

I-80 Winter Operations Coalition for Coordinated Operations and Maintenance in the Western States

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ABSTRACT

It is anticipated that this I-80 Winter Operations Coalition corridor integration, with a focus on winter mobility, will serve as a model for other states to leverage funds, share resources and knowledge, and implement high-impact strategies that make travel safer and more reliable on this important Interstate corridor.

KEYWORDS

Reliability / Traveler Information / Freight Mobility / Weather Forecasting / Performance Management

INTRODUCTION

Interstate 80 is a major economic freight and traveler corridor that stretches from the east coast to the west coast of the United States. During winter, poor travel reliability and increased delay seriously affect commerce and goods movement along this major route. This is especially true in the west, where numerous mountain passes must be navigated. During severe winter weather (including snow and ice), portions of I-80 are often closed due to safety hazards of freight and other vehicles trying to navigate extreme elevations.

Integration and continuity of winter maintenance operations among State Departments of Transportation (DOT) is needed to provide consistent traveler information and similar levels of service to achieve a higher degree of boundary transparency and improved mobility. The western states of California, Nevada, Utah and Wyoming have initiated an important strategic planning effort to reach consensus on how best to link operational processes and data to maximize winter mobility in their I-80 corridor.

The purpose of the I-80 Winter Operations Coalition is to improve the quality of information provided to travelers, and to improve the quality of real-time information shared among agencies for decision making. This planning process is broken down into two distinct focus areas:

- **Focus Area 1: Provide travelers with the information they need to make informed route and travel decisions.** In order to make good decisions, the road users must have accurate, consistent and near-real-time information. Road descriptors, (i.e. slippery in spots, icy in spots, blowing snow, chains required), road closures, weather conditions, and reliability information must be available and accurate across the entire Western Region. This is accomplished by linking Traffic Management Centers (TMCs) that share a common goal of focusing on all weather mobility, and developing a coordinated strategy for how information is shared with agencies and road users.
- **Focus Area 2: Coordinated maintenance and operations to promote consistency across state lines.** This process begins with sharing new technologies and advances in meteorological and pavement forecasting to maximize resources and improve consistency. It also includes developing pilot test programs for Road Weather Information Systems, Maintenance Decision Support Systems, Mobile Data Collection and Automatic Vehicle Location. Other items include proactive and coordinated snow and ice control training among the DOTs in the four states. This will allow a much larger pool of maintenance and operations professionals to make better informed decisions on which new technologies would best benefit their state.

The I-80 Winter Operations Coalition in the Western States has a strong focus on Winter Mobility and Reliability, with key activities that support that over-arching objective as shown in Figure 1. The concept for this Coalition and the focus areas of Travelers and DOT Agencies relies on aligning with other key efforts underway by partners as well as other coalitions. There is great benefit in aligning with the activities of other coalitions, namely the 511 Coalition and the American Association of State Highway and Transportation Officials, as these provide excellent forums to exchange information about innovative practices and approaches. The TMC Pooled Fund Study may also provide an opportunity to launch some pilot programs with multi-state involvement. As shown in Figure 1, there are specific target audiences for road user information, as well as specific activities that would need to be led by transportation agency organizations.

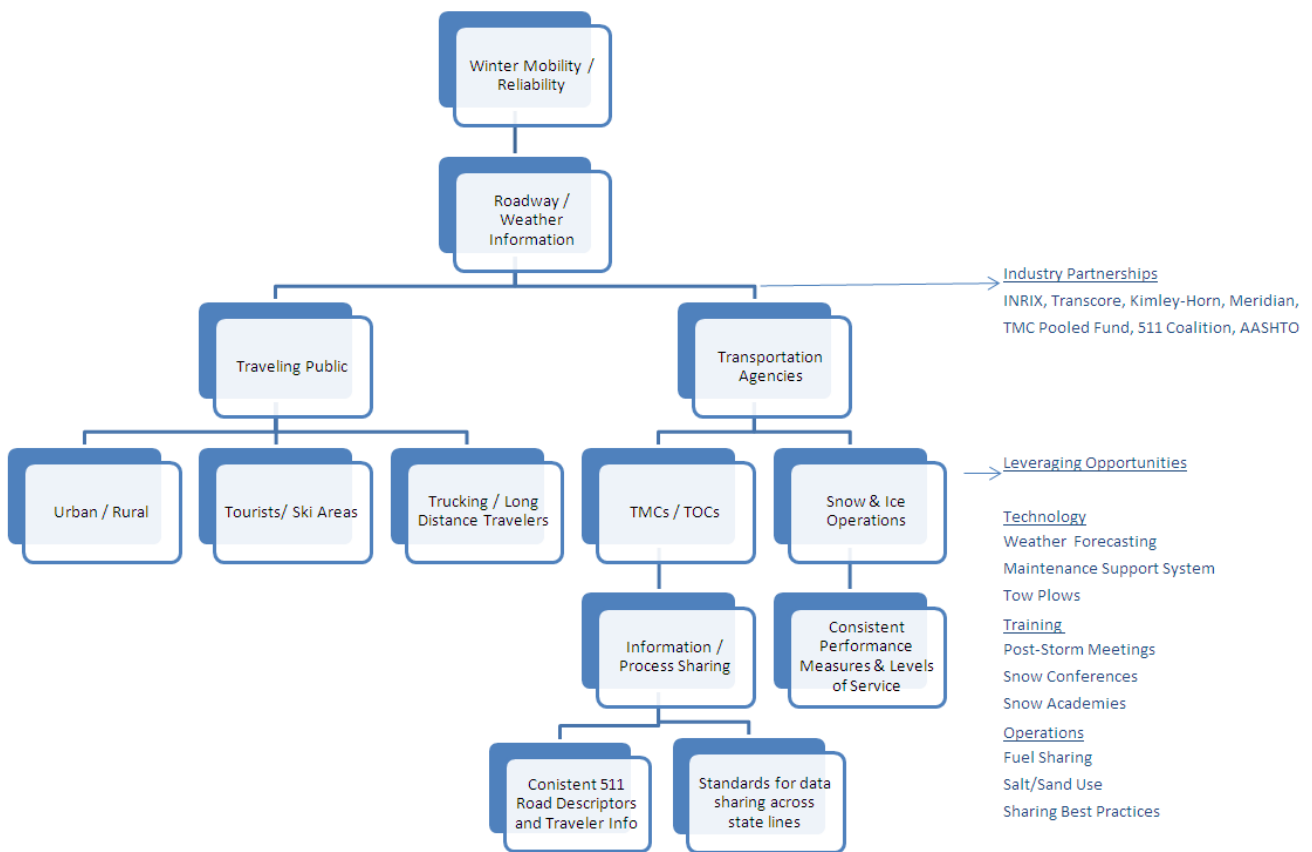


Figure 1 – I-80 Winter Operations Coalition Institutional and Operations Structure

Challenges Facing Western I-80 States

There are specific challenges for this I-80 corridor that affect freight movement, traffic and incident management and operations during hazardous winter weather conditions. These include:

- **Multi-state coordination** – Each state within the western I-80 corridor has different operational needs and institutional structures. Coordinating numerous agencies to disseminate information or provide consistent management of the corridor across states can be challenging. This multi-state coalition is focused on coordinating operations and management of the corridor as if it was one system rather than multiple state-operated systems. This helps in organizing strategies and programs to support consistent management of the corridor across state lines.
- **Regional truck parking during ice and snow events** – Truck parking and storage challenges during ice and snow events are regional issues affecting many agencies. When there is a closure on I-80 that requires trucks to divert or wait, there are very few available places where trucks can park. Queues during short term closures can impact local access to freeways. Nevada DOT in specific is working with cities and counties to try to develop long term solutions which would be supported by this program for coalition building.
- **Funding for capital improvements** – All government agencies are experiencing funding challenges through traditional revenue generators. In the current Federal

- **Available traveler or road closure information for the corridor across state, district, and even county boundaries** – States need access to consistent corridor information well in advance of the location of the incident/closure or weather event. There is a need for improved traveler information that reflects current conditions, issues, and hazards. The coalition is focused on identifying user information needs, particularly for freight travel, and how best to deliver information to drivers to provide them with advanced warning of hazards on I-80.

Multi-State Coordination Efforts

Each of the four western states have Traffic Management Centers that are the focal point of system monitoring, weather data gathering, information dissemination, and coordinating maintenance and response operations. Some of these centers are even open 24/7. Figure 2 shows the California, Nevada, Utah and Wyoming Transportation Management Centers along I-80.

Some of the functions of these TMCs include: monitoring CCTV, monitoring Road Weather Information Systems, updating traveler information systems and databases, coordinating with law enforcement and with adjacent states, implementing responses to hazardous weather conditions or incidents, among other key functions.



Figure 2 – I-80 Winter Operations Coalition Partners

There are several coordination processes currently underway, and these have come about as a result of state DOT operations and maintenance divisions recognizing there is a need to be more proactive in responding to winter weather hazards on the I-80 corridor. For example, closures on I-80 at the Nevada/California state line (such as during a major winter storm) set in motion a process where the Nevada DOT will notify agencies along the corridor about the extent and expected timeframe. Depending on the anticipated length of the closure, the notifications from Nevada DOT could go as far east as Wyoming to alert westbound truckers on I-80 to use an alternate route. This I-80 Winter Operations Coalition program builds on this concept of multi-state coordination and expands it to not only freeway closures, but general road conditions information, consistent traveler information along the corridor, traffic management strategies, maintenance operations and potentially shared use of infrastructure near state boundaries if applicable.

Impacts and Influences on Agencies and Road Users

Transportation agencies take action based on the data and information they can gather before a storm, during a storm and after a storm: What will happen? What is happening? What happened? Weather forecasting plays an important role in the decision making process at each stage of a storm. The decision on whether to anti-ice, shift deployments, or use other strategies, plays a critical role in how efficient and effective snow and ice operations will be. Post-storm evaluations help an agency fine-tune proactive operations.

The traveling public also has to make decisions based on the information they receive about a storm prior to the event: Should I make the trip? Wait an hour? Carry chains? Plan for an extra hour during the trip? These are just a few of the questions travelers will ask themselves when trying to plan around the potential for winter weather. Real-time and accurate information through 511, web-based information, Dynamic Message Signs (DMS), CCTV (Closed-Circuit Television cameras) video access, road conditions, and road closures are all tools the public needs. Consistency in the use and dissemination of this information across state lines, and especially along rural interstate routes, is very important in the public making good decisions regarding their travel.



I-80 Corridor Existing Conditions

The four states involved with this I-80 Winter Operations Coalition have various infrastructure and operating methods for managing winter conditions along I-80. Maps of the supporting infrastructure and brief descriptions of each state's capabilities are provided below.

California

Caltrans has set up numerous DMS along the I-80 corridor in rural California near the Nevada state line to alert drivers about weather. Caltrans and Nevada DOT have a shared operating agreement where Caltrans can post messages on DMS in Nevada if the state line is closed. A winter operations center is activated in Kingvale maintenance yard along I-80 to support winter maintenance activities and coordination with other states during closures/restrictions.

Caltrans operates a chain check station in Nevada during certain ice and snow events in order to make sure that trucks entering California have adequate chains. Caltrans advises Nevada DOT prior to mobilizing in vehicle checkpoints in Nevada. Prohibited vehicles are directed to turn around for their safety.

Caltrans occasionally closes I-80 in Nevada for motorist safety. During these closures, Caltrans staff along with law enforcement from both states will direct traffic to turn around until the freeway is open. Rather than a closure, in some circumstances when conditions warrant, Caltrans will funnel three lanes into one near the state line to clear the highway for snow-removal trucks and emergency vehicles.

Ten miles of magnets were installed on the eastbound and westbound of I-80 over Donner Summit, which often gets more snowfall than any other road in the rest of the contiguous country. The magnet sensors installed in the roadway to allow snow removal trucks using infra-red sensors to stay on the road and do their work more efficiently. These have been used by the Kingvale maintenance yard since 1998.

Nevada

The I-80 corridor through Nevada is operated, managed and maintained by NDOT District 2 and District 3 which routinely coordinate on winter weather management strategies, detours, and other operational requirements. Infrastructure includes CCTV cameras, DMS, HAR, and RWIS. Warning signs for chain areas, state line closures and DMS in advance of key decision points are important strategies for I-80 rural corridor operations in Nevada. NDOT plans to make use of more HAR to warn of incidents, weather hazards, detours, or closure of I-80 at the California state line.

NDOT also coordinates closely with Caltrans and UDOT for incidents and closures that have multi-state impacts. NDOT operates Regional Operations Centers/TMCs (ROCs) in District 2 and District 3 which control NDOT field devices, coordinate with NDOT field personnel and other agencies, monitor weather and pavement data from NDOT RWIS, and maintain a trunked radio system across the state. These ROCs are staffed 24/7. NDOT has multiple resources for disseminating information to travelers and to the freight community:

- **Interagency communication:** Northern Nevada Road Operations Center (NNROC) has constant communication with adjacent NDOT districts, Caltrans and NHP. They also have contact with trucks stops and ports of entry in adjacent states.
- **ITS devices:** NDOT has installed several DMS and flashing warning beacons along I-80, with a particular focus on west-bound traffic. Caltrans also operates three DMS signs and one HAR in Nevada for westbound motorists.
- **Nevada 511 System:** The Nevada 511 system includes road conditions information, incident and closure information and winter weather advisories. Road conditions and closure information is also available on <http://safetravelusa.com/nv/>.
- **NDOT Road Closure Crews:** NDOT maintains a list of road closure crews for major events affecting state highways. NDOT intends to use these crews to man truck check stations east of Reno and to implement truck controls similar to the Caltrans truck controls.
- **Free internet access at certain rest areas:** NDOT has implemented free wireless internet access at four rest areas along the I-80 corridor. Travelers can use the wi-fi to check weather conditions and routes.

Figure 3 shows ITS infrastructure and operations centers on I-80 in California and Nevada.

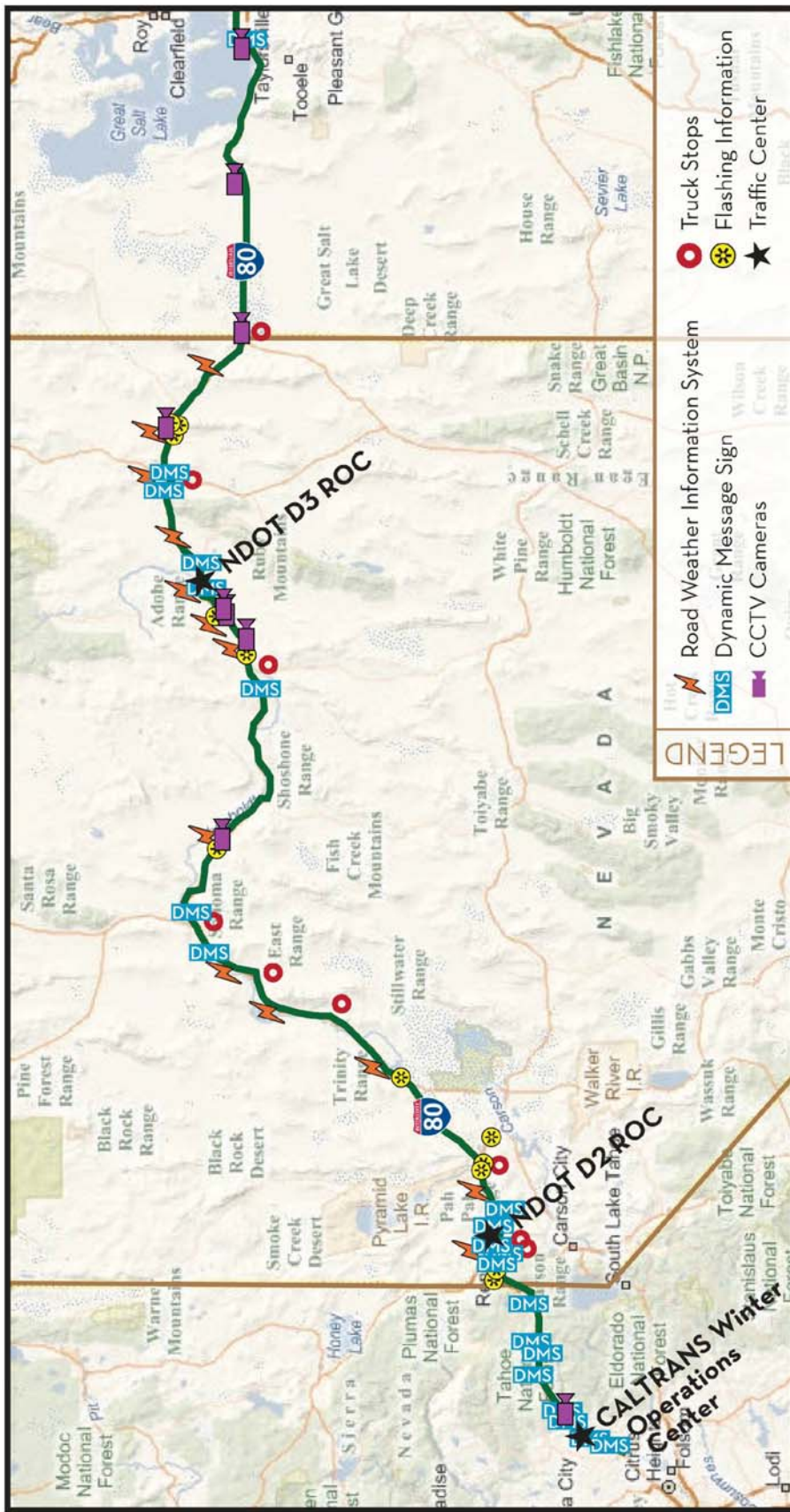


Figure 3 – California and Nevada Supporting Infrastructure

Utah

The Utah Department of Transportation (UDOT) has a number of ITS devices deployed on I-80, including DMS, CCTV cameras, RWIS stations, and HAR transmitters. While much of

the CCTV and DMS devices are concentrated in the Salt Lake City urban area, UDOT has deployed a number of RWIS devices, CCTV, DMS and several HAR sites along rural segments of I-80. Utah also installed a DMS on the Nevada side of I-80 which UDOT operates and potential joint operations of that DMS is currently in discussions.

UDOT operates a 511 traveler information telephone service and the CommuterLink website. RWIS data and road conditions information is provided to the traveling public through the phone and web information systems. UDOT recently implemented a freight-focused web site for truckers to locate suitable parking or other amenities along I-80 and other corridors in Utah (<http://www.itruck.utah.gov>).

For winter road maintenance, UDOT has three types of information that is used to guide UDOT winter response activities, including the following:

- RWIS data gathered from sites deployed across the state;
- Short-term weather forecasts provided by UDOT's in-house meteorological team; and
- Road conditions reporting provided by UDOT maintenance staff throughout the state.

For road conditions reporting, UDOT maintenance crews are required to report current conditions two times daily, at 8 AM and 4 PM, and as conditions change. UDOT crews can call in and enter information verbally into the traffic management system database, or can enter information via a web interface from any UDOT maintenance office. UDOT has increased the focus in recent years in getting crews to enter road conditions during the winter season, and appears to be getting good compliance.

Wyoming.

Wyoming DOT (WYDOT) has developed infrastructure to support operations and maintenance of I-80 in their state. I-80 in Wyoming runs parallel to the southern state line, which makes interstate travel a common subject along this section of I-80. Large overhead DMS, small side mounted DMS, and HAR provide traveler information to the public, particularly freight traffic for information on road conditions along I-80 in the state as well as for neighboring states. "Road closed" flashing beacon sign systems are also in place. Monitoring and management infrastructure includes RWIS stations, CCTV cameras and web cameras, and vehicle speed monitoring sensors.

Dispatchers at the WYDOT operations center monitor the traffic and weather conditions on I-80 between Cheyenne and Laramie using the RWIS and CCTV. The dispatchers can provide information to travelers using the blank-out signs, HAR system, WYDOT website, and broadcast media.

Nine new electronic message signs, seven new Web cameras and 29 additional road weather information systems will be installed along Wyoming's highways under two projects scheduled to be completed this fall to help keep WYDOT and motorists informed of road conditions.

Figure 4 shows ITS and corridor management infrastructure on I-80 in Utah and Wyoming.

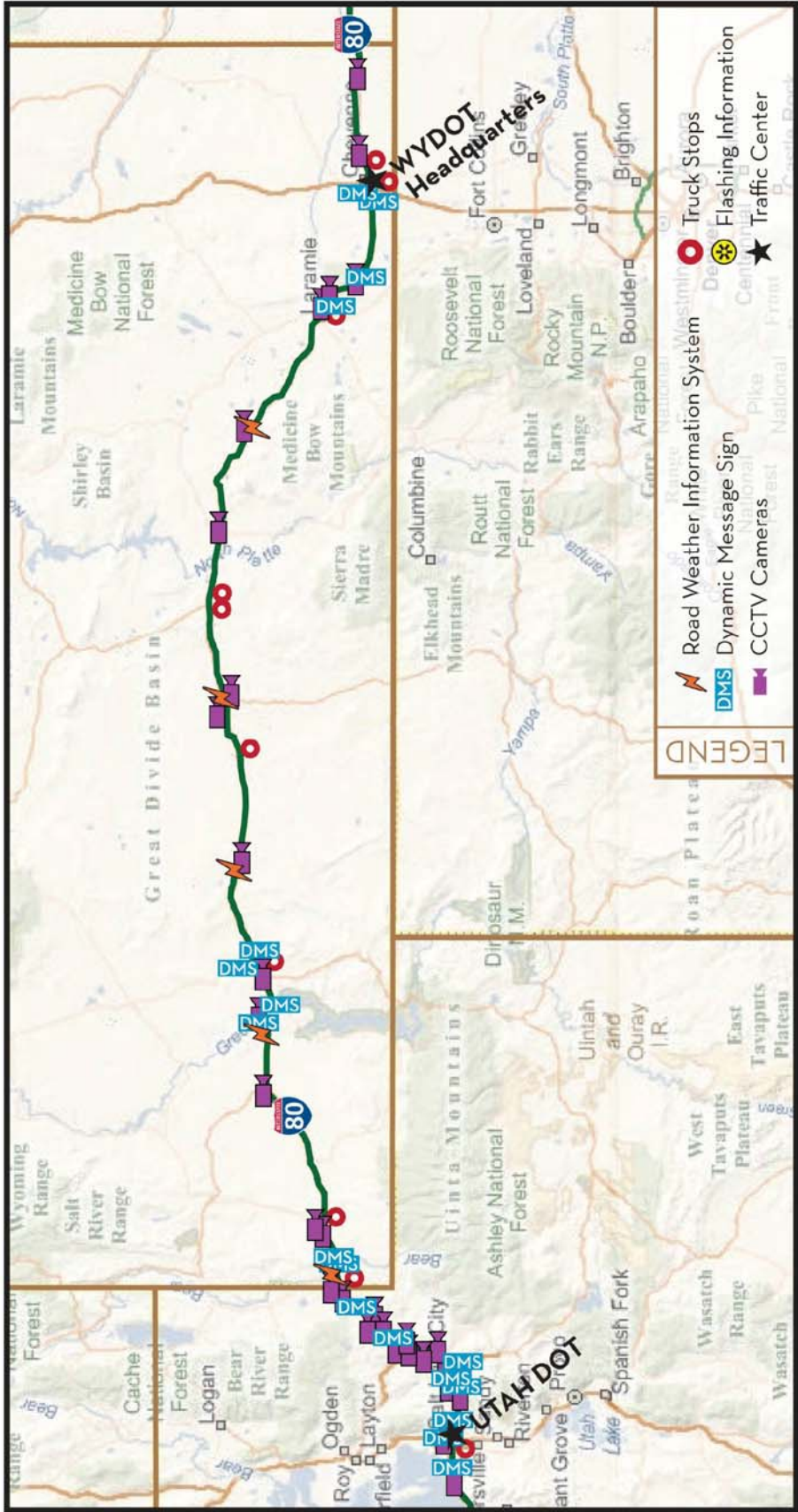


Figure 4 – Utah and Wyoming Supporting Infrastructure

Looking Forward

Considering the numerous challenges with multi-state I-80 corridor management and operations, it is important for the I-80 Winter Operations Coalition to focus on key areas of coordination:

- **Establish institutional structure for coordinating operations.** Organizing regular in-person working group meetings and more frequent conference calls supports coordination between agencies based on existing conditions and issues. These meetings also provide a venue for stakeholders to discuss agency policies and procedures that affect I-80 operations and maintenance that could be modified to improve coordination efforts.
- **Aggregate weather conditions information from multiple sources.** Each agency owns, operates, and controls RWIS stations that collect road weather information that can be shared with other agencies. This information, combined with information available from the National Weather Service or local agency RWIS adjacent to I-80, would provide comprehensive weather information for the I-80 corridor across the four states. National efforts through the USDOT, such as CLARUS, would also foster enhanced weather information sharing.
- **Identify traffic data collection capabilities and share information with other agencies.** Technologies that support data collection include automated vehicle location and detection on the main travel lanes. There are emerging models that are using probes to be able to provide speed data where agencies do not have any sensor-based detection systems installed. Investing effort in identifying communications capabilities and gaps in coverage is important to the I-80 Winter Operations Coalition to provide continuous monitoring and management of the western I-80 corridor. Sharing this information with other agencies leads to all agencies along the corridor having consistent knowledge of real-time information to make operational decisions.
- **Establish existing capabilities and near-term enhancements to identify specific continuity issues.** It is important to document current agency systems and practices for I-80 winter operations to be able to understand the potential gaps and limitations that face multi-agency and multi-state coordination. Traveler information, freight notifications, inter-agency notifications/alerts, coordination with other partners (state police, local transportation agencies) are all occurring in some form in each of the states. Near-term enhancements to infrastructure and operations strategies are also important to document as they guide the future of the use of that infrastructure and potentially changes to agency policies/processes.
- **Research innovative practices from other areas of the country facing similar challenges.** Other area operations and maintenance activities may offer innovative strategies and solutions to the I-80 Winter Operations Coalition. Innovative practices with winter maintenance and multi-state coalitions (I-5 corridor partners, Northwest Passage, I-95 coalition, and AASHTO) can potentially provide lessons learned in winter maintenance approaches or overall multi-state coordinated operations. Funding will likely continue to be a challenge. It is important for the coalition to research potential pooled fund opportunities or other innovative strategies for funding strategies and pilot deployments that come out of the

coalition. The Pooled Fund Study Maintenance Decision Support System is an opportunity for this four-state coalition to leverage for rural I-80 corridor purposes. Considering that plow drivers are the ones that typically give TMCs/TOCs the updated road conditions, new technologies such as mobile data systems to allow drivers to use in-cab touch screens to quickly update road conditions and road closures should be researched for applicability to this corridor. Also, through mobile data collection and automatic vehicle location, video streams from in-cab video cameras could be viewed by TMC/TOC staff to verify road conditions and post road conditions based on real-time video images. Sharing this information with bordering states in a near real-time scenario across four states would be extremely useful and cost effective.

Leveraging opportunities will be very important and cost effective. For example, Utah DOT is using the Tow Plow, an experimental project that has proven to show substantial savings in fuel and resource deployments. This information can be shared with surrounding states in a formal setting. A coalition research program could pool funds and reduce the risk of trying something that doesn't cost one state a lot of money. The risk and funding (as well as benefits and outcomes) are shared by four states instead of just one.

Also, leveraging the latest research and information from the SHRP II program, with regards to driver behavior and human factors, would solidify a very strong Coalition agenda of providing the safest and most reliable trip and help stretch taxpayer dollars and help financially strapped states do more with less.

Conclusions

It is anticipated that this I-80 Winter Operations Coalition corridor integration, with a focus on winter mobility, will serve as a model for other states to leverage funds, share resources and knowledge, and implement high-impact strategies that make travel safer and more reliable on this important Interstate corridor.

Furthermore, this integrated model will illustrate the necessary processes needed to achieve the overarching goals of improving the consistency and dissemination of road weather information to those who make life-safety decisions on a daily basis.