I-90, Snoqualmie Pass

Highway Advisory Radio

WA-RD 103.1

Final Report
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Washington State Department of Transportation
Planning, Research and Public Transportation Division
in cooperation with the
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Federal Highway Administration

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A Highway Advisory Radio (HAR) system was installed on I-90, Snoqualmie Pass to inform motorists of winter driving conditions. Despite numerous operational problems with equipment, the service has been well received by the traveling public. The system was found to have an added benfit during the summer months as an information system to alert motorists of delays or other problems caused by construction acitivites. The HAR system on Snoqualmie Pass has been expanded and additional systems have been installed in the Seattle area to inform motorists of construction activities.

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HIGHWAY ADVISORY RADIO

I-90, Snoqualmie Pass

by

Harry O. Krug,
District 5 Maintenance Superintendent

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HIGHWAY ADVISORY RADIO

I-90 Snoqualmie Pass

Final Report

INTRODUCTION

In the winter of 1979 the first installation of a Highway Advisory Radio (HAR) system was completed on I-90, Snoqualmie Pass. Highway Advisory Radio (HAR) is a means of providing motorists with pertinent driving and travel related information over their vehicle's standard AM radio receiver. HAR operates as a Travelers Information System, licensed by the Federal Communications Commission (FCC), and transmits on either 530 or 1610 kHz. These frequencies are sufficiently close to the commercial AM broadcast band that a high percentage of automobile AM radios can tune to them without any modifications or adapters.

A HAR broadcasting system consists of a low-power AM transmitter (type accepted by the FCC), a cable or vertical monopole antenna, and a continuous format type recorder/playback tape unit. The AM transmitter is generally interconnected to the tape unit via leased telephone lines.

The HAR system is combined with a system of signs the first of which alerts the motorists to tune to the appropriate AM radio band for messages concerning the highway conditions. A second sign is placed at the beginning of the broadcast zone and a third at the end of the broadcast zone. These signs are equipped with amber flashing lights which are automatically activated when the HAR system is broadcasting messages.

The length of the messages transmitted are adjusted, knowing the speed limit and length of the broadcast zone, so that the motorist will hear the message twice. Human-factors research has found that audio messages should be received at least twice to insure motorist retention.

SYSTEM INSTALLATION

The initial installation consisted of two transmission/reception zone locations controlled from a message command center. One transmission/reception zone covered I-90 eastbound traffic from approximately M.P. 30.0 near the South Ford Road Interchange in the vicinity of North Bend to approximately M.P. 32.3 near the Cedar Falls Road Interchange. The other location covered I-90 westbound traffic from approximately M.P. 82.2 near the West Cle Elum Interchange to approximately M.P. 84.5 near the Oakes Avenue Interchange. The message command center was housed in the Department's maintenance complex at Hyak.

The message command center consisted of a console with a library of prerecorded tapes and two triple deck tape player/recorders. Each player/recorder accepted three tape cartridges at one time. As soon as one message was completed, the next cartridge started playing while the first rewinds to be ready to play again. This provided for three separate messages or a repeated single message as conditions warranted. The messages are fed onto telephone lines and sent to each respective transmission/reception zone where they are transmitted via the vertical monopole

antennas to the motorist. The console, with its twin deck tape recorders/players can send different messages to each of the transmitters at the same time.

The HAR system was complimented by the construction of a Changeable Message Signing System completed under the same contract. Seven fixed messages (CMS) chain enforcement signs were installed to inform motorists where chain enforcement begins and ends.

PERFORMANCE

The HAR system has performed its function of informing motorists of the pass conditions for a period of five years. During this period operation has been continuous but not without problems. Much of the systems components have been replaced due either to the poor choice in original equipment or to improvements in equipment design during the intervening period. An example of the latter case involves the cartridge tape players. The only tape players available at the time of initial purchase were not designed for continuous use application. The cartridges had a two to three day life span due to tape materials and heat generated by the players. The tape deck required daily cleaning and annual replacement of drive motors, bearings and other parts due to mechanical wear and excessive heat within the units. These machines were replaced prior to the 1982-83 winter season with solid state voice storage units installed at the transmitter sites. Messages are sent from the Hyak control center via telephone lines directly to these voice storage units. The voice storage units have no moving parts and are reliable and maintenance free. Other problems included short transmitter range, nonfunction of the automatic activation of the flashing lights on signs, and poor signal quality of transmitted messages. These were all solves or compensated for by our own maintenance personnel in charge of the systems operation.

EVALUATION

The HAR system was widely publicized to acquaint the motoring public of its use and it has been well received by the public. The system has proven to have added benefits during the summer months to inform motorists of possible delays due to construction on Snoqualmie Pass. The Department is very pleased with the concept of HAR as proven by the expansion of the system to include transmitters at Snoqualmie Summit and Ellensburg as well as a separate HAR system for construction information in the Seattle I-5 corridor.

CONCLUSIONS

The following conclusions can be drawn from the performance of the HAR system.

1) Highway Advisory Radio is a successful tool for information dissemination as evidenced by the continued expansion of the initially planned system and the use of similar systems at other locations within the state.

2) The decision by FHWA to promote the use of HAR through its NEEP program provided a valuable incentive for state departments of transportations to give the system a trial which has resulted in a new tool to increase the comfort and safety of the travelling public.

3) WSDOT's involvement in the NEEP program has provided us with a background of knowledge and experience which can be used to design and install ever better HAR systems in the future.

4) HAR is an excellent example of successful technology transfer from FHWA to individual state transportation departments.