



Safety/Warning



EARLY ACTION PROJECT SET

SAFETY/WARNING

PROJECT IDENTIFICATION:

SW-1

PROJECT NAME:

Incident Investigation Sites

PROJECT DESCRIPTION:

Construction of pull-outs, every one-half to one mile in both directions, or at known high incident areas would provide a safe refuge to clear vehicles and debris from the travel lanes. Police and response teams would be able to safely conduct accident investigations from these sites, allowing traffic to pass. The pull-outs would also allow safe refuge for motorists to pull off to the roadside, if needed.

Pull-outs would provide an area for motorists and public workers to move vehicles if the MOVE-IT and REMOVE-IT regulations (EAP 11-3) for the I-70 West Corridor are successfully passed.

PROBLEM RESOLUTION:

- Accidents and stalls create blockage of travel lanes.

USER BENEFIT:

- Traveler safety.
- Response team safety.
- Travel delay reduction.

APPROXIMATE COST:

\$50,000 to \$100,000 Per Site

PARTICIPATING AGENCIES:

Colorado Department of Transportation
Colorado Department of Public Safety

**EARLY ACTION PROJECT SET****SAFETY/WARNING****PROJECT IDENTIFICATION:**

SW-2

PROJECT NAME:

Excessive Speed Warning System

PROJECT DESCRIPTION:

Often, motorists and commercial vehicle operators travel at speeds 10 to 20 miles per hour in excess of the posted limits. In many cases, individual drivers are not aware that they are speeding. In others, they are unfamiliar with the roadway and enter dangerous areas at speeds far above their ability to control their vehicle. The resulting run-off-road accidents, spin-outs, and jack-knives not only endanger the perpetrator, but also other unsuspecting travelers in the vicinity.

Using radar and VMS technologies, detectors would be permanently stationed along the roadside in known high speed areas. As vehicles crossed the line of detection, speed would be clocked. If that speed exceeds the posted limit by more than 5 miles per hour, the speed would be automatically transmitted to and posted on a VMS message that would advise the driver of the excessive speed. The system could be expanded so that, when the safe speed is below the posted speed (e.g. during icy road conditions), the speed limit compliance parameters would be adjusted accordingly.

A second set of detection devices could be installed to check the violator for speed limit compliance. When appropriate, the State Patrol could man these areas and ticket violators for not heeding the warning. Surveillance cameras could be installed with the second set of detectors to record any warnings that were not followed. Vehicle identification would allow ticketing of the offense by mail if State regulations are passed to allow this procedure.

A legislative campaign would need to be initiated as a part of Early Action Project II-1, Proactive Legislative Change Campaign.

PROBLEM RESOLUTION:

- Excessive speeds for roadway geometrics and/or pavement/weather conditions.

USER BENEFIT:

- Traveler security/safety.
- Reduction in run-off-road and loss-of-control accidents.
- More efficient use of State Patrol/maintenance crew resources.

APPROXIMATE COST:

\$60,000 Per Installation

PARTICIPATING AGENCIES:Colorado Department of Transportation
Colorado Department of Public Safety

**EARLY ACTION PROJECT SET****SAFETY/WARNING****PROJECT IDENTIFICATION:****SW-3****PROJECT NAME:**

Avalanche Detection and Warning System

PROJECT DESCRIPTION:

Following successful identification and evaluation of a reliable sensing technology (Early Action Project DCA-4, Avalanche Detection Research), avalanche detection sensors and warning systems would be installed at known high-probability locations. Upon detection by the sensors of snowpack movement or shifts, a warning would be transmitted to the Regional TOC. The operator would dispatch response teams to the potential slide area to implement traffic controls and begin obstruction removal operations.

The operator would also initiate broadcasts and announcements, via HAR, to ATIS centers, and local media to advise potential travelers of road closures or potential hazard locations so they can make informed decisions regarding trip starts and/or delays.

Where there is danger of the slide traversing roadway rights-of-way, advanced warnings would be posted automatically on associated VMS to advise travelers of impending danger and what action to take (stop, pull-off, proceed with caution).

PROBLEM RESOLUTION:

- Avalanche slides onto roadways block travel lanes and trap/injure travelers.
- Delays for response teams arriving at the slide scene.

USER BENEFIT:

- Traveler safety.
- Advance warning of impending danger.
- Early mobilization of response crews.
- Early implementation of traffic controls.

APPROXIMATE COST:

\$100,000 to \$200,000 Per Installation

PARTICIPATING AGENCIES:

Colorado Department of Transportation

**EARLY ACTION PROJECT SET****SAFETY/WARNING****PROJECT IDENTIFICATION:****SW-4****PROJECT NAME:**

Advanced Technology Roadway Delineation

PROJECT DESCRIPTION:

Installation of lighted edge-of-pavement delineation systems on median and outside shoulder barriers and guardrails would improve drivers' ability to distinguish the outer boundaries of the roadway travel path. Lighted Guidance systems, such as the 3M Guidance Tube, use a special reflective tubing that transmits light along the length of the tube, either mono or bi-directionally (median applications would use the bidirectional reflective material; outside shoulder applications would use the single direction reflective material). Power would be needed approximately every 2,000 feet.

Installations could initially be placed on bridge and guard rails at sharp curve locations and at known locations where blowing snow and snow pack typically obstruct edge-of-pavement boundaries. Lighted delineation systems could also be used for temporary marking of construction work zones.

PROBLEM RESOLUTION:

- Poor and/or impaired driver visibility due to blowing snow and dust or light conditions block visual identification of roadway travel ways.

USER BENEFIT:

- Traveler security/safety.
- Potential accident reduction.
- More effective use of State Patrol/response team resources.
- High public acceptance.

APPROXIMATE COST:

\$50,000 per 2,000-foot section
\$5,000 Per Annum Operation/Maintenance Per Installation

PARTICIPATING AGENCIES:

Colorado Department of Transportation



EARLY ACTION PROJECT SET

SAFETY/WARNING

PROJECT IDENTIFICATION:

SW-5

PROJECT NAME:

Regional Incident Control Centers

PROJECT DESCRIPTION:

Establishing Regional Incident Control Centers (RICC) would provide cooperative and coordinated centralized control and immediate response to all incidents occurring within the I-70 West Corridor and the surrounding region. These regional centers would be located in the Denver Metro, Eisenhower, and Hanging Lake TOCs, occupying a set aside “war room” for detection, dispatch, and follow-up for all incidents requiring response along I-70 and the region’s state highway and county roadway system. The RICCs would employ their own operators/dispatchers and be equipped with autonomous, dedicated computer and communications systems. RICC systems would be linked to TOC systems so that all data, results, and logs can be shared. Collocation with the TOC will allow coordination of incident response with other TOC activities.

A management program would be developed to administer each RICC. This program would establish the organizational structure, jurisdictional responsibilities and activities, and communications obligations. An automated mapping (AM) or geographic information system (GIS) would be developed for incident management, control, and response. This graphical database would be linked to the detection, dispatch, response, and follow-up systems for automated logging of all activities and to provide a management and control tool.

Early Action Projects for Emergency Response (ER-1, Hot Spot Courtesy Patrols; ER-2, Good Samaritan Reporting System; ER-3, Corridor-Wide Call Box System; ER-4, MAYDAY Systems; and ER-5, Emergency Services District Program) would be coordinated through the RICCs, once operational.

PROBLEM RESOLUTION:

- Uncertainty as to the appropriate response agency where multiple jurisdictions serve the same area or region.
- Incomplete communications between response jurisdictions.

USER BENEFIT:

- Coordinated centralized management.
- Shared responsibilities and services.
- Effective use of resources.
- Improved lines of communication.

APPROXIMATE COST:

\$200,000 Per Location

PARTICIPATING AGENCIES:

Colorado Department of Transportation
Colorado Department of Public Safety
Local Police/Fire/Response Districts

**EARLY ACTION PROJECT SET****SAFETY/WARNING****PROJECT IDENTIFICATION:****SW-6****PROJECT NAME:**

Animal Alert Warning System@

PROJECT DESCRIPTION:

The Animal Alert Warning System (AAWS) would apply existing microwave sensor technology and highway advisory signage to detect objects entering the roadway rights-of-way and to warn approaching motorists of a potential obstacle in the travel path. Migration of elk, deer, big horn sheep, and other wildlife are frequent causes of single-vehicle crashes along rural routes during the spring and fall seasons.

The AAWS would emit a microwave beam between a transmitter and receiver mounted along the roadway rights-of-way (up to 1000 feet apart). When any animal penetrates the beam between the transmitter and receiver, the break would trigger a signal to automatically turn on fixed message signs (FMS) flashers and variable message sign (VMS) messages, positioned on each side of the roadway in advance of the sensed area. The VMS would warn approaching motorists that an animal had entered the roadway and caution to slow down and proceed with care.

PROBLEM RESOLUTION:

- Significantly high rate of animal/vehicular conflicts along rural interstate, state highway, and county road corridors due to high speeds, blind curves, difficult terrain, and impaired distance vision during nighttime travel.
- Animal fencing systems require routine maintenance and replacement.
- Fixed warning signs are generally ignored by the travelling public because many motorists rarely encounter an animal in their travel path.

USER BENEFIT:

- Traveler security/safety.
- Advanced warning of potential hazard.
- More effective use of incident response/maintenance resources.
- Protection of wild animals.
- Reduction of personal property damage and personal injury.

APPROXIMATE COST:

\$500,000

PARTICIPATING AGENCIES:Colorado Department of Transportation
Colorado Department of Public Safety
Eagle County

(Note: The AAWS is a registered trademark and patented system. Any interest in this or a similar system must be coordinated through De Leuw, Cather & Company.)

**EARLY ACTION PROJECT SET****SAFETY/WARNING****PROJECT IDENTIFICATION:****SW-7****PROJECT NAME:**

Tunnel Video Surveillance Systems

PROJECT DESCRIPTION:

Installation of color CCTV cameras and CRT monitors, to replace black/white models would improve vehicle identification and incident detection and help to enforce HAZMAT restrictions within the tunnel bores and along tunnel approaches. Color systems would allow better coordination and cooperation between CDOT and CSP to identify, locate, and track suspect vehicles travelling through the I-70 West Corridor. Additional surveillance capabilities within the Eisenhower Tunnel and along the approaches would establish comprehensive coverage of the area so that emergency operations can be conducted more efficiently.

PROBLEM RESOLUTION:

- Eisenhower Tunnel surveillance systems are old (color cameras) and have incomplete coverage.
- Hanging Lake Tunnel surveillance systems do not allow adequate vehicle identification (black/white cameras).

USER BENEFIT:

- Traveler security/safety.
- Improved operational efficiency.
- Added coordination between CDOT and CSP.

APPROXIMATE COST:

\$100,000 to \$200,000 Per Tunnel

PARTICIPATING AGENCIES:

Colorado Department of Transportation

**EARLY ACTION PROJECT SET****SAFETY/WARNING****PROJECT IDENTIFICATION:****SW-8****PROJECT NAME:**

Emergency Response Information System

PROJECT DESCRIPTION:

Emergency situations occurring on I-70 are often compounded by motorists who, unaware of the emergency conditions ahead, continue to travel the corridor. The Emergency Response Information Systems would broadcast incident information to motorists traveling the corridor. When not precluded by an emergency, the system would broadcast travel delays associated with recurring congestion.

Emergency information pertaining to roadway accidents, adverse weather, avalanches or other catastrophes, collected at the Denver Metro and Eisenhower TOCs would be transmitted to the Hanging Lake TOC and fused with the Hanging Lake emergency information. By processing the information centrally, all data would be subjected to the same criteria to determine appropriate predetermined message content and VMS location for message broadcast. Some emergencies may necessitate a variety of predetermined messages, of differing intensity, for multiple VMS along the corridor.

Information regarding travel delays from recurring congestion would also be broadcast. Travel delays for the entire corridor would be processed centrally by the Hanging Lake TOC. Travel delay reports would be fused and processed to determine travel delays for the entire corridor. Predetermined messages relating this information would be sent out to the system of VMS to alert motorists of delays.

PROBLEM RESOLUTION:

- Motorists not aware of emergency conditions ahead.

USER BENEFIT:

- Traveler awareness/security/safety.
- High public acceptance.

APPROXIMATE COST:

\$2,000,000

PARTICIPATING AGENCIES:

Colorado Department of Transportation