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FINAL

Freight Task Force, Year 2

Summary Report

Prepared for:

North/West Passage Pooled Fund

Prepared by:

CPCS Transcom Inc.

Solutions for growing economies

CPCS Ref: 16270
July 28, 2017

Client Ref: T7901-2000005413

MnDOT North/West Passage – Project 10.4: Freight Task Force, Year 2

The objective of Year 2 activities of the North/West Passage (NWP) Freight Task Force was to continue the momentum of the Year 1 work. Specifically, to 1) support the active engagement of NWP Members, 2) conduct best practice (and practical) research on project funding opportunities, 3) to help refine the truck parking concept so that it best fits NWP needs, and 4) conduct exploratory research on truck platooning in the corridor. Each of these activities is aimed at getting the coalition closer to project implementation.

Summary Report

This Summary Report represents a consolidation of findings from each of the work plan tasks.

Acknowledgments

The CPCS Team acknowledges and is thankful for the input of those consulted in the development of this Working Paper, as well as the guidance and input of representatives from NWP Freight Task Force.

Opinions

Unless otherwise indicated, the opinions herein are those of the authors and do not necessarily reflect the views of the NWP Freight Task Force.

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Cover image source: CPCS

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Acronyms / Abbreviations

ATRI	American Transportation Research Institute
AV	Autonomous Vehicles
CFIRE	Center for Freight and Infrastructure Research and Education (at the University of Wisconsin–Madison)
CRFC	Critical Rural Freight Corridors
CUFC	Critical Urban Freight Corridor
CV	Connected Vehicles
DOT	Department of Transportation
FAST Act	Fixing America's Surface Transportation Act
FASTLANE	Fostering Advancements in Shipping and Transportation for the Long-Term Achievement of National Efficiencies
FHWA	Federal Highway Administration
GHz	Gigahertz
ITD	Idaho Transportation Department
ITS	Intelligent Transportation Systems
KSDOT	Kansas Department of Transportation
MN	Minnesota
MnDOT	Minnesota Department of Transportation
MPO	Metropolitan Planning Organization
MT	Montana
ND	North Dakota
NWP	North/West Passage
OSOW	Oversize/Overweight
RFI	Request for Information
SD	South Dakota
TIGER	Transportation Investment Generating Economic Recovery
TPIMS	Truck Parking Information and Management System
TTI	Texas Transportation Institute
US	United States
USDOT	United States Department of Transportation
VWS	Virtual Weigh Station
WA	Washington
WASHTO	Western Association of State Highway and Transportation Officials
WIM	Weigh In Motion
WSDOT	Washington State Department of Transportation
WY	Wyoming

1 Introduction

1.1 Background

The North/West Passage (NWP) is a multi-state operations-focused partnership between the states of Idaho, Minnesota, Montana, North Dakota, South Dakota, Washington, and Wyoming initiated with the leadership of Minnesota DOT in 2002. These states share similar challenges with Interstates 90 and 94 serving as major passenger and commercial vehicle highway corridors, and both subject to operational challenges due in part to extreme weather conditions. Many of the operational issues are exacerbated for commercial vehicles and are related to truck parking management, traveler information, truck permitting and other operational issues.

The Freight Task Force (Task Force) was established in 2014 to help realize the NWP Corridor's vision of…

…developing effective methods for sharing, coordinating, and integrating traveler information and operational activities across state and provincial borders.

1.2 Objectives

Year 2 activities of the Task Force were pursued to continue the momentum of the Year 1 work. Specifically the activities were designed to:

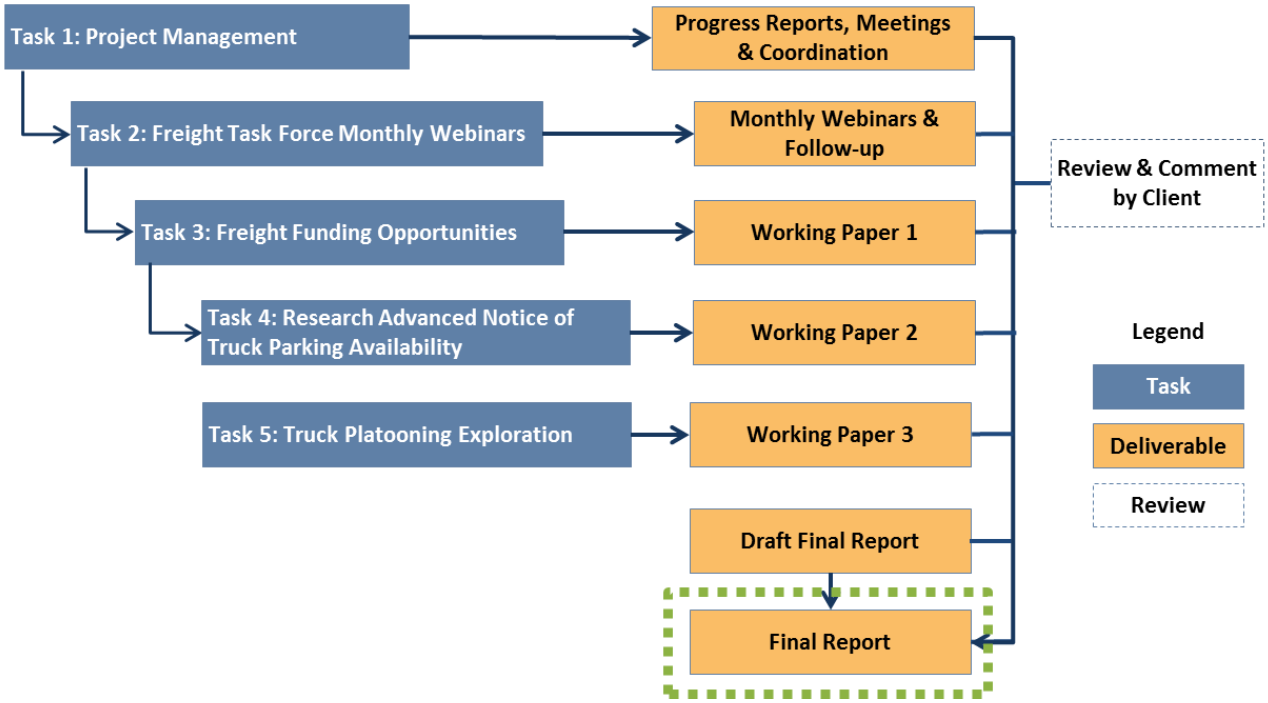
- Support the active engagement of Task Force members,
- Conduct best practice (and practical) research on project funding opportunities,
- Help refine the truck parking concept so that it best fits NWP needs, and
- Conduct exploratory research on truck platooning for the NWP corridor.

Each of these activities is aimed at getting the coalition closer to implementation of those projects that are most important to the seven NWP member states.

1.3 Project Structure

The project was conducted in five phases, as set out in Figure 1-1. This document represents the Final Report, providing a summary of all project related activities and findings.

Figure 1-1: Project Management Task Organization



Additional information on Freight Task Force Year 2 activities, including specific task deliverables, can be found on the NWP website.[1]

1.4 Limitations

Some of the findings in this report are based on the analysis of third party data. While CPCS makes efforts to validate data, CPCS cannot warrant the accuracy of third party data.

[1] "Project 10.4, Freight Task Force – Year 2", North/West Passage, https://www.nwpassage.info/projects/phase10/?project=10.4

2 Key Task: Web Meetings

Key Research Takeaway

The focus of the web meetings was current and emerging trends and best practices that are relevant to and/or have the potential to affect all NWP states. This approach sought to maximize applicability, interest, and the opportunity for future action resulting from the web meetings

The web meetings served a twofold purpose, 1) to provide information to attendees and 2) to solicit discussion and conversation between presenters and NWP member states. The output of the monthly web meetings is both a more informed task force, as well as presentations and contact information for other member states and external resources to be leveraged in the future.

2.1 About this Task

A key component of Task Force Year 2 activities were monthly web meetings focused on presenting relevant information of freight trends and best practices. The focus of the web meetings was current and emerging trends and best practices that are relevant to and/or have the potential to affect all NWP states. This approach sought to maximize applicability, interest, and the opportunity for future action resulting from the web meetings.

The remainder of this section outlines the purpose, methodology and a discussion of outcomes of the NWP web meetings.

2.1.1 Purpose

The web meetings served a twofold purpose, 1) to provide information to attendees and 2) to solicit discussion and conversation between presenters and NWP member states. The output of the monthly web meetings is both a more informed task force, as well as presentations and contact information for other member states and external resources to be leveraged in the future.

To this end, the CPCS team coordinated regular web meetings for NWP states. The CPCS team addressed the following questions when developing the web meeting topics, identifying presenters, and administering the meetings:

- What freight-related topics are of greatest interest and importance to the Task Force?
- What further productive opportunities are there for Task Force members to collaborate with each other?
- What upcoming events and other resources are available to the Task Force in advancing their goals?

2.1.2 Methodology

The Project Champion and other members of the Task Force were surveyed in order to develop a preliminary list of topics and agendas for the monthly web meetings. This preliminary screen yielded a list of topics that could provide value to the Task Force. The preliminary topics were roughly outlined to include information such as topic name, general topic description, identification of why the topic is important relevant to the NWP, and suggested presenters. The preliminary list of topics was presented to the Task Force during the introductory meeting for consensus on direction. Based on direction from member states and discussion with the Project Champion, the final list of web meeting topics was developed (see Figure 2-1 for a list of the meetings held).

2.2 Web Meetings Convened

Session content and speakers were determined through targeted topical research to ensure the latest information is being considered and presented to the Task Force. Both internal (i.e. NWP states) and external (i.e. other public and private sector stakeholders) presenters were considered to share their best practice information and perspectives. CPCS staff reached out to presenters, discussed topics for the web meeting with presenters, and administered the web both technically and by soliciting discussion from attendees.

Figure 2-1 displays the web meeting held during the project, the topic discussed, and the presenters. Additionally, the slides used by presenters can be found on the NWP website.[2]

Figure 2-1: Summary of Web Meetings Held

Month	Topic	Presenters
July 2016	Introduction to Freight Task Force Web Series, Topic Solicitation	Bob Koeberlein, ITD Erika Witzke, CPCS
August 2016	FAST Act Freight Provisions Overview	Jeff Purdy, FHWA Chip Millard, FHWA
September 2016	Freight Data	Donald Ludlow, CPCS Dan Murray, ATRI
October 2016	Truck Parking	Davonna Moore, KSDOT John Tompkins, MnDOT Dan Murray, ATRI
November 2016	Connected Trucks (I-80 Pilot)	Tony English, TriHydro
January 2017	Toward Zero Deaths	Kristine Hernandez, MnDOT John Milton, WSDOT
February 2017	Truck Platooning 101	Steve Boyd, Peloton Technologies Geoff Johnson, Peloton Technologies

[2] "Project 10.4, Freight Task Force – Year 2", North/West Passage, https://www.nwpassage.info/projects/phase10/?project=10.4

Month	Topic	Presenters
March 2017	State Freight Plan Best Practices	Ernie Perry, University of Wisconsin CFIRE
May 2017	NWP Annual Meeting *(select invitations)*	Erika Witzke, CPCS Jeff Marker, ITD Beverly Kuhn, TTI
July 2017	Truck Platooning Roundtable *(select invitations)*	Erika Witzke, CPCS Alex Marach, CPCS
July 2017	Summary of Freight Task Force Year 2 Activities	Erika Witzke, CPCS Alex Marach, CPCS

The following list is a compilation of topics of discussion during web meetings. Some of these topics may warrant further exportation by the NWP Freight Task Force.

Data

- Interest in the best practices on collecting and using data
- Interest in using dynamic data to see where trucks are going in response to incidents
- Concern over the governance of data and the DOTs role in protecting data

Connected Vehicles (Types discussed vehicle-to-infrastructure and vehicle-to-vehicle)

- General interest in platooning, with NWP states at different stages of exploration
    - Some states are at initial stages of exploration (some states with political support for platooning and others that are in preliminary discussions)
    - WY has a grant for connected vehicles
    - Other states are in discussions aimed at advancing platooning demonstrations
- Some confusion about connected vehicles (CV) and autonomous vehicles (AV) being the same, suggests need for legislatures and other interested parties are being educated
    - AVs and CVs are not the same, they complement each other in some ways, but in others they are different and have different functionality/abilities
- Technical concerns about CVs
    - Competition or interference with the 5.9 GHz signal
    - Optimal distance between platooned trucks
    - What about the impact of snow clouds kicked up by two trucks platooning
    - Weather's effect on platooning
    - Mountainous terrain may present problems for platooning on some corridors

  - Establish oversight of connected vehicles
    - Opportunity to set up a privileged status permit for connected vehicles that could be revoked if needed
  - Impact of weather and mountainous topography
- NWP interest in a CV demo
  - Recognize that states are at different stages in CV exploration (some states need policy changes to allow connected and there are concerns about safety)
    - Figure out regulation first and then think about a demo
  - Use state borders to involve at least two states and keep it under NWP umbrella,
    - NWP involvement could aid in addressing border issues as they occur
    - Wouldn't want demo to be a burden to hosting states
  - Include outreach to academic community, especially on research objectives

Oversize/Overweight (OSOW)

- Topic of "bridge hits" was brought up as a topic of interest as they cause delays for travelers and increase cost to the DOT
  - Potential for hits to be prevented through education, enforcement and technology applications
- Topic of OS/OW is not as useful to the Western Association of State Highway and Transportation Officials (WASHTO) states, as they have explored this for years
  - Topic related to implementation of OS/OW solutions may be more beneficial
- Topic of bridge analysis for weight issues is of interest, there is an issue where loads could get permitted in ND but not MN
- Topic of coordinated permitting between states could be of interest

Freight Planning

- Interest in guidance on the freight network and critical rural freight corridors (CRFC) and Critical Urban Freight Corridor (CUFC) designation
- Fixing America's Surface Transportation (FAST) Act compliance for state freight plans
- Defining a "freight project"
- Work across state borders in developing their freight plans

- Creative ways to work together on grant
- Meeting Federal performance measure requirements
- How States can consider scaling freight plans down to rural and MPO areas

Truck Parking

- Interest in the outcomes of Midwest Tuck Parking Information and Management System (TPIMS)
- Approach to surveying the trucking industry on truck parking

Safety

- Each State is a leader in this field and are working toward incorporating trucks in their safety data analysis and mitigation activities
    - The attendees expressed interests and asked questions related to education, partnership, and involvement of media in safety campaigns.

3 Key Task: Freight Funding Opportunites

Key Research Takeaway

The projects that the NWP Freight Task Force identified in 2014 include a mix of freight operations-related research and implementation activities. While, NWP Freight Task Force projects are well suited for a variety of state and Federal funding sources, they may not qualify for grant programs such as Fostering Advancements in Shipping and Transportation for the Long-Term Achievement of National Efficiencies (FASTLANE) due to their comparatively low project cost in relation to the grant minimums. Additionally, technological advancement and economic trends, as well as ongoing state and national research, make it necessary to re-evaluate the need for, state's interest in, and the implementation status of that slate of NWP priority projects. As such, the following opportunities for next steps were identified:

- **Update or Remove Irrelevant Projects** – Projects may not be relevant anymore or may need to be updated based state or Federal research that is underway or already completed.
- **Identify New Projects** – NWP states should generate new research projects to ensure the list of project options presents state of the art application of technology and addresses current and emerging needs and issues.
- **Align Projects with Funding** – NWP states should work to identify corridor wide project proposals and proactively plan to better position the NWP to compete in future grant application cycles for larger, more impactful projects, specifically on grant programs such as TIGER and FASTLANE.
- **Transition to Implementation** – The NWP should continue developing research, but should place greater emphasis on transitioning that research to implementation (with a deliberate focus on the potential for competitive grant funding noted above). The Freight Task Force could serve as the venue to discuss where implementation will provide the greatest benefit.

The next steps identified by the project team will position the NWP to take advantage of future grant opportunities, as well as ensure that NWP projects are focused on high impact research and projects.

3.1 About this Task

3.1.1 Purpose

The purpose of this task was to provide insight into the availability of funding and partnership opportunities for the Task Force to advance projects identified in 2014. Specifically, this task was intended to:

- Provide an update on freight projects that were identified as priorities during Year 1 Task Force activities,

- Indicate what projects should be continue to be considered as priorities the Freight Task Force,
- Identify which projects the Task Force may have a future coordination or facilitation role, and
- Align potential funding mechanisms to advance priority projects in the short term.

3.1.2 Methodology

Task research was conducted using three types of input: 1) review of Year 1 activities which included identification of nine priority projects; 2) a broad survey distributed to NWP Freight Task Force members; and 3) one-on-one follow-up consultations with NWP member states on their progress and interest in advancing these projects. In addition to soliciting input on the projects, the CPCS team identified opportunities to fund NWP projects.

3.2 Freight Task Force Projects

In 2014, the NWP Freight Task Force undertook an effort to identify and prioritize projects that could improve the safety and efficiency within the NWP. Now, three years later, technological advancement and economic trends, as well as ongoing state and national research, make it necessary to re-evaluate the need for, state's interest in, and the implementation status of that slate of NWP priority projects.

Figure 2-1 displays the projects identified in 2014, as well as the results of a survey used to rank the projects. The top three priority projects in 2014 were: 1) Pilot Escort Certification and Reciprocity Universal Standard; 2) Advanced Notice of Truck Parking Availability – Phase 2; and 3) Electronic Display of Oversize/Overweight Permits.

Figure 3-1: 2014 Project Prioritization Survey Results

Project	Average Score	Rank	Estimated Cost
Pilot Escort Certification and Reciprocity Universal Standard	3.125	1	$75-100K
Advanced Notice of Truck Parking Availability – Phase 2	3.125	2	N/A
Electronic Display of Oversize/Overweight Permits	4	3	$50-70K
Pursue a "Toward Zero Deaths" Commercial Vehicles Safety Campaign	4.25	4	$75-100K
NWP Virtual Weigh Station Initiative	5	5	$50K
Oversize/Overweight Permitting Uniformity (Mid-long term)	5	6	$150K
Calibrate Downstream WIM Scales with Permanent Scale Data	5.75	7	$75-100K
Model Legislation for Autonomous Commercial Vehicle Operation	6.875	8	$25K
Multistate Commercial Vehicle Platoon Demonstration (Mid-long term)	7.875	9	$250K

Source: Technical Memorandum 1: Freight Task Force Work Plan, North/West Passage, October 2014.

A survey conducted in early 2017 asked NWP member states to update their preferences related to these priority projects. The results, shown in Figure 3-2 indicate if a NWP member state has an active, planned (and will be funded and underway within next five years), has

interest (but no current funding), or has no interest (or funding) in the priority projects. Noteworthy are the number of states that are actively implementing priority projects, but are not necessarily coordinating with other NWP states, for example related to the Toward Zero Deaths Campaign. And, while a different approach was used to examine these projects in 2017 (not a ranking approach, as was done in 2014), the survey showed that projects previously ranked as high priorities, have lower interest among stakeholders today. For example, Oversize/Overweight Permitting Uniformity which ranked sixth in 2014, is arguably a project with greatest interest due to the number of active, planned (and will be funded and underway within next five years), and has interest (but no current funding) responses.

Figure 3-2: Level of Activity and Interest in Each Project

Project	Active	Planned	Interested	Not Interested
Oversize/Overweight Permitting Uniformity	4	1	1	0
Electronic Display of Oversize/Overweight Permits	3	0	1	1
Pursue a “Toward Zero Deaths" Campaign	4	0	1	1
Pilot Escort Certification and Reciprocity Universal Standard	2	0	2	2
Calibrate Downstream WIM Scales with Permanent Scale Data	2	0	2	2
NWP Virtual Weigh Station Initiative	1	0	4	1
Model Legislation for Autonomous Commercial Vehicle Operation	1	0	3	2
Advanced Notice of Truck Parking Availability – Phase 2	1	0	5	0
Multistate Commercial Vehicle Platoon Demonstration	0	0	4	2

Source: CPCS Survey of NWP States. Note: South Dakota did not respond to the survey, and Idaho did not respond to “Electronic Display of Oversize/Overweight Permits.” More recent information on NWP perspectives on Model Legislation for Autonomous Commercial Vehicle Operation and Multistate Commercial Vehicle Platoon Demonstration is provided in Section 5.

While each of the projects identified in 2014 continues to have some level of interest by one or more NWP member state, they don’t all require or warrant the same level of involvement by the Freight Task Force. In some cases, there is a misalignment between the readiness of NWP states to implement project, with some state having already implemented and others at only the initial stages of research. In other cases, regional or National organizations are taking a lead role, making any efforts by the NWP redundant or counterproductive.

3.3 Opportunities for Funding NWP Projects

Based on their intended objectives, NWP Freight Task Force projects are well suited for a variety of state and Federal funding sources. In most cases NWP states have not and are not planning on directly allocating state or Federal funding to advance NWP Freight Task Force projects. Therefore, in most cases the NWP pooled fund or other outside sources of funding, such as competitive grant programs, will have to be used. At the same time, NWP Freight Task Force projects may not qualify for grant programs such as Fostering Advancements in Shipping and Transportation for the Long-Term Achievement of National Efficiencies (FASTLANE), on the basis of their comparatively low project cost in relation to the grant minimums (in some cases $5 million, $25 million, or more).

Taking the survey, ongoing research, and limits on funding into account, the CPCS team identified projects with both NWP interest and current state of implementation that makes sense for NWP Freight Task Force to take an active role in advancing research or implementation. The projects demonstrating NWP interest and have a role for the NWP are as follows:

- **Pursue Toward Zero Deaths Commercial Vehicle Campaign** – The Toward Zero Deaths Commercial Vehicle Campaign project is estimated to take 12 months, with projected costs between $50,000 and $100,000. The project is general research on lessons learned in the implementation of Toward Zero Deaths and the development of specific strategies and marketing materials. This project is best funded through the NWP pooled fund. Subsequent outputs or corridor wide initiatives using technology or other means could be eligible for federally allocated funding and grants. On a state-by-state basis, Toward Zero Deaths activities could be funded through the Highway Safety Improvement Program. The Highway Safety Improvement Program projects or strategies must be included in the state's Strategic Highway Safety Plan, requires additional lead time to add lessons learned and initiatives to those documents.
- **North/West Passage Virtual Weigh Station Initiative** – The expected cost of the Virtual Weigh Station project ranges from $20,000 to $50,000. The research focus of the Virtual Weigh Station project makes it most likely to be funded by the NWP pooled fund, but state or federal research programs could also fund the project. Subsequent phases of this research focused on implementation could be funded by Federal surface transportation programs depending on the need and intended purpose of the project. Additionally, Federal Motor Carrier Safety Administration funding sources such as the Motor Carrier Safety Assistance Program and the Innovative Technology Deployment Program may present opportunities for funding subsequent steps on the VWS Initiative.
- **Calibrate Downstream WIM Scales** – Phase I of the project is expected to take 12-18 months with costs ranging from $75,000 to $250,000, depending on research tasks. Given the research focus of the WIM project, Phase 1 is best funded through the NWP pooled fund, though admittedly this may stretch the resources of the fund.

Note, the NWP is currently conducting research on three projects, 1) The Model Legislation for Autonomous Commercial Vehicle Operations; 2) Advanced Notice of Truck Parking Availability – Phase 2; and 3) Multistate Commercial Vehicle Platoon Demonstration. As the results of those efforts are finalized, the future role of the NWP may be expanded to also include these topics.

3.4 Conclusions and Next Steps

The findings presented in this Working Paper have revealed several next steps the NWP should consider as it works to implement projects that enhance the safety and efficiency of corridor wide operations. Noteworthy is the opportunity to re-evaluate the priority projects and examine ways to redefine and combine project concepts to align with and become eligible for Federal grants. A successful example of this approach is the eight Midwest states that

jointly pursued and secured a $25 million Transportation Investment Generating Economic Recovery (TIGER) grant to provide truck parking information within the eight states (TPIMS). Suggested next steps for the NWP include:

- **Update or Remove Irrelevant Projects** – Projects in the 2014 priority listing may not be relevant anymore or may need to be updated based on state or Federal research that is underway or already completed.
- **Identify New Projects** – Incorporating the current state of the practice, NWP member states should generate new research projects to ensure the list of project options presents state of the art application of technology and address current and emerging needs and issues.
- **Align Projects with Funding** – Using the information provided on the opportunities for funding NWP freight projects, specifically on grant programs such as TIGER and FASTLANE, the NWP should work to identify corridor wide project proposals that link multiple projects together, that today are disconnected. Proactive planning could better position the NWP to compete in future grant application cycles for larger, more impactful projects.
- **Transition to Implementation** – The NWP should continue developing research, but should place greater emphasis on transitioning that research to implementation (with a deliberate focus on the potential for competitive grant funding noted above). The Freight Task Force could serve as the venue to discuss where implementation will provide the greatest benefit, and to guide where the shift to implementation should be focused.

4 Key Task: Research Advanced Notice of Truck Parking Availability

Key Research Takeaway

Providing adequate parking, information on parking options, and insight into whether or not parking is available or full is important for the safety of truck drivers and the overall transportation system. Public and private sector stakeholders were engaged to understand the need for truck parking and information from those who conduct business in the NWP on a daily basis. Eighteen stakeholders were consulted representing a mix of trucking roles and geographies within the NWP region.

While the NWP region does not have the widespread truck parking challenges found in other parts of the US, there are three key areas of need:

- Additional truck parking (primarily in Seattle and Twin Cities, with select rural areas also identified),
- Information on truck parking facility locations and amenities throughout the NWP region, and
- Information on truck parking availability (primarily in Seattle and Twin Cities).

Each state, urban or rural area in the NWP has the ability to take steps on their own to address these needs. However, building on concepts used by the Midwest Truck Parking Information Systems program, which has roots in the early efforts led by MnDOT, it is recommended that the next steps for NWP states are incremental and are done in partnership with each other.

4.1 About this Task

4.1.1 Purpose

The purpose of this task was to conduct best practice research for the Task Force and provide guidance on implementation of a truck parking information system in the NWP. Specifically, Task 4 sought to address the following questions:

- What truck parking information systems are available and what are their strengths/weaknesses?
- What are key public and private sector stakeholder perspectives on truck parking information?

- What components of truck parking information systems should be implemented in the NWP and how can this most productively and affordably be done?
- How can truck parking availability be incorporated in the NWP website for disseminating information?

4.1.2 Methodology

Task research was conducted using input from two processes: 1) a review of literature on truck parking trends and technology, and 2) consultations with eighteen (18) truck-related stakeholders in the NWP member states.

The literature review helped place the NWP in a national context and enabled a status update on truck parking projects underway. Phone consultations identified specific parking issues in the region as well as potential solutions to identified issues.

4.2 About Truck Parking and the Need for Information

The majority of freight tonnage on the transportation system is carried by trucks – over 18 billion tons of freight in 2015, with an expected increase of 27% in the next 20 years.[3] This increase in truck tonnage will translate into an increased number of trucks on the road – each requiring safe and convenient places to pull off the road to eat, rest, comply with hours-of-service requirements, wait out traffic, wait until their delivery time, and for other purposes.

Providing adequate parking, information on parking options, and insight into whether or not parking is available is important for the safety of truck drivers and the overall transportation system. If drivers cannot easily find safe parking, they may park in inappropriate areas such as highway ramps and shoulders, where they are a hazard to traffic, and where their heavy trucks may damage lightly-paved shoulders. Alternately, drivers may park in empty commercial or industrial properties, or on local streets, where they may be a nuisance to local residents, or place themselves in an unsafe situation. This is most clearly illustrated by the tragic loss of life by a truck driver who parked in unsafe conditions and prompted development of Jason's Law. This law requires USDOT/FHWA to evaluate the capability of each state to provide adequate parking and rest facilities for trucks (among other objectives), and has resulted in the quantification of the most troublesome areas for parking in the US – including for the NWP member states.

Per the USDOT/FHWA report the NWP states as a whole do not have an acute shortage of truck parking space. Washington ranks as the NWP state with the least available truck parking spaces per 100,000 vehicle miles traveled, but it is the only NWP state in the bottom half of national ranking. Montana ranks 1st for parking availability nationally, and Wyoming and Idaho rank 3rd and 6th, respectively. In all cases, nationally and within the NWP, the majority of truck parking spaces are provided by the private sector.

[3] CPCS analysis of Freight Analysis Framework, Federal Highway Administration, 2017

The American Transportation Research Institute (ATRI) conducted a study to also assess parking challenges from the driver perspective. Drivers noted they "gave up" an average of 56 minutes of available drive time per day by choosing to park early rather than risk not being able to find parking down the road. It was estimated that the daily forfeit of this hour of driving due to parking concerns reduces an individual driver's productivity by 9,300 revenue-earning miles annually – which equates to lost wages of $4,600 annually, or about 10% of a driver's wages.

4.3 Truck Parking Information Systems and Lessons Learned from Implementation

Truck parking information systems use a variety of detection and communications technologies to provide information to truckers in advance of when parking is needed so they can make informed decisions. Examples of these systems include variable message signs that display parking availability, or mobile applications that "crowd source" parking availability information from participating truckers. Truck parking information systems are in development or deployment stages throughout the US including in NWP member state Minnesota. The experiences of those emerging systems, provide key lessons for the NWP as they consider next steps for the corridor. Best practices for the NWP to consider include:

- To achieve optimum outcomes in meeting and smoothing parking demand, broad coverage across a long corridor is desired. This may require multiple states to cooperate.
- For multistate projects, designating a single project manager will simplify administrative processes and make collaboration easier.
- Designing a consistent system-wide user interface (signs, websites, mobile device applications) while allowing individual states to select their own data collection technology can make parking systems collaboration more attractive to DOT administration.
- Parking information systems are most suitable in areas where parking demand approaches, but does not exceed parking capacity; they may be less effective in urban areas where demand is higher than capacity.

Truck parking information systems are not a one-size-fits-all solution. Each geography must consider the appropriate application based on identified needs. As part of developing this working paper, stakeholder perspectives were considered to complement USDOT/FHWA and ATRI research to uncover any nuances the NWP region may experience.

4.4 NWP Stakeholder Perspectives

Both public and private sector stakeholders were engaged to understand the perspectives and the need for truck parking and information from those who conduct business in the NWP on a daily basis. Eighteen stakeholders were consulted representing a mix of trucking roles and geographies within the region. Figure 4-1 shows locations of stakeholders consulted and portions of the corridor with identified parking problems.

Figure 4-1: Stakeholders, Cities, and Noted Parking Issues

Source: CPCS based on stakeholder consultations

The map shows how parking problems were most frequently mentioned in relation to the metropolitan areas of Seattle and the Twin Cities. Occasional problems were noted in three general areas: 1) I-90 in Idaho and eastern Montana, 2) I-90 in southwestern Montana, Wyoming, and western South Dakota, and 3) I-94 from Fargo to central Minnesota. Problems around Ellensburg, WA were associated with "spill over" parking congestion in the Seattle region.

The problem associated with metropolitan areas was a consistent lack of parking, while problems associated with more rural areas were congested parking in select areas (like western South Dakota and eastern Wyoming, which are a one-day drive from large hubs like Chicago), long distances between parking, and temporary parking shortages associated with winter storm road closures.

Additionally, the consultation found that parking information systems were a commonly suggested improvement for metropolitan Seattle and the Twin Cities, with the caveat that more parking spaces were needed overall. Two-thirds of stakeholders do not believe there are parking problems in non-urban areas of the NWP region. And, information improvements such as static signage listing parking facilities could be important for all portions of the NWP, but the type of needed information varies by location. Potential information solutions for urban and rural areas are listed in Figure 4-2.

Figure 4-2: Information Solutions

	Rural (no parking shortages)	Urban (parking shortages observed)
Needed Information	Location of parking Amenities at parking locations Weather conditions Distance to next parking facility	Real-time parking availability Local parking regulations / rules
Communication Solutions	Fixed signs at exits Printed maps and visor cards Website with reference info 511 service Mobile applications with reference info	Parking Systems: • Variable signs • Mobile applications • Website • 511 service Reservation services
Relative Cost	Low, basic or no infrastructure required	Moderate, ITS infrastructure required

4.5 Conclusions and Next Steps

While the NWP region does not have the widespread truck parking challenges found in other parts of the US, there are three key areas of need, listed below. These areas of need, and their potential solutions are compared in Figure 4-3.

- Additional truck parking (primarily in Seattle and Twin Cities, and select rural areas),
- Information on truck parking facility locations and amenities throughout the NWP region, and
- Information on truck parking availability (primarily in Seattle and Twin Cities).

Figure 4-3: Potential Deployments by NWP Geography

	I-90: Seattle to Ellensburg, WA	I-90: Coeur d'Alene to St. Regis, MT	I-90: Billings, MT to Rapid City, SD	I-94: West-Central MN to WI border	I-90 and 94: all other sections
Area Type	Urban and Rural	Rural	Rural	Urban and Rural	Rural
Need Additional Truck Parking	Yes	Possibly, further study needed	Possibly, further study needed	Yes	No
Need Additional Information on Truck Parking Options	Yes	Maybe	Maybe	Yes	No
Need Truck Parking Availability Information	Yes	Maybe	Maybe	Yes	No
Deployment	Full TPIMS	Truck Parking Map, Website	Truck Parking Map, Website	Full TPIMS	Truck Parking Map, Website

Each state, urban or rural area in the NWP has the ability to take steps on their own to address these needs. However, building on concepts used by the eight-state Midwest Truck Parking Information Management System (TPIMS) initiative, which has roots in the early efforts led by MnDOT, it is recommended that the next steps for NWP states are incremental and are done in partnership with each other. The incremental steps include:

1. Establish a project champion,
2. Inventory truck parking facility location and amenity information and develop a corridor-wide parking map,
3. Provide a website that houses truck parking facility location and amenity information by adapting the existing NWP traveler information site,
4. Confirm the need for truck parking availability information and agree on future partnership,
5. Conduct follow-up studies, and
6. Continue to track on-going TPIMS deployments to gather best practices.

Each of these steps is described more fully below. These steps are not necessarily listed sequentially and do not need to occur independent of each other – they are synergistic and can occur in parallel, as staff and funding resources allow.

First, it is recommend that a **project champion** be established to lead and follow through with recommendations. As the NWP Task Force already has a formal structure that designates state and staff leads for various topics, it is recommended that this structure be followed and a lead for future truck parking and information activities be formally designated.

Second, as it was determined that truck drivers could benefit from better parking facility location information across the corridor, it is recommended that the NWP Task Force **inventory and publish truck parking facility location and amenity information** for the entire NWP corridor. The NWP Task Force should lead an initiative to collect, synthesize and publish this information as a future Task Force activity on behalf of NWP member states. Washington, Wyoming and Minnesota have already done some legwork to understand assets within their borders, so this effort would include a combination of collecting already existing information, filling in gaps with new data collection where facilities have not been inventoried, and synthesizing all results in a single place (static map). A static map will enable truck drivers to be better aware of existing facilities and some of the perceived parking shortages (e.g., between Rapid City, SD and Billings, MT) may be quelled. However, development of this resource may also confirm to NWP member states where truck parking shortages do, in fact, exist.

Third, a static, printed map could be provided to state trucking associates to distribute to their members, or posted at key truck stops in the NWP. However, a cost effective way to best manage updates and information dissemination is to **publish on the web** the truck parking

facility location and amenity information. The NWP Task Force already has a website of information related to NWP led initiatives that could serve as a repository for individual state truck parking maps, or a synthesized, NWP truck parking facility map. The current NWP website is not heavily trafficked, and it does not have a URL that would easily attract potential users of truck parking information. A dedicated webpage(s) within the NWP website with a unique URL (e.g., "North West US Truck Parking Facilities Information") should be created to house all truck-parking related information. Individual state trucking associations and DOTs can direct truckers to this NWP website (e.g., via a link from their web-based truck permit sites); the NWP can provide links to member state information in-kind. Initially this facility information can be provided in static form, but as additional information is available (e.g., parking availability) this website maybe enhanced to enable truckers to query and/or have information pushed to them directly, as they request.

Fourth, the NWP Task Force should **work with member states to consider and confirm these findings and agree on future partnership** (Figure 4-3). While the need for truck parking availability information has been determined to be centered in the urban areas of Seattle and the Twin Cities, it should not be assumed that states where information needs have not been identified are not interested in continued partnership on related activities. As the NWP is focused on corridor-wide operations, all states have a potential role in collecting and disseminating information to system users.

Fifth, there are several **next-step exploratory activities** the Task Force should consider to further refine the direction the NWP takes related to truck parking and availability information. These next steps are generally geographically focused and include:

- Washington – conduct a study of the feasibility of TPIMS in and around Seattle. This step could be best led by WSDOT, as compared to the NWP Task Force.
- Minnesota – ensure that the system being deployed as part of the Midwest initiative is inclusive of/provides sufficient information for trucks transiting to/from points west of the state.
- All NWP States – study possibility/feasibility of creating parking in remote or underserved areas (the inventory developed in Step 2 will inform where these may be needed).

And last, the NWP should continue to **track on-going TPIMS deployments** in the Midwest, Florida and other localities to gather best practices that may be applied to a future NWP TPIMS. This could include 1) approach to developing a corridor-wide "brand" for truck parking information that encapsulates messaging both online and in the field (e.g., common logo/name, roadside signage, etc.), 2) approach to maintaining a multi-state partnership, 3) approach to deploying in an ever-evolving technology environment, and 4) system performance and effectiveness tracking.

5 Key Task: Truck Platooning Exploration

Key Research Takeaway

Throughout the US and in Europe, truck platooning demonstrations are being considered and legislation advanced to enable their use in the "real world." Two demonstrations are particularly relevant to NWP discussions on advancing a truck platooning demonstration: 1) The Dutch-led European Truck Platooning Challenge had the goal of facilitating a multi-national harmonized approach to developing truck platooning regulations and infrastructure in Europe (an effort that would be required across multiple states in the NWP) and 2) the Texas Transportation Institute (TTI) efforts in Texas, while to-date have been held on a closed course, will seek to demonstrate the technology in corridors similar to those of the NWP beginning in April 2019.

Since 2014, the NWP has discussed the potential for future research related to developing model legislation for AV/CVs in the corridor, as well as conducting a truck platooning demonstration. To further explore logical next steps for the NWP, on July 12, 2017, a roundtable discussion of NWP member states was convened to gauge interest in truck platooning in the I-90/94 corridor. Participants during that discussion indicated that the NWP could serve as a unique demonstration location for truck platoons in that – the corridor states have a history of partnership on operations, the multi-state nature of the corridor could serve as a test bed that has not yet been explored in a US demonstration, the corridor presents weather and terrain challenges, and states are actively taking steps on their own that could be enhanced through partnership with others. It was recommended that the NWP Coalition should continue to serve as a lead in next steps.

5.1 About this Task

5.1.1 Purpose

The purpose of this task is to conduct exploratory research on truck platooning technologies and initiatives to provide a basis for the NWP in assessing their own next steps. Specifically, this task was intended to:

- Educate the NWP members on truck platooning activities underway nationally and internationally.
- Provide information to facilitate discussions with NWP members so that interest in advancing a truck platooning project can be assessed.
- Identify an action plan for next steps to advance a platoon demonstration, or other related activities.

5.1.2 Methodology

This research was undertaken by 1) conducting a desk scan of national and international truck platooning technology and initiatives; 2) coordinating a NWP member to attend a truck platooning demonstration and conducting a follow-up interview on his perspectives on applicability to the NWP and next steps; 3) conducting two web meetings focused on providing NWP members information on truck platooning; and 4) conducting a roundtable discussion with NWP members on their thoughts on next steps for the corridor related to truck platooning.

5.2 Truck Platooning Demonstration

Throughout the US and in Europe, truck platooning demonstrations are being considered and legislation advanced to enable their conduct in the "real world." Two demonstrations are particularly relevant to NWP discussions on advancing a truck platooning demonstration, one in Europe and one in Texas, as further described below.

5.2.1 European Truck Platooning Challenge

The Dutch-led European Truck Platooning Challenge had the goal of facilitating a multi-national harmonized approach to developing truck platooning regulations and infrastructure in Europe (an effort that would be required across multiple states in the NWP).

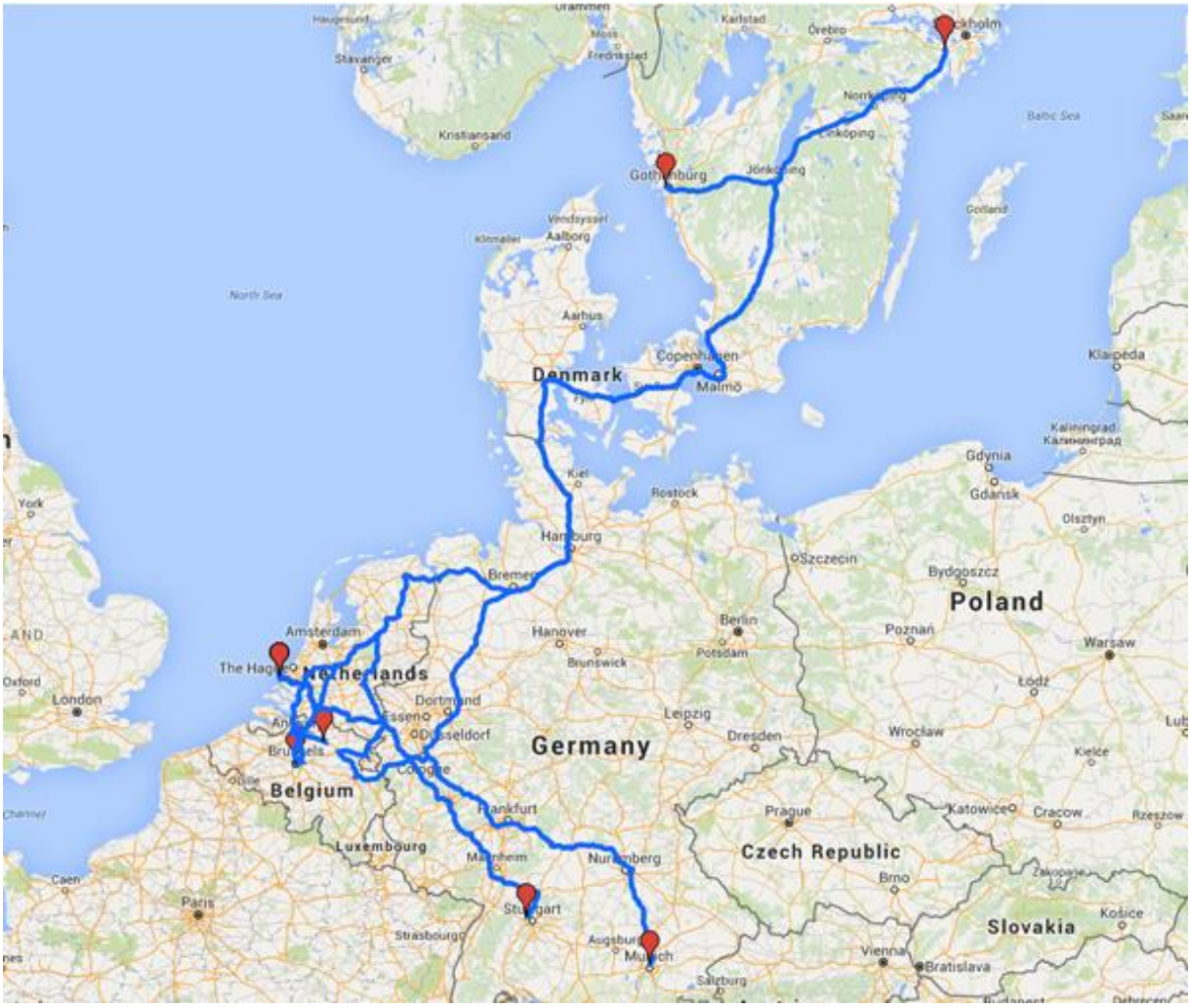
In April 2016, six truck manufacturers (Scania, Volvo, Daimler (Benz), MAN, IVECO, and DAF) and five nations (Sweden, Denmark, Germany, Belgium, and the Netherlands) participated in a region-wide demonstration of truck platooning. A truck platoon from each manufacturer drove to the Port of Rotterdam in the Netherlands. Figure 5-1 shows the routes used in the demonstration.

To accommodate the decreased following distance necessary for platooning, national and regional governments along the routes issued temporary permits for platoon vehicles, which allowed for a minimum following time between trucks of 0.5 to 1.3 seconds. A total of 19 transportation regulation exemptions were issued by European nations for the Challenge.

Interviews with the eighteen drivers in the platoons revealed some common responses:

- Participating truckers believed that truck platoons were more troublesome for other road users than for truckers themselves: the public often did not immediately recognize the platoon's size, and were hesitant to pass a long line of trucks.
- Re-forming platoons after traffic cut in between platooned trucks was time consuming.
- In complex situations, drivers "decoupled" from the platoon on their own, even if it was not required.

Figure 5-1: European Truck Platooning Challenge Routes



Source: European Truck Platooning Challenge. 2016

Four areas for future harmonization efforts were identified by the project:

1. **Drivers:** for the demonstration, truck drivers had to be employed by the manufacturer of the truck they drove (Volvo, Daimler, etc.), and following trucks in the platoon had to have a co-driver. These requirements were considered barriers to participation for future field tests, and barriers to adoption of platooning technology, as the requirement for co-drivers would increase labor costs.

2. **Vehicle characteristics:** identification requirements for platooned vehicles varied between countries. For example, some nations required different combinations of platoon notification placards and flashing lights.

3. **Load:** truck weight restrictions varied between nations. Some of the 19 exemptions issued for the demonstration imposed a weight limit of 20 metric tons per truck, and some exemptions required platoons to either increase following distance, or decouple before

crossing weight-sensitive bridges. Project leaders concluded that platoons' wear and tear on pavements and bridges warrants further research.

4. **Settings of the platooning system:** a greater understanding of whether or not platooning system settings (ex: following distance) are easily changed when crossing borders. If some settings are not flexible, those topics must be harmonized across nations.[4]

5.2.2 Texas DOT

The Texas A&M Transportation Institute (TTI), FHWA, and Texas DOT collaborated to host a platoon demonstration in July 2016. This two-truck demonstration was hosted on a closed track, and featured technology developed by multiple private-sector partners. Unlike most other demonstrations conducted in the US (most notably by Peloton), which only control acceleration and braking, the TTI demonstration allowed for the following trucks to operate autonomously, both steering, and speed were controlled with no driver intervention. As part of the demonstration, an autonomous truck followed a human-controlled truck through lane changes, speed changes, and figure-eight maneuvers.[5] This demonstration was the first US demonstration where following trucks followed the steering actions of a human-controlled lead truck.

The TTI project has just entered Phase 2 of a three Phase project. While demonstrations to date have been on a closed course, Phase 3 seeks to conduct a "real world" demonstration in corridors that have the following requirements. Corridor stretches in the NWP could very well satisfy these requirements:

- 4-lane, rural interstate highways
- Low AADT
- High truck percentage, at least 15% of AADT
- Relatively long stretches of highway between urban centers
- Posted speed limit $\geq$ 65 mph

The TTI Phase 3 activities are expected to begin after Phase 2 is complete in April 2019.

TTI has hosted demonstrations to continue to educate state decision makers on platooning technology and its' benefits. One such demonstration was hosted on May 5, 2017 in conjunction with the Texas A&M Transportation Technology Conference in College Station, TX. One NWP member state attended the demonstration in order to bring further understanding of the project to the coalition.

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[4] "Lessons Learnt." European Truck Platooning Challenge. 2016.
[5] "Follow the Leader: Two-Truck Automated Platoon Test is a Winner." Texas Transportation Researcher. 2016. https://tti.tamu.edu/2016/12/01/follow-the-leader-two-truck-automated-platoon-test-is-a-winner-2/

5.3 Truck Platooning in the North/West Passage

During NWP Freight Task Force Year 1 (2014) both autonomous and connected vehicles were identified as areas for potential future research. During the course of conducting Freight Task Force Year 2 (2017) activities – which, in part, aimed to confirm research and implementation priorities for the corridor – AV/CV generally, and as applied to commercial vehicles specifically, received wide interest from most states.

Four research initiatives have been identified for further study by the NWP and are in various stages of advancement: 1) Day One Activities to Prepare for Connected and Automated Vehicles (on-going), 2) Model Legislation for Autonomous and/or Connected Vehicle Operations (expected, 2017/18), 3) Multistate Commercial Vehicle Platoon Demonstration (awaiting research results), and 4) Expanded I-80 Connected Vehicle Pilot (not funded)

This truck platooning research relates specifically to two of those advancements, described below.

5.3.1 Proposed North/West Passage Research

Model Legislation for Autonomous and/or Connected Vehicle Operations

In 2014, the NWP Freight Task Force identified commercial AV/CV operations as a potential topic for future research. While AV/CV commercial vehicles have the potential to revolutionize trucking in the NWP, the legislation required for AV/CV operations is not in place in most NWP states.[6] For example, many states require trucks to maintain a minimum following distance that is too far apart for platooning operations to yield any fuel savings.

One of the proposed Freight Task Force projects seeks to develop model legislation to allow AV/CV operations in NWP states. Tasks include collecting examples of successful legislation, and interviews with representatives in states where AV/CV legislation failed, and in states where it was successfully adopted. AV/CV legislation best practices would be identified, and model legislation would be developed for potential adoption by NWP states.[7]

When this project was first proposed in 2013, the estimated time was six to nine months, and estimated cost was about $25,000. In spring 2017, states were asked to re-evaluate their desired research projects, and Figure 5-2 shows which states are currently interested in developing model legislation for AV/CV operations.

[6] Technical Memorandum 1: Freight Task Force Work Plan, North/West Passage, October 2014
[7] Ibid.

Figure 5-2: State Interest in Model Autonomous Vehicle Legislation, 2017

State	Status
Idaho	Interest in the topic, but not currently funded
Minnesota	Interest in the topic
Montana	Interest in the topic, but not currently funded
North Dakota	Active
South Dakota	Interest in the topic
Washington	Interest in the topic
Wyoming	Interest in the topic, but not currently funded

Source: CPCS Survey of NWP States. Updated July 2017, during truck platooning roundtable discussion.

In early 2017, North Dakota's legislature signed a bill directing the North Dakota DOT to begin: studying how autonomous vehicles could be used in the state, gathering information on what data could be collected by autonomous vehicles, and studying how current laws and requirements would apply to autonomous vehicles. The long-term goal of the bill is to support the state's role as an early leader in autonomous vehicle development.[8] In Washington State a bill has been introduced in the legislature aimed at getting government agencies ready to deal with driverless cars.[9]

Due to the strong NWP state interest in commercial AV/CV operations, and the natural cross-border movements of autonomous vehicles, it makes sense for the NWP to lead research so that AV/CV standards established at the national level consider state DOT perspectives.

This project has been funded and is expected to be included in NWP Freight Task Force Year 3 activities.

Multistate Commercial Vehicle Platoon Demonstration

Another proposed Freight Task Force research project is a commercial vehicle platoon demonstration, similar to demonstrations that have been performed in Europe, Utah, Nevada, and California. However, differing CV and safety regulations between NWP states could be a potential barrier to a demonstration. Should NWP states successfully pass legislation enabling CV operations, platooning will become a potential research topic.[10]

The purpose of this project is to demonstrate the potential safety and environmental benefits of platooning in the NWP corridor. Possible tasks include applying for grants to explore and

[8] "Lawmakers Encouraging Self Driving Vehicle Research," The Bismarck Tribune, January 19, 2017
[9] "Washington state considers autonomous vehicle regulations — but is it too early?," GeekWire, March 17, 2017
[10] Technical Memorandum 1: Freight Task Force Work Plan, North/West Passage, October 2014

demonstrate multi-state, multi-vehicle platoons.[11] The current NWP work plan includes multistate commercial vehicle platoon discussions and next steps identification.

The advancement of this research project will be partially informed by the output of Project 11.5: Exploring Options for Truck Platooning along the North/West. Project 11.5 (the subject of this Working Paper – Truck Platooning Exploration).[12] Information and recommendations from this project will inform the options and opportunities for the NWP Freight Task Force to pursue a Multistate Commercial Vehicle Platoon Demonstration Project.

When proposed, the CV demonstration project was expected to take two years,[13] with an estimated cost of $250,000. Again, in spring 2017, states were asked to re-evaluate their desired research projects and Figure 5-3 shows states' current level of interest in a platoon demonstrations. Future projects should take the findings of this current platooning work, and states' level of interest into account.

Figure 5-3: State Interest in Commercial Motor Vehicle Platoon Demonstration

State	Status
Idaho	Interest in the topic, but not currently funded
Minnesota	Interest in the topic
Montana	Interest in the topic, but not currently funded
North Dakota	Interest in the topic, but not currently funded
South Dakota	Interest in the topic
Washington	Interest in the topic
Wyoming	Interest in the topic, but not currently funded

Source: CPCS Survey of NWP States. Updated July 2017, during truck platooning roundtable discussion.

The NWP presents a unique opportunity to further advance truck platooning research in a multistate corridor setting.

5.4 Roundtable Discussion on Truck Platooning in the North/West Passage

To further explore logical next steps for the NWP, on July 12, 2017, a roundtable discussion of NWP member states was convened to gauge interest truck platooning in the I-90/94 corridor. Staff from the states of Idaho, Minnesota, Montana, North Dakota, South Dakota, and Washington joined the discussion.

At the onset of the roundtable each state was provided an opportunity to note if their state is pursuing truck platooning or related legislative initiatives. North Dakota indicated they are considering what studies may be needed to advance the truck platooning concept, South

[11] Ibid.
[12] Transportation Pooled Fund Study TPF-5(190) – FINAL Work Plan 11, North/West Passage, August 16, 2016. Note: this Working Paper will form the content of this Pooled Fund Study.
[13] Note: research shows that the European demonstration was coordinated in one year.

Dakota is considering legislation that should be fed into the next state cycle, and Washington recently passed an executive order that enables the testing of AV/CV's in the state and their Department of Licensing established a licensing/permitting process for these applications.

Each of the states participating in the roundtable noted that they were either interested in a truck platooning project along the corridor, or were not openly opposed to one. North Dakota noted their interest and the interest by the legislature, as evidenced by the questions to the DOT. South Dakota noted that they are most interested in developing model legislation to enable truck platooning, and also indicated that if a truck platooning project were advanced, objectives would need to be established for the demonstration so that the effort wouldn't be redundant of others work.

The NWP states recommend taking an incremental approach, and one that is able to capture low hanging fruit.

Each of Minnesota, South Dakota and Montana suggested a likely first step would be to work on legislative barriers. In terms of a demonstration, Idaho noted that there are parts of the corridor that likely wouldn't be suitable for a demonstration (e.g., narrow and mountainous passes), but that a demonstration that touched at least two states to work on legislative issues, as well as aimed at any new technical objectives, would be ideal.

When queried, the group expressed minimal concern about private sector involvement or lead in a demonstration. The group did note that the private sector will have to have liability insurance at a level adequate/acceptable for states. Also, that it will be important for the states where the demonstration is held to work with the private sector during scoping and mobilization so that the environment it is conducted in is safe.

5.5 Next Steps

Based on research presented in this Working Paper and interest expressed during the roundtable discussion next steps were identified to flow over the course of 18-months. These were developed keeping in mind the interest of NWP members to take small steps first.

North/West Passage Role

First, it is recommend that the NWP continues to serve in a lead role related to truck platooning. This is particularly important as the NWP member states have interest in exploring a number of legislative and demonstration next steps that cross borders and could benefit from the NWP serving as a clearing house of information and a neutral forum for discussion.

A Project Champion should be established to lead and follow through with recommended actions. As the NWP Freight Task Force already has a formal structure that designates state and staff leads for various topics, it is recommended that this structure be followed and a lead for future truck platooning activities is named (Project Champion). As mentioned in the

following section on timeline of activities, depending on the speed NWP states would like to advance activities, multiple state task leads that support the Project Champion should be designated to work on behalf of the members on specific activities.

Model Legislation for Autonomous and/or Connected Vehicle Operations

As noted in Section 5.3.1, as part of NWP Freight Task Force Year 3 activities this project to develop model legislation has been funded. Considering the operating and legislative environment (and barriers) within and among NWP states is a step that is in line with feedback provided during the roundtable discussion. This initial step starts with legislation and provides a basis to build upon gradually.

Identify Research Gaps and North/West Passage Objective

While the concept of a truck platooning demonstration has been discussed by the NWP for a number of years, to date no formalized concept or research objective has been developed. Based on the information provided in this Working Paper, as well as the roundtable discussion, some features the NWP may consider in constructing a demonstration that advances truck platooning research include:

- Multistate demonstration
- 2+ truck platoon demonstration
- Evaluation of platoon operations in various conditions/situations:
    - Weather conditions (wind and snow)
    - Seasons (which translates to intense construction activity/work zone during milder months)
    - Terrain/elevation change

There are likely numerous other features that could be considered to ensure a NWP demonstration unique in the US. As these are further explored, a vison for the corrido/research objective should be formed to focus all future truck platooning related activities.

Seek University or Other Research Partner

Many of the truck platooning demonstrations, in particular the Texas demonstration that is working toward advancing to Level 2 automation, have a university or research partner on the team. The NWP itself has a number of research institutions (e.g., the Upper Great Plains Institute at North Dakota State University, Western Transportation Institute at Montana State University, Pacific Northwest Transportation Consortium at the University of Washington, or others) that should be leveraged. In seeking a university or other research partner there could be benefit in understanding the university's ongoing research and research strengths, and building on those as appropriate as a research objective is formed.

Identify Potential Demonstration Location(s)

The NWP members have provided some initial thoughts on what locations could work better than others (e.g., border between North Dakota and Montana could be better than the borders between North Dakota and Minnesota or Washington and Idaho). Bi-state corridor segments should be identified, and discussions convened with state DOTs and other potentially affected agencies, as appropriate. This step does not select "the" corridor(s) for demonstration, but rather identifies a slate of possibilities that best aligns with research objectives.

Leverage Private Sector Innovations

Building on the previous recommended activities, a refined demonstration concept will be beginning to form. At this point, in an effort to leverage private sector resources, a Request for Information (RFI) should be published to collect ideas and insights from a variety of industry players and potential partners based on the concepts and research objectives conceived by the NWP. During the RFI process vendors can respond to and augment the concept based on their perspective and the technology they offer. After evaluation of the RFI responses, the NWP can better gauge if it is in their best interests to proceed with a demonstration and the potential vendors that may be able to assist.

5.5.1 Timeline of Activities

A conceptual timeline of activities, leading up to mobilizing toward a demonstration is shown in Figure 5-4. The key items presented in the previous section are aligned against a monthly timescale.

Figure 5-4: Potential Timeline of North/West Passage Next Steps

Activity	Month																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Model Legislation for Autonomous and/or Connected Vehicle Operations																		
2. Identify Research Gaps and North/West Passage Objective																		
3. Seek University or Other Research Partner																		
4. Identify Potential Demonstration Location(s)																		
5. Leverage Private Sector Innovations																		

Activity	Month																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
6. Evaluate Next Steps																		

As shown, the first activity beginning in **Month 1** is reflective of one the NWP Freight Task Force has already identified as a next step - Model Legislation. When originally scoped this task was anticipated to have a six to nine month duration. In the interest of providing a conservative schedule, the nine month duration was used.

The next two activities, Identify Gaps and Research and Seek University or Other Research Partner, should be conducted in coordination with each other. These activities are slated to begin in **Month 7**, but could also begin earlier. The intent of scheduling this activity during Month 7, is to ensure that state resources (namely personnel) tasked with overseeing these activities is not overly taxed. Traditionally, the NWP Freight Task Force has had a single lead/champion, but if the desire is to initiate Activities 2 and 3 earlier, it is recommended that a second NWP Freight Task Force member is assigned to champion these steps. Conversations and establishing a formal partnership with the selected research partner is expected to extend beyond simply discussion of research topics (Activity 2).

The fourth activity relates to identifying a demonstration location(s) and begins in **Month 12**. And, again, this step could be accelerated provided level of comfort by NWP members, as well as available staffing resources.

The fifth activity, beginning in **Month 14**, reflects solicitation additional information on technology and applications through a Request for Information (RFI). The idea here is that the activities in Months 7 through 14 will have help the NWP refine research objectives, potential research or evaluation partner and possible location(s) for a demonstration that vendors can respond to and augment based on their perspective. The process of developing an RFI and soliciting responses is expected to take four months.

Lastly, in **Month 18** after information is received related to vendor interest and technology proposals, the NWP has a few options:

- Advance discussions with one or more of the vendors,
- Selectively solicit vendors from the RFI results to respond to a competitive RFP,
- Continue to refine the concept of a truck platooning demonstration in the NWP internally, among NWP members, or
- Decide that an alternate approach is in the better interest of NWP members (e.g., postponing or canceling discussions on a NWP truck platooning demonstration).

As noted in several places in this timeline description, each of these steps could potentially be advanced at a quicker pace, but they have been intentionally spaced to provide NWP members an increased level of comfort with the process.

6 Conclusions

Key Research Takeaway

Year 2 activities of the NWP Freight Task Force were pursued to continue the momentum of the Year 1 work. As shown in this Summary Report, Year 2 activities were able to accomplish this by:

- Supporting the active engagement of the Freight Task Force via regular web meetings on timely topics of member interest,
- Conducting best practice (and practical) research to determine priority projects and funding opportunities the Freight Task Force should pursue in the coming years,
- Identifying and scaling truck parking concepts and opportunities that best fit the varying needs of NWP member states and industry, and
- Conducting exploratory research on truck platooning and establishing next steps for the Freight Task Force to help get closer to conducting a demonstration in a bi-state corridor.

These findings show that there is value in continuing NWP Freight Task Force activities into Year 3, and have identified key areas where focus should be placed, and initial next steps for the coming year.