EVALUATION PLAN:

The I-40 Traveler and Tourist Information System Field Operational Test

February 25, 1998

Prepared for:

U.S. Department of Transportation
Federal Highway Administration

U.S. Department of Transportation
ITS Joint Program Office, HVH-1
Room 3400
400 Seventh Street, SW
Washington, D.C. 20590

Prepared by:

Battelle
. . . Putting Technology To Work

Battelle
505 King Avenue
Columbus, OH 43201

E V A L U A T I O N P L A N

The I-40 Traveler and Tourist Information System Field Operational Test

February 25, 1998

Principal Authors:

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

Prepared for:
U.S. Department of Transportation

Notice

This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

1. Report No. FHWA-JPO-99-028	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Evaluation Plan: The I-40 Traveler and Tourist Information System Field Operational Test		5. Report Date February 25, 1998 6. Performing Organization Code
7. Author(s) John Orban, Bennett Pierce, Matt Burt, Hugh Clark, Diane Burkom		8. Performing Organization Report No.
9. Performing Organization Name and Address Battelle Memorial Institute 505 King Avenue Columbus, Ohio 43201		10. Work Unit No. (TRAIS) 11. Contract or Grant No. DTFH61-96-C-00077
12. Sponsoring Agency Name and Address U.S. Department of Transportation Federal Highway Administration ITS Joint Program Office 400 Seventh Street S.W. Washington, D.C. 20590		13. Type of Report and Period Covered Evaluation Plan. 1/98-4/99 14. Sponsoring Agency Code HVH-1

15. Supplementary Notes

Contracting Officer's Technical Representative: Joseph I. Peters (JPO). An electronic version of this document is available on the ITS Electronic Document Library: http://www.its.fhwa.dot.gov/cyberdocs/welcome.htm

16. Abstract

The I-40 Traveler and Tourist Information System (TTIS) in northern Arizona is a Field Operational Test (FOT) of Traveler Information Services in Tourism Areas funded through the National Advanced Rural Transportation Systems Program. 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, with roughly 40 percent of these being 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). The main objective of the I-40 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) will serve as the central data store for the collection and dissemination of information. The HCRS will communicate with a multitude of traveler information systems ranging from existing radio and television links to kiosks, Internet services, and dial-in phone services.

The evaluation of the I-40 TTIS is being conducted by Battelle under the ITS Program Assessment Support contract with the Department of Transportation's ITS Joint Program Office. The evaluation will address technical challenges in developing ATIS applications in rural environments, institutional benefits and issues, usefulness of the information to the traveling public, effectiveness of various media to disseminate information to the public, and the overall impact of the information on traveler behavior. The evaluation strategy combines primary and secondary data collection and analyses for evaluating benefits and outcomes. Tourist intercept surveys, focus groups, personal interviews, and special traffic studies are the primary data collection methods that will be used. The evaluation will also make use of secondary data sources such as systems operational data (e.g., number of Web page hits) and historical traffic and accident data as a low-cost means of measuring impacts of various system components.

17. Key Words Rural, Advanced Traveler Information Systems, I-40, Kiosks, Tourists, TTIS	18. Distribution Statement No Restrictions

19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No of Pages 25	22. Price N/A

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

PREFACE

This document is part of a series of planning documents for the evaluation of Field Operational Tests of Traveler Information Services in Rural Tourism Areas (Branson TRIP and I-40 TTIS) prepared by Battelle, along with subcontractors BRW Incorporated and CJI Research, for the U.S. Department of Transportation's ITS Joint Program Office (DOT/JPO). Electronic versions of these documents are available through the ITS Electronic Document Library (EDL):

http://www.its.fhwa.dot.gov/cyberdocs/welcome.htm

As indicated below, selected document were published by DOT and are available through the National Technical Information Service (NTIS). Questions or comments concerning the documents in this series are encouraged and can be directed to:

Joseph I. Peters
ITS Joint Program Office
Federal Highway Administration (HVH-1)
400 Seventh Street, SW
Washington, DC 20590
(202) 366-2202
E-mail: joe.peters@fhwa.dot.gov

Title	Date	DOT Report No.
Evaluation Plan: The I-40 Traveler and Tourist Information System Field Operational Test	February 25, 1998	FHWA-JPO-99-028
Test Plan: I-40 TTIS Tourist Intercept Survey	May 18, 1998	FHWA-JPO-99-029
Test Plan: I-40 TTIS Focus Groups and Personal Interviews	May 18, 1998	
Test Plan: I-40 TTIS System/Historical Data Analysis	May 20, 1998	
Test Plan: I-40 TTIS Route Diversion Study	May 20, 1998	
Evaluation Plan: The Branson Travel and Recreational Information Program Field Operational Test	February 25, 1998	FHWA-JPO-99-027
Test Plan: Branson TRIP Tourist Intercept Survey	May 29, 1998	
Test Plan: Branson TRIP Focus Groups and Personal Interview	May 29, 1998	
Test Plan: Branson TRIP System/Historical Data Analysis	June 1, 1998	
Test Plan: Branson TRIP Travel Time/Data Accuracy Test	June 1, 1998	
Executive Summary: Evaluation Plan (for the) National Advanced Rural Transportation Systems Field Operational Tests of Traveler Information Services in Tourism Areas	July 1998	

TABLE OF CONTENTS

Page

List of Tables

List of Figures

EXECUTIVE SUMMARY

The I-40 Traveler and Tourist Information System (TTIS) in northern Arizona is one of two field operational tests (FOTs) of traveler information services in tourism areas funded through the National Advanced Rural Transportation Systems Program. The Branson Travel and Recreational Information Program (TRIP) in southwest Missouri was also funded under this program.

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, and roughly 40 percent of these 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 show that nearly one of every eight vehicles on this stretch of interstate is either going to or coming from the GCNP. Because tourism is 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 I-40 TTIS is to have better-informed corridor visitors, which will result 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) will serve as the central data store for the collection and dissemination of information. HCRS will collect 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 will communicate with other traffic operations centers (i.e., Flagstaff, Kingman, Holbrook), other key operating agencies (GCNP, state DOTs, Forest Service) and serve as the multimodal traveler information center. The HCRS will communicate with a multitude of traveler information systems ranging from existing radio and television links to kiosks, Internet services, dial-in phone services, and wireless systems designed to provide in-vehicle traveler information.

The evaluation of I-40 TTIS is being conducted by Battelle under the ITS Program Assessment Support contract with the Department of Transportation's ITS Joint Program Office. The evaluation will address technical challenges in developing advanced traveler information systems (ATIS) applications in rural environments, institutional benefits and issues, usefulness of the information to the traveling public, effectiveness of various media to disseminate information to the public, and the overall impact of the information on traveler behavior. The evaluation will focus on five goal areas. Some of the key measures associated with these goals are listed in the table on the following page.

Evaluation Goals and Measures

Goal Area (Focus)	Evaluation Measures
Mobility (Traveler)	- Travel Time - Perceived Ease of Travel - Customer Satisfaction
Access (Destinations)	- Knowledge of Travel Options - Use of Alternative Modes and Routes - Perceived Availability of Options
Congestion (Transportation System)	- Number of Delays - Level of Service - Perception of Delay Frequency and Severity
Economic Development (Region)	- Duration of Visit - Intent to Return
Safety (Traveler)	- Number of Emergency Calls - Amount of Safety Information Available

While achieving the evaluation objectives of assessing impacts of ITS on mobility, access, congestion, economic development, and safety in rural tourist environments, the technical approach will also provide valuable information on the mechanisms for achieving these objectives. The evaluation study will answer such questions as, "Which components of the systems being deployed are the most successful? What worked? What didn't work? How accurate is the information? Are travelers aware of the technology? Do they use the information? How do the systems change the behavior of the traveling public? How valuable is the information to the traveling public? Where do travelers prefer to get information? What type of information do they prefer? Does this technology improve the experience of the tourist?"

The evaluation strategy combines primary and secondary data collection and analyses for evaluating benefits and outcomes. Tourist intercept surveys, focus groups, personal interviews, and special traffic data collection activities are the primary data collection methods that will be used. The evaluation will also make use of secondary data sources such as systems operational data (e.g., number of Web page hits) and historical traffic and accident data as a low-cost means of measuring impacts of various system components.

Evaluation planning began in February 1998 and will continue, along with baseline data collection, through the spring. Pilot tourist surveys and focus groups are scheduled to occur in May or June, shortly after the planned deployment of the system. The main data collection period will be in August of 1998. Preliminary results will be available in November 1998, and the final report in April 1999.

EVALUATION PLAN

FOR

THE I-40 TRAVELER AND TOURIST INFORMATION SYSTEM FIELD OPERATIONAL TEST

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 underway since 1996. In 1997, the Federal Highway Administration 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 initiatives.

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.

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, with roughly 40 percent of these being 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 show that nearly one of every 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) will serve as the central data store for the collection and dissemination of information. HCRS will collect 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 will communicate with other traffic operations centers (i.e., 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 will communicate with a multitude of traveler information systems ranging from existing radio and television links to kiosks, Internet services, dial-in phone services, and wireless systems designed to provide in-vehicle traveler information.

An important component of the FOT is the independent evaluation of the effectiveness of the services. The evaluation is needed to assess the technical challenges in developing ATIS applications in rural environments, institutional benefits and issues, usefulness of the information to the traveling public, the effectiveness of various media to disseminate information to the public, and the overall impact of the information on traveler behavior.

2.0 SYSTEM DESCRIPTION

2.1 System Components

The I-40 TTIS will collect, process, and disseminate weather, road condition, and traveler information to I-40 corridor travelers. I-40 is an east-west interstate highway that crosses northern Arizona (see Figure 1). 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 primary components of the I-40 TTIS are shown in Figure 2. 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.

System Inputs

The I-40 TTIS will gather 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 will be entered into the database and will be 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 thirteen 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).

Data Processing

Data collected from various sources will be entered into the HCRS, the central information system of the I-40 TTIS located in the Phoenix Traffic Operations Center. This central database will combine I-40 corridor information with metropolitan Phoenix area information and will serve as a statewide repository of real-time traveler information.

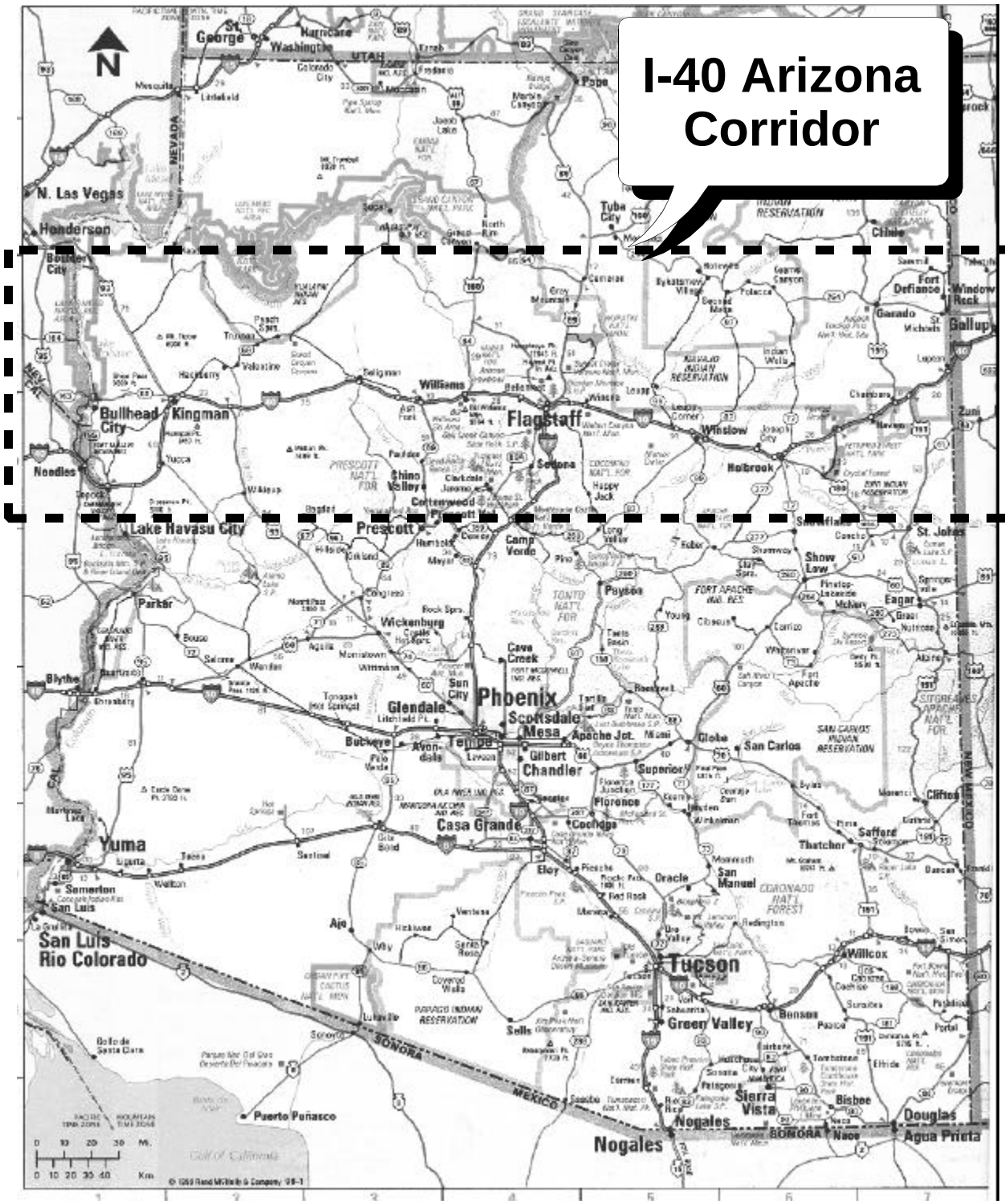

Figure 1. I-40 Corridor

Once integrated, the HCRS database will provide information to I-40 users through various ADOT interfaces. The private partner will add private attraction and traveler services information to the database and provide the combined information to I-40 users through privately operated interfaces.

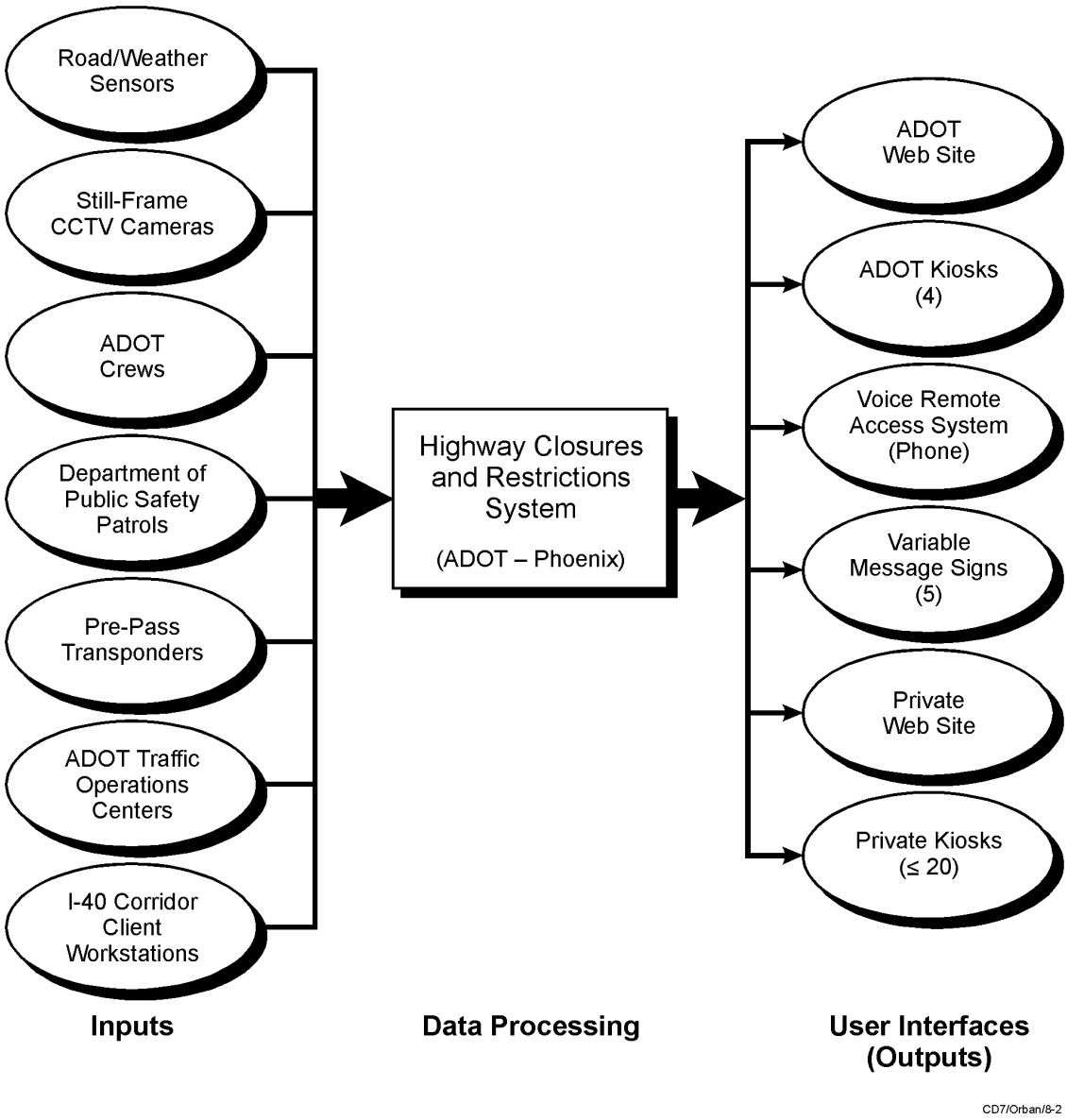

Figure 2. I-40 TTIS Overview

User Interfaces (System Outputs)

The I-40 TTIS user interfaces include a web site, four 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. The ADOT statewide web site provides real-time roadway condition information. Using a state road map, users can click on a specific route and receive a list of current roadway incident and construction information. The four ADOT kiosks, located at three tourist information centers and a truck stop, provide access to the ADOT web site. The VRAS uses a computerized voice system to provide the same information as the web site. The five ADOT variable message signs are located in advance of major route junctures throughout the I-40 corridor.

Up to 20 private-partner kiosks will be located at selected attractions and hotels and will include the traffic information provided on the ADOT web site, plus information on private attractions and traveler services.

2.2 Schedule and Status

I-40 TTIS is expected to be fully operational by May 1, 1998.

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 will be 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 I-40 TTIS team during a workshop conducted as part of the evaluation planning process (see Section 3.1). In particular, the fifth goal area, safety, was added based on discussions with the I-40 TTIS team. The final evaluation measures and corresponding hypotheses for the evaluation were developed using the results of the workshop. These measures and example hypotheses are presented in Section 3.2.

3.1 Development of the Evaluation Plan

Using information in the I-40 TTIS FOT proposal and related planning documents, Battelle developed a preliminary evaluation *strategy* for the FOT. In developing the evaluation *plan*, the first step was to seek input from and secure the participation of various stakeholders. Stakeholders include federal, state, and local government agencies; local residents and business owners; and private FOT partners.

On February 9, 1998, a meeting was held with members of the I-40 TTIS team, including members of the implementation team and steering committee. The purposes of the meeting were to:

- Present the proposed evaluation strategy,
- Obtain information from the I-40 TTIS team on the types of changes that are expected following deployment,
- Review and prioritize the evaluation objectives,
- Identify ways in which the proposed evaluation strategy can be adjusted to best address the prioritized evaluation objectives, and
- Identify areas for coordination.

The meeting was attended by representatives from FHWA (Thomas Fowler), ADOT (J.R. Romley, FOT Project Manager; and Tim Wolfe, FOT Project Sponsor), FOT contractors (Tomas Guerra, Computran Systems; Jonathan Upchurch, Evaluation Liaison from Arizona State University), and the Evaluation Team (John Orban, Battelle Evaluation Leader; and Matt Burt, BRW On-Site Evaluator).

It was recognized that two important stakeholder groups were not directly represented at the meeting. Specifically, the system developer (Castle Rock Services) and local jurisdictions and vendors did not attend. However, their interests were well known and taken into consideration based on their participation in the earlier FOT planning process.

After reviewing the proposed evaluation strategy, a workshop was conducted to accomplish the following objectives:

1. Identify anticipated changes associated with the ITS deployment.
2. Identify anticipated benefits of the ITS deployment.
3. Prioritize the benefits to be evaluated and identify the relevant data collection methods.

In identifying anticipated changes associated with the ITS deployment, workshop participants (members of the I-40 TTIS team) were encouraged to think broadly and not to limit their input to benefits or ultimate outcomes. The changes that were identified are listed in Table A.1 in Appendix A.

Next, the anticipated benefits of the I-40 TTIS deployment were listed. The following criteria were provided to guide the selection of benefits:

1. The importance of the benefit itself.

2. The anticipated ability of the ITS deployment to produce the benefit.

3. The ability to measure the benefit within the evaluation time frame.

The anticipated benefits identified by the workshop participants are listed in Table A.2 in Appendix A (benefits are not listed in order of importance). The I-40 TTIS team emphasized the importance of the anticipated safety benefits of the deployment, but ranked these benefits lower based on the limitations in evaluating these benefits within the time frame of the evaluation (see criterion #3, above). For example, it was noted that the extremely limited amount of the post-implementation accident rate data that will be available during the evaluation will be insufficient to directly establish the safety impact of the I-40 TTIS. However, surrogate measures, such as the number of emergency calls, were identified and included in the evaluation plan.

Following the ranking, participants identified which data collection methods, starting with those categories identified in the proposed evaluation strategy, are appropriate to the measurement of each benefit. The purpose of this activity was to help identify the appropriate focus of evaluation resources and to identify the data collection methods necessary to measure anticipated project benefits. Table A.3 in Appendix A presents the results of this activity.

Finally, as a check of the consistency between the I-40 TTIS team's evaluation objectives and those of the rural ITS program (those reflected in the original proposed evaluation strategy), the benefits in Table A.3 were correlated with the five goal areas. Table A.4 in Appendix A presents that correlation.

The following are the major conclusions of the workshop activity and of the evaluation kick-off meeting:

- The anticipated benefits of the I-40 TTIS align fairly closely with the goal areas and "few good measures" presented in the proposed evaluation strategy.

- The proposed data collection methods are generally sufficient and appropriate to measure the anticipated benefits, especially the use of traveler surveys and focus groups.

- Because of limited route choices and distances involved, the proposed "Travel Time/Data Accuracy" case studies might not be the best way to characterize travel times or to assess data accuracy. Instead, the evaluation team will consider other methods to compare pre- and post-implementation motor carrier border-to-border travel times and analyze pre- and post-implementation auto and truck route selection in response to VMS messages.

- Several specific examples of the role for system operational data and existing/historic data were identified.

- Measurement of congestion, safety related and economic development ultimate outcomes (such as changes in accident rates or changes in roadway level of service) is not feasible within the evaluation time frame. However, baseline data can be identified for future analysis.

3.2 Revised Evaluation Measures and Example Hypotheses

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 have been identified. Collectively, these are considered to be the key measures underlining

the evaluation effort. In some cases, however, the FGM may be difficult to quantitatively measure or to obtain in a cost-effective and timely manner. Therefore, several surrogate measures that can be obtained in the evaluation time frame have also been identified. The FGM and their surrogates, presented in Table 1, were revised to incorporate the results of the kickoff workshop. For example, the I-40 TTIS team indicated that the perception of tourists on the number and nature of delays is a good surrogate to measure congestion. Thus, this surrogate measure was added.

The overall objectives of the evaluation will be translated into several specific hypotheses of interest. The FGM and their surrogates will be used to test these hypotheses. For example, some of the hypotheses that will be examined to evaluate improved mobility include: Are trip times among tourists using ITS shorter than trip times among tourists that do not use ITS? Does the perception of tourists using ITS on ease of travel differ from the perception of tourists not using ITS? Do tourists using ITS believe that it improved their mobility? If tourists were aware of and used ITS sooner, would they have stayed longer or attended more attractions? Examples of the various hypotheses that will be tested in each goal area are presented in Table 1. Also listed are the data collection methods that the February 9 workshop participants felt would be appropriate for addressing the hypotheses in each goal area.

4.0 TECHNICAL APPROACH

Many different sources of data and several different tools will be used to collect information to evaluate the success of ITS deployment in the I-40 TTIS FOT. The primary source of information for this evaluation study will be collected from tourists using survey instruments and qualitative interviews. These study tools will provide information in all goal areas. In addition, a case study on travel time/data accuracy will be conducted to provide information on mobility. Operational systems data and historical travel/traffic data will be used to evaluate the effect that the deployment has on congestion and the economic impact. A more detailed discussion of the type of data that will be obtained as well as the strategy used to collect the information is presented below for each study tool.

4.1 Surveys

A key component to the evaluation will be information collected from tourist intercept surveys. Section 4.1.1 discusses the overall sampling design for surveying tourists. Section 4.1.2 contains a discussion on questionnaire development. Section 4.1.3 describes the survey operations and procedures.

4.1.1 Sampling Design

Information will be collected from tourists using two different survey instruments: a screening instrument (screening questionnaires) and a more extensive questionnaire (main questionnaire). The screening questionnaire will be short (about the size of a 3" x 5" index card), interviewer administered, and completed by a large portion of the population. The main questionnaire will be self-administered, will collect more information (both sides of one 8 ½" by 11" card-stock sheet), but will be given only to a subset of tourists.

There will be two separate data collection periods. The first collection period will be conducted shortly after deployment of ITS (in late May or early June) and will serve as a Pilot Study. The Pilot Study will be used to refine the survey instruments, gather information that can be used to refine sample size estimation, assess the level of cooperation from tourists and local businesses, and provide a limited amount of information on awareness of ITS shortly after deployment. The main data collection period will be held two to three months following the deployment of ITS (August/September). A two- to three-month delay is needed to allow for an increased awareness of the ITS from local residents, business owners, and tourists.

Table 1. Evaluation Measures and Example Hypotheses to be Tested

Goal Area (Focus Area)	Few Good Measures	Surrogate Measures	Hypotheses	Data Collection Method
Mobility (Traveler)	• Travel time • Ease of travel • Tourist traveler satisfaction	• Perceived ease of travel for tourists who are aware of and using ITS versus those who are not using ITS • Actual trip time of commercial motor carriers under various conditions • Perceived satisfaction of total travel experience	• Trip times of commercial motor carriers using ITS are shorter than trip times of those who do not use 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.	• Survey • Focus group/interviews • CVO travel time study
Access (Destination)	• Knowledge of travel options	• Mode of travel (use of alternative modes) • Volume in alternative parking lots • Number of arrivals by time of day • Actual and perceived availability of travel option information (number of sources, amount and type of information)	• Tourists who use ITS are more aware of travel options than those who do not use ITS. • Tourists use alternative routes or travel modes due to ITS. • Tourists perceive that they have increased access as a result of ITS.	• Survey • Focus group/interviews • System operational data • Existing/historic traffic data
Congestion (Overall System)	• Number and nature of delays • Level of service (LOS)	• Perceptions of travelers who aware of and use ITS regarding the number and severity of delays versus the perceptions of those who do not use ITS • Traffic volume and throughput • Average travel speed • Number of accidents • Incident response time	• The average travel speed improved following ITS deployment. • There are fewer delays due to incidents following ITS deployment. • The percentage of traffic on main thoroughfares decreased after ITS deployment. • Travelers who use ITS perceive fewer and less severe delays than those who do not.	• Survey • Focus group/interviews • Existing/historic traffic data
Economic Impact (Region)	• Increased visitation • Tourism revenue • Increased awareness of alternative attractions	• Duration of stay • Estimated expenditures throughout stay • Intent to return • Utilization of information outlets • Number of attractions visited	• ITS users stay longer than non-ITS users. • A higher percentage of tourists using ITS (as opposed to those not using ITS) indicate an intent to return. • ITS users spend more during their stay than non-users. • All ITS information outlets are used equally.	• Survey • Focus group/interviews • System operational data
Safety (Traveler)	• Safety • Injuries, fatalities	• The number of calls made to the ITS system, law enforcement, and emergency services regarding roadway conditions • 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	• ITS deployment results in fewer calls to law enforcement and emergency services regarding roadway condition information and therefore increases the ability to respond to emergencies. • 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.	• Survey • Focus group/interviews • System operational data

For example, it will take some time before hotel concierges become aware of and accept the new system and begin to direct tourists towards using ITS. In both data collection periods, information from tourists will be collected using an "intercept" approach. That is, information is collected by "intercepting" tourists as they enter or leave a pre-specified attraction or location. This approach will be used, over other common approaches such as mail or callback surveys, because it will yield the highest possible response with the most reliable data (i.e., respondents are not asked for addresses or telephone numbers which people may be reluctant to give out nor does this method require extensive recall).

Two likely approaches are to intercept tourists as they exit attraction parking lots or as they check out of local hotels. Both of these approaches will be employed for this evaluation. Using hotels has the advantage of a comfortable environment, which may increase the willingness of tourists to participate in the study. Parking lot interceptions allow information to be collected from the portion of the population not using hotels (i.e., day-trippers, campers). If the results of the Pilot Study reveal that a large component of the tourist population is not using hotels, more emphasis will be placed on intercepting potential participants as they enter/leave attractions and less emphasis will be placed on hotel-based intercepts. Conversely, if the Pilot Study demonstrates that a large proportion of the tourist population are overnight travelers, then more emphasis will be placed on hotel-based intercepts and less on attraction-based intercepts.

Information from several sampling locations will be collected using a two-stage cluster sampling design. First, in most cases, a sample of clusters will be selected (each cluster represents a group of tourists at a single hotel or parking lot) with probability proportional to the maximum bed capacity.[1] In a few select cases, clusters will be selected with certainty. Sampling with certainty will occur if: (1) a particular hotel has indicated a high degree of willingness to participate, which results in substantial cost savings or substantially facilitates the logistics of collecting samples; or (2) a particular attraction or location, such as the Grand Canyon National Park, is identified as a critical visitation site for tourists. Next, in each of the selected clusters, a systematic sampling scheme will be employed to identify tourists for participation. That is, every n-th person will complete a screening questionnaire (only one person from each family will complete a screening questionnaire). Everyone who indicates that they are aware of and have used ITS will be asked to complete a main questionnaire. For each person who is aware of and has used ITS, the next "unaware" person will also complete a main questionnaire. The exact number of primary clusters and the number of times that a systematic sample is drawn from each primary cluster will depend upon the costs associated with sampling from different primary clusters as well as the variability between primary clusters. The results of the Pilot Study will be used to ascertain both of these components and will allow us to determine the appropriate number of primary and secondary clusters to sample. However, we anticipate collecting a total of approximately 1,900 screening and 900 main questionnaires at approximately five sites for the I-40 evaluation (see Section 4.1.3).

4.1.2 Questionnaire Development

All survey instruments (questionnaires) will be designed to ensure easy administration and accurate data collection. In particular, they will include a sufficient number of questions but will be compact enough to be easily completed in a relatively short period of time. During the pilot phase, several steps will be taken to construct the questionnaire:

- **!** Qualitative interviews with key informants and site observations will influence question design and facilitate decisions on the balance of subject matter in the instrument.

[1] A similar methodology will be employed to collect questionnaire information at parking lots that will be selected in proportion to maximum volume.

- Also during the pilot phase, several small focus groups or qualitative interviews will be conducted with tourists and local residents. These will provide a consumer perspective on tourism travel issues.

- The characteristics of the I-40 sites will determine some of the approaches and lines of questioning, and may limit the potential to compare to other FOT sites. For example, GCNP is a more dominant destination feature for the tourist traveling in the I-40 corridor than any single destination in other FOT sites under study. Moreover, although local mobility is an issue, a key issue for the I-40 traveler is access to the GCNP from a distance with limited alternative routes. These kinds of considerations will help shape the unique approach to the I-40 site.

- Existing data sources will be examined to determine feasibility and utility of including identical questions in the I-40 survey for comparison to earlier periods. Comparison to some of the findings of the 1997 statewide survey *(Arizona Quality Initiative Survey of Highway Users and Community Leaders*, B. Hernandez, 1997, Arizona Department of Transportation) with regard to awareness of, and willingness to use, selected information sources will be especially useful.

- Certain sections of the *Evaluation Plan for I-40 Short Term Implementation Plan* (J. Upchurch, Arizona Department of Transportation, 1997) called for evaluation methods requiring survey techniques. Special attention will be paid to these methods to ensure that the methods employed in this evaluation are consistent with those proposed in the *Evaluation Plan for I-40 Short Term Implementation Plan*.

- Finally, a draft survey questionnaire will be pre-tested for ease of understanding and time of completion.

If the results of the Pilot Study indicate a need for languages other than English, the survey instruments will be translated into the appropriate languages. These will be performed using a repetitive translation, reverse translation technique to ensure that the equivalent rather than literal meanings have been conveyed.

While specific wording of the survey questions is not yet known, the survey format and many subject areas are known. In general, the survey will focus on what is essential for the evaluation process, and will include questions to measure perceptions of mobility, access, experiences with congestion, items that describe the respondent's trips, awareness of and visitation to alternative attractions, awareness of and use of ITS, demographics, and other characteristics. Most of the question areas presented in Table 2 will be included and perhaps others that will be determined after initial qualitative interviews and site visits.

As a practical matter, however, the number of items will have to be limited; and the total number of items may have to be either reduced from those shown in the following table, or spread between two "interlocked" surveys. The latter approach is appropriate when the sample is large and the number of questions has to be large as well; otherwise the respondents would be unlikely to complete a self-administered survey in the midst of a vacation.

In such cases, two questionnaires can be used and the sample split. Each questionnaire would then carry a core of questions concerning awareness and use of ITS travel patterns. Other items would be divided between the two alternative survey forms.

Table 2. Question Areas for Main Questionnaire

Overall Question Area	Information to be Collected
Information Sources	# Planning this trip, non-ITS information sources used (e.g., travel agent, AAA) # Use of/familiarity with/comfort with electronic data sources
ITS	# Level of awareness of specific ITS sources of information (variable message road signs, Web site, kiosks, tourist information sites, cell-phone access, and other sources implemented in the final test design) # Frequency of accessing each of these sources # Actual use of ITS travel information in reaching the general FOT area # Actual use of ITS travel information within the FOT area # Information desired but not available
Overall Vacation Trip Characteristics	# Mode of local travel (tour bus and non-drivers screened out) # Origin/destination # Hotel or other accommodation # Duration of stay (nights/days) # Number in party and ages # Purpose of local travel (recreation, worker) # Meal sources (restaurant, picnic) and number of meals out # Previous visits to same site (number, when) # Estimated expenditures (Note: In tourist studies it is often better to determine lodging nights, meals purchased, and events attended from the respondent, then derive expenditures from local industry cost averages. Method will be decided when the quality and availability of local data are known.) # Estimated travel time to the local hotel in FOT
Local Travel and Visiting Characteristics	# Modal choice (drive/park and ride/other) # Flexibility of local travel plans – Can routes, choice of times, and other choices be shifted in response to new information? # Estimated local travel times when using/not using ITS information # Congestion incidents encountered and traveler's responses to them (includes use of ITS)
Satisfaction (if previous visit was made, comparisons with present visit will be requested)	# With information # With the overall driving/ traffic conditions of the trip # With mobility # With access # With congestion/lack of congestion # Intent to return
Demographics	# Age # Income # Education # Region of country # Type of vehicle # Extent of annual vacation travel # Gender

In the pilot phase, we will observe the actual I-40 site, including the variety of information sources, and attractions necessary to ask about, as well as the complexity of existing ITS systems in place. At that point we will make a decision whether to use the split-sample, interlocked questionnaire or a single sample with a single questionnaire.

4.1.3 Survey Operations

Questionnaire information will be collected during two data collection periods by five interviewer teams. Each team will consist of two local residents who will be hired and trained expressly for this study. The data collection teams will be supervised by a full-time staff member. The first data collection period, or Pilot Study, will be conducted on two consecutive days in late May or early June. The second, or main, data collection period will be conducted over four consecutive days in late August or early September. Each team will collect questionnaire information for at least six hours per day.[2] Further, it is anticipated that each team can screen approximately 10 tourists per hour and that one in four of the persons screened would have used ATIS at some time during their visit and would be willing to fill out the more detailed questionnaire. Thus, approximately 1,900 tourists will be screened (5 teams * 10 tourists per hour * 6 hours per day * 6 days), and main questionnaires will be completed by 900 tourists.

Prior to each data collection period, the interviewers will undergo a half-day training session where they will be trained on basic data collection techniques that emphasize the need for accuracy and attention to detail, as well as the necessity for legible and complete recording of data. The training will also include an explanation of the specific aims of this project along with question-by-question specifications for each item in the survey instrument.

Structured group role-playing will be used to ensure that each interviewer is comfortable with the data collection procedures. Specific training in methods to prevent refusals and to persuade reluctant subjects will be provided. Training will continue throughout the data collection process. Data collectors will be given feedback by supervisory staff on errors and how to correct them. During data collection, data collection staff will be required to conduct their activities in the manner prescribed at training.

To encourage a high response rate from tourists, all staff will appear professional and courteous at all times. Interviewers will dress appropriately for the weather in clothing that is not offensive to others. In addition to photo identification badges that indicate the study title and interviewer's name, data collection staff will have uniform hats or T-shirts that identify the study and can be spotted from a distance.

Money has been allocated in the budget for respondent incentives. The exact form of the incentives will be determined with input from both the COTR and the I-40 TTIS team and will be dependent upon the precise mode of data collection. For example, if tourists are approached in a hotel lobby we may be able to offer coupons for a free breakfast in the hotel restaurant. Incentives will be appropriate to the time commitment required for the survey. Tourists who are stopped in a parking lot and asked screening questions for 5 minutes may receive no incentive, while tourists who are asked to complete a 30-minute interview might be offered $10 for their time and effort. Again, the extent and nature of the incentives will be finalized following the Pilot Study.

An on-site review of all forms for completeness and accuracy will be conducted. Forms will then be mailed to Battelle and manually edited for completeness, accuracy, and consistency by editors who have been trained specifically for this project. Data will be verified manually using a 10 percent re-edit of the data entry and by electronic data cleaning. All errors flagged during the electronic data cleaning effort will be researched and the correct answer entered into the database.

---

[2] If necessary, the data collection may be spread over additional days and times during those days to ensure that information is collected from a representative sample of the tourist population. In all, 120 hours will be spent conducting the intercept surveys during the Pilot phase and 240 hours will be spent conducting the intercept surveys during the main collection stage.

4.2 Focus Groups and Personal Interviews

Qualitative interviews of two kinds will be used to supplement the quantitative information gathered in the Pilot Study and main data collection portion of the project. These qualitative interviews will include both key informant interviews and focus groups.

The results of baseline surveys and interviews conducted by the I-40 TTIS team will be reviewed and, in cases where respondents may provide useful "post-implementation" comment, follow-up qualitative interviews or focus group sessions will be conducted. Small scale focus groups or interviews may also be conducted with other groups of people including hospitality industry workers who commute; tour bus drivers; various managers of sites, hotels, and restaurants; workers in supervisory positions; local police; and ITS operators. Decisions on how many group sessions to hold, and what characteristics they should have, will be made at the time of the Pilot Study.

Prior to and during the quantitative survey itself, tourist respondents will be screened and those who meet certain characteristics will be invited to focus groups to be conducted over an early breakfast before the typical tourist day begins. The mix of respondents will be determined at the time of the Pilot Study. In the I-40 area, this mix of participants should include hospitality industry workers, overnight vacationers, and day-trippers (if there are a significant number).

Given the compressed time and variety of settings in which these people will have to be recruited, it is not now possible to specify precisely the proportions of persons to be contacted in each of these segments. But the views of each are important and need to be gathered.

In accord with standard industry practice, participants will be paid cash incentives to provide motivation independent of the subject itself. This assures that interest in ITS does not bias attendance in the groups. The groups will be small scale (three or four persons, one hour) because time is scarce and costly during vacations, and because large groups would be difficult to schedule. Sites for the group discussions will be determined during the Pilot Study period.

The focus group discussions will be *focused* on issues of vacation travel to and within the I-40 area, including the area in the immediate vicinity of the Grand Canyon National Park. The primary purpose for discussions held during the pilot stage is to determine the scope of issues involving access to the sites and mobility within the sites. Groups held during the survey will provide in-depth information and examples of experiences with traffic, site-finding, and use of ITS. Trip planning behavior and trip purpose (vacation, business, etc.) will be characterized. The groups will be professionally facilitated and the results tape-recorded for later analysis.

If only a small percentage of tourists are aware of or use ATIS components, several of the tourist focus groups will be replaced with a series of test-site case studies. Here, a small sample of tourists will be exposed to an ITS component, then asked to comment on what they learned. For example, at kiosk sites, tourists could be intercepted and asked to use the kiosk, then respond to questions related to their understanding of the technology, satisfaction with the device or the information, or planned use of the information obtained.

4.3 Response to Variable Message Sign Messages

As indicated in Table A.3, several specific data collection methods were added based on discussions with the I-40 TTIS team. These activities replace the travel time/data accuracy activities proposed in the original Battelle team evaluation strategy.

Response to "alternate route"-type messages on variable message signs (VMSs) will be evaluated by comparing traffic percentages on primary and alternate routes under both normal ("no-message") and "with-

message" conditions. Corridor VMSs are generally located in advance of intersections with alternate routes so that travelers may choose either to stay on their current route or to detour to the alternate route or routes. Total traffic volumes, under both "with-message" and "no message" conditions, will be obtained at three locations: at the VMS sign location, after the VMS location along the primary route, and after the VMS location along the alternate route(s). These volumes will be converted to percentages, and the percentage of total vehicles diverting to alternate routes will be compared under the "with-message" and "no-message" conditions.

It is anticipated that the traffic volume data will be collected using the permanent automatic traffic recorders that are in place at various locations throughout the corridor, supplemented with additional traffic counts as necessary. Traffic volumes will be collected over a time period sufficient both to identify the normal or "no-message" traffic splits on primary/alternate route(s) and to capture enough "with-message" data to establish validity. Obviously, selection of locations for data collection will be dictated primarily by the locations of the five VMSs being deployed. Selection of specific data collection locations will be made in conjunction with the I-40 TTIS team and will be in part based on the location of the automatic traffic recorders. Specification of locations and the duration of data collection will occur in the development of specific test plans.

4.4 Systems Operational Data

4.4.1 Highway Closures and Restrictions System Input Data

Matrices will be available identifying the number and type of inputs to the HCRS, categorized by subject (e.g., incidents, weather, etc.) and by inputting agency. This information will be used to help identify the role of the TTIS in increasing the availability of various types of information.

This information will also provide useful feedback regarding the effectiveness of the I-40 TTIS approach to data input, in which a wide range of diverse agencies will input information into what will become a consolidated data base. Specifically, the matrix will indicate how much of what type of information is input by which agencies.

4.4.2 Voice Remote Access System/Condition Information Calls

As indicated in Table A.3, one of the desired results of the I-40 ITS deployment will be a reduction in the number of information-request telephone calls fielded by agencies responsible for incidents. Many of the calls fielded by emergency management and law enforcement agencies are from individuals reporting and/or requesting information pertaining to incidents and other roadway conditions. It is anticipated that at least some of these calls will be diverted to the Voice Remote Access System (VRAS), which is a toll-free, dial-up phone information system. To measure this, the number of calls to the VRAS that are related to roadway conditions will be collected.

4.4.3 Availability, Content, and Utilization of Information

As noted in Table A.3, the number of information dissemination sources, the amount and type of information provided through those sources, and the extent of traveler utilization of those sources will be recorded to help measure benefits related to promotion of ITS awareness and promotion of travel options.

4.5 Historical and Existing Data

To the extent to which it is feasible, historical and existing data will be used to examine the impact of the ITS deployment on congestion and access. However, as recognized by the I-40 TTIS team during the kickoff workshop, it may not be possible to measure the impact of the ITS deployment using historical data.

Nevertheless, it is important to identify and collect data that could serve as baseline information for future evaluation efforts.

4.6 Comparing Results with Other Projects

To date, few ITS projects have focused on the delivery of traveler and tourist information in a rural setting. One project that is comparable to portions of the I-40 TTIS is the Yosemite Area Traveler Information (YATI) system. This project is most similar to the portions of the I-40 TTIS that directly impact the Grand Canyon National Park. With this exception, however, there are few comparable projects, a fact that helps explains the U.S. DOT's funding of the I-40 and Branson tests.

Although there are very limited opportunities to compare the I-40 TTIS with projects having the same scope and intent, there are several projects that contain elements that can be compared to equivalent or similar components of the I-40 TTIS. For example, there are projects that focus on weather-related issues, such as the AURORA project in Minnesota or the Idaho Storm Warning System. Other rural programs such as the Advantage I-75 in the Midwest or the Green Light program in Oregon focus on commercial vehicle operations (CVO), specifically electronic clearance and down-hill speed safety.

Given these opportunities, the comparison of I-40 TTIS results to other projects will be focused on the following:

1. Comparison of results between I-40 TTIS and Branson TRIP

2. Comparison of components of the I-40 TTIS to similar components in a range of other projects that have more limited scopes, but which share some commonalities, including (but not limited to, based on additional literature review):

   - YATI (national park traveler information system)
   - AURORA and Idaho Storm Warning System (weather related)
   - Advantage I-75 and Green Light (CVO)
   - Components of urban traveler information systems (the general literature on traveler information preferences and results from MMDIs)
   - Atlanta Showcase.

5.0 MANAGEMENT PLAN

The organization and responsibilities of the evaluation project team are presented in Section 5.1. Project schedules and deliverables are provided in Section 5.2.

5.1 Organization and Responsibilities of the Evaluation Project Team

The evaluation of I-40 TTIS is being conducted by Battelle under the ITS Program Assessment Support (IPAS) contract with DOT's ITS Joint Program Office (JPO). Dr. Joseph Peters, the ITS Program Assessment Coordinator for the JPO, serves as the contracting officer's technical representative (COTR) for the IPAS contract. He will also serve as the Government's Task Order manager for this evaluation project. Mr. David Norstrom is Battelle's IPAS Program Manager.

As Evaluation Leader, Dr. John Orban will provide the overall direction to the evaluation team and maintain routine communications with Dr. Peters and Mr. J. R. Romley, the FOT Project Manager. Dr. Orban will be supported by several key staff, as shown in Figure 3.

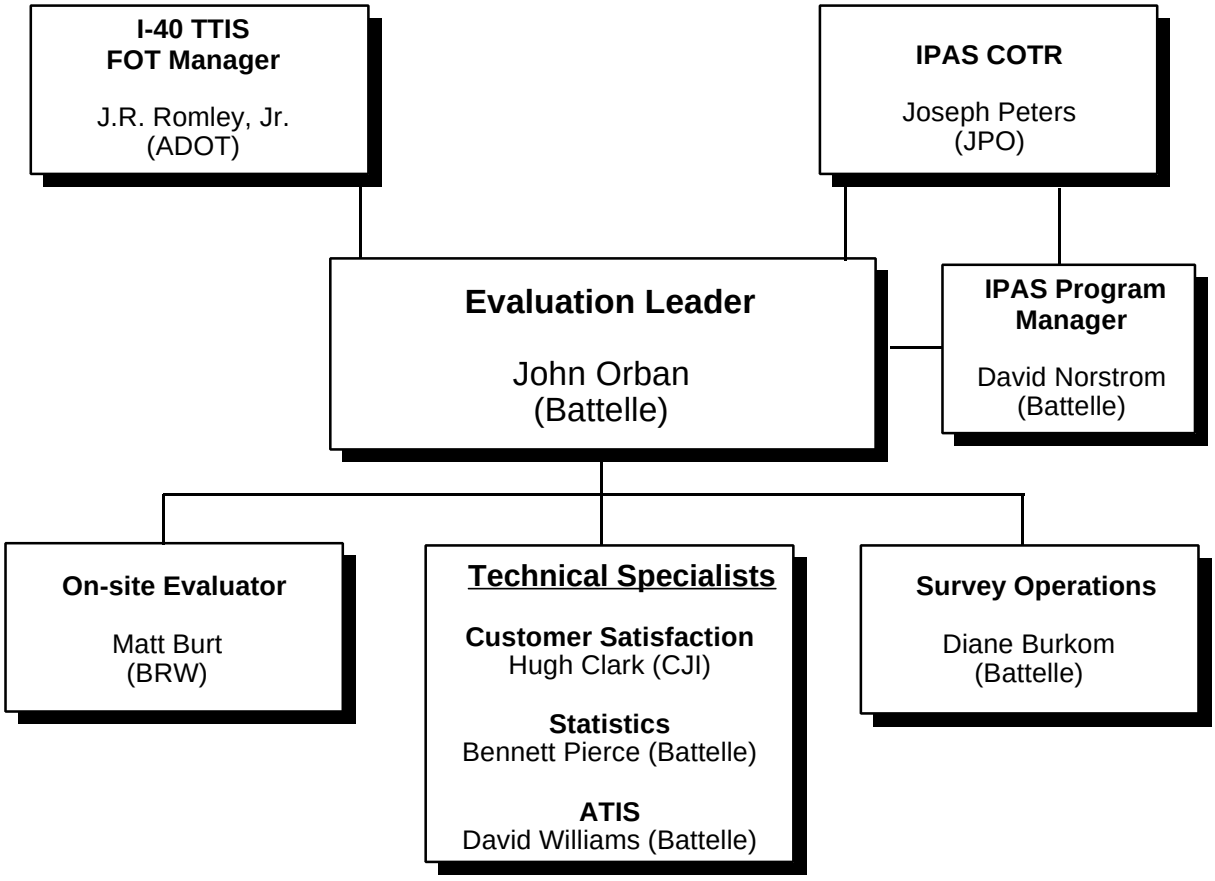

Figure 3. I-40 TTIS FOT Evaluation Team

Mr. Matt Burt, the on-site evaluator, will have the principal role in working with the local partners to refine the evaluation goals, objectives, and measures. He will then work with the rest of the project team, under the direction of Dr. Orban, to develop a data collection and analysis approach that is technically sound and achievable within time and budget constraints. Mr. Burt will also work with the local partners to prepare systems descriptions and collect systems operational and historical data and work with Mr. David Williams to address issues related to ATIS architecture and synergies with other programs. Mr. Bennett Pierce will be responsible for survey design and statistical analysis, Dr. Hugh Clark will lead the development of the survey questionnaires and conduct focus groups, and Ms. Diane Burkom will have management responsibilities for the survey operations. The level of effort planned for each project team member is shown in Table 3.

Table 3. Allocation of Hours for Evaluation Team Members*

Name	Project Role	Task							Total
		1	2	3	4	5	6	7	
Key Personnel									
J. Orban	Task Manager and Evaluation Leader		20	50	20	20	40		150
M. Burt	On-Site Evaluator		120	150	190	100	60	80	700
H. Clark	Customer Satisfaction Study Leader		42	30	40		32		144
D. Williams	ATIS Specialist		20				20		40
B. Pierce	Statistician		15	15			80		110
D. Burkom	Survey Operations Manager		10	15		90	15		130
Support Staff									
M. Greene	Data Collection Supervisor				30	120			150
B. Herman	Data Preparation Supervisor				14	56			70
I. Sung	Programmer/Data Manager						100	100	200
Support/Administrative Staff (BRW)			10	30	14	6	20		80
Data Collection Crew (including data cleaning, editing, etc.)					292	1168			1460
Secretarial Support			8				28		36
									3270

* Includes evaluation of Branson TRIP and I-40 TTIS FOTs.

Task 1. Strategy
Task 2. Plan
Task 3. Test Plans
Task 4. Baseline Data
Task 5. Data Collection
Task 6. Report
Task 7. Integration Report

5.2 Schedule of Milestones and Deliverables

The Battelle Team will accomplish the evaluations of the Branson TRIP and I-40 TTIS FOTs within a 16-month completion schedule. Table 4 summarizes the deliverables.

Table 4. Schedule of Milestones and Deliverables

Documentation	1998												1999			
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A
Preliminary Evaluation Strategy	◆															
Evaluation Status Report (2)*		◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Evaluation Kickoff Meetings		◆														
Evaluation Plans (2)*		◆														
Detailed Test Plans (2)*				◆												
Design Completed and System Operational					◆											
Data Collection					◆	◆	◆	◆	◆	◆						
Pilot Survey						◆										
Full-Scale Survey								◆								
Summary of Preliminary Results (2)*											◆					
Final Evaluation Report (2)*																◆
Integrating Summary Report																◆

* Battelle will submit separate reports for Branson TRIP and I-40 TTIS.
◆ Milestone or Deliverable.

APPENDIX A

Results of the Kickoff Workshop

Table A.1
Anticipated Changes
(February 9, 1998, Evaluation Strategy Workshop)

- Real-time information available to the public.
- Improved information dissemination through merchants, attractions, etc.
- "One-stop shopping"— consolidation of road, weather, etc., information at one location.
- Improved data quality (WYLBUR vs. HCRS).
- Increased use of alternate routes and modes (e.g., to/from the Grand Canyon).
- Improved safety.
- Provide timely emergency services.
- Disseminate information to and share information with travelers.
- Provide efficient flow of traffic.
- Ensure conformance with laws.
- Ensure that agencies/offices cooperate effectively.
- Better information on field conditions (e.g., weather, pavement surface conditions).
- More able to share improved information among institutions.
- Many improved alternatives to disseminate the improved information to public.
- More pre-trip planning by the public.
- More complaints about "too much" information or conflicting information.
- Media will have better information (newspaper, radio, and television).
- Public will have the *information necessary* to avoid major bottlenecks/delays (fatalities, forest fires, road kills, dust storms, fog, smoke, construction and maintenance activities, major accidents, and cargo spills.
- DPS will get fewer phone calls.
- Fewer people will arrive at the Grand Canyon and get unpleasant surprises (no lodging available, parking conditions, restaurant availability, etc.).
- People will re-route in response to VMSs.
- Faster EMS response times.
- Establish commercial viability and stimulate private investment.
- Establish basis to determine benefits/costs for ITS.
- Rural ITS feasibility will be evaluated.
- Increase awareness of ITS.
- Evaluate the effectiveness of the system architecture.
- Position Arizona as a national ITS leader.
- Strengthen and extend institutional relationships.
- Establish an ITS procurement strategy.
- Determine the practicality of stakeholders inputting data.
- Tested specific devices and technologies.
- Establish a long term support mechanism (long-term O&M capabilities).
- Deploy FMS software Stage II. PRAS, HCRS, etc.
- Spent a lot of money.

Table A.2
Anticipated Benefits
(February 9, 1998, Evaluation Strategy Workshop)

- Improved overall transportation system efficiency through ITS-related impact to alternative modes (i.e., other than auto) (e.g., reduce VMT/VHT related to lack of foreknowledge) - less frustration, improved safety, less fuel consumed.
- Improved access through promotion of travel options.
- Improved customer satisfaction (tourists, CVO, other participating agencies) and less stress, frustration, and surprises for customers.
- Improved safety (avoidance of unsafe conditions). Faster response times.
- Improve public entity ability to handle incidents (by reducing the number of calls/situations they deal with).
- Reduced delays (shorter and fewer) e.g., less congestion at the Grand Canyon.
- New revenue streams to help address transportation problems (e.g., commercialization of portions of the ATIS).
- Improved awareness of ITS.
- Increased tourism revenues.
- Less traffic to manage during incidents (non-reoccurring congestion).

Table A.3
Benefit Ranking and Data Collection Methods
(February 9, 1998, Evaluation Strategy Workshop)

Benefits	Total Score [1]	Data Collection Methods [2]
Improved customer satisfaction (tourists, CVO, other participating agencies), e.g., less stress, frustration, and surprises for customers.	15	A, B
Improved overall transportation system efficiency through ITS related impact to alternative modes (i.e., other than auto) (e.g., reduce VMT/VHT related to lack of foreknowledge) - less frustration, improved safety, less fuel consumed.	8	A, B
Improved safety (avoidance of unsafe conditions, faster response times).	5	A, D[3]
Improve public entity ability to handle incidents (by reducing the number of calls/situations they deal with).	5	D[4]
Less traffic to manage during incidents (non-reoccurring congestion).	5	A, B, F[5]
Reduced delays (shorter and fewer), e.g., less congestion at the Grand Canyon.	4	A, F[6]
Improved awareness of ITS.	4	A, D
Improved access through promotion of travel options.	2	A, B, D
New revenue streams to help address transportation problems (e.g., commercialization of portions of the ATIS).	1	A[7], B[7], D
Increased tourism revenues.	1	A, B, E

[1] Each of the five workshop participants were given ten total votes to distribute among the benefits according to their priorities.

[2] Data Collection Methods:

A = Tourist Intercept Survey (this category taken from the proposed evaluation strategy)
B = Focus Group/Interviews (this category taken from the proposed evaluation strategy)
C =Travel Time/Data Accuracy Case Studies (this category taken from the proposed evaluation strategy)
D = System Operational Data (this category taken from the proposed evaluation strategy)
E = Existing/Historic Data (this category taken from the proposed evaluation strategy)
F = Special Traffic Data Collection (this category added at the workshop)

[3] Computran can provide data on the number of safety related inputs to the centralized data system.

[4] The number of calls to the voice information system related to road conditions can be collected.

[5] Collect data on percentages of vehicles changing route based on VMS data (get traffic splits at VMS sites).

[6] The HELP, Inc./Lockheed CVO system can supply border-border travel times.

[7] Surveys and focus groups/interviews can ask about willingness to pay.

Table A.4
Anticipated Benefits by Goal Area
(February 9, 1998 Evaluation Strategy Workshop)

Goal Area/Focus of Goal Area	Anticipated Benefit
Mobility (Individual Traveler Oriented)	Improved customer satisfaction (tourists, CVO, other participating agencies), e.g., less stress, frustration, and surprises for customers.
Access (Destination Oriented)	Improved access through promotion of travel options.
Congestion (System Oriented)	Improved overall transportation system efficiency through ITS related impact to alternative modes (i.e., other than auto) (e.g., reduce VMT/VHT related to lack of foreknowledge)—less frustration, improved safety, less fuel consumed.
	Improve public entity ability to handle incidents (by reducing the number of calls/situations they deal with).
	Reduced delays (shorter and fewer), e.g. less congestion at the Grand Canyon.
Economic Development (Regional)	Increased awareness of and attendance at alternative attractions.
Safety (System Oriented)	Improved safety (avoidance of unsafe conditions, faster response times).
	Less traffic to manage during incidents (non-reoccurring congestion).
Other	New revenue streams to help address transportation problems (e.g., commercialization of portions of the ATIS).
	Improved awareness of ITS.