FINAL REPORT

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Evaluating the Impact and Usefulness of Highway Advisory Radio (HAR) and Citizens' Band Radio Advisory Systems (CBRAS) in Providing Traveler Information and Improving the User Experience on the Florida Turnpike Enterprise's Toll Road Network and the Florida Interstate Highway (FIH) System

Submitted to

Florida Department of Transportation (FDOT) Research Center

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Metric Conversion Chart

Symbol	When You Know	Multiply By	To Find	Symbol
Length				
mi	miles	1.61	kilometers	km
km	kilometers	0.621	miles	mi

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16. Abstract

This research designed and conducted state-of-the-art traveler information surveys, agency surveys, and a benefit-cost analysis to evaluate the existing highway advisory radio (HAR) and citizens' band radio advisory systems (CBRAS) on the Florida Turnpike Enterprise (FTE) and Florida Department of Transportation (FDOT) roadways. Six surveys (four traveler surveys and two agency surveys) were designed and conducted using various implementation methods, including the novel approach of having students survey travelers at FTE service plazas and FDOT rest areas using iPads to store the responses in real time. These surveys indicated that HAR and CBRAS should be continued, but that awareness and usage of these systems are low. HAR can be especially beneficial during emergency situations, such as hurricane evacuations. The benefit-cost analysis also showed that the benefits of HAR (travel time savings to drivers who divert due to HAR congestion messages) outweigh the costs of HAR, even if only 10% of HAR messages cause diversion. Considering these results, it is recommended for FTE and FDOT to continue supporting HAR and CBRAS on their roadways. It is also recommended to promote these systems through various outlets to increase awareness of these systems. In the future, it might be beneficial for FTE and FDOT to expand HAR and CBRAS throughout the state of Florida.

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Executive Summary

Advanced traveler information systems (ATIS) are important to provide drivers with congestion, safety, special event, and other potentially vital information. In recent years, new technologies, such as GPS navigation devices and smartphone applications, have become available to provide travel information to drivers. It is important to understand how these technologies compete with older ATIS technologies, such as highway advisory radio (HAR).

The Florida Turnpike Enterprise (FTE) and Florida Department of Transportation (FDOT) wanted to know whether they should continue supporting the legacy Citizens' Band Radio Advisory System (CBRAS) and HAR technologies, expand and improve these technologies, or replace them with newer ATIS technologies. To aid in this decision, the University of Central Florida (UCF) research team designed and implemented four traveler surveys and two agency surveys. Implementation details of these surveys are shown in Table ES-1. A benefit-cost analysis was also performed on HAR.

Table ES-1: Summary of Survey Implementation and Sample Audience

Survey Name	Sample Audience	Implementation Method	Completed Sample Size
HAR Phone Survey	Random FTE customers	Phone	1000
HAR Internet Survey	Random FTE customers selected from a professional survey panel	Online	500
HAR Field Survey for Travelers/Tourists	Random travelers on Florida's Turnpike, I-75, and I-95	Face-to-face (iPads)	1610
CBRAS/HAR Field Survey for Truck Drivers	Random truck drivers on Florida's Turnpike, I-75, and I-95	Face-to-face (iPads)	613
State DOTs TID/ATIS Current Practices Survey	Representatives from state DOTs throughout the United States	Online	28
FDOT Districts and Local Emergency Management Departments HAR Survey	Representatives from FDOT districts and emergency management departments in Florida	Online	37

* Note that TID stands for Traffic Information Dissemination.

The results of the four traveler surveys indicated that HAR is not the preferred source of travel information for many travelers, but it can be invaluable during emergencies, especially if other communication networks fail. Only 57% of travelers (excluding truck drivers) were aware of HAR and only 24% had used HAR. HAR users were typically satisfied with the system. 87% of travelers said HAR should be continued and 87% said they would use HAR in emergencies. Truck drivers were not as satisfied with HAR as other roadway users, but the truck drivers who used CBRAS were very satisfied with it. However, only 12% of truck drivers had ever used CBRAS.

The results of the agency surveys showed that HAR should be continued. Over 70% of the local agencies said HAR should be continued in case of emergency situations and over 60% said CBRAS should be continued. While some of the states surveyed in the state DOT survey indicated that they were thinking of retiring or replacing HAR due to signal interference issues and the availability of new technologies, other states said HAR is important due to its portability, ability to broadcast detailed messages, and redundancy in emergencies. Some of these states are using HAR in conjunction with dynamic message signs (DMS) and other ATIS technologies to provide more detailed messages to motorists.

In addition to these survey results, the benefit-cost analysis also showed that HAR should be continued or even expanded. Using information from previous studies, responses from this study's surveys, and cost and HAR utilization information from FDOT and FTE, a range of benefit-cost ratios was calculated. Considering only travel time savings due to HAR congestion messages, the benefit-cost ratio ranged from 1.19 if only 10% of HAR messages caused diversion to 11.91 if 100% of HAR messages caused diversion. These values indicate that HAR provides valuable benefits to FTE and FDOT. Additional benefits will also be provided during emergency situations.

The results of this research indicate a clear trend of travelers favoring use of smartphones; therefore, it is inevitable that HAR and CBRAS messages will become integrated in smartphone applications to accommodate the growing number of smartphone users. The HAR and CBRAS systems are in the middle of a heated ATIS competition led by digital communication technologies. As seen from this study's results, HAR and CBRAS must be able to deliver clear, timely, and rapid messages to compete with these new and emerging traffic information technologies. It might be necessary to create HAR/CBRAS smartphone applications to increase the longevity of these traditional technologies.

Based on the results of this study, it is recommended to continue supporting HAR and CBRAS on FTE and FDOT roadways. While the benefits of HAR currently outweigh the costs, these benefits can be increased even further by increasing the awareness and usage of HAR. The awareness of CBRAS also needs to be increased as well. This can be accomplished by promoting HAR and CBRAS on DMS, television, or other media outlets (including smartphone applications) and using these systems in conjunction with other traffic information sources to provide more detailed messages to motorists. If these methods succeed in increasing HAR and CBRAS usage, expansion of these systems should possibly be considered in the future.

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List of Abbreviations and Acronyms

Abbreviation	Meaning
AHAR	Automatic Highway Advisory Radio
ATIS	Advanced Traveler Information Systems
CATI	Computer Assisted Telephone Instrument
CB	Citizens' Band
CBRAS	Citizens' Band Radio Advisory System
CCTV	Closed Circuit Television
CVO	Commercial Vehicle Operator
DMS	Dynamic Message Signs
DOT	Department of Transportation
FCC	Federal Communications Commission
FCMS	Freeway Changeable Message Signs
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
FIH	Florida Interstate Highway
FTE	Florida Turnpike Enterprise
HAR	Highway Advisory Radio
HP	Highway Patrol
IDAS	ITS Deployment Analysis System
IRB	Institutional Review Board
ITS	Intelligent Transportation Systems
KYTC	Kentucky Transportation Cabinet
NYSTA	New York State Thruway Authority
O&M	Operation and Maintenance
PDMS	Portable Dynamic Message Signs
TID	Traffic Information Dissemination
TIS	Traveler Information Systems
TMC	Traffic Management Center
TTI	Texas A&M Transportation Institute
UCF	University of Central Florida
VDOT	Virginia Department of Transportation
VMS	Variable Message Signs
WisDOT	Wisconsin Department of Transportation

Chapter 1: Introduction

1.1 Problem Description

Advanced Traveler Information Systems (ATIS) are an important component of any roadway agency's Intelligent Transportation Systems (ITS) network. ATIS, which can include dynamic message signs (DMS), highway advisory radio (HAR), 511 phone systems, and other traffic information dissemination (TID) systems, provide travelers with accurate, up-to-date travel and safety information. The advent of new ATIS technologies, such as smartphone applications, provides agencies with the opportunity to communicate with a larger number of their roadway users. However, these technologies can also compete with existing ATIS technologies, such as HAR. Therefore, it is important to understand the value of these legacy systems to decide whether these systems should continue to be supported.

The Florida Turnpike Enterprise (FTE) and the Florida Department of Transportation (FDOT) are currently evaluating whether they should continue supporting two legacy ATIS technologies, HAR and Citizens' Band Radio Advisory System (CBRAS), expand and improve these systems, or replace them. HAR has been in place on the FTE system for over 15 years and is also available on Florida interstates. There are 16 transmitters and 35 beacons along FTE roadways, with each transmitter having a 5 mile (8 km) range. Travelers can access HAR through the AM 1640 radio station. CBRAS is installed at 16 permanent locations on the FTE system, with each location having a range of 5 to 15 miles (8 to 24 km). This system is mainly in place for truck drivers, since the Florida Turnpike is a major freight route. Truck drivers can receive CBRAS information through channel 19 on Citizens' Band (CB) radios.

1.2 Research Goal, Objectives, and Tasks

The primary goal of this research was to understand and determine the value of HAR and CBRAS technologies and whether either or both technologies should continue to be supported. To achieve this goal, feedback and opinions about these systems and other ATIS technologies were obtained from FTE customers, FTE and Florida interstate travelers (including truck drivers), Florida transportation and emergency management districts, and state Departments of Transportation (DOTs) throughout the United States. A benefit cost-analysis was also performed on HAR that considered travel time savings due to HAR messages.

The following are specific objectives of this research:
- Assessing the extent of knowledge and familiarity with HAR of the target audiences (SunPass customers , truck drivers, and tourists visiting Florida),
- Evaluating the satisfaction of SunPass customers, travelers throughout Florida (tourists), and truck drivers with HAR and its performance,
- Determining how HAR traveler information has affected travelers' route choices,
- Assessing the knowledge and familiarity with CBRAS of truck drivers,
- Evaluating truck drivers' satisfaction with CBRAS and its performance,
- Assessing usage of other existing traffic information systems such as DMS, Florida 511, and smartphone applications,

- Understanding how FDOT Districts value and utilize HAR along with perceived benefits from local emergency management agencies, and
- Assessing current practice of other state DOTs with the use of HAR and CBRAS technologies and considerations of alternatives to HAR and CBRAS.

The research approach consisted of a literature review, design and implementation of six surveys (four traveler surveys and two agency surveys), analysis of survey responses, modeling of HAR user satisfaction, and a HAR benefit-cost analysis. For the literature review (Chapter 2), previous studies on HAR and other ATIS technologies were reviewed. No previous studies had been performed on CBRAS, but there were studies that examined other CB alert systems. Chapter 3 discusses the design, methodology, and implementation of the six surveys (HAR phone survey, HAR internet survey, HAR field survey for travelers/tourists, CBRAS/HAR field survey for truck drivers, state DOTs TID/ATIS current practices survey, and FDOT districts and local emergency management departments HAR survey). Each survey was designed to capture the opinions and feedback of a specific audience. Various implementation methods were used to collect the survey responses, including the novel method of sending University of Central Florida (UCF) students equipped with iPads to FTE service plazas and FDOT rest areas to collect and record surveys. This method saved resources and reduced errors compared to traditional paper survey methods.

Chapters 4 and 5 discuss the analysis of the traveler survey responses and the agency survey responses, respectively. The HAR phone, internet, and field survey responses were analyzed both individually and together to gain a better understanding of FTE travelers' opinions. Additionally, the responses of the phone and field surveys were modeled to determine what factors influence user satisfaction with HAR. The responses of the remaining three surveys were analyzed individually. Some survey responses were used for the benefit-cost analysis (Chapter 6), along with cost information provided by FTE and other assumptions. Finally, recommendations concerning HAR and CBRAS are discussed in Chapter 7.

Chapter 2: Literature Review

2.1 Detailed Literature Review

This literature review covers research from the United States that is directly related to HAR and CB radio systems and their efficacy against other traveler information systems (TIS) that are used to deliver critical traffic information to roadway users. These TIS can include 511 calls, dynamic message signs (DMS), smartphone applications, and other various technologies. Many of these studies have researched and evaluated the implementation of HAR systems in various states or surveyed drivers on the use of HAR and other TIS technologies.

Wolshon and Schwehm (1999) studied the applications, equipment, installation, power, cost, and licensing requirements of implementing HAR in construction zones in Louisiana. The HAR system was mainly used to provide travel time information during the construction period. Limitations were found regarding the lack of infrastructure to collect and broadcast real-time traffic information and the amount of labor needed to operate the system. It was concluded that the HAR system will not work properly and give the desired results to satisfy travelers unless there is an established infrastructure that can collect and provide real-time traffic information.

Havinoviski and Sutton (2006) analyzed whether the existing HAR system in the Hampton Roads area of Virginia should be upgraded or replaced. The existing HAR experienced transmission issues, especially during bad weather, and had a smaller broadcast radius than originally expected. Four possible alternatives were evaluated using a benefit-cost analysis: keeping HAR system as is, upgrading the HAR system to reduce transmission issues, purchasing an existing AM radio station to provide traveler information, or building a new FM radio transmitter to provide area-wide coverage. The analysis showed that upgrading the HAR system or having a new FM radio transmitter were the best options, indicating that HAR has the potential to be a cost-effective method to provide travel information over a large area. The FM transmitter could provide a larger coverage area, but would have more licensing and permitting issues, as well as possible issues with obtaining a frequency in a crowded metropolitan area.

Smith et al. (1995) published an investigation about operational procedures for HAR systems. Interviews with both Virginia drivers and key transportation personnel from other states were performed to obtain information on the public image of HAR systems. Conclusions indicated that data for TIS must be gathered/updated from many agencies in order to give a clear picture to motorists, which shows that the operation of HAR systems is personnel-intensive. Also, most of the motorists listened to traffic reports from commercial radio; therefore, there is a need to use DMS with specific messages telling drivers to tune into the HAR broadcast when they are in a covered area. Tables 2-1, 2-2 and 2-3 below show some of the survey results; these results show that many people think HAR should broadcast congestion and incident information, that a low percentage of participants use HAR compared to commercial and CB radio, and that drivers often did not feel a need to tune in to HAR or were familiar enough with the area to not need to use HAR.

Table 2-1: Preferred Type of Information for HAR Broadcasts
(Smith et al., 1995)

What type of information do you think should be broadcast on HAR?	I-81 (28 subjects)	I-66 (24 subjects)
Location of work zones	61%	19%
Incident information	**75%**	**33%**
Tourist information	18%	0%
Congestion information	**68%**	**70%**
Weather information	61%	26%
Alternate routes	36%	26%
Special event information	18%	0%
Location of motorist services	11%	0%

Table 2-2: Usual Sources of Traffic Information
(Smith et al., 1995)

What is your usual source of traffic information?	I-81 (29 subjects)	I-66 (27 subjects)
Commercial radio	21%	59%
Television	3%	0%
HAR	**10%**	**0%**
CB radio	**24%**	**11%**
Other	3%	7%
None	38%	22%

Table 2-3: Reasons for Not Tuning in to HAR
(Smith et al., 1995)

Was there a particular reason that you did not tune in?	Blacksburg (68 responses)	I-81 (19 subjects)	I-66 (17 subjects)
Perceived no reason to seek information	**23%**	**37%**	**23%**
Listening to music/other audio	9%	21%	23%
Familiar with area	**45%**	**16%**	**18%**
Prior bad experience with HAR	6%	5%	18%
Other	16%	21%	18%

Salazar (2002) studied the application of HAR in transmitting information to road users in San Antonio, Texas. Interviews with agencies, design concepts, and analysis of the system architecture provided a better understanding of this type of ATIS. A text-to-speech technology was applied to the HAR system so that the local traffic management center (TMC) could broadcast written messages on air. Many other important points on HAR are summarized below:

- The Federal Communications Commission (FCC) licenses the use of HAR systems; governmental agencies, as well as other non-governmental organizations, can use such systems under the FCC's license, guidelines and regulations.
- HAR equipment consists of an audio source, transmitter, antenna, and ground system.

- It is recommended to install flashing beacons for HAR signage. Signage can be either static or dynamic.
- The HAR radio frequency is controlled by the FCC in the range of 530 kHz to 1700 kHz.
- A HAR system can broadcast information on road closures and detours, traffic restrictions, parking situations, traffic conditions, special events, or other traffic related information.
- A HAR system cannot be used to broadcast "music or to identify the commercial name of any business establishment whose services may be available within or outside the coverage area of the station" (Salazar, 2002).
- The length of HAR messages should be as short as possible while delivering clear message containing information on "attention, problem, effect, and taking action" (Salazar, 2002).

Many roadway agencies with HAR experience were interviewed, including Minnesota DOT, New Jersey Turnpike Authority, Texas DOT, Washington State DOT, and Wyoming DOT. These agencies discussed important limitations of HAR, including the lack of updated transmitted information and interference from topography, geography, or other radio frequencies.

Walton et al. (2009) published a report describing arterial intelligent transportation systems. According to this report, there are almost 4004 miles of US freeways and 2,453 miles of arterials covered by the HAR system (based on ITS Joint Programs Office's (JPO) 2006 Metropolitan Summary). Various advantages of HAR were mentioned, including that HAR can broadcast a considerable amount of information, has reduced delay and a low number of information stops, covers a considerable range (up to 6 miles), is easy to access (radio is available in almost all vehicles), and has no commercial disruption.

Athey Creek Consultants (2014) discussed HAR system technical specifications and regulations, best practices, benefits and limitations, current usage, and future. The FCC regulates various aspects of HAR systems, including frequency (available on AM and low-power FM frequencies), transmitter output power (10 watts), antenna height (49.2 feet, or 15 m), coverage radius (1.86 miles, or 3 km), and licensing period (first license is active for ten years and renewable). Additionally, HAR systems can only broadcast information related to "travel, imminent danger, emergencies, emergency points of assembly, traffic conditions, weather information, information regarding motor vehicle crashes, road closures and construction, parking, current driving travel times, air flight status, truck weigh stations, driver rest areas, locations of truck services, and road closures" (Athey Creek Consultants, 2014).

Table 2-4 on the next page summarizes HAR deployment by state. HAR is used in 19 states, with the most sites in Pennsylvania and Washington. HAR towers are typically located near large cities or along major interstates and expressways, although some states use HAR on mountain roads and other remote locations.

Table 2-4: HAR Deployment by State
(Athey Creek Consultants, 2014)

States	Deployment Descriptions
>50 HAR Sites	
Pennsylvania	Pennsylvania DOT operates 92 HAR towers. HAR use in Pennsylvania varies by district, with District 6 (around Philadelphia) operating no HAR, while District 2 operations multiple HAR along the I-80 corridor.
Washington	Washington State DOT operates close to 90 sites throughout the state, primarily at locations near key decision points, mountain passes, or areas prone to major events. Several of these sites also support the state's ferry operations.
10-50 HAR Sites	
Colorado	Colorado DOT operates 16 HAR sites (nine AM broadcasts on the East Slope of the Rocky Mountains and seven FM broadcasts on the west slope).
Connecticut	Connecticut operates 14 HAR (eight along the Connecticut Turnpike).
Florida	The Florida Turnpike operates 10 HAR along the Turnpike.
Idaho	Idaho Transportation Department identified that they will deploy 25 HAR in southern Idaho by summer 2014.
Illinois	Illinois DOT operates 10 HAR sites in the Chicago metropolitan area and nine sites in the East St. Louis area to advise of travel times, lane closures and weather conditions affecting travel.
Indiana	Indiana DOT operates 23 towers throughout the state.
Iowa	Iowa DOT operates 10 HAR towers, three of which are FM broadcasts, and one location utilizes Super HAR broadcast that extends the coverage area.
New Jersey	New Jersey has 13 HAR operational throughout the state, and they previously relied on these HAR more for traveler information before the 511 phone system was launched.
New York	New York State DOT operates 15 HAR throughout the state.
	The New York State Thruway Authority (NYSTA) operates more than 20 HAR along the Thruway.
Ohio	Ohio DOT operates 26 HAR towers clustered around the largest cities (seven near Cleveland, six near Columbus, four in Dayton, three in Cincinnati, and one in Akron).
Oregon	Oregon DOT operates approximately 24 HAR towers in key locations throughout Oregon.
Utah	Utah DOT operates about 12 HAR towers, primarily in the Salt Lake City valley and on roads to remote ski destinations.
<10 HAR Sites	
Alabama	Alabama DOT operates four mobile HAR units, primarily for hurricanes, incidents, and winter weather reports.
Montana	Montana DOT operates five HAR on mountain passes, typically one HAR on each side of the mountain pass.
New Hampshire	New Hampshire DOT operates two HAR towers along the Turnpike.
Tennessee	Tennessee DOT operates three HAR towers.
Texas	Texas DOT operates 21 HAR towers around San Antonio, Austin, El Paso and Amarillo to advise of lane closures, events and extreme weather conditions.

This study also discussed major uses of HAR, including communication during weather-related emergencies, broadcasting of overlong and complex information that is difficult to broadcast through other tools (such as DMS), availability during emergency situations when other TIS are unavailable, dissemination of traffic warnings about particular corridors, and broadcasting of travel time information. Travelers can be alerted about important HAR information via static roadside signs with beacons, portable DMS, or websites; Figure 2-1 below shows the New York State Thruway Authority (NYSTA) website, which indicates HAR locations and current messages.
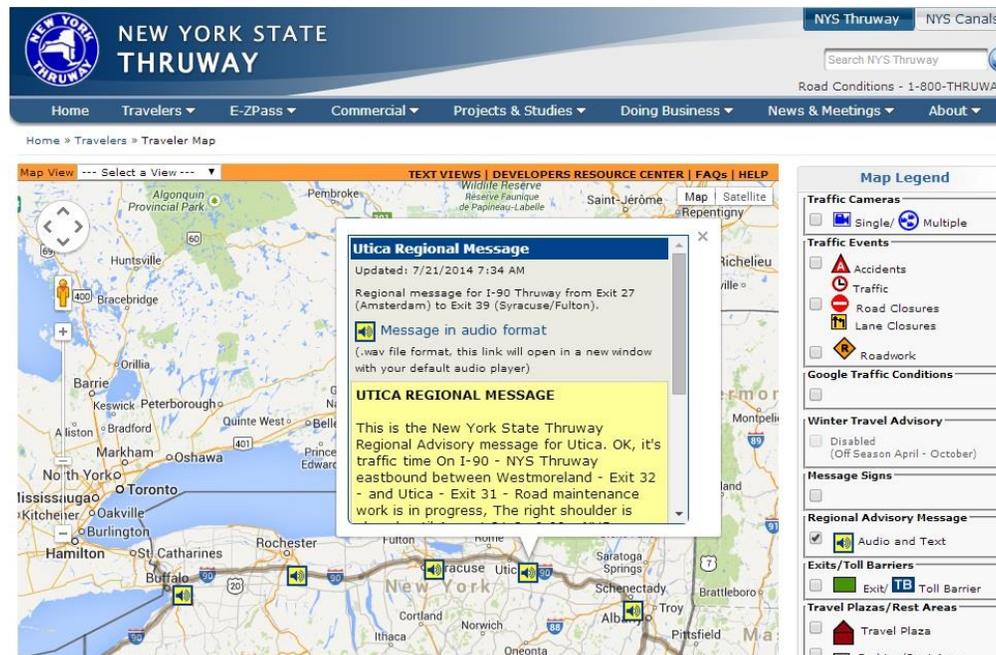
Figure 2-1: NYSTA Website Map of HAR Locations and Current Messages
(NYSTA Website, 2014)

Eidswick et al. (2009) evaluated the deployment of portable dynamic message signs (PDMS) with highway advisory radio (HAR) in Grand Canyon National Park (shown in Figure 2-2) to increase transit usage, improve parking management, and reduce congestion. Data collection and surveys were implemented, along with a general plan on how to design, run, and maintain DMS/HAR systems. Results showed that modal share of shuttle buses increased by 32 to 46 percent due to the deployment of PDMS/HAR. This reduction in private vehicles usage led to fuel savings of over 10,000 gallons. Also, congestion inside park roads and parking areas was reduced, with people stating that the parking was smoother than previous years, even though demand did not decrease. Finally, guests' experience was improved due to better traveler information, with 94% stating that the PDMS were accurate and 86% stating that the HAR was accurate. Based on this test, it was recommended to install a permanent traveler information system containing both HAR and PDMS systems with real-time (not static) information. It was also recommended to establish a partnership with Arizona DOT to utilize HAR, DMS, and 511 in other areas outside the park.

Figure 2-2: HAR and PDMS in Tusayan, Grand Canyon National Park
(Eidswick et al., 2009)

Another plan study (operational and maintenance guidelines) done by **Villwock-Witte et al. (2011)** studied the use of DMS and HAR as ITS solutions to the congestion problems in Bear Lake Corridor in Colorado. These tools aimed to increase the use of public transport (shuttle buses), reduce emissions, and manage parking issues. Using these devices in tandem is beneficial, as the DMS gains the attention of travelers to alert them that there is a HAR message and the HAR allows for more information to be transmitted to the travelers than DMS allows.

Caltrans (2011) studied the performance of HAR and how to improve it. They conducted a survey on state DOTs to learn about their experiences with HAR. Six state transportation agencies (from Louisiana, Maryland, Missouri, New Jersey, Oregon, and West Virginia) completed this survey. The agencies from Maryland, Oregon, and New Jersey stated that they actively use HAR, with New Jersey having 13 HAR stations in use. Louisiana and Missouri have few HAR stations in place with inactive HAR programs, and West Virginia has a few HAR stations in place, but these are all county-operated and not operated by the state. Many of these states had concerns about HAR, with Louisiana describing HAR effectiveness as less than satisfactory, New Jersey complaining about weak signals and radio interference at most HAR sites, and West Virginia having issues with topography. Louisiana, Missouri, and West Virginia preferred using 511 phone systems instead of using HAR stations. HAR users and experts, including HAR vendors, were also interviewed to obtain information on the best practices nationwide; these interviews indicated that HAR efficiency is difficult to obtain since it is hard to find the ideal location to place HAR stations to ensure high signal quality without negative effects from other radio signals from commercial stations.

Martin et al. (2011) studied the use of various TIS as tools for traffic incident management. HAR was one of these tools; compared to DMS, HAR is more useful, provides a larger amount of information, and can be accessed by all users (depending on the coverage area and signal quality) by just tuning the radio to a specific frequency. Signage advertising HAR is important to tell users/drivers that they are in a HAR zone and what frequency to tune their radio to. Flashing beacons should be used to let users know when there is a message being broadcast.

Some disadvantages mentioned in this study include the bad effect on signals by tall buildings, especially where the 50 foot antenna height is restricted by the FCC, and the harmful impact by high-power electric lines on broadcast quality.

Neudorff et al. (2003) discussed HAR as one of various traveler information delivery methods that can be used to manage/operate traffic on the freeway. HAR can spread more information (live and recorded messages) to a wider range of travelers than DMS and many other methods. However, because of its limited distribution range of no more than 3-4 miles from the transmitter, which is restricted by the FCC (unlike commercial stations), poor signal quality is expected for HAR. Figure 2-3 shows a typical HAR station along a freeway.

Figure 2-3: HAR Station along Freeway
(Neudorff et al., 2003)

HAR systems can be either fixed or portable/mobile systems and can be deployed in two major ways: point coverage (to cover a specific localized area) and wide-range coverage (with multiple synchronized transmitters). HAR signing (static or dynamic) with flashing beacons to alert travelers if there is a message being transmitted is important to notify travelers that they are in a HAR broadcast area (example HAR signage is shown in Figure 2-4). Also mentioned was the Automatic Highway Advisory Radio (AHAR) system in Europe, which automatically tunes the

radio to the particular HAR station frequency and mutes all other broadcasts until the message is finished.

Figure 2-4: Example HAR Signage
(Neudorff et al., 2003)

A study on incident management strategies performed by **Ozbay et al. (2005)** evaluated the costs/benefits of various incident management strategies including closed circuit television (CCTV), police patrols, DMS, and HAR. The major HAR benefits mentioned were the instant traffic reports it provides and the widespread availability of this information to the travelers when they need it. Disadvantages included the need for accurate timely data to ensure these messages are reliable, as well as ensuring the HAR messages are not constantly repeated, causing drivers to ignore these repetitious/boring messages.

In 2004, the **Florida Turnpike Enterprise (FTE, 2004)** surveyed their customers about their use and opinions on HAR. 90% of the respondents were positively satisfied with HAR. Only 11% of respondents reported that they used HAR often; however, 51% stated they tuned into the HAR station when the lights were flashing. 89% of respondents who listened to HAR felt that the HAR information was accurate and 87% used the HAR information to change their route. Overall, 92% of respondents thought that HAR was important on Florida's Turnpike**.**

A report prepared by **Battelle Memorial Institute and Meyer, Mohaddes Associates, Inc. (2004)** discussed the installation and operation of ITS information systems along U.S. 395 north of Spokane, Washington. This ITS system includes "road weather information system environmental sensor stations, mobile Highway Advisory Radio systems, and Closed Circuit Television (CCTV) cameras" (Battelle Memorial Institute and Meyer, Mohaddes Associates Inc., 2004). A before and after phone survey was conducted on Commercial Vehicle Operators (CVOs) that traveled through the project corridor; this survey showed that 56% used the HAR stations and 51% found HAR messages "somewhat useful" or "very useful" (Figure 2-5).
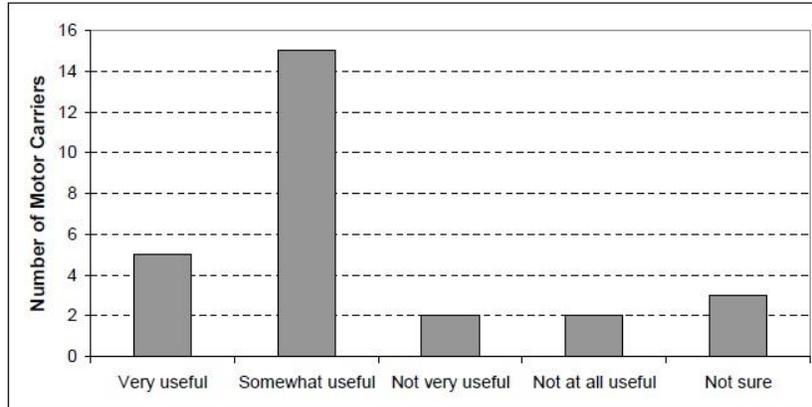
Figure 2-5: Reported Usefulness of HAR Messages by CVOs
(Battelle Memorial Institute and Meyer, Mohaddes Associates Inc., 2004)

The use of various TIS by CVOs before and after implementation of ITS information systems implementation was also analyzed, as shown in Figures 2-6 and 2-7. These figures show that there is high use in the new HAR program (almost 56% of the CVOs report using HAR "sometimes" or "often") and that cell phones and CB radios are still used frequently by CVOs compared to the other information sources. Therefore, it appears that the new ITS sources do not replace the traditional ITS sources used by CVOs, but are instead used to enhance these traditional sources. It is important to note that the responses of CVOs might differ from the responses of normal drivers and agencies.
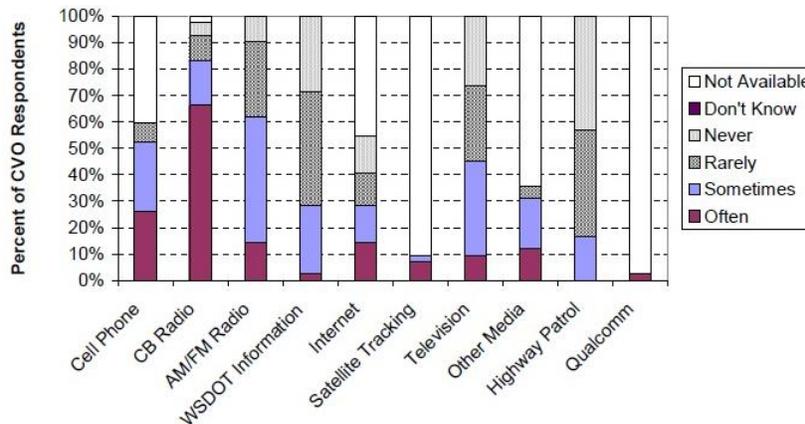
Figure 2-6: Reported Pre-System Deployment Use of Various Information Sources
(Battelle Memorial Institute and Meyer, Mohaddes Associates Inc., 2004)
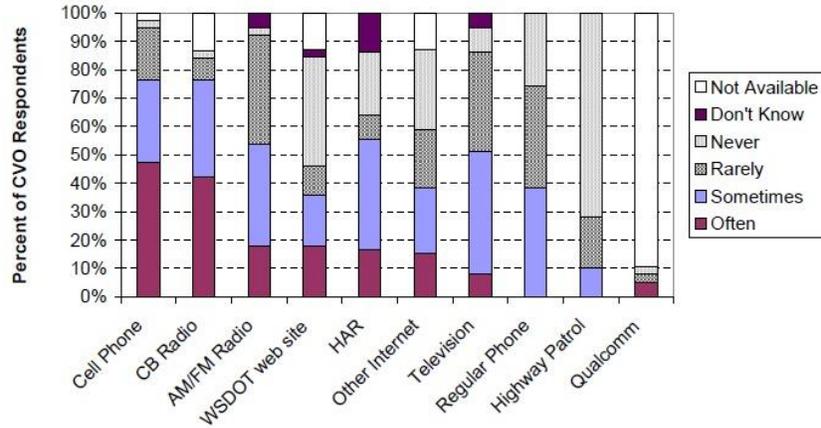
Figure 2-7: Reported Post-System Deployment Use of Various Information Sources
(Battelle Memorial Institute and Meyer, Mohaddes Associates Inc., 2004)

Some studies have also been done concerning the use of CB radios as TIS technologies. **Ullman et al. (2002)** conducted research in Texas exploring the use of CB wizard technology. This technology was used to "provide pre-recorded information regarding highway or work zone conditions, much like a highway advisory radio" (Ullman et al., 2002) for work zone safety enhancement at late-merge lane closures. A CB wizard warning unit is shown in Figure 2-8. This study provided general guidelines and found that CB wizard technology can improve lane choices and speed (in addition to reducing queue length and delay) for trucks approaching work zones.

Figure 2-8: CB Wizard Advanced Warning Unit
(Ullman et al., 2002)

Kamyab and Maze (2013) published a paper assessing the Wizard CB Alert System in Iowa that regularly transmits warning messages around work zones area to manage traffic speed. This study recommended using such a system in the future to warn truck operators of maintenance and construction crews. Data collection was performed by listening to truck operators' comments on the radio (both positive and negative) and conducting survey at rest areas near work zones. Some of the survey results are summarized below:

- Of the 94 truck operators surveyed, 94% owned CB radio.
- 80% of the operators who owned a CB radio turned their radio to the appropriate channel to receive the Wizard CB alerts.
- 84% of the operators who were on the appropriate channel noticed the maintenance crew on the interstate; 75% of these heard the Wizard CB message, 98% felt the message was not annoying, and 100% thought the system should continue to be used in the future.
- 89% of the operators who heard the Wizard CB message felt the message was an effective warning of the maintenance crew.
- 41% stated that the Wizard CB alert was the first notification that alerted them to the maintenance crew.

Gass et al. (1979) developed a simulation model to assess the effects of CB radios in improving highway safety in New York. They showed how direct reporting of accidents by citizens using CB radios to highway patrol (HP) emergency response units significantly decreased response time, making this technology a better reporting alternative to phone calls and direct observation of accidents and roadway hazards. This developed mathematical model considered the geography, dynamics and emergency response under a given set of assumed conditions. The simulation exercise involved various traffic systems, from simple highway traffic systems to more complex systems. The following are some of the statistics and results of the simulation:
- CB radios allowed HP to respond to 4.2% of accidents before any other form of reporting was completed. Also, reporting of accidents to HP centers by citizens using CB radios, before any other link could report, accounted for 29.6 % of the total reported accidents.
- Approximately 90% of the time (in the last six test data points), direct reporting by CB radios resulted in the minimum detection and notification time.
- Response time using direct HP reporting (notification and response times) in the experimental area was less than five minutes compared with the control area, where response times were more than ten minutes.
- Time saved upon the occurrence of an accident using HP reporting via CB radios was 3.88 minutes saved in notification time, and 2.45 minutes saved in response time.

Many studies also evaluated various TIS technologies, often including HAR and CB radio, and compared them to each other. **Deeter (2009)** summarized the state-of-the-practice in the United States on real-time traveler information delivery, mainly focusing on 511 phone systems and websites. This study consisted of an online survey on TIS sent to 51 public and private agencies, to which there were 34 unique responses (67% response rate); observation and testing of various TIS in use throughout the nation; review of previous studies on TIS; and interviews with various transportation professionals. There are a variety of TIS currently in use, including 511 phone systems, traveler information websites, DMS, and HAR; these are all available to drivers at no cost. Additional information can also be obtained from private sector websites, phones, television news, and media outlets.

This report suggested to have more cooperation and communication between public, private, operating, and expert agencies, as well as the consumers/users, to increase the consciousness, usefulness, and accessibility of TIS technologies at all levels; more effort to achieve uniformity between agencies nationwide on the use of these technologies; enhancement of 511 call systems

to provide more accurate information to callers; and implementation of more surveys to obtain a better understanding of what consumers need from TIS technologies and how they feel about these technologies.

Details were also discussed about 511 phone systems nationwide; these systems are very widespread, with 42 systems in 33 states providing coverage to 47% of Americans. Figure 2-9 shows the deployment status of 511 nationwide as of February 21, 2008. Around 100 million 511 calls had been made as of the date of the research documented by **Deeter (2009)**; almost 30% of these calls had been made from either the San Francisco Bay area or the state of Florida. Figure 2-10 shows the 511 call volumes from April 2007 to March 2008.
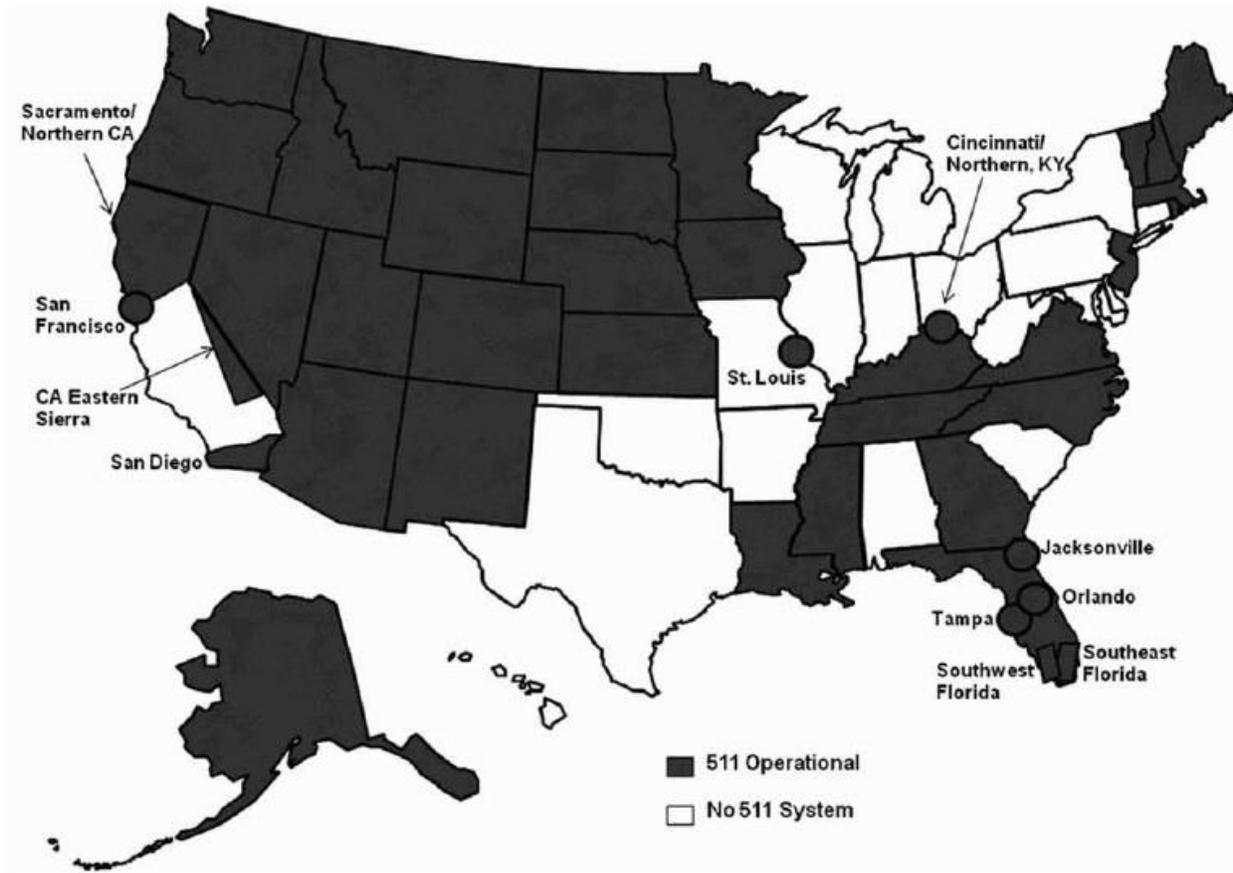
Figure 2-9: Current 511 Phone System Deployment Status as of February 21, 2008
(Deeter, 2009)
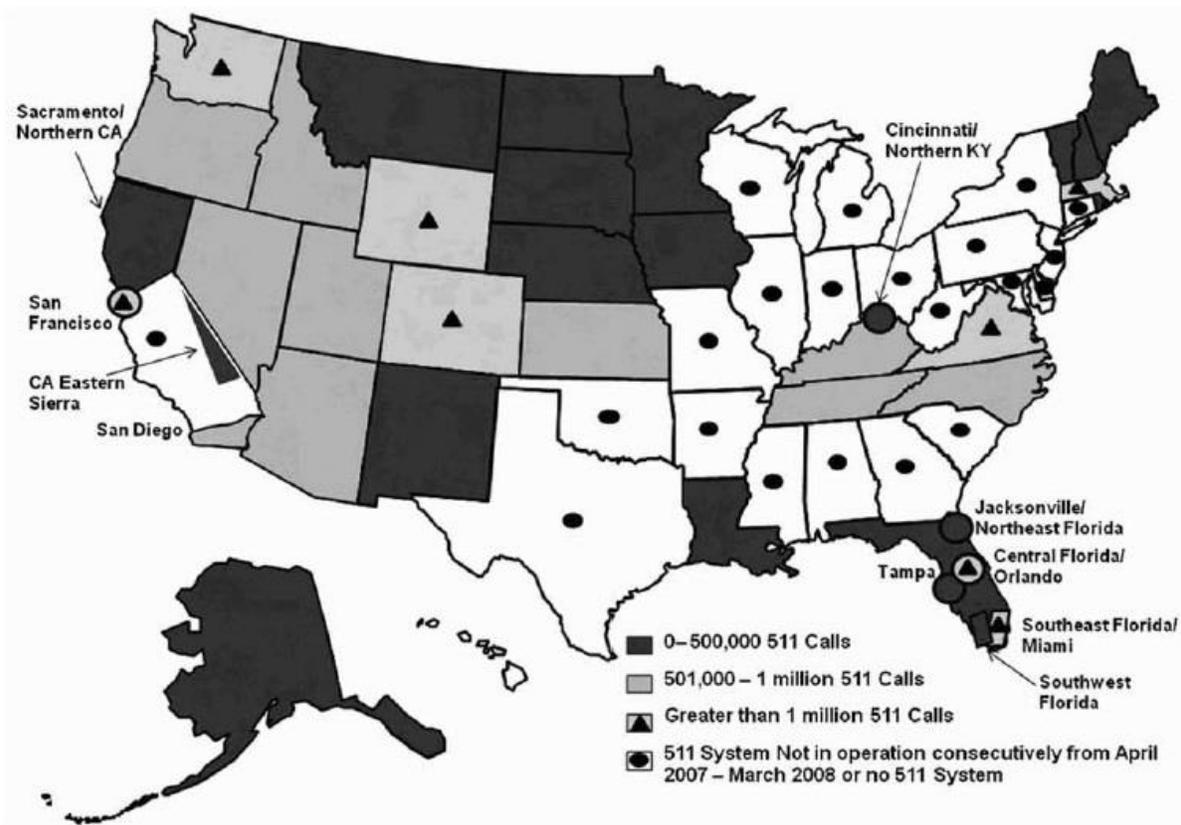
Figure 2-10: Total 511 Call Volumes from April 2007 – March 2008
(Deeter, 2009)

Noyce et al. (2009) studied TIS through a literature review and web/telephone-based surveys on the motor carrier industry in the Ten-State Mississippi Valley Region (Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Ohio, and Wisconsin). Two main surveys were conducted: a Motor Carrier Representatives Survey and a Planners and Regulators Survey. Some results from the Motor Carrier Representatives Survey are shown in Figures 2-11 and 2-12, as well as in Table 2-5. Figure 2-11 shows the usage of TIS by dispatchers and truck drivers to obtain current traffic and weather information; 79.6% use CB radio reports from other drivers and 59.3% use HAR. Figure 2-12 shows what TIS methods the dispatchers and truck drivers would prefer to use to receive various types of information; this shows that they would prefer the use of freeway changeable message signs (FCMS), which are similar to DMS, for traffic information and commercial radio reports for weather information. Table 2-5 shows the various responses that fall under the "Other" category in Figure 2-12. These responses indicate that these respondents also prefer the internet to obtain travel information.
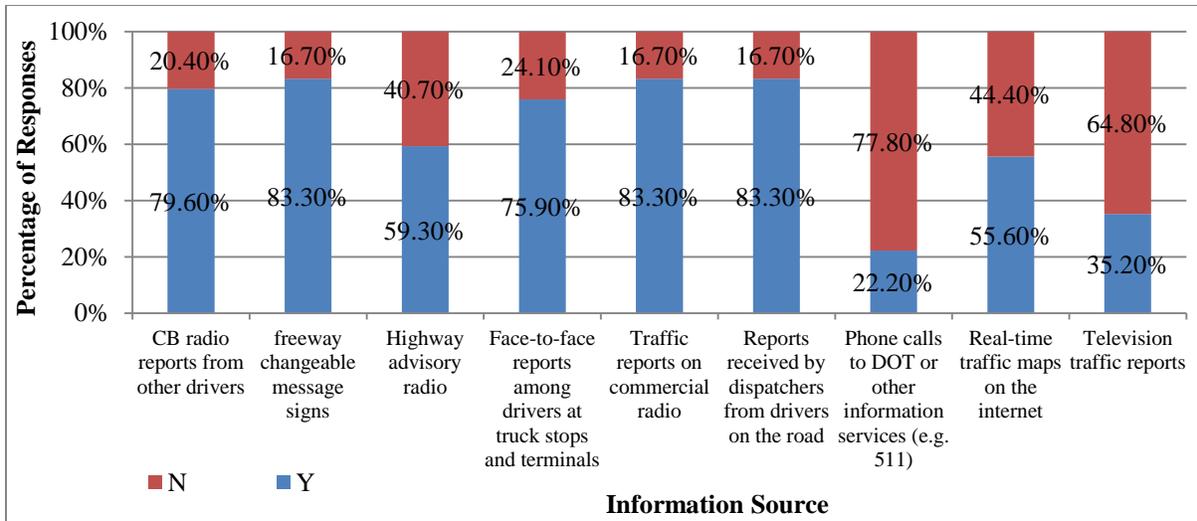
Figure 2-11: Current Usage of Information Delivery Methods
(Noyce et al., 2009)
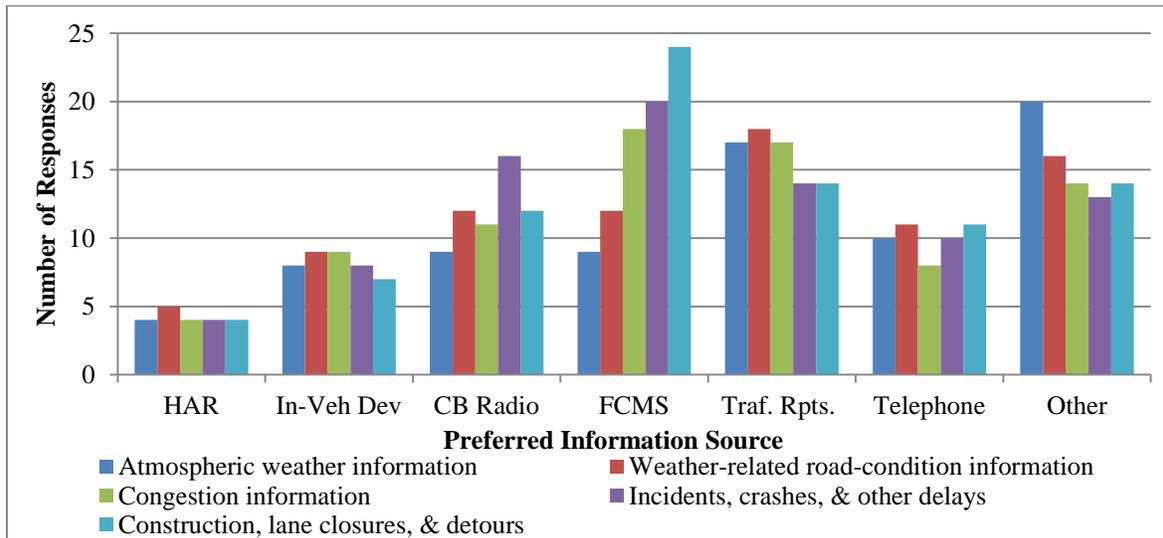
Figure 2-12: Preferred Delivery Methods for Information Types
(Noyce et al., 2009)

Table 2-5: Other Suggested Delivery Methods for Information Types
(Noyce et al., 2009)

Delivery Method	Count
Internet	15
Dispatch push to drivers	7
Weather band radio	2
No need for weather info	1
GPS	1
Satellite radio	1
E-mail	1
Weather Channel (TV)	1

The Planners and Regulators Survey was given to variety of agencies, including state DOTs, Federal Highway Administration (FHWA) personnel, and regional planning offices. Figure 2-13 shows how useful these agencies felt a variety of TIS technologies were to motor carriers; this indicates that agencies felt that FCMS were the most useful TIS technology and that HAR was not very useful.
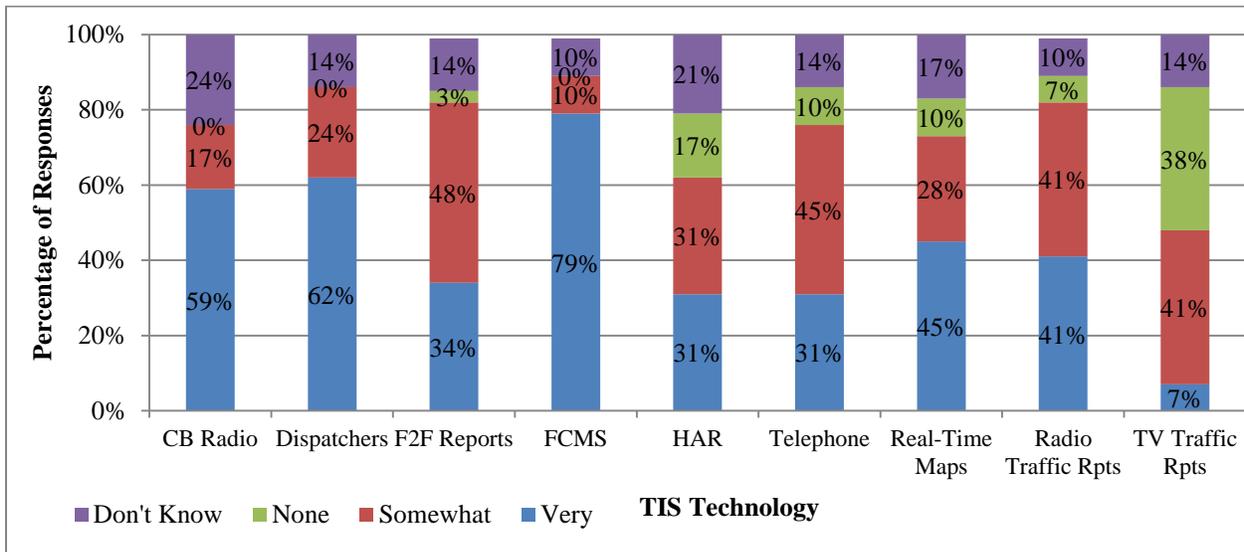
Figure 2-13: Agency Opinions on Usefulness of Information Delivery Methods to Motor Carriers
(Noyce et al., 2009)

Walton et al. (2006) studied the enhancement of a toll road network in Austin, Texas by using traveler information to increase toll roads' usage, divert traffic from non-toll roads, and reduce travel time. A commuter survey was conducted and the results were used to build a simulation DYNASMART-P model (developed by the Center for Transportation Research at the University of Texas and FHWA) in order to analyze various ATIS implementation strategies. Results showed that toll road usage and revenue were positively affected by ATIS, with a reduction in congestion on non-toll roads. Table 2-6 shows how the 706 participants in the online survey currently receive and would prefer to receive local traveler information; a vast majority currently

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use radio and would prefer to continue using radio. Note that the term "radio" can include both commercial radio and HAR.

Table 2-6: Austin Commuters' Current Usage and Preferences Regarding Travel Information Sources
(Walton et al., 2006)

Question	Radio	TV	Local Newspaper	DMS	Internet
How do you currently receive traveler information on the local roadway system?	89%	36%	4%	12%	15%
Which of the following would you prefer to use to receive traveler information on the local roadway system?	78%	19%	2%	37%	18%

Patten et al. (2003) studied the use of ATIS by road users (motorists and truckers) on the Pennsylvania Turnpike. A mail survey was sent to 5,510 motorists and 3,584 truckers; 1,528 motorists (27.7%) and 889 truckers (24.8%) responded. Results are summarized below:

- Almost 33% of motorists and over 50% of truckers use DMS information in their trips.
- About 5% of motorists and around 15% of truckers use HAR information in their trips.
- Almost 45% of motorists obtained travel information before heading on their trip.
- Almost 45% of motorists used communications device(s) during their trip.

Cortelazzi et al. (2006) studied the expansion of the Pennsylvania Turnpike Commission's ATIS statewide; the ATIS included HAR, DMS, CCTV cameras, and many other technologies. This expansion allowed greater effectiveness in managing traffic and incidents, greater driver access to traveler information, and a reduction in truck rollovers, as well as economic and environmental benefits.

Martin et al. (2005) studied four major ATIS technologies (DMS, HAR, 511 calls, and CommuterLink website) in Utah. A survey was performed on 201 random respondents in Salt Lake Valley; only 28.9% recognized these four ATIS technologies and only 4% used all of them. HAR was the second most known and used system after DMS.   Users of HAR usually found it helpful, but a majority of HAR users did not often tune into HAR when the beacons were flashing. Overall, a lot of participants were aware of HAR, but did not necessarily use it. Recommendations focused on the advertisement and public education of ATIS technologies and how to integrate the various systems with each other.

Robinson et al. (2012) studied the deployment, use and efficiency of real-time TIS in six major cities (Rockville MD, Orlando FL, San Francisco CA, Teaneack NJ, Detroit MI, and Salt Lake City UT). A variety of data was collected via trip logs, focus groups, and surveys, amongst other methods. About 70% of agencies use HAR as a TIS, but many users had negative impressions of HAR due to the poor sound quality and lack of usefulness and updated information. These negative impressions led users to not use HAR and recommend others to not use it. However, about 18% of travelers used HAR while traveling to make trip decisions.

Young and Edwards (2009) and Young and Ringenberg (2010) published a two phase report on evaluating the usefulness of TIS, (with a focus on DMS), on a 40 mile corridor of Interstate 80 in Wyoming. Surveys on both frequent and random travelers, as well as statistical analyses were used for this evaluation. Some results of the frequent traveler online survey showed that many people did not use any information source during their trips and only learned about incidents by encountering them while they were driving and that drivers felt DMS were the most important TIS technology. Results from the 42 collected random traveler surveys conducted at travel plazas concerning the use of TIS technologies showed that DMS had the highest percentage of use (72% for trucks and 17% for non-trucks), followed by 511 (42% for trucks and 50% for non-trucks), flashing caution signs (39% for trucks and 0% for non-trucks), HAR (33% for trucks and 17% for non-trucks), and then others (including broadcast radio, CB radio, and television). Also, results from the 147 random traveler surveys conducted at rest areas showed that HAR (8% for trucks and 14% for non-trucks) is less used than DMS (37% for trucks and 40% for non-trucks) and 511 (33% for trucks and 25% for non-trucks) for both truck drivers and regular motorists.

The University of South Florida (USF) (1993) prepared a report for FDOT that discussed integrated transportation information (real-time traffic information) applications in Tampa Bay. Data collection techniques used to gather real-time traffic information can be summarized in seven major methods: "inductance detectors, piezoelectric sensors, roadside detectors, video-based surveillance, fleet vehicles as probes, aerial surveillance, and citizen call-in" (USF, 1993). The use of CB radio by citizens was considered as a citizen call-in technique for on-site incidents and congestion situations. The collected information was distributed to roadway users through many methods including television, radio, telephone, HAR, and DMS.

Golob and Regan (2002) interviewed nearly 1200 trucking companies' managers to determine their experience with, usefulness of, and potential improvements for traffic information regarding trucking operations in California. Results showed that DMS (57%) and CB radio (56%) reports from other drivers were considered to be the most useful, then commercial radio (47%), and face-to-face drivers' reports (40%), with dedicated HAR (35%) being the least useful.

The usefulness of various improved TIS was also asked; these results showed that dedicated HAR had the highest percentage (64.7%) of drivers who thought it would be "very useful" in the future. DMS came in second with 56%, followed in-vehicle navigation systems with 50%. This surprising result indicates that the drivers/managers see the current HAR in place at the time of study as not very useful, but they think it could be very useful with improvements.

Higgins et al. (2014) published a paper on improving communication with travelers in Wisconsin. The Wisconsin Department of Transportation (WisDOT) developed alternative route systems to relieve congestion during highway construction. After learning that these alternative systems were underused, WisDOT performed a study to examine the decision-making processes of their drivers regarding diversion to alternate routes. Media-specific strategies used by other agencies, including websites, smartphone applications, social media, text messages, e-mail lists, commercial radio, television, HAR, and DMS were discussed. A survey conducted at three driver license offices (total of 287 usable responses) found that the travel information sources

most mentioned by commercial drivers were radio (56%), road signs (47%), WisDOT/Wi511 websites (39%), and other commercial drivers or dispatchers (39%). The following recommendations were made to WisDOT regarding the alternative route system:

- Encourage the use of the existing alternate route system by improving communications with travelers.
- Continue to educate drivers on the available traveler information website by increasing promotional efforts.
- Provide drivers with additional messages, via DMS, concerning delays and alternate routes.
- Consider improvements to the existing HAR system, such as the use of clear computer-generated messages or personalized messages whenever possible to improve on the existing audio message quality.
- Make specific alternate route recommendations when feasible and supply drivers with information about the expected time when a delay-causing event will end.

Shaheen et al. (2014) published a paper about ITS deployment, including the use of some TIS technologies. A survey was conducted on stakeholders to determine the status of ITS deployment regionally and to identify future ITS testing locations and integration strategies. Key survey questions were associated with ITS status, TMC status, factors that may slow development of infrastructure and technology deployment, and the relative status of 10 to 20 year ITS plans within the surveyed regions. Survey results regarding deployment rates of various ITS technologies showed that 88% of responding stakeholders used DMS and 56% used HAR. It was also shown that 57% of TMCs are involved in incident management, 55% of TMCs are involved in coordination with emergency information agencies, and 52% of TMCs are involved with the distribution of public information.

A new, emerging TIS technology is the use of smartphone applications (apps) to obtain traffic information. Previous studies have not thoroughly investigated this technology, so the UCF research team performed some preliminary research regarding traffic information smartphone apps. The **Kentucky Transportation Cabinet's (KYTC, 2014)** official website (http://511.ky.gov/) offers smartphone apps for iPhone and Android operating systems to help Kentucky roadway users obtain real-time traffic and travel information. **Virginia DOT (VDOT, 2014)** also has 511 systems that provide traveler information through a website, telephone, and smartphone apps. These apps allow users to obtain information on incidents and construction projects, in addition to access to live traffic cameras. Figure 2-14 shows a sample of the VDOT traffic app for iPhones.
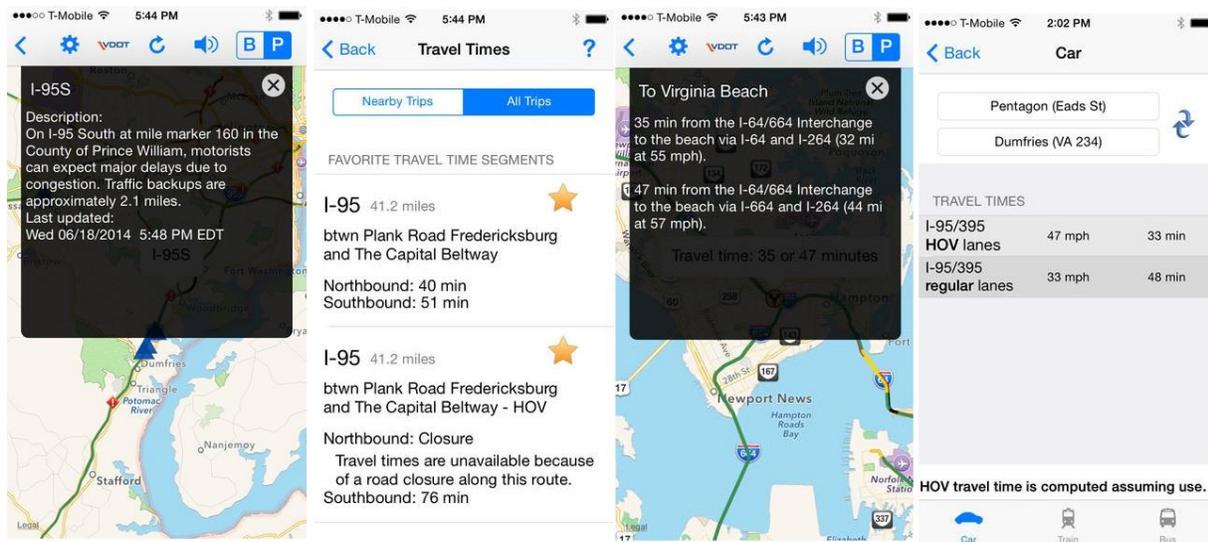
Figure 2-14: VDOT 511 Virginia Traffic App on iPhone
(Apple iTunes website)

2.2 Summary of Literature Review

This literature review shows that many states have evaluated various TIS technologies, including HAR and CB radios. No studies have been done on the CBRAS technology, although one study concerned the Wizard CB alert system, which is similar to CBRAS. Many states found that HAR was not very useful for regular motorists, but that it was more useful for truck drivers. The main complaints about HAR were poor signal quality and the need to have a strong data collection infrastructure to provide real-time traffic information through HAR messages. New TIS technologies, including 511 phone systems, websites, and smartphone applications, have become more prevalent recently; however, these are often used to supplement the existing information that can be obtained from HAR or CB radio. The use of DMS has become very widespread in recent years, but this covers a smaller area and provides less information than HAR can. DMS is also more expensive than HAR, regarding equipment costs and O&M costs. For all the TIS technologies, it was found that advertising and promotion were necessary to ensure travelers understood these technologies were available and how to effectively use them.

Many of the previous studies conducted agency and/or traveler surveys regarding the use of various TIS technologies. Only one study went to rest areas and service plazas to survey random travelers. Since Florida has a large proportion of out-of-state travelers, it is important to survey field travelers to determine if travelers from other areas are aware of and use HAR. Previous studies found that local travelers were less likely to use HAR than travelers from other areas; a traveler field survey will help FDOT see if this is true for HAR in Florida as well. Knowing how various driver populations (local drivers, tourists, and truck drivers) view and use HAR and CBRAS, along with other TIS technologies, will allow FDOT to effectively decide whether these systems are useful and how to proceed with them in the future. However, the literature review shows that no matter what types of technologies are used, it is important to educate the public about these technologies and ensure real-time data can be collected and distributed to travelers to ensure these systems are as beneficial as possible.

Chapter 3: Survey Designs, Methodology, and Implementation

A major portion of this research was the design, implementation, and analysis of six surveys. These surveys are listed below:
1. HAR Phone Survey
2. HAR Internet Survey
3. HAR Field Survey for Travelers/Tourists
4. CBRAS/HAR Field Survey for Truck Drivers
5. State DOTs TID/ATIS Current Practices Survey
6. FDOT Districts and Local Emergency Management Departments HAR Survey

A separate methodology and design was developed for each of these surveys. While certain aspects overlapped between some of the surveys, such as identical questions or similar implementation methods, each survey had a unique feature that made it beneficial to the study. This chapter discusses the purpose of each survey, their designs, and implementation methods. Once the designs of these surveys were finalized, they had to be approved by the UCF Institutional Review Board (IRB); the approval letters are shown in Appendix A.

3.1 HAR Phone Survey Design and Implementation

The purpose of the HAR phone survey was to obtain information from FTE customers on their knowledge, use, and satisfaction with HAR, as well as information on other traffic information sources they use. This survey utilized the computer assisted telephone instrument (CATI) survey method, which employs random digit dialing to call potential survey participants from a target audience. This ensured a random sample of the target audience (FTE customers) was obtained without wasting excess resources calling people who do not meet the survey requirements. Only phone numbers of people who lived in zip codes close to the Florida Turnpike were randomly called. A sample size of 1000 completed surveys was chosen for this survey in order to provide enough responses while still being within the budget and schedule.

For this HAR phone survey, it was important to include questions regarding the participant's awareness of HAR, use of HAR, and satisfaction with HAR. Diversion questions relating to HAR were also important to indicate how HAR users respond to HAR delay messages. There were also questions on the participant's use of other traffic information sources and demographic questions relating to age and education level to provide FTE and FDOT with additional information about traveler's preferences and characteristics. Screening questions were also needed to ensure the participant was a member of the target audience; if the participant was not a Turnpike traveler, the survey was terminated and not counted as a complete survey. Since the survey was implemented over the phone, only multiple choice questions were asked; no free response questions were included in the survey. Additionally, the number of questions was selected to provide as much information as possible while keeping the length of the entire survey at ten minutes or below to prevent participants from stopping in the middle of the survey. The survey contained a total of 28 questions, including questions on HAR, other traffic information sources, typical FTE trip characteristics, and social demographics. However, there were many paths of the survey, which caused the length to vary from a minimum of 14 to a maximum of 28 questions. The detailed design of this survey is shown in Appendix B and the IRB approval

letters are shown in Appendix A, Figures A-1 (initial approval letter) and A-2 (final approval letter after modifications to the survey design).

3.2 HAR Internet Survey Design and Implementation

Like the HAR phone survey, the purpose of the HAR internet survey was to obtain information from FTE customers on their knowledge, use, and satisfaction with HAR and use of other traffic information sources. However, this survey was implemented over the internet rather than by phone. A large selection of zip codes was used to target Florida residents who live near the Turnpike. Unlike the HAR phone survey, the internet survey participants were not completely random people from the target audience, but rather individuals from a reliable professional panel randomly chosen from a larger pool recruited by the survey company. A sample size of 500 completed surveys was collected for this survey.

The design of this survey was similar to the HAR phone survey, but featured more questions, since the respondents were paid by the survey company to complete the survey and therefore less likely to terminate the survey early. Implementing the survey online also allowed for sample HAR audio messages to be incorporated in the survey. Two sample HAR audio messages were provided by FTE, one concerning congestion and one concerning a hurricane evacuation. Survey respondents listened to each of these messages and were then asked how they would react to them and if they thought the messages would be easy to understand and beneficial in real-life situations. Additional social demographic questions were also asked compared to the HAR phone survey. Since this survey was conducted on professionals, it did not need IRB approval before being conducted. The detailed survey design is shown in Appendix C.

3.3 HAR Field Survey for Travelers/Tourists Design and Implementation

The purpose of the HAR field survey for travelers/tourists was to obtain information from Florida Turnpike and interstate drivers regarding their knowledge, use, and satisfaction with HAR and use of other traffic information sources. Unlike the previous two surveys, which were only conducted on Florida residents, this survey was conducted on all travelers, whether they were Florida residents or tourists. Obtaining tourists' responses was desired to provide a more thorough understanding of FTE and interstate travelers' opinions relating to HAR. Since it would be difficult to survey tourists over the phone or online, it was necessary to actually travel to the field to conduct these surveys at service plazas along the Turnpike and rest areas on interstates. Field visits were made to three FTE service plazas along the Turnpike mainline (Okahumpka, Turkey Lake, and Canoe Creek) and two FDOT rest areas (I-95 rest area in St. Lucie and I-75 rest area in Charlotte) to collect surveys. These locations are shown in Figure 3-1 (red boxes around survey locations).

Figure 3-1: Field Survey Locations

Whereas surveys in previous studies were typically conducted using paper surveys, a novel approach utilizing iPads was used for this survey. The survey questions were programmed on a server that could be accessed via a website on the iPads. UCF student researchers traveled to the three service plazas and two rest areas previously mentioned and surveyed drivers. The completed surveys were stored on the server so they could be accessed and analyzed at a later date. This innovative method reduced the potential for errors by allowing for real-time monitoring of the survey responses and eliminated the chance of misplacing surveys, as can happen with paper surveys. A target sample size of 1000 was initially set for this field survey, but a total of 1610 field surveys were collected (an increase of 61%) over 12 trips.

The design of the HAR field survey was very similar to the design of the HAR phone survey. However, some questions were removed, such as the diversion questions, since they could have been confusing for tourists who did not frequently travel in Florida. Additionally, it was desired to make the survey as short as possible, since travelers might not have much time to complete the survey. The survey contained a total of 20 multiple choice questions, but the actual length of the survey varied from 13 to 20 questions depending on the question path. The IRB approval letter

for this survey is shown in Appendix A, Figure A-3, and the detailed survey design is shown in Appendix D.

3.4 CBRAS/HAR Field Survey for Truck Drivers Design and Implementation

The purpose of the CBRAS/HAR field survey was to obtain information from freight truck drivers traveling on the Florida Turnpike or Florida interstates regarding their knowledge, use, and satisfaction with CBRAS and/or HAR, as well as their use of other traffic information sources. Since it would have been difficult to target truck drivers over the phone or online, it was decided to survey these truck drivers at FTE service plazas and FDOT rest areas. Surveys were collected at the same three FTE service plazas (Okahumpka, Turkey Lake, and Canoe Creek) and two FDOT rest areas (I-95 rest area in St. Lucie and I-75 rest area in Charlotte) as the HAR field survey. This survey was implemented the same way as the HAR field survey, with UCF students using iPads to survey the truck drivers. A target sample size of 500 was initially set and 613 completed truck driver surveys were collected (an increase of 22.6%) over 12 trips.

For this survey, it was important to include questions regarding the truck driver's awareness, use, and satisfaction with CBRAS and/or HAR. In order to prevent the survey from being too lengthy, it was decided to only ask a respondent about either CBRAS or HAR. If the respondent had ever used CBRAS, he or she was asked questions pertaining to the use and satisfaction with CBRAS and not asked questions about HAR. If the participant was not aware of or had never used CBRAS, he or she was asked questions about HAR. Splitting the survey like this provided the desired information while minimizing the survey's length. Since this is the only traveler survey that asked about CBRAS, the CBRAS questions were chosen to have priority over the HAR questions in regard to the order asked. The survey also contained diversion questions relating to CBRAS and HAR, questions about the participant's use of other traffic information sources, and demographic questions. Only multiple choice questions were used to keep the survey short and make the responses easier to analyze. The survey contained a total of 22 questions. However, since a participant was only asked either the CBRAS or HAR questions (or neither if he or she had never used either technology), the maximum number of questions a participant was asked was 16 questions, with a minimum of 6 questions. This survey was designed at the same time as the HAR field survey, so it had the same IRB approval letter as the field survey (shown in Figure A-3 of Appendix A). The detailed design of this survey is shown in Appendix E.

3.5 State DOTs TID/ATIS Current Practices Survey Design and Implementation

The purpose of the state DOTs current practices survey was to obtain information on what TID and ATIS technologies other state DOTs are currently using on their roadways. Specific emphasis was placed on the use of HAR and CB technologies and previous experience with these technologies. The survey was implemented online. Contact information was obtained for representatives of all 51 state DOTs (50 states plus District of Columbia). These representatives were contacted via phone to inform them of the survey and obtain their approval to send them the survey. Once approval was obtained, a link to the survey was sent to the representative via email. Since the survey was online, there were many free response questions to obtain

information about the benefits and weaknesses of HAR, costs of HAR, and future plans concerning HAR and other ATIS technologies. This survey is important to understand what other state agencies are doing with HAR and other ATIS technologies and what previous experiences they have had with these technologies. IRB approval was not needed for this survey, since it was conducted on professionals from public agencies. The detailed design of this survey is shown in Appendix F.

3.6 FDOT Districts and Local Emergency Management Departments HAR Survey Design and Implementation

The purpose of the FDOT districts and local emergency management departments HAR survey was to obtain opinions from local agencies on the continued use of HAR and other TID/ATIS technologies, as well as input from FDOT districts on their experiences with TID/ATIS technologies that are currently in use, including HAR. Obtaining local opinions was important to help FDOT and FTE understand how these agencies currently use HAR and would like it to be used in the future, such as whether it should be implemented statewide, or discontinued altogether and replaced with a different TID/ATIS technology. This survey was implemented online, similar to the state DOTs current practices survey. Representatives from Florida county emergency management departments, Florida city emergency management departments, and FDOT districts were contacted via phone to receive their approval before sending them the survey via email. The survey contained many free response questions to allow these agencies to voice their opinions and comments on HAR and other TID/ATIS technologies. Some questions were specific to either emergency management or FDOT personnel. Like the state DOT survey, IRB approval was not needed for this survey. The detailed design of this survey is shown in Appendix G.

3.7 Summary of Survey Methodologies and Purposes

Proper development of the six surveys used in this research was imperative to ensure that the surveys targeted the desired audiences and obtained accurate and reliable results. Therefore, understanding the goals of each survey, the differences between each survey, and the best implementation method for each survey was crucial. Each survey had its own specific purpose. Three of the surveys (HAR phone survey, HAR internet survey, and HAR field survey for travelers/tourists) focused on FTE customers and travelers' use of and opinions about HAR, the CBRAS/HAR field survey for truck drivers focused on truck drivers' use of and opinions regarding CBRAS or HAR, and the other two surveys focused on transportation agencies' current use of TID/ATIS technologies, including HAR and CB, as well as their opinions and past experiences with these technologies. Four of the surveys targeted Florida Turnpike travelers (FTE customers, truck drivers, and/or tourists) and the other two surveys targeted transportation agencies (state DOTs, FDOT districts, and local emergency management agencies). The use of different implementation methods (phone, online, and field visits by students with iPads) allowed for different audiences to be surveyed and different types of questions (multiple choice, free response, audio) to be asked. The innovative field implementation method used also reduced the possibility of errors and allowed for more field surveys to be collected quicker and easier. Overall, all six surveys provided valuable information that could not have been captured in only one or two surveys.

Chapter 4: Analysis of Traveler Survey Responses

This chapter discusses the analysis of the responses to the four traveler surveys (HAR phone survey, HAR internet survey, HAR field survey for travelers/tourists, and CBRAS/HAR survey for truck drivers). First, the responses of the three HAR surveys are analyzed individually. Then, the combined analysis of these three surveys is discussed. Next, a model for HAR user satisfaction using the results from the phone and field surveys is detailed. Finally, the responses of the truck driver survey are analyzed.

4.1 HAR Phone Survey Analysis

As discussed in Chapter 3, the HAR phone survey was developed to obtain information on FTE customers' experiences and opinions about HAR. The CATI method was used to implement this survey. A total of 1000 completed surveys were collected using this method. A simple summary of the results is discussed below and response frequency tables for each question can be found in Appendix H.

Overall, the phone survey respondents felt that HAR is useful, especially in emergency situations. 85% of respondents said that HAR should be continued, with 9% impartial, and 83% would use it in the future if it was continued. 90% of respondents said they would use HAR in emergency evacuation situations (this 90% includes 12% who would use HAR after other sources of information). If HAR was discontinued, 83% of respondents said they would use DMS to obtain travel information, 73% would use commercial radio reports, 53% would use smartphone applications, 51% would use the internet, 39% would use Florida 511, 18% would use CB radio, and 3% would use another alternative (note that this question allowed respondents to choose multiple answer choices, which caused the number of answers to be greater than 1000).

Over half of the survey respondents knew about HAR, but not many respondents used HAR frequently, if at all. 53% of respondents were aware that HAR is available on the Florida Turnpike. 81% of these respondents became aware of HAR via the signs along the Florida Turnpike, 8% became aware of HAR via a friend or relative, 2% became aware of HAR from the Florida Turnpike website, and 9% became aware of HAR via other methods. Out of the respondents who were aware of HAR, 42% had previously used HAR on the Florida Turnpike. 46% of HAR users rarely used HAR, 35% sometimes used it, 10% often used it, and 9% always used it. To increase the awareness of HAR, all 1000 respondents were asked how FTE and FDOT should promote HAR. The opinions varied, with 29% choosing television, 28% choosing highway DMS, 16% choosing popular radio stations, 11% choosing billboards, 10% choosing social media websites, and 6% choosing the FTE or FDOT website.

Even though only 22% of the 1000 total survey participants had used HAR, these HAR users were typically satisfied with HAR. 72% of HAR users were satisfied and 12% were strongly satisfied with HAR. Regarding their strongest reason for being satisfied with HAR, 34% of satisfied HAR users were most satisfied with the accuracy and timeliness of the HAR messages, 26% thought the HAR messages were easy to understand, 22% liked that HAR provides location specific information, and 19% thought HAR was easy to access. For the HAR users who were

dissatisfied (11%) or strongly dissatisfied (6%) with HAR, 43% felt the HAR messages were not easy to understand, 22% felt that HAR needs a wider coverage area, 14% felt the information was not accurate or up to date, 11% felt that HAR was not easy to access, and 11% felt that HAR did not provide location specific information.

Many HAR users felt that traffic congestion information and safety information should be broadcast over HAR. Additionally, HAR users trusted HAR congestion messages and were likely to divert off the Turnpike to avoid the congestion. 58% of the HAR users felt that traffic congestion locations and durations are the most important type of information that should be broadcast over HAR, 24% felt that safety information is most important, 8% felt that roadway construction information is most important, 6% felt that alternate route information is most important, 4% felt that weather information is most important, and 1% felt that special event information is most important. 62% of HAR users had heard a HAR message warning of congestion on the Turnpike; 61% of these users exited the Turnpike to avoid this congestion. For the 39% who did not divert, 28% felt their alternate route would still take more time, 25% said they had no alternate routes, 21% were unfamiliar with alternate routes, and only 2% (one respondent) did not trust the accuracy of the HAR message. Additionally, 25% said they did not divert for other reasons.

The previous diversion question was a revealed preference question, since it asked about the respondents' actual experiences. All 1000 respondents were also asked two stated preference questions about a hypothetical diversion scenario due to a delay message broadcast over HAR. When asked about the amount of delay that would cause them to divert off the Florida Turnpike, 35% said 30 minutes of delay, 34% said 15 minutes of delay, 10% said more than 45 minutes of delay, 10% said 45 minutes of delay, and 11% said they would not divert off the Florida Turnpike. For the participants who would not divert, 35% felt that their alternate route would still take more time, 26% were unfamiliar with alternate routes, 17% had no alternate routes available, 22% said other reasons, and no respondents said it would be due to lack of trust in the accuracy of the HAR message. This shows that even people who do not necessarily use HAR trust the accuracy of HAR messages and a majority would divert due to delays of 30 minutes or less.

In addition to the HAR-related questions, the survey respondents were also asked about their current use of travel information sources. Out of the total 1000 respondents, 31% preferred DMS, 24% preferred commercial radio reports, 19% preferred their GPS navigation device, 15% preferred smartphone applications (52% of these respondents preferred Google Maps, 13% preferred vehicle navigation smartphone apps, 11% preferred Waze, 10% preferred Apple Maps, and 15% preferred a different application), 7% preferred HAR, 3% preferred Florida 511, and 1% preferred CB radio. This shows that HAR is not the preferred travel information source for many people, but it is preferred by more people than Florida 511 and CB radio. 35% liked their preferred travel information source because it is easy to use, 13% liked the availability of location specific information, 10% liked the availability of safety information, 10% liked the on-time delivery of information, 10% liked the information accuracy, 4% liked the availability of special event information, and 19% had other reasons.

Questions were also asked regarding social demographics and characteristics of the respondents' typical trips on the Florida Turnpike. These questions showed that many of the respondents were older, well educated, and infrequent users of the Turnpike. 60% of the respondents were over 50 years old (33% over 65 years old), 21% were between 36 and 50 years old, 16% were between 26 and 35 years old, and 4% were between 18 and 25 years old. One possible reason for this high proportion of older respondents is that this survey was conducted using only landlines, but many younger people primarily use cell phones. Additionally, older people were probably more likely to have the time to take the survey, as younger people are busy with other things (e.g., college, work, family, etc.). Most of the respondents were well educated, as 25% had a bachelor's degree, 21% had a post-graduate degree, 14% had an associate's degree, 19% took some college, and 22% had a high school diploma or less. The sample was not evenly split by gender, as 58% of the respondents were female.

Many of the respondents did not use the Florida Turnpike for commuting. 42% of respondents mainly used the Turnpike for leisure/vacation, 23% mainly used it to travel to or from work or school, 7% mainly used it for shopping, and 27% mainly used it for other trips. For the respondents that mainly used the Turnpike to commute to work or school, 35% of trips took between 15 and 30 minutes, 24% took between 31 and 45 minutes, 17% took more than 60 minutes, 16% took less than 15 minutes, and 9% took between 46 and 60 minutes. 33% of these commuters had one alternate route for this trip, 20% had two alternate routes, 17% had four or more alternate routes, 17% had no alternate routes, and 13% had three alternate routes. The alternate route trips typically took longer than the Turnpike trips, as 32% of the shortest alternate route trips took between 31 and 45 minutes, 28% took between 15 and 30 minutes, 22% took more than 60 minutes, 13% took between 46 and 60 minutes, and 6% took less than 15 minutes. Most of the participants were infrequent users of the Turnpike, as 70% only used the Turnpike once a week or less, 21% used it 2 to 5 times a week, 6% used it 6 to 10 times a week, and 3% used it more than 10 times a week.

Analysis of the HAR phone survey shows that a majority of the sampled FTE customers thought HAR was beneficial and should be continued. People who had used HAR generally had positive experiences with it and trusted the accuracy of HAR congestion messages. 90% of respondents said they would use HAR in emergency situations, showing that HAR can be useful in these situations to distribute important information to travelers. However, a majority of the participants were elderly and infrequent users of the Turnpike and had never used HAR. The survey also showed that people like to use DMS for travel information and do not prefer to use Florida 511 or CB radios.

4.2 HAR Internet Survey Analysis

Like the HAR phone survey, the HAR internet survey was conducted to obtain information on FTE customers' experiences and opinions about HAR. This survey was sent to members of a professional survey panel who were filtered by zip code. The respondents were also filtered by age and gender to ensure these distributions matched the age and gender distributions of the Florida population as a whole. A total of 500 completed surveys were collected. A simple summary of the results is discussed below and response frequency tables for each question can be found in Appendix I.

Out of the total 500 respondents, 85% said that HAR should be continued, 3% said it should be discontinued, and 11% were impartial. If HAR was continued, 91% of respondents said they would use it in the future. In emergency situations, 75% of respondents said they would use HAR, 19% of respondents said they would use HAR after other sources of information, and 6% of respondents said they would not use HAR. If HAR was discontinued, 45% of respondents would use highway DMS for traffic information, 40% would use commercial radio reports, 36% would use smartphone applications, 24% would use internet sources, 21% would use Florida 511, 2% would use CB radio, and 1% would use other sources (GPS devices, TV reports, etc.) (note that this question allowed respondents to choose multiple answer choices, which caused the number of answers to be greater than 500).

Approximately 50% of the respondents were aware of HAR on the Florida Turnpike. 42% of these respondents became aware of HAR due to the signs along the Florida Turnpike, 29% became aware due to a friend or relative, 27% became aware from the Florida Turnpike website, and 2% became aware by other methods (such as local news or just happened to come across it). 67% of the respondents who were aware of HAR had previously used it. A majority of these HAR users were frequent users of HAR, as 24% always used HAR, 32% often used HAR, 25% sometimes used HAR, and 19% rarely used HAR. When asked about the best place to promote HAR, 32% of the 500 respondents said television, 28% said highway DMS, 18% said popular radio stations, 9% said social media, 6% said FTE or FDOT website, and 6% said billboards.

Like the previous two surveys, HAR users were typically satisfied with HAR. 56% were satisfied and 38% were strongly satisfied, whereas only 4% were dissatisfied and 2% were strongly dissatisfied. The satisfied users tended to praise HAR's accurate and up-to-date information (47%) and HAR's ease of access (36%), with 9% saying HAR was easy to understand and 8% saying that HAR provides location-specific information. The main reasons for dissatisfaction were that HAR is not easy to understand (64% of dissatisfied users), it does not provide location-specific information (18%), information is not accurate (9%), and that it needs a wider coverage area (9%).

The HAR users felt that the most important information to broadcast over HAR is traffic congestion locations and durations (58% of HAR users), followed by weather conditions (17%), roadway construction (8%), safety information (8%), special events (5%), and alternate route information (5%). 77% of the HAR users had heard a HAR message about congestion while traveling on the Florida Turnpike, and 72% of these users diverted off the Florida Turnpike due to this congestion. Out of the users who did not divert, 39% were unfamiliar with alternate routes, 33% thought that their alternate route would still take more time, 22% had no alternate routes available, 3% (1 respondent) did not trust the accuracy of the HAR message, and 3% (1 respondent) waited at a rest stop.

All 500 respondents were also asked about hypothetical diversion situations (stated preference) and HAR messages. When asked about the amount of delay broadcast over HAR that would cause them to divert off the Florida Turnpike, 47% of respondents said 30 minutes, 24% said 15 minutes, 13% said 45 minutes, 7% said more than 45 minutes, and 8% said they would not divert. The main reasons respondents would not divert were that the alternate route would

probably take more time (54%), unfamiliarity with alternate routes (27%), and absence of alternate routes (20%). The respondents were also provided audio samples of two types of HAR messages (one concerning congestion and one concerning a hurricane evacuation) and asked about these messages. For the congestion message, 79% of respondents said they would exit off the Florida Turnpike if they heard the message (48% would stay off the Turnpike and 31% would get back on the Turnpike farther downstream); 18% said they would continue driving on the Florida Turnpike, but drive more cautiously; 2% said they would not change their driving behavior; and 1% said they would cancel their trip. 89% of respondents thought the congestion message was easy to understand and 94% thought the message would be beneficial if they heard it while traveling. For the hurricane evacuation message, 29% of respondents said they would exit off the Florida Turnpike (19% would stay off the Turnpike and 10% would get back on farther downstream); 14% would stay on the Turnpike, but drive more cautiously; 4% would not change their behavior; and 53% would cancel their trip. This large number of people canceling their trip was probably due to the fact that the message discussed hurricane conditions, which most people would not want to drive in. 97% of respondents thought the message was easy to understand and 96% thought it would be beneficial.

When asked about their preferred travel information source, 28% of respondents preferred highway DMS, 25% preferred smartphone applications, 18% preferred GPS navigation devices, 16% preferred commercial radio, 9% preferred Florida 511, and 4% preferred HAR. The most popular smartphone apps were Google Maps (52%), followed by Waze (18%), vehicle navigation apps (17%), Apple Maps (10%), and other apps (such as Florida 511 and local news apps) (3%). Respondents liked their preferred travel information source due to its ease of use (40%), information accuracy (23%), location-specific information (22%), on-time delivery of information (11%), availability of safety information (3%), availability of special event information (1%), or other reasons, such as ability to reroute or safest way to get information (0.4%).

The respondents were also asked questions about their most common trip on the Florida Turnpike. 47% of the respondents mainly used the Florida Turnpike for leisure/vacation trips, 22% used it to travel to/from work or school, 16% used it for shopping, and 15% used it for other reasons. These trips typically took more than 60 minutes (31% of respondents), 15-30 minutes (27%), or 31-45 minutes (26%), with a smaller amount of trips taking 46-60 minutes (11%) or less than 15 minutes (5%). Most respondents had only ever taken two or less alternate routes for this trip (44% had taken one alternate route, 25% had taken two alternate routes, and 23% had never taken an alternate route), but 6% had taken three alternate routes and 3% had taken four or more alternate routes. Of the respondents who had ever taken an alternate route, 29% said this route would take 31-45 minutes, 27% said it would take more than 60 minutes, 21% said it would take 15-30 minutes, 19% said it would take 46-60 minutes, and 4% said it would take less than 15 minutes. 64% of the respondents traveled on the Florida Turnpike once a week or less, 28% traveled on the Florida Turnpike 2-5 times a week, 6% traveled on it 6-10 times a week, and 3% traveled on it more than 10 times a week. Most of the respondents owned a toll transponder, with 69% owning a Sunpass and 11% owning an E-pass, but 20% did not have either transponder. Additionally, most of the respondents spent less than $20 a month on tolls (56% of respondents), with 23% spending $21-$40, 13% spending $41-$60, 4% spending $61-$80, 3% spending $81-$100, and 1% spending over $100 per month on tolls.

The remaining questions were concerned with social demographics. 53% of the respondents were aged 50 or less (11% were aged 18-25, 17% were aged 26-35, and 25% were aged 36-50), with 24% aged 51-65 and 23% over 65. This age distribution corresponds to the age distribution in Florida as a whole, since respondents were filtered by age and gender to match the statewide population. The respondents were almost evenly split by gender (51% female). 60% of the respondents had an associate's degree or higher (11% had an associate's degree, 28% had a bachelor's degree, and 21% had a post-graduate degree), 24% had some college education, and 16% had a high school diploma or less. 58% of the respondents were employed (42% full-time and 16% part-time), with 29% retired and 13% unemployed. Besides "Other", which was chosen by 23% of working respondents, the most represented industries were Business and Professional Services (13% of working respondents), Health Services (9%), Educational Services (9%), Retail and Wholesale Trade (9%), and Finance and Insurance (8%). 40% of the working respondents worked 40-49 hours per week, 30% worked 30-39 hours per week, 15% worked 20-29 hours per week, 7% worked 10-19 hours per week, 6% worked 50 hours per week or more, and 3% worked less than 10 hours per week. A majority of the working respondents (60%) worked five days per week, 18% worked three or four days, 17% worked six or seven days, and 6% worked one or two days. Many of these workers would have very severe (15%) or somewhat severe (35%) consequences if they were 30 minutes late to work, but 19% would not have severe consequences, 18% would not have any consequences, and 13% would have varying consequences. 45% of the working respondents made less than $50,000 per year, 40% made between $50,000 and $100,000, and 15% made more than $100,000 per year. Also, most of the respondents had lived in Florida for a long time, with 67% living in the state more than 10 years, 14% between 5 and 10 years, 13% between 1 and 5 years, 4% between 6 and 12 months, and only 2% less than 6 months.

Similar to the HAR phone survey, the HAR internet survey showed that a majority of the sampled Turnpike customers thought HAR was beneficial and should be continued. This internet survey also provided the opportunity to see how travelers would react to and felt about various HAR messages. The message about congestion would cause a majority of travelers to divert off the Florida Turnpike, whereas the message about hurricane conditions would cause a majority of travelers to cancel their trips. More respondents felt that the weather message was easier to understand and would be more beneficial than the congestion message. HAR users felt that traffic congestion information is the most important information that should be broadcast over HAR. The most popular travel information sources were DMS and smartphone apps. Unlike the phone survey, this survey was not as biased towards elderly respondents. However, a majority of the respondents still only traveled on the Florida Turnpike once a week or less.

4.3 HAR Field Survey Analysis

The HAR field survey was developed to obtain information on FTE and Florida interstate travelers' experiences and opinions about HAR. UCF students used iPads to survey travelers at three FTE service plazas (Turkey Lake, Canoe Creek, and Okahumpka) and two FDOT rest areas (I-75 rest area in Charlotte and I-95 rest area in St. Lucie). A total of 1610 field traveler completed surveys were collected. A simple summary of the results is discussed below and response frequency tables for each question can be found in Appendix J.

The field survey respondents felt that HAR is beneficial. 89% of respondents felt that HAR should be continued and 84% would use it in the future if it was continued. 82% of respondents said they would use HAR in emergency evacuation situations (this 82% includes 38% who would use HAR after other sources of information). If HAR was discontinued, 72% of respondents said they would use DMS to obtain travel information, 58% would use smartphone applications, 56% would use commercial radio reports, 51% would use the internet, 13% would use Florida 511, and 5% would use CB radio (note that this question allowed respondents to choose multiple answer choices, which caused the number of answers to be greater than 1610).

62% of the field survey respondents were aware HAR was available on the roadway they were traveling on. A majority of these respondents became aware of HAR due to the roadway signs (93%), 2% became aware due to a friend or relative, 1% became aware due to the FTE or FDOT website, and 5% became aware by other methods. Of these respondents who were aware of HAR, only 37% had ever used HAR. 54% of these HAR users rarely used it, 27% sometimes used it, 13% often used it, and 6% always used it. To best increase awareness of HAR, 29% of the 1,610 respondents said it should be promoted on DMS, 21% said social media websites, 17% said popular radio stations, 17% said television, 16% said billboard, and 1% said FTE or FDOT website.

HAR users only made up 23% of the 1610 total survey participants, but these HAR users were typically satisfied with HAR. 65% of HAR users were satisfied and 15% were strongly satisfied with HAR. Regarding their strongest reason for being satisfied with HAR, 36% of satisfied HAR users were most satisfied with the accuracy and timeliness of the HAR messages, 33% thought HAR was easy to access, 16% liked that HAR provides location specific information, and 15% thought the HAR messages were easy to understand. For the HAR users who were dissatisfied (14%) or strongly dissatisfied (6%) with HAR, 31% felt the HAR messages were not easy to understand, 24% felt that HAR needs a wider coverage area, 22% felt the information was not accurate or up to date, 17% felt that HAR was not easy to access, and 7% felt that HAR did not provide location specific information. 64% of the HAR users felt that traffic congestion locations and durations are the most important type of information that should be broadcast over HAR, 15% felt that safety information is most important, 8% felt that alternate route information is most important, 7% felt that weather information is most important, 5% felt that roadway construction information is most important, and 1% felt that special event information is most important.

The 1610 respondents were also asked about their current use of travel information sources. 34% preferred DMS, 28% preferred smartphone applications (58% of these respondents preferred Google Maps, 5% preferred vehicle navigation smartphone apps, 15% preferred Waze, 12% preferred Apple Maps, and 11% preferred a different application), 23% preferred their GPS navigation device, 14% preferred commercial radio reports, 2% preferred HAR, 1% preferred Florida 511, and 0% preferred CB radio. This shows that HAR is not the preferred travel information source for many travelers. 56% liked their preferred travel information source because it is easy to use, 19% liked the information accuracy, 12% liked the availability of location specific information, 9% liked the on-time delivery of information, 3% liked the availability of safety information, and 1% liked the availability of special event information.

70% of the 1,610 respondents were Florida Turnpike travelers (42% of these respondents were surveyed at Canoe Creek Service Plaza, 40% were surveyed at Turkey Lake Service Plaza, and 19% were surveyed at Okahumpka Survey Plaza), 17% were I-75 travelers, and 13% were I-95 travelers. 64% of respondents were on leisure or vacation trips, 17% were on commuting trips to or from work or school, 2% were on shopping trips, and 17% were on other types of trips. Most of these travelers were infrequent users of the roadway, as 74% used the roadway once a week or less, 16% used it 2-5 times a week, 6% used it 6-10 times a week, and 4% used it more than 10 times a week. 71% of respondents lived in Florida and 62% were male. The respondents were typically well educated, as 21% had a post graduate degree, 28% had a bachelor's degree, 12% had an associate's degree, 24% took some college, and 15% had a high school diploma or less. These respondents tended to be middle-aged, as 28% were 51-65 years old, 27% were 36-50 years old, 18% were over 65 years old, 16% were 26-35 years old, and 11% were 18-25 years old.

The HAR field survey showed that a majority of the sampled Turnpike and interstate travelers thought HAR was beneficial and should be continued. People who had used HAR generally had positive experiences. 82% of respondents said they would use HAR in emergency situations, showing that HAR can be useful in these situations to distribute important information to travelers. Over 60% of travelers were aware of HAR, but only 23% of the respondents actually used HAR. A majority of the participants were infrequent users of the Turnpike, I-75, or I-95 and mainly used these roadways for leisure trips. The preferred travel information sources were DMS, smartphone apps, and GPS devices.

4.4 Combined Traveler Survey Analysis

To better understand the results of the HAR phone, field, and internet surveys, the responses to all shared questions were combined. Tables 4-1, 4-2, and 4-3 show the results for each of these three individual surveys, as well as the combined total. Table 4-1 shows questions related to HAR, Table 4-2 shows questions about other traffic information sources, and Table 4-3 shows questions regarding trip characteristics and social demographics. The percentages shown are based on the number of respondents who were asked the question; percentages shown in parentheses are based on the total number of survey respondents. For example, 42% of the phone survey respondents who were asked if they had ever used HAR responded "Yes." This is equivalent to 22% of the entire 1000 phone survey respondents, as only the 53% of respondents who were aware of HAR were asked if they had used HAR. For some questions, such as HAR usage, the percentage based on the total number of respondents can be more important than the percentage based on the number of respondents who were asked the question. The bolded percentages in each row indicate the highest percentage among the three surveys.

Table 4-1: HAR Related Questions

Question	Response	Phone Results	Internet Results	Field Results	Combined Results
HAR awareness	Yes	53%	50%	**62%**	57%
	No	47%	**50%**	38%	43%
How first became aware of HAR	Signs along roadway	81%	42%	**93%**	82%
	Friend or relative	8%	**29%**	2%	8%
	Florida Turnpike or FDOT website	2%	**27%**	1%	5%
	Other	**9%**	2%	5%	6%
HAR usage	Yes	42% (22%)	**67% (33%)**	37% (22%)	42% (24%)
	No	58% (31%)	33% (17%)	**63% (39%)**	58% (33%)
Frequency of HAR usage	Always	9% (2%)	**24% (8%)**	6% (1%)	11% (3%)
	Often	10% (2%)	**32% (11%)**	13% (3%)	16% (4%)
	Sometimes	**35% (8%)**	25% (8%)	27% (6%)	29% (7%)
	Rarely	46% (10%)	19% (6%)	**54% (12%)**	44% (11%)
HAR satisfaction	Strongly Satisfied	12%	**38%**	15%	19%
	Satisfied	**72%**	56%	65%	65%
	Dissatisfied	11%	4%	**14%**	11%
	Strongly Dissatisfied	6%	2%	**6%**	5%
Strongest opinion on HAR (satisfaction)	Information is accurate and up-to-date	34%	**47%**	36%	38%
	Easy to access	19%	**36%**	33%	30%
	Easy to understand	**26%**	9%	15%	17%
	Provides location-specific information	**22%**	8%	16%	16%
Strongest opinion on HAR (dissatisfaction)	Information is not accurate and up-to-date	14%	9%	**22%**	18%
	Not easy to access	11%	0%	**17%**	13%
	Not easy to understand	43%	**64%**	31%	38%
	Does not provide location-specific information	11%	**18%**	7%	9%
	Needs a wider coverage area	22%	9%	**24%**	22%
Most important information to broadcast over HAR	Traffic congestion locations and durations	58%	58%	**64%**	60%
	Weather conditions	4%	**17%**	7%	8%
	Roadway construction	8%	**8%**	5%	7%
	Special events	1%	**5%**	1%	2%
	Alternate route information	6%	5%	**8%**	7%
	Safety information	**24%**	8%	15%	16%

Table 4-1: HAR Related Questions…Continued

Question	Response	Phone Results	Internet Results	Field Results	Combined Results
Heard HAR congestion message	Yes	62% (14%)	**77% (25%)**	N/A	68% (18%)
	No	**38% (8%)**	23% (8%)	N/A	32% (8%)
Diverted due to HAR message	Yes	61% (8%)	**72% (18%)**	N/A	66% (12%)
	No	**39% (5%)**	28% (7%)	N/A	34% (6%)
Reason for not diverting (revealed preference)	Unfamiliar with alternate routes	21%	**39%**	N/A	28%
	Did not trust accuracy of HAR message	2%	**3%**	N/A	2%
	Alternate route would still take more time	28%	**33%**	N/A	30%
	No alternate routes available	**25%**	22%	N/A	24%
	Other reason	**25%**	3%	N/A	16%
Amount of delay over HAR necessary to cause diversion	15 minutes	**34%**	24%	N/A	31%
	30 minutes	35%	**47%**	N/A	39%
	45 minutes	10%	**13%**	N/A	11%
	More than 45 minutes	**10%**	7%	N/A	9%
	Would not divert	**11%**	8%	N/A	10%
Reason for not diverting (stated preference)	Unfamiliar with alternate routes	26%	**27%**	N/A	26%
	Would not trust accuracy of HAR message	0%	0%	N/A	0%
	Alternate route would likely take more time	35%	**54%**	N/A	40%
	No alternate routes available	17%	**20%**	N/A	18%
	Other reason	**22%**	0%	N/A	16%
Best place to promote HAR	DMS	28%	28%	**29%**	29%
	Television	29%	**32%**	17%	23%
	Popular radio stations	16%	**18%**	17%	17%
	Florida Turnpike or FDOT website	6%	**6%**	1%	3%
	Social media website	10%	9%	**21%**	15%
	Billboards	11%	6%	**16%**	13%
Emergency use of HAR	Yes	**79%**	75%	44%	60%
	Yes, after other information sources	12%	19%	**38%**	27%
	No	10%	6%	**18%**	13%
Continuation of HAR	Continued	85%	85%	**89%**	87%
	Discontinued	6%	3%	**11%**	8%
	Impartial	9%	**11%**	0% *	5%
Future use of HAR	Yes	83%	**91%**	84%	84%
	No	**17%**	9%	16%	15%

*Note that "Impartial" was not offered as a choice to respondents of the field survey.

Table 4-2: Traffic Information Source Questions

Question	Response	Phone Results	Internet Results	Field Results	Combined Results
Preferred travel information source	DMS	31%	28%	**34%**	32%
	Smartphone applications	15%	25%	**28%**	23%
	HAR	**7%**	4%	2%	4%
	Commercial radio reports	**24%**	16%	14%	17%
	Florida 511	3%	**9%**	1%	3%
	CB radio	**1%**	0%	0%	0.4%
	GPS device	19%	18%	**23%**	21%
Main reason for using preferred travel information source	Ease of use	35%	40%	**56%**	47%
	Information accuracy	10%	**23%**	19%	17%
	On-time delivery of information	10%	**11%**	9%	10%
	Location-specific information	13%	**22%**	12%	14%
	Availability of safety or security information	**10%**	3%	3%	5%
	Availability of special event information	**4%**	1%	1%	2%
	Other reason *	**19%**	0.4%	0%	6%
Preferred smartphone application	Vehicle navigation apps	13%	**17%**	5%	8%
	Waze Social GPS Maps	11%	**18%**	15%	14%
	Google Maps	52%	52%	**58%**	56%
	Apple Maps	10%	10%	**12%**	11%
	Other	**15%**	3%	11%	11%
Travel information sources that would be used if HAR was discontinued (multiple responses allowed)	Commercial radio reports	**73%**	40%	56%	59%
	Florida 511	**39%**	21%	13%	23%
	Internet	51%	24%	**51%**	47%
	Highway DMS	**83%**	45%	72%	71%
	Smartphone applications	53%	36%	**58%**	53%
	CB radio	**18%**	2%	5%	9%
	Other *	**3%**	1%	0%	1%

*Note that responses marked with an asterisk were not offered as a choice to respondents of the field survey.

Table 4-3: Trip Characteristic and Social Demographic Questions

Question	Response	Phone Results	Internet Results	Field Results	Combined Results
Trip purpose	Leisure / Vacation	42%	47%	**64%**	54%
	Work / School	**23%**	22%	17%	20%
	Shopping	7%	**16%**	2%	6%
	Other	**27%**	15%	17%	20%
Length of Turnpike trip *	Less than 15 minutes	**16%**	5%	N/A	8%
	15-30 minutes	**35%**	27%	N/A	29%
	31-45 minutes	24%	**26%**	N/A	26%
	46-60 minutes	9%	**11%**	N/A	11%
	More than 60 minutes	17%	**31%**	N/A	27%
Number of alternate routes *	None	17%	**23%**	N/A	21%
	One	33%	**44%**	N/A	40%
	Two	20%	**25%**	N/A	24%
	Three	**13%**	6%	N/A	8%
	Four or more	**17%**	3%	N/A	7%
Length of alternate route trip *	Less than 15 minutes	**6%**	4%	N/A	5%
	15-30 minutes	**28%**	21%	N/A	24%
	31-45 minutes	**32%**	29%	N/A	30%
	46-60 minutes	13%	**19%**	N/A	17%
	More than 60 minutes	22%	**27%**	N/A	25%
Frequency of travel	Once per week or less	70%	64%	**74%**	71%
	2-5 times per week	21%	**28%**	16%	20%
	6-10 times a week	6%	6%	**6%**	6%
	More than 10 times a week	3%	3%	**4%**	3%
Age Bracket	18-25 years	4%	**11%**	11%	9%
	26-35 years	16%	**17%**	16%	16%
	36-50 years	21%	25%	**27%**	25%
	51-65 years	27%	24%	**28%**	27%
	Over 65	**33%**	23%	18%	24%
Education	High school diploma or less	**22%**	16%	15%	17%
	Some college	19%	**24%**	24%	23%
	Associate's degree	**13%**	11%	12%	12%
	Bachelor's degree	25%	28%	**28%**	27%
	Post graduate degree	21%	**21%**	21%	21%
Gender	Male	42%	49%	**62%**	54%
	Female	**58%**	51%	38%	46%

*Note that questions marked with an asterisk were asked to all respondents of the internet survey, but only to phone survey respondents whose primary trip purpose was "Work / School."

Out of all 3110 responses from all three surveys, 57% of respondents were aware of HAR. The field survey had the highest awareness (62%) and the internet survey had the lowest awareness (50%). 82% of these respondents became aware of HAR by the roadway signs, showing that these signs are useful in promoting HAR. Increasing the number of signs could potentially

increase HAR awareness. Promoting HAR on DMS (assuming FDOT policy permits the use of DMS for this purpose) could also improve awareness, as 29% of respondents thought DMS would be the best place to promote HAR. 24% of the total survey respondents had used HAR (42% of the respondents who were aware of HAR had used it). Even though the internet survey had the lowest awareness, it had the highest percentage of HAR usage (33% of internet survey respondents).

Since many respondents who are aware of HAR do not use it, making HAR more attractive to these respondents can increase HAR usage. Understanding the opinions of HAR users can indicate ways in which HAR can be improved. 84% of all HAR users were satisfied or strongly satisfied with HAR, showing that HAR provides benefits to many of its users. The main benefits of HAR were accurate and timely information and ease of access. For the dissatisfied users, the main criticisms of HAR were that messages are difficult to understand and that it needs a wider coverage area. 60% of HAR users also said that traffic congestion locations and durations are the most important information to broadcast over HAR. By focusing on these types of messages and working to improve the quality and coverage of these messages, FTE and FDOT can make HAR more attractive to travelers.

Even though only 24% of the respondents had ever used HAR, most of the respondents thought that HAR should be continued and indicated that they would use it in the future. 87% of respondents said HAR should be continued and 85% said they would use it in the future. Additionally, 87% said they would use HAR in emergency situations. Only 4% of respondents said HAR was their preferred travel information source, with the most popular sources being DMS (32%) and smartphone apps (23%). Therefore, even though HAR is not the preferred travel information source for typical travel, it can be very beneficial in emergency situations, especially if FTE or FDOT needs to provide crucial safety information to a large number of travelers throughout the state.

HAR also provides travel time savings to its users. 68% of HAR users from the phone and internet surveys had heard a congestion message over HAR while traveling on the Florida Turnpike and 66% of these users diverted (this diversion corresponds to 11.7% of all respondents from these two surveys). These diversion numbers are important for calculating the benefits of HAR, as discussed in Section 9.

The trip characteristic and social demographic questions show that 71% of the respondents used the Florida Turnpike (or I-75 and I-95 for some field survey respondents) once a week or less and these roadways were most commonly used for leisure trips (54%). The phone survey had a large proportion (33%) of respondents over the age of 65, but this proportion was much lower in the other two surveys. Overall, 76% of the 3110 respondents were over the age of 36. 60% of the total respondents had at least an associate's degree and 54% were male.

Combining all three of the HAR surveys for FTE customers and travelers shows that over half of the survey respondents were aware of HAR, but less than one-fourth of respondents had ever used HAR. Over 80% of HAR users were satisfied with HAR, citing its information accuracy as the main reason for being satisfied. However, dissatisfied users felt that HAR was not easy to understand and needed a larger coverage area. A majority of HAR users also thought that traffic

congestion information is the most important information to broadcast over HAR. Using these survey responses, FTE and FDOT can make HAR more attractive to travelers so it can compete with DMS, smartphone applications, and other more popular travel information sources for typical travel information. HAR does seem to be important for emergency situations, as over 85% of respondents would use HAR in emergencies. Since 87% of respondents said HAR should be continued and 85% said they would use it in the future, it is recommended for FTE and FDOT to keep HAR and possibly expand it along their roadways.

4.5 Modeling HAR User Satisfaction

It is important to understand the satisfaction of HAR users and how this satisfaction relates to other answered questions in the surveys. To obtain a more in-depth understanding of HAR user satisfaction, a decision tree model was developed using the responses from the HAR phone survey and HAR field survey. Results from the HAR internet survey were not included since the respondent selection process (random selection from a group of professional panelists) was not as random as the selection processes for the phone and field surveys. The purpose of this tree model was to examine what survey questions were influential in predicting user satisfaction with HAR. A decision tree was chosen since it is an effective model for predicting categorical responses.

The tree model was developed using SAS Enterprise Miner. Responses from both the phone survey and field survey were combined and filtered so only responses from HAR users remained in the modeling data set. The modeled data set had a total of 583 responses (only the responses from people who had previously used HAR). To ease in modeling, the responses for the HAR satisfaction question were classified into two categories (satisfaction and dissatisfaction) instead of the original four ("Strongly Satisfied" and "Satisfied" were grouped together as satisfaction and "Strongly Dissatisfied" and "Dissatisfied" were grouped together as dissatisfaction). Chi-square tests were performed on this data set to see which questions were most significant in predicting user satisfaction; Table 4-4 below shows the most significant questions (p-value <0.05).

Table 4-4: Significant Survey Questions in Predicting HAR Satisfaction

Input Question	Chi-Square Statistic	Degrees of Freedom	P-Value
Continuation of HAR	77.9290	2	<0.0001
Future use of HAR	62.1994	1	<0.0001
Emergency use of HAR	59.8826	2	<0.0001
Frequency of HAR usage	14.1650	3	0.0027
Age bracket	11.7910	4	0.0190
Gender	5.4963	1	0.0191

Before creating the tree model, the data was partitioned into training and validation sets using a 70% training / 30% validation split. Figure 4-1 below shows the top branches of the final tree model on this partitioned data set. Thicker branches (lines) indicate a larger sample size and darker colored leaves (boxes showing the results) indicate better matching between the training and validation results. The lower branches that resulted in small sample sizes were removed

from this figure, to make it easier to read, but were considered in the tree modeling results. Figure K-1 in Appendix K shows the tree model in its entirety.

Response	Training %	Validation %
Dissatisfied:	18.47	19.21
Satisfied:	81.53	80.79
Count:	406	177

Continuation of HAR

Discontinue or impartial — Continue

Response	Training %	Validation %
Dissatisfied:	68.57	57.14
Satisfied:	31.43	42.86
Count:	35	14

Response	Training %	Validation %
Dissatisfied:	13.75	15.95
Satisfied:	86.25	84.05
Count:	371	163

Emergency Use of HAR

No or after other sources

Yes

Response	Training %	Validation %
Dissatisfied:	22.50	29.63
Satisfied:	77.50	70.37
Count:	120	54

Response	Training %	Validation %
Dissatisfied:	9.56	9.17
Satisfied:	90.44	90.83
Count:	251	109

Frequency of HAR Usage

Always, Often, or Sometimes

Rarely

Response	Training %	Validation %
Dissatisfied:	13.21	23.08
Satisfied:	86.79	76.92
Count:	53	26

Response	Training %	Validation %
Dissatisfied:	29.85	35.71
Satisfied:	70.15	64.29
Count:	67	28

Figure 4-1: Top Branches of Decision Tree Model

This tree model shows that the most important variables in predicting HAR user satisfaction are:
- Whether the user thinks HAR should be continued or not,
- If he or she would use HAR in emergencies, and
- How often he or she uses HAR

The first two questions were important for both the training and validation data sets, but the third question was only important in validation. All three questions were shown to be significant by the chi-square tests in Table 4-4, but the tree also shows how these questions influence user satisfaction. From this tree, it can be seen that respondents who said HAR should be discontinued were more likely to be dissatisfied than respondents who thought HAR should be continued. Also, respondents who would not use HAR in emergencies or would use it after other information sources were more likely to be dissatisfied than users who would turn directly to HAR. Frequent users of HAR were more likely to be satisfied than infrequent users.

The SAS Enterprise Miner results indicated that the tree had an average squared error of 0.105 for training and 0.132 for validation. Additionally, the training misclassification rate was 12.81% and the validation misclassification rate was 15.82% (details of these misclassification

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rates are shown in Table K-1 of Appendix K). Both of these misclassification rates are lower than the 18.7% of users who were dissatisfied with HAR, which indicates that the tree is better at predicting and classifying responses than randomly guessing that all respondents are satisfied. The tree model was more accurate at predicting satisfied responses than predicting dissatisfied responses.

Overall, this tree is beneficial as it expands on the simple response percentages by showing that whether a respondent wants HAR to be continued or would use HAR in emergencies are important in predicting the respondent's satisfaction. By working to improve HAR and increase user satisfaction, FTE could cause travelers to use HAR more frequently and in emergency situations.

4.6 CBRAS/HAR Survey for Truck Drivers Analysis

The CBRAS/HAR survey for truck drivers was developed to obtain information on FTE and Florida interstate truck drivers' experiences and opinions about CBRAS and HAR. This survey was conducted by the same UCF students who conducted the HAR field survey. These students used iPads to survey truck drivers at the same three FTE service plazas (Turkey Lake, Canoe Creek, and Okahumpka) and two FDOT rest areas (I-75 rest area in Charlotte and I-95 rest area in St. Lucie). In order to reduce the length of the survey, respondents were first asked about CBRAS. If they were not aware of or had never used CBRAS, they were then asked about HAR. Truck drivers who had used CBRAS were then asked questions about CBRAS, but were not asked about HAR. A total of 613 truck drivers completed the survey. A simple summary of the results is discussed below and response frequency tables for each question can be found in Appendix L.

54% of the surveyed truck drivers had a CB radio in their truck; 22% always used their CB radio, 17% often used it, 23% sometimes used it, 25% rarely used it, and 12% never used it. Out of these truck drivers who had a CB radio, 44% were aware of CBRAS. 52% of these truck drivers had ever used CBRAS (12% of the total 613 respondents). These CBRAS users tended to use the system frequently, as 39% always used it, 25% often used it, 20% sometimes used it, and 16% rarely used it.

The CBRAS users were very satisfied with the system, as 31% were strongly satisfied and 61% were satisfied. 35% of satisfied CBRAS users were satisfied due to the accurate and up-to-date information, 33% due to the ease of access, 25% due to the ease of understanding the messages, and 7% due to the presence of location-specific information. The main reasons for dissatisfaction were that information is not accurate or up-to-date (50%), messages are not easy to understand (33%), and that the system needs a wider coverage area (17%, which was only one response). 68% of CBRAS users had heard a congestion message over CBRAS and 71% of these users had diverted due to the message. 43% of the CBRAS users had more than 20 years of professional truck driving experience, 15% had less than 5 years, 15% had 5-10 years, 15% had 11-15 years, and 13% had 16-20 years.

The truck drivers who had not used CBRAS were asked about HAR. Only 27% of these truck drivers (24% of all survey respondents) had used HAR. These users did not use HAR frequently,

as 6% always used it, 20% often used it, 30% sometimes used it, and 44% rarely used it. So, even though more truck drivers used HAR than CBRAS, the CBRAS users were more frequent users.

Compared to CBRAS users, HAR users were not as satisfied. 8% of truck drivers who used HAR were strongly satisfied with the system, 65% were satisfied, 24% were dissatisfied, and 4% were strongly dissatisfied. The satisfied HAR users said that HAR was easy to access (32%), provided accurate information (29%), provided location-specific information (21%), and was easy to understand (18%). The dissatisfied users said that HAR was not easy to access (34%), not easy to understand (24%), did not provide accurate information (17%), needed a wider coverage area (17%), and did not provide location-specific information (7%). 44% of HAR users had heard a congestion message over HAR and 55% diverted due to this message. This is a lower diversion rate than CBRAS users. Like the CBRAS users, the HAR users had many years of experience (42% had more than 20 years, 21% had 16-20 years, 18% had 11-15 years, 13% had 5-10 years, and 5% had less than 5 years).

All 613 truck drivers were also asked for their preferred traffic information source. 28% preferred GPS navigation devices, 22% preferred smartphone applications (69% preferred Google Maps, 8% preferred Apple Maps, 5% preferred vehicle navigation apps, 5% preferred Waze, and 13% preferred other apps), 16% preferred CB radio, 15% preferred highway DMS, 9% preferred commercial radio, 5% preferred information from their dispatcher, 3% preferred Florida 511, and 2% preferred HAR. The reasons for their preferred information source were ease of use (51%), information accuracy (26%), location-specific information (13%), on-time delivery of information (7%), availability of safety information (2%), and availability of special event information (1%).

72% of the surveyed truck drivers were traveling on the Florida Turnpike (53% of these were surveyed at Turkey Lake Service Plaza, 34% were surveyed at Canoe Creek Service Plaza, and 13% were surveyed at Okahumpka Service Plaza), 16% were traveling on I-75, and 12% were traveling on I-95. 97% of the respondents were male and 59% lived in Florida. These truck drivers were more frequent users of the Florida Turnpike, I-75, or I-95 than the respondents of the three HAR surveys, as 45% used the roadway once a week or less, 33% used it 2-5 times per week, 12% used it 6-10 times per week, and 11% used it more than 10 times a week.

The CBRAS/HAR truck driver survey showed that not many truck drivers (12% of the survey respondents) had used CBRAS, but these users were frequent users and were very satisfied with the system. About twice as many truck drivers had used HAR compared to CBRAS, but the HAR users were less frequent users and less satisfied than the CBRAS users. This shows that increasing awareness of CBRAS can increase the satisfaction of truck drivers. Even though CBRAS is only used by a small portion of truck drivers, these drivers actively use the system and trust it with respect to congestion messages. Therefore, it is recommended for FTE and FDOT to keep CBRAS and promote it to increase its usage.

4.7 Traveler Survey Conclusions

The four traveler surveys provided valuable information on HAR and CBRAS. 85% of the sampled FTE customers in the HAR phone survey thought HAR should be continued and 83% would use it in the future. People who had used HAR generally had positive experiences with it and trusted the accuracy of HAR congestion messages. 90% of respondents said they would use HAR in emergency situations. These respondents preferred DMS for travel information and did not prefer to use Florida 511 or CB radios.

85% of the sampled FTE customers in the HAR internet survey thought HAR should be continued and 91% would use it in the future. 94% would use HAR in emergency situations. Only 50% of respondents were aware of HAR, but 67% of these respondents had used HAR and were generally satisfied. The most popular travel information sources were DMS and smartphone apps.

89% of the sampled FTE and interstate travelers in the HAR field surveys thought HAR should be continued and 84% would use it in the future. HAR users typically had positive experiences with the system. 82% of respondents said they would use HAR in emergency situations. Over 60% of travelers were aware of HAR, but only 23% of the respondents actually used HAR. The preferred travel information sources were DMS, smartphone apps, and GPS devices.

Combining all three of the HAR surveys for FTE customers and travelers showed that over half of the survey respondents were aware of HAR, but less than one quarter of respondents had ever used HAR. Over 80% of HAR users were satisfied with HAR, citing its information accuracy as the main reason for being satisfied. However, dissatisfied users felt that HAR was not easy to understand and needed a larger coverage area. A majority of HAR users also thought that traffic congestion information is the most important information to broadcast over HAR. Over 85% of respondents would use HAR in emergencies, 87% said HAR should be continued and 85% said they would use it in the future.

The CBRAS/HAR truck driver survey showed that only 12% of surveyed truck drivers had used CBRAS, but these users were frequent users and were very satisfied with the system. About twice as many truck drivers had used HAR compared to CBRAS, but the HAR users were less frequent users and less satisfied than the CBRAS users. Common complaints about HAR were that it is not easy to access or understand.

Based on the results of these surveys, it is recommended that FTE and FDOT keep HAR and CBRAS on their roadways. While HAR is not the most preferred travel information source by roadway users, it has undeniable benefits during emergencies, especially if other communication networks fail. Improvements might need to be made to the existing HAR system to make messages easier to understand and provide a larger coverage area. It is also important to increase awareness of HAR, whether through DMS, television, or other means. Truck drivers who use CBRAS are very satisfied with the system and trust its accuracy. However, a low proportion of truck drivers are aware of the system, so it is recommended that the system be promoted through other ATIS technologies that truck drivers tend to use (such as GPS devices and smartphone applications).

Chapter 5: Analysis of Agency Survey Responses

The traveler survey responses indicated that HAR and CBRAS should be kept and possibly even expanded on FTE and FDOT roadways. However, it is important for FTE and FDOT to understand the potential costs and issues, as well as the benefits, which could be caused by this expansion. This information was obtained via the two agency surveys.

5.1 State DOTs TID/ATIS Current Practices Survey Analysis

The state DOTs TID/ATIS current practices survey was conducted on state DOT officials throughout the United States to understand other states' experiences with HAR and their usage of other Advanced Traveler Information System (ATIS) technologies. Fifty-one state DOTs (fifty states plus District of Columbia) were contacted to respond to this survey and 28 DOTs completed the survey, for a completion rate of 55%. A simple summary of the results is discussed below and response frequency tables for each question can be found in Appendix M.

The following 28 states completed the survey:
- Northeast: Maine, New York, Pennsylvania
- Midwest: Indiana, Iowa, Michigan, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Wisconsin
- South: Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Oklahoma, South Carolina, Tennessee, Texas
- West: Alaska, California, Hawaii, Montana, Nevada

19 of the surveyed states currently use HAR, six have never used HAR and do not plan to use it, and three had used HAR in the past but do not currently use it. The main reasons for stopping HAR were driver feedback and maintenance issues, availability of alternative technologies, poor range, and a lot of interference. 17 states have had HAR in place for 10 years or more, with some states having it since the 1990s. Five states believe they might retire or replace their HAR systems with other technologies in the next five years, with two additional states not planning to deploy any future HAR stations. However, nine states stated they would work on improving their current HAR systems, whether by upgrading communication capabilities, improving reliability, expanding usage of portable HAR and rural implementation, and using HAR and DMS in conjunction to provide more detailed information to travelers. 12 states currently provide HAR in both rural and urban areas, four states mainly use it in urban areas, and three states mainly use it in rural areas.

HAR is mainly used to provide travelers with roadway construction information (84%), special event information (74%), alternative route information (68%), safety information (68%), weather conditions (53%), and traffic congestion locations (53%). It is used less frequently for traffic congestion durations (32%), travel times (21%), evacuation (11%), amber and silver alerts (11%), and major incident information (11%). 17 states operate their HAR system from a traffic management center. Mentioned benefits to this operational strategy include real-time notification and automated updating of HAR messages, emergency response, and coordination of HAR with DMS. Limitations include lack of cellular update capabilities, overlap of competing

messages from different events, lack of personnel in TMC (so HAR can only be operated during peak hours), interference issues, and low power output.

Many of the surveyed officials did not know specific information about the make and model of their HAR equipment, but popular makes included Information Station Specialists (ISS), Highway Information Systems (HIS), and M.H. Corbin. Six states had installed their most recent permanent HAR station in 2014 or 2015 and two states had last installed a permanent HAR station in 2000. Nine states did not know the cost of their most recent HAR installation, but cost estimates from the remaining ten states ranged from $3,600 to $100,000, with an average of around $40,000 - $50,000. Estimates for the annual operation and maintenance costs per permanent HAR unit ranged from $235 - $25,000, with 10 states not sure of the operation and maintenance costs or saying these costs vary across districts. Only two states had previously performed a benefit-cost analysis of HAR, but they did not know the results of these analyses.

10 states had experienced significant HAR maintenance issues, with 70% experiencing communication issues, 30% experiencing vandalism, 20% experiencing power supply issues, and 60% experiencing other issues (including copper theft, being hit by errant drivers, and maintaining signals). Only four states said their HAR systems were personnel intensive. The most common technical issues concerning HAR deployment were signal interference (32%); information dissemination issues (16%); and other reasons (26%), such as integration with TMC, compatibility with other systems, difficulty of using application software, and low wattage. Four states (21%) reported no issues.

Seven states had received public feedback on HAR, with 57% reporting mainly negative feedback and 43% reporting mainly positive feedback. To notify the public of HAR, 68% said they use or would use billboards or roadside signs, 58% said dynamic message signs, 53% said state DOT or local traffic agency websites, 21% said social media websites, 21% said none, 5% said commercial radio stations, and 0% said television. 68% of states said they use portable HAR systems or plan to use them in the future. Common situations to use portable HAR include construction zones (69%), special events (38%), and weather-related or other emergencies (23%).

The state DOTs were also asked about the types of traffic information they provide to the public and how they provide this information. Out of the 28 surveyed states, 96% provide roadway travel condition status, 93% provide construction information, 86% provide weather information, 86% provide safety information (such as Amber and Silver alerts), 82% provide traffic incident locations, 79% provide roadway CCTV video, 75% provide travel times, 64% provide safety messages (such as "Buckle Up"), 61% provide special event information, 43% provide alternate route information, 11% provide parking availability, and 7% provide information on transit alternatives. These information messages are disseminated to the public through various methods, including highway DMS (100%), 511 website or mobile application (86%), social media websites (82%), smartphone applications (75%), 511 phone system (71%), HAR (61%), other media outlets (such as commercial radio or television) (61%), arterial DMS (50%), other websites (25%), arrangements with third party travel information providers (25%), and in-vehicle systems (11%). All 28 states stated that their traveler information systems would change in the future, with 75% stating they might add components to their ATIS program, 68% stating

they might partner more with the private sector, 39% stating they might drop components of their ATIS program, and 11% stating they might make other changes (adding vehicle-to-infrastructure technologies, improving radio services, and using third party data probes).

The results of the State DOTs TID/ATIS current practices survey show that some of the 28 surveyed states consider HAR to be an important component of their ATIS network, especially for rural areas. However, operational issues (signal interference, low range, etc.) and the availability of new technologies, such as social media websites and smartphone applications, have caused some states to abandon or consider retiring their HAR systems. Nine states said they plan on improving their HAR systems by using more portable HAR devices, improving reliability and communication capabilities, and using HAR in conjunction with DMS to provide more detailed information. Most states use HAR to provide information on roadway construction, special events, safety situations, weather conditions, and congestion.

With the advent of new ATIS technologies, some states are reducing their deployment of HAR or replacing it, whereas others are improving their HAR systems to make them competitive with these new technologies. The portability of HAR and capability to reach many travelers in rural areas and during emergency events show that HAR can still be useful for today's travelers. Using HAR to supplement other ATIS technologies, such as DMS, can also allow for travelers to receive more detailed messages with minimal distraction and inconvenience.

5.2 FDOT Districts and Local Emergency Management Departments Survey Analysis

The FDOT districts and local emergency management departments survey was conducted on FDOT officials and emergency management departments' officials throughout the state of Florida.   A total of 37 completed surveys were collected; six from FDOT districts and Central Office (District 2, District 3, District 4, District 7, Turnpike, and Central Office) and 31 from county or city agencies. This survey asked these professionals about their experiences and opinions concerning HAR, CBRAS, and other traffic information technologies. A simple summary of the results is discussed below and response tables for each question can be found in Appendix N.

All six FDOT respondents had previous experience with HAR. Mentioned strengths of HAR included that drivers can listen to the message without looking at a phone or other device, HAR is a redundant technology in case of cellular communication failure or in emergency situations, it can provide information to a specific region, beacons can be used to alert drivers when there is an important message, and HAR can provide a lot of information compared to other alternatives (such as DMS). Weaknesses of HAR include weak AM signal, lack of access to AM band in newer vehicles, requires motorist action (tuning into radio station) to receive information, and limited transmission range. When these respondents were asked how FDOT's traveler information systems should change, two said there is no need for much change, three said the systems should be expanded to include additional components, three said FDOT should partner more with the private sector, and one said FDOT should interrupt ongoing radio broadcasts or turn on vehicle radios for emergency notifications.

45% of the 31 local emergency management department respondents said that coordination between traffic management centers, transit agencies, and emergency operation centers is very important; 48% said this coordination is important; 3% (one respondent) said this coordination is mildly important; and 3% (one respondent) had no opinion. All of these respondents had taken at least one Incident Command System course offered by the Federal Emergency Management Agency. Out of these 31 respondents, 55% said it is very important to integrate public traffic information into their agency's emergency response plan, 39% said it is important, 3% (one respondent) said it is mildly important, and 3% (one respondent) had no opinion. Only 29% of these respondents said their agency had excellent implementation of public traffic information into its emergency response plan, 45% said their agency had good implementation, 23% said their agency had fair implementation, and 3% (one respondent) had no opinion.

All 31 respondents said their agency provides emergency alert information to the public or a select audience. 90% provide media releases, 90% provide Facebook alerts, 77% provide alerts on their webpage, 74% provide email alerts, 68% provide text message alerts, 65% provide Twitter alerts, 61% provide automated phone messages, 26% provide radio alerts (including local radio AM and FM broadcasts, EAS, and iPaws), 13% use outdoor sirens or public speakers, and 23% use other methods (including apps and call centers). These agencies receive travel information via Florida 511 (55%), commercial radio reports (42%), internal radio dispatch (42%), highway DMS (36%), smartphone applications (32%), GPS navigation devices (10%), HAR (3%), and other sources (such as social media and email from FDOT) (39%). Additionally, 6% (two respondents) said their agency does not receive traffic information. The preferred smartphone apps were Google Maps (70%), vehicle navigation apps (50%), Florida 511 app (50%), Apple Maps (20%), and Waze (10%). When asked how their agency might change its traveler information systems, 33% did not expect much change, 33% thought their systems might expand, and 50% thought they might partner more with the private sector.

All 37 respondents were also asked about HAR, CBRAS, and other traffic information technologies. 30% of respondents preferred smartphone applications for their personal travel information source (27% preferred Google Maps; 18% preferred vehicle navigation apps; 18% preferred the Florida 511 app; 18% preferred Waze; and 18% preferred other apps, such as Inrix or text messaging), 14% preferred DMS, 14% preferred Florida 511, 5% preferred commercial radio reports, 8% preferred GPS navigation devices, 3% (one respondent) preferred HAR, 3% (one respondent) preferred internal radio dispatch, and 24% preferred other sources (including email alerts, reports from FHP, and social media). 76% of respondents were aware that HAR is available on Florida interstates and FTE roadways and 49% were aware that CBRAS is available on FTE roadways. 16% of agencies use CBRAS or other CB communication to broadcast emergency alerts.

To determine what technologies are important during emergency situations, the respondents were asked to rank various traffic information technologies based on their usefulness in these situations. Smartphone applications were ranked most important by 38% of respondents, followed by commercial radio reports (30%), DMS (16%), Florida 511 (11%), and GPS navigation devices (5%). CB radio was ranked least important by 54% of respondents, followed by GPS navigation devices (30%), HAR (8%), commercial radio reports (5%), and Florida 511 (3%).

73% of respondents said HAR should be maintained for emergency situations, with 27% saying that maybe it should be retained. Out of the respondents who said it should be maintained, 82% said for redundancy, 59% for portability, 59% for reliability, 44% for scalability, and 22% for other reasons (including low maintenance cost and ability to accommodate large messages). 62% of all respondents said that HAR would probably be successful during hurricane evacuations, 35% said it might be successful, and 3% (one respondent) said it would probably not be successful. 62% of respondents said CBRAS should continue to be supported, 35% said maybe it should be supported, and 3% (one respondent) said it should not be supported. Most of the respondents had many years of experience in their discipline (43% had more than 20 years experience, 19% had 16-20 years experience, 11% had 11-15 years experience, 16% had 5-10 years experience, and 11% had less than 5 years experience).

This survey shows that state and local transportation officials believe that both HAR and CBRAS should continue to be supported. HAR should be maintained due to its redundancy (which can be extremely useful in emergency situations) and its ability to provide detailed messages to drivers without causing unnecessary distractions. Over 90% of the respondents think that it is important for emergency operations centers to coordinate with traffic management centers and transit agencies and for their agencies to integrate traffic information into their emergency response plans. However, only about 74% of respondents said their agency effectively implements this information into emergency response plans. These state and local agencies prefer the use of Florida 511 and smartphone applications to send and receive travel information and emergency alerts and the majority do not envision a change in this practice.
The majority of agencies surveyed (over 70%) indicated that HAR should be maintained for emergency situations. Based on the percentages of respondents selecting the various types of HAR benefits under emergency conditions, the following are ranked from highest to lowest: redundancy, portability and reliability (these had equal percentages selecting them), and scalability. The majority of respondents believe HAR will be successful under hurricane conditions. Also, the majority of agencies surveyed (62%) supports the continuation of CBRAS.

5.3 Agency Survey Conclusions

The state DOTs TID/ATIS current practices survey showed that about one-third of the 28 surveyed states consider HAR to be an important component of their ATIS network, especially for rural areas. However, operational issues and the availability of new technologies have caused some states to consider retiring their HAR systems. Nine states said they plan on improving their HAR systems by using more portable HAR devices, improving reliability and communication capabilities, and using HAR in conjunction with DMS to provide more detailed information. Only two states had performed a benefit-cost analysis on HAR, but they did not know the results of these analyses.

The FDOT districts and local emergency management departments survey shows that state and local transportation officials believe that both HAR and CBRAS should continue to be supported. HAR should be maintained due to its redundancy (which can be extremely useful in emergency situations) and its ability to provide detailed messages to drivers without causing unnecessary distractions. These state and local agencies prefer the use of Florida 511 and

smartphone applications to send and receive travel information and emergency alerts and the majority do not envision a change in this practice. Over 70% indicated that HAR should be maintained for emergency situations and 62% support the continuation of CBRAS.

These agency survey results support the conclusions from the traveler surveys that both HAR and CBRAS should be continued. Local agencies consider HAR to be very important during emergencies, due to its redundancy and ability to broadcast detailed messages. The state DOTs survey indicates that there are common issues with HAR (such as signal interference) and that new technologies are competing with HAR. However, HAR can be used to supplement DMS and other technologies to provide more detailed messages. Making these types of changes to the existing HAR system can provide FTE and FDOT travelers additional benefits compared to the current use of HAR.

Chapter 6: HAR Benefit-Cost Analysis

The results from the six surveys indicate that FTE and FDOT should continue using HAR and possibly even expand or modify the system. To help decide on whether it is worth expanding the HAR system, a benefit-cost analysis was performed. This chapter discusses this analysis in detail, including previous research on HAR benefits and costs, related findings from the surveys conducted for this research, and assumptions made.

6.1 Previous Efforts at Evaluating HAR Benefits and Costs

This section provides a preview of the various efforts over the last two decades to evaluate the benefits and costs of HAR.

Wolshon and Schwehm (1999) estimated the cost of a HAR system in Louisiana. The total system cost was around $77,000 including "three pole mounted transmitter units, along with three accompanying sets of solar power supply systems, three tone-in-broadcast flash activation systems, and cellular telephone capability for all transmitters" (Wolshon and Schwehm, 1999). Operational costs were estimated to be $20 per month for electrical service and $30-$50 for cellular service, depending on the usage.

Walton et al. (2009) provided a range of HAR component costs, including both capital and operation & maintenance (O&M) costs. These costs were all calculated based on the 2007 ITS Cost Database and are shown in Table 6-1 below.

Table 6-1: HAR Component Costs
(Walton et al., 2009 based on 2007 ITS Cost Database)

Element	Life	Capital Cost		O&M Cost	
	Years	$K, 2007 Dollars		$K/year, 2007 Dollars	
		Low	High	Low	High
Highway Advisory Radio	20	15.00	35.00	0.60	1.00
Highway Advisory Radio Sign	10	5.00	9.00	0.25	0.25
Roadway Probe Beacon	5	5.00	8.00	0.50	0.80

Athey Creek Consultants (2014) discussed HAR system technical specifications and regulations, best practices, values, current usage and future. The cost for portable HAR with mobile operations ranges from $35,000-$50,000 and the cost for permanent HAR with frequent information at major areas ranges from $25,000-$55,000.

Maccubbin et al. (2003) discussed the unit costs of various ITS units, including HAR, as of September 2002. Table 6-2 below shows the costs for variable message signs (VMS) and HAR components. Both capital and O&M costs are much lower for HAR than for VMS systems.

Table 6-2: Some ITS Unit Costs
(Maccubbin et al., 2003)

Subsystem/Unit Cost Element	Lifetime (years)	Capital Cost ($K)		O&M Cost ($K/year)		Notes
		Low	High	Low	High	
Variable Message Sign	20	48	120	2.4	6	Low capital cost is for smaller VMS installed along arterial. High capital cost is for full matrix, LED, 3-lines, walk-in VMS installed on freeway.
Variable Message Sign Tower	20	25	125	-	-	Low capital cost is for cantilever structure. High capital cost is for a truss structure that will span across 3-4 lanes. VMS tower structure requires minimal maintenance.
Variable Message Sign - Portable	14	21.5	25.5	1.2	2	Trailer-mounted VMS (3-lines, 8-inch character display): includes trailer, solar, or diesel powered.
Highway Advisory Radio	20	16	32	0.6	1	Capital cost is for a 10-watt HAR. Includes processor, antenna, transmitters, battery back-up, cabinet, rack mounting, lighting, mounts, connectors, cable, and license fee. Super HAR costs an additional $9-10K (large antenna). Primary use of the super HAR is to gain a stronger signal.
Highway Advisory Radio Sign	10	5	-	0.25	-	Cost is for an HAR sign with flashing beacons and variable message capability. Includes cost of the controller.

Havinoviski and Sutton (2006) analyzed whether the existing HAR system in the Hampton Roads area of Virginia should be upgraded or replaced. The benefit-cost ratios were calculated for four possible alternatives: keeping HAR system as is, upgrading the HAR system to reduce transmission issues, purchasing an existing AM radio station to provide traveler information, or building a new FM radio transmitter to provide area-wide coverage.

This study presented several cost values for constructing a new radio station, purchasing an existing radio station, and repairing the existing HAR system. The average capital cost per unit was as follows:

- Option#1: Construct a new radio station.
    - Estimated cost: $467,000 (station), plus $25,000 (test equipment).
        - Total cost = 467,000 + 25,000 = $492,000 ≈ **$500,000**.
        - 25,000 watt FM station with 20 year lifespan.
- Option#2: Purchase existing radio station.
    - Capital cost = $**550,000** with 10 year lifespan.

- Option#3: Repair existing HAR system.
    - Capital cost = **$55,000** with 10 year lifespan.

This study also presented values for the average O&M cost for the same options:
- Option#1: Construct new radio station.
    - Estimated annual O&M cost = $210,000.

- Option#2: Purchase existing radio station.
    - Estimated annual O&M cost = $210,000.

- Option#3: Repair existing HAR system.
    - Estimated annual O&M cost = $200,000.

This study also assumed several values regarding the benefits gained from the system based on FHWA-IDAS. ITS Deployment Analysis System (IDAS) is a software developed by the FHWA that is used in planning for ITS deployments. Some assumptions were the following:
- 2.5% of drivers save 4 minutes of travel time.
- 25% of market listens for 10% of the time per day in which severe conditions occur.
- 0.07 vehicle-hour (4 min/vehicle) travel time savings for each HAR message during severe congestion periods.
- $16/vehicle-hour cost of time based on Texas A&M Transportation Institute (TTI) values.

Tables 6-3 through 6-5 show a summary of the benefit-cost calculation for several alternatives. Overall, the results showed that repairing the existing HAR system had one of the highest benefit-cost ratios (8.55:1).

Table 6-3: Estimated Benefits
(Havinoviski and Sutton, 2006)

Alternative	Annual Travel Savings (Vehicle-Hours)	Value of Benefits ($ based on $16/veh-hr cost of time – derived from TTI values)
Current Low-Power Transmitters:		
Design HAR Coverage	127,500	$2,040,000
Estimated Actual Coverage	85,000	$1,360,000
1000-watt AM (1450 AM –existing station)	87,500	$1,400,000
Area-wide 25,000-watt FM Transmitter	131,250	$2,100,000

Table 6-4: Estimated Annual Cost Comparison
(Havinoviski and Sutton, 2006)

Assumptions	Repair existing HAR system	Procure existing 1000 Watt AM station	Build new 25,000 Watt FM station
Capital Cost	$55,000	$550,000	$500,000
Equipment Life Span	10 years	10 years	20 years
Annualization of Capital Cost	$38,610	$64,350	$33,600
Annual Operation and Maintenance Cost	$200,000	$210,000	$210,000
Total Cost	$238,610	$269,670	$243,600

Table 6-5: Estimated Benefit-Cost Ratios
(Havinoviski and Sutton, 2006)

Alternative	Benefit ($ annual)	Cost ($ annual)	Benefit-Cost Ratio
Existing HAR System (reduced transmitter coverage)	$1.36 Million	$238,610	5.70:1
Upgrade Low-Power HAR System (if design works 100%)	$2.04 Million	$238,610	**8.55:1**
1000-watt AM (1450 AM – existing station)	$1.40 Million	$274,350	5.10:1
Area-wide 25,000-watt FM Transmitter	$2.10 Million	$243,600	**8.62:1**

Eidswick et al. (2009) presented several costs for HAR and DMS as follows:
- Rental fee for (2) portable HARs = $1600 per unit per month for 3 months = $9,600
- Rental fee for (1) portable DMS = $50 per day for 90 days = $4,500
- Delivery/pick-up for one portable DMS = $300
- Two (2) static signs with flashing beacons = $5,000 each x 2 = $10,000
- Total system cost for 3 months = $9,600 + $4,500 + $300 + $10,000 = **$24,400**

TTI published the 2015 Urban Mobility Scorecard which is a "comprehensive analysis providing a variety of traffic congestion measures in 471 urban areas across the nation" (TTI, 2015). Based on this report, the value of time for the city of Orlando, FL was equal to $17.67 per hour. This value was used for estimating the HAR benefits in this research.

6.2 Survey Answers Related to HAR Benefit-Cost Analysis

The surveys conducted in this research provided some information related to the HAR benefit-cost analysis. Four questions were asked in the state DOTs survey regarding HAR costs or a HAR benefit-cost analysis. The estimated purchase and installation cost for the agency's most recent permanent HAR unit ranged from $3,600 to $100,000. The estimated annual O&M costs for HAR ranged from $250 to $25,000. Only two states had previously conducted a HAR benefit-cost analysis, but the survey respondents from these two states did not know the results of this analysis.

Another survey result that was used for the benefit-cost analysis was the percentage of people who diverted due to a HAR congestion message. Only respondents of the HAR phone and HAR internet surveys were asked if they had diverted due to a HAR congestion message. Out of the total 1500 respondents from these two surveys, 175 respondents (11.7%) had heard a HAR congestion message and diverted due to that message. This value of 11.7% was used in the HAR benefit-cost analysis to represent the percentage of drivers who will divert when there is a HAR congestion message.

6.3 FTE HAR Utilization

Figure 6-1 and Table 6-6 below show how many HAR congestion messages were broadcast and how many HAR stations were utilized for each month on the FTE system from January 2013 to September 2015. On average, HAR congestion messages were broadcast 62 times per month, or 768 times per year, on FTE roadways.
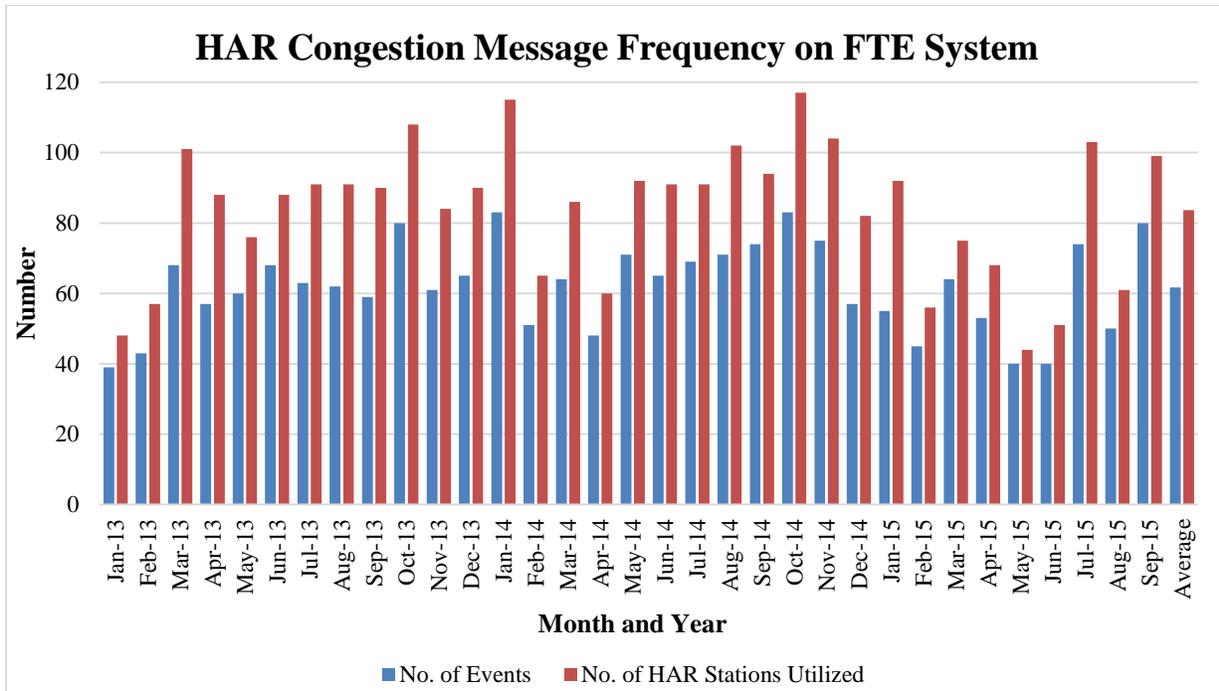
Figure 6-1: Number of HAR Congestion Messages and HAR Stations Utilized per Month
(Source: FTE)

Table 6-6: Number of HAR Congestion Messages and HAR Stations Utilized by Month

Month	Number of Messages	Number of HAR Stations Utilized
Jan-13	39	48
Feb-13	43	57
Mar-13	68	101
Apr-13	57	88
May-13	60	76
Jun-13	68	88
Jul-13	63	91
Aug-13	62	91
Sep-13	59	90
Oct-13	80	108
Nov-13	61	84
Dec-13	65	90
Jan-14	83	115
Feb-14	51	65
Mar-14	64	86
Apr-14	48	60
May-14	71	92
Jun-14	65	91
Jul-14	69	91
Aug-14	71	102
Sep-14	74	94
Oct-14	83	117
Nov-14	75	104
Dec-14	57	82
Jan-15	55	92
Feb-15	45	56
Mar-15	64	75
Apr-15	53	68
May-15	40	44
Jun-15	40	51
Jul-15	74	103
Aug-15	50	61
Sep-15	80	99
Average	**62**	**84**

6.4 FDOT HAR Capital Cost and Maintenance Cost Summary

The FTE has 16 transmitters and 35 beacons throughout its system in the state of Florida. North Florida contains 8 transmitters and 16 beacons and south Florida has 8 transmitters and 19 beacons. According to FDOT, the total annual maintenance cost for the HAR system in the state of Florida in 2012 was equal to **$81,132.89**.   The detailed maintenance costs are as follows:
- ITS maintenance contract - North Turnpike
  - Total annual routine maintenance = $14,125.19

- o Total annual preventative maintenance = $5,330.70
  - o Total annual maintenance = $14,125.19 + $5,330.70 = **$19,455.89**
- ITS maintenance contract - South Turnpike
  - o Total annual routine maintenance = $40,164.00
  - o Total annual preventative maintenance = $21,513.00
  - o Total annual maintenance = $40,164 + $21,513 = **$61,677**
- Total ITS maintenance cost (North Turnpike + South Turnpike) = $19,455.89 + $61,677 = **$81,132.89**

According to FDOT, the average unit cost for a HAR system in the state of Florida is **$115,888.23**. Per the 2012 edition of the FDOT Basis of Estimates, the HAR system consists of a radio antenna mounted on a pole, a control cabinet containing the transmitter, a power supply, communication hardware, and a conduit. The system includes a roadside HAR sign with flashing beacons to alert motorists that a message is being broadcast.

6.5 Estimation of HAR Benefit-Cost Ratio

The following analysis and estimates are based on the HAR cost information and coverage provided by FTE and FDOT, the responses from participants in the various HAR surveys conducted as part of this project, and a literature review documenting the value of time in Central Florida.

Al-Deek et al. (2009) published a paper about DMS deployment and diversion behavior of travelers on Central Florida toll roads. Based on this paper, "the average perceived travel time loss for the respondents who stayed on the toll road was 7.23 minutes (savings if they had diverted), while savings for those who actually diverted was **10.73 minutes**." (Al-Deek et al., 2009). Since there is no literature documenting travel time savings to travelers diverting due to messages broadcast on HAR, it was assumed that this same DMS travel time savings of 10.73 minutes also applies to travelers diverting due to HAR messages.

Assuming that FTE and FDOT will not construct a new HAR system and will keep the existing system, a 10-year life cycle analysis can be used to estimate the benefits and costs of HAR (similar to the analysis in the VDOT study by Havinoviski and Sutton from 2006). A discount rate of 4 percent was assumed. All annual costs were converted to present values using the following formula:

$$PV = [(1+i)^n - 1] / [i*(1+i)^n]$$

Where n = number of years (10), i = 4%.

Applying the present value formula we get the PV multiplier as follows:
$PV = [(1 + 0.04)^{10} - 1] / [0.04 * (1+0.04)^{10}] = [(1.04)^{10} - 1]/ [0.04 * (1.04)^{10}]$
  $= (1.48-1) / [0.04 (1.48)] = 0.48/ 0.0592 = \underline{\textbf{8.1109}}$

Using the PV multiplier to calculate HAR expenses for 10 years:
- Expenses per year = $81,132.89 (provided by FDOT as discussed in the previous section)
- $PV_{Expenses}$ = $81,132.89 * 8.1109 = $658,060.76

Adding this value of $658,060.76 to the initial cost of equipment ($115,888.23 as discussed in the previous section) yields a present cost of approximately $773,948.99 ($773,949 when rounded to the nearest dollar). This cost is per HAR unit, so the total cost for all 16 HAR units is **$12,383,184**.

For calculating the benefits, two possible scenarios were considered:
Scenario I
All 768 HAR messages broadcast per year are congestion messages that cause diversion to an alternate route and save travel time. In other words, 100% of HAR messages result in diversion for HAR listeners. This assumption was used to calculate the upper bound of HAR benefits.

Scenario II
Only 10% of the 768 HAR messages broadcast per year are congestion messages that cause diversion to an alternate route and save travel time. This assumption was used to calculate the lower bound of HAR benefits.

The average annual travel time savings to FTE travelers who divert as a result of HAR messages was calculated using the following assumptions:
- The average time savings that results from diversion = 10.73 minutes = 0.179 hours (based on Al-Deek et al., 2009).
- Estimated AADT on FTE mainline = 64,000 vehicles/day (FDOT Florida Traffic Online).
- Average HAR messages that are broadcast per year (based on a yearly average from January 2013 through September 2015) = 768 messages (2.1 messages per day).
- Estimated percentage of roadway users who divert due to HAR congestion message = 11.7% (based on responses to phone and online surveys).
- Value of time for Orlando, FL = $17.67 per vehicle hour (TTI, 2015)

Scenario I: Upper Bound of HAR Benefit-Cost Ratio
- The annual average travel savings on FTE system = (64,000 vpd) * (0.179 hours/message) * (2.1 messages per day) * (11.7% diversion rate) = 2,820 vehicle-hours per day = **1,029,390** vehicle-hours per year.
- The annual value of the travel time savings benefits = 1,029,390 * $17.67 = **$18,189,327**.
- PV benefits = $18,189,327 * 8.1109 = **$147,531,814**
- Upper bound of HAR benefit-cost ratio = $147,531,814 / $12,383,184 = **11.91**

Scenario II: Lower Bound of HAR Benefit/Cost Ratio
This scenario assumes only 10% of HAR messages cause diversion.
- The annual average travel savings on FTE system = (64,000 vpd) * (0.179 hours/message) * (2.1 messages per day) * (10% of messages cause diversion) * (11.7% diversion rate) = 282 vehicle-hours per day = **102,939** vehicle-hours per year.
- The annual value of the travel time savings benefits = 102,939 * $17.67 = **$1,818,932**.
- PV benefits = $1,818,932 * 8.1109 = **$14,753,176**
- Lower bound of HAR benefit-cost ratio = $14,753,176 / $12,383,184 = **1.19**

6.6 Conclusions of HAR Benefit/Cost Analysis

The benefit/cost analysis presented in this chapter was based on data provided by FDOT and FTE, as well as some assumptions. The HAR system cost includes an average capital cost for all units in the system and an average O&M cost during the assumed 10-year life cycle of the equipment. The major benefits of HAR to FTE customers are the travel time savings that result from diversion due to traffic congestion messages broadcast over HAR.

Based on the HAR cost information provided by the FTE and FDOT, coverage of HAR messages, traveler responses regarding diversion from the HAR phone and internet surveys conducted in this research, and literature review, the estimated lower and upper bounds for the HAR benefit-cost ratio are 1.19 and 11.91, respectively. All values in this range are larger than one, indicating that the benefits of HAR outweigh its costs. These values are conservative estimates that did not consider other important benefits of HAR such as providing information redundancy during emergency conditions, i.e., hurricanes and mass evacuations due to natural and man-made disasters. Additionally, HAR can provide important safety information when all other communication systems fail. Therefore, it is recommended for FTE to continue the HAR system on its roadways. The benefit-cost ratios also indicate that there is benefit in expanding the HAR system throughout the state of Florida, as there are significant benefits for the system even when its use during emergencies is not considered.

Chapter 7: Conclusions and Recommendations

Based on the survey responses and the HAR benefit-cost analysis, it is recommended to continue HAR and CBRAS on FTE and FDOT roadways. HAR can be very useful in emergencies, such as hurricanes, as it provides a redundant information source when other communications fail. Travelers who used HAR were satisfied with the system. However, only 24% of the surveyed motorists had ever used HAR and only 57% were aware of HAR. Even though many survey respondents had never used HAR, 87% said it should be continued, 84% said they would use it in the future, and 87% said they would use it in emergencies. Compared to other motorists, truck drivers were not as satisfied with HAR. However, the 12% of surveyed truck drivers who had used CBRAS were very satisfied with it.

The agency surveys provided useful information on how FTE and FDOT can improve the existing HAR system. Using HAR to broadcast detailed messages that cannot be provided over DMS is one way that other states have adapted their HAR systems. Agencies also indicated that HAR is important for emergency situations, due to its redundancy and portability.

The HAR benefit-cost analysis also indicated that HAR should be continued. If only 10% of HAR congestion messages cause diversion, the benefit-cost ratio is 1.19, which means that the value of travel time savings per year is approximately 19% greater than the cost of the system (including installation and O&M costs). These benefits could increase drastically if the benefits during emergency situations were also considered.

Based on this study, the UCF research team recommends that FTE and FDOT continue supporting HAR and CBRAS on their roadways. It is also recommended to increase the awareness of these systems by promoting them on DMS, television, and other popular travel information source and media outlets, including smartphone applications. Additionally, HAR messages should be made clearer and easier to understand and they should be used to supplement information provided through other sources. Once HAR and CBRAS usage have increased, it might be beneficial to expand these systems throughout the state. This will not only provide travel time benefits to more motorists, but also provide additional communication redundancy for hurricane evacuations and other emergency situations.

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Appendix A: UCF Institutional Review Board (IRB) Approval Letters for Surveys

University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Exempt Human Research

From: **UCF Institutional Review Board #1**
          FWA00000351, IRB00001138

To: **Haitham M. Al-Deek**

Date: **October 02, 2014**

Dear Researcher:

On 10/02/2014, the IRB approved the following activity as human participant research that is exempt from regulation:

Type of Review:	Exempt Determination
Project Title:	Evaluating the Impact and Usefulness of Highway Advisory Radio (HAR) and Citizens' Band Radio Advisory Systems (CBRAS) in Providing Traveler Information and Improving the User Experience on the Florida Turnpike Enterprise's Toll Road Network and the Florida Interstate Highway (FIH) System
Investigator:	Haitham M Al-Deek
IRB Number:	SBE-14-10639
Funding Agency:	FL Department of Transportation
Grant Title:	
Research ID:	1057181

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these changes affect the exempt status of the human research, please contact the IRB. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

Signature applied by Joanne Muratori on 10/02/2014 09:41:00 AM EDT

IRB Coordinator

Figure A-1: Initial IRB Approval Letter for HAR Phone Survey

Approval of Exempt Human Research

From: **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To: **Haitham M. Al-Deek**

Date: **October 29, 2014**

Dear Researcher:

On 10/29/2014, the IRB approved the following minor modifications to human participant research that is exempt from regulation:

Type of Review:	Exempt Determination
Modification Type:	A revised phone survey has been uploaded in iRIS and a revised consent document has been approved for use.
Project Title:	Evaluating the Impact and Usefulness of Highway Advisory Radio (HAR) and Citizens' Band Radio Advisory Systems (CBRAS) in Providing Traveler Information and Improving the User Experience on the Florida Turnpike Enterprise's Toll Road Network and the Florida Interstate Highway (FIH) System
Investigator:	Haitham M Al-Deek
IRB Number:	SBE-14-10639
Funding Agency:	FL Department of Transportation
Grant Title:	
Research ID:	1057181

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these changes affect the exempt status of the human research, please contact the IRB. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

Joanne Muratori

Signature applied by Joanne Muratori on 10/29/2014 12:10:27 PM EDT

IRB Coordinator

Figure A-2: Final IRB Approval Letter for HAR Phone Survey

University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Exempt Human Research

From: **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To: **Haitham M Al-Deek**

Date: **November 03, 2014**

Dear Researcher:

On 11/03/2014, the IRB approved the following minor modifications to human participant research that is exempt from regulation:

Type of Review:	Exempt Determination
Modification Type:	Two field surveys have been uploaded in iRIS and two consent scripts have been approved for use. In addition, the total number of study participants has been increased to 1,400 individuals. The following undergraduate research assistants have been added to the study: A. Borgmeier, J. Bruns, N. Crosby, D. Hufschmid, S. lamas, R. Mai, V. Martinez, T. McClure, F. Musmurati, S. Pope, A. Sandt, and N. Pepe. S. Aroui, J. Echevarria, and O. Mouri will be added when they activate their iRIS accounts.
Project Title:	Evaluating the Impact and Usefulness of Highway Advisory Radio (HAR) and Citizens' Band Radio Advisory Systems (CBRAS) in Providing Traveler Information and Improving the User Experience on the Florida Turnpike Enterprise's Toll Road Network and the Florida Interstate Highway (FIH) System
Investigator:	Haitham M Al-Deek
IRB Number:	SBE-14-10639
Funding Agency:	FL Department of Transportation
Grant Title:	
Research ID:	1057181

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these changes affect the exempt status of the human research, please contact the IRB. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

Joanne Muratori

Signature applied by Joanne Muratori on 11/03/2014 01:36:10 PM EST

IRB Coordinator

Figure A-3: Final IRB Approval Letter for HAR and CBRAS/HAR Field Surveys

Appendix B: HAR Phone Survey

THE UNIVERSITY OF CENTRAL FLORIDA IS CONDUCTING A SURVEY OF PEOPLE WHO USE THE FLORIDA'S TURNPIKE ENTERPRISE TOLL ROADS. WE ARE NOT SELLING OR MARKETING YOU ANYTHING. WE ARE SIMPLY TRYING TO GET YOUR UNDERSTANDING AND OPINIONS ABOUT TRAFFIC INFORMATION AND HIGHWAY ADVISORY RADIO. YOUR RESPONSES ARE VERY IMPORTANT AS THEY WILL HELP US IMPROVE THE QUALITY OF TRAFFIC INFORMATION ON THESE ROADS. YOU ARE FREE TO TERMINATE THIS SURVEY AT ANY TIME. IF YOU CHOOSE TO TERMINATE THIS SURVEY AT ANY TIME, DATA COLLECTED FROM YOUR RESPONSE WILL NOT BE USED UNLESS YOU EXPLICITLY ALLOW US TO USE IT. ALL ANSWERS ARE STRICTLY CONFIDENTIAL AND THE SURVEY WILL ONLY TAKE A FEW MINUTES OF YOUR TIME.

WOULD YOU LIKE TO PARTICIPATE IN THIS SURVEY? (Yes, No) **(if "No", terminate survey)**

Are you 18 years old or older? (Yes, No) **(if "No", terminate survey)**

1. Have you traveled on the Florida Turnpike in the past year?
    a. Yes
    b. No **(if "No", terminate survey)**

(If participant does not terminate, operator should note participant's gender)

Gender: (Male, Female)

2. What is the purpose of your most common trip on the Florida Turnpike?
    a. Travel to/from work or school **(if "Travel to/from work or school", proceed to question 3, otherwise proceed to question 6)**
    b. Shopping
    c. Leisure/vacation
    d. Other

3. Excluding intermediate stops, how long does this trip on the Florida Turnpike typically take?
    a. Less than 15 minutes
    b. 15-30 minutes
    c. 31-45 minutes
    d. 46-60 minutes
    e. More than 60 minutes

4. Excluding the Florida Turnpike, how many other routes have you ever taken for this trip?
   a. None **(if "None", proceed to question 6; otherwise proceed to question 5)**
   b. One
   c. Two
   d. Three
   e. Four or more

5. Excluding intermediate stops, how long does this trip typically take using the best alternate route?
   a. Less than 15 minutes
   b. 15-30 minutes
   c. 31-45 minutes
   d. 46-60 minutes
   e. More than 60 minutes

6. How many times per week do you travel on the Florida Turnpike?
   a. Once a week or less
   b. 2-5 times a week
   c. 6-10 times a week
   d. More than 10 times a week

7. How do you prefer to receive travel information, such as traffic conditions, road closures, and special events information while traveling?
   a. Commercial Radio Reports
   b. Florida 511
   c. Highway Electronic Message Signs
   d. Smartphone Applications **(if "Smartphone Applications", proceed to question 8)**
   e. Highway Advisory Radio (HAR)
   f. Citizens' Band (CB) Radio
   g. GPS Navigation Device

(For all answer choices except "Smartphone Applications", proceed to question 9)

8. What is your preferred smartphone application?
   a. Vehicle Navigation Smartphone Apps (TomTom, Garmin, Magellan, etc...)
   b. Waze Social GPS Maps
   c. Google Maps
   d. Apple Maps
   e. Other

9. What do you like most about your preferred source of travel information you selected?
    a. Ease of use
    b. Information accuracy
    c. On-time delivery of information
    d. Location-specific information
    e. Availability of safety or security information
    f. Availability of special event information
    g. Other reasons

10. Highway Advisory Radio (HAR) is a radio station (AM 1640) dedicated to 24-hour highway travel information. Are you aware that Highway Advisory Radio is available on the Florida Turnpike?
    a. Yes **(if "Yes", proceed to question 11)**
    b. No **(if "No", proceed to question 20)**

11. How did you first become aware that Highway Advisory Radio is available on the Florida Turnpike?
    a. Signs along Florida Turnpike
    b. Friend or relative
    c. Florida Turnpike website
    d. Other

12. Have you ever used Highway Advisory Radio while traveling on the Florida Turnpike?
    a. Yes **(if "Yes", proceed to question 13)**
    b. No **(if "No", proceed to question 20)**

13. How frequently do you use Highway Advisory Radio during your trips on the Florida Turnpike?
    a. Always
    b. Often
    c. Sometimes
    d. Rarely

14. How would you rate your experience with Highway Advisory Radio and the travel information it provides?
    a. Strongly Satisfied
    b. Satisfied
    c. Dissatisfied
    d. Strongly Dissatisfied

(if "Strongly Satisfied" or "Satisfied", proceed to question 15.A; if "Dissatisfied" or "Strongly Dissatisfied", proceed to question 15.B)

15. A. Which answer best describes your strongest opinion on Highway Advisory Radio and the travel information it provides?
    a. Information is accurate and up-to-date
    b. Easy to access
    c. Easy to understand
    d. Provides location-specific information

(Proceed to question 16)

15. B. Which answer best describes your strongest opinion on Highway Advisory Radio and the travel information it provides?
    a. Information is not accurate and up-to-date
    b. Not easy to access
    c. Not easy to understand
    d. Does not provide location-specific information
    e. Needs a wider coverage area

16. What is the most important type of traffic information you think should be broadcast on Highway Advisory Radio?
    a. Traffic congestion locations and durations
    b. Weather conditions
    c. Roadway construction
    d. Special events
    e. Alternate route information
    f. Safety information

17. While traveling on the Florida Turnpike, have you ever heard a message on Highway Advisory Radio that informed you of congestion?
    a. Yes **(if "Yes", proceed to question 18)**
    b. No **(if "No", proceed to question 20)**

18. Did you exit off the Florida Turnpike to avoid this congestion?
    a. Yes **(if "Yes", proceed to question 20)**
    b. No **(if "No", proceed to question 19)**

19. Why did you stay on the Florida Turnpike?
    a. Unfamiliar with alternate routes
    b. Did not trust accuracy of Highway Advisory Radio message
    c. Alternate route would still take more time
    d. No alternate routes available
    e. Other

20. While traveling on the Florida Turnpike, what amount of delay broadcast on Highway Advisory Radio would make you exit off the Florida Turnpike?
    a. 15 minutes
    b. 30 minutes
    c. 45 minutes
    d. More than 45 minutes
    e. Would not exit off the Florida Turnpike

(if "Would not exit off the Florida Turnpike", proceed to Question 21; otherwise proceed to Question 22)

21. What is the main reason you would stay on the Florida Turnpike?
    a. Unfamiliar with alternate routes
    b. Would not trust accuracy of Highway Advisory Radio message
    c. Alternate route would likely take more time
    d. No alternate routes available
    e. Other reasons

22. If there was an emergency, such as a hurricane, that required you to evacuate your area of residence in Florida and Highway Advisory Radio was available for emergency broadcasts, would you use Highway Advisory Radio?
    a. Yes
    b. No
    c. Yes, but would seek out other sources of information first

23. To increase awareness of Highway Advisory Radio, where do you think is the best place to promote or advertise Highway Advisory Radio?
    a. Television
    b. Popular Radio Stations
    c. Florida Turnpike and/or Florida Department of Transportation Website
    d. Social Media Website
    e. Highway Electronic Message Signs
    f. Billboard

24. Should Highway Advisory Radio service be continued or discontinued?
    a. Continued
    b. Discontinued
    c. Impartial

25. If Highway Advisory Radio service is discontinued, what alternatives would you use to obtain travel information? (select all that apply)
    a. Commercial Radio Reports
    b. Florida 511
    c. Internet
    d. Highway Electronic Message Signs
    e. Smartphone Applications
    f. Citizens' Band (CB) Radio
    g. Other alternative

26. If Highway Advisory Radio service is continued, would you use Highway Advisory Radio in the future?
    a. Yes
    b. No

27. Which of the following best describes your age?
    a. 18-25 years
    b. 26-35 years
    c. 36-50 years
    d. 51-65 years
    e. Over 65 years

28. What is your highest level of education reached?
    a. High School Diploma or less
    b. Some College
    c. Associate Degree
    d. Bachelor Degree
    e. Post Graduate Degree

Thank you for participating in this survey.

END OF SURVEY

Appendix C: HAR Internet Survey

THE UNIVERSITY OF CENTRAL FLORIDA IS CONDUCTING A SURVEY OF PEOPLE WHO USE THE FLORIDA'S TURNPIKE ENTERPRISE TOLL ROADS. WE ARE NOT SELLING OR MARKETING YOU ANYTHING. WE ARE SIMPLY TRYING TO GET YOUR UNDERSTANDING AND OPINIONS ABOUT TRAFFIC INFORMATION AND HIGHWAY ADVISORY RADIO. YOUR RESPONSES ARE VERY IMPORTANT AS THEY WILL HELP US IMPROVE THE QUALITY OF TRAFFIC INFORMATION ON THESE ROADS. YOU ARE FREE TO TERMINATE THIS SURVEY AT ANY TIME. IF YOU CHOOSE TO TERMINATE THIS SURVEY AT ANY TIME, DATA COLLECTED FROM YOUR RESPONSE WILL NOT BE USED UNLESS YOU EXPLICITLY ALLOW US TO USE IT. ALL ANSWERS ARE STRICTLY CONFIDENTIAL AND THE SURVEY WILL ONLY TAKE A SHORT AMOUNT OF YOUR TIME.

WOULD YOU LIKE TO PARTICIPATE IN THIS SURVEY? (Yes, No) **(if "No", terminate survey)**

Please enter your age. _____ **(if below 18 terminate survey)**

Are you…?
- Male
- Female

Please enter your zip. (**Terminate if invalid zip based on the list**)

1. Have you traveled on the Florida Turnpike in the past year?
   a. Yes
   b. No **(if "No", terminate survey)**

2. What is the purpose of your most common trip on the Florida Turnpike?
   a. Travel to/from work or school
   b. Shopping
   c. Leisure/vacation
   d. Other

3. Excluding intermediate stops, how long does this trip on the Florida Turnpike typically take?
   a. Less than 15 minutes
   b. 15-30 minutes
   c. 31-45 minutes
   d. 46-60 minutes
   e. More than 60 minutes

4. How many alternate routes besides the Florida Turnpike have you ever taken for this trip?
   a. None **(if "None", proceed to question 6 and automatically select "Do not know alternate routes" for question 5)**
   b. One
   c. Two
   d. Three
   e. Four or more

(For all answer choices except "None", proceed to question 5)

5. Excluding intermediate stops, how long does this trip typically take using the best alternate route?
   a. Less than 15 minutes
   b. 15-30 minutes
   c. 31-45 minutes
   d. 46-60 minutes
   e. More than 60 minutes
   f. Do not know alternate routes **("Do not know alternate routes" should be automatically selected for respondents who answered "None" to question 4 and should not be shown to any respondents)**

6. How many times per week do you travel on the Florida Turnpike?
   a. Once a week or less
   b. 2-5 times a week
   c. 6-10 times a week
   d. More than 10 times a week

7. What is your most preferred method of receiving travel information, such as traffic conditions, road closures, and special events information while traveling?
   a. Commercial Radio Reports
   b. Florida 511
   c. Highway Electronic Message Signs
   d. Smartphone Applications **(if "Smartphone Applications", proceed to question 8)**
   e. Highway Advisory Radio (HAR)
   f. Citizens' Band (CB) Radio
   g. GPS Navigation Device

(For all answer choices except "Smartphone Applications", proceed to question 9)

8. What is your preferred smartphone application?
   a. Vehicle Navigation Smartphone Apps (TomTom, Garmin, Magellan, etc...)
   b. Waze Social GPS Maps
   c. Google Maps
   d. Apple Maps

e. Other (please specify):
9. What do you like most about your preferred source of travel information you selected?
   a. Ease of use
   b. Information accuracy
   c. On-time delivery of information
   d. Location-specific information
   e. Availability of safety or security information
   f. Availability of special event information
   g. Other (please specify):

10. Highway Advisory Radio (HAR) is a radio station (AM 1640) dedicated to 24-hour highway travel information. Are you aware that Highway Advisory Radio is available on the Florida Turnpike?
    a. Yes **(if "Yes", proceed to question 11)**
    b. No **(if "No", proceed to question 20)**

11. How did you first become aware that Highway Advisory Radio is available on the Florida Turnpike?
    a. Signs along Florida Turnpike (see picture below)
    b. Friend or relative
    c. Florida Turnpike website
    d. Other (please specify):

Figure C-1: Highway Advisory Radio Sign
(Source: Florida Turnpike Enterprise Website)

12. Have you ever used Highway Advisory Radio while traveling on the Florida Turnpike?
    a. Yes **(if "Yes", proceed to question 13)**
    b. No **(if "No", proceed to question 20)**

13. How frequently do you use Highway Advisory Radio during your trips on the Florida Turnpike?
    a. Always
    b. Often
    c. Sometimes
    d. Rarely

14. How would you rate your experience with Highway Advisory Radio and the travel information it provides?
   a. Strongly Satisfied
   b. Satisfied
   c. Dissatisfied
   d. Strongly Dissatisfied

(if "Strongly Satisfied" or "Satisfied", proceed to question 15.A; if "Dissatisfied" or "Strongly Dissatisfied", proceed to question 15.B)

15. A. Which answer best describes your strongest opinion on Highway Advisory Radio and the travel information it provides?
   a. Information is accurate and up-to-date
   b. Easy to access
   c. Easy to understand
   d. Provides location-specific information

(Proceed to question 16)

15. B. Which answer best describes your strongest opinion on Highway Advisory Radio and the travel information it provides?
   a. Information is not accurate and up-to-date
   b. Not easy to access
   c. Not easy to understand
   d. Does not provide location-specific information
   e. Needs a wider coverage area

16. What is the most important type of traffic information you think should be broadcast on Highway Advisory Radio?
   a. Traffic congestion locations and durations
   b. Weather conditions
   c. Roadway construction
   d. Special events
   e. Alternate route information
   f. Safety information

17. While traveling on the Florida Turnpike, have you ever heard a message on Highway Advisory Radio that informed you of congestion?
   a. Yes **(if "Yes", proceed to question 18)**
   b. No **(if "No", proceed to question 20)**

18. Did you exit off the Florida Turnpike to avoid this congestion?
   a. Yes **(if "Yes", proceed to question 20)**
   b. No **(if "No", proceed to question 19)**

19. Why did you stay on the Florida Turnpike?
   a. Unfamiliar with alternate routes
   b. Did not trust accuracy of Highway Advisory Radio message
   c. Alternate route would still take more time
   d. No alternate routes available
   e. Other (please specify):

20. While traveling on the Florida Turnpike, what amount of delay broadcast on Highway Advisory Radio would make you exit off the Florida Turnpike?
   a. 15 minutes
   b. 30 minutes
   c. 45 minutes
   d. More than 45 minutes
   e. Would not exit off the Florida Turnpike

(if "Would not exit off the Florida Turnpike", proceed to Question 21; otherwise proceed to Question 22)

21. What is the main reason you would stay on the Florida Turnpike?
   a. Unfamiliar with alternate routes
   b. Would not trust accuracy of Highway Advisory Radio message
   c. Alternate route would likely take more time
   d. No alternate routes available
   e. Other (please specify):

22. If there was an emergency, such as a hurricane, that required you to evacuate your area of residence in Florida and Highway Advisory Radio was available for emergency broadcasts, would you use Highway Advisory Radio?
   a. Yes
   b. No
   c. Yes, but would seek out other sources of information first

23. To increase awareness of Highway Advisory Radio, where do you think is the best place to promote or advertise Highway Advisory Radio?
   a. Television
   b. Popular Radio Stations
   c. Florida Turnpike and/or Florida Department of Transportation Website
   d. Social Media Website
   e. Highway Electronic Message Signs
   f. Billboard

The next three questions are about the Highway Advisory Radio message below which indicates traffic congestion on the Florida Turnpike.

(A sample congestion audio message was provided before question 24 along with the above text so the survey respondent could read the text and play the audio message before answering question 24.)

24. If you heard this message while traveling on the Florida Turnpike, what would you be most likely to do?
    a. Exit off the Florida Turnpike at the next opportunity and finish your trip using another route.
    b. Exit off the Florida Turnpike at the next opportunity and get back on the Florida Turnpike to finish your trip.
    c. Stay on the Florida Turnpike, but drive more cautiously.
    d. Stay on the Florida Turnpike without changing your driver behavior.
    e. Cancel your trip.

25. Was this message easy to understand?
    a. Yes
    b. No

26. Would you consider this type of message to be beneficial if you heard it while traveling on the Florida Turnpike?
    a. Yes
    b. No

The next three questions are about the Highway Advisory Radio message below which indicates bad weather conditions on the Florida Turnpike.

(A sample hurricane evacuation audio message was provided before question 27 along with the above text so the survey respondent could read the text and play the audio message before answering question 27.)

27. If you heard this message while traveling on the Florida Turnpike, what would you be most likely to do?
    a. Exit off the Florida Turnpike at the next opportunity and finish your trip using another route.
    b. Exit off the Florida Turnpike at the next opportunity and get back on the Florida Turnpike to finish your trip.
    c. Stay on the Florida Turnpike, but drive more cautiously.
    d. Stay on the Florida Turnpike without changing your driver behavior.
    e. Cancel your trip.

28. Was this message easy to understand?
    a. Yes
    b. No

29. Would you consider this type of message to be beneficial if you heard it while traveling on the Florida Turnpike?
    a. Yes
    b. No

30. Should Highway Advisory Radio service be continued or discontinued?
   a. Continued
   b. Discontinued
   c. Impartial

31. If Highway Advisory Radio service is discontinued, what alternatives would you use to obtain travel information? (select all that apply)
   a. ☐ Commercial Radio Reports
   b. ☐ Florida 511
   c. ☐ Internet
   d. ☐ Highway Electronic Message Signs
   e. ☐ Smartphone Applications
   f. ☐ Citizens' Band (CB) Radio
   g. ☐ Other (please specify):

32. If Highway Advisory Radio service is continued, would you use Highway Advisory Radio in the future?
   a. Yes
   b. No

33. What is your gender?
   a. Male
   b. Female

34. Which of the following best describes your age?
   a. 18-25 years
   b. 26-35 years
   c. 36-50 years
   d. 51-65 years
   e. Over 65 years

35. What is your highest level of education reached?
   a. High School Diploma or less
   b. Some College
   c. Associate Degree
   d. Bachelor Degree
   e. Post Graduate Degree

36. What is your current job status?
   a. Unemployed **(if "Unemployed", proceed to question 42)**
   b. Part-time
   c. Full-time
   d. Retired **(if "Retired", proceed to question 42)**

37. What industry do you currently work in? (select all that apply)
    a. ☐ Agriculture, Fishing, Forestry and Mining
    b. ☐ Business and Professional Services
    c. ☐ Construction
    d. ☐ Educational Services
    e. ☐ Finance and Insurance
    f. ☐ Government (City, County, State, Tribal & Federal)
    g. ☐ Health Services
    h. ☐ Information (Publishing, Broadcast, Telecommunications, Data Processing)
    i. ☐ Leisure and Hospitality (Arts, Entertainment, Recreation, and Food Services)
    j. ☐ Manufacturing
    k. ☐ Real Estate, Rental, and Leasing
    l. ☐ Retail and Wholesale Trade
    m. ☐ Transportation and Warehousing
    n. ☐ Utilities
    o. ☐ Other Services (Repair/Maintenance, Religious, Personal Services, etc.)

38. How severe are the consequences if you are 30 minutes late to your job or a job appointment because of unexpected traffic congestion?
    a. Very severe (could lose job if frequent)
    b. Somewhat severe (could be reprimanded if frequent)
    c. Not severe (could adjust my shift)
    d. Not a big deal at all (I can set my own hours)
    e. Varies depending on the day or the specific appointment

39. How many hours do you typically work per week?
    a. Less than 10
    b. 10-19
    c. 20-29
    d. 30-39
    e. 40-49
    f. 50 or more

40. How many days do you typically work per week?
    a. One or two
    b. Three or four
    c. Five
    d. Six or seven

41. What is your estimated personal yearly gross income (before taxes or benefits are taken out)?
    a. Less than $10,000
    b. $10,000 - $14,999
    c. $15,000 - $24,999
    d. $25,000 - $34,999
    e. $35,000 - $49,999
    f. $50,000 - $74,999
    g. $75,000 - $99,999
    h. $100,000 - $149,999
    i. $150,000 - $199,999
    j. $200,000 or more

42. Which of the following toll transponders do you own?
    a. Sunpass
    b. E-Pass
    c. Neither

43. How much do you typically spend on tolls per month?
    a. Between $0 and $20
    b. Between $21 and $40
    c. Between $41 and $60
    d. Between $61 and $80
    e. Between $81 and $100
    f. Over $100 a month

44. How long have you lived in Florida?
    a. Less than 6 months
    b. Between 6 and 12 months
    c. Between 1 and 5 years
    d. Between 5 and 10 years
    e. More than 10 years

Thank you for participating in this survey.

END OF SURVEY

Appendix D: HAR Field Survey for Travelers/Tourists

Student should select Survey Roadway: Florida Turnpike
                                              I-75 (Charlotte Rest Area)
                                              I-95 (St. Lucie Rest Area)

[Student must select appropriate roadway and that roadway (Florida Turnpike, I-75, or I-95) will be selected automatically in questions that have roadway names in them.]

If student selects Florida Turnpike above then the student must select one of the three service plazas on Florida Turnpike: **(Student must select one of the following three service plazas)**

1) Turkey Lake Service Plaza
2) Okahumpka Service Plaza
3) Canoe Creek Service Plaza

If student selects I-75 (Charlotte Rest Area) or I-95 (St. Lucie Rest Area) then there are no more choices since it is only one location for each of these two interstates. In other words, the service plaza selection (one of the three) is only if the student selects the Florida Turnpike as the roadway for the survey.

_____

Hello, my name is _____ and I am an undergraduate student researcher with the University of Central Florida. We are conducting a survey on your understanding and opinions about traffic information and Highway Advisory Radio. Your responses are very important as they will help improve the quality of traffic information on Florida toll roads and interstates. We are not selling or marketing you anything. You are free to terminate this survey at any time. If you choose to terminate this survey, data collected from your responses will not be used without your explicit permission. All responses are strictly confidential. This survey will only take a few minutes of your time.

Would you like to participate in this survey? (Yes, No) **(if "No", terminate survey)**

Are you 18 years old or older? (Yes, No) **(if "No", terminate survey)**
(only asked to participants who could possibly be under 18)

[If participant does not terminate, student should note participant's gender (Male, Female)]

Gender: (Male, Female)

1. What is the purpose of your current trip on the Florida Turnpike/I-75/I-95? (note that only one road should show in this question (and all other questions with roadway names) depending on selection of student for roadway location at the start of the survey)
    a. Travel to/from work or school
    b. Shopping
    c. Leisure/vacation
    d. Other

2. How many times per week do you travel on the Florida Turnpike/I-75/I-95?
    a. Once a week or less
    b. 2-5 times a week
    c. 6-10 times a week
    d. More than 10 times a week

3. How do you prefer to receive travel information, such as traffic conditions, road closures, and special events information while traveling?
    a. Commercial Radio Reports
    b. Highway Electronic Message Signs
    c. Smartphone Applications **(if "Smartphone Applications", proceed to question 4)**
    d. Highway Advisory Radio (HAR)
    e. Citizens' Band (CB) Radio
    f. Florida 511
    g. GPS Navigation Device

(For all answer choices except "Smartphone Applications", proceed to question 5)

4. What is your preferred smartphone application?
    a. Vehicle Navigation Smartphone Apps (TomTom, Garmin, Magellan, etc...)
    b. Waze Social GPS Maps
    c. Google Maps
    d. Apple Maps
    e. Other

5. What do you like most about your preferred source of travel information you selected?
    a. Ease of use
    b. Information accuracy
    c. On-time delivery of information
    d. Location-specific information
    e. Availability of safety or security information
    f. Availability of special event information

6. Highway Advisory Radio (HAR) is a radio station (AM 1640) dedicated to 24-hour highway travel information. Are you aware that HAR is available on the Florida Turnpike/I-75/I-95?
   a. Yes **(if "Yes", proceed to question 7)**
   b. No **(if "No", proceed to question 13)**

7. How did you first become aware that HAR is available on the Florida Turnpike/I-75/I-95?
   a. Signs along roadway
   b. Friend or relative
   c. Florida Turnpike or Florida Department of Transportation website
   d. Other

8. Have you ever used HAR while traveling on the Florida Turnpike/I-75/I-95?
   a. Yes **(if "Yes", proceed to question 9)**
   b. No **(if "No", proceed to question 13)**

9. How frequently do you use HAR during your trips on the Florida Turnpike/I-75/I-95?
   a. Always
   b. Often
   c. Sometimes
   d. Rarely

10. How would you rate your experience with HAR and the travel information it provides?
    a. Strongly Satisfied
    b. Satisfied
    c. Dissatisfied
    d. Strongly Dissatisfied

(if "Strongly Satisfied" or "Satisfied", proceed to question 11.A; if "Dissatisfied" or "Strongly Dissatisfied", proceed to question 11.B)

11. A. Which answer best describes your strongest opinion on HAR and the travel information it provides?
    a. Information is accurate and up-to-date
    b. Easy to access
    c. Easy to understand
    d. Provides location-specific information

(Proceed to question 12)

11. B. Which answer best describes your strongest opinion on HAR and the travel information it provides?
    a. Information is not accurate and up-to-date
    b. Not easy to access
    c. Not easy to understand
    d. Does not provide location-specific information
    e. Needs a wider coverage area

12. What is the most important type of traffic information you think should be broadcast on HAR?
    a. Traffic congestion locations and durations
    b. Weather conditions
    c. Roadway construction
    d. Special events
    e. Alternate route information
    f. Safety information

13. If you were required to evacuate the area of Florida that you reside in because of a hurricane and HAR was available for emergency broadcasts, would you use HAR?
    a. Yes
    b. No
    c. Yes, but would seek out other sources of information first

14. To increase awareness of HAR, where do you think is the best place to promote or advertise HAR?
    a. Television
    b. Popular Radio Stations
    c. Social Media Websites
    d. Florida Turnpike and/or Florida Department of Transportation Website
    e. Highway Electronic Message Signs
    f. Billboard

15. Should HAR service be continued or discontinued?
    a. Continued
    b. Discontinued

16. If HAR service is discontinued, what alternatives would you use to obtain travel information? (select all that apply)
    a. Commercial Radio Reports
    b. Internet
    c. Highway Electronic Message Signs
    d. Smartphone Applications
    e. Citizens' Band (CB) Radio
    f. Florida 511

17. If HAR service is continued, would you use HAR in the future?
    a. Yes
    b. No

18. Do you live in Florida?
    a. Yes
    b. No

19. Which of the following best describes your age?
    a. 18-25 years
    b. 26-35 years
    c. 36-50 years
    d. 51-65 years
    e. Over 65 years

20. What is your highest level of education reached?
    a. High School Diploma or less
    b. Some College
    c. Associate Degree
    d. Bachelor Degree
    e. Post Graduate Degree

Thank you for participating in this survey.

END OF SURVEY

Appendix E: CBRAS/HAR Truck Driver Field Survey

Student should select Survey Roadway: Florida Turnpike
                                           I-75 (Charlotte Rest Area)
                                           I-95 (St. Lucie Rest Area)

[Student must select appropriate roadway and then appropriate roadway (Florida Turnpike, I-75, or I-95) will be selected automatically in questions that have roadway names in them.]

If student selects Florida Turnpike above then the student must select one of the three service plazas on Florida Turnpike: **(Student must select one of the following three service plazas)**

1) Turkey Lake Service Plaza
2) Okahumpka Service Plaza
3) Canoe Creek Service Plaza

If student selects I-75 (Charlotte Rest Area) or I-95 (St. Lucie Rest Area) then there are no more choices since it is only one location for each of these two interstates. In other words, the service plaza selection (one of the three) is only if the student selects the Florida Turnpike as the roadway for the survey.
_____

Hello, my name is _____ and I am an undergraduate student researcher with the University of Central Florida. We are conducting a survey on your understanding and opinions about traffic information systems such as Citizens' Band Radio Advisory System or Highway Advisory Radio. Your responses are very important as they will help improve the quality of traffic information on Florida Turnpike Enterprise roadways and interstates. We are not selling or marketing you anything. You are free to terminate this survey at any time. If you choose to terminate this survey, data collected from your responses will not be used without your explicit permission. All responses are strictly confidential. This survey will only take a few minutes of your time.

Would you like to participate in this survey? (Yes, No) **(if "No", terminate survey)**

[If participant does not terminate, student should note participant's gender (Male, Female)]

Gender: (Male, Female)

1. Do you have a Citizens' Band (CB) radio in your truck?
   a. Yes **(if "Yes", proceed to question 2)**
   b. No **(if "No", proceed to question 3)**

2. How often do you use CB radio for travel information?
    a. Always
    b. Often
    c. Sometimes
    d. Rarely
    e. Never

3. Do you live in Florida?
    a. Yes
    b. No

4. How many times per week do you travel on the Florida Turnpike/I-75/I-95? (note that only one road should show in this question (and all other questions with all three roadway names) depending on selection of student for roadway location at the start of the survey)
    a. Once a week or less
    b. 2-5 times a week
    c. 6-10 times a week
    d. More than 10 times a week

5. How do you prefer to receive travel information, such as traffic conditions, road closures, and special events information while traveling?
    a. CB Radio
    b. Information from your dispatcher
    c. Highway Advisory Radio (HAR)
    d. Highway Electronic Message Signs
    e. Smartphone Applications **(if "Smartphone Applications", proceed to question 6)**
    f. Commercial Radio
    g. Florida 511
    h. GPS Navigation Device

(For all answer choices except "Smartphone Applications", proceed to question 7)

6. What is your preferred smartphone application?
    a. Vehicle Navigation Smartphone Apps (TomTom, Garmin, Magellan, etc...)
    b. Waze Social GPS Maps
    c. Google Maps
    d. Apple Maps
    e. Other

7. What do you like most about your preferred source of travel information you selected?
   a. Ease of use
   b. Information accuracy
   c. On-time delivery of information
   d. Location-specific information
   e. Availability of safety or security information
   f. Availability of special event information

(Participants who answered "Yes" to Question 1 should be asked Set A questions next; participants who answered "No" to Question 1 should be asked Set B questions next)

Set A Questions
(only asked to participants who answered "Yes" to Question 1)
These questions concern CBRAS.

1A. Citizens' Band Radio Advisory System (CBRAS) is a traffic information channel (channel 19) broadcasted over CB radios. Are you aware that CBRAS is available on the Florida Turnpike?
   a. Yes **(if "Yes", proceed to question 2A)**
   b. No **(if "No", proceed to Set B questions)**

2A. Have you ever used CBRAS while traveling on the Florida Turnpike?
   a. Yes **(if "Yes", proceed to question 3A)**
   b. No **(if "No", proceed to Set B questions)**

3A. How frequently do you use CBRAS during your trips on the Florida Turnpike?
   a. Always
   b. Often
   c. Sometimes
   d. Rarely

4A. How would you rate your experience with CBRAS and the travel information it provides?
   a. Strongly Satisfied
   b. Satisfied
   c. Dissatisfied
   d. Strongly Dissatisfied

(if "Strongly Satisfied" or "Satisfied", proceed to question 5A.A; if "Dissatisfied" or "Strongly Dissatisfied", proceed to question 5A.B)

5A. A. Which answer best describes your strongest opinion on CBRAS and the travel information it provides?
        a. Information is accurate and up-to-date
        b. Easy to access
        c. Easy to understand
        d. Provides location-specific information
(Proceed to question 6A)

5A. B. Which answer best describes your strongest opinion on CBRAS and the travel information it provides?
        a. Information is not accurate and up-to-date
        b. Not easy to access
        c. Not easy to understand
        d. Does not provide location-specific information
        e. Needs a wider coverage area

6A. While traveling on the Florida Turnpike, have you ever heard a message on CBRAS that informed you of congestion?
        a. Yes **(if "Yes", proceed to question 7A)**
        b. No **(if "No", proceed to question 8A)**

7A. Did you divert off the Florida Turnpike to avoid this congestion?
        a. Yes
        b. No

8A. How many years of professional truck driving experience do you have?
        a. Less than five years
        b. 5-10 years
        c. 11-15 years
        d. 16-20 years
        e. More than 20 years

End of Survey

Set B Questions
(only asked to participants who answered "No" to Questions 1, 1A, or 2A)
These questions concern HAR.

1B. Have you ever used Highway Advisory Radio (HAR) while traveling on the Florida Turnpike/I-75/I-95?
        a. Yes **(if "Yes", proceed to question 2B)**
        b. No **(if "No", end survey)**

2B. How frequently do you use HAR during your trips on the Florida Turnpike/I-75/I-95?
- a. Always
- b. Often
- c. Sometimes
- d. Rarely

3B. How would you rate your experience with HAR and the travel information it provides?
- a. Strongly Satisfied
- b. Satisfied
- c. Dissatisfied
- d. Strongly Dissatisfied

(if "Strongly Satisfied" or "Satisfied", proceed to question 4B.A; if "Dissatisfied" or "Strongly Dissatisfied", proceed to question 4B.B)

4B. A. Which answer best describes your strongest opinion on HAR and the travel information it provides?
- a. Information is accurate and up-to-date
- b. Easy to access
- c. Easy to understand
- d. Provides location-specific information

(Proceed to question 5B)

4B. B. Which answer best describes your strongest opinion on HAR and the travel information it provides?
- a. Information is not accurate and up-to-date
- b. Not easy to access
- c. Not easy to understand
- d. Does not provide location-specific information
- e. Needs a wider coverage area

5B. While traveling on the Florida Turnpike/I-75/I-95, have you ever heard a message on HAR that informed you of congestion?
- a. Yes **(if "Yes", proceed to question 6B)**
- b. No **(if "No", proceed to question 7B)**

6B. Did you divert off the Florida Turnpike/I-75/I-95 to avoid this congestion?
- a. Yes
- b. No

7B. How many years of professional truck driving experience do you have?
      a. Less than five years
      b. 5-10 years
      c. 11-15 years
      d. 16-20 years
      e. More than 20 years

End of Survey

Appendix F: State DOTs TID/ATIS Current Practices Survey

THE UNIVERSITY OF CENTRAL FLORIDA IS CONDUCTING A SURVEY OF STATE DOTs. WE ARE NOT SELLING OR MARKETING ANYTHING TO YOU. WE ARE SIMPLY TRYING TO GET INFORMATION REGARDING YOUR EXPERIENCES AND OPINIONS ABOUT TRAFFIC INFORMATION DISSEMINATION TECHNOLOGIES, SPECIFICALLY HIGHWAY ADVISORY RADIO. YOU ARE FREE TO TERMINATE THIS SURVEY AT ANY TIME. IF YOU CHOOSE TO TERMINATE THIS SURVEY EARLY, DATA COLLECTED FROM YOUR RESPONSES WILL NOT BE USED UNLESS YOU EXPLICITLY ALLOW US TO USE IT. THIS SURVEY WILL ONLY TAKE A FEW MINUTES OF YOUR TIME.

WOULD YOU LIKE TO PARTICIPATE IN THIS SURVEY? (Yes, No) **(if "No", terminate survey)**

1. Please provide the following information.
   Name:
   Title:
   Agency:
   Phone number: (Programmer: Make sure a valid phone number is entered)
   E-mail: (Programmer: Make sure a valid E-mail is entered)

2. Has your agency ever used/deployed HAR or plan to use/deploy HAR in the future? (Check only one of the following choices)
   ☐ Used it previously, but not currently
   ☐ Use it currently **(if "Use it currently", skip to Question 4)**
   ☐ Plan to use it in the future **(if "Plan to use it in the future", skip to Question 6)**
   ☐ Have never used and do not plan to use HAR **(if "Have never used or do not plan to use HAR", skip to Question 25)**

3. Why did your agency stop using HAR?
   Answer:

(Skip to Question 25)

4. How long has your agency's HAR system been in place?
   Answer:

5. How do you think your agency's HAR program might change during the next five years?
   Answer:

6. Where is your agency's HAR system mainly deployed or where will it be mainly deployed in the future? (Check only one of the following choices)
☐ Rural areas
☐ Urban areas
☐ Both

7. For what specific applications does your agency use or plan to use HAR in the future? (Check all that apply).
☐ Traffic congestion locations
☐ Traffic congestion durations
☐ Travel times
☐ Roadway construction
☐ Alternative route information
☐ Weather conditions
☐ Special event information
☐ Safety information
☐ Other (please specify):

8. Is your agency's HAR system operated or planned to be operated in the future from a traffic management/operations center?
☐ Yes
☐ No **(if "No", skip to Question 10)**

9. What are some of the benefits and limitations of this HAR operational strategy?
Answer:

10. What type(s) of commercial HAR equipment does your agency currently deploy or plan to deploy in the future?
Make:
Model:

(if "Plan to use it in the future" was answered for Question 2, skip to Question 22)

11. In which year did your agency most recently purchase and install a complete HAR unit at a permanent location (not portable)?
Answer:

12. How much did this most recent permanent HAR unit purchase and installation cost (estimate)?
Answer:

13. How much does your agency spend on operation and maintenance costs per permanent HAR unit per year?
Answer:

14. Did your agency ever perform a benefit cost analysis (or a similar effort) of your HAR units in the past?
☐ Yes
☐ No **(if "No", skip to Question 16)**

15. Based on the benefit cost analysis (or similar effort) you mentioned in your answer to the previous question, what were the dollar benefits estimated for each permanent HAR unit per year?
Answer:

16. Has your agency experienced any significant HAR maintenance issues? (Vandalism, power supply, communications, etc.)
☐ Yes
☐ No **(if "No", skip to Question 18)**

17. What types of HAR maintenance issues has your agency experienced? (Check all that apply).
☐ Vandalism
☐ Power supply issues
☐ Communication issues
☐ Other (please specify):

18. Is your agency's HAR system personnel-intensive?
☐ Yes
☐ No

19. What is the most common technical issue your agency has faced concerning its HAR deployment? (Check only one of the following choices)
☐ HAR information dissemination issues
☐ Signal interference
☐ Placement of the transmitters in relation to the beacon signs
☐ No issues
☐ Other (please specify):

20. Has your agency received any public feedback on HAR?
☐ Yes
☐ No **(if "No", skip to Question 22)**

21. What type of feedback on HAR has your agency received?
☐ Mainly positive
☐ Mainly negative

22. What methods does your agency use or plan to use in the future to make the public aware of HAR? (Check all that apply).
☐ Billboard/Roadside signs
☐ Highway dynamic message signs
☐ State DOT or local traffic agency websites
☐ Social media websites
☐ Commercial radio stations
☐ Television
☐ Other (please specify):

23. Does your agency use portable HAR systems or plan to use them in the future?
☐ Yes
☐ No **(if "No", skip to Question 25)**

24. In what situations does your agency use or plan to use portable HAR systems?
Answer:

25. What real-time traveler information does your agency currently disseminate to the traveling public? (Check all that apply).
☐ Roadway travel condition status (e.g., traffic map of current speeds)
☐ Roadway CCTV video
☐ Traffic incident locations
☐ Travel times
☐ Alternate routes
☐ Parking availability
☐ Roadwork / Construction zones
☐ Transit alternatives
☐ Special events
☐ Weather information
☐ Safety alerts (Amber Alerts, Silver Alerts, etc.)
☐ Safety messages ("Buckle Up", "Signal When Changing Lanes", etc.)
☐ Other (please specify):

26. How is this information currently disseminated to the traveling public? (Check all that apply).
☐ Highway dynamic message signs
☐ Arterial dynamic message signs
☐ Highway advisory radio
☐ 511 system (land-line or mobile call-in system with intelligent voice recognition (IVR) that allows menu driven access to real-time traveler information).
☐ 511 website and/or mobile applications
☐ Social media websites
☐ Other websites
☐ Smartphone applications (e.g., travel info related iPhone or Android applications)
☐ On-board devices (but not mobile devices), such as in-car navigation systems
☐ Other media outlets (commercial radio, television, etc.)
☐ Via arrangement with 3rd party traveler information providers
☐ Other (please specify):

27. Technology is changing rapidly, and the private sector is becoming more involved in traveler information technologies (e.g., generating and delivering its own congestion information through mobile devices). How do you think your agency may adapt its real-time traveler information system in response to these changes (i.e., where are you going in the future)? (Check all that apply).
☐ Do not envision much change **(if "Do not envision much change" then respondent cannot check the rest of the boxes in other words this first option should be exclusive)**
☐ Might drop components of our traveler information program
☐ Might expand our program to include additional components
☐ Might partner more with the private sector
☐ Other (please specify):

End of Survey

Appendix G: FDOT Districts and Local Emergency Management Departments HAR Survey

THE UNIVERSITY OF CENTRAL FLORIDA IS CONDUCTING A SURVEY OF THE FLORIDA DEPARTMENT OF TRANSPORTATION (FDOT) TO GATHER INPUT FROM FDOT DISTRICTS, EMERGENCY MANAGEMENT DEPARTMENTS AND LOCAL GOVERNMENT/PUBLIC AGENCIES. WE ARE NOT SELLING OR MARKETING ANYTHING TO YOU. WE ARE SIMPLY TRYING TO GET INFORMATION REGARDING YOUR EXPERIENCES AND OPINIONS ABOUT TRAFFIC INFORMATION DISSEMINATION TECHNOLOGIES, SPECIFICALLY HIGHWAY ADVISORY AND CITIZENS BAND RADIO ADVISORY SYSTEMS. YOUR RESPONSES ARE VERY IMPORTANT AS THEY WILL HELP US IMPROVE THE QUALITY OF TRAFFIC INFORMATION ON THESE ROADS. YOU ARE FREE TO TERMINATE THIS SURVEY AT ANY TIME. IF YOU CHOOSE TO TERMINATE THIS SURVEY AT ANY TIME, DATA COLLECTED FROM YOUR RESPONSE WILL NOT BE USED UNLESS YOU EXPLICITLY ALLOW US TO USE IT. THE SURVEY WILL ONLY TAKE A FEW MINUTES OF YOUR TIME.

1. Please provide the following information:
   a. Name:
   b. Title:
   c. Agency:
   d. Phone number: (Programmer: Make sure a valid phone number is entered)
   e. Email: (Programmer: Make sure a valid E-mail is entered)

2. Please select your organization type:
   a. Local
   b. County
   c. State
   d. Public Utility
   e. Education
   f. Tribal
   g. Federal
   h. Other (please specify):

3. Please select the discipline that best describes your agency or division:
   a. Fire Service
   b. Law Enforcement
   c. Public Safety Communications
   d. Emergency Management
   e. Emergency Medical
   f. Public Utility
   g. Public Administration
   h. Highway and DOT
   i. Transportation Services
   j. Other (please specify):

(if "Highway and DOT" and if Question 2 "State", ask Question 4; if not then skip to Question 7)

4. Do you professionally have working experience within your position or past positions implementing, operating, maintaining, or managing any components of Highway Advisory Radio (HAR)?
    a. Yes **(if "Yes" ask Question 5 and Question 6)**
    b. No **(if "No" skip to Question 15)**

5. Please list and describe the strengths that are associated with HAR as a traffic information technology.
    a. Free Response Segment

6. Please list and describe any weaknesses that are associated with HAR as a traffic information technology.
    a. Free Response Segment **(now skip to Question 15 because Questions 7-14 are for local emergency departments only)**

7. On the following scale, please rate the importance of your organization's coordination between Traffic Management Centers (TMCs), transit agencies, and Emergency Operation Centers (EOC).
    a. No opinion
    b. Not at all important
    c. Mildly Important
    d. Important
    e. Very Important

8. Have you taken any of the Incident Command System (ICS) courses offered by the Federal Emergency Management Agency (FEMA)?
    a. Yes **(if "Yes" then ask Question 9)**
    b. No **(if "No" skip to Question 11)**

9. Please rate the importance of integrating public traffic information into your organization's incident command plan for emergency responses.
    a. No opinion
    b. Not at all important
    c. Mildly Important
    d. Important
    e. Very Important

10. Please rate how well your organization implements public traffic information into your incident command for emergency response.
    a. No opinion
    b. Not at all implemented (Poor)
    c. Minimally implemented (Fair)
    d. Mildly implemented (Good)
    e. Fully implemented (Excellent)

11. Does your organization provide emergency alert information to the public or a select audience?
    a. Yes **(proceed to question 12)**
    b. No **(proceed to question 13)**

12. How does your organization provide emergency alerts to the public or select audience? (check all that apply)
    a. Text Messaging
    b. Email
    c. Webpage
    d. Outdoor sirens or loud speakers
    e. Automated phone dial in messaging
    f. Radio communication (please specify)
    g. Media release
    h. Facebook
    i. Twitter
    j. Other (please specify):

13. How does your agency receive travel information, such as traffic conditions, road closures, and special events information while traveling? (check all that apply)
    a. Commercial Radio Reports
    b. Florida 511
    c. Highway Electronic Message Signs
    d. Smartphone Applications **(if "Smartphone Applications", ask Question 14; otherwise skip to Question 15)**
    e. Highway Advisory Radio (HAR)
    f. Citizens Band (CB) Radio
    g. Internal Radio Dispatch
    h. Automatic Vehicle Location/GPS Navigation Device
    i. Other (please specify)
    j. Does not currently utilize traffic information

14. What are the smartphone applications for traffic information used specifically by your agency? (check all that apply)
    a. Vehicle Navigation Smartphone Apps (TomTom, Garmin, Magellan, etc...)
    b. Florida 511 Mobile App
    c. Waze Social GPS Maps
    d. Google Maps
    e. Apple Maps
    f. Other (please specify):

15. What is your most preferred method of receiving travel information, such as traffic conditions, road closures, and special events information while traveling? (check only one)
    a. Commercial Radio Reports
    b. Florida 511
    c. Highway Electronic Message Signs
    d. Smartphone Applications **(if "Smartphone Applications", ask Question 16; otherwise skip to Question 17)**
    e. Highway Advisory Radio (HAR)
    f. Citizens Band (CB) Radio
    g. Internal Radio Dispatch
    h. Automatic Vehicle Location/GPS Navigation Device
    i. Other (please specify):

16. What is your personal preferred smartphone application for traffic information?
    a. Vehicle Navigation Smartphone Apps (TomTom, Garmin, Magellan, etc...)
    b. Florida 511 Mobile App
    c. Waze Social GPS Maps
    d. Google Maps
    e. Apple Maps
    f. Other (please specify):

(if Question 2 response was "State" and Question 3 response was "Highway and DOT" ask Question 17, if not then skip to Question 18)

17. Technology is changing rapidly, and the private sector is becoming more involved (e.g., generating and delivering congestion and travel information through mobile devices). How do you think FDOT real-time traveler information systems (Dynamic Message Signs or DMS, HAR, 511, etc.) should respond to these changes? (check all that apply)
    a. Do not need much change **(if "Do not need much change" then respondent cannot check the rest of the boxes, in other words this first option should be exclusive)**
    b. Should drop components of its traveler information programs
    c. Should expand program to include additional components
    d. Should partner more with the private sector
    e. Other (please specify) **(if "Other" is selected, a box should come up for the participant to type in a response)**

(Skip to question 19)

18. Technology is changing rapidly, and the private sector is becoming more involved in traveler information technologies (e.g., generating and delivering its own congestion information through mobile devices). How do you think your agency may adapt its real-time traveler information system in response to these changes (i.e., where are you going in the future)? (Check all that apply).
    a. Do not envision much change **(if "Do not envision much change" then respondent cannot check the rest of the boxes in other words this first option should be exclusive)**
    b. Might drop components of our traveler information program
    c. Might expand our program to include additional components
    d. Might partner more with the private sector
    e. Other (please specify) **(if "Other" is selected, a box should come up for the participant to type in a response)**

19. Highway Advisory Radio (HAR) is a radio station dedicated to 24-hour highway travel information. Are you aware that Highway Advisory Radio is available on some Florida Interstates and the Florida's Turnpike Toll Roadways? **(if "Yes" response to Question 4, automatically mark "Yes" for Question 19, and skip to Question 20)**
    a. Yes
    b. No

20. Citizens Band Radio Advisory System (CBRAS) is a traffic information channel (channel 19) broadcasted over CB radios. Are you aware that CBRAS is available on the Florida's Turnpike Toll Roadways?
    a. Yes
    b. No

21. Does your agency use CBRAS or other CB communication technology to broadcast emergency alerts?
    a. Yes
    b. No
    c. Other (please specify):

22. For disseminating public travel information during emergency evacuations, please rank technologies for today's communications market and infrastructure (please rank 1 for the highest and 2 for the next rank and so forth). (1 to 7, or 1 to 8 if other is specified)
    a. Commercial Radio Reports – rank ____
    b. Florida 511 – rank ____
    c. Highway Electronic Message Signs – rank ____
    d. Highway Advisory Radio (HAR) – rank
    e. Citizens Band (CB) Radio – rank ____
    f. Smart Phone Applications – rank ____
    g. GPS Navigation Device – rank ____
    h. Other (please specify): – rank ____

23. For emergency broadcast circumstances like mandatory evacuations and other large congestion incidents, should Highway Advisory Radio continue to be supported and maintained?
    a. Yes (**If "Yes", then ask Question 24, skip Question 25 and then ask Question 26**)
    b. Maybe **(If "Maybe" skip to Question 26**)
    c. No **(If "No", ask Question 25, then ask Question 26)**

24. Why should Highway Advisory Radio be continued for Emergency Traffic Broadcasts? (check all that apply)
    a. Reliability
    b. Scalability (ability and flexibility to expand the system so that it can accommodate demand)
    c. Portability (the ability to temporarily use the system in places where it is not permanently deployed. In this case, HAR equipment may have wireless communication, solar power, weather proof container, and can be moved from one location to another using a trailer)
    d. Redundancy (the ability to communicate through diverse alternative methods when standard capabilities suffer damage. The redundant systems serve as back up in case other systems have issues)
    e. Other (please specify):

25. Why should Highway Advisory Radio be discontinued for Emergency Traffic Broadcasts? (Check all that apply).
    a. Old antiquated technology
    b. Information can be distributed by other means
    c. Low usage of HAR
    d. Lack of funding to support HAR
    e. Difficulty/cost of measuring actual operational impacts of HAR
    f. Other (please specify):

26. From the latest series of winter storms to hit the northeastern region of the US, public safety officials state that Community Information Radio Stations have worked well because AM radio works reliably in time of large area power outages with a specific audience that does not rely on the Internet for their daily news, which includes a larger portion of the senior population. Do you think Highway Advisory Radio in Florida would currently experience similar success for hurricane evacuations, response, and recovery?
    a. Yes
    b. No
    c. Maybe

27. Currently, Florida's Turnpike is designated as the long-haul oversized freight route within Florida. Should technology like Citizens Band Radio Advisory System, which mostly targets truckers, continue to be supported by the Florida's Turnpike Enterprise?
    a. Yes
    b. No
    c. Maybe

28. How many years of professional experience do you have working within your agencies' discipline
    a. Less than five years
    b. 5-10 years
    c. 11-15 years
    d. 16-20 years
    e. More than 20 years

End of Survey

Appendix H: HAR Phone Survey Response Frequency Tables

The following tables show the results for each question in the HAR phone survey. Bolded responses indicate the most frequently selected response for each question.

Table H-1: HAR Phone Survey Gender

QGENDER. Gender:

Value	Response	Counts	%
1	Male	422	42.2
2	**Female**	**578**	**57.8**

Answered   1000

Table H-2: HAR Phone Survey Trip Purpose

Q2. What is the purpose of your most common trip on the Florida Turnpike?

Value	Response	Counts	%
1	Travel to/from work or school	234	23.4
2	Shopping	74	7.4
3	**Leisure/vacation**	**421**	**42.1**
4	Other	271	27.1

Answered   1000

Table H-3: HAR Phone Survey Trip Length

Q3. Excluding intermediate stops, how long does this trip on the Florida Turnpike typically take?

Value	Response	Counts	%
1	Less than 15 minutes	37	15.81
2	**15-30 minutes**	**81**	**34.6**
3	31-45 minutes	55	23.5
4	46-60 minutes	21	8.97
5	More than 60 minutes	40	17.09

Answered   234

Table H-4: HAR Phone Survey Number of Alternate Routes

Q4. Excluding the Florida Turnpike, how many other routes have you ever taken for this trip?

Value	Response	Counts	%
1	None	39	16.67
2	**One**	**77**	**32.9**
3	Two	47	20.09
4	Three	31	13.25
5	Four or more	40	17.09

Answered 234

Table H-5: HAR Phone Survey Length of Alternate Route

Q5. Excluding intermediate stops, how long does this trip typically take using the best alternate route?

Value	Response	Counts	%
1	Less than 15 minutes	11	5.64
2	15-30 minutes	54	27.69
3	**31-45 minutes**	**62**	**31.8**
4	46-60 minutes	26	13.33
5	More than 60 minutes	42	21.54

Answered 195

Table H-6: HAR Phone Survey Frequency of Travel

Q6. How many times per week do you travel on the Florida Turnpike?

Value	Response	Counts	%
1	**Once a week or less**	**700**	**70**
2	2-5 times a week	214	21.4
3	6-10 times a week	59	5.9
4	More than 10 times a week	27	2.7

Answered 1000

Table H-7: HAR Phone Survey Preferred Travel Information Source

Q7. How do you prefer to receive travel information, such as traffic conditions, road closures, and special events information while traveling?

Value	Response	Counts	%
1	Commercial Radio Reports	237	23.7
2	Florida 511	28	2.8
3	**Highway Electronic Message Signs**	**314**	**31.4**
4	Smartphone Applications	152	15.2
5	Highway Advisory Radio (HAR)	66	6.6
6	Citizens' Band (CB) Radio	11	1.1
7	GPS Navigation Device	192	19.2
	Answered	1000	

Table H-8: HAR Phone Survey Preferred Smartphone Application

Q8. What is your preferred smartphone application?

Value	Response	Counts	%
1	Vehicle Navigation Smartphone Apps (TomTom, Garmin, Magellan, etc...)	19	12.5
2	Waze Social GPS Maps	17	11.18
3	**Google Maps**	**79**	**52**
4	Apple Maps	15	9.87
5	Other	22	14.47
	Answered	152	

Table H-9: HAR Phone Survey Reason for Preferred Travel Information Source

Q9. What do you like most about your preferred source of travel information you selected?

Value	Response	Counts	%
1	**Ease of use**	**348**	**34.8**
2	Information accuracy	97	9.7
3	On-time delivery of information	100	10
4	Location-specific information	126	12.6
5	Availability of safety or security information	101	10.1
6	Availability of special event information	40	4
7	Other reasons	188	18.8
	Answered	1000	

Table H-10: HAR Phone Survey Awareness of HAR

Q10. Highway Advisory Radio (HAR) is a radio station (AM 1640) dedicated to 24-hour highway travel information. Are you aware that Highway Advisory Radio is available on the Florida Turnpike?

Value	Response	Counts	%
1	**Yes**	**527**	**52.7**
2	No	473	47.3
	Answered	1000	

Table H-11: HAR Phone Survey Method of HAR Awareness

Q11. How did you first become aware that Highway Advisory Radio is available on the Florida Turnpike?

Value	Response	Counts	%
1	**Signs along Florida Turnpike**	**425**	**80.7**
2	Friend or relative	42	7.97
3	Florida Turnpike website	12	2.28
4	Other	48	9.11
	Answered	527	

Table H-12: HAR Phone Survey Usage of HAR

Q12. Have you ever used Highway Advisory Radio while traveling on the Florida Turnpike?

Value	Response	Counts	%
1	Yes	221	41.94
2	**No**	**306**	**58.1**
	Answered	527	

Table H-13: HAR Phone Survey Frequency of HAR Usage

Q13. How frequently do you use Highway Advisory Radio during your trips on the Florida Turnpike?

Value	Response	Counts	%
1	Always	20	9.05
2	Often	22	9.95
3	Sometimes	77	34.84
4	**Rarely**	**102**	**46.2**
	Answered	221	

Table H-14: HAR Phone Survey Satisfaction with HAR

Q14. How would you rate your experience with Highway Advisory Radio and the travel information it provides?

Value	Response	Counts	%
1	Strongly Satisfied	26	11.76
2	**Satisfied**	**158**	**71.5**
3	Dissatisfied	24	10.86
4	Strongly Dissatisfied	13	5.88
	Answered	221	

Table H-15: HAR Phone Survey Reason for Satisfaction with HAR

Q15A. Which answer best describes your strongest opinion on Highway Advisory Radio and the travel information it provides?

Value	Response	Counts	%
1	**Information is accurate and up-to-date**	**62**	**33.7**
2	Easy to access	35	19.02
3	Easy to understand	47	25.54
4	Provides location-specific information	40	21.74
	Answered	184	

Table H-16: HAR Phone Survey Reason for Dissatisfaction with HAR

Q15B. Which answer best describes your strongest opinion on Highway Advisory Radio and the travel information it provides?

Value	Response	Counts	%
1	Information is not accurate and up-to-date	5	13.51
2	Not easy to access	4	10.81
3	**Not easy to understand**	**16**	**43.2**
4	Does not provide location-specific information	4	10.81
5	Needs a wider coverage area	8	21.62
	Answered	37	

Table H-17: HAR Phone Survey Most Important HAR Traffic Information

Q16. What is the most important type of traffic information you think should be broadcast on Highway Advisory Radio?

Value	Response	Counts	%
1	**Traffic congestion locations and durations**	**127**	**57.5**
2	Weather conditions	8	3.62
3	Roadway construction	17	7.69
4	Special events	2	0.9
5	Alternate route information	13	5.88
6	Safety information	54	24.43
	Answered		221

Table H-18: HAR Phone Survey HAR Congestion Message

Q17. While traveling on the Florida Turnpike, have you ever heard a message on Highway Advisory Radio that informed you of congestion?

Value	Response	Counts	%
1	**Yes**	**137**	**62**
2	No	84	38.01
	Answered		221

Table H-19: HAR Phone Survey Diversion Due to HAR Message

Q18. Did you exit off the Florida Turnpike to avoid this congestion?

Value	Response	Counts	%
1	**Yes**	**84**	**61.3**
2	No	53	38.69
	Answered		137

Table H-20: HAR Phone Survey Reason for Not Diverting

Q19. Why did you stay on the Florida Turnpike?

Value	Response	Counts	%
1	Unfamiliar with alternate routes	11	20.75
2	Did not trust accuracy of Highway Advisory Radio message	1	1.89
3	**Alternate route would still take more time**	**15**	**28.3**
4	No alternate routes available	13	24.53
5	Other	13	24.53
	Answered		53

Table H-21: HAR Phone Survey Diversion (Stated Preference)

Q20. While traveling on the Florida Turnpike, what amount of delay broadcast on Highway Advisory Radio would make you exit off the Florida Turnpike?

Value	Response	Counts	%
1	15 minutes	344	34.4
2	**30 minutes**	**351**	**35.1**
3	45 minutes	96	9.6
4	More than 45 minutes	102	10.2
5	Would not exit off Florida Turnpike	107	10.7

Answered 1000

Table H-22: HAR Phone Survey Reason for Not Diverting (Stated Preference)

Q21. What is the main reason you would stay on the Florida Turnpike?

Value	Response	Counts	%
1	Unfamiliar with alternate routes	28	26.17
2	Would not trust accuracy of Highway Advisory Radio message	0	0
3	**Alternate route would likely take more time**	**37**	**34.6**
4	No alternate routes available	18	16.82
5	Other reasons	24	22.43

Answered 107

Table H-23: HAR Phone Survey Use of HAR in Emergencies

Q22. If there was an emergency, such as a hurricane, that required you to evacuate your area of residence in Florida and Highway Advisory Radio was available for emergency broadcasts, would you use Highway Advisory Radio?

Value	Response	Counts	%
1	**Yes**	**785**	**78.5**
2	No	96	9.6
3	Yes, but would seek out other sources of information first	119	11.9

Answered 1000

Table H-24: HAR Phone Survey Best Place to Promote HAR

Q23. To increase awareness of Highway Advisory Radio, where do you think is the best place to promote or advertise Highway Advisory Radio?

Value	Response	Counts	%
1	**Television**	**289**	**28.9**
2	Popular Radio Stations	163	16.3
3	Florida Turnpike and/or Florida Department of Transportation Website	59	5.9
4	Social Media Website	98	9.8
5	Highway Electronic Message Signs	282	28.2
6	Billboard	109	10.9
	Answered	1000	

Table H-25: HAR Phone Survey Continuation of HAR

Q24. Should Highway Advisory Radio service be continued or discontinued?

Value	Response	Counts	%
1	**Continued**	**849**	**84.9**
2	Discontinued	59	5.9
3	Impartial	92	9.2
	Answered	1000	

Table H-26: HAR Phone Survey Alternative Travel Information Sources

Q25. If Highway Advisory Radio service is discontinued, what alternatives would you use to obtain travel information?

Value	Response	Counts	%
1	Commercial Radio Reports	726	72.6
2	Florida 511	388	38.8
3	Internet	509	50.9
4	**Highway Electronic Message Signs**	**828**	**82.8**
5	Smartphone Applications	525	52.5
6	Citizens' Band (CB) Radio	182	18.2
7	Other alternative	26	2.6
	Answered	1000	

Table H-27: HAR Phone Survey Future Use of HAR

Q26. If Highway Advisory Radio service is continued, would you use Highway Advisory Radio in the future?

Value	Response	Counts	%
1	**Yes**	**832**	**83.2**
2	No	168	16.8

Answered 1000

Table H-28: HAR Phone Survey Age

Q27. Which of the following best describes your age?

Value	Response	Counts	%
1	18-25 years	40	4
2	26-35 years	159	15.9
3	36-50 years	205	20.5
4	51-65 years	266	26.6
5	**Over 65 years**	**330**	**33**

Answered 1000

Table H-29: HAR Phone Survey Education Level

Q28. What is your highest level of education reached?

Value	Response	Counts	%
1	High School Diploma or less	224	22.4
2	Some College	189	18.9
3	Associate Degree	132	13.2
4	**Bachelor Degree**	**247**	**24.7**
5	Post Graduate Degree	208	20.8

Answered 1000

Appendix I: HAR Internet Survey Response Frequency Tables

The following tables show the results for each question in the HAR internet survey. Bolded responses indicate the most frequently selected response for each question. Note that the percent column indicates the percentage out of all 500 respondents and the valid percent column indicates the percentage out of all respondents to that specific question. Also, responses labeled as "Missing" represent respondents who were not asked that question.

Table I-1: HAR Internet Survey Trip Purpose

q2 What is the purpose of your most common trip on the Florida Turnpike?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Travel to/from work or school	112	22.4	22.4	22.4
	2 Shopping	78	15.6	15.6	38.0
	3 Leisure/vacation	**235**	**47.0**	**47.0**	**85.0**
	4 Other	75	15.0	15.0	100.0
	Total	500	100.0	100.0	

Table I-2: HAR Internet Survey Trip Length

q3 Excluding intermediate stops, how long does this trip on the Florida Turnpike typically take?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Less than 15 minutes	24	4.8	4.8	4.8
	2 15-30 minutes	133	26.6	26.6	31.4
	3 31-45 minutes	132	26.4	26.4	57.8
	4 46-60 minutes	56	11.2	11.2	69.0
	5 More than 60 minutes	**155**	**31.0**	**31.0**	**100.0**
	Total	500	100.0	100.0	

Table I-3: HAR Internet Survey Number of Alternate Routes

q4 How many alternate routes besides the Florida Turnpike have you ever taken for this trip?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 None	113	22.6	22.6	22.6
	2 One	**218**	**43.6**	**43.6**	**66.2**
	3 Two	127	25.4	25.4	91.6
	4 Three	28	5.6	5.6	97.2
	5 Four or more	14	2.8	2.8	100.0
	Total	500	100.0	100.0	

Table I-4: HAR Internet Survey Length of Alternate Route

q5 Excluding intermediate stops, how long does this trip typically take using the best alternate route?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Less than 15 minutes	15	3.0	3.0	3.0
	2 15-30 minutes	83	16.6	16.6	19.6
	3 31-45 minutes	111	22.2	22.2	41.8
	4 46-60 minutes	75	15.0	15.0	56.8
	5 More than 60 minutes	103	20.6	20.6	77.4
	6 Do not know alternate routes	**113**	**22.6**	**22.6**	**100.0**
	Total	500	100.0	100.0	

Table I-5: HAR Internet Survey Frequency of Travel

q6 How many times per week do you travel on the Florida Turnpike?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Once a week or less**	**320**	**64.0**	**64.0**	**64.0**
	2 2-5 times a week	138	27.6	27.6	91.6
	3 6-10 times a week	29	5.8	5.8	97.4
	4 More than 10 times a week	13	2.6	2.6	100.0
	Total	500	100.0	100.0	

Table I-6: HAR Internet Survey Preferred Travel Information Source
q7 What is your most preferred method of receiving travel information, such as traffic conditions, road closures, and special events information while traveling?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Commercial Radio Reports	82	16.4	16.4	16.4
	2 Florida 511	46	9.2	9.2	25.6
	3 Highway Electronic Message Signs	**139**	**27.8**	**27.8**	**53.4**
	4 Smartphone Applications	124	24.8	24.8	78.2
	5 Highway Advisory Radio (HAR)	20	4.0	4.0	82.2
	7 GPS Navigation Device	89	17.8	17.8	100.0
	Total	500	100.0	100.0	

Table I-7: HAR Internet Survey Preferred Smartphone Application
q8 What is your preferred smartphone application?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Vehicle Navigation Smartphone Apps (TomTom, Garmin, Magellan, etc...)	21	4.2	16.9	16.9
	2 Waze Social GPS Maps	22	4.4	17.7	34.7
	3 Google Maps	**65**	**13.0**	**52.4**	**87.1**
	4 Apple Maps	12	2.4	9.7	96.8
	5 Other (please specify):	4	.8	3.2	100.0
	Total	124	24.8	100.0	
Missing	System	376	75.2		
Total		500	100.0		

Table I-8: HAR Internet Survey Preferred Smartphone Application - Other

q8_5_other What is your preferred smartphone application? - Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		496	99.2	99.2	99.2
	511 App	1	.2	.2	99.4
	Beat the traffic	1	.2	.2	99.6
	Channel 5 traffic	1	.2	.2	99.8
	local news alert	1	.2	.2	100.0
	Total	500	100.0	100.0	

Table I-9: HAR Internet Survey Reason for Preferred Travel Information Source

q9 What do you like most about your preferred source of travel information you selected?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Ease of use**	**198**	**39.6**	**39.6**	**39.6**
	2 Information accuracy	117	23.4	23.4	63.0
	3 On-time delivery of information	53	10.6	10.6	73.6
	4 Location-specific information	111	22.2	22.2	95.8
	5 Availability of safety or security information	16	3.2	3.2	99.0
	6 Availability of special event information	3	.6	.6	99.6
	7 Other (please specify):	2	.4	.4	100.0
	Total	500	100.0	100.0	

Table I-10: HAR Internet Survey Reason for Preferred Travel Information Source - Other

q9_7_other What do you like most about your preferred source of travel information you selected? - Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		498	99.6	99.6	99.6
	Ability to reroute	1	.2	.2	99.8
	safest way to get updates/info	1	.2	.2	100.0
	Total	500	100.0	100.0	

Table I-11: HAR Internet Survey Awareness of HAR

q10 Highway Advisory Radio (HAR) is a radio station (AM 1640) dedicated to 24-hour highway travel information. Are you aware that Highway Advisory Radio is available on the Florida Turnpike?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Yes	248	49.6	49.6	49.6
	2 No	**252**	**50.4**	**50.4**	**100.0**
	Total	500	100.0	100.0	

Table I-12: HAR Internet Survey Method of HAR Awareness

q11 How did you first become aware that Highway Advisory Radio is available on the Florida Turnpike?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Signs along Florida Turnpike**	**96**	**19.2**	**38.7**	**38.7**
	2 Friend or relative	71	14.2	28.6	67.3
	3 Florida Turnpike website	67	13.4	27.0	94.4
	4 Other	14	2.8	5.6	100.0
	Total	248	49.6	100.0	
Missing	System	252	50.4		
Total		500	100.0		

Table I-13: HAR Internet Survey Method of HAR Awareness - Other

q11_4_other How did you first become aware that Highway Advisory Radio is available on the Florida Turnpike? - Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		486	97.2	97.2	97.2
	by listening to radio	1	.2	.2	97.4
	driving	1	.2	.2	97.6
	Driving on the road	1	.2	.2	97.8
	Happened to come across it	1	.2	.2	98.0
	local news	1	.2	.2	98.2
	Radio	1	.2	.2	98.4
	saw it	2	.4	.4	98.8
	Saw it	2	.4	.4	99.2
	saw on roadside	1	.2	.2	99.4
	tuned in	1	.2	.2	99.6
	Was employed with FHP	1	.2	.2	99.8
	while driving	1	.2	.2	100.0
	Total	500	100.0	100.0	

Table I-14: HAR Internet Survey Usage of HAR

q12 Have you ever used Highway Advisory Radio while traveling on the Florida Turnpike?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Yes**	**165**	**33.0**	**66.5**	**66.5**
	2 No	83	16.6	33.5	100.0
	Total	248	49.6	100.0	
Missing	System	252	50.4		
Total		500	100.0		

Table I-15: HAR Internet Survey Frequency of HAR Usage

**q13 How frequently do you use Highway Advisory Radio during your trips
on the Florida Turnpike?**

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Always	39	7.8	23.6	23.6
	2 Often	**53**	**10.6**	**32.1**	**55.8**
	3 Sometimes	41	8.2	24.8	80.6
	4 Rarely	32	6.4	19.4	100.0
	Total	165	33.0	100.0	
Missing	System	335	67.0		
Total		500	100.0		

Table I-16: HAR Internet Survey Satisfaction with HAR

**q14 How would you rate your experience with Highway Advisory Radio and
the travel information it provides?**

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Strongly Satisfied	62	12.4	37.6	37.6
	2 Satisfied	**92**	**18.4**	**55.8**	**93.3**
	3 Dissatisfied	7	1.4	4.2	97.6
	4 Strongly Dissatisfied	4	.8	2.4	100.0
	Total	165	33.0	100.0	
Missing	System	335	67.0		
Total		500	100.0		

Table I-17: HAR Internet Survey Reason for HAR Satisfction

q15a Which answer best describes your strongest opinion on Highway Advisory Radio and the travel information it provides?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Information is accurate and up-to-date**	**72**	**14.4**	**46.8**	**46.8**
	2 Easy to access	56	11.2	36.4	83.1
	3 Easy to understand	14	2.8	9.1	92.2
	4 Provides location-specific information	12	2.4	7.8	100.0
	Total	154	30.8	100.0	
Missing	System	346	69.2		
Total		500	100.0		

Table I-18: HAR Internet Survey Reason for HAR Dissatisfaction

q15b Which answer best describes your strongest opinion on Highway Advisory Radio and the travel information it provides?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Information is not accurate and up-to-date	1	.2	9.1	9.1
	3 Not easy to understand	**7**	**1.4**	**63.6**	**72.7**
	4 Does not provide location-specific information	2	.4	18.2	90.9
	5 Needs a wider coverage area	1	.2	9.1	100.0
	Total	11	2.2	100.0	
Missing	System	489	97.8		
Total		500	100.0		

Table I-19: HAR Internet Survey Most Important HAR Traffic Information

q16 What is the most important type of traffic information you think should be broadcast on Highway Advisory Radio?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Traffic congestion locations and durations**	**95**	**19.0**	**57.6**	**57.6**
	2 Weather conditions	28	5.6	17.0	74.5
	3 Roadway construction	13	2.6	7.9	82.4
	4 Special events	8	1.6	4.8	87.3
	5 Alternate route information	8	1.6	4.8	92.1
	6 Safety information	13	2.6	7.9	100.0
	Total	165	33.0	100.0	
Missing	System	335	67.0		
Total		500	100.0		

Table I-20: HAR Internet Survey HAR Congestion Message

q17 While traveling on the Florida Turnpike, have you ever heard a message on Highway Advisory Radio that informed you of congestion?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Yes**	**127**	**25.4**	**77.0**	**77.0**
	2 No	38	7.6	23.0	100.0
	Total	165	33.0	100.0	
Missing	System	335	67.0		
Total		500	100.0		

Table I-21: HAR Internet Survey Diversion

q18 Did you exit off the Florida Turnpike to avoid this congestion?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Yes**	**91**	**18.2**	**71.7**	**71.7**
	2 No	36	7.2	28.3	100.0
	Total	127	25.4	100.0	
Missing	System	373	74.6		
Total		500	100.0		

Table I-22: HAR Internet Survey Reason for Not Diverting
q19 Why did you stay on the Florida Turnpike?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Unfamiliar with alternate routes**	**14**	**2.8**	**38.9**	**38.9**
	2 Did not trust accuracy of Highway Advisory Radio message	1	.2	2.8	41.7
	3 Alternate route would still take more time	12	2.4	33.3	75.0
	4 No alternate routes available	8	1.6	22.2	97.2
	5 Other (please specify):	1	.2	2.8	100.0
	Total	36	7.2	100.0	
Missing	System	464	92.8		
Total		500	100.0		

Table I-23: HAR Internet Survey Reason for Not Diverting - Other
q19_5_other Why did you stay on the Florida Turnpike? - Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		499	99.8	99.8	99.8
	Waited at rest stop	1	.2	.2	100.0
	Total	500	100.0	100.0	

Table I-24: HAR Internet Survey Diversion (Stated Preference)
q20 While traveling on the Florida Turnpike, what amount of delay broadcast on Highway Advisory Radio would make you exit off the Florida Turnpike?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 15 minutes	120	24.0	24.0	24.0
	2 30 minutes	**236**	**47.2**	**47.2**	**71.2**
	3 45 minutes	66	13.2	13.2	84.4
	4 More than 45 minutes	37	7.4	7.4	91.8
	5 Would not exit off the Florida Turnpike	41	8.2	8.2	100.0
	Total	500	100.0	100.0	

Table I-25: HAR Internet Survey Reason for Not Diverting (Stated Preference)
q21 What is the main reason you would stay on the Florida Turnpike?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Unfamiliar with alternate routes	11	2.2	26.8	26.8
	3 Alternate route would likely take more time	**22**	**4.4**	**53.7**	**80.5**
	4 No alternate routes available	8	1.6	19.5	100.0
	Total	41	8.2	100.0	
Missing	System	459	91.8		
Total		500	100.0		

Table I-26: HAR Internet Survey Use of HAR in Emergencies
q22 If there was an emergency, such as a hurricane, that required you to evacuate your area of residence in Florida and Highway Advisory Radio was available for emergency broadcasts, would you use Highway Advisory Radio?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Yes**	**373**	**74.6**	**74.6**	**74.6**
	2 No	31	6.2	6.2	80.8
	3 Yes, but would seek out other sources of information first	96	19.2	19.2	100.0
	Total	500	100.0	100.0	

Table I-27: HAR Internet Survey Best Method to Promote HAR

q23 To increase awareness of Highway Advisory Radio, where do you think is the best place to promote or advertise Highway Advisory Radio?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Television**	**161**	**32.2**	**32.2**	**32.2**
	2 Popular Radio Stations	91	18.2	18.2	50.4
	3 Florida Turnpike and/or Florida Department of Transportation Website	32	6.4	6.4	56.8
	4 Social Media Website	47	9.4	9.4	66.2
	5 Highway Electronic Message Signs	141	28.2	28.2	94.4
	6 Billboard	28	5.6	5.6	100.0
	Total	500	100.0	100.0	

Table I-28: HAR Internet Survey Reaction to Sample Congestion Message

q24 If you heard this (congestion) message while traveling on the Florida Turnpike, what would you be most likely to do?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Exit off the Florida Turnpike at the next opportunity and finish your trip using another route.**	**240**	**48.0**	**48.0**	**48.0**
	2 Exit off the Florida Turnpike at the next opportunity and get back on the Florida Turnpike to finish your trip.	153	30.6	30.6	78.6
	3 Stay on the Florida Turnpike, but drive more cautiously.	91	18.2	18.2	96.8
	4 Stay on the Florida Turnpike without changing your driver behavior.	11	2.2	2.2	99.0
	5 Cancel your trip.	5	1.0	1.0	100.0
	Total	500	100.0	100.0	

Table I-29: HAR Internet Survey Understanding of Sample Congestion Message
q25 Was this (congestion) message easy to understand?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Yes**	**447**	**89.4**	**89.4**	**89.4**
	2 No	53	10.6	10.6	100.0
	Total	500	100.0	100.0	

Table I-30: HAR Internet Survey Benefit of Sample Congestion Message
q26 Would you consider this type of message to be beneficial if you heard it while traveling on the Florida Turnpike?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Yes**	**471**	**94.2**	**94.2**	**94.2**
	2 No	29	5.8	5.8	100.0
	Total	500	100.0	100.0	

Table I-31: HAR Internet Survey Reaction to Sample Safety Message
q27 If you heard this (safety) message while traveling on the Florida Turnpike, what would you be most likely to do?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Exit off the Florida Turnpike at the next opportunity and finish your trip using another route.	94	18.8	18.8	18.8
	2 Exit off the Florida Turnpike at the next opportunity and get back on the Florida Turnpike to finish your trip.	50	10.0	10.0	28.8
	3 Stay on the Florida Turnpike, but drive more cautiously.	70	14.0	14.0	42.8
	4 Stay on the Florida Turnpike without changing your driver behavior.	21	4.2	4.2	47.0
	5 Cancel your trip.	**265**	**53.0**	**53.0**	**100.0**
	Total	500	100.0	100.0	

Table I-32: HAR Internet Survey Understanding of Safety Message

q28 Was this message easy to understand?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Yes**	**484**	**96.8**	**96.8**	**96.8**
	2 No	16	3.2	3.2	100.0
	Total	500	100.0	100.0	

Table I-33: HAR Internet Survey Benefit of Safety Message

q29 Would you consider this type of message to be beneficial if you heard it while traveling on the Florida Turnpike?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Yes**	**482**	**96.4**	**96.4**	**96.4**
	2 No	18	3.6	3.6	100.0
	Total	500	100.0	100.0	

Table I-34: HAR Internet Survey Continuation of HAR

q30 Should Highway Advisory Radio service be continued or discontinued?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Continued**	**427**	**85.4**	**85.4**	**85.4**
	2 Discontinued	16	3.2	3.2	88.6
	3 Impartial	57	11.4	11.4	100.0
	Total	500	100.0	100.0	

Table I-35: HAR Internet Survey Alternative Travel Information Source – Commercial Radio Reports

q31_1 If Highway Advisory Radio service is discontinued, what alternatives would you use to obtain travel information? - Commercial Radio Reports

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**302**	**60.4**	**60.4**	**60.4**
	1 Yes	198	39.6	39.6	100.0
	Total	500	100.0	100.0	

Table I-36: HAR Internet Survey Alternative Travel Information Source – Florida 511

q31_2 If Highway Advisory Radio service is discontinued, what alternatives would you use to obtain travel information? – Florida 511

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**394**	**78.8**	**78.8**	**78.8**
	1 Yes	106	21.2	21.2	100.0
	Total	500	100.0	100.0	

Table I-37: HAR Internet Survey Alternative Travel Information Source – Internet

q31_3 If Highway Advisory Radio service is discontinued, what alternatives would you use to obtain travel information? - Internet

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**380**	**76.0**	**76.0**	**76.0**
	1 Yes	120	24.0	24.0	100.0
	Total	500	100.0	100.0	

Table I-38: HAR Internet Survey Alternative Travel Information Source – DMS

q31_4 If Highway Advisory Radio service is discontinued, what alternatives would you use to obtain travel information? - Highway Electronic Message Signs

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**277**	**55.4**	**55.4**	**55.4**
	1 Yes	223	44.6	44.6	100.0
	Total	500	100.0	100.0	

Table I-39: HAR Internet Survey Alternative Travel Information Source – Smartphone Apps

q31_5 If Highway Advisory Radio service is discontinued, what alternatives would you use to obtain travel information? - Smartphone Applications

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	320	64.0	64.0	64.0
	1 Yes	**180**	**36.0**	**36.0**	**100.0**
	Total	500	100.0	100.0	

Table I-40: HAR Internet Survey Alternative Travel Information Source – CB Radio

q31_6 If Highway Advisory Radio service is discontinued, what alternatives would you use to obtain travel information? - Citizens' Band (CB) Radio

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**489**	**97.8**	**97.8**	**97.8**
	1 Yes	11	2.2	2.2	100.0
	Total	500	100.0	100.0	

Table I-41: HAR Internet Survey Alternative Travel Information Source – Other

q31_7 If Highway Advisory Radio service is discontinued, what alternatives would you use to obtain travel information? – Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**494**	**98.8**	**98.8**	**98.8**
	1 Yes	6	1.2	1.2	100.0
	Total	500	100.0	100.0	

Table I-42: HAR Internet Survey Alternative Travel Information Source – Other (Details)

q31_7_other If Highway Advisory Radio service is discontinued, what alternatives would you use to obtain travel information? – Other

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	494	98.8	98.8	98.8
gps	1	.2	.2	99.0
Local TV news	1	.2	.2	99.2
not sure	1	.2	.2	99.4
tv weather	1	.2	.2	99.6
TV weather reports	1	.2	.2	99.8
weather radio	1	.2	.2	100.0
Total	500	100.0	100.0	

Table I-43: HAR Internet Survey Future Use of HAR

q32 If Highway Advisory Radio service is continued, would you use Highway Advisory Radio in the future?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Yes**	**454**	**90.8**	**90.8**	**90.8**
	2 No	46	9.2	9.2	100.0
	Total	500	100.0	100.0	

Table I-44: HAR Internet Survey Gender

q33 What is your gender?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Male	245	49.0	49.0	49.0
	2 Female	**255**	**51.0**	**51.0**	**100.0**
	Total	500	100.0	100.0	

Table I-45: HAR Internet Survey Age

q34 Which of the following best describes your age?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 18-25 years	57	11.4	11.4	11.4
	2 26-35 years	84	16.8	16.8	28.2
	3 36-50 years	**124**	**24.8**	**24.8**	**53.0**
	4 51-65 years	121	24.2	24.2	77.2
	5 Over 65 years	114	22.8	22.8	100.0
	Total	500	100.0	100.0	

Table I-46: HAR Internet Survey Education Level

q35 What is your highest level of education reached?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 High School Diploma or less	78	15.6	15.6	15.6
	2 Some College	122	24.4	24.4	40.0
	3 Associate Degree	53	10.6	10.6	50.6
	4 Bachelor Degree	**140**	**28.0**	**28.0**	**78.6**
	5 Post Graduate Degree	107	21.4	21.4	100.0
	Total	500	100.0	100.0	

Table I-47: HAR Internet Survey Job Status

q36 What is your current job status?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Unemployed	65	13.0	13.0	13.0
	2 Part-time	81	16.2	16.2	29.2
	3 Full-time	**210**	**42.0**	**42.0**	**71.2**
	4 Retired	144	28.8	28.8	100.0
	Total	500	100.0	100.0	

Table I-48: HAR Internet Survey Industry - Agriculture

q37_1 What industry do you currently work in? - Agriculture, Fishing, Forestry and Mining

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**287**	**57.4**	**98.6**	**98.6**
	1 Yes	4	.8	1.4	100.0
	Total	291	58.2	100.0	
Missing	System	209	41.8		
Total		500	100.0		

Table I-49: HAR Internet Survey Industry - Business

q37_2 What industry do you currently work in? - Business and Professional Services

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**252**	**50.4**	**86.6**	**86.6**
	1 Yes	39	7.8	13.4	100.0
	Total	291	58.2	100.0	
Missing	System	209	41.8		
Total		500	100.0		

Table I-50: HAR Internet Survey Industry - Construction

q37_3 What industry do you currently work in? - Construction

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**272**	**54.4**	**93.5**	**93.5**
	1 Yes	19	3.8	6.5	100.0
	Total	291	58.2	100.0	
Missing	System	209	41.8		
Total		500	100.0		

Table I-51: HAR Internet Survey Industry - Education

q37_4 What industry do you currently work in? - Educational Services

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**266**	**53.2**	**91.4**	**91.4**
	1 Yes	25	5.0	8.6	100.0
	Total	291	58.2	100.0	
Missing	System	209	41.8		
Total		500	100.0		

Table I-52: HAR Internet Survey Industry - Finance

q37_5 What industry do you currently work in? - Finance and Insurance

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**269**	**53.8**	**92.4**	**92.4**
	1 Yes	22	4.4	7.6	100.0
	Total	291	58.2	100.0	
Missing	System	209	41.8		
Total		500	100.0		

Table I-53: HAR Internet Survey Industry - Government

q37_6 What industry do you currently work in? - Government (City, County, State, Tribal & Federal)

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**274**	**54.8**	**94.2**	**94.2**
	1 Yes	17	3.4	5.8	100.0
	Total	291	58.2	100.0	
Missing	System	209	41.8		
Total		500	100.0		

Table I-54: HAR Internet Survey Industry – Health Services

q37_7 What industry do you currently work in? - Health Services

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**264**	**52.8**	**90.7**	**90.7**
	1 Yes	27	5.4	9.3	100.0
	Total	291	58.2	100.0	
Missing	System	209	41.8		
Total		500	100.0		

Table I-55: HAR Internet Survey Industry - Information

q37_8 What industry do you currently work in? - Information (Publishing, Broadcast, Telecommunications, Data Processing)

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**272**	**54.4**	**93.5**	**93.5**
	1 Yes	19	3.8	6.5	100.0
	Total	291	58.2	100.0	
Missing	System	209	41.8		
Total		500	100.0		

Table I-56: HAR Internet Survey Industry - Hospitality

q37_9 What industry do you currently work in? - Leisure and Hospitality (Arts, Entertainment, Recreation, and Food Services)

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**275**	**55.0**	**94.5**	**94.5**
	1 Yes	16	3.2	5.5	100.0
	Total	291	58.2	100.0	
Missing	System	209	41.8		
Total		500	100.0		

Table I-57: HAR Internet Survey Industry - Manufacturing

q37_10 What industry do you currently work in? – Manufacturing

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**278**	**55.6**	**95.5**	**95.5**
	1 Yes	13	2.6	4.5	100.0
	Total	291	58.2	100.0	
Missing	System	209	41.8		
Total		500	100.0		

Table I-58: HAR Internet Survey Industry – Real Estate

q37_11 What industry do you currently work in? - Real Estate, Rental, and Leasing

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**279**	**55.8**	**95.9**	**95.9**
	1 Yes	12	2.4	4.1	100.0
	Total	291	58.2	100.0	
Missing	System	209	41.8		
Total		500	100.0		

Table I-59: HAR Internet Survey Industry - Retail

q37_12 What industry do you currently work in? - Retail and Wholesale Trade

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**266**	**53.2**	**91.4**	**91.4**
	1 Yes	25	5.0	8.6	100.0
	Total	291	58.2	100.0	
Missing	System	209	41.8		
Total		500	100.0		

Table I-60: HAR Internet Survey Industry - Transportation

q37_13 What industry do you currently work in? - Transportation and Warehousing

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**279**	**55.8**	**95.9**	**95.9**
	1 Yes	12	2.4	4.1	100.0
	Total	291	58.2	100.0	
Missing	System	209	41.8		
Total		500	100.0		

Table I-61: HAR Internet Survey Industry - Utilities

q37_14 What industry do you currently work in? - Utilities

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**287**	**57.4**	**98.6**	**98.6**
	1 Yes	4	.8	1.4	100.0
	Total	291	58.2	100.0	
Missing	System	209	41.8		
Total		500	100.0		

Table I-62: HAR Internet Survey Industry - Other

q37_15 What industry do you currently work in? - Other Services (Repair/Maintenance, Religious, Personal Services, etc.)

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**223**	**44.6**	**76.6**	**76.6**
	1 Yes	68	13.6	23.4	100.0
	Total	291	58.2	100.0	
Missing	System	209	41.8		
Total		500	100.0		

Table I-63: HAR Internet Survey Consequences of Being Late to Work

q38 How severe are the consequences if you are 30 minutes late to your job or a job appointment because of unexpected traffic congestion?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Very severe (could lose job if frequent)	44	8.8	15.1	15.1
	2 Somewhat severe (could be reprimanded if frequent)	**103**	**20.6**	**35.4**	**50.5**
	3 Not severe (could adjust my shift)	54	10.8	18.6	69.1
	4 Not a big deal at all (I can set my own hours)	52	10.4	17.9	86.9
	5 Varies depending on the day or the specific appointment	38	7.6	13.1	100.0
	Total	291	58.2	100.0	
Missing	System	209	41.8		
Total		500	100.0		

Table I-64: HAR Internet Survey Hours Worked per Week

q39 How many hours do you typically work per week?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Less than 10	9	1.8	3.1	3.1
	2 10-19	19	3.8	6.5	9.6
	3 20-29	43	8.6	14.8	24.4
	4 30-39	86	17.2	29.6	54.0
	5 40-49	**117**	**23.4**	**40.2**	**94.2**
	6 50 or more	17	3.4	5.8	100.0
	Total	291	58.2	100.0	
Missing	System	209	41.8		
Total		500	100.0		

Table I-65: HAR Internet Survey Days Worked per Week

q40 How many days do you typically work per week?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 One or two	18	3.6	6.2	6.2
	2 Three or four	51	10.2	17.5	23.7
	3 Five	**173**	**34.6**	**59.5**	**83.2**
	4 Six or seven	49	9.8	16.8	100.0
	Total	291	58.2	100.0	
Missing	System	209	41.8		
Total		500	100.0		

Table I-66: HAR Internet Survey Income

q41 What is your estimated personal yearly gross income (before taxes or benefits are taken out)?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Less than $10,000	14	2.8	4.8	4.8
	2 $10,000 - $14,999	9	1.8	3.1	7.9
	3 $15,000 - $24,999	20	4.0	6.9	14.8
	4 $25,000 - $34,999	32	6.4	11.0	25.8
	5 $35,000 - $49,999	55	11.0	18.9	44.7
	6 $50,000 - $74,999	**60**	**12.0**	**20.6**	**65.3**
	7 $75,000 - $99,999	57	11.4	19.6	84.9
	8 $100,000 - $149,999	30	6.0	10.3	95.2
	9 $150,000 - $199,999	7	1.4	2.4	97.6
	10 $200,000 or more	7	1.4	2.4	100.0
	Total	291	58.2	100.0	
Missing	System	209	41.8		
Total		500	100.0		

Table I-67: HAR Internet Survey Toll Transponder Owned

q42 Which of the following toll transponders do you own?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Sunpass**	**344**	**68.8**	**68.8**	**68.8**
	2 E-Pass	55	11.0	11.0	79.8
	3 Neither	101	20.2	20.2	100.0
	Total	500	100.0	100.0	

Table I-68: HAR Internet Survey Monthly Tolls

q43 How much do you typically spend on tolls per month?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Between $0 and $20**	**278**	**55.6**	**55.6**	**55.6**
	2 Between $21 and $40	115	23.0	23.0	78.6
	3 Between $41 and $60	65	13.0	13.0	91.6
	4 Between $61 and $80	22	4.4	4.4	96.0
	5 Between $81 and $100	16	3.2	3.2	99.2
	6 Over $100 a month	4	.8	.8	100.0
	Total	500	100.0	100.0	

Table I-69: HAR Internet Survey Length of Florida Residency

q44 How long have you lived in Florida?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Less than 6 months	9	1.8	1.8	1.8
	2 Between 6 and 12 months	21	4.2	4.2	6.0
	3 Between 1 and 5 years	65	13.0	13.0	19.0
	4 Between 5 and 10 years	69	13.8	13.8	32.8
	5 More than 10 years	**336**	**67.2**	**67.2**	**100.0**
	Total	500	100.0	100.0	

Appendix J: HAR Field Survey Response Frequency Tables

The following tables show the results for each question in the HAR field survey. Bolded responses indicate the most frequently selected response for each question. Note that the percent column indicates the percentage out of all 1610 respondents and the valid percent column indicates the percentage out of all respondents to that specific question. Also, responses labeled as "Missing" represent respondents who were not asked that question.

Table J-1: HAR Field Survey Roadway

qroadway Survey Roadway:

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Florida Turnpike**	**1119**	**69.5**	**69.5**	**69.5**
	2 I-75 (Charlotte Rest Area)	280	17.4	17.4	86.9
	3 I-95 (St. Lucie Rest Area)	211	13.1	13.1	100.0
	Total	1610	100.0	100.0	

Table J-2: HAR Field Survey Service Plaza

qs1 Survey Location:

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Turkey Lake Service Plaza	442	27.5	39.5	39.5
	2 Okahumpka Service Plaza	207	12.9	18.5	58.0
	3 Canoe Creek Service Plaza	**470**	**29.2**	**42.0**	**100.0**
	Total	1119	69.5	100.0	
Missing	System	491	30.5		
Total		1610	100.0		

Table J-3: HAR Field Survey Gender

qs4 Gender:

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Male**	**1002**	**62.2**	**62.2**	**62.2**
	2 Female	608	37.8	37.8	100.0
	Total	1610	100.0	100.0	

Table J-4: HAR Field Survey Trip Purpose

hq1 What is the purpose of your current trip on Florida Turnpike/I-75/I-95?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Travel to/from work or school	268	16.6	16.6	16.6
	2 Shopping	37	2.3	2.3	18.9
	3 Leisure/vacation	**1025**	**63.7**	**63.7**	**82.6**
	4 Other	280	17.4	17.4	100.0
	Total	1610	100.0	100.0	

Table J-5: HAR Field Survey Frequency of Travel

hq2 How many times per week do you travel on the Florida Turnpike/I-75/I-95?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Once a week or less**	**1194**	**74.2**	**74.2**	**74.2**
	2 2-5 times a week	260	16.1	16.1	90.3
	3 6-10 times a week	96	6.0	6.0	96.3
	4 More than 10 times a week	60	3.7	3.7	100.0
	Total	1610	100.0	100.0	

Table J-6: HAR Field Survey Preferred Travel Information Source

hq3 How do you prefer to receive travel information, such as traffic conditions, road closures, and special events information while traveling?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Commercial Radio Reports	223	13.9	13.9	13.9
	2 Highway Electronic Message Signs	**540**	**33.5**	**33.5**	**47.4**
	3 Smartphone Applications	442	27.5	27.5	74.8
	4 Highway Advisory Radio (HAR)	29	1.8	1.8	76.6
	6 Florida 511	14	.9	.9	77.5
	7 GPS Navigation Device	362	22.5	22.5	100.0
	Total	1610	100.0	100.0	

Table J-7: HAR Field Survey Preferred Smartphone Application

hq4 What is your preferred smartphone application?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Vehicle Navigation Smartphone Apps (TomTom, Garmin, Magellan, etc...)	20	1.2	4.5	4.5
	2 Waze Social GPS Maps	64	4.0	14.5	19.0
	3 Google Maps	**257**	**16.0**	**58.1**	**77.1**
	4 Apple Maps	51	3.2	11.5	88.7
	5 Other	50	3.1	11.3	100.0
	Total	442	27.5	100.0	
Missing	System	1168	72.5		
Total		1610	100.0		

Table J-8: HAR Field Survey Reason for Preferred Travel Information Source

hq5 What do you like most about your preferred source of travel information you selected?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Ease of use**	**908**	**56.4**	**56.4**	**56.4**
	2 Information accuracy	308	19.1	19.1	75.5
	3 On-time delivery of information	142	8.8	8.8	84.3
	4 Location-specific information	198	12.3	12.3	96.6
	5 Availability of safety or security information	46	2.9	2.9	99.5
	6 Availability of special event information	8	.5	.5	100.0
	Total	1610	100.0	100.0	

Table J-9: HAR Field Survey Awareness of HAR

hq6 Highway Advisory Radio (HAR) is a radio station (AM 1640) dedicated to 24-hour highway travel information. Are you aware that HAR is available on the Florida Turnpike/I-75/I-95?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Yes**	**993**	**61.7**	**61.7**	**61.7**
	2 No	617	38.3	38.3	100.0
	Total	1610	100.0	100.0	

Table J-10: HAR Field Survey Method of HAR Awareness

hq7 How did you first become aware that HAR is available on the Florida Turnpike/I-75/I-95?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Signs along roadway**	**921**	**57.2**	**92.7**	**92.7**
	2 Friend or relative	22	1.4	2.2	95.0
	3 Florida Turnpike or Florida Department of Transportation website	5	.3	.5	95.5
	4 Other	45	2.8	4.5	100.0
	Total	993	61.7	100.0	
Missing	System	617	38.3		
Total		1610	100.0		

Table J-11: HAR Field Survey Usage of HAR

hq8 Have you ever used HAR while traveling on the Florida Turnpike/I-75/I-95?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Yes	362	22.5	36.5	36.5
	2 No	**631**	**39.2**	**63.5**	**100.0**
	Total	993	61.7	100.0	
Missing	System	617	38.3		
Total		1610	100.0		

Table J-12: HAR Field Survey Frequency of HAR Usage

hq9 How frequently do you use HAR during your trips on the Florida Turnpike/I-75/I-95?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Always	21	1.3	5.8	5.8
	2 Often	47	2.9	13.0	18.8
	3 Sometimes	99	6.1	27.3	46.1
	4 Rarely	**195**	**12.1**	**53.9**	**100.0**
	Total	362	22.5	100.0	
Missing	System	1248	77.5		
Total		1610	100.0		

Table J-13: HAR Field Survey Satisfaction with HAR
hq10 How would you rate your experience with HAR and the travel information it provides?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Strongly Satisfied	54	3.4	14.9	14.9
	2 Satisfied	**236**	**14.7**	**65.2**	**80.1**
	3 Dissatisfied	49	3.0	13.5	93.6
	4 Strongly Dissatisfied	23	1.4	6.4	100.0
	Total	362	22.5	100.0	
Missing	System	1248	77.5		
Total		1610	100.0		

Table J-14: HAR Field Survey Reason for Satisfaction
hq11a Which answer best describes your strongest opinion on HAR and the travel information it provides?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Information is accurate and up-to-date**	**105**	**6.5**	**36.2**	**36.2**
	2 Easy to access	95	5.9	32.8	69.0
	3 Easy to understand	43	2.7	14.8	83.8
	4 Provides location-specific information	47	2.9	16.2	100.0
	Total	290	18.0	100.0	
Missing	System	1320	82.0		
Total		1610	100.0		

Table J-15: HAR Field Survey Reason for Dissatisfaction

hq11b Which answer best describes your strongest opinion on HAR and the travel information it provides?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Information is not accurate and up-to-date	16	1.0	22.2	22.2
	2 Not easy to access	12	.7	16.7	38.9
	3 Not easy to understand	**22**	**1.4**	**30.6**	**69.4**
	4 Does not provide location-specific information	5	.3	6.9	76.4
	5 Needs a wider coverage area	17	1.1	23.6	100.0
	Total	72	4.5	100.0	
Missing	System	1538	95.5		
Total		1610	100.0		

Table J-16: HAR Field Survey Most Important HAR Traffic Information

hq12 What is the most important type of traffic information you think should be broadcast on HAR?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Traffic congestion locations and durations**	**230**	**14.3**	**63.5**	**63.5**
	2 Weather conditions	26	1.6	7.2	70.7
	3 Roadway construction	19	1.2	5.2	76.0
	4 Special events	3	.2	.8	76.8
	5 Alternate route information	29	1.8	8.0	84.8
	6 Safety information	55	3.4	15.2	100.0
	Total	362	22.5	100.0	
Missing	System	1248	77.5		
Total		1610	100.0		

Table J-17: HAR Field Survey Use of HAR in Emergencies

hq13 If you were required to evacuate the area of Florida that you reside in because of a hurricane and HAR was available for emergency broadcasts, would you use HAR?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Yes**	**713**	**44.3**	**44.3**	**44.3**
	2 No	284	17.6	17.6	61.9
	3 Yes, but would seek out other sources of information first	613	38.1	38.1	100.0
	Total	1610	100.0	100.0	

Table J-18: HAR Field Survey Best Method to Promote HAR

hq14 To increase awareness of HAR, where do you think is the best place to promote or advertise HAR?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Television	266	16.5	16.5	16.5
	2 Popular Radio Stations	278	17.3	17.3	33.8
	3 Social Media Websites	330	20.5	20.5	54.3
	4 Florida Turnpike and/or Florida Department of Transportation Website	12	.7	.7	55.0
	5 Highway Electronic Message Signs	**466**	**28.9**	**28.9**	**84.0**
	6 Billboard	258	16.0	16.0	100.0
	Total	1610	100.0	100.0	

Table J-19: HAR Field Survey Continuation of HAR

hq15 Should HAR service be continued or discontinued?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Continued**	**1429**	**88.8**	**88.8**	**88.8**
	2 Discontinued	181	11.2	11.2	100.0
	Total	1610	100.0	100.0	

Table J-20: HAR Field Survey Alternative Travel Information Source – Commercial Radio Reports

hq16_1 If HAR service is discontinued, what alternatives would you use to obtain travel information? - Commercial Radio Reports

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	716	44.5	44.5	44.5
	1 Yes	**894**	**55.5**	**55.5**	**100.0**
	Total	1610	100.0	100.0	

Table J-21: HAR Field Survey Alternative Travel Information Source – Internet

hq16_2 If HAR service is discontinued, what alternatives would you use to obtain travel information? - Internet

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	783	48.6	48.6	48.6
	1 Yes	**827**	**51.4**	**51.4**	**100.0**
	Total	1610	100.0	100.0	

Table J-22: HAR Field Survey Alternative Travel Information Source – DMS

hq16_3 If HAR service is discontinued, what alternatives would you use to obtain travel information? - Highway Electronic Message Signs

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	455	28.3	28.3	28.3
	1 Yes	**1155**	**71.7**	**71.7**	**100.0**
	Total	1610	100.0	100.0	

Table J-23: HAR Field Survey Alternative Travel Information Source – Smartphone Apps

hq16_4 If HAR service is discontinued, what alternatives would you use to obtain travel information? - Smartphone Applications

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	672	41.7	41.7	41.7
	1 Yes	**938**	**58.3**	**58.3**	**100.0**
	Total	1610	100.0	100.0	

Table J-24: HAR Field Survey Alternative Travel Information Source – CB Radio

hq16_5 If HAR service is discontinued, what alternatives would you use to obtain travel information? - Citizens' Band (CB) Radio

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**1534**	**95.3**	**95.3**	**95.3**
	1 Yes	76	4.7	4.7	100.0
	Total	1610	100.0	100.0	

Table J-25: HAR Field Survey Alternative Travel Information Source – Florida 511

hq16_6 If HAR service is discontinued, what alternatives would you use to obtain travel information? - Florida 511

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**1394**	**86.6**	**86.6**	**86.6**
	1 Yes	216	13.4	13.4	100.0
	Total	1610	100.0	100.0	

Table J-26: HAR Field Survey Future Use of HAR

hq17 If HAR service is continued, would you use HAR in the future?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Yes**	**1353**	**84.0**	**84.0**	**84.0**
	2 No	257	16.0	16.0	100.0
	Total	1610	100.0	100.0	

Table J-27: HAR Field Survey Florida Residency

hq18 Do you live in Florida?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Yes**	**1150**	**71.4**	**71.4**	**71.4**
	2 No	460	28.6	28.6	100.0
	Total	1610	100.0	100.0	

Table J-28: HAR Field Survey Age

hq19 Which of the following best describes your age?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 18-25 years	175	10.9	10.9	10.9
	2 26-35 years	249	15.5	15.5	26.3
	3 36-50 years	441	27.4	27.4	53.7
	4 51-65 years	**455**	**28.3**	**28.3**	**82.0**
	5 Over 65 years	290	18.0	18.0	100.0
	Total	1610	100.0	100.0	

Table J-29: HAR Field Survey Education Level

hq20 What is your highest level of education reached?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 High School Diploma or less	239	14.8	14.8	14.8
	2 Some College	392	24.3	24.3	39.2
	3 Associate Degree	190	11.8	11.8	51.0
	4 Bachelor Degree	**456**	**28.3**	**28.3**	**79.3**
	5 Post Graduate Degree	333	20.7	20.7	100.0
	Total	1610	100.0	100.0	

Appendix K: HAR User Satisfaction Tree Model Details

Figure K-1 below shows the entire decision tree model for HAR user satisfaction.
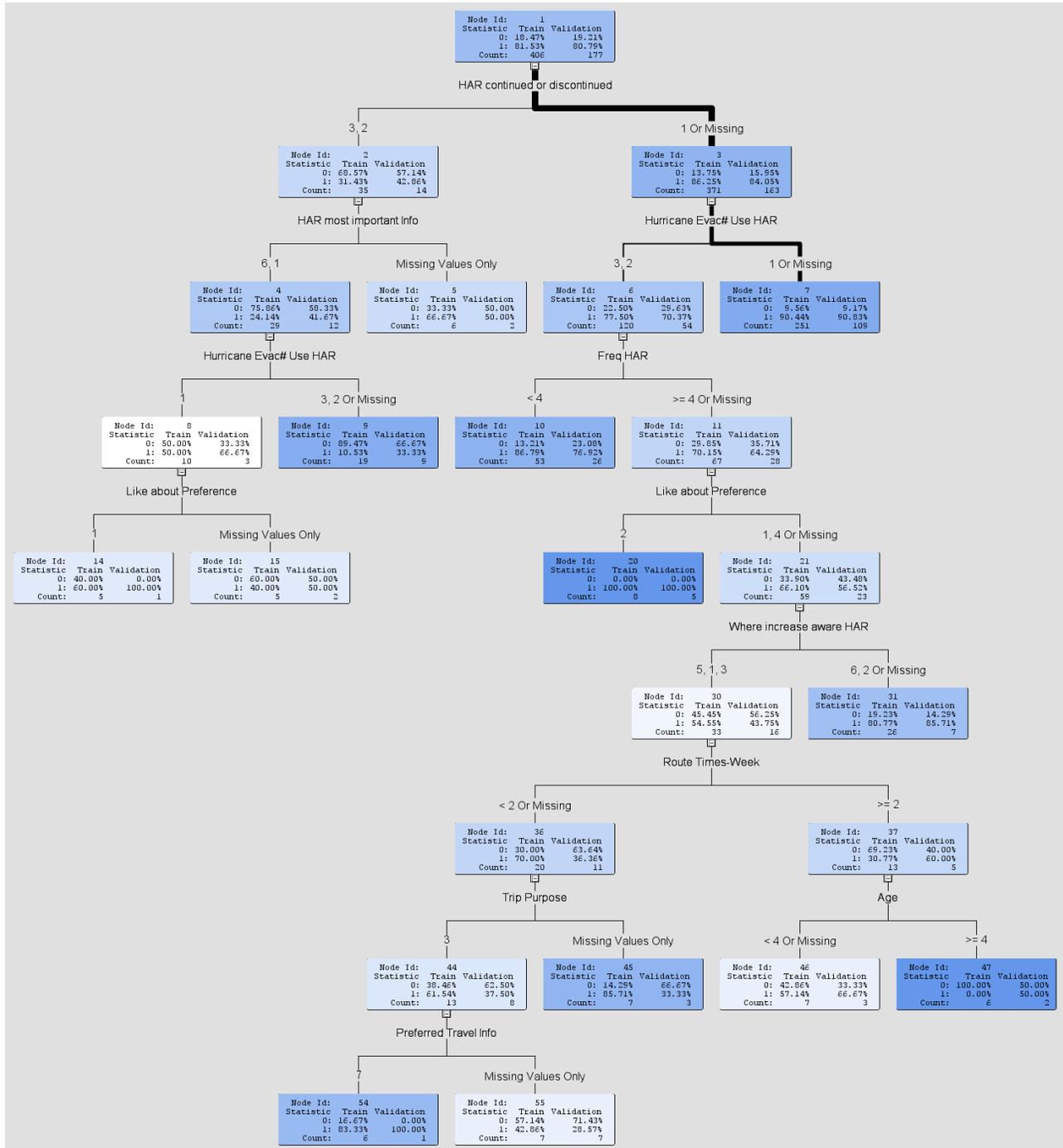
Figure K-1: Full HAR User Satisfaction Tree Model

Table K-1 below details the tree misclassification for both training and validation. In this table, responses of "1" indicate satisfaction and responses of "0" indicate dissatisfaction. The "True" column shows the percentage of responses that were correctly predicted and the "False" column shows the percentage of responses that were incorrectly predicted.

Table K-1: Tree Misclassification

Data Set	Target Response	True	False
Training	1	79.80%	1.72%
	0	7.39%	11.08%
	Misclassification:		**12.81%**
Validation	1	76.84%	3.95%
	0	7.34%	11.86%
	Misclassification:		**15.82%**

Appendix L: CBRAS/HAR Survey for Truck Drivers Response Frequencies

The following tables show the results for each question in the CBRAS/HAR survey for truck drivers. Bolded responses indicate the most frequently selected response for each question. Note that the percent column indicates the percentage out of all 613 respondents and the percent answered column indicates the percentage out of all respondents to that specific question. Also, responses labeled as "Missing" represent respondents who were not asked that question.

Table L-1: CBRAS/HAR Survey Roadway

qroadway Survey Roadway:

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	**1 Florida Turnpike**	**440**	**71.8**	**71.8**	**71.8**
	2 I-75 (Charlotte Rest Area)	98	16.0	16.0	87.8
	3 I-95 (St. Lucie Rest Area)	75	12.2	12.2	100.0
	Total	613	100.0	100.0	

Table L-2: CBRAS/HAR Survey Service Plaza

qs1 Survey Location:

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	**1 Turkey Lake Service Plaza**	**234**	**38.2**	**53.2**	**53.2**
	2 Okahumpka Service Plaza	57	9.3	13.0	66.1
	3 Canoe Creek Service Plaza	149	24.3	33.9	100.0
	Total	440	71.8	100.0	
Missing	System	173	28.2		
Total		613	100.0		

Table L-3: CBRAS/HAR Survey Gender

qs4 Gender:

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	**1 Male**	**593**	**96.7**	**96.7**	**96.7**
	2 Female	20	3.3	3.3	100.0
	Total	613	100.0	100.0	

Table L-4: CBRAS/HAR Survey Presence of CB Radio

q1 Do you have a Citizens' Band (CB) radio in your truck?

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	**1 Yes**	**329**	**53.7**	**53.7**	**53.7**
	2 No	284	46.3	46.3	100.0
	Total	613	100.0	100.0	

Table L-5: CBRAS/HAR Survey CB Radio Usage

q2 How often do you use CB radio for travel information?

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	1 Always	73	11.9	22.2	22.2
	2 Often	57	9.3	17.3	39.5
	3 Sometimes	77	12.6	23.4	62.9
	4 Rarely	**83**	**13.5**	**25.2**	**88.1**
	5 Never	39	6.4	11.9	100.0
	Total	329	53.7	100.0	
Missing	System	284	46.3		
Total		613	100.0		

Table L-6: CBRAS/HAR Survey Florida Residency

q3 Do you live in Florida?

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	**1 Yes**	**362**	**59.1**	**59.1**	**59.1**
	2 No	251	40.9	40.9	100.0
	Total	613	100.0	100.0	

Table L-7: CBRAS/HAR Survey Frequency of Travel

q4 How many times per week do you travel on the Florida Turnpike/I-75/I-95?

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	**1 Once a week or less**	**273**	**44.5**	**44.5**	**44.5**
	2 2-5 times a week	200	32.6	32.6	77.2
	3 6-10 times a week	72	11.7	11.7	88.9
	4 More than 10 times a week	68	11.1	11.1	100.0
	Total	613	100.0	100.0	

Table L-8: CBRAS/HAR Survey Preferred Travel Information Source

q5 How do you prefer to receive travel information, such as traffic conditions, road closures, and special events information while traveling?

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	1 CB Radio	95	15.5	15.5	15.5
	2 Information from your dispatcher	32	5.2	5.2	20.7
	3 Highway Advisory Radio (HAR)	13	2.1	2.1	22.8
	4 Highway Electronic Message Signs	92	15.0	15.0	37.8
	5 Smartphone Applications	134	21.9	21.9	59.7
	6 Commercial Radio	57	9.3	9.3	69.0
	7 Florida 511	20	3.3	3.3	72.3
	8 GPS Navigation Device	**170**	**27.7**	**27.7**	**100.0**
	Total	613	100.0	100.0	

Table L-9: CBRAS/HAR Survey Preferred Smartphone Application

q6 What is your preferred smartphone application?

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	1 Vehicle Navigation Smartphone Apps (TomTom, Garmin, Magellan, etc...)	6	1.0	4.5	4.5
	2 Waze Social GPS Maps	6	1.0	4.5	9.0
	3 Google Maps	**93**	**15.2**	**69.4**	**78.4**
	4 Apple Maps	11	1.8	8.2	86.6
	5 Other	18	2.9	13.4	100.0
	Total	134	21.9	100.0	
Missing	System	479	78.1		
Total		613	100.0		

Table L-10: CBRAS/HAR Survey Reason for Preferred Travel Information Source
q7 What do you like most about your preferred source of travel information you selected?

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	**1 Ease of use**	**312**	**50.9**	**50.9**	**50.9**
	2 Information accuracy	157	25.6	25.6	76.5
	3 On-time delivery of information	44	7.2	7.2	83.7
	4 Location-specific information	80	13.1	13.1	96.7
	5 Availability of safety or security information	13	2.1	2.1	98.9
	6 Availability of special event information	7	1.1	1.1	100.0
	Total	613	100.0	100.0	

Table L-11: CBRAS/HAR Survey Awareness of CBRAS

q1a Citizens' Band Radio Advisory System (CBRAS) is a traffic information channel (channel 19) broadcasted over CB radios. Are you aware that CBRAS is available on the Florida Turnpike?

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	1 Yes	144	23.5	43.8	43.8
	2 No	**185**	**30.2**	**56.2**	**100.0**
	Total	329	53.7	100.0	
Missing	System	284	46.3		
Total		613	100.0		

Table L-12: CBRAS/HAR Survey Usage of CBRAS
q2a Have you ever used CBRAS while traveling on the Florida Turnpike?

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	**1 Yes**	**75**	**12.2**	**52.1**	**52.1**
	2 No	69	11.3	47.9	100.0
	Total	144	23.5	100.0	
Missing	System	469	76.5		
Total		613	100.0		

Table L-13: CBRAS/HAR Survey Frequency of CBRAS Usage
q3a How frequently do you use CBRAS during your trips on the Florida Turnpike?

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	**1 Always**	**29**	**4.7**	**38.7**	**38.7**
	2 Often	19	3.1	25.3	64.0
	3 Sometimes	15	2.4	20.0	84.0
	4 Rarely	12	2.0	16.0	100.0
	Total	75	12.2	100.0	
Missing	System	538	87.8		
Total		613	100.0		

Table L-14: CBRAS/HAR Survey Satisfaction with CBRAS
q4a How would you rate your experience with CBRAS and the travel information it provides?

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	1 Strongly Satisfied	23	3.8	30.7	30.7
	2 Satisfied	**46**	**7.5**	**61.3**	**92.0**
	3 Dissatisfied	4	.7	5.3	97.3
	4 Strongly Dissatisfied	2	.3	2.7	100.0
	Total	75	12.2	100.0	
Missing	System	538	87.8		
Total		613	100.0		

Table L-15: CBRAS/HAR Survey Reason for CBRAS Satisfaction
q5aa Which answer best describes your strongest opinion on CBRAS and the travel information it provides?

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	**1 Information is accurate and up-to-date**	**24**	**3.9**	**34.8**	**34.8**
	2 Easy to access	23	3.8	33.3	68.1
	3 Easy to understand	17	2.8	24.6	92.8
	4 Provides location-specific information	5	.8	7.2	100.0
	Total	69	11.3	100.0	
Missing	System	544	88.7		
Total		613	100.0		

Table L-16: CBRAS/HAR Survey Reason for CBRAS Dissatisfaction

q5ab Which answer best describes your strongest opinion on CBRAS and the travel information it provides?

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	**1 Information is not accurate and up-to-date**	**3**	**.5**	**50.0**	**50.0**
	3 Not easy to understand	2	.3	33.3	83.3
	5 Needs a wider coverage area	1	.2	16.7	100.0
	Total	6	1.0	100.0	
Missing	System	607	99.0		
Total		613	100.0		

Table L-17: CBRAS/HAR Survey CBRAS Congestion Message

q6a While traveling on the Florida Turnpike, have you ever heard a message on CBRAS that informed you of congestion?

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	**1 Yes**	**51**	**8.3**	**68.0**	**68.0**
	2 No	24	3.9	32.0	100.0
	Total	75	12.2	100.0	
Missing	System	538	87.8		
Total		613	100.0		

Table L-18: CBRAS/HAR Survey CBRAS Diversion

q7a Did you divert off the Florida Turnpike to avoid this congestion?

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	**1 Yes**	**36**	**5.9**	**70.6**	**70.6**
	2 No	15	2.4	29.4	100.0
	Total	51	8.3	100.0	
Missing	System	562	91.7		
Total		613	100.0		

Table L-19: CBRAS/HAR Survey Years of Experience (CBRAS Respondents)

q8a How many years of professional truck driving experience do you have?

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	1 Less than five years	11	1.8	14.7	14.7
	2 5-10 years	11	1.8	14.7	29.3
	3 11-15 years	11	1.8	14.7	44.0
	4 16-20 years	10	1.6	13.3	57.3
	5 More than 20 years	**32**	**5.2**	**42.7**	**100.0**
	Total	75	12.2	100.0	
Missing	System	538	87.8		
Total		613	100.0		

Table L-20: CBRAS/HAR Survey Usage of HAR

q1b Have you ever used Highway Advisory Radio (HAR) while traveling on the Florida Turnpike/I-75/I-95?

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	1 Yes	147	24.0	27.3	27.3
	2 No	**391**	**63.8**	**72.7**	**100.0**
	Total	538	87.8	100.0	
Missing	System	75	12.2		
Total		613	100.0		

Table L-21: CBRAS/HAR Survey Frequency of HAR Usage

q2b How frequently do you use HAR during your trips on the Florida Turnpike/I-75/I-95?

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	1 Always	9	1.5	6.1	6.1
	2 Often	30	4.9	20.4	26.5
	3 Sometimes	44	7.2	29.9	56.5
	4 Rarely	**64**	**10.4**	**43.5**	**100.0**
	Total	147	24.0	100.0	
Missing	System	466	76.0		
Total		613	100.0		

Table L-22: CBRAS/HAR Survey Satisfaction with HAR
q3b How would you rate your experience with HAR and the travel information it provides?

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	1 Strongly Satisfied	11	1.8	7.5	7.5
	2 Satisfied	**95**	**15.5**	**64.6**	**72.1**
	3 Dissatisfied	35	5.7	23.8	95.9
	4 Strongly Dissatisfied	6	1.0	4.1	100.0
	Total	147	24.0	100.0	
Missing	System	466	76.0		
Total		613	100.0		

Table L-23: CBRAS/HAR Survey Reason for HAR Satisfaction
q4ba Which answer best describes your strongest opinion on HAR and the travel information it provides?

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	1 Information is accurate and up-to-date	31	5.1	29.2	29.2
	2 Easy to access	**34**	**5.5**	**32.1**	**61.3**
	3 Easy to understand	19	3.1	17.9	79.2
	4 Provides location-specific information	22	3.6	20.8	100.0
	Total	106	17.3	100.0	
Missing	System	507	82.7		
Total		613	100.0		

Table L-24: CBRAS/HAR Survey Reason for HAR Dissatisfaction

q4bb Which answer best describes your strongest opinion on HAR and the travel information it provides?

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	1 Information is not accurate and up-to-date	7	1.1	17.1	17.1
	2 Not easy to access	**14**	**2.3**	**34.1**	**51.2**
	3 Not easy to understand	10	1.6	24.4	75.6
	4 Does not provide location-specific information	3	.5	7.3	82.9
	5 Needs a wider coverage area	7	1.1	17.1	100.0
	Total	41	6.7	100.0	
Missing	System	572	93.3		
Total		613	100.0		

Table L-25: CBRAS/HAR Survey HAR Congestion Message

q5b While traveling on the Florida Turnpike/I-75/I-95, have you ever heard a message on HAR that informed you of congestion?

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	1 Yes	65	10.6	44.2	44.2
	2 No	**82**	**13.4**	**55.8**	**100.0**
	Total	147	24.0	100.0	
Missing	System	466	76.0		
Total		613	100.0		

Table L-26: CBRAS/HAR Survey HAR Diversion

q6b Did you divert off the Florida Turnpike/I-75/I-95 to avoid this congestion?

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	**1 Yes**	**36**	**5.9**	**55.4**	**55.4**
	2 No	29	4.7	44.6	100.0
	Total	65	10.6	100.0	
Missing	System	548	89.4		
Total		613	100.0		

Table L-27: CBRAS/HAR Survey Years of Experience (HAR Respondents)

q7b How many years of professional truck driving experience do you have?

Response		Frequency	Percent	Percent Answered	Cumulative Percent
Valid	1 Less than five years	8	1.3	5.4	5.4
	2 5-10 years	19	3.1	12.9	18.4
	3 11-15 years	27	4.4	18.4	36.7
	4 16-20 years	31	5.1	21.1	57.8
	5 More than 20 years	**62**	**10.1**	**42.2**	**100.0**
	Total	147	24.0	100.0	
Missing	System	466	76.0		
Total		613	100.0		

Appendix M: State DOTs TID/ATIS Current Practices Survey Response Frequencies

The following tables show the results for each question in the State DOTs TID/ATIS current practices survey. Bolded responses indicate the most frequently selected response for each question. Note that the percent column indicates the percentage out of all 28 respondents and the valid percent column indicates the percentage out of all respondents to that specific question. Also, responses labeled as "Missing" represent respondents who were not asked that question.

Table M-1: State DOT Survey Agencies

qagency_1 Address:

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	AHTD	1	3.6	3.6	3.6
	Alabama Department of Transportation	1	3.6	3.6	7.1
	Caltrans	1	3.6	3.6	10.7
	Delaware Department of Transportation	1	3.6	3.6	14.3
	Department of Transportation and Public Facilities	1	3.6	3.6	17.9
	Florida DOT	1	3.6	3.6	21.4
	Geordia DOT	1	3.6	3.6	25.0
	Hawaii Dept. of Transportation	1	3.6	3.6	28.6
	Indiana Department of Transportation	1	3.6	3.6	32.1
	Iowa Department of Transportation	1	3.6	3.6	35.7
	KY Transportation Cabinet	1	3.6	3.6	39.3
	LA DOTD	1	3.6	3.6	42.9
	Maine Dept of Transportation	1	3.6	3.6	46.4
	MDOT	1	3.6	3.6	50.0
	Minnesota Department of Transportation	1	3.6	3.6	53.6
	Missouri Department of Transportation	1	3.6	3.6	57.1

Table M-1: State DOT Survey Agencies

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Montana Department of Transportation	1	3.6	3.6	60.7
Nebraska Dept. of Roads	1	3.6	3.6	64.3
Nevada DOT	1	3.6	3.6	67.9
North Dakota Department of Transportation	1	3.6	3.6	71.4
NYS Dept of Transportation	1	3.6	3.6	75.0
Oklahoma DOT	1	3.6	3.6	78.6
PennDOT	1	3.6	3.6	82.1
SCDOT	1	3.6	3.6	85.7
South Dakota Dept. of Transportation	1	3.6	3.6	89.3
TDOT	1	3.6	3.6	92.9
Texas Department of Transportation	1	3.6	3.6	96.4
Wisconsin DOT	1	3.6	3.6	100.0
Total	28	100.0	100.0	

Table M-2: State DOT Survey HAR Usage

q2 Has your agency ever used/deployed HAR or plan to use/deploy HAR in the future?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Used it previously, but not currently	3	10.7	10.7	10.7
	2 Use it currently	**19**	**67.9**	**67.9**	**78.6**
	4 Have never used and do not plan to use HAR	6	21.4	21.4	100.0
	Total	28	100.0	100.0	

Table M-3: State DOT Survey Reason for Stopping HAR

q3 Why did your agency stop using HAR?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		25	89.3	89.3	89.3
	Driver feedback and maintenance issues.	1	3.6	3.6	92.9
	Other technologies are available	1	3.6	3.6	96.4
	We could not get it to work well. Lots of interference, especially at night. Range was very short too.	1	3.6	3.6	100.0
	Total	28	100.0	100.0	

Table M-4: State DOT Survey Time HAR System Has Been in Place

q4 How long has your agency's HAR system been in place?

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	9	32.1	32.1	32.1
10 years	1	3.6	3.6	35.7
12/22/2009	1	3.6	3.6	39.3
15 years	1	3.6	3.6	42.9
17 years	1	3.6	3.6	46.4
2003	1	3.6	3.6	50.0
25 years	1	3.6	3.6	53.6
Approximately 15 years.	1	3.6	3.6	57.1
Approximately twenty years.	1	3.6	3.6	60.7
At least 20 years	1	3.6	3.6	64.3
First HAR system deployed 2003 or @ 12 years	1	3.6	3.6	67.9
First system installed in mid 1990's. Current system in place for 5 years.	1	3.6	3.6	71.4
Forever	1	3.6	3.6	75.0
HARs have been in-place since 1998 in the Pittsburgh region.	1	3.6	3.6	78.6
more than 15 years	1	3.6	3.6	82.1
More than 20 years.	1	3.6	3.6	85.7
Off and on for the past 20 years	1	3.6	3.6	89.3
Since early 2000.	1	3.6	3.6	92.9
Temporary system, not permanent, is being used for the past 4 to 5 months.	1	3.6	3.6	96.4
Varies by TxDOT agency Districts. First HAR System began transmitting in 1998.	1	3.6	3.6	100.0
Total	28	100.0	100.0	

Table M-5: State DOT Survey Future Changes in HAR
q5 How do you think your agency's HAR program might change during the next five years?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		9	32.1	32.1	32.1
	As vehicle to infrastructure and vehicle to vehicle technology advances HAR will become obsolete.	1	3.6	3.6	35.7
	Because of limited communications in rural areas, we still find it useful for sharing information at key decisions points, so we may need to modify the system to communicate with any systems that change or upgrade in the future.	1	3.6	3.6	39.3
	Communication method upgrades; near real time programming; upgrade software and equipment; relocation of existing HAR Stations to more outlying District areas (more rural/adjacent to more urban area - urban sprawl)	1	3.6	3.6	42.9
	Currently further deployment of any HAR is suspended. Maintenance of current system continues.	1	3.6	3.6	46.4

Table M-5: State DOT Survey Future Changes in HAR--Continued

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Expand use to construction work zones	1	3.6	3.6	50.0
HAR will be used in conjunction with variable message signs - both permanent and portable - to give the traveling public more detailed information than what can be contained on a static or dynamic message sign.	1	3.6	3.6	53.6
I don't think it will.	1	3.6	3.6	57.1
Increase usage	1	3.6	3.6	60.7
It is currently only used as part of project-specific AWIS Systems.	1	3.6	3.6	64.3
It's hard to know. Without being able to know how much it's used it's difficult to be able to determine its value. With budget cuts going on, we might look at phasing permanent stations and looking more at portable HAR. But nothing has been decided yet.	1	3.6	3.6	\67.9
More automation, integrating into traffic monitoring / incident management systems	1	3.6	3.6	71.4
Not sure	1	3.6	3.6	75.0

Table M-5: State DOT Survey Future Changes in HAR--Continued

Response	Frequency	Percent	Valid Percent	Cumulative Percent
The "system" is really individual HAR stations that are operated by the local regional TMC's. HAR is not the best tool to use for many situations it was originally intended for. we are relying less on HAR, and more on other applications. HOWEVER, we still see some value in HAR and, it certain locations, there is much value in HAR. The limits on the strength of the signal is one of it's biggest downfalls	1	3.6	3.6	78.6
There are no future plans to deploy HARs at this time.	1	3.6	3.6	82.1
We anticipate a shift from "static" message delivery to interactive information as in-vehicle technology advances. Less HARs will deploy, and those that are deployed will be paired with DMS instead of a stand alone sign.	1	3.6	3.6	85.7
We are considering retiring the HAR system as 511 traveler information expands	1	3.6	3.6	89.3

Table M-5: State DOT Survey Future Changes in HAR--Continued

Response	Frequency	Percent	Valid Percent	Cumulative Percent
We will implement changes to reduce the instances of HAR activation in the opposite direction of travel of the HAR panel sign / flasher.	1	3.6	3.6	92.9
We're using it less and less. I would expect that we would decommission the system in the next 5 years.	1	3.6	3.6	96.4
Yes. Most likely we cease using HAR.	1	3.6	3.6	100.0
Total	28	100.0	100.0	

Table M-6: State DOT Survey HAR Location

q6 Where is your agency's HAR system mainly deployed or where will it be mainly deployed in the future?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Rural areas	3	10.7	15.8	15.8
	2 Urban areas	4	14.3	21.1	36.8
	3 Both	**12**	**42.9**	**63.2**	**100.0**
	Total	19	67.9	100.0	
Missing	System	9	32.1		
Total		28	100.0		

Table M-7: State DOT Survey HAR Use – Traffic Congestion Locations

q7_1 For what specific applications does your agency use or plan to use HAR in the future? - Traffic congestion locations

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	9	32.1	47.4	47.4
	1 Yes	**10**	**35.7**	**52.6**	**100.0**
	Total	19	67.9	100.0	
Missing	System	9	32.1		
Total		28	100.0		

Table M-8: State DOT Survey HAR Use – Traffic Congestion Durations

q7_2 For what specific applications does your agency use or plan to use HAR in the future? - Traffic congestion durations

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**13**	**46.4**	**68.4**	**68.4**
	1 Yes	6	21.4	31.6	100.0
	Total	19	67.9	100.0	
Missing	System	9	32.1		
Total		28	100.0		

Table M-9: State DOT Survey HAR Use – Travel Times

q7_3 For what specific applications does your agency use or plan to use HAR in the future? - Travel times

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**15**	**53.6**	**78.9**	**78.9**
	1 Yes	4	14.3	21.1	100.0
	Total	19	67.9	100.0	
Missing	System	9	32.1		
Total		28	100.0		

Table M-10: State DOT Survey HAR Use – Roadway Construction

q7_4 For what specific applications does your agency use or plan to use HAR in the future? - Roadway construction

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	3	10.7	15.8	15.8
	1 Yes	**16**	**57.1**	**84.2**	**100.0**
	Total	19	67.9	100.0	
Missing	System	9	32.1		
Total		28	100.0		

Table M-11: State DOT Survey HAR Use – Alternative Route Information

q7_5 For what specific applications does your agency use or plan to use HAR in the future? - Alternative route information

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	6	21.4	31.6	31.6
	1 Yes	**13**	**46.4**	**68.4**	**100.0**
	Total	19	67.9	100.0	
Missing	System	9	32.1		
Total		28	100.0		

Table M-12: State DOT Survey HAR Use – Weather Conditions

q7_6 For what specific applications does your agency use or plan to use HAR in the future? - Weather conditions

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	9	32.1	47.4	47.4
	1 Yes	**10**	**35.7**	**52.6**	**100.0**
	Total	19	67.9	100.0	
Missing	System	9	32.1		
Total		28	100.0		

Table M-13: State DOT Survey HAR Use – Special Events

q7_7 For what specific applications does your agency use or plan to use HAR in the future? - Special event information

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	5	17.9	26.3	26.3
	1 Yes	**14**	**50.0**	**73.7**	**100.0**
	Total	19	67.9	100.0	
Missing	System	9	32.1		
Total		28	100.0		

Table M-14: State DOT Survey HAR Use – Safety Information

q7_8 For what specific applications does your agency use or plan to use HAR in the future? - Safety information

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	6	21.4	31.6	31.6
	1 Yes	**13**	**46.4**	**68.4**	**100.0**
	Total	19	67.9	100.0	
Missing	System	9	32.1		
Total		28	100.0		

Table M-15: State DOT Survey HAR Use – Other

q7_9 For what specific applications does your agency use or plan to use HAR in the future? - Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**14**	**50.0**	**73.7**	**73.7**
	1 Yes	5	17.9	26.3	100.0
	Total	19	67.9	100.0	
Missing	System	9	32.1		
Total		28	100.0		

Table M-16: State DOT Survey HAR Use – Other (Details)

q7_9_other For what specific applications does your agency use or plan to use HAR in the future? - Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		23	82.1	82.1	82.1
	Amber and Silver alerts	1	3.6	3.6	85.7
	Evacuation information	1	3.6	3.6	89.3
	Hurricane Evacuation	1	3.6	3.6	92.9
	Major incident information PSA Amber Alerts	1	3.6	3.6	96.4
	Major incidents.	1	3.6	3.6	100.0
	Total	28	100.0	100.0	

Table M-17: State DOT Survey HAR Operation
q8 Is your agency's HAR system operated or planned to be operated in the future from a traffic management/operations center?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Yes**	**17**	**60.7**	**89.5**	**89.5**
	2 No	2	7.1	10.5	100.0
	Total	19	67.9	100.0	
Missing	System	9	32.1		
Total		28	100.0		

Table M-18: State DOT Survey HAR Operational Strategy Benefits and Limitations
q9 What are some of the benefits and limitations of this HAR operational strategy?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		11	39.3	39.3	39.3
	At this time all the HAR stations are updated from a fixed location other than a Traffic Control Center and cannot be updated by cell phone. Most likely technology will be replaced with vehicle to infrastructure technology automation.	1	3.6	3.6	42.9
	Automated test to voice system has difficulty with regional place names	1	3.6	3.6	46.4

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Table M-18: State DOT Survey HAR Operational Strategy Benefits and Limitations --Continued

Response	Frequency	Percent	Valid Percent	Cumulative Percent
BENEFITS: -Longer time to listen to message based on broadcast radius -ability to locate transmitters near each other for continuous messaging -Lower O&M costs LIMITATIONS -Broadcast range based on geography -Multiple AM frequencies in the same area requires motorists to switch channels -Overlap of competing messages from different projects	1	3.6	3.6	50.0
Benefits: Provides near-real time notification of highway advisory conditions and events. Most vehicles are equipped with AM radio, so it appeals to the masses. Limitations: Operations personnel are needed to manage. Not all Districts using HAR have 24-hr TMC operators, so limitation is to peak hour/daytime peak in those situations.	1	3.6	3.6	53.6
Can get a lot of info out	1	3.6	3.6	57.1

Table M-18: State DOT Survey HAR Operational Strategy Benefits and Limitations
--Continued

Response	Frequency	Percent	Valid Percent	Cumulative Percent
control, duration and timing of messages	1	3.6	3.6	60.7
HAR is a good resource to provide information in areas that have no DMS. In rural areas where ITS has not been deployed as in the urban areas. The limitation is the AM frequency and allowed output.	1	3.6	3.6	64.3
Advancements in cellular technology has far surpassed HAR for motorists to receive information. HARs allow the public traveling within a specific area (not necessarily constrained to a particular roadway)to get up to date information on a multitude of subjects at once. There is a limitation in the fact that depending on your network frequency you may experience interference that may be outside of your control.	1	3.6	3.6	67.9

Table M-18: State DOT Survey HAR Operational Strategy Benefits and Limitations
--Continued

Response	Frequency	Percent	Valid Percent	Cumulative Percent
One of the key benefits of operating our HAR in conjunction with our dynamic message signs is the ability to grab peoples' attention with the sign and then give more detailed information to the driving public without having the driver being distracted - by listening to a message rather than reading and interpreting the message trying to be conveyed. One limitation of the HAR system is its limited range of use in mountainous areas due to low power output of the transmitter.	1	3.6	3.6	71.4

Table M-18: State DOT Survey HAR Operational Strategy Benefits and Limitations--Continued

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Our HAR events are automated through our condition reporting software, so once the TOC enters an event, it is automatically put on the appropriate location's HAR. It also has some filtering in place so it only puts high priority events. This process allows minimal interaction from the TOC and only puts out the need to know incidents to the public.	1	3.6	3.6	75.0
Our HAR is a statewide fully licensed AM station, we reach our entire state 24/7	1	3.6	3.6	78.6
Ours is old and hard to use.	1	3.6	3.6	82.1
Part of response plan efforts. Limitations would be communication issues at times.	1	3.6	3.6	85.7
Perceived benefit is that radio reaches more people. Limitations are: 1) coverage area, 2) quality of radio signal, 3) operative state of equipment.	1	3.6	3.6	89.3

Table M-18: State DOT Survey HAR Operational Strategy Benefits and Limitations
--Continued

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Provides information to drivers who may not be able to access 511/traveler information because of minimal/no cell phone coverage in rural areas.	1	3.6	3.6	92.9
running it from a TMC?? I think it is imperative that the TMC manage HAR content to ensure there is coordination between the messages being played and current conditions.	1	3.6	3.6	96.4
The greatest limitation to the HAR system is the low-power AM band and wattage that the FCC requires us to operate under. This is true regardless of where the program initiates from.	1	3.6	3.6	100.0
Total	28	100.0	100.0	

Table M-19: State DOT Survey HAR Equipment Make
qmake_1 Make:

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	9	32.1	32.1	32.1
?	1	3.6	3.6	35.7
Cambium	1	3.6	3.6	39.3
Do Not Know	1	3.6	3.6	42.9
Highway Information Systems	1	3.6	3.6	46.4
Highway Information Systems, Inc.; MH Corbin	1	3.6	3.6	50.0
HIS	2	7.1	7.1	57.1
idk	1	3.6	3.6	60.7
Information Station Specialists	2	7.1	7.1	67.9
ISS	1	3.6	3.6	71.4
M. H. Corbin and prior mfrs of the product line	1	3.6	3.6	75.0
M.H. Corbin	1	3.6	3.6	78.6
Many Different	1	3.6	3.6	82.1
Quixote/Vaisala	1	3.6	3.6	85.7
There is a lot of equipment that make up the HAR system. not sure what you're looking for.	1	3.6	3.6	89.3
Unknown	2	7.1	7.1	96.4
varies	1	3.6	3.6	100.0
Total	28	100.0	100.0	

Table M-20: State DOT Survey HAR Equipment Model

qmodel_1 Model:

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		9	32.1	32.1	32.1
	?	2	7.1	7.1	39.3
	22JNJ1165	1	3.6	3.6	42.9
	Black Max, DR 2000, DRPSM1 (Power Module), DRTXM4 (AM transmitter module), DRWX1 (weather receiver), RC200A (Remote controller); HAR 100	1	3.6	3.6	46.4
	Black Max, Highway Max, Solar Max	1	3.6	3.6	50.0
	don't know	1	3.6	3.6	53.6
	DR2000	1	3.6	3.6	57.1
	DR360	1	3.6	3.6	60.7
	idk	1	3.6	3.6	64.3
	ITS600	1	3.6	3.6	67.9
	N/A	1	3.6	3.6	71.4
	not sure.	1	3.6	3.6	75.0
	RoadRunnR	1	3.6	3.6	78.6
	unknown	1	3.6	3.6	82.1
	Unknown	2	7.1	7.1	89.3
	varies	1	3.6	3.6	92.9
	various	1	3.6	3.6	96.4
	Which One?	1	3.6	3.6	100.0
	Total	28	100.0	100.0	

Table M-21: State DOT Survey Most Recent Year of HAR Installation
q11 In which year did your agency most recently purchase and install a complete HAR unit at a permanent location (not portable)?

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	9	32.1	32.1	32.1
?	1	3.6	3.6	35.7
2006	1	3.6	3.6	39.3
2007	2	7.1	7.1	46.4
2009	1	3.6	3.6	50.0
2010	1	3.6	3.6	53.6
2010 ish	1	3.6	3.6	57.1
2011	1	3.6	3.6	60.7
2012	1	3.6	3.6	64.3
2014	3	10.7	10.7	75.0
2015	1	3.6	3.6	78.6
2015 - conversion from paging system - MH Corbin - 15 locations, relocation of 2 permanent HAR locations	1	3.6	3.6	82.1
2015 - in a construction project for a tunnel	1	3.6	3.6	85.7
Approx. 2000.	1	3.6	3.6	89.3
Approximately 2000.	1	3.6	3.6	92.9
N/A	1	3.6	3.6	96.4
We are in the process of replacing certain equipment at various sites.	1	3.6	3.6	100.0
Total	28	100.0	100.0	

Table M-22: State DOT Survey Cost of HAR Installation

q12 How much did this most recent permanent HAR unit purchase and installation cost (estimate)?

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	9	32.1	32.1	32.1
$100,000 (estimate) - State labor, contractor on-call contract and controller, wireless Ethernet radios and sign relocation	1	3.6	3.6	35.7
<$100,000	1	3.6	3.6	39.3
$20,000	1	3.6	3.6	42.9
$3,600.00	1	3.6	3.6	46.4
$50,000	1	3.6	3.6	50.0
$50000	1	3.6	3.6	53.6
$50000.00	1	3.6	3.6	57.1
$85,000 (1 transmitter & 3 signs)	1	3.6	3.6	60.7
20,000	1	3.6	3.6	64.3
idk	1	3.6	3.6	67.9
N/A	1	3.6	3.6	71.4
NA	1	3.6	3.6	75.0
Not sure	1	3.6	3.6	78.6
Several thousands	1	3.6	3.6	82.1
unknown	2	7.1	7.1	89.3
Unknown	1	3.6	3.6	92.9
Unknown.	1	3.6	3.6	96.4
Unsure	1	3.6	3.6	100.0
Total	28	100.0	100.0	

Table M-23: State DOT Survey HAR Operation and Maintenance Costs

q13 How much does your agency spend on operation and maintenance costs per permanent HAR unit per year?

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	9	32.1	32.1	32.1
$1,000	1	3.6	3.6	35.7
$10,000	1	3.6	3.6	39.3
$2000	1	3.6	3.6	42.9
$235.00	1	3.6	3.6	46.4
$25000	1	3.6	3.6	50.0
$5,000	1	3.6	3.6	53.6
250	1	3.6	3.6	57.1
335.90	1	3.6	3.6	60.7
Approximately $500.00	1	3.6	3.6	64.3
District costs range from $0 to $7,500 annually	1	3.6	3.6	67.9
Do not currently use permanent system.	1	3.6	3.6	71.4
it is included in our ITS maintenance costs	1	3.6	3.6	75.0
Specific amount unknown, but very little. The HAR system is not a high priority.	1	3.6	3.6	78.6
this is a very minor part of our budget - probably less than 1% of ITS budget	1	3.6	3.6	82.1
unknown	1	3.6	3.6	85.7
Unknown	1	3.6	3.6	89.3
unknown. Varies by DOT District	1	3.6	3.6	92.9

Table M-23: State DOT Survey HAR Operation and Maintenance Costs--Continued

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Varies, aging system in some areas. Operation cost is primarily the communication carrier is minimal, enhancements do cost quite a bit. Maintence is difficult to pin down as it is part of the PM in our contracts.	1	3.6	3.6	96.4
We don't have those numbers easily available.	1	3.6	3.6	100.0
Total	28	100.0	100.0	

Table M-24: State DOT Survey HAR Benefit Cost Analysis

q14 Did your agency ever perform a benefit cost analysis (or a similar effort) of your HAR units in the past?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Yes	2	7.1	10.5	10.5
	2 No	**17**	**60.7**	**89.5**	**100.0**
	Total	19	67.9	100.0	
Missing	System	9	32.1		
Total		28	100.0		

Table M-25: State DOT Survey HAR Estimated Benefits

q15 Based on the benefit cost analysis (or similar effort) you mentioned in your answer to the previous question, what were the dollar benefits estimated for each permanent HAR unit per year?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		26	92.9	92.9	92.9
	Don't have those numbers	1	3.6	3.6	96.4
	Unknown - Benefit / Cost was completed by another entity.	1	3.6	3.6	100.0
	Total	28	100.0	100.0	

Table M-26: State DOT Survey HAR Maintenance Issues

q16 Has your agency experienced any significant HAR maintenance issues? (Vandalism, power supply, communications, etc.)

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Yes**	**10**	**35.7**	**52.6**	**52.6**
	2 No	9	32.1	47.4	100.0
	Total	19	67.9	100.0	
Missing	System	9	32.1		
Total		28	100.0		

Table M-27: State DOT Survey HAR Maintenance Issues - Vandalism

q17_1 What types of HAR maintenance issues has your agency experienced? - Vandalism

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**7**	**25.0**	**70.0**	**70.0**
	1 Yes	3	10.7	30.0	100.0
	Total	10	35.7	100.0	
Missing	System	18	64.3		
Total		28	100.0		

Table M-28: State DOT Survey HAR Maintenance Issues – Power Supply

**q17_2 What types of HAR maintenance issues has your agency experienced? -
Power supply issues**

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**8**	**28.6**	**80.0**	**80.0**
	1 Yes	2	7.1	20.0	100.0
	Total	10	35.7	100.0	
Missing	System	18	64.3		
Total		28	100.0		

Table M-29: State DOT Survey HAR Maintenance Issues – Commmunication

**q17_3 What types of HAR maintenance issues has your agency experienced? -
Communication issues**

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	3	10.7	30.0	30.0
	1 Yes	**7**	**25.0**	**70.0**	**100.0**
	Total	10	35.7	100.0	
Missing	System	18	64.3		
Total		28	100.0		

Table M-30: State DOT Survey HAR Maintenance Issues - Other

**q17_4 What types of HAR maintenance issues has your agency experienced? -
Other**

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	4	14.3	40.0	40.0
	1 Yes	**6**	**21.4**	**60.0**	**100.0**
	Total	10	35.7	100.0	
Missing	System	18	64.3		
Total		28	100.0		

Table M-31: State DOT Survey HAR Maintenance Issues – Other (Details)
q17_4_other What types of HAR maintenance issues has your agency experienced? - Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		22	78.6	78.6	78.6
	AGE	1	3.6	3.6	82.1
	Copper Theft	1	3.6	3.6	85.7
	Due to the location, we've had a couple hit by errant drivers.	1	3.6	3.6	89.3
	failure of ground plane antennas	1	3.6	3.6	92.9
	Maintaining good, reliable signal is frequently a problem. This has limited the deployment of HAR as a resource for daily operations.	1	3.6	3.6	96.4
	paging system is now obsolete. Cell modem or wireless Ethernet radio or fiber communication now prevalent	1	3.6	3.6	100.0
	Total	28	100.0	100.0	

Table M-32: State DOT Survey HAR Personnel
q18 Is your agency's HAR system personnel-intensive?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Yes	4	14.3	21.1	21.1
	2 No	**15**	**53.6**	**78.9**	**100.0**
	Total	19	67.9	100.0	
Missing	System	9	32.1		
Total		28	100.0		

Table M-33: State DOT Survey HAR Technical Issues

q19 What is the most common technical issue your agency has faced concerning its HAR deployment?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 HAR information dissemination issues	3	10.7	15.8	15.8
	2 Signal interference	**6**	**21.4**	**31.6**	**47.4**
	3 Placement of the transmitters in relation...	1	3.6	5.3	52.6
	4 No issues	4	14.3	21.1	73.7
	5 Other	5	17.9	26.3	100.0
	Total	19	67.9	100.0	
Missing	System	9	32.1		
Total		28	100.0		

Table M-34: State DOT Survey HAR Technical Issues - Other

q19_5_other What is the most common technical issue your agency has faced concerning its HAR deployment? - Other

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	23	82.1	82.1	82.1
Communication and integration into Centralized Traffic Management Centers	1	3.6	3.6	85.7
continued compatibility with other systems as they are upgraded.	1	3.6	3.6	89.3
Difficulty of using application software.	1	3.6	3.6	92.9
Low wattage allows for only an approximate 5 mile range of transmission from the transmitter. Also, AM 530 (and, AM 1610 in in instance) is a low-quality frequency.	1	3.6	3.6	96.4
Once DOT began hiring a PE broadcast engineer to perform frequency selection, interference issues disappeared.	1	3.6	3.6	100.0
Total	28	100.0	100.0	

Table M-35: State DOT Survey HAR Public Feedback

q20 Has your agency received any public feedback on HAR?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Yes	7	25.0	36.8	36.8
	2 No	**12**	**42.9**	**63.2**	**100.0**
	Total	19	67.9	100.0	
Missing	System	9	32.1		
Total		28	100.0		

Table M-36: State DOT Survey Type of HAR Public Feedback

q21 What type of feedback on HAR has your agency received?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Mainly positive	3	10.7	42.9	42.9
	2 Mainly negative	**4**	**14.3**	**57.1**	**100.0**
	Total	7	25.0	100.0	
Missing	System	21	75.0		
Total		28	100.0		

Table M-37: State DOT Survey HAR Promotion Method – Roadside Signs

q22_1 What methods does your agency use or plan to use in the future to make the public aware of HAR? - Billboard/Roadside signs

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	6	21.4	31.6	31.6
	1 Yes	**13**	**46.4**	**68.4**	**100.0**
	Total	19	67.9	100.0	
Missing	System	9	32.1		
Total		28	100.0		

Table M-38: State DOT Survey HAR Promotion Method – DMS

q22_2 What methods does your agency use or plan to use in the future to make the public aware of HAR? - Highway dynamic message signs

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	8	28.6	42.1	42.1
	1 Yes	**11**	**39.3**	**57.9**	**100.0**
	Total	19	67.9	100.0	
Missing	System	9	32.1		
Total		28	100.0		

Table M-39: State DOT Survey HAR Promotion Method – Traffic Agency Websites

q22_3 What methods does your agency use or plan to use in the future to make the public aware of HAR? - State DOT or local traffic agency websites

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	9	32.1	47.4	47.4
	1 Yes	**10**	**35.7**	**52.6**	**100.0**
	Total	19	67.9	100.0	
Missing	System	9	32.1		
Total		28	100.0		

Table M-40: State DOT Survey HAR Promotion Method – Social Media Websites

q22_4 What methods does your agency use or plan to use in the future to make the public aware of HAR? - Social media websites

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**15**	**53.6**	**78.9**	**78.9**
	1 Yes	4	14.3	21.1	100.0
	Total	19	67.9	100.0	
Missing	System	9	32.1		
Total		28	100.0		

Table M-41: State DOT Survey HAR Promotion Method – Commercial Radio

q22_5 What methods does your agency use or plan to use in the future to make the public aware of HAR? - Commercial radio stations

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**18**	**64.3**	**94.7**	**94.7**
	1 Yes	1	3.6	5.3	100.0
	Total	19	67.9	100.0	
Missing	System	9	32.1		
Total		28	100.0		

Table M-42: State DOT Survey HAR Promotion Method – Television

q22_6 What methods does your agency use or plan to use in the future to make the public aware of HAR? - Television

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	19	67.9	100.0	100.0
Missing	System	9	32.1		
Total		28	100.0		

Table M-43: State DOT Survey HAR Promotion Method – Other

q22_7 What methods does your agency use or plan to use in the future to make the public aware of HAR? - Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**15**	**53.6**	**78.9**	**78.9**
	1 Yes	4	14.3	21.1	100.0
	Total	19	67.9	100.0	
Missing	System	9	32.1		
Total		28	100.0		

Table M-44: State DOT Survey HAR Promotion Method – Other (Details)

q22_7_other What methods does your agency use or plan to use in the future to make the public aware of HAR? - Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		24	85.7	85.7	85.7
	N/A	1	3.6	3.6	89.3
	none	2	7.1	7.1	96.4
	None	1	3.6	3.6	100.0
	Total	28	100.0	100.0	

Table M-45: State DOT Survey Portable HAR

q23 Does your agency use portable HAR systems or plan to use them in the future?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Yes**	**13**	**46.4**	**68.4**	**68.4**
	2 No	6	21.4	31.6	100.0
	Total	19	67.9	100.0	
Missing	System	9	32.1		
Total		28	100.0		

Table M-46: State DOT Survey Uses of Portable HAR
q24 In what situations does your agency use or plan to use portable HAR systems?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		15	53.6	53.6	53.6
	construction projects; Weather related emergencies	1	3.6	3.6	57.1
	Construction work zones and event management	1	3.6	3.6	60.7
	Disasters. So far tornadoes and flooding.	1	3.6	3.6	64.3
	Portables will be used in Workzones as well as in "semi-permanent" locations to manage recurring congestion	1	3.6	3.6	67.9

Table M-46: State DOT Survey Uses of Portable HAR--Continued

Response	Frequency	Percent	Valid Percent	Cumulative Percent
road conditions, closures, traffic control	1	3.6	3.6	71.4
Same as permanent	1	3.6	3.6	75.0
Special and planned events. Construction	1	3.6	3.6	78.6
Special emergencies and events.	1	3.6	3.6	82.1
Special Event (NASCAR, Music Concerts, Etc)	1	3.6	3.6	85.7
We have the ability to include these in construction projects when there is a value or benefit.	1	3.6	3.6	89.3
We use portable HAR for construction projects - daily construction reports, detours, road closures, etc. as well as, for similar maintenance activities such as road closures, chip seals, incident management.	1	3.6	3.6	92.9
Work Zones	1	3.6	3.6	96.4
Workzones and special events	1	3.6	3.6	100.0
Total	28	100.0	100.0	

Table M-47: State DOT Survey Travel Information – Roadway Condition

q25_1 What real-time traveler information does your agency currently disseminate to the traveling public? - Roadway travel condition status (e.g., traffic map of current speeds)

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	1	3.6	3.6	3.6
	1 Yes	**27**	**96.4**	**96.4**	**100.0**
	Total	28	100.0	100.0	

Table M-48: State DOT Survey Travel Information – Roadway CCTV Video

q25_2 What real-time traveler information does your agency currently disseminate to the traveling public? - Roadway CCTV video

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	6	21.4	21.4	21.4
	1 Yes	**22**	**78.6**	**78.6**	**100.0**
	Total	28	100.0	100.0	

Table M-49: State DOT Survey Travel Information – Traffic Incident Locations

q25_3 What real-time traveler information does your agency currently disseminate to the traveling public? - Traffic incident locations

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	5	17.9	17.9	17.9
	1 Yes	**23**	**82.1**	**82.1**	**100.0**
	Total	28	100.0	100.0	

Table M-50: State DOT Survey Travel Information – Travel Times

q25_4 What real-time traveler information does your agency currently disseminate to the traveling public? - Travel times

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	7	25.0	25.0	25.0
	1 Yes	**21**	**75.0**	**75.0**	**100.0**
	Total	28	100.0	100.0	

Table M-51: State DOT Survey Travel Information – Alternate Routes

q25_5 What real-time traveler information does your agency currently disseminate to the traveling public? - Alternate routes

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**16**	**57.1**	**57.1**	**57.1**
	1 Yes	12	42.9	42.9	100.0
	Total	28	100.0	100.0	

Table M-52: State DOT Survey Travel Information – Parking

q25_6 What real-time traveler information does your agency currently disseminate to the traveling public? - Parking availability

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**25**	**89.3**	**89.3**	**89.3**
	1 Yes	3	10.7	10.7	100.0
	Total	28	100.0	100.0	

Table M-53: State DOT Survey Travel Information – Construction

q25_7 What real-time traveler information does your agency currently disseminate to the traveling public? - Roadwork / Construction zones

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	2	7.1	7.1	7.1
	1 Yes	**26**	**92.9**	**92.9**	**100.0**
	Total	28	100.0	100.0	

Table M-54: State DOT Survey Travel Information – Transit Alternatives

q25_8 What real-time traveler information does your agency currently disseminate to the traveling public? - Transit alternatives

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**26**	**92.9**	**92.9**	**92.9**
	1 Yes	2	7.1	7.1	100.0
	Total	28	100.0	100.0	

Table M-55: State DOT Survey Travel Information – Special Events

q25_9 What real-time traveler information does your agency currently disseminate to the traveling public? - Special events

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	11	39.3	39.3	39.3
	1 Yes	**17**	**60.7**	**60.7**	**100.0**
	Total	28	100.0	100.0	

Table M-56: State DOT Survey Travel Information – Weather

q25_10 What real-time traveler information does your agency currently disseminate to the traveling public? - Weather information

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	4	14.3	14.3	14.3
	1 Yes	**24**	**85.7**	**85.7**	**100.0**
	Total	28	100.0	100.0	

Table M-57: State DOT Survey Travel Information – Safety Alerts

q25_11 What real-time traveler information does your agency currently disseminate to the traveling public? - Safety alerts (Amber Alerts, Silver Alerts, etc.)

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	4	14.3	14.3	14.3
	1 Yes	**24**	**85.7**	**85.7**	**100.0**
	Total	28	100.0	100.0	

Table M-58: State DOT Survey Travel Information – Safety Messages

q25_12 What real-time traveler information does your agency currently disseminate to the traveling public? - Safety messages ("Buckle Up", "Signal When Changing Lanes", etc.)

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	10	35.7	35.7	35.7
	1 Yes	**18**	**64.3**	**64.3**	**100.0**
	Total	28	100.0	100.0	

Table M-59: State DOT Survey Travel Information – Other
q25_13 What real-time traveler information does your agency currently disseminate to the traveling public? – Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**26**	**92.9**	**92.9**	**92.9**
	1 Yes	2	7.1	7.1	100.0
	Total	28	100.0	100.0	

Table M-60: State DOT Survey Travel Information – Other (Details)
q25_13_other What real-time traveler information does your agency currently disseminate to the traveling public? – Other

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	26	92.9	92.9	92.9
Note: INDOT does message for AMBER Alerts, but does not for Silver Alerts.	1	3.6	3.6	96.4
weather information only as it relates to the status of the roadway (Dust Storm, Hurricane). Do not post widespread variable weather information - eg. no tornado warning info posted on HAR	1	3.6	3.6	100.0
Total	28	100.0	100.0	

Table M-61: State DOT Survey Travel Information Sources – Highway DMS
q26_1 How is this information currently disseminated to the traveling public? - Highway dynamic message signs

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Yes	28	100.0	100.0	100.0

Table M-62: State DOT Survey Travel Information Sources – Arterial DMS

q26_2 How is this information currently disseminated to the traveling public?
- Arterial dynamic message signs

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	14	50.0	50.0	50.0
	1 Yes	14	50.0	50.0	100.0
	Total	28	100.0	100.0	

Table M-63: State DOT Survey Travel Information Sources – HAR

q26_3 How is this information currently disseminated to the traveling public?
- Highway advisory radio

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	11	39.3	39.3	39.3
	1 Yes	**17**	**60.7**	**60.7**	**100.0**
	Total	28	100.0	100.0	

Table M-64: State DOT Survey Travel Information Sources – 511 System

q26_4 How is this information currently disseminated to the traveling public?
- 511 system (land-line or mobile call-in system with intelligent voice
recognition (IVR) that allows menu driven access to real-time traveler
information).

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	8	28.6	28.6	28.6
	1 Yes	**20**	**71.4**	**71.4**	**100.0**
	Total	28	100.0	100.0	

Table M-65: State DOT Survey Travel Information Sources – 511 Website or Mobile
Application

q26_5 How is this information currently disseminated to the traveling public?
- 511 website and/or mobile applications

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	4	14.3	14.3	14.3
	1 Yes	**24**	**85.7**	**85.7**	**100.0**
	Total	28	100.0	100.0	

Table M-66: State DOT Survey Travel Information Sources – Social Media Websites

q26_6 How is this information currently disseminated to the traveling public?
- Social media websites

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	5	17.9	17.9	17.9
	1 Yes	**23**	**82.1**	**82.1**	**100.0**
	Total	28	100.0	100.0	

Table M-67: State DOT Survey Travel Information Sources – Other Websites

q26_7 How is this information currently disseminated to the traveling public?
- Other websites

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**21**	**75.0**	**75.0**	**75.0**
	1 Yes	7	25.0	25.0	100.0
	Total	28	100.0	100.0	

Table M-68: State DOT Survey Travel Information Sources – Smartphone Applications

q26_8 How is this information currently disseminated to the traveling public?
- Smartphone applications (e.g., travel info related iPhone or Android applications)

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	7	25.0	25.0	25.0
	1 Yes	**21**	**75.0**	**75.0**	**100.0**
	Total	28	100.0	100.0	

Table M-69: State DOT Survey Travel Information Sources – In-vehicle Devices

q26_9 How is this information currently disseminated to the traveling public?
- On-board devices (but not mobile devices), such as in-car navigation systems

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**25**	**89.3**	**89.3**	**89.3**
	1 Yes	3	10.7	10.7	100.0
	Total	28	100.0	100.0	

Table M-70: State DOT Survey Travel Information Sources – Other Media
q26_10 How is this information currently disseminated to the traveling public? - Other media outlets (commercial radio, television, etc.)

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	12	42.9	42.9	42.9
	1 Yes	**16**	**57.1**	**57.1**	**100.0**
	Total	28	100.0	100.0	

Table M-71: State DOT Survey Travel Information Sources – Third Party Providers
q26_11 How is this information currently disseminated to the traveling public? - Via arrangement with 3rd party traveler information providers

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**22**	**78.6**	**78.6**	**78.6**
	1 Yes	6	21.4	21.4	100.0
	Total	28	100.0	100.0	

Table M-72: State DOT Survey Travel Information Sources – Other
q26_12 How is this information currently disseminated to the traveling public? - Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**26**	**92.9**	**92.9**	**92.9**
	1 Yes	2	7.1	7.1	100.0
	Total	28	100.0	100.0	

Table M-73: State DOT Survey Travel Information Sources – Other (Details)

q26_12_other How is this information currently disseminated to the traveling public? - Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		26	92.9	92.9	92.9
	Via arrangement with 3rd party traveler information providers. In progress	1	3.6	3.6	96.4
	We have a contract with local radio station KBEM. The station is owned and operated by the Minneapolis Public School district. The contract is for $200,000 per year. They provide a traffic reporter and broadcast equipment at our NYC. Reports are 1 minute long every 10 minutes during peak hours and we have the ability to do longer reports during major incidents. Coverage is metrowide in the Twin Cities.	1	3.6	3.6	100.0
	Total	28	100.0	100.0	

Table M-74: State DOT Survey Travel Information Changes – Not Much

q27_1 ...How do you think your agency may adapt its real-time traveler information system in response to these changes (i.e., where are you going in the future)? - Do not envision much change

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 0 No	28	100.0	100.0	100.0

Table M-75: State DOT Survey Travel Information Changes – Drop Components

q27_2 ...How do you think your agency may adapt its real-time traveler information system in response to these changes (i.e., where are you going in the future)? - Might drop components of our traveler information program

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Valid **0 No**	**17**	**60.7**	**60.7**	**60.7**
1 Yes	11	39.3	39.3	100.0
Total	28	100.0	100.0	

Table M-76: State DOT Survey Travel Information Changes – Expand Components

q27_3 ...How do you think your agency may adapt its real-time traveler information system in response to these changes (i.e., where are you going in the future)? - Might expand our program to include additional components

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 0 No	7	25.0	25.0	25.0
1 Yes	**21**	**75.0**	**75.0**	**100.0**
Total	28	100.0	100.0	

Table M-77: State DOT Survey Travel Information Changes – Partner More with Private Sector

q27_4 ...How do you think your agency may adapt its real-time traveler information system in response to these changes (i.e., where are you going in the future)? - Might partner more with the private sector

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 0 No	9	32.1	32.1	32.1
1 Yes	**19**	**67.9**	**67.9**	**100.0**
Total	28	100.0	100.0	

Table M-78: State DOT Survey Travel Information Changes – Other

q27_5 ...How do you think your agency may adapt its real-time traveler information system in response to these changes (i.e., where are you going in the future)? - Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**25**	**89.3**	**89.3**	**89.3**
	1 Yes	3	10.7	10.7	100.0
	Total	28	100.0	100.0	

Table M-79: State DOT Survey Travel Information Changes – Other (Details)

q27_5_other ...How do you think your agency may adapt its real-time traveler information system in response to these changes (i.e., where are you going in the future)? - Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		25	89.3	89.3	89.3
	Add infrastructure to vehicle ITS components.	1	3.6	3.6	92.9
	Although we've seen KBEM as more cost effective than HAR, we are looking at ways to improve the service or refocus resources elsewhere as radio is used less and less for getting traveler information. We are having the same discussions about our 511 phone. No changes are currently planned. Only discussions at this point.	1	3.6	3.6	96.4
	Shift from Department owned/maintained sensors towards using 3rd party supplied probe data	1	3.6	3.6	100.0
	Total	28	100.0	100.0	

Appendix N: FDOT Districts and Local Emergency Management Departments HAR Survey Response Frequencies

The following tables show the results for each question in the FDOT Districts and Local Emergency Management Departments HAR survey. Bolded responses indicate the most frequently selected response for each question. Note that the percent column indicates the percentage out of all 37 respondents and the valid percent column indicates the percentage out of all respondents to that specific question. Also, responses labeled as "Missing" represent respondents who were not asked that question.

Table N-1: Local HAR Survey Agency Name
qagency_1 Please provide the following information: - Agency:

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1746 Cedar Street	1	2.7	2.7	2.7
	Bay County Emergency Services	1	2.7	2.7	5.4
	Citrus County Sheriff's Office	1	2.7	2.7	8.1
	City of Cape Coral Fire Department	1	2.7	2.7	10.8
	city of Miami fire-rescue	1	2.7	2.7	13.5
	Clay County	1	2.7	2.7	16.2
	Colombia County	1	2.7	2.7	18.9
	Desoto County Emergency Management	1	2.7	2.7	21.6
	Dixie County	1	2.7	2.7	24.3
	Emergency Management Division Broward county	1	2.7	2.7	27.0
	Escambia County Emergency Management	1	2.7	2.7	29.7
	FDOT -- District Seven	1	2.7	2.7	32.4
	FDOT D4	1	2.7	2.7	35.1
	FDOT District 2	1	2.7	2.7	37.8
	Florida Dep't of Transportation	1	2.7	2.7	40.5
	Florida DOT	1	2.7	2.7	43.2
	Florida's Turnpike	1	2.7	2.7	45.9
	Gulf County Emergency Management	1	2.7	2.7	48.6
	Hardee County Emergency Management	1	2.7	2.7	51.4
	Highlands County	1	2.7	2.7	54.1

Table N-1: Local HAR Survey Agency Name--Continued

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Jackson County Emergency Management	1	2.7	2.7	56.8
Lafayette County Sheriff's Office	1	2.7	2.7	59.5
Lake County Emergency Management	1	2.7	2.7	62.2
Lee County Department of Public Safety / EM	1	2.7	2.7	64.9
Liberty County Emergency Mgt.	1	2.7	2.7	67.6
Manatee County Emergency Management	1	2.7	2.7	70.3
Marion County	1	2.7	2.7	73.0
Martin County Fire Rescue/Emergency Management Agency	1	2.7	2.7	75.7
Monroe County Emergency Management	1	2.7	2.7	78.4
Okeechobee County Emergency Management	1	2.7	2.7	81.1
Orange County Office of Emergency Management	1	2.7	2.7	83.8
Pinellas County Emergency Mgmt	1	2.7	2.7	86.5
Polk Co. Emergency Management	1	2.7	2.7	89.2
Santa Rosa County	1	2.7	2.7	91.9
Seminole County OEM	1	2.7	2.7	94.6
Sumter County Emergency Management	1	2.7	2.7	97.3
Walton County Emergency Management	1	2.7	2.7	100.0
Total	37	100.0	100.0	

Table N-2: Local HAR Survey Agency Type

q2 Please select your organization type:

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Local	5	13.5	13.5	13.5
	2 County	**26**	**70.3**	**70.3**	**83.8**
	3 State	6	16.2	16.2	100.0
	Total	37	100.0	100.0	

Table N-3: Local HAR Survey Agency Discipline

q3 Please select the discipline that best describes your agency or division:

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**4 Emergency Management**	**29**	**78.4**	**78.4**	**78.4**
	8 Highway and DOT	6	16.2	16.2	94.6
	10 Other	2	5.4	5.4	100.0
	Total	37	100.0	100.0	

Table N-4: Local HAR Survey Agency Discipline - Other

q3_10_other Please select the discipline that best describes your agency or division: - Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		35	94.6	94.6	94.6
	emergency management falls under fire in our city.	1	2.7	2.7	97.3
	We include multiple of the above, including public safety communications, emergency management and emergency medical services.	1	2.7	2.7	100.0
	Total	37	100.0	100.0	

Table N-5: Local HAR Survey Experience with HAR

q4 Do you professionally have working experience within your position or past positions implementing, operating, maintaining, or managing any components of Highway Advisory Radio (HAR)?

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1 Yes	6	16.2	100.0	100.0
Missing System	31	83.8		
Total	37	100.0		

Table N-6: Local HAR Survey Strengths of HAR

q5 Please list and describe the strengths that are associated with HAR as a traffic information technology.

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	31	83.8	83.8	83.8
-They can accept a large audio file that will accept detailed information. -Gives a visual, active message to drivers to go to the information source. -Can give drivers a lot of information by using resources that are already in virtually every car. -Drivers do not have to divert their attention from the roadway to gather the information from HAR.	1	2.7	2.7	86.5
HAR is the only direct radio broadcast method widely available between public safety agencies and the public.	1	2.7	2.7	89.2
HAR, known by the FCC as Traveler Information Services, is the only broadcast emergency notification capability directly operated by state and local governments.	1	2.7	2.7	91.9

Table N-6: Local HAR Survey Strengths of HAR--Continued

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Regionally based specific area information can be transmitted to those travelers within and or heading to an impacted region. Provides an information means through a medium that all customers are familiar with and know how to operate. Provides immediate means to get more information than just DMS type alert, up to 2 minutes worth of "the rest of the story" information that is needed and useful to travelers. Can be enhanced with beacon activation to provide a "call to action" by the traveler when urgent information is being transmitted.	1	2.7	2.7	94.6
Strength: Able to provide a lot of detailed information. Weakness: Requires that motorist take some action to listen (i.e., change radio station)	1	2.7	2.7	97.3

Table N-6: Local HAR Survey Strengths of HAR--Continued

Response	Frequency	Percent	Valid Percent	Cumulative Percent
The ability to deliver a brief, but information-loaded message to the traveler without the traveler having to divert his/her attention from the roadway network. HAR is invaluable in times of severe emergencies, e.g., in times of hurricane evacuation activities, critical information about gasoline supplies, shelter availability, road closures, and meteorological updates may be easily delivered to the traveler with no interruption of the trip. The purchase, installation, and maintenance costs of a HAR are not substantial. HARs become very valuable when nearby dynamic message signs become disabled. HAR messages are easily programmable and easily revised as critical events evolve. The actual benefit to cost (or return on investment perhaps) of a HAR or a HAR subsystem is extremely high, particularly in light of the critical information it (they) provide in severe emergencies, e.g., expansive forest fires that produce substantial smoke.	1	2.7	2.7	100.0
Total	37	100.0	100.0	

Table N-7: Local HAR Survey Weaknesses of HAR

q6 Please list and describe any weaknesses that are associated with HAR as a traffic information technology.

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	31	83.8	83.8	83.8
-AM frequency is heavily dependent on grounding, which can weaken signal. -AM frequency signal strength also affected by trees, buildings, etc. -Requires maintenance to ensure signal is proper strength. -Cars have varying abilities to accept AM input.	1	2.7	2.7	86.5
HAR operates in the AM broadcast band, and is not a band primarily accessed by motorists. Additionally, some new vehicles no longer install radios that will access the AM band.	1	2.7	2.7	89.2
Persons who need to receive information must tune their radios to the local station to receive what may be life-saving information.	1	2.7	2.7	91.9
Requires motorist take action to change radio station. Low frequency transmitter can result in garbled transmission.	1	2.7	2.7	94.6

Table N-7: Local HAR Survey Weaknesses of HAR--Continued

Response		Frequency	Percent	Valid Percent	Cumulative Percent
	Technological based weakness, strength of transmission, distance of transmission and that it is broadcast on AM stations that most people do not keep radios on.... ability to confirm actual airing transmission from TMC setting.	1	2.7	2.7	97.3
	The ability of the AM bandwidth to deliver a quality message is not consistent. Many travelers simply do not listen to the AM bandwidth. The wattage allowed for HARS does not allow the message to travel very far, i.e., several to tens of miles.	1	2.7	2.7	100.0
	Total	37	100.0	100.0	

Table N-8: Local HAR Survey Importance of TMC and EOC Coordination

q7_1 On the following scale, please rate the importance of your organization's coordination between Traffic Management Centers (TMCs), transit agencies, and Emergency Operation Centers (EOC).

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 No opinion	1	2.7	3.2	3.2
	3 Mildly Important	1	2.7	3.2	6.5
	4 Important	**15**	**40.5**	**48.4**	**54.8**
	5 Very Important	**14**	**37.8**	**45.2**	**100.0**
	Total	31	83.8	100.0	
Missing	System	6	16.2		
Total		37	100.0		

Table N-9: Local HAR Survey ICS Courses

q8 Have you taken any of the Incident Command System (ICS) courses offered by the Federal Emergency Management Agency (FEMA).

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Yes**	**31**	**83.8**	**100.0**	**100.0**
Missing	System	6	16.2		
Total		37	100.0		

Table N-10: Local HAR Survey Importance of Integrating Traffic Information

q9 Please rate the importance of integrating public traffic information into your organization's incident command plan for emergency responses.

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 No opinion	1	2.7	3.2	3.2
	3 Mildly Important	1	2.7	3.2	6.5
	4 Important	12	32.4	38.7	45.2
	5 Very Important	**17**	**45.9**	**54.8**	**100.0**
	Total	31	83.8	100.0	
Missing	System	6	16.2		
Total		37	100.0		

Table N-11: Local HAR Survey Implementation of Traffic Information

q10 Please rate how well your organization implements public traffic information into your incident command for emergency response.

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 No opinion	1	2.7	3.2	3.2
	3 Minimally implemented (Fair)	7	18.9	22.6	25.8
	4 Mildly implemented (Good)	**14**	**37.8**	**45.2**	**71.0**
	5 Fully implemented (Excellent)	9	24.3	29.0	100.0
	Total	31	83.8	100.0	
Missing	System	6	16.2		
Total		37	100.0		

Table N-12: Local HAR Survey Emergency Alert Information

q11 Does your organization provide emergency alert information to the public or a select audience?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Yes	31	83.8	100.0	100.0
Missing	System	6	16.2		
Total		37	100.0		

Table N-13: Local HAR Survey Emergency Alert Method – Text Messaging

q12_1 How does your organization provide emergency alerts to the public or select audience? - Text Messaging

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	10	27.0	32.3	32.3
	1 Yes	**21**	**56.8**	**67.7**	**100.0**
	Total	31	83.8	100.0	
Missing	System	6	16.2		
Total		37	100.0		

Table N-14: Local HAR Survey Emergency Alert Method – Email

q12_2 How does your organization provide emergency alerts to the public or select audience? – Email

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	8	21.6	25.8	25.8
	1 Yes	**23**	**62.2**	**74.2**	**100.0**
	Total	31	83.8	100.0	
Missing	System	6	16.2		
Total		37	100.0		

Table N-15: Local HAR Survey Emergency Alert Method – Webpage

q12_3 How does your organization provide emergency alerts to the public or select audience? - Webpage

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	7	18.9	22.6	22.6
	1 Yes	**24**	**64.9**	**77.4**	**100.0**
	Total	31	83.8	100.0	
Missing	System	6	16.2		
Total		37	100.0		

Table N-16: Local HAR Survey Emergency Alert Method – Sirens/Speakers

q12_4 How does your organization provide emergency alerts to the public or select audience? - Outdoor sirens or loud speakers

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**27**	**73.0**	**87.1**	**87.1**
	1 Yes	4	10.8	12.9	100.0
	Total	31	83.8	100.0	
Missing	System	6	16.2		
Total		37	100.0		

Table N-17: Local HAR Survey Emergency Alert Method – Automated Phone Dialing

q12_5 How does your organization provide emergency alerts to the public or select audience? - Automated phone dial in messaging

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	12	32.4	38.7	38.7
	1 Yes	**19**	**51.4**	**61.3**	**100.0**
	Total	31	83.8	100.0	
Missing	System	6	16.2		
Total		37	100.0		

Table N-18: Local HAR Survey Emergency Alert Method – Radio

q12_6 How does your organization provide emergency alerts to the public or select audience? - Radio communication

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**23**	**62.2**	**74.2**	**74.2**
	1 Yes	8	21.6	25.8	100.0
	Total	31	83.8	100.0	
Missing	System	6	16.2		
Total		37	100.0		

Table N-19: Local HAR Survey Emergency Alert Method – Media Release

q12_7 How does your organization provide emergency alerts to the public or select audience? - Media release

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	3	8.1	9.7	9.7
	1 Yes	**28**	**75.7**	**90.3**	**100.0**
	Total	31	83.8	100.0	
Missing	System	6	16.2		
Total		37	100.0		

Table N-20: Local HAR Survey Emergency Alert Method – Facebook

q12_8 How does your organization provide emergency alerts to the public or select audience? - Facebook

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	3	8.1	9.7	9.7
	1 Yes	**28**	**75.7**	**90.3**	**100.0**
	Total	31	83.8	100.0	
Missing	System	6	16.2		
Total		37	100.0		

Table N-21: Local HAR Survey Emergency Alert Method – Twitter

q12_9 How does your organization provide emergency alerts to the public or select audience? – Twitter

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	11	29.7	35.5	35.5
	1 Yes	**20**	**54.1**	**64.5**	**100.0**
	Total	31	83.8	100.0	
Missing	System	6	16.2		
Total		37	100.0		

Table N-22: Local HAR Survey Emergency Alert Method – Other

q12_10 How does your organization provide emergency alerts to the public or select audience? – Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**24**	**64.9**	**77.4**	**77.4**
	1 Yes	7	18.9	22.6	100.0
	Total	31	83.8	100.0	
Missing	System	6	16.2		
Total		37	100.0		

Table N-23: Local HAR Survey Emergency Alert Method – Radio (Details)

q12_6_other How does your organization provide emergency alerts to the public or select audience? - Radio communication

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		29	78.4	78.4	78.4
	"Code Red"	1	2.7	2.7	81.1
	EAS	1	2.7	2.7	83.8
	EAS message and IPAWS capability	1	2.7	2.7	86.5
	local radio	1	2.7	2.7	89.2
	Local Radio	1	2.7	2.7	91.9
	Local radio station are provided the bulletin to announce on the air	1	2.7	2.7	94.6
	MOU with two (2) local radio stations.	1	2.7	2.7	97.3
	Wokc Wqcs	1	2.7	2.7	100.0
	Total	37	100.0	100.0	

Table N-24: Local HAR Survey Emergency Alert Method – Other (Details)

q12_10_other How does your organization provide emergency alerts to the public or select audience? – Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		30	81.1	81.1	81.1
	Automated telephone calls NextDoor	1	2.7	2.7	83.8
	call center	1	2.7	2.7	86.5
	CodeRED, iPaws, Reverse 911	1	2.7	2.7	89.2
	Local Em app for mobile devices (coming soon)	1	2.7	2.7	91.9
	Ping4 Alert Code Red	1	2.7	2.7	94.6
	Reverse 911	1	2.7	2.7	97.3
	Wireless Emergency Alerts Emergency Alert System Reverse 911 Type Calls	1	2.7	2.7	100.0
	Total	37	100.0	100.0	

Table N-25: Local HAR Survey Agency Traffic Information Source – Commercial Radio

q13_1 How does your agency receive travel information, such as traffic conditions, road closures, and special events information while traveling? - Commercial Radio Reports

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**18**	**48.6**	**58.1**	**58.1**
	1 Yes	13	35.1	41.9	100.0
	Total	31	83.8	100.0	
Missing	System	6	16.2		
Total		37	100.0		

Table N-26: Local HAR Survey Agency Traffic Information Source – Florida 511

q13_2 How does your agency receive travel information, such as traffic conditions, road closures, and special events information while traveling? - Florida 511

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	14	37.8	45.2	45.2
	1 Yes	**17**	**45.9**	**54.8**	**100.0**
	Total	31	83.8	100.0	
Missing	System	6	16.2		
Total		37	100.0		

Table N-27: Local HAR Survey Agency Traffic Information Source – DMS

q13_3 How does your agency receive travel information, such as traffic conditions, road closures, and special events information while traveling? - Highway Electronic Message Signs

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**20**	**54.1**	**64.5**	**64.5**
	1 Yes	11	29.7	35.5	100.0
	Total	31	83.8	100.0	
Missing	System	6	16.2		
Total		37	100.0		

Table N-28: Local HAR Survey Agency Traffic Information Source – Smartphone Apps

q13_4 How does your agency receive travel information, such as traffic conditions, road closures, and special events information while traveling? - Smartphone Applications

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**21**	**56.8**	**67.7**	**67.7**
	1 Yes	10	27.0	32.3	100.0
	Total	31	83.8	100.0	
Missing	System	6	16.2		
Total		37	100.0		

Table N-29: Local HAR Survey Agency Traffic Information Source – HAR

q13_5 How does your agency receive travel information, such as traffic conditions, road closures, and special events information while traveling? - Highway Advisory Radio (HAR)

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**30**	**81.1**	**96.8**	**96.8**
	1 Yes	1	2.7	3.2	100.0
	Total	31	83.8	100.0	
Missing	System	6	16.2		
Total		37	100.0		

Table N-30: Local HAR Survey Agency Traffic Information Source – CB Radio

q13_6 How does your agency receive travel information, such as traffic conditions, road closures, and special events information while traveling? - Citizens' Band (CB) Radio

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**31**	**83.8**	**100.0**	**100.0**
Missing	System	6	16.2		
Total		37	100.0		

Table N-31: Local HAR Survey Agency Traffic Information Source – Internal Radio Dispatch

q13_7 How does your agency receive travel information, such as traffic conditions, road closures, and special events information while traveling? - Internal Radio Dispatch

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**18**	**48.6**	**58.1**	**58.1**
	1 Yes	13	35.1	41.9	100.0
	Total	31	83.8	100.0	
Missing	System	6	16.2		
Total		37	100.0		

Table N-32: Local HAR Survey Agency Traffic Information Source – GPS Device

q13_8 How does your agency receive travel information, such as traffic conditions, road closures, and special events information while traveling? - Automatic Vehicle Location/GPS Navigation Device

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**28**	**75.7**	**90.3**	**90.3**
	1 Yes	3	8.1	9.7	100.0
	Total	31	83.8	100.0	
Missing	System	6	16.2		
Total		37	100.0		

Table N-33: Local HAR Survey Agency Traffic Information Source – Other

q13_9 How does your agency receive travel information, such as traffic conditions, road closures, and special events information while traveling? - Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**19**	**51.4**	**61.3**	**61.3**
	1 Yes	12	32.4	38.7	100.0
	Total	31	83.8	100.0	
Missing	System	6	16.2		
Total		37	100.0		

Table N-34: Local HAR Survey Agency Traffic Information Source – None

q13_10 How does your agency receive travel information, such as traffic conditions, road closures, and special events information while traveling? - Does not currently utilize traffic information

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**29**	**78.4**	**93.5**	**93.5**
	1 Yes	2	5.4	6.5	100.0
	Total	31	83.8	100.0	
Missing	System	6	16.2		
Total		37	100.0		

Table N-35: Local HAR Survey Agency Traffic Information Source – Other (Details)

q13_9_other How does your agency receive travel information, such as traffic conditions, road closures, and special events information while traveling? - Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		25	67.6	67.6	67.6
	County warning point staff text messages	1	2.7	2.7	70.3
	FDOT, MCSO	1	2.7	2.7	73.0
	FDOT, WebEOC	1	2.7	2.7	75.7
	follow @FHPOrlando	1	2.7	2.7	78.4
	in person monitoring	1	2.7	2.7	81.1
	Law Enforcement Agencies and FDOT Emergency Reporting System, County ITS	1	2.7	2.7	83.8
	live fire computer system live feed	1	2.7	2.7	86.5
	social media	1	2.7	2.7	89.2
	State will email information	1	2.7	2.7	91.9
	sunguide cameras	1	2.7	2.7	94.6
	Web EOC	1	2.7	2.7	97.3
	Web EOC TIMS board	1	2.7	2.7	100.0
	Total	37	100.0	100.0	

Table N-36: Local HAR Survey Smartphone Application Used – Vehicle Navigation Apps

q14_1 What are the smartphone applications for traffic information used specifically by your agency? - Vehicle Navigation Smartphone Apps (TomTom, Garmin, Magellan, etc...)

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**5**	**13.5**	**50.0**	**50.0**
	1 Yes	5	13.5	50.0	100.0
	Total	10	27.0	100.0	
Missing	System	27	73.0		
Total		37	100.0		

Table N-37: Local HAR Survey Smartphone Application Used – Florida 511 App

q14_2 What are the smartphone applications for traffic information used specifically by your agency? - Florida 511 Mobile App

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**5**	**13.5**	**50.0**	**50.0**
	1 Yes	5	13.5	50.0	100.0
	Total	10	27.0	100.0	
Missing	System	27	73.0		
Total		37	100.0		

Table N-38: Local HAR Survey Smartphone Application Used – Waze Social GPS Maps

q14_3 What are the smartphone applications for traffic information used specifically by your agency? - Waze Social GPS Maps

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**9**	**24.3**	**90.0**	**90.0**
	1 Yes	1	2.7	10.0	100.0
	Total	10	27.0	100.0	
Missing	System	27	73.0		
Total		37	100.0		

Table N-39: Local HAR Survey Smartphone Application Used – Google Maps

q14_4 What are the smartphone applications for traffic information used specifically by your agency? - Google Maps

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	3	8.1	30.0	30.0
	1 Yes	**7**	**18.9**	**70.0**	**100.0**
	Total	10	27.0	100.0	
Missing	System	27	73.0		
Total		37	100.0		

Table N-40: Local HAR Survey Smartphone Application Used – Apple Maps

q14_5 What are the smartphone applications for traffic information used specifically by your agency? - Apple Maps

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**8**	**21.6**	**80.0**	**80.0**
	1 Yes	2	5.4	20.0	100.0
	Total	10	27.0	100.0	
Missing	System	27	73.0		
Total		37	100.0		

Table N-41: Local HAR Survey Smartphone Application Used – Other Apps

q14_6 What are the smartphone applications for traffic information used specifically by your agency? - Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	9	24.3	90.0	90.0
	1 Yes	**1**	**2.7**	**10.0**	**100.0**
	Total	10	27.0	100.0	
Missing	System	27	73.0		
Total		37	100.0		

Table N-42: Local HAR Survey Smartphone Application Used – Other Apps (Details)

q14_6_other What are the smartphone applications for traffic information used specifically by your agency? - Other

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	36	97.3	97.3	97.3
None are used "specifically" by our agency. It's the driver's choice.	1	2.7	2.7	100.0
Total	37	100.0	100.0	

Table N-43: Local HAR Survey Preferred Travel Information Source

q15 What is your most preferred method of receiving travel information, such as traffic conditions, road closures, and special events information while traveling?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Commercial Radio Reports	2	5.4	5.4	5.4
	2 Florida 511	5	13.5	13.5	18.9
	3 Highway Electronic Message Signs	5	13.5	13.5	32.4
	4 Smartphone Applications	**11**	**29.7**	**29.7**	**62.2**
	5 Highway Advisory Radio (HAR)	1	2.7	2.7	64.9
	7 Internal Radio Dispatch	1	2.7	2.7	67.6
	8 Automatic Vehicle Location/GPS Navigation Device	3	8.1	8.1	75.7
	9 Other	9	24.3	24.3	100.0
	Total	37	100.0	100.0	

Table N-44: Local HAR Survey Preferred Travel Information Source - Other

q15_9_other What is your most preferred method of receiving travel information, such as traffic conditions, road closures, and special events information while traveling? - Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		28	75.7	75.7	75.7
	call in to citizen information center	1	2.7	2.7	78.4
	direct reports from FDOT/highway patrol	1	2.7	2.7	81.1
	Email alerts	1	2.7	2.7	83.8
	FDOT, MCSO - currently	1	2.7	2.7	86.5
	Law Enforcement, especially Florida Highway Patrol.	1	2.7	2.7	89.2
	live fire	1	2.7	2.7	91.9
	State email	1	2.7	2.7	94.6
	Twitter	1	2.7	2.7	97.3
	WebEOC utilized by FDOT and counties/law enforcement to feed all traffic info into and keep one situational awareness view of roads and traffic	1	2.7	2.7	100.0
	Total	37	100.0	100.0	

Table N-45: Local HAR Survey Preferred Smartphone Application

q16 What is your personal preferred smartphone application for traffic information?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Vehicle Navigation Smartphone Apps (TomTom, Garmin, Magellan, etc...)	2	5.4	18.2	18.2
	2 Florida 511 Mobile App	2	5.4	18.2	36.4
	3 Waze Social GPS Maps	2	5.4	18.2	54.5
	4 Google Maps	**3**	**8.1**	**27.3**	**81.8**
	6 Other	2	5.4	18.2	100.0
	Total	11	29.7	100.0	
Missing	System	26	70.3		
Total		37	100.0		

Table N-46: Local HAR Survey Preferred Smartphone Application - Other

q16_6_other What is your personal preferred smartphone application for traffic information? - Other

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	35	94.6	94.6	94.6
Inrix	1	2.7	2.7	97.3
Text Message	1	2.7	2.7	100.0
Total	37	100.0	100.0	

Table N-47: Local HAR Survey FDOT ATIS Changes – Not Much Change

q17_1 How do you think FDOT real-time traveler information systems (Dynamic Message Signs or MDS, HAR, 511, etc.) should respond to these changes? - Do not need much change

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**4**	**10.8**	**66.7**	**66.7**
	1 Yes	2	5.4	33.3	100.0
	Total	6	16.2	100.0	
Missing	System	31	83.8		
Total		37	100.0		

Table N-48: Local HAR Survey FDOT ATIS Changes – Drop Components

q17_2 How do you think FDOT real-time traveler information systems (Dynamic Message Signs or MDS, HAR, 511, etc.) should respond to these changes? - Should drop components of its traveler information programs

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	6	16.2	100.0	100.0
Missing	System	31	83.8		
Total		37	100.0		

Table N-49: Local HAR Survey FDOT ATIS Changes – Add Components

q17_3 How do you think FDOT real-time traveler information systems (Dynamic Message Signs or MDS, HAR, 511, etc.) should respond to these changes? - Should expand program to include additional components

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**4**	**10.8**	**66.7**	**66.7**
	1 Yes	2	5.4	33.3	100.0
	Total	6	16.2	100.0	
Missing	System	31	83.8		
Total		37	100.0		

Table N-50: Local HAR Survey FDOT ATIS Changes – Partner More with Private Sector

q17_4 How do you think FDOT real-time traveler information systems (Dynamic Message Signs or MDS, HAR, 511, etc.) should respond to these changes? - Should partner more with the private sector

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**3**	**8.1**	**50.0**	**50.0**
	1 Yes	3	8.1	50.0	100.0
	Total	6	16.2	100.0	
Missing	System	31	83.8		
Total		37	100.0		

Table N-51: Local HAR Survey FDOT ATIS Changes – Other

q17_5 How do you think FDOT real-time traveler information systems (Dynamic Message Signs or MDS, HAR, 511, etc.) should respond to these changes? - Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**5**	**13.5**	**83.3**	**83.3**
	1 Yes	1	2.7	16.7	100.0
	Total	6	16.2	100.0	
Missing	System	31	83.8		
Total		37	100.0		

Table N-52: Local HAR Survey FDOT ATIS Changes – Other (Details)

q17_5_other How do you think FDOT real-time traveler information systems (Dynamic Message Signs or MDS, HAR, 511, etc.) should respond to these changes? - Other

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	36	97.3	97.3	97.3
Should break into ongoing radio broadcasts or turn on the radio to provide emergency notifications	1	2.7	2.7	100.0
Total	37	100.0	100.0	

Table N-53: Local HAR Survey Agency ATIS Changes – Not Much Change

q18_1 How do you think your agency may adapt its real-time traveler information system in response to these changes (i.e., where are you going in the future)? - Do not envision much change

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**22**	**59.5**	**71.0**	**71.0**
	1 Yes	9	24.3	29.0	100.0
	Total	31	83.8	100.0	
Missing	System	6	16.2		
Total		37	100.0		

Table N-54: Local HAR Survey Agency ATIS Changes – Drop Components

q18_2 How do you think your agency may adapt its real-time traveler information system in response to these changes (i.e., where are you going in the future)? - Might drop components of our traveler information program

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 0 No	31	83.8	100.0	100.0
Missing System	6	16.2		
Total	37	100.0		

Table N-55: Local HAR Survey Agency ATIS Changes – Add Components

q18_3 How do you think your agency may adapt its real-time traveler information system in response to these changes (i.e., where are you going in the future)? - Might expand our program to include additional components

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Valid **0 No**	**19**	**51.4**	**61.3**	**61.3**
1 Yes	12	32.4	38.7	100.0
Total	31	83.8	100.0	
Missing System	6	16.2		
Total	37	100.0		

Table N-56: Local HAR Survey Agency ATIS Changes – Partner More with Private Sector

q18_4 How do you think your agency may adapt its real-time traveler information system in response to these changes (i.e., where are you going in the future)? - Might partner more with the private sector

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Valid **0 No**	**18**	**48.6**	**58.1**	**58.1**
1 Yes	13	35.1	41.9	100.0
Total	31	83.8	100.0	
Missing System	6	16.2		
Total	37	100.0		

Table N-57: Local HAR Survey Agency ATIS Changes – Other

q18_5 How do you think your agency may adapt its real-time traveler information system in response to these changes (i.e., where are you going in the future)? - Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**29**	**78.4**	**93.5**	**93.5**
	1 Yes	2	5.4	6.5	100.0
	Total	31	83.8	100.0	
Missing	System	6	16.2		
Total		37	100.0		

Table N-58: Local HAR Survey Agency ATIS Changes – Other (Details)

q18_5_other How do you think your agency may adapt its real-time traveler information system in response to these changes (i.e., where are you going in the future)? - Other

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	35	94.6	94.6	94.6
WE are still a rural area so I'm not sure this really applies.	1	2.7	2.7	97.3
work with fdot	1	2.7	2.7	100.0
Total	37	100.0	100.0	

Table N-59: Local HAR Survey Awareness of HAR

q19 Highway Advisory Radio (HAR) is a radio station dedicated to 24-hour highway travel information. Are you aware that Highway Advisory Radio is available on some Florida Interstates and the Florida's Turnpike Toll Roadways?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Yes**	**28**	**75.7**	**75.7**	**75.7**
	2 No	9	24.3	24.3	100.0
	Total	37	100.0	100.0	

Table N-60: Local HAR Survey Awareness of CBRAS

q20 Citizens' Band Radio Advisory System (CBRAS) is a traffic information channel (channel 19) broadcasted over CB radios. Are you aware that CBRAS is available on the Florida's Turnpike Toll Roadways?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Yes**	**18**	**48.6**	**48.6**	**48.6**
	2 No	19	51.4	51.4	100.0
	Total	37	100.0	100.0	

Table N-61: Local HAR Survey Use of CB/CBRAS

q21 Does your agency use CBRAS or other CB communication technology to broadcast emergency alerts?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Yes	6	16.2	16.2	16.2
	2 No	**30**	**81.1**	**81.1**	**97.3**
	3 Other	1	2.7	2.7	100.0
	Total	37	100.0	100.0	

Table N-62: Local HAR Survey Use of CB/CBRAS - Other

q21_3_other Does your agency use CBRAS or other CB communication technology to broadcast emergency alerts? - Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		36	97.3	97.3	97.3
	we have a dot office that works with Miami Dade	1	2.7	2.7	100.0
	Total	37	100.0	100.0	

Table N-63: Local HAR Survey Importance of ATIS technology – Commercial Radio

q22_1 For disseminating public travel information during emergency evacuations, please rank technologies for today's communications market and infrastructure. - Commercial Radio Reports

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1**	**11**	**29.7**	**29.7**	**29.7**
	2	8	21.6	21.6	51.4
	3	7	18.9	18.9	70.3
	4	4	10.8	10.8	81.1
	5	1	2.7	2.7	83.8
	6	4	10.8	10.8	94.6
	7	2	5.4	5.4	100.0
	Total	37	100.0	100.0	

Table N-64: Local HAR Survey Importance of ATIS technology – Florida 511

q22_2 For disseminating public travel information during emergency evacuations, please rank technologies for today's communications market and infrastructure. - Florida 511

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	10.8	10.8	10.8
	2	6	16.2	16.2	27.0
	3	8	21.6	21.6	48.6
	4	7	18.9	18.9	67.6
	5	**9**	**24.3**	**24.3**	**91.9**
	6	2	5.4	5.4	97.3
	7	1	2.7	2.7	100.0
	Total	37	100.0	100.0	

Table N-65: Local HAR Survey Importance of ATIS technology – DMS

q22_3 For disseminating public travel information during emergency evacuations, please rank technologies for today's communications market and infrastructure. - Highway Electronic Message Signs

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	6	16.2	16.2	16.2
	2	**10**	**27.0**	**27.0**	**43.2**
	3	**10**	**27.0**	**27.0**	**70.3**
	4	7	18.9	18.9	89.2
	5	3	8.1	8.1	97.3
	6	1	2.7	2.7	100.0
	Total	37	100.0	100.0	

Table N-66: Local HAR Survey Importance of ATIS technology – HAR

q22_4 For disseminating public travel information during emergency evacuations, please rank technologies for today's communications market and infrastructure. - Highway Advisory Radio (HAR)

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	3	8.1	8.1	8.1
	3	3	8.1	8.1	16.2
	4	7	18.9	18.9	35.1
	5	**12**	**32.4**	**32.4**	**67.6**
	6	9	24.3	24.3	91.9
	7	3	8.1	8.1	100.0
	Total	37	100.0	100.0	

Table N-67: Local HAR Survey Importance of ATIS technology – CB Radio

q22_5 For disseminating public travel information during emergency evacuations, please rank technologies for today's communications market and infrastructure. - Citizens' Band (CB) Radio

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	2	5.4	5.4	5.4
	4	1	2.7	2.7	8.1
	5	1	2.7	2.7	10.8
	6	12	32.4	32.4	43.2
	7	**20**	**54.1**	**54.1**	**97.3**
	8	1	2.7	2.7	100.0
	Total	37	100.0	100.0	

Table N-68: Local HAR Survey Importance of ATIS technology – Smartphone Applications

q22_6 For disseminating public travel information during emergency evacuations, please rank technologies for today's communications market and infrastructure. - Smart Phone Applications

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1**	**14**	**37.8**	**37.8**	**37.8**
	2	9	24.3	24.3	62.2
	3	5	13.5	13.5	75.7
	4	4	10.8	10.8	86.5
	5	2	5.4	5.4	91.9
	6	3	8.1	8.1	100.0
	Total	37	100.0	100.0	

Table N-69: Local HAR Survey Importance of ATIS technology – GPS Navigation Device

q22_7 For disseminating public travel information during emergency evacuations, please rank technologies for today's communications market and infrastructure. - GPS Navigation Device

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	5.4	5.4	5.4
	2	1	2.7	2.7	8.1
	3	2	5.4	5.4	13.5
	4	6	16.2	16.2	29.7
	5	9	24.3	24.3	54.1
	6	6	16.2	16.2	70.3
	7	**11**	**29.7**	**29.7**	**100.0**
	Total	37	100.0	100.0	

Table N-70: Local HAR Survey Importance of ATIS technology – Other

q22_8 For disseminating public travel information during emergency evacuations, please rank technologies for today's communications market and infrastructure. - Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4	1	2.7	50.0	50.0
	8	1	2.7	50.0	100.0
	Total	2	5.4	100.0	
Missing	System	35	94.6		
Total		37	100.0		

Table N-71: Local HAR Survey Importance of ATIS technology – Other (Details)

q22_8_other For disseminating public travel information during emergency evacuations, please rank technologies for today's communications market and infrastructure. - Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		35	94.6	94.6	94.6
	ipaws	1	2.7	2.7	97.3
	social media	1	2.7	2.7	100.0
	Total	37	100.0	100.0	

Table N-72: Local HAR Survey HAR Use for Emergencies

q23 For emergency broadcast circumstances like mandatory evacuations and other large congestion incidents, should Highway Advisory Radio continue to be supported and maintained?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Yes**	**27**	**73.0**	**73.0**	**73.0**
	2 Maybe	10	27.0	27.0	100.0
	Total	37	100.0	100.0	

Table N-73: Local HAR Survey Reason to Continue HAR - Reliability

q24_1 Why should Highway Advisory Radio be continued for Emergency Traffic Broadcasts? - Reliability

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	11	29.7	40.7	40.7
	1 Yes	**16**	**43.2**	**59.3**	**100.0**
	Total	27	73.0	100.0	
Missing	System	10	27.0		
Total		37	100.0		

Table N-74: Local HAR Survey Reason to Continue HAR - Scalability

q24_2 Why should Highway Advisory Radio be continued for Emergency Traffic Broadcasts? - Scalability

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**15**	**40.5**	**55.6**	**55.6**
	1 Yes	12	32.4	44.4	100.0
	Total	27	73.0	100.0	
Missing	System	10	27.0		
Total		37	100.0		

Table N-75: Local HAR Survey Reason to Continue HAR - Portability

q24_3 Why should Highway Advisory Radio be continued for Emergency Traffic Broadcasts? - Portability

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	11	29.7	40.7	40.7
	1 Yes	**16**	**43.2**	**59.3**	**100.0**
	Total	27	73.0	100.0	
Missing	System	10	27.0		
Total		37	100.0		

Table N-76: Local HAR Survey Reason to Continue HAR - Redundancy

q24_4 Why should Highway Advisory Radio be continued for Emergency Traffic Broadcasts? - Redundancy

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 No	5	13.5	18.5	18.5
	1 Yes	22	59.5	81.5	100.0
	Total	27	73.0	100.0	
Missing	System	10	27.0		
Total		37	100.0		

Table N-77: Local HAR Survey Reason to Continue HAR - Other

q24_5 Why should Highway Advisory Radio be continued for Emergency Traffic Broadcasts? - Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**0 No**	**21**	**56.8**	**77.8**	**77.8**
	1 Yes	6	16.2	22.2	100.0
	Total	27	73.0	100.0	
Missing	System	10	27.0		
Total		37	100.0		

Table N-78: Local HAR Survey Reason to Continue HAR – Other (Details)

q24_5_other Why should Highway Advisory Radio be continued for Emergency Traffic Broadcasts? - Other

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		31	83.8	83.8	83.8
	I don't really know about this.	1	2.7	2.7	86.5
	It is 'low tech' available to all immediately on their radio when and where they need it. It can accommodate a lot of information sharing, unlike dynamic message signs, texting, etc. where messages are limited in length.	1	2.7	2.7	89.2
	Low operating cost once installed	1	2.7	2.7	91.9
	Once in place, minimal cost to maintain	1	2.7	2.7	94.6
	timely and current	1	2.7	2.7	97.3
	when a population is mobile, that is about the only thing we have	1	2.7	2.7	100.0
	Total	37	100.0	100.0	

Table N-79: Local HAR Survey Success of HAR during Emergencies

q26 Do you think Highway Advisory Radio in Florida would currently experience similar success for hurricane evacuations, response, and recovery?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Yes**	**23**	**62.2**	**62.2**	**62.2**
	2 No	1	2.7	2.7	64.9
	3 Maybe	13	35.1	35.1	100.0
	Total	37	100.0	100.0	

Table N-80: Local HAR Survey Continuation of CBRAS

q27 Should technology like Citizens Band Radio Advisory System, which mostly targets truckers, continue to be supported by the Florida Turnpike Enterprise?

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1 Yes**	**23**	**62.2**	**62.2**	**62.2**
	2 No	1	2.7	2.7	64.9
	3 Maybe	13	35.1	35.1	100.0
	Total	37	100.0	100.0	

Table N-81: Local HAR Survey Years of Experience

q28 How many years of professional experience do you have working within your agencies' discipline

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Less than five years	4	10.8	10.8	10.8
	2 5-10 years	6	16.2	16.2	27.0
	3 11-15 years	4	10.8	10.8	37.8
	4 16-20 years	7	18.9	18.9	56.8
	5 More than 20 years	**16**	**43.2**	**43.2**	**100.0**
	Total	37	100.0	100.0	