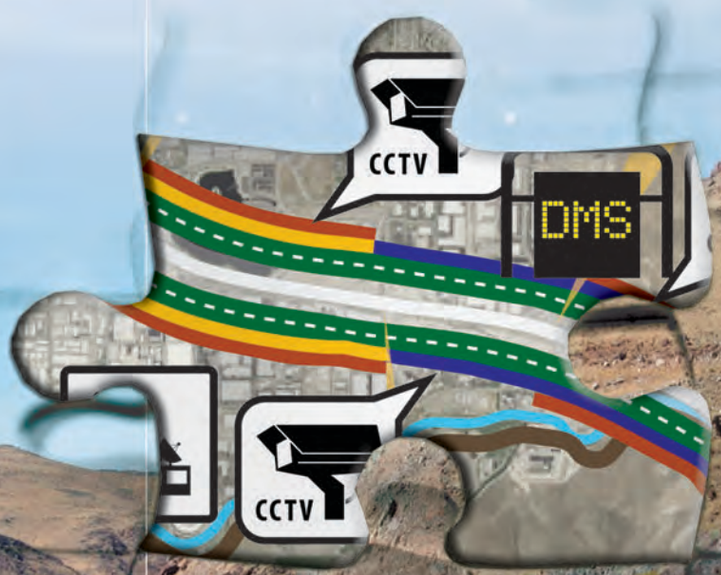
I-80 CORRIDOR STUDY TECHNICAL REPORT

Appendix J
ITS Alternatives

PREPARED FOR
NEVADA DEPARTMENT OF TRANSPORTATION



NEVADA DOT

08082|KD|2009

1. Introduction

The I-80 Corridor Study area encompasses I-80 west from the California state line to the West McCarran Boulevard (SR 651) Interchange, and I-80 east from the East McCarran Boulevard (SR650) Interchange in the City of Sparks to east of the Wadsworth-Pyramid (SR 427) Interchange. The study's intent is to provide decision-makers an action plan that will define future transportation needs along the corridor. It is also intended to provide participating agencies with a range of workable and cost-effective transportation alternatives that address current and future needs. These alternatives will be assessed for their socioeconomic, community, environmental, and fiscal impacts.

2. Purpose of the Memo

The I-80 Corridor Study will address concerns related to the need for improving transportation along this corridor by evaluating the future land use demands while protecting and using existing resources. Analysis of existing and future conditions provides information regarding current deficiencies as well as growth areas and associated issues. The intelligent transportation system (ITS) elements identified in the Northern Nevada ITS Architecture are tools that will help improve corridor operations. This document will provide a brief summary of ITS status along the corridor and identify the ITS elements that will help mitigate future congestion, enhance mobility, and improve safety along the I-80 corridor. Next steps for ITS improvements are also provided.

3. Future Corridor Characteristics

The latent capacity analysis provided estimates of future traffic conditions using a risk-based approach. Figure 1 shows a comparison of the existing Annual Average Daily Traffic (AADT) with the expected average AADT in 7-, 15- and 25-year horizons.

Analysis of future conditions indicates that the urban area will be expanding further east and west of the corridor, which may be associated with the following issues:

- Increase in traffic and deterioration of operations
- Increase in transit services or park-and-ride facilities
- Deterioration of operations, which may result in increased crashes
- Further expansion of the Reno-Tahoe Industrial Park, with an increase in truck traffic.
- Bridges at the end of design life and several roadway improvements anticipated, increasing work zones
- Weather will continue to be a significant event during winter months
- Fire will continue to be a significant event during summer months

This information regarding future traffic conditions can be used to select and prioritize equipment deployment locations.

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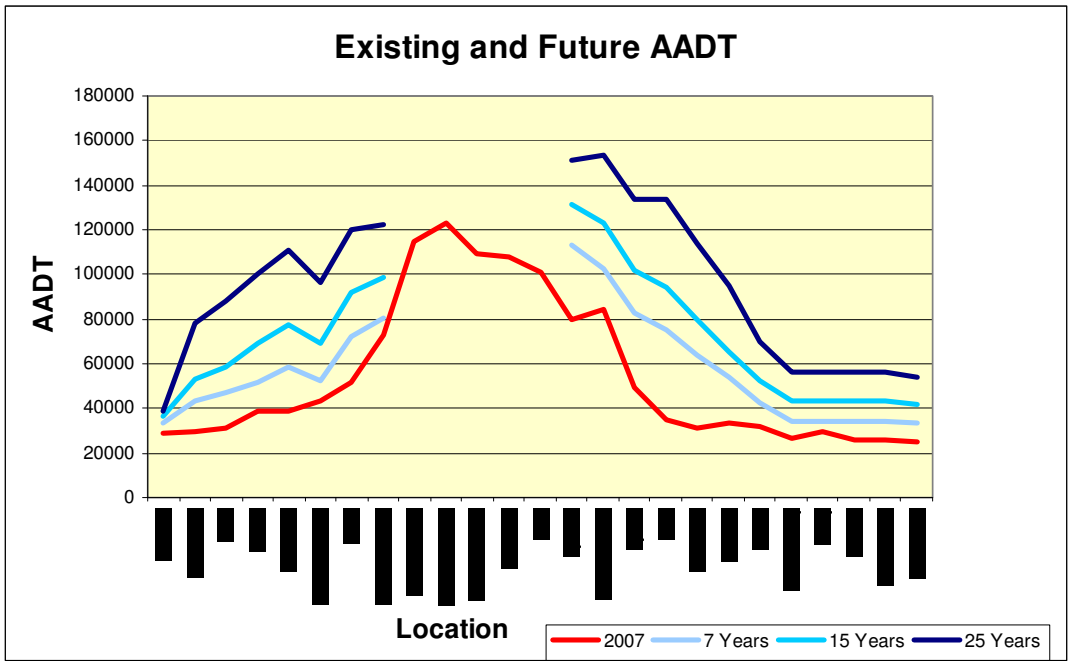

Figure 1. Existing and Future AADT

4. Northern Nevada ITS Architecture

The Northern Nevada Regional ITS Architecture and Strategic Deployment Plan developed by Iteris in September 2004 and updated in 2007 represents a collaborative effort between regional agencies and provides the framework for current ITS deployment and strategies for future investments.

The architecture ensures that all ITS investments in northern Nevada have common communication protocols, avoid duplication of investments in infrastructure, provide the ability to share data and access to data sources between agencies, and bring northern Nevada into compliance with nationally established ITS standards and architecture. The plan can be found at http://www.iteris.com/nnvitsupdate/ .

5. Existing and Future ITS Equipment Deployment Analysis (Gap Assessment)

The deployment of additional ITS elements along the I-80 corridor must conform to the Northern Nevada ITS Architecture and be coordinated with other area-wide efforts. An analysis of the northern Nevada architecture market packages was therefore considered necessary to identify the future ITS improvements along the corridor.

Archived Data Management

NDOT maintains traffic volume information obtained from annual count locations and automatic traffic recorders (ATR) and compiles this information into an online database and the Annual Traffic Report. NDOT also maintains collision reports for the entire state based on the information obtained from Nevada Highway Patrol and local law enforcement agencies.

Advanced Public Transportation Systems

The Washoe County Regional Transportation Commission (RTC) operates the area's public transit system, including RTC RIDE and RTC ACCESS. Based on information in its *Regional Transportation*

Plan, RTC is nearing the end of a multi-year project to provide fleet ITS features. Additional capabilities will include:

- Automatic vehicle location (AVL)
- Real-time bus arrival information
- Automatic passenger counters
- Electronic fare collection
- Onboard automated stop announcements
- Onboard diagnostics to monitor equipment status and maintenance needs
- Transit signal priority

Traveler Information

Traveler information along I-80 and throughout the region is disseminated through several methods. The media includes highway advisory radio (HAR), dynamic message signs (DMS), NDOT 511 Website, and interactive telephone service. The map in Figure 2, shows the locations of existing DMS, HAR coverage, and road weather information system (RWIS) locations along I-80. Two I-80 DMS are administered by Caltrans to broadcast information during winter road closures at the Donner Summit Pass.

Transportation Management

NDOT currently operates a Transportation Management Center that operates the NDOT's Advanced Transportation Management System. The communication technology between the existing devices and the TMC is wireless.

Incident Detection and Management System

This is currently limited to a freeway service patrol in the urban area that gives assistance to motorists with disabled vehicles on the freeway.

Road Weather Information System

RWIS data collection sites currently exist East of Sparks and at former Tracy Clark interchange.

Table 1 summarizes the market packages in northern Nevada and their status along the I-80 corridor and in the region. The table also highlights the implementation priority of each market package along the I-80 Corridor. The level was assigned based on an evaluation of existing and future conditions along I-80 as well as the priority set by NDOT.

Table 1. Gap Assessment

Market Packages		Existing	Planned	I-80 Corridor Specific	
				Existing	Proposed
Archived Data Management (AD)					
AD1	ITS Data Mart	X			
AD2	ITS Data Warehouse		X		
Advanced Public Transportation Systems (APTS)					
APTS1	Transit Vehicle Tracking	X			
APTS2	Transit Fixed-Route Operations	X			
APTS3	Demand Response Transit Operations	X			
APTS4	Transit Passenger and Fare Management		X		Medium
APTS5	Transit Security	X			

Market Packages		Existing	Planned	I-80 Corridor Specific	
				Existing	Proposed
APTS6	Transit Maintenance	X			
APTS7	Multi-modal Coordination	X			
APTS8	Transit Traveler Information	X			
Advanced Traveler Information Systems (ATIS)					
ATIS1	Broadcast Traveler Information		X	3 Caltrans DMS (Mustang, Keystone, Mogul) 511 System HAR, telephone, website	High
ATIS2	Interactive Traveler Information		X		Medium
ATIS5	ISP Based Trip Planning and Route Guidance		X		Low
Advanced Transportation Management Systems (ATMS)					
ATMS1	Network Surveillance	X		NDOT D2	High
ATMS3	Surface Street Control	X		Reno/Sparks	Medium
ATMS4	Freeway Control		X	Specific	High
ATMS6	Traffic Information Dissemination	X		DMS, CMS, HAR.	High
ATMS7	Regional Traffic Control		X		Medium
ATMS8	Traffic Incident Management System		X	Regional	High
ATMS11	Emissions Monitoring and Management		X		Low
ATMS13	Standard Railroad Grade Crossing	X		UPRR Xings	
ATMS14	Advanced Railroad Grade Crossing		X		Low
ATMS19	Speed Monitoring	X		VSL at Tracy	Low
ATMS21	Roadway Closure Management	X		n/a	Low
Commercial Vehicle Operations (CVO)					
CVO03	Electronic Clearance	X			Medium
CVO04	CV Administrative Processes	X			Medium
CVO06	Weigh-In-Motion	X			Medium
CVO07	Roadside CVO Safety		X		Low
CVO10	HAZMAT Management		X		Medium
CVO12	CV Driver Security Authentication		X		Low
Emergency Management (EM)					
EM01	Emergency Call-Taking and Dispatch	X		Regional	High
EM02	Emergency Routing		X		Medium
EM04	Roadway Service Patrols	X		Regional	
EM06	Wide-Area Alert		X		Medium
EM07	Early Warning System		X		Medium
EM08	Disaster Response and Recovery		X		Medium
EM09	Evacuation and Reentry Management		X		Low
EM10	Disaster Traveler Information		X	Regional	High

Market Packages		Existing	Planned	I-80 Corridor Specific	
				Existing	Proposed
Maintenance and Construction Operations (MC)					
MC01	Maintenance and Construction Vehicle and Equipment Tracking	X			Medium
MC02	Maintenance and Construction Vehicle Maintenance		X		Low
MC03	Road Weather Data Collection	X		East Sparks, Tracy/Clark, Lovelock, east	High
MC04	Weather Information Processing and Distribution		X		High
MC05	Roadway Automated Treatment	X		Non existing	Medium
MC06	Winter Maintenance	X		Regional	High
MC07	Roadway Maintenance and Construction	X		Regional	Medium
MC08	Work Zone Management	X		Regional	High
MC09	Work Zone Safety Monitoring		X		Low
MC10	Maintenance and Construction Activity Coordination		X		Low

6. Planned ITS Equipment and Deployment

A review of future corridor characteristics and the gap assessment indicate that future corridor ITS investments need to be specifically focused in the following areas:

- Advanced Transportation Management Systems (ATMS)
- Advanced Traveler Information Systems (ATIS)
- Road Weather Information Systems (RWIS)

Although the ITS architecture provides a framework for ITS investments, there are several other ongoing and planned activities that may overlap and serve the same purpose of improving safety, efficiency, and reliability of travel (for example, the traffic incident management and surface transportation programs). To coordinate these activities, it is recommended that a Freeway Management Program be established. This program will provide the appropriate policies, strategies, and actions needed to mitigate potential impacts on freeway operations and allow agencies to better prioritize their ITS investments. Many of the market packages that require immediate attention go beyond one specific route and should be planned at a regional level.

To address some of the issues identified in this study, improvements that may require the use of ITS are discussed below:

- Currently NDOT is in the process of installing DMS along the I-80 corridor, show (in addition to other devices) in Figure 2. The new DMS will support freeway management, traffic information dissemination, incident management, and the ATIS.

- Although the existing conditions operational analysis does not indicate unacceptable LOS, poor freeway operations were captured by the westbound travel time runs from Vista Boulevard to East McCarran Boulevard. This can be attributed to the relatively heavy ramp volumes that introduce a significant lane imbalance, affecting driver behavior and deteriorating freeway operations. As the urban area grows, similar events may appear in the vicinity of other interchanges, further

deteriorating freeway operations and interstate functionality. Deploying ramp metering at the ramp terminals within the urban area can be explored as a strategy to improve and maintain interstate operation, in addition to facilitating traffic redistribution into the arterial network. This could create an incentive for local governments to provide alternative arterial routes that would alleviate congestion on I-80 and preserve the functionality of the interstate.

- HAR, which have a radius of 5 miles, currently cover the urban area and rural areas east of Fernley, with recommendations for uncovered areas of the corridor. HAR will also support truck traffic information dissemination during winter months.

- Additional vehicle detection coverage is recommended for the I-80 corridor. Installing flow detectors at key locations will improve the collection of traffic demand data, facilitate incident detection and response (especially in rural areas), help manage periods of high-traffic demand in poor roadway conditions, and provide advance warning of unexpected slowdowns.

- Considering the importance of incident management in increasing safety and improving traffic flow, it is recommended that a Regional Traffic Incident Management Program be established. A discussion of incident management is provided in Appendix K, Potential Alternative Solutions Technical Memorandum. To smooth the progress of incident management and in addition to DMS, flow detectors, surveillance cameras, communications, and supporting traffic management center (TMC) devices are recommended. This equipment will also collect information to be used by the ATIS. The location of these devices needs to be identified by NDOT and other stakeholders, depending on regional traffic incident management and ATIS goals.

- Urban area growth and ramp metering or other ramp management strategies will necessitate coordination between arterial operations and freeway management. This would require a communications link between the systems.

- Analysis of current conditions indicates that truck traffic creates a challenge for freeway operations, especially during winter months. Road closures for truck traffic in California due to inclement weather can cause queues to back up for miles into the urban area. Trucks are allowed to park in the shoulder due to insufficient truck parking space. The lack of equipment and communication also contributes to a difficulty in keeping the urban area clear of truck traffic during closure events. To address this issue, two DMS are installed East of Fernley. Additionally, establishing a dedicated communication link between NDOT ATMS and Caltrans ATMS will allow for the exchange of travel information, resulting in better motorist notification and traffic handling.

- Road weather data collection sites currently exist East of Sparks and at former Tracy Clark interchange. An additional weather data collection site may be required on the west side of the corridor.

- To support weather information processing and distribution and ATIS, in addition to HAR and DMS, surveillance cameras and supporting hardware/software to broadcast NDOT 511 images are recommended at all existing weather data collection sites.

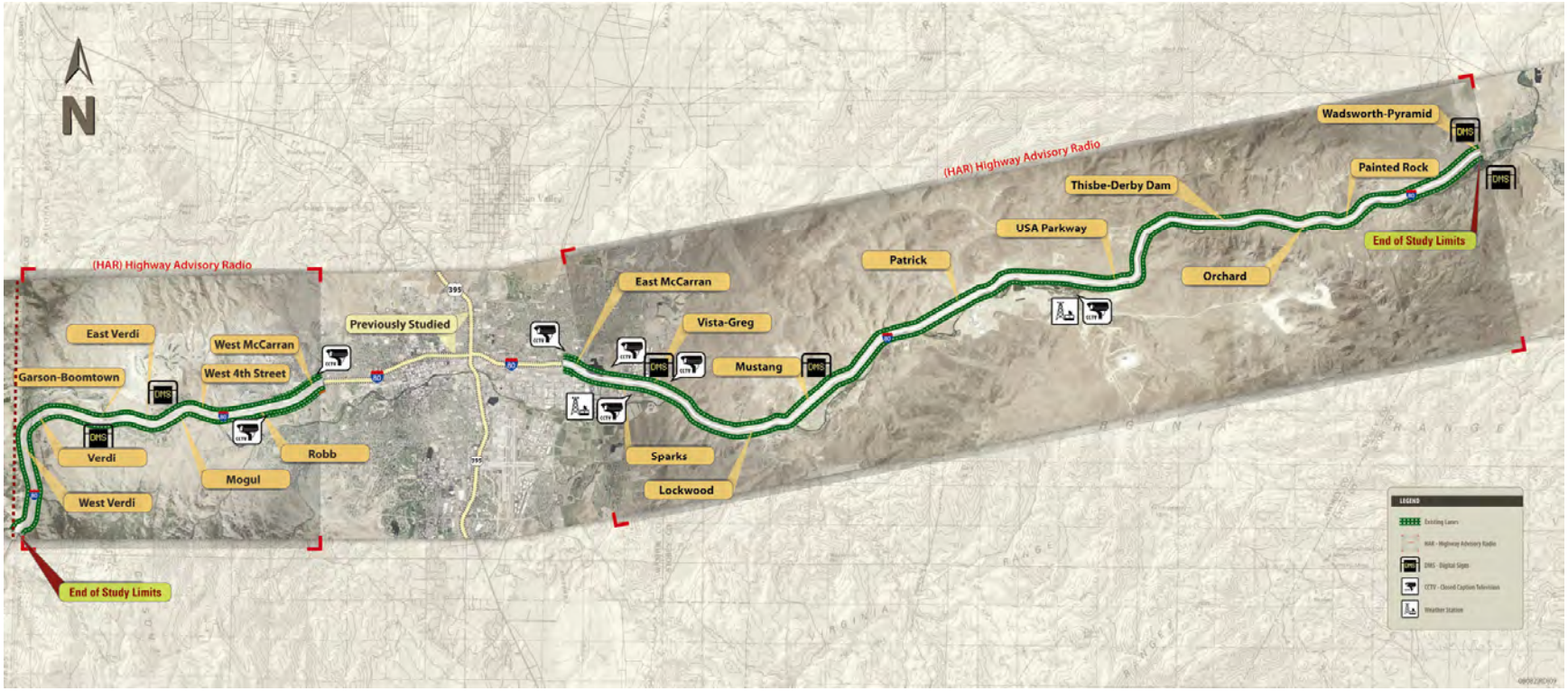

Figure 2. ITS Devices

7. Next Steps

The following list of items reflects the immediate emphasis areas, which allow stakeholders to concentrate on activities that ensure long-term regional viability of ITS as a value-added component of transportation infrastructure and operations. The recommended actions that would require early intervention include:

- Establish a Freeway Management Program that includes stakeholders from local jurisdictions and other private organizations. This group will generate regional goals, policies, and strategies for establishing the components of the program, including:
  - Surveillance and incident detection
  - HOV treatments, ramp management
  - Information dissemination
  - Land use control
- Finalize the process of creating a Traffic Incident Management Coalition for establishing a Regional Traffic Incident Management Program.
- Coordinate with Caltrans in establishing a dedicated communication link between NDOT ATMS and Caltrans ATMS. This link allows the exchange of travel information between NDOT and Caltrans, providing better motorist notification and traffic handling.
- Perform an assessment study to justify ramp metering deployment (including geographic extent, metering flow, adjacent facility operations, and implementation plan).
- Expand the NDOT traffic operations field elements in compliance with the Regional ITS Architecture. These elements include but are not limited to closed-circuit television (CCTV), HAR systems and transmitters, RWIS and field sensors, DMS, flow detectors, and communications infrastructure.
- Provide surveillance cameras along with communications and other software that may be required to broadcast images on the existing NDOT 511 site at all existing weather data collection sites.
- Establish dedicated communication link between the traffic operation centers to coordinate arterial operations with freeway management.

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8. References

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Northern Nevada Regional ITS Architecture and Strategic Deployment Plan, Iteris, September 2004.

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