Integrated Corridor Management Initiative: Overview of the Dallas Traveler Response Panel Survey

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16. Abstract

This report presents findings from the Integrated Corridor Management (ICM) traveler behavior surveys, a set of panel surveys of US-75 corridor users, conducted before and after the deployment of ICM. The purpose of the surveys was to measure the impacts of the ICM initiative on travelers' use of real-time information, their travel behavior in the corridor, and their satisfaction with their corridor trips. In addition to surveying drivers about their general behavior in a baseline and endline survey, pulse surveys were administered immediately following incidents in the corridor to obtain a measure travelers' use of traveler information during incident conditions and its impact on their behavior. A survey of transit riders (light rail) was also conducted. Across the survey waves, the surveys found a significant increase in the use of smartphones to acquire real-time traffic information. Overall there was increased awareness of traveler information sources, but the use of sources remained relatively constant, with the exception of increased use of Google Maps. With respect to travel behavior, the baseline and endline surveys indicate that there were no significant changes in travel behavior in response traveler information; however the pulse surveys demonstrated an increase in minor route changes for afternoon peak trips. The baseline and endline surveys also found that travelers were more satisfied with the predictability of their trip time, with modest positive shifts in the ratings of congestion and driving time in the corridor. The transit survey found that transit riders tend to rely on their smartphones for information, and for peak hours corridor trips, they utilize Dallas Area Rapid Transit apps and Google Maps most often. Overall, a large majority of transit riders are satisfied with the service, though satisfaction levels were somewhat lower for seat availability, particularly during afternoon peak hour trips.

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Executive Summary

This report presents findings from the traveler behavior panel survey conducted in Dallas as part of the National Evaluation of the Integrated Corridor Management Initiative. The Volpe Center administered surveys before and after the deployment of ICM strategies to measure the impacts of these strategies on travelers in the US-75 corridor in Dallas, Texas.
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Background

The U.S. Department of Transportation launched the Integrated Corridor Management (ICM) Initiative in 2006 as part of its effort to reduce congestion. Through the combined application of intelligent transportation systems technologies and a commitment of network partners to coordinate their operations, ICM integrates operations across individual networks in a corridor (freeway, arterial, transit) to manage total corridor capacity. As part of the ICM Initiative, the U.S. DOT has partnered with 8 "Pioneer Sites" to develop, deploy and evaluate ICM concepts in eight of the nation's busiest corridors. In December 2009, the U.S. DOT awarded funding to two of these Pioneer sites – Dallas, Texas and San Diego, California -- to demonstrate and measure how actively managing a transportation corridor as a fully integrated system can reduce congestion, improve travel time reliability and predictability, improve network performance, and empower travelers by providing them with access to more and better information.

A national evaluation is being conducted at each site to measure the impacts of ICM and to share findings and lessons learned with other regions across the United States to facilitate informed decisions regarding the development of other ICM systems. Additionally, the Intelligent Transportation Systems (ITS) Joint Program Office (JPO), in collaboration with Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), funded this survey to understand the travel behavior impacts of ICM on corridor travelers. The data collected from the surveys will support the National Evaluation's traveler response analysis. The objectives of the survey are to measure:

- Changes in awareness of traveler information sources.
- Changes in reported utilization (e.g., frequency, method, timing, etc.) of traveler information sources.
- Changes in satisfaction regarding traveler information/sources.
- Changes in peak-period travel behavior (e.g., mode, route, timing, frequency, etc.) due to conditions in the corridor and improved traveler information.
- Changes in satisfaction regarding travel/trip experiences in the corridor.

Survey Methodology

Given the primary objectives of the survey, the Volpe team determined that a panel survey would be the most appropriate approach, whereby the same individuals are surveyed both before and after the deployment of ICM. This approach enables an assessment of change both at the aggregate level and the individual level. The population of interest for this survey consisted of US-75 drivers and corridor transit riders.

US-75 drivers were sampled using a license plate capture methodology and recruitment was conducted by mail. A series of mailings were sent to sampled drivers to encourage participation, including a pre-notification postcard, a survey invitation packet and reminder postcards and emails, as necessary. The project employed three types of driver surveys:

- A **comprehensive baseline survey instrument** was administered before ICM implementation to capture baseline measures for each respondent.
- Short "**pulse**" surveys were administered immediately after incidents in the corridor to capture travelers' reactions to information about specific events or highway incidents that impacted traffic conditions. These "pulse" surveys were conducted both "**pre-ICM**" and "**post-ICM**" (before and after ICM implementation).
- A **final "endline" survey instrument,** administered after ICM implementation and pulse survey administration to capture changes to baseline measures.

Incentives were offered as a means of boosting response rates, including a $15 Amazon gift card upon completion of the baseline survey, and a $30 Amazon gift card upon completion of the endline survey. In addition, monthly raffles of iPads were held for those who completed a pulse survey. Panel maintenance efforts were also undertaken in between the two survey waves to keep respondents interested and engaged.

For the transit component, transit riders were sampled in person at transit stations in the US-75 corridor. Transit riders were only surveyed in the post-ICM period. A baseline survey was administered to obtain a general understanding of their transit experience following the deployment of ICM, and transit riders who completed the baseline survey were also invited to complete two pulse surveys.

Overall, 1421 drivers completed the endline survey, resulting in a 3% response rate. The transit sample consisted of 603 respondents, for a response rate of 22%.

Key Findings

Key findings are presented separately for the driver sample, followed by the transit sample.

US-75 Drivers

Use of communication devices

As measured in the baseline and endline surveys, there was a significant increase in the use of smartphones (from 79% to 87%) and tablets (31% to 41%), with smartphone use being nearly

universal. While there was a decline in the use of desktops and laptops, a majority of respondents still regularly use these devices (56% and 61%, respectively).

When asked specifically about the use of devices to acquire real time travel information, radio and electronic message signs were cited most often, with the use of these devices remaining the same across the survey waves. However, there was a significant increase in the use of smartphones for traveler information, such that respondents reported using smartphones (31% consult daily) nearly as often as the radio (39% daily) in the post-ICM survey period.

In the pulse surveys, which collected data for trips in which an incident had occurred, respondents were also asked about their use of information sources and devices, both pre-trip and during their trip. While the general pattern of information use was similar to that found in the baseline and endline surveys, a comparison of pre and post-ICM pulse surveys did not show an overall increase in the use of apps or smartphones for acquiring real time travel information. Prior to traveling for their morning peak hour trips, pulse survey respondents consulted radio most often (24%), followed closely by television (20%, with use dropping to 1% in the afternoon) and apps (14%). Use of these sources did not change across the survey waves. During their trips, radio dominated all sources; respondents consulted this source for approximately one-third of their trips. Electronic highways signs and apps were each consulted for fewer trips (about 10%), and again, there were no significant changes from pre to post-ICM. Relative to their use of desktops, laptops, and tablets, however, smartphones were cited most often for acquiring information – both pre-trip and during trips.

Awareness and use of traveler information sources

In both the baseline and endline surveys, respondents were asked about their awareness and use of specific information sources – including websites, apps, alerts, social media, and telephone numbers. For a number of the sources, there was a significant increase in awareness; however this did not translate into increased use. Rather, decreases in the percentage who had "never heard of" a source were accompanied by increases in the percentage who had "heard of, but never use" the source.

This increase in awareness of traveler information sources is also reflected in a separate measure that asked respondents to rate how informed they feel (using a seven point scale) about where to check for real time *traffic* information, as well as how informed they feel about where to check for real time *transit* information. Across the two survey periods, there was a significant increase in the proportion of respondents who felt "informed" (rating of 5, 6, or 7) about where to check for traffic information (from 37% to 46%), while the shifts related to transit information levels were smaller and only marginally significant. It is worth noting that these shifts may be due, in part, to a learning effect. That is, through the process of being surveyed multiple times, respondents were repeatedly exposed to questions about information sources, and this constituted a form of "learning" about these sources.

Despite increased awareness and learning, use of specific information sources generally remained stable across the baseline and endline surveys, with one exception. There was growth in the frequency of using Google Maps – both the website and the app. In both survey waves, use of Google Maps dominated all sources. The pattern of response was similar in the pulse surveys, as Google Maps was cited more than any other source (with a slight increase in use during the afternoon peak from the pre-to post-ICM survey period).

In addition, in the baseline and endline surveys, respondents were asked more generally about the frequency with which they consult real-time travel information for their morning and afternoon peak

hour trips in the US-75 corridor– always, nearly always, sometimes, rarely, or never. During both peak periods, respondents reported a slight increase in the frequency with which they consult information.

Satisfaction with traveler information

Respondents were asked to rate several aspects of real traffic information, including the accuracy of: incident location information, travel time/delay information for their usual route, travel time/delay information for their alternate routes, and information on how long it took to clear an incident. In the baseline and endline surveys, respondents were most satisfied with incident location information (57% satisfied in baseline) and travel time/delay information for their usual route (52% satisfied). Lower levels of satisfaction were expressed for travel time time/delay on alternate routes (35% satisfied) and how long it took to clear an incident (28% satisfied). Across the survey waves, respondents demonstrated increased satisfaction with incident location information and travel time/delay information for both their usual route and alternate routes. There was no change in satisfaction with information on how long it took to clear an incident.

The pulse surveys included the same traveler satisfaction questions, and the trip-level findings mirror the general pattern found in the baseline/endline surveys. Satisfaction ratings were higher for incident location information, followed by travel time/ delay information for usual route, and travel time/delay information for alternate routes. Respondents were least satisfied with information on how long it took to clear an incident.

However, changes in traveler information satisfaction at the trip level (e.g., pulse surveys) do not fully align with changes observed at a general level (baseline/endline survey). For example, in comparing pre-ICM pulse trips to post-ICM pulse trips, there was increased dissatisfaction with information on how long it took to clear an incident (PM peak), and similarly, there was slightly greater dissatisfaction for incident location information. Satisfaction with travel time/delay information for alternate routes did increase across AM peak trips, as did incident location information for PM peak trips.

The difference in the findings may be attributed to the difference in the nature of the measures. The pulse surveys are based on individual trips in which there was an incident of some sort. Depending on the nature of the incidents, and the extent to which respondents were affected by the incident, there is the potential for greater variability in the pulse survey measures. The baseline and endline surveys, however, ask respondents about their satisfaction more generally, without reference to specific trips.

In addition, the pulse surveys asked respondents to rate the overall usefulness of the real-time information they acquired for their trip using a 7 point scale.[1] For a majority of trips, respondents rated the information as useful, with the share of positively rated trips increasing slightly from the pre- to post-ICM periods. Similarly, for each trip, respondents were asked to rate the usefulness of the information on US-75 electronic highway message signs. While a plurality of travelers selected “not applicable” (e.g., they did not see the sign or there was no information posted on the sign), among those who provided a rating, positive ratings outweighed negative ratings in both survey waves.

The pulse surveys also included three attitudinal questions in which respondents were asked the degree to which agree or disagree with three statements – ”real time traffic information reduces the

[1] In the 7 point scale, 1=not at all useful; 4=neutral; 7=Very useful.

stress of my trip," "real time information did not help me avoid traffic congestion," and "real time information improved my ability to make decisions about my trip." These measures remained relatively stable from the pre- to post-ICM periods, and overall, attitudes were positive. For approximately two-thirds of their trips, respondents agreed that traveler information improved their ability to make decisions, and for slightly more than one-half of trips they agreed that traveler information reduced the stress of their trip. On whether or not real-time information helped them avoid traffic congestion – a far more rigorous test of the usefulness of information – respondents were more evenly divided and were somewhat more likely to agree than disagree that information did **not** help them avoid traffic congestion.

Travel behavior in the corridor

In the baseline and endline surveys, traveler behavior changes were captured only very generally. For a list of possible changes (e.g., minor route changes, completely change route, leave for trip earlier, leave for trip later, switch to transit, telecommute) respondents were asked whether they had made the change - as a result of learning about traffic congestion on their route - in the last month, outside of the last month or never. The question was asked separately for travel behavior changes occurring pre-trip versus en-route. Overall, responses on these measures were consistent across the baseline and endline surveys. In response to learning about traffic congestion *prior to leaving for their trip*, respondents were most likely to make route changes; about one-half of respondents had done so in the last month. A relatively large share of respondents changed the timing of their trips, as nearly one half of respondents had left earlier for a trip in the past month and about one-third had left later. Relatively few respondents made other types of changes. In fact, in both the baseline and endline surveys, roughly three-quarters of respondents reported "never" having switched mode (e.g. taking transit or carpooling instead of driving), and two-thirds of respondents had never cancelled their trip or telecommuted instead of traveling. With respect to *en-route* changes in travel due to learning about traffic congestion, respondents were again most likely to change their route. While en-route, large majorities have never switched to transit or cancelled their trip – a finding that is consistent in both the baseline and endline surveys.

When asked about changes made in response to information at the trip level (in the pulse surveys), there is an increase in the afternoon peak in the proportion who made a minor route change during their trip. In addition, during the morning peak, there was an increase in the proportion completely changing their route (both pre-trip and during trip); however, this change was due to two severe incidents that involved a temporary closure of US 75 (when these two pulse surveys are removed from the analysis, the difference disappears).

Satisfaction with driving experience

The survey asked travelers to rate their level of satisfaction[2] with several aspects of their trips on US-75, including predictability of travel time, level of traffic congestion, overall driving time, and lane width. The latter measure, lane width, was used as a control to test the reliability of the measures. Since the sites did not change the width of the lanes over the course of the two year study, we would expect ratings to be similar in both survey waves, and they were.

For two measures, level of traffic congestion and driving time, a large majority of travelers reported being dissatisfied (73% and 63%, respectively) in the baseline, whereas for predictability of trip time, respondents were more evenly divided; 47% were dissatisfied and 40% were satisfied. By the endline survey, however, respondent satisfaction outweighed dissatisfaction on the measure of predictability of trip time (45% satisfied and 37% dissatisfied). On the other measures as well, there were moderate shifts toward increased satisfaction (ranging from four to seven percentage points), and conversely, fewer respondents reported being dissatisfied (declines of four to ten percentage points).

In the post-ICM pulse surveys, respondents who made a change to their trip (including changes made pre-trip or during their trip) were asked whether they felt they had made the right choice, whether they should have stayed with their original plan, or whether they should have made a different choice. Both pre-trip and during trip, respondents felt they made the right choice for a large majority of their trips. For AM peak pulse surveys, about seven-in-ten respondents said they had made the right choice, and for PM peak pulses, 90% were satisfied with their decision.

US-75 Transit Riders

As described in the Methodology section, a separate survey of transit riders was administered to understand their use of and satisfaction with traveler information, as well as their satisfaction with their transit experience. A summary of key findings is presented below.

Transit trip satisfaction

Transit riders reported being satisfied with nearly all aspects of their experience on the DART Red/Orange line in the US-75 corridor. In rating their morning trips, an overwhelming majority of transit riders expressed satisfaction (very satisfied, satisfied or somewhat satisfied) with their overall travel experience (91%), and similarly large numbers were satisfied with the reliability of the service (92%), parking availability at Park & Ride lots (90%), frequency of the service (88%) and overall travel time (85%). Satisfaction dipped slightly with respect to the cost of the transit fare, but even on this measure nearly three-quarters of respondents (71%) expressed some level of satisfaction. Respondents were least satisfied with their ability to find a seat on the train, particularly during afternoon trips, where only half of respondents expressed satisfaction. On all these measures respondents were somewhat less satisfied during their afternoon peak hour trips, as compared to their morning peak trips.

[2] A seven point satisfaction scale was used, which included the following ratings: very dissatisfied, dissatisfied, somewhat dissatisfied, neither satisfied or dissatisfied, somewhat satisfied, satisfied, and very satisfied.

In addition, transit riders were asked the frequency with which different problems occur, including cannot find a seat on the train, train is delayed by more than five minutes, cannot get on the train because it is full, and cannot find a parking space at the Park & Ride lot. For their morning peak trips, more than eight in ten respondents indicated that they "rarely" or "never":

- Experience a train delay of more than five minutes (82%),
- Are unable to get on the train due to crowding (90%)
- Are unable to find a parking space (91%).

By comparison, about one-half of respondents never or rarely have problems finding a seat, and about one-quarter have such problems almost every trip (7%) or frequently (17%). Again, in the afternoon, these problems occur with greater frequency, particularly finding a seat on the train. One fifth of respondents have trouble finding a seat on almost every trip (21%) and an additional quarter frequently (26%) have this difficulty. Given that no transit diversion plans were implemented during the survey period, the problems associated with finding a seat cannot be attributed to the deployment of ICM.

Use of communication devices and real-time traveler information

Transit riders are most likely to use their smartphones to acquire real-time traffic or transit information, and fewer respondents cited regular use of the radio, television or highway electronic signs. Indeed, in comparison to drivers, transit riders were significantly less likely to regularly use the radio (which tends to focus on road conditions) or electronic highway signs. Like drivers, though, transit riders tended to favor Google Maps for their information, as this source dominated both website and app use. Other websites utilized by a plurality of transit riders included TV and radio station websites and the DART website. At the time of the survey, the new 511 service had yet to make significant penetration. Only about one-quarter of transit riders were aware of the service and 1% reported using it.

About one-in-ten transit respondents said they always (13%) check information, and a similar proportion do so nearly always (13%) for their transit trips in the corridor. By comparison, 32% of drivers always check information and 21% do so nearly always. Transit riders who reported "never" consulting information were asked why they don't. From a list potential reasons, respondents tended to indicate that they do not check information because they typically do not experience delays (54%), or they have to use the same route no matter what (38%). Very few respondents said that information is not available (4%), information is not accurate or up-to-date (1%), or information is not detailed enough (1%).

Satisfaction with traveler information

Several different measures were used to assess satisfaction with real time traffic and transit information. First, transit riders were asked to rate the usefulness of key information sources, including telephone services, websites, apps, alerts, and social media. In general, a majority of transit riders found these sources useful (rating of 5, 6, or 7). Overall, apps were rated most positively, followed by social media and alerts.

Transit riders were also asked to rate their satisfaction with specific aspects of real time traffic and transit information for their US-75 corridor trips, including:

- accuracy of travel time and delay information
- accuracy of accident location information
- accuracy of next train information on electronic signs
- accuracy of 511 information on parking availability, and
- accuracy of 511 information transit conditions

A large majority of respondents – 70% - were satisfied with the accuracy of the next train information on electronic signs, and only 9% were dissatisfied. For the two 511 items, approximately 60% of transit riders indicated "not applicable," which suggests they have not used the service, and another 19% indicated they were neither satisfied nor dissatisfied. Ten percent were satisfied with 511 information on transit conditions and 4% were dissatisfied. Transit riders were more evenly divided in their ratings of 511 information on parking availability (7% satisfied/ 5% dissatisfied).

With respect to the accuracy of travel time/delay information and accident location information, nearly one-quarter of respondents indicated not applicable, and one-fifth were neither satisfied nor dissatisfied. Approximately 43% expressed some level of satisfaction and only 10% were dissatisfied.

In one of the pulse surveys of transit riders, when the DART Red/Orange line was temporarily closed, there was a spike in dissatisfaction with traveler information. Six in ten respondents expressed some level of dissatisfaction (with 39% being very dissatisfied) with real-time transit information for that trip.

Finally, respondents were asked whether they had experienced a change in satisfaction with traveler information over the course of the last year. Most respondents either reported that their satisfaction level was the same, or they responded not applicable to the question. Among those who indicated a change, respondents tended to be more satisfied (8%) rather than less satisfied (2%), and among those who reported being more satisfied, several respondents cited the new electronic signs at transit stations, as well as improvements in the accuracy of the information.

Impact of real-time information on travel behavior

Similar to drivers, transit riders were asked a series of questions about the impact of real time traffic and transit information on their travel decisions, both before making a trip as well as during the trip. More specifically, transit riders were asked if they had made any of the following changes – prior to leaving for their trip - as a result of learning about traffic or transit problems:

- Start their trip earlier (20% in the last month/38% outside of the last month/38% never)
- Choose a different route to get to the transit station (15% in the last month/26% outside of the last month/54% never)
- Start trip later (14% in the last month/31% outside of the last month/52% never)
- Choose to drive or carpool instead of taking transit (14% in the last month/22% outside of the last month/58% never)
- Choose a different station to get on DART (11% in the last month/28% outside of the last month/57% never)

- Choose a different station to get off DART (10% in the last month/26% outside of the last month/60% never)
- Decide to Telecommute (7% in the last month/23% outside of the last month/63% never)
- Cancel Trip (6% in the last month/20% outside of the last month/68% never)

For each change, no more than one-fifth of respondents had made the change in the last month, and a majority of transit riders had "never" made the change (with the exception of starting their trip earlier).

Similarly, respondents were asked if they had ever made any of the following changes while en-route, as a result of learning about traffic problems:

- Wait for a later train due to overcrowding (21%)
- Change route to the transit station (12%)
- Get off DART at a different transit station (9%)
- Use a different station to get on DART (6%)
- Turn around and return to trip start (3%)

While one-fifth of respondents have had to wait for a later train in the last month, relatively few respondents have made any of the other changes. Again, a majority of respondents indicated never having made each change while en-route (with the exception of waiting for a later train due to overcrowding). Based on the high level of satisfaction with their transit experience, the findings suggest that transit riders generally do not need to alter their trip behavior. In most cases, they are not facing conditions that would require them to change their behavior.

Chapter 1 Introduction

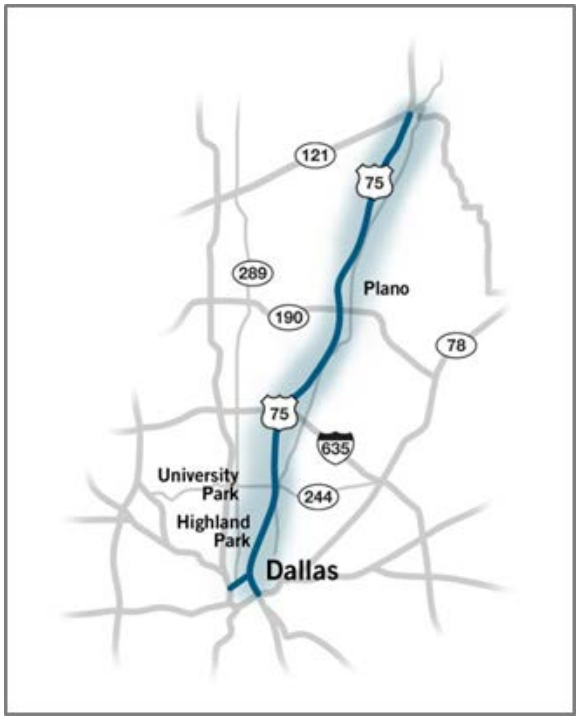
This project involved a two-year longitudinal panel survey to measure the travel behavior impacts of the Integrated Corridor Management (ICM) Initiative Demonstration projects in Dallas, Texas and San Diego, California. The U.S. Department of Transportation launched the Integrated Corridor Management (ICM) Initiative in 2006 as part of its effort to reduce congestion. Through the combined application of intelligent transportation systems technologies and a commitment of network partners to coordinate their operations, ICM integrates operations across individual networks in a corridor (freeway, arterial, transit) to manage total corridor capacity. With ICM, the various institutional partner agencies manage the transportation corridor as a system (rather than the more traditional approach of managing individual assets) and provide travelers with real-time information on corridor conditions so they can make more efficient travel decisions (in mode, travel time, and/or route).

As part of the ICM Initiative, the U.S. DOT partnered with 8 "Pioneer Sites" to develop, deploy and evaluate ICM concepts in eight of the nation's busiest corridors. In December 2009, the U.S. DOT awarded funding to two of these Pioneer sites – Dallas, Texas and San Diego, California -- to demonstrate and measure how actively managing a transportation corridor as a fully integrated system can reduce congestion, improve travel time reliability and predictability, improve network performance, and empower travelers by providing them with access to more and better information.

Site Overview

The ICM Pioneer demonstration sites include the US-75 corridor in Dallas and the I-15 Corridor in San Diego. In Dallas the US-75 corridor connects downtown Dallas with the cities and suburbs north of Dallas. The north-south corridor is approximately 25 miles long and consists of the US-75 freeway (high-occupancy vehicle lane and general purpose lanes), frontage roads that run parallel to US-75, the Dallas Area Rapid Transit (DART) Red and Orange Lines, transit bus service, park and ride lots, and major arterial streets (including Greenville Avenue) within approximately two miles of the US-75 freeway (see next page for graphic representation of the corridor).

Figure 1. Dallas Study Corridor



Source: U.S. DOT

The major stakeholders for the ICM Initiative include DART, City of Dallas, City of Richardson, City of Plano, Town of Highland Park, City of University Park, North Central Texas Council of Governments, North Texas Tollway Authority, and Texas Department of Transportation (Dallas District). These stakeholders developed a vision for the project, namely to "operate the US-75 Corridor in a true multimodal, integrated, efficient, and safe fashion where the focus is on the transportation customer."

The strategies to be implemented as part of the ICM project included:

- Providing improved multi-modal traveler information
- Developing pre-approved response plans among agencies
- Diverting traffic to key arterials with responsive traffic signal control, and
- Shifting travelers to transit during major incidents on US-75

In addition to utilizing the significant intelligent transportation systems (ITS) infrastructure, the ICM project involved the deployment of a number of technology systems that would enable the implementation of the new strategies, namely a Decision Support Subsystem (DSS), a SmartNET Subsystem, and a SmartFusion Subsystem. The DSS monitors real-time data to assess current transportation network conditions and recommends pre-approved response plans when events or incidents occur that affect corridor operations. The response plans are location specific, and include a set of specific strategies based on both the location and severity of the incident.

An ICM Coordinator monitors corridor operations and recommends response plans to the partner agencies (based on the DSS); otherwise, corridor operations remain decentralized. The Coordinator

may recommend a response plan, but each of the local partners has discretion on whether or not to approve the plan. Once the agency approves a response plan, the strategies associated with the specific plan are automatically implemented.

Other projects and activities deployed in support of the ICM included:

- A regional 511 traveler information system (launched April 2013)
- Responsive signal control on arterial roadways
- Parking management systems at Park and Ride lots
- Improved data and video information sharing among agencies
- Improved traffic detection on key arterial diversion routes
- Improved transit management systems (e.g., automatic vehicle location, expanded automatic passenger counters)

Survey Overview

A national evaluation was conducted at each site to measure the impacts of ICM and to share findings and lessons learned with other regions across the United States to facilitate informed decisions regarding the development of other ICM systems. Additionally, the Intelligent Transportation Systems (ITS) Joint Program Office (JPO), in collaboration with Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), funded this survey to understand the travel behavior impacts of ICM on corridor travelers. The data collected from the surveys is designed to support the National Evaluation's traveler response analysis. The objectives of the survey are to measure:

- Changes in peak-period travel behavior (e.g., mode, route, timing, frequency, etc.) due to conditions in the corridor and improved traveler information.
- Changes in satisfaction regarding travel/trip experiences in the corridor.
- Changes in awareness of traveler information sources.
- Changes in reported utilization of (e.g., frequency, method, timing, etc.) traveler information sources.
- Changes in satisfaction regarding traveler information/sources.

Given the primary objectives of the survey, the Volpe team determined that a panel survey would be the most appropriate approach, whereby the same individuals are surveyed both before and after the deployment of ICM. This approach enables an assessment of change both at the aggregate level and the individual level.

This project employed three types of driver surveys:

- A **comprehensive baseline survey instrument** was administered before ICM implementation to capture baseline measures for each respondent.
- Short "**pulse**" surveys were administered immediately after incidents in the corridor to capture travelers' reactions to information about specific events or highway incidents that impact congestion. These "pulse" surveys were conducted both "**pre-ICM**" and "**post-ICM**" (before and after ICM implementation).
- A **final "endline" survey instrument,** administered after ICM implementation and pulse survey administration to capture changes to baseline measures.

The corresponding sampling plan and panel management tasks were intended to ensure a sufficient sample size over the course of the project (minimum goal of 1,600 auto travelers and 500 transit travelers per city in the post-ICM deployment wave). The surveys and the survey administration process were tested and refined in a pilot study conducted at each site.

The three types of surveys were administered over approximately 28 months. (This was initially planned to be 18 months, but was extended due to ICM implementation delays, as discussed later in the report). The baseline survey was administered in the fall of 2012 to establish panel members' pre-existing travel patterns and their pre-existing knowledge and use of traveler information resources. Immediately following this baseline survey, from December 2012 to March 2013, pre-ICM pulse surveys were administered to establish panel members' use of real-time travel information and its impact on their travel behavior in the face of highway incidents and major events (prior to the implementation of ICM).

As components of the ICM Initiative were implemented and tested during the shakedown period for each site, no surveys were administered. During the panel maintenance period, the survey contractor, Resource Systems Group, Inc. (RSG), maintained periodic contact with respondents in order to keep them engaged and to encourage continued participation. This contact primarily took the form of emails, informing respondents about the survey schedule. In addition, a very brief Interim Survey (optional) was administered in in June 2014. Then, in preparation for the post-ICM surveys, an update survey was administered in August 2014 to determine the extent to which respondents maintained a similar pattern of travel in the corridor, relative to what they reported in the baseline survey.

After the ICM program was implemented, and after a period of adjustment to the program's changes, a second round of "post-ICM" pulse surveys was administered in the fall of 2014. These surveys were almost identical to the first round of pulse surveys to allow for comparisons between pre-ICM and post-ICM pulse data and to determine if there were any changes in travel behavior. Lastly, after the post-ICM round of pulse surveys was completed, the final "endline" survey was administered to panel members in January 2015. This endline survey was similar to the baseline survey and served to gauge changes in typical travel behavior and in the awareness, use, and satisfaction with traveler information.

In addition, a separate transit survey was administered at each site during the post-ICM period only. In order to fully evaluate the impact of ICM on corridor travelers, it is important to consider not only drivers, but also transit riders. While the focus of ICM is on managing highway demand, one of the corridor management strategies during severe congestion includes the diversion of drivers to transit, through the use of messages on dynamic message signs (DMS). Such mode shifts could have potential adverse impacts on regular transit riders, who may not be able to find parking at their transit station or seats on the train. To capture these impacts, a separate survey of transit riders was administered.

Table 1 provides a summary of the study activities and schedule, including all survey efforts.

Table 1. Survey Administration Schedule

Activity	Schedule
PRE-ICM	
Pilot Study Sample Recruitment (License Plate Capture)	Pilot: June 26 – 27, 2012 Main: September 24 – 26, 2012
Pilot Baseline Survey Administration	August 14 – September 4, 2012
Pilot Pulse Survey Administration	September 6 - October 3, 2012
Main Baseline Survey Administration	November 8 – 16, 2012
Pre-ICM Pulse Surveys Administration	December 5, 2012 – March 18, 2013
POST-ICM	
Panel Maintenance Period	April 1, 2013 – September 10, 2014
"**Interim" Survey Administration**	June 4 - 23, 2014
"Update" Survey Administration	August 14 - 30, 2014
Transit Survey Administration	September 16 - 25, 2014
Post-ICM Pulse Surveys Administration	September 11 - December 21, 2014
Final "Endline" Survey Administration	January 14 - 29, 2015
Note: ICM Deployment was October, 2013.	

Source: U.S. DOT

Chapter 2 Methodology

This chapter provides a detailed description of the methodology utilized for the ICM traveler response surveys. The following topics are addressed:

- Survey population
- Auto panel sampling and recruitment
- Survey administration (baseline and pulse surveys)
- Pilot study
- Panel maintenance
- Response rates
- Weighting

Background

The survey approach and methodology for the ICM traveler response surveys were developed with input from a range of stakeholders. In December, 2010 a workshop was convened in conjunction with the Transportation Research Board (TRB) to understand the data requirement needs of the traveler behavior and modeling communities and to solicit feedback on the methodology. Input from the workshop participants was incorporated into both the survey approach and the questionnaire design.

In addition, a "Survey Team" was convened, which included Volpe staff, a statistician from the National Evaluation team, and survey experts from each of the sites (Stacey Bricka for the Dallas site and Kristin Rohanna and Anne Steinberger for the San Diego site). The survey team held five meetings to discuss and formulate the approach and design of the surveys. In addition, meetings were convened with the local partners at each site to gather their input for refining the methodology.

Survey Population

A key step in developing the approach was to define the population of interest for the survey. Given that ICM was being deployed in a specific corridor, the survey team identified US-75 corridor users as the target population. This population included two key sub-components that were sampled separately: US-75 freeway drivers and DART transit riders. The definition for the survey population was further refined to include "regular peak hour" users, for the following reasons:

1. Regular users would be most familiar with typical operations along the corridor and would be best equipped to notice any changes in operations resulting from ICM strategies.
2. ICM was expected to have the greatest benefit during peak hours, when traffic congestion is at its heaviest, and travelers are more likely to consider diversion, either to an arterial or to another mode.

3. Administering pulse surveys only makes sense if the panel of respondents uses the corridor on a regular basis. In this way, they are more likely to be on the freeway when an incident occurs and are able to respond to the pulse survey.

Based on survey objectives, including the need to collect data from the same respondents across multiple surveys (over time), the survey population for the driver panel was defined as regular, peak period US-75 users. "Regular" use was defined as three or more weekdays per week.

For the transit survey, the survey population was defined as regular, peak period transit riders on the DART Red/Orange lines in the US. 75 corridor. The definition for "regular" use was relaxed to ensure the recruitment of a sufficient sample size; anyone riding DART in the corridor at least one day per week was eligible to participate in the transit survey.

Driver Panel Sampling and Recruitment

The sampling approach was largely based on the need to recruit and maintain a panel of representative peak-period corridor users.

License Plate Capture Sample

Studies across the United States have shown that the composition of travelers within a specific corridor varies according to the variety of trip types, the geographic range, and the demographics of travelers. For this reason, the automobile sample was recruited using license plate capture (LPC) with address matching. This technique, which is widely used for origin-destination (O-D) surveys, ensures that all types of travelers and trips are represented in the sample in proportion to their use of the corridor, and it enables a focus on peak hour users.

License plates are captured using multiple high-speed, high-resolution video cameras. Upon obtaining permission from the Texas Department of Transportation (TxDOT) and the cities of Plano and Richardson, the license plate capture was conducted September 24-26, 2012.[3] Video footage was only captured during the AM and PM peak periods, including 6:00 a.m. - 10:00 a.m., and 4:00 p.m. – 7:00 p.m., as the focus of the study was peak hour corridor users. License plates were captured in the peak direction only: southbound in the AM peak and northbound in the PM peak.

After processing the LPC footage, initial cleaning of the license plate files was performed to remove out of state plates, commercial vehicle plates, duplicate plate observations (repeated observations), and plates used during the pilot study. The files were then submitted to the Division of Motor Vehicles (DMV) for address matching, After the DMV returned a file of license plates with matched addresses, further cleaning was performed to remove businesses, multiple plate records and duplicate names/addresses. The final sample included 50,000 names and addresses.

[3] The survey team also worked with the Texas Department of Motor Vehicles for permission to acquire the matched names and addresses for the sample of license plates.

Table 2. Sample Address Processing

License Plate Processing Steps	Number of Records
License plate observations	104,499
Records sent to DMV (after initial cleaning)	74,697
Address records returned from the DMV	75,762
Valid addresses for invitation (after final round of cleaning)	50,000
Undeliverable Invitations (Returned To Sender):	1,260
Final Addresses Invited For Panel Participation:	48,740

Source: U.S. DOT

Recruitment

For the initial recruitment into the panel, whereby respondents were asked to complete the baseline survey, a set of printed materials was mailed to all sampled drivers (N=50,000). Printed materials included three items: a pre-notification postcard, an invitation packet, and a reminder postcard. Prior to distribution, all printed materials were shared with the Dallas site lead and the core Federal team. Based on their input, as well as feedback from the pilot study, minor revisions were made.

To initiate recruitment, a pre-notification postcard was sent to all sampled drivers. The postcard informed invitees about the study, included contact information for questions, and encouraged invitees to look for the subsequent invitation packet. The invitation packet included a formal invitation letter (with the survey website link and a unique password for each participant) and a Frequently Asked Questions (FAQ) page. For individuals who did not respond to the initial survey invitation, a reminder postcard was sent a few days after the letter. This postcard included the survey website link, the participant's unique password, and contact information. It also included a QR code (a bar code that can be scanned with a smartphone) that linked to the survey website.

Driver Panel Survey Administration

All surveys were collected using a web-based survey instrument, designed and hosted on a secure (https) website. Respondents could only access the survey using their unique password. A telephone option was also available, and call center operators used the same web-based survey to record telephone responses, so there are no differences between online and telephone surveys. Overall, 14 respondents completed the baseline survey by telephone. Following recruitment, communication with survey participants was generally conducted via e-mail, including all invitations and reminders for pulse surveys and the endline survey. An e-mail address was established for each study area so participants could ask questions, report issues or concerns, and provide additional feedback outside of the survey format. The e-mail inboxes were monitored daily so that concerns were addressed as

quickly as possible. Respondents could also call a toll-free number with questions or concerns. Respondents called or emailed with general questions about the study, when they had difficulty finding or logging onto the websites, password requests, or other technical issues with the surveys.

Pilot Study

A pilot study was conducted from August 15, 2012 through October 3, 2012. The entire survey process, from the recruitment of participants via license plate capture to the collection and analysis of baseline and pulse survey data was piloted.

The pilot study resulted in the recruitment of 761 drivers who completed a baseline survey. The data from the pilot were used to determine what changes were needed to the methodology and/or the survey instruments. In addition, the pilot enabled the survey team to gauge what might be expected from the main survey effort (e.g. response rates to the baseline and pulse surveys, DMV processing time of license plates, etc.), and to plan accordingly for the main survey effort.

Baseline Survey

The baseline survey had six main sections:

1. Screening for trip frequency
2. Typical peak hour trip details (AM and PM trips details collected separately)
3. Satisfaction with peak hour trips
4. Traveler Information awareness, use, and impacts
5. Satisfaction with traveler information
6. Employment and household Demographics

In order to be eligible for survey participation, respondents had to travel in the corridor three or more weekdays per week. Using an initial screener question, those who reported traveling less than three weekdays per week in both the morning and evening peak periods were terminated from the survey.[4] As infrequent or irregular travelers, they were expected to be less responsive to pulse surveys in subsequent stages of the study and possibly less influenced by traveler information.

To ensure that the survey was meeting evaluation needs, the survey instrument was reviewed by the ICM Federal team, the Analysis, Modeling and Simulation (AMS) team, and the National Evaluation team. In addition the local partners were given the opportunity to provide feedback on the questions. See Appendix C, D and E for the survey instruments.

Pulse Surveys

Pulse surveys were administered to respondents who completed the baseline survey. The overall target for the project was to collect at least four complete pulse-survey responses from every panel member (including at least once before the ICM project was implemented and at least once afterwards). The pulse surveys were designed to collect information on how travelers respond to

[4] The majority of respondents (approximately 85%) in both the pilot and the main survey met the screening criteria, as they typically traveled in the corridor three or more weekdays per week.

specific events that occur during the peak periods in the corridor and that result in increased congestion. Events could include traffic accidents or hazardous road conditions, extreme weather, or other isolated, unplanned incidents that cause delay on major routes. While events could also include planned or foreseen events that generate more traffic than usual during weekday peak periods (e.g., major sporting events, concerts, or advance warnings of extreme weather), no suitable planned events were identified, so they were not included in the sample.

As the study intended to collect this information from each panel member multiple times, it was intentionally kept as short as possible (approximately 5 minutes) to minimize repetition and respondent burden. While each pulse survey focused on how panel members reacted to specific events, the questionnaire and survey invitations did not include information about those events except the time period that the event occurred. This was done to minimize bias, so that respondents could honestly report whether they knew about the event or not and whether they reacted to the event if they knew about it, or if they reacted to other information or to their experience of traffic conditions. Each pulse survey was customized with the date and time period of the incident on which it was based. The relevant time period included 90 minutes following the incident because it was assumed that traffic could be impacted for that long after the incident occurred (accounting for the time it took to clear the incident off the roadway as well as additional time for the backlog of traffic to begin flowing more freely). So, for example, if a collision occurred at 5:30 p.m., the time period relevant to the pulse survey was from 5:30-7:00 p.m. on the day of the incident.

Invitations for pulse surveys were distributed usually within 8 to 12 hours of an incident, so that the trip would be relatively easy for the respondent to recall, and the survey was kept open for no more than four days.

Sample plan for pulse surveys

Incidents were evaluated to determine their potential for pulse surveys. Criteria for selecting an incident for a pulse survey included that the incident:

- Occurred on the primary facility (US-75) within the study area;
- Occurred during the peak times (6:00–10:00 a.m. or 3:00–7:00 p.m. on weekdays);
- Blocked at least one lane of traffic; and
- Had delay of 20 minutes or more

In addition to the incident criteria mentioned above, pulse survey selection was also guided by respondent criteria, including that selected respondents:

- Typically traveled in the segment location coinciding with the traffic incident.
- Typically traveled during the incident “time window” (approximately 90 minutes after the incident occurred).
- Had not been invited to a pulse survey in the past week; and
- Had not yet completed three ICM pulse surveys

Not all severe incidents triggered a pulse survey, unless a sufficient sample of respondents also met the above criteria for that incident. The ideal sample size was estimated to be approximately 400 invitations (to allow for a useful response), but this was not strictly enforced due to variable sizes of travel segment groups.

Respondents only qualified to complete pulse surveys if they were traveling during the pulse-survey period. To reduce respondent burden and to increase the likelihood that they qualified for each pulse survey which they were invited to complete (based on the screening criteria of the pulse survey itself), each respondent was assigned to travel segments based on their typical travel behavior in the corridor (e.g. where they typically got on and off US-75). Then, pulse-survey invitations were targeted to different travel segments based on the location of the incidents. The times of the incidents and the times at which panelists typically traveled on US-75 were also considered in pulse survey sampling. In other words, only a portion of the panel was invited to each pulse survey, and the invitations were targeted to those most likely to have been traveling in the corridor at the time of the incident.

Also, to reduce respondent burden and to minimize possible dropouts due to excessive requests for participation, a minimum time between invitations was established. Except in rare cases (e.g., when extremely severe incidents occurred), panelists were only invited to pulse surveys once per week. Once a respondent completed three surveys, they were considered to have fulfilled their requirement for the pre-ICM period and were not invited to more pulse surveys for that period.

A summary of all the criteria used to determine who would be invited to a pulse survey is shown in Table 3. The criteria for invitation to a pulse survey were slightly modified in February 2013 due to the fact that panelists who traveled during the earlier portion of the peak periods were not qualifying for and not being invited to pulse surveys. The incident time period was expanded slightly to allow for these panelists to be invited to pulse surveys.

Table 3. Summary of Pulse-Survey Sampling Criteria

Criteria	Pre-ICM Pulse Period (through Feb 12, 2013)	Pre-ICM Pulse Period (Beginning February 13, 2013)
Incident Time Period	Weekday peak periods (6–10 a.m., 3–7 p.m.)	Weekday peak periods and slightly earlier (5:30–10 a.m., 2:30–7 p.m.)
Respondent Typical Trip Time Start	Up to 30 minutes before incident or 90 minutes after	Up to 30 minutes before incident or 90 minutes after
Incident Location	On primary freeway (US-75 or I-15) within study corridor	On primary freeway (US-75 or I-15) within study corridor AND within 2 miles north and south of the study corridor
Respondent Typical Trip Location	In segment where incident occurs or delay impacts are alerted	In segment where incident occurs or delay impacts are alerted; OR “upstream” or counter-flow to incident segment if incident may have significant impact
Incident Delay/Duration	Minimum 20-minute delay (based on SigAlert or RITIS details)	Minimum 20-minute delay (based on SigAlert or RITIS details); for early portion of peak periods (6-7 a.m., 3-4 p.m.),

Criteria	Pre-ICM Pulse Period (through Feb 12, 2013)	Pre-ICM Pulse Period (Beginning February 13, 2013)
		minimum 15-minute delay is acceptable*
Incident Impact	Blocks at least one lane	Blocks at least one lane
Respondent Invitation Frequency	Maximum one new invitation per week	Maximum one new invitation per week
Respondent Number of Completions	Maximum 3 pulse-survey completions	Maximum 3 pulse-survey completions

Source: U.S. DOT

During the post-ICM period, the criteria for selecting pulse surveys remained the same as in the pre-ICM period, with the exception of one additional criterion that was considered:

- ICM response plan is implemented

As previously described, an "ICM response plan" is a plan to adjust traffic operations and to inform or divert travelers in the corridor when an event or incident in the corridor causes more congestion or delay than normal. Response plans may include using alerts or dynamic message signs (DMS) to inform travelers of delays and encourage them to divert to alternate routes, as well as adjusting traffic signals on arterial roads parallel to the freeway (which travelers may not be explicitly aware of).

For several reasons, the new criterion, "ICM response plan is implemented" could not be applied consistently throughout the post-ICM period. First, the ICM response plans did not frequently coincide with incidents identified by external traffic alerts. There was also a disruption in the Dallas ICM system when TX DOT migrated to a new Advanced Travel Monitoring System (ATMS) software and switched from C2C to Navtech and Bluetooth data.[5] This disruption resulted in no ICM response plans being issued in October 2014 and November 2014. As a result, no pulse surveys were conducted during October (with the exception of a pulse survey for an October 2, 2014 storm that closed down the DART system). In November, pulse surveys were resumed in order to keep the survey panelists engaged, even though the ICM system was still down. In December 2014, the ICM system began receiving data and implementing response plans again, and for the last few weeks of the Dallas post-ICM pulse-survey period, a concerted effort was made to align remaining pulse surveys with ICM response plans. However, at this time, it appeared that fewer response plans were being implemented, so some pulse surveys continued to be fielded even if an ICM response plan was not implemented.

[5] Causes of the ICM data disruptions described in e-mails from Chris Poe at TTI (October 6, 2015) and Todd Plesko at DART (November 21, 2014).

Monitoring incidents

During the pulse survey periods, RSG monitored incidents in the corridor using the criteria described, and issued pulse survey invitations. RSG utilized the SigAlerts site (http://www.sigalert.com) to monitor events because, compared to other sites, it allowed the most customizable alerts with information that could be reviewed at a later time. In contrast, other information systems (such as the DalTrans RSS feed) could not be filtered automatically by freeway, location, or time period. Also, for many of these systems, detailed information about incidents was only provided in real time, and archived information was limited or non-existent. This was an important factor as it was not practical to monitor events in real time for the entire duration of the project.

Also, during the ICM pulse survey periods, the SigAlerts information was supplemented with information from the Regional Integrated Transportation Information System (RITIS) developed by the University of Maryland's Center for Advanced Transportation Technology Lab (http://www.cattlab.umd.edu). RITIS synthesizes information from multiple local and state agencies. Google News alerts were set up to monitor general news sources about traffic issues on US-75 in Dallas. Generally, these alerts were used to verify SigAlert incidents or to provide additional context.

In both the pre- and post-ICM pulse survey periods, the same information sources were consulted in monitoring incidents. However, in the post-ICM period, information from the SigAlert e-mails was supplemented by information monitored on the new 511dfw traffic information website (which also sent e-mail alerts for a defined route).

Pulse survey administration

A "dashboard" was developed on the survey website to manage pulse survey invitations. Each respondent's dashboard contained a list of all pulse surveys he or she had been invited to and the status of each survey (whether it was closed, completed, in progress, or a new survey to begin). All survey invitations, reminders, and other communications were conducted via e-mail. Standard e-mail messages were created for survey invitations and reminders. The e-mail content was modified slightly during the pulse-survey period to clarify that panel members should participate even if they had canceled a trip during the pulse time window. The study sought to understand if respondents had cancelled trips due to learning about congested traffic conditions from traveler information.

E-mail messages inviting respondents to participate in the pulse survey had passwords embedded in the survey link so that respondents could click on the link and go directly to the dashboard where their available pulse surveys were listed (and therefore they did not need to enter their unique password to access the survey).

The pulse survey included four main sections:

1. Screening and trip details: The first question of the survey asked respondents if they traveled during the pulse-survey period. Respondents who did not travel and did not plan to travel during the pulse-survey period were disqualified.
2. Before-trip real-time travel information and reactions (behavioral & attitudinal)
3. During-trip real-time travel information and reactions (behavioral & attitudinal)
4. Trip and information satisfaction

The pre-ICM pulse survey period was conducted December 5, 2012 through March 13, 2013. The post-ICM pulse survey period was conducted from September 11, 2014 to December 22, 2014. The

post-ICM pulse-survey administration period occurred later than originally planned due to delays in ICM implementation. Rather than a 6-month "shakedown period" to allow travelers to adjust to new ICM strategies in the study area, delays to ICM implementation plans resulted in a break of approximately 16 months between the last "pre-ICM" pulse survey in March 2013 and the first "post-ICM" pulse survey in September 2014. Dallas ICM strategies were deployed beginning in October 2013. In keeping with the "before-and-after" design of this panel study, the post-ICM pulse surveys were designed to align as closely as possible (e.g., sampling and administration methodologies, invitation materials, and questionnaire design) with the pre-ICM pulse surveys. A few small changes were made to incorporate ICM measures into the data collection process, but these changes were minimized so that comparisons between "before" and "after" responses would not be biased by changes in study design.

Summary of the sample of pulse survey incidents

During the pre-ICM period, 26 pulse surveys were administered. Of these pulse surveys, 11 were in the AM peak period, 8 were in the PM peak period and 7 were reverse direction trips. In the post-ICM period, 22 pulse surveys were administered. Of these, 6 were in the AM peak, 10 in the PM peak and 6 were reverse direction. In both survey periods, a majority of the incidents were accidents. The post-ICM survey also included a weather event and a fuel spill.

Most incidents involved either one lane being blocked (8 pre-ICM, 9 post-ICM) or two lanes being blocked (6 pre-ICM, 4 post- ICM). In each survey period, there was a fatality on US-75 that involved the temporary closure of all lanes. In the post-ICM period, the fatality incident occurred when the ICM system was not operational (during the migration to ATMS), so it was not possible to issue a response plan. It should also be noted that the fatality incident in the post-ICM period comprised a disproportionate share of all pulse survey responses, so in the analysis, the pulse data are often presented both "with" and "without" the two fatality incidents. The table below summarizes the key characteristics of the pulse surveys.

Table 4. Key Attributes of Pulse Survey Incidents

Pulse Incidents	Pre-ICM	Post-ICM
Direction of trip		
AM peak direction	11	6
PM peak direction	8	10
Reverse peak direction	7	6
Number of lanes blocked (excluding reverse peak direction)		
One	8	9
Two	6	4
Three	4	1
Four	1	1
Overall Number of Pulses	26	22

Source: U.S. DOT

Endline Survey

The final survey that the driver panelists were asked to complete (referred to as the "endline" survey in this report) was conducted in January 2015. The goal of this survey was to collect updated information about panelists' typical travel patterns and new measures of panelists' awareness of, use of, and satisfaction with real-time traveler information. With the updated measures in the endline survey, within-person comparisons could be made to understand how individual behaviors and attitudes changed over the course of the study (during and after ICM measures were implemented).

Once the post-ICM pulse surveys were closed and the endline survey was scheduled, invitations were e-mailed to panelists. The survey was "soft-launched" on January 14, 2015, with approximately 100 panelists. Once the initial response was assessed and once minor survey issues were addressed, the survey was fully launched to all qualified panelists on January 15, 2015. Reminder e-mails were sent several days after the initial invitation e-mails to encourage those who had not yet responded to complete the final survey.

The endline questionnaire was designed to be as similar to the baseline survey as possible. While the number of changes to the survey was relatively small, there were some question deletions, additions, and modifications. In addition, the qualification criteria for completing the endline survey were somewhat less restrictive. The original qualification criteria in the baseline survey was that respondents must typically travel in the study corridor at least three weekdays per week during a peak period. This criterion was initially repeated in the endline survey, so panelists who had reduced their travel since the start of the study and typically traveled less than three days per week during peak periods were disqualified. Within a few days of launching the endline survey, a number of respondents had e-mailed to express their disappointment that they were disqualified from the final survey even though they had completed all previous parts of the study. Several of these respondents also felt that they were entitled to the final incentive, as the study materials had only said that panelists had to be "regular" weekday travelers in the study corridor (specific travel frequency was not described in study communications so as not to bias response). Due to these respondent concerns and the number of disqualified panelists, the frequency criterion was relaxed on January 16, 2015 in order to allow panelists to complete the endline survey if they traveled in the study corridor at least one weekday per week during a peak period[6].

Incentives and Panel Maintenance

For panel surveys, particularly when respondents are being asked to participate over a period of time, incentives are often used to increase response rates and to improve the representativeness of the sample. Incentives are one method for encouraging ongoing participation in the survey, particularly among segments of the population that might otherwise refuse to participate.

For the ICM panel survey, respondents who completed the baseline survey received a $10 Amazon.com gift card. During the pulse-survey periods, respondents who completed a pulse survey were entered into that month's drawing for an iPad. One prize drawing was held each month during

[6] Passwords were reset for 110 Dallas panelists who had been initially disqualified under the original criterion but met the new criterion; these participants were sent an e-mail again inviting them to the survey (regardless of whether they had e-mailed to inquire about their disqualification).

the pulse-survey periods, and respondents' names were entered once for each pulse survey they completed. RSG legal advisors reviewed the requirements for conducting the prize drawings in Texas, and the drawing process adhered to all state and federal requirements. During the pre-ICM pulse-survey period, one iPad was given away per month. During the post-ICM pulse-survey period, this was increased to three iPads per month to encourage retention after unexpected study delays. In total, twelve iPads were given away over the course of the study. Panel members who qualified for and completed the final survey at the end of the study received a $30 Amazon.com gift card. The incentive at the end of the study was larger than the baseline incentive to try to encourage continued participation over the full course of the two-year study period. All Amazon gift cards, as well as iPad win notifications, were distributed via e-mail to the respondents.

In addition, panel maintenance activities were undertaken to keep respondents engaged and motivated so they would continue to participate. This was particularly important given the delays in the study and the extension of the "shakedown period." This study was designed to collect "before-and-after" surveys, and a "shakedown period" partway through the study was planned to allow time for travelers to adjust to any changes implemented as part of the ICM Initiative. This break was initially planned to begin in April 2013 (after the last pre-ICM pulse survey was conducted) and to last until early fall 2013. The post-ICM pulse surveys had been scheduled to begin in October 2013. Due to delays in the implementation of the ICM strategies, however, the post-ICM pulse surveys were rescheduled to begin in September 2014. This resulted in a break of approximately 16 months in which no surveys were administered.

To reduce attrition over this period, several panel maintenance activities were conducted, including:

- Periodic "check-in" e-mails with the panel (ongoing, March 2013–August 2014)
- Maintenance of the study website
- An "interim" survey to assess general changes in satisfaction (June 2014)
- An "update" survey to update the typical trips panelists make in the corridor (August 2014)
- Reminder postcards mailed as the post-ICM pulse surveys were beginning

Response Rates

The final panel size was approximately one-third of the sample that completed the initial baseline survey, and approximately 3% of the total number of observed corridor users who were initially invited, as shown in the table below.

Table 5. Panel Retention – Baseline, Pulse and Final Panel Size

Panel Status	Number	Percent (Total)	Percent (of baseline)
Invited to baseline	48,740	100%	--
Completed baseline	4,488	9%	100%
Completed at least one pre-ICM pulse survey	2,885	6%	64%
Completed endline survey	1,454	3%	32%
Final Panel Size	1,421	3%	32%

Source: U.S. DOT

Weighting

This section of the report briefly describes the assumptions, data, and procedures used for weighting the panel data. Because peak period travelers have notably different characteristics than the overall population in a region, it is not advisable to weight the sample to the Census or other general population data for a region. Instead, the final sample of respondents was compared to the total population of invited respondents (48,740), who were identified as using the corridor during peak hours. Specifically, household income and number of adults were used to weight the data, as these two characteristics are known to be strongly correlated to response rates. In general, lower income households and larger households tend to have lower response rates and thus are under-represented in the data. Weighting can be used to adjust for such biases.

To conduct the weighting, ancillary data on estimated household income and estimated number of household adults for the population of corridor users were purchased from Acxiom, a data and analytics company. Acxiom derives demographic data for residential addresses based on a variety of data sources, including public and private Census data, public records (such as property records), credit information, purchasing activities and other data. While there were some gaps in the ancillary data, it was possible to match 97% of the corridor population on the number of household adults and 79% of the corridor population on income.

A single weight variable per respondent was calculated using the ancillary data from Acxiom. The weights were adjusted through an iterative process so that the weighted survey data would match the target distribution of the overall population. The final baseline weights by category are shown below. The largest weights were applied to lower income households and to larger-sized households.

Table 6. Final Weights by Category

Income	1 adult	2 adult	3 adults	4+ adults
Less than $50,000	5.37	2.05	4.86	10.38
$50,000-$99,999	2.60	.99	2.35	5.03
$100,000-$149,999	.53	.20	.48	1.02
$150,000 or more	.38	.15	.35	.74

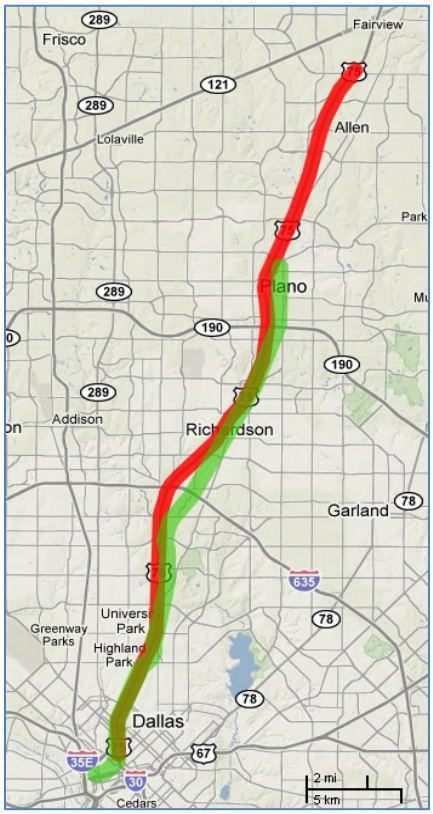
Source: U.S. DOT

Transit Survey Sampling and Recruitment

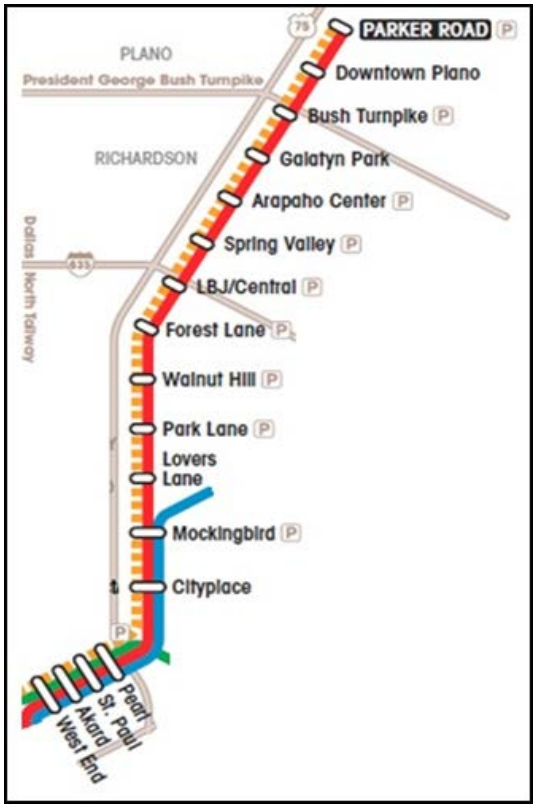
In order to fully evaluate the impact of ICM on corridor travelers, it is important to consider not only drivers, but also the transit riders in the corridor. The study area for the transit rider survey was consistent with the study corridor of the main survey. The DART Red line runs parallel to US-75 between Allen and downtown Dallas, then continues south to Westmoreland (beyond the corridor study area.) The DART Orange line shares the Red line tracks between the Parker Road Station and downtown Dallas during weekday peak periods, then separates from the Red line and continues west to Dallas-Ft. Worth airport. During nonpeak periods, the Orange line eastern terminus (or the northernmost station) is at the LBJ/Central station.[7] Figure 2 illustrates the Red/Orange line route (marked in green) in relation to the entire study corridor (marked in red).

[7] DART light rail maps and schedules retrieved August 2014 from the DART website: http://www.dart.org/.

Figure 2: DART Light-Rail Lines (Green) in Relation to US-75 Corridor (RED)



Source: U.S. DOT



Source: DART

Passenger data from the DART Red/Orange line in spring 2013 informed the sample-size estimation in Dallas.[8] The survey team took into account the number of passengers boarding southbound (peak direction) trains at each station between 6:00 a.m. and 10:00 a.m. to select stations for recruitment. Stations closer to downtown Dallas were ruled out as recruitment possibilities, since riders boarding at these stations would only be traveling a short distance in the US-75 study corridor. Five stations were selected based on high ridership, as well as input from DART, including:

- Parker Road
- Bush Turnpike
- Arapaho Center
- Spring Valley
- Park Lane

The LBJ/Central station was added because ICM strategies were planned for this station, despite slightly lower ridership than other stations in the corridor. The intercept rate, or the percentage of total riders who would be approached by recruit staff, was assumed to be 75%, based the assumptions about how much time staff would spend explaining the survey and that some riders would refuse or

[8] DART ridership data (boardings by station and time) provided August 2013 by DART.

not qualify. Given the average southbound ridership at these stations and the assumed intercept rate, the survey team estimated a need for 2,500 postcards.

Transit Baseline Questionnaire

The transit baseline survey was similar in design to the auto panel baseline questionnaire, but several questions were modified to suit the needs of the transit survey, particularly questions regarding transit trip details, trip satisfaction, and satisfaction with information about travel conditions. The questionnaire included the following key topic areas:

- Details about their typical or most common morning and/or evening transit trip
- Perceptions and satisfaction with their typical morning and evening transit trips
- Awareness and use of real time traffic and transit information
- Impact of real time information on travel behavior
- Satisfaction with the real-time traffic and transit information
- Changes in satisfaction with the transit information over the past year
- Household and employment demographics

Draft surveys were sent to the ICM Federal team, the ICM Evaluation team, and the local partners for their input. To the extent possible, revisions suggested by the panel were incorporated in the final version of the survey. The final transit survey is included in the Appendices.

Similar to the auto baseline survey, the questionnaire for the transit survey asked respondents how often they ride one of the transit lines of interest during the weekday morning and evening peak periods. If respondents reported typically traveling less than one weekday per week on the transit system during both peak periods, then they were terminated from the survey. Four participants were determined ineligible due to this screening criteria. Respondents who answered that they ride transit in one or both peak periods (morning or evening) at least one weekday per week could continue with the survey. If a respondent only traveled regularly during one peak period, then they were only asked about trips during that time.

Transit Survey Field Effort

The transit baseline survey involved in-person recruitment of regular transit riders. The recruitment postcards for the transit surveys were designed using the logo and color schemes from the main US-75 survey. The postcards included a brief overview of the study, the survey website, the study phone number and e-mail address, and a unique password. The postcards also provided information on the pulse surveys to follow the transit baseline survey and mentioned the incentives for the baseline and pulse surveys.

Field recruitment was conducted during the morning peak period on Tuesday, September 16, 2014 through Thursday, September 18, 2014. The field staff included a field manager and six staff. Permission letters were obtained from DART officials in case station managers or transit operators requested proof of permission to be working at the sites or if transit riders had questions about who was sponsoring the survey. To distinguish themselves, staff wore nametags with the RSG logo and the study logo, and every field staff and field manager wore an orange safety vest.

The recruitment plan was based upon the southbound weekday morning peak ridership, so field staff targeted riders traveling southbound at the stations. Field staff positioned themselves at the stations strategically to make contact with as many southbound riders as possible, such as standing near different entrances when more than one entrance was available. Recruiters asked people arriving to the platform if they were regular DART riders to determine if they were eligible for the study. Typically, recruiters were able to explain the study and the incentive to riders when they handed out the postcards. During high-volume periods, recruiters spent less time engaging with riders and instructed them to read the postcard for more information. Staff kept a tally of those who accepted the postcard, declined, were eligible, ineligible, or unknown if eligible.

Table 7. Recruitment at DART Stations

Transit Station	Agreed	Declined (Eligible)	Declined (Unknown)	Ineligible	Total Intercepts
Parker Road	766 (76%)	53 (5%)	157 (15%)	38 (4%)	1,014
Bush Turnpike	520 (81%)	63 (10%)	18 (3%)	42 (7%)	643
Arapaho	303 (78%)	29 (7%)	24 (6%)	34 (9%)	390
Spring Valley	293 (85%)	11 (3%)	9 (3%)	32 (9%)	345
LBJ/Central	127 (91%)	7 (5%)	5 (4%)	0 (0%)	139
Park Lane	287 (75%)	14 (4%)	22 (6%)	60 (16%)	383
Total*	**2,296 (79%)**	**177 (6%)**	**235 (8%)**	**206 (7%)**	**2,914**

**19 postcards were unaccounted for and assumed to have been handed out, for a total of 2,315.*

Source: U.S. DOT

Transit Participation in Pulse Surveys

For two of the pulse surveys that were administered to the driver sample, transit riders were also invited to participate, as the incidents had the potential to impact transit riders' travel experiences. One of the pulse surveys involved a weather related event; a severe thunderstorm with high winds caused power outages and electrical safety issues, prompting DART to suspend rail service during the afternoon peak. The other incident involved a fatality and the temporary closure of US-75 for several hours during the morning peak. This incident may have impacted DART riders who use US-75 to get to their DART station, or they may have been affected if drivers switched to transit for that day's commute. Overall, there were 517 responses to the pulse surveys; 275 responses to the weather related event and 242 responses to the fatality incident. It should be noted that a transit diversion plan was not implemented during these incidents, as the ICMS was temporarily not functioning.

Transit Survey Response Rate

Once recruited, survey respondents completed the baseline survey online or over the phone and then received their baseline incentive before being incorporated into the pulse-survey panel. Response rate is calculated as the number of respondents who were eligible for and completed the survey divided by the total number of invites handed out.

Table 8. Transit Survey Response Rate

Respondents	Response
Eligible Intercepts	2708
Responses	607 (22%)
Terminated	4 (0.1%)
Completed	603 (22%)
Unsubscribed	9 (0.3%)
Final sample	594 (22%)

Source: U.S. DOT

Note: Those who declined a postcard and were of "unknown eligibility" (N=235), were included in the total number of eligible intercepts. As a result, the reported response rate may underestimate the true response rate.

Of the 594 respondents, 29% completed 2 pulse surveys (N=169), 30% completed 1 pulse survey (N=179) and 41% did not complete any pulse surveys (N=246).

Chapter 3 Driver Sample Findings

This chapter presents findings from the panel of US-75 drivers, recruited using a license plate capture methodology. The findings are organized into three key sections, including an overview of the sample, a comparison of the Baseline and Endline surveys and a comparison of pre-ICM versus post-ICM pulse surveys.

Overview of Sample Respondents

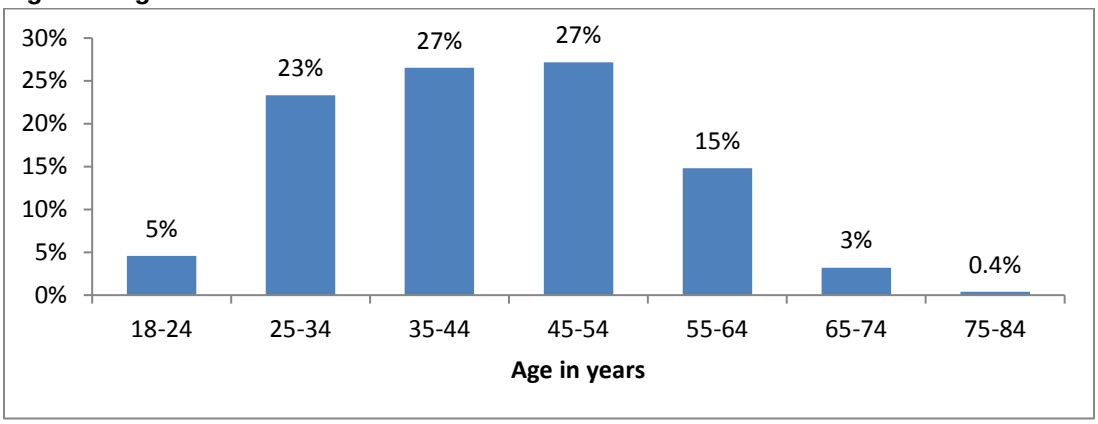
This section of the report describes the socio-demographic characteristics of the sample of US-75 users, including individual, household and employment demographics.

Socio- Demographic Characteristics

Findings on the socio-demographic characteristics of the sample include three topic areas: individual–level demographic characteristics, household level characteristics, and employment demographics. As previously described, the screening criteria required that respondents travel in the US-75 corridor at least three times per week in either the morning or evening peak timeframe in both the baseline and endline surveys. Baseline survey measures are presented, and where relevant, data is also presented from the endline survey.

Travelers aged 35-54 make up a full 54% of respondents at the time of the baseline survey, and the younger 25-34 age group comprises a further 23%. Only 3% of respondents are 65 years of age or older, and a similarly small proportion are 18 to 24 years of age (5%). Given the peak hour sampling methodology, it is not surprising that the sample is primarily comprised of working-age individuals. As expected over the course of a two year study, the shares of the three youngest age cohorts decreased slightly while the older cohorts grew in size between the baseline and endline surveys.

Figure 3. Age

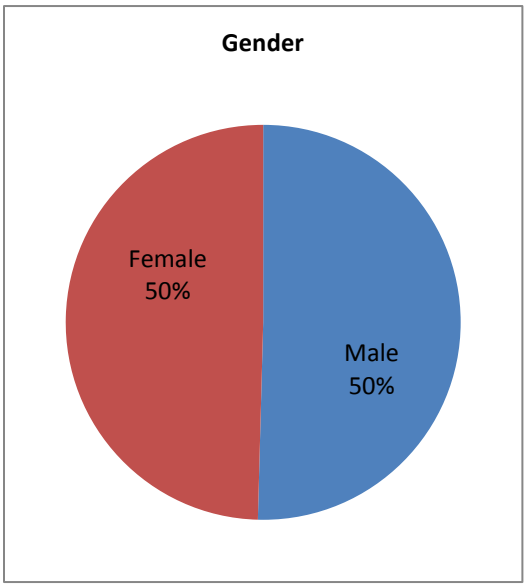


Source: U.S. DOT

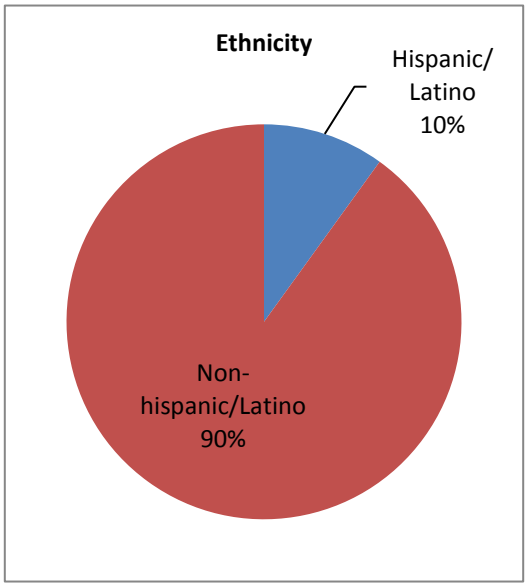
The sample is split evenly according to gender (50% male; 50% female. With respect to race, white travelers comprise 68% of respondents. A further 14% are Asian, 8% identify as African American, 1% are American Indian or Native Alaskan, and 4% are Other (5% did not provide a response). In addition, 10% of respondents reported being Hispanic or Latino.

Figure 4. Gender, Ethnicity, and Race

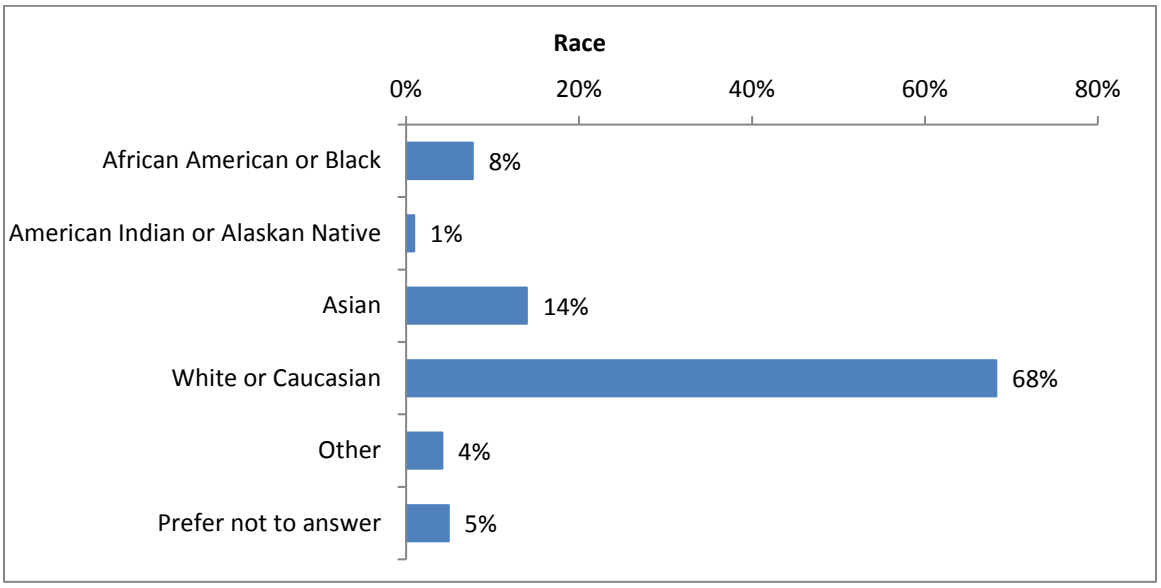
N=1335



Source: U.S. DOT



Source: U.S. DOT



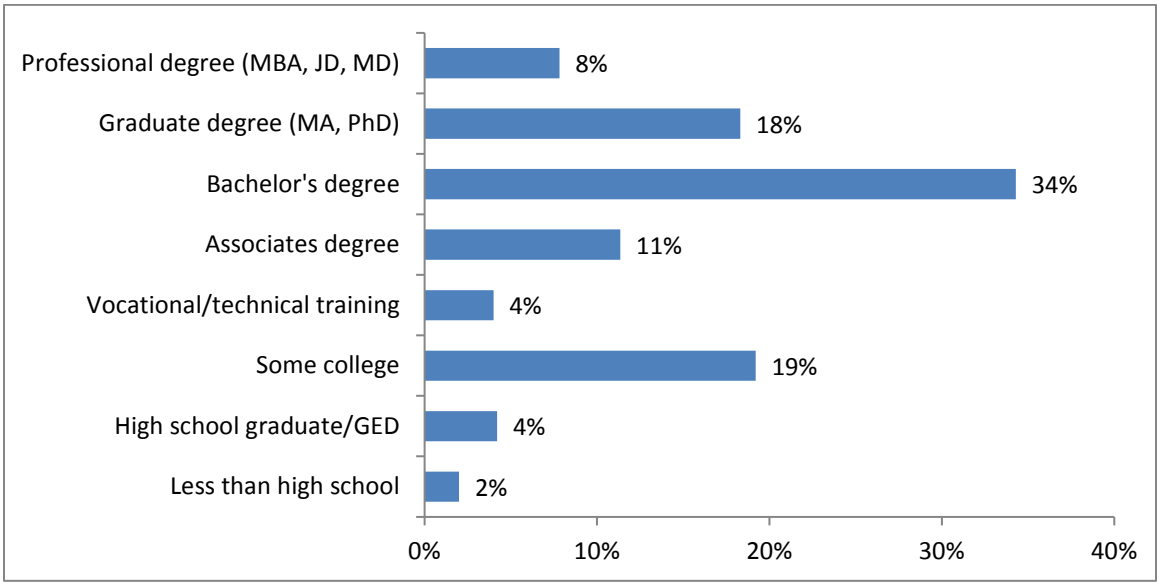
Source: U.S. DOT

The sample is highly educated, with one-third of respondents (34%) having attained a college degree, 18% a graduate degree, and 8% a professional degree, such as an MBA or MD. An additional 19%

attended some college, and 11% obtained an Associate degree. Only 6% reported a high school degree (or didn't complete high school), and half as many completed vocational/technical training (3%). Changes in educational attainment were minimal between the pre-and post-ICM surveys (shifts of 3 percentage points or less for any category).

Figure 5. Education

N = 1,335



Source: U.S. DOT

Household characteristics

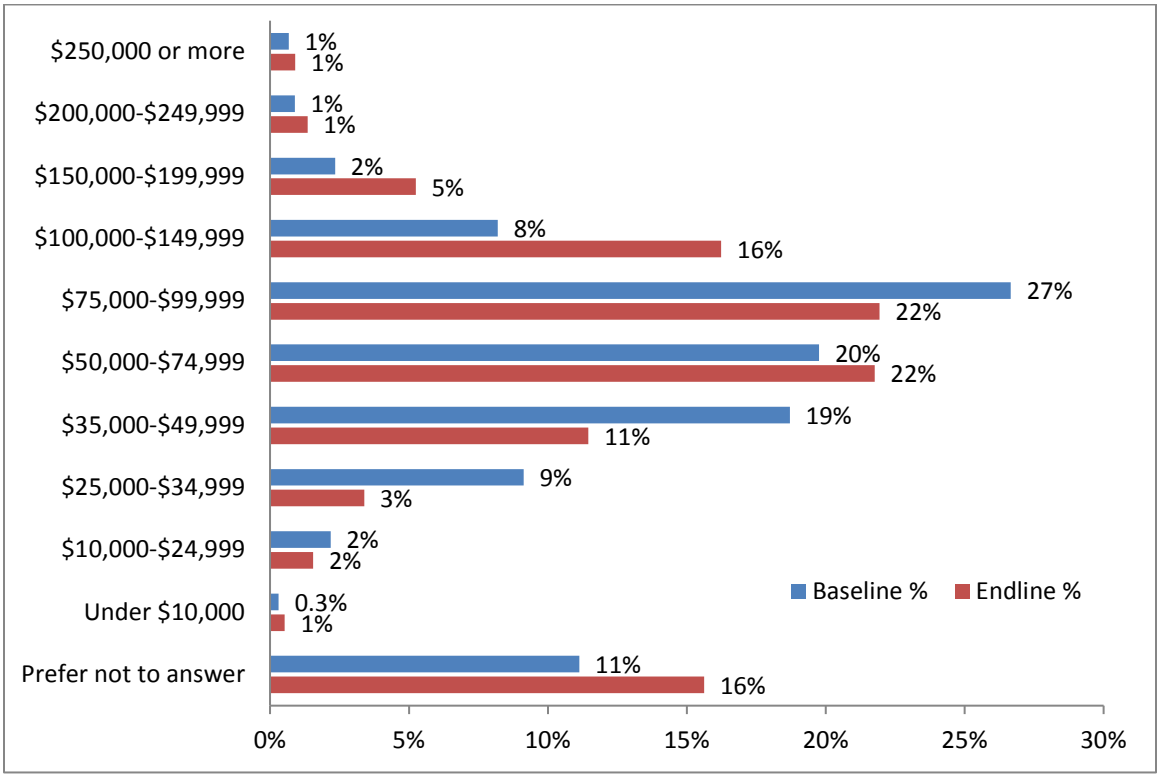
In the baseline survey, two- thirds of respondents lived in households with annual earnings between $35,000 and $100,000. More specifically, 27% of respondent households earned $75,999 to $99,999 in annual income, 20% earned between $50,000 and $74,999, and a similar share (19%) of respondent households earned between $35,000 and $49,999. Only 11% of respondent households earned less than $35,000, and at the upper end of the income bracket, 12% earned $100,000 or more. Eleven percent declined to report their income.

On the whole, household incomes rose from baseline to endline; the share of respondent households earning between $25,000 and $34,999 as well as between $35,000 and $49,999 decreased by 6 and 8 percentage points, respectively. At the same time, the share of respondents in the $100,000-$149,999 bracket increased by 8 percentage points (from 8% to 16%), and the number of respondents in the $150,000-$199,999 group also grew slightly.

A closer analysis of individual shifts confirms these patterns; between 5% and 8% of respondents shifted from the $35,000-$49,999 to the $50,000-$74,999 group as well as from the $50,000-$74,999 to the $75,000-$99,999 bracket and from the $75,000-$99,999 to the $100,000-$149,999 brackets.

Figure 6. Respondents' Self-Reported Household Income

N = 1,335



Source: U.S. DOT

At the time of the baseline, the largest share of respondents were living in 2 adult households (38%), while 29% lived in single adult households. A further 16% lived in 3 adult households, and a similar share lived in a household with 4 adults (13%). From baseline to endline, the shares of 2 and 3 adult households increased, while the shares of small (one adult) and large households (four adults) – each decreased by 6 percentage points. The most frequently seen shift in household size involves adding a second adult to a single adult household.

Table 9. Number of Adults in Respondents' Household

# adults in household	Baseline	Endline
1 adult	29%	23%
2 adults	38%	48%
3 adults	16%	19%
4 adults	13%	7%
5 adults	3%	3%
6 or more adults	*	1%
N	**1335**	**1335**

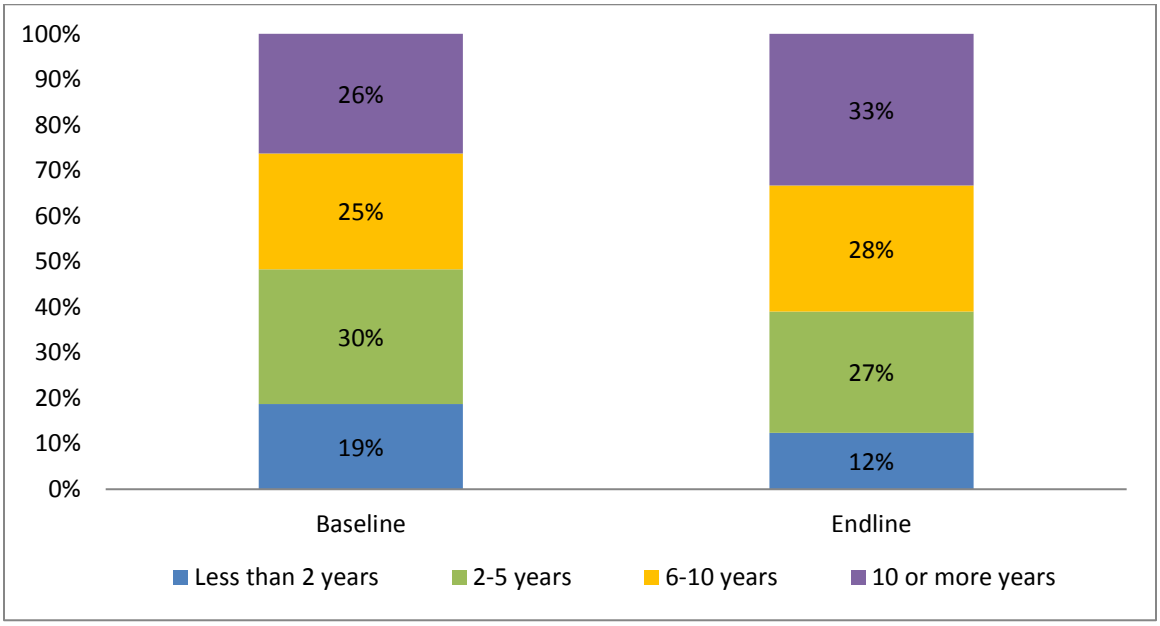
* denotes <0.5%
Source: U.S. DOT

At the time of the baseline survey, 43% of respondents lived in households with children, including 21% with one child, 14% with two children, 6% with three children, and 3% with four or more children. These shares remained roughly constant over the course of the survey waves.

Just over half of respondents (51%) in the baseline had lived in their current home for at least 6 years; this share rose to 61% in the endline. Additionally, around a third of respondents had lived in their current home for 2-5 years in both survey waves, while the share who had lived in their home for less than 2 years fell from 19% to 12% over the course of the survey period.[9]

Figure 7. Number of Years at Current Residence

N = 1,335

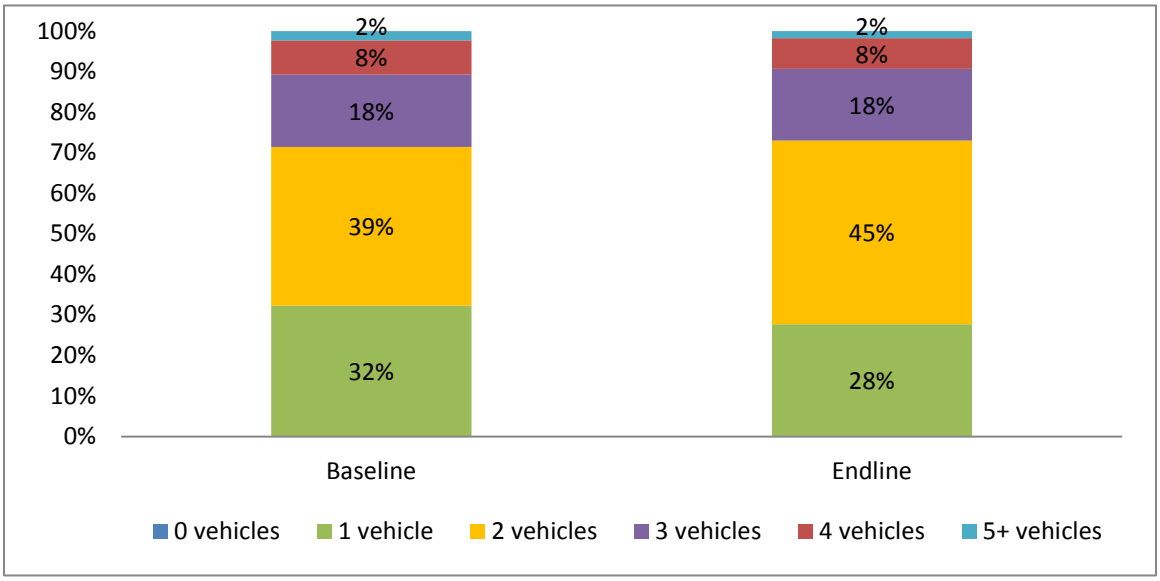


In the baseline, around one-third of respondents (32%) lived in one-vehicle households, while 39% owned two vehicles. The share of one vehicle households had decreased slightly by the endline (28%), and the share of two-vehicle households increased to 45%. In each wave, a further 18% lived in 3-vehicle households, while 8% lived in a household that owned 4 vehicles. In each wave, less than one half of one percent of respondents lived in a carless household.

[9] Since slightly more than two years had lapsed between the baseline and endline surveys, one might expect the percent living in their residence for less than two years to be 0. However, 12% indicated this response in the endline, due to a combination of survey error, as well as people who moved during the survey waves.

Figure 8. Number of Vehicles

N= 1,335



Source: U.S. DOT

Employment demographics

At the time of the baseline survey, 86% of respondents were employed full-time and 8% were employed part-time (including employed students). Retirees, homemakers, and the unemployed collectively comprised only about 5% of the panel sample. Given the peak hour, license plate capture methodology, it is expected that our sample would be comprised almost exclusively of employed individuals. These shares changed little from baseline to endline. Accordingly, shifts at the individual level were minimal (3% of respondents or less) and consisted mostly of individuals who shifted between full- and part-time status and from student to full-time status.

Table 10. Employment

Employment status	Baseline	Endline
Employed full-time	85%	86%
Employed part-time	4%	6%
Student, employed full-time	1%	1%
Student, employed part-time	4%	3%
Student, not employed	2%	1%
Homemaker	1%	1%
Retired	2%	2%
Not currently employed	1%	*
N	**1,335**	**1,335**

* denotes <0.5%

Source: U.S. DOT

The survey also included a series of questions about employer benefits. In the baseline survey, roughly one-half of employed respondents (52%) reported that their employers offered free or subsidized parking, about a third said their employers offered flextime (31%) and one-fifth of employers offered free or subsidized transit use (21%) or telecommuting (20%). By the endline, a full 71% of respondents indicated their employers offered free or subsidized parking, and the share of respondents' employers offering a telecommuting option increased by about 5 percentage points. The prevalence of other commuter benefits, including flextime and transit perks, did not change over the course of the study.

In general, employees in the sample make use of the benefits offered to them, with the exception of transit benefits. In both the baseline and endline survey, at least 95% of employees whose employers offered free or subsidized parking were taking advantage of this perk. Similarly, in both survey waves, roughly 75% of employees with the option of using flextime were doing so. In the baseline, 62% of respondents who had the option of telecommuting made use of this flexibility, a share which increased to 70% by the endline. On the other hand, only 24% of employees who were offered free or subsidized transit used this benefit in the baseline, and 16% did so in the endline survey. Not surprisingly, free transit is a bigger draw than subsidized transit. Among respondents who were offered free transit, 31% used this benefit (31%), compared to 9% who used the subsidized transit benefit that is offered to them.

Table 11. Utilization of Employer Benefits

Among Respondents whose Employer Offers the Benefit

Benefit	Baseline	Endline
Free or subsidized parking	97% (689)	95% (997)
Flextime/Compressed work schedule	78% (436)	75% (489)
Telecommuting	62% (380)	70% (451)
Free or subsidized transit	24% (338)	16% (331)

Source: U.S. DOT

In a separate question, respondents were asked how often they telecommute. Those who report telecommuting tend to do so infrequently; in the baseline, 66% of employees telecommute less than one day per week. A further 14% telecommute one day per week, 7% telecommute twice per week, and 5% do so every workday in the baseline. Over the course of the survey, the aggregate data reveal a slight increase in telecommuting, particularly among those telecommuting 2 days per week (from 7% to 13%). At the individual-level, 8% of respondents transitioned from telecommuting one day per week to doing so two days per week, and 10% shifted from telecommuting a few times per month to one day per week. However, a similar share shifted from "a few times per month" to "less than monthly."

Table 12. Telecommuting Behavior
Among respondents who telecommute

Frequency	Baseline	Endline
5 days per week	5%	4%
4 days per week	*	*
3 days per week	*	2%
2 days per week	7%	13%
1 day per week	14%	16%
A few times per month	39%	31%
Less than monthly	27%	24%
It varies	8%	10%
N	**269**	**329**

* denotes <0.5%
Source: U.S. DOT

Baseline-Endline Results

This section of the report presents findings from the baseline (pre-ICM) and endline surveys (post-ICM), highlighting significant changes across the survey waves. Findings are organized according to the following key topic areas:

- US-75 peak hour travel characteristics
- Use of communication devices
- Use of real-time travel information
- Travel behavior changes
- Trip satisfaction

US-75 Peak Hour Travel Characteristics

The survey included a number of specific questions about the trip that respondents make most often during the AM and PM peak periods, referred to in this summary as their "AM peak reference trip" and their "PM peak reference trip." Questions include frequency of making the trip, trip purpose, trip mode, routes typically used, alternate routes used, and times and locations where they typically enter and exit US 75, among other measures.

When summarizing questions pertaining specifically to their morning or afternoon peak hour trip, we exclude all respondents who reported traveling less than 3 times per week in that specific time period in the baseline or endline respectively. The excluded respondents, however, amount to only a small fraction of the sample, between 5% and 9% in each time period in both the baseline and endline surveys.

Frequency of travel during peak hours

The majority of respondents used US-75 every weekday. In the baseline, 79% of respondents traveled daily on US-75 during the morning peak period, and 82% did so during the afternoon peak period. By the endline, this percentage had decreased to 70% in the morning peak and 67% in the afternoon peak. Conversely, the percentage of respondents traveling four weekdays per week increased across the survey waves, from 6% to 10% in the morning and 7% to 12% in the afternoon. Likewise, the percentage of respondents traveling three weekdays per week increased during both peak periods. Between 2% and 5% of respondents traveled two times per week in each time period both (pre- and post-ICM), and the shares of travelers traveling one weekday per week, weekends only, less than weekly, and never were each below 3%.

Table 13. Number of Weekdays Typically Travel on US-75 in the Study Corridor N = 1,335

Based on those who travel 3 or more weekdays in each peak period

Number of Days	Morning Baseline	Morning Endline	Afternoon Baseline	Afternoon Endline
Five weekdays	79%	70%	82%	67%
Four weekdays	6%	10%	7%	12%
Three weekdays	8%	11%	6%	12%
Two weekdays	3%	3%	2%	5%
One weekday	2%	2%	1%	1%
Weekends only	1%	1%	1%	1%
Less than weekly	1%	2%	1%	2%
Never	*	1%	*	0%

Source: U.S. DOT

The decline in the proportion of respondents traveling in the corridor five weekdays per week - both in the morning and the afternoon peak - is significant at the one percent level[10] using a Rao and Scott-corrected X^2 test.[11] The decline is primarily driven by travelers making the switch from traveling five days per week in the baseline to traveling three or four weekdays per week in the endline. In the morning, 11% of respondents made this switch, and 14% did so in the afternoon. These shifts in

[10] **AM:** Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 27.2; design-based F(1,2669) = 8.99, F statistic-based p-value = 0.0027
PM: Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 79.2; design-based F(1, 2669) = 29.6, F statistic-based p-value = 0.00

[11] The Rao and Scott X^2 test reported in this paper accounts for survey weights; in order to facilitate the calculation of the degrees of freedom, this statistic is then transformed into an F statistic using a procedure proposed by Rao and Thomas. See p. 11, pp. 17-19 in http://www.stata.com/manuals13/svysvytabulatetwoway.pdf as well as Rao and Scott (1981) "The analysis of categorical data from complex sample surveys: Chi-squared tests for goodness of fit and independence in two-way tables," Rao and Scott (1984) "On chi-squared tests for multiway contingency tables with cell proportions estimated from survey data" and Rao and Thomas (1989) "Chi-squared tests for contingency tables."

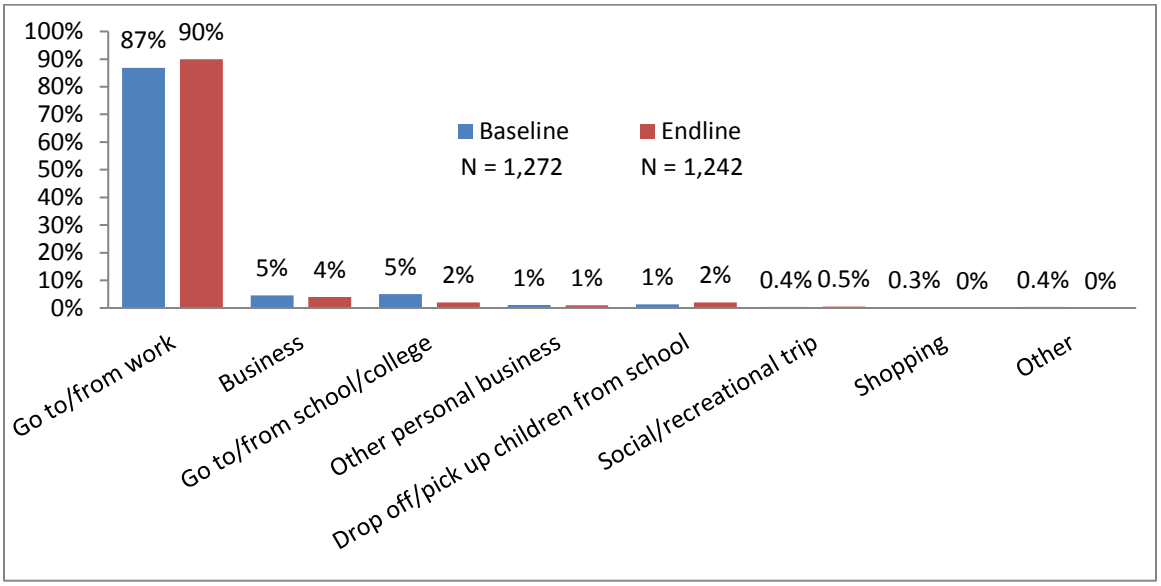
travel may be explained by changes in employment or telecommuting status, as well as changes in activities. Moreover, it is worth noting a sample selection issue. The sampling methodology was designed to recruit frequent travelers, and those who travel most frequently (five weekdays per week) cannot travel any more frequently than they already do; they can only travel less frequently.

Overall, the majority maintained a consistent pattern, as 63% of morning travelers traveled in the corridor five weekdays per week during the morning peak in both the baseline and endline periods, and the comparable figure for afternoon travelers was 62%.

Trip purpose

Commute trips comprised the overwhelming share of peak hour reference trips for our sample; a full 87% of baseline respondents most frequently traveled on US-75 in the morning for work commuting purposes, while a further 5% commuted to school and 5% traveled on business. One percent or less report dropping children off at school, shopping, social/recreational trips, and other personal business as their motivation for morning travel in the corridor. In the endline survey, there is no significant change in trip purpose for morning peak hour trips.[12]

Figure 9. Primary Trip Purpose of Morning Reference Trip

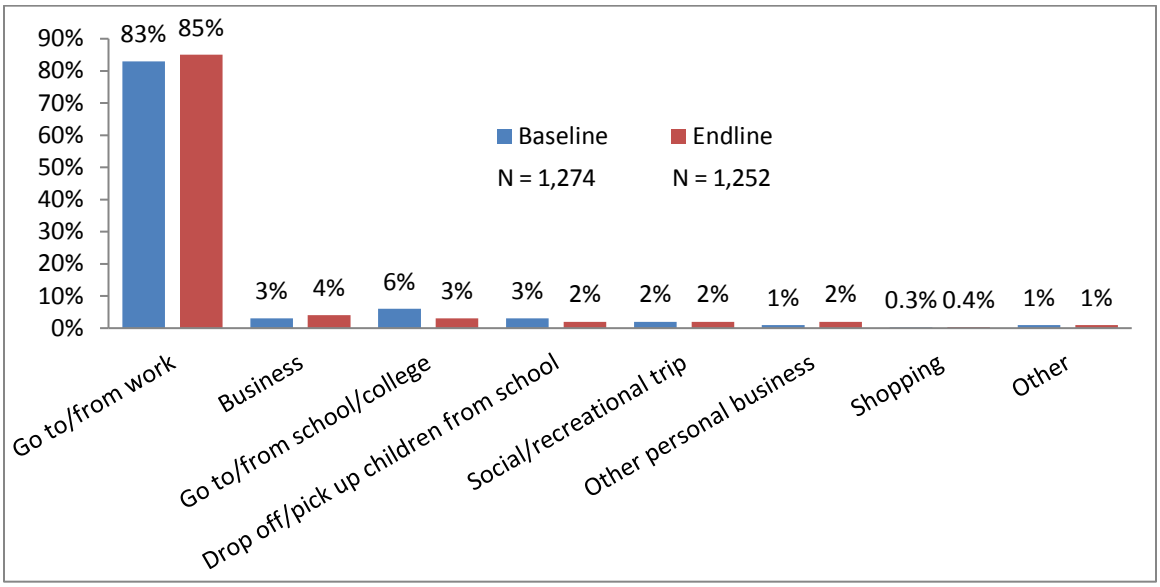


Source: U.S. DOT

Commute trips also comprised the largest share of trips in the afternoon peak (83%), with other trip types (e.g., social/recreational trips (3%) and trips to pick up children from school (3%), comprising a marginally larger share of afternoon peak hour trips, compared to the morning peak. Again, the patterns in the endline closely mirror those presented for the baseline.

[12] Rao and Scott X^2 test: uncorrected Pearson's X^2 (5 df) = 16.3; design-based F(3.8,9479) = 1.1, F statistic-based p-value = 0.35

Figure 10. Primary Trip Purpose of Afternoon Reference Trip



Source: U.S. DOT

Trip mode and modal flexibility

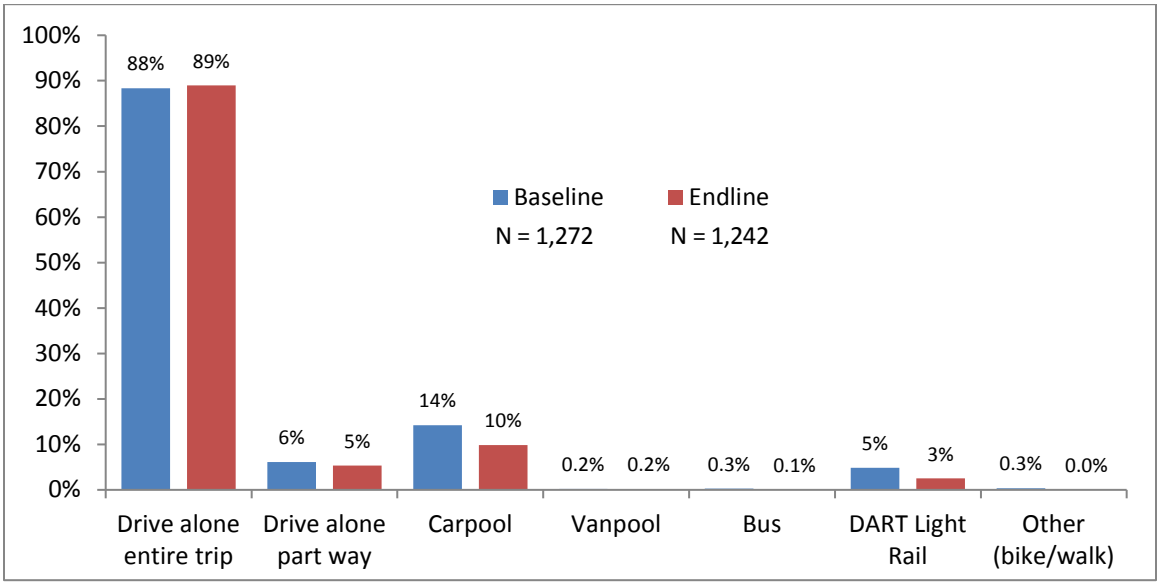
Travelers were asked which mode they typically use for their morning and afternoon trips. Results are presented for morning trips only, due to the small sample size for afternoon trips. [13] An overwhelming majority of respondents – almost 90% - typically drove alone for their entire trip in both the baseline and the endline survey. In addition, in the baseline, 14% reported carpooling, 6% drove alone for part of their trip, and 5% reported using DART light rail for at least part of their trip. Vanpool, bus, and non-motorized modes of travel were utilized by few respondents. In the post-ICM endline period, mode shares remained roughly constant, with the exception of carpooling, which decreased to 10%, a change significant at the 5% level.[14] Employment-related changes during the study period may help explain the decrease in carpooling.

[13] In order to decrease respondent burden, respondents who reported a commute trip in the morning (the large majority of respondents) were not asked the question about their travel mode for their afternoon peak hour trip (assuming they used the same mode for their return trip). This resulted in significantly fewer responses to the travel mode question for afternoon peak hour trips.

[14] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 11.49; design-based F(1, 2513) = 4.04, F statistic-based p-value = 0.04

Figure 11. Typical Mode for Morning Peak Hour Trip

Note: multiple responses possible



Source: U.S. DOT

It is important to note that respondents could select multiple modes, so those who reported traveling on DART may also have driven for part of their trip. In the baseline, the most common morning mode combinations were driving alone the entire trip and carpooling (4% of respondents), driving alone for part of the trip and taking DART (1%), and driving alone for the entire trip and taking DART (1%). In the endline, the most frequently chosen mode combinations were once again driving alone the entire trip and carpooling (1%) as well as driving alone for part of the trip and taking DART (1%).

In the endline survey, carpool users also reported information on the people with whom they carpooled. In the morning, 52% of carpoolers rode with other adults in their household, 37% rode with kids in their household, 27% with coworkers, and 7% with friends (7% indicated "other"). In the afternoon, a full 65% of carpoolers rode with other adults in their household, just under half rode with kids in their household, 5% rode with coworkers, 20% with friends, and 1% with "other" types of people.

Sixty three respondents (5%) in the baseline and 72 in the endline (5%) did not select any mode for their morning trip; of these respondents, only 12 in the baseline and 4 in the endline reported working from home.

In addition to the mode they typically use, respondents were also asked how often they use other modes for their peak hour reference trip. Travelers who typically drive for their entire trip tended to be relatively inflexible with respect to mode choice. In the baseline survey, only 9% of drivers indicated that they will sometimes carpool instead; 17% rarely carpool, and 74% never do so. The endline findings mirror those of the baseline. DART use is even less common among "habitual" drivers: in the baseline survey, only 4% reported "sometimes" using DART, and in the endline survey this share

remained constant (3%). The number of drivers reporting that they never take DART, though, increased from 79% in the baseline to 86% (endline), an increase that is significant at the 5% level.[15]

Table 14. Mode Flexibility: Drivers

Based on those who chose only "Drive alone the entire way" as their typical mode

Frequency of drivers using other modes (AM):	Carpool Baseline	Carpool Endline	DART Baseline	DART Endline
Sometimes	9%	6%	4%	3%
Rarely	17%	18%	17%	11%
Never	74%	76%	79%	86%
N	**1001**	**1050**	**1001**	**1050**

Source: U.S. DOT

In general, carpoolers showed more flexibility in modes utilized, but it should be noted that the sample sizes for carpoolers are relatively small and limit any conclusions that can be drawn from the data. Among respondents who typically carpooled in the baseline, 65% sometimes drive alone the entire way instead; 17% do so rarely and 18% never drive. In the endline, carpoolers tended to drive alone less frequently on the whole, but these overall changes are not statistically significant.[16] In both the pre-and post-ICM surveys, roughly 80% of carpoolers reported never taking DART as an alternate mode. While there is a trend toward more frequent usage of DART as an alternate, the overall changes in DART use are not significant when the "sometimes" and "rarely" response categories are aggregated.[17]

Table 15. Mode Flexibility: Carpoolers

Based on those who chose only "carpool" as their typical mode

Frequency of carpoolers using other modes in AM:	Driving Baseline	Driving Endline	DART Baseline	DART Endline
Sometimes	65%	46%	2%	13%
Rarely	17%	35%	20%	7%
Never	18%	19%	78%	80%
N	**110**	**95**	**110**	**95**

Source: U.S. DOT

[15] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 16.8; design-based F(1,2050) = 5.9, F statistic-based p-value = .015. The overall change in the distribution of frequencies is, however, only significant at the 10% level. Rao and Scott X^2 test: uncorrected Pearson's X^2 (2 df) = 16.9; design-based F(1.9,3843.3) = 2.5, F statistic-based p-value = .09

[16] Rao and Scott X^2 test: uncorrected Pearson's X^2 (2 df) = 9.72; design-based F(1.97,402.5) = 2.17, F statistic-based p-value = .12

[17] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 0.11; design-based F(1,204) = .04, F statistic-based p-value = .84

Among those who typically ride DART for at least part of their trip, the sample sizes are too small to draw reliable conclusions on alternate modes used, so the data are not presented.

Reasons for not using transit

In the endline survey, travelers who reported never using DART for their morning trip in the corridor were asked the reason why they do not use transit. These respondents most frequently stated that they prefer the convenience of having their own vehicle (53%) and that the DART stations are too far from their home or destination (50%). Additionally, 31% prefer the comfort of their own vehicles. Around a fifth of these travelers cited inconvenient transfers and excessive light rail travel time, while 10% said they had no interest in using light rail, 8% didn't feel safe on DART, and 5% said fares are too expensive. Less than 5% of travelers said that they didn't know how to use light rail, that no parking is available at the most convenient station, that trains are too crowded, or that schedules are unreliable.

Table 16. Reasons Cited for Not Using DART

Among travelers who report never using DART

Note: Multiple responses allowed

Reasons never use DART	AM Trips
Prefer having own vehicle for convenience	53%
Station too far from home/destination	50%
Prefer comfort of own vehicle	31%
Transfers not convenient	20%
Trip takes too long on light rail	19%
No interest	10%
Do not feel safe	8%
Fares too expensive	5%
Don't know how	3%
No parking available at station	3%
Trains too crowded	1%
Schedules not reliable	0%
Other	16%
N	**1030**
* denotes <0.5%	

Source: U.S. DOT

Use of HOV lanes

In the baseline, for their morning peak hour trips, 87% of travelers reported using only the regular lanes on US-75; 12% used both the regular and the HOV lanes, and 1% used only the HOV lanes. For afternoon trips, lane use was very similar: 86% used only the regular lanes, 13% used both the

regular and HOV lanes, and 1% used only the HOV. This overall pattern remained consistent in the endline survey.

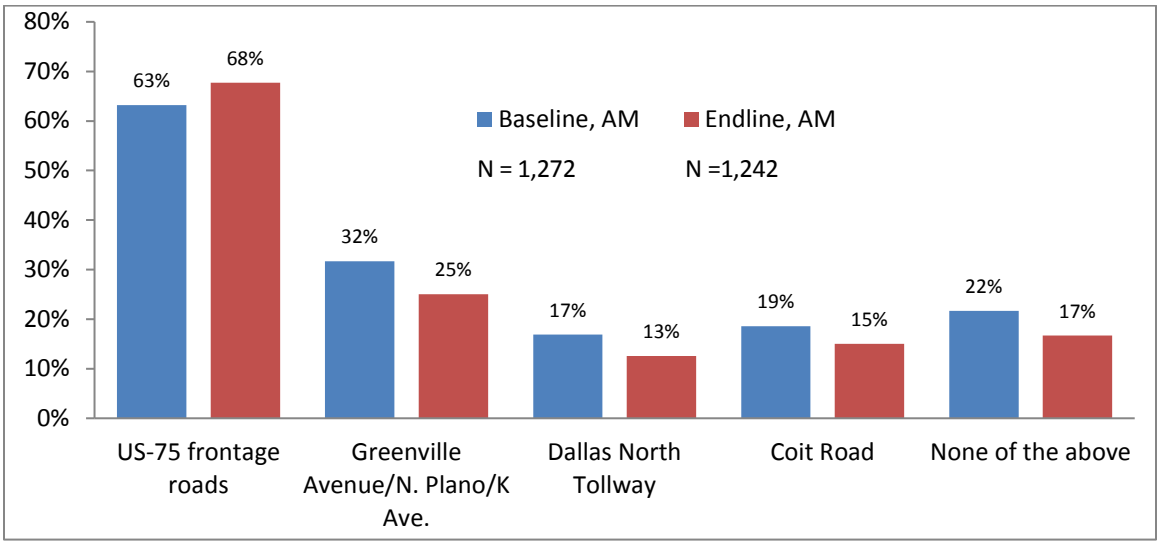
Route flexibility

The survey also asked travelers about their use of key arterials in the corridor, including the US-75 Frontage roads and Greenville Avenue/North Plano Road/K Avenue, both of which were serving as diversion routes for the ICM deployment. In both the baseline and endline surveys, the overall pattern was the same: about two-thirds of drivers used the frontage roads for their AM and PM peak reference trip, about one-quarter to one-third used Greenville Avenue/North Plano Road/K Avenue, and somewhat smaller proportions (between 12% and 19%) used either the Dallas North Tollway or Coit Road as part of their route.

Across the baseline and endline periods, the significant differences include:

- The share of travelers using Greenville/Plano/K Ave. declined by a statistically significant seven percentage points (at the 5% level) in the morning peak.[18]
- The share of travelers who reported using the frontage roads increased by eight percentage points in the afternoon peak[19]

Figure 12. Other Roads Typically Used for Morning Reference Trip

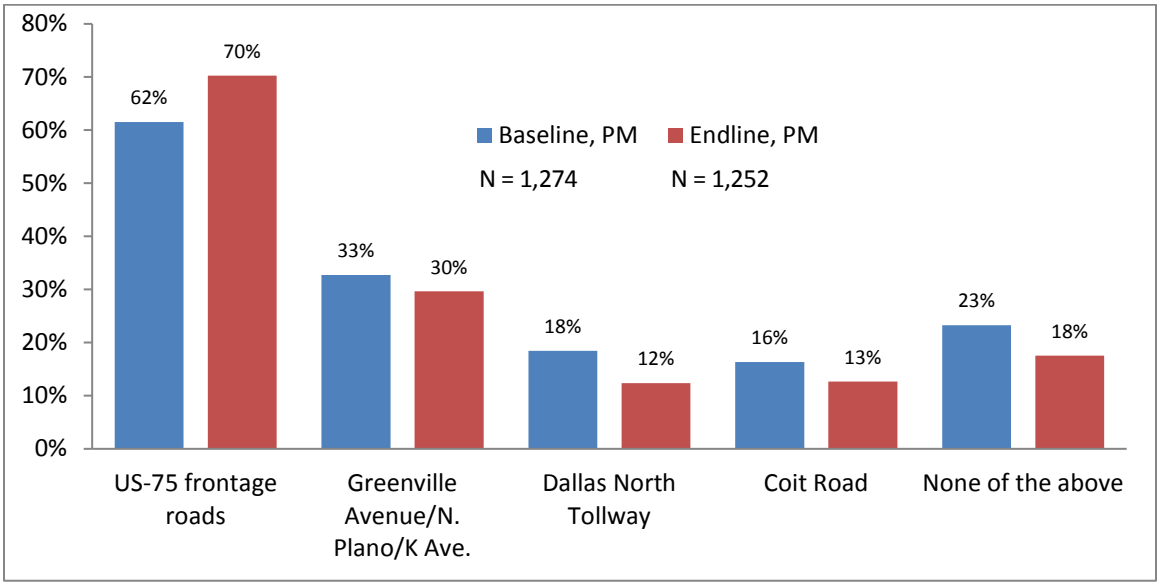


Source: U.S. DOT

[18] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 13.8; design-based F(1,2513) = 4.5, F statistic-based p-value = .03

[19] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 21.5; design-based F(1,2525) = 7.81, F statistic-based p-value = .005

Figure 13. Other Roads Typically Used for Afternoon Reference Trip



Source: U.S. DOT

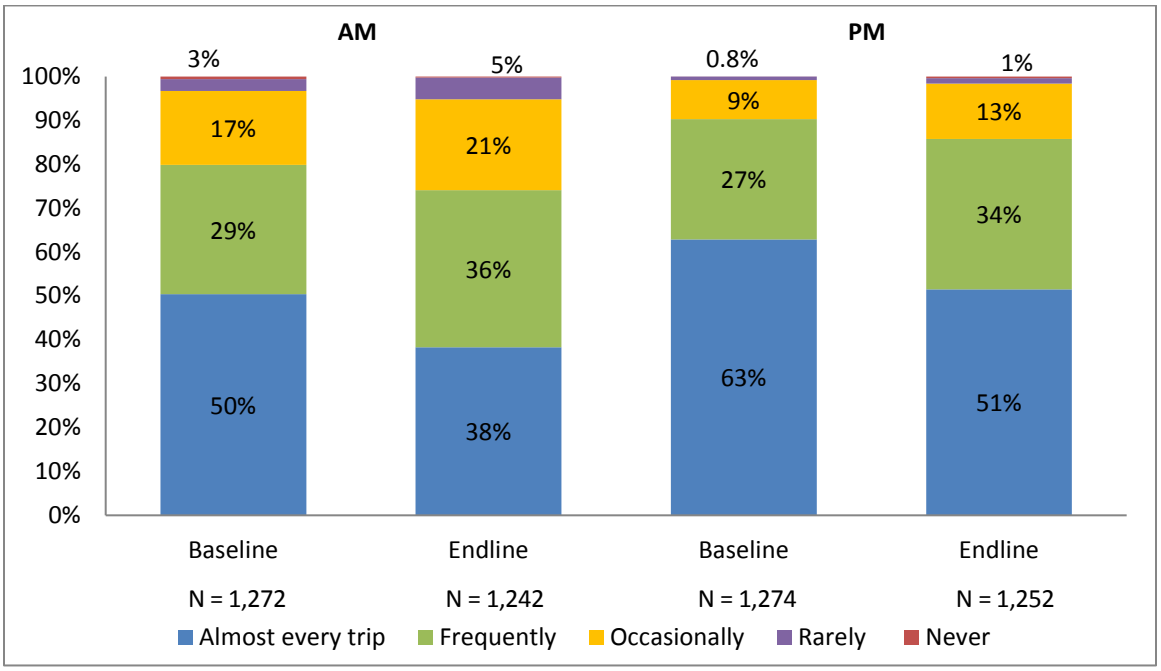
According to the results of our survey, the frequency of severe congestion experienced by respondents on US-75 seems to have decreased over the study period, for both the morning[20] and afternoon[21] peak periods. The share of travelers experiencing severe congestion almost every trip fell a full 12 percentage points from 50% to 38% for morning trips and by a similar amount for afternoon trips (63% to 51%). The proportion of travelers "frequently" experiencing severe congestion on US-75 increased from 29% to 36% for morning trips and by a similar amount for afternoon trips. In both the baseline and endline surveys, negligible proportions of travelers report that they rarely or never experience severe congestion.

Those who do not travel in the corridor every day seem to experience slightly less congestion. For example, the percentage who experience congestion almost every trip is 10 to 20 percentage points lower for 4-day-a-week travelers than for daily travelers.

The data also indicate that in both the baseline and endline periods, congestion appears to be more severe in the afternoon compared to the morning. In the baseline period, 63% of those traveling in the afternoon peak reported experiencing severe congestion almost every trip, compared to 50% in the morning. In the endline, survey, there is a similar difference between the afternoon peak and the morning peak (51% vs 38%, respectively).

[20] Rao and Scott X^2 test: uncorrected Pearson's X^2 (3 df) = 38.7; design-based F(3,7439) = 4.89, F statistic-based p-value = 0.002. Performing this test required aggregating the "rarely" and "never" response categories.
[21] Rao and Scott X^2 test: uncorrected Pearson's X^2 (3 df) = 35.7; design-based F(2.9,7350) = 4.8, F statistic-based p-value = 0.003. Performing this test required aggregating the "rarely" and "never" response categories.

Figure 14. Frequency of Severe Congestion on US-75



Source: U.S. DOT

The survey inquired as to respondents' use of alternate routes and modes when facing severe traffic congestion or construction on US-75 (e.g., roads and modes that are not typically used in the course of a respondent's trip). As shown in the table below, roughly 60% of respondents reported diverting to the frontage roads when there is heavy congestion on US-75, in both the morning and the afternoon peak periods. This share increased by a full 8 percentage points from baseline to endline for morning trips (an increase which is significant at the 5% level[22]) and by 5% for afternoon trips. This latter increase is only significant at the 10% level.[23] Roughly a third of travelers used Greenville Avenue/North Plano Road/K Avenue as an alternate route during both peak periods, and these shares remained consistent in the endline survey.

Approximately 11% to 17% of respondents indicated they use either the Dallas North Tollway or Coit Road as an alternate route, and there were no significant changes between the baseline and endline surveys, with the exception of the decrease in Dallas North Tollway use during the afternoon peak.[24] Only a small number of travelers use DART light rail when US-75 is congested (5% baseline AM, 4% baseline PM), and these numbers changed little over the course of the two survey periods. About a fifth of travelers use US-75 even when it is congested. From the baseline to the endline survey,

[22] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 18.1; design-based F(1,2505) = 6.3, F statistic-based p-value = 0.012

[23] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 7.88; design-based F(1,2521) = 2.8, F statistic-based p-value = 0.097

[24] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 9.05; design-based F(1,2521) = 3.5, F statistic-based p-value = 0.06

travelers appeared somewhat more willing to shift off US-75 during their morning peak trips, as the proportion who stayed on US-75 dropped from 22% to 17%, but this change is only significant at the 10% level.[25]

Table 17. Use of Alternates if Heavy Traffic Congestion/Construction on US-75

Based on those who experience some level of congestion on US-75. Note: Multiple responses allowed

Alternate Roads	Morning Baseline	Morning Endline	Afternoon Baseline	Afternoon Endline
US-75 frontage roads	55%	63%	58%	63%
Greenville Avenue/N. Plano/K Ave.	34%	33%	39%	37%
Dallas North Tollway	14%	12%	17%	13%
Coit Road	14%	11%	14%	14%
DART Orange or Red line	5%	3%	4%	2%
Other roads or modes	26%	19%	24%	21%
Use US-75 even when congested	22%	17%	19%	16%
N	**1269**	**1237**	**1273**	**1249**

Source: U.S. DOT

Reasons for not using alternate routes

Travelers in the endline survey who reported using US-75 even when it is congested were asked the reason why they do not shift to an alternate route. With respect to morning trips, 56% said that in their experience, it is best to stay on US-75 and wait out the delay, and 47% felt that alternate routes are unlikely to reduce their travel times. Just over a fifth stated that alternate routes are inconvenient or unattractive, that they have a flexible schedule, or that they don't know the conditions on alternate routes. Only 6% of this subgroup of travelers reported not knowing of alternate routes. The responses for afternoon trips closely mirrored the responses for morning trips.

[25] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 9.32; design-based F(1,2505) = 3.2, F statistic-based p-value = 0.07

Table 18. Reasons Cited For Not Using Alternate Routes

Based on those who never change routes. Note: Multiple responses allowed

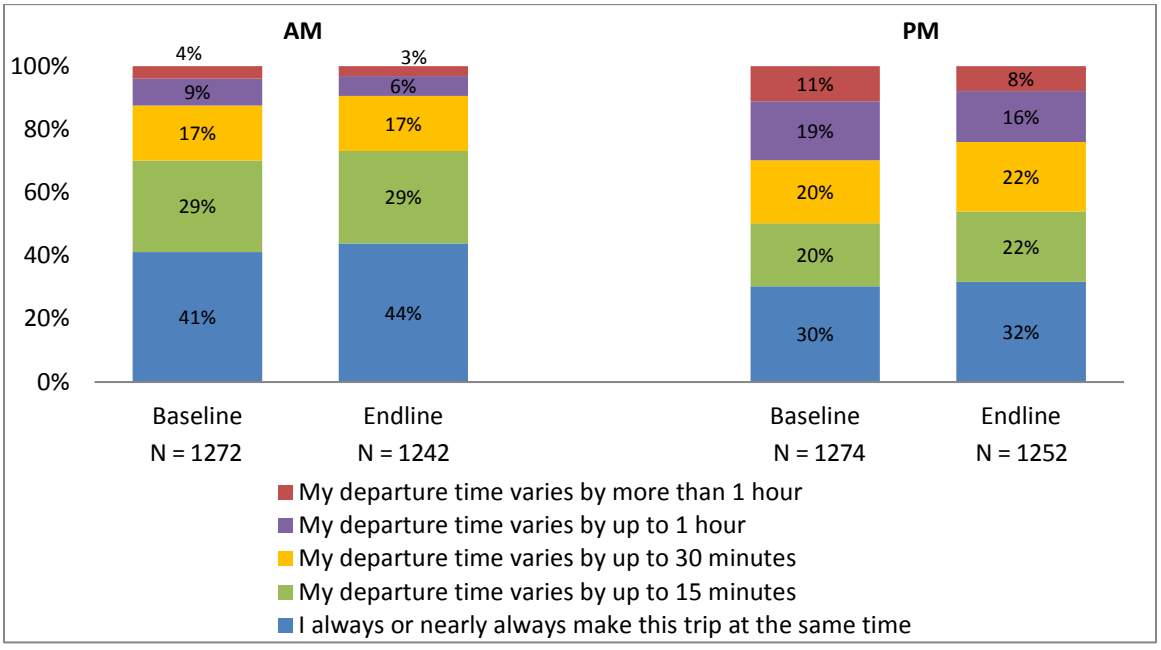
Reasons	Morning	Afternoon
In my experience it's generally better stay on usual route and wait out delay	56%	55%
Alternate routes unlikely to reduce travel time	47%	51%
Alternate routes inconvenient or unattractive	23%	28%
Flexible schedule	21%	18%
Don't know alternate route conditions	20%	19%
Don't know of alternate routes	6%	3%
Other	5%	6%
N	**214**	**193**

Source: U.S .DOT

Departure time flexibility

In both the morning and afternoon peak periods, flexibility in departure time is very consistent across the baseline and endline surveys. As expected, respondents have less flexibility in their morning departure times as compared to the afternoon. In the baseline, 41% of travelers said they make their morning trip at the same time nearly every day, compared to 30% of afternoon travelers. For their afternoon trips, respondents were more likely to vary their departure time by up to an hour or more than an hour (30% vs. 13% doing the same for morning trips).

Figure 15. Departure Time Flexibility



Source: U.S .DOT

Travel time

As reported by respondents, the frequency of severe congestion seems to have decreased from baseline to endline (see Figure 14), however, respondents' mean travel time on US-75 under free flow, typical, and congested congestions did not change. In both survey periods, respondents reported that their morning travel time averaged around 20 minutes under free flow conditions, about 30 minutes under typical road conditions, and roughly 45 minutes under congested conditions. Mean afternoon travel times for the typical and congested scenarios are slightly higher (in both survey periods), at roughly 34 minutes and 52 minutes, respectively. This result aligns with travelers' reports that they more frequently face severe congestion in the afternoon peak compared to the morning peak.

Table 19. Respondents' Mean Travel Time on US-75 under Varying Conditions

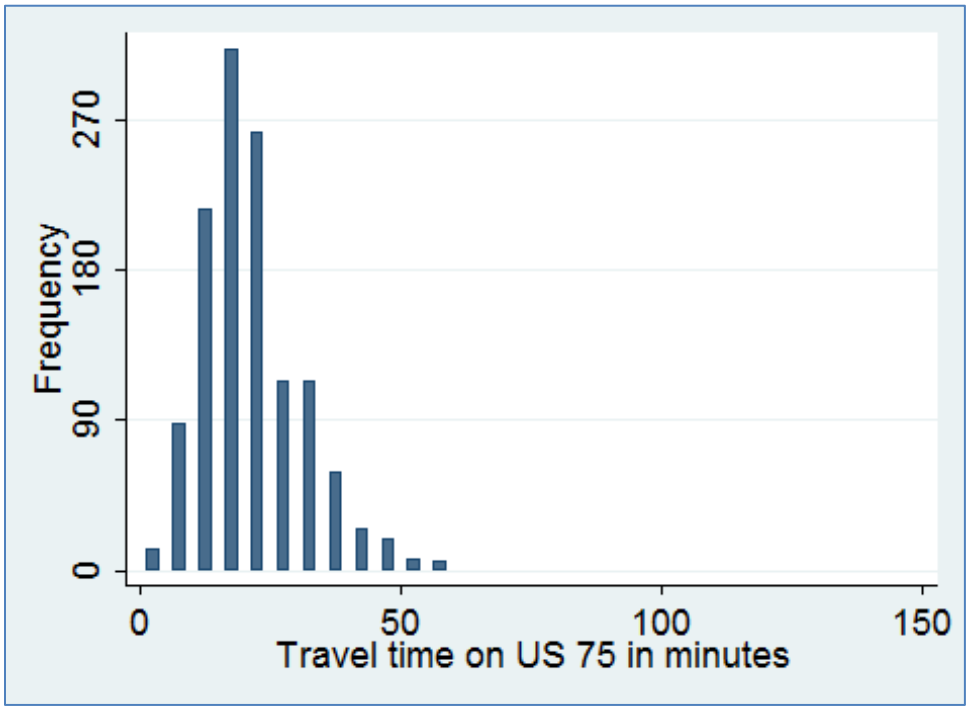
Conditions	Morning Baseline	Morning Endline	Afternoon Baseline	Afternoon Endline
Free flow	19	20	20	21
Typical	29	30	34	34
Congested	46	46	52	52

Source: U.S .DOT

Not surprisingly, given the lower bound on travel time, the distributions of travel times under all three circumstances are skewed right; the distribution of congested-scenario travel times, however, is slightly more symmetric.[26] Only the morning baseline trip histograms are presented here, but the distributions of afternoon as well as endline travel times closely resemble those below.

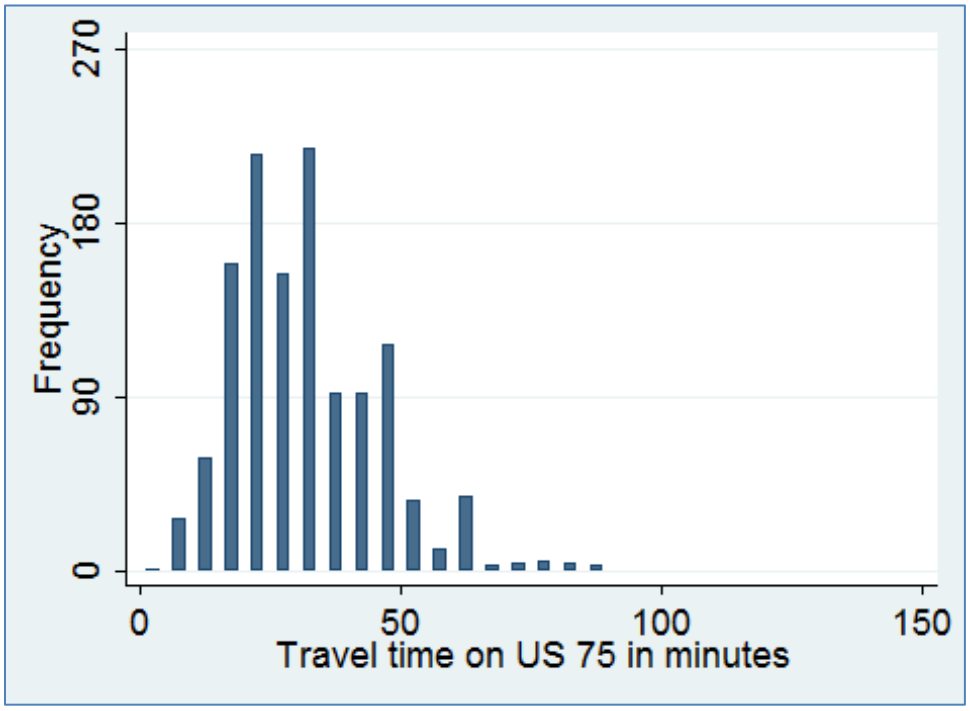
[26] Note that for purposes of data cleaning, we excluded all responses that indicate a travel time of one minute (this includes no more than 1 respondent, except in the endline PM free flow category, where 5 respondents indicated such a short travel time on US-75).

Figure 16. Mean Free Flow Travel Time, Morning trips (Baseline)



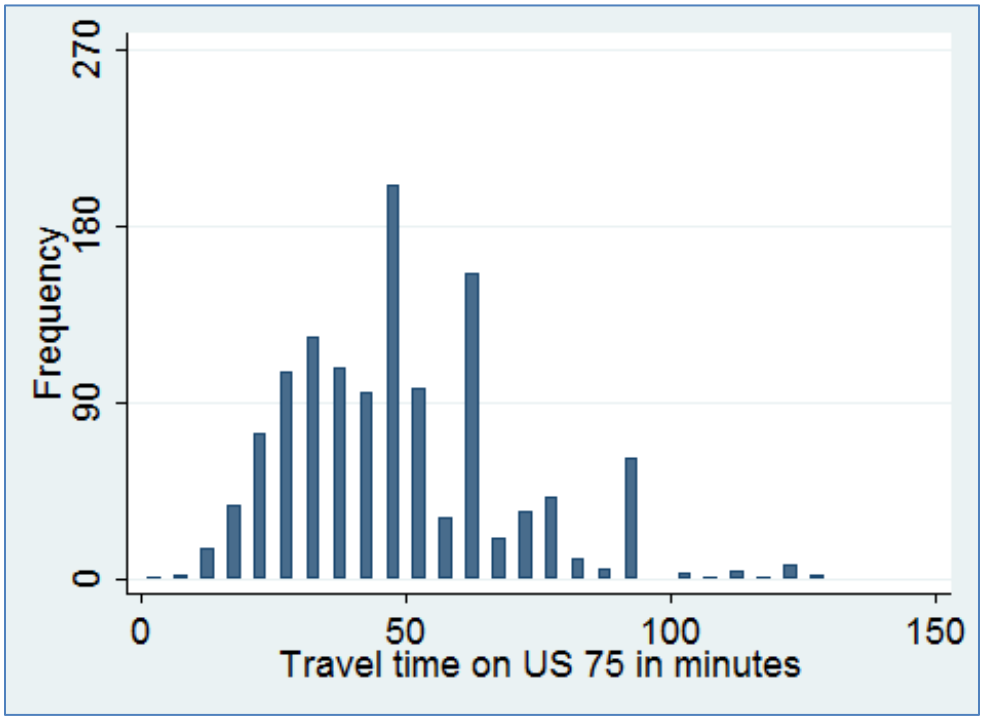
Source: U.S .DOT

Figure 17. Mean Typical Travel Time, Morning Trips (Baseline)



Source: U.S .DOT

Figure 18: Mean Congested Travel Time, Morning Trips (Baseline)



Source: U.S .DOT

Frequency of DART use

The survey also included a measure on general use of DART light rail, in order to understand the extent to which drivers in our sample utilize DART and whether this shifts after the deployment of ICM. The overall findings on this measure are consistent across survey waves, with a large majority either never riding DART or doing so less than monthly. It is worth noting that the percentage of travelers who indicated that they never[27] use DART increased from 57% to 64%, a difference significant at the 5% level.[28] In both survey waves, fewer than 5% used DART once or more per week.

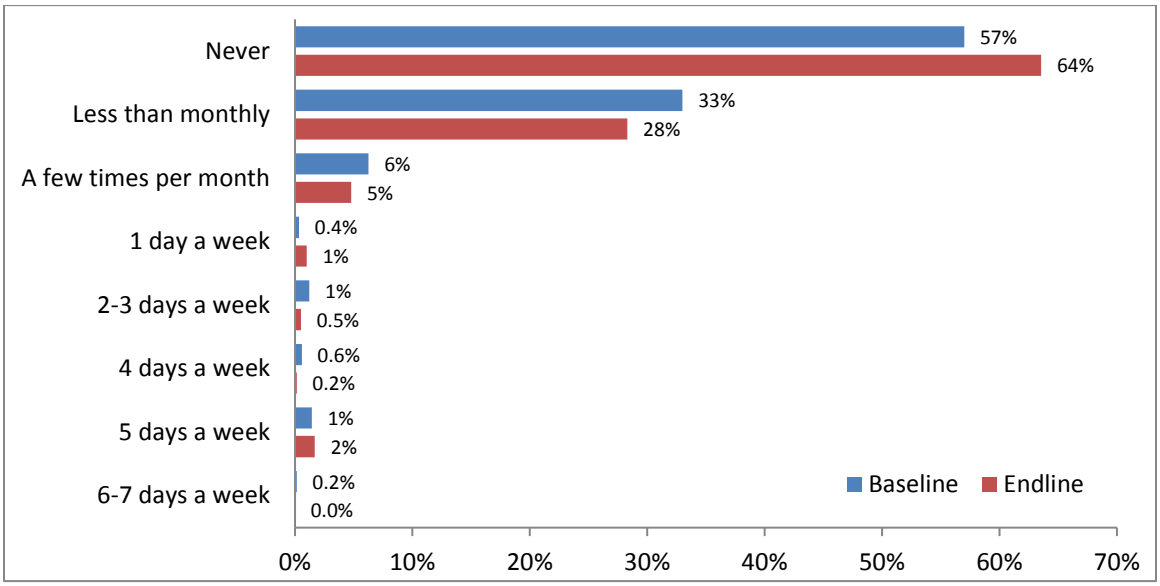
[27] The increase in respondents selecting "never" for this question may seem logically inconsistent. However, the questions asks, "In general, how often do you ride the DART Red and/or Orange light rail line?" So respondents may be answering the question with respect to their behavior in the last few months. The "Never" response is not measuring whether they have ever ridden DART. In addition, with the extension of the blue line in December 2012, some transit users may have shifted from the Red/Orange line to the Blue line.

[28] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 12.02; design-based F(1,2669) = 4.14, F statistic-based p-value = 0.04

When analyzing individual level change across the two surveys, the greatest shifts occurred among those who reported using DART "less than monthly" in the baseline and "never" in the endline (13%). As a whole, however, there were no significant changes in the distribution of DART use.[29]

Figure 19. Overall Use of DART Red/Orange Line

N=1335



Source: U.S .DOT

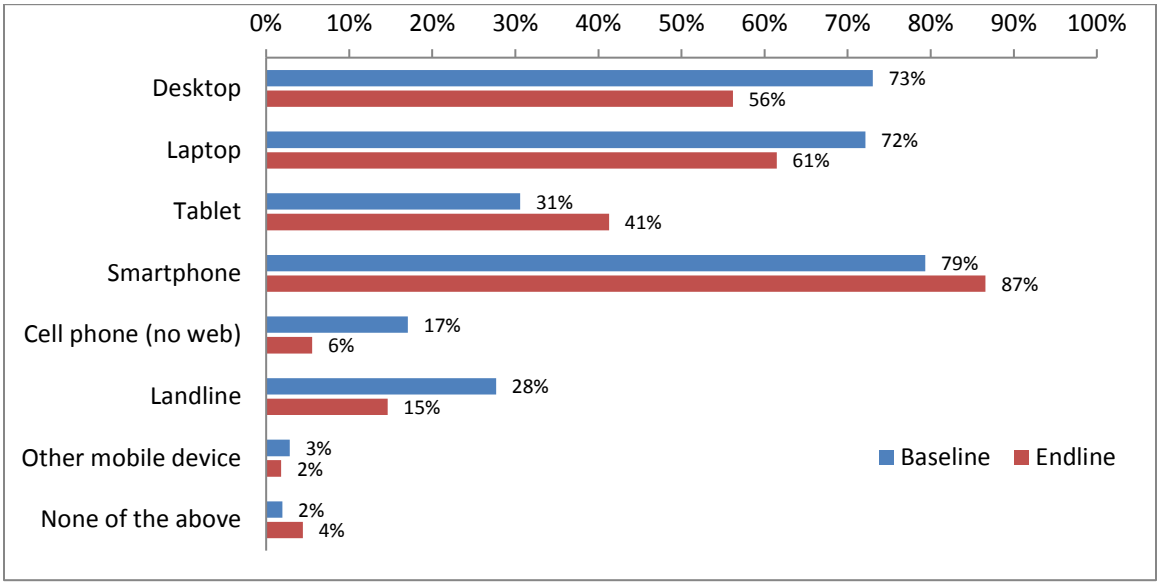
Use of Communication Devices

When asked which communication devices they use regularly use for any purpose, smartphones were cited by the most respondents. Fully 87% of respondents in the endline survey regularly use their smartphone, up eight percentage points from the baseline survey. Other technologies utilized by a majority of respondents in the endline included desktops and laptops; however, each of these technologies experienced a significant decline in use across the surveys; 73% of respondents reported regularly using a desktop in the baseline period, compared to 56% in the endline. Laptop computer usage fell from 72% to 61%. Tablets, like smartphones, experienced a growth in use, from 31% (baseline) to 41% (endline). Not surprisingly, there was a decrease in the percentage of respondents who reported regularly using a cell phone that is not web-enabled (17% to 6%) or a landline (from 28% to 15%). Finally, fewer than 5% reported using "other" mobile devices or none of the above.

[29] Rao and Scott X^2 test: uncorrected Pearson's X^2 (4 df) = 12.6; design-based F(3.8,10067) = 1.0, F statistic-based p-value = 0.39. The test was performed on the following categories: "never," "less than monthly," "a few times per month," "1-3 days/week," and "4-7 days/week" categories

Figure 20. Communication Technologies Used Regularly (1+ Times / Week) for Any Purpose

N=1335; Multiple responses allowed



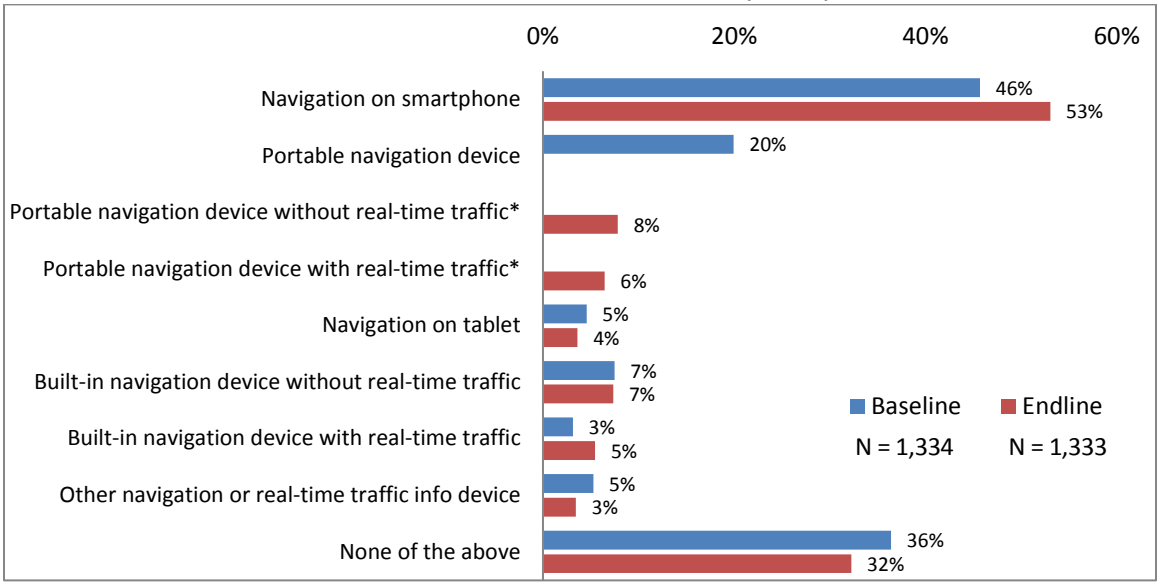
Source: U.S .DOT

Vehicle owners also answered questions about their usage of navigation devices in their vehicle. The most significant change over the course of the study was the growth in smartphone-based navigation, which increased from 46% (baseline) to 53% (endline)[30]. On the other hand, there appears to be a slight dip in the use of portable navigation devices (from 20% to 14%). Relatively few respondents reported using built-in navigation, navigation on a tablet, or other navigation devices in their vehicle, and a full 36% claim to use "none of the above." These shares remained relatively constant through the two survey waves.

[30] Oddly enough, 9 respondents in the baseline and 21 respondents in the endline claimed that they did not regularly use a smartphone in the first question presented in this section pertaining to general communications technologies but did claim to use smartphone navigation regularly; tablet usage displays a similar inconsistency.

Figure 21. Navigation or Real-Time Information Devices Used Regularly in Vehicle

Based on those who have a vehicle in their household. Note: multiple responses allowed



Source: U.S .DOT

**The baseline survey only included "portable navigation device" as an option and did not include options to indicate whether the respondent used a portable navigation device with or without real-time traffic. These two options were included separately in the endline, but for this reason, there is no comparable baseline information.*

Use of Traveler Information

A key component of ICM includes the dissemination of real time traveler information so that travelers are aware of conditions on the road and can adjust their travel plans accordingly (e.g., route, timing, mode). As a result, a number of questions on the awareness and use of traveler information, as well as attitudinal questions about how well-informed the respondent feels about where to find real time information were included in the surveys. We expect that there will be some increase in awareness and perceived information levels due to learning effects from repeated exposure to surveys that ask about traveler information and specific sources of information.

Perceived information levels

On the whole, the proportion of respondents reporting that they feel informed about where to locate real-time traffic information increased over the course of the survey. Using a seven point scale, where 1 represents "very uninformed", 4 represents "somewhat informed" and 7 represents "very informed," respondents were asked to rate how informed they feel about where to find real time traffic information as well as real time transit information[31]. With respect to real time traffic information, the proportion

[31] It should be noted that this scale is skewed in a positive direction as four points of the scale measure a state of being informed (points 4 through 7), whereas only three scale points measure a

reporting they feel informed (rating of 5, 6, or 7) increased from 37% to 46%. In particular, the proportion saying they feel "very informed" increased from 15% to 22%, which is significant at the 5% level.[32] Furthermore, the overall change in respondents' knowledge of traffic information sources from baseline to endline is highly significant.[33]

Respondents' ability to find transit information follows a similar pattern, increasing over time, but the shifts were not as large, and on the whole are only marginally significant.[34] More specifically, the percentage of respondents who reported feeling "very uninformed" about transit information decreased from 23% to 17% - a change that is significant at the 5% level.[35] Conversely, the percentage feeling "very informed" increased from 9% to 13%, though this latter increase is only significant at the 10% level.[36] When looking at shifts at the individual level, 4% of respondents shifted from "very uninformed" to "somewhat informed" (rating of 1 to 4), and an additional 3% made the shift from a rating of 1 to a rating of 2.

Table 20. How Informed Respondents Feel About Where to Check for Traffic Information

Information Level	Traffic Info Baseline	Traffic Info Endline
1 - Very Uninformed	15%	10%
2	11%	9%
3	10%	7%
4 - Somewhat Informed	26%	28%
5	11%	7%
6	11%	17%
7 - Very Informed	15%	22%
Not Applicable	2%	1%
N	**1335**	**1335**

Source: U.S .DOT

state of being uninformed (1 through 3). However since the scale was asked in the same way across survey waves, it is still a reliable measure of change.

[32] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 17.5; design-based F(1,2669) = 6.3, F statistic-based p-value = 0.012

[33] Rao and Scott X^2 test: uncorrected Pearson's X^2 (7 df) = 75.02; design-based F(6.8,18253) = 4, F statistic-based p-value = 0.0003

[34] Rao and Scott X^2 test: uncorrected Pearson's X^2 (7 df) = 34.5; design-based F(6.8,18105) = 1.8, F statistic-based p-value = 0.08

[35] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 15.6; design-based F(1,2669) = 5.7, F statistic-based p-value = 0.02

[36] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 11.5; design-based F(1,2669) = 3.7, F statistic-based p-value = 0.054

Table 21. How Informed Respondents Feel About Where to Check for Transit Information

Information Level	Transit Info Baseline	Transit Info Endline
1 - Very Uninformed	23%	17%
2	11%	11%
3	7%	8%
4 - Somewhat Informed	21%	24%
5	6%	4%
6	7%	8%
7 - Very Informed	9%	13%
Not Applicable	16%	15%
N	**1335**	**1335**

Source: U.S .DOT

Overall use of real-time information sources and devices

Built-in GPS real-time information was the source type used most frequently by the relatively small number in our sample who own this technology. While the sample sizes in the baseline do not permit the analysis of built-in GPS use, half of all respondents who own a built-in navigation device with real-time information use it at least daily in the endline, and only 4% never use their devices.

For other sources of traveler information that are more widely available, including radio and electronic message signs, use remained consistent across the two survey periods; 43% of respondents used the radio daily for traffic information purposes at the time of the baseline survey, while 39% did so in the endline survey. Sizable shares of respondents also used the radio to get traffic information a few times per week (26% baseline, 25% endline).

Electronic highway message signs were another popular source, as 32% reported using them at least daily in both baseline and endline, and a similar proportion was using them a few times per week (30% baseline, 31% endline).

Aside from radio and electronic message signs, smartphones were used most frequently to access real-time traffic and travel information. The share of smartphone owners using their phone for this purpose on a daily basis increased from 20% in the baseline to 31% in the endline, while the share doing so a few times per week increased from 19% to 27%. These changes were driven by approximately 6% each of owners who made the shift from never using their smartphone to using it less than once per week, a few times per week, or daily; a similar share of owners made the switch from using their smartphone a few times per week to daily. Notably, this increase in usage was not driven only by new smartphone owners. Of the 1037 respondents who reported owning a smartphone in both the baseline and endline, the share who never use their smartphone fell from 30% to 12%, while the shares using their smartphone a few times per week and daily to access traffic information each rose from 20% to about a third.

The use of television remained similarly stable from baseline to endline; in the baseline, 16% of respondents indicated using the TV for traffic information at least daily. A similar share did so a few times per week (14%), but a full 42% of respondents reported never using real-time televised information.

Relatively few respondents regularly used desktops, laptops, or tablets to access travel information; about one-fifth to one one-quarter of respondents consulted these devices a few times per week or more often. While each device did see slight increases in use from baseline to endline, the overall increases in use (overall changes in the distribution) are not significant.[37]

Non-web-enabled cell phones, landlines, and other people were the sources used least often; fewer than 5 percent of owners of non-web cell phones or landlines consulted them daily at the time of the baseline, and a similar proportion of all respondents consulted other people daily; and with the exception of non-web-enabled cell phones, these shares remained equally low in the endline[38].

Table 22. Use of Devices to Obtain Real-Time Traffic and Traveler Information (a)

Frequency of Use	Built-in Navigation Baseline	Built-in Navigation Endline	Radio Baseline	Radio Endline	Electronic Highway Message Signs Baseline	Electronic Highway Message Signs Endline
Never use	#	4%	14%	14%	13%	11%
Use less than 1 day/week	#	20%	9%	13%	12%	13%
Use about 1 day/week	#	9%	8%	8%	13%	13%
Use a few times/week	#	16%	26%	25%	30%	31%
Use 1+ times/day	#	50%	43%	39%	32%	32%
N	**81**	**97**	**1335**	**1335**	**1335**	**1335**

** denotes <0.5%; # denotes cases where the sample size is too small draw reliable conclusions.*

Source: U.S. DOT

[37] **Desktop:** Rao and Scott X^2 test: uncorrected Pearson's X^2 (4 df) = 16.5; design-based F(3.95,6869) = 1.4, F statistic-based p-value = 0.23. **Laptop:** Rao and Scott X^2 test: uncorrected Pearson's X^2 (4 df) = 17.6; design-based F(3.95,7407) = 1.5, F statistic-based p-value = 0.21. **Tablet:** Rao and Scott X^2 test: uncorrected Pearson's X^2 (4 df) = 14.6; design-based F(3.9,4544) = 1.2, F statistic-based p-value = 0.29

[38] The endline sample size for non web-enabled cell phones is quite small (n=66), so the results should be interpreted with caution.

Table 23. Use of Devices to Obtain Real-Time Traffic and Traveler Information (b)

Frequency of Use	Smartphone Baseline	Smartphone Endline	Television Baseline	Television Endline	Desktop Baseline	Desktop Endline
Never use	30%	14%	42%	42%	45%	39%
Use less than 1 day/week	19%	17%	20%	20%	28%	27%
Use about 1 day/week	12%	10%	8%	7%	10%	10%
Use a few times/week	19%	27%	14%	15%	10%	13%
Use 1+ times/day	20%	31%	16%	16%	8%	12%
N	**1101**	**1184**	**1335**	**1335**	**973**	**766**

Source: U.S. DOT

Table 24. Use of Devices to Obtain Real-Time Traffic and Traveler Information (c)

Frequency of Use	Laptop Baseline	Laptop Endline	Tablet Baseline	Tablet Endline	Cellphone (no web) Baseline	Cell phone (no web) Endline
Never use	52%	45%	57%	49%	79%	78%
Use less than 1 day/week	25%	26%	26%	25%	6%	6%
Use about 1 day/week	9%	7%	5%	7%	7%	*
Use a few times/week	9%	14%	7%	11%	4%	16%
Use 1+ times/day	5%	8%	6%	9%	4%	*
N	**1025**	**849**	**535**	**619**	**210**	**66**

** denotes <0.5%; # denotes cases where the sample size is too small draw reliable conclusions.*

Source: U.S. DOT

Table 25. Use of Devices to Obtain Real-Time Traffic and Traveler Information (d)

Frequency of Use	Landline Baseline	Landline Endline	Another Person Baseline	Another Person Endline
Never use	91%	90%	43%	41%
Use less than 1 day/week	6%	4%	32%	34%
Use about 1 day/week	*	1%	12%	11%
Use a few times/week	1%	1%	8%	10%
Use 1+ times/day	2%	4%	5%	4%
N	**429**	**258**	**1335**	**1335**

** denotes <0.5%; # denotes cases where the sample size is too small draw reliable conclusions.*

Source: U.S. DOT

Note: usage frequency questions (except TV, radio, electronic signs, another person) only asked to those who indicated that they own a given device.

However, respondents did not always consistently describe their usage in the baseline and endline surveys; across all device types, an average of 105 respondents (7.8%) reported in the endline that they had never checked a given information source (device) for traffic information yet reported doing

so (even if only intermittently) in the baseline survey. Respondents may have only been considering the last year in responding, and not whether they had "ever" used the device.

Timing of device usage

For each of the devices used for traffic information, respondents were also asked when they consult the source – before, during, or both before and during their trip. Not surprisingly, radio and built-in navigation device tend to be used while traveling; almost two-thirds of regular radio users (check the radio for traffic information at least once weekly) do so exclusively during their trips, while about one-third do so both before and during their trips (across both survey waves). In the baseline and endline surveys, around half of built-in GPS users made use of their device exclusively during-trip, and about a third did so both before and during their trips. The overwhelming majority of laptop users (92% baseline, 84% endline) and a sizable share of tablet users (68% baseline, 84% endline) use their devices only before embarking on a trip.

In contrast, smartphone users tend to use their device both before and during their trips (45%). Approximately one-quarter reported using their smartphones exclusively pre-trip, and another quarter use their device exclusively during the trip. Finally, almost half of respondents who reported obtaining traffic information from other people do so exclusively before their trips in both baseline and endline. Unfortunately, the small sample sizes for portable navigation device and non-web enabled cell phone usage prevent reliable inference.

Table 26. When Devices are Checked for Real-Time Traffic or Transit Information

Note: timing questions only asked to those who report using the device at least one day per week.

Device	Before Trip	During Trip	Both Before/During	Number of Respondents
Radio				
Baseline	5%	64%	31%	1026
Endline	7%	64%	29%	937
Laptop				
Baseline	92%	3%	5%	225
Endline	84%	0%	15%	206
Tablet				
Baseline	68%	14%	18%	93
Endline	84%	2%	14%	139
Smartphone				
Baseline	29%	17%	44%	547
Endline	25%	29%	45%	799
Another person				
Baseline	46%	23%	32%	316
Endline	43%	30%	26%	335
Built-in Navigation device				
Baseline	22%	51%	27%	85
Endline	6%	56%	38%	76

Source: U.S. DOT

Use of specific information sources

Beyond inquiring about respondents' use of specific devices, the survey asked respondents to describe their use of specific telephone numbers, websites, social media, apps, and email/text alert systems. Overall, three sources of information were used significantly more often than other sources: Google website, Google app, and TV/Radio station websites. The results are discussed in detail below.

Among the website sources, Google Maps and TV/radio station websites were dominant. Nine percent of respondents used Google Maps daily to access traffic information in the baseline, and by the endline, 18% reported doing so. The share of respondents using Google Maps a few times per week saw a similar increase. Simultaneously, the share of respondents who had never heard of Google Maps decreased from 15 to 8%. The overall shift in Google Maps use is highly significant.[39] Aside from Google, the website source used most by respondents was TV/radio websites; nearly one-half of respondents have used this source (even if infrequently) in both baseline and endline surveys. The share of respondents consulting this source daily was similar across the baseline and endline surveys (12% and 15%, respectively), and the share using them a few times per week remained at roughly a tenth. Only 14% of respondents in the baseline had never heard of TV/radio websites, but a full 40% had heard of but never used them.

For all other sources of information, there is no meaningful increases in reported use from the baseline to the endline survey. While fewer respondents reported "never" having heard of a source, this did not translate into increased use. Rather, there is a greater number of respondents reporting they have "heard of but never use" the source. For example, for TX DOT websites, the proportion never having heard of this source decreased from 50% to 40%, while the proportion who have heard of but never use the source increased by the same amount (36% baseline to 46% endline). This increase in TX DOT site awareness is significant at the 5% level.[40]

The increased awareness for some sources may also be due to learning effects from the survey experience itself (e.g., being asked about their use of traveler information repeatedly over time). While there is no way to determine the extent to which such learning occurred, the increases in awareness were not consistent across all information sources, and in some cases, there was no shift in awareness. This suggests that survey– related learning may have been minimal.

[39] Rao and Scott X^2 test: uncorrected Pearson's X^2 (5 df) = 93.6; design-based F(5,13319) = 6.4, F statistic-based p-value = 0.00

[40] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 29.7; design-based F(1,2669) = 10.3, F statistic-based p-value = 0.0014

Table 27. Websites: Awareness and Use (a)

Frequency of Use	Google Maps/ Transit Baseline	Google Maps/ Transit Endline	TV or Radio Station Websites Baseline	TV or Radio Station Website Endline	Any TX DOT Website Baseline	Any TX DOT Website Endline	DART Online Trip Planner Baseline	DART Online Trip Planner Endline
Never heard of	15%	8%	14%	12%	50%	40%	51%	51%
Heard of but never used	33%	27%	40%	42%	36%	46%	38%	38%
Use less than 1 day/week	21%	18%	20%	13%	7%	8%	9%	10%
Use about 1 day/week	10%	11%	5%	7%	3%	2%	1%	*
Use a few times/week	12%	17%	9%	10%	2%	3%	1%	*
Use 1+ times/day	9%	18%	12%	15%	2%	1%	*	1%
N	**1335**	**1335**	**1335**	**1335**	**1335**	**1335**	**1335**	**1335**

** denotes <0.5%*

Source: U.S. DOT

Table 28. Websites: Awareness and Use (b)

Frequency of Use	Traffic.com Baseline	Traffic.com Endline	Bing Maps Baseline	Bing Maps Endline	Map Quest Baseline	Map Quest Endline	Other Websites Baseline	Other Websites Endline
Never heard of	51%	45%	39%	34%	27%	20%	62%	57%
Heard of but never used	34%	42%	52%	56%	50%	58%	31%	36%
Use less than 1 day/week	9%	9%	6%	5%	16%	12%	2%	2%
Use about 1 day/week	2%	2%	2%	1%	3%	4%	2%	1%
Use a few times/week	3%	2%	1%	2%	3%	4%	1%	1%
Use 1+ times/day	2%	1%	1%	2%	2%	2%	2%	2%
N	**1335**	**1335**	**1335**	**1335**	**1335**	**1335**	**1276**	**1335**

** denotes <0.5%*

Source: U.S. DOT

Among the mobile app-based purveyors of traffic information included in the survey, it is not surprising that Google Maps dominates; the survey results indicate that the share of respondents using this source increased from 54% to 63%. The overall change in the distribution of Google Maps use is highly significant.[41] In particular, the proportion of respondents who use Google Maps at least once per day increased by eight percentage points, from 13% to 21%, whereas the proportion that had

[41] Rao and Scott X^2 test: uncorrected Pearson's X^2 (5 df) = 66.6; design-based F(5,11665) = 4.5, F statistic-based p-value = 0.0004

never heard of Google Maps declined from 16% in the baseline to 9% in the endline. Both shifts are significant at the 1% level.[42]

Respondents used other app options much less frequently. Aside from Google app, respondents in the endline were most likely to report using Waze[43] (14% did so at least once a week or more often).

Awareness of DART and Traffic.com did increase over the survey period, as the share of the unaware fell from 55% to 42% for the DART app and from 58% to 47% for the Traffic.com app. As before, the percentage of respondents who had heard of but never used each rose over the course of the survey (from 39% to 51% for DART and from 33% to 42% for Traffic.com). These two apps, however, were used by fewer than 10% of respondents in both survey waves. The DalTrans and 511 apps saw even lower usage rates, as almost three quarters of respondents had never heard of each app; a further quarter had heard of but never used them. Nearly one-in-ten regularly used (one or more times per week) "other" apps that were not listed in the survey, significantly more than indicated they use "other" websites, social media, or alerts.

Table 29. Apps: Awareness and Use (a)

Among those who use a smartphone or tablet. Note: sample sizes vary due to survey error – some respondents did not receive all options. "511" and "Waze" options included only in endline survey.

Frequency of Use	Google Maps Baseline	Google Maps Endline	DART Baseline	DART Endline	Traffic.com Baseline	Traffic.com Endline	Waze Baseline	Waze Endline
Never heard of	16%	9%	55%	42%	58%	47%	Not Asked	55%
Heard of but never used	31%	27%	39%	51%	33%	42%	Not Asked	23%
Use less than 1 day/week	21%	17%	5%	6%	4%	6%	Not Asked	7%
Use about 1 day/ week	7%	9%	1%	*	2%	2%	Not Asked	2%
Use a few times/ week	13%	16%	*	*	2%	2%	Not Asked	6%
Use 1+ times/day	13%	21%	*	1%	1%	1%	Not Asked	6%
N	**1140**	**1210**	**1140**	**1210**	**1140**	**1210**	Not Asked	**1210**

** denotes <0.5%*

Source: U.S. DOT

[42] **Daily:** Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 31.4; design-based F(1,2349) = 9.7, F statistic-based p-value = 0.002; **Never:** Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 27.4; design-based F(1,2349) = 10.7, F statistic-based p-value = 0.001

[43] Waze was not included in the baseline survey. As of mid-2013, Waze is owned by Google.

Table 30. Apps: Awareness and Use (b)

Frequency of Use	DalTrans Baseline	DalTrans Endline	511 Baseline	511 Endline	Other Apps Baseline	Other Apps Endline
Never heard of	74%	69%	Not deployed	75%	61%	63%
Heard of but never used	23%	28%	Not deployed	23%	25%	27%
Use less than 1 day/week	1%	2%	Not deployed	1%	4%	2%
Use about 1 day/week	*	*	Not deployed	*	1%	2%
Use a few times/week	1%	*	Not deployed	1%	4%	3%
Use 1+ times/day	*	1%	Not deployed	*	5%	3%
N	**1140**	**1210**	Not deployed	**1210**	**1106**	**1210**

** denotes <0.5%*

Source: U.S. DOT

Email or text message alert sources suffer from a sheer lack of awareness among travelers. Almost two thirds of respondents had never heard of Traffic.com and DART alerts, but this share had declined slightly (to 59% and 55%, respectively) by the time of the endline survey, while the shares of respondents who had heard of but never used each alert service saw corresponding increases. The DalTrans and 511 alerts were even less well known to travelers; approximately three quarters of respondents had never heard of each of these services. Overall, fewer than 5% of respondents reported using any of the alert services listed in the survey.

Table 31. Alerts: Awareness and Use (a)

Frequency of Use	Traffic.com Baseline	Traffic.com Endline	DART Baseline	DART Endline	DalTrans Baseline	DalTrans Endline
Never heard of	64%	59%	62%	55%	75%	73%
Heard of but never used	30%	37%	35%	41%	24%	25%
Use less than 1 day/week	2%	2%	2%	3%	1%	*
Use about 1 day/week	1%	1%	*	*	1%	1%
Use a few times/week	1%	*	*	*	*	*
Use 1+ times/day	1%	1%	*	*	*	*
N	**1335**	**1335**	**1335**	**1335**	**1335**	**1335**

** denotes <0.5%*

Source: U.S. DOT

Table 32. Alerts: Awareness and Use (b)

Note: "511" option only included in endline survey

Frequency of Use	511 Baseline	511 Endline	Other Alerts Baseline	Other Alerts Endline
Never heard of	Not Deployed	79%	72%	77%
Heard of but never used	Not Deployed	19%	26%	22%
Use less than 1 day/week	Not Deployed	1%	1%	1%
Use about 1 day/week	Not Deployed	*	*	*
Use a few times/week	Not Deployed	*	*	*
Use 1+ times/day	Not Deployed	1%	1%	*
N	Not Deployed	**1335**	**1294**	**1335**

** denotes <0.5%*

Source: U.S. DOT

Respondents were also asked whether they used TX DOT, DART or 511 telephone numbers to obtain traffic information. Few respondents in our sample utilize these telephone services, and in fact, a majority have never heard of them. In the baseline, 65% of respondents had never heard of the TX DOT phone line, a share which did fall to 54% by the endline, as the share of respondents having heard of but never used the TX DOT service increased from roughly a third to 42%. Awareness and use of the DART phone line followed a similar pattern.

For the 511 service that was implemented as part of the ICM initiative, there is no baseline data, as the service was launched in April 2013. At the time of the endline survey (January 2015), a large majority of respondents – 81% - had not heard of the service and an additional 15% had heard of but never used it. Less than 1% of our sample reported using the 511 phone service.

Table 33. Telephone lines: Awareness and Use

Note: "511" option only included in endline survey

Use	TX DOT Baseline	TX DOT Endline	DART Baseline	DART Endline	511 Baseline	511 Endline	Other Phone # Baseline	Other Phone # Endline
Never heard of	65%	54%	68%	61%	Not Deployed	81%	85%	85%
Heard of but never used	32%	42%	29%	35%	Not Deployed	18%	15%	15%
Use less than 1 day/week	2%	3%	2%	4%	Not Deployed	*	1%	*
Use about 1 day/week	*	1%	*	*	Not Deployed	*	*	*
Use a few times/week	1%	1%	*	*	Not Deployed	*	*	*
Use 1+ times/day	1%	1%	*	*	Not Deployed	*	*	*
N	**1333**	**1335**	**1333**	**1335**	Not Deployed	**1335**	**1281**	**1335**

** denotes <0.5%*

Source: U.S. DOT

Awareness of the traffic information functionalities of social media websites was even lower than awareness of the aforementioned telephone sources and alerts. In the baseline, roughly four-fifths of respondents did not know that Twitter, Facebook, and YouTube provide real-time traffic information. The share of respondents who had used Facebook's traffic capability, however, did increase - from 3% to 8% -- over the course of the survey waves, a change that is significant at the 1% level.[44]
While fewer than 5 percent of respondents reported using Twitter and YouTube as a source of traffic information, the overall change in Twitter use, combining the 1+ times/day, a few times per week, and 1 day/week categories, is significant at the 5% level. [45]

Table 34. Social Media: Awareness and Use

Note: sample sizes vary due to survey error – some respondents did not receive all options

Use	Twitter Base-line	Twitter End-line	Face-book Base-line	Face-book End-line	YouTube Base-line	YouTube End-line	Other Social Media Base-line	Other Social Media End-line
Not aware provides traffic info	81%	76%	81%	76%	85%	85%	83%	81%
Aware source provides traffic info, but never used	17%	20%	16%	15%	14%	13%	15%	17%
Use less than 1 day/week	1%	2%	1%	3%	*	1%	1%	*
Use about 1 day/week	*	*	*	1%	*	*	*	1%
Use a few times/week	1%	1%	1%	2%	*	1%	*	*
Use 1+ times/day	*	1%	1%	2%	*	*	*	1%
N	**1335**	**1335**	**1335**	**1335**	**1335**	**1335**	**1298**	**1335**

** denotes <0.5%*

Source: U.S. DOT

These responses concerning specific information sources were unfortunately not always consistent with earlier responses regarding device usage. For almost every above category in the baseline and the endline – telephone, web, social media, app, and alert sources – up to 38 respondents claimed to use a specific information source, such as the Google Maps website – to access traffic information, but checked "never" when asked about their usage of every device that could possibly be used to access that specific source, in this example smartphones, desktops, laptops, and tablets. These

[44] Rao and Scott X^2 test: uncorrected Pearson's X^2 (3 df) = 31.9; design-based F(2.9,7837) = 3.9, F statistic-based p-value = 0.009
[45] Rao and Scott X^2 test: uncorrected Pearson's X^2 (3 df) = 21.7; design-based F(2.9,7650) = 2.8, F statistic-based p-value = 0.04

discrepancies may well reflect users' tendency to forget that the survey questions were intended to pertain only to instances where they used a device or source to access real-time traffic or traveler information.

Respondents were also asked when they consult each information source type – websites, apps, social media, telephone numbers and alerts. In the baseline, a large majority of users consulted websites (80%) exclusively before embarking on a trip, a pattern which held through the endline survey. A bare majority (51%) consulted social media only before departing for a trip, and more than one-third did so both before and during trips. Similar to usage of smartphones, about one-half of app users consulted apps both before and during their trips. One quarter of respondents consulted apps exclusively pre-trip, and another quarter did so exclusively during their trip. The small sample sizes for telephone sources and text alerts did not permit reliable inference.

Table 35. Timing of Information Source Use
Among respondents who consult source at least one day per week.

Timing of use	Websites Baseline	Websites Endline	Social Media Baseline	Social Media Endline	Apps Baseline	Apps Endline
Before trip	80%	78%	51%	51%	24%	21%
During trip	8%	11%	13%	11%	25%	25%
Both before and during trip	12%	11%	37%	38%	51%	54%
N	**674**	**825**	**40**	**73**	**451**	**679**

Source: U.S. DOT

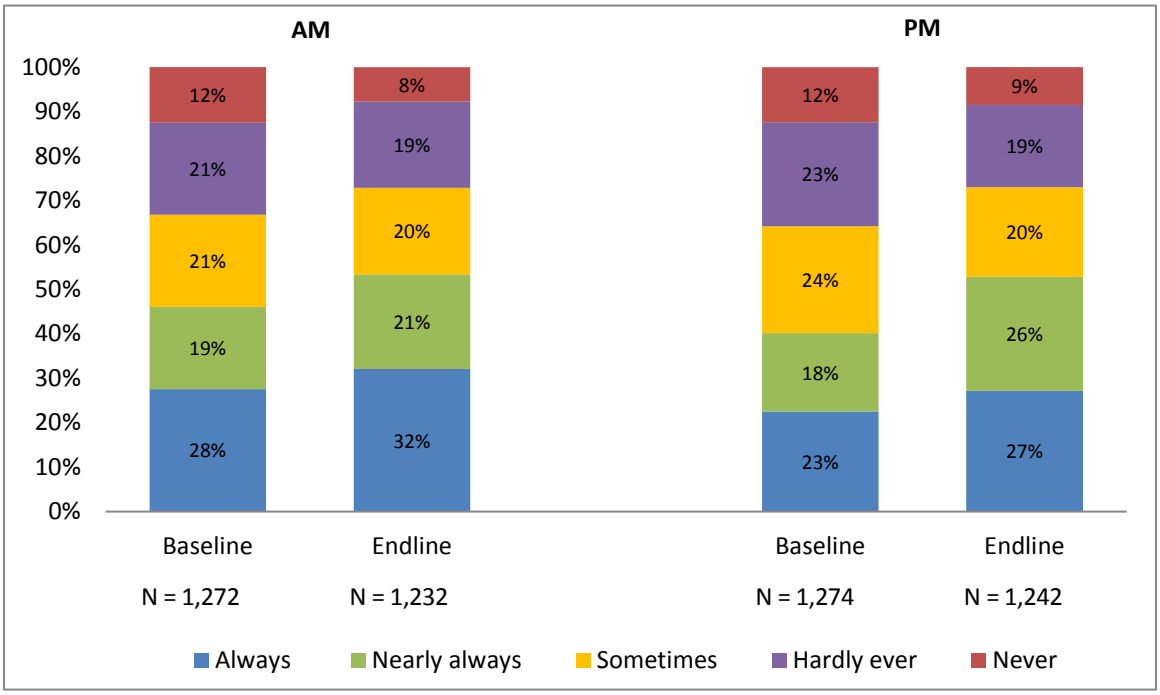
Use of real-time traveler information for peak hour reference trips

Overall, a majority of travelers make ample use of real-time information sources when traveling in the corridor, and use is somewhat more frequent in the morning compared to the afternoon (likely due to the more time constrained nature of morning trips). When asked how often they check traffic and traveler information for their morning and afternoon trips (using any device), 28% of travelers in the morning baseline and 23% in the afternoon baseline reported checking real time information every time they make a trip, i.e. "always." These proportions increased by 4 percentage points each from baseline to endline; similarly, the share of travelers "nearly always" checking real-time information rose by 2 percentage points to 21% in the morning and by a full 6 percentage points to 26% in the afternoon. In both survey waves, about a fifth of travelers in both the morning and the afternoon reported consulting information sources at least a few times per month ("sometimes") while a similar proportion consulted such sources less than monthly ("hardly ever"), and only about one-tenth reported never checking real time information. Overall, the baseline-to-endline changes in the frequency of utilizing real-time information for corridor trips are only borderline significant for morning trips[46] but highly significant for afternoon travel.[47]

[46] **Using disaggregated 5 response categories:** Rao and Scott X^2 test: uncorrected Pearson's X^2 (4 df) = 21.42; design-based F(3.94, 9867.9) = 1.8831, F statistic-based p-value = 0.1114
Using aggregated categories, always + nearly always, sometimes, hardly ever + never: Rao and Scott X^2 test: uncorrected Pearson's X^2 (2 df) = 14.7; design-based F(2, 5002) = 2.47, F statistic-based p-value = 0.0850

Figure 22. Frequency of Checking Real-Time Traffic and Traveler Information for US-75 Trip

Note: Figures include travelers who reported traveling 3+ times per week in that time period and who did not select "never" for all information devices in the previous question pertaining to their use



Source: U.S. DOT

The few travelers who indicated that they "never" check real time information for their corridor trips were asked to provide more information as to why they do not consult real-time traffic information. Results are presented with respect to morning peak hour trips (the sample size for afternoon trips was too small to allow reliable inference). In the baseline, respondents most often said they have to use the same route no matter what (40%), or they cited preexisting knowledge of traffic conditions (37%) as the reason why they do not check information. The share of respondents citing each of these reasons fell in the endline survey (to 26%).

In both baseline and endline, between one-quarter and one-third of travelers who never check information in the morning reported that they have no interest in checking (27%), while a similar proportion has no time to check. Around 16% reported that they don't have the need because "there isn't much traffic congestion on my trip." Respondents were less likely to mention issues related to

[47] **Disaggregated:** Rao and Scott X^2 test: uncorrected Pearson's X^2 (4 df) = 44.77; design-based F(3.96, 9965) = 4.02, F statistic-based p-value = 0.003
Aggregated: Rao and Scott X^2 test: uncorrected Pearson's X^2 (2 df) = 41.5; design-based F(2, 5026.7) = 7.2, F statistic-based p-value = 0.0008

data quality or availability, such as the information is not accurate or up-to-date (8%), the information is not detailed enough (8%), or information is not available for their trips (2%).

Table 36. Reasons Why Travelers Never Check Real-Time Information

Among travelers who "never" check information sources. Note: Multiple responses allowed; PM questions only asked to travelers who did not *answer corresponding AM question*

Reason	Morning Baseline	Morning Endline
Must use same route	40%	26%
No need - already know conditions	37%	26%
No interest in checking	27%	27%
No time to check	32%	26%
No need - little congestion	16%	11%
Info not accurate/up-to-date	8%	10%
Info not detailed enough	8%	3%
No info available	*	2%
Other	9%	14%
N	**158**	**110**
** denotes <0.5%*		

Source: U.S. DOT

Satisfaction with traveler information

In order to gauge user satisfaction with real-time traveler information, the survey asked respondents to rate their satisfaction with six content-based categories, including travel time and delay information for their usual routes, delay information for alternate routes, accident location information, information on the length of time needed to clear the road after an incident, real-time transit information, and parking availability at transit stations.

Overall, those who consult real-time information sources were quite satisfied with their experiences; except in one case, the share of travelers expressing a positive opinion ("very satisfied," "satisfied," or "somewhat satisfied," henceforth referred to simply as satisfied travelers) outweigh the share expressing negative opinions ("very dissatisfied," "dissatisfied," or "somewhat dissatisfied," or simply dissatisfied travelers).

In the baseline survey, respondents were most satisfied with accident location information; a majority (57%) were satisfied, while only 25% expressed any level of dissatisfaction. In the endline survey, the percentage satisfied grew to 64%, while only one-fifth were dissatisfied. The greatest shifts in percentage terms were seen among the various "positive" categories – in particular, 8% of respondents who reported being "somewhat satisfied" in the baseline indicated they were "satisfied" in the endline.

Travel time and delay information for travelers' usual routes also earned high marks: 50% were satisfied in the baseline and half as many were dissatisfied. In the endline, there was a significant increase in satisfaction, with as many as 66% reporting they were satisfied. In each case, about one-fifth (15% and 19%) reported ambivalence, i.e., "neither satisfied nor dissatisfied."

Travelers reported similar increases in satisfaction with travel time and delay information for alternate routes; the proportion satisfied increased from 35% to 52%. While the share of dissatisfied respondents did not see much change (from 20% to 17%), the share of ambivalent travelers fell from 29% in the baseline to 22% in the endline. The data demonstrate that many of those who were ambivalent in the baseline tended to be either "somewhat satisfied" or "satisfied" in the endline.

Only in regards to information on how long it took to clear incidents did dissatisfaction outweigh satisfaction in the baseline; 35% were dissatisfied, and 28% were satisfied. In the endline, however, roughly equal shares expressed positive and negative opinions (32% satisfied, 30% dissatisfied).

Not surprisingly, the transit-related categories drew mostly "not applicable responses," as many of the drivers in our sample never use transit for their trips in the corridor. In the baseline, 55% of respondents reported that real-time transit information did not apply to them, while 56% said so in regards to parking availability information at transit stations. Another quarter of travelers were ambivalent, indicating they were neither satisfied nor dissatisfied. The response patterns for these two questions remained almost identical from baseline to endline.

Table 37. **Overall Satisfaction with Traveler information Used for Reference Trip (a)**
Note: Includes only respondents who did not check "never" for both the AM and PM questions regarding the overall frequency of information use.

Satisfaction	Accident or Incident Location Info Baseline	Accident or Incident Location Info Endline	Travel time/ Delay Info; Usual Route Baseline	Travel time/ Delay Info; Usual Route Endline	Travel Time/Delay Info; Alternate Route Baseline	Travel Time/Delay Info; Alternate Route Endline
Very Dissatisfied	4%	3%	3%	2%	4%	2%
Dissatisfied	9%	6%	8%	3%	7%	4%
Somewhat dissatisfied	12%	11%	14%	11%	9%	11%
Neither satisfied nor dissatisfied	13%	13%	19%	15%	29%	22%
Somewhat satisfied	27%	23%	24%	25%	17%	21%
Satisfied	22%	29%	22%	32%	16%	25%
Very Satisfied	8%	12%	4%	9%	2%	6%
Info not available	1%	*	1%	*	3%	1%
Not applicable	4%	3%	5%	3%	12%	8%
N	**1208**	**1230**	**1208**	**1230**	**1208**	**1230**

** denotes <0.5%*

Source: U.S. DOT

Table 38. Overall Satisfaction with Traveler information Used for Reference Trip (b)

Satisfaction	Time it Took to Clear Incident Baseline	Time it Took to Clear Incident Endline	Real-time Transit Info Baseline	Real-time Transit Info Endline	Parking Availability @ Transit Stations Baseline	Parking Availability @ Transit Stations Endline
Very Dissatisfied	7%	5%	3%	3%	3%	2%
Dissatisfied	12%	10%	2%	2%	3%	2%
Somewhat dissatisfied	16%	15%	3%	2%	2%	2%
Neither satisfied nor dissatisfied	24%	25%	24%	22%	24%	21%
Somewhat satisfied	13%	13%	4%	3%	3%	3%
Satisfied	13%	14%	6%	5%	4%	6%
Very Satisfied	2%	5%	2%	2%	3%	2%
Info not available	4%	4%	2%	4%	2%	3%
Not applicable	9%	10%	55%	58%	56%	59%
N	**1208**	**1230**	**1208**	**1230**	**1208**	**1230**

** denotes <0.5% (Source: U.S. DOT)*

The endline survey also asked those respondents who reported using an information source type at least once per week to rate its overall usefulness. Travelers were most satisfied with apps – 80% selected 5, 6, or 7 (out of 7) for these sources. They were less enthusiastic about the usefulness of the other sources listed - websites, social media, and alerts. In each case, around half selected positive ratings (5, 6, 7), and 20% to 35% selected a negative rating, (1, 2, or 3). The sample size for telephone sources (N=26) was too small for reliable inference and is not shown in the table.

Table 39. Usefulness Ratings of Traveler Information Sources

Note: includes only respondents who check source type one day per week or more often

Endline: usefulness rating	Website	Social Media	Apps	Alerts
1 - Not at all useful	6%	10%	3%	4%
2	8%	3%	3%	10%
3	7%	22%	5%	17%
4 - Neutral	27%	19%	9%	21%
5	21%	14%	12%	9%
6	17%	21%	30%	10%
7 - Very useful	14%	11%	37%	29%
N	**825**	**73**	**679**	**52**

Source: U.S. DOT

Traveler Behavior Changes

Changes before trip

A separate question explored travel behavior changes that respondents have made before starting their trip, in response to learning about traffic congestion. Respondents were asked the whether they have made any of the following changes (in the last month, not in the last month, or never):

- Started trip earlier
- Started trip later
- Completely changed route
- Made minor changes to route
- Changed number or order of stops
- Chose to use public transit
- Chose to carpool
- Chose not to make the trip at all
- Chose to telecommute

Overall, responses were quite similar in the baseline and endline surveys, and there were no significant shifts on this general measure of how travelers respond to pre-trip information about traffic congestion on their route.

The data indicate that respondents are most likely to change their route or the timing of their trips before leaving (due to learning about traffic congestion); in the baseline, 57% reported minor route changes in the last month, 46% had completely changed their route, and 48% had started their trips earlier. In each case, between 23% and 33% had done so outside of the previous month, and between 10% and 25% had never made the change. Somewhat fewer respondents reported leaving later for their trip in the last month (33% in the baseline and 27% in the endline), and 41% reported never having done so. These shares all remain surprisingly consistent through the endline survey, save for the share of respondents who had started their trip earlier in the last month, which fell from 48% to 39%, and the percentage of those who had done so but not in the last month, which rose from 26% to 34%. Both changes are significant at the 1% level.[48]

In the last month, about one-fifth of travelers in each survey wave had changed the stops they planned to make before starting their trip; a similar proportion had done so outside of the previous month, and about half had never done so.

In contrast, at the time of the baseline, large majorities of respondents had never switched to transit (74%), decided to carpool (74%), chosen not to make a trip at all (66%), or chosen to telecommute (68%), and only small fractions had made these changes pre-trip in the last month (transit, 5%; carpool, 9%; cancel trip, 9%; telecommute, 8%). Most of these shares remained constant through the endline, with the exception of the share of people who had chosen to carpool instead of using their usual mode in the last month, which dropped to 4% in the endline, a change which is highly significant.[49] In each case, a further 10% to 16% had made each change before the last month. Unfortunately, these data also contain inconsistencies; for each change, between 81 and 201 respondents (6% to 15%) reported never having made the change in the endline survey yet indicated that they *had* made the change in the baseline.

[48] **In last month:** Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 21; design-based F(1, 2669) = 7.03, F statistic-based p-value = 0.008
Done but not in last month: Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 21; design-based F(1, 2669) = 7.24, F statistic-based p-value = 0.007

[49] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 34.8; design-based F(1, 2669) = 12.8, F statistic-based p-value = 0.0003

Table 40. Pre-Trip Changes Due to Learning about Traffic Congestion (a)

Frequency	Minor Route Changes Baseline	Minor Route Changes Endline	Completely Changed Route Baseline	Completely Changed Route Endline	Started Trip Earlier Baseline	Started Trip Earlier Endline
Never done this	16%	10%	21%	19%	24%	24%
Done but not in last month	26%	31%	31%	33%	26%	34%
Done in last month	57%	55%	46%	45%	48%	39%
N/A	2%	3%	2%	2%	2%	3%
N	**1335**	**1335**	**1335**	**1335**	**1335**	**1335**

Source: U.S. DOT

Table 41. Pre-Trip Changes Due to Learning about Traffic Congestion (b)

Frequency	Started Trip Later Baseline	Started Trip Later Endline	Changed Stops Baseline	Changed Stops Endline	Chose Transit Baseline	Chose Transit Endline
Never done this	41%	39%	47%	51%	74%	78%
Done but not in last month	23%	28%	21%	21%	13%	10%
Done in last month	33%	27%	22%	18%	5%	3%
N/A	4%	6%	10%	11%	8%	9%
N	**1335**	**1335**	**1335**	**1335**	**1335**	**1335**

Source: U.S. DOT

Table 42. Pre-Trip Changes Due to Learning about Traffic Congestion (c)

Frequency	Chose to Carpool Base-line	Chose to Carpool End-line	Chose Not to Make Trip Baseline	Chose Not to Make Trip Endline	Chose to Telecommute Baseline	Chose to Telecommute Endline
Never done this	74%	77%	66%	63%	68%	66%
Done but not in last month	7%	9%	14%	16%	9%	11%
Done in last month	9%	4%	9%	8%	8%	7%
N/A	10%	11%	11%	13%	15%	17%
N	**1335**	**1335**	**1335**	**1335**	**1335**	**1335**

Source: U.S. DOT

Changes during trip

In a related series of questions, respondents were asked about the changes they make during their trip, as a result of learning about traffic congestion while en-route. Specifically, respondents were asked the whether they have made any of the following changes (in the last month, not in the last month, or never):

- Used a completely different route
- Made small changes to planned route
- Changed the number or order of stops
- Parked and used public transit instead of driving
- Turned around and returned to where they started the trip

Similar to travel changes made pre-trip, travelers tended to either have made small changes to their route in the last month (62%, baseline) or to have completely changed their route in the last month (45%, baseline). In addition, 25% had changed the number or order of their stops due to knowledge of traffic conditions. Only 10% had never made minor route changes, and 21% had never completely changed their route; but significantly more respondents - 44% - had never changed the stops they planned to make. The pattern of responses is very similar across the baseline and endline surveys, with the exception of small shifts in the share of travelers who completely change their route. The share who have never done so decreased by 4 percentage points (the overall changes in the distribution of this measure is significant at the 5% level).[50]

When learning about traffic congestion while en-route, very few respondents decide to switch to transit or to cancel their trip; 83% (baseline) reported never having parked and switched to transit during their trip, and 79% have never turned around. In the last month, only 3% and 4%, respectively, had parked to use transit or turned around. These numbers remain relatively consistent across the two surveys. Here again, between 50 and 128 respondents per change category reported never having made a change in the endline even after claiming to have made it at the time of the baseline survey.

[50] Rao and Scott X^2 test: uncorrected Pearson's X^2 (3 df) = 24.7; design-based F(3,8004) = 2.8, F statistic-based p-value = 0.04

Table 43. Changes made DURING trip Due to Learning about Traffic Congestion (a)

Frequency	Completely Changed Route Baseline	Completely Changed Route Endline	Minor Route Baseline	Minor Route Endline	Changed Stops Baseline	Changed Stops Endline
Never done this	21%	17%	10%	7%	44%	45%
Done but not in last month	33%	38%	27%	32%	22%	24%
Done in last month	45%	41%	62%	60%	25%	22%
N/A	1%	3%	1%	1%	9%	9%
N	**1335**	**1335**	**1335**	**1335**	**1335**	**1335**

Source: U.S. DOT

Table 44. Changes made DURING trip Due to Learning about Traffic Congestion (b)

Frequency	Parked and Used Transit Baseline	Parked and Used Transit Endline	Turned Around Baseline	Turned Around Endline
Never done this	83%	87%	79%	78%
Done but not in last month	8%	4%	12%	14%
Done in last month	3%	3%	4%	4%
N/A	6%	6%	4%	4%
N	**1335**	**1335**	**1335**	**1335**

Source: U.S. DOT

Trip Satisfaction

US-75

The survey asked travelers to rate their level of satisfaction[51] with several aspects of their trips on US-75, including predictability of travel time, level of traffic congestion, overall driving time, and lane width. The latter measure, lane width, was used as a control to test the reliability of the measures. Since the sites did not change the width of the lanes over the course of the two year study, we would expect ratings to remain similar. While significant changes in satisfaction with lane width might raise concerns about the reliability of these measures, it could also provide a calibration for exogenous factors affecting satisfaction. Overall, lane width saw no change in satisfaction, with a majority being satisfied in both the morning peak and the afternoon peak across the two survey waves.

For the other measures, including level of traffic congestion, driving time and predictability of trip time, travelers gave more negative marks overall, and they consistently were more dissatisfied in the

[51] A seven point satisfaction scale was used, which included the following ratings: very dissatisfied, dissatisfied, somewhat dissatisfied, neither satisfied or dissatisfied, somewhat satisfied, satisfied, and very satisfied.

afternoon compared to the morning. When analyzed over time (pre- vs. post-ICM), there are small shifts, for some measures, in the direction of greater satisfaction (or less dissatisfaction).

Three quarters of travelers were dissatisfied ("very dissatisfied," "dissatisfied," or "somewhat dissatisfied") with the level of congestion during their morning trips in the baseline, and only 17% were satisfied – these shares held through the endline. In the baseline, fully 84% were dissatisfied with the afternoon level of congestion, and 9% reported being satisfied. By the endline survey, satisfaction with congestion did increase moderately from 9% to 16%.

Likewise, satisfaction with morning driving time on US-75 increased marginally over the course of the survey from 25% to 30%, while the share of travelers who were dissatisfied decreased by a significant[52] 8 percentage points from 63% to 54%. Similarly, the share of travelers dissatisfied with afternoon driving times decreased from 76% (baseline) to 70% (endline).

Relative to other measures, somewhat fewer travelers were dissatisfied with the predictability of their trip time. In the baseline survey, 47% of travelers were dissatisfied, compared to 40% who were satisfied. In the endline survey, fewer travelers were dissatisfied (37%). While there was no significant increase in satisfaction, by the endline, satisfaction did outweigh dissatisfaction (45% vs. 37%). For afternoon trips, responses were more polarized – 62% of baseline respondents reported dissatisfaction with the predictability (26% were satisfied), but satisfaction did increase slightly to 30% as the percentage dissatisfied fell to 53% from baseline to endline.

Only in regards to lane width did more than 5% of travelers ever select "very satisfied;" conversely, anywhere from 10% to 35% of respondents expressed extreme dissatisfaction ("very dissatisfied") with the other measures.

Table 45. Satisfaction with Different Aspects of US-75 Reference Trip (a)

Satisfaction	Predictability of Trip Times-Morning Baseline	Predictability of Trip Times-Morning Endline	Predictability of Trip Times-Afternoon Baseline	Predictability of Trip Times-Afternoon Endline
Very Dissatisfied	11%	9%	20%	15%
Dissatisfied	18%	11%	21%	20%
Somewhat Dissatisfied	18%	17%	21%	18%
Neither Satisfied nor Dissatisfied	13%	19%	13%	17%
Somewhat Satisfied	24%	24%	17%	16%
Satisfied	14%	17%	7%	11%
Very Satisfied	2%	4%	2%	3%
N	**1272**	**1242**	**1274**	**1252**

Source: U.S. DOT

[52] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 16.98; design-based F(1,2509) = 5.9, F statistic-based p-value = 0.015

Table 46. Satisfaction with Different Aspects of US-75 Reference Trip (b)

Satisfaction	Congestion Morning Baseline	Congestion Morning Endline	Congestion Afternoon Baseline	Congestion Afternoon Endline
Very Dissatisfied	24%	19%	35%	29%
Dissatisfied	27%	24%	30%	30%
Somewhat Dissatisfied	22%	26%	20%	19%
Neither Satisfied nor Dissatisfied	9%	11%	7%	7%
Somewhat Satisfied	10%	10%	6%	10%
Satisfied	6%	9%	3%	5%
Very Satisfied	1%	2%	0%	1%
N	**1272**	**1242**	**1274**	**1252**

Source: U.S. DOT

Table 47. Satisfaction with Different Aspects of US-75 Reference Trip (c)

Satisfaction	Driving Time Morning Baseline	Driving Time Morning Endline	Driving Time Afternoon Baseline	Driving Time Afternoon Endline
Very Dissatisfied	18%	12%	26%	21%
Dissatisfied	23%	20%	30%	27%
Somewhat Dissatisfied	22%	22%	20%	22%
Neither Satisfied nor Dissatisfied	12%	16%	9%	11%
Somewhat Satisfied	12%	16%	9%	10%
Satisfied	12%	11%	5%	7%
Very Satisfied	1%	3%	1%	2%
N	**1272**	**1242**	**1274**	**1252**

Source: U.S. DOT

Table 48. Satisfaction with Different Aspects of US-75 Reference Trip (d)

Satisfaction	Lane Width Morning Baseline	Lane Width Morning Endline	Lane Width Afternoon Baseline	Lane Width Afternoon Endline
Very Dissatisfied	10%	9%	11%	9%
Dissatisfied	7%	9%	9%	11%
Somewhat Dissatisfied	10%	11%	10%	10%
Neither Satisfied nor Dissatisfied	20%	18%	23%	21%
Somewhat Satisfied	16%	16%	14%	16%
Satisfied	29%	27%	26%	24%
Very Satisfied	8%	10%	8%	10%
N	**1272**	**1242**	**1274**	**1252**

Source: U.S. DOT

Greenville Avenue

Additionally, travelers who used Greenville Avenue as part of their reference trip were asked to rate their satisfaction with predictability of trip time, level of traffic congestion, and amount of time spent at red lights. Interestingly, travelers' ratings of the predictability of trip time and level of traffic congestion on Greenville Avenue were more positive than the same assessments for US-75, and there was a significant increase in satisfaction on these measures across the two survey waves.

At the time of the baseline survey, 45% of Greenville travelers were satisfied with the predictability of their morning trip ("very satisfied," "satisfied," or "somewhat satisfied") compared to 34% who indicated dissatisfaction. In the endline, the percentage of travelers who were satisfied increased to 55% for morning trips. Satisfaction with the predictability of afternoon trips was also higher in the endline, as the percentage satisfied rose from 39% to 46%.

In regards to congestion on Greenville Avenue, 36% of morning travelers were satisfied and 39% were dissatisfied. For afternoon trips, the number of dissatisfied travelers outweighed the satisfied (49% to 27%). By the endline, however, satisfaction had increased; 46% of Greenville travelers were satisfied with the level of congestion in the morning, compared to 31% who were dissatisfied. In the afternoon, ratings were more mixed; 40% each expressed satisfaction and dissatisfaction with the level of congestion, but this still represents an increase in satisfaction from the baseline period.

Red lights, on the other hand, are a source of greater dissatisfaction. In the baseline, roughly 60% of respondents were dissatisfied with the amount of time spent at red lights – both for morning and afternoon trips - while only a fifth expressed satisfaction. By the endline, however, closer to 50% rated the time spent at red lights negatively, and almost a third selected either "somewhat satisfied," "satisfied," or "very satisfied."

Table 49. **Satisfaction with Different Aspects of Greenville Avenue on Reference Trip** (a)

Note: Greenville questions only for respondents who use Greenville as part of reference trip

Satisfaction	Predictability of Trip Time Morning Baseline	Predictability of Trip Time Morning Endline	Predictability of Trip Time Afternoon Baseline	Predictability of Trip Time Afternoon Endline
Very Dissatisfied	3%	1%	8%	4%
Dissatisfied	13%	12%	11%	7%
Somewhat Dissatisfied	18%	14%	19%	21%
Neither Satisfied nor Dissatisfied	22%	18%	24%	22%
Somewhat Satisfied	23%	28%	28%	27%
Satisfied	20%	24%	10%	16%
Very Satisfied	2%	3%	1%	3%
N	**348**	**315**	**372**	**365**

Source: U.S. DOT

Table 50. Satisfaction with Different Aspects of Greenville Avenue on Reference Trip (b)

Satisfaction	Congestion Morning Baseline	Congestion Morning Endline	Congestion Afternoon Baseline	Congestion Afternoon Endline
Very Dissatisfied	3%	2%	12%	6%
Dissatisfied	13%	12%	14%	12%
Somewhat Dissatisfied	23%	17%	23%	21%
Neither Satisfied nor Dissatisfied	25%	22%	25%	20%
Somewhat Satisfied	26%	23%	22%	23%
Satisfied	9%	21%	4%	13%
Very Satisfied	1%	2%	1%	4%
N	**348**	**315**	**372**	**365**

Source: U.S. DOT

Table 51. Satisfaction with Different Aspects of Greenville Avenue on Reference Trip (c)

Satisfaction	Time Spent at Red Lights Morning Baseline	Time Spent at Red Lights Morning Endline	Time Spent at Red Lights Afternoon Baseline	Time Spent at Red Lights Afternoon Endline
Very Dissatisfied	15%	7%	17%	8%
Dissatisfied	19%	24%	16%	25%
Somewhat Dissatisfied	26%	21%	22%	20%

Satisfaction	Time Spent at Red Lights Morning Baseline	Time Spent at Red Lights Morning Endline	Time Spent at Red Lights Afternoon Baseline	Time Spent at Red Lights Afternoon Endline
Neither Satisfied nor Dissatisfied	19%	16%	25%	17%
Somewhat Satisfied	16%	18%	16%	14%
Satisfied	4%	14%	4%	14%
Very Satisfied	1%	1%	1%	2%
N	**348**	**315**	**372**	**365**

Source: U.S. DOT

Pulse Survey Results

This section describes findings from the pulse surveys. In addition to the person-level baseline and endline surveys, the ICM survey included a series of pulse surveys which were administered after incidents in the US-75 corridor. Based on their travel profile, respondents who were likely to be traveling on US-75 at the time of the incident were invited to participate in the pulse survey. The pulse surveys measured respondents' use of real time traffic information and the impact of that information on their travel behavior under incident conditions.

These surveys produced trip-level data, and so the analysis that follows looks at the shares of *trips*. Many respondents filled out multiple surveys, i.e. made multiple qualifying trips, in each wave, and some did not fill out any surveys in one wave. For those who completed multiple surveys in the same wave, weights were used so that for any given individual the sum of all weighted surveys is equal is one.

It should be noted that results are presented separately for reverse peak direction trips (e.g. northbound in the morning and southbound in the afternoon), because incidents occurring in the reverse peak direction tend to have somewhat different characteristics (less congestion, overall). Likewise, where possible (e.g., sample sizes are sufficient), peak direction pulse surveys are stratified by morning peak direction (southbound) versus afternoon peak direction (northbound).

Finally, as reported in the methodology section, there were two pulse surveys in the AM peak – one during the pre-ICM survey wave and one in the post-ICM survey wave - that involved a fatality and a temporary closure of US-75. For a number of questions, results are presented both with and without these two pulse surveys. In particular, the fatality incident in the post –ICM period made up a disproportionate share of all pulse survey responses for the post period, and thus tended to have an even greater impact on the overall data.

Travel Characteristics

This section of the report summarizes findings on the trips that respondents made in the corridor following incident conditions. Findings on the characteristics of the trip, use of and satisfaction with real time traffic information, and the impact of that information on their travel are presented.

Trip purpose

The vast majority of trips across the two survey waves were trips traveling to or from work, with other trip purposes making up a relatively small portion of trips. Eighty-one percent of peak direction trips were for commuting purposes in both waves of the survey, and an additional 3% to 6% were either business-related travel or commuting to school. Trips in the non-peak direction, however, were somewhat less likely to be commute trips (64% pre-ICM; 76% post-ICM). In particular, a greater number of respondents traveling in the reverse peak direction were making social/recreational trips.

Table 52. Trip Purpose

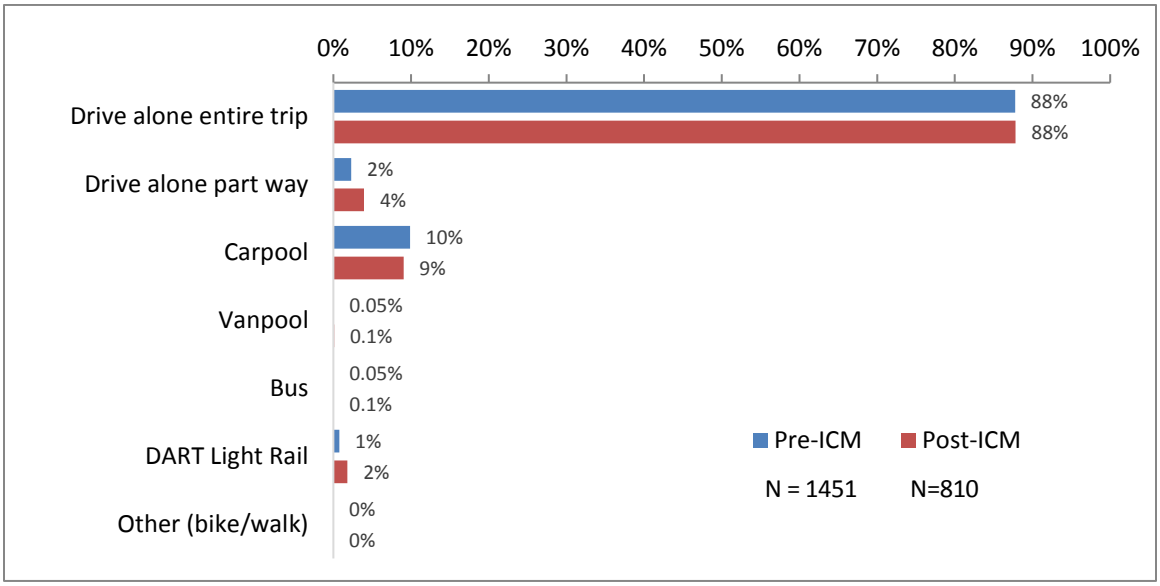
Trip Purpose	Peak Direction Pre-ICM	Peak Direction Post-ICM	Reverse Peak Direction Pre-ICM	Reverse Peak Direction Post-ICM
Go to/from work	81%	81%	64%	76%
Business-related travel	3%	6%	7%	3%
Go to/from school/college	5%	4%	3%	3%
Drop off/pick up children from school	2%	2%	3%	3%
Go to/from the airport	1%	0%	0%	1%
Shopping trip	1%	2%	3%	3%
Social/recreational trip	2%	2%	9%	7%
Other personal business	2%	3%	7%	3%
Other type of trip	1%	0%	4%	1%
N	**2191**	**1418**	**627**	**1113**

Source: U.S. DOT

Mode

In each wave, close to 90% of peak trips were made by travelers driving alone the entire way. A further 9% were made by carpooling, but every other mode made up only negligible shares of peak trips. Mode choice for reverse-peak trips (not included in the chart) closely mirrored that of peak direction trips.

Figure 23. Mode Choice, Peak Direction Trips



Source: U.S. DOT

Roads used

Across all time periods and waves, surveyed travelers overwhelmingly used the US-75 regular lanes, and to a lesser extent, its frontage roads. In each time period both before and after deployment of ICM, travelers reported using US-75 during close to 90% of trips. During the pre-ICM survey period, travelers reported using the US-75 frontage roads for 37% of peak trips and 27% of reverse direction trips. In the post-ICM period, the overall findings were very similar. Across both waves, about a tenth of trips involved Greenville/North Plano Road/K. Avenue, while even fewer involved the US-75 HOV lanes.

Table 53. Roads Used in US-75 Corridor

Road	Peak	Reverse
US-75 regular lanes		
Pre-ICM	91%	86%
Post-ICM	87%	92%
US-75 frontage roads		
Pre-ICM	37%	27%
Post-ICM	35%	32%
Greenville/N. Plano/K		
Pre-ICM	13%	10%
Post-ICM	13%	10%
US-75 HOV lanes		
Pre-ICM	7%	6%
Post-ICM	5%	4%
Other		
Pre-ICM	10%	9%
Post-ICM	6%	4%
N (Pre-ICM)	**2191**	**627**
N (Post-ICM)	**1418**	**1113**

Source: U.S. DOT

Delay due to congestion

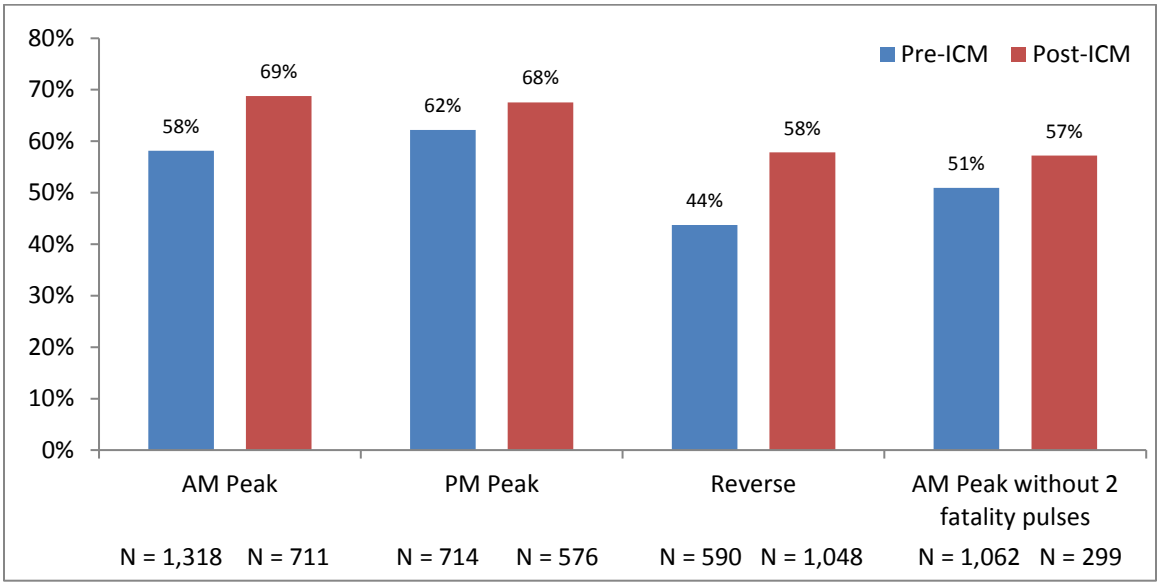
In both the pre and post-ICM survey periods, a majority of US-75 trips were delayed on US-75 by heavier than normal traffic congestion. This is not surprising, given that the pulse methodology was intentionally designed to survey drivers who likely were affected by an incident in the corridor. Results for this question were analyzed separately for morning and afternoon peak direction trips, in addition to reverse direction trips. In the morning peak, the share of trips experiencing greater than normal congestion was 58% in the pre-ICM period and 69% in the post-ICM period, a difference that

is significant at the 5% level.[53] However, when the two pulse surveys that involved a fatality are removed from the analysis, the increase is no longer statistically significant (51% pre-ICM, 57% post-ICM).[54] In the PM peak, the difference in measures (62% pre-ICM and 68% post-ICM) is not statistically significant.[55]

In both waves, reverse peak travelers were less likely to experience delays, compared to peak direction travelers. However, across the survey waves, there is an increase in the number of reverse peak travelers who experience delay – from 44% in the pre-ICM period to 58% in the post-ICM period. This does not necessarily mean that incident conditions in the reverse peak direction on US-75 were worse in the post-ICM period. The increase may also be explained by factors related to the pulse methodology, as more travelers who were affected by the incident may have been invited (or responded) to the pulse survey in the post-ICM period as compared to the pre-ICM period.

Figure 24. Travelers Experiencing Delay Due to Traffic Congestion

Among travelers who used US-75 regular or HOV lanes



Source: U.S. DOT

Those travelers who were delayed by heavier than normal congestion on US-75 were asked if the traffic congestion they faced was "a little heaver" "somewhat heavier," or "significantly heavier" than a typical day. In the pre-ICM period, a majority of those traveling in the peak direction experienced

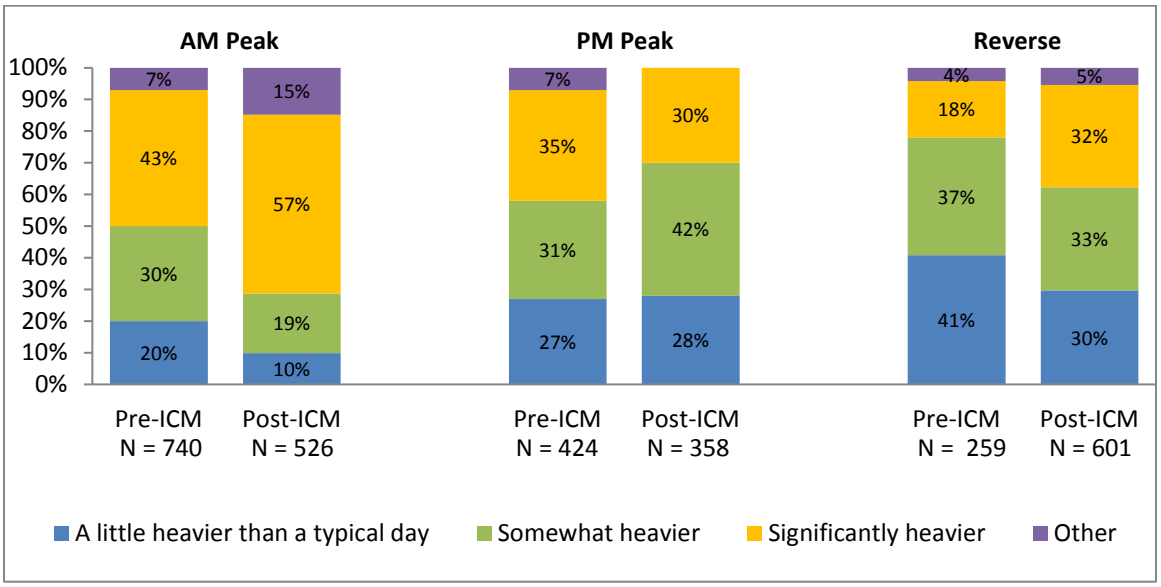
[53] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 22.3; design-based F(1,2028) = 6.0, F statistic-based p-value = 0.018
[54] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 3.98; design-based F(1,1360) = 0.86, F statistic-based p-value = 0.35
[55] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 3.98; design-based F(1,1289) = 1.19, F statistic-based p-value = 0.27

"somewhat heavier" or "significantly heavier" congestion – 73% in the AM peak and 66% in the PM peak and 55% of reverse direction trips.

The proportion of morning peak trips for which the traveler reported "significantly heavier" congestion was 43% pre-ICM and 57% post-ICM. When the two pulse surveys that involved a fatality are removed from the AM peak analysis, the difference persists, with an increase in the share of trips experiencing "significantly greater" traffic congestion (from 34% to 46%). Likewise, for reverse peak trips, travelers were more likely to experience significantly heavier traffic congestion in the post-ICM period compared to the pre-ICM period (18% pre-ICM vs. 32% post-ICM period).

Figure 25. Level of Traffic Congestion on US-75 Compared to a Typical Day

Among travelers who were delayed by congestion on US-75



Source: U.S. DOT

Use of Traveler Information

Sources consulted before trip

In order to understand the use and impact of real time traffic information, respondents were asked to indicate which sources of information they consulted, if any, both before leaving for their trip as well as during their trip. Results were analyzed separately for morning and afternoon peak direction trips, as well as for reverse peak direction trips.

Across the two survey waves, a majority of travelers in both the morning and afternoon peak periods did not check any real-time information before their trips. For AM peak trips, about one half of travelers did not consult any information pre-trip (54% pre-ICM and 52% post-ICM). For PM peak trips, even more respondents – about six-in-ten- did not consult any sources pre-trip (65% pre-ICM and 61% post-ICM).

Among the sources listed, travelers were most likely to consult radio, TV, and apps prior to departing for their trip. With the exception of apps, the use of sources generally changed little between the pre- and post-ICM periods.

In both waves, 24% of AM peak trips as well as about a fifth each of PM peak and reverse direction trips saw the traveler consult the radio before leaving. 18% of pre-ICM AM peak trips involved pre-trip TV usage, compared to 5% of reverse direction and 1% of PM peak trips – these shares changed little over the course of the survey timeframe. Excluding the two pulse incidents involving a fatality, however, produces a slight decrease in AM peak TV use from the pre- to post-ICM periods (from 15% pre-ICM to 8% post-ICM).

In the pre-ICM period, travelers reported using apps before traveling for about 10% of trips in the morning as well as the afternoon peak period; this share increased slightly for the peak periods and doubled for the reverse direction by the post-ICM period.

Around 5% of trips in the PM peak and reverse periods involve pre-trip website use, and between 2% and 6% of trips in each time period and wave involve pre-trip portable navigation use; travelers use the remaining sources for even fewer trips.

Table 54. Information Sources Consulted Before Trip

Source	AM Peak	PM Peak	Reverse
Apps			
Pre-ICM	10%	10%	10%
Post-ICM	14%	14%	20%
Television			
Pre-ICM	18%	1%	5%
Post-ICM	20%	1%	7%
Radio			
Pre-ICM	24%	19%	18%
Post-ICM	24%	18%	22%
Websites			
Pre-ICM	3%	4%	4%
Post-ICM	1%	5%	7%
Portable navigation			
Pre-ICM	3%	4%	2%
Post-ICM	3%	6%	6%
Alerts			
Pre-ICM	*	*	*
Post-ICM	*	1%	1%
Social Media			
Pre-ICM	*	1%	*
Post-ICM	3%	*	1%
Phone number			
Pre-ICM	*	*	*
Post-ICM	*	*	*
Another person			
Pre-ICM	3%	1%	1%
Post-ICM	3%	1%	3%

Source	AM Peak	PM Peak	Reverse
Built-in navigation			
Pre-ICM	1%	2%	*
Post-ICM	2%	1%	2%
Other			
Pre-ICM	1%	1%	1%
Post-ICM	1%	1%	1%
Did not check			
Pre-ICM	54%	65%	68%
Post-ICM	52%	61%	50%
N (Pre-ICM)	**1451**	**740**	**627**
N (Post ICM)	**810**	**608**	**1113**

Source: U.S. DOT

Specific information sources consulted before trip

Among app users, sample sizes were sufficient to report statistics on the use of specific apps.[56] Prior to departing for their trip, app users most frequently checked Google Maps. Inrix, TX DOT/Daltrans, or Traffic.com experienced lower but non-trivial levels of use. In the post-ICM period, travelers reported using 511 for less than 0.5% of trips, largely due to a lack of awareness of the service.

In the pre-ICM period, 47% of app users consulted Google Maps before their AM peak trips, and two thirds (67%) did so before embarking on their afternoon peak trips. In addition, 60% of non-peak direction travelers consulted the Google app. In the post-ICM period, the share of travelers using the Google app prior to their afternoon trips[57] and for their non-peak direction trips had increased by an insignificant twelve percentage points and nine percentage points, respectively (morning use Google Maps remained stable).

Inrix saw lower levels of use, as only 14% of app users' AM peak trips, 13% of PM peak trips, and 6% of reverse direction trips involved use of the app pre-trip. While the AM peak and reverse shares fell slightly, the PM peak use share fell by a full 8 percentage points.

The TX DOT, Daltrans and Traffic.com apps were generally used pre-trip for about 7% of app users' trips across both waves and most time periods. These shares either remained constant or declined only slightly between the pre- and the post-ICM periods.

[56] For other information sources, including websites, text alerts and telephone numbers, the sample sizes were too small to make reliable inferences.

[57] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 4.3; design-based F(1,226) = 1.8, F statistic-based p-value = 0.18

Table 55. Smartphone or Tablet Apps Checked for Real-Time Information Before Starting Trip

Among travelers who reported checking apps before traveling

Source	AM Peak	PM Peak	Reverse
Google Maps			
Pre-ICM	47%	67%	60%
Post-ICM	49%	79%	69%
Inrix			
Pre-ICM	14%	13%	6%
Post-ICM	11%	5%	4%
TX DOT/ Daltrans			
Pre-ICM	7%	6%	7%
Post-ICM	8%	1%	5%
Traffic.com			
Pre-ICM	7%	8%	*
Post-ICM	2%	1%	8%
DART			
Pre-ICM	*	1%	3%
Post-ICM	1%	1%	2%
511			
Post-ICM	*	*	*
Other			
Pre-ICM	30%	20%	34%
Post-ICM	33%	16%	21%
N (Pre-ICM)	**154**	**105**	**71**
N (Post-ICM)	**149**	**122**	**223**
** denotes <0.5%*			
***Note:** 511 option not included in pre-ICM surveys*			

Source: U.S. DOT

Devices checked before trip

Travelers who reported consulting alerts, websites, apps, social media, or telephone lines before traveling overwhelmingly used smartphones to access this real-time traveler information. Smaller shares used desktops, laptops, tablets, or non-web enabled cell phones[58]. In the pre-ICM period, travelers who consulted information pre-trip reported using a smartphone to do so for 72% of AM peak

[58] These travelers may have also used the radio as an information source. For findings on the use of radio relative to other information sources see Table 37.

trips, 62% of PM peak, and 62% of reverse direction trips; these shares remained constant in the post-ICM period.

In the pre-ICM period, roughly 10% to 15% of this subgroup of travelers' trips involved the use of desktops and the use of laptops in each time period (AM and PM peak), while slightly lower shares used a tablet pre-trip. In the post-ICM period, desktop use appears to have increased slightly in the afternoon peak period, and laptop use decreased slightly; but these changes are not significant.[59]

Interestingly, there was an increase in the use of non-web enabled cell phones across the surveys; however, these increases likely stem from some respondents selecting "non-web enabled cell phone" in error, when they should have selected "smartphone phone." Respondents who indicated using non-web enabled cellphones most frequently indicated they were checking Google as well as TV/Radio station websites for information, which would not be possible on a non-web enabled cell phone. The use of landline phone services was negligible (less than 0.5% of trips).

Table 56. Devices Used to Check Real-time Information Before Starting Trip

Among travelers who reported checking information sources

Device	AM Peak	PM Peak	Reverse
Smartphone			
Pre-ICM	72%	62%	62%
Post-ICM	70%	65%	60%
Desktop			
Pre-ICM	10%	15%	16%
Post-ICM	3%	29%	23%
Laptop			
Pre-ICM	8%	18%	13%
Post-ICM	3%	8%	15%
Tablet			
Pre-ICM	7%	4%	13%
Post-ICM	4%	*	8%
Non-web enabled cell			
Pre-ICM	2%	5%	1%
Post-ICM	14%	8%	14%
Landline			
Pre-ICM	*	*	*
Post-ICM	*	*	*
Other			
Pre-ICM	1%	*	6%
Post-ICM	4%	1%	1%
None of the above			
Pre-ICM	6%	8%	18%
Post-ICM	7%	7%	8%
N (Pre-ICM)	**213**	**147**	**101**
N (Post-ICM)	**182**	**157**	**285**

** denotes <0.5%*

Source: U.S. DOT

[59] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 8.4; design-based F(1,303) = 2.5, F statistic-based p-value = 0.11

Knowledge gained from pre-trip information sources

Travelers who consulted real-time information sources pre-trip were asked about what they learned. The results are presented in the table below. For the morning peak period, findings are presented both with and without the two pulses that involved a fatality, as the findings for the morning peak are sensitive to those pulse incidents. In fact, when the two fatality pulses are excluded from the analysis, there are no significant differences on this measure across the two survey waves.

In each wave, a majority of respondents knew there was some type of delay before departing for their trip – in some cases, they learned there was an accident and in other cases they learned only that there was increased congestion (without knowing the specific cause), or they learned the extent of the delay.

More specifically, travelers who consulted real-time information reported learning about an accident pre-trip for about a third of trips in each time period (AM peak, PM peak and reverse peak). This share remained constant for the PM peak and reverse directions but rose to 56% for the AM peak in the post-ICM period. The fatality pulse incident in the post-ICM period seems to account for most of this increase, however. When the incidents involving a fatality are removed from the analysis, the proportion of respondents who learned there was an accident was very similar in the pre and post periods (18% and 20%, respectively).

During the pre-ICM period, travelers learned that there were no unusual delays while consulting information pre-trip on one-quarter to one-third of trips in each time period (24% AM peak; 34% PM peak); these shares tended to decrease by 7 to 9 percentage points. However, when the two extreme pulse incidents from the AM peak are excluded from the analysis, this response is cited by a significantly greater proportion of those traveling in the AM peak direction, and there is in fact a slight increase across the survey waves in the proportion saying there were no unusual delays (31% pre-ICM; 39% post-ICM).

About one-fifth of trips involved learning about increased traffic congestion (no specifics) pre-trip, with no significant differences from pre-to post. In addition, about 15% of each peak period's trips involved learning about the current travel time, and while there was a slight increase in the share reporting this response from the pre-to-post period, the increase is not statistically significant.[60]

This subgroup of travelers reported learning about the extent of any delays pre-trip for around 17% of trips in each peak period pre-ICM. While this percentage increased from pre- to post-ICM for morning peak trips, excluding the two fatality pulse incidents renders the increase insignificant.[61]

Predictably, the proportion of trips before which this subgroup of travelers learned about weather-related hazards varied widely across waves and time periods, and virtually no travelers in either wave reported learning about special events. Finally, travelers reported learning nothing on fewer than 10% of trips in each time period, and these numbers remained consistent through the post-ICM period.

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[60] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 3.4; design-based F(1,679) = -.78, F statistic-based p-value = 0.38

[61] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 6.1; design-based F(1,679) = 2.15, F statistic-based p-value = 0.14

Table 57. Information Learned from Source(s) Consulted Pre-trip

Among travelers who consulted real-time information sources before traveling

Information Learned-Accident	All Pulse Surveys AM Peak	All Pulse Surveys PM Peak	Reverse	Excluding Two Fatality Pulses AM Peak
Pre-ICM	34%	32%	27%	18%
Post-ICM	56%	33%	24%	20%
No unusual delays				
Pre-ICM	24%	34%	35%	31%
Post-ICM	15%	27%	26%	39%
More traffic congestion (no specifics)				
Pre-ICM	18%	22%	15%	17%
Post-ICM	13%	29%	14%	21%
Current travel time				
Pre-ICM	13%	15%	28%	14%
Post-ICM	23%	18%	24%	20%
Extent of delay				
Pre-ICM	17%	17%	8%	10%
Post-ICM	30%	13%	17%	17%
Weather-related hazard				
Pre-ICM	14%	1%	2%	19%
Post-ICM	*	1%	26%	*
Special event				
Pre-ICM	1%	*	1%	*
Post-ICM	*	*	*	*
Other				
Pre-ICM	6%	*	1%	3%
Post-ICM	5%	1%	2%	2%
Nothing				
Pre-ICM	7%	4%	4%	10%
Post-ICM	4%	6%	7%	3%
N (Pre-ICM)	**711**	**266**	**200**	**527**
N (Post-ICM)	**451**	**262**	**546**	**153**

** denotes <0.5%*

Source: U.S. DOT

Changes in travel plans based on pre-trip information

Travelers who reported learning something from real-time information pre-trip were also asked to enumerate any changes that they made to their travel plans based on what they learned about travel conditions. These travelers most frequently made adjustments to their route, with smaller numbers changing their departure time. In some cases, strategies varied by time of day; for example, travelers were more likely to completely change their route for their morning peak trip compared to their afternoon peak trips, whereas they were somewhat more likely to make minor adjustments to their route in the afternoon (versus the morning). Overall, the prevalence of these travel behavior changes remained unchanged over the course of the survey.

In the pre-ICM period, travelers reported making small changes to their route as a result of pre-trip information on 19% of AM peak trips, 28% of PM peak trips, and 11% of reverse direction trips; these shares each increased by 7 percentage points over the course of the survey, but the magnitude of the shifts were not statistically significant, and when the fatality pulses are excluded from the analysis, there is no difference between the pre and post measures in the AM peak (18% pre-ICM; 20% post-ICM).

Travelers chose a completely different route on fewer of these trips – 17% of pre-ICM AM peak trips, 7% of PM peak trips, and 7% of reverse peak trips. Notably, the share of AM peak trips involving complete route changes increased by 12 percentage points over the course of the survey, but this change is driven by the two pulses involving fatalities. When these two pulse surveys are excluded, the share of trips that entail a complete route change are 3% (pre-ICM) and 5% (post-ICM).

Between 5% and 14% of travelers' trips in each time period involved leaving earlier, and these shares saw little change over the course of the survey. These travelers reported leaving later for 6% of AM peak trips, 1% of PM peak trips, and 3% of reverse direction trips, proportions which remained constant from the pre- to the post-ICM period. Dropping the two fatality pulses does, however, reveal a drop (8 percentage points) in the AM peak share.

Virtually no travelers who learned something from real-time information pre-trip decided to change stops, use DART, use other transit, or carpool.

Overall, for roughly one-half to two-thirds of trips, respondents who learned something from real-time information did not make any changes to their travel plans pre-trip. For PM peak and reverse peak trips, somewhat fewer respondents reported making "no change" in the post-ICM period, but the differences were not statistically significant. In the AM peak, there is a dramatic difference in findings depending on whether or not the two fatality pulse surveys are included. In particular, in the post-ICM period, the proportion of trips for which "no change" was made was 30% with the fatality pulse, compared to 66% without the fatality pulse. Moreover, when the two fatality pulses are excluded, there was no significant difference across the survey waves on this measure (59% pre-ICM vs. 66% post-ICM).[62]

[62] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 1.8; design-based F(1,622) = 0.61, F statistic-based p-value = 0.43

Table 58. Changes in Travel Plans Based on Real-Time Information

Among travelers who learned from real-time information sources

Travel Change	All Pulse Surveys AM Peak	All Pulse Surveys PM Peak	Reverse	Excluding Two Pulse Surveys AM Peak
Minor route changes				
Pre-ICM	19%	28%	11%	18%
Post-ICM	26%	35%	18%	20%
Completely different route				
Pre-ICM	17%	7%	7%	3%
Post-ICM	29%	4%	9%	5%
Left earlier				
Pre-ICM	14%	5%	10%	10%
Post-ICM	11%	8%	13%	6%
Left later				
Pre-ICM	6%	1%	3%	9%
Post-ICM	7%	1%	5%	1%
Changed stops				
Pre-ICM	2%	1%	2%	*
Post-ICM	1%	*	1%	*
Used DART				
Pre-ICM	*	*	*	1%
Post-ICM	*	*	*	*
Used other transit				
Pre-ICM	*	*	*	*
Post-ICM	*	*	*	1%
Carpooled				
Pre-ICM	1%	1%	2%	1%
Post-ICM	*	*	*	*
Other				
Pre-ICM	5%	1%	*	7%
Post-ICM	4%	1%	*	2%
No changes				
Pre-ICM	47%	61%	69%	59%
Post-ICM	30%	51%	58%	66%
N (Pre-ICM)	**660**	**249**	**187**	**479**
N (Post-ICM)	**434**	**242**	**523**	**144**

** denotes <0.5%*

Source: U.S. DOT

In addition to asking travelers to identify changes they made, a new question was added to the post-ICM survey to better understand why travelers do not make changes in the face of traffic congestion. More specifically, respondents who learned about delays on their route but did not make any changes were asked to select the reason(s) why they did not alter their travel plans.

The sample sizes for this question were relatively small, so the results should be interpreted with caution. These travelers most frequently stated that the alternatives were unlikely to reduce their trip time (44% of AM peak trips, 34% PM peak, 46% reverse). For between 20% and 30% of their trips in each time period, these respondents reasoned that the delays didn't sound severe, that the alternatives weren't convenient or attractive, or that they thought conditions would improve. Similar numbers – except in the PM peak – said that they didn't need to arrive at a specific time.

Among those traveling in the peak direction, respondents were least likely to state that they were unaware of alternate routes or modes or that they weren't confident about the accuracy of the traffic information.

Table 59. Reasons for Not Changing Travel Plans

Among travelers who learned about heavier congestion, accidents, weather, special events, or the extent of the delay pre-trip but made no changes to their travel plans

Reason	AM Peak	PM Peak	Reverse
Alternatives not likely to reduce trip time	44%	34%	46%
Didn't sound severe	28%	20%	26%
Alternatives not convenient/attractive	23%	25%	17%
Didn't need to arrive at specific time	26%	7%	14%
Thought conditions would improve	22%	30%	14%
Not confident about accuracy	7%	7%	3%
Unaware of alternate routes/modes	3%	8%	14%
Other	7%	7%	8%
N	**71**	**83**	**157**

Source: U.S. DOT

Travelers who made minor or complete route changes based on pre-trip information were asked about specific changes to their route in order to understand the extent to which drivers are diverting to key alternate routes in the corridor – the US-75 frontage roads and Greenville Avenue. Overall, there was no increase in the diversion to these routes, as measured in the pulse surveys. In the pre-ICM period, 40% of peak travelers reported switching onto the frontage roads, and in the post-ICM period, 34% did so (a slight decline that is not statistically significant). One third (30%) of these travelers' peak trips involved switching onto Greenville, a share that remained constant through the post-ICM surveys.

Table 60. Diversion to Key Arterials

Among travelers who learned from information sources pre-trip and either made minor route changes or used completely different routes

Traveler Plans	Peak
Switched to US-75 frontage	
Pre-ICM	40%
Post-ICM	34%
Switched to Greenville Avenue	
Pre-ICM	30%
Post-ICM	33%
Switched to US-75	
Pre-ICM	6%
Post-ICM	2%
Stayed on US-75	
Pre-ICM	6%
Post-ICM	2%
Stayed on Greenville	
Pre-ICM	4%
Post-ICM	8%
Stayed on US-75 frontage	
Pre-ICM	4%
Post-ICM	11%
Other	
Pre-ICM	30%
Post-ICM	26%
None of the above	
Pre-ICM	3%
Post-ICM	3%
N (Pre-ICM)	**311**
N (Post-ICM)	**315**

Source: U.S. DOT

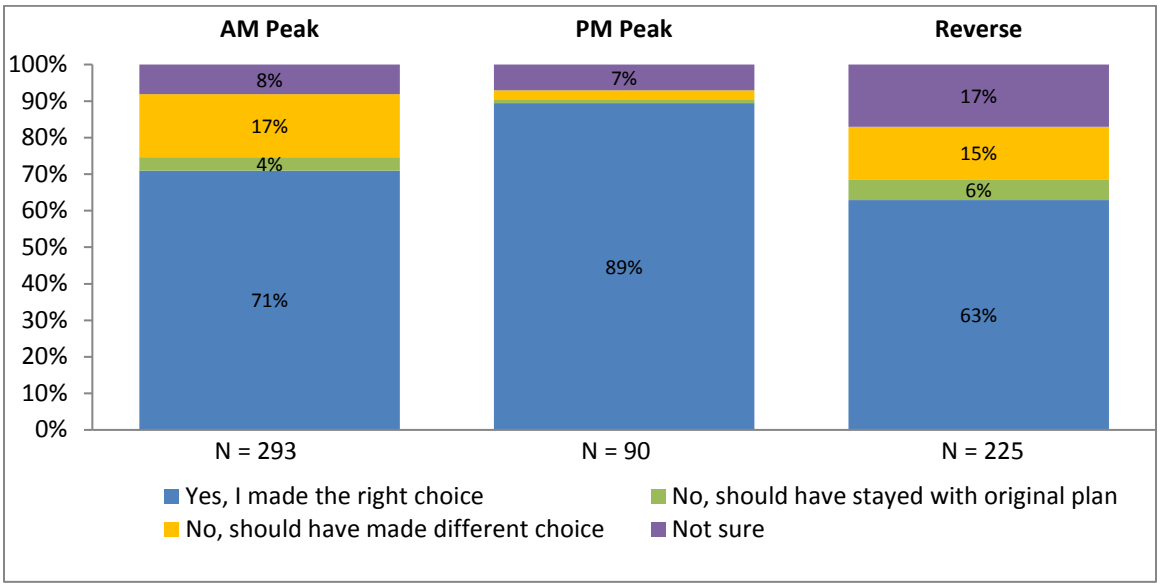
The post-ICM survey asked travelers who made a change to their travel plans based on real time information whether they were satisfied with their choice. In general, a large majority of travelers were satisfied with the changes they made. Satisfaction was highest among PM peak travelers. Travelers felt that they had made the right choice with respect to 89% of PM peak trips, 71% of AM peak trips and 63% of reverse direction trips. The difference in satisfaction between the AM and PM peak travelers is significant at the 5% level.[63]

Morning peak travelers reported that they should have made a different choice for 17% of trips (compared to 3% for PM trips), and only 4% said that they should have stayed with their original plan. Similar shares said the same for reverse direction trips, although reverse direction travelers reported greater uncertainty with respect to their decisions (17% not sure about their decision).

[63] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 13.03; design-based F(1,382) = 5.96, F statistic-based p-value = 0.02

Figure 26. Respondent Assessment of Pre-Trip Travel Choices

Among travelers who learned from information sources pre-trip and made changes to their travel plans based on what they learned



Source: U.S. DOT

Sources Consulted During Trip

Infomation use during trips generally mirrored pre-trip information use among the surveyed travelers, as they frequently consulted radio, apps, and electronic highway message signs. Not surprisingly, radio is the most popular source of during-trip real-time information – in the pre-ICM period, travelers reported consulting the radio during 40% of AM peak trips, 35% of PM peak trips, and a similar share of reverse direction trips. Over the course of the survey, the pattern remained similar.

About a tenth of pre-ICM AM and PM peak trips involved consulting electronic message signs, while travelers consulted signs on 5% of reverse trips; this latter share increased to 12% in the post-ICM period. Furthermore, travelers consulted apps during 13% of AM peak trips and about a tenth of PM peak and reverse trips. Use of apps in the PM peak increased from 9% to 16%, an increase that is significant at the 10% level.[64]

Across all waves and time periods, travelers consulted other information sources for a a smaller share of trips (5% or less). Overall, the share of trips during which the traveler did not check real-time information rose slightly - from 47% to 53% - in the PM peak, but remained fairly consistent in the AM peak (43% pre-ICM, 39% post –ICM).

[64] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 13.99; design-based F(1,1347) = 3.5, F statistic-based p-value = 0.06

Table 61. Information Sources Consulted During Trip

Source	All Pulse Surveys AM Peak	All Pulse Surveys PM Peak	Reverse	Excluding Two Pulse Surveys AM Peak
Radio				
Pre-ICM	40%	35%	33%	35%
Post-ICM	42%	29%	33%	34%
Electronic highway signs				
Pre-ICM	10%	9%	5%	8%
Post-ICM	8%	7%	12%	9%
Apps				
Pre-ICM	13%	9%	10%	11%
Post-ICM	15%	16%	15%	10%
Portable navigation				
Pre-ICM	3%	5%	1%	2%
Post-ICM	2%	2%	3%	2%
Alerts				
Pre-ICM	*	*	*	*
Post-ICM	*	*	*	*
Websites				
Pre-ICM	*	*	*	*
Post-ICM	1%	*	2%	*
Social media				
Pre-ICM	1%	*	1%	*
Post-ICM	2%	*	2%	*
Phone #				
Pre-ICM	*	*	*	*
Post-ICM	*	*	*	*
Another person				
Pre-ICM	2%	1%	1%	*
Post-ICM	2%	1%	2%	1%
Built-in navigation				
Pre-ICM	1%	2%	1%	1%
Post-ICM	2%	1%	2%	2%
Other				
Pre-ICM	*	1%	*	*
Post-ICM	4%	1%	1%	2%
Did not check info information				
Pre-ICM	43%	47%	55%	50%
Post-ICM	39%	53%	46%	50%
N (Pre-ICM)	**1451**	**740**	**627**	**1133**
N (Post-ICM)	**810**	**608**	**1113**	**312**

** denotes <0.5%*

Source: U.S. DOT

Specific information sources consulted during trip

The sample sizes for specific information sources consulted during trip are too small to report, with the exception of apps. Similar to their pre-trip behavior, app users were most likely to consult Google Maps during their trip, and this source dominated all other real-time traffic apps. While use of Google Maps increased from the pre- to the post- period in most cases, use of other apps tended to decrease.

More specifically, in the pre-ICM pulse surveys, app users reported using Google during 46% of AM peak, 60% of PM peak, and a full 71% of reverse direction trips. The PM peak usage rate remained constant over the course of the survey, while the AM peak and reverse rates rose by 16 and 9 percentage points, respectively.

App users reported using the Inrix, TX DOT/Daltrans, and Traffic.com apps during 13% of trips or fewer across both waves and all time periods. From the pre- to the post-ICM period, these shares decreased by anywhere from 1 to 10 percentage points. App users reported consulting the 511 app for less than .5% of their trips.

Table 62. Smartphone or Tablet Apps Consulted During Trip

Among travelers who reported checking apps while traveling

Apps	AM Peak	PM Peak	Reverse
Google Maps			
Pre-ICM	46%	60%	71%
Post-ICM	62%	56%	80%
Inrix			
Pre-ICM	13%	6%	5%
Post-ICM	6%	4%	2%
TX DOT/Daltrans			
Pre-ICM	11%	*	5%
Post-ICM	*	1%	4%
Traffic.com			
Pre-ICM	12%	3%	5%
Post-ICM	4%	*	3%
DART			
Pre-ICM	1%	*	*
Post-ICM	*	*	4%
511			
Post-ICM	*	*	1%
Other			
Pre-ICM	33%	36%	19%
Post-ICM	31%	46%	20%
N (Pre-ICM)	**175**	**104**	**72**
N (Post-ICM)	**173**	**122**	**172**

** denotes <0.5%*

Note: *511 option not included in pre-ICM surveys*

Source: U.S. DOT

Devices checked during trip

Not surprisingly, travelers who consulted alerts, websites, apps, social media, or telephone lines during their trips made use of smartphones during the vast majority of their trips in both waves of the survey. In the pre-ICM period 95% of AM peak, 82% of PM peak, and 94% of reverse direction trips

relied on a smartphone to access these sources of information.[65] In the post-ICM period, the overall pattern remained the same, with only small shifts that were not statistically significant.[66] Morning and afternoon peak travelers used tablets and non-web enabled cell phones during fewer than 5% of trips; reverse direction travelers used tablets during 10% of pre-ICM and 6% of post-ICM trips.

Table 63. Devices Used to Check for Real-time Information During Trip

Among travelers who reported checking information sources while traveling

Devices	AM Peak	PM Peak	Reverse
Smartphone			
Pre-ICM	95%	82%	94%
Post-ICM	85%	91%	86%
Tablet			
Pre-ICM	2%	3%	10%
Post-ICM	1%	*	6%
Non-web enabled cell			
Pre-ICM	3%	4%	*
Post-ICM	3%	3%	6%
Other			
Pre-ICM	2%	10%	4%
Post-ICM	7%	7%	2%
None of the above			
Pre-ICM	2%	4%	*
Post-ICM	7%	1%	5%
N (Pre-ICM)	**196**	**117**	**74**
N (Post-ICM)	**197**	**130**	**194**

** denotes <0.5%*

Source: U.S. DOT

Knowledge gained from during-trip information sources

The types of knowledge travelers gleaned during their trips closely track those gained from pre-trip information consultation. In particular, accidents were the most frequently cited piece of knowledge among travelers who checked real-time information during their trips, followed by length of delay, the presence of heavier than usual congestion, the expected travel time, and the lack of unusual delay. In the pre-ICM peak periods, travelers who checked real-time information during-trip reported learning about an accident during about 40% of trips, and in the post-ICM period, the share of AM peak trips involving knowledge of an accident rose almost 20 percentage points. When the two fatality pulses are excluded, both the pre and post-ICM shares decline significantly; however, there is still a marginally significant[67] 13 percentage point increase in knowledge about accidents (24% pre-ICM to 37% post-ICM). The PM peak and reverse shares, on the other hand, remained relatively constant.

[65] These travelers may have also used the radio as an information source. For findings on the use of radio relative to other information sources, see Table 44 for findings on radio.

[66] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 4.3; design-based F(1,246) = 0.91, F statistic-based p-value = 0.34

[67] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 11.7; design-based F(1,759) = 3.6, F statistic-based p-value = 0.06

The shares of trips during which travelers learned about heavier congestion and the expected travel time also remained relatively flat - across most time periods and waves. One-fifth of trips involved learning about heavier congestion, while around a tenth of AM peak and PM peak as well as a fifth of reverse trips involved learning about the expected travel time.

Travelers were more likely to have learned about the length of delay in the post-ICM period, as compared to the pre-ICM period. While just over a tenth of pre-ICM trips in each time period (where the traveler checked real-time info) involved learning about the length of delays, close to a quarter of post-ICM AM and PM peak trips saw the traveler learn the same. In the AM peak, however, the two fatality pulse incidents account for nearly all of this difference (i.e., when those pulse surveys are excluded, there is no change on this measure).

The shares of trips during which the traveler learned about weather-related hazards varied widely, and virtually no travelers learned about special events or parking availability at transit stations. The share of trips for which the traveler checked real-time information during their trip but learned nothing fell slightly in the AM peak (as measured both with and without the wo fatality pulse surveys), but remained fairly constant in the in the PM peak (16% and 20%), and hovered around 15% for reverse peak trips.

Table 64. Information Learned from Source(s) Consulted During Trip

Among travelers who consulted real-time information sources while traveling

Information Learned–Accident	All Pulse Surveys AM Peak	All Pulse Surveys PM Peak	Reverse	Excluding Two Pulse Surveys AM Peak
Pre-ICM	41%	40%	25%	24%
Post-ICM	60%	34%	22%	37%
More traffic congestion (no specifics)				
Pre-ICM	19%	21%	19%	20%
Post-ICM	18%	21%	14%	15%
Expected travel time				
Pre-ICM	9%	11%	19%	11%
Post-ICM	14%	10%	20%	16%
No unusual delays				
Pre-ICM	14%	18%	28%	18%
Post-ICM	13%	12%	17%	26%
Length of delay				
Pre-ICM	13%	12%	13%	11%
Post-ICM	23%	25%	16%	9%
Weather-related hazard				
Pre-ICM	6%	*	2%	9%
Post-ICM	*	1%	27%	*
Special event				
Pre-ICM	*	*	1%	*
Post-ICM	*	*	1%	*
Parking available at transit station				
Pre-ICM	*	*	*	*
Post-ICM	*	*	*	*
Other				
Pre-ICM	3%	*	2%	1%
Post-ICM	6%	2%	3%	4%
Nothing				
Pre-ICM	17%	16%	14%	24%
Post-ICM	8%	20%	15%	13%
N (Pre-ICM)	**829**	**424**	**292**	**582**
N (Post-ICM)	**533**	**349**	**623**	**178**

** denotes <0.5%*

Source: U.S. DOT

Changes in travel plans based on during-trip information/traffic conditions

A majority of all travelers - approximately two-thirds – did not make changes during their trip. Respondents who consulted information, however, were somewhat more likely to make a change to their trip. And among those who consulted information *and* learned something (e.g., an accident, delay, congestion), there was an even greater likelihood that they made a change to their trip (just under one-half reported making "no change").

This pattern is consistent in both the pre and post-ICM periods, as use of information (and particularly if knowledge is gained from that information) is associated with a greater incidence of travel behavior changes.

Table 65. During Trip Changes by Information Level

Travel Changes	All Travelers	Travelers Who Consulted Information	Travelers Who Consulted Info & Learned Something
Minor route changes			
Pre-ICM	21%	25%	31%
Post-ICM	25%	28%	33%
Completely different route			
Pre-ICM	9%	12%	17%
Post-ICM	11%	.16%	20%
Changed stops			
Pre-ICM	1%	2%	3%
Post-ICM	1%	1%	1%
Used DART			
Pre-ICM	*	*	*
Post-ICM	*	*	*
Used other transit			
Pre-ICM	*	*	*
Post-ICM	*	*	*
Other			
Pre-ICM	2%	2%	3%
Post-ICM	1%	2%	.3%
No changes			
Pre-ICM	68%	60%	49%
Post-ICM	63%	54%	45%
N (Pre-ICM)	**2818**	**1545**	**985**
N (Post-ICM)	**2531**	**1505**	**1098**
** denotes <0.5%*			

Source: U.S. DOT

A more detailed analysis by peak period was performed for travelers who consulted information and learned something. The data indicate that these respondents were most likely to make a route change during their trip; very few respondents made any other type of change. In the AM peak period, about one-third of respondents made a minor route change based on information – and this share remained consistent through the post-ICM period. In the PM peak, however, there was a significant increase in the proportion reporting a minor route change (from 23% to 41%). In the AM peak, a sizeable share of respondents also completely changed their route (23% pre-ICM and 35% post-ICM), but this is a spike that is due to the fatality incidents. When the two fatality pulses are excluded, fewer than one-in-ten respondents in each survey wave reported completely changing their route.

Table 66. "During Trip" Changes in Travel Plans

Based on travelers who reported consulting real-time info during trip and learned something other than "no unusual delay"or "nothing" from the real-time information

Travel Change	All Pulse Surveys AM Peak	All Pulse Surveys PM Peak	Reverse	Excluding Two Pulse Pulses AM Peak
Minor route changes				
Pre-ICM	36%	23%[68]	29%	38%
Post-ICM	32%	41%	30%	34%
Completely different route				
Pre-ICM	23%[69]	13%	9%	8%
Post-ICM	35%	7%	13%	9%
Changed stops				
Pre-ICM	2%	2%	5%[70]	*
Post-ICM	2%	*	*	*
Used DART				
Pre-ICM	*	*	*	*
Post-ICM	1%	*	*	*
Other				
Pre-ICM	5%	2%	1%	4%
Post-ICM	5%	2%	1%	*
No changes				
Pre-ICM	37%[71]	63%[72]	60%	51%[73]
Post-ICM	28%	49%	58%	56%
N (Pre-ICM)	**559**	**259**	**167**	**331**
N (Post-ICM)	**445**	**233**	**420**	**125**

** denotes <0.5%;*

Source: U.S. DOT

[68] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 18.6; design-based F(1,491) = 4.4, F statistic-based p-value = 0.04

[69] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 19.3; design-based F(1,1003) = 5.2, F statistic-based p-value = 0.02

[70] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 15.4; design-based F(1,586) = 29.3, F statistic-based p-value = 0.00

[71] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 10.7; design-based F(1,1003) = 2.9, F statistic-based p-value = 0.09

[72] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 9.7; design-based F(1,491) = 2.3, F statistic-based p-value = 0.13

[73] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 0.9; design-based F(1,455) = 0.28, F statistic-based p-value = 0.6

In the post-ICM pulse surveys, travelers who learned about and/or experienced travel delays during their trips but made no change to their travel plans were given the opportunity to explain their decision not to make a change. The reason cited most often was that travelers felt the alternatives were unlikely to reduce their trip time - travelers chose this option for about half of AM peak and reverse trips and 35% of PM peak trips. Furthermore, for 20% to 25% of trips, travelers revealed that the alternatives were not convenient or attractive and that they thought conditions would improve. For slightly smaller shares of trips, respondents claimed that the delays didn't sound severe and that they didn't need to arrive at a specific time. Fewer than 10% of travelers across all time periods were unaware of alternate options, and only 2% to 4% were not confident about the accuracy of real-time information.

Table 67. Reasons for Not Changing Trip Plans

Among travelers who learned about delay from information sources or experienced delays but made no changes to their travel plans

Reasons	AM Peak	PM Peak	Reverse
Alternatives not likely to reduce trip time	52%	35%	51%
Thought conditions would improve	24%	25%	21%
Alternatives not convenient/attractive	20%	21%	20%
Didn't need to arrive at specific time	14%	10%	16%
Didn't sound severe	12%	15%	23%
Unaware of alternate routes/modes	9%	9%	4%
Not confident about accuracy	4%	2%	2%
Other	11%	8%	6%
N (Post-ICM)	**219**	**253**	**426**

Source: U.S. DOT

As was the case for route changes based on pre-trip information, travelers who made minor or complete route changes based on traffic conditions or information consulted during their trips were most likely to switch onto the US-75 frontage roads, and to a lesser extent, Greenville Avenue, but no clear trends can be observed in the use of these roads as alternates.[74]

Over half of AM and PM peak trips involved switches onto the US-75 frontage roads in the pre-ICM period. In the AM peak, the share of changed trips that involved switching onto the frontage roads fell by a marginally significant[75] 12 percentage points. While the PM peak share increased, the change is

[74] As in the previous question pertaining to route changes due to information consulted before traveling, some travelers gave logically inconsistent answers – 2 travelers said that they made the decision to stay on or enter US-75 during their trip but said in an earlier question that they did not use US-75. Surprisingly, 261 travelers said the same for the frontage roads, and 130 did so with respect to Greenville Ave. Clearly, travelers' memories are not fool-proof, but these data also suggest that some do not consistently distinguish between the frontage roads and the actual US-75 lanes.

[75] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 13.0; design-based F(1,883) = 3.6, F statistic-based p-value = 0.057

not statistically significant.[76] In addition, about one-fourth of these changed trips in the pre-ICM time period involved switching onto Greenville; and while there were marginal shifts across the survey waves, the changes are not statistically significant.[77] Across all waves and time periods, 10% of changed trips or fewer involved switching onto US-75, staying on US-75, staying on Greenville, and staying on the frontage roads, with the exception of the post-ICM PM peak, during which 19% of changed trips involved a decision to stay on the frontage roads.

Table 68. Diversion to Key Arterials in the Corridor

Among travelers who made minor route changes or used completely different routes

Route Change	AM Peak	PM Peak	Reverse
Switched to US-75 frontage			
Pre-ICM	55%	54%	42%
Post-ICM	43%	63%	52%
Switched to Greenville			
Pre-ICM	26%	27%	21%
Post-ICM	33%	16%	24%
Stayed on US-75			
Pre-ICM	1%	6%	10%
Post-ICM	3%	5%	7%
Switched to US-75			
Pre-ICM	6%	4%	3%
Post-ICM	1%	3%	7%
Stayed on US-75 frontage			
Pre-ICM	6%	3%	6%
Post-ICM	7%	19%	9%
Stayed on Greenville			
Pre-ICM	2%	4%	8%
Post-ICM	3%	7%	3%
Other			
Pre-ICM	25%	21%	14%
Post-ICM	26%	9%	8%
None of the above			
Pre-ICM	4%	6%	5%
Post-ICM	7%	2%	11%
N (Pre-ICM)	**487**	**180**	**116**
N (Post-ICM)	**397**	**154**	**310**

Source: U.S. DOT

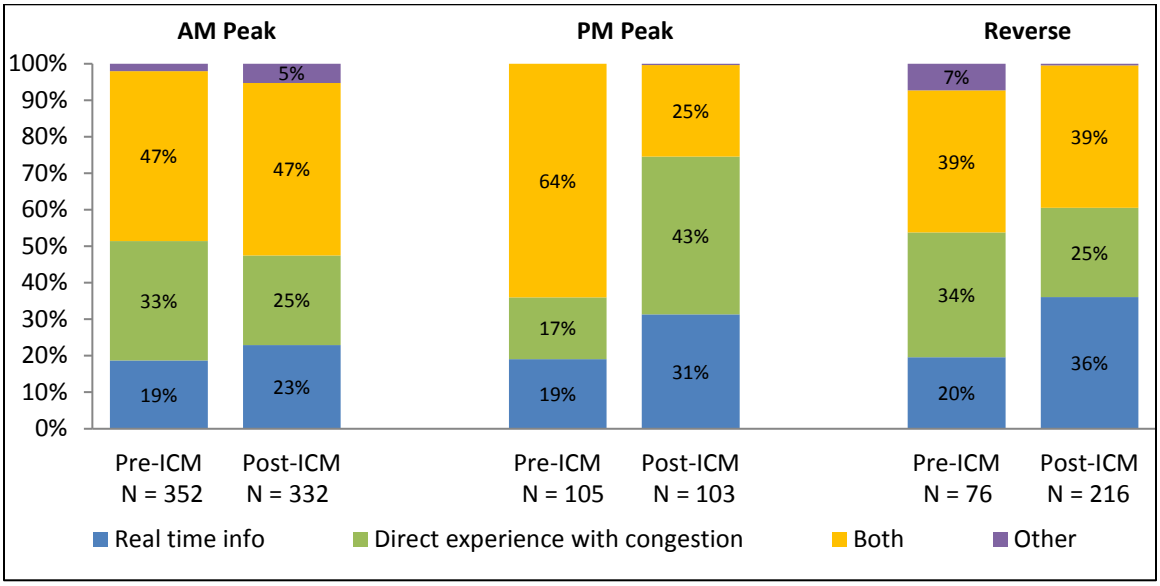
[76] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 2.8; design-based F(1,333) = 0.76, F statistic-based p-value = 0.38

[77] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 6.5; design-based F(1,333) = 2.3, F statistic-based p-value = 0.13

The survey asked travelers who reported checking real-time information and making a change to their travel plans whether the change was primarily due to the information consulted or to traffic conditions on the road. The share of trip changes instigated exclusively by real-time information increased for PM peak trips, from 19% to 31% (although the latter increase is not statistically significant),[78] and in the PM peak, the share of trip changes due solely to direct experience with congestion also rose from 17% to 43%. However, the results for the PM peak should be interpreted with caution due to the relatively small sample sizes.

Figure 27. Cause of Changes Made During Trip

Among travelers who learned from real-time info during their trips and changed their travel plans



Source: U.S. DOT

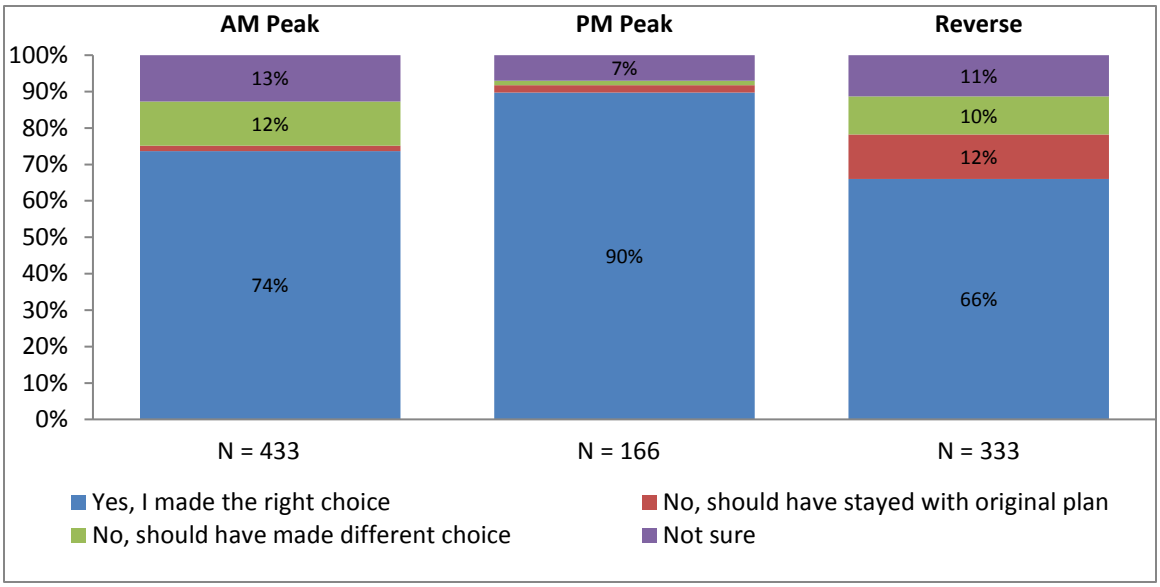
For the vast majority of post-ICM AM and PM peak trips where travelers made a change – 74% and 90%, respectively – the traveler felt that he or she had made the correct choice.[79] For 12% of AM peak trips, travelers reported that they should have made a different choice, and for 13%, they were uncertain. For reverse direction trips, travelers were slightly less satisfied with their choice (66%).

[78] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 4.1; design-based F(1,207) = 1.04, F statistic-based p-value = 0.31

[79] This question was asked only in the post-ICM pulse surveys.

Figure 28. Respondent Assessment of En-Route Travel Choices

Among travelers who learned from information sources during their trips and made changes to their travel plans



Source: U.S. DOT

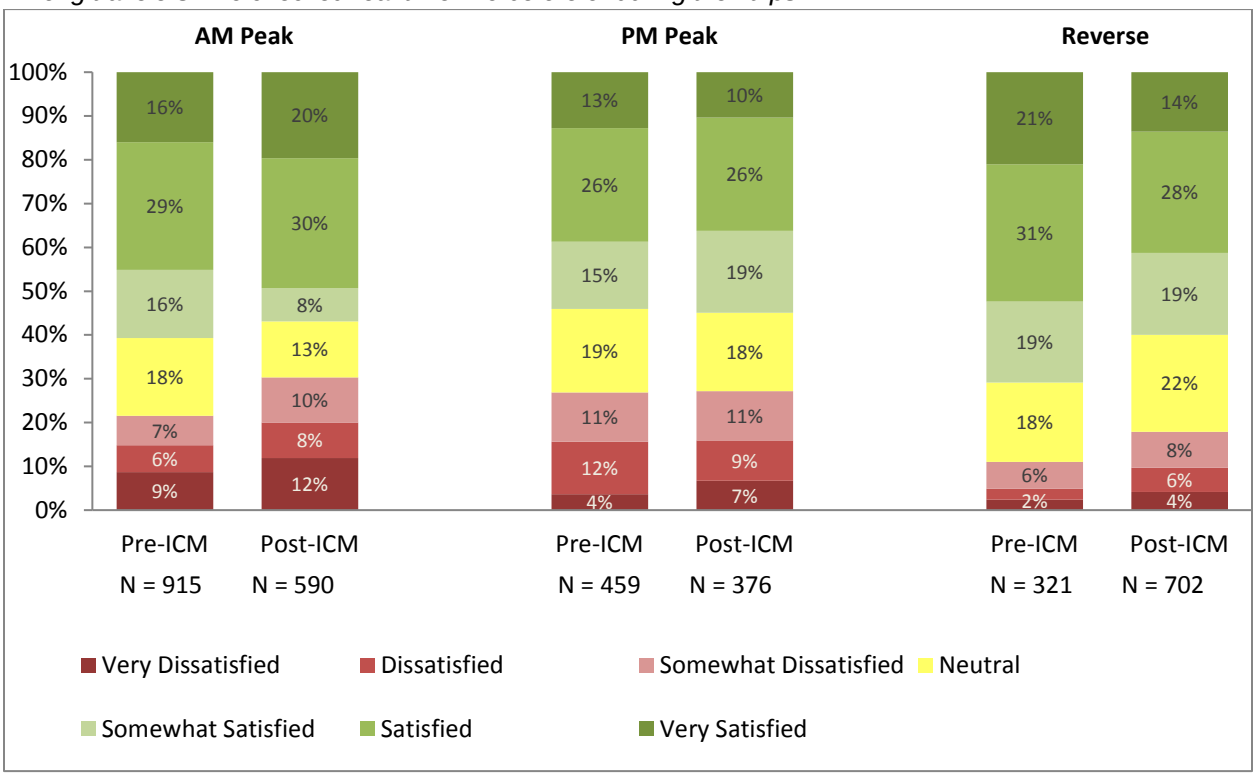
Satisfaction with Accuracy of Real-Time Information

Travelers who consulted real-time information either before or during their trips were generally satisfied with the options available to them. For every type of information except the time needed to clear an accident, the share of travelers (who consulted information sources) expressing satisfaction outweighed the share expressing dissatisfaction. With respect to transit station parking availability and real-time transit info, however, the overwhelming majority selected "not applicable."

In the pre-ICM period, travelers who consulted information expressed satisfaction ("very satisfied," "satisfied," or "somewhat satisfied" – henceforth simply referred to as satisfied) with the usual route travel time information for over half of AM and PM peak trips and for over two-thirds of reverse direction trips. In the post-ICM period, similar satisfaction levels were found. These travelers expressed dissatisfaction ("very dissatisfied," "dissatisfied," or "somewhat dissatisfied" – henceforth simply termed dissatisfied) for 22-30% of trips. For reverse direction trips, the proportion dissatisfied increased from 11% to 18% over the course of the survey.

Figure 29. Satisfaction with Accuracy of Real-time Information for Usual Route

Among travelers who checked real-time info before or during their trips

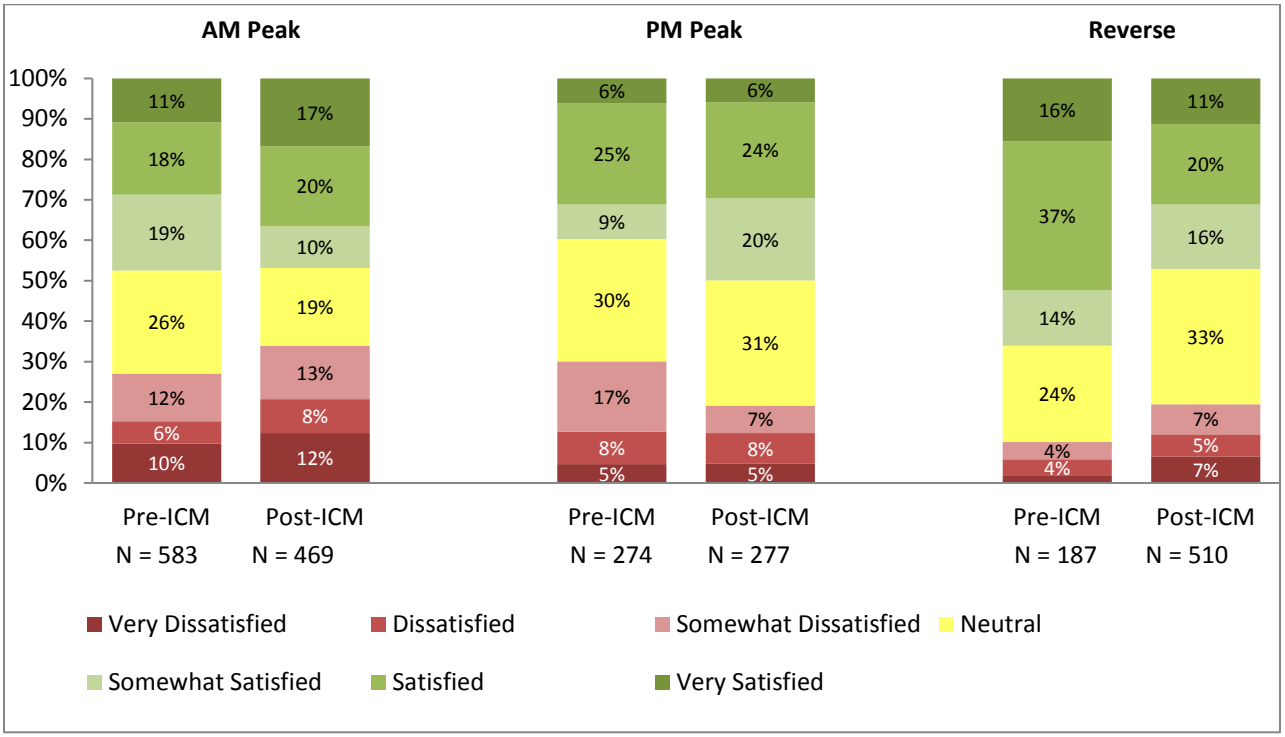


Source: U.S. DOT

Overall, respondents were somewhat less satisfied with information on alternate routes, as compared to information about their usual routes; nonetheless, satisfaction with this type of information remained relatively stable over time. During the AM peak period, the proportion of trips for which travelers expressed satisfaction remained at 47% over the course of the survey, and satisfaction in the PM peak increased slightly from 40% to 50% of trips. In contrast to the peak periods, the reverse direction satisfaction actually fell from 67% to 47% while dissatisfaction increased from 10% to 19%.

Figure 30. Satisfaction with Accuracy of Alternate Route Information

Among travelers who checked real-time info before or during their trips



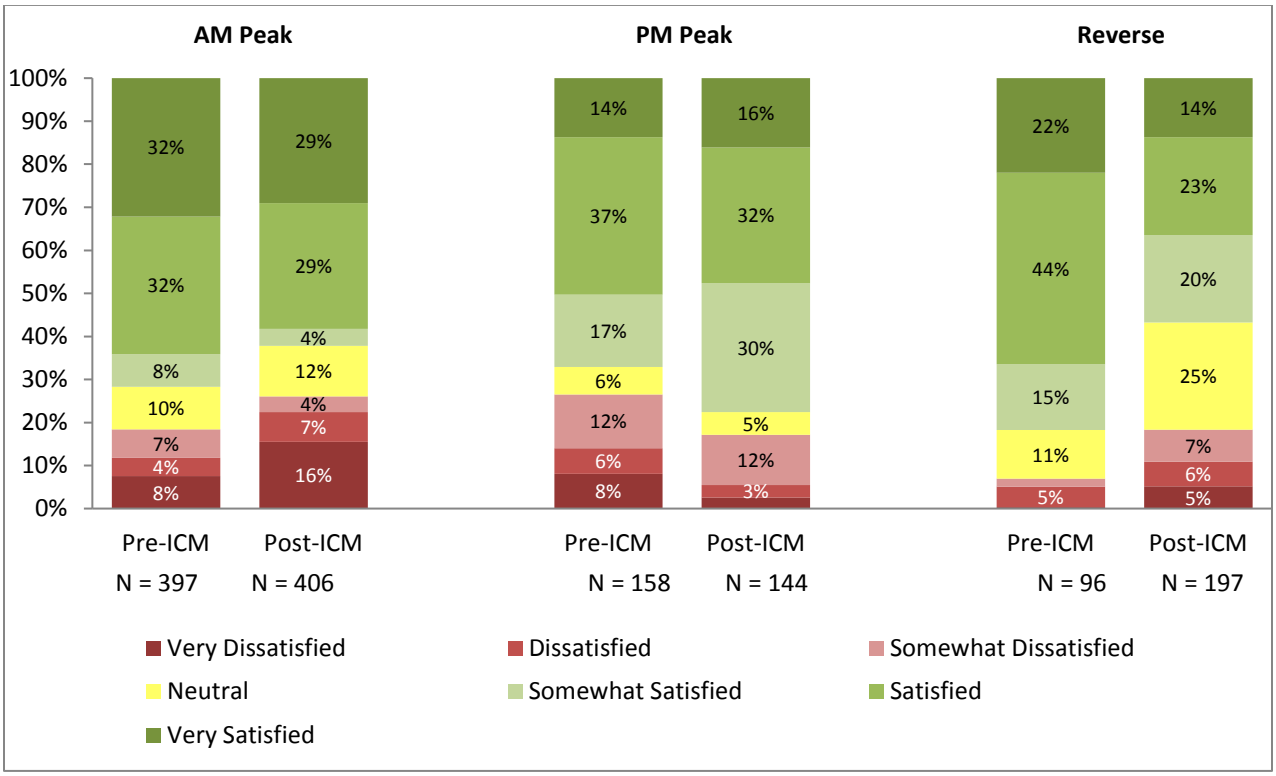
Source: U.S. DOT

With respect to accident location, the absolute levels of satisfaction are much higher than for the other measures included in the survey – in the pre-ICM period, travelers who checked real-time information and learned about an accident expressed satisfaction with 72% of AM peak, 68% of PM peak, and 81% of their reverse trips, while they expressed dissatisfaction with only 19% of AM peak, a 26% of PM peak, and 8% of reverse trips. By the post-ICM period, while there were small shifts (e.g., dissatisfaction rose from 19% to 27% in the AM peak and fell from 26% to 17% in the PM peak), these changes are not statistically significant.[80]

[80] **AM Peak:** Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 7.7; design-based F(1,830) = 1.83, F statistic-based p-value = 0.18

Figure 31. Satisfaction with Accuracy of Accident Location Information

Among travelers who checked real-time info before or during their trips and learned about an accident either before or during their trips



Source: U.S. DOT

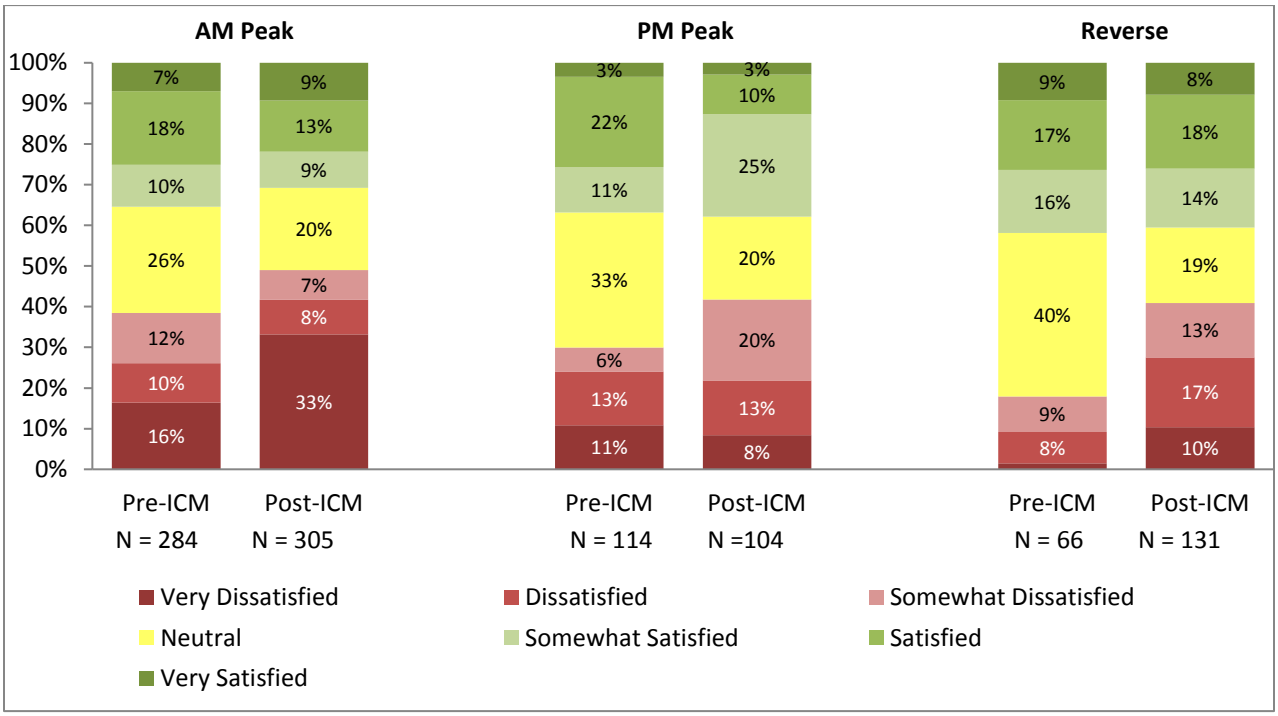
Respondents were less satisfied, overall, with information on the amount of time taken to clear an accident. In both peak periods across both waves, travelers who learned about an accident were satisfied with this information on only about a third of trips; the share of trips for which respondents expressed dissatisfaction on this measure rose from 38% to 48% in the AM peak and 30% to 41% in the PM peak. In particular, the share of trips for which the traveler felt "very dissatisfied" with accident duration information rose from 16% to 33% in the AM peak; this increase is significant at the 5% level.[81] Dissatisfaction also increased for reverse trips.

PM Peak: Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 3.6; design-based F(1,311) = 1.42, F statistic-based p-value = 0.23

[81] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 21.9; design-based F(1,588) = 5.01, F statistic-based p-value = 0.026

Figure 32. Satisfaction with Information on Time to Clear Incident

Among travelers who checked real-time information before or during their trips and learned about an accident either before or during their trips



Source: U.S. DOT

Travelers were also asked about their satisfaction with real-time transit information as well as information related to parking availability at transit stations. Regarding both measures, for a large majority of trips -- between 70% and 90% -- travelers selected "not applicable." Among the small number of respondents who provided a rating, positive ratings outweighed negative ratings, though most tended to select "neutral."

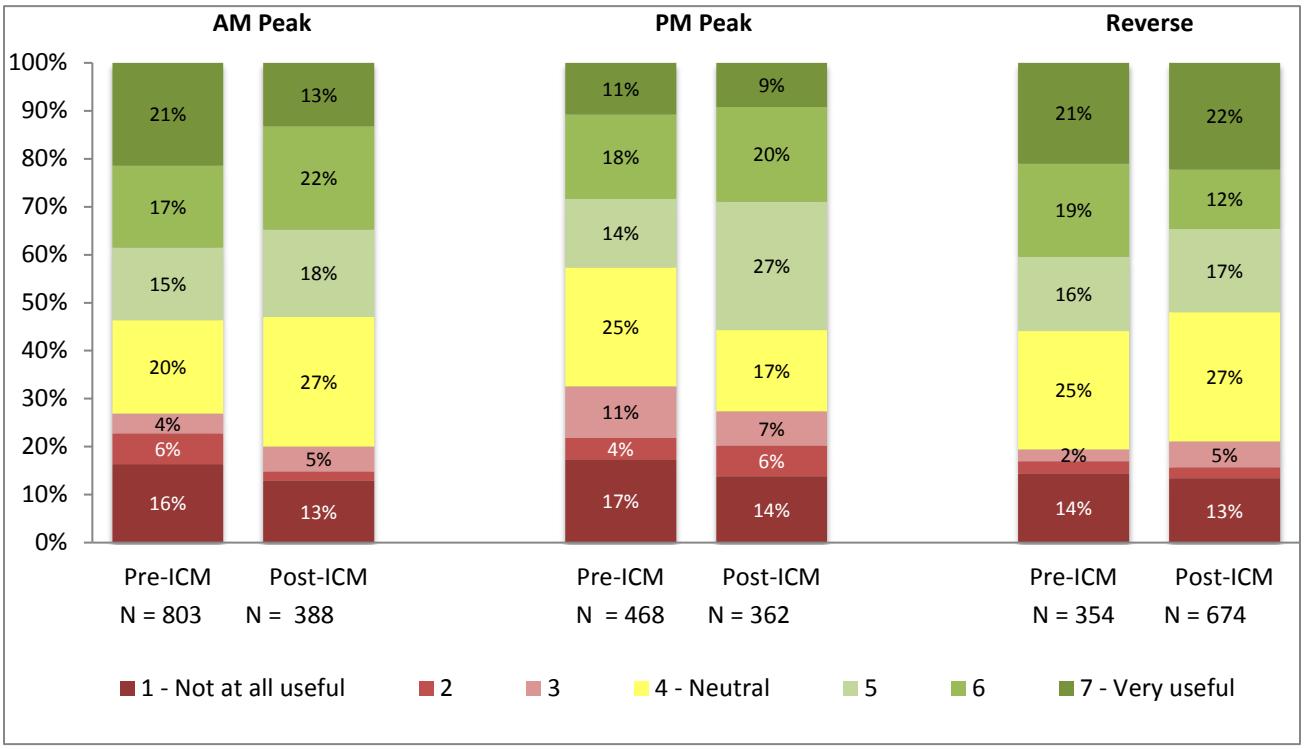
Usefulness of information on electronic highway message signs

The survey asked travelers who used the US-75 regular or HOV lanes to use a seven point scale[82] to rate the usefulness of the information provided on electronic highway message signs. In each time period and wave, anywhere from 34% to 46% of the US-75 users selected "not applicable," which suggests they did not see the sign or no relevant information was posted. In each wave and time period, travelers selected a positive rating (score of 5, 6, or 7) more often than they selected a negative rating (1, 2 or 3). Among those who provided a rating, respondents rated the signs as useful for 43% to 56% of trips, while between 19% and 33% of these trips garnered negative ratings. There were no significant changes in the ratings across the survey periods.

[82] A rating of "1" indicated "not at all useful"; a rating of "4" indicated "neutral" and a rating of "7" indicated "very useful."

Figure 33. Usefulness of Information on US-75 Electronic Highway Message Signs

Among travelers who used the US-75 regular or HOV lanes



Source: U.S. DOT

Overall usefulness of real-time information

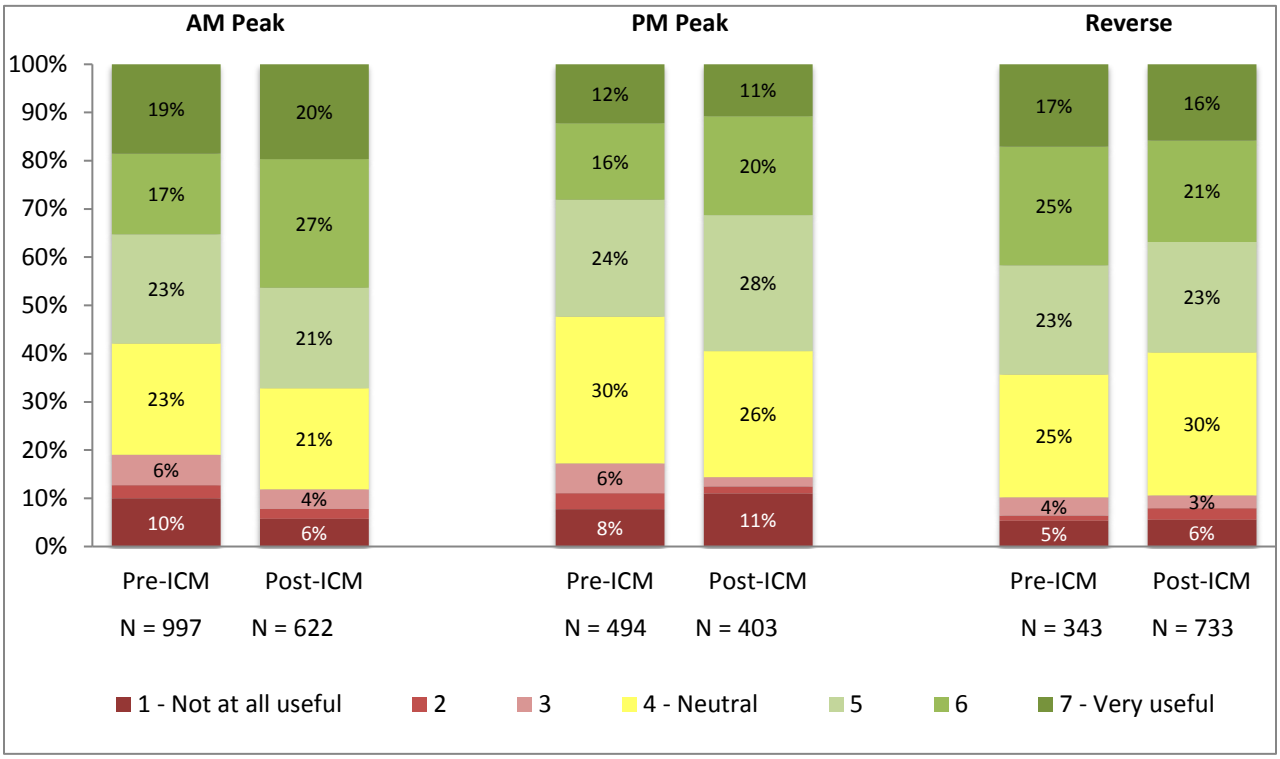
Using the same seven point scale, respondents were asked to rate the overall usefulness of the real time information they consulted for their trip. Travelers who checked real-time sources gave the information equally high marks during the pre-ICM period, choosing a positive rating (5, 6, or 7) for 59% of AM peak trips, 52% of PM peak trips, and 65% of reverse trips, while 19% (AM peak), 17% (PM peak), and 10% (reverse) of trips received lower ratings of 1,2, or 3. The share of positively rated AM peak trips increased by a marginally significant[83] 9 percentage points from the pre-to the post-ICM period. The trend in the PM peak mirrored the AM trend, but the 7 percentage point increase in the PM peak is not significant.[84]

[83] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 13.96; design-based F(1,1618) = 3.49, F statistic-based p-value = 0.06

[84] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 4.57; design-based F(1,896) = 1.11, F statistic-based p-value = 0.29

Figure 34. Usefulness of Real-Time Traveler Information

Among travelers who checked real-time information sources before or during their trips



Source: U.S. DOT

Attitudes about real-time information

Respondents were also asked the extent to which they agree or disagree with various attitudinal statements related to their use of real time traffic information for their trip in the corridor.[85] The agree-disagree statements included the following:

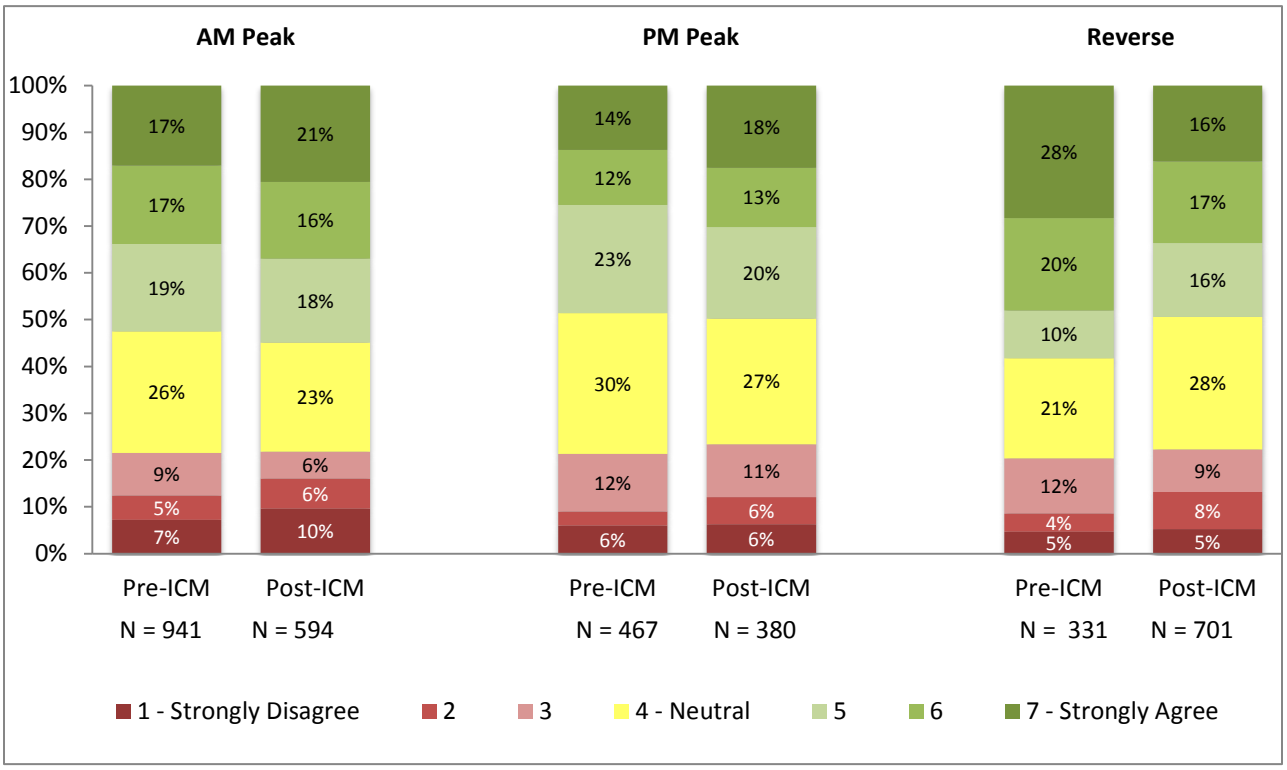
- Real time traffic and travel information reduced the stress of my trip
- Real time traffic and traveler information did not help me to avoid traffic congestion
- Real time traffic and traveler information improved my ability to make decisions about my trip

Travelers who used information sources were significantly more likely to agree than disagree that the information reduced the stress of their trip. In each peak period, these travelers agreed that real-time information reduced stress for around half of their trips, whereas they disagreed for only about 20% of trips. For about one-quarter of trips, travelers expressed neutral opinions. The findings were consistent across both survey waves.

[85] Results are only presented for those who gave a rating; "Not applicable" responses were excluded.

Figure 35. Attitude: Real Time Information Reduced the Stress of My Trip

Among travelers who checked real-time information sources before or during their trips

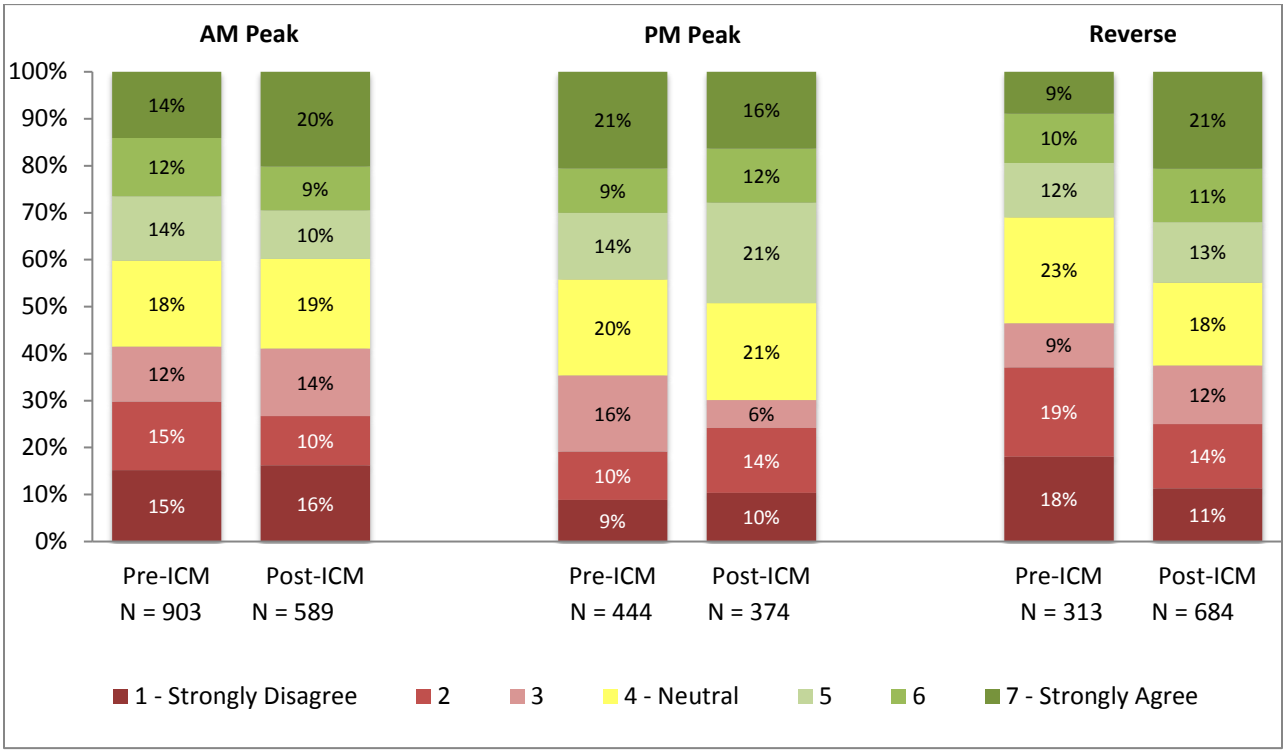


Source: U.S. DOT

Travelers who checked real-time information were also asked whether they agree that "real-time traffic and traveler information did not help [them] to avoid traffic congestion." AM peak travelers were evenly split in their responses, as they expressed disagreement (1-3) as well as agreement (5-7) for around 40% of trips. Afternoon peak travelers gave slightly more negative ratings; these travelers agreed that information did not help them avoid congestion for 44% to 49% of trips, and they disagreed for about one-third of trips. Those making a reverse trip saw greater changes over the course of the survey – in the pre-ICM period, these travelers agreed that information did not help avoid congestion for 31% of trips and disagreed for 46%. In the post-ICM period, then, the shares flipped as agreement came to outweigh disagreement; more specifically, the share of reverse trips for which travelers strongly disagreed fell by 7 percentage points while the share for which they strongly agreed rose by a full 12 percentage points.

Figure 36. Attitude: Real-Time Information Did Not Help Me Avoid Traffic Congestion

Among travelers who checked real-time information sources before or during their trips

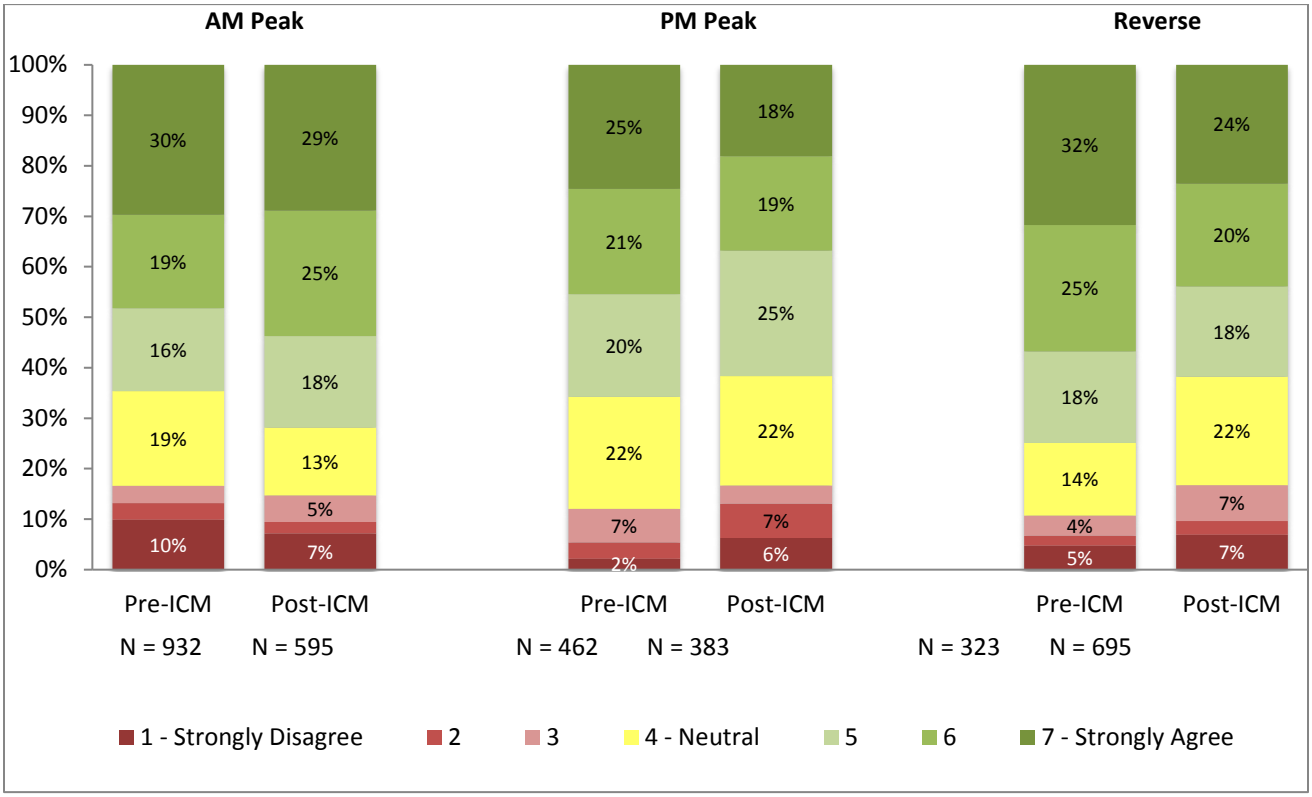


Source: U.S. DOT

Finally, large majorities of travelers who checked real-time information agreed that it improved their ability to make trip-related decisions (65% of their AM peak trips, 66% of their PM peak trips, and 75% of reverse trips in the pre-ICM period). Over the course of the survey timeframe, the findings remained relatively stable, with agreement increasing somewhat in the AM peak, and dipping slightly in the PM peak. For reverse peak trips, however, there was a 13 percentage point decline in agreement.

Figure 37. Attitude: Real-Time Information Improved My Ability to Make Decisions

Travelers who checked real-time information sources before or during their trips



Source: U.S. DOT

Planned Trips

The pulse survey invitations also asked a limited set of questions to respondents who were planning to travel in the corridor, but decided they would not. The purpose was to better understand if these travelers utilized real time traffic or travel information in making their decision not to travel, and whether their use of information changed (pre-ICM vs. post-ICM). The following sections highlight the findings for this group of non-travelers. Due to small sample sizes, morning and afternoon peak direction trips are combined into "Peak," and findings from reverse peak direction trips are not presented.

The majority of planned trips across all waves and time periods involved travelers originally intending to travel to or from work in the corridor. Before the implementation of ICM, around 71% of these peak-direction planned trips were commutes trips, as were 79% of post-ICM planned trips, and an additional one-in-ten trips were business related travel (6% pre-ICM vs. 10% post-ICM). Not surprisingly, the majority of these planned peak direction trips would have involved driving alone for the entire journey (82% pre-ICM and 92% post-ICM, respectively).

The survey asked non-travelers which sources of real-time traffic and traveler information, if any, they consulted for the trip they had originally planned. Across survey waves, there was no change in the

proportion of trips for which information was consulted. Both pre and post-ICM, non-travelers checked real time information for about two-thirds of their trips. Among the various sources, only radio, TV, and apps saw reasonably high levels of use among non-travelers. During the pre-ICM period, sources consulted for planned peak trips included: radio (35%), TV (29%) and apps (14%). In the post-ICM survey, the findings were relatively consistent. While there was a slight increase in the use of apps and a decrease in the use of radio, these changes were not statistically significant. The survey also asked non-travelers who reported using text alerts, websites, apps, social media, or telephone lines about their use of specific information providers, but the small sample sizes do not allow for reliable inference.

Table 69. I**nformation sources consulted for planned trip**
Among non-travelers

Source	Peak
Radio	
Pre-ICM	35%
Post-ICM	25%
TV	
Pre-ICM	29%
Post-ICM	32%
Apps	
Pre-ICM	14%
Post-ICM	23%
Websites	
Pre-ICM	9%
Post-ICM	5%
Another person	
Pre-ICM	6%
Post-ICM	6%
Did not check	
Pre-ICM	38%
Post-ICM	31%
Portable navigation	
Pre-ICM	13%
Post-ICM	3%
Social media	
Pre-ICM	2%
Post-ICM	4%
Alerts	
Pre-ICM	*
Post-ICM	*
Built-in navigation	
Pre-ICM	*
Post-ICM	1%
Phone #	
Pre-ICM	*
Post-ICM	*
Other	
Pre-ICM	1%
Post-ICM	1%
N (Pre-ICM)	**229**
N (Post-ICM)	**232**
** denotes <0.5%*	

Source: U.S. DOT

All non-travelers who checked information sources were then asked what they learned about travel conditions from real-time information. In the pre-ICM period peak, non-travelers most frequently cited learning about accidents (45% of peak trips), the current travel time (17%), and the extent of delays (25%), and these shares increased over the course of the survey period, by a statistically significant[86] 33 percentage points in the case of knowledge about accidents and by 10-15 percentage points in the other two cases.

Table 70. Information Learned from Source(s) Consulted Pre-Trip
Among non-travelers who consulted real-time information sources

Information Learned	Peak
Accident	
Pre-ICM	45%
Post-ICM	72%
Current travel time	
Pre-ICM	17%
Post-ICM	27%
Extent of delay	
Pre-ICM	25%
Post-ICM	36%
No unusual delays	
Pre-ICM	13%
Post-ICM	7%
Nothing	
Pre-ICM	14%
Post-ICM	1%
Weather-related hazard	
Pre-ICM	15%
Post-ICM	1%
More t congestion (no specifics)	
Pre-ICM	10%
Post-ICM	11%
Special event	
Pre-ICM	*
Post-ICM	*
Other	
Pre-ICM	4%
Post-ICM	10%
N (Pre-ICM)	**145**
N (Post-ICM)	**164**
** denotes <0.5%*	

Source: U.S. DOT

Non-travelers were also asked whether they made any changes to their trip based on the real time travel information they consulted, including cancel their trip, telecommute, make the trip earlier, make the trip later, or other. Roughly half of peak non-travelers who reported learning something from real-time info selected the "other" option. For the other response categories, there are no changes across the two survey waves.

[86] Rao and Scott X^2 test: uncorrected Pearson's X^2 (1 df) = 24.1; design-based F(1,308) = 7.08, F statistic-based p-value = 0.009

Table 71. Changes in Travel Plans Based on Information
Among non-travelers who learned from real-time information sources

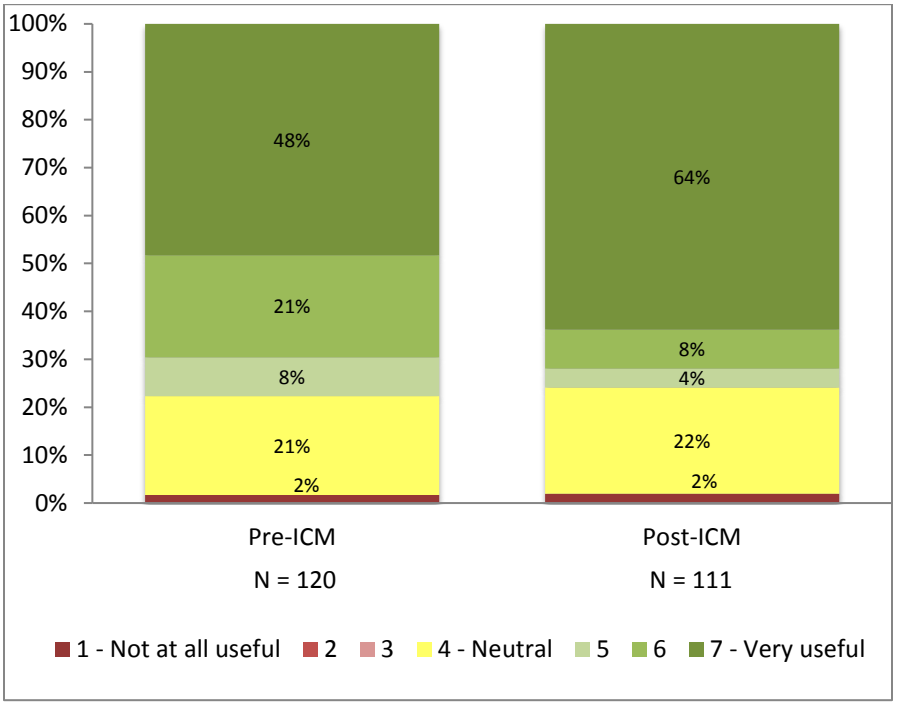
Travel Change	Peak
Make trip later	
Pre-ICM	19%
Post-ICM	17%
Make trip earlier	
Pre-ICM	8%
Post-ICM	3%
No impact	
Pre-ICM	10%
Post-ICM	11%
Cancel trip	
Pre-ICM	8%
Post-ICM	8%
Telecommute	
Pre-ICM	7%
Post-ICM	6%
Other	
Pre-ICM	50%
Post-ICM	56%
N (Pre-ICM)	**138**
N (Post-ICM)	**159**
** denotes <0.5%*	

Source: U.S. DOT

Overall Usefulness of Real-Time Information

Non-travelers who checked real time information were asked to indicate how useful they found the real-time information. Overall, for planned peak trips, these respondents felt that the information was indeed useful. Before ICM implementation, non-travelers rated the information as "very useful" ('7') for 48% of trips and gave the next highest rating ('6') for a further 21% of trips. Post-ICM, travelers gave the highest rating for an even greater proportion of trips (64%). In each wave, the non-travelers chose "neutral" for one-fifth of trips, and less than 5% said the information was not useful (rating of 1, 2, or 3).

Figure 38. Usefulness of Real-Time Traveler Information, AM Peak Trips
Among non-travelers who checked real-time information sources



Source: U.S. DOT

Chapter 4 Transit Sample Findings

As described in the Methodology chapter, the sampling and recruitment for the transit survey was conducted separately from the auto panel and utilized an in-person intercept at five transit stations along the US-75 corridor. The transit survey was conducted during the post-ICM period only, in order to obtain service feedback from regular transit riders following the deployment of ICM. The detailed findings are organized into the following sections:

- Demographic profile
- Transit use in the corridor
- Assessments of transit service
- Use of communication devices and real time traveler information
- Assessments of real time traveler information
- Impact of real time traveler information on behavior

Demographic Profile

Respondents in the transit sample are 59% male and 41% female. Based on the peak hour transit intercept, it is not surprising that the large majority of respondents are working age, with approximately one-quarter being 25 to 34 years old, 35 to 44 years old, and 45 to 54 years old.
In addition, 16% of respondents are 55 to 64 years old , 11% are 18-24 years old, and only 3% are 65 years or older.

With respect to race, 62% of transit respondents are white, 14% are Asian, and 11% are Black. Seven percent preferred not to answer, 5% identified as “other” and 1% are American Indian or Native Alaskan. Ten percent of the sample also identified as Hispanic.

Respondents tend to be well educated, with 39% having attained a Bachelor’s degree, 23% a Graduate degree and 9% a professional degree. Fifteen percent of respondents completed some college and an additional 7% reported achieving an Associate’s degree. Much smaller proportions indicated their highest level of education is a high school degree (3%), vocational/technical training (3%) or less than high school (1%).

Compared to the baseline auto sample, the transit sample is somewhat more racially diverse (25% black or Asian vs. 16% in the driver sample), but on measures of gender, age, and education, the two samples are similar.

Table 72. Transit Sample: Respondent Demographic Profile

Respondent Demographic	Percent
Gender	
Male	59%
Female	41%
Age	
18-24	11%
25-34	22%
35-44	26%
45-54	22%
55-64	16%
65+	3%
Race	
White	62%
Black	11%
Asian	14%
American Indian/Native Alaskan	1%
Other	5%
Refused to Answer	7%
Ethnicity	
Hispanic	10%
Education	
Less than High School	1%
High School Graduate	3%
Vocational/Technical degree	3%
Associates Degree	7%
Some College	15%
Bachelor's Degree	39%
Graduate Degree	23%
Professional Degree	9%
N	**594**

Source: U.S. DOT

With respect to household size, 60% of respondents are in two adult households, 16% are in three adult households, and 15% live alone (the remaining 9% live in households with 4 or more adults). Nearly half the sample has children (45%).

The largest share of respondents lives in households with an annual household income of $100,000 to $149,999 (22%). Less than one-fifth earn between $50,000 and $74,999 (17%) or $75,000 - $99,999 (16%). At the lower end of the income scale, 8% of households earn less than $35,000 and an additional 8% earn $35,000 - $49,999. At the upper end of the income scale, 11% earn $150,000 - $199,999 and 4% earn $200,000 or more in annual household income. Fourteen percent refused to respond. Compared to the baseline auto sample, a greater proportion of transit respondents live in households earning $50,000 or less in annual income (16% vs. 8%).

The large majority of transit users in our sample – 94% -have at least one vehicle in their household, while 6% do not have a vehicle. Approximately one-half of respondents (52%) live in a two-vehicle household, 25% own a single vehicle, 12% have three vehicles, and 5% have four or more vehicles. Among respondents with one or more vehicles, 90% indicate that a vehicle is

available to them during the AM peak period. Taking both car ownership and access into account, 85% of respondents are choice riders (e.g., they have the option to drive), whereas 15% are transit dependent.

With respect to residence, 27% of respondents live in Plano, 24% live in Richardson and 17% live in Dallas. Other cities in which respondents reside include Allen, Garland, McKinney, Murphy, and Wylie. Thirty-one percent have lived in their current residence for less than two years and 25% have lived in their current home for two to five years. Another 16% have lived in their home for 6 to 10 years, and 29% are longer-term residents (10 years or more).

Table 73. Household Characteristics

Household Characteristics	Percent
Household size	
1 person	15%
2 people	60%
3 people	16%
4+ people	9%
Households With Children	45%
Annual Household Income	
Less than $35,000	8%
$35,000- $49,999	8%
$50,000-$74,999	17%
$75,000-$99,999	16%
$100,000-$149,999	22%
$150,000-$199,999	11%
$200,000+	4%
Refused to respond	14%
Number of Vehicles	
0	6%
1	25%
2	52%
3	12%
4+	5%
Home City	
Plano	27%
Richardson	24%
Dallas	17%
Allen	8%
Garland	6%
McKinney	6%
Murphy	4%
Wylie	3%
Other	5%
Length at Residence	
Less than two years	31%
2 to 5 years	25%
6 to 10 years	16%
More than 10 years	29%
N	**594**

Source: U.S. DOT

Nearly all respondents – 88% - are employed full time, and 2% are employed part-time. An additional 3% are students who are employed full-time, and 3% are students employed part-time. Only 4% of respondents are currently not employed outside the home (with 3% being students who are not employed).

Respondents were asked about commuter benefits offered by their employer and whether or not they use them. Forty-one percent of employers offer a reduced transit cost benefit and 36% of respondents use it. Significantly fewer employers –about one –quarter (26%) - offer a free transit benefit, and 24% of employees use the benefit. Given that respondents are primarily transit commuters, it is not surprising that relatively few use the parking benefits offered by their employers. One-third of employers offer a free parking benefit (33%) and 14% of respondents use it. Likewise, while 22% of employers offer reduced parking, only 5% of respondents use that benefit. Respondents report that 33% of employers offer a telecommute benefit and 22% use it. A similar number of employers – 29% - offer flextime and 19% of respondents use it.

Among those who use the telecommute benefit (N=126), a majority do so either a few times per month (36%) or less than monthly (23%). About one-in-ten telecommute one day a week (13%) and a similar proportion telecommute two days per week (11%). Five percent telecommute three days per week, 2% do so four days a week, and 2% indicate they telecommute five days a week.

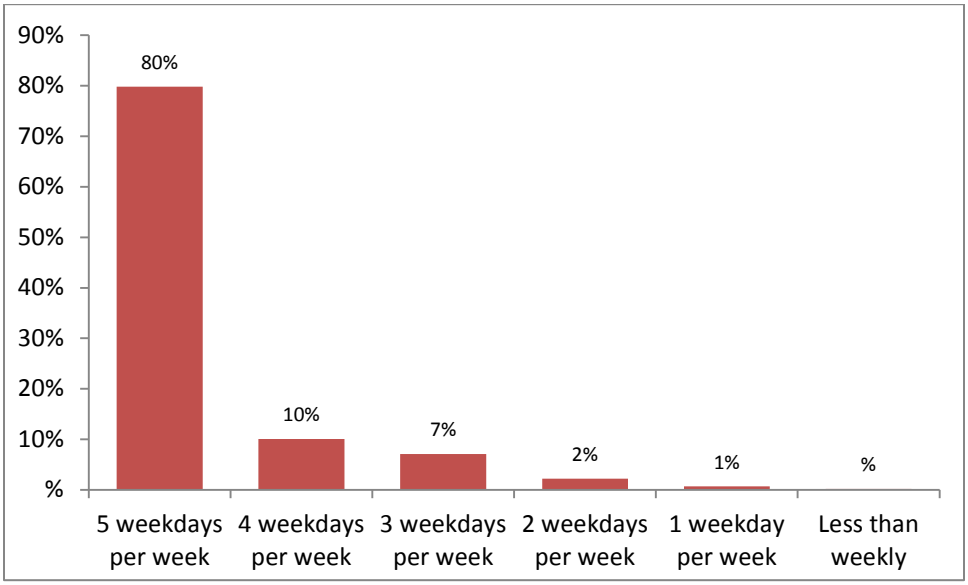
Transit Use in the Corridor

Three-quarters of respondents are committed transit riders who use either an annual (44%) or monthly transit pass (34%) to ride DART. An additional 19% use a short term pass, such as a 7 day pass or daily pass, and 3% use a semester or quarter pass purchased through their school. Forty-three percent of respondents have used the GoPass App to purchase their DART pass or ticket.

Fully 80% of respondents use the Red/Orange line 5 weekdays per week during the AM peak; 10% travel on DART 4 weekdays, and 7% do so 3 weekdays per week. The pattern of response is similar for the afternoon peak.

Figure 39. Use of the DART Red/Orange Line

N=594



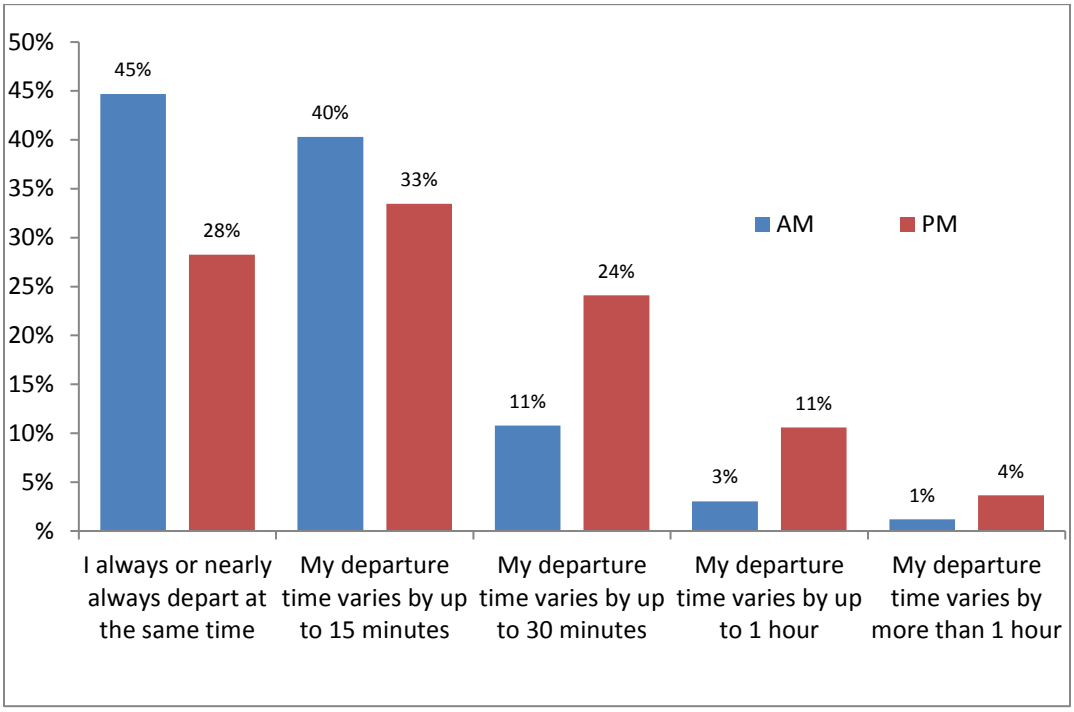
Source: U.S. DOT

With respect to trip purpose, nearly all respondents are using DART to go to work (92%) and an additional 6% are using it to go to school, both in the AM and PM peak.

In the morning peak, respondents tend to always or nearly always depart at the same time (45%) or to vary their departure time by up to 15 minutes (40%). Very few respondents vary their departure time by up to 30 minutes (10%). Not surprisingly, in the PM peak, respondents have more flexibility, and a smaller number - 28% - always or nearly always depart at the same time. One third (33%) vary their departure by up to 15 minutes, and 24% vary their departure time by up to 30 minutes.

Figure 40. Flexibility of Departure Time among Transit Riders

N=593

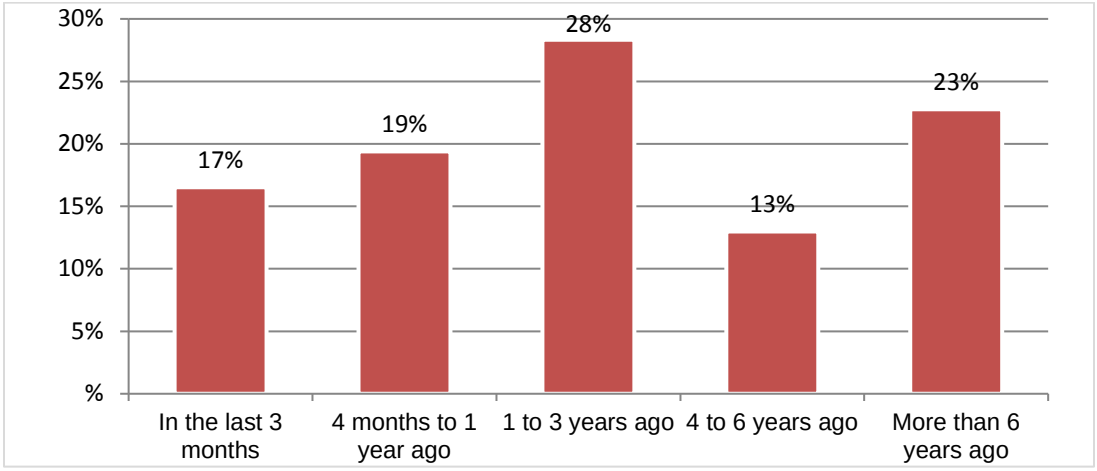


Source: U.S. DOT

Among our sample of riders, 28% reported that they have been riding DART for 1 to 3 years, 13% for 4 to 6 years, and 23% for more than 6 years. One-third of respondents are relative newcomers, with 17% who started riding DART in the last 3 months and 19% between 3 months and 1 year ago.

Figure 41. When Started Using DART

N=593



Source: U.S. DOT

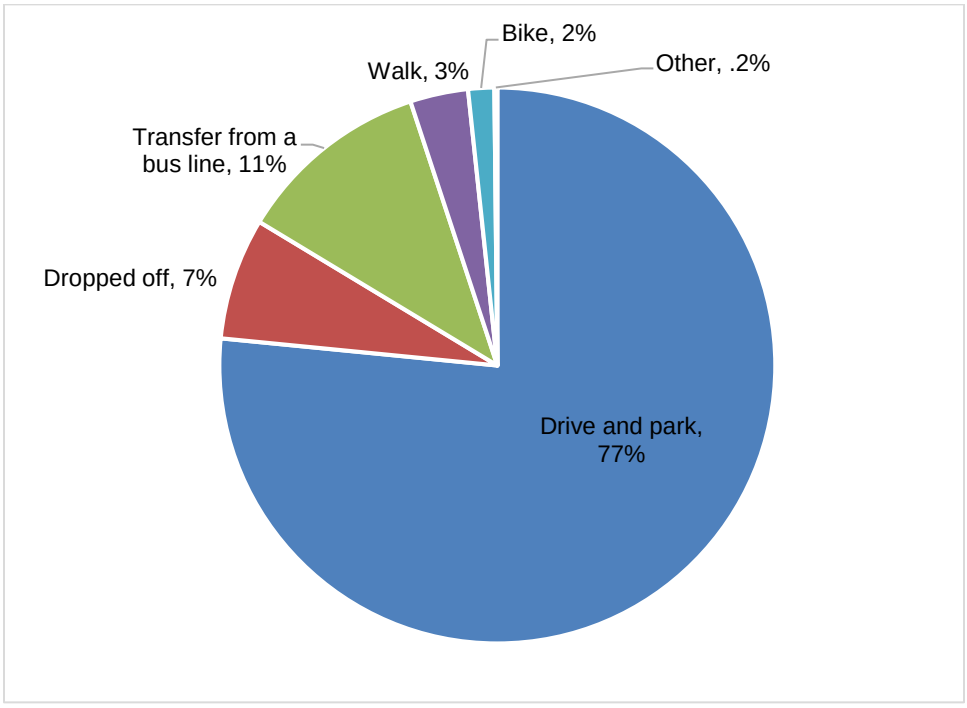
New transit riders (using DART one year or less) were asked why they started using DART. The top reason cited was convenience (41%). Specifically, 28% reported that a new job, an office relocation or a move now made DART a more convenient option. Respondents also cited the desire to avoid the traffic congestion and the stress of driving on US-75 (29%). One quarter of respondents cited cost as a factor. The reasons mentioned most often for using transit are summarized below:

- More convenient (41%)
- New job/job location switched/moved (28%)
- Avoid traffic/Traffic on US 75 is terrible (29%)
- More affordable/cost efficient (25%)
- Avoid stress (9%)
- Do not own a vehicle/no other transportation (7%)
- More eco-friendly/green (4%)
- Have transit benefit (4%)

Many transit riders take advantage of the parking that is available at transit stations (all stations in our sample have parking). For their AM peak hour trips, a large majority of respondents --77% -- drive and park to access the transit station (further evidence that most respondents are choice riders). Eleven percent reported transferring to the Red/Orange line from a bus, 7% are dropped off at the transit station, 3% walk, and 2% bike.

Figure 42. Mode Used to Access DART

N=593



Source: U.S. DOT

Respondents were asked the frequency with which they use other modes than transit for their peak hour trip. Respondents are most likely to drive if they don't take transit – 16% reported doing so regularly, 25% sometimes, 34% rarely and 25% never. By contrast, large majorities reported they never vanpool (98%), take the bus (88%)[87], or carpool (80%) instead of taking rail transit.

The stations that riders utilize to board transit largely reflected the survey sampling strategy, as riders access the Red /Orange line at Parker Road (36%) and Bush Turnpike (26%), with somewhat fewer riders getting on at Arapaho (17%), Spring Valley (11%) or Park Lane (5%). Eight percent of riders who drive and park at Parker Road indicated that they have a reserved parking spot at that station.

In terms of destination, a majority of respondents are getting off the Red/Orange line in downtown Dallas, at St. Paul (24%), Akard (20%), Pearl (11%), or West End (7%). From the transit station, 68% walk to their final destination; an additional 14% reported taking a bus, 13% drive, 3% are picked up and 1% bike from transit to their destination.

For their afternoon trips, nearly all respondents are traveling northbound (93%), and only 7% are traveling southbound. A majority of riders board the red line (70%), and one-quarter (26%) board the orange line. About one-fifth of riders board at Akard (22%) and the same proportion board at St. Paul (21%). Somewhat fewer respondents board at Pearl 11%, West End (8%), and Cityplace (4%). Fewer than 5% mentioned any other stop.

A majority of respondents get off transit at Parker Road (36%) or Bush Turnpike (25%). In addition, other stations where riders deboard include Arapaho (16%), Spring Valley (10%), Park Lane (4%), and LBJ/Central (3%). The following table summarizes respondents' use of transit stations during the peak periods.

[87] DART does not offer bus service that runs the length of the US-75 corridor (i.e., along the same route as the Red/Orange line), but it does operate feeder buses to nearly all the transit stations in the corridor.

Table 74. Use of DART Red/Orange Line Transit Stations

Station Name	AM Peak Board	AM Peak De-board	PM Peak Board	PM Peak De-board
Parker Road	36%	2%	3%	36%
Downtown Plano	*	*	1%	*
Bush Turnpike	26%	2%	2%	25%
Galatyn Park	0	1%	1%	*
Arapaho center	17%	2%	2%	16%
Spring Valley	11%	1%	1%	10%
LBJ Central	3%	3%	3%	3%
Forest lane	*	1%	1%	0%
Walnut Hill	*	2%	2%	*
Park Lane	5%	2%	1%	4%
Lovers Lane	1%*	1%	1%	1%
Mockingbird	*	2%	2%	1%
City Place	*	4%	4%	0%
Pearl	*	11%	11%	1%
St. Paul	*	24%	21%	*
Akard	0%	20%	22%	*
West end	0.5%	8%	8%	*
Other Red/Orange Line Station	0.5%	14%	14%	1%
Don't know	0%	0%	*	0%
N	**593**	**593**	**577**	**577**

Source: U.S. DOT

Assessments of Transit Service

In an effort to measure the adverse impacts that might result from the implementation of a transit diversion plan on US-75 (whereby US-75 drivers are encouraged to shift to transit), respondents were asked to indicate the frequency of each of the following problems on their transit trips:

- My train is delayed by more than 5 minutes
- I cannot find a seat on the train
- I cannot get on the train because it is full (e.g., I have to wait for the next train)
- [if park & ride] I cannot find a parking space

Response options included "almost every trip," "frequently," " occasionally," "rarely," and "never."

During their morning peak hour trips, very few respondents experienced any of these problems with any regularity. Indeed, for three of the issues being rated --the train is delayed by more than 5 minutes, cannot get on the train because it is too full, and cannot find a parking space – 80% or more of respondents said this rarely or never happens.

For two of the issues – cannot access the train because it is full and cannot find a parking space, at least two-thirds of respondents said this never happens during their morning peak hour trips (67% and

72%, respectively), and an additional quarter indicated that it rarely happens (23% and 25%, respectively). Train delays of 5 minutes or more happen more frequently. Only 21% reported that it never happens during morning trips, but at the same time, a majority said that it rarely happens (61%). Seventeen percent said five minute delays occur occasionally, and only 1% said frequently.

Finding a seat on the train, however, is more of a recurring problem. During the morning peak hours, 7% of respondents reported not being able to find a seat on almost every trip; 17% said this frequently happens, and 24% said occasionally. It should be noted, however, that this problem is not due to the implementation of ICM. Given that a transit diversion plan was not implemented during the evaluation period, the crowding reported by respondents cannot be attributed to drivers shifting to transit as a result of an ICM response plan.

During the afternoon peak period (as compared to the morning), there is an increase in the frequency with which transit customers experience these problems, particularly finding a seat on the train. Nearly half of respondents said this happens either almost every trip (21%) or frequently (26%). Another 23% said it happens occasionally. Similarly, respondents more frequently experience delays and full trains during the afternoon peak hours, compared to the morning.

Table 75. Frequency of Transit Service Problems

Problem	AM Peak	PM Peak
I cannot find a seat on the train		
Almost every trip	7%	21%
Frequently	17%	26%
Occasionally	24%	23%
Rarely	25%	19%
Never	27%	10%
Train is delayed by more than 5 minutes		
Almost every trip	*	1%
Frequently	1%	5%
Occasionally	17%	32%
Rarely	61%	47%
Never	21%	15%
I cannot get on the train because it is full		
Almost every trip	1%	2%
Frequently	2%	7%
Occasionally	7%	19%
Rarely	23%	35%
Never	67%	37%
[If uses Park & Ride, N=454] I cannot find a parking space		
Almost every trip	1%	NA
Frequently	2%	NA
Occasionally	6%	NA
Rarely	19%	NA
Never	72%	NA
N	**593**	**577**

Source: U.S. DOT

Using a seven point scale, respondents were asked to rate their satisfaction with their overall experience on the DART Red/Orange line, as well as their satisfaction with specific aspects of their peak hour trip. A large majority of the DART Red/Orange line customers in our sample reported being satisfied (including very satisfied, satisfied, or somewhat satisfied) both in the AM and PM peak periods.

For morning peak hour trips, nine-in ten respondents indicated some level of satisfaction. DART performs particularly well on reliability – 37% were very satisfied and another 49% were satisfied. Those respondents who drive to their transit stop gave similarly high satisfaction ratings to parking availability (39% very satisfied, 41% satisfied). For other measures, respondents' level of satisfaction was less intense, as approximately one-quarter reported being "very satisfied" with the frequency of the service (29%), overall travel time (27%) and overall service (25%)

For afternoon peak hour trips, respondents were slightly less satisfied, a finding that held true across all measures. In particular, fewer respondents reported being "very satisfied."

Table 76. Satisfaction with Transit Service

Respondent Experience	AM peak	PM Peak
Overall experience on the DART red/orange line	91% satisfied 25% very satisfied 53% satisfied 13% somewhat satisfied	81% satisfied 17% very satisfied 45% satisfied 19% somewhat satisfied
The reliability of the service (my train arrives on schedule)	92% satisfied 37% very satisfied 49% satisfied 8% somewhat satisfied	88% satisfied 23% very satisfied 47% satisfied 18% somewhat satisfied
***[if P&R]* Parking availability at park and ride lots**	90% satisfied 39% very satisfied 41% satisfied 10% somewhat satisfied	[Not Applicable]
The frequency of the service (how often my train runs)	88% satisfied 29% very satisfied 43% satisfied 16% somewhat satisfied	77% satisfied 19% very satisfied 40% satisfied 18% somewhat satisfied
Overall travel time (including time waiting and time traveling to and from the station)	85% satisfied 27% very satisfied 43% satisfied 15% somewhat satisfied	79% satisfied 18% very satisfied 44% satisfied 17% somewhat satisfied

Source: U.S. DOT

Relatively few respondents registered any level of dissatisfaction with the different aspects of their morning peak hour transit experience. However, one-fifth of respondents were dissatisfied with seat availability, and 16% expressed some level of dissatisfaction with the cost of the transit fare. But even

for these two issues, a majority of respondents were satisfied (73% satisfied with seat availability and 71% satisfied with the transit fare).

For their afternoon peak hour trips, respondents expressed significantly greater dissatisfaction with seat availability, with 40% of respondents voicing some level of dissatisfaction.

Table 77. Percent Dissatisfied with Seat Availability and Transit Fares

Respondent Experience	AM Peak	PM Peak
Seat availability on the train	20% Dissatisfied 4% very dissatisfied 6% dissatisfied 10% somewhat dissatisfied	40% Dissatisfied 10% very dissatisfied 12% dissatisfied 18% somewhat dissatisfied
Transit Fare	16% Dissatisfied 3% very dissatisfied 2% dissatisfied 11% somewhat dissatisfied	15% Dissatisfied 3% very dissatisfied 3% dissatisfied 9% somewhat dissatisfied

Source: U.S. DOT

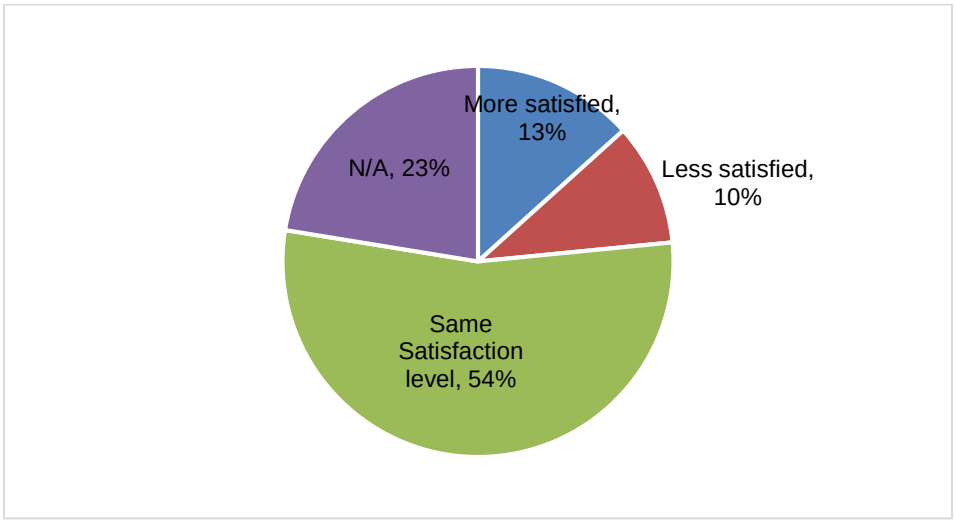
When compared to drivers in the US-75 corridor (who were asked to rate their satisfaction with their driving time, congestion, and predictability of their trip time), we find that transit users were significantly more satisfied. In surveys conducted in Atlanta and Seattle, the same trend was found, with transit customers being more satisfied than drivers.

Respondents were also asked whether or not their satisfaction with transit service in the US 75 corridor had changed in the last year. The purpose of this question was to assess whether ICM, particularly the deployment of transit DSS response plans had an impact on transit riders in the corridor. However, since a transit diversion plan was not implemented during the course of the evaluation period, it is not possible to determine the impacts on transit riders.

For morning peak hour trips, a majority of respondents – 54%- indicated no change in their satisfaction, and an additional 22% said the question is not applicable, since they were not using DART one year ago. Of those who indicated a change in satisfaction over the last year, views were relatively balanced; 13% were more satisfied (n=79) and 10% (n=60) were less satisfied.

Figure 43. Change in Satisfaction with Morning Transit Trips (Compared to One Year Ago)

N=593



Source: U.S. DOT

Among those who were more satisfied with their AM peak trips, the reasons cited most often included parking (n=16), specifically the fact that there was no more paid parking. This was followed by the addition of the orange line (n=13) and the frequency of trains (n=13). Other reasons for increased satisfaction were mentioned by fewer respondents, including:

- Fewer delays (n=4)
- Reliability of service (n=4)
- Schedule/timing (n=4)

Among those who reported being less satisfied, crowding was cited most often (n=19), followed by parking (n=12). Parking issues included the following:

- "I have to park at a lot that takes longer for me to drive to rather than the first lot with available spaces"
- "McKinney and Allen rider taking all parking space close to the station"
- "Parking at Bush has gotten worse because of construction worker parking there to work on the State Farm building"
- "Parking congestion now that there is no paid parking. I now have to leave for work earlier so that I can find a closer parking spot (mobility issue)
- "Parking has gotten worse for non-Plano residents"

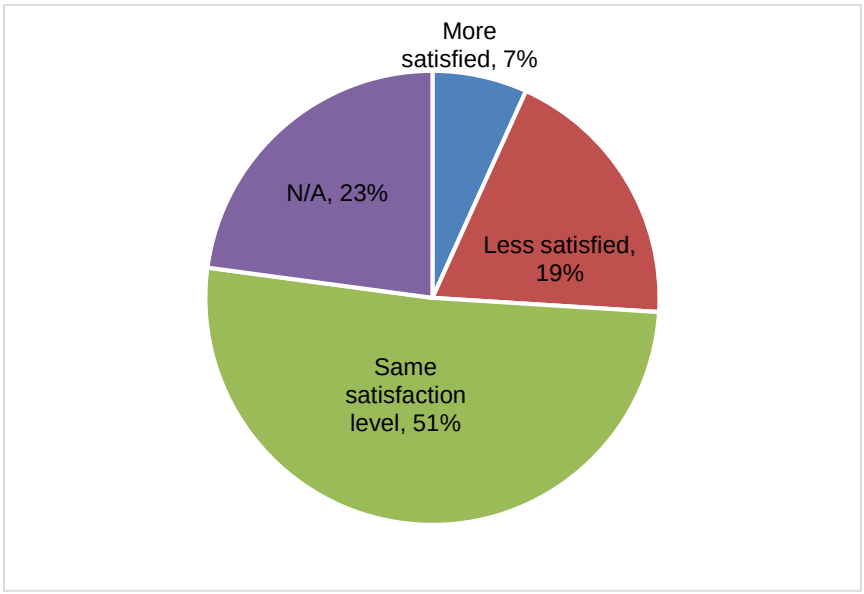
Other reasons cited for being less satisfied include:

- Cost (n=5)
- Lack of cleanliness (n=3)
- Delays (n=3)
- No Express Service (n=3)

Respondents who use transit during the afternoon peak were asked the same question about changes in satisfaction with the DART Red/Orange line over the course of the last year. Similar to responses for the morning peak, one-half of respondents indicated there was no change in their level of satisfaction (51%), and 23% indicated "not applicable" as they were not riding transit one year ago. For those experiencing a change, the number of dissatisfied customers (n=111) significantly outweighed the number of satisfied customers (n=39).

Figure 44. Change in Satisfaction with Afternoon Transit Trips (Compared to One Year Ago)

N=577



Source: U.S. DOT

Respondents overwhelmingly cited crowding as the reason for their increased dissatisfaction (N=63). Related to crowding, a number of respondents are unhappy that during the afternoon the orange line stops at the Lyndon B. Johnson (LBJ) station.

- "The orange line train stops at LBJ and I have to wait 10 minutes to go one more stop to Spring Valley"
- "It is crazy the orange line stops at LBJ and does not continue to Parker"

Other reasons for increased dissatisfaction, cited by significantly fewer respondents, included:

- Delays (n=11)
- Lack of security/safety concerns (n=8)
- Lack of cleanliness (n=8)

Among those who were more satisfied than a year ago, a variety of reasons were mentioned, including:

- The addition of the orange line/more frequent trains (n=8)
- Free parking (n=6)
- Reliability (n=5)
- More trains/more seating (n=5)

Use of Communication Devices and Real Time Traveler Information

When asked about communication technologies that are used regularly (at least once a week), the devices that top the list are smartphone (86%), laptop (70%), and desktop (62%). In addition 47% reported regularly using a tablet, 22% use a landline and 10% use a cell phone that is not web-enabled.

When asked about navigation or real time information devices used regularly (at least once a week) in the vehicle, 59% cited their smartphone, significantly more than any other technology. Relatively few respondents use portable GPS devices (9% without traffic information; 6% with traffic information) or built-in GPS devices (7% without real time traffic; 5% with real time information), and only 4% use a tablet in their vehicle for navigation or real-time information purposes.

Using a 7-point scale, where 1 equals "very uninformed" and 7 equals "very informed" (4 equals somewhat informed), respondents were asked how informed they feel about where to check for real-time transit information as well as where to check for real-time traffic information and where to check for real time parking information. In general respondents feel informed about where to check for real time transit information, as 54% indicated a score of 5 or higher, and 75% indicated a score of 4 or higher. With respect to finding traffic information, 45% of respondents report a score of five or higher, and 68% indicate a score of 4 or higher. Respondents were more likely to feel "very informed" about where to check for transit information relative to traffic information (27% vs. 19%, respectively). Interestingly, the transit respondents are similar to the sample of regular US 75 drivers in how informed they feel about where to check for traffic information (but they are significantly more likely than drivers to feel informed about where to find transit information).

Table 78. Respondents' Level of Understanding of Where to Collect Real-Time Information

Scale	Where to check for real time traffic information	Where to check for real-time transit information	Where to check for real time parking information
1 very uninformed	11%	10%	46%
2	9%	7%	17%
3	7%	4%	7%
4 Somewhat informed	23%	21%	12%
5	10%	9%	3%
6	16%	18%	2%
7 very informed	19%	27%	3%
8 Not applicable	5%	4%	10%
N	***594***	***594***	***594***

Source: U.S. DOT

Respondents are most likely to use their smartphone to acquire real time traffic or transit information. One quarter of respondents (25%) use their smartphone a few times per day for this

purpose, and another quarter (25%) do so at least a few times per week. The only other sources used with any regularity by a plurality of respondents include:

- Radio (17% 1+ times per day; 19% a few times per week)
- TV (12% 1+ times per day; 14% a few times per week)
- Electronic highway signs (7% 1+ times per day; 16% a few times per week)

Table 79. Use of Devices to Acquire Real Time Information

Device	Use 1+ times/day	Use few times/week	Use about 1 day/week	Use less than 1 day/week	Never Use	N
Smartphone	25%	25%	14%	20%	15%	(594)
Radio	17%	19%	8%	20%	36%	(594)
TV	12%	14%	6%	21%	47%	(594)
Electronic Highway signs	7%	16%	15%	30%	33%	(594)
Desktop	6%	13%	10%	30%	41%	(367)
Laptop	5%	11%	12%	35%	37%	(414)
Tablet	5%	10%	10%	31%	44%	(281)
Cell phone–not web enabled	5%	11%	3%	10%	71%	(62)
Landline	2%	1%	0%	7%	90%	(133)

Source: U.S. DOT

Compared to the baseline driver sample, transit respondents are significantly more likely to regularly[88] use their smartphone (50% vs. 37%), and not surprisingly, they are significantly less likely to use radio (which tends to focus on traffic conditions and not transit conditions) (36% vs. 65%) or electronic highway signs (23% vs. 57%). The use of other devices, including TV, Desktop PC, laptop and tablets is fairly similar across the two samples.

Respondents were asked about their awareness and use of specific websites, apps, telephone numbers and texts/alerts that provide real-time traffic and transit conditions. About one-third regularly consulted the Google Maps website (13% one or more times per day; 19% a few times per week). Fifteen percent reported regularly consulting TV or radio station websites and 12% use the DART website (in addition, 18% have never heard of the DART website and 33% have heard of but never used it). At the time of the survey only about one-quarter of respondents were aware of the 511 DFW website, with only 1% reporting regular use.

[88] "Regular use" is defined as using the source either "1+ times per day" OR "a few times per week."

Table 80. Use of Websites for Real Time Travel Information

Websites	Use 1+ times/day	Use few times/week	Use about 1 day/week	Use less than 1 day/week	Heard of, never use	Never Heard of
Google maps	13%	19%	12%	24%	25%	7%
TV/Radio Station	7%	8%	6%	20%	41%	18%
DART website	4%	8%	5%	31%	33%	18%
MapQuest	1%	3%	3%	17%	52%	24%
Traffic.com	1%	1%	*	5%	41%	52%
Texas DOT	*	1%	2%	9%	45%	43%
Bing Maps	1%	1%	2%	5%	58%	33%

Source: U.S. DOT

Among respondents who own a smartphone or tablet, 28% regularly consult the Google Maps app (12% one or more times per day and 16% at least a few times per week). Far fewer respondents use other apps with any regularity, as detailed in the table below.

Table 81. Use of Apps for Real-Time Information

Apps	Use 1+ times/day	Use few times/week	Use about 1 day/week	Use less than 1 day/week	Heard of, never use	Never Heard of
Google maps	12%	16%	10%	22%	29%	11%
Where's My Bus	5%	5%	5%	13%	34%	38%
Where's My DART Stop	4%	4%	4%	15%	32%	41%
Waze	2%	3%	2%	6%	21%	66%
Traffic.com	1%	*	1%	2%	38%	59%
Daltrans	*	*	1%	2%	22%	74%
511	0%	0%	0%	*	24%	76%
Other	2%	1%	1%	1%	27%	69%

Source: U.S. DOT

When asked about their awareness and use of text/email alerts, 7% indicated that they use the DART email/text alerts one or more times daily, 6% do so a few times per week, and 4% do so about once per week. An additional 12% use the DART email or text alerts less than weekly. For all other text/email alerts, including Traffic.com, DalTrans, and 511, a majority of respondents (from two-thirds to three-quarters) was unaware of these alert services and an additional quarter to one-third had heard of but never used the service.

Very few respondents call telephone services for real time traffic or transit information. Only 3% call the DART telephone line at least a few times a week or more often. Fifty-two percent have never

heard of the DART telephone line and 36% have heard of it but never use it. Most respondents – 82% - were not aware of the 511 telephone service and only 1% of the sample had ever used it.

Table 82. Use of Telephone Services for Real Time Information

Telephone Service	Use 1+ times/day	Use few times/week	Use about 1 day/week	Use less than 1 day/week	Heard of, never use	Never Heard of
DART	1%	2%	1%	8%	36%	52%
Texas DOT	*	*	*	2%	33%	64%
511	*	*	*	1%	17%	82%

Source: U.S. DOT

Respondents who check each source at least once per week were asked when they consult the source – before their trip, during their trip, or both before and after their trip. Nearly three-quarters of respondents who consult websites (at least once per week) do so before starting their trip (71%). One half of respondents (50%) indicated that they consult apps both before and during their trip, while 34% consult apps before their trip only. For other sources of information (telephone services, social media) sample sizes were too small for presentation.

When making their peak hour transit trip in the corridor, a majority of respondents indicated they either hardly ever (32%) or never (27%) check real time traffic and transit information. An additional 18% sometimes check information. Only about one-in-ten respondents said they always (13%) check information, and a similar proportion nearly always (10%) does so. By comparison, 26% of the baseline drivers said they always check real time traffic and transit information, and 18% said nearly always (only 35% of drivers hardly ever or never check information).

Transit respondents who never check real time traffic or transit information were asked to indicate why from a list of possible reasons. Just over half of respondents (54%) indicated they never check real time information for their morning peak hour trips because they typically do not experience delays. Other reasons cited by fewer respondents include:

- I have to use the same route no matter what (38%)
- I am not interested in checking (28%)
- I already know what conditions are like (17%)
- I do not have time to check (16%)

Very few respondents reported that information is not available (4%), information is not accurate/up-to-date (1%), or information is not detailed enough (1%).

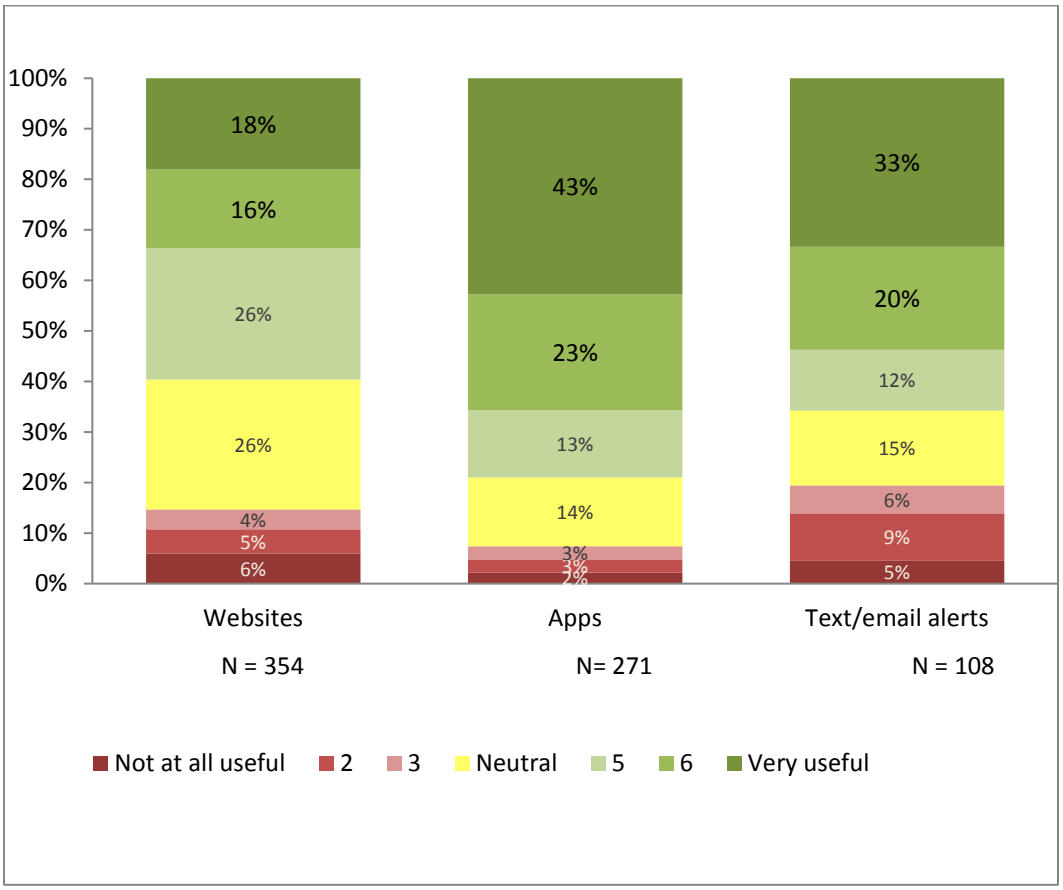
For afternoon peak hour trips, a similar proportion of respondents indicated they never check information because they typically do not experience delay (46%), and more than one –half indicated that they have to use the same route no matter what (54%). An additional 29% are not interested in checking information, and 16% reported knowing what conditions are like.

Assessments of Real Time Traveler Information

Several different measures were used to capture respondents' assessments of real time traveler information. In one series of questions, respondents were asked to rate the usefulness of the information they obtain from different sources, including telephone services, websites, apps, alerts and social media. A seven point scale was used that ranged from "Not at all useful" (1) to "very useful" (7), with 4 being a neutral response.

Overall, apps were rated most positively, with 43% giving the highest rating of "very useful" (7), and an additional 36% rating apps positively (5 or 6). One-third of respondents also rated alerts (33%) as very useful. About one-fifth of respondents gave websites (18%) a similarly high rating. For apps and websites, only 8% and 15% (respectively) gave negative ratings (1, 2, or 3). In general, the usefulness ratings given by transit riders were quite similar to those provided by drivers.

Figure 45. Usefulness Ratings of Traveler Information Sources



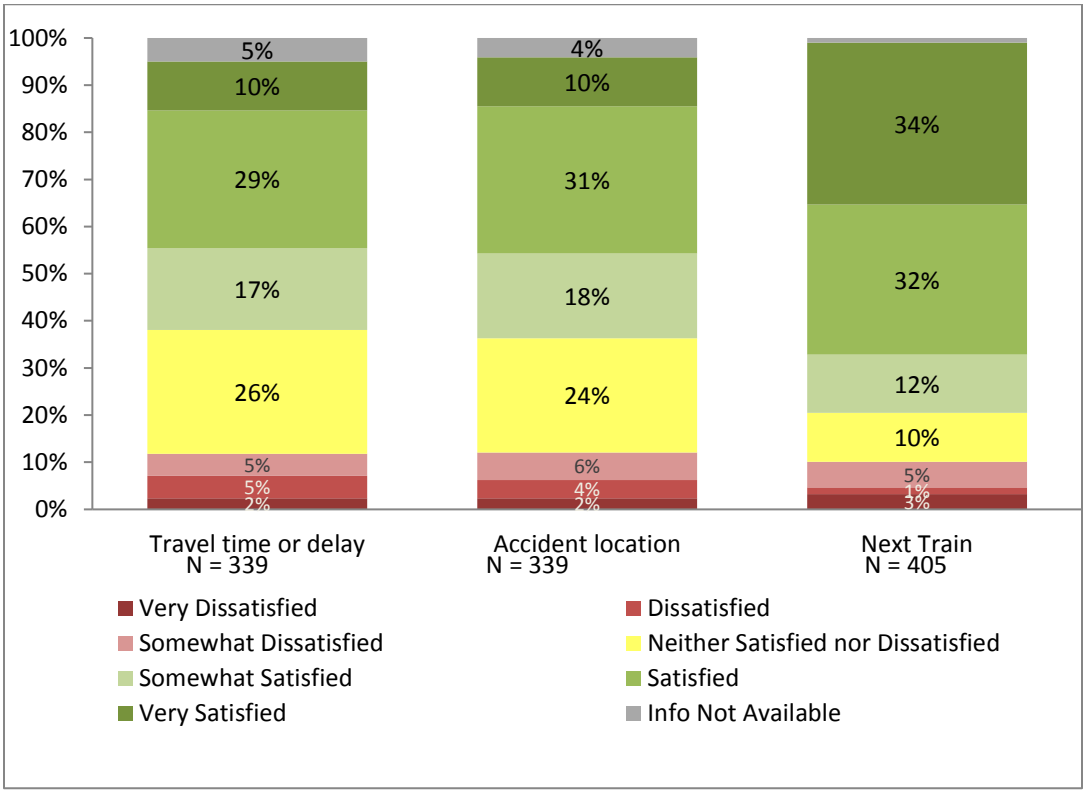
Source: U.S. DOT

In a separate series of questions, respondents were asked to rate their satisfaction with different aspects or types of real time information, including:

- Accuracy of travel time or delay information
- Accuracy of accident location information
- Accuracy of next train information on electronic signs
- Accuracy of 511 information on parking availability
- Accuracy of 511 information on transit conditions

For the two items on 511 information, approximately 60% of respondents said "not applicable", suggesting that they had not previously used the 511 system. In rating accuracy of travel time or delay information, accident location information, and next train information there were fewer "not applicable" responses (24%, 24%, and 10%, respectively). When the not applicable responses are excluded from the analysis, respondents were most satisfied with the Next Train information; three quarters of respondents (78%) expressed some degree of satisfaction, with one-third being very satisfied (34%). Satisfaction with travel time/delay information and accident location information was not as high. While a majority of respondents were satisfied (56% and 59%, respectively), only 10% were "very satisfied," and about one-quarter of respondents were neutral in their opinions (neither satisfied nor dissatisfied).

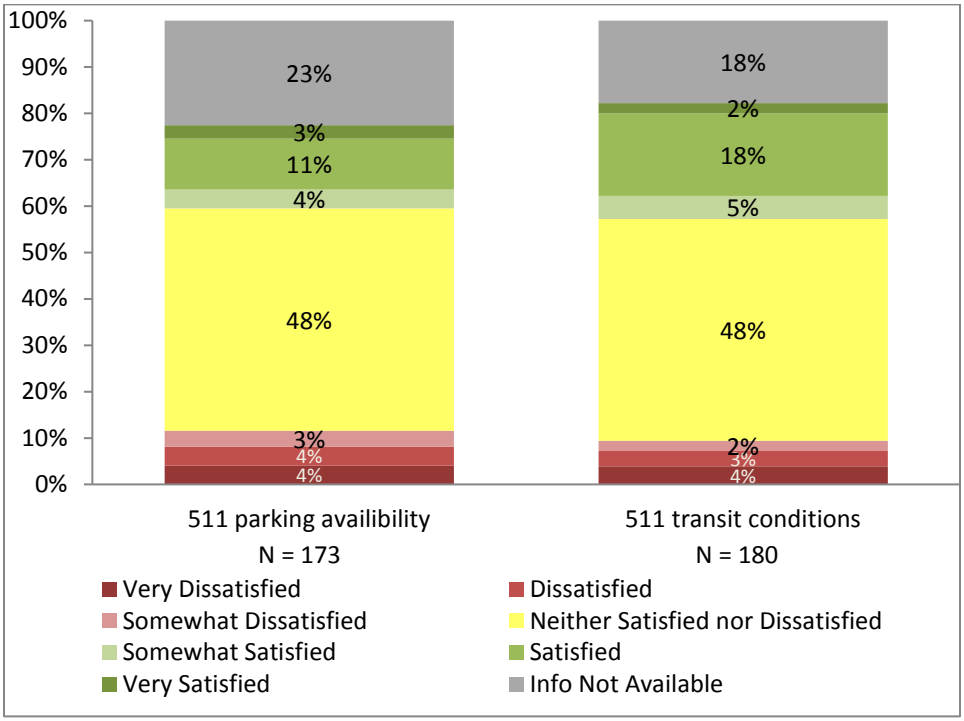
Figure 46. Satisfaction with Different Aspects of Real-Time Information



Source: U.S. DOT

With respect to 511, when the not applicable responses are excluded, 25% reported being satisfied with transit condition information, compared to 9% who were dissatisfied. Respondents were more evenly split in their rating of parking availability information on 511; 18% expressed some level of satisfaction and 11% were dissatisfied. For both measures, nearly one-half (48%) were neutral.

Figure 47. Satisfaction with 511 Information



Source: U.S. DOT

When asked to consider whether they are more or less satisfied with traveler information compared to one year ago, 47% of respondents reported that their satisfaction level was the same, and an additional 42% reported not applicable, as they were not using traffic information one year ago. Among the relatively small number of respondents who indicated a change in satisfaction, 8% (50 respondents) were more satisfied as compared to 2% (13 respondents) who were less satisfied. While these sample sizes are small, the results suggest that some respondents did notice traveler information improvements associated with ICM. Among those who were more satisfied, respondents were most likely to cite the electronic signs at transit stations (13 respondents). A handful of respondents mentioned that the accuracy of information has improved or that there is more information available. Of the 13 respondents who indicated they were less satisfied, four respondents referenced overcrowded conditions and a similar number indicated that the information on the electronic signs is wrong.

Impact of Real Time Traveler Information on Behavior

Similar to the auto survey, transit riders were asked a series of questions about the impact of real time traffic and transit information on their travel behavior – both before making the trip as well as during

the trip. First, respondents were asked about changes they make before their trip, if they learn about a delay, including:

- Start their trip earlier
- Choose a different route to get to regular transit station
- Start trip later
- Choose to drive or carpool instead of taking transit
- Choose a different station to get on DART
- Choose a different station to get off DART

For each travel behavior change, respondents were asked whether they have made the change in the last month, whether they have made the change but not in the last month, or whether they have never made the change.

With the exception of starting their trip earlier, a majority of respondents (50% or more) have never made any of the changes listed. In the last month, no more than one-fifth of respondents made a change, as shown in the table below. By comparison, in the driver sample, 43% of respondents reported that they have started their trip earlier in the last 3 months, and 28% have started their trip later.

Table 83. Changes Made Pre-Trip, Due to Learning about Traffic Congestion

N=594

Source	Yes, in last month	Yes, but not in last month	Never	Not Applicable
Started trip earlier	20%	38%	38%	3%
Chose different route to transit station	15%	26%	54%	5%
Started trip later	14%	31%	52%	3%
Chose to drive instead of DART	14%	22%	58%	6%
Chose different station to get on DART	11%	28%	57%	4%
Chose a different station to get off DART	10%	26%	60%	4%
Telecommuting	7%	23%	63%	7%
Cancel Trip	6%	20%	68%	6%

Source: U.S. DOT

Transit riders were also asked about whether they had made changes during their trip, based on information they acquired about delays. In the last month, 21% of respondents have had to wait for a later train due to overcrowding, and an additional 33% reported that this has happened, but not in the last month. Significantly fewer respondents indicated making any of the other changes in the last

month. Twelve percent have changed the route to their transit station in the last month; 9% have gotten off DART at a different station than their usual one; 6% have used a different station to get on DART, and only 3% have turned round and returned to their trip origin.

Table 84. Changes Made During Trip, Due to Learning about Traffic Congestion

N=594

Source	Yes, in last month	Yes, but not in last month	Never	Not Applicable
Wait for a later train due to overcrowding on train	21%	33%	43%	3%
Change route to transit station	12%	23%	61%	4%
Get off DART at a different transit station (than usual one)	9%	29%	59%	3%
Use a different transit station to get on DART	6%	25%	65%	4%
Turn around and return to where trip started	3%	13%	80%	4%

Source: U.S. DOT

Pulse Surveys

Transit respondents were invited to participate in two pulse surveys that were administered during their peak hour trips in the corridor. For the purposes of this analysis, responses to the two pulse surveys were combined. Findings from the pulse surveys related to transit riders' use of real time information, its impact on their travel behavior, and their satisfaction with the information are presented below. While no transit diversion plan was implemented during these two incidents, there was the possibility that transit riders may have been impacted (see Chapter 2, Methodology).

Use of Traveler Information

Sources consulted before trip and the impact on travel behavior

While respondents were most likely to consult apps (23%) for real time traffic and transit information prior to leaving for their trip, they also used a variety of other sources, including: websites (16%), radio (12%), TV (9%), alerts (8%), another person (8%), social media (6%) and GPS (4%). For one-half of trips (50%), respondents did not check any source of real-time information.

App users tended to consult either a DART app (64%) or Google Maps App (44%). Other apps were consulted for significantly fewer trips, including "other" apps (13%), Inrix (1%), Traffic.com (1%), and 511dfw (1%). Website users also tended to consult the DART website or Google Maps website (61%

and 40%, respectively). TV/Radio station websites were consulted for 17% of trips, Daltrans for 5% of trips, Traffic.com for 2% of trips, and 511dfw for % of trips.

Compared to the baseline survey, the pulse surveys demonstrated that transit respondents made greater use of DART apps. This may be due to the fact that the baseline transit survey asked about use of traffic and transit information, *in general* (i.e. for all trips and not just transit trips), whereas the pulse surveys focused exclusively on peak hour trips when respondents were using transit.

For trips in which real-time information was consulted, the smartphone was the dominant device for acquiring such information (73% of trips). Other devices were used for significantly fewer trips, as shown below:

- Desktop computer (22%)
- Laptop computer (14%)
- Cell phone (not web-enabled) (10%)
- Tablet (6%)
- Other (1%)

For nearly one-half of trips, (45%) respondents made some change to their trip, including:

- Left earlier (12%)
- Complete route change (11%)
- Changed to carpool/called home for a ride (11%)
- Left later (11%)
- Minor route change (9%)
- Changed to DART (7%)
- Changed number/order of stops (3%)
- Changed to other transit (2%)
- Other (6%)

For trips in which a change was made, respondents felt they made the right choice for nearly three-quarters of trips (72%). For 15% of trips, respondents felt they should have made a different choice and for 11% of trips they were not sure (for 2% of trips they indicated they should have stuck with their original plan).

Sources consulted during trip and their impact on travel behavior

The findings on information sources used *during* the trip are quite similar to the findings on pre-trip information usage. For just over one-half of trips (56%), respondents did not consult any information sources. For nearly a quarter of trips, they consulted apps (24%), while other sources were consulted for fewer trips, including radio (14%), electronic highway signs (8%), websites (7%), social media (6%), alerts (4%), GPS (1%), and Other (3%). App users primarily consulted either DART apps (56% of trips) or Google Maps (42% of trips).

For two-thirds of trips (66%), respondents reported making no change during their trip. Other changes included:

- Made a minor route change (10%)
- Completely changed route (9%)
- Changed to DART (6%)
- Changed number/order of stops (3%)
- Changed to other transit (2%)

- Other (8%)

For a majority of trips (66%), respondents were satisfied with the change they had made. For 15% of trips respondents felt they should have made a different choice, and for an additional 15% of trips they said they were not sure.

Assessments of traveler information

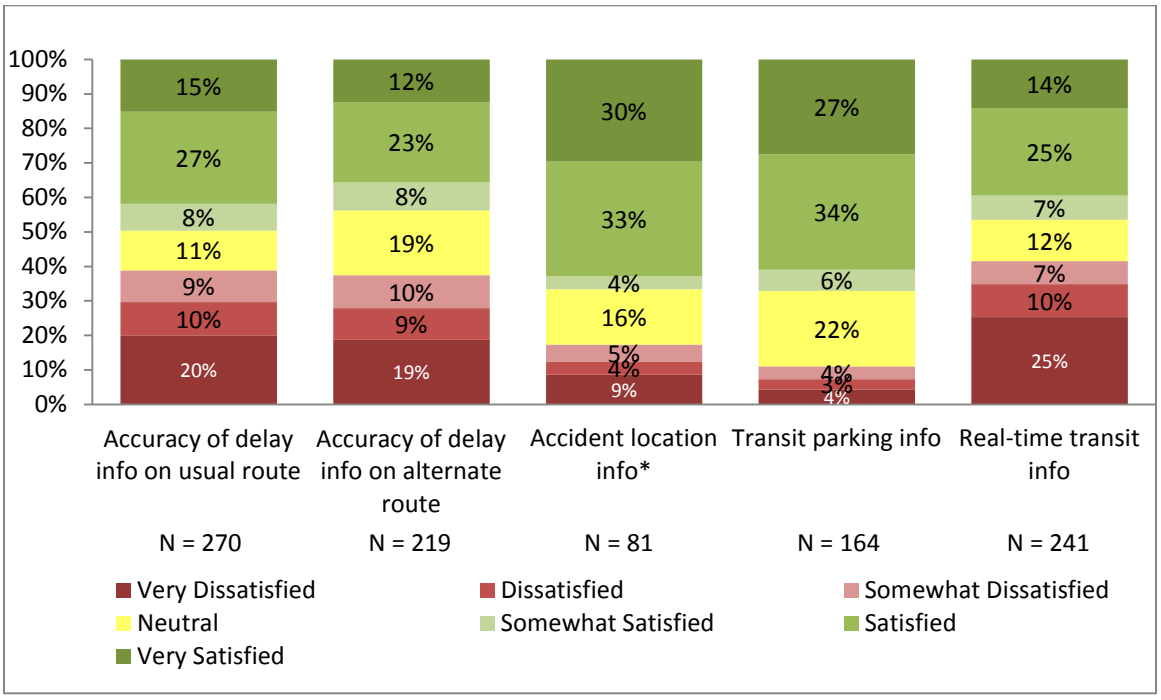
Respondents who consulted traveler information before or during their trip were asked to rate their satisfaction with several different aspects of the information, including:

- Accuracy of the travel time or delay information for their usual route
- Accuracy of travel time and delay information for their alternate route
- Accuracy of accident location information
- Accuracy of accident duration information
- Parking availability information at transit stations
- Real time transit information (next bus arrival, etc.)

Among respondents who provided a rating, they tended to be satisfied (very satisfied, satisfied, or somewhat satisfied) with accident location information (67%) and parking availability information (67%). Opinions were somewhat more mixed with respect to accuracy of travel time and delay information for their usual route, as respondents were satisfied for 50% of trips, but dissatisfied on 39% of trips. Likewise, in rating the accuracy of travel time and delay information for alternate routes and in rating real time transit information, respondents were divided (43% satisfied/ 38% dissatisfied with alternate route information; 46% satisfied/42% dissatisfied with real time transit information).

Figure 48. Satisfaction with Accuracy of Real-Time Information

Among travelers who checked information before/during trip



** Question only asked of those who learned of accident*

Source: U.S. DOT

These ratings differed significantly across the two pulse surveys, with dissatisfaction being much greater during the pulse incident in which DART was temporarily closed. For example, 58% were dissatisfied with the accuracy of the delay information for their usual route during the transit closure pulse, compared to only 13% who were dissatisfied during the other pulse incident (when the pulse surveys are combined, 39% were dissatisfied, as shown in Figure 46). Similarly, on the rating of real time transit information, 60% were dissatisfied overall (with 39% saying they were "very dissatisfied") and only 25% were satisfied during the DART closure incident. For the other pulse incident, 77% were satisfied and only 12% were dissatisfied.

Respondents who completed the pulse surveys were also asked to rate the usefulness of real time information in general, as well as the usefulness of electronic highway signs. Overall, positive ratings outweighed negative ratings by more than two-to-one. That is for 54% of trips, respondents found the information useful (rating of 5, 6, or 7 on a seven-point scale), whereas they reported it was not very useful (rating of 1, 2, or 3) for 24% of trips. For the remaining fifth of trips (22%), respondents were "neutral" in their assessment.

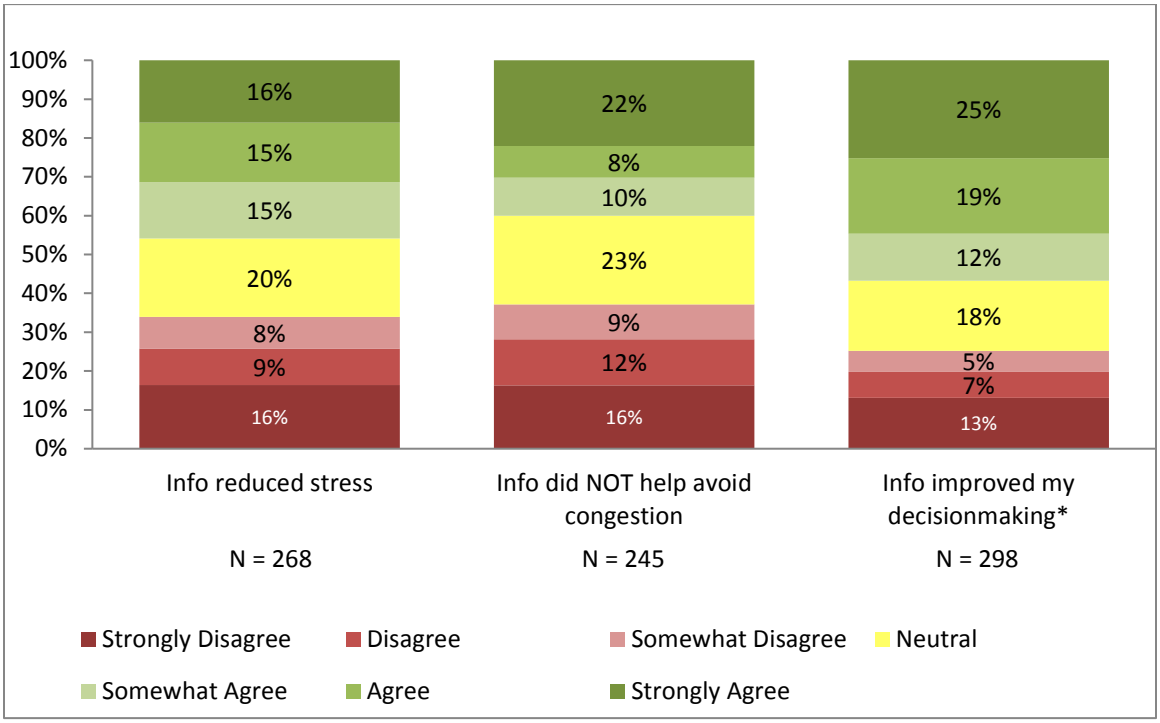
Regarding electronic signs, respondents did not provide a rating ("Not applicable") for nearly half of trips (43%). A number of reasons might explain this response, such as there were no electronic signs on their route, no information was posted on the signs, or they not notice the signs. Among those who provided a rating, respondents found the information useful for 45% trips, and for a similar share of

trips – 39% - they were neutral. Respondents reported that the information was not useful for only 15% of trips.

In a separate set of questions, respondents were asked the extent to which they agree or disagree with various attitudinal statements about traveler information. For more than one-half of trips (56%), respondents agreed (either strongly agree, agree, or somewhat agree) that real time information improved their decision-making, and they disagreed this was the case for one-quarter (25%) of trips (for an additional 18% of trips they neither agreed nor disagreed). Respondents were somewhat more evenly divided on whether information reduced the stress of their trip, with agreement slightly outweighing disagreement (46% vs. 33%). When asked the extent to which real time information did NOT help them avoid congestion, opinions were even more evenly divided – as respondents agreed this was the case for 40% of trips and disagreed for 37% of trips.

Figure 49. Attitudes About Real-time Information

Among travelers who checked real-time information sources before or during their trips



**also asked of those who did not travel but checked real-time info before trip*

Source: U.S. DOT

Chapter 5 Conclusions

The Dallas ICM demonstration involved the coordination of operations along the US-75 corridor, including increased communication and coordination among partner agencies, facilitated by the deployment of a DSS. During incident conditions, the DSS recommends response plans that are designed to improve mobility by making necessary adjustments to operations and by providing travelers with improved real-time travel information. This report presents findings on how travelers responded to the deployment of ICM, based on a panel survey in which the same travelers were surveyed both before and after the deployment. One set of surveys (the baseline and endline surveys) explore – more generally -- changes in travel behavior and travelers' use of and satisfaction with real-time information. A second set of surveys – the pulse surveys – assess changes in travel behavior and the use of traveler information during trips in which there was an incident. Key conclusions from both sets of surveys are highlighted below.

Travelers feel more informed about where to find traveler Information. Over the course of the two survey waves, a greater proportion of respondents indicated that they felt very informed about where to check for real time traffic information, and to a lesser extent, they also felt more informed about where to check for real-time transit information. For the sources of information included in the survey, there was an increase in awareness (e.g., "heard of" the source) from the pre-ICM to the post-ICM survey period, but in general, this increased awareness did not translate to increased *use* of the sources. One of the few exceptions to this pattern is Google Maps, which experienced significantly more frequent use (both the website and the app) in the post-ICM survey period.

Radio eclipses other sources of real time information, but travelers also tend to rely on electronic message signs and smartphones. Radio dominates other sources of information, and while this was particularly true in the pulse surveys, it was also reflected in the baseline and endline surveys. The significant increase in the use of smartphones to access real-time travel information is also noteworthy. In our sample of peak hour US-75 users, nearly nine-in-ten respondents regularly use a smartphone, and 58% use their smartphone a few times per week or more often to acquire real time travel information (up from 39% in the baseline survey). Interestingly, in the pulse surveys, there was no similar increase in the use of either smartphones or apps; however, aside from the radio and electronic signs, apps were used most frequently. A sizeable share of travelers also obtain real time information from television, but access to this source is limited to mornings.

At the time of the survey, the new 511 service was still relatively unknown.
As part of ICM, a 511 service was deployed in April 2013 to provide travelers in the region with improved real-time traffic and transit information to help them make more informed travel decisions. The survey findings indicated that awareness of the new service was still quite low (approximately 20% of respondents were aware of the service) during the fall and winter of 2014, and very few travelers in our sample had used the service. To put the use of 511 in context, however, it is worth noting that with the exception of a few sources (radio, electronic signs, Google Maps, Radio/TV station websites, and Waze), fewer than one-in-ten respondents reported regularly using any of the sources listed in the survey.

Satisfaction with traveler information varies by type of information

Across the baseline and endline surveys, there was an increase in satisfaction with accident/incident location information and travel time/delay information for usual route, with about two-thirds of respondents in the endline survey providing a rating of "satisfied" (either very satisfied, satisfied, or somewhat satisfied). Fewer respondents – about one-half – were satisfied with travel time/delay information for their alternate routes, but this represents a significant increase from the baseline measure, where 35% were satisfied with alternate route information. Respondents were least satisfied with information on how long it took to clear an incident (about one-third expressed some level of satisfaction in both baseline and endline).

In the pulse surveys, there was increased dissatisfaction on a couple of measures, including information on how long it took to clear an incident and accident location information. For these measures, the snapshot provided by the pulse surveys does not fully correspond with respondent's more general perceptions about traveler information.

Travelers change their route and the timing of their trips, but they are reluctant to switch modes.

In both the general surveys and the pulse surveys, respondents reported changing their route and the timing of their trips in response to learning about traffic congestion, but in the baseline and endline surveys, these measures remained stable across the survey waves. When asked about their use of alternate routes in the corridor when there is heavy congestion on US-75, the number who reported diverting to the frontage roads increased slightly, from 55% to 63% during the morning peak and 58% to 63% during the afternoon peak.

In the pulse surveys, which measured travel behavior during incident conditions, there was an increase in the number of afternoon peak drivers who made a minor route change (from 23% pre-ICM to 41% post-ICM). In addition, in the morning peak, there was a sizeable proportion of pulse survey respondents who reported changing to a completely different route during their trip (23% pre-ICM, 35% post-ICM), but this is largely attributed to a single severe incident (involving a fatality) that resulted in the temporary closure of US-75 in each survey wave. When the two fatality incidents are excluded from the analysis, fewer than one-in-ten respondents reported completely changing their route (8% pre-ICM; 9% post-ICM).

Despite their willingness to switch routes or the timing of their trips, a negligible number of respondents switch modes in the face of congestion – a finding that is consistent across the two survey waves. When asked generally about how often they will use other modes for their US-75 peak hour trips, only 3% to 4% "sometimes" use DART. In the pulse surveys, less than 0.5% reported switching to transit.

It is also telling that a large majority of the drivers in the sample generally do not ride DART. When asked about their use of the DART Red/Orange line, nearly two-thirds of drivers said they never use DART and another quarter said "less than monthly." Getting drivers out of their cars and onto transit is a challenge; moreover, the reasons that a majority of respondents cite for **not** using transit (namely that they prefer the convenience of having their own vehicle (53%) and transit is not convenient to their home and/or their destination (50%) are barriers that are not easily overcome. Transit agencies

are well aware of this challenge, and are looking at ways to encourage transit use through demand responsive services.[89]

US-75 trip satisfaction remains relatively stable, with slight shifts in a positive direction
One of the goals of ICM was to improve predictability in the corridor, and the survey shows signs of progress on this front. In the baseline, drivers were more likely to be dissatisfied than satisfied with predictability during their morning trips (47% dissatisfied; 40% satisfied), but in the endline survey the reverse was the case – satisfaction outweighed dissatisfaction (45% satisfied vs. 37% dissatisfied). In the afternoon, a majority were dissatisfied with predictability during both surveys, but again the level of dissatisfaction dropped (from 62% to 53%). When respondents were asked to rate their satisfaction with the congestion and driving time for their US 75 peak hour trips, a majority - in both survey periods - was dissatisfied, particularly during afternoon peak hour trips. However, on both these measures there were positive signs, as the level of dissatisfaction decreased slightly.

Most DART riders are satisfied with their transit experience, but crowding is an issue
Large majorities of transit riders reported being satisfied with their experience on the DART Red/Orange line in the US-75 corridor, including the reliability of the service, parking availability, the frequency of the service and overall travel time. While a majority were also satisfied with seat availability, this emerged as a problem, particularly in the afternoon. Forty-seven percent indicated that they "frequently" or "nearly always" cannot find a seat on the train during the afternoon peak, and 40% were dissatisfied with this aspect of the service.

When asked whether there had been a change in their satisfaction over the last year, those who were more satisfied highlighted the addition of the orange line and the discontinuation of paid parking at Parker Road. Those who were more dissatisfied tended to cite increased crowding on the trains, and a number also mentioned their displeasure that the orange line terminates at Lyndon B. Johnson station in the afternoon, rather than continuing to Parker Road station.

Many transit riders are unaware of 511, but they like the electronic "next train" signs at transit stations.
Like the driver sample, a large majority of transit riders – 82% - had not heard of 511, and an additional 17% had heard of, but not used the new service. Among the sources listed, respondents were most likely to regularly consult (a few times per week or more often) Google Maps, TV/Radio station websites, DART website, "Where's My Bus" app, and "Where's my DART Stop" app.

When asked to rate their satisfaction with various types of real-time information, transit users demonstrated the greatest satisfaction with electronic, next train signs. Nearly 80% of transit users expressed some level of satisfaction, with one-third (34%) being "very satisfied."

[89] Puckett, Sean; Bucci, Gregory; Biernbaum, Lee, *Impact Assessment of Integrated Dynamic Transit Operation*s, March 2, 2016.

APPENDIX A. List of Acronyms

ATMS	Advanced Travel Monitoring System
DART	Dallas Area Rapid Transit
DSS	Decision Support System
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
ICMS	Integrated Corridor Management System
ITS JPO	Intelligent Transportation Systems Joint Program Office
LPC	License plate capture
RITIS	Regional Integrated Transportation Information Systems
RSG	Resource Systems Group
RSS	Rich Site Summary
TxDOT	Texas Department of Transportation

APPENDIX B. Panel Attrition

Panel attrition

Given the relatively long time frame for this study (2 years), it was anticipated that a share of the initial respondents would drop out at some point during the study period. With panel surveys, there is a concern that certain demographic groups (e.g., low-income) may drop out of the survey at disproportionately higher rates than other groups, resulting in their under-representation in the final sample. To assess panel attrition, we compare ***unweighted*** data from the panel sample of travelers (N= 1,335) to the full original baseline (N = 4,488, including the aforementioned infrequent travelers as well as all who dropped out of the study). These comparisons indicate relatively minor differences between the two samples, although differences are in the expected direction, with lower-educated respondents tending to drop out at slightly higher rates.

The distributions of baseline age, gender, race, ethnicity, and age remain quite stable even after almost 75% of initial respondents drop out of the survey. In terms of education, the panel baseline contains on the whole fewer less educated respondents than the original baseline sample. In particular, the share of respondents with only a high school diploma and the share with some college courses each decrease by 2 percentage points, while the proportions of respondents with a graduate degree and with a professional degree are roughly 2 percentage points higher in the panel sample as compared to the original baseline.

Comparisons of the baseline and endline income distributions do not show the expected substantial decreases in the share of low-income respondents. The shares of respondents whose household income placed them in the $75,999-99,999 and in the $100,000-$149,999 brackets each increase by approximately 2 percentage points, from 16% to 18% and from 24% to 27%, respectively, from the original to the panel baseline. The percentage of respondents in every other bracket changed by no more than one percentage point. Thus, the income distribution changes surprisingly little from the original to the panel baseline, but upper middle class respondents were slightly more likely to respond to the endline survey while the wealthiest respondents responded at marginally lower rates.
Finally, the distributions of adults and children per household are almost identical in both the baseline panel sample and the full baseline sample.

Table 85. Original and panel baseline samples

Sample Category	Original baseline	Panel baseline
Age		
Under 18	*	*
18-24	3%	2%
25-34	20%	20%
35-44	30%	31%
45-54	27%	29%
55-64	16%	16%
65-74	4%	3%
75-84	*	*
85 or older	*	*

Sample Category	Original baseline	Panel baseline
Gender		
Male	62%	61%
Female	38%	39%
Race		
African American or Black	5%	5%
American Indian or Alaskan Native	1%	1%
Asian	11%	11%
White or Caucasian	74%	75%
Other	4%	3%
Prefer not to answer	6%	5%
Ethnicity		
Hispanic/Latino background	8%	7%
Non-Hispanic/Latino	92%	93%
Education		
Less than high school	*	*
High school graduate/GED	4%	3%
Some college	15%	12%
Vocational/technical training	3%	3%
Associates degree	6%	6%
Bachelor's degree	40%	40%
Graduate degree (MA, PhD)	21%	23%
Professional degree (MBA, JD, MD)	11%	13%
Household Income		
Prefer not to answer	19%	18%
Under $10,000	0%	0%
$10,000-$24,999	1%	1%
$25,000-$34,999	2%	2%
$35,000-$49,999	5%	5%
$50,000-$74,999	11%	12%
$75,000-$99,999	16%	18%
$100,000-$149,999	24%	27%
$150,000-$199,999	12%	11%
$200,000-$249,999	5%	4%
$250,000 or more	5%	4%
N	**4488**	**1335**

* denotes <0.5%

Source: U.S. DOT

APPENDIX C. Endline Survey

Dallas "Endline" survey

The purpose of this final survey is to collect typical travel behavior at the end of the ICM Traveler Response Study. In most respects the survey is identical to the "baseline" survey conducted in 2012 so that the "baseline" responses can be compared to the "endline" responses. Because of this, and because of the length of the survey, the survey will not be substantially changed.

However, a few text items and questions have been modified for clarity or new information (such as the Dallas 511 information source), and a few new questions have been added based on feedback from the 2013 ICM Peer Review Workshop. New questions are listed below.

1. carpoolType (AM/PM) (if carpool, is it family-only, coworkers, other, mix?)
2. yNoTransit (AM/PM) (why people never use DART / Rapid if it is never an "other" mode)
3. yNoRouteChange (why people stay on US-75 or I-15 even when congested)
4. parkPay (cost of parking if not fully subsidized by employers)
5. participate (willing to participate in future surveys)

Introduction

intro1

Welcome back and thank you for your participation!

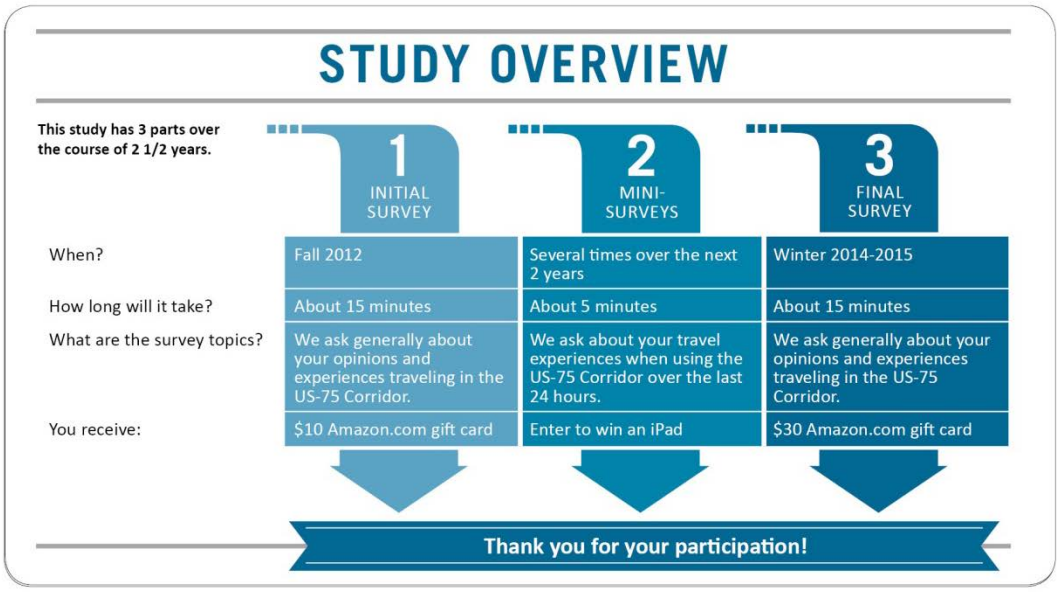
The purpose of this final survey is to understand your current travel experiences on US-75, other nearby roads, and DART light rail in the US-75 Corridor. This will help the U.S. Department of Transportation and the other study sponsors understand how your travel experiences have changed since the beginning of the study. This will also help study sponsors understand how to improve conditions in the US-75 Corridor in the future.

You are one of a small number of travelers participating in this study, so your response is very important! Thank you again for your continued efforts throughout this study and your contribution to improving travel in the Dallas region!

Your privacy will be protected. Please click here to view the privacy policy, and you may refer to the links below for more information. You may also email dallas@rsgsurvey.com with any questions or concerns or call toll-free 1-877-258-6501 and we will call you back to help you complete the survey.

intro2

We now invite you to complete the last part of this study. After completing this final survey and telling us about your travel experiences using US-75, we will provide you with a $30 Amazon.com gift certificate.



Source: U.S. DOT

Trip details - general

corridorIntro

Definition and Description of the US-75 Corridor

For this survey, the US-75 Study Corridor is shown on the map and includes:

- About 28 miles of US-75 between downtown Dallas and McKinney
- Other local/secondary roads within approximately 2 miles of US-75, including the frontage roads, and Greenville Avenue/North Plano Road/K Avenue
- Orange/Red DART light rail line that runs alongside US-75

[show corridor map image]

numWeekdays

In a typical week, about how many weekdays (Monday-Friday) do you travel <u>on US-75</u> in the study corridor during the following time periods?

Please click here for a map of the US-75 Corridor.

Between 6AM-10AM: [Drop-down]

Between 3PM-7PM: [Drop-down]

1. 5 weekdays per week
2. 4 weekdays per week
3. 3 weekdays per week
4. 2 weekdays per week
5. 1 weekday per week
6. Weekends only
7. Less than weekly
8. Never

*[Termination logic <u>before</u> Jan 16, 2015, 3PM ET: Terminate respondent from survey if they use US-75 less than **three times** weekly for both AM and PM time periods. If they use US-75 **three times** per week or more for only one time period the respondent will be allowed to continue through the survey.]*

*[Termination logic <u>after</u> Jan 16, 2015, 3PM ET: Terminate respondent from survey if they use US-75 less than **one time** weekly for both AM and PM time periods. If they use US-75 **one time** per week or more for only one time period the respondent will be allowed to continue through the survey. This change was made due to a number of panelists who were upset that they were disqualified after 2+ years of study participation due to less frequent travel habits.]*

term

Thank you for your interest in this survey.
Unfortunately, we cannot invite you to participate further because this study focuses on the experiences of people who regularly travel on US-75 on weekdays.
If you would still like to provide feedback, please email comments to dallas@rsgsurvey.com.

purpose

On a typical weekday, what is the PRIMARY purpose of the trip you make MOST OFTEN on US-75 in the study corridor?
Please click here for a map of the US-75 Corridor.

Between 6AM-10AM *[Drop-down]*
Between 3PM-7PM *[Drop-down]*

[Hide dropdown if <3 trips per week in previous question]

1. Go to/from work
2. Business-related travel (e.g. going to a meeting, sales call, delivery, etc)
3. Go to/from school/college
4. Drop off/pick up children from school
5. Go to/from the airport
6. Shopping trip
7. Social/recreational trip (e.g. go to restaurant, place of worship, gym, or visit friends)
8. Other personal business (e.g. go to doctor)
9. Other

[if 6AM-10AM is hidden, go to pmIntro]

Trip details – AM Peak Period (6AM-10AM)

amIntro

For the next set of questions, we will ask about your **<purposeAM trips> between 6AM-10AM on US-75**. Please think about this trip as you respond.

modesAM

How do you typically make your <purpose trip> on US-75 in the corridor between 6AM-10AM?
Please select all that apply. For example, if you typically drive alone to the transit station and then ride DART, you should select both "Drive alone for part (but not all) of my trip" AND "DART light rail".

1. Drive alone (auto/truck/motorcycle) for my entire trip
2. Drive alone (auto/truck/motorcycle) for part (but not all) of my trip
3. Carpool (2 or more people)
4. Organized vanpool
5. Bus (Express or local)
6. DART light rail
7. Other (walk/bike)

carpoolTypeAM *[if mode=carpool]*

Who typically travels with you when you carpool for your <purpose trip> on US-75 between 6AM-10AM?
Please select all that apply.

1. Other adult members of my household
2. Children in my household
3. Coworkers
4. Friends
5. Other, please specify: _____

othmodesAM

How often do you make your <purpose trip> on US-75 between 6AM-10AM using a different way of traveling?

[hide answer options selected on modesAM]

Category	Sometimes use (at least once per month)	Rarely use (have done at least once)	Never Use
Drive alone (auto/truck/motorcycle) for my entire trip	○	○	○
Drive alone (auto/truck/motorcycle) for part (but not all) of my trip	○	○	○
Carpool (2 or more people)	○	○	○
Organized vanpool	○	○	○
Bus (Express or local)	○	○	○
DART light rail	○	○	○
Other (bike/walk)	○	○	○

[If only modesAM selection is 'other', branch to pmIntro if 3+pm trips, else branch to tripSatOE]

yNoTransitAM *[if othModes-DART = "Never"]*

Can you indicate why you never use DART light rail for your <purpose trip> on US-75 in the corridor between 6AM-10AM?

Please select up to three reasons that are most important to you.
[require at least 1 answer, but don't allow more than 3 to be checked]

1. I am not interested in taking light rail
2. I do not know how to ride light rail
3. Parking is not available at the most convenient light rail station
4. The transit station is too far from my home and/or my destination
5. I do not feel safe traveling to, from or on light rail
6. Light trail trains are too crowded
7. The light rail schedules are not reliable
8. I prefer traveling in the comfort of my own vehicle
9. I prefer having my vehicle available for convenience
10. Fares are too expensive
11. The trip takes too long on light rail
12. Transfers to other lines or to local buses are not convenient
13. Other, please specify: _____

[show list in random order with "other" anchored at the bottom]

US75laneAM

What lanes on US-75 do you primarily use on your <purpose trip> on US-75 in the corridor between 6AM-10AM?

1. US-75 regular lanes only
2. US-75 HOV lanes only
3. Both US-75 regular lanes and HOV lane

roadsAM

In addition to using US-75, what roads do you typically use to make your <purpose trip> between 6AM-10AM?

Please select all that apply.

Please click here for a map of the US-75 Corridor.

1. US-75 frontage roads
2. Greenville Avenue/North Plano Road/K Avenue
3. Dallas North Tollway
4. Coit Road
5. None of the above

congestionFreqAM

During your typical <purpose AM trip> between 6AM-10AM, how often do you experience severe congestion or delay on US-75?

1. Almost every time I make the trip
2. Frequently (a few days a week)
3. Occasionally (a few days a month)
4. Rarely (less than once a month)
5. Never

congestionLocAM *[show if congestionFreqAM is NOT "never"]*

***Optional:* Please describe where you typically experience the worst congestion on US-75 during your <purpose trips> between 6AM-10AM.**

Please click here to see the US-75 northbound exit ramps.
Please click here to see the US-75 southbound exit ramps.

[open-ended text box, no validation required]

roadsCongestedAM *[show if congestionFreqAM is NOT "never"]*

Which of the following alternate routes or forms of transportation do you use when there is heavy traffic congestion or construction on US-75 during your <purpose trip> between 6AM-10AM?

Please select all that apply.

Please click here for a map of the US-75 Corridor.

1. US-75 frontage roads
2. Greenville Avenue/North Plano Road/K Avenue
3. Dallas North Tollway
4. Coit Road
5. DART Orange or Red light rail line
6. Other roads or types of transportation not listed here
7. None of the above – I use US-75 even when there is heavy congestion or construction

yNoRouteChangeAM *[show if roadsCongestedAM = "none, always use US-75"]*

Can you indicate why you don't use alternate routes even when there is heavy congestion on US-75 during your weekday <purpose> from 6AM-10AM

Please select all that apply.

1. I do not know of alternate routes that I could use to complete my trip
2. The available alternate routes do not seem likely to reduce my trip time
3. The available alternate routes are not convenient or attractive (for reasons other than travel time)
4. I do not know what conditions are like on alternate routes, so I prefer to stay on US-75
5. In my experience it's generally better to stay on my usual route and wait out the delay
6. My schedule is typically flexible (e.g., I do not have to arrive at a specific time or I can call ahead to arrange to arrive late)
7. Other, please specify: _____

[show list in random order with "other" anchored at the bottom]

details75AM

Please provide the following information that best describes what you do MOST OFTEN on your weekday <purpose> on US-75 from 6AM-10AM. We understand your schedule or travel patterns may vary.

Please click here to see the US-75 northbound exit ramps.

Please click here to see the US-75 southbound exit ramps.

If you do not see your exact entrance or exit ramp, please select the next closest ramp.

Flexibility on the timing of your trip	[Drop-down – see below]
Most frequent direction of travel	[Drop-down – see below]
Typical US-75 entrance point	[Drop-down – see data dictionary]
Typical time get on US-75	[Drop-down – see data dictionary]
Typical US-75 exit point	[Drop-down – see data dictionary]
Typical time exit US-75	[Drop-down – see data dictionary]

[flexibility]

1. I always or nearly always make this trip at the same time
2. My departure time varies by up to 15 minutes
3. My departure time varies by up to 30 minutes
4. My departure time varies by up to 1 hour
5. My departure time varies by more than 1 hour

[direction]

1. Southbound (towards downtown Dallas)
2. Northbound (away from downtown Dallas)

[*validate that enter time <= exit time]*

detailsTranAM *[If DART is typically used]*

You indicated that you typically use light rail for your weekday <purpose trips> between 6AM-10AM. Please provide the following information about this typical transit trip.

	Which DART light rail line do you typically get on first?	*[Drop-down]*
[pop up if Orange or Red line]	**At what station do you typically get on DART light rail?**	*[Drop-down]*
	On which DART light rail line do you typically end your trip?	*[Drop-down]*
[pop up if Orange or Red line]	**At what station do you typically get off DART light rail?**	*[Drop-down]*

[DART Light Rail Lines]

1. Red line
2. Orange line
3. Green line
4. Blue line
5. Trinity Railway Express

[Red/Orange line stations in corridor]

1. Parker Road
2. Downtown Plano
3. Bush Turnpike
4. Galatyn Park
5. Arapaho Center
6. Spring Valley
7. LBJ/Central
8. Forest Lane
9. Walnut Hill
10. Park Lane
11. Lovers Lane
12. Mockingbird

13. Cityplace
14. Pearl
15. St. Paul
16. Akard
17. West End
18. Other Red/Orange Line Station

travTimeAM

Approximately how long does the portion of your trip on US-75 take when you make your [redacted] under the conditions described below:

On your usual route, at the usual time of your trip, on a typical day:
_____minutes

On your usual route, at the usual time of your trip, on a heavy traffic congestion day:
_____minutes

On your usual route, when there is no traffic congestion, such as late at night or early Sunday morning:
_____minutes

[validate that typical is >= congestion free]
[validate that typical is <= heavy congestion]

tripSatAM

How satisfied are you with each of the following aspects of your typical [redacted]?

Please click here for a map of the US-75 Corridor.

Category	Very Dissatisfied	Dissatisfied	Somewhat Dissatisfied	Neither Satisfied nor Dissatisfied	Somewhat Satisfied	Satisfied	Very Satisfied
The predictability of your trip time on US-75							
The level of traffic congestion on US-75							
Overall driving time on US-75							
Lane width on US-75							
[if Greenville] The predictability of your trip time on Greenville							

Category	Very Dissatisfied	Dissatisfied	Somewhat Dissatisfied	Neither Satisfied nor Dissatisfied	Somewhat Satisfied	Satisfied	Very Satisfied
Avenue/North Plano Road/K Avenue							
[if Greenville] The level of traffic congestion on Greenville Avenue/North Plano Road/K Avenue							
[If Greenville] Amount of time spent at red lights on Greenville Avenue/North Plano Road/K Avenue							

Trip details – PM Peak Period (3PM-7PM)

*Repeat full set of AM Peak period questions for PM trips (3PM-7PM);
But, if AM purpose=work and PM purpose=work, skip these PM questions:

- modesPM
- carpoolTypePM
- othmodesPM
- yNoTransitPM

For detailsTranPM logic, reference modesAM answers when modesPM is skipped
USE BLUE HIGHLIGHTS where the AM questions use Yellow Highlights

tripSatOE

Optional: **If you would like to provide additional feedback about improvements needed in the US-75 Corridor, please share them below.**

[open-ended text box, no validation required]

Corridor Use: General Behavior

tranUse

Thank you for your answers so far. Now we would like to ask about your overall use of DART light rail in the US-75 Corridor.

In general, how often do you ride the DART Red and/or Orange light rail line?

Please click here for a map of the DART transit system.

1. 6-7 days a week
2. 5 days a week
3. 4 days a week
4. 2-3 days a week
5. 1 day a week
6. A few times per month
7. Less than monthly
8. Never

tranUseOE

Optional: **If you would like to provide additional feedback about how DART can be improved to better serve your travel needs, please share them below.**

[open-ended text box, no validation required]

Real-Time Traveler Information: Awareness, Use, and Satisfaction

infoIntro

For the next section, we will ask you about your familiarity with and use of communication devices and real-time traffic and traveler information sources.

Real-time traffic and traveler information includes:

- Traffic, transit, and/or travel condition information that is updated frequently to show current travel conditions.
- This real-time traffic, transit, and travel information is available to the traveling public in a variety of ways such as: TV, radio, and electronic message signs on highways or at transit stations. Other ways the public can obtain real-time travel information such as 511 include apps, alerts, and/or text messages on a cellphone, smartphone, computer, or tablet.

techOwned

Which of the following communication technologies do you regularly use for any purpose?
Please select all that apply.

1. Computer (desktop) with Internet access
2. Laptop computer with Internet access
3. Tablet computer (e.g. Apple iPad, Motorola Xoom) with Internet access
4. Smartphone (e.g. iPhone, Android, Blackberry)
5. Cell phone that is NOT web-enabled
6. Landline telephone
7. Other mobile communication device, please specify:
8. None of the above

numVehicles

How many motor vehicles (in working order) are there in your household?
Please include all motor vehicles that are kept at home and that your household regularly uses during the week. Include cars, trucks, SUVs, vans, RVs, and motorcycles (whether owned, leased, or a company vehicle)

1. 0 (no vehicles)
2. 1 vehicle
3. 2 vehicles

4. 3 vehicles
5. 4 vehicles
6. 5 or more vehicles

vehicleYear - *[if 1+ vehicle]*

[if 2+ vehicles] For the next 3 questions please answer for the vehicle in your household that you personally use the most.

What is your vehicle's model year?

[Dropdown of years, 1980-2015 in reverse chronology, with "1980 or older" and "I don't know" at the bottom]

transponder - *[if 1+ vehicle]*

Do you have a toll transponder* in your vehicle?

1. Yes, vehicle has a TollTag, TxTag or EZ TAG
2. Yes, vehicle has another type of transponder
3. No transponder in vehicle

*Note: A toll transponder is an electronic toll payment device (electronic sticker or plastic box) that is mounted inside the windshield of your vehicle. When your vehicle passes through a highway toll plaza/gantry, an antenna at the toll plaza/gantry reads the account information contained in the device. The appropriate toll is then deducted from your prepaid account.

inVehTechUsed – *[if 1+ vehicle]*

Do you regularly (at least once a week) use any of the following navigation or real-time information devices in your vehicle?
Please select all that apply.

1. Built-in (factory/dealer installed) GPS or navigation device without real-time traffic information
2. Built-in (factory/dealer installed) GPS or navigation device with real-time traffic information
3. Portable GPS or navigation device (e.g. TomTom, Magellan, Garmin) without real-time traffic information
4. Portable GPS or navigation device (e.g. TomTom, Magellan, Garmin) with real-time traffic information

5. GPS or navigation on a smartphone
6. GPS or navigation on an iPad or tablet computer
7. Other navigation or real-time traffic information device, please specify: ____
8. None of the above

informed

For the Dallas region in general, how informed do you feel about each of the following?

What is real-time traffic and traveler information?

Category	Very Uninformed 1	2	3	Somewhat Informed 4	5	6	Very Informed 7	Not Applicable
Where to check for real-time traffic information	O	O	O	O	O	O	O	O
Where to check for real-time transit information (e.g. next bus or train arrival)	O	O	O	O	O	O	O	O

Note: Statements will be shown in random order.

infoDevices

In general, how often you check each of the following <u>to get real-time traffic and traveler information</u>?

What is real-time traffic and traveler information?

Category	Never used	Use less than 1 day per week	Use about 1 day per week	Use a few times per week	Use 1+ times per day
Television					
Radio					
Electronic highway message signs					
[If owns WITH real-time info] Vehicle's built-in (factory installed) navigation device					
[if owns WITH real-time info] Portable GPS or navigation device					
*[if owns]*Desktop					

Category	Never used	Use less than 1 day per week	Use about 1 day per week	Use a few times per week	Use 1+ times per day
computer					
[if owns] Laptop computer					
[if owns] Tablet computer					
[if owns] Smartphone					
[if owns] Mobile/cell phone (not web-enabled)					
[if owns] Landline telephone					
Another person (e.g. family or friend)					

Note: Statements will be shown in random order.

Devices When *[show if checks device 1 day per week or more often]*

For each of the following, please indicate <u>when</u> you generally check it for real-time traffic or transit information.

Category	Before starting my trip	During my trip	Both before AND during my trip
Radio			
Vehicle's built-in (factory installed) navigation device			
Portable GPS or navigation device			
Laptop computer			
Tablet computer			
Smartphone			
Mobile/cell phone (not web-enabled)			
Another person (e.g. family or friend)			

infoTel

In general, how often do you check each of the following <u>TELEPHONE NUMBERS</u> to get real-time traffic and traveler information?

If you use a telephone number that is not listed below, please use the "Other" category for your response.

<u>What is real-time traffic and traveler information?</u>

Category	Never heard of	Heard of but never used	Use less than 1 day per week	Use about 1 day per week	Use a few times per week	Use 1+ times per day
Texas DOT (1.800.452.9292)	O	O	O	O	O	O
DART (1.214.979.1111)	O	O	O	O	O	O
Other telephone numbers	O	O	O	O	O	O
511dfw (511 or 1-877-511-DALL)						

Note: List will be shown in random order with "other" at the bottom.

What other telephone numbers do you use <u>to get real-time traffic and traveler information</u>?

____

[optional text box – show if "other" = any use]

infoWeb

In general, how often do you check each of the following <u>WEBSITES</u> to get real-time traffic and traveler information?

If you use a website that is not listed below, please use the "Other" category for your response.

What is real-time traffic and traveler information?

Category	Never heard of	Heard of but never used	Use less than 1 day per week	Use about 1 day per week	Use a few times per week	Use 1+ times per day
Any Texas DOT website (e.g. www.daltrans.org, www.drivetexas.org, dfwtraffic.dot.state.tx.us, etc.)	O	O	O	O	O	O
DART online trip planner (www.tripplan.dart.org)	O	O	O	O	O	O
Traffic.com	O	O	O	O	O	O
Google Maps (Traffic)/Google Transit	O	O	O	O	O	O
Bing Maps (View Traffic)	O	O	O	O	O	O

Category	Never heard of	Heard of but never used	Use less than 1 day per week	Use about 1 day per week	Use a few times per week	Use 1+ times per day
Mapquest (Live Traffic)	O	O	O	O	O	O
TV or Radio Station websites	O	O	O	O	O	O
Other websites	O	O	O	O	O	O
511 (511dfw.org						

Note: List will be shown in random order with "other" at the bottom.

[Popup if "other" is any use
What other websites do you use to get real-time traffic and traveler information?

[openend textbox, response not required]

infoSocial

In general, how often do you check each of the following SOCIAL MEDIA to get real-time traffic and traveler information?
If you use a social media source that is not listed below, please use the "Other" category for your response.
What is real-time traffic and traveler information?

Category	Not Aware source provides real-time traffic information	Aware source provides traffic info, but never used	Use less than 1 day per week	Use about 1 day per week	Use a few times per week	Use 1+ times per day
Twitter	O	O	O	O	O	O
Facebook	O	O	O	O	O	O
Youtube	O	O	O	O	O	O
Other social media						

Note: List will be shown in random order with "other" at the bottom.

[Popup if "other" is any use
What other social media do you use to get real-time traffic and traveler information? ____

[openend textbox, response not required]

InfoApp *[If owns smartphone or tablet]*

In general, how often do you check each of the following SMARTPHONE APPS to get real-time traffic and traveler information?

If you use an app that is not listed below, please use the "Other" category for your response.

What is real-time traffic and traveler information?

Category	Never heard of	Heard of but never used	Use less than 1 day per week	Use about 1 day per week	Use a few times per week	Use 1+ times per day
Google Maps/Navigation						
Dallas Transportation (DalTrans)	O	O	O	O	O	O
DART	O	O	O	O	O	O
Traffic.com	O	O	O	O	O	O
Other apps	O	O	O	O	O	O
511dfw						
Waze						

Note: List will be shown in random order with "other" at the bottom.

[Popup if "other" is any use

What other smartphone apps do you use to get real-time traffic and traveler information?

____

[openend textbox, response not required]

infoText

In general, how often do you check each of the following EMAIL AND/OR TEXT MESSAGE ALERTS to get real-time traffic and traveler information?

If you use email or text alerts not listed below, please use the "Other" category for your response.

What is real-time traffic and traveler information?

Category	Never heard of	Heard of but never used	Use less than 1 day per week	Use about 1 day per week	Use a few times per week	Use 1+ times per day
Traffic.com	O	O	O	O	O	O
Dallas Transportation (DalTrans)	O	O	O	O	O	O
DART	O	O	O	O	O	O
Other alerts	O	O	O	O	O	O
511dfw Alerts (My511)						

Note: List will be shown in random order with "other" at the bottom.

[Popup if "other" is any use
What other email or text alerts do you use? ____

[openend textbox, response not required]

infoWhen *[Show each category if respondent indicated they consult it "1 day per week" or more often]*

For each of the following, please indicate <u>when</u> you generally check it for real-time traffic or transit information.

Category	Before starting my trip	During my trip	Both before AND during my trip
Telephone number(s)			
Website(s)			
Social Media			
App(s)			
Email, text or other alert			

infoRating *[Show each category if respondent indicated they consult it "1 day per week" or more often – same logic as infoWhen]*

For each of the following, please rate the <u>usefulness</u> of the real-time traffic or transit information you generally receive.

Category	1 – Not at all useful	2	3	4 - Neutral	5	6	7 – Very useful
Telephone number(s)							
Website(s)							
Social Media							
App(s)							
Email, text or other alert							

Impacts Due to Real-Time Traveler Information: Traveler Behavior Changes and Trip Satisfaction

changeBefore

In the next two questions, we want to understand if you change your trip plans based on information about traffic congestion. First, we'll ask about changes in travel plans BEFORE making a trip. Next, we'll ask about changes in travel plans DURING a trip.

Have you done any of the following BEFORE you left for your trip as a result of learning about traffic congestion on your route?

Category	I have never done this	I have done this, but not in the last month	I have done this in the last month	Not applicable
Started my trip earlier	O	O	O	
Started my trip later	O	O	O	
Used a completely different route than my planned route for that trip	O	O	O	
Took my planned route, but with small changes to avoid a congested area	O	O	O	
Changed the number or the order of the stops I planned to make on my trip	O	O	O	
Used public transit instead of driving	O	O	O	
Decided to carpool instead of driving alone	O	O	O	
Decided not to make the trip at all	O	O	O	
Decided to telecommute instead of going to work	O	O	O	

Note: List will be shown in random order.

changeDuring

Now, we'll ask about changes you may have made as a result of learning about traffic congestion DURING your trip.

Have you made any of the following changes to your travel DURING your trip as a result of learning about traffic congestion while en-route?

Category	I have never done this	I have done this, but not in the last month	I have done this in the last month	Not Applicable
Used a completely different route than my planned route for that trip	O	O	O	
Took my planned route, but with small changes to avoid a congested area	O	O	O	
Changed the number or the order of the stops I planned to make on my trip	O	O	O	
Parked and used public transit instead of driving	O	O	O	
Turned around and returned to where I started my trip	O	O	O	

Note: List will be shown in random order.

infoFreqAM *[if saw AM questions and infoDevices is NOT "Never" for all options]*

Now we are going to ask you some specific questions about your use of real-time traffic and traveler information for the trips you make most often in the US-75 Corridor.

How often do you check real-time traffic and traveler information for your weekday <purpose trips> on US-75 between 6AM-10AM?

1. Always (every time I make the trip)
2. Nearly always (a few times per week)
3. Sometimes (at least a few times per month)
4. Hardly ever (less than monthly)
5. Never

ynoinfoAM – *[if infoFreqAM = never]*

Can you indicate why you don't check real-time traffic and traveler information for your weekday <purpose trips> on US-75 between 6AM-10AM?
Please select all that apply.

1. No Information available for my trip
2. No need to check - there isn't much traffic congestion on my trip
3. No need to check - I already know what traffic conditions are like
4. No interest in checking
5. No time to check
6. I have to use the same route no matter what

7. Information is not accurate or up-to-date
8. Information is not detailed enough
9. Other, please specify: _____

[Note: List will be shown in random order.]

infoFreqPM *[if saw PM questions and infoDevices is NOT "Never" for all options]*

How often do you check real-time traffic and traveler information for your weekday <purpose trips> on US-75 between 3PM-7PM?

1. Always (every time I make the trip)
2. Nearly always (a few times per week)
3. Sometimes (at least a few times per month)
4. Hardly ever (less than monthly)
5. Never

ynoinfoPM *[if infoFreqPM = never AND if they did not see yNoInfoAM]*

Can you indicate why you don't check real-time traffic and traveler information for your weekday <purpose trips> on US-75 between 3PM-7PM?
Please select all that apply.

1. No Information available for my trip
2. No need to check - there isn't much traffic congestion on my trip
3. No need to check - I already know what traffic conditions are like
4. No interest in checking
5. No time to check
6. I have to use the same route no matter what
7. Information is not accurate or up-to-date
8. Information is not detailed enough
9. Other, please specify:

[Note: List will be shown in random order.]

infoSatPM *[if infoFreqPM OR infoFreqAM is NOT "never"]*

For your trips in the US-75 Corridor, how satisfied are you with <u>the accuracy of the reported real-time information</u> for each of the following?

Category	Very Dissatisfied	Dissatisfied	Somewhat Dissatisfied	Neither Satisfied nor Dissastisfied	Somewhat Satisfied	Satisfied	Very Satisfied	Info Not Available	Not Applicable
Travel time or delay information for your usual route	O	O	O	O	O	O	O	O	O
Travel time or delay information for your alternate routes	O	O	O	O	O	O	O	O	O
Accident or incident location	O	O	O	O	O	O	O	O	O
Information on how long it took to clear the incident	O	O	O	O	O	O	O	O	O
Real-time transit info (next bus arrival, etc.)	O	O	O	O	O	O	O	O	O
Parking availability at transit stations	O	O	O	O	O	O	O	O	O

Employment Demographics:

employment

Thank you for your answers so far. The next few questions are about you and your work.

What is your employment status?

1. Employed full-time
2. Employed part-time
3. Student, employed full-time
4. Student, employed part-time
5. Student, not employed
6. Homemaker
7. Retired
8. Not currently employed

[if employment=5+, go to demogshome]

numJobs *[if employment<5]*

How many jobs do you have?

1. 1 job
2. 2 jobs
3. 3 or more jobs

driveJob

Do you have a job where you drive for a living or need to drive a lot (make at least 3 trips per day for meetings, sales calls, and/or deliveries)?

1. Yes
2. No

workathome

Do you work out of your home (your job is based at your home or you telecommute all the time)?

1. Yes
2. No

geocodeWork *[If doesn't work at home]*

[If 1 job] **Where is your workplace located?**
[If more than 1 job] **Where is your primary workplace (where you work the most number of hours per week) located?**

Street: _____ *[optional]*
City: _____ *[required]*
State: *[drop-down of states with TEXAS prepopulated]*
Zip Code: _____ *[optional, but validate for real zip code if any text]*

benefits

[Sentence shown if has more than 1 job] For the next few questions please think about your primary job where you work the most number of hours per week.

Which of the following commuter benefits does your employer offer and which do you personally use?

Category	Not offered	Offered, but I don't use	Offered and I use	I don't know or N/A
Telecommuting	O	O	O	O
Flextime or compressed work week	O	O	O	O
Free parking	O	O	O	O
[if free not offered/ available] Partly subsidized parking (employer pays part of parking costs)	O	O	O	O
Free transit use	O	O	O	O
[if free not offered/ available] Partly subsidized transit use (employer pays part of transit fare)	O	O	O	O

parkPay *[show if free parking is not offered or not used]*

How much do you personally pay for parking at work per month?
Please round to the nearest dollar amount.

Parking fees per month: _____ *[allow whole numbers 1 to 999]*

☐ I don't know or not applicable

telecommuteFreq *[show if uses telecommute]*

How many days per week do you typically telecommute instead of traveling to and from work?

1. 5 days per week
2. 4 days per week
3. 3 days per week
4. 2 days per week
5. 1 day per week
6. A few times per month
7. Less than monthly
8. It varies

Household Demographics:

[Section shown to all respondents]

demogsHome

Thank you again for your participation. You are almost done – we just have a few general questions about your household and yourself to help us confirm that this study is representative of the Dallas region.

Please tell us about where you live.

Street: _____ *[optional]*
City: _____ *[required]*
State: *[drop-down of states with TEXAS prepopulated]*
Zip Code: _____ *[optional, but validate for real zip code]*

How long have you lived here? *[drop-down]*

1. Less than 2 year
2. 2-5 years
3. 6-10 years
4. 10 or more years

demogsSelf

Please tell us about yourself.

Age: *[Drop-down]*
Education: *[Drop-down]*

[Age]

1. Under 18
2. 18-24
3. 25-34
4. 35-44
5. 45-54
6. 55-64
7. 65-74
8. 75-84
9. 85 or older

[Education Level]

1. Less than high school
2. High school graduate/GED
3. Some college
4. Vocational/technical training
5. Associates degree
6. Bachelor's degree
7. Graduate degree (MA, PhD)
8. Professional degree (MBA, JD, MD)

demogsHH

Please tell us about your household.

Other adults (18 or older) who live in your household:

1. 0 (I am the only adult)
2. 1 other adult
3. 2 other adults
4. 3 other adults
5. 4 other adults
6. 5 other adults
7. 6 or more other adults

Children (under age 18) who live in your household:

1. 0 (no children)
2. 1 child
3. 2 children
4. 3 children
5. 4 children
6. 5 children
7. 6 or more children

income

In 2014, what was your household's total annual income (from all sources) before taxes or other deductions from pay?

1. Under $10,000
2. $10,000-$24,999

3. $25,000-$34,999
4. $35,000-$49,999
5. $50,000-$74,999
6. $75,000-$99,999
7. $100,000-$149,999
8. $150,000-$199,999
9. $200,000-$249,999
10. $250,000 or more
11. Prefer not to answer

Note: This is information is used to help us confirm that a representative sample of the Dallas/Fort Worth region participates in this study. Please click here to view our privacy policy.

participate

Would you be willing to participate in future surveys with the U.S. Department of Transportation (U.S. DOT), TxDOT, DART, or the other study sponsors?

An important part of improving the transportation system is gathering feedback from residents such as yourself. If you say "Yes" you may be contacted in the future to invite you to another study.

1. Yes
2. No

end

Thank you for taking the time to complete this survey. You have now completed the last part of the US-75 Corridor Transportation Study.

Thank you very much for your participation over the past two years! Your input will help the U.S. Department of Transportation and the other study sponsors understand changing travel conditions and traveler decisions, and will help plan for future improvements in the region.

As thanks for your contribution, you will receive a $30 Amazon.com gift certificate. This will be emailed to you within 10 days. Also, once the final surveys have been collected from all participants, we will provide you with a summary of the study results.

Thank you again for helping to improve travel in the greater Dallas area!

General template

footer

Questions or problems: dallas@rsgsurvey.com or toll-free 1-877-258-6501
Who is Sponsoring this Study?
Study Overview and FAQ's
Privacy Policy

Sponsoring this study

The U.S. Department of Transportation (U.S. DOT) is sponsoring this study in cooperation with:

- Dallas Area Rapid Transit (DART)
- City of Dallas
- Town of Highland Park
- North Central Texas Council of Governments (NCTCOG)
- North Texas Tollway Authority (NTTA)
- City of Plano
- City of Richardson
- Texas Department of Transportation (TxDOT)
- City of University Park.

An independent research firm, Resource Systems Group, Inc., is administering this survey on behalf of the U.S. DOT.

FAQ's

PDF

Privacy

RSG Privacy Policy

SUMMARY

- Resource Systems Group (RSG) will never sell, or trade any personal information collected in its surveys with any third party. RSG will not share any such personal information, except as required by law or our by our raffle requirements (detailed separately).
- RSG will never spam you, advertise to you, or otherwise contact you outside of this survey without your explicit and direct permission.

- Any and all information collected during this survey will only be presented to RSG's clients as part of an aggregate sample. At no time will individual responses be connected to survey takers' personal information.
- During the study, we need your name and contact information in order to reach you, but at the conclusion of the study, this information will be destroyed. Your survey responses will never be sold or shared.
- Slightly different rules apply to any raffle drawing, as described separately.

PRIVACY STATEMENT IN DEPTH

We are committed to your privacy and we take it very seriously. This statement is intended to provide you with information and understanding about how Resource Systems Group (RSG) collects and safeguards personal information that is used as part of the firm's market research studies.

ABOUT RSG'S MARKET RESEARCH WORK

RSG conducts market research on behalf of both public and private sector clients using Internet, stand-alone computer, and other data collection means. Ultimately, this research allows our clients to provide you with better products and services that you use on a daily basis. These products and services range from large infrastructure, like rail service and highways, to consumer products, like magazines and cell phones.

THE INFORMATION WE COLLECT AND WHAT WE DO WITH IT

Through independently commissioned surveys, RSG may collect information such as your email address, home or work location, and a variety of demographic information (e.g., gender, age, household income) that will allow us to qualify you for a current survey, tailor survey questions, or ensure we have collected a sample that provides representation across a variety of characteristics. Once you are qualified to participate in a survey, you may be asked to provide additional demographic data, express opinions, and register preferences. The information gathered is aggregated, analyzed, and summarized on behalf of RSG's clients. This information is always presented to clients in summary fashion and never contains any personally identifiable information. Participation in these surveys is completely voluntary, and you therefore have a choice whether or not to disclose this information requested. We do not seek or accept any information from children under the age of 13.

INFORMATION COLLECTED TO MAKE YOUR SURVEY EXPERIENCE MORE PLEASANT

During the course of our surveys, we may passively collect information about your Internet browser and computer settings that makes your survey experience more pleasant. In addition to making your survey experience better, we use this information, which does not identify individual users, to analyze trends and to administer the site.

CHANGING OR DELETING PERSONAL INFORMATION

If your personal information changes, if you no longer desire to participate in this study, or if you have inquiries or complaints, please contact us via email at dallas@rsgsurvey.com or by contacting us by telephone at 1-877-258-6501.

SECURITY

We follow generally accepted industry standards to protect the personal information submitted to us, both during transmission and once we receive it. No method of transmission over the Internet, or method of electronic storage, is 100% secure, however. Therefore, while we strive to use commercially acceptable means to protect your personal information, we cannot guarantee its absolute security.

CHANGES IN THIS PRIVACY STATEMENT

RSG reserves the right to change its privacy policy. These changes will be posted clearly on the firm's websites and other places we deem appropriate so that you are aware of what information we collect, how we use it, and under what circumstances, if any, we disclose it.

LEGAL DISCLAIMER

We reserve the right to disclose your personally identifiable information as required by law, and when we believe that disclosure is necessary to protect our rights and/or to comply with a judicial proceeding, court order, or legal process served on our website.

CONTACT US

If you have any questions or suggestions regarding our privacy policy, please contact us at:

Resource Systems Group, Inc. (RSG)
55 Railroad Row
White River Junction, VT 05001
Email: dallas@rsgsurvey.com

APPENDIX D. Pulse Survey (Post-ICM)

Dallas POST-ICM Pulse Survey Draft

Revisions and new questions from the Pre-ICM Pulse Survey are highlighted in GREEN

Dynamic info (to be updated for each individual pulse survey)

Insertion 1 (this is the "pulse window") – used on travel, roads, yNoTravel, tripSat

Example: TUESDAY, 7 JANUARY 2014 BETWEEN 8:30-10AM

Insertion 2 (this is the "pulse window") – used on yNoTravel, purpose, mode, delay, duringSource

Example: BETWEEN 8:30-10AM

Insertion 3 – used on timeOn75

Example: Before 7:30AM

dashboard

Welcome back!

This page shows the status of all your surveys. Please click "Let's get started!" to begin a new survey or "In progress" to complete a survey.

If no surveys are currently available, we will contact you soon with an invitation to a new survey, and that survey will be added to the table below.

Thank you!

intro1

Welcome and thank you for your participation!

For this 5-minute survey, we will ask you about your travel experiences and your use of real-time traffic and traveler information in the US-75 Corridor over the last few days. The following questions will focus on your travel experiences during a recent "rush hour" when there may have been a lot of traffic congestion.

Let's get started!

travel

Did you travel AT ALL in the US-75 Corridor <insertion 1>?

Please click here for a map of the US-75 Corridor.

1. Yes
2. No

yNoTravel – *[If travel = 2]*

You said you did NOT travel in the US-75 Corridor <insertion 1>.

Had you planned to travel in the US-75 Corridor <insertion 1>?

1. Yes, I originally planned to travel in the US-75 Corridor but decided NOT to
2. No, I had no plans to travel in the US-75 corridor <insertion 2>

[Note: if yNoTravel = 2 send to 'end']

origin

[if travel=1] **Where did you start the trip you made <insertion 1>?**

[if travel=2] **Where would you have started the trip you originally planned to make <insertion 1>?**

Please provide the address or the nearest intersection.

We are asking this question to better understand travel patterns in the corridor. Remember, your answers will be kept strictly anonymous (see our privacy policy for more information about how we protect your privacy).

Address/Intersection: _____

City: _____

State: *[dropdown of states with Texas at the top]*

Zip: _____ *[validate for real zip code]*

☐ Prefer not to answer

[At least one answer on this page is required: one or more of the address fields or the checkbox]

roads *[If travel = 1]*

Which of the following roads in the US-75 Corridor did you use on <insertion 1>?

Please select all that apply.

Please click here for a map of the US-75 Corridor.

1. US-75 (regular lanes)
2. US-75 HOV lanes

3. US-75 frontage roads
4. Greenville Avenue/ North Plano Road/K Avenue
5. Other roads in the US-75 Corridor

timeOn75 – *[if roads = 1, 2, or 3]*

[If roads = 1 or roads = 2]

At approximately what time did you get on US-75?

[if roads != 1 and roads != 2]

At approximately what time did you get on the US-75 frontage roads?

1. <insertion 3>
2. 7:30-7:45AM
3. 7:45-8:00AM
4. 8:00-8:15AM
5. 8:15-8:30AM
6. 8:30-8:45AM
7. 8:45-9:00AM
8. 9:00-9:15AM
9. 9:15-9:30AM
10. 9:30-9:45AM
11. 9:45-10:00AM
12. I don't remember

[Note: the list of times shown will include all the 15-minute increments beginning 1 hour before the start of the "pulse window" and ending with the last 15-minute increment IN the "pulse window". The FIRST answer option will always show "Before 00:00" (allowing people to say they got on the highway MORE than 1 hour before the pulse window started) – see "Insertion 3". The last answer choice anchored at the bottom will always be "I don't remember".]

purpose

[if travel =1]

What was the PRIMARY purpose of the trip you were making <insertion 2>?

[if travel =2]

What was the PRIMARY purpose of the trip you were originally planning to make <insertion 2>?

1. Go to/from work
2. Business-related travel (e.g. going to a meeting, sales call, delivery, etc.)
3. Go to/from school/college
4. Drop off/pick up children from school
5. Go to/from the airport
6. Shopping trip
7. Social/recreational trip (e.g. go to restaurant, place of worship, gym, or visit friends)
8. Other personal business (e.g. go to doctor)
9. Other type of trip

mode

[if travel =1]

What types of transportation did you use for your trip <insertion 2>?

Please select all that apply. For example, if you drove alone to the transit station and then rode DART, you should select both "Drive alone for part (but not all) of my trip" AND "DART light rail".

[if travel =2]

What types of transportation were you originally planning to use for your trip <insertion 2>?

Please select all that apply. For example, if you were planning to drive alone to the transit station and then ride DART, you should select both "Drive alone for part (but not all) of my trip" AND "DART light rail".

1. Drive alone (auto/truck/motorcycle) for my entire trip
2. Drive alone (auto/truck/motorcycle) for part (but not all) of my trip
3. Carpool (2 or more people)
4. Organized vanpool
5. Bus (Express or local)
6. DART Light Rail
7. Other (walk/bike)

destination *[entire page is optional]*

[if travel=1] **Where did you end the trip you made <insertion 1>?**

[if travel=2] **Where would you have ended the trip you originally planned to make <insertion 1>?**

Please provide the address or the nearest intersection.

We are asking this question to better understand travel patterns in the corridor. Remember, your answers will be kept strictly anonymous (see our privacy policy for more information about how we protect your privacy).

Note: question is optional.

Address/Intersection: _____

City: _____

State: *[dropdown of states with Texas at the top]*

Zip: _____ *[validate for real zip code]*

☐ Prefer not to answer

[At least one answer on this page is required: one or more of the address fields or the checkbox]

delay – *[if travel = 1 AND road = 1,2]*

On your trip in the US-75 Corridor <insertion 2>, were you delayed on US-75 by heavier than normal traffic congestion?

1. Yes
2. No

congestionAmount *[if delay = 1]*

How would you rate the level of traffic congestion that you experienced on US-75 in the study corridor, compared to a typical day?

1. A little heavier than a typical day
2. Somewhat heavier than a typical day
3. Significantly heavier than a typical day
4. Other, please specify:

beforeSource

[if travel = 1]

Before starting your trip, did you check any of the following sources of real-time traffic and traveler information?

[If travel= 2]

Did you check any of the following sources of real-time traffic and traveler information for the trip you'd originally planned?

Please select all that apply.

1. Email and/or text message alert(s)
2. Website(s)
3. Smartphone or tablet app(s)

4. Social Media (e.g. Twitter, Facebook)
5. Telephone number to call for real-time travel information
6. Another person (family/friend)
7. Television
8. Radio
9. Vehicle's built-in navigation system
10. Portable GPS or navigation device
11. Other, please specify:
12. No, did not check real-time traffic or traveler information <u>before</u> trip

Note: List will be shown in random order with other/none anchored at the bottom.

beforeDevice *[If beforeSource <6 or beforeSource = 11]*

[if travel = 1]

<u>Before</u> starting your trip, which of the following devices did you use to check for real-time traffic and traveler information?

[If travel = 2]

When originally planning your trip, which of the following devices did you use to check for real-time traffic and traveler information?

Please select all that apply.

1. Desktop computer
2. Laptop computer
3. Tablet computer (e.g. iPad)
4. Smartphone
5. Mobile/cell phone (not web-enabled)
6. Landline telephone
7. Other, please specify:
8. None of the above

Note: List will be shown in random order with other/none anchored at the bottom

beforeText – *[if beforeSource = 1]*

[if travel = 1]

Before starting your trip in the US-75 Corridor, did you check any of the following ALERTS to get real-time traffic and traveler information?

[If travel = 2]

You said you decided not to make your trip. When originally planning your trip in the US-75 Corridor, did you check any of the following ALERTS to get real-time traffic and traveler information?

Please select all that apply.

1. Traffic.com
2. Dallas Transportation (Daltrans)
3. DART
4. Other, please specify:
5. 511dfw Alerts (My511)

beforeWeb – *[if beforeSource = 2]*

[if travel = 1]

Before starting your trip in the US-75 Corridor, did you check any of the following WEBSITES to get real-time traffic and traveler information?

[If travel = 2]

You said you decided not to make your trip. When originally planning your trip in the US-75 Corridor, did you check any of the following WEBSITES to get real-time traffic and traveler information?

Please select all that apply.

1. Any Texas DOT/Dallas Transportation (Daltrans) website (www.daltrans.org, www.drivetexas.org, dfwtraffic.dot.state.tx.us, etc.)
2. DART online trip planner (www.tripplan.dart.org)
3. Traffic.com
4. Google Maps (Traffic)/Google Transit
5. Bing Maps (View Traffic)
6. Mapquest (Live Traffic)
7. TV or Radio station websites
8. Other, please specify:
9. 511 (511dfw.org)

beforeApp – *[if beforeSource = 3]*

[if travel = 1]

Before starting your trip in the US-75 Corridor, did you check any of the following SMARTPHONE SMARTPHONE or TABLET APPS to get real-time traffic and traveler information?

[If travel = 2]

You said you decided not to make your trip. When originally planning your trip in the US-75 Corridor, did you check any of the following SMARTPHONE or TABLET APPS to get real-time traffic and traveler information?

Please select all that apply.

1. Texas DOT/ Dallas Transportation (Daltrans)
2. DART
3. Google Maps (Traffic)/Google Transit
4. Traffic.com
5. Inrix
6. Other, please specify:
7. 511dfw

beforeSocial – *[if beforeSource = 4]*

[if travel = 1]

Before starting your trip in the US-75 Corridor, did you check any of the following SOCIAL MEDIA to get real-time traffic and traveler information?

[If travel = 2]

You said you decided not to make your trip. When originally planning your trip in the US-75 Corridor, did you check any of the following SOCIAL MEDIA to get real-time traffic and traveler information?

Please select all that apply.

1. Twitter
2. Facebook
3. YouTube
4. Other, please specify:

beforeTel – *[if beforeSource = 5]*

[if travel = 1]

Before starting your trip in the US-75 Corridor, did you check any of the following TELEPHONE NUMBERS to get real-time traffic and traveler information?

[If Travel = 2]

You said you decided not to make your trip. When originally planning your trip in the US-75 Corridor, did you check any of the following TELEPHONE NUMBERS to get real-time traffic and traveler information?

Please select all that apply.

1. Texas DOT (1.800.452.9292)
2. DART (1.214.979.1111)
3. Other, please specify:
4. 511dfw (511 or 1-877-511-DALL)

beforeLearn - *[if beforeSource != 12)*

What did you learn from the sources(s) about travel conditions for your trip in the US-75 Corridor?

Please select all that apply.

1. There were no unusual delays affecting my route
2. There was more traffic congestion than normal, but no specific information was given
3. There was an accident or other incident
4. There was a weather-related hazard
5. There was a special event (e.g. a sporting event, concert)
6. I learned about current travel time on my route
7. I learned about the extent of the delay on my route
8. Other, please specify:
9. There was no information (I did not learn anything)

Note: List will be shown in random order with other/none anchored at the bottom.

beforeImpact - *[if travel = 1 & beforeLearn!=9]*

Before making your trip, did you change your travel plans in any of the following ways based on what you learned about travel conditions?

Please select all that apply.

1. I left earlier on my trip
2. I left later on my trip
3. I took my planned route, but with small changes to avoid the congested area
4. I used a completely different route than my usual/planned route
5. I changed the number or the order of my planned stops
6. I decided to use DART Light Rail Line for all/part of my trip instead of driving
7. I decided to use some other form of transit (e.g. bus) instead of driving
8. I decided to carpool instead of driving alone

9. Other, please specify:
10. I made no changes to my trip

Note: List will be shown in random order with other/none anchored at the bottom and options 6 & 7 (DART & transit) anchored in place.

yNoChangeBefore *[If beforeLearn=2,3,4 5, or 7 AND beforeImpact=10)]*

You said you learned about traffic congestion or other travel delays before your trip, but didn't make any changes.

Why did you decide not to change your trip?

Please select all that apply

1. The congestion or traffic issues I learned about did not sound too severe
2. I did not know of any alternate routes or travel modes that I could use to complete my trip
3. The available alternate routes or travel modes for this trip did not seem likely to reduce my trip time
4. The available alternate routes or travel modes were not convenient or attractive to me (for reasons other than trip time)
5. I did not have to arrive at my destination at a specific time (e.g. my schedule was flexible or I could call ahead and arrange to arrive late)
6. I thought traffic conditions would improve
7. I was not confident about the accuracy of the traffic information
8. Other, please specify:_____

[Randomize answer choices with "other" anchored at the bottom]

beforeImpact2 – *[if travel=2 & beforeLearn != 9]*

When planning your trip in the US-75 Corridor <insertion 2>, did you change your travel plans in any of the following ways based on what you learned about travel conditions on your route?

Please select all that apply.

1. I decided not to make the trip at all
2. I decided to telecommute instead of going to work
3. I decided to make the trip earlier in the day
4. I decided to make the trip later in the day
5. Other, please specify:
6. The information had no impact on my travel plans

beforeRouteChange - *[if beforeImpact = 3 or 4]*

Did you do any of the following when you changed your planned travel route?

Please select all that apply.

1. Switched to Greenville Avenue/North Plano Road/K Avenue (instead of staying on US-75)
2. Switched to the US-75 frontage roads (instead of staying on US-75)
3. Switched to US-75 (instead of staying on another road)
4. Stayed on US-75 (instead of exiting as originally planned)
5. Stayed on Greenville Avenue/North Plano Road/K Avenue (instead of exiting as originally planned)
6. Stayed on the US-75 frontage roads (instead of exiting as originally planned)
7. Other, please specify:
8. None of the above

beforeChangeSat *[if beforeImpact = 1-9 or beforeImpact2 = 1-5]*

Do you think the change you made before your trip was the right choice?

1. Yes, I made the right choice
2. No, I should have stayed with my original plan
3. No, I should have made a different choice
4. I am not sure

duringSource - *[if travel = 1]*

Did you check any of the following source(s) of real time traffic and traveler information DURING your trip in the US-75 Corridor <insertion 2>?

Please select all that apply.

1. Email and/or text message alert(s)
2. Website(s)
3. Smartphone or tablet app(s)
4. Social Media (e.g. Twitter, Facebook)
5. Telephone number to call for real-time travel information
6. Another person (family/friend)
7. Electronic highway message signs
8. Radio
9. Vehicle's built-in navigation system
10. Portable GPS or navigation device

11. Other, please specify:
12. No, did not consult real-time traffic or traveler information during trip

Note: List will be shown in random order with other/none anchored at the bottom.

duringDevice *[If duringSource <6 or duringSource = 11]*

Which of the following devices did you use to check for real-time traffic and traveler information DURING your trip?

1. Tablet computer (e.g. iPad)
2. Smartphone
3. Cell phone (not web-enabled)
4. Other, please specify:
5. None of the above

Note: List will be shown in random order with "other" and "none" anchored at the bottom

duringText – *[if duringSource = 1]*

Did you check any of the following ALERTS to get real-time traffic and traveler information DURING your trip?

Please select all that apply.

1. Traffic.com
2. Dallas Transportation (Daltrans)
3. DART
4. Other, please specify:
5. 511dfw Alerts (My511)

duringWeb – *[if duringSource = 2]*

Did you check any of the following WEBSITES to get real-time traffic and traveler information DURING your trip?

Please select all that apply.

1. Any Texas DOT/Dallas Transportation (Daltrans) website (www.daltrans.org, www.drivetexas.org, dfwtraffic.dot.state.tx.us,etc.)
2. DART online trip planner (www.tripplan.dart.org)
3. Traffic.com

4. Google Maps (Traffic)/Google Transit
5. Bing Maps (View Traffic)
6. Mapquest (Live Traffic)
7. TV or Radio station websites
8. Other, please specify:
9. 511 (511dfw.org)

duringApp – *[if duringSource = 3]*

Did you check any of the following SMARTPHONE OR TABLET APPS to get real-time traffic and traveler information DURING your trip?

Please select all that apply.

1. Texas DOT/ Dallas Transportation (Daltrans)
2. DART
3. Google Maps (Traffic)/Google Transit
4. Traffic.com
5. Inrix
6. Other, please specify:
7. 511 (511dfw.org)

duringSocial – *[if duringSource = 4]*

Did you check any of the following SOCIAL MEDIA to get real-time traffic and traveler information DURING your trip?

Please select all that apply.

1. Twitter
2. Facebook
3. YouTube
4. Other, please specify:

duringTel – *[if duringSource = 5]*

Did you check any of the following TELEPHONE NUMBERS to get real-time traffic and traveler information DURING your trip?

Please select all that apply.

1. Texas DOT (1.800.452.9292)

2. DART (1.214.979.1111)
3. 511dfw (511 or 1-877-511-DALL)
4. Other, please specify:

duringLearn *[if duringSource != 12]*

What did you learn from the sources(s) about travel conditions for your trip in the US-75 Corridor?

Please select all that apply.

1. There were no unusual delays affecting my route
2. There was more traffic congestion than normal, but no specific information was given
3. There was an accident or other incident
4. There was a weather-related hazard
5. There was a special event (e.g. a sporting event, concert)
6. I learned about expected travel time for my trip
7. I learned about the expected length of delay on my route
8. There was parking availability at a transit station along my route
9. Other, please specify:
10. There was no information (I did not learn anything new)

Note: List will be shown in random order with other/none anchored at the bottom.

duringImpact *[if travel=1]*

[If duringSource = 12 OR duringLearn = 10]

During your trip in the US-75 corridor, did you make any of the following changes as a result of the traffic conditions on your route?

[if duringLearn != 10]

During your trip in the US-75 corridor, did you make any of the following changes as a result of the traffic conditions on your route or based on what you learned from real-time traffic information?

Please select all that apply.

1. I took my planned route, but with small changes to avoid the congested area
2. I used a completely different route than my usual/planned route
3. I changed the number or the order of my planned stops
4. I decided to use the DART Light Rail Line for all/part of trip instead of driving the whole way

5. I decided to use some other form of transit (e.g. bus) instead of driving the whole way
6. Other, please specify:
7. No, I made no changes to my planned trip

Note: List will be shown in random order with other/none anchored at the bottom and options 4 & 5 (DART & transit) anchored in place.

yNoChangeDuring *[If (delay=1 OR duringLearn =,2,3,4,5, or 7) AND duringImpact=7]*

You said you experienced and/or learned about unusual traffic congestion or other travel delays during your trip, but didn't make any changes to your trip.

Why did you decide not to change your trip?

Please select all that apply

1. The congestion or traffic issues I experienced or learned about did not seem too severe
2. I did not know of any alternate routes or travel modes that I could use to complete my trip
3. The available alternate routes or travel modes for this trip did not seem likely to reduce my trip time
4. The available alternate routes or travel modes were not convenient or attractive to me (for reasons other than trip time)
5. I did not have to arrive at my destination at a specific time (e.g. my schedule was flexible or I could call ahead and arrange to arrive late)
6. I thought traffic conditions would improve
7. I did not feel confident about the accuracy of the traffic information
8. Other, please specify:_____

duringRouteChange - *[if duringImpact = 1 or 2]*

Did you do any of the following when you changed your planned route during your trip?

Please select all that apply.

1. Switched to Greenville Avenue/North Plano Road/K Avenue (instead of staying on US-75)
2. Switched to the US-75 frontage roads (instead of staying on US-75)
3. Switched to US-75 (instead of staying on another road)
4. Stayed on US-75 (instead of exiting as originally planned)
5. Stayed on Greenville Avenue/North Plano Road/K Avenue (instead of exiting as originally planned)
6. Stayed on the US-75 frontage roads (instead of exiting as originally planned)

7. Other, please specify:
8. None of the above

changeLearn *[If duringSource != 12 and duringLearn!=10 and duringImpact = 1-6]*

Were the changes you made to your trip due to what you learned from real-time traffic and traveler information or from your direct experience with traffic congestion on your route?

1. Real time traffic and traveler information
2. Direct experience with traffic congestion
3. Both
4. Other, please specify:

duringChangeSat *[if duringImpact = 1-6]*

Do you think the change you made during your trip was the right choice?

1. Yes, I made the right choice
2. No, I should have stayed with my original plan
3. No, I should have made a different choice
4. I am not sure

tripSat – *[if travel = 1 & (beforeSource!= 12 or duringSource != 12)]*

Thinking about your trip <insertion 1> in the US-75 Corridor…

How satisfied were you with the <u>accuracy of the reported real-time traffic and traveler information</u> for each of the following?

Category	Very Dissatisfied	Dissatisfied	Somewhat Dissatisfied	Neutral	Somewhat Satisfied	Satisfied	Very Satisfied	Info Not Available	Not Applicable
Travel time or delay information for your usual route									
Travel time or delay information for your alternate routes									
[If beforeLearn = 3 or									

Category	Very Dissatisfied	Dissatisfied	Somewhat Dissatisfied	Neutral	Somewhat Satisfied	Satisfied	Very Satisfied	Info Not Available	Not Applicable
duringLearn = 3] Accident or incident location									
[If beforeLearn = 3 or duringLearn = 3] Information on how long it took to clear the incident									
Parking availability at transit stations									
Real-time transit info (next bus arrival, etc.)									

signSat - *[if used roads = 1 or 2]*

How useful was the real-time traffic and traveler information provided on the electronic highway message signs on US-75?

Please click here for an example of an electronic highway sign.

1. 1 Not at all useful
2. 2
3. 3
4. 4 Neutral
5. 5
6. 6
7. 7 Very Useful
8. Not applicable – did not see signs or no information posted

tripSatOverall - *[if beforeSource != 12 or duringSource != 12]*

[if travel = 1]

Overall, how useful was the real-time traffic and traveler information you checked for your trip in the US-75 Corridor?

[if travel = 2]

Overall, how useful was the real-time traffic and traveler information you checked for your planned trip in the US-75 Corridor?

1. 1 Not at all useful
2. 2
3. 3
4. 4 Neutral
5. 5
6. 6
7. 7 Very Useful

tripOpinion - *[if beforeSource != 12 or duringSource != 12]*

For the real-time traffic and traveler information you checked for your trip in the US-75 Corridor, how strongly do you agree or disagree with the following statements?

Category	Strongly Disagree 1	2	3	Neutral 4	5	6	Strongly Agree 7	Not Applicable
[If travel=1] Real-time traffic and travel information reduced the stress of my trip								
[if travel=1] Real-time traffic and traveler information did <u>not</u> help me to avoid traffic congestion								
Real-time traffic and traveler information improved my ability to make decisions about my trip								

end

[if completed – travel=1 or yNoTravel=1]

Thank you! You have completed the survey.

Please click “Finish” to be entered in this month’s raffle to win an iPad.

[if terminated – travel=2 and yNoTravel=2]
Thank you! You have completed the survey.
Please click “Finish” to submit your responses.

dashboard

Welcome back.

This page shows the status of all your surveys. Please click "Let's get started!" to begin a new survey or "In progress" to complete a survey.

If no surveys are currently available, we will contact you soon with an invitation to a new survey, and that survey will be added to the table below.

Thank you!

APPENDIX E. Transit Survey

Dallas Transit Baseline Survey

Page/Question names are underscored by a single line (a paragraph border)

Notes to programmer are in *[brackets, red italics, or comments in the margin]*

Introduction

Intro1

Welcome and thank you for your participation!

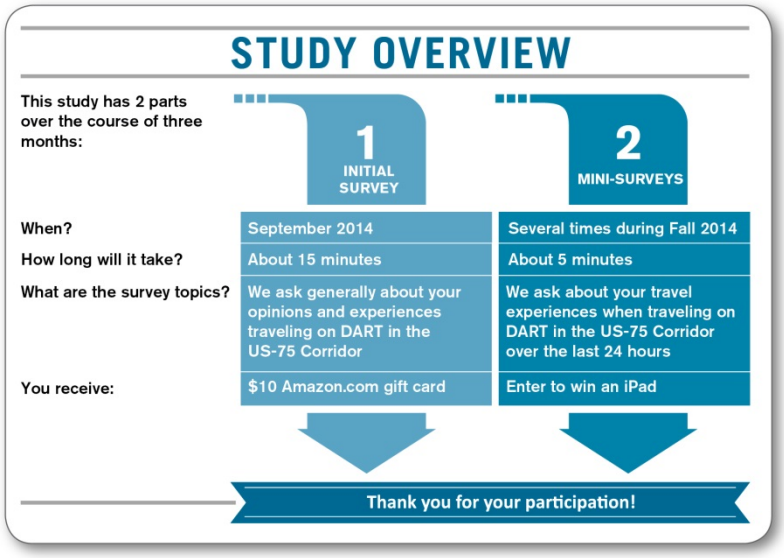
The purpose of this study is to better understand residents' travel experiences using DART light rail and buses in the US-75 Corridor. The U.S. Department of Transportation, Dallas Area Rapid Transit (DART) and other local and state agencies want to understand the decisions you currently make to plan your transit trips and also want to understand your opinions on how to improve travel conditions in the US-75 Corridor. RSG, Inc. is administering this survey on behalf of the U.S. Department of Transportation.

You are one of a small number of travelers invited to take part in this study, so your responses will have a significant impact on transportation decisions in the region. Thank you again for your participation.

Your privacy will be protected. Please click here to view the privacy policy, and you may refer to the links below for more information. You may also email dallas@rsgsurvey.com, or call toll-free 1-877-258-6501 with any questions or concerns and someone will return your call.

Intro2

We now invite you to complete Part 1 of this study. After completing this brief survey and telling us about your travel experiences using DART and US-75, we will provide you with a $10 Amazon.com gift certificate.



Source: U.S. DOT

Trip Details - General

corridorIntro

Definition and description of the US-75 Corridor

For this survey, the US-75 Study Corridor is shown on the map and includes:

- Orange/Red DART light rail line that runs alongside US-75 between Plano and downtown Dallas
- About 28 miles of US-75 between downtown Dallas and McKinney
- Other local/secondary roads within approximately 2 miles of US-75

[show corridor map image]

numWeekdays

In a typical week, about how many weekdays (Monday-Friday) do you travel on the DART Red or Orange line in the study corridor during the following time periods?

Please click here for a map of the US-75 Corridor.

Between 6AM-10AM: *[Drop-down]*
Between 3PM-7PM: *[Drop-down]*

5 weekdays per week
4 weekdays per week
3 weekdays per week
2 weekdays per week
1 weekday per week
Less than weekly

[Terminate respondent from survey if they use DART less than 1 time weekly for both AM and PM time periods. If they use DART 1 time per week or more for just the AM OR the PM time period the respondent will be allowed to continue through the survey.]

term

Thank you for your interest in this survey.

Unfortunately, we cannot invite you to participate further because this study focuses on the experiences of people who regularly travel on DART on weekdays.

If you would still like to provide feedback, please email comments to dallas@rsgsurvey.com.

purpose

On a typical weekday, what is the PRIMARY purpose of the DART Red/Orange line trip you make MOST OFTEN in the study corridor?

Please click here for a map of the US-75 Corridor.

Between 6AM-10AM *[Drop-down]*

Between 3PM-7PM *[Drop-down]*

[Hide dropdown if <1 trips per week in previous question]

Go to/from work
Business-related travel (e.g. going to a meeting, sales call, delivery, etc.)
Go to/from school/college
Drop off/pick up children from school
Go to/from the airport
Shopping trip
Social/recreational trip (e.g. go to restaurant, place of worship, gym, or visit friends)
Other personal business (e.g. go to doctor)
Other

[if 6AM-10AM purpose is hidden, go to pmIntro]

Trip details – AM Peak Period (6AM-10AM)

amIntro

For the next set of questions, we will ask about your **DART Red/Orange line <purposeAM trips> between 6AM-10AM**. Please think about this trip as you respond.

tranuse_startAM

When did you first start using the DART Red/Orange line to make your <purpose> trip between 6AM-10AM?

In the last 3 months
4 months to 1 year ago
1 to 3 years ago
4 to 6 years ago
More than 6 years ago

[If started using in the last year] tranuse_whystartAM

Why did you start using the DART Red/Orange Line to make your <purpose> trip between 6AM-10AM?

[optional open-end text box]

[if numweekdays is less than "5 weekdays per week] daysUsedAM

Which weekdays do you typically make your DART Red/Orange line <purposeAM trip> between 6AM-10AM? Even if your schedule varies, please select which days you are MOST LIKELY to be on DART for your trip.

Please select all that apply.

Please click here for a map of the US-75 Corridor.

Monday
Tuesday
Wednesday
Thursday
Friday

detailsTranAM

Please provide the following information that best describes what you do MOST OFTEN on your weekday DART Red/Orange line <purpose trip> from 6AM-10AM. We understand your schedule or travel patterns may vary.

Most frequent direction of travel	*[Drop-down]*
Which DART light rail line do you typically use to start your trip?	*[Drop-down]*
<if 1st line is Red/Orange> **What station do you typically use to get on DART light rail?** <if 1st line is NOT Red/Orange> **What station do you typically use when you get on/transfer to the Red/Orange line?**	*[Drop-down]*
What time do you typically get on the DART Red/Orange line?	*[Drop-down]*
On which DART light rail line do you typically end your trip?	*[Drop-down]*
<if last line is Red/Orange> **What station do you typically use to get off DART light rail?** <if last line is NOT Red/Orange> **At what station do you typically get off/transfer from the RED/ORANGE line?**	*[Drop-down]*
What time do you typically get off the DART Red/Orange line?	*[Drop-down]*

[answer options for trip detail questions]

direction	*line_on, line_off*	*stop_on, stop_off*	*time_on, time_off*
1. Southbound (towards downtown Dallas) 2. Northbound (away from downtown Dallas)	1. Red line 2. Orange line 3. Green line 4. Blue line 5. Trinity Railway Express	1. Parker Road 2. Downtown Plano 3. Bush Turnpike 4. Galatyn Park 5. Arapaho Center 6. Spring Valley 7. LBJ/Central 8. Forest Lane 9. Walnut Hill 10. Park Lane 11. Lovers Lane 12. Mockingbird 13. Cityplace 14. Pearl 15. St. Paul 16. Akard	15-minute intervals - from "Before 6AM" to "9:45-10:00AM" (time_on), or - from "6:00-6:15AM" to "After 10AM" (time_off) *[validate that timeoff >= timeon]*

direction	*line_on, line_off*	*stop_on, stop_off*	*time_on, time_off*
		17. West End 18. Other Red/Orange Line Station 19. I don't know	

flexTranAM

How much flexibility do you TYPICALLY have in your schedule for making your <purpose trip> between 6AM-10AM?

Flexibility of your **departure time** (when you start your trip): *[Drop-down]*
Flexibility of your **arrival time** (when you arrive at your destination): *[Drop-down]*

I always or nearly always <depart/arrive> at the same time
My <departure/arrival> time varies by up to 15 minutes
My <departure/arrival> time varies by up to 30 minutes
My <departure/arrival> time varies by up to 1 hour
My <departure/arrival> time varies by more than 1 hour

transitaccessAM

How do you typically get to the DART light rail station?

Drive and park
Dropped off
Transfer from a bus line
Walk
Bike
Other

transitegressAM

How do you typically travel from the DART light rail station to your destination?

Drive
Picked up
Take a bus
Walk
Bike
Other

transitcongestionAM

During your typical <purpose AM trip> between 6AM-10AM, how often do you experience the following on DART light rail?

Category	Almost every trip	Frequently	Occasionally	Rarely	Never
My train is delayed by more than 5 minutes	O	O	O	O	O
I cannot find a seat on the train	O	O	O	O	O
I cannot get on the train because it is full (e.g., I have to wait for the next train)	O	O	O	O	O
[if park&ride] I cannot find a parking space	O	O	O	O	O

[randomize]

othmodesAM

How often do you make your <purpose trip> in the US-75 corridor between 6AM-10AM using a different way of traveling (other than the DART Red/Orange line)?

Category	Regularly use (at least once per week)	Sometimes use (at least once per month)	Rarely use (have done at least once)	Never Use
Drive alone (auto/truck/motorcycle) for my entire trip	O	O	O	O
Carpool (2 or more people) for my entire trip	O	O	O	O
Organized vanpool	O	O	O	O
Bus (Express or local)	O	O	O	O
Other (e.g., bike or walk)	O	O	O	O

tripSatAM

How satisfied are you with each of the following for your typical DART Red/Orange line <purpose trips> between 6AM-10AM?

Please click here for a map of the US-75 Corridor.

Category	Very Dissatis-fied	Dissatis-fied	Somewhat Dissatisfied	Neither Satisfied nor Dissatisfied	Somewhat Satisfied	Satis-fied	Very Satis-fied
The reliability of the service (my train arrives on schedule)	0	0	0	0	0	0	0
The frequency of the service (how often my train runs)	0	0	0	0	0	0	0
[if P&R] Parking availability at park and ride lots	0	0	0	0	0	0	0
Seat availability on the train	0	0	0	0	0	0	0
Overall travel time (including time waiting and time traveling to and from the station)	0	0	0	0	0	0	0
[if transfers] Transfer wait time	0	0	0	0	0	0	0
The cost of the transit fare	0	0	0	0	0	0	0
Overall experience on the DART red/orange line	0	0	0	0	0	0	0

[randomize]

transatAM_change

Compared to one year ago, how would you describe your satisfaction with your transit experience on the DART Red/Orange line for your <purpose trip> between 6AM-10AM?

I am more satisfied, for the following reason(s): _____
I am less satisfied, for the following reason(s): _____
My satisfaction level for this DART Red/Orange line trip is about the same
[if tranUse_start is less than one year ago] N/A – I wasn't using the DART Red/Orange line for this trip one year ago

Trip details – PM Peak Period (3PM-7PM)

**Repeat full set of AM Peak period questions for PM trips (3PM-7PM), but if AM purpose=PM purpose=work, skip daysUsedPM, daysVaryPM, tranUse_Start, tranUse_WhyStart, othmodesPM. (WITH BLUE HIGHLIGHTS)*

Corridor Use: General Behavior

tranPass

Next, we will ask you a few questions about your use of transit and other travel options more generally.

What type of DART transit pass do you use most often?

I use an annual pass
I use a monthly pass
I use a quarter or semester pass purchased through my school
I typically use short-term passes (2-hour pass, 5-hour mid-day pass, daily pass, 7-day pass, etc.)

goPass

Have you ever purchased a DART pass or ticket (for one-time use) using the GoPass mobile ticketing app on your smartphone or tablet pc?

Yes
No

numVehicles

How many motor vehicles (in working order) are there in your household?

Please include all motor vehicles that are kept at home and that your household regularly uses during the week. Include cars, trucks, SUVs, vans, RVs, and motorcycles (whether owned, leased, or a company vehicle)

0 (no vehicles)
1 vehicle
2 vehicles
3 vehicles
4 vehicles
5 or more vehicles

reserved_pnr - *[if stop on or off = Parker Rd and numvehicles > 0]*

Do you have a reserved parking spot at the Parker Road Station lot?

Yes
No

vehicle_avail_tr - *[if numVehicles > 0]*

[if numVehicles = 1] **Is your household's vehicle typically available for you to use if needed during your morning and evening trips in the US-75 corridor?**

[if numVehicles >= 2] **Are any of your household's vehicles typically available for you to use during your morning and evening trips in the US-75 corridor?**

<AM purpose trip> between 6AM-10AM *[Drop-down]*
<PM purpose trip> between 3PM-7PM *[Drop-down]*

[Hide dropdown if <1 trips per week in AM/PM freq question]

[drop-down answers]
Yes, a vehicle is typically available to me
No, I do not typically have access to a vehicle (e.g. all household vehicles are used by other members)

Real-Time Traveler Information: Awareness, Use, and Satisfaction

infoIntro

For the next section, we will ask you about your familiarity with and use of communication devices and real-time traffic and traveler information sources.

Real-time traffic and traveler information includes:

- Traffic, transit, and/or travel condition information that is updated frequently to show current travel conditions.
- This real-time traffic, transit, and travel information is available to the traveling public in a variety of ways such as: TV, radio, and electronic message signs on highways or at transit stations. Other ways the public can obtain real-time traffic and transit information, such as 511, include websites, telephone services, apps, alerts, and/or text messages on a cellphone, smartphone, computer, or tablet.

techOwned

Which of the following communication technologies do you regularly use for any purpose?
Please select all that apply.

Computer (desktop) with Internet access
Laptop computer with Internet access
Tablet computer (e.g. Apple iPad, Motorola Xoom) with Internet access
Smartphone (e.g. iPhone, Android, Blackberry)
Cell phone that is NOT web-enabled
Landline telephone
Other mobile communication device, please specify:
None of the above

transponder - *[if 1+ vehicle]*

[add sentence if 2+ vehicles] For the next 2 questions please answer for the vehicle in your household that you personally use the most.

Do you have a toll transponder* in your vehicle?

Yes, vehicle has a TollTag, TxTag or EZ TAG
Yes, vehicle has another type of transponder
No transponder in vehicle

*Note: A toll transponder is an electronic toll payment device (electronic sticker or plastic box) that is mounted inside the windshield of your vehicle. When your vehicle passes through a highway toll plaza/gantry, an antenna at the toll plaza/gantry reads the account information contained in the device. The appropriate toll is then deducted from your prepaid account.

inVehTechUsed – *[if 1+ vehicle]*

Do you regularly (at least once a week) use any of the following navigation or real-time information devices in your vehicle?

Please select all that apply.

Built-in (factory/dealer installed) GPS or navigation device without real-time traffic information
Built-in (factory/dealer installed) GPS or navigation device with real-time traffic information
Portable GPS or navigation device (e.g. TomTom, Magellan, Garmin) without real-time traffic information
Portable GPS or navigation device (e.g. TomTom, Magellan, Garmin) with real-time traffic information
GPS or navigation on a smartphone
GPS or navigation on an iPad or tablet computer
Other navigation or real-time traffic information device, please specify: ____
None of the above

informed

For the Dallas region in general, how informed do you feel about each of the following?
What is real-time traffic and transit information?

Category	Very Uninformed 1	2	3	Somewhat Informed 4	5	6	Very Informed 7	Not Applicable
Where to check for real-time traffic information	O	O	O	O	O	O	O	O
Where to check for real-time transit information (e.g. next bus or train arrival)	O	O	O	O	O	O	O	O
Where to check for real-time parking availability information	O	O	O	O	O	O	O	O

[Note: Statements will be shown in random order.]

infoDevices

In general, how often you check each of the following to get real-time traffic or transit information?

What is real-time traffic and transit information?

Category	Never used	Use less than 1 day per week	Use about 1 day per week	Use a few times per week	Use 1+ times per day
Television	O	O	O	O	O
Radio	O	O	O	O	O
Electronic highway message signs	O	O	O	O	O
*[If owns]*Vehicle's built-in (factory installed) navigation device	O	O	O	O	O
[If owns] Portable GPS or navigation device	O	O	O	O	O
[If owns] Desktop computer	O	O	O	O	O
[If owns] Laptop computer	O	O	O	O	O
[If owns] Tablet computer	O	O	O	O	O
[If owns] Smartphone	O	O	O	O	O
[If owns] Mobile/cell phone (not web-enabled)	O	O	O	O	O
[If owns] Landline telephone	O	O	O	O	O
Another person (e.g. family or friend) to get traffic info	O	O	O	O	O

[Note: Statements will be shown in random order.]

devicesWhen – *[show each device if checks 1 day per week or more often; never shows TV, Hwy signs, or Landline phone (can only be used before OR during)]*

For each of the following, please indicate <u>when</u> you generally check it for real-time traffic or transit information.

Category	Before starting my trip	During my trip	Both before AND during my trip
Radio	O	O	O
Vehicle's built-in (factory installed) navigation device	O	O	O
Portable GPS or navigation device	O	O	O
Laptop computer	O	O	O
Tablet computer	O	O	O
Smartphone	O	O	O
Mobile/cell phone (not web-enabled)	O	O	O
Another person (e.g. family or friend)	O	O	O

[Note: Statements will be shown in random order.]

infoTel

In general, how often do you check each of the following <u>TELEPHONE NUMBERS</u> to get real-time traffic or transit information?
If you use a telephone number that is not listed below, please use the "Other" category for your response.
<u>What is real-time traffic and transit information?</u>

Category	Never heard of	Heard of but never used	Use less than 1 day per week	Use about 1 day per week	Use a few times per week	Use 1+ times per day
Texas DOT (1.800.452.9292)	O	O	O	O	O	O
DART (1.214.979.1111)	O	O	O	O	O	O
Other telephone numbers	O	O	O	O	O	O
511DFW	O	O	O	O	O	O

[Note: List will be shown in random order with "other" anchored last.]

[show if "other" is any of the "use" options] **What other telephone numbers do you use <u>to get real-time traffic or transit information</u>?** ____
[openend textbox, response not required]

infoWeb

In general, how often do you check each of the following <u>WEBSITES</u> to get real-time traffic or transit information?

If you use a website that is not listed below, please use the "Other" category for your response.

What is real-time traffic and transit information?

Category	Never heard of	Heard of but never used	Use less than 1 day per week	Use about 1 day per week	Use a few times per week	Use 1+ times per day
Any Texas DOT website (e.g. www.daltrans.org, www.drivetexas.org, dfwtraffic.dot.state.tx.us, etc.)	O	O	O	O	O	O
DART online trip planner (www.tripplan.dart.org)	O	O	O	O	O	O
Traffic.com	O	O	O	O	O	O
Google Maps (Traffic)/Google Transit	O	O	O	O	O	O
Bing Maps (View Traffic)	O	O	O	O	O	O
Mapquest (Live Traffic)	O	O	O	O	O	O
TV or Radio Station websites	O	O	O	O	O	O
Other websites	O	O	O	O	O	O
511DFW.org	O	O	O	O	O	O

[Note: List will be shown in random order with "other" anchored last.]

[show if "other" is any of the "use" options] **What other websites do you use to <u>get real-time traffic or transit information</u>? _____**

[openend textbox, response not required]

infoSocial

In general, how often do you check each of the following <u>SOCIAL MEDIA</u> to get real-time traffic or transit information?

If you use a social media source that is not listed below, please use the "Other" category for your response.

What is real-time traffic and transit information?

Category	Not Aware source provides real-time traffic information	Aware source provides traffic info, but never used	Use less than 1 day per week	Use about 1 day per week	Use a few times per week	Use 1+ times per day
Twitter	O	O	O	O	O	O
Facebook	O	O	O	O	O	O
Other social media	O	O	O	O	O	O

[Note: List will be shown in random order with "other" anchored last.*]*

[show if "other" is any of the "use" options] **What other social media do you use to get real-time traffic or transit information? ____**
[openend textbox, response not required]

InfoApp - *[If owns smartphone or tablet]*

In general, how often do you check each of the following SMARTPHONE APPS to get real-time traffic or transit information?
If you use an app that is not listed below, please use the "Other" category for your response.
What is real-time traffic and transit information?

Category	Never heard of	Heard of but never used	Use less than 1 day per week	Use about 1 day per week	Use a few times per week	Use 1+ times per day
Google Maps/Navigation	O	O	O	O	O	O
Dallas Transportation (DalTrans)	O	O	O	O	O	O
DART "Where's My Bus"	O	O	O	O	O	O
"Where's my DART Stop"	O	O	O	O	O	O
511DFW	O	O	O	O	O	O
Traffic.com	O	O	O	O	O	O
WAZE	O	O	O	O	O	O
Other apps	O	O	O	O	O	O

[Note: List will be shown in random order with "other" anchored last.*]*

[show if "other" is any of the "use" options] **What other smartphone apps do you use to get real-time traffic or transit information? ____**
[openend textbox, response not required]

infoText

In general, how often do you check each of the following EMAIL, TEXT MESSAGE, or OTHER ALERTS to get real-time traffic or transit information?
If you use email or text alerts not listed below, please use the "Other" category for your response.
What is real-time traffic and transit information?

Category	Never heard of	Heard of but never used	Use less than 1 day per week	Use about 1 day per week	Use a few times per week	Use 1+ times per day
Traffic.com	O	O	O	O	O	O
Dallas Transportation (DalTrans)	O	O	O	O	O	O
DART	O	O	O	O	O	O
Other alerts	O	O	O	O	O	O
511DFW	O	O	O	O	O	O

[Note: List will be shown in random order with "other" anchored last.]

[Popup if "other" is NOT "never"] **What other email or text alerts do you use to get real-time traffic or transit information? ____**
[openend textbox, response not required]

infoWhen

[Show main category if respondent indicated they consult it "1 day per week" or more often] **For each of the following, please indicate when you generally check it for real-time traffic or transit information.**

Category	Before starting my trip	During my trip	Both before AND during my trip
Telephone number(s)			
Website(s)			
Social Media			
App(s)			
Email, text or other alert			

infoRating

[Show main category if respondent indicated they consult it "1 day per week" or more often] **For each of the following, please rate the usefulness of the real-time traffic and transit information you generally receive.**

Cateogry	1 - Not at all useful	2	3	4 - Neutral	5	6	7 – Very useful
Telephone number(s)							
Website(s)							
Social Media							
App(s)							
Email, text or other alert							

changeBefore

In the next two questions, we want to understand if you change your trip plans based on information about transit delays, traffic congestion or other travel delays. First, we'll ask about changes in travel plans BEFORE making a trip. Next, we'll ask about changes in travel plans DURING a trip.

Have you done any of the following BEFORE you left for a DART light rail trip in the US-75 Corridor as a result of learning about travel delays on your route?

Category	I have never done this	I have done this, but not in the last month	I have done this in the last month	Not applicable
Started my trip earlier	O	O	O	O
Started my trip later	O	O	O	O
Chose a different route to get to your regular transit station	O	O	O	O
Chose a different transit station to go to in order to get on DART	O	O	O	O
Planned to get off DART at a different station than your usual one	O	O	O	O
Drove or carpooled instead of using DART	O	O	O	O

Category	I have never done this	I have done this, but not in the last month	I have done this in the last month	Not applicable
light rail on my trip				
Decided not to make the trip at all	O	O	O	O
Decided to telecommute instead of going to work	O	O	O	O

[Note: List will be shown in random order.]

changeDuring

Now, we'll ask about changes you may have made as a result of learning about transit delays, traffic congestion or other travel delays DURING your trip.

Have you made any of the following changes to your travel while you were making a DART light rail trip in the US-75 Corridor as a result of learning about travel delays while en-route?

Category	I have never done this	I have done this, but not in the last month	I have done this in the last month	Not Applicable
Changed and drove a different route on the way to your regular transit station	O	O	O	O
Went to a different transit station to get on DART light rail (e.g. if parking was not available at your regular station)	O	O	O	O
Got off (or transferred from) DART light rail at a different station than your usual one	O	O	O	O
Turned around and returned to where I started my trip	O	O	O	O
Waited for a later train due to overcrowding on the first train	O	O	O	O

[Note: List will be shown in random order.]

infoFreqAM – *[if saw AM questions and infoDevices is NOT "Never" for all options]*

Now we are going to ask you some specific questions about your use of real-time traffic and transit information for the DART light rail trips you make most often in the US-75 Corridor.

How often do you check real-time traffic or transit information for your weekday DART light rail <purpose trips> between 6AM-10AM?

Always (every time I make the trip)
Nearly always (a few times per week)
Sometimes (at least a few times per month)
Hardly ever (less than monthly)
Never

ynoinfoAM – *[if infoFreqAM = never]*

Can you indicate why you don't check real-time traffic or transit information for your weekday DART light rail <purpose trips> between 6AM-10AM?

Please select all that apply.

No Information available for my trip
No need to check – typically there are no delays on my trip
No need to check - I already know what travel conditions are like
No interest in checking
No time to check
I have to use the same route no matter what
Information is not accurate or up-to-date
Information is not detailed enough
Other, please specify: ____
[Note: List will be shown in random order.]

infoFreqPM – *[if saw PM questions and infoDevices is NOT "Never" for all options]*

How often do you check real-time traffic or transit information for your weekday DART light rail <purpose trips> between 3PM-7PM?

Always (every time I make the trip)
Nearly always (a few times per week)
Sometimes (at least a few times per month)
Hardly ever (less than monthly)
Never

ynoinfoPM – *[if infoFreqPM = never AND if they did not see yNoInfoAM]*

Can you indicate why you don't check real-time traffic or transit information for your weekday DART light rail <purpose trips> between 3PM-7PM?

Please select all that apply.

No Information available for my trip
No need to check - there aren't typically delays on my trip
No need to check - I already know what travel conditions are like
No interest in checking
No time to check
I have to use the same route no matter what
Information is not accurate or up-to-date
Information is not detailed enough
Other, please specify: _____
[Note: List will be shown in random order.]

infoSat *[if infoFreqAM OR infoFreqPM is NOT "never"]*

For your trips in the US-75 Corridor, how satisfied are you with <u>the accuracy of the reported real-time traffic and transit information</u> for each of the following?

Category	Very Dissatis-fied	Dissatis-fied	Somew hat Dissatis-fied	Neither Satisfied nor Dissatis-fied	Some-what Satisfied	Satis-fied	Very Satis-fied	Info Not Available	Not Applica-ble
Travel time or delay information for US-75	O	O	O	O	O	O	O	O	O
Accident or incident location information for US-75	O	O	O	O	O	O	O	O	O
"Next Train" information posted on electronic message signs at transit stations	O	O	O	O	O	O	O	O	O
511 information on parking availability at transit stations	O	O	O	O	O	O	O	O	O
511 information on real-time transit conditions, including transit incidents, constructio n or delays									

[Note: List will be shown in random order.]

traninfosat_change

Compared to one year ago, how would you describe your overall satisfaction with the quality of real-time TRANSIT information available for the US-75 Corridor?

I am more satisfied, for the following reason(s): _____ *[optional]*
I am less satisfied, for the following reason(s): _____ *[optional]*
My satisfaction level with real-time transit information is about the same
N/A – I wasn't using real-time transit information one year ago

Employment Demographics:

employment

Thank you for your answers so far. The next few questions are about you and your work.

What is your employment status?

Employed full-time
Employed part-time
Student, employed full-time
Student, employed part-time
Student, not employed
Homemaker
Retired
Not currently employed
[if employment >= 5, go to demogshome]

numJobs *[if employment<5]*

How many jobs do you have?

1 job
2 jobs
3 or more jobs

workathome

Do you work out of your home (your job is based at your home or you telecommute all the time)?

Yes
No

workloc *[If doesn't work at home]*

[If 1 job] **Where is your workplace located?**

[If more than 1 job] **Where is your <u>primary</u> workplace (where you work the most number of hours per week) located?**

Street: _____ *[optional field]*
City: _____ *[required field]*

State: _____ *[drop-down of states with Texas at the top, prepopulate TX]*
Zip Code: _____ *[validate real zip code]*

benefits

[Sentence shown if has more than 1 job] For the next few questions please think about your primary job where you work the most number of hours per week.

Which of the following commuter benefits does your employer offer and which do you personally use?

Category	Not offered	Offered, but I don't use	Offered and I use	I don't know or N/A
Telecommuting	O	O	O	O
Flextime or compressed work week	O	O	O	O
Free parking (my employer pays or reimburses ALL of my parking cost or free public parking is available)	O	O	O	O
Reduced parking costs (my employer pays or reimburses PART of my parking cost)	O	O	O	O
Free transit use (my employer pays or reimburses ALL of my transit costs)	O	O	O	O
Reduced transit costs (my employer pays or reimburses PART of my transit costs)	O	O	O	O

[Note: List will be shown in random order.]

paypark *[show if free parking is not offered]*

Typically, how much do you personally pay for parking when you drive to work?

Please do not include any amount your employer pays or reimburses. Please round to the nearest dollar amount.

$_____ per day *[allow whole numbers 0-99]*
Not applicable/I don't know

telecommuteFreq *[show if uses telecommute]*

How many days per week do you typically telecommute instead of traveling to and from work?

5 days per week
4 days per week
3 days per week
2 days per week
1 day per week
A few times per month
Less than monthly
It varies

APPENDIX F. Pulse Survey Response Rates

** Note: The completion rate includes respondents who completed a pulse survey, and does not include those who responded but were terminated (e.g., because they were not traveling during the window for the pulse survey). The total response rate (which includes those who were terminated) is not presented here, but is generally 8 to 15 percentage points higher than the completion rate.*

Pre-ICM Pulse Survey #	Pre-ICM Number of Invitations	Pre-ICM Completion Rate*
1	485	41%
2	627	40%
3	426	28%
4	531	27%
5	908	45%
6	1892	39%
7	378	31%
8	798	37%
9	391	35%
10	605	42%
11	1114	31%
12	560	38%
13	190	29%
14	1087	37%
15	454	26%
16	379	30%
17	764	38%
18	1980	35%
19	400	27%
20	287	21%
21	293	38%
22	330	26%
23	1677	31%
24	502	25%
25	275	10%
26	1441	15%

Source: U.S. DOT

Post-ICM Pulse Survey #	Post ICM Number of Invitations	Post-ICM Completion Rate*
1	476	24%
2	648	31%
3	589	30%
4	354	21%
5	993	36%
6	729	31%
7	582	29%
8	471	25%
9	353	22%
10	5043	31%
11	3312	34%
12	456	18%
13	287	14%
14	689	18%
15	729	16%
16	201	11%
17	368	8%
18	689	13%
19	408	15%
20	368	9%
21	487	15%
22	213	10%

Source: U.S. DOT

U.S. Department of Transportation
ITS Joint Program Office-HOIT
1200 New Jersey Avenue, SE
Washington, DC 20590

Toll-Free “Help Line” 866-367-7487
www.its.dot.gov

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