

II. PROJECT BACKGROUND

Travelers crossing Arizona in winter find that their long-held images of the desert's arid terrain, cacti and climate can be quickly shattered, as snowstorms often blanket the high country from early October into April. Commercial transport delivery schedules, regional economies, and personal mobility and safety expectations are all critical factors in the struggle to keep Arizona's highways open through the long winter storm season. As later chapters of this report will show, the cost impacts of winter storm-caused crashes are very high for Arizona.



Figure 2. Arizona's Highway Corridors are Critical to Commerce and Travel

Over the past five years, this ADOT advanced-vehicle research project has demonstrated and tested several sophisticated technologies, as described below, that have significant potential to support the snowplow operators and highway agencies of other rural states such as Arizona.

PROJECT PHASES

Phase One of this research began in 1997 with intelligent-vehicle concept demonstrations and tests focused on Arizona's transportation needs. The early efforts soon led the project to focus on winter maintenance operations. In 1998 and 1999, ADOT crews evaluated California's ASP lane-guidance system over two winters, at a six-mile roadway magnet test site near Flagstaff.

In Phase Two (2000-01), the project evaluated a 3M Lane Awareness System, with five miles of magnetic striping tape installed at a second test site. The joint research program continued with Caltrans with an added goal to compare both vehicle guidance concepts in similar conditions.

In Phase Two(b), during 2001-02, ADOT's goal of same-day operator training on both advanced snowplows was hampered by a lack of snowfall at Flagstaff. Both systems were effective and reliable, but the mild weather did not allow either to excel. It also was clear to ADOT that the cost of either system infrastructure was prohibitive. As a result, the research focus in 2002-03 shifted from roadway-based guidance systems to commercial on-board driver warning systems. In the current Phase Three winter (2002-03), ADOT has expanded the research activity area to the I-40 corridor districts east and west of Flagstaff. Four snowplows have been equipped with

collision warning radar, and three more with passive infrared night vision systems. With the new systems in service at seven diverse sites across northern Arizona, the project has documented the driver ratings and performance results in local winter conditions for these two on-board warning concepts.

PROJECT SPONSORSHIP AND FIELD PARTICIPATION

The project stakeholders on the Technical Advisory Committee (TAC) bear the responsibility for a successful research project, by giving clear direction and leadership for the work, and providing generous resource support. The Intelligent Vehicle (IV) project TAC, by their participation and their positive attitude, were vital to the development of the two unique Arizona test sites, and to the ATRC's ability to capture valid and relevant results from the ongoing field activities.

Many individual stakeholders have had key roles in the long-term joint testing, training and evaluation program for advanced snowplow systems in Arizona. Many of the project partners named below have been actively involved in this snowplow research from its beginning in 1997 (*asterisks (*) designate Phase Three TAC membership*).

ADOT's I-40 Corridor District Engineers, Maintenance Engineers, Superintendents (1997-2003):

- Flagstaff District – *John Harper, *Kent Link, *Danny Russell, Don Dorman
- Holbrook District – *Jeff Swan, *Robert Wilbanks, David Sikes
- Kingman District – *Sam Elters, *Mike Kondelis, *Rance Spurlock, Debra Brisk, Bill Wang

ADOT Maintenance Yard or Camp (Org) & Equipment Shop Supervisors (1997-2003):

- *Tim Bighorse (Gray Mountain Maintenance Org)
- *Mike Gutzwiller (Little Antelope)
- *Ernie Sanchez, Jack Gray (East Flagstaff)
- *Bruce Mejia (Seligman)
- *Tom Steinberger (Kingman)
- *Gilbert Nastacio (Chambers)
- *Frances McCauley (Winslow)
- *Carl Eyrich (Flagstaff Equipment Shop)
- *Dave McNally (Kingman Equipment Shop)
- *Jim Finley, Ed Zamora (Holbrook Equipment Shop)

During the entire project, from 1997 to 2003, the project TAC included personnel both from key ADOT sections and from partner agencies. In addition to the ADOT field personnel listed in the preceding section, the other project TAC partners were:

Project 473 Technical Advisory Committee (1997-2003):

- Dennis Halachoff, Larry Presnall, Dean Murguic, Mike O'Malley, Mike Signa (ADOT Equipment Services)
- Tim Wolfe, Manny Agah (ADOT Transportation Technology Group (TTG))
- Doug Nintzel, Matt Burdick, Howard Boice (ADOT Community Relations Office)
- Lt. Dan Wells (Arizona Department of Public Safety: Flagstaff Patrol District)
- George Howard, Mike Campbell (NOAA / National Weather Service: Flagstaff –Bellemont)
- Alan Hansen, Jennifer Brown (Federal Highway Administration)

ADOT Project Snowplow Operators (2002-03, Phase Three: On-Board Systems):

- Robin Nelson, Seymour Tso (Gray Mountain)
- Chuck Bement, Robert Lyons, Jeff Saligoe (Little Antelope)
- Darwin Brewer, Harley Cody (Flagstaff)
- Stetson Baker, Lamar James, Bertram Billy, Dick Nez (Chambers)
- Jerry Pfalzgraff, Dave Henderson (Kingman)
- Curtiss West, Danny Solberg (Seligman)
- Ronnie Baca, Rick Sedillo, Steven Sanchez (Winslow)

PROJECT PARTNER & VENDOR SUPPORT: 1997-2003

Eaton VORAD System Technical Support (2002-03):

- Jeff Hall, Tom Mattox

Bendix XVision System Sales and Technical Support (2002-03):

- Craig Stark

Caltrans Advanced Snowplow Project Development (1997-2002):

- Bob Battersby, Kirk Hemstalk, Mike Jenkinson, Greg Larson of Caltrans
- Dr Ty A. Lasky and the AHMCT project team from the University of California at Davis
- Dr. Wei-Bin Zhang, Dr. Han-Shue Tan and the California PATH / UC Berkeley project team

3M Advanced Snowplow Project Development (2000-02):

- Heinrich Bantli, Gary Nourse, Chin-Yee Ng