FINAL REPORT

Advanced Traveler Information Services in Rural Tourism Areas: Branson Travel and Recreational Information Program (Missouri) and Interstate 40 Traveler and Tourist Information System (Arizona)

June 30, 2000

Principal Authors:

John Orban (Battelle)
Bennett Pierce (Battelle)
Matt Burt (BRW Inc.)
Hugh Clark (CJI Research)
Diane Burkom (Battelle)

Prepared for:

U.S. Department of Transportation
ITS Joint Program Office, HVH-1
Washington, D.C. 20590

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EXECUTIVE SUMMARY

The Branson Travel and Recreational Information Program (Branson TRIP) in Branson, Missouri, and the I-40 Traveler and Tourist Information System (I-40 TTIS) in northern Arizona are field operational tests (FOTs) being conducted through partnerships involving state and federal agencies and private organizations. The FOTs are funded in part by the National Advanced Rural Transportation Systems program. The focus of these FOTs is to provide the traveling public, especially tourists, with information about traffic and travel conditions, national and state parks, local events and attractions, and accommodations. These tests will demonstrate the degree to which Advanced Traveler Information Systems (ATIS) can improve traveler mobility and access, relieve congestion, and stimulate economic development in rural tourism areas.

Branson TRIP is a regional traveler information system that will provide comprehensive information on tourist attractions, weather, traffic, and road construction in the Branson/ Tri-Lakes area. Each year, over six million visitors are attracted to the Branson area because of the availability of over 38 live music and entertainment theaters, numerous outlet malls and shopping centers, and various outdoor recreation opportunities. The TRIP system is envisioned as the first phase of the Great Plains TRIP, which will encompass Nebraska, Iowa, Kansas, Missouri, Oklahoma, and Arkansas.

The I-40 TTIS collects, processes, and disseminates weather, road condition, and traveler information to I-40 corridor travelers. I-40 is an east-west interstate highway that crosses northern Arizona. Average daily traffic is more than 25,000 vehicles per day, including about 10,000 commercial vehicles. The I-40 corridor is the primary access to the Grand Canyon and over 20 other major national parks, monuments, and recreation areas. Significant changes in elevation and adverse weather conditions occur along the corridor. Like Branson TRIP, the I-40 TTIS links existing and new data sources to provide tourists and travelers with information before departure, while en route, and at designated local sites. Information is available through systems managed by public and private organizations.

Battelle has evaluated the Branson TRIP and I-40 TTIS under a contract with the U.S. Department of Transportation's ITS Joint Program Office. An overview of the common evaluation strategy is presented below. It is followed by a brief summary of the key results for each evaluation goal.

Overview of Evaluation Strategy

Battelle's evaluation addresses technical challenges of developing advanced traveler information systems in rural environments, institutional benefits and issues, usefulness of the information to the traveling public, effectiveness of various media in disseminating information to the public, and the overall impact of the information on traveler behavior. Specifically, the evaluation addresses five goal areas: mobility, access, congestion, economic development, and safety. The key measures associated with these goals are listed in the table below.

Table E1. Evaluation Goal Areas and Measures (Continued at Right)

Goal Area (Focus Area)	Few Good Measures	Surrogate Measures
Mobility (Traveler)	• Travel time • Ease of travel • Tourist traveler satisfaction	• Proportion of surveyed respondents using an ITS component who report that the information saved them time. • Proportion of survey respondents that agree or strongly agree on ease of travel • Perceived satisfaction of total travel experience • Number of stops for directions
Access (Destination)	• Knowledge of travel options	• Percentage of tourists indicating use of an alternative route • Number of attractions visited • Percentage of tourists indicating a change in attractions visited • Percentage of tourists indicating that they visited attractions they had not previously known about because of information obtained through ITS
Congestion (Overall System)	• Number and nature of delays • Level of service (LOS)	• Reported number and severity of delays • Percentage of tourists indicating that congestion was avoided • Prior knowledge of traffic problems • Traffic volume and throughput • Average travel speed • Number of accidents • Incident response time
Economic Impact (Region)	• Increased visitation • Tourism revenue • Increased awareness of alternative attractions	• Duration of stay (overnights) • Estimated expenditures throughout stay • Intent to return • Willingness to utilize information outlets for fee • Utilization of information outlets
Safety (Traveler)	• Safety • Injuries, fatalities	• The amount of information regarding safety that is available before and after implementation • The percentage of travelers detouring as a result of traveler advisories displayed on roadside variable message signs • Perception of safety

Table E1. Evaluation Goal Areas and Measures (Continued from Left)

Information on Measures Collected?	Hypotheses
Yes (See 1) Yes Yes Yes	• A significant percentage of tourists will perceive that they have saved time by using ITS. • Tourists who use ITS perceive travel to be easier than those who do not use ITS. • Tourists who use ITS are more satisfied with their overall travel experience than tourists who do not use ITS. • Tourists who use ITS will have fewer stops for directions than non-users.
Yes Yes Yes Yes	• A significant proportion of ITS users will use alternative routes or travel modes due to ITS. • Tourists that use ITS components will visit more attractions that those that do not. • A significant proportion of tourists that use an ITS component will report that the information made them change which attractions they visited. • A significant proportion of tourists who use ITS will visit an attraction they had not previously know about before accessing ITS provided information.
Yes Yes Yes No (See 2) No (See 2) No (See 2) No (See 2)	• Travelers who use ITS perceive fewer and less severe delays than those who do not. • A significant proportion of tourists who use an ITS component will indicate that the information helped them avoid traffic congestion. • A significant proportion of tourists who use an ITS component will indicate that the information let them know what driving problems to expect.
Yes Yes Yes Yes Yes	• ITS users stay longer than non-ITS users. • Users of ITS components will have higher expenditures throughout their stay than will non-users • A higher percentage of tourists using ITS (as opposed to those not using ITS) indicate an intent to return. • A significant proportion of ITS users would be willing to pay a fee to use the source again
Yes No (See 3) Yes	• More information regarding safety is available to travelers after ITS implementation. • Travelers using ITS feel that the safety of their trip has been improved as a result of the ITS. • A higher proportion of users than non-users of ITS components will perceive that the roadways are safe

1. A Travel Time/Data Accuracy Test was planned at the Branson FOT, to validate observed field conditions against the information reported through the TRIP user interfaces. However, the amount of field data collected was insufficient to allow an analysis. Data collection was affected by delays in implementation of some TRIP user interfaces, changes in the functionality of some interfaces, and an absence of congested traffic conditions suitable for testing.

2. This information was not available during the evaluation period.

3. A Route Diversion Test was planned at the I-40 TTIS FOT to test the hypothesis that drivers will alter their routes based on the presence of specific advisories on the I-40 TTIS variable message signs. However, during the evaluation period, there were an extremely small number of VMS message postings suitable for analysis, and no results can be reported for this test.

The evaluation strategy and approach were developed in cooperation with local partners. Separate evaluation workshops were conducted with the I-40 and Branson teams to prioritize the evaluation goals. Both workshops included representatives from the state and federal Departments of Transportation. The Branson workshop also included private partners and representatives from several participating communities. Despite the differences in participant make-up of the workshops, the conclusions were very similar. Both teams considered assessing improvements in visitor satisfaction the most important evaluation goal. Evaluating improvements in efficiency of the transportation system was the second highest priority for both teams.

The teams also agreed on the overall approach to conducting the evaluations. Several evaluation tests were conducted at each FOT site. These tests combined primary and secondary data collection and analyses for evaluating benefits and outcomes. At both sites, tourist intercept surveys, focus groups and personal interviews, and system and historical data analysis were conducted. The tourist intercept surveys collected primary data on user awareness and satisfaction. The focus groups and personal interviews provide more in-depth perspectives on issues affecting deployment, awareness, and use of the technology, as well as additional information on behavioral responses. The analysis of systems data documents the type, content, and sources of information made available through the various input systems and characterizes the use of various user interfaces. Two tests that focused on specific traffic management issues were planned but not conducted. In Branson, a travel time/data accuracy study was planned to assess the accuracy of travel information and estimate the travel time saved as a result of traffic routing recommendations. An I-40 route diversion study was planned to evaluate behavioral responses to variable message signs (VMSs) in a rural environment. In both cases, however, a lack of data prohibited the usefulness of these tests.

The results of this evaluation were derived primarily from the tourist intercept surveys and the qualitative interviews/focus groups. Table E2 below summarizes the number of tourists approached and the numbers that completed the screener questionnaire (i.e., provided information on levels of awareness and use) and the detailed main questionnaire. In all, qualitative interviews and focus groups were conducted with approximately 70 traveling parties (roughly equally divided between the two FOT sites).

The evaluation strategies, developed in collaboration with the local partners during the planning stages of these field operational tests, were based on the current understanding of what systems and features would be operational by late summer. For the most part, all of the planned systems were operational. However, at both locations, there were delays in deploying kiosks or fewer kiosks were deployed than originally planned. This meant that the tourists would not have had the opportunity to use them prior to the surveys and focus groups planned for late in the tourist season. Furthermore, the limited use of kiosks also meant that fewer tourists would have accessed the web site.

Table E2. Number of Tourists Approached and Completing Questionnaires

	I-40	Branson	Total
Number of Tourists Approached (Intercepted)	2,174	1,803	3,977
Number of Tourists Completing Screener	1,712	1,698	3,410
Number of Tourists Completing Detailed Questionnaire	813	640	1,453

Another factor affecting the evaluation plan had to do with the potential for affecting the behavior of tourists. The deployment plans at both sites called for more real-time processing of data in order to alert travelers, via phone systems and variable message signs, to changing road congestion and incidents. However, the systems as deployed by late summer did not include such features. Few if any messages related to major incidents, road closures, or weather conditions were displayed on variable message signs or reported through telephone or radio systems.

These changes in the deployment plans, and their potential impact on the evaluation project, were discussed with the U.S. DOT and the local partnerships. Cancellation of the evaluation project was discussed; however, most felt that it was valuable to proceed as planned. It was recognized that awareness and utilization of the kiosks and web sites would be limited and the impact on tourist travel options and behaviors would be minimal. Nevertheless, the partners felt it was important to record tourists' reactions to these systems and assess their general attitudes toward ITS systems. Also, the study as proposed could serve as a useful baseline for future evaluations.

Overview of Key Findings

Awareness and Use of ATIS Components

- Awareness and use of ATIS components is dependent upon destination characteristics and traveler characteristics, particularly travel planning styles. Four distinct travel planning styles were observed among tourists: "High-Technology, Non-Planner," "Modern Traveler," "Nomadic Vacationer," and "Traditional Automobile Traveler."

- A significant percentage of tourists reported that they were aware of at least one of the deployed ATIS components (approximately 78 percent of the surveyed tourists in Arizona and 85 percent in Branson). Further about 45 and 48 percent of those surveyed in Arizona and Branson, respectively, were users of at least one component. However, only 10 to 20 percent of the tourists were aware of the

kiosks, web sites, or interactive phone systems, and less than 10 percent were users of any one of these services. Table E3 shows awareness and use of ATIS by tourists.

Table E3. Awareness and Use of ATIS Components

Component	I-40		Branson	
	Aware and Not Using	Aware and Using	Aware and Not Using	Aware and Using
Telephone	5%	1%	7%	2%
Web Site	12%	12%	9%	8%
Kiosk	9%	3%	7%	3%
Route Signs	25%	30%	31%	29%
Radio	26%	13%	46%	25%

When considering the percentages of tourists that were aware of ATIS component, it is important to note that the ATIS systems in both Branson and Arizona were not fully operational during the survey periods. Therefore, it is likely that higher percentages of tourists would become aware of ATIS systems as more of these systems come on-line.

- User interface utilization data from the ATIS components (i.e., “hits” data) was difficult to tabulate due to loss of data, delays in implementation and, in the case of some I-40 interfaces, the inability to isolate I-40 Corridor-related use of interfaces that also provide information statewide. However, based on the available data, the private web sites appear to be the most heavily utilized interface, with the number of sessions rising from less than 1,000 to about 15,000 per month over the course of the ten-month evaluation period, in both Branson and the I-40 Corridor. Kiosk utilization data was only available for I-40, where utilization averaged about 360 sessions per month, or about 12 per day.

Mobility

- A significant percentage of the surveyed tourists at each FOT site reported that the travel information they received from one of the deployed ATIS components (with the exception of radio) saved them time and made it easier for them to get to the FOT site.

- Several “ease of travel” questions (e.g., easy to find attractions, easy to find parking lots, easy to avoid congestion, etc.) were asked of ATIS users. In Arizona, the percentage of tourists that agreed or strongly agreed to the ease of travel questions did not vary by awareness or use of ATIS components. In Branson, the corresponding percentage did vary by awareness and use, with a higher percentage of users reporting easier travel.

- Tourists surveyed in Arizona were pleased with travel conditions on their current trip irrespective of awareness or use of ATIS components. In Branson, tourists who were unaware of all ATIS components were less satisfied with the travel conditions than tourists who were aware of at least one ATIS component.

Access

- Key informants and tourists indicated during qualitative interviews that the deployed components improve travelers’ knowledge and therefore improve access.

- In general, a significant number of tourists in the I-40 area believed that ATIS improved traveler access. This is, the information confirmed the correct route, changed the route taken or attraction visited, or resulted in choosing an attraction not previously known about. Overall, tourists in Arizona indicated a more positive response to improvements in access than the tourists in Branson.

- Tourists in Arizona visited an average of three attractions regardless of awareness or use of an ATIS component. In Branson, tourists who used ATIS visited more attractions than non-users of the ATIS components.

Congestion

- In both Branson and Arizona, a significant percentage of tourists indicated that the information provided by an ATIS component helped them avoid traffic congestion. Yet, a smaller percentage reported that the information let them know what driving problems to expect.

- Most of the surveyed tourists did not encounter significant delays. In both Arizona and Branson, awareness and use of ATIS components did not affect the number of delays encountered by tourists.

Economic Development

- Use of ATIS components appeared to have a significant relationship with a tourist's intent to return to the FOT areas. This relationship was observed in both FOT sites.

- Whether a tourist is aware of and/or uses an ATIS component appears to have a marginally significant relationship with the number of nights spent in the area and in the amount of money spent during the visit.

- More than 10 percent of the surveyed tourists in both Branson and Arizona indicated that they would be willing to pay a fee of $1 to $3 for travel-related information. However, this result is contradictory to that found during qualitative interviews and observations with users of the deployed kiosks.

Safety

- An overwhelming majority of tourists in both Branson and in Arizona agreed that the highways in the area were safe.

- Perception of safety did not vary by awareness or use of ATIS in Arizona.

- Perception of safety did vary somewhat by awareness and use of ATIS in Branson. A much higher percentage of tourists that were aware of at least one ATIS component perceived that the highways were safe compared to tourists that were unaware of any ATIS component.

System Performance

- Overall, both the Arizona TTIS and Branson TRIP systems generally performed as intended, although in Branson, several user interfaces were significantly delayed, and some of the user interfaces did not function as intended during the evaluation period. Implementation delays were minor for Arizona (several kiosks came on-line mid-way through the ten-month evaluation period) but were pervasive for Branson, where no user interfaces were fully operational at the intended start date (June 1998).

  During the main tourist survey period, all of the ADOT user interfaces were operational and over 90 travel advisories or events were input to the HCRS system. However, fewer messages were posted during the survey period on the VMS than on average over the ten-month evaluation period, with no messages related to major incidents, road closures or weather conditions. In Branson, all of the user interfaces were operational during the main survey period, although only one kiosk had been implemented and the message signs and HAR were still providing only "canned," generic traveler information.

- Despite delays in the implementation and not having fully mature systems at the time that survey information was collected, a significant percentage of the surveyed tourists in both Branson and Arizona felt that the information provided by the operational ATIS components was accurate, easy to obtain, and understandable.

Conclusions

The overall conclusion of this evaluation is that the I-40 TTIS and Branson TRIP FOTs were successful in deploying ITS technology in a rural setting. A significant percentage of tourists at each site were aware of, and users of, at least one deployed component. However, because this evaluation effort took place early in the deployment phase, awareness of certain components (kiosks, web sites, and interactive phone systems) was quite low (10% to 20%). Tourists as well as key informants indicated that the ITS deployments are currently, and will continue to be, successful in meeting the five overall goals of the rural Test Program (Improving Mobility, Increasing Access, Improving Congestion, Stimulating Economic Development, and improving Safety).

Future Plans

Both the I-40 TTIS and Branson TRIP ATIS continue to operate and will be supported indefinitely into the future by ADOT and MoDOT—one measure of success. MoDOT and ADOT have both continued to expand and upgrade the TRIP and TTIS, respectively. The TRIP Highway Advisory Radio (HAR) system will be linked directly with the telephone information center (TIC) so that HAR messages will be created automatically, and will include the real-time information originally intended. Under an agreement with a new private partner, 39 additional kiosks will be implemented. The kiosks can be used to purchase tickets to attractions, with TRIP web site information provided free of charge to users, but at a cost to MoDOT. Several additional overhead-mounted changeable messages will be added on Highway 76 and Highway 165. The TRIP system will be linked via fiber optic cable to MoDOT traffic operations in Springfield, allowing the remote monitoring of traffic signal operations and updating of construction information. Additional traffic detectors are being added, primarily at cordon crossing locations so as to provide a more accurate picture of traffic entering and exiting the area. Finally, MoDOT intends to contact Arkansas transportation officials to coordinate with their traveler information efforts, the first linkage in the intended multi-state Great Plains TRIP.

The Arizona Department of Transportation will continue to pursue ATIS along I-40. Several VMS boards and RWIS (Rural Weather Information System) devices are already planned and will be implemented over the next few years. The Department has deployed three AZTech© kiosks along I-40 and is in the process of installing a fourth. These are non-commercial kiosks and offer a variety of information about road conditions, weather, area attractions and local communities. The deployment of devices along I-40 is just a part of an ATIS program that will place over one hundred VMS boards and RWIS devices across the state.

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1.0 INTRODUCTION

The Advanced Rural Transportation Systems program is one of three major Intelligent Transportation Systems (ITS) program initiatives being pursued by the Federal Highway Administration (FHWA) in collaboration with local governments and industry. The Metropolitan Model Deployment Initiative (MMDI) in Seattle, Phoenix, San Antonio, and New York and the Commercial Vehicle Information Systems and Networks MDI (CVISN MDI) in ten pilot and prototype states have been under way since 1996. In 1997, the FHWA expanded the ITS deployment activities in several rural applications. Currently, there are more than 50 active field operational tests (FOTs) among the three ITS program areas.

Two of the rural ITS projects selected by FHWA for this initiative are the Branson Travel and Recreational Information Program (TRIP) around Branson, Missouri, and the I-40 Travel and Tourist Information System (I-40 TTIS) in northern Arizona. The focus of these FOTs is to provide the traveling public with current, accurate information on traffic and travel conditions as well as tourist information such as national and state park information, local events, attractions, and accommodations. With an emphasis on ITS applications surrounding national or state parks and tourist areas, the objectives of the rural FOTs are to determine the degree to which Advanced Traveler Information Systems (ATIS) can improve mobility and access, relieve congestion, and thereby help stimulate economic development in rural environments.

Branson, Missouri – which 10 years ago was a small town of approximately 4,000 known for wonderful outdoor recreational activities such as boating, hunting, fishing, and hiking in the Tri-Lakes Area – has grown to be known as the "live entertainment capital of the world." With more than 38 music and entertainment theaters, the Branson area has more entertainment seating than the theaters on New York's Broadway. Branson's permanent population, now around 4,400, swells to more than 40,000 (with an annual visitor population in excess of 6 million) during peak tourism season, and the majority of traffic enters and leaves the area on one of two highways. Thus, traffic congestion has become a problem. In an effort to address these problems, the Branson Travel and Recreational Information Program (TRIP) is building upon existing ITS infrastructure (internet sites, Highway Advisory Radio [HAR] stations, traffic detection equipment, and variable message signs [VMS]) to enhance the overall picture of traveler information provided in the area. This new solution includes a centralized database and control point for data collection/dissemination, additional surveillance equipment, a portable traffic management system, kiosks, enhanced web sites, coordinated links to television and radio stations, and full-area HAR coverage. The Branson TRIP system is envisioned as the first phase of the Great Plains TRIP, which will encompass Nebraska, Iowa, Kansas, Missouri, Oklahoma, and Arkansas.

The segment of rural Interstate 40 (I-40) crossing Arizona is a major east-west thoroughfare serving Arizona and its adjoining states. Traffic volumes on this section of interstate approach 25,000 vehicles per day, roughly 40 percent of which are commercial

vehicles. While not a major commuter route, I-40 does serve as a major feeder to more than 25 national parks and monuments, tourist attractions, and key recreational areas; the most well known of these is the Grand Canyon National Park (GCNP). Estimates suggest that nearly one of eight vehicles on this stretch of interstate is either going to or coming from the GCNP. With tourism serving as a major contributor to regional and state economies, the most pressing transportation needs for this area have been identified as increased availability of visitor services, up-to-date traveler information, and improved safety – particularly as it pertains to the mix of high volumes of commercial traffic and passenger vehicles as well as the diverse weather conditions experienced along this stretch of interstate. The main objective of the Arizona I-40 Traveler and Tourist Information System (TTIS) is to have corridor visitors become better informed, resulting in a safer, enhanced visitor experience while traveling along the corridor. This program has three integrated parts: data collection, data processing, and data dissemination. The Highway Closures and Restrictions System (HCRS) serves as the central data store for the collection and dissemination of information regarding the I-40 TTIS. HCRS collects data from public safety and construction workers, road/weather information systems, variable message signs, and other surveillance systems to provide a complete picture of the traveling conditions in the I-40 area. As the central server, this system also communicates with other traffic operations centers (e.g., Flagstaff, Kingman, Holbrook), and other key operating agencies (GCNP, state departments of transportation, Forest Service) and serve as the multimodal traveler information center. The HCRS communicates with a multitude of traveler information systems including existing radio and television links to kiosks, internet services, and dial-in phone services.

An important component of the FOTs is the independent evaluation of the benefits and effectiveness of these services. The primary objective of the I-40 and Branson TRIP FOT evaluation effort is to document the benefits of ATIS in rural tourism areas. Specifically, increasing traveler mobility and access, reducing congestion, stimulating economic development, and improving safety. However, it is also important to assess the overall effectiveness of the systems for achieving the national ITS strategies. Therefore, the studies conducted for this evaluation program support the following supplementary goals:

- Evaluate the ***technical*** aspects involved in the integration of existing and new data collection mechanisms and the fusion and dissemination of that information to the traveling public (e.g., focus on methods and procedures, performance of specific technologies, effectiveness of architectures and relationships)

- Evaluate the ***institutional*** aspects involved in the integration of existing and new data collection mechanisms and the fusion and dissemination of that information to the traveling public (e.g., focus on the roles, requirements, and relationships among the participants in the tests)

- Evaluate ***utility*** of the information provided to the traveling public (e.g., focus on the usefulness and value of the information provided, from the customer/traveler perspective)

- Evaluate the ***effectiveness*** of the various media for disseminating information to the traveling public (e.g., the role of the various media in the overall dissemination strategy and the relative strengths and weaknesses of the various media)

- Evaluate the ***impact*** of the traveler information on traveler behavior (e.g., identify the net impact of strategies in supporting traveler decisions that produce individual and systemic benefits).

The remainder of this document presents the results from the evaluation of the I-40 TTIS and the Branson TRIP FOTs.

2.0 SYSTEM DESCRIPTION

Advanced Traveler Information Systems (ATIS) is defined by DOT and ITS America as "groups and systems of technologies that aid in the collection, collation, and dissemination of traveler information before and during trips." Many of the same technologies were deployed as part of the Branson TRIP FOT and the I-40 TTIS FOT. However, it is important to note that both of these FOTs were conducted separately and there are differences in the systems and technologies that were deployed. The following summarizes the deployed ATIS as part of each FOT.

2.1 Branson TRIP System

The Branson TRIP is a regional traveler information system that provides comprehensive information on tourist attractions, weather, traffic, and road construction in the Branson/Tri-Lakes area. Each year, over six million visitors are attracted to the Branson area because of the availability of over 38 live music and entertainment theaters, numerous outlet malls and shopping centers, and various outdoor recreation opportunities. Most of these attractions are concentrated in and around Branson itself, a geographic area of a few square miles. Adding to the traffic situation, most of these attractions also line both sides of Highway 76, a two lane highway running through Branson. Figure 1 shows the major highways and tourist attractions in the Branson/Tri-Lakes area in southwest Missouri. Figure 2 illustrates the overall design for the Branson TRIP advanced traveler information system that is comprised of several input systems, a centralized data processing center, and various user interfaces.

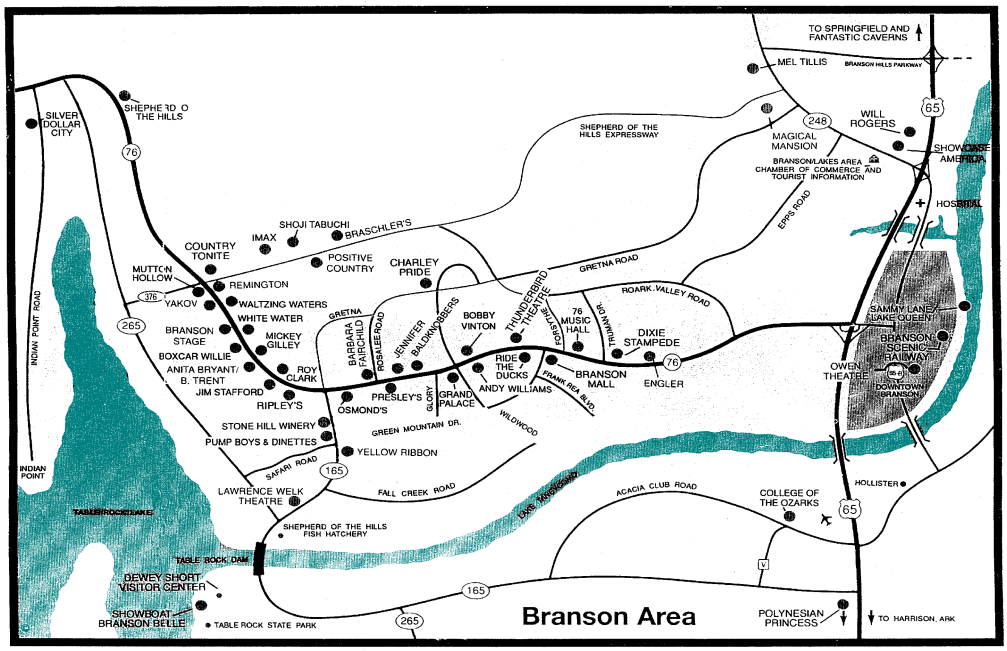

Figure 1. Branson Tri-Lakes Tourist Attractions

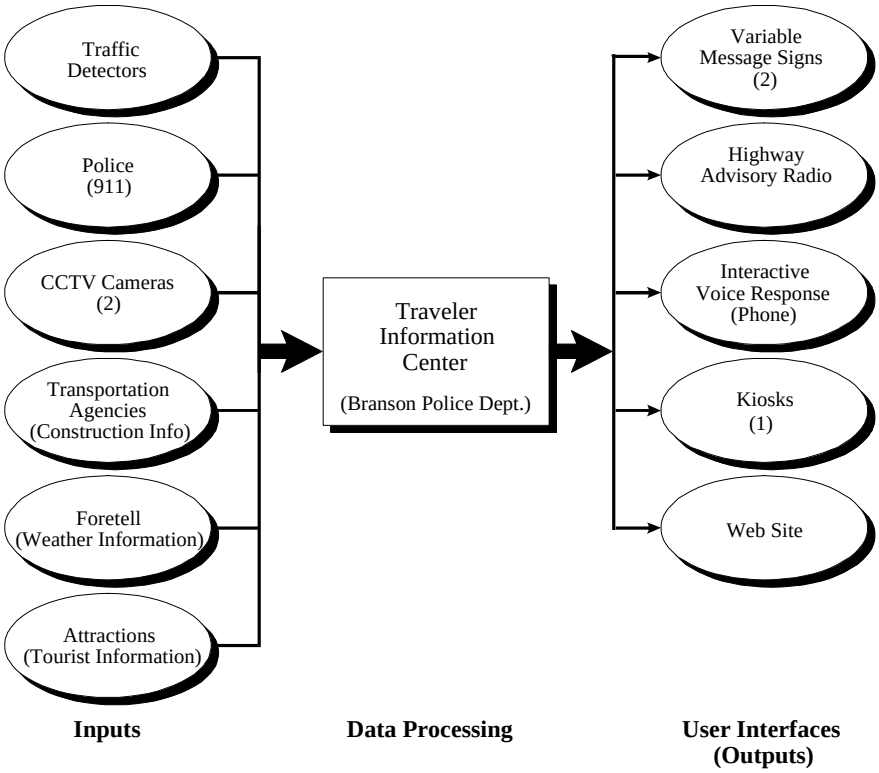

Figure 2. Branson TRIP ATIS Overview

2.1.1 System Inputs

Data was acquired by the TRIP system either through public agency infrastructure and reporting systems, or by the private partner, who operated the web site. The Branson TRIP private partner collects information on lodging, restaurants, and attractions and provides this information through the TRIP web site, which is accessed via the TRIP kiosks or from any computer with Internet access. Data is acquired by the public sector Branson TRIP partners through a network of traffic sensors, two traffic surveillance cameras, from police field reports, from Missouri Department of Transportation, county and local roadway construction reports, and from the privately operated "FORETELL" weather information system.

All of this information is compiled and entered into the Branson TRIP central information database, the "Traveler Information Center" (TIC). The TIC computer server is located at the City of Branson Police Department's 911 center and all inputs to the system are made by police department staff. All inputs to the TIC are entered as "situations" via a graphical user interface. All situations are categorized into one of 20 possible "classes," such as "level of service" or "incident."

2.1.2 Data Processing

TRIP information is integrated within a central Traveler Information Center (TIC) database, located in and operated by the Branson police department. Police department employees monitor traffic, verify conditions using the two CCTV cameras, and update variable message signs. The TIC computer system features a graphical user interface that alerts operators when traffic conditions change and is linked directly to traffic detectors, variable message signs, a highway advisory radio, a telephone information system, and a web server.

2.1.3 User Interfaces (System Outputs)

The various TRIP user interfaces came on-line at different times starting in 1997 and continued through August 1998. Information was disseminated to travelers using variable message signs, highway advisory radio, interactive voice response (phone), web pages, and a kiosk. All user interfaces were operational during some portion of the evaluation period, though most of them were not operating fully as intended. The following summarizes the deployed user interfaces and the status of each during the evaluation period:

- Variable Message Signs: Two portable changeable message signs were deployed on US 65 to the north and south of interchanges with Highway 76 throughout the evaluation period. However, the signs generally displayed a welcome message advising travelers to tune to the highway advisory radio station for traveler information. Specific alternative route information was not provided.

- Highway Advisory Radio: The highway advisory radio system provided pre-recorded, basic information on area traffic conditions and routes and did not provide real-time information during the evaluation period.

- Interactive Voice Response (telephone): The Branson TRIP telephone information system, or "IVR" (Interactive Voice Response), allows travelers to obtain traffic condition information on roads in the Branson area. Callers can either get general area traffic condition information, or by keying in their general origin-destination (e.g., "downtown," "west I-76 area"), can get information on specific routings. The telephone system only became operational during the second portion of the evaluation period.

- Kiosks: Only one kiosk was deployed during the evaluation period. This kiosk was located at a private tourist information storefront office. The business closed after only one month with the kiosk.

- Web Site: The web site provided traffic information through a color-coded map with icons and included information on lodging, restaurants, and attractions. The web site was fully operational throughout the evaluation period and was heavily

used by travelers (visited over 2.2 million times throughout the 10-month evaluation period).

2.1.4 Future Plans

The Branson TRIP system continues to operate and MoDOT has continued to expand and upgrade the system, both in terms of the user interfaces—each of which will continue to operate—as well as communications, detection and other TRIP functions. With regard to the user interfaces, the Interactive Voice Response system (i.e., telephone information line) and the Internet web site will continue to operate as they did during the evaluation period. The highway advisory radio (HAR), kiosks and changeable message signs are all being upgraded and/or expanded. MoDOT plans to add 39 private partner-sponsored kiosks at area motels/hotels and businesses, installing several additional changeable message signs to supplement the two permanent signs on Highways 65 and 76. Also the approach to entering messages on the HAR is changing from a manual to an automatic process. In addition to the expansion and improvement of the user interfaces, MoDOT is also adding new traffic detectors to the TRIP system, some of which are intended to provide a more accurate picture of traffic flows into and out of the Branson area. This information will allow TRIP traffic operators to estimate the total number of vehicles in the area at any one time.

MoDOT also plans to connect the TRIP system to traffic management and traveler information systems in nearby Springfield via fiber optic cable. This connection will allow MoDOT to enter construction information directly from their Springfield headquarters, rather than sending the information to the private partner for entry—the approach up to this point. The TRIP-Springfield linkage will also allow traffic operators in Springfield to remotely monitor Branson area traffic signal operations. Finally, MoDOT intends to initiate discussions with the Arkansas Department of Transportation regarding the coordination of Missouri and Arkansas traffic management and traveler information activities, with the possibility of making Arkansas the second link in the planned expansion of the Branson TRIP into the multi-state Great Plains TRIP.

2.2 <u>I-40 TTIS System</u>

The I-40 TTIS collects, processes, and disseminates weather, road conditions, and traveler information to I-40 corridor travelers. I-40 is an east-west interstate highway that crosses northern Arizona (see Figure 3). Average daily traffic is more than 25,000 vehicles per day, including about 10,000 commercial vehicles. The I-40 corridor is the primary access to the Grand Canyon and over 20 other major national parks, monuments, and recreation areas. Significant changes in elevation and adverse weather conditions occur along the corridor.

The I-40 TTIS was designed to link existing and new data sources to provide tourists and travelers with information before departure, while en route, and at designated local sites. Information is available through systems managed by public and private organizations. Figure 4

illustrates the overall design for the I-40 TTIS advanced traveler information system that is comprised of several input systems, a centralized data processing center, and various user interfaces.

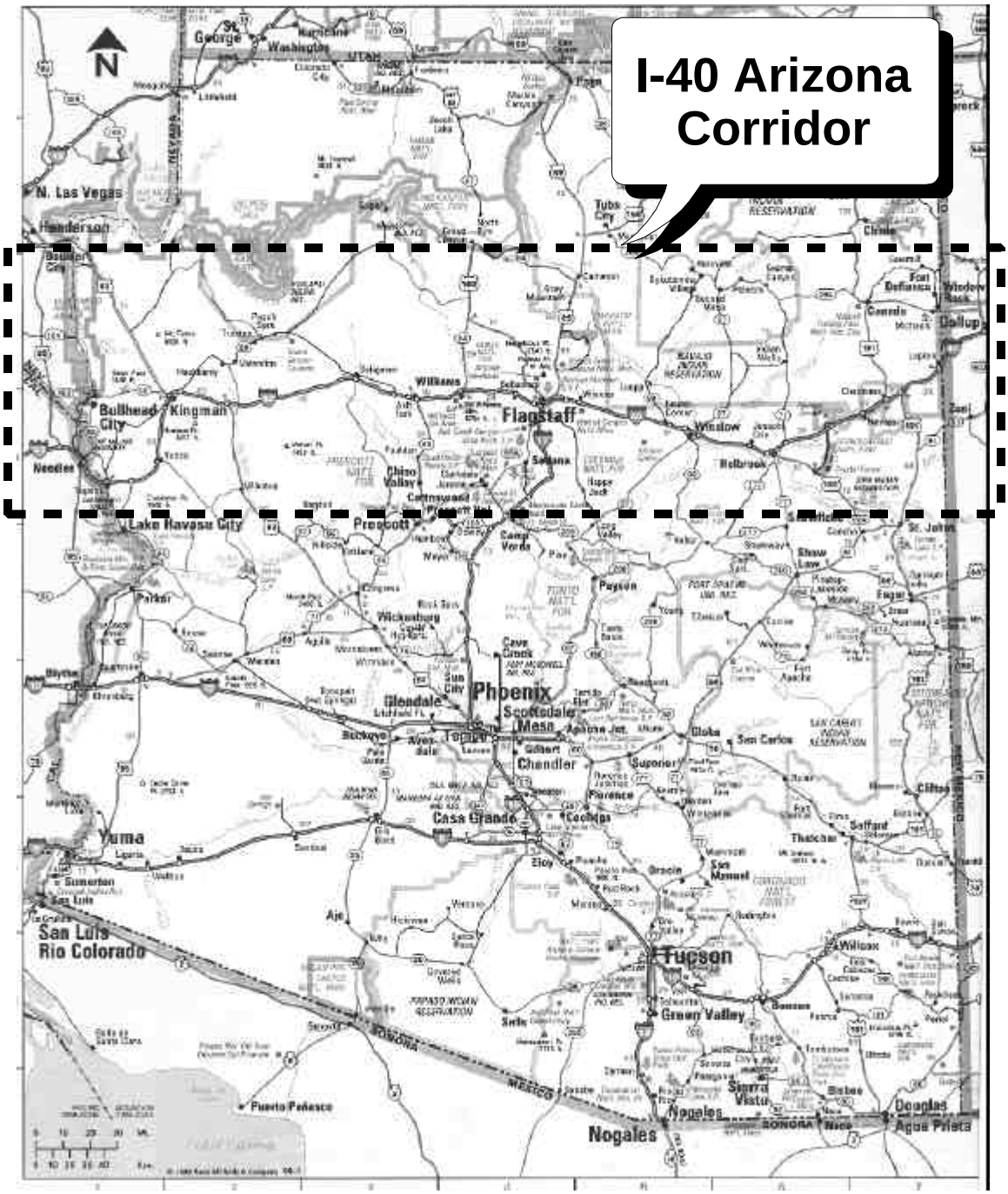

Figure 3. I-40 Corridor

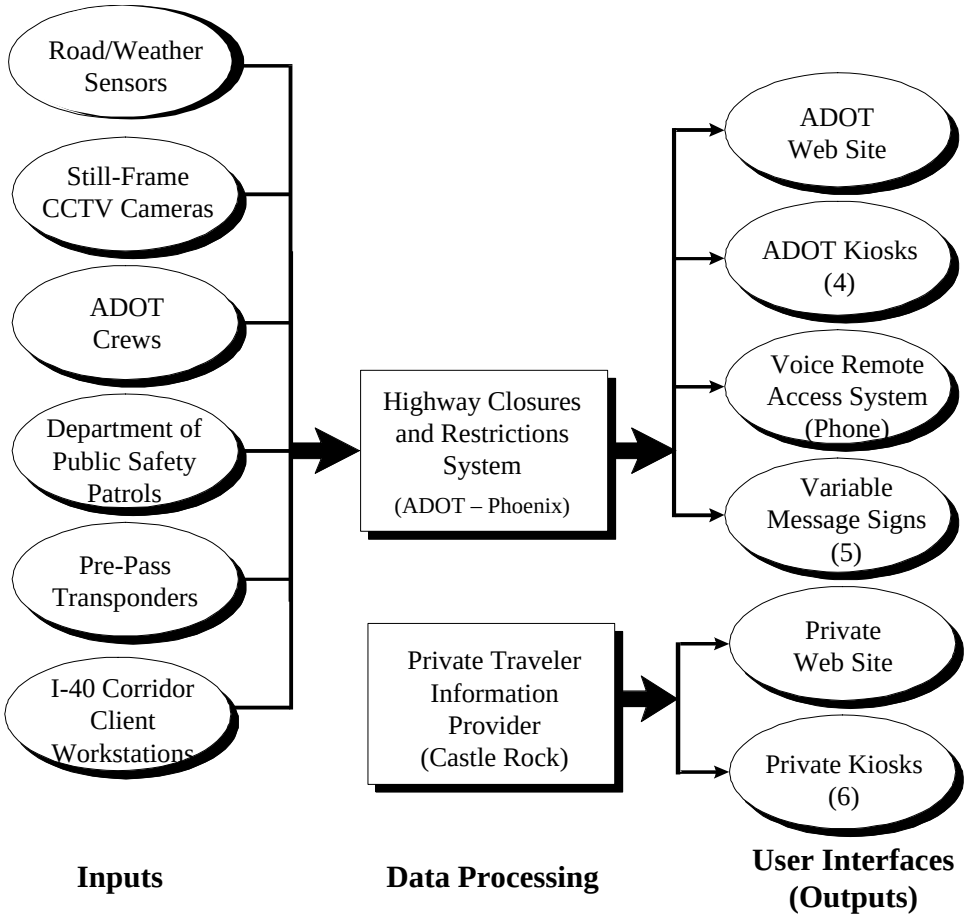

Figure 4. I-40 TTIS ATIS Overview

2.2.1 System Inputs

The I-40 TTIS gathers traffic and weather information from a network of road/weather information sensors, still-frame video cameras, and construction and maintenance crews and patrols. Information on private attractions and tourist services is entered into the database and is available through user interfaces operated by a private partner.

A unique aspect of the I-40 TTIS is that it includes a widely distributed network of 13 workstations at agencies throughout the corridor — law enforcement; national park; chamber of commerce; National Weather Service; local transit agencies; and the California, Utah, New Mexico, and Navajo Nation departments of transportation — where TTIS information can be entered and accessed. Additional workstations are located at three Arizona Department of Transportation (DOT) corridor traffic operations centers — Kingman (west corridor), Flagstaff (central corridor), and Holbrook (east corridor).

Information is entered into the HCRS via the workstations located at public and private organizations throughout Arizona. Information is input to the HCRS manually by workstation operators in the form of "events." For the purposes of this document the terms "HCRS input," "HCRS event," and "HCRS entry" are synonymous. Each event entered into the HCRS appears as a traveler advisory via each of the TTIS user interfaces.

2.2.2 Data Processing

The HCRS serves as the central information system of the I-40 TTIS and is located in the Phoenix Traffic Operations Center. This central database combines I-40 corridor information with metropolitan Phoenix area information and serves as a statewide repository of real-time traveler information. The HCRS database compiles and maintains the event information entered by workstation operators. This information includes International Traveler Information Interchange Standard (ITIS) "category" and "description," location, and duration of the event. This information is processed and provided to I-40 users through various ADOT interfaces.

The private partner adds private attraction and traveler services information to the database and provides the combined information to I-40 users through privately operated interfaces such as private web sites and kiosks.

2.2.3 User Interfaces (System Outputs)

The I-40 TTIS user interfaces came on-line at different times throughout the evaluation period. Information was disseminated to travelers through a web site, kiosks, a Voice Remote Access (telephone) System (VRAS), variable message signs operated by ADOT, and a web site and kiosks operated by the private partner. Most of the user interfaces were operational during the evaluation period. The following summarizes the deployed user interfaces and the status of each during the evaluation period:

- Web Sites: Two different web sites were deployed; one operated by ADOT and the other by a private partner. Both web sites were operational during the evaluation period. The ADOT web site was estimated to have between 68 and 22 thousand sessions during the evaluation period. The private web site had approximately 74 thousand sessions with a steady increase in the number of sessions per month throughout the evaluation period.

- Kiosks: Four ADOT and six private kiosks were deployed during the evaluation period. However, only three ADOT and three private kiosks were deployed during the field data collection period for the tourist surveys (see Section 4.0). Over the entire evaluation period, ADOT kiosks recorded nearly 4,000 sessions and the private kiosks recorded approximately 5,000 sessions. The heaviest volumes among the ADOT kiosks were at the Flagstaff Little America Truck Stop and Lupton Welcome Center (approximately 1,300 and 1,700 sessions,

respectively). Among the privately operated kiosks, the kiosk located at the Flagstaff Visitor Center received the bulk of the sessions (approximately 3,100).

- Voice Remote Access System (telephone): The TTIS telephone user interfaces consisted of a menu driven, toll-free telephone line that provided information on state highways and interstate routes throughout Arizona. The telephone system was fully operational throughout the evaluation period and had approximately 3,800 I-40 corridor sessions during the evaluation period. Use of the telephone interface varied substantially from month to month.

- Variable Message Signs: Five variable message signs located in the I-40 corridor were identified by ADOT as part of the TTIS. Two of the signs were located on I-40 to the east and to the west of Flagstaff, facing travelers headed towards Flagstaff. Another sign was located on I-17 south of Flagstaff, facing travelers headed toward Flagstaff. The remaining two signs were located at the far western end of the corridor to the west and northwest of Kingman on US 93 and SR 68, facing travelers headed east. A variety of different messages were displayed on the signs. However, road closures, almost always related to weather/pavement conditions, and weather/pavement condition advisories were the most common types of messages displayed, accounting for 57 percent of the messages displayed. Messages related to roadway congestion and delays accounted for 12 percent of the messages displayed.

2.2.4 Future Plans

The Arizona Department of Transportation will continue to pursue ATIS along I-40. Several VMS boards and RWIS (Rural Weather Information System) devices are already planned and will be implemented over the next few years. The Department has deployed three AZTech© kiosks along I-40 and is in the process of installing a fourth. These are non-commercial kiosks and offer a variety of information about road conditions, weather, area attractions and local communities. The deployment of devices along I-40 is just a part of an ATIS program that will place over 100 VMS boards and RWIS devices across the state.

ADOT is committed to providing current, critical traveler information to residents and visitors. Whether it is snow in the mountains or heat in the deserts, lengthy delays put the young, the elderly, the infirm, and the sick at an unacceptable risk. Strategically placed VMS messages will permit drivers, and passengers, to make informed decisions which affect their well being. The pursuit of this ATIS program has been mandated by the Governor of Arizona, Jane Hull, and endorsed by the Citizens of Arizona.

3.0 EVALUATION GOALS AND MEASURES

The rural ITS test program has five central goals: improve mobility, increase access, reduce congestion, stimulate economic development, and improve system safety. Although there is a substantial overlap among these goal areas, each goal has a slightly different focus. For this evaluation, the following definitions were used:

- Mobility refers to the ease of movement, or perceived ease of movement, as viewed by the traveler. Mobility can be increased by giving travelers accurate and timely information that enables them to make choices concerning travel routes or modes or trip start times. Traveler satisfaction is improved by avoiding unexpected problems en route or when arriving at the destination (e.g., canceled events), by reducing travel time, or simply by being aware of available options.

- Access to attractions and other destinations is improved when travelers are aware of alternative travel options (modes or routes) or alternative attractions. Tourists provided with information on alternative attractions prior to starting the trip or while visiting the area might visit locations they had not previously intended to visit.

- Congestion can be caused by problems with individual mobility and access. When travelers do not have accurate information on traffic conditions, event schedules, or alternative routes and attractions, congestion can result because too many people crowd into limited locations in a limited time period or remain in congested traffic when alternate routes are available.

- Economic development has a macro- or regional-level impact. It may result, for example, from increased productivity of individual attractions as a result of better distribution of tourists among them. Tourists may be attracted to the area or stay longer and visit more attractions because of increased awareness of alternative attractions. They might spend more time and money in the area and return because of greater mobility and access.

- Safety is a system-level outcome impacted by mobility and congestion. When travel is difficult, when knowledge of options and conditions is limited, and when facilities become congested, safety is degraded. Safety is reflected in measures such as accident rates, accident severity, the number of “close calls” or “near-misses,” the number of 911 traffic accident calls, the number of emergency vehicle call-outs, and average incident response time.

These goal areas were developed in conjunction with the Branson TRIP team and the I-40 TTIS team during separate workshops conducted as part of the evaluation planning process. The

final evaluation measures and corresponding hypotheses for the evaluation were developed using the results of these two workshops. Both workshops were conducted with the objectives of identifying the anticipated changes associated with the ITS deployment, identifying the anticipated benefits of the ITS deployment, prioritizing the benefits to be evaluated, and identifying the relevant data collection methods. Based upon the results of these workshops, the final evaluation measures, hypotheses, and data collection methods were developed.

As revealed in both workshop sessions, information about many different measures can be collected and related to each of the five goal areas. However, collecting all available information can be both expensive and time consuming, and as such, counterproductive. To improve the focus of the evaluation, a few good measures (FGM) in each of the five goal areas were identified. Collectively, these were considered to be the key measures underlining the evaluation effort. In some cases, however, the FGM are difficult to quantitatively measure or to obtain in a cost-effective and timely manner. Therefore, several surrogate measures that could be obtained in the evaluation time frame were also identified. The kickoff workshops were instrumental in the development and finalization of these measures.

The evaluation measures provide the mechanism by which to gauge the success of the FOT deployments in meeting the overall objectives of the evaluation. In particular, the evaluation measures were used to test specific hypotheses of interest to the evaluation that in turn provide insight into the extent to which the overall goals have been met. For example, one of the five central ITS goals is to improve mobility. One evaluation measure of improved mobility is ease of travel. A surrogate measure is the perceived ease of travel (e.g., perceived ease of finding attractions). The corresponding hypothesis was to determine if a higher percentage of tourists that were aware of and using an ATIS component reported that finding attractions was easier than did tourists that did not use an ATIS component or those that were unaware of any ATIS components.

For each of the goal areas, Table 1 lists the measures and hypotheses that were used to develop the evaluation strategies. These strategies, developed in collaboration with the local partners during the planning stages of these field operational tests, were based on the current understanding of what systems and features would be operational by late summer. For the most part, all of the planned systems were operational. However, at both locations, there were delays in deploying kiosks or fewer kiosks were deployed than originally planned. This meant that the tourists would not have had the opportunity to use them prior to the surveys and focus groups planned for late in the tourist season. Furthermore, the limited use of kiosks also meant that fewer tourists would have accessed the web site.

Another factor affecting the evaluation plan had to do with the potential for affecting the behavior of tourists. The deployment plans at both sites called for more real-time processing of data in order to alert travelers, via phone systems and variable message signs, to changing road congestion and incidents. However, the systems as deployed by late summer did not include such features. Few if any messages related to major incidents, road closures, or weather

conditions were displayed on variable message signs or reported through telephone or radio systems.

Table 1. Evaluation Measures and Hypotheses (Continued to Right)

Goal Area (Focus Area)	Few Good Measures	Surrogate Measures
Mobility (Traveler)	• Travel time • Ease of travel • Tourist traveler satisfaction	• Proportion of surveyed respondents using an ITS component who report that the information saved them time. • Proportion of survey respondents that agree or strongly agree on ease of travel • Perceived satisfaction of total travel experience • Number of stops for directions
Access (Destination)	• Knowledge of travel options	• Percentage of tourists indicating use of an alternative route • Number of attractions visited • Percentage of tourists indicating a change in attractions visited • Percentage of tourists indicating that they visited attractions they had not previously known about because of information obtained through ITS
Congestion (Overall System)	• Number and nature of delays • Level of service (LOS)	• Reported number and severity of delays • Percentage of tourists indicating that congestion was avoided • Prior knowledge of traffic problems • Traffic volume and throughput • Average travel speed • Number of accidents • Incident response time
Economic Impact (Region)	• Increased visitation • Tourism revenue • Increased awareness of alternative attractions	• Duration of stay (overnights) • Estimated expenditures throughout stay • Intent to return • Willingness to utilize information outlets for fee • Utilization of information outlets
Safety (Traveler)	• Safety • Injuries, fatalities	• The amount of information regarding safety that is available before and after implementation • The percentage of travelers detouring as a result of traveler advisories displayed on roadside variable message signs • Perception of safety

Table 1. Evaluation Measures and Hypotheses (Continued from Left)

Information on Measures Collected?	Hypotheses
Yes (See 1) Yes Yes Yes	• A significant percentage of tourists will perceive that they have saved time by using ITS. • Tourists who use ITS perceive travel to be easier than those who do not use ITS. • Tourists who use ITS are more satisfied with their overall travel experience than tourists who do not use ITS. • Tourists who use ITS will have fewer stops for directions than non-users.
Yes Yes Yes Yes	• A significant proportion of ITS users will use alternative routes or travel modes due to ITS. • Tourists that use ITS components will visit more attractions that those that do not. • A significant proportion of tourists that use an ITS component will report that the information made them change which attractions they visited. • A significant proportion of tourists who use ITS will visit an attraction they had not previously know about before accessing ITS provided information.
Yes Yes Yes No (See 2) No (See 2) No (See 2) No (See 2)	• Travelers who use ITS perceive fewer and less severe delays than those who do not. • A significant proportion of tourists who use an ITS component will indicate that the information helped them avoid traffic congestion. • A significant proportion of tourists who use an ITS component will indicate that the information let them know what driving problems to expect.
Yes Yes Yes Yes Yes	• ITS users stay longer than non-ITS users. • Users of ITS components will have higher expenditures throughout their stay than will non-users • A higher percentage of tourists using ITS (as opposed to those not using ITS) indicate an intent to return. • A significant proportion of ITS users would be willing to pay a fee to use the source again
Yes No (See 3) Yes	• More information regarding safety is available to travelers after ITS implementation. • Travelers using ITS feel that the safety of their trip has been improved as a result of the ITS. • A higher proportion of users than non-users of ITS components will perceive that the roadways are safe

1. A Travel Time/Data Accuracy Test was planned at the Branson FOT, to validate observed field conditions against the information reported through the TRIP user interfaces. However, the amount of field data collected was insufficient to allow an analysis. Data collection was affected by delays in implementation of some TRIP user interfaces, changes in the functionality of some interfaces, and an absence of congested traffic conditions suitable for testing.

2. This information was not available during the evaluation period.

3. A Route Diversion Test was planned at the I-40 TTIS FOT to test the hypothesis that drivers will alter their routes based on the presence of specific advisories on the I-40 TTIS variable message signs. However, during the evaluation period, there were an extremely small number of VMS message postings suitable for analysis, and no results can be reported for this test.

These changes in the deployment plans, and their potential impact on the evaluation project were discussed with the U.S. DOT and the local partnerships. Cancellation of the evaluation project was discussed; however, most felt that it was valuable to proceed as planned. It was recognized that awareness and utilization of the kiosks and web sites would be limited and the impact on tourist travel options and behaviors would be minimal. Nevertheless, the partners felt is was important to record tourists' reactions to these systems and assess their general attitudes toward ITS systems. Also, the study as proposed could serve as a useful baseline for future evaluations.

For the most part, the evaluation proceeded as planned. However, we did not receive sufficient data to test hypotheses concerning the impact on travel options and time savings. Also, at both sites we planned special tests to assess the impact of these systems on travel time and route selection. Some data were collected. However, the tests were not completed because of the lack of real-time data on incidents, congestion levels, and recommended alternative routes. On the other hand, we did conduct an extra study to evaluate tourists' reactions and attitudes towards the use of kiosks. This study, conducted after the original field study, involved interviewing tourists after they were invited to operate a kiosk.

4.0 TECHNICAL APPROACH

Many different sources of data and several different tools were used to evaluate the success of ITS deployment in the I-40 TTIS and the Branson TRIP FOTs. The primary evaluation methods were tourist intercept surveys and qualitative interviews. These study tools provide information in all goal areas. The survey and qualitative data was supplemented by operational systems data and historical travel/traffic data which was used to place the survey and qualitative information in context. Finally, a case study on travel time/data accuracy was planned to provide information on mobility, but the study did not produce useful results. A summary of the type of data that was obtained as well as the strategy used to collect the information is presented below for each study tool.

4.1 Tourist Intercept Surveys

For each FOT, tourists were surveyed during two separate data collection periods. In both data collection periods, information from tourists was collected using an "intercept" approach. In this survey technique, information is collected by "intercepting" tourists as they enter or leave a pre-specified attraction or location. In particular, tourists were intercepted as they arrived at a site, or arrived at their vehicles prior to leaving, during their stay at a local hotel, and at information centers.

At each site, a two- or three-person data collection team attempted to intercept one person from each traveling party or vehicle to complete a screening questionnaire. This questionnaire was short, interviewer administered, and completed by most tourists intercepted in Branson and northern Arizona. This screener captured information that was used to determine whether respondents were aware of and/or users of an ATIS component. Following the completion of the screening questionnaire, respondents were asked to complete a more lengthy main questionnaire. This questionnaire was self-administered and collected more detailed information pertaining to the five evaluation goals. Table 2 summarizes the number of tourists (intercepted) and the numbers that completed the screener questionnaire and the detailed main questionnaire.

The collected questionnaires were reviewed on-site and again prior to data entry for completeness, accuracy, and consistency. Following the review, information from the questionnaires was entered and converted to a database suitable for analysis.

Table 2. Number of Tourists Approached and Completing Questionnaires

	I-40	Branson	Total
Number of Tourists Approached (Intercepted)	2,174	1,803	3,977
Number of Tourists Completing Screener	1,712	1,698	3,410
Number of Tourists Completing Detailed Questionnaire	813	640	1,453

Tourists were surveyed twice at each FOT site. Once for two days in early summer for the pilot phase of data collection and again for four days during late summer/early fall for the main phase of data collection. The pilot data collection phases were performed on June 19-20, 1998, and June 26-27, 1998, for the I-40 TTIS and Branson TRIP FOT, respectively. The main data collection phase was conducted on August 7-10, 1998, for I-40 and September 25-28, 1998, for Branson.

A variety of sites were selected as survey sites in both the I-40 TTIS FOT and the Branson TRIP FOT. However, the Grand Canyon National Park (GCNP) is by far the largest tourist attraction along the I-40 corridor. Therefore, sampling locations in both the pilot and main data collection phase were focused on locations in the GCNP and in the surrounding area. Similarly in Branson, there was an emphasis on conducting the tourist intercepts at the two largest tourist attractions: Silver Dollar City and Shepherd of the Hills. Additional sampling locations in I-40 and Branson were selected based upon prior knowledge of the local FOT team or through random selection.

4.2 Qualitative Measures

Three types of qualitative measures were conducted for this evaluation. Focus groups and personal interviews were conducted with tourists and with key informants who are occupationally in a position to be affected by the success of ITS. These qualitative interviews were conducted in northwest Arizona in Flagstaff and near the Grand Canyon National Park, Arizona, and in Branson Missouri, in August and September 1998 (respectively). All interviews were semi-structured and conducted by a professional moderator but allowed respondents to provide information in a conversational format. A separate observational study was conducted in October 1998 to examine tourist interactions with kiosks in rural tourism areas.

Tourists were recruited at their hotels and asked to come to be interviewed at breakfast. They were paid $5 to $10 depending upon the time and place, and were given a small gift such as a guidebook or coffee mug for their participation. Interviews with tourists covered awareness

and use of ITS components. However, the interviews also asked more generally how tourists sought travel information and made travel decisions. On average, the interviews lasted approximately 20 to 30 minutes. A total of 35 travel parties were interviewed at each FOT site.

Key informants were selected for interviewing at the suggestion of the local FOT teams. Generally, the key informant interviews targeted people that would be a primary user of the system, or whose regular professional job functions could be strongly impacted by a successful ITS system. Key informants included professionals such as park rangers, traffic engineers, hotel managers, Department of Transportation personnel, etc. The key informants were asked their observations of how the ITS has affected the flows of traffic, the business climate, and other factors in the life of the FOT area, and how, in their opinions, it might be improved.

The kiosk observational study was conducted by monitoring a kiosk, making observations of how people used the kiosk, and conducting a semi-structured interview with anyone who approached the kiosk. Additionally, if no one approached the kiosk in a reasonable amount of time, tourists were intercepted and asked to try the kiosk. Respondents were offered $5 cash to participate and a total of 21 people in 12 traveling parties participated. Two persons refused the invitation to try the kiosk.

4.3 System and Historical Data Analysis

System information was obtained from the Branson TRIP TIC computer server. This information included TIC Situation Entries by class and the number of Branson TRIP Interactive Voice Response (telephone) sessions. Additional information on web site usage was obtained from the Branson TRIP private partner.

System information for the I-40 TTIS was obtained as records from the ADOT Highway Closures and Restrictions System (HCRS). These records provided information on the ITIS category, location, and duration for each event logged into the HCRS system. Additionally, information on the VMS messages by subject, the number of TTIS telephone user interface sessions, usage of public and private kiosks, and the number of sessions at the private and public web sites were obtained.

4.4 Travel Time/Data Accuracy and Route Diversion

A Travel Time/Data Accuracy Test was planned at the Branson FOT, to validate observed field conditions against the information reported through the TRIP user interfaces. However, the amount of field data collected was insufficient to allow an analysis. Data collection was affected by delays in implementation of some TRIP user interfaces, changes in the functionality of some interfaces, and an absence of congested traffic conditions suitable for testing.

A Route Diversion Test was planned at the I-40 TTIS FOT to test the hypothesis that drivers will alter their routes based on the presence of specific advisories on the I-40 TTIS

variable message signs. However, during the evaluation period, there were an extremely small number of VMS message postings suitable for analysis, and no results can be reported for this test.

5.0 RESULTS

In all, five different tests were conducted or planned as part of this evaluation (tourist intercept surveys, qualitative measures, system/historical data analysis, travel time/data accuracy, and a route diversion test). Each of these tests provided insight into one or more of the ITS program goal and the evaluation objectives. For example, the tourist intercept surveys provided results for all five goal areas. Collectively, these five tests provide an extensive amount of data that has been analyzed for this evaluation. In this report, and specifically in this chapter, we present a high level synopsis of the overall results combining results across the five tests. However, detailed information and results for each test are presented as appendices to this report.

Awareness and usage of the deployed ATIS components is a necessary prerequisite for meeting each of the five evaluation goals: improved mobility, increased access, reduced congestion, stimulated economic development, and improved system safety. Therefore, we begin with a discussion of awareness and use of ATIS components.

5.1 Awareness and Use of ATIS Components

There are many different factors that affect how and when tourists obtained trip information. As shown in Figure 5, travelers obtain information from a variety of sources at different time points: pre-trip, mid-trip, and at the area of destination. Currently, ATIS components are a relatively small subset of all possible sources of trip information, as evidenced by the number of sessions logged on the various user interfaces. Nevertheless, results from the tourist surveys and the qualitative measures indicate that the ATIS components can and are important sources of information for many travelers. Factors affecting tourists' use of the deployed ITS components for their trip planning purposes can be classified as either destination characteristics or traveler characteristics. Destination characteristics affecting the use of ATIS components include such factors as the nature of traffic at the destination, the availability of alternative routes, the distance from which travelers come, the season of travel and resulting weather and traffic conditions, the availability of alternative sources of information, and the range of activities at the destination. Each of these destination characteristics, and how they appear to affect use of ITS are discussed at length in Appendix B.

Traveler characteristics affecting the use of ATIS components include demographics (especially age), level of comfort with new technology (e.g., the internet), previous experience in the area, and perhaps most importantly, the traveler's travel planning style. It is the traveler's travel planning style that ultimately determines which ATIS components are available to the traveler throughout their trip planning process, and whether they are likely to utilize the components that are available. During the course of this evaluation, four distinct travel planning styles were observed: "High-technology, Non-planner," "Modern Traveler," "Nomadic Traveler," and "Traditional Automobile Traveler." Each of these travel planning styles represents the combination of the nature of information seeking and level of planning (see Figure 6).

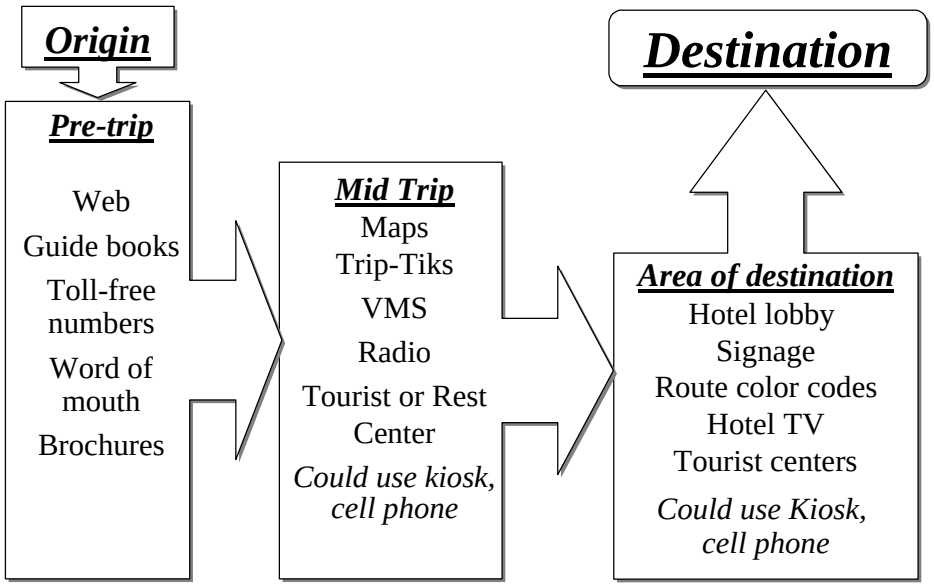

Figure 5. How Travelers Obtain Trip Information

	Little Advanced Planning	Detailed Advanced Planning
High Tech Information Seeking	**High Tech Non-Planner** • Null set	**Modern Traveler** **Uses** • Web • Toll free numbers • Guide books and maps • Concierge, lobby information **Would use** • Kiosk, VMS, cell phone, radio
Low Tech Information Seeking	**Nomadic Vacationer** **Uses** • No pre-planning; "Hit the road" • Maps • Uses hotel lobby for information **May Use** • VMS • Web TV	**Traditional Auto Traveler** **Uses** • Maps and trip-tiks • Guide books • VMS • Lobby brochure racks, concierge, clerks **May Use** • Kiosk • Radio • Cell phone

Figure 6. Travel Planning Styles

The following summarizes the observed characteristics of each type of planning styles:

- The High-Tech, Non-Planner was not observed in the evaluation. However, conceptually, these travelers would arrive at a destination with no plan and seek out electronic information once there. This traveler type will develop in the future if and when portable electronic devices are routinely carried on vacation or kiosk types of local information sources become ubiquitous.

- The Modern Traveler was frequently encountered at the I-40 TTIS FOT, but rarely encountered at the Branson TRIP FOT. This type of traveler obtains prior reservations, roughly allocates time to each site, and is aware in advance of much detail about destinations. Generally, these travelers were younger, traveling from a distance, and usually, though not always, affluent.

- The Nomadic Traveler was occasionally encountered at both FOT sites. This type of traveler has few or no prior reservations and are not concerned about not finding accommodations at the next stop. They will deviate from initial destination at short notice to go to a place that appears interesting. These travelers are usually less educated and vary in age.

- The Traditional Automobile Traveler was frequently encountered at both FOT sites. However, this was the dominant mode of tourists interviewed at the Branson TRIP FOT site. This traveler makes prior reservations and keeps a schedule. He uses guidebooks, maps, and is likely to visit a tourist center and use brochures. These travelers were generally middle income and hold jobs that do not require use of the Internet.

The observance of these four different travel planning styles, and the distribution of the interviewed tourists, suggests that any ITS system used for a tourist site will have to relate to the differing travel styles of the tourists who frequent the area. For example, the survey results indicated that traditional signage and low-technology devices such as color coded streets were very effective in reaching visitors to Branson, which suggests that ATIS components need to build upon the visibility of low-technology information systems (e.g., linking information in the telephone or web-pages to the color-coded routes).

The Travel Planning matrix presented in Figure 6 is useful in understanding the types of ATIS components that are likely to be used by different types of tourists. However, for the deployments to be successful in obtaining the overall goals of the rural ITS Test Program a significant percentage of tourists must be made aware of and become users the deployed components. Tourists surveyed at either FOT can be separated into three fundamentally distinct groups: (1) those that are aware of and used at least one deployed ITS component; (2) those that are aware of at least one deployed ITS component, but did not use any of the deployed components; and (3) those that were unaware of all deployed ITS components. Figure 7

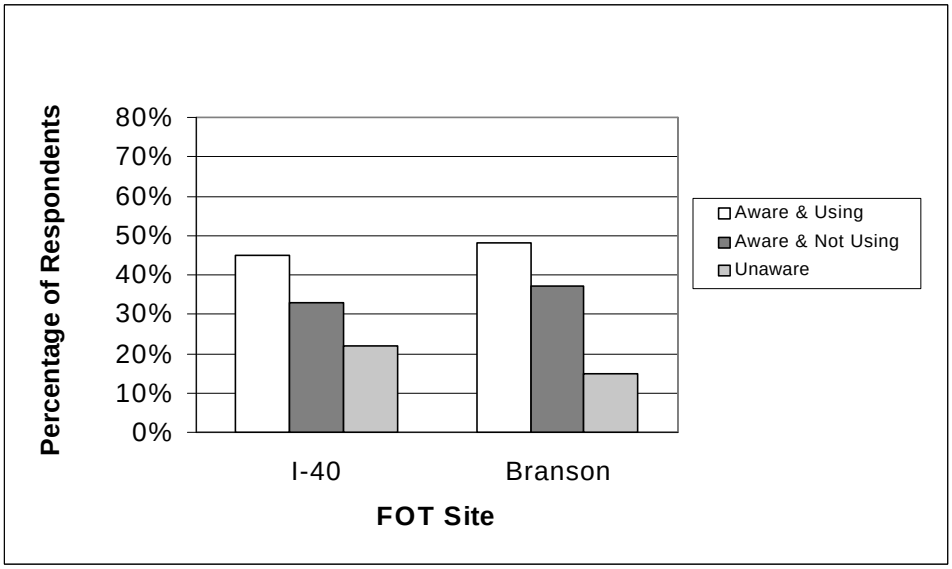

Figure 7. Awareness and Use of at Least One Deployed ATIS Component

summarizes the percentage of tourists in each of these three groups for the I-40 TTIS and the Branson TRIP FOT. As seen in the figure, both FOT sites had a significant percentage of tourists that reported that they were aware of at least one of the deployed ATIS components (approximately 78 percent of the surveyed tourists in Arizona and 85 percent in Branson). Further, about 45 and 48 percent of those surveyed in Arizona and Branson, respectively, were users of at least one component. The level of utilization of the user interfaces during the main survey period—relatively low compared to the total number of potential survey respondents—helps explain the relatively low utilization levels found in the survey.

Awareness and usage did vary substantially by ATIS component. However, many of the deployed components in Branson were not operational during the time that the tourist surveys were conducted. Therefore, some care needs to be taken when interpreting the survey results. For example, only one kiosk was operational in Branson during the tourist survey period and only half of the total number of kiosks deployed as part of the I-40 TTIS FOT were operational during the survey period. Figures 8 and 9 summarize the reported awareness and usage of the ATIS components after combining the responses from the pilot and the main data collection phases, in Arizona and in Branson, respectively. Also included in Figure 9 are the percentages of tourists that were aware of and/or users of color coded routes. While not ATIS per se, statistics on the color coded routes are included because they indicate a *potential* avenue for ATIS. The table and figures illustrate the following:

- Awareness and use of the phone, web site, and kiosk were much lower than either the variable message signs, the radio, or in Branson, the color coded routes.

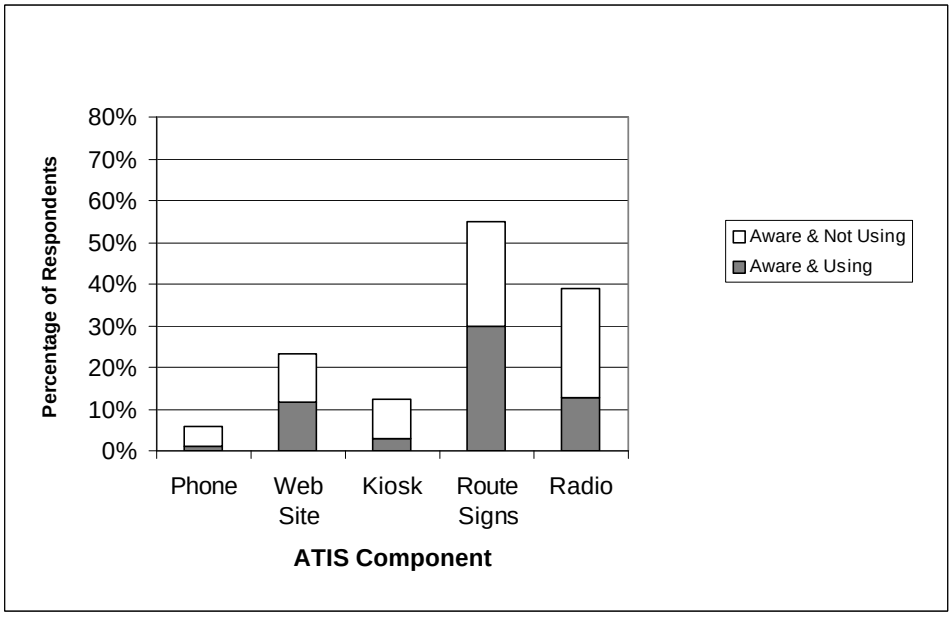

Figure 8. Awareness and Use of ATIS Components (I-40 TTIS)

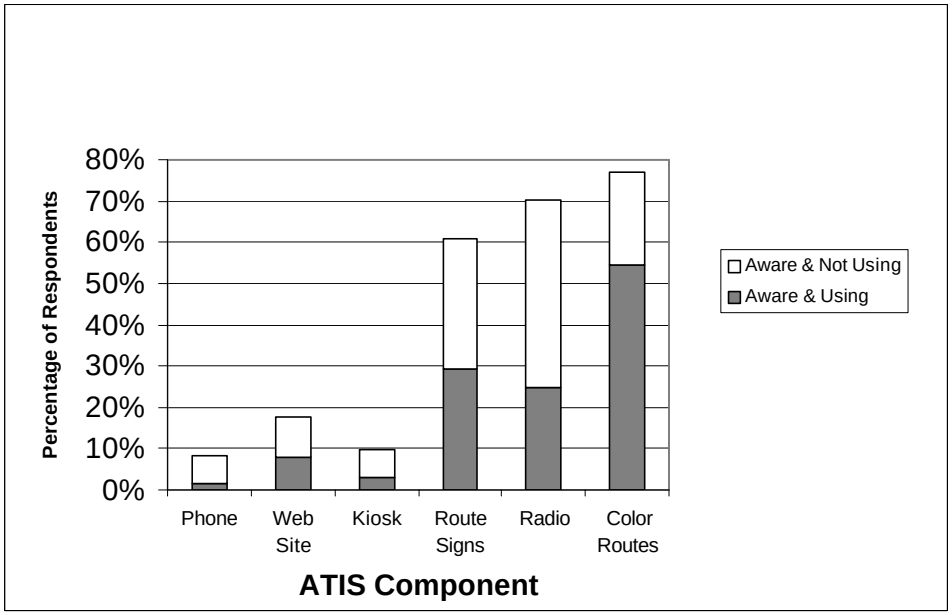

Figure 9. Awareness and Use of ATIS Components (Branson TRIP)

- In both Branson and Arizona, the toll-free phone system was the ATIS component with the least amount of awareness and subsequent usage. In both FOT sites, the percentage of tourists reporting awareness and usage levels of the telephone systems were similar.

- Levels of awareness and usage of the FOT specific web sites were similar between tourists in Arizona and Branson. However, this does not necessarily contradict the travel planning profiles discussed earlier (i.e., tourists in Branson were mostly Traditional Automobile Travelers). In all likelihood, many of the Modern Travelers in Arizona did not encounter the FOT specific web sites (either the ADOT or the private partner's) because of the many other Arizona web sites.

- At both FOT sites, approximately 10 percent of tourists were aware of the kiosks, which is unusual as only one kiosk was operational in Branson during the survey period and this kiosk was located at an isolated business establishment. It is possible that, despite all precautions, tourists in Branson were recalling use of a non-FOT related kiosk.

- Fifty-five percent of the surveyed tourists were aware of the deployed variable message signs in Arizona and a similar statistic was observed in Branson (61 percent were aware). In both locations approximately 30 percent of tourists indicated that they had used the variable message signs.

- In Branson, nearly twice as many tourists were aware of the radio advisories (70 percent) compared to tourists surveyed in Arizona (39 percent). A similar trend was observed among the users. As with kiosks, this is somewhat unusual as radio advisories in Branson during the survey period were static and did not provide current information. Again, it is possible that the survey tourists were reporting awareness and use of traffic information reported on local commercial radio programs.

- In Branson, more tourists were aware of and used the color coded alternative routes than any other information source (77 percent were aware and 55 percent reported usage).

Analysis of system data from Arizona and Branson, generally support the results observed in the survey of tourists. Further results, based upon system data, include for Arizona:

- Each of the variable message signs was heavily and consistently used by ADOT throughout the evaluation period to provide a variety of information.

- There was no clear trend in usage of the ADOT telephone information line over

the ten month evaluation period, with the number of calls rising over the period June to December, then falling January through March. If such a usage pattern could be shown to exist over multiple years, it would support the assumption that call volumes increase during the winter months when severe weather conditions are most likely.

- Utilization of the private partner web site increased steadily over the ten-month evaluation period, growing over 3,000 percent (or about 35 times) from June 1998 to March 1999.

- Based on the available data, three of the four ADOT kiosks were not heavily utilized, averaging less than ten sessions per day. These kiosks were located at visitor centers and a port of entry. The most heavily utilized kiosk, based on two months of data, was located at a commercial truck stop and averaged almost 30 sessions per day. The available data suggests that the private kiosks, located at a mix of visitor centers and commercial attractions, were, like the ADOT kiosks, not heavily utilized, averaging less than 12 sessions per day.

- Overall, among the phone system, web sites and kiosks, the web sites were by far the most heavily utilized user interface deployed in as part of the Arizona TTIS.

In Branson, the telephone information system was utilized very infrequently, averaging no more than 120 calls per month, or about 4 calls per day. Unfortunately, the system was not operational during the summer months, when visitation and traffic volumes are highest. However, the web site, which was operational during the survey period, was heavily utilized and utilization increased dramatically—over 2,000 percent (or about 21 fold)—over the ten-month evaluation period.

5.2 Mobility

Mobility in the context of this evaluation refers to movement at the individual traveler level. Therefore, users of ATIS components were asked several mobility questions pertaining to their individual travel including whether the information they received saved them time, whether the information made traveling to Branson or their destination in the I-40 corridor easier, and whether the information allowed them to have a more satisfying travel experience. Figure 10 and Figure 11 present the percentage of respondents in Arizona and Branson, respectively, who agreed or strongly agreed that the information they received saved them time, and/or made it easier to get to their destination. The figures illustrate the following results:

- With the exception of information received from the radio, over 50 percent of the respondents in Arizona indicated that they agreed or strongly agreed that the information they received saved them time. Most notably, over 70 percent of tourists receiving information from the web site thought that the information saved them time. Generally, a smaller percentage (35 to 63 percent) of tourists

reported that the information made it easier to get to their destination.

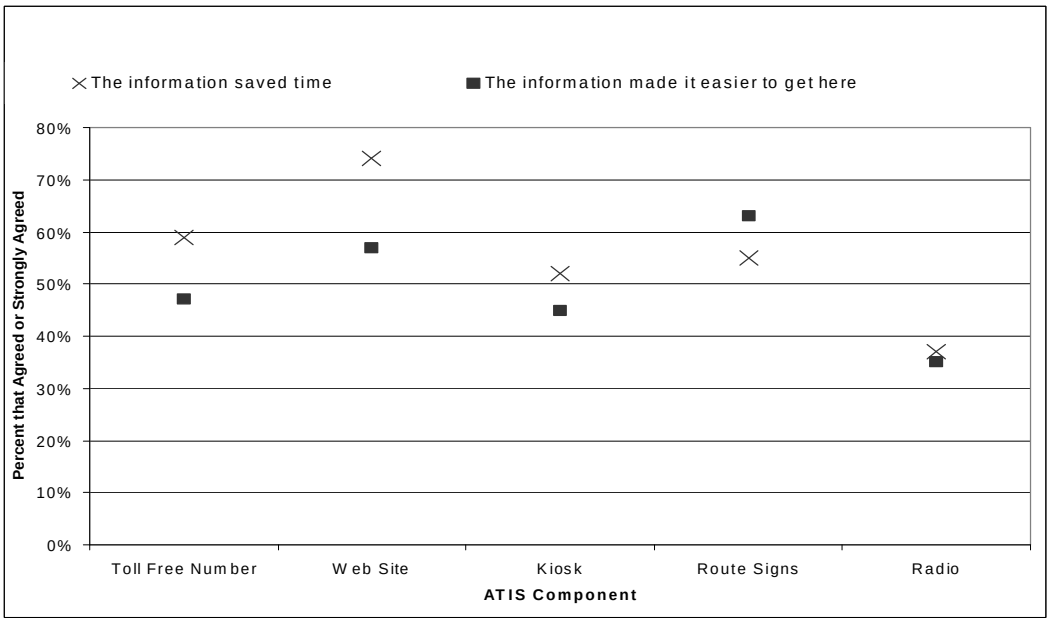

Figure 10. Percentage of I-40 Respondents Indicating Easier Travel or Time Savings

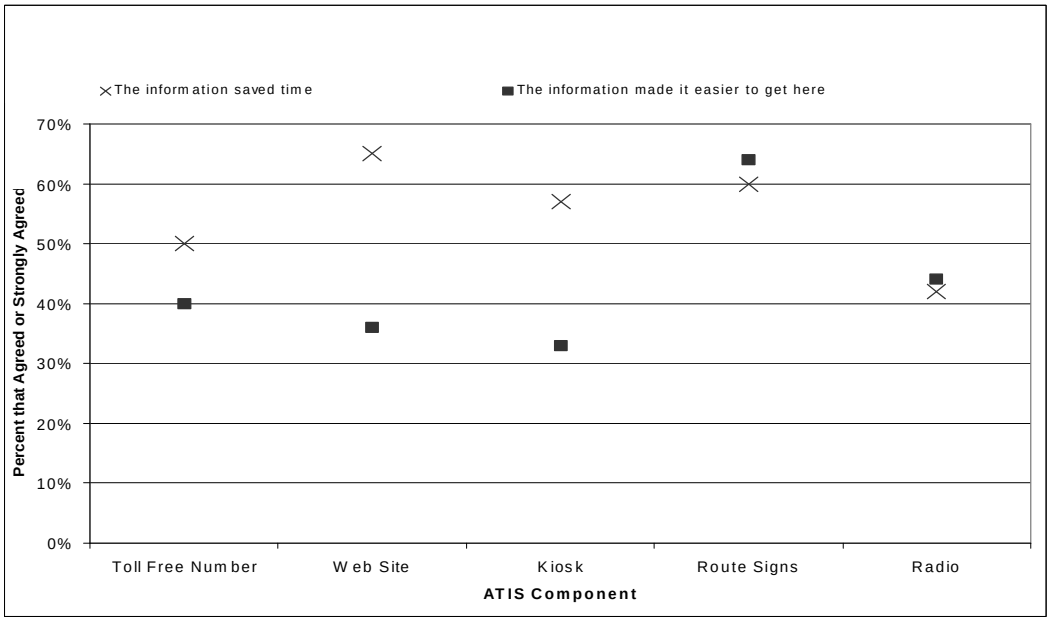

Figure 11. Percentage of Branson Respondents Indicating Easier Travel or Time Savings

- A trend similar to that seen among Arizona respondents was observed in Branson. Over 50 percent of the respondents (excluding radio) indicated that the information saved them time. A smaller percentage (30 to 40 percent) of respondents indicated that the information they received from the toll-free number, web site, and kiosk, made it easier to get to their destination.

Two types of questions pertaining to mobility were asked of all respondents regardless of whether they were aware of or had used an ATIS component. The first type of questions pertained to ease of travel and asked questions on topics such as ease of finding attractions, parking lots, and avoiding congestion. The second type of questions addressed the perception of the respondent on the overall travel conditions. Figure 12 presents the responses to both types of questions for tourists surveyed in Arizona while Figure 13 presents the corresponding responses for tourists surveyed in Branson. The following results from Arizona can be observed from Figure 12:

- The percentage of tourists who agreed or strongly agreed to the ease of travel questions did not vary by awareness or use of ATIS components.

- Approximately 86 percent of the surveyed tourists agreed or strongly agreed that they were pleased with travel conditions on their current trip. There was no statistically significant difference in the responses of tourists based upon ATIS awareness or usage. A significantly lower percentage (approximately 40 percent) of tourists in Arizona were pleased with the travel conditions on a previous trip irrespective of ATIS awareness and usage.

One interpretation of this second result could be that the deployment of ATIS systems have benefitted tourists equally and because of the ATIS systems, tourists as a whole are more pleased with the travel conditions. However, a more reasonable conclusion might be that tourists who are return visitors build upon their past experience and purposefully avoid troublesome traffic conditions (e.g., driving at night rather than during the day).

The following results from Branson are illustrated in Figure 13:

- Compared to tourists surveyed in Arizona, there was more variation in the responses according to awareness and usage of ATIS components.

- A higher percentage of users (used at least one ATIS component) compared to tourists who were either unaware of, or aware of but not using an ATIS component, reported that they agreed or strongly agreed that it was easy to find attractions, parking lots, or avoid congestion. However, not all of these differences were statistically significant (users were significantly higher on the sale of agreement than tourists that were unaware, but no other comparisons were significantly different).

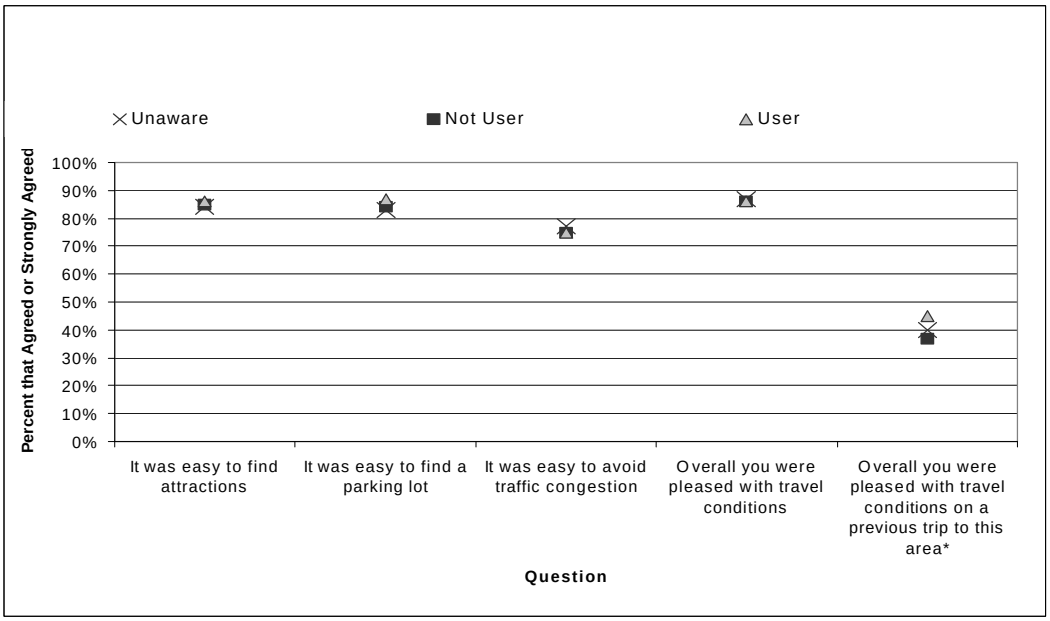

Figure 12. Ease of Travel by Awareness and Use Among I-40 Respondents

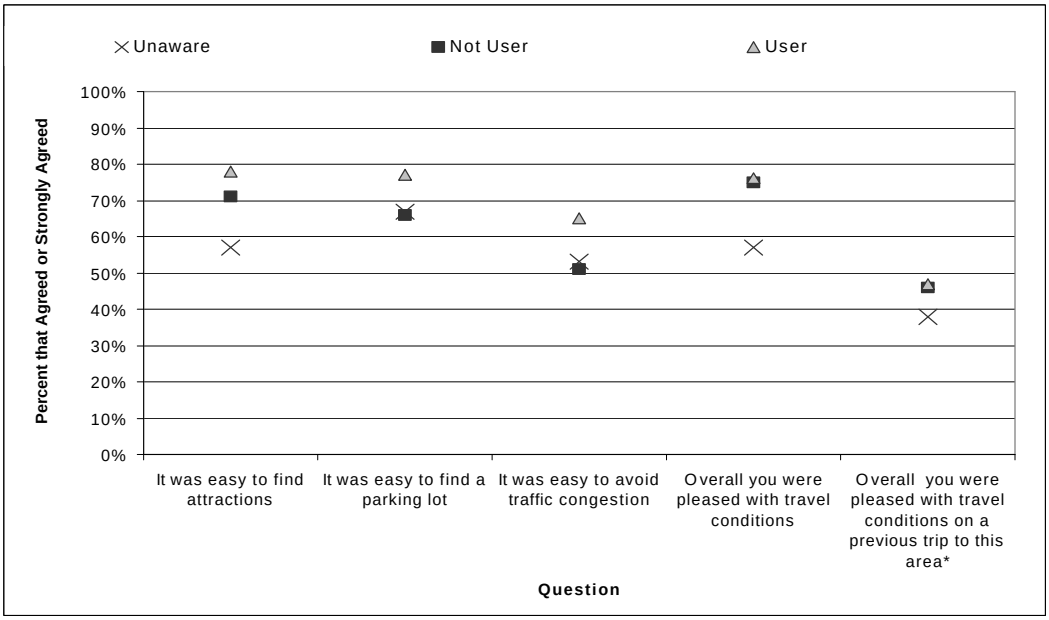

Figure 13. Ease of Travel by Awareness and Use Among Branson Respondents

- Tourists who were aware of at least one ATIS component reported greater satisfaction with the travel conditions on the current and previous trip than did tourists who were unaware of the ATIS components. No significant differences were found between tourists that were aware of an ATIS component and those that were also users.

- As in Arizona, regardless of whether they were aware of (or used) an ATIS component, tourists were more satisfied with travel conditions on their current trip than they were on a previous trip.

Tourists at both sites were asked the number of times they stopped for directions as a surrogate measure of mobility. In Arizona, approximately 55 percent of the surveyed tourists indicated that they had stopped at least once for directions and the distribution of the number of stops did not significantly differ among the three groups of tourists. In Branson, approximately 45 percent of the surveyed tourists who were aware of, but not using an ATIS component reported that they stopped at least once and asked for directions. Roughly 49 percent of ATIS users stopped for directions, but 77 percent of tourists that were unaware of any ATIS component stopped and asked directions. However, these percentages were not significantly different.

5.3 Access

Access to attractions and destinations is improved when travelers are aware of alternative travel options or alternative routes. Many of the key informants interviewed indicated that they believe that the deployed ATIS components have already, or will, improve access by making more travel information available. For example, one restaurant owner speculated that when his kiosk was installed, it could provide a simple means for his customers to obtain information about and directions to other destinations (i.e., improving traveler knowledge and therefore increasing access). Other key informants point to another ATIS component, VMS, as having a potential to increase access by providing information to tourists.

Tourists who were users of the ATIS components were asked to respond to several questions related to access. Highlighted in Figure 14 and Figure 15 are the responses to a subset of these questions among tourists surveyed in Arizona and Branson, respectfully. Overall, the percentage of tourists in Arizona that indicated a positive response to the four access questions contained in the figures were higher than the corresponding percentages in Branson.

The obtained information did appear to change the routes taken or the attractions visited for some of the tourists using an ATIS component in Arizona. In Branson, the percentage of tourists who reported changing the routes taken or the attractions visited by using the toll free phone system or the kiosks was not significantly different from zero. Of the remaining components, 13 percent of web site users, 19 percent of message sign users, and 16 percent of radio users reported changing the route taken because of the information they received. Also, 25 percent of web site users, 9 percent of message sign users, and 9 percent of radio users reported changing the attraction visited because of the information they received.

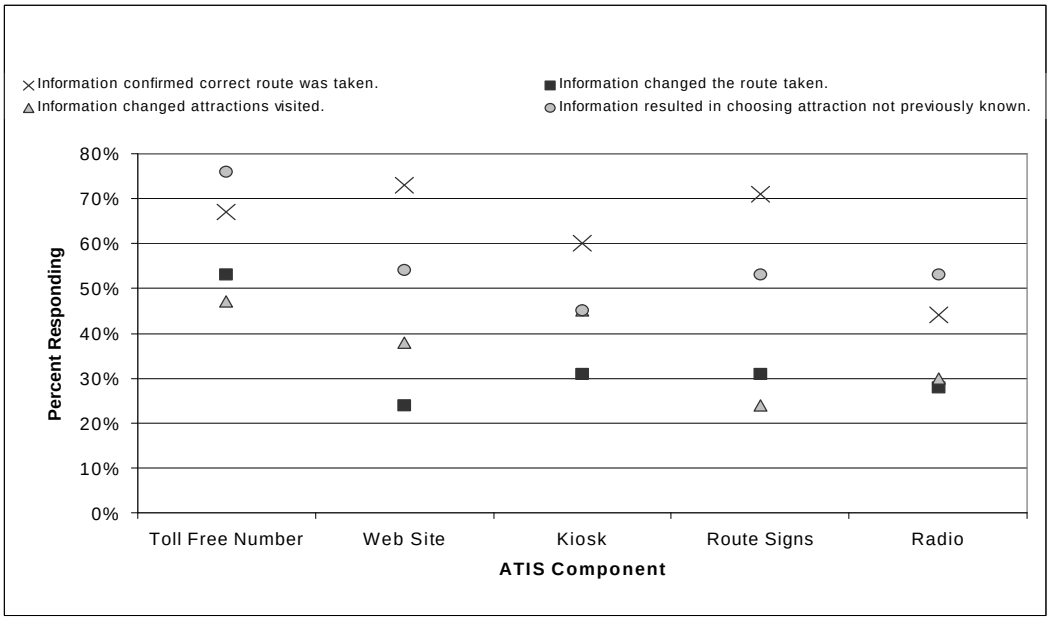

Figure 14. Percentage of I-40 TTIS ATIS Users Indicating Increased Access

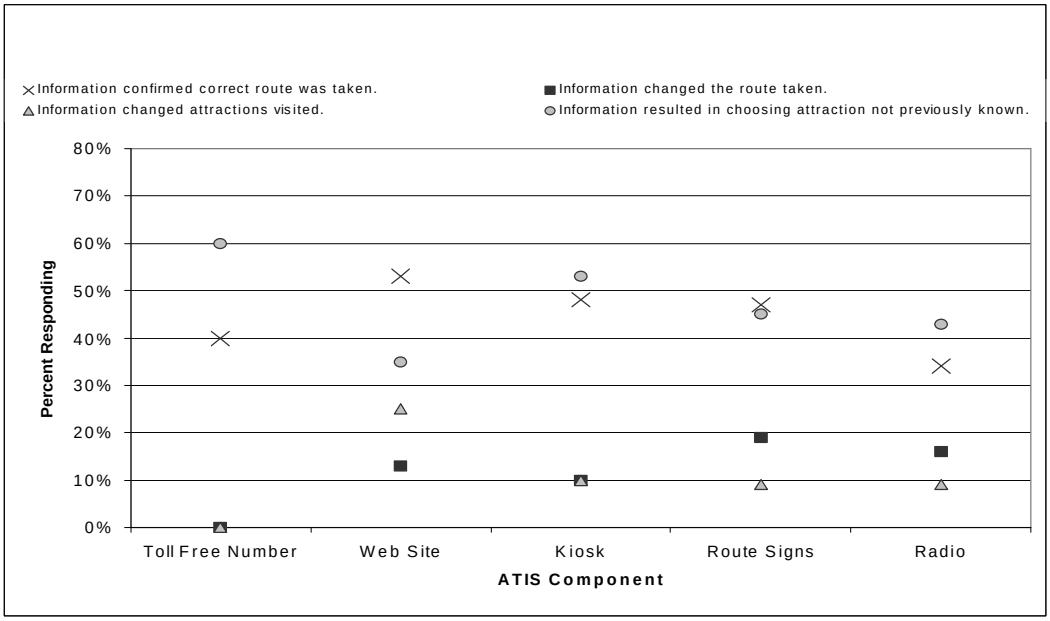

Figure 15. Percentage of Branson TRIP ATIS Users Indicating Increased Access

Tourists surveyed in Arizona visited, on average, about three attractions irrespective of awareness or use of an ATIS component. That is, no significant differences in the average number of attractions visited were observed among tourists that were users, unaware, or aware but not using (3.8, 3.4, and 3.3 attractions, respectively). On average, tourists surveyed in Branson visited between 3 and 4 attractions. Tourists that were users of at least one ATIS component visited on average 4.3 attractions which was significantly higher than the 3.6 attractions visited, on average, by tourists that were aware of, but not users of an ATIS component. Tourists that were unaware of any ATIS component visited 4.4 attractions on average, although this was not significantly different than either of the other two groups of tourists

5.4 Congestion

Congestion refers to the overall system-level travel problems. Certainly, congestion can be caused by breakdowns in an individual traveler's mobility and access. As with access, many of the key informants stated that they believed that the deployed ATIS components would result in reduced traffic congestion. For example, one key informant mentioned that the system's potential to accurately provide early severe weather warnings would enable ADOT to direct truckers around severe snow storms and prevent heavy congestion situations that have occurred in the past. Additionally, during qualitative interviews, tourists themselves already were reporting that they had noticed improved traffic flows.

Two key issues related to congestion were prior knowledge of problems commonly encountered when driving in and around the I-40 area and in Branson, and avoiding traffic congestion. Figure 16 and Figure 17 summarize the responses to these two congestion questions for Arizona and Branson, respectively. In both Arizona and in Branson, a significant percentage of tourists using an ATIS component indicated that the ATIS component helped them avoid traffic congestion. However, among tourists using ATIS components in Arizona, less than 50 percent agreed or strongly agreed that the information let them know what driving problems to expect or helped them avoid traffic congestion. Similarly in Branson, with the exception of route signs, less than 50 percent agreed or strongly agreed that the information let them know what driving problems to expect or helped them avoid traffic congestion. Sixty-three percent of the users in Branson indicated that route signs helped them avoid traffic congestion, which is large compared to the other percentages observed. However, this result needs to be interpreted with care. Only a very limited number of variable message signs were operational at the time of the data collection and, despite efforts of the data collection teams to distinguish between the two, it is possible that the respondents were responding to "color coded route signs" instead of variable message signs.

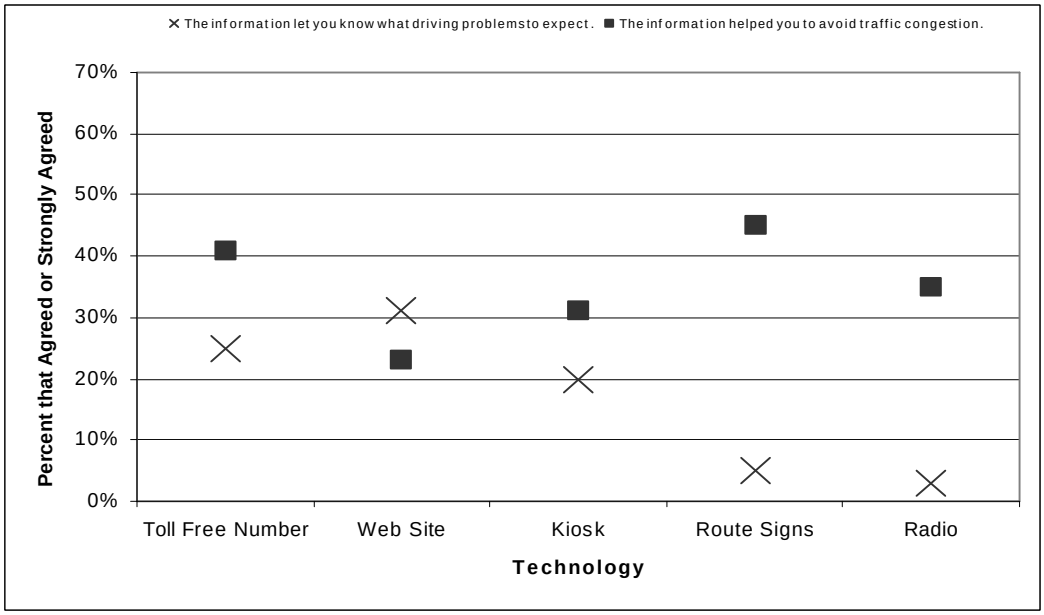

Figure 16. Knowledge of Driving Problems and Avoidance of Congestion Among I-40 TTIS ATIS Users

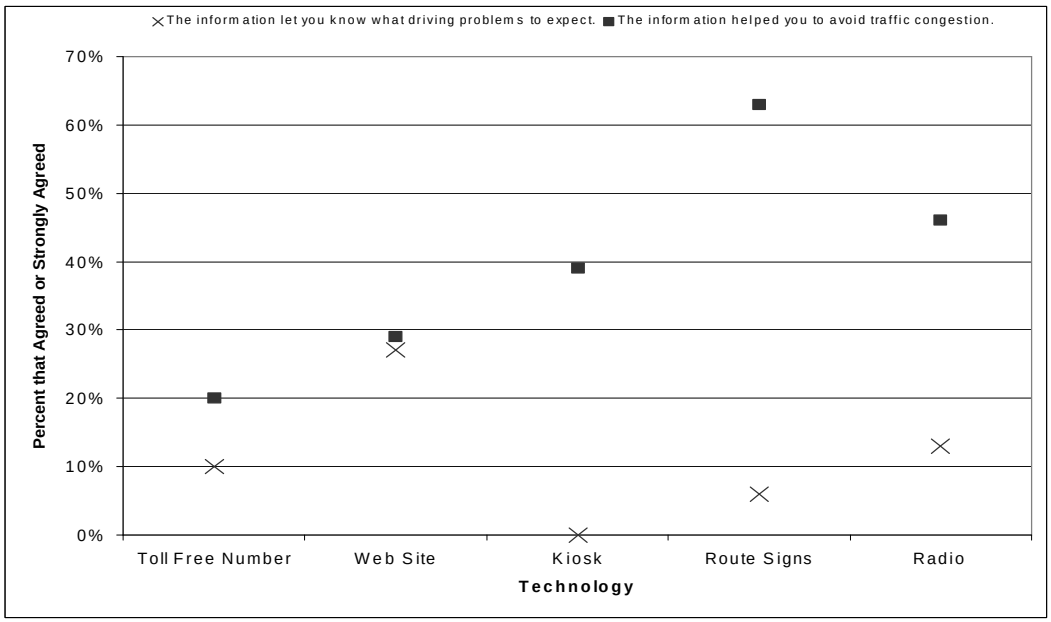

Figure 17. Knowledge of Driving Problems and Avoidance of Congestion Among Branson TRIP ATIS Users

Another measure of improvements to congestion is the number and length of delays among the surveyed tourists. Many of the surveyed tourists did not encounter a "significant" delay. In Arizona, 55, 64, and 81 percent of the surveyed tourists that were aware and using an ATIS component, aware and not using, and unaware, respectively, did not encounter any significant delays. A similar result, although somewhat lower, was observed among the tourists surveyed in Branson with 33, 42, and 40 percent, respectively, not encountering any significant delays. In both Arizona and in Branson, the distribution of tourists that did encounter a significant delay within the respective FOT area was very similar among the three groups of tourists. However, a higher percentage of tourists in Branson encountered more delays than tourists surveyed in Arizona.

5.5 Economic Impact

ITS can potentially have an impact on the economic well-being of the community at the FOT site. For example, if the deployed ATIS components make the travel experience more pleasurable, tourists may be more inclined to stay longer or to have a return visit to the area. Surveyed tourists were asked several questions in an effort to gauge the potential economic impact that the ITS deployment may have. The following results were based upon these survey questions.

Whether or not a tourist uses ATIS components has some effect on their likelihood to return to the area in the future. In Arizona, the percentage of users that indicated they would definitely or probably return (78 percent) was significantly larger than the corresponding percentage of tourists that were unaware of ATIS components (70 percent). Neither of these percentages was significantly different than the percentage of tourists that were aware of, but not using an ATIS component who indicated that they might return (75 percent). In Branson, the percentage of users that indicated they were likely to return (87 percent) was significantly larger (p-value 0.0363) than the corresponding percentage of tourists that were aware of, but not using (80 percent). The percentage of tourists unaware of ATIS components who indicated they were likely to return (81 percent) was not significantly different from either of the other groups.

Whether a tourist is aware of and/or uses an ATIS component appears to have a marginally significant relationship with the number of nights spent in the area and in the amount of money spent during the visit (not including hotel or rental car costs). In Arizona, tourists that were unaware of any ATIS component spent an average of 2.1 nights in the area compared to an average of 2.2 nights for tourists that were aware of but not using an ATIS component and 2.6 nights for tourists that were users of at least one component. Further, a higher percentage of tourists (44 percent) that were users of an ATIS component spent more than $200 during their visit than did either of the other two groups of tourists (33 percent among aware, but not using tourists, and 32 percent among tourist that were unaware of any ATIS component). Among Branson tourists, there was no significant difference between the average number of nights spent in the area for tourists that were unaware of any ATIS component (3.3 nights) and those that

were aware of an ATIS component (3.0 nights for non-users, 3.9 nights for users). However, the average number of nights for tourists that were aware of, but not users of an ATIS component was significantly lower than the corresponding average among users. There did not appear to be a significant difference between the three groups of tourists in terms of the amount of money spent during their visit. Approximately 69 percent of users, 61 percent of non-users, and 67 percent of tourists that were unaware of any ATIS component spent more than $200 during their visit.

More than 10 percent of the surveyed tourists in both Branson and I-40 indicated that they agreed or strongly agreed that they would be willing to pay a fee of $1 to $3 for travel-related information (see Figure 18). Tourists surveyed in Arizona appeared to be more willing to pay a fee of $1 to $3 for travel-related information than were tourists in Branson. This may be due in part to the vast number of tourist information centers in Branson offering free information to tourists. These results on the willingness of tourists to pay a nominal fee should be interpreted with caution. In particular, when conducting the observational study on the use of kiosks, a great many tourists indicated that they did not believe that the kiosks were free (because of the appearance of the kiosks) and therefore they were not interested. Therefore, it seems likely that the survey results indicate a theoretical potential for charging a nominal fee, but the observational study indicated a practical barrier to implementing such a fee.

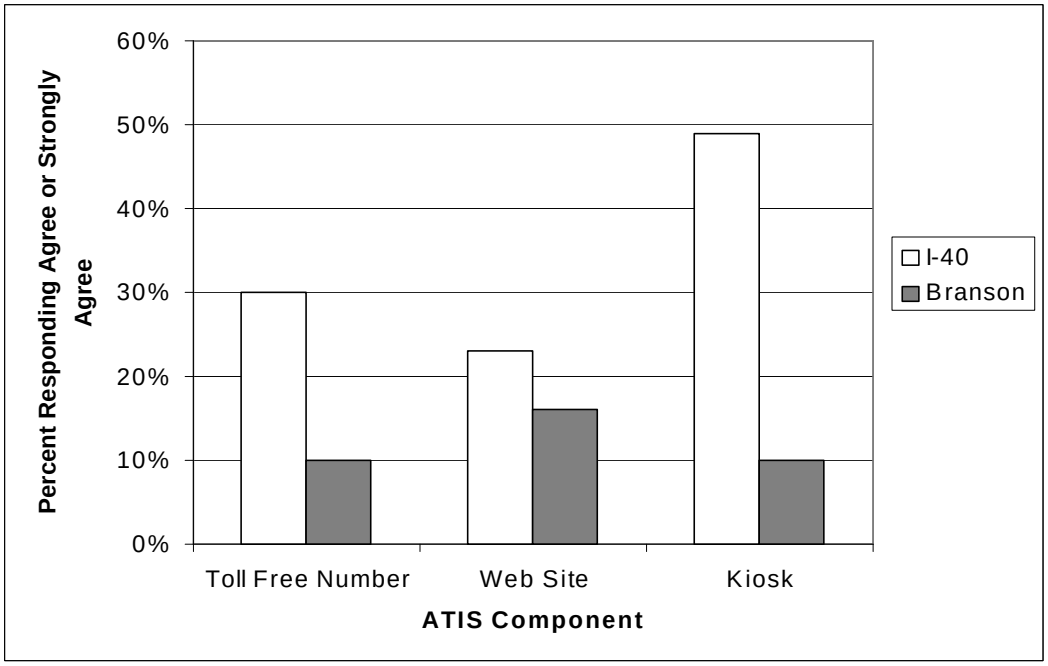

Figure 18. Reported Willingness to Pay a Nominal Fee to Utilize ATIS Component

5.6 Safety

An overwhelming majority of tourists in both Branson and in Arizona agreed or strongly agreed that the highways in the area were safe. In Arizona, roughly 84 percent of respondents agreed or strongly agreed irrespective of whether they were aware of or used an ATIS component. In Branson, approximately 78 percent agreed or strongly agreed with some variation by awareness and use. Seventy-nine percent of tourists that used an ATIS component agreed or strongly agreed that the highways they used to get to Branson were safe compared to 75 percent among those tourists that were aware of, but not users and 52 percent among the tourists that were unaware of any ATIS component. However, this last result should be interpreted with care as approximately 19 percent of the tourists that were unaware of any ATIS component did not respond to this question (compared to 2 percent of non-users, and 3 percent of users).

5.7 System Performance

Overall, both the Arizona TTIS and Branson TRIP systems generally performed as intended, although in Branson, several user interfaces were significantly delayed, and some of the user interfaces did not function as intended during the evaluation period. Implementation delays were minor for Arizona (several kiosks came on-line mid-way through the ten-month evaluation period) but were pervasive for Branson, where no user interfaces were fully operational at the intended start date (June 1998).

During the main survey period in Arizona, there was traveler information available—all of the user interfaces were operational and the HCRS system included over 90 inputs. Utilization of the VMS signs, however, was less intense during this period than on average over the entire ten-month evaluation period, with no messages related to major incidents, road closures or restrictions or weather conditions. For the most part, the I-40 deployment was executed and operated as planned. Overall, the utilization of the interfaces was relatively low, as confirmed by the survey results, compared to the size of the potential audience or market for the information.

In Branson, very little information was available through TRIP during the first survey session; only the message signs and HAR were operating and it appears that neither interface were providing real-time travel advisories. During the main survey session, all of the interfaces were operational, although only one kiosk was deployed and the message signs and HAR were still providing only “canned” travel information. As with the Arizona TTIS, the lack of long-term data and data “black outs” inhibits the ability to develop strong conclusions relative to the utilization of many of the TRIP user interfaces. Implementation delays and the failure to provide the real-time traffic information that was originally envisioned (in the case of the HAR and changeable message signs) likely had an adverse impact on the utilization of ATIS components deployed as part of the TRIP. As a result, the overall impact of the user interfaces on travelers

was not as large as might be possible in relation to the size of the potential market, based on the survey results and the utilization statistics for most of the interfaces.

In Arizona, very little information (about 3 percent of total inputs) was entered into the HCRS by non-ADOT agencies. Clearly, one would expect ADOT to be the greatest source of information, given their primary responsibilities in the area of traveler information. However, the fact that nearly all information came from ADOT may suggest that, at least during the evaluation period, the utility of providing "client workstations" with both HCRS input and output capability to a wide range of corridor organizations, remains unproven. Generally, maintenance, construction, and weather/environmental related inputs were most common in the HCRS. Conversely, in Branson—an area with considerably more congestion and delay than the I-40 corridor as a whole—the vast majority of inputs to the TIC pertained to traffic conditions (level of service and delay information).

The effort to deploy and operate kiosks in Branson, at least during the evaluation period, was not successful. Delays in acquiring and deploying the kiosks, coupled with less-than-anticipated interest on the part of potential kiosk hosts, resulted in only one kiosk being deployed. The kiosk was operational for only one month. Although usage statistics are not available, field observations indicate that the kiosk was located in an out-of-the-way private tourist information center with low foot traffic.

The highway advisory radio system in Branson was operated by a commercial radio broadcaster, who had to manually record messages based on information passed on by the TIC. Limited field observations and anecdotal information suggest that, during the evaluation period, the system never operated as intended, providing only "canned" generic information on traffic conditions rather than real-time advisories.

Fewer changeable message signs were deployed as part of the Branson TRIP than anticipated and the two that were deployed generally provided only "canned" generic traffic condition information rather than real-time advisories.

6.0 CONCLUSIONS

The overall conclusion of this evaluation is that the I-40 TTIS and Branson TRIP FOTs were successful in deploying ITS technology in a rural setting. A significant percentage of tourists at each site were aware of, and users, of at least one deployed component. However, because this evaluation effort took place early in the deployment phase, awareness of certain components (kiosks, web sites, and interactive phone systems) was quite low (10% to 20%). Further, these tourists as well as key informants indicated that the ITS deployments are currently, and will continue to be, successful in meeting the five overall goals of the rural Test Program (Improving Mobility, Increasing Access, Reducing Congestion, Stimulating Economic Development, and Improving Safety). However, this is not to say that various issues and barriers to the continued success of the ITS deployments were not observed as part of the evaluation process. Moreover, the evaluation process revealed avenues that could improve these ITS deployments as well as other rural ITS deployments. The following summarizes some additional conclusions of the evaluation team:

- Targeted Deployments: The type of ATIS components that are used by travelers depends largely upon the travel planning style of the traveler. Therefore, ITS deployments should consider the travel planning style as a means to target the types of deploying ATIS components.

- Appearance and Location: The appearance and location of the deployed components makes a large difference in their effectiveness. For example, most tourists believed that the kiosks were ATM machines or other commercial machines. The Branson kiosk was located in an isolated business and was virtually unavailable to tourists. Another example includes VMS. Tourists commented that the location of the VMS signs prohibited them from processing the information in time to act on it. Thus, appearance and location of the ATIS components should be carefully considered in future deployments.

- Schedule of Deployments: Deploying an ATIS often requires more time than expected. In both the I-40 TTIS FOT and the Branson TRIP FOT, there were significant delays in the deployments of several of the ATIS components.

- Methods: The recruitment and field experiences demonstrate that tourist intercept surveys and qualitative measures are a useful and practical method for obtaining information from tourists. Generally, tourists appeared willing to participate in the study and were appreciative of the chance to provide information that could be used to improve the traffic conditions in the area. Because of its success, this approach should be adopted in future evaluation efforts where information is to be collected from tourists.

7.0 PARTNERS' LESSONS LEARNED

The following describes, from the local partners' perspective, some of the lessons learned during the deployment of ATIS components as part of the TRIP or TTIS FOT. Generally, these lessons learned stem from observations made by the local partners, but in some cases, these observations are supported by the results of the formal evaluation tests.

The following lessons learned were reported by representatives from the Arizona TTIS:

- Cost of telephone bills. The cost of telephone communications, such as for kiosks, was not fully considered by some project participants and in some cases became a major concern. In some cases, these costs actually resulted in a partner, such as a kiosk site host, ending their participation in the project.

- No standard icons. The lack of standard icons, such as for the Highway Closures and Restrictions System (HCRS) map display, resulted in additional effort to develop specific icons for the project.

- Multiple entries for single event. Multiple entries into the HCRS for a single event create confusion, and this problem needs to be addressed.

- Different time zones. HCRS workstations are located in multiple time zones, a technicality that was not originally accounted for and had to be addressed.

- Amount of daily foot traffic for kiosk host. Daily foot traffic is a key factor for kiosk success.

- Advertising for competitors on kiosk. A significant hurdle to getting kiosks deployed in places of business was the potential hosts' concerns that advertising for competing businesses would be available on the kiosk.

- Lobbies kept non-commercial. A significant hurdle to getting kiosks deployed in places of business was the fact that many hotels and motels prefer to keep commercial advertising out of their lobbies.

- Opportunities for additional efforts with commercial vehicle operations (CVO). The I-40 TTIS project, and the Pre-Pass program in particular, helped build bridges with commercial vehicle operators, creating opportunities for further cooperation.

- Opportunities for additional efforts with rural transit. The I-40 TTIS project helped build bridges with rural transit operators, creating opportunities for further

cooperation.

- Rural ITS not ready for in-vehicle systems. The difficulties associated with the in-vehicle components of the I-40 TTIS, specifically the mobile HCRS access provided to Department of Public Safety (highway patrol) and ADOT maintenance crews, suggest that rural areas are not fully prepared for in-vehicle systems.

- Arizona DEMA. The Arizona Department of Emergency Management's interest in hosting a HCRS workstation was not expected and helps build bridges between ADOT and the DEMA.

- Hoover Dam. The Hoover Dam operators' interest in hosting a HCRS workstation was not expected and helps build bridges between ADOT and the Hoover Dam operation.

- Variable message signs (VMSs) are popular.

- Internet/web information and use are steadily increasing. Increasing access to and use of the internet make it an increasingly effective communications tool.

- ADOT Districts are receptive to user-friendly formats. The user-friendly format of the HCRS was a major factor in the ADOT District offices, acceptance of and use of the system.

- Quality/timely data. High quality, timely information is critical to drive the HCRS.

- Statewide HCRS results in better communication. The expansion of the HCRS to a statewide, and even interstate, system has promoted communication between different ADOT Districts and between ADOT and other organizations.

- Jury is still out on kiosks. The results of the I-40 TTIS effort suggest that kiosks have not yet been proven as an effective communications tool in rural environments.

- Jury is still out on business model. The I-40 TTIS experience has not proven the financial benefit of using a private partner for traveler information dissemination, e.g., kiosks and web site. For example, because far fewer private kiosks were deployed than expected, the ADOT share of the costs for the kiosks was relatively high, on a per kiosk basis.

- Success of independent service providers is still being assessed. The I-40 TTIS

experience has not yet demonstrated that independent service providers can be effective for disseminating traveler information in rural environments.

The following lessons learned were reported by representatives from the Branson TRIP:

- Importance of Marketing. Marketing of any system is extremely important to sell the idea and the building of partnerships for the success of the program. The marketing of Branson TRIP should be included in the Agreement so that the consultant made this task equal to all the other tasks. This would also include a person that spends full time dedicated to the marketing of the system. MoDOT handled a great part of the marketing of Branson TRIP and as a result of balancing work normally associated with Department of Transportation's Public affairs and customer service, the required dedication needed to market Branson TRIP or any other ITS system was not as present as needed.

- Expectations. Issues important to the Cities and Counties regarding their expectations for the system and plans for using the data need to be gathered in the beginning of the project concept phase. One example: the City of Branson intended to gather traffic information to help determine tax revenue months in advance of the actual tax revenue receipts. This would help plan as well as anticipate cash flow of the city. By not having this information and knowing the city's intent during the planning phase of the project, the implementation of this task was added after the initial completion of the project. By knowing all these issues up front during the planning stages, the design of the system may have been better suited for accomplishing more local goals as well as the primary goals of the system without much effort or expense.

- Perception of Partners. Perceptions of all the partners and local entities need to be addressed up front so that there is no disappointment in the final project performance and what was perceived as being the project performance. This happens quite often when individuals and groups perceive that the system will accomplish or provide more of a service than what is being designed. This is not saying that the system isn't capable of delivering the services eventually, but the initial design phase did not meet all the expectations of the system. This basically happened as a result of confusion between what the system initially would do, and if more development and funds were put into the system to expand it, what it was capable of becoming.

- Emphasis on Self-Sustainment. This is related to marketing, but during the planning phase of the project more emphasis should be made towards how to make the system self-sustaining. If partnerships and agreements were made during the planning stage then less effort would have to be made after the system is operational. Additionally, by having these efforts made during the initial

planning stages of the system, the design of the system may have been modified to collect necessary data or other services that would make the system more attractive for partners to invest in the system.

- Untested Equipment. As the result of the short time required to have the system operational, some equipment technology was utilized that was not tested and did not have a history of working in the conditions of this system. Researched technologies closely related to the applications we were looking for would have provided a system that would consist of equipment that worked more reliably. This lesson learned has shown us that by giving more consideration to proven technologies suited for our application, we may have had to give up some portions of the systems capabilities, but the part of the system we did develop would have a better chance of working reliably.

- Public Involvement. Selling the ideas and the system should be started from the beginning and followed through the entire development of the system. This will ensure that the acceptance and long-range participation in the project by partners are secure. For example, in the Branson TRIP, more efforts to provide training to motel clerks and other service oriented positions would have likely increased the acceptance and use of the system by the community and would have better promoted the use of these components even after the system operational phase.

- Survey Results and Time Constraints. Having the survey being performed before the entire system was operational and during the time when there was not a large amount of marketing efforts being initiated resulted in data that may not have been as good as if the system was fully operational and the marketing of the system had been in place for several months. The lesson is that the planning and coordination of the marketing and the evaluation need to be closely planned together to ensure that the results of the survey are representative of the entire operational system.

- Communication of Partnership, Expectations, and Commitments. From the very beginning of the planning and development of partnerships for the system, the commitment of the partners needs to be identified and addressed with complete buy-in by the partners. This would help eliminate the partners becoming involved with activities where they would not be able to meet the commitment required to make the system successful.

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