

**IMPROVING GUIDANCE FOR INTERNATIONAL TRAVELLERS  
TO AND FROM U.S. AIRPORTS**

by

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## SUMMARY

In recent years, tourists have become lost while using the U.S. highway system. The tourists may become lost because of different signing practices in their homeland, language barriers may make the sign incomprehensible, or the sign may not provide enough information to effectively guide the tourists. This paper focuses on the tourists' trips to and from the airport. Summaries of a survey conducted by the Texas Transportation Institute and Wilbur Smith Associates are used to identify problems encountered by tourists on roads in Florida and to identify critical incident locations. This paper presents the problems encountered by the surveyed tourists, evaluates the existing guide signs in Orlando, recommends changes to the guide signs and establishes a general philosophy for international signing, and assesses the possibility of Changeable Message Signs (CMS) and Highway Advisory Radio (HAR) enhancing guidance for international travellers.

The TTI and WSA survey revealed that the problems tourists had at specific locations in Orlando were often related to guidance problems. Those problems were perceived by tourists as inadequate advance signing of exits, confusing messages, poor visibility and lighting, insufficient guidance to destinations, poor rental car agency guidance, insufficient route confirmation, inadequate distance to exit, and more destinations given at the exit. European and U.S. signing practices were then compared. There were obvious differences between European and U.S. regulatory and warning signs; however, the guide signs were similar. Therefore, there should not be any trouble for the tourists accustomed to European signing when using U.S. guide signs.

The problems tourists were having with guidance were due to some deficient guide signs in the corridor travelled between the airport and their origin/destination. Some of the existing guide signs in Orlando were evaluated and recommendations were made to improve guidance. Recommendations included uniform and consistently used trailblazers to and from the airport, overhead guide signs used at major interchanges/intersections, symbols of area attractions used as trailblazers, and association of route number and road name provided for roads. A general philosophy for signing to and from airports in the U.S. was then developed. The recommendations were based on the problems and incident locations expressed by the tourists surveyed in Orlando. Recommendations included determination of corridor(s) used by tourists leaving and approaching the airport, overhead guide signs used to provide guidance, and trailblazers used throughout the corridor(s).

Finally, the use of CMSs and HAR to enhance guidance of tourists was assessed. CMSs were recommended for providing route information to tourists departing from the airport. Displaying the CMS messages in various languages is not recommended. HAR was recommended to provide the tourists routing information and rental car agency locations. Agencies that provide HAR could broadcast messages in multiple languages other than English based on surveys of the common languages spoken by the international motorists. CMS and HAR should only be used with effective guide signs in providing guidance for the international traveller.

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## INTRODUCTION

In recent years, tourists have in some instances become lost while driving in U.S. cities and wandered into unfamiliar neighborhoods. The tourists that use the U.S. highway system might be accustomed to homeland standards that differ from U.S. standards, language barriers may make the signs incomprehensible, or the signs may not, from their perspectives, provide enough information to effectively guide the international traveller. In order to make the international traveller's visit in the U.S. as enjoyable and safe as possible, our highways need to effectively guide the tourist. Since English is not the primary language of some tourists, special attention must be given to highway guide signs. Providing guidance to the primary users of the highway system should be the primary function of guide signs. However, familiar motorists may not need the guide signs to provide information on area attractions or route selection to reach their destination, but unfamiliar motorists including international travellers will need effective guide signs to find their destinations.

Tourists often enter the U.S. at an airport and then enter the U.S. highway system from a rental car agency near the airport. It can be assumed that rental car agencies provide the tourists with pre-trip information such as maps and/or computer print-outs of directions to reach destinations. Although the tourists are provided this pre-trip information, they will need guidance while travelling to their destinations. The tourists might begin their vacations by finding the hotels that they plan to stay. If most tourists choose hotels conveniently located near the area attractions, they will use highways located within a corridor between the airport and hotels. When the tourists are ready to end their visit in the U.S., they might check out of their hotel and travel back towards the airport using the same highways. The guide signs within the corridor need to guide these tourists to the area where the hotels are located and back to the airport. The guide signs should be evaluated for effectiveness in guiding the international traveller.

### Objectives

The objectives of the paper are as follows:

1. Identify the navigational problems that international travellers encounter when departing and arriving at the Orlando airport.
2. Determine whether the needs of the international traveller are being satisfied with the existing guide signs to and from the Orlando airport.
3. Recommend appropriate signing changes to resolve the problems and provide a general philosophy for international signing.
4. Assess whether changeable message signs (CMS) and Highway Advisory Radio (HAR) would enhance guidance for international travellers.

### Scope

This paper will focus on the international traveller's trips between the Orlando airport and areas that the hotels are located. A summary of a survey conducted by the Texas Transportation Institute (TTI) and Wilbur Smith Associates (WSA) at the Orlando airport will be used to identify the problems that international travellers encountered on highways in Florida (1). Technical

memorandums prepared by TTI will be used to identify the critical incident locations that are in the corridor between the Orlando airport and hotels. A literature review will be performed to assess the possible uses of changeable message signs and highway advisory radio to guide international travellers to and from U.S. airports.

## **Organization**

This paper is divided into four main sections that follow the four objectives. The first section consists of:

- problems that the surveyed tourists encountered while driving on highways in Florida, and
- differences between European and U.S. signing systems that may adversely affect international motorists using U.S. highways.

The second section consists of:

- a table of critical incident locations in Orlando and the problems tourists may have at the locations, and
- an evaluation of the existing guide signs at these critical incident locations.

The third section consists of:

- recommendations to improve the existing guide signs such that the international motorists are effectively guided to their destinations, and
- a general philosophy for international signing to effectively guide international travellers to and from U.S. airports.

The fourth section consists of:

- an assessment of changeable message signs to guide international travellers to their destinations, and
- an assessment of highway advisory radio to guide international travellers to their destinations.

## **PROBLEMS INTERNATIONAL TRAVELLERS HAD WITH U.S. SIGNS**

### **Orlando Airport Study**

TTI and WSA surveyed international tourists seeking data on routing problems while driving in Florida and where the problems occurred. Of the 500 international tourists surveyed, 205 (41%) reported that they became lost or confused. The summary of the results stated "...the survey is not designed to identify all possible highway locations where motorists are experiencing navigational problems." (1) However, the survey provided valuable information on common problems that international motorists had while using the highways in Florida. There were a total of 219 complaints or suggestions to improve guidance on the highways in Florida. The common complaints and suggestions are given in Table 1 (2).

The problems that are most likely to adversely affect the tourists' trip between the airport and hotel are:

- inadequate advance signing of exits,
- confusing messages,
- poor visibility and lighting,
- poor guidance to destinations,
- poor rental car agency guidance,
- insufficient route confirmation,
- distance to exit needed, and
- destinations at exits.

All of these problems are due to the fact that the driver is unfamiliar with the highway system, and consequently must depend upon guide signs, some that do not effectively guide the tourists to their destinations. A possible explanation for the apparent inadequacy of the guide signs could be that the drivers are accustomed to homeland standards that differ from U.S. standards. The tourists surveyed in Florida were predominately from Europe, South America, and North America (3). There are various signing systems used throughout the world, but most systems are variations of either the European or U.S. signing systems (4). The signing system in Canada is similar to U.S. signing, and Latin America uses a combination of both systems (4). Within Europe, the signing is relatively consistent, and the European Community is developing a uniform signing system for the member countries (4). Since the European and U.S. signing systems are different, it should be expected that there would be some problems for a motorist accustomed to one system trying to use the other system.

### **Differences Between European and U.S. Signing Systems**

It has been documented that U.S. Army personnel using European roadways have had trouble comprehending some of the abstract symbols used on regulatory and warning signs (5). In a controlled U.S. Army experiment evaluating European sign comprehension, some guide signs such as detour, diagrammatic directional, and freeway entrance signs were

Table 1. Complaints and Suggestions by International Motorists in Florida (2).

Complaints and Suggestions	Frequency	Percentage
Need early warning (advance notice of exit)	73	33
Confusing message	35	16
Visibility and lighting	19	9
Guidance to destination	17	8
Better maps	15	7
Information booths	12	5
Rental car agency guidance	10	5
Overhead location is bad	6	3
Distant cities on route needed	6	3
Confirmation of route needed	4	2
Distance to exit needed	4	2
Destinations at exits	4	2
Unforgiving if fail to exit	3	1
No speed limits posted	3	1
Confirmation of city currently in	3	1
Miscellaneous missing information	2	1
Roadside sign location is poor	1	< 1
Sign is down (no maintenance)	1	< 1
Need services signed when exit	1	< 1
<b>TOTAL</b>	<b>219</b>	<b>10</b>

in the top twenty of most often misunderstood (5). If Americans have difficulty comprehending these signs, most likely motorists accustomed to the European signing system would have similar difficulties with the U.S. signing system. The major difference between European and U.S. signs of this type is European signs use symbols while U.S. signs use text messages to display similar information.

Other differences between the European and U.S. signing systems are sign placement, color coding, and different information provided. In an interview with Dr. Walter Kraft (6), an American transportation engineer that recently toured European transportation systems, questions were asked relevant to these differences. Signing at the gore area and exit ramp is placed differently than in the U.S. The overhead signs at exit ramps were diagrammatic, unlike the U.S. practice of providing the route number and/or road name on either an overhead or ground mounted sign. The signs in Europe are color coded according to roadway type as being European, national, or local road. The U.S. uses uniform colors and symbols for interstates and U.S. highways; however, state symbols may be inconsistent such as Florida's designation of toll

roads. Although color coding is used on guide signs throughout Europe, a survey conducted in England found that English drivers did not comprehend the differing border colors (7). Therefore, color coding may not be an important issue if English drivers do not associate the color bordering with the intended message of local destinations or non-primary route. There are some European guide signs not found in the U.S. such as countdown markers along the highway preceding the exit and static signs on German roads that guide motorists off the highway and back to it, which could be followed to avoid downstream congestion.

There are obvious differences between the two basic signing systems, but the differences are not necessarily the cause for tourists in the U.S. having difficulties in finding their destinations away from and back to the airport. The major differences between the two systems are most often differences between regulatory and warning signs. These differences should not affect the tourist trying to find their destination. From the interview with Dr. Kraft, European and U.S. guide signs provide similar information; therefore, tourists in the U.S. generally should not be surprised with the amount of information provided on the guide signs. However, the tourists using U.S. highways may be unaccustomed to the guide sign placement and the use of text rather than diagrammatics. There should not be problems adjusting from one system of signing to the other, yet tourists surveyed had many complaints of the guidance provided at specific locations. Rather than assume there is a problem with the entire U.S. signing system, the problems encountered by the tourists may be local within the corridors travelled. The critical incident locations cited by the tourists that are within the corridors travelled away from the airport towards hotels will be reviewed.



## EVALUATION OF GUIDE SIGNS TO AND FROM THE ORLANDO AIRPORT

The summaries prepared by TTI and WSA included specific critical incident locations in Orlando (1). The critical incident locations that will be evaluated are within the corridor between SR 528 Bee Line Expressway at the airport to International Drive, a location where many tourists stay at hotels. Problems associated with these critical incident locations are given in Table 2. Figure 1 shows the major roads between the airport and International Drive. The evaluation of critical incident locations is divided into the tourists departing from the airport and the tourists approaching the airport.

### Departing from the Airport

#### *Airport Boulevard NB at SR 528*

If the international tourists rent a vehicle from a rental agency that is located on airport property, they will use Airport Boulevard and head north toward SR 528, Bee Line Expressway. One of the first guide signs the tourists will see is shown in Figure 2. Tourists are given the information that the area attractions are not necessarily in Orlando. The omission of route numbers and specific destinations within Orlando may confuse the driver in deciding whether he needs to go into Orlando or go towards the area attractions. The message of area attractions is very vague, and could mislead the driver.

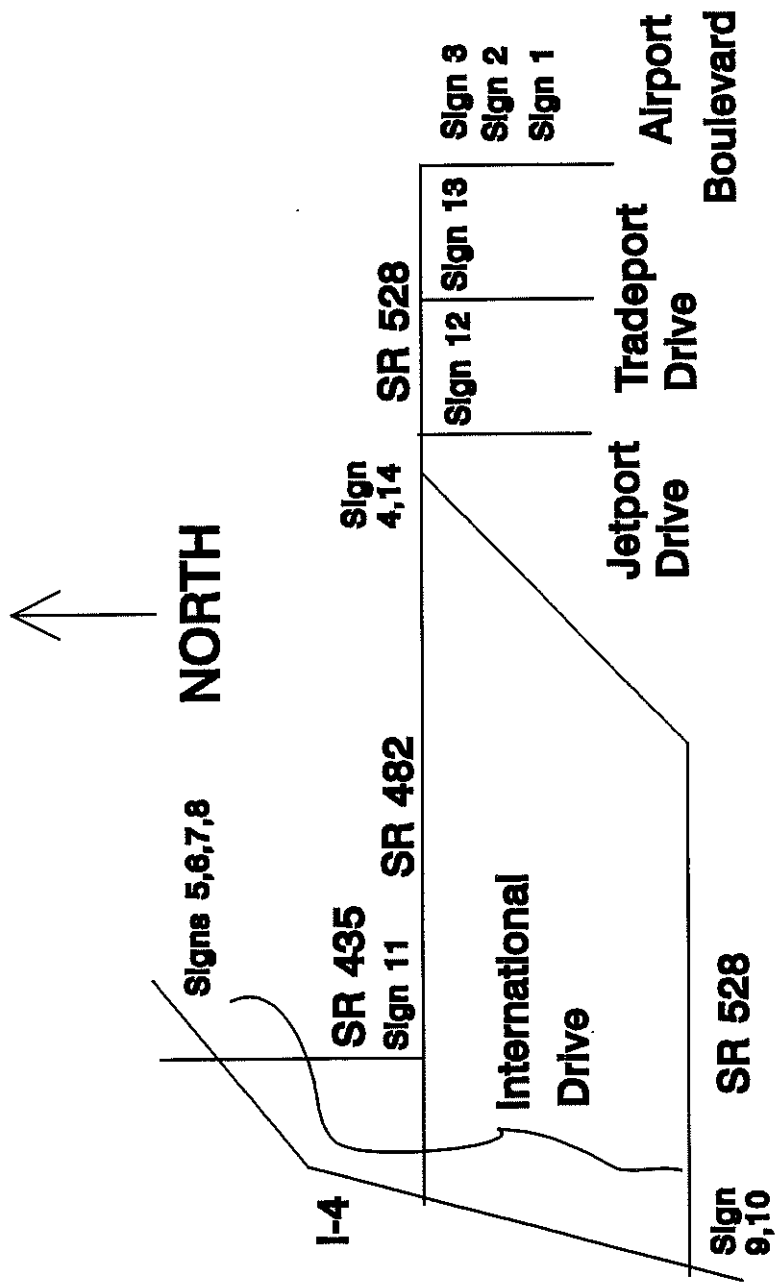
The next guide sign which is a tenth of a mile downstream is shown in Figure 3. This sign has the potential to confuse drivers because the information is inconsistent. SR 528 is now called Bee Line, and now the driver is told that he can reach Orlando by two different routes, again without any specific destinations given. The symbol for Bee Line Expressway is not consistently used throughout Orlando, and the small size of the lettering and background colors make the symbol difficult to comprehend. There is no information telling the motorist that SR 528 and Bee Line Expressway are the same roadway.

The next guide sign which is 0.15 mile downstream is shown in Figure 4. Again there is a disparity between the SR 528 and Bee Line Expressway. The guide sign for the SR 528 exit gives the destinations of Tampa and area attractions, when the previous sign informed the driver that it was an exit to Orlando. Kennedy Space Center is not the same direction as area attractions. The vagueness of area attractions could cause drivers to choose the wrong lane and miss the exit for Kennedy Space Center, when that was their destination.

The next group of guide signs are 0.15 mile downstream, and similar to the guide signs shown in Figure 4 excluding the sign for SR 528 EB. Immediately beyond that at the exit, there is a group of trailblazers for 441, 17, 92, I-4, and Turnpike with an arrow pointing to the right. This is the first guidance that the driver receives for I-4, which is a common route to reach hotels. Since the trailblazers are at the exit ramp, there appears to be inadequate advance warning to exit. Again Tampa is the destination of 528 West, which is not true. SR 528 WB from the airport terminates at I-4 in Orlando.

Table 2. Problems at Critical Incident Locations within Corridor between the Airport and International Drive.

	<b>Critical Incident Location</b>	<b>Problems</b>
Departing from the airport	Airport Boulevard NB at SR 582	Need early warning, confusing message, visibility and lighting, guidance to destination, destinations at exits
	Tradeport Drive at SR 528	Need early warning, visibility and lighting, guidance to destination
	SR 528 WB at SR 482	Confusing message, guidance to destination, destinations at exits
	I-4/SR 435 at International Drive	Need early warning, visibility and lighting, guidance to destination
Approaching the airport	I-4 EB at SR 528	Visibility and lighting, guidance to destination, destinations at exit
	SR 435 SB at SR 482	Need early warning, confusing message, visibility and lighting, guidance to destination
	SR 528 EB at Jetport Drive	Need early warning, confusing message, guidance to destination
	SR 528 EB at Airport Boulevard	Visibility and lighting, rental car agency guidance, distance to exit needed



not to scale

Figure 1. Map of Roads between the Orlando Airport and International Drive.



Figure 2. Guide Sign 1 on NB Airport Boulevard.

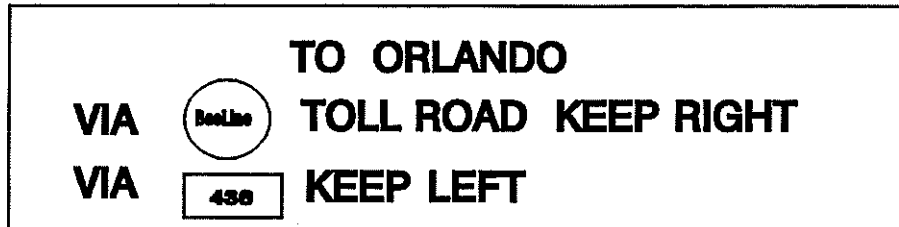


Figure 3. Ground-mounted Guide Sign 2 on NB Airport Boulevard.

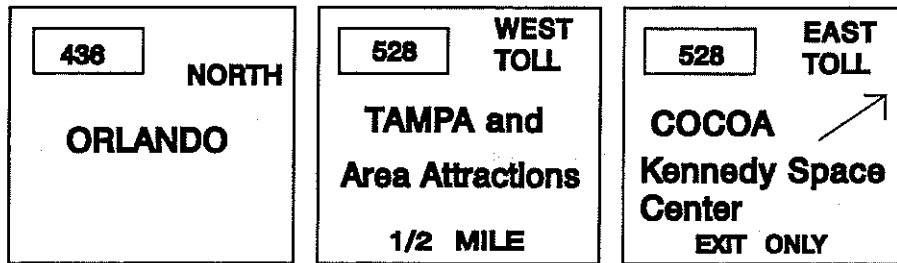


Figure 4. Guide Sign 3 on NB Airport Boulevard.

After exiting onto 528 West, the driver is finally told that SR 528 and Bee Line Expressway are the same road. However, that is assuming the driver did in fact exit onto 528 West. Airport Boulevard is a common route away from the airport for tourists, yet the guide signs do not provide guidance to destinations that tourists would be seeking. Trailblazers for commonly used routes are not given until it is too late, and not all the commonly used routes are given. Guidance to SR 482 Sand Lake Road, SR 435, and International Drive are not provided. SR 482 and 435 are routes that lead to International Drive, which may be the destination of tourists because it is a road where many hotels are located near area attractions.

#### *Tradeport Drive at SR 528*

Some of the rental car agencies are on Tradeport Drive, so some tourists will travel north on Tradeport toward SR 528. The guide signs along Tradeport do not appear to provide sufficient guidance. There are guide signs that are white with small black lettering which are not standard in appearance. Since these guide signs are the first that the driver will encounter, the driver may expect all guide signs to appear this way. However, the guide signs along the

freeways and highways use green with white lettering signs. The size of the lettering is small and difficult to read, especially if the driver is in the left lane. This could cause the driver to miss the advance warning for SR 528.

Once drivers reach the interchange of SR 528 and Tradeport, there are only trailblazers for east and west SR 528. There are no destinations given, no trailblazers for routes commonly travelled, and there is no information that SR 528 and Bee Line Expressway are the same road. After travelling under the overpass, there are trailblazers for west 528 beyond the entrance ramp and beyond the gore area. Drivers could easily miss these trailblazers and accidentally turn onto McCoy Road heading east.

#### *SR 528 WB at SR 482*

The first major interchange the tourists encounter while travelling on WB SR 528 is at SR 528 and SR 482, which is approximately 2.3 miles from the SR 528 and Airport Boulevard interchange. At the SR 528 and Airport Boulevard interchange is a route confirmation sign with Tampa as the destination. The motorists then pass through a toll plaza and then past the interchange of SR 528 and Tradeport. At 1.5 miles from the SR 528 and Airport Boulevard interchange is a trailblazer for I-4 with an arrow pointing straight ahead. This is the first trailblazer on WB SR 528 that the tourists will see. However, there are no other routes given, i.e. International Drive.

A half mile downstream from the trailblazer are overhead guide signs for west SR 528 and west SR 482, shown in Figure 5. The guide sign for SR 528 lists Tampa as the destination, which may lead the drivers to think they need to exit onto SR 482 in order to go into Orlando. SR 482 is also known as Sand Lake Road, which the drivers are not informed. Immediately beyond the overhead signs is a trailblazer for SR 527 with an arrow pointing to the right. There are no other trailblazers provided for other common routes sought such as I-4 or International Drive, and no guidance to area attractions. The guidance provided appears deficient and the Tampa/Orlando information may cause the tourists to take the wrong route.

#### *I-4/SR 435 at International Drive*

Tourists may approach International Drive from I-4 WB. The first guide sign the driver will see is shown in Figure 6. Presently this sign is within a construction zone and is blocked by a bridge pier, which reduces the visibility of the sign. At 0.2 mile downstream is the ground-mounted guide sign shown in Figure 7. The only guide sign for north SR 435 precedes the exit a quarter of a mile, then followed by the overhead guide sign that is shown in Figure 8. There are no destinations given on this sign. The next guide sign is at the exit and is shown in Figure 9. The left lane must exit and the lane next to it serves as a through and left exit lane, both lanes being appropriately marked on the overhead sign. No destinations are given on the guide signs.

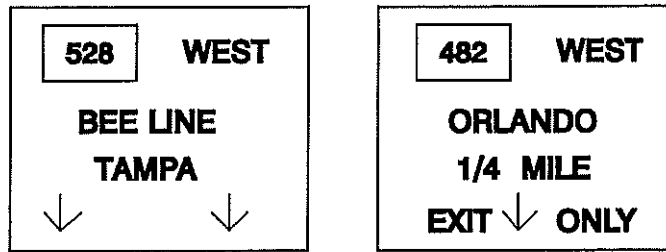


Figure 5. Guide Sign 4 on WB SR 528 at SR 482.

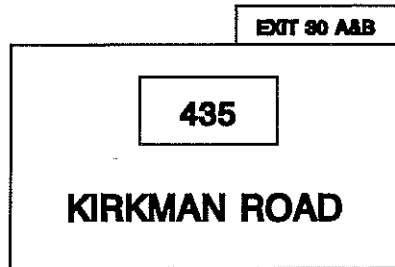


Figure 6. Guide Sign 5 on WB I-4 at SR 435.



Figure 7. Ground-mounted Guide Sign 6 on WB I-4 at SR 435.

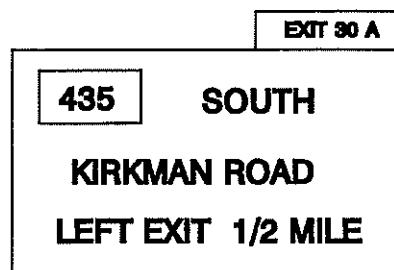


Figure 8. Guide Sign 7 on WB I-4 at SR 435.

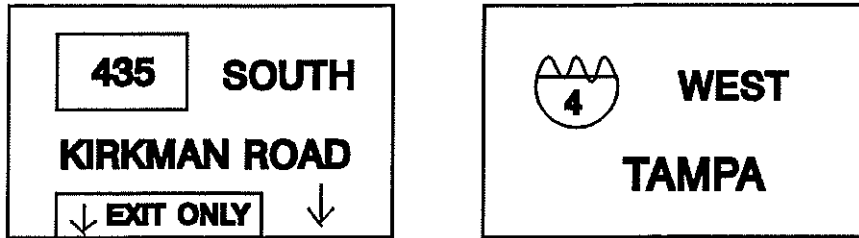


Figure 9. Guide Sign 8 on WB I-4 at SR 435.

After exiting onto south SR 435, the motorist travels through some vertical and horizontal curves. In order to make a right turn onto SB International Drive, the driver must make three lane changes. However, the driver may not know this because there are no guide signs informing the driver that International Drive is ahead. There is a ground mounted signal ahead warning sign with a small sign below it that reads Int'l Dr. The geometry of the roadway and the small size of the intersecting roadway sign may cause the driver to be in the wrong lane upon arriving at the International Drive intersection.

### Approaching the Airport

#### *I-4 EB at SR 528*

When travelling back to the airport, tourists might use I-4 EB to SR 528. The first guide sign the driver will see is the overhead sign that is shown in Figure 10. Missing are information that SR 528 and Bee Line Expressway are the same road, and an airport trailblazer along with the text of Orlando International Airport, as shown in Figure 11. The next guide sign is shown in Figure 12. The message turnpike south is vague and may cause confusion for the drivers. Missing from this sign is an airport trailblazer. The next two guide signs are similar to the guide sign for EB SR 528 shown in Figure 10. There is no information for Bee Line Expressway and no airport trailblazer.

#### *SR 435 SB at SR 482*

Tourists may leave their hotels and head toward the airport on SR 435 SB. After passing through the intersection of International Drive, there is a route confirmation sign. Approximately a half mile downstream is a ground-mounted guide sign that is shown in Figure 13. The next guide sign is similar to the previous guide sign, except the Next Right is replaced with an arrow pointing to the right. There have been no airport trailblazers or other signs with directions to reach the airport. Just beyond the West 482 exit there is a sign that reads Last Exit Before Entering Private Property with an arrow pointing to the right. Due to the geometry of the roadway, this sign blocks a small lettered sign that reads Int'l Airport. This sign could easily be missed by a driver because its placement and lettering size. The next sign is a trailblazer for East 482 that is placed beyond the gore area. This sign could also be missed by the driver because of its placement. The interchange has signing deficiencies and could easily cause the tourist to miss the desired exit. There are no airport trailblazers, and no destinations given on the guide signs at this interchange.

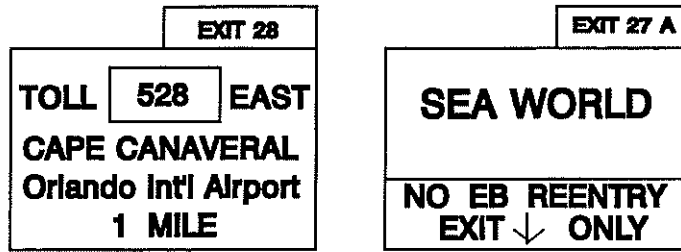


Figure 10. Guide Sign 9 on EB I-4 at SR 528.



Figure 11. Airport Trailblazer.

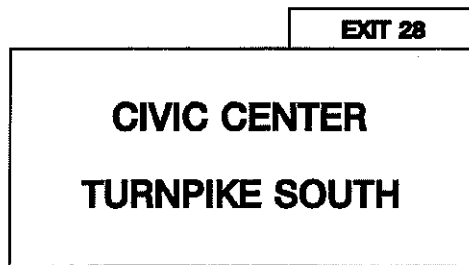


Figure 12. Guide Sign 10 on EB I-4 at SR 528.

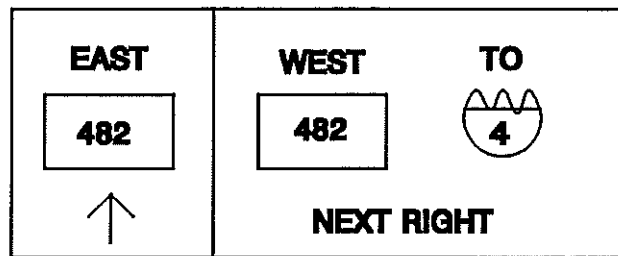


Figure 13. Ground-mounted Guide Sign 11 on SB SR 435 at SR 482.

*SR 528 EB at Jetport Boulevard*

As the tourists are approaching the airport on SR 528 EB, they see overhead guide signs at the Jetport exit having not seen any advance guide signs. The guide signs are shown in Figure 14. There are no airport trailblazers, and the sign informing the drivers that the





Figure 14. Guide Sign 12 on EB SR 528 at Jetport Drive.

airport is 2 1/2 miles ahead might not be enough guidance for tourists. The driver must react quickly since the exit sign is at the exit ramp. The name Jetport Drive may cause the tourists to think that they must exit onto this roadway in order to reach the airport. This uncertainty could be due to no advance guide signing and no airport trailblazers.

#### *SR 528 EB at Airport Boulevard*

Once the tourists have reached the airport, they must find the car rental agencies in order to return the rented vehicle. After exiting from SR 528 EB and staying to the right to enter Airport Boulevard, the drivers see guide signs for terminals and airlines located at each terminal. The drivers pass under a series of three guide signs before seeing any information pertaining to rental cars. Under heavy traffic conditions, the drivers may not be able to get into the proper lane to reach the desired rental car agency. The guide signs are white with either blue or red lettering dependent upon the terminal. The lettering size and coloring makes the sign difficult to read, and the drivers may not exit at the correct terminal thus having to circle around the airport and try again.

## RECOMMENDATIONS FOR ORLANDO GUIDE SIGNS AND INTERNATIONAL SIGNING IN GENERAL

Based on the previous evaluation of existing guide signs to and from the Orlando airport, changes to some of the guide signs could improve guidance. The recommendations will be made based on whether the tourist would be departing or approaching the Orlando airport. Following the recommendations for Orlando guide signs, a general philosophy for signs that guide international tourists to and from U.S. airports will be presented.

### Recommendations for Orlando Guide Signs

#### *Departing from the Airport*

The primary function of guide signs leading the tourists from the airport should be guidance to the primary route used by the tourists. Airport Boulevard provides guidance to SR 528, however there are no signs associating SR 528 and Bee Line Expressway as being the same roadway. The overhead guide signs need Bee Line Expressway included with SR 528 such that the tourists know that the route number and road name are for the same roadway. The first recommendation is replacing the guide sign shown in Figure 3 with a guide sign that provides guidance to Disney World, Universal Studios, and Sea World via SR 528, Bee Line Expressway WB. Next to each individual attraction could be a symbol that could be used on guide signs as a trailblazer. The criteria for choosing which attractions to symbolize and display should consider which attractions draw the most tourists. This would provide a large percentage of tourists effective guidance.

The next recommendation is to clarify the destination messages. The first change could be replacing Tampa as a destination with the destinations Orlando, I-4, and International Drive. Since space is limited on the sign and the sign should not be overloaded with information, Area Attractions could be replaced with the area attraction symbols previously suggested. These changes might solve the problems tourists are having by providing guidance to desired destinations with advance warning, eliminating messages that could confuse tourists, and defining that SR 528 and Bee Line Expressway are the same roadway.

Since some tourists will use the rental agency on Tradeport, they will approach SR 528 on Tradeport NB. A ground-mounted guide sign is recommended to provide guidance to Disney World, Universal Studios, and Sea World via SR 528, Bee Line Expressway in advance of an overhead guide sign. Next to each individual attraction could be the symbols used at the Airport Boulevard and SR 528 interchange. This would expose all tourists to the symbols and their associated meaning. Instead of a non-standard, ground mounted guide sign, there should be an overhead guide sign similar in appearance to those used on the primary routes at the interchange. The information that could be provided on an overhead guide sign is shown in Figure 15. These improvements would provide the tourist guidance to common destinations, eliminate the use of a non-standard guide sign, and define that SR 528 and Bee Line Expressway are the same roadway.

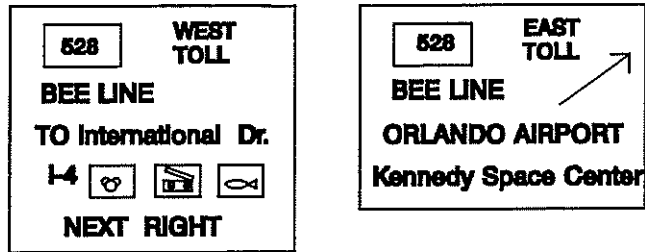


Figure 15. Proposed Guide Sign 13 for NB Tradeport Drive at SR 528.

Route confirmation signs are recommended within a half mile from the interchanges of both SR 528 at Airport Boulevard and SR 528 at Tradeport Drive. This will inform the drivers that they are on the correct route travelling in the correct direction. The first major interchange encountered while travelling west on SR 528 is at SR 528 and SR 482. Although both roads lead to I-4 and International Drive, it may be desirable to have the tourists use SR 528 since SR 528 is a freeway and SR 482 is an urban arterial. The overhead guide signs should be changed to resemble those in Figure 16. An advance guide sign with these messages placed a mile from the exit and again at the exit is recommended. These changes might alleviate the problems of having to choose a route to reach a destination, defining SR 482 and Sand Lake Road are the same road, and no guide signs in advance of the exit.

Although the interchange signs might be changed to influence the tourists to use SR 528 in order to reach their destination, SR 482 should provide guidance for those tourists who decide to use it. Trailblazers for I-4, International Drive, and the area attractions making use of the previously used symbols are recommended. The tourists should be guided to I-4 with similar guide signs used at the SR 528 and SR 482 interchange. Trailblazers for International Drive and the previously suggested area attraction symbols are recommended for consistent use on I-4 east of the of the interchange with SR 528.

Most tourists will most likely use this corridor when travelling from the airport to International Drive, however there is the possibility that tourists will approach International Drive from I-4 WB, possibly using Florida's Turnpike to reach I-4. Although this is unlikely, especially if the previously discussed changes are implemented, the I-4/SR 435 at International Drive interchange could use improved guide signs. The overhead guide signs for the SR 435 south exit need to include a trailblazer for International Drive. Once the motorists are on SR 435 south, they need an advance guide sign that International Drive is the next intersection. An overhead diagrammatic upstream of the intersection is recommended for use to convey the necessary information such that the drivers could maneuver their vehicle into the proper lane to turn onto International Drive. These changes might resolve the problems tourists have trying to reach International Drive from I-4 WB.

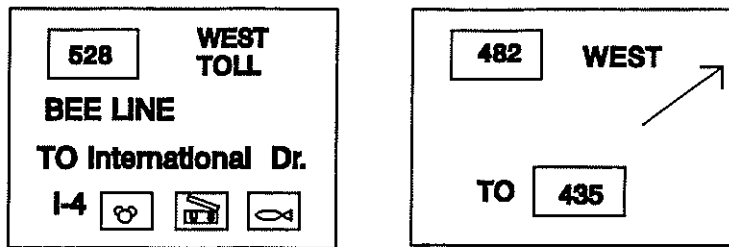


Figure 16. Proposed Guide Sign 14 for WB SR 528 at SR 482.

### *Approaching the Airport*

The tourists might end their vacation by checking out of their hotel and travelling back to the airport. The tourists may take either I-4 to SR 528 or SR 435 to SR 482 in order to reach the airport from International Drive. Some changes to the existing guide signs from I-4 WB to SR 528 would more effectively guide the drivers to the airport. A trailblazer for the Orlando airport should be used consistently along I-4 preceding the exit to SR 528. The overhead guide signs that precede the SR 528 exit need to include the airport trailblazer and define SR 528 and Bee Line Expressway as the same road. These changes would effectively guide the tourists onto SR 528. Airport trailblazers are recommended for consistent use along SR 528 such that there is no doubt in the tourists' minds that they are travelling in the correct direction on the correct route.

Since tourists may choose to travel SR 435 SB in order to reach the airport, airport trailblazers are recommended for consistent use along SR 435 SB. The interchange of SR 435 and SR 482 could use some changes to more effectively guide the drivers toward the airport. There should be an overhead guide sign upstream of the interchange rather than the use a ground mounted signs. A diagrammatic sign with route number, road name, and an airport trailblazer would be an easy sign to see, comprehend, and visually show that both turning movements are to the right. Then at the exit ramp for SR 482 WB, a ground mounted guide sign should be used that displays the route number, road name, direction, and a destination of I-4. On the bridge overpass, the guide sign for the SR 482 EB exit should be placed containing the route number, road name, direction, and the airport trailblazer with an arrow pointing to the right. These changes would guide the tourists toward the airport, reducing the possibility of tourists experiencing confusion at this interchange. Airport trailblazers should be used consistently along SR 482 EB such that the drivers know they are travelling on the correct route to reach the airport.

The guide signs at the interchange at SR 528 and Jetport Drive could use some changes such that the tourists do not experience any confusion approaching the airport. An advance overhead guide sign upstream of the interchange would help. Including the airport trailblazer with an arrow pointing straight ahead may reduce some of the confusion at this interchange. These two changes could alleviate any possibilities of confusion, because the guide signs have informed the tourists that Jetport Drive is not the route to reach the airport.

Once the tourists have reached the airport area, they will need to find the rental agency they used. Since Tradeport Drive has only one rental agency located on it, the tourists who

rented from that agency should remember it is located on Tradeport Drive. However, the tourists who rented from an agency located on airport property might need some guidance. There are overhead guide signs that list the rental agencies under the terminals. Possible changes to these guide signs would be providing lane assignment and increasing the letter size such that the sign is legible further upstream. The tourists would have more time to read through the rental agencies listed and then make any necessary lane changes.

The aforementioned changes at critical incident locations and consistent trailblazers throughout the corridor will more effectively guide tourists to their destinations of either International Drive or the Orlando airport. These changes have been made without introducing any non-standard signing. Therefore, the changes should not adversely affect familiar and unfamiliar U.S. motorists travelling through this corridor. In fact, the changes should also help guide unfamiliar U.S. motorists through the corridor.

### **Recommendations for International Signing to and from U.S. Airports**

A general philosophy for international signing, particularly to and from U.S. airports, can be derived from the TTI and WSA survey of international travellers. The surveys revealed that some of the guide signs did not provide enough guidance to and from the Orlando airport. Since tourists probably will be travelling on an unfamiliar highway system, they will need as much guidance as possible. The guide signs must be effective in order to make the tourists feel comfortable using the U.S. highway system. The following guidelines could enhance the guidance of international motorists:

- associate route number to road name,
- use symbols,
- provide trailblazers,
- provide route confirmation after major interchanges,
- use overhead guide signs that are standard in appearance,
- provide destinations that tourists seek,
- provide adequate advance warning, and
- provide consistent messages from one guide sign to the next.

Most tourists will rent a vehicle from a rental agency near the airport and enter the highway system from the agency. The tourists' first destination might be the hotel that they intend to stay during their visit. Information on the corridor or corridors most commonly used by tourists may not be readily available; however, this information could be obtained by a survey of the tourists or hotels throughout the city. Once these data have been collected, the corridor(s) used by the tourists to leave and approach the airport can be identified.

The area(s) of hotels commonly used by tourists should be provided as destinations on guide signs of the routes that lead out of the airport. Trailblazers throughout the corridor are recommended to provide guidance to the routes that will be used by the international motorists in order to reach their destinations. The trailblazers should be used in a consistent manner throughout the corridor in order to avoid any confusion. After passing through major interchanges or changing routes, there should be a route confirmation sign within a reasonable distance downstream of the interchange.

A study on overhead and ground mounted guide signs revealed that the overhead signs increased the level of service at an intersection (8). Assuming overhead signs will increase the level of service at interchanges as well, and assuming the visibility is greater, guide signs should be overhead. This practice within the corridor could possibly make guide signs more effective. This would also meet any possible expectancies of tourists accustomed to the European signing system and its variations, since the guide signs are placed overhead as was discussed in the section on differences between European and U.S. signs of this paper. The tourists need advance guide signs such that they can make any necessary lane changes before reaching the exit. The messages on the guide signs need to be consistent from one guide sign to the next in order to avoid any confusion.

Most likely the tourists will travel back to the airport on the same route(s) used to reach their hotel. Airport trailblazers are needed on the streets and highways that lead back to the airport. The airport trailblazer should be used consistently such that there is no doubt in the tourists' minds. The guide signs on freeways within the corridor should use the airport trailblazer as a destination, and provide trailblazers for routes that the tourists might have to use in order to reach the airport. Route confirmation signs should be used after any major interchanges.

Many cities in the U.S. might have large numbers of tourists using the local highway systems. These cities should provide effective guidance for those using the highways. Guiding travellers to and from the airport can be accomplished by following these guidelines, and understanding the problems that tourists encounter while using the U.S. highway system, i.e. the problems tourists had on highways in Florida. Although providing guidance to the tourists is important, any changes to guide signs should not adversely affect the guidance of the highways' local users.

## ASSESSMENT OF CHANGEABLE MESSAGE SIGNS AND HIGHWAY ADVISORY RADIO ENHANCING GUIDANCE OF INTERNATIONAL TRAVELLERS

Guide signs are not the only way to provide guidance to international tourists. Changeable Message Signs (CMSs) and Highway Advisory Radio (HAR) could be used within the corridor(s) that tourists use to reach their destinations of either hotels or airport. CMS and HAR used with effective guide signs have the potential to enhance guidance of the tourists.

### Changeable Message Signs (CMSs)

#### *Potential Use of CMS*

CMSs have been used for more than 30 years to convey real-time motorist information (9). In 1973, the Transportation Research Board identified CMSs as having the potential application as a guide sign providing route designation and destinations (10). An agency considering the use of CMS must define the problem that is to be addressed and then establish objectives to resolve the problem. Dudek detailed a procedure to follow for selection of an effective CMS (11). The agency should answer the following questions:

- Who is the target audience;
- What type of driver response is desired;
- Where the change should take place;
- What degree of driver response is required; and
- How the system will be operated (11).

The potential uses of CMSs as guide signs probably had American motorists as the audience of the CMS. However, international motorists could be the audience of CMSs to be used within the corridor(s) that tourists use. CMSs could be used to provide routing information to tourists departing from the airport. In order to effectively guide the tourists, the same destination name(s) used on static guide signs should be used on the CMS (12). Since the CMS are intended for international tourists, messages must be comprehended by the tourists. In order to avoid any confusion, abbreviations should not be used. Since the CMS usually displays a large amount of information, symbols and logos should not appear on the CMS (12). Guidelines on the selection of type of CMS, design of messages, use of CMS, and operation of CMS have been well documented by Dudek in references (11,12,13).

CMSs could also be used to display guidance information in various languages. However, this should be carefully considered. Messages must be displayed long enough for the motorists to recognize and read the language of the message. The amount of time required to read messages on signs can be found in reference (12). If many languages are used, the motorists may have to watch for a message to appear in a language that they can comprehend. This would require the motorists to focus their attention on the CMS for an extended period of time, rather than concentrating on the other driving tasks. The use of multiple languages on CMSs could be a distraction to the drivers, and is therefore not recommended.

## *Proposed Use of CMS in Orlando*

A possible location for the use of a CMS to guide tourists is upstream of the interchange of Airport Boulevard and SR 528. A light-emitting CMS could be used to display routing messages. The messages could provide information that would help guide tourists to destinations such as International Drive, I-4, area attractions, etc. However, this recommendation may not be necessary. The agency that is considering the use of CMSs to enhance guidance of tourists would need to determine the effectiveness of using static guide signs. If static guide signs can provide sufficient guidance for the tourists, the CMS is not necessary.

## **Highway Advisory Radio (HAR)**

### *Information on HAR*

HAR is a Travellers Information Station that governmental agencies can use to provide travel information to motorists on their AM radio receiver (14). Studies on motorists have produced the following results:

- Repetition of a message aids in retention;
- Most motorists have difficulty remembering route diversion instruction consisting of more than four instructional units (an instructional unit is a specific instruction such as "turn right");
- The use of internal redundancy (repetition of key words such as "turn right on Kingman and take Kingman to Anderson"), helps in retention;
- Motorists remember names better than numbers; and
- Motorists retain cautionary messages better than informational messages (14).

In order for HAR to be effective, the messages must be designed and broadcast to provide motorists with appropriate information such that good routing decisions will be made (15). Keys in developing effective HAR messages are:

- be concise,
- keep the message as simple as practical,
- tell drivers what they need to know, and
- let the drivers know when the message has ended (15).

### *Potential Uses of HAR*

HAR has the potential to enhance guidance for international motorists. The most logical place to provide HAR is at the airport. HAR could be used to provide routing information and the locations of car rental agencies. To help ease in the comprehension of HAR messages, languages other than English could be used to provide the information to the tourists. A survey could determine the most common spoken languages of the international tourists that drive vehicles to and from the particular airport. These data could be used to decide what languages should be used to broadcast the HAR messages. If the messages are short enough and the motorists are within the range of the HAR long enough, the messages in various languages could be broadcast on one radio frequency. However, if the messages are too lengthy, more than one



frequency may be needed. It is now possible to use frequencies other than 530 and 1610 AM, because the Federal Communications Commission removed the frequency restrictions (16). The agency providing the HAR would need to decide what is feasible. The HAR systems would need advance visual signing along the highway. These signs could look similar to the those in Figures 20 and 21. If an agency provides HAR messages in the native languages of the international tourists, the tourists may feel that the highway system is friendly for them to use.

**INFORMATION RADIO  
1610 ON AM DIAL  
BROADCAST IN SPANISH,  
GERMAN, FRENCH  
1 MILE**

Figure 20. Message on Advance Visual Signing for Multi-lingual HAR Frequency.

**INFORMATION RADIO  
TUNE DIAL TO  
530 AM FOR SPANISH  
540 AM FOR GERMAN  
550 AM FOR FRENCH  
1 MILE**

Figure 21. Message on Advance Visual Signing for Multiple HAR Frequencies.

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