that may be needed daily and others that may only be needed seasonally or in specific areas of the state. As such, TMC/TOC staff in a statewide center requires a broad knowledge of transportation operations throughout the state to have a working context for incidents when they occur. It is also common for statewide centers to be co-located with other services such as state police, natural resources or emergency management. In a rural state, combining statewide services in one facility can optimize the investment in physical space and support relationships among agencies that often work together to manage transportation incidents.

By operating one TMC for the entire state, **Wyoming** is able to provide TMC services to areas that could not provide adequate (or any) service if operating regionally. Development for Wyoming's central TMC began in 2003 and was completed in 2008. The center is located in Cheyenne and operates 24/7. The TMC works closely with the trucking industry to share information and was constructed to allow for eventual co-location with the State Patrol. In addition to managing incidents and traveler information

statewide, the center manages a variable speed limit system and a citizen reporting system, and it also tracks nuclear waste movements.

Utah also has a consolidated statewide TMC in Salt Lake City. Their center was always planned but eventual implementation was strongly influenced by the 2002 Winter Olympics. In addition to managing incidents and traveler information, the center operates as a DOT emergency management center, tracks construction closures and restrictions, manages fiber optic communications inventory and network management, and issues AMBER Alerts.

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4.2. Regional Center

Regional TMC/TOC arrangements consist of two or more facilities located around geographic areas typically defined by DOT district or regional offices. Regional centers and the services they offer can be scaled to the size and needs that are unique to the area, such as mountain passes, high-volume commercial vehicle traffic and seasonal events. The more localized nature of a regional center also allows TMC/TOC staff to become more familiar with the communities served by the transportation system. This familiarity also supports relationships among the local law enforcement, emergency medical staff, towing operators and other stakeholder involved in managing transportation incidents. Regional centers can also allow flexibility with managing 24/7 operation as duties can be shifted from one center to another during nighttime hours of operation.

Washington has six TMCs located in Shoreline, Tacoma, Vancouver, Yakima, Spokane and Wenatchee, in addition to one seasonal center on Snoqualmie Pass. Centers operate 24/7 and help coordinate incident response, vehicle clearance, real-time traveler information and AMBER alert information. Typically, a center is staffed with two people during the day and one person at night - with is more staff in the larger urban areas of Seattle and Vancouver. Night staff is primarily radio operators who support construction maintenance and response to significant events.

The regional center model was also in place in **Minnesota** from 2000-2013. MnDOT operated eight TOCCs located in Bemidji, Duluth, Detroit Lakes, Brainerd, St. Cloud, Mankato and Rochester, in addition to the Regional TMC in the Twin Cities. The centers were co-located with the Minnesota State Patrol to better serve traveler needs on major roadways throughout the state. The State Patrol provided staff and MnDOT supported TOCC operations 24/7. The integrated centers served as communication hubs for: emergency response, enforcement, incident management, maintenance operations, traffic management, and traveler information. When the State Patrol underwent dispatch consolidation, all but two of the centers were decommissioned. The build out of the 800 Megahertz statewide radio system combined with implementation of the Next Generation 911 Emergency Services IP Network allowed the State Patrol to downsize and consolidate their PSAP resources into the remaining centers in the Twin Cities and Rochester.

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4.3. Contracted Inter-Agency Center

In the regional and statewide TMC/TOC concepts, the physical center is often owned and primarily operated by the DOT. This may not be the case for a contracted inter-agency center. In this concept, the DOT may seek another agency with an existing facility that provides similar services. The other agency could be another state function like state police, natural resources or emergency management, or they could be a local transportation department. Most often the other agency already provides some type of dispatching services which lends itself to a degree of familiarity with the transportation network, incident management and operational protocols. Under this type of contracted arrangement, the DOT may pay for additional dedicated staff from the host agency or they may arrange for designed DOT office space and staff to work in the facility.

The **Idaho** Consolidated State Communication Center is managed by the Department of Health and Welfare. The Idaho Transportation Department originally contracted with DHW in 2004 to provide nighttime dispatching services for one district and in 2011 the partnership evolved to 24/7 dispatching for all ITD districts. Staff in the center provides all ITD transportation management services, as well as several other services for state police, mountain search and rescue, fish and game and environmental quality. The partnership between DHW and ITD has provided more comprehensive management of rural travel conditions and maintenance, and it has provided a single point of coordination for traveler information.

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4.4. Virtual Center

This concept is not currently in use in any state TMC as a primary mode of daily operation. However, several statewide and regional centers use virtual TMC technology to facilitate operations during major emergency events or to operate satellite offices in areas with temporary additional needs. Virtual TMCs rely on remote access technology such as VPNs and web-based software to allow employees to perform their duties outside of a centralized physical office. For example, **Florida** has regional centers located in Pensacola, Jacksonville, Orlando, Turkey Lake, Tampa Bay, Fort Meyers, Palm Beach, Pompano, Fort Lauderdale and Miami. The centers use the virtual TMC concept to operate in the event of closure due to hurricane.

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4.5. Multistate Center

Partnering with neighboring states to offer TMC services under the multistate center model could be useful for states with limited needs or restrictive funding. Somewhat similar to the contracted inter-agency concept, this arrangement would require contracting among the states to establish administrative and operating parameters for the facility, as well as operational parameters for the services to be performed in the center. All TMC/TOC service requires coordination among a variety of agencies and jurisdictions and this concept would require another level of coordination among the participating states and agencies. The multistate center also offers the potential for driving greater consistency in operations and information shared with travelers across state borders. This could produce significant travel benefits across multistate corridors like I-90/I-94.

The states of **New Hampshire, Maine and Vermont** have a history of collaboration to deliver traveler information. Changing need recently motivated the states to collaborate on the development of a new transportation management system, traveler information system and data hub that will allow the sharing of operational responsibilities (e.g. after-hours operational support and shared control of DMS along I-95). The states worked together to develop a combined concept of operations and to issue a joint request for proposals. The new systems are under development and expected to be operational in late 2015.

Oregon and Washington also have a multistate model for managing transportation through the Portland-Vancouver area. There are two separate centers, both operated by the state DOTs, but the centers share daily traffic operations for the I-5 bridge over the Columbia River and also collaborate on incidents, construction and other major events that impact regional transportation between the two states. The agencies help each other with posting traveler information messages to DMS and HAR. They also share an application called Transport which allows them to see camera images, messages posted to DMS, ramp meters, traffic signals and incident response vehicles.

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Table 3 maps each of the rural TMC/TOC operational concepts summarized here against the foundational needs expressed by the North/West Passage states.

Table 3 Operational Concepts vs. Needs

Operational Concept	Rural TMC/TOC Needs				
	Single Point of Contact	24/7 Availability	Two-Way Event Communication	High-Level Knowledge of Available Resources	Other Considerations
4.1 Consolidated Statewide Center	Yes	Dependent on hours of operation and presence of on-call staff	Single operations center allows for increased efficiency of communication among TMC staff during event	Consolidated operations allow for centrally maintained information	Need strong observation network to decrease gap between state and local level conditions
4.2 Regional Center	No statewide, yes each center	Dependent on hours of operation and presence of on-call staff	Common systems and operating protocols among regional centers make event communication more efficient	Regional operations facilitate high levels of knowledge about local resources	Multiple centers allows for operations to be tailored to local needs
4.3 Contracted Inter-Agency Center	Yes	Dependent on hours of operation and presence of on-call staff	Location of related government agencies can significantly increase efficiency of event communication	Multiple agencies allow for broad knowledge and sharing of resources	Nurtures coordination and support between agencies
4.4 Virtual Center	Possible, based on set-up	Communication coverage and therefore connectivity can be unreliable in rural areas Dependent on availability of staff	Because communication coverage can be unreliable in rural areas, two-way communication during events could be challenging	Possibility of on-site center operations allows for potentially higher awareness of conditions and available resources	May be used for remote operations at points of need and may allow for on-site operations
4.5 Multistate Center	Yes	Dependent on hours of operation and presence of on-call staff	Requires cooperation of local agencies to deal with a TMC which may be headquartered in another state	Multistate agreement may obscure knowledge of resources, particularly localized resources	Requires high level of cooperation and information sharing Allows states with moderate needs to pool resources

5. State Action Plan Highlights

Following the peer exchange meeting that was held for this project, South Dakota, Montana and North Dakota all had further discussions within their individual agencies about next steps for the potential development of center. This section presents a brief summary of the actions taken or to be taken by each state. It is intended to help the states remain aware of each other's activities so that additional information or work may be shared, as appropriate, along the way.

Prior to the peer exchange meeting in Cheyenne, SDDOT completed a self-assessment of their Transportation Systems Management and Operations (TSM&O) capabilities. One of the recommended actions from their assessment was to develop a TMC/TOC. An example action plan based on the SDDOT assessment was shared with North Dakota and Montana as potential next steps for the states to consider in the development of a TMC/TOC. SDDOT confirmed that they will prepare of a concept of operations to support their decision for further development of a TMC/TOC. The concept of operations is expected to be completed by 2015.

NDDOT expected to develop a concept of operations for a rural TMC/TOC and to use it as a decision-making tool. Following the peer exchange meeting, NDDOT also met with the North Dakota Department of Emergency Services and State Radio. This group is in the process of updating their CAD system which gives NDDOT the opportunity to work with them to develop an automated CAD input for traveler information. The agencies may also be interested in co-located space if NDDOT chooses to proceed with developing a TMC/TOC.

MDT was interested in learning more about the TSM&O self-assessment completed by SDDOT to understand if it could give MDT further perspective on developing a center. MDT also had follow up discussions among agency leadership about the prospect of developing a center in light of new performance measures and requirements specified by the Real-Time System Management Information Program.

All three states believed there was enough interest in exploring next steps for TMC/TOC development that they are planning another peer exchange in the next several months. The three states and Wyoming belong to a regional Transportation Learning Network that would allow additional stakeholders from the agencies to learn more about rural TMC/TOC development.

6. Future Collaboration and Conclusion

Although there are unique needs for rural TMC/TOC operations, there are a number of existing resources available to support the consideration, development, implementation and operation of a center. Many of the examples used to illustrate processes in these resources are urban oriented but the processes themselves are relevant to any center. The North/West Passage states – those with and those without centers – outlined several foundational needs for rural TMC/TOC operations. These needs may be used by Montana, North Dakota and South Dakota as they further consider their options for developing centers in their states. Several operational concepts for rural TMC/TOC operations are also

used throughout the United States and those concepts were mapped against the needs identified by the North/West Passage states to offer preliminary consideration of which concepts could work best in the individual states.

This project provided updated information and facilitated the initial steps for Montana, North Dakota and South Dakota to consider further development of TMC/TOC operations within their states. Although each state will likely proceed with any further development individually, there are several project ideas being considered for the next North/West Passage work plan that could continue to support the states' efforts – individually or collaboratively.

Table 4 Excerpts from North/West Passage Work Plan 9 Project Ideas

Project Title	Project Purpose
Rural Incident Management Best Practices and Information Sharing (operations)	Document how each North/West Passage state manages rural incidents with emphasis on determining incident duration and coordinating activities across jurisdictions during an incident.
Planning for Major Events (operations)	Conduct a peer exchange style meeting to identify and plan for major events along the corridor.
Operations Task Force (operations)	To continue to meet as a task force for another year. SPECIFIC TOPICS TO BE SELECTED AFTER MAY SURVEY.
Major Event Tabletop Exercise	Conduct a tabletop exercise (via webinar) for a major event that allows states to describe their response and then evaluate the response.

The process for developing Work Plan 9 for North/West Passage will conclude following the annual meeting in June and projects would likely begin in fall 2014. These and any additional project ideas developed by the states could further support Montana, North Dakota and South Dakota directly and the rest of the North/West Passage states indirectly by improving operational coordination throughout the corridor.

7. References

¹ Concepts for Rural TMC/TOC Operations <http://www.nwpassage.info/projects/phase8/?project=8.2>

² Transportation Management Center Pooled Fund <http://tmcpfs.ops.fhwa.dot.gov/index.htm>.

³ Transportation Management Center Concepts of Operation Implementation Guide http://tmcpfs.ops.fhwa.dot.gov/cfprojects/uploaded_files/TMCConOpsImplmGuide.pdf

⁴ Freeway Management and Operations Handbook http://ops.fhwa.dot.gov/freewaymgmt/publications/frwy_mgmt_handbook/index.htm

⁵ Enhancement of Statewide Operations Concept of Operations Study http://www.westerntransportationinstitute.org/documents/reports/4W0337_ConOps_Final.pdf

⁶ Traffic Operations Center Concepts for South Dakota http://sddot.com/business/research/projects/docs/SD2005-04_Executive_Summary.pdf

⁷ Handbook for Developing a TMC Operations Manual

http://tmcops.fhwa.dot.gov/cfprojects/uploaded_files/Handbook_TMC_Ops_Manual.pdf

⁸ Primer for Handbook for Developing a TMC Operations Manual

http://tmcops.fhwa.dot.gov/cfprojects/uploaded_files/PrimerForHandbookForTMC_OpsManual.pdf

⁹ TMC Staffing and Scheduling for Day-to-Day Operations

http://tmcops.fhwa.dot.gov/cfprojects/uploaded_files/Final_Technical_Document1.pdf

¹⁰ TMC Business Planning and Plan Handbook

http://tmcops.fhwa.dot.gov/cfprojects/uploaded_files/TMC_BPG_Final.pdf

¹¹ ITS Benefits, Costs, Deployment and Lessons Learned Desk Reference: 2011 Update

[http://www.itskr.its.dot.gov/its/benecost.nsf/files/BCLLDepl2011Update/\\$File/Ben_Cost_Less_Depl_2011%20Update.pdf](http://www.itskr.its.dot.gov/its/benecost.nsf/files/BCLLDepl2011Update/$File/Ben_Cost_Less_Depl_2011%20Update.pdf)

¹² Integration of Emergency and Weather Elements into Transportation Management Centers

http://ntl.bts.gov/lib/jpodocs/reports/14247_files/14247.pdf

¹³ Impacts of Technology Advancements on Transportation Management Center Operations

<http://www.ops.fhwa.dot.gov/publications/fhwahop13008/fhwahop13008.pdf>