North/West Passage INTERSTATE 90 INTERSTATE 94

Technical Memorandum 3:

Corridor CVOP Feasibility

December 2014

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I. Executive Summary

The Northwest Passage Coalition (NWP) commissioned this study to determine feasibility of implementing the Commercial Vehicle Operations Portal (CVOP) developed by the Wyoming Department of Transportation (WYDOT) across the NWP states. The CVOP is a website and program through which road-weather impact forecasting services tailored to Commercial Vehicle Operators (CVO) are provided.

There are many sources of traveler and forecast information available to the public and to CVO provided through agency-sponsored websites and tools, regional aggregations, and private sources, many of which are interlinked back to private forecasting services or the National Weather Service (NWS). These sites provide many types of traveler information, including real-time conditions (e.g. congestion, construction, current weather, road conditions), static information (e.g. rest areas, weigh stations, truck stops), and weather forecasts.

Feedback from the CVO community suggests that detailed weather forecasts are needed to make routing and schedule judgments, such as those provided through the CVOP, which are not available through most other sources. A listing of other traveler information sources and other traveler information needs for CVO are discussed in this report.

The CVOP system is populated once per day through the summer and twice per day through the winter by a contract forecasting service. The system provides 12 hour forecasts over a 72-hour period that includes wind, road surface conditions, and visibility. It also allows WYDOT operations personnel to send alerts via email and text to users who sign up for the service regarding emergencies and changing conditions.

Three alternatives are explored in this report, including the Operations and Travel Information Integration Sharing (OTIIS), a regional traveler information site commissioned by the NWP, route specific forecasting provided by the NWS, and other regional and private forecasting services, such as the Weather Channel®.

The conclusions of the analysis are that implementation of the CVOP throughout the corridor is feasible from a technical perspective; however doing so would require all NWP states to provide forecasting services at the same level as WYDOT to populate the CVOP. There are currently no other existing alternative sources that can provide the information detail or frequency that would satisfy the specific needs expressed by the CVO community.

From a strategic perspective, the NWP Coalition should consider how the CVOP fits into and overlaps with existing traveler information efforts, including OTIIS, as well as, other private and agency-sponsored sites.

II. Introduction

This report provides information about the feasibility of using WYDOT's CVOP website across all of the NWP member states as part of the Corridor Freight Support project with the NWP Coalition.

WYDOT developed the CVOP in response to feedback from the freight community in 2011 that road condition and weather forecast information available at that time was inadequate for their needs. WYDOT then developed the program based on requirements driven by the freight community, providing impact weather forecast information tailored for freight operators and dispatchers. The forecasts cover road conditions, visibility, and wind, presented in a format that are most useful to them, and provided in forecast time horizons that allow them to plan their routes. The 2014-2015 winter season will be the third season that the system will be in use, and it has received many strongly positive reviews from freight operators who now use and rely on the system for forecast information.

The study provides an assessment of the requirements for and impacts of the site implementation for all NWP states. It includes a brief description of the weather-related services already being provided by each of the NWP states and other regional and national sources on information.

III. Background

Travelers in the ever-expanding information age continue to demand more and better information. This has been both a boon and a burden to transportation providers. The boon is that informed travelers tend to make better decisions. The burden is for agencies to gather and disseminate high quality information for travelers that is easy to consume.

Each state in the NWP has programs in place to provide traveler information to the public including winter driving conditions. Each state also employs a variety of real-time road-weather assessment and forecasting tools and services. These are largely employed to support winter maintenance operations; however, some of this information is also passed on to the public at various levels. As part of the development of this report, each agency completed a survey describing their weather programs and traveler information efforts, included in **Appendix A**.

Traveler Information

The NWP states all provide traveler information through websites, and most also have mobile apps and other mechanisms for disseminating information including: weather-related travel conditions, Closed Circuit Television (CCTV) images, travel speeds, incident and construction information, etc. In addition, raw data feeds from Road Weather Information Systems (RWIS) are also provided by all states into the Meteorological Assimilation Data Ingest System (MADIS), and other road conditions are in some cases provided through data feeds to external organizations (i.e. Google™).

There are several regional partnerships that combine traveler information data in an attempt to minimize the number of sources that travelers have to access as they travel from state to state. There are various private sites that also attempt to provide multi-state traveler information either by including links to state traveler information sites or through their own sources. Other sites and sources include links or pages specifically dedicated to providing information to CVO. **Exhibit 1** lists the traveler information websites for the NWP states, and **Exhibit 2** provides a list of regional traveler information sites, and a sample of national traveler information sites.

Exhibit 1: NWP State Traveler Information Sites

State	Traveler Information Website
ID	• http://511.idaho.gov
MN	• http://www.511mn.org
MT	• http://roadreport.mdt.mt.gov/travinfomobile/
ND	• http://www.dot.nd.gov/travel-info-v2/
SD	• http://www.safetravelusa.com/sd/
WA	• http://www.wsdot.com/traffic/
WI	• http://www.511wi.gov/Web/
WY	• http://www.wyoroad.info

Exhibit 2: Regional and National Traveler Information Sites

Site	Link	Sponsor	Coverage
Operations and Travel Information Integration Sharing (OTIIS)	Public Link not yet available	NWP Coalition	ID, MN, MT, ND, SD, WA, WI, WY
One Stop Shop for Traveler Information	http://oss.weathershare.org	Western Transportation Institute	CA, NV, OR, WA
National Weather Service Transportation Decision Support	Idaho version: http://www.wrh.noaa.gov/pih/transportation/index.php Regional Version: Available soon	Extension of current service provided to Idaho	AZ, CA, ID, MT, NV, OR, SD, UT, WA, WY
TravelMidwest.com	http://www.travelmidwest.com/lmiga/home.jsp	Lake Michigan states	WI, IL, IN, MI
The Weather Channel® – interstate forecasts	http://www.weather.com/forecast/commuter?layers=driving	Private. Developed by The Weather Channel® General forecast information, but customized and organized by Interstate travel corridors.	National
Safe Travel USA	http://www.safetravelusa.com	Private. Developed by Iteris. Provides links to all states traveler information sites. Includes more detailed information for sites that they manage.	National
Here.com	http://here.com	Privately developed by here.com (formerly traffic.com). Includes Traffic and travel information, not including weather	National

Weather Forecasting Services

All NWP states are currently providing either real-time road condition information or forecasts, or both. Real-time information supports short-term decision-making, while forecast information supports medium-term (~12 – 36 hour) travel planning. The focus of this report is forecasting, since most NWP states have already made significant investment in the gathering and dissemination of real-time travel conditions through RWIS and field personnel and citizen reporting systems.

Forecast information can be classified into one of three categories:

National Weather Service - It is the function of the NWS to provide forecasts, severe weather, and other information to anyone. NWS coverage is broad, and they provide good general forecast information as well as various types of severe weather alerts. Recently, the NWS has beta-tested a site in Idaho that allows travelers to obtain forecasts along a specific route. Based on positive feedback for the site, they are expanding this service to the Western US and are looking at compiling it for the full contiguous United States. However, except for severe weather information, NWS forecasts are intentionally general in order to avoid competing with private companies that provide specialized forecasting services, including detailed road-weather information forecasts.

General Commercial Forecasting Services – These services include local and national news as well as The Weather Channel® and Weather Underground®. These services provide additional detail and customization for a region or type of service, and are readily accessible through many sources such as apps, websites, television and radio. Some even provide travel-specific forecasting, such as the Weather Channel's Interstate Forecasts (http://www.weather.com/forecast/commuter?layers=driving), which forecasts along the full length of an Interstate highway. Similar to the NWS, these forecasts are general and lack information about maintenance activities that impact road conditions. They target the general public, and do not generally provide the level of detail desired by CVO operations.

Private Forecasting Services - Because of the generality of the NWS and commercial forecasts, many agencies choose instead to rely on private forecasting services. These providers use both NWS and a suite of other information sources to develop specialized forecasts for various purposes. In the case of road-weather, they may include knowledge of the Department's roadway maintenance activities, RWIS sensor information, and department personnel field observations to refine their forecasts for winter travel, construction, and other activities. This is valuable for example when the NWS forecast calls for snow, but a private forecaster knows that the road has been pre-treated and that the snow will not accumulate on the road – making travel conditions safe.

NWP states use a combination of services from all of these sources to support their maintenance operations and some states also extend forecasts to the public through traveler information sites. **Exhibit 3** shows the weather forecast information currently being provided to the public by each of the NWP coalition states.

Exhibit 3: Agency Sponsored Weather Forecast Information Websites

State	Weather Forecast Information	Source	Range	Time Blocks
ID	• http://www.wrh.noaa.gov/pih/transportation/index.php	NWS	72 h	12 h
MN	• Forecasts not currently being provided to the public	-	-	-
MT	• http://www.mdt.mt.gov/travinfo/weather/weather.shtml (replicated from NWS)	NWS	5d	12 h
ND	• http://nddot.meridian-enviro.com/public/	Contract	48 h	12 h
SD	• http://www.safetravelusa.com/sd/	Contract	48 h	12 h
WA	• http://www.wsdot.com/traffic/weather/default.aspx (replicated from NWS)	NWS	36 h	12 h
WI	• Forecasts not currently being provided to the public	-	-	-
WY	• https://apps.wyoroad.info/cvop/ (CVO Weather Portal – for CVO personnel only)	Contract	72 h	12 h

Weather Information for CVO

The freight community desires a level of weather forecasting detail typically only provided by private meteorology services or data providers. Many of the larger freight companies have meteorologists on staff that provide more detailed forecasts for their company's drivers. Although these groups lack information about road maintenance activities, they provide guidance to drivers and dispatchers on weather conditions that affect truckers, specifically along routes that they travel.

Smaller companies or independent freight operators turn to a variety of sources including the transportation agency's traveler information sources as well as general weather news sources. There are many services that provide general information for truckers (mechanical services, parking, truck stops, weigh stations, etc.) that also provide replicated weather information from NWS, links to agency maintained traveler information sites, or replicated information from sources such as The Weather Channel®. **Exhibit 4** provides a sample of such sites.

Exhibit 4: Sample Trucker Weather Information Sites

Trucker Information Site	Weather Information Source
http://www.truckmiles.com/Conditions.asp	Agency traveler information websites
http://www.dieselboss.com/weather-for-truckers.htm	NWS
http://www.roadtrucker.com/policy/trucker-weather.htm	NWS
http://www.thetruckersreport.com/truckingindustryforum/truckers-weather-and-road-conditions/13063-current-trucker-weather-maps.html	NWS & The Weather Channel®

IV. Needs and Requirements

Through the feedback received by WYDOT, the myriad sources of weather and traveler information, and the efforts of large trucking companies to obtain customized weather forecasts, we can infer that weather information currently available to CVO organizations is generally inadequate for their needs. Based on the types of information being offered from all of these sources (and not from a formal survey), we have compiled the following list of the apparent real-time information needs for CVO operators as follows. We recommend a follow-up task to conduct a formal needs assessment survey.

1. Real-time & Forecasted information
    a. Weather Information
        i. Surface Conditions
            1. Account for maintenance activities
        ii. Visibility
        iii. Wind
        iv. Weather Restrictions
            1. Chains
            2. Closures
            3. Other restrictions
        v. Route-specific
    b. Other Travel Information
        i. Traffic (incidents and recurring delays)
        ii. Ongoing construction
        iii. Ongoing restrictions
        iv. Parking availability
        v. Border crossing wait times
    c. Alerts for condition changes
2. Other Requirements
    a. Consistent information from state to state
    b. Ability to program a route, & get info and alerts for that route (driver)
    c. Ability to identify specific routes, or multiple routes (for dispatcher)
    d. Simple interface
        i. User (graphical)
        ii. Dispatcher (printable list view)
        iii. Forecaster (automatic feed, simple interface, or both)
    e. General trucker information (locations for mechanical services, truck stops, weight stations, etc.)
    f. A minimum number of locations to go to find this information.
    g. Information should be available from a computer or a mobile device.

V. Alternatives

There are various alternatives that can be pursued by the NWP regarding these needs. Notably, each state may have a different acceptable level of service, which will in part be driven by varying funding constraints and competing needs in other areas. The four alternatives considered in this report are:

- WYDOT CVOP
- Operations and Travel Information Integration Sharing (OTIIS)
- National Weather Service
- Other Regional, National, or Private Organizations

Each of these alternatives will be described in detail, including implications for the implementation of each. These will be summarized and compared in Section VI.

WYDOT CVOP

WYDOT developed the CVOP in response to needs expressed by CVO providers in 2011. WYDOT responded by turning their request into requirements and developing the CVOP. It has been used successfully for the 2012-2013 and 2013-2014 winter seasons, and WYDOT has received very positive feedback on the type and quality of services provided.

Description

The CVOP is a website that displays forecast information specifically tailored to freight dispatchers and drivers. The site consists of three interfaces including: User, Forecaster, and Administrator. The site has the following key features:

- Access is restricted to those to whom WYDOT has provided a login. This provides some freedom to provide information in terms that CVO operators will understand, whereas the general public may require simpler or more accessible terms.
- The interfaces are designed with input from CVO personnel. Specifically, dispatch centers requested both graphical and tabular forms of the reports so that they can print and hand out daily reports to dispatchers.
- Includes forecasts specifically relevant to CVO operations: visibility, wind, surface conditions, and NWS alerts.
- Ability to send automatic or manual alerts for changing conditions, such as activation or de-activation of warnings, amber alerts, or other emergency messages. Users can sign up to receive these alerts via email or text message.
- The site's hosting is robust. WYDOT provides dual internet connections through different providers. This maximizes the accessibility in the event of an outage with either provider.
- The site's construction and management is simple. There are no GIS elements to the base-map, but manually drawn polyline segments are overlaid on a bitmap background. No real-time information is currently provided, limiting the number of moving parts.
- The site is forecaster-friendly. The forecaster interface is designed to make updating the forecast information easy by allowing simultaneous update of multiple segments, and copying information from the previous forecast.

WYDOT maintains contracts with a private forecast provider and a software developer. The forecasting firm provides an on-site meteorologist, who develops forecasts on a statewide basis to support various functions, such as maintenance support and population of the CVOP. The software for the site was developed and is maintained through a contract with a software development company.

The user interface consists of a graphical and a tabular display. Exhibit 5 shows the graphical interface. A legend below the display allows the user to select a forecast and a forecast time frame option. The Forecast options include forecasts for visibility, wind, surface conditions, and "worst case" which automatically displays the most severe of the three forecast elements. The time frame option allows users to select a forecast horizon from 0 to 72 hours.

Exhibit 6 shows the tabular representation of the forecast data. It is sorted by highway and by mile marker. The filter options described for the graphical interface also adjust the tabular display accordingly.

Exhibit 7, the "wind spreadsheet", is also available, which provides the specific forecasted wind speed and gust values along each forecast segment in 3 hour time blocks for a 24 hour period.

North/West Passage

Exhibit 5: WYDOT CVOP User Graphical Interface

TODAY: High pressure will build over the region today. This will keep skies sunny to mostly sunny and conditions mainly dry for much of the state. Winds, however, will be breezy to gusty with gusts between 35 and 50 mph. Temperatures will also stay cool, but close to normal.

WEDNESDAY: A fast-moving weather system will pass through Montana and northern Wyoming. This will create slightly more cloud cover statewide. We also cannot rule out an isolated shower across eastern Wyoming, but the best chance for any shower activity will be in far northern parts of the state. Windy conditions are also expected with gusts between 35 and 45 mph. Wind prone areas of I-25 (Cheyenne to Chugwater) and I-80 (Cheyenne to Arlington) could see gusts as high as 55 mph. Temperatures will become a few degrees warmer and stay near or slightly above normal.

Last updated: 2014-10-28 09:30:56

Legend

Forecast	Time Frame	Impact	L	M	H	E
● Worst-Case	○ 0-12 Hours	Visibility Forecasts				
○ Visibility	● 12-24 Hours	Wind Forecasts				
○ Wind	○ 24-36 Hours	Surface Forecasts				
○ Surface	○ 36-48 Hours	NWS Alerts				
	○ 48-60 Hours					
	○ 60-72 Hours					

L = Low Impact
M = Moderate Impact
H = High Impact
E = Extreme Blow-Over Risk

☐ Show green icons

Please see map.wyoroad.info for information about current width/height/weight restrictions and truck parking areas.

For current conditions, please see map.wyoroad.info.

Click for the wind spreadsheet.

Impact Levels	Recommended Action
Low	Minimal impacts expected, use general caution (see forecasts and present conditions)
Moderate	Some impacts expected, use extra caution (see forecasts and present conditions)
High	Dangerous impacts expected, use caution, delay travel, or consider alternate route (see forecasts and present conditions)
Extreme Blow-Over Risk	Gusty winds 65+ MPH expected, wind closures possible for light and high-profile vehilces. Use extreme caution, adjust travel, or consider an alternate route.

Exhibit 6: WYDOT CVOP User Tabular Interface

I-80					
I-80 Utah state line to Lyman (mp 0-41)	👁	Low	Mainly good visibility expected	Mainly good visibility is expected during this time.	
I-80 Utah state line to Lyman (mp 0-41)	▣	Low	Breezy to gusty winds expected	Winds will be breezy to gusty at times overnight. Expect gusts as high as 35 mph.	
I-80 Utah state line to Lyman (mp 0-41)	△	Low	Mainly dry roads expected	Mainly dry roads are expected during this time.	
I-80 Lyman to Rock Springs (mp 41-104)	👁	Low	Mainly good visibility expected	Mainly good visibility is expected during this time.	
I-80 Lyman to Rock Springs (mp 41-104)	▣	Low	Breezy to gusty winds expected	Winds will be breezy to gusty at times overnight. Expect gusts as high as 35 mph.	
I-80 Lyman to Rock Springs (mp 41-104)	△	Low	Mainly dry roads expected	Mainly dry roads are expected during this time.	
I-80 Rock Springs to Rawlins (mp 104-214)	▣	Moderate	Gusty winds expected	Expect lighter winds overnight, but gusty winds return by late Wed. AM. Gusts will be as high as 45 mph.	
I-80 Rawlins to Arlington (mp 214-272)	▣	Moderate	Gusty winds expected	Expect lighter winds overnight, but gusty winds return by late Wed. AM. Gusts will be as high as 45 mph.	
I-80 Arlington to Laramie (mp272-311)	▣	High	Windy conditions expected	Expect lighter winds overnight, but windy conditions return by late Wed. AM with gusts as high as 55 mph.	
I-80 Laramie to Cheyenne (mp 311-359)	▣	High	Windy conditions expected	Expect lighter winds overnight, but windy conditions return by late Wed. AM with gusts as high as 55 mph.	
I-80 Cheyenne to NE state line (mp 359-403)	▣	Moderate	Gusty winds expected	Expect lighter winds overnight, but gusty winds return by late Wed. AM. Gusts will be as high as 45 mph.	

Exhibit 7: WYDOT CVO User Interface - Wind Spreadsheet

Wyoming Department WYDOT of Transportation

Highway Wind Forecasts

WD: Average wind direction
WS: Average wind speed (mph)
Strong: Forecast winds near "Strong Wind" criteria (35 mph +)
Caution: Forecast winds near "No Light Trailer" criteria (50 mph +)
CLOSED: To Light and High Profile Vehicles only (65 mph +, or a blow-over)

The following are average forecasted wind speeds. Higher gusts may occur which are not alw
Last Updated: Today, 11:00 AM

Tuesday, October 28		NOON - 3PM			3PM - 6PM			6PM - 9PM		
		WD	WS	Gust	WD	WS	Gust	WD	WS	Gust
D1	I-80 (Wamsutter - Rawlins)	W	30	40	W	27	37	SW	34	44
	I-80 (Rawlins - Laramie)	W	43	53	W	35	45	W	38	48
	I-80 (Elk Mtn/Arlington - Laramie)	W	43	53	W	35	45	W	38	48
	I-80 (Laramie - Cheyenne)	W	30	40	W	27	37	SW	34	44
	I-25/I-80 Junction (Cheyenne)	W	28	38	W	22	32	SW	33	43
	I-25 (Wyo Hill area)	W	28	43	W	22	37	SW	33	48
	US-30	W	30	40	W	27	37	SW	34	44
	WY-34	W	30	40	W	27	37	SW	34	44
	US-287	W	30	40	W	27	37	SW	34	44
D2	I-25 (Cheyenne - Wheatland)	W	28	38	W	22	32	SW	33	43
	I-25 (Chugwater - Bordeaux)	W	28	48	W	22	42	SW	33	53
	I-25 (Wheatland - Douglas)	SW	15	25	W	9	19	SW	8	18
	I-25 (Douglas - Casper)	SW	15	25	W	9	19	SW	8	18
	I-25 (Casper - Kaycee)	SW	15	25	W	9	19	SW	8	18
	WY-220 (Muddy Gap - Casper)	SW	15	25	W	9	19	SW	8	18
	US-85 (Torrington and Lusk)	W	13	23	W	7	17	SW	8	18
D3	I-80 (Utah - Green River)	W	12	22	W	9	19	W	7	17
	I-80 (Green River - Rock Springs)	W	16	26	W	13	23	W	12	22
	I-80 (Rock Springs - Wamsutter)	W	16	26	W	13	23	W	12	22
D4	I-25 (Kaycee - Buffalo)	SE	6	16	NW	3	13	SW	5	15
	I-90 (Montana border - Buffalo)	N	6	16	SE	1	11	S	2	12
	I-90 (Buffalo - Gillette)	W	9	19	W	5	15	S	5	15
	I-90 (Gillette - Sundance)	W	9	19	W	5	15	S	5	15
	I-90 (Sundance - SD border)	W	9	19	W	5	15	S	5	15
D5	WY-28 (South Pass - Lander)	N	5	15	NW	6	16	W	6	16
	US-287 (Lander - Dubois)	N	5	15	NW	6	16	W	6	16
	US-287 (Dubois - Tetons)	SW	7	17	SW	6	16	S	7	17
	WY-789 (Lander - Shoshoni)	SW	6	16	N	6	16	W	9	19
	WY-789 (Shoshoni - Worland)	SE	3	13	SE	5	15	SE	3	13
	WY-120 (surrounding Clark)	SE	3	13	SE	5	15	SE	3	13
	WY-789 (Worland - Lovell)	W	8	23	SW	7	22	SW	7	22

The CVOP forecaster interface has been designed and built specifically for the forecaster in an effort to provide a simple and fast way of entering forecasts. Exhibit 8 shows the forecast and segment matrix. Values can be copied from a previous entry, and multiple segments can be selected for a single update. On the next page, Exhibit 8 shows the forecast input detail screen.

The administrator interface provides the ability to manage user accounts and to create, remove, or modify segment information as well as other administrative functions.

Exhibit 8: WYDOT CVOP Forecast Input Matrix

Location	Friday 2012/05/04 00:00:00 - 11:59:59	Friday 2012/05/04 12:00:00 - 23:59:59	Saturday 2012/05/05 00:00:00 - 11:59:59	Saturday 2012/05/05 12:00:00 - 23:59:59	Sunday 2012/05/06 00:00:00 - 11:59:59
I-80 Rawlins to Arlington (mp 214-272) *(District 1) (4)*	V: L, Good visibility expected *(25144)* W: L, Light breeze expected *(25147)* S: L, Mainly dry roads expected *(25146)* X: L *(25145)*	V: L, Good visibility expected *(25208)* W: L, Breezy and gusty winds expected *(25211)* S: L, Mainly dry roads expected *(25210)* X: L *(25209)*	V: L, Good visibility expected *(25259)* W: M, Breezy and gusty winds expected *(25262)* S: L, Mainly dry roads expected *(25261)* X: M *(25260)*	V: L, Good visibility expected *(25323)* W: M, Breezy and gusty winds expected *(25326)* S: L, Mainly dry roads expected *(25325)* X: M *(25324)*	Add (V) Add (W) Add (S)
I-80 Arlington to Laramie (mp272-311) *(District 1) (291)*	V: L, Good visibility expected *(25148)* W: L, Light breeze expected *(25151)* S: L, Mainly dry roads expected *(25150)* X: L *(25149)*	V: L, Lowered visibility w/any late-developing showers *(25214)* W: L, Breezy winds expected *(25212)* S: L, Few wet spots possible late aftn/evening *(25215)* X: L *(25213)*	V: L, Good visibility expected *(25263)* W: M, Breezy and gusty winds expected *(25266)* S: L, Mainly dry, perhaps a few wet spots late *(25265)* X: M *(25264)*	V: L, Good visibility expected *(25330)* W: M, Breezy and gusty winds expected *(25329)* S: L, Mainly dry, perhaps a few wet spots late *(25327)* X: M *(25328)*	Add (V) Add (W) Add (S)
I-80 Laramie to Cheyenne (mp 311-359) *(District 1) (292)*	V: L, Good visibility expected *(25152)* W: L, Light breeze expected *(25155)* S: L, Mainly dry roads expected *(25154)* X: L *(25153)*	V: L, Good visibility expected *(25218)* W: M, Breezy and gusty winds expected *(25219)* S: L, Mainly dry roads expected *(25216)* X: M *(25217)*	V: L, Good visibility expected *(25267)* W: M, Breezy and gusty winds expected *(25270)* S: L, Mainly dry roads expected *(25269)* X: M *(25268)*	V: L, Good visibility expected *(25331)* W: M, Breezy and gusty winds expected *(25333)* S: L, Mainly dry roads expected *(25334)* X: M *(25332)*	Add (V) Add (W) Add (S)
I-80 Cheyenne to NE state line (mp 359-403) *(District 1) (293)*	V: L, Good visibility expected *(25156)* W: L, Light breeze expected *(25159)* S: L, Mainly dry roads expected *(25158)* X: L *(25157)*	V: L, Good visibility expected *(25220)* W: L, Breezy and gusty winds expected *(25223)* S: L, Mainly dry roads expected *(25222)* X: L *(25221)*	V: L, Good visibility expected *(25271)* W: L, Breezy and gusty winds expected *(25273)* S: L, Mainly dry roads expected *(25274)* X: L *(25272)*	V: L, Good visibility expected *(25335)* W: L, Breezy and gusty winds expected *(25336)* S: L, Mainly dry roads expected *(25338)* X: L *(25337)*	Add (V) Add (W) Add (S)
Location	**Friday 2012/05/04 00:00:00 - 11:59:59**	**Friday 2012/05/04 12:00:00 - 23:59:59**	**Saturday 2012/05/05 00:00:00 - 11:59:59**	**Saturday 2012/05/05 12:00:00 - 23:59:59**	**Sunday 2012/05/06 00:00:00 - 11:59:59**
I-90 MT state line to Buffalo (mp 0-56) *(District 4) (290)*	V: L, Good visibility expected *(25104)* W: L, Light breeze expected *(25107)* S: L, A few wet spots possible early on *(25106)* X: L *(25105)*	V: L, Lowered visibility w/any late-developing showers *(25164)* W: L, Breezy winds expected *(25167)* S: L, Few wet spots possible late aftn/evening *(25166)* X: L *(25165)*	V: L, Lowered visibility w/any showers or t-storms *(25275)* W: L, Breezy winds expected *(25277)* S: L, Partly wet roads expected *(25278)* X: L *(25276)*	V: M, Showers expected, some reduced visibility *(25339)* W: L, Breezy winds expected *(25341)* S: L, Mainly wet roads expected *(25342)* X: M *(25340)*	Add (V) Add (W) Add (S)
I-90 Buffalo to Gillette (mp 56-122) *(District 4) (2)*	V: L, Good visibility expected *(25096)* W: L, Light breeze expected *(25098)* S: L, A few wet spots possible early on *(25099)* X: L *(25097)*	V: L, Lowered visibility w/any late-developing showers *(25168)* W: L, Breezy winds expected *(25171)* S: L, Few wet spots possible late aftn/evening *(25170)* X: L *(25169)*	V: L, Lowered visibility w/any showers or t-storms *(25279)* W: L, Breezy winds expected *(25282)* S: L, Partly wet roads expected *(25281)* X: L *(25280)*	V: M, Showers expected, some reduced visibility *(25343)* W: L, Breezy winds expected *(25346)* S: L, Mainly wet roads expected *(25345)* X: M *(25344)*	Add (V) Add (W) Add (S)
I-90 Gillette to SD state line (mp 122-207) *(District 4) (253)*	V: L, Good visibility expected *(25100)* W: L, Light breeze expected *(25103)* S: L, A few wet spots possible early on *(25102)* X: L *(25101)*	V: L, Lowered visibility w/any late-developing showers *(25172)* W: L, Breezy winds expected *(25174)* S: L, Few wet spots possible late aftn/evening *(25175)* X: L *(25173)*	V: L, Lowered visibility w/any showers or t-storms *(25283)* W: L, Breezy winds expected *(25286)* S: L, Partly wet roads expected *(25284)* X: L *(25285)*	V: M, Showers expected, some reduced visibility *(25347)* W: L, Breezy winds expected *(25349)* S: L, Mainly wet roads expected *(25350)* X: M *(25348)*	Add (V) Add (W) Add (S)
WY 28 Farson through South Pass (mp 0-69) *(District 5) (13132)*	V: L, Good visibility expected *(25108)* W: L, Breezy conditions expected	V: L, Good visibility expected *(25184)* W: L, Breezy conditions expected	V: L, Lowered visibility w/any rain showers *(25290)* W: M, Breezy winds expected	V: L, Lowered visibility w/any rain showers *(25351)* W: M, Breezy winds expected	Add (V) Add (W) Add (S)

Exhibit 9: WYDOT CVOP Forecast Input Detail

Implementation

In order to implement the CVOP across all of the NWP states, various requirements will need to be met:

Consistency in Forecasting Services

Currently there are various levels and types of forecasting services used across the NWP states, as noted previously the level of forecasting detail needed to make the CVOP tool consistent for the end user would require each of the states to match this level. States that

already use contract forecasting services would need to add updating the CVOP to their existing services, and states that don't currently employ private forecasting services would need to add them. The possible operational scenarios for this include:

- Each state's forecaster would be provided a forecaster login to the system, and be required to update the system at the agreed-upon frequencies and time horizons.
- One possible alternative is for NWP to jointly employ a single contract forecaster who would have the responsibility to populate the CVOP across all states.
- A second alternative would be to work with the NWS so that they would provide this level of forecasting across all of the NWP states. This may require informing them about maintenance activities in order for them to incorporate that information into their forecasts.

Software Change Control Board and Agreements

Agreements for site hosting and software administration would need to be developed and implemented across all of the states. We recommend that this include a formal software Change Control Board (CCB) to manage software functional changes and approve the capital and operational cost impacts that changes will have. This is stated simply because it would need to be done, though the NWP states have long been exemplars of cost sharing for collaborative efforts.

- WYDOT has expressed that they would be happy to continue to host the site for the NWP, as well as continue the administration of the software development and support contract.

OTIIS

The NWP has commissioned the development of a regional traveler information website, OTIIS. As of the writing of this report, the site is in its final stages of development. The purpose of the site is to provide a single source for consistent traveler information for those traveling within and across the NWP states. It is being considered here as an alternative because it is a site already being sponsored and deployed by the NWP states and includes several information categories relevant for CVO.

Description

The OTIIS system provides a browser-based interface that gives various types of real-time and static traveler information, warnings and alerts, restrictions, alerts, traffic conditions, and other information. The information filter menu identifies all of the different types of information provided by the site, shown in **Exhibit 10**.

Exhibit 10: OTIIS Information Type List

The information that drives the information for OTIIS is received through data feeds from each of the member states as well as other third party sources (e.g. the NWS), and requires no manual input. Because of the large amount of information that drives OTIIS, a design decision was made to require users to input their route of interest, the menu for which is shown in **Exhibit 11**. While this is an additional step for the users, it prevents information overload by filtering out alerts and data that are not relevant for the user. The routing is based on the map from Google, so reports will be generated for any route present in that database.

Exhibit 11: OTIIS Route Filter Dialogue

Trip Start	Waypoint	Trip Destination	Travel Date	Departure Time		
Butte, MT, USA		Spokane, WA, USA	Wednesday Oct 29, 201	11:00 AM	Get Directions	Print

Once the users select a route, information is displayed both on the map (shown in Exhibit 12) as well as in a tabular format (shown in Exhibit 13). The tabular format also has the option to be printed. Printable directions for the route are also available.

Exhibit 12: OTIIS Map Display
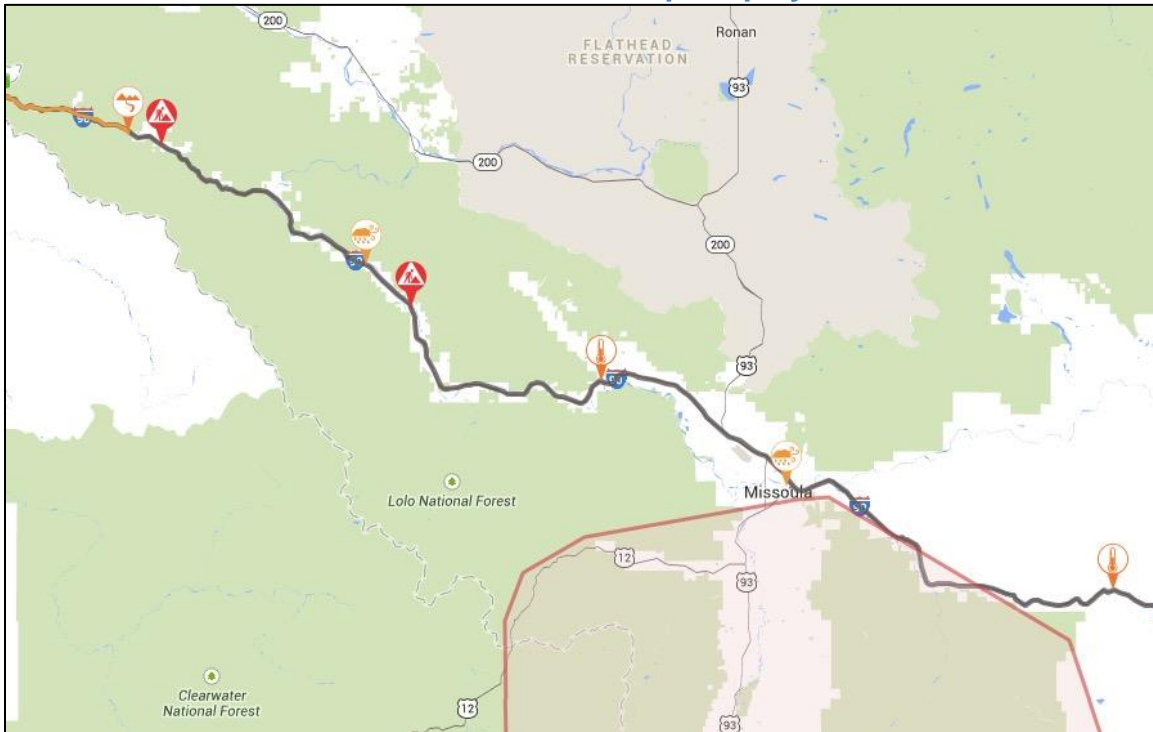
Exhibit 13: OTIIS Tabular Route Summary

The weather forecasts used consist of the NWS 5-day forecast, which are available by clicking on an icon as shown in Exhibit 14. NWS Alert polygons are also available along with detailed information about the alert, as shown in Exhibit 15.

Exhibit 14: OTIIS Forecast Display
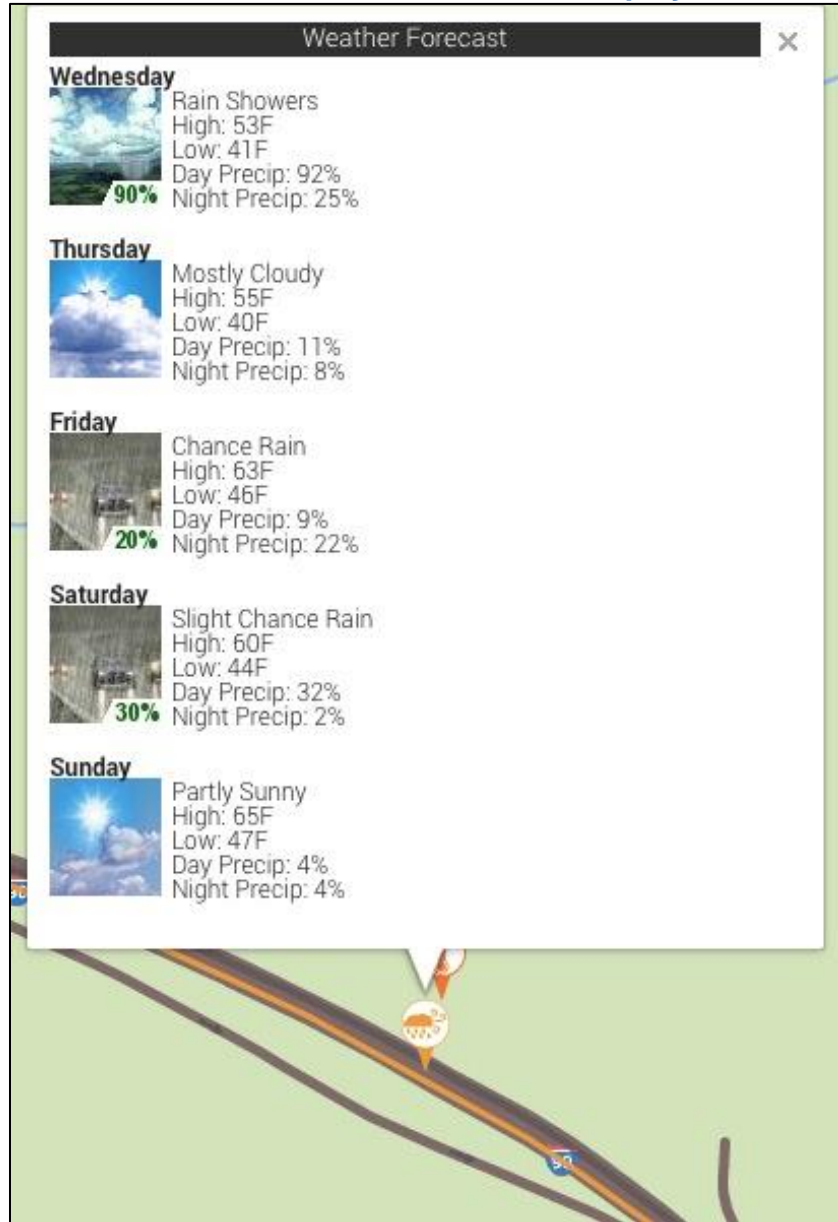
Exhibit 15: OTIIS NWS Alert Detail
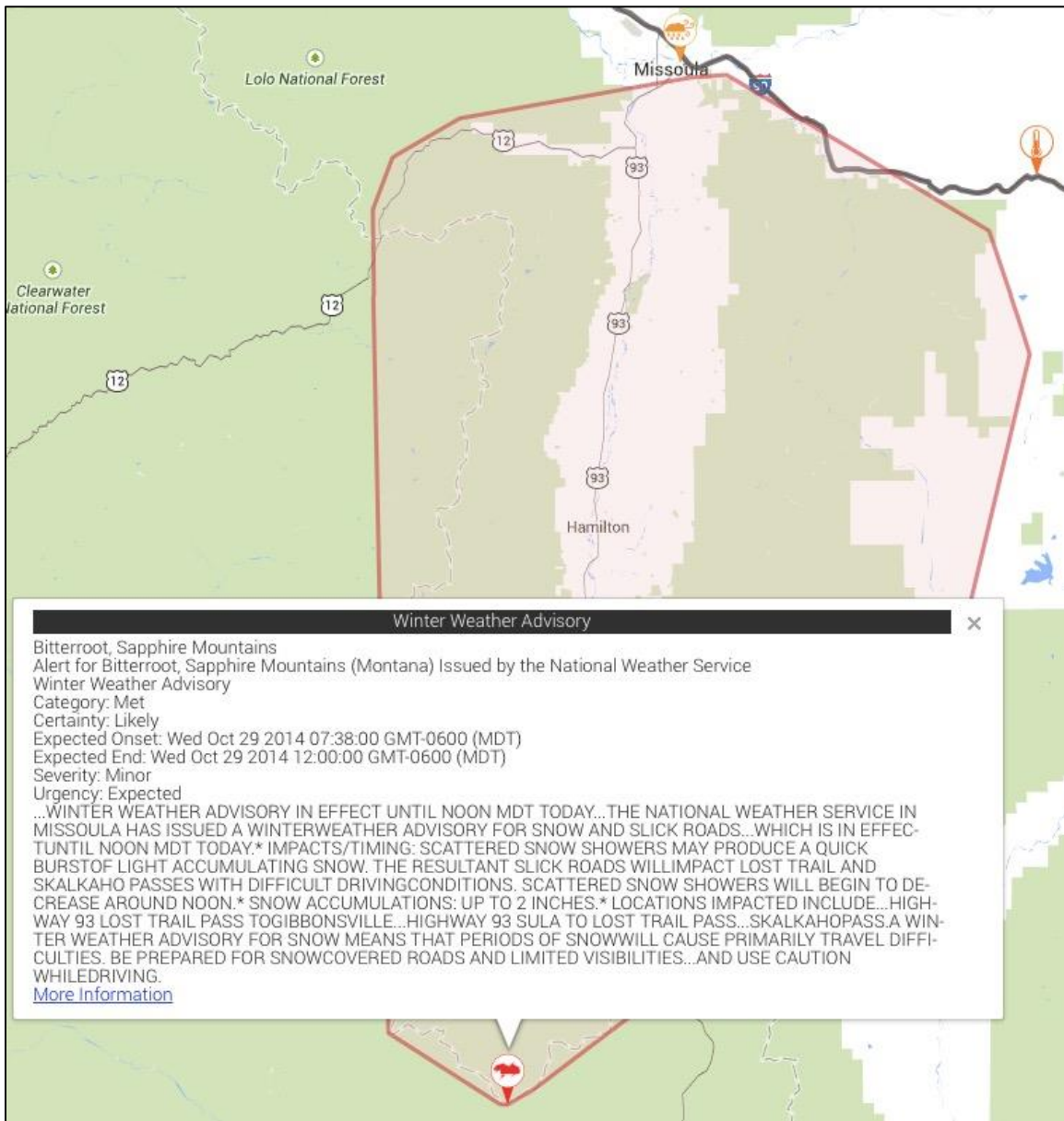
Implementation

The OTIIS project meets many of the goals and needs for regional travel across the NWP and is already tied to the data feeds from each of the states. It includes resources for CVO, including information for truck restrictions, weigh stations, fuel stops, truck parking, and other general travel and weather information. The site, however, lacks the ability to meet the specific needs that the WYDOT CVO portal is designed to meet – which is to provide detailed and dedicated

CVO oriented weather forecasts for visibility, wind, and road conditions. There two primary alternatives for implementation:

- Add functionality of the OTIIS site to include the same functionality currently provided by the WYDOT CVOP.
- Implement the CVOP across the NWP, and provide a link to it for truckers from the OTIIS Site.

NWS Transportation Decision Support (TDS)

As described in Section III, the NWS in Idaho worked closely with the Idaho Transportation Department (ITD) to develop a site dedicated to providing weather forecasting specifically for highway travelers. It was used successfully for the 2013-2014 winter season with strongly positive feedback. Since that time, the NWS has expanded the site to cover the western United States and as far east as South Dakota. The NWS reports that the site is currently being evaluated for nationwide application. While the current version was not available online as of the writing of this report (11/1/14), a white paper with a detailed description of the concept is available at

http://products.weather.gov/devPDD/PDD%20Submittal%20Transportation%20Page%20(1).pdf

Description

Since NWS forecasting models are presented by area, the NWS merges area forecasts together and combine it with Interstate Highway data in order to present forecasts on a route basis. No non-interstate roadways are currently included. An example overview map is shown in **Exhibit 16**. The site incorporates forecast and warning information. Similar to the OTIIS site, the NWS site also allows users to input the beginning and ending points of a route. The website then provides information along segments of the requested route. The preliminary interface for input route parameters is shown in **Exhibit 17.**

Implementation

As with all NWS level forecasts, they do not address the specific needs identified for dedicated CVO weather forecasting of the type provided by the WYDOT CVOP. Use or reference to this site can however, serve as an interim solution that may not meet all of the needs of the CVO community, but provide them with more route specific, general forecast information. As such, the NWS application is only modestly better information than the weather forecasts that most of the CVO community has been operating with for many years. The TDS site is likely to become just another resource for those searching the web for weather information and will be used by those who happen upon it and prefer the way it presents the information.

One alternative to this option would be to work with the NWS and begin providing maintenance information that can be integrated into their forecasting efforts, so that the forecasts from the TDS site can extend its utility. If the NWS is willing to add maintenance and condition data to their forecasting efforts, it will help raise the overall level and accuracy of highway travel related forecasts. We recognize that NWS may see this option as too close to direct competition with the private sector, but exploring the possibility with them is an option.

Exhibit 16: NWS TDS Map
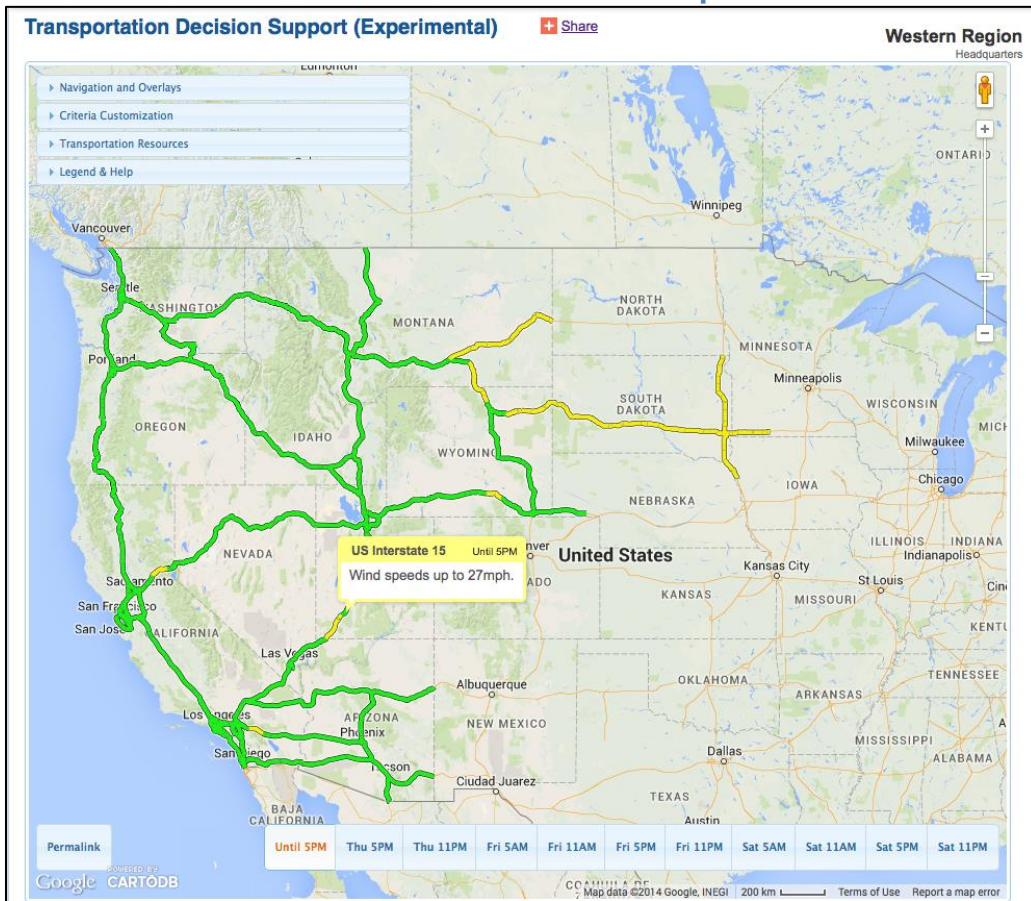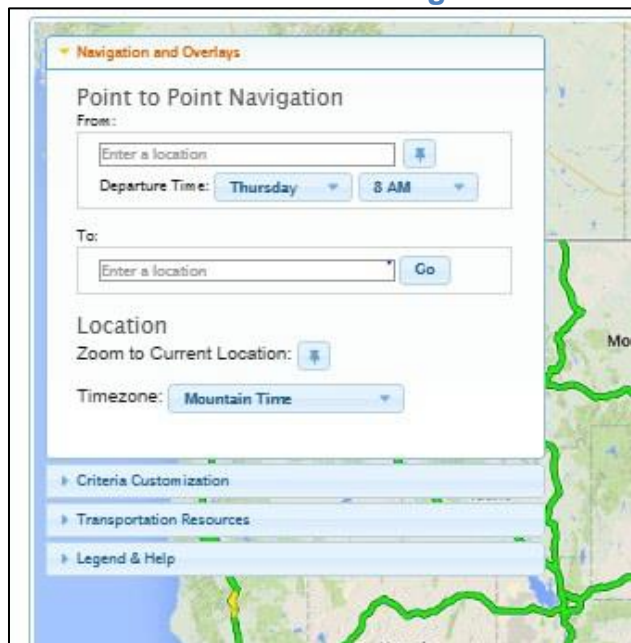
Exhibit 17: NWS TDS Navigation Menu

Other Regional, National, or Private Organizations

As presented in Section III, there are several regional, national, and private organizations that provide traveler information, including weather forecasts. As the large trucking firms have hired their own staff meteorologists, other private companies may find a profitable way to meet the need for specific weather forecasts for small companies and independent truckers. Generally speaking, this is a "keep doing what we're doing" alternative, while relying on private industry to help advance the quality and distribution of weather forecast information.

One alternative method would be to sponsor forecasts and make them available generally as a data feed to private organizations and service providers who wish to add value in the data presentation and services. This option essentially is for the DOTs to take a role in the collection of data and development of forecasts, while relying on private industry to disseminate the information.

VI. Summary

The original objective for this report was to determine the feasibility of implementing the CVOP across the NWP states. From a technical perspective, implementation of the CVOP is feasible, assuming the participating states are committed to provide the level of forecasting required to ensure consistency from state-to-state. From a strategic perspective, it is recommend that the NWP Coalition counsel together to determine whether and how to adopt the CVOP; and weigh considerations of the CVOP carefully against each of the other options.

The principal benefit of the CVOP is that fills a need for targeted forecasts for large and small CVO operations as well as independent operators. Providing this information to all of these users enables them to make better travel decisions, thereby increasing all of the consequential benefits for safety, efficiency, and cost.

The drawbacks of CVOP implementation are:

- There will be cost for each additional state to either provide additional required forecasting services, or cost for the added service of updating the CVOP.
- There are already myriad sites that provide traveler information (including dedicated CVO information) and weather forecasts, albeit these do not include targeted forecasts for CVO.

There are several options for implementation. The options are not necessarily mutually exclusive, and within each option are several variations that can be explored.

- Deploy the CVOP over the NWP as a regional agency sponsored site. A link can then be added to each state's traveler information sites and even provided to other regional and private travel information sources.
- Build the functionality of the CVOP into the already-sponsored regional OTIIS site. Links would also need to be added to each state's traveler information sites and provided to other regional and private traveler information sources.
- Work with the NWS to have them assume the responsibility to provide the level of detail required for CVO. This may require providing maintenance information to NWS also.
- Provide the forecasts as a general feed, and allow regional and private traveler information sources to disseminate the information through their existing tools.

If all NWP states commit to its implementation, it can be projected as a corridor-wide effort. If any states decline participation, it can be implemented only for states that participate, but would no longer be projected as a corridor-wide effort.

A generally summary of the options in comparison to the needs matrix is shown in Exhibit 18. Items in the "Other" column include private, regional, and agency-sponsored regional traveler information sites.

Exhibit 18: Options and Needs Summary Matrix

Requirement/Need	CVOP	OTIIS	NWS	Other
1. Real-time & Forecasted information				
a. Weather Information	F[a]	RF	F	RF[1]
i. Surface Conditions	F	R		RF[1]
1. Forecasts account for maintenance activities	F			F[1]
ii. Visibility	F		F	F[1]
iii. Wind	F		F	F[1]
iv. Weather Restrictions	F	R		R[2]
1. Chains	F	R		R[2]
2. Road Closures	F	R		R[2]
3. Other restrictions	F	R	R[3]	R[4]
v. Route-specific	F	RF[4]	F[4]	RF[5]
b. Other Travel Information		R		R
i. Traffic (incidents and recurring delays)		R		R
ii. Ongoing construction		R		R
iii. Ongoing restrictions		R		R
iv. Parking availability				
v. Border crossing wait times				R[6]
c. Alerts for condition changes	R		R	R
2. Other Requirements				
a. Consistent information from state to state	D	P	P	P
b. Ability to program a route, and get information and alerts for that route (driver)	P	P	P	P
c. Ability to identify specific routes, or multiple routes (for dispatcher)	D			
d. Simple interface	Y	Y	Y	Y
i. User (graphical)	Y	Y	Y	Y
ii. Dispatcher (printable list view)	Y			
iii. Forecaster (automatic feed, simple interface, or both)	Y			
e. General trucker information (locations for mechanical services, truck stops, weight stations, etc.)		Y		Y
f. A minimum number of locations to go to find this information.				
g. Information should be available from a computer or a mobile device.	P	P	P	Y

[a] R = Real-time, F = Forecasted, Y= Yes, P = Partial, D = Needs to be developed

Footnotes on Exhibit 18 are found on the following page.

Exhibit 18 Footnotes

[1] Most agency-maintained traveler information sites provide real-time information, some provide forecasted weather information, and a few provide forecasts that account for maintenance activities.

[2] Provided by some agency-maintained traveler information sites

[3] Many sites re-broadcast NWP alerts, and most agency-maintained sites provide restriction information.

[4] Provides general forecasts for locations along a specified route.

[5] In some cases agency-maintained and private sites include route-specific forecast information.

[6] Provided for Washington DOT border crossings

Appendix A: Weather Portal Questionnaire Results

Contents:

Weather Portal Questionnaire Results: Idaho

This questionnaire seeks to assess the functions, services, or tools each agency has in place for obtaining, using, and providing weather data and information. Please return the completed questionnaire to bghansen@olssonassociates.com and mberndt@olssonassociates.com. Thank you.

Agency	Idaho Transportation Department
Responder Name	Dennis Jensen / Tony Ernest
Responder Phone	208.901.1100
Responder Email	Dennis.Jensen@itd.idaho.gov / Tony.Ernest@itd.idaho.gov
Survey Completion Date	9/29/14

Weather Data Sources

1. *What source do you use to obtain weather information?*

- RWIS/ESS – 120
- Road Condition reporting from agency field crews (twice during weekdays, once during weekends & holidays, and anytime conditions change)
- Road Condition reporting from approved Citizens through Citizen Reporting module of the 511 system.
- District 4 has had a contract for custom forecasting services (may or may not still have it)
- Twice-a-week forecasts / pre-storm teleconferences from NWS
- NWS CAP (Common Alerting Protocol) Events
- Route-specific forecasting from NWS (http://www.wrh.noaa.gov/pih/transportation/index.php)

2. *Is this the same for all groups in your organization? (Y / N)*
   a. *If no, how do other groups in your organization obtain weather information?*

   Yes, with the possible exception of District 4 as noted above.

Using Weather Data

3. *How do you use the information that you collect?*

   Maintenance decision making support
   Real-time condition communication to the public and partners

4. *Do you provide weather information to others (within and/or outside of your organization)? (Y / N). If yes:*
   a. *What information do you provide?*

   - Providing RWIS and road condition feeds to NWS (NWS has access to login to the ITD system)
   - Provide RWIS data to MADIS
   - CARS 511 system has a data hub which makes road condition data available to 3rd parties (not RWIS data). Made available to anyone who asks for it (app developers, Google, etc.)

b. *What tools or mechanisms are in place to provide weather information?*

- 511 website / telephone
- NWS forecasting page (see question 1)
- RWIS Navigator System website (internal only)

c. *Do you customize or process the information before you share it? If so, how?*

- Free-text comments in citizen reports are automatically filtered to eliminate profanity, etc.
- Alert information is automatically generated from NWS, and from RWIS sensor thresholds (visibility, wind, ice, etc.).
- All RWIS Sensor values are converted from metric to English standard units prior to public display.

Future Service

5. *What are your plans to expand or change your weather information process or service?*

Making the RWIS network to be more robust by upgrading to newer sensor functionality. This will improve that will provide better wind speed and direction, and will report precipitation by type. Visibility sensors will also be added to critical locations currently lacking them.

Other Information

6. *Is the current way that you access weather data sufficient? Would the data be utilized more often if it were easier to obtain?*

> Just upgraded the RWIS website that now provides forecast information in a 2.5 x 2.5 km grid around each RWIS. These are model information only, but NWS will answer any questions.

7. *What other information about your state's weather-related activities may be pertinent to the Northwest Passage Corridor Coalition study for Freight-focused weather information service?*

> ITD has a very strong partnership with the NWS.
>
> NWS developed a specific site for ITD that provides 6 hour route-specific forecasting based on ITD's 511 reporting segments. They are working to expand this to other states also.

Weather Portal Questionnaire Results: Minnesota

This questionnaire seeks to assess the functions, services, or tools each agency has in place for obtaining, using, and providing weather data and information. Please return the completed questionnaire to bghansen@olssonassociates.com and mberndt@olssonassociates.com. Thank you.

Agency	MNDOT
Responder Name	Jakin Koll
Responder Phone	320.241.3631
Responder Email	jakin.koll@state.mn.us
Survey Completion Date	9/18/14

Weather Data Sources

1. *What source do you use to obtain weather information?*

- RWIS/ESS (94 State owned, also have access to surrounding states' RWIS/ESS)
- METAR (Airport ESS Weather Stations) from surrounding sites.
- Meteorologists from our contracted weather service provider for general and site specific road-weather and atmospheric forecasts
- MDSS (Maintenance Decision Support System)
  - Includes NWS warnings & METAR stations (airport ESS, etc.)
- Limited use of direct NWS info – mostly centered on spring flooding, but also use advisories and warnings during winter and summer months to help aid in operational decisions.
- Field personnel (highway patrol & maintenance personnel) reporting road and weather conditions in (highway patrol & maintenance personnel)

2. *Is this the same for all groups in your organization? (**Y** / N)*
    a. *If no, how do other groups in your organization obtain weather information?*

- Yes, the same sources of weather information are available to all groups within the organization. Each group may favor a different source depending on their specific needs.

Using Weather Data

3. *How do you use the information that you collect?*

- Weather data is focused mainly on supporting winter maintenance
- Limited but increasing use in summer-time operations
- Road maintenance / permits / construction / emergency management / planning (is not using it to its fullest potential yet)

4. *Do you provide weather information to others (within and/or outside of your organization)? (**Y** / N). If yes:*
    a. *What information do you provide?*

- Providing information to the public, including near real-time road conditions, camera images and NWS advisories and warnings
- Feed provided to Clarus, Madis & NCAR (National Center of Atmospheric Research
- Provided MDSS to the Highway Patrol

    b. *What tools or mechanisms are in place to provide weather information?*

- MDSS Application, website, and mobile app (Android and Apple)
- 511 through website (streamline and full feature versions), phone and CARS mobile app
- ScanWeb (camera & RWIS/ESS data) - publically available
- National Center of Atmospheric Research (NCAR) site

c. *Do you customize or process the information before you share it? If so, how?*

- Raw data sent to Clarus, MADIS, NCAR
- Processed custom information for specific internal users
- Processed RWIS information for public use through ScanWeb site
- Customized road weather forecasts from contract forecasting service
- Nothing specific for freight – some elements are in development

Future Service

5. *What are your plans to expand or change your weather information process or service?*

- Making the CARS 511 weather data dictionary more consistent with other states and services
- Starting to integrate RWIS information into 511 website and mobile apps. Will start with cameras and may expand to atmospheric weather and road condition data as time and funding allow.
- Developing a citizen reporting system to allow public to supplement our 511 road condition reports
- Adding additional customized internal reports for specific internal customers (e.g. management), both for weather information (current and historic) and for maintenance activities
- Incorporating weather information into trip planning applications
- Upgrading our RWIS system with new precipitation sensors that report type, intensity and amount, adding high definition cameras as well as an infrared illuminator for night time viewing of road conditions, looking at adding a few new RWIS sites to help fill in some of the gaps in coverage
- Utilizing more mobile weather data acquisition devices
- Supporting development of connected vehicle information (windshield wipers, traction control, mobile road condition and friction sensors, etc.)
- Considering ways of expanding information distribution to include more social media

Other Information

6. *Is the current way that you access weather data sufficient? Would the data be utilized more often if it were easier to obtain?*

> Currently weather data is being accessed from many sources. A focus is being placed on internal education and training in order to take advantage of the many tools that have been made available.

7. *What other information about your state's weather-related activities may be pertinent to the Northwest Passage Corridor Coalition study for Freight-focused weather information service?*

> - Looking forward to making use of more mobile weather data acquisition systems as they become available as this will be valuable (e.g. vehicle mounted road condition and friction sensors mounted to supervisor vehicles)
> - Exploring and watching new developments in sensing technology
> - Taking advantage of connected vehicle technology

Weather Portal Questionnaire Results: Montana

This questionnaire seeks to assess the functions, services, or tools each agency has in place for obtaining, using, and providing weather data and information. Please return the completed questionnaire to bghansen@olssonassociates.com and mberndt@olssonassociates.com. Thank you.

Agency	Montana DOT
Responder Name	Brandi Hamilton
Responder Phone	406.444.0468
Responder Email	brhamilton@mt.gov
Survey Completion Date	September 24, 2014

Weather Data Sources

1. *What source do you use to obtain weather information?*

- NWS – participate in regular forecasting webinars by region
- Have contracted for forecasting in specific areas in the past.
- Forecasts from Meridian system
- RWIS/ESS - 70 sites statewide
- Local areas often pick their own favorite weather information sites
- Road condition reports from field personnel

2. *Is this the same for all groups in your organization? (Y / N)*
    a. *If no, how do other groups in your organization obtain weather information?*

- Weather information sources have become consistent across all departments.

Using Weather Data

3. *How do you use the information that you collect?*

- Maintenance/operations uses the data to help with decision-making for scheduling resources and determining appropriate material application rates.
- Construction may use some RWIS data to help manage construction schedules and weather-days, but not extensively.

4. *Do you provide weather information to others (within and/or outside of your organization)? (Y / N). If yes:*
   a. *What information do you provide?*

- Provide data to all regional MDT maintenance/operations groups
- Provide data to MADIS (CLARIS) and Mesowest
- Agency partners
- Public

   b. *What tools or mechanisms are in place to provide weather information?*

- Direct data feeds for RWIS are provided to MADIS and other areas.
- Public information is provided through the 511 system and traveler information website. The website is supplemented with information from the Iteris/Meridian system which feeds information to the website.
- Forecast information is provided to 511 callers, but not on the website.
- Agency partners also may go to the traveler information website, but no direct processed data is provided to them specifically.

c. *Do you customize or process the information before you share it? If so, how?*

- Forecast and road condition Information is provided to 511 and the website. This information is processed based on forecasting models and real-time road condition information.

Future Service

5. *What are your plans to expand or change your weather information process or service?*

RWIS/ESS will continue to be deployed as budget allows. Other new technology is being considered, but no initiatives for their implementation are currently underway.

MDT would like to provide more specific information to freight partners, such as advisories for wind, mountain passes, and chain-up status.

Other Information

6. *Is the current way that you access weather data sufficient? Would the data be utilized more often if it were easier to obtain?*

The data usage is appropriate for the amount of information that is currently available.

7. *What other information about your state's weather-related activities may be pertinent to the Northwest Passage Corridor Coalition study for Freight-focused weather information service?*

Weather Portal Questionnaire Results: North Dakota

This questionnaire seeks to assess the functions, services, or tools each agency has in place for obtaining, using, and providing weather data and information. Please return the completed questionnaire to bghansen@olssonassociates.com and mberndt@olssonassociates.com. Thank you.

Agency	North Dakota DOT
Responder Name	Brandon Beise
Responder Phone	701.328.4359
Responder Email	bbeise@nd.gov
Survey Completion Date	9/18/14

Weather Data Sources

1. *What source do you use to obtain weather information?*

> 1) ESS & RWIS (30-50)
> 2) Meteorologist (contracted services) for general and site specific road-weather and atmospheric forecasts.
> 3) MDSS (use heavily)
>   a. Road and atmospheric conditions reported by maintenance vehicle drivers
>   b. Pulls information from many sources (airport atmospheric sensors, etc.) as input into the model
> 4) NWS weather briefings
> 5) Some individuals supplement weather information with their personal favorite weather information websites

2. *Is this the same for all groups in your organization? (Y / N)*
    a. *If no, how do other groups in your organization obtain weather information?*

> All sources of information are available to everyone within the DOT, though each group has their favorite.

Using Weather Data

3. *How do you use the information that you collect?*

   Operations
   - Road Maintenance
   - Construction
   - Winter maintenance
   - Emergency operations

   Traveler Information

4. *Do you provide weather information to others (within and/or outside of your organization)? (Y / N). If yes:*

   a. *What information do you provide?*

   - All weather information is available to DOT departments
   - MDSS is also provided to the Highway Patrol and the Department of Emergency Services for incident management and emergency operations.
   - Real-time weather conditions and forecasts (not maintenance information) are made available to the public

   b. *What tools or mechanisms are in place to provide weather information?*

   - MDSS site (website or application?)
   - Public website
   - Data feed to any requestor
   - Mobile App (ND Roads)
   - 511 system

   c. *Do you customize or process the information before you share it? If so, how?*

   - MDSS processes the information before recommending decision recommendations.
   - Contract meteorologist processes, and customizes the information to develop site-specific forecasts, which are also quality-checked.

Future Service

5. *What are your plans to expand or change your weather information process or service?*

- Adding additional ESS and RWIS as funding becomes available
- Looking at ways to expand information distribution to include more social media
- Are considering some kind of citizen reporting system
- Are consistently improving the traveler information map

Other Information

6. *Is the current way that you access weather data sufficient? Would the data be utilized more often if it were easier to obtain?*

The data has been made relatively easy to obtain and is being used widely throughout the Department, by partners, and by the public.

7. *What other information about your state's weather-related activities may be pertinent to the Northwest Passage Corridor Coalition study for Freight-focused weather information service?*

- ND is not a 24-hour maintenance winter maintenance state, except within the biggest cities. Interstates are not maintained 24/7. While the local population and most truckers know this through experience or internal communications, occasionally a new driver is not aware, so it would be useful to find a way to provide this information.

Weather Portal Questionnaire Results: South Dakota

This questionnaire seeks to assess the functions, services, or tools each agency has in place for obtaining, using, and providing weather data and information. Please return the completed questionnaire to bghansen@olssonassociates.com and mberndt@olssonassociates.com. Thank you.

Agency	South Dakota Department of Transportation
Responder Name	David Huft
Responder Phone	605.773.3358
Responder Email	dave.huft@state.sd.us
Survey Completion Date	09/26/14

Weather Data Sources

1. *What source do you use to obtain weather information?*

   Largely rely on Iteris, Inc. – when there is a blizzard coming, state may activate EOC that includes public safety and other. These folks will also look to NWS for information. Also have 60+ RWIS/ESS.

2. *Is this the same for all groups in your organization? (Y / N)*
   a. *If no, how do other groups in your organization obtain weather information?*

   Yes

Using Weather Data

3. *How do you use the information that you collect?*

> The information is used for:
> - Traveler information via http://SafeTravelUSA.com/sd, 511, and mobile apps (for iOS and Android)
> - Winter Maintenance Decision Support System
> - General use by SDDOT maintenance forces

4. *Do you provide weather information to others (within and/or outside of your organization)? (Y / N). If yes:*
   a. *What information do you provide?*

> Yes. We provide:
>
> - Current weather conditions
> - Forecasted weather conditions
> - Select national weather service warnings
>
> RWIS sites go to MADIS

   b. *What tools or mechanisms are in place to provide weather information?*

> Weather information is provided by:
>
> - Travel information website http://SafeTravelUSA/sd, 511, and mobile apps (iOS and Android)

   c. *Do you customize or process the information before you share it? If so, how?*

> The information is not processed after it is provided by Iteris.

Future Service

5. *What are your plans to expand or change your weather information process or service?*

> SDDOT is looking at ways to
>
> - Provide more specific weather-related information on dynamic message signs
> - Slightly expand types of NWS warnings communicated
> - Provide forecasted <u>road</u> conditions likely to result from forecasted weather

Other Information

6. *Is the current way that you access weather data sufficient? Would the data be utilized more often if it were easier to obtain?*

> Yes, we think so

7. *What other information about your state's weather-related activities may be pertinent to the Northwest Passage Corridor Coalition study for Freight-focused weather information service?*

> It would be worthwhile to visit http://safetravelusa.com/sd

Weather Portal Questionnaire Results: Washington

This questionnaire seeks to assess the functions, services, or tools each agency has in place for obtaining, using, and providing weather data and information. Please return the completed questionnaire to bghansen@olssonassociates.com and mberndt@olssonassociates.com. Thank you.

Agency	Washington DOT
Responder Name	Bill Legg
Responder Phone	360.705.7994
Responder Email	LeggB@wsdot.wa.gov
Survey Completion Date	10/2/2014

Weather Data Sources

1. *What source do you use to obtain weather information?*

   - RWIS/ESS network of 500+ Sites
   - NWS forecast information (replicated for the public)
   - Maintenance-specific forecast information from private forecasting contractor (for maintenance)

2. *Is this the same for all groups in your organization? (Y / N)*
   a. *If no, how do other groups in your organization obtain weather information?*

   - The operations and public information functions NWS forecasts and real-time conditions from the RWIS/ESS
   - The maintenance group uses the RWIS/ESS extensively. This is also provided to a private forecasting contractor, who uses this in their modeling and provides area-specific forecasts to the maintenance group.

Using Weather Data

3. *How do you use the information that you collect?*

- RWIS data and NWS forecasts are provided to the public through the traveler information website.
- RWIS data and private forecasts are used extensively in maintenance operations.

4. *Do you provide weather information to others (within and/or outside of your organization)? (Y / N). If yes:*

a. *What information do you provide?*

- RWIS data is provided to the CLARUS system.
- Data provided to the WTI's "One Stop Shop" Rural traveler information website (http://oss.weathershare.org)

b. *What tools or mechanisms are in place to provide weather information?*

- Traveler Information website
- iPhone and Android Mobile Apps
- Social Media:
  - a. Real-time: Twitter (live tweets) & Flickr
  - b. Non-real-time: Facebook & blog

c. *Do you customize or process the information before you share it? If so, how?*

- Data is not customized before sharing. RWIS data is provided as-is, and forecasts are passed through from NWS only.

Future Service

5. *What are your plans to expand or change your weather information process or service?*

- A recent study shows that now more people are accessing the traveler information website from a mobile platform than from a desktop (~1M hits per day). WashDOT is modifying their traveler information website to be geared toward the mobile user.
- 511 usage has steadily diminished, however remains important during emergencies, and will be maintained.

Other Information

6. *Is the current way that you access weather data sufficient? Would the data be utilized more often if it were easier to obtain?*

- The data is sufficiently accessible.

7. *What other information about your state's weather-related activities may be pertinent to the Northwest Passage Corridor Coalition study for Freight-focused weather information service?*

- RWIS real-time data cannot all be provided to 3rd parties since WashDOT doesn't own all of the RWIS stations. Owned RWIS data can be provided only.

Weather Portal Questionnaire Results: Wisconsin

This questionnaire seeks to assess the functions, services, or tools each agency has in place for obtaining, using, and providing weather data and information. Please return the completed questionnaire to bghansen@olssonassociates.com and mberndt@olssonassociates.com. Thank you.

Agency	Wisconsin DOT
Responder Name	Mike Adams
Responder Phone	608.266.5004
Responder Email	Michael.adams@dot.wi.gov
Survey Completion Date	10/1/14

Weather Data Sources

1. *What source do you use to obtain weather information?*

- RWIS/ESS network of 65 sites
- Forecast info comes from MDSS
- NWS pre-storm conference calls.
- State patrol provides road condition reports

2. *Is this the same for all groups in your organization? (Y / N)*
    a. *If no, how do other groups in your organization obtain weather information?*

- Operations may get some data from other sources also.
- Data is made available to planning, construction, and roadway maintenance, but the sense is that it may be underused.
- WisDOT contracts out winter maintenance to the counties. Some counties also contract with Schneider Electric for weather information.

Using Weather Data

3. How do you use the information that you collect?

- Maintenance decisions for the timing and application of road treatments.
- Operational decisions such as staffing, public & media relations, and resource coordination.

4. Do you provide weather information to others (within and/or outside of your organization)? (Y / N). If yes:

a. What information do you provide?

- Provide data to counties - all have MDSS application. Also providing this to state patrol dispatch centers & other partner agencies. They are all participating in statewide weather conference calls.
- 511 system – includes state-patrol reported road-condition reports. No forecast information is provided to the public.

b. What tools or mechanisms are in place to provide weather information?

- MDSS Application (including website & mobile app) for partners
- 511 system for the public (road conditions only).
- Internal staff and partners have pre-major event calls to coordinate efforts. These are not held before every storm but are often triggered by NWS warnings.

c. Do you customize or process the information before you share it? If so, how?

- Provided information is not customized after MDSS provides forecasts

Future Service

5. *What are your plans to expand or change your weather information process or service?*

- Expanding RWIS network as funding is available
- Looking for ways to allow the STOC to make better use of the information
- May add RWIS info to 511
- WisDOT is increasing freight operations support and initiatives, which will likely include providing better weather information for freight.

Other Information

6. *Is the current way that you access weather data sufficient? Would the data be utilized more often if it were easier to obtain?*

- Yes, but they are always looking for ways to improve. Recently did the Federal weather self-assessment, which showed that they are doing well, but are not perfect.

7. *What other information about your state's weather-related activities may be pertinent to the Northwest Passage Corridor Coalition study for Freight-focused weather information service?*

- During events, head of permitting will coordinate with weather to revoke or modify oversize-overweight permits based on weather events.

Weather Portal Questionnaire Results: Wyoming

This questionnaire seeks to assess the functions, services, or tools each agency has in place for obtaining, using, and providing weather data and information. Please return the completed questionnaire to bghansen@olssonassociates.com and mberndt@olssonassociates.com. Thank you.

Agency	Wyoming DOT
Responder Name	Vince Garcia
Responder Phone	307.777.4231
Responder Email	Vince.garcia@wyo.gov
Survey Completion Date	11/19/2014

Weather Data Sources

1. *What source do you use to obtain weather information?*

- 80 RWIS & 162 webcams throughout the state
- Private Forecasting Services
- Citizen Reporting System (ECAR)
- NWS (links to atmospheric conditions from public website)
- Maintenance personnel or highway patrol reported road conditions

2. *Is this the same for all groups in your organization? (Y / N)*
   a. *If no, how do other groups in your organization obtain weather information?*

- Yes

Using Weather Data

3. *How do you use the information that you collect?*

- Information is disseminated to support maintenance and construction activities, to the general public, and is customized for the CVO community.

4. *Do you provide weather information to others (within and/or outside of your organization)? (Y / N). If yes:*
    a. *What information do you provide?*

    - Some RWIS station information is provided to MADIS. Additional RWIS devices have been deployed which have not been sent to MADIS. WYDOT's attorney general is currently reviewing the FHWA agreement for data sharing.

    b. *What tools or mechanisms are in place to provide weather information?*

    - Traveler information website, CVOP, 511 telephone system, 511 text alerts, mobile apps,

    c. *Do you customize or process the information before you share it? If so, how?*

    - Information for the CVOP and for maintenance support is customized and input into the system by a contract meteorologist
    - RWIS data is provided to MADIS in its raw format
    - Surface, atmospheric, and RWIS data are supplied to the traveler information website automatically without manual modification.

Future Service

5. *What are your plans to expand or change your weather information process or service?*

- No current plans.

Other Information

6. *Is the current way that you access weather data sufficient? Would the data be utilized more often if it were easier to obtain?*

- The private forecasting service provides excellent services sufficient for maintenance and CVO needs.
- Current surface conditions reported by field personnel and the citizen reporting system are sufficient for public dissemination through the existing tools.

7. *What other information about your state's weather-related activities may be pertinent to the Northwest Passage Corridor Coalition study for Freight-focused weather information service?*

- Wyoming is willing to take the lead for hosting and software contract management if the NWP Coalition should choose to implement it across the corridor.
- Feedback from the CVOP has been strongly positive from all users.