Applied Research and Innovation Branch

Community Outreach Tools and Strategies for Accelerated Highway Construction Projects: Research Report (TPF – 5(260) - Project 3)

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16. Abstract

State transportation agencies (STAs) are using a variety of accelerated construction techniques to shorten the duration of highway construction project. However, accelerated highway construction projects may impact communities in terms of traffic congestion, safety issues and other public inconveniences, but also can provide opportunities to highlight innovative accomplishments and increase trust between STAs and the traveling public. As some studies have shown, effective management of outreach strategies is a key success factor of accelerated construction projects. One of the main goals of this study is to gauge the effectiveness of public outreach tools and strategies in meeting different communication goals, including traffic avoidance, increasing driving awareness, decreasing impatient behavior and building trust with the public. The data for this research is based on a survey of 71 experts from 40 different STAs. ANOVA analysis indicates that the effectiveness of outreach tools vary significantly in achieving different communication goals during the construction phase of accelerated highway projects. In addition, the results allowed us to find the most appropriate communication strategies based on project types and target audience. The findings of this research can help STAs to better manage their outreach activities during the accelerated construction projects.

Implementation

To facilitate the research's findings, the project developed a separate implementation guide (Report# CDOT-2015-13). That guide recommends a process for formulating outreach strategies during the construction phase of accelerated highway projects. Outreach strategies are categorized based on project characteristics (traffic impact and capacity loss) and types of travelers (passenger vehicles and commercial trucks). Three tiers of strategies are recommended in each situation. The five-step process explained in the guide allows the recommendation of three-tiered strategies for projects with multiple characteristics.

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Community Outreach Tools and Strategies for Accelerated Highway Construction Projects

Prepared for:

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DISCLAIMER

The opinions and conclusions expressed or implied are those of the research agency that performed the research and are not necessarily those of the Transportation Pooled-Fund Program or its sponsors.

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Background

An increase in the traveling demands has urged state transportation agencies (STAs) to shorten highway construction project duration, using a variety of accelerated construction techniques and strategies. However, accelerated highway construction projects may impact communities in terms of traffic congestion, safety issues, and other public inconveniences. On the other hand, effective communication with community stakeholders about these potential inconveniences can provide an opportunity to highlight innovative accomplishments and gain trust with the traveling public. Therefore, as some studies have shown, effective management of outreach strategies is a key success factor of accelerated construction projects.

Project Objectives

There is a lack of best practices for community outreach during the construction phase of accelerated transportation projects. In order to address this issue, this study examines the recent experiences of the departments of transportation (DOTs) in using different outreach tools and strategies. These tools range from traditional, low-tech methods, such as town hall meetings and static traffic signage to high-tech methods such as websites and social media. Also, this research provides project decision makers with a framework to formulate outreach strategies during the construction phase of the accelerated highway projects.

Methodology

We used an online survey methodology to capture the knowledge of experienced practitioners in the area of community outreach practices for accelerated construction projects. The survey questionnaire design was based on a thorough literature review. The electronic questionnaire was developed and distributed to all 50 states' STAs in the months of November and December, 2014. After four rounds of data collection, a total of 71 experts from 40 different STAs responded to our survey. About 71 percent of the respondents had more than 10 years of work experience in the public outreach activities for construction projects.

The survey provided information on a variety of topics, including different outreach tools and strategies used during accelerated highway construction projects, the goals addressed by individual outreach tools, the effectiveness of outreach tools in addressing each goal, the selection of outreach tools based on project specifications (traffic impact and capacity loss), and consideration of the types of travelers.

Key Findings

With the exception of static temporary signage and variable sign boards which are almost used in every project, the results indicate that project specific websites, town hall meetings, planned interview with newspaper, social media, and planned interview with television are most frequently used by STAs during the construction phase of accelerated projects.

The frequency and effectiveness of usage of outreach tools in addressing four main communication goals is analyzed. These goals include creating traffic avoidance, increasing awareness, decreasing impatient behavior, and building trust. Statistical analysis of the survey data reveals that outreach tools and strategies vary significantly in achieving each communication goal. The analysis of data shows that social media are ranked high in both effectiveness and frequency of usage. This result justifies the increase in the use of social media by STAs. Also, the survey results indicate that the most commonly used methods employed to reach specific goals are not necessarily the most effective ones. One interesting case is mobile application which is currently among less frequent outreach tools but was reported as highly effective to address most communication goals.

Outreach strategies are categorized based on project characteristics (traffic impact and capacity loss) and types of travelers (commuter, non-commuter, and commercial trucks). Three tiers of strategies are recommended in each situation.

Finally, the results of the study were used to implement, a five-step process that can assist in formulating outreach strategies during the construction phase of accelerated highway projects. This framework allows the recommendation of three-tiered strategies for projects with multiple characteristics.

Introduction

Steady growth in traffic in the U.S. during the last decades (FHWA, 2012) along with an urgent need for transportation infrastructure rehabilitation (ASCE, 2013) has resulted in an increase in the number of highway construction and maintenance projects. Increasing traffic demand has given rise to congestion especially in the urban areas. Rising traffic congestion, in turn, imposes significant costs on the public in terms of time, money, energy consumption, and potential environmental impact. Compounding the issue, highway construction projects are among main contributors to the traffic congestion (FHWA, 2015b).

In order to respond to these issues, state transportation agencies (STAs) are employing a variety of accelerated construction techniques and strategies to reduce the duration of highway construction projects. These techniques include both contractual techniques for accelerated construction and innovative construction methods. However, accelerated construction projects, while shorter in duration, may influence adjacent communities by increasing traffic congestion; potentially incurring safety issues and other inconveniences. However, with proper communication, accelerated projects can provide opportunities for building trust between STAs and the public, if these agencies can effectively convey the appropriate information to the stakeholders. Therefore, effective management of outreach strategies is essential to the success of accelerated construction projects.

The primary goal of this research is to assess the effectiveness of public outreach tools and strategies in meeting specific goals, for different project characteristics and different types of travelers during the construction phase of accelerated highway projects. While there is existing information relating to the general effectiveness of each tool for communicating with project stakeholders, much less information exists related to the effectiveness of the tools during the construction phase. Moreover, there is only sparse information that relates the effectiveness of each outreach tool to the type of highway construction project (e.g. full closure versus lane loss) and the types of travelers (e.g. commuters versus commercial trucks).

There are numerous research constraints on measuring the effectiveness of outreach tools. These include a lack of comparable projects and the difficulty in gathering traffic data. Most transportation agencies do not currently collect this type of data for accelerated highway construction projects (Hallmark, et al., 2013). As Warne (2011) clearly shows in the National Cooperative Highway Research Program (NCHRP) Synthesis 413 on urban highway construction projects, most agencies gauge the effectiveness of outreach tools through “experience”.

Given these constraints and availability of data, this study employs the experience of public agencies to assess the effectiveness of outreach tools in different scenarios. An electronic survey

questionnaire was developed and distributed to all 50 STAs in order to understand various aspects of managing their outreach activities. A total of 71 experts from 40 different STAs responded to our survey. The results of the study give a comprehensive understanding of the most commonly used outreach strategies by STAs and their effectiveness in addressing different communication goals, including reducing traffic demand, increasing driving awareness, decreasing impatient behavior, and building trust with the public. In addition, the results allowed us to find the most appropriate outreach tools and strategies based on project characteristics and target audience. The findings of this research can help STAs and other public utilities' administrators to better manage their outreach activities during accelerated construction projects.

Increasing Need for Accelerated Highway Construction Projects

Increasing traffic demand in the U.S. requires more highway construction projects. Metrics such as vehicle-miles traveled (VMT) recorded by the Federal Highway Administration (FHWA) since 1987 show that, although VMT has leveled in recent years, Americans continue to travel at a high rate on the highways (see figure 1). The steady increases in VMT have been a primary contributing factor to congestion issues in the U.S., especially in the urban areas.

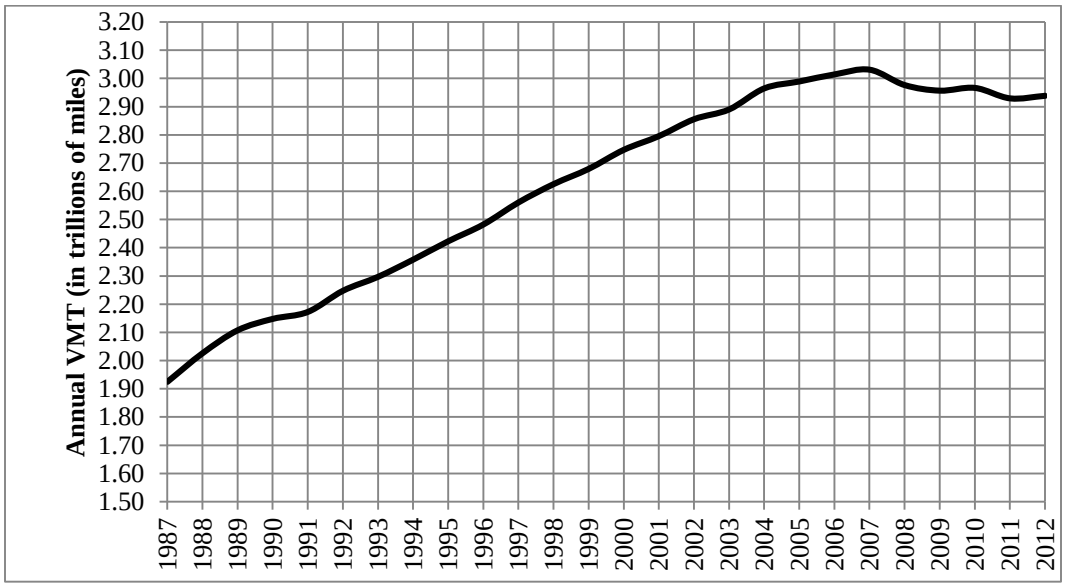


Figure 1: Annual VMT in the United States since 1987 (FHWA, 2012)

As figure 2 shows, the average delay per commuter in urban areas has dramatically increased since 1980s. In fact, the most recent value for average delay per commuter has reached approximately 38 hours (Schrank, et al., 2012).

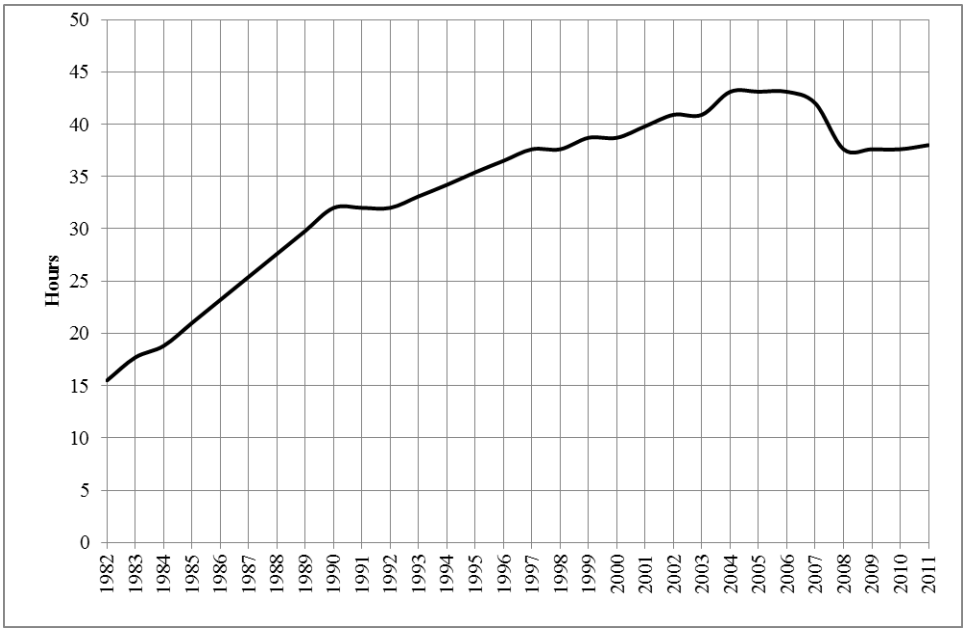


Figure 2: Average Annual Delay per Commuter in Urban Areas (Schrank, et al., 2012)

In addition to its direct effect on driver delay time, congestion has numerous secondary effects. In one study, Schrank et al. (2012) attempted to quantify these effects in terms of total cost and total wasted fuel. The study shows that the cost of congestion is over $100 Billion per year and rising. Figures 3 and 4 show the trends of total cost and wasted fuel due to urban congestion, respectively. Altogether, traffic congestion imposes numerous costs on society in terms of time, money, and other resources and exacerbates environmental impacts caused by excess consumption of fossil fuels.

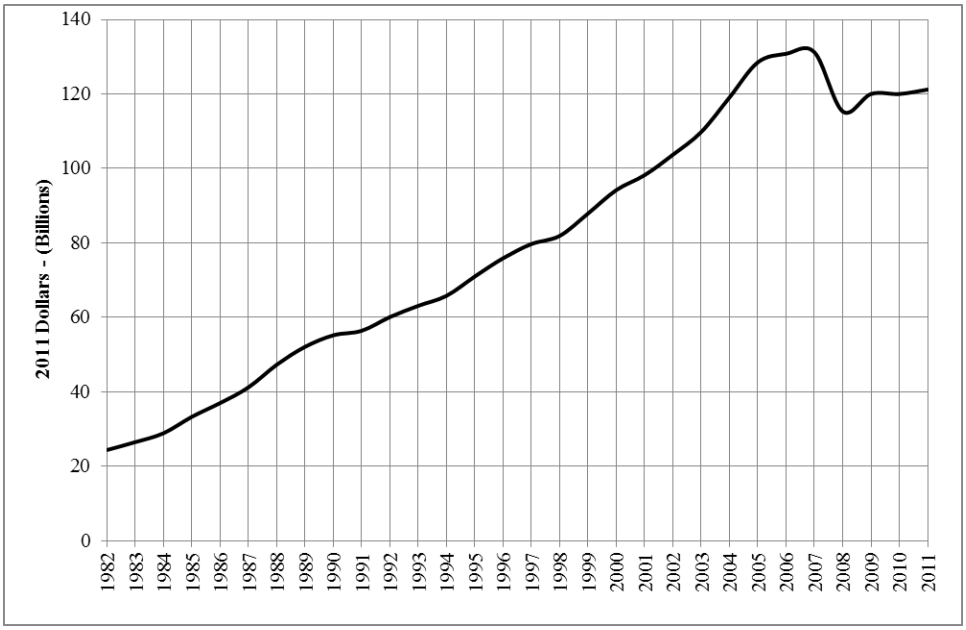


Figure 3: Total Cost of Congestion in Urban Areas (Schrank, et al., 2012)

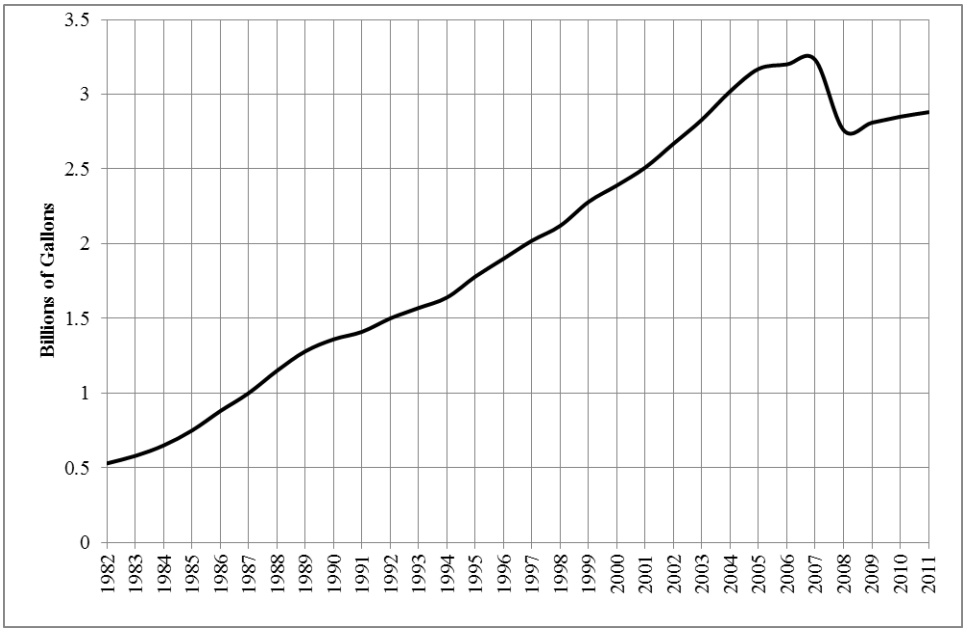


Figure 4: Total Fuel Wasted by Congestion in Urban Areas (Schrank, et al., 2012)

In addition to the increasing traffic demand, the need for upgrading transportation infrastructure requires more highway construction and maintenance projects. In its 2013 assessment of the country's infrastructure, the American Society for Civil Engineers (ASCE) gave the U.S. roads and bridges a D and a C+, respectively (ASCE, 2013). The growing traffic demand along with the current status of roads and bridges indicates that a larger number of road construction projects will be needed in the future.

Highway construction itself is a major contributor to the congestion, especially in urban areas. According to FHWA, 10 percent of traffic congestion in the United States is directly related to the work zones (FHWA, 2015b). While the direct effect of accelerated highway construction projects is not quantifiable with the currently available data, it is possible to make an estimation of costs and resources associated with work zones. For example, the 2012 Urban Mobility Report (Schrank, et al., 2012) shows that urban congestion resulted in an average commuter delay of 38 hours, a cost of $121.2 billion, and wastage of 2.88 billion gallons of fuel in 2011. Using the 10 percent ratio, this means that, just in urban areas, 3.8 hours of average commuter delay, a cost of $12.1 billion, and 288 million gallons of fuel per year can be attributed to work zone construction on roads and highways in the United States. While these numbers are not precise, they do communicate the order of magnitude that is associated with traffic congestion caused by work zones. As a result, constraints such as time, cost, and secondary impacts of highway construction have made schedule acceleration a required element of highway construction projects.

Accelerated Highway Construction Projects

Accelerated highway construction refers to the techniques used to shorten the duration of highway projects. These techniques may include contractual techniques for accelerated construction, such as construction manager/general contractor and design-build techniques. In addition to their benefit of reducing the cost of the agency and delivering projects more efficiently, these methods are commonly implemented to incorporate the creativity and experience of designers and contractors with the hope of decreasing project duration and traffic impact (AASHTO, 2008). Along with contractual techniques for accelerating highway construction projects, there are several forms of innovative construction techniques. Some of the most common types of these innovative techniques are: Accelerated bridge construction (ABC), prefabricated bridge elements and systems (PBES), slide-in bridge construction, and geosynthetic reinforced soil – integrated bridge system (GRS-IBS)

It is evident that project acceleration has become a mantra in many agencies, including FHWA, where its Every Day Counts (EDC) initiative is designed to "…identify and employ innovation aimed at reducing the time it takes to deliver highway projects, enhance safety, and protect the environment (FHWA, 2015a). In parallel, many STAs have also adopted the fundamental principles of the "Get In, Stay In, Get Out, Stay Out" emphasis of the EDC initiative (Mistry and Mangus, 2006). This statement supports the fact that accelerated construction is at the center of attention in highway construction projects.

The positive effects of accelerated construction efforts in highway projects have been documented in numerous case studies. In one study, Lee and Thomas (2007) showed that accelerated construction techniques resulted in a 28% cost reduction and 29% of time-valued savings on a major urban interstate project. This study demonstrated that appropriate planning and execution of outreach strategies could result in a 20% reduction in construction zone traffic demand and a 50% reduction in maximum peak-hour delay. These findings indicate that well executed public outreach efforts can decrease the costs to the traveling public in terms of money, time, and resources associated with congestion in accelerated highway construction projects. In addition, this relationship demonstrates the need for understanding which outreach tools and strategies are most effective and, more specifically, for what types of projects.

Communication Theory

Public outreach efforts are based on the principles of communication and mass communication theory. According to the Guide to the Project Management Body of Knowledge (PMBOK), communication is an iterative process between two or more parties where a message is sent through one or more mediums from a sender to a receiver. The message is encoded and decoded by either sender or receiver with possible noise which is anything that can interfere with the transmission and understanding of the message (PMI, 2008).

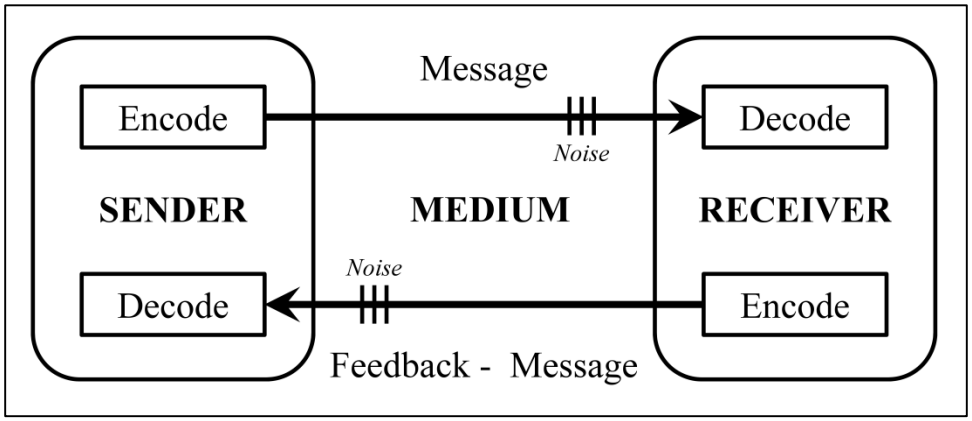


Figure 5: General Form of a Communication Model (reproduced from PMI, 2008, p.255)

Mass communication can be defined by using the same fundamental definitions presented for communication in that a sender and a receiver still exist. In contrast, the receiver in mass communication typically consists of a large group of individuals rather than just a single person. Danesi (2013) states that the beginning of mass communication are typically attributed to Johannes Gutenburg's invention of printing in 1500's era Germany over handwritten reproductions of various texts. His invention demonstrates one of the basic tenets of mass communication. The principle is that mass communication not only targets multiple individuals, but also provides a level of efficiency. This level of efficiency is typically measured in resources such as cost and time to create the communication. In the example of Gutenburg, printed media was more cost and time efficient than handwritten reproductions and could therefore reach a greater number of individuals (Danesi, 2013). In addition to varying levels of efficiency, mass communications also vary in the degree to which two-way interactions can occur.

In the literature, the history of mass communication is commonly broken into two eras. Poster (1995) shows that these two distinct "ages" are delineated by the advent of Internet based forms of mass communication. Whereas the first age of mass communication was primarily measured on the efficiency with which the message could be sent to the greatest number of people, the second age of mass communication is defined by this same measures of efficiency and the degree to which

the mass of individuals can reciprocally respond to both the sender and with each other about the original communication (Poster, 1995; Holmes, 2005; McQuail, 2010).

Public Outreach Efforts in Accelerated Highway Construction Projects

As previously mentioned, STAs are responding to the increasing demands from the traveling public to shorten highway construction project duration through a variety of accelerated construction techniques and strategies. However, accelerated highway construction projects may impact neighborhood communities in terms of traffic congestion, safety issues and other public inconveniences. On the other hand, effectively communicating with community stakeholders about these potential inconveniences can provide an opportunity to highlight innovative accomplishments and increase trust between agencies and the traveling public. Managing outreach strategies effectively is a key success factor to accelerated construction projects.

Nearly every STA provides information relating to current traffic and weather conditions on the roads under construction and maintenance by that agency. In order to facilitate the communication between agencies and the communities, FHWA has developed a comprehensive website that directs web users to road condition maps hosted by individual state agency websites (FHWA, 2015c). Typically agencies communicate information related to state maintained road conditions including both roads affected by weather, as well as roads affected by highway construction projects.

In addition to websites, transportation agencies also use a range of tools on specific projects. Warne's study (2011) presents 14 categories of communication tools commonly used by STAs for highway construction projects in congested urban areas. These tools range from methods such as traditional town hall meetings to high-tech social media methods such as Twitter. Transportation agencies continue to improve their use of these tools in different contexts.

Overview of Outreach Strategies and Tools

There is a wide range of communication tools used for public outreach by nearly every transportation agency that oversees highway construction projects. These tools range from traditional, low-tech methods, such as town hall meetings and static traffic signage to high-tech methods such as websites and social media.

The FHWA shows many examples of public outreach in highway construction projects on its webpage titled “Project-Level Public Information and Outreach Examples”, many of which apply to accelerated construction projects (FHWA, 2015d). In this resource, project-level examples of public outreach tools are presented in many contexts and locations, including states such as Washington, Utah, Minnesota, Colorado, Arizona, Maryland, Illinois, California, Michigan, Missouri, and Georgia. The context of the highway projects varies greatly as do the tools to communicate with the public.

In addition to the many project-level examples given by the FHWA, best practice manuals exist for both work zones and public outreach for highway construction projects. The FHWA released a “Work Zone Operations: Best Practices Guidebook”. This guidebook presents best practices in community outreach for highway work zones (FHWA, 2007). It provides information about the best practices in building relationships with media. In addition, it has several examples related to the use of communication tools in work zones projects across different states. In each example, the transportation agency explains its communication technique(s), the context in which it was implemented, and the best practices for implementing the related technique in other contexts.

This study found 16 different outreach tools and strategies that were commonly used by state transportation agencies. Each is described below:

Static Temporary Signage

- Static signs are used to describe the situation in and around the work zone
- The content of the signs should reflect what action should be taken by motorists and provide relevant and current information
- Construction signs such as "Construction Ahead" or "Entering a Construction Zone" are used to notify the motoring public of the work zone and/or offer options for alternative routes (CDOT, 2014).

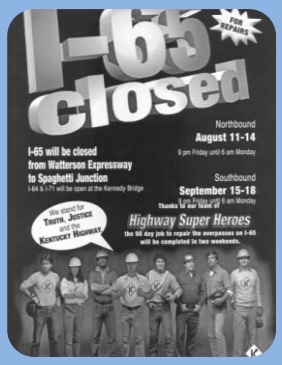
Variable Sign Boards

- Variable sign boards are placed along roadways to notify travelers of incidents, travel time information, road closures, and potential hazards in and around the work zone.
- They are used when the condition of the work zone is changing and where a static sign is not sufficient to provide information to travelers (CDOT, 2014)

Name Branding for the Construction Project

- Name branding is often used on projects that are expected to have a significant impact on a large population over an extended period of time.
- Project is branded by using distinctive project name, logo and catchphrases to enable people to easily recognize any information related to the project
- Some examples of branded projects are I-64 improvements in St. Louis, expansion of I-15 in Utah County, and West County Connectors project which link the high-occupancy vehicle (HOV) lanes between the SR-22, I-405 and I-605 freeways in California (Warne, 2011).

Flyer Distribution



- Flyers are commonly used to communicate with local communities and provide advance information on upcoming closures, alternative routes, and general information about the project.
- They are easy to mail, hand out at community meetings and events, and make available for downloading from a web site.
- The I-95 Corridor Coalition which includes eastern seaboard states from Maine to Florida produced a brochure twice a year for distribution to travelers in welcome centers, rest areas, transportation agencies, private companies, and individuals and could also be downloaded from the Coalition's web site (Mallett et al., 2005).

Door to Door Visits by Project Personnel

- Door to door visits provide personal contact with businesses and individuals located adjacent to the project.
- This method can be used to explain the positive impacts of the completed project, what to expect (work hours, type of work, and nuisance duration), actions to mitigate nuisances, where to get more information, and how to voice complaints (Shane et. al, 2012).

Town Hall Meetings

- Town hall meetings are used to provide detail information of the project such as the status of the project, schedule, cost and budget, risk management and health and safety issues.
- Meetings can facilitate the communication with stakeholders of the project including the local community and the local press and media.
- Town hall meetings can be held in person or virtually on the phone (telephone town halls) or digitally through interactive web sites.

Project Specific Newspaper Advertisements

- Paid advertising may be necessary in the case of dramatic changes to the road network such as full closure of an interstate
- Kentucky Transportation Cabinet (KTC) engaged in an extensive media campaign using both newspaper and radio advertisements to create traffic avoidance during I-64 rehabilitation project in Louisville which led to eight weekends of full closure of the highway (Mallett et al., 2005).

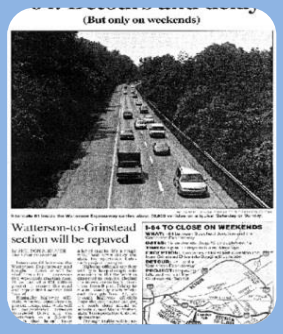
Project Specific Radio Advertisements

- Paid radio advertising is relatively expensive, but can be a cost-effective way to reach a wide audience.
- Before and during the Upgrade I-74 project in Peoria, Illinois, IDOT developed and ran a successful radio advertisement by using a fictional character Jack Hammer to increase awareness of the project and remind adults to drive safely and slowly while in a work zone (Mallett et al., 2005).

Project Specific Television Advertisements

- Paid television advertising can reach many people at one time, but the timing, frequency, and size of the television market will have a significant impact on the advertisement costs.

Planned Interviews with Newspaper Journalists



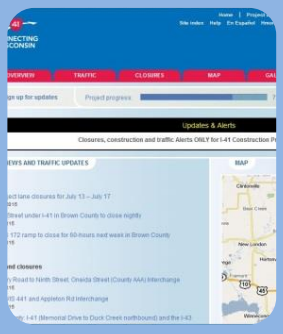
- Large projects are typically considered newsworthy by local media outlets, so free media coverage in form of interviews with newspapers can be used to provide the media with accurate, up-to-date, and consistent information (Mallett et al., 2005).

Planned Interviews with Radio News Media

- Similarly, free media coverage in form of interviews radio news media can be used to provide the media with accurate, up-to-date, and consistent information (Mallett et al., 2005).

Planned Interviews with Television News Media

- Similarly, free media coverage in form of interviews with television news media can be used to provide the media with accurate, up-to-date, and consistent information (Mallett et al., 2005).



Project Specific Websites or Webpages

- Project specific websites are often used for projects and offer comprehensive and up-to-date information about the project status, traffic, and closures in multiple formats including text, photographs, videos, maps, etc.
- Examples are US 41(Wisconsin) and I-70 Mountain Corridor (Colorado) project specific websites (FHWA, 2015d).

Project Specific Social Media Account

- Social network platforms help broaden outreach, provide up-to-date information, and create engagement opportunities.
- One example is Willow Road reconstruction project, in which Illinois DOT used Facebook page and Twitter feed to share information about the project and Instagram account to share project photos (FHWA, 2015d).

Text Message Alerts

- Recipients voluntarily sign up for text message service to get project related information.
- Colorado DOT uses text message alerts to inform motorists about road conditions and delays on Colorado highways.
- Recipients are reminded that it is unsafe and illegal to text while driving in Colorado (CDOT, 2015).

Mobile Application

- Applications are used to make information more accessible to mobile devices like smart phones and tablet computers by offering mobile-friendly websites and mobile applications.
- Virginia DOT developed a mobile application (511 VDOT app) for both iOS and Android devices to provide travelers with real-time traffic information. Users are reminded to not use mobile applications while driving(VDOT, 2015).

Research Methodology and Data Collection

As Warne (2011) states, there are very few quantitative methods for gauging the success of outreach activities, so most agencies evaluate the effectiveness of outreach strategies through "experience". Consistent with this approach, we used an online survey methodology to capture the knowledge of experienced practitioners in the area of community outreach practices for accelerated construction projects.

The survey questions were designed based on the related literature. The survey was implemented on Qualtrics©, which is an online platform for conducting and managing surveys. Prior to the main study, the research team reviewed and revised the survey questions several times. Then, the survey was sent to external examiners for their reviews and comments. The survey had seven major sections.

1) Different outreach tools and strategies used during accelerated highway construction projects
2) Goals addressed by individual outreach tools
3) Effectiveness of outreach tools to address each goal
4) Selection of outreach tools based on project specifications (traffic impact and capacity loss)

5) Consideration of geographic/demographic characteristics
6) Consideration of types of travelers
7) Demographics of respondents

The survey questionnaire is included in Appendix C of this report.

The final version of the questionnaire was sent to 270 potential respondents from different STAs. The research team sent the questionnaire several times in the months of November and December, 2014. After four rounds of data collection, a total of 71 experts from 40 different STAs responded to our survey. Figure 6 shows the distribution of respondents from different states. Also, figure 7 indicates that 71% of respondent have more than 10-year work experience in the public outreach activities for construction projects. In the next sections, we will present and explain the results of the statistical analysis.

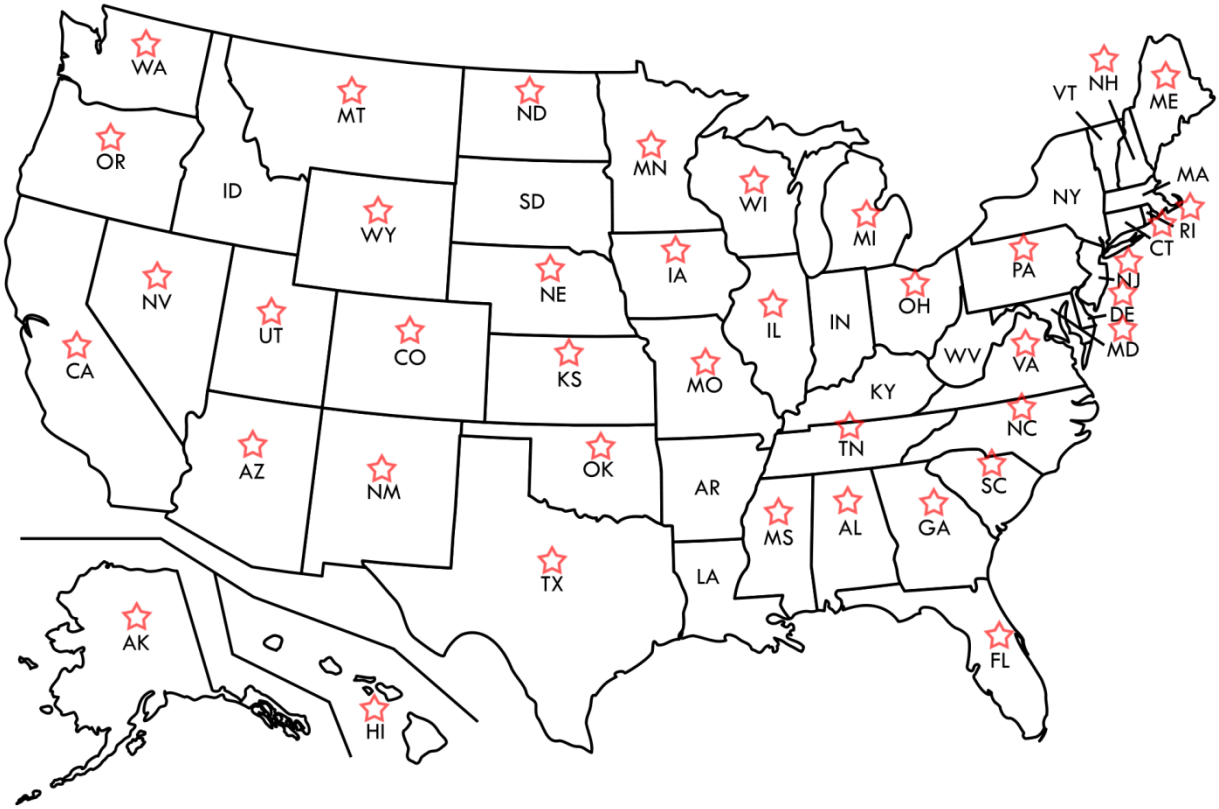


Figure 6: States Responded to the Survey

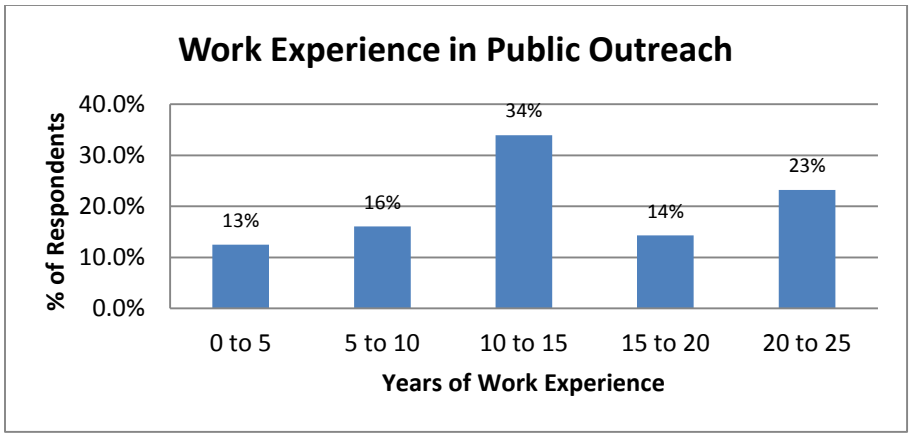


Figure 7: Distribution of Respondents Work Experience in Public Outreach

Outreach Tools and Strategies Used During Accelerated Highway Construction Projects

Figure 8 shows the usage of these tools and strategies during the construction phase of accelerated transportation projects among responding agencies. Except for static temporary signage and variable sign boards which are required by law and used by all STAs, project specific websites (97%), town hall meetings (86%), planned interview with newspaper (79%), social media (77%), and planned interview with television (76%) are among the top five outreach tools that are used by STAs. On the other hand, mobile application (54%), project specific television advertisement (42%) and text message alerts (30%) are less commonly used by STAs.

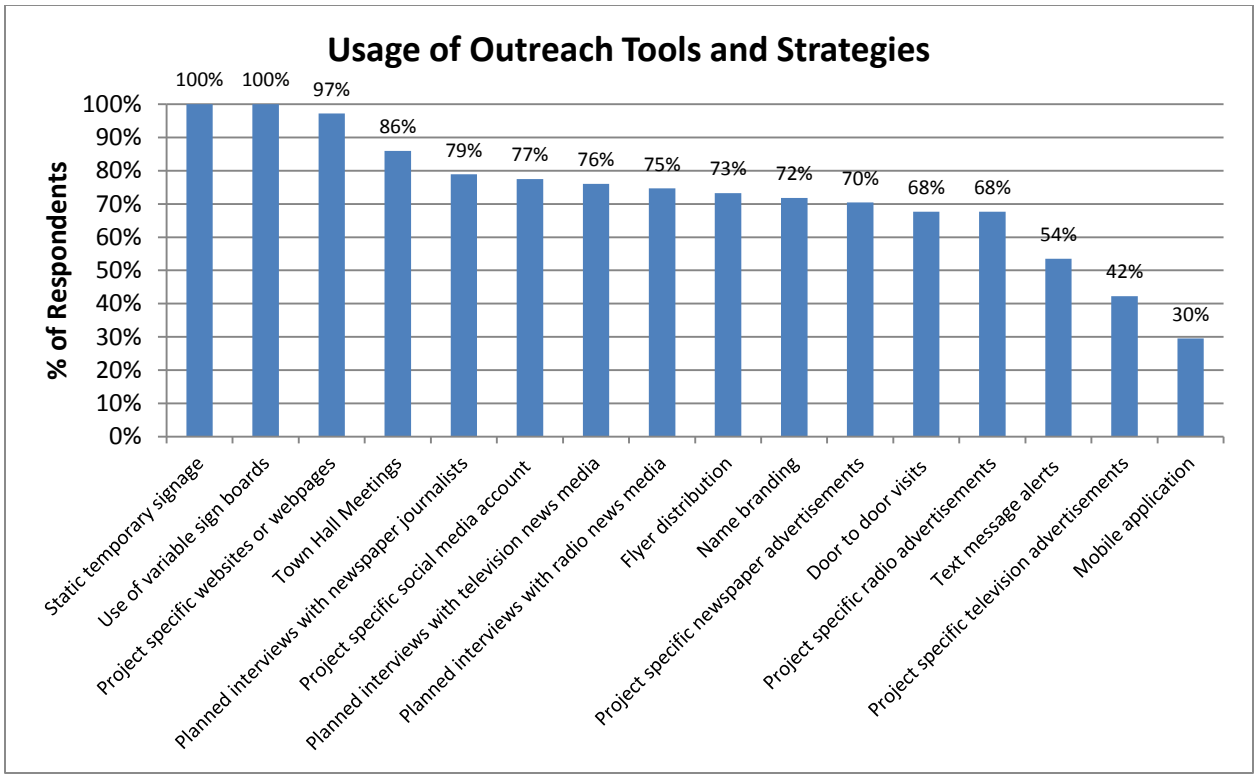


Figure 8: Frequency of Usage of Outreach Tools and Strategies

About 90% of STAs consider some aspects of geographic and demographic characteristics in selecting appropriate outreach tools and strategies. Figure 9 presents the relative importance of geographic and demographic characteristics across respondents. All responding agencies reported that they paid attention to the location of the project (rural versus urban) when evaluating the suitability of outreach tools and strategies. As Warne (2011) mentioned, stakeholder issues and public involvement have increasingly become major elements of urban projects. Thus, good communication is significantly more important in urban projects, compared to rural ones. In addition, age and language are among the most important demographic factors that STAs take into consideration in their outreach activities, as the results of this study shows.

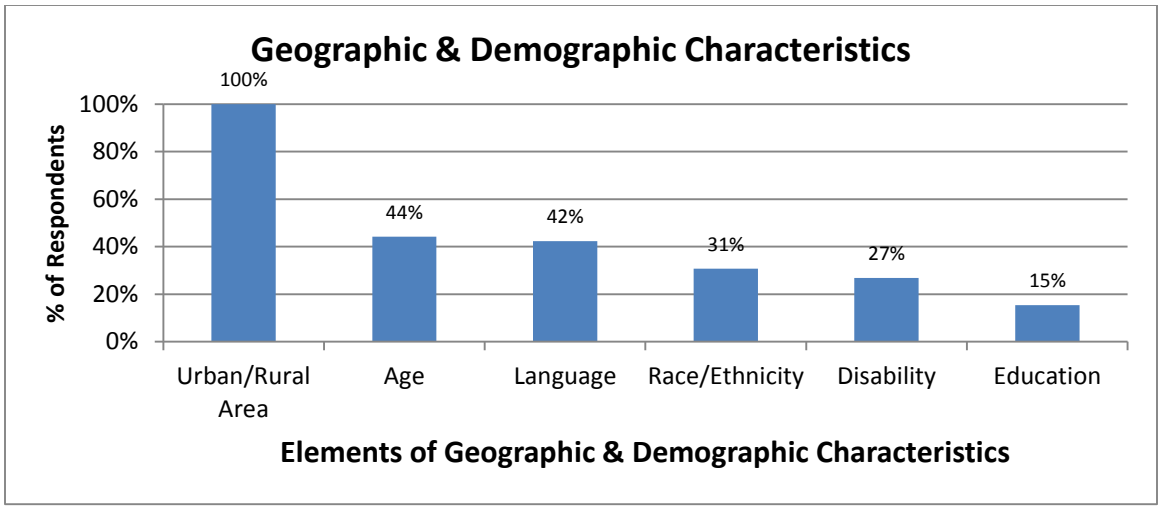


Figure 9: Consideration of Geographic and Demographic Characteristics in Outreach Activities

Outreach Tools and Strategies in Addressing Different Goals

STAs employ outreach tools and strategies during accelerated highway construction projects to achieve the following goals:

- Creating traffic avoidance during construction (i.e., reducing demand),
- Increasing driver awareness in construction zones (e.g. work zone safety),
- Decreasing impatient driver behaviors in construction zones (e.g. speeding and road rage), and
- Building trust with the public (e.g. demonstrating competency, efficiency, or highlighting innovative methods) (FHWA, 2007, Mallett et al., 2005, Maryland State Highway Administration, 2006, Warne, 2011).

The results of Chi-square test show that the frequencies of tools usage are statistically significant for each of the four goals of: creating traffic avoidance ($X^2 = 132.84, p < 0.001$), increasing awareness ($X^2 = 273.81, p < 0.001$), decreasing impatient behavior ($X^2 = 122.33, p < 0.001$), and building trust ($X^2 = 207.63, p < 0.001$).

In the next sections, we will present the tools and strategies that were mostly used by STAs in order to achieve each goal.

Tools and Strategies Used to Create Traffic Avoidance

To create traffic avoidance, except variable sign board as a communication channel that provides information directly to motorists affected by the project, outreach tools with extensive coverage such as website, social media, television, radio and newspaper are used most frequently. Meanwhile, mobile application and name branding are used less frequently (see figure 10).

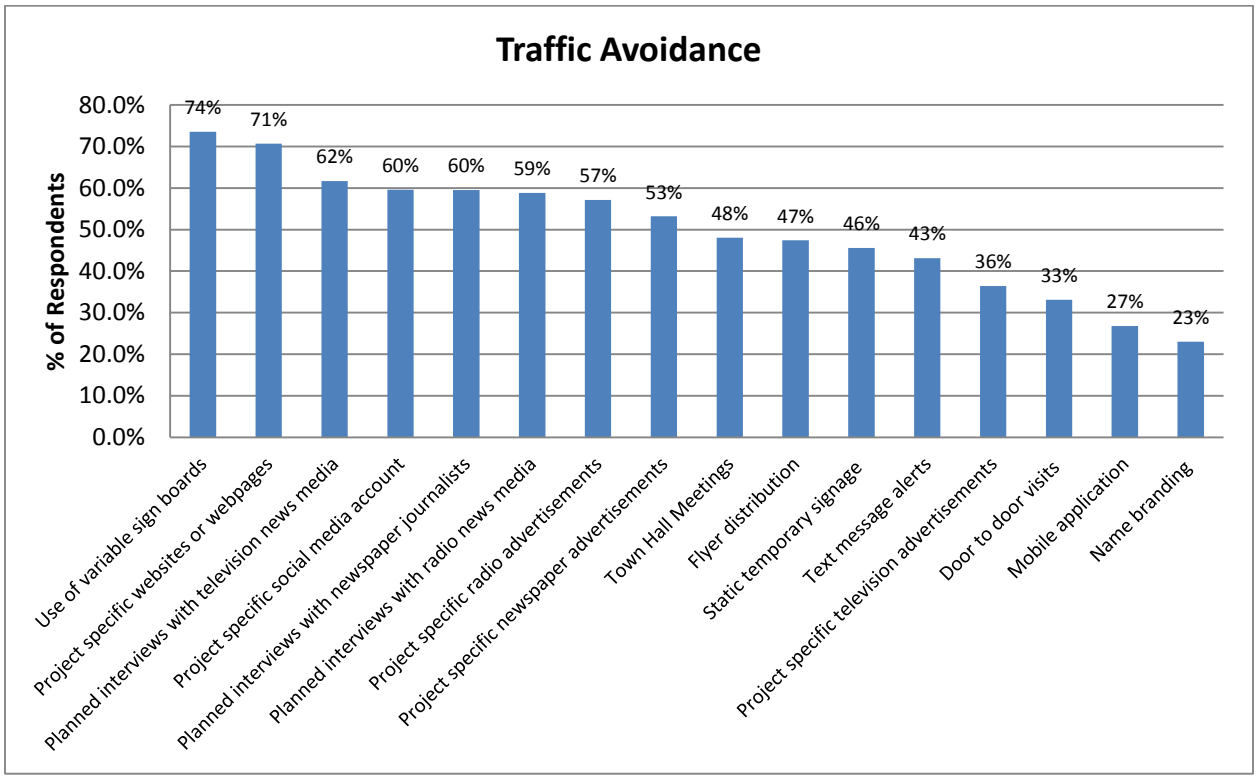


Figure 10: Outreach Tools -Traffic Avoidance

Tools and Strategies Used to Increase Driver Awareness

Figure 11 illustrates that on-site communication channels, static signage and variable sign boards have the highest usage rate among outreach tools that are used to increase awareness. This can be justified by the fact that one of the main functions of these tools are to notify motorists of safety issues in the work zones. The next three most frequently used tools of communication consist of project website, social media, and radio advertisements. Again, mobile application and name branding are ranked the lowest.

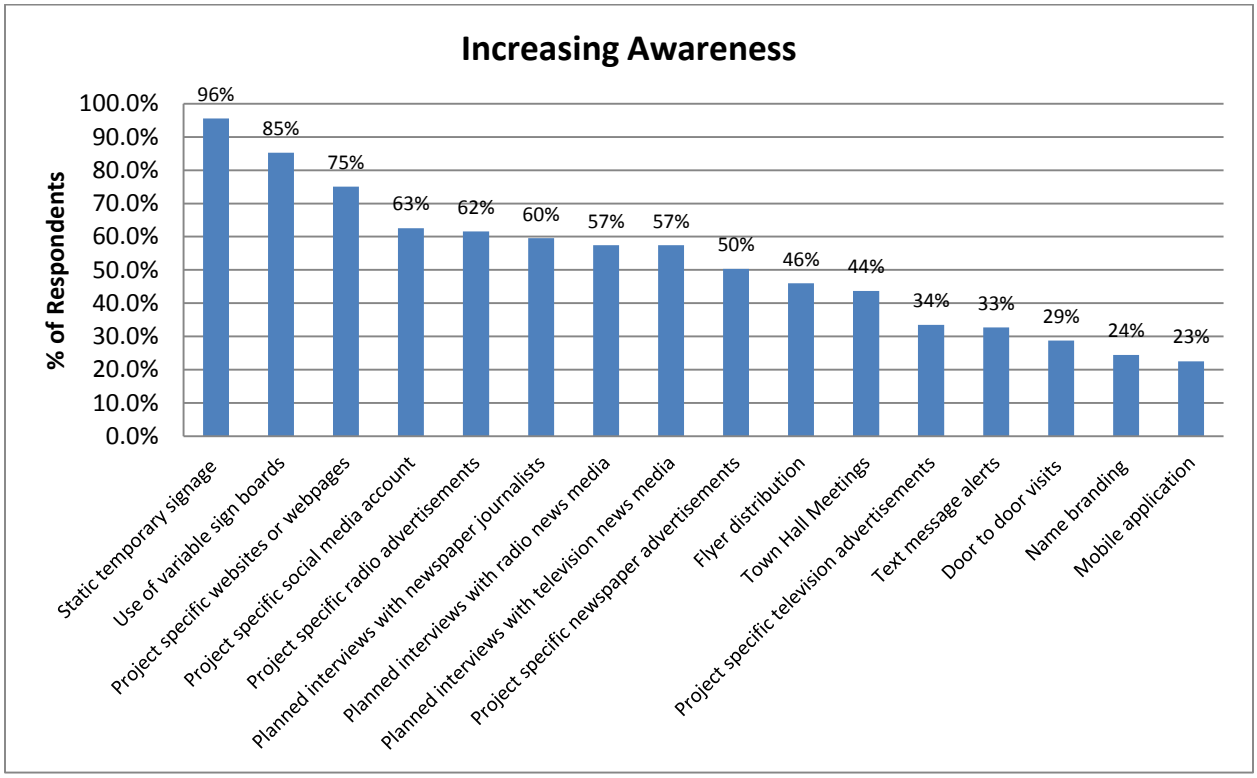


Figure 11: Outreach Tools – Increasing Awareness

Tools and Strategies Used to Decrease Impatient Driver Behaviors

In order to decrease impatient driver behaviors in construction zones, STAs usually use a combination of on-site outreach tools with immediate effects and tools with wide coverage including social media, planned interview with television, and radio advertisement. Relatively low usage rate of most outreach tools for this goal compared to the other goals might indicate that STAs don't use a wide range of outreach tools to decrease impatient driver behaviors in construction zone (see figure 12).

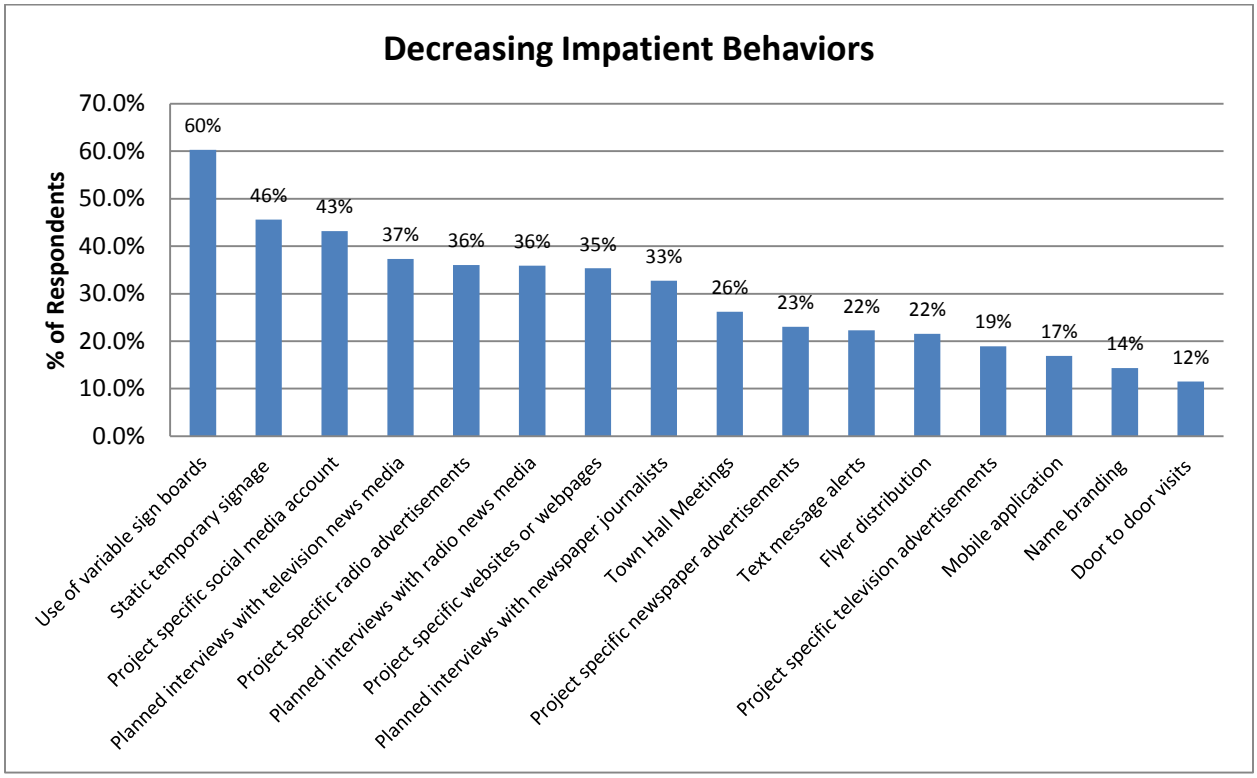


Figure 12: Outreach Tools – Decreasing Impatient Behaviors

Tools and Strategies Used To Build Trust with Public

Project specific website, town hall meetings, planned interview with newspaper, television, and radio are the top five communication tools used to attract public trust (see figure 13). Door to door visits and name branding are not among the top outreach tools. However, the comparison of their usage frequencies for addressing different goals shows that they are mainly used to build trust with the public. In addition, it is interesting to note that static temporary signage and mobile application are not among the tools that are often used to achieve this goal.

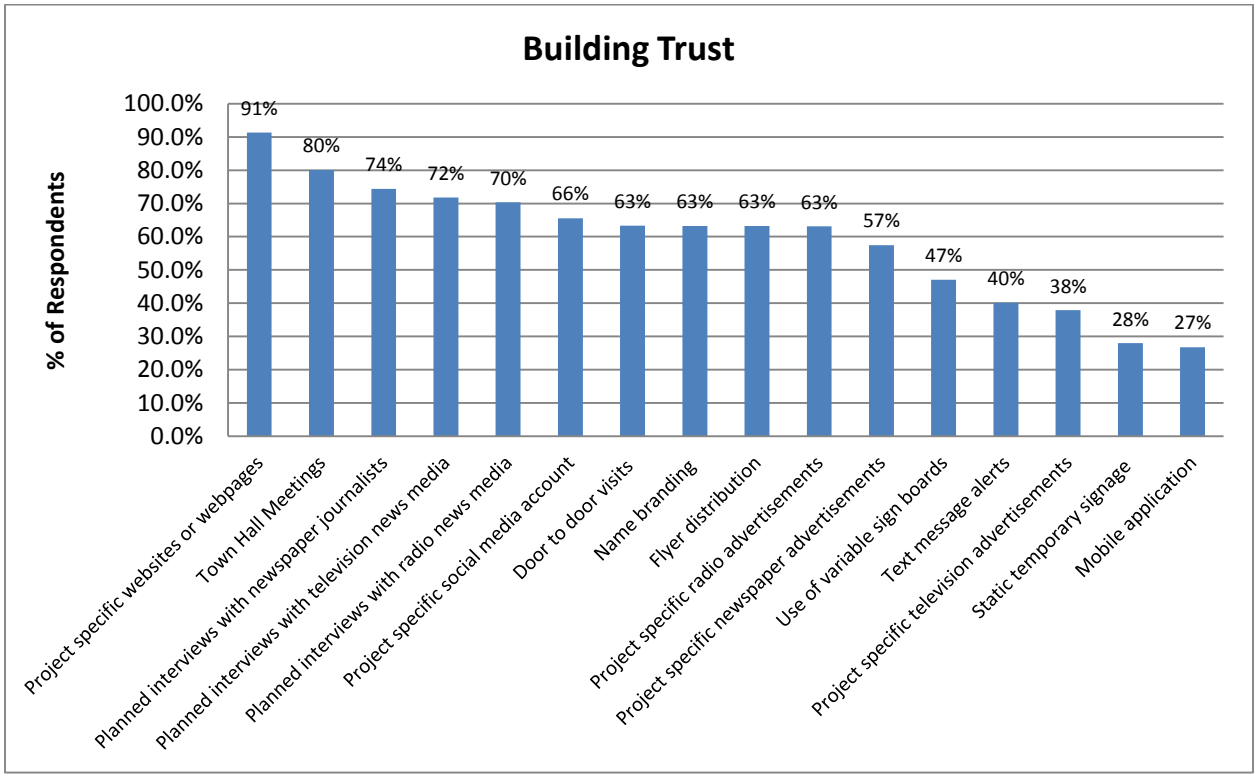


Figure 13: Outreach Tools – Building Trust

In summary, while there is some consistency in the frequency of use for specific outreach tools across the four strategies, there are differences as well. Variable sign boards, television interviews, social media, and project-specific websites are used relatively frequently across all the four strategies. In contrast, town hall meetings, which are more personal and direct compared to other tools, are used in building trust with the community; their use is relatively rare (less than 50%) across the other three strategies. While a tool's frequency of usage is an important factor, its effectiveness should also be considered when selecting a tool among different options. This issue will be addressed in the next section.

Effectiveness of Outreach Strategies and Tools

The respondents were asked to rate the effectiveness of outreach tools using a 1-5 Likert scale with a higher rate showing a higher effectiveness to address the related goal. The results of ANOVA show that the effectiveness of different tools is statistically significant for each of the four goals of: creating traffic avoidance ($F = 3.37$, $p < 0.001$), increasing awareness ($F = 5.16$, $p < 0.001$), decreasing impatient behavior ($F = 2.64$, $p < 0.001$), and building trust ($F = 3.00$, $p < 0.001$). In order to increase the resolution of scores, raw scores were normalized to 1-10 scale using the min-max method. Outreach tools' effectiveness in achieving each goal is demonstrated in figures 14 - 17.

Effectiveness of Outreach Tools and Strategies in Creating Traffic Avoidance

Interestingly, mobile application and social media are among the most effective outreach tools in reducing traffic demand. This can be due to the fact they can provide real-time information to people which allows them to plan in advance of their travels. The next most effective tools for traffic avoidance are project specific television advertisements, interviews with television, and text message alerts, respectively.

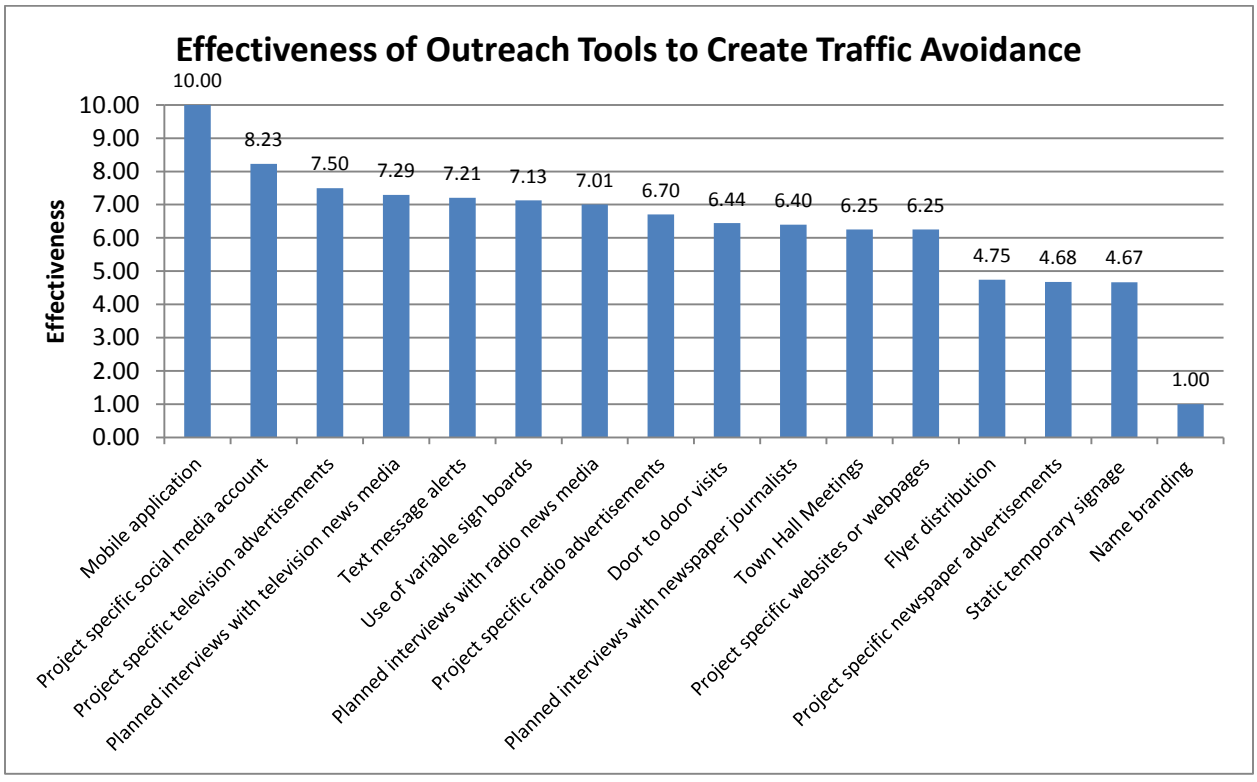


Figure 14: Effectiveness of Outreach Tools to Create Traffic Avoidance

Effectiveness of Outreach Tools and Strategies in Increasing Driver Awareness

Mobile application is the most effective tool for increasing driver awareness. In addition, on-site outreach tools, static signage, and variable sign board are among the tools that have high effectiveness scores. Comparing the results to the frequencies of usage shows that on-site outreach tools are both widespread and effective in increasing driver awareness.

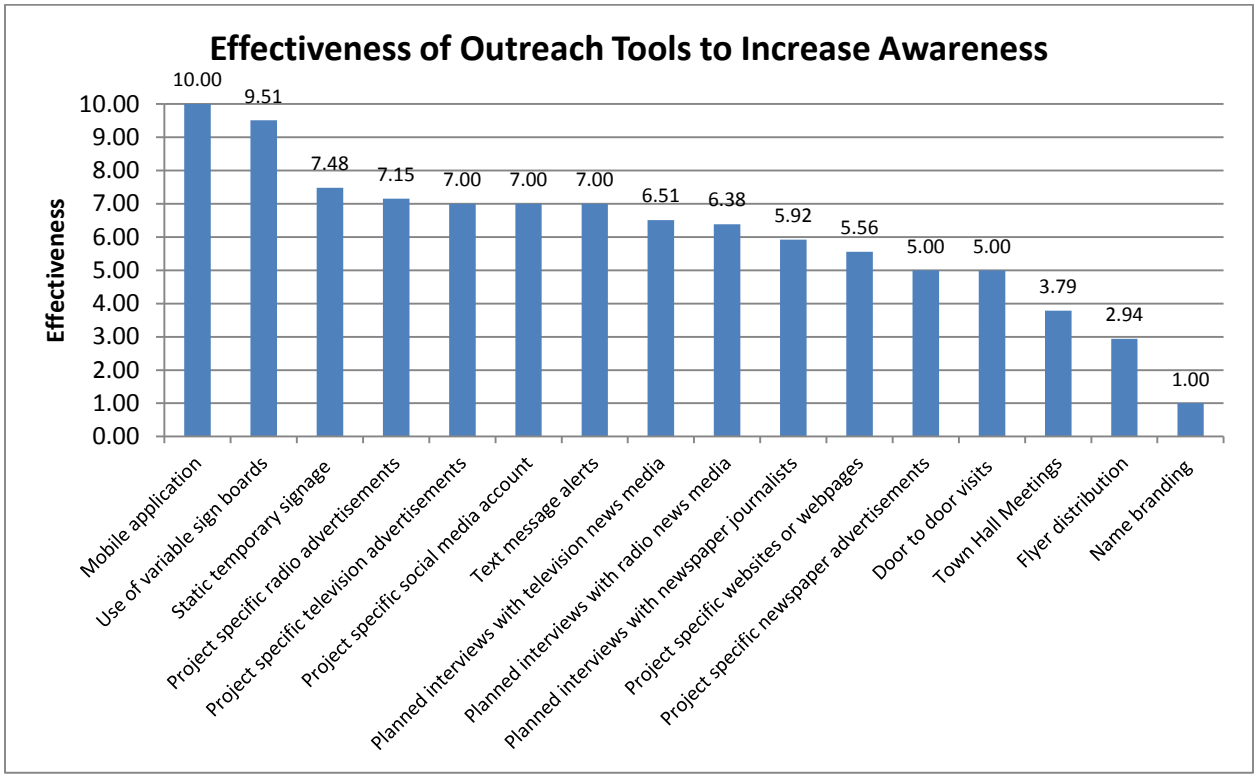


Figure 15: Effectiveness of Outreach Tools to Increase Awareness

Effectiveness of Outreach Tools and Strategies in Decreasing Impatient Behavior

The results show that social media, text message alerts, mobile application and variable sign boards have the highest effectiveness in decreasing driver impatient behavior, respectively. While, the frequency of usage results show that STAs use variable sign boards most frequently, these results indicate that there are other effective tools that can be used to address this goal.

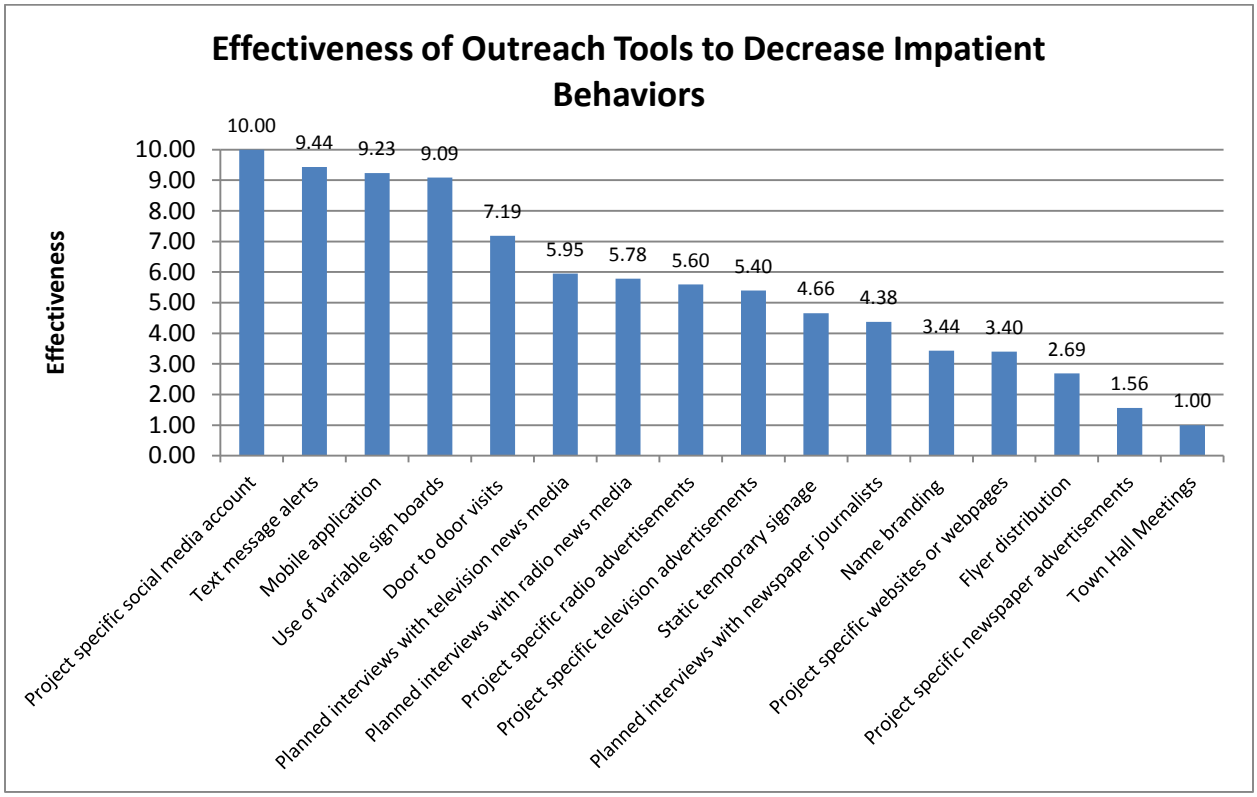


Figure 16: Effectiveness of Outreach Tools to Decrease Impatient Behaviors

Effectiveness of Outreach Tools and Strategies in Building Trust with the Public

Door to door visits and town hall meeting are among the most effective tools to build trust. This can be due to the fact that they allow STAs to have personal contact and direct interaction with people. Social media and mobile applications are also considered as highly effective in building trust among different stakeholders. This can be due to the fact that these tools can increase public engagement via internet which in turn broadens public outreach.

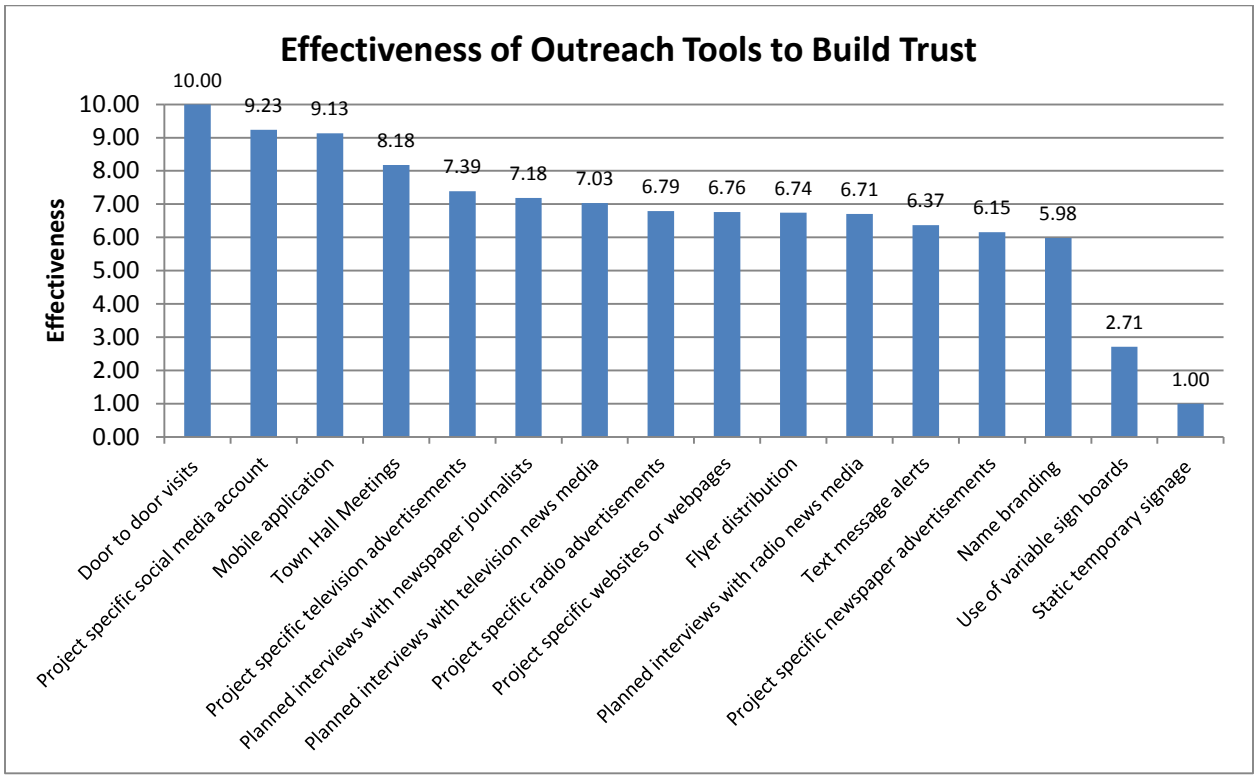


Figure 17: Effectiveness of Outreach Tools to Build Trust

Figure 18 summarizes the results of this section and presents the effectiveness of each outreach tool across multiple communication goals. By comparing the results of the last section to this section, it becomes apparent that the most commonly used methods employed to reach specific goals are not always the most effective ones. One interesting discrepancy is mobile applications. Although, mobile applications are not used by many respondents, they are categorized among highly effective tools by those respondents who used them to communicate with stakeholders and the public. Also, text messaging was ranked among the top five effective tools in creating traffic avoidance, increasing driver awareness, and decreasing impatient behaviors. In 2013, more than 90% of U.S. adults owned a cell phone and 56% of the cell phones were smart phones (AASHTO, 2013). These facts along with the results of our study provide evidence for the effectiveness of

cellular phones as communication channels in accelerated construction projects. However, this recommendation should be considered with caution due to the concerns regarding the use of cellular phones while driving.

Another point is that social media is both frequently used by STAs to achieve most communication goals and also reported as highly effective in achieving the related goals. This finding is supported by the survey conducted by American Association of State Highway Transportation Officials (AASHTO) Subcommittee on Transportation Communication which indicates that the use of social media for communication is constantly on the rise by state DOTs (AASHTO, 2013).

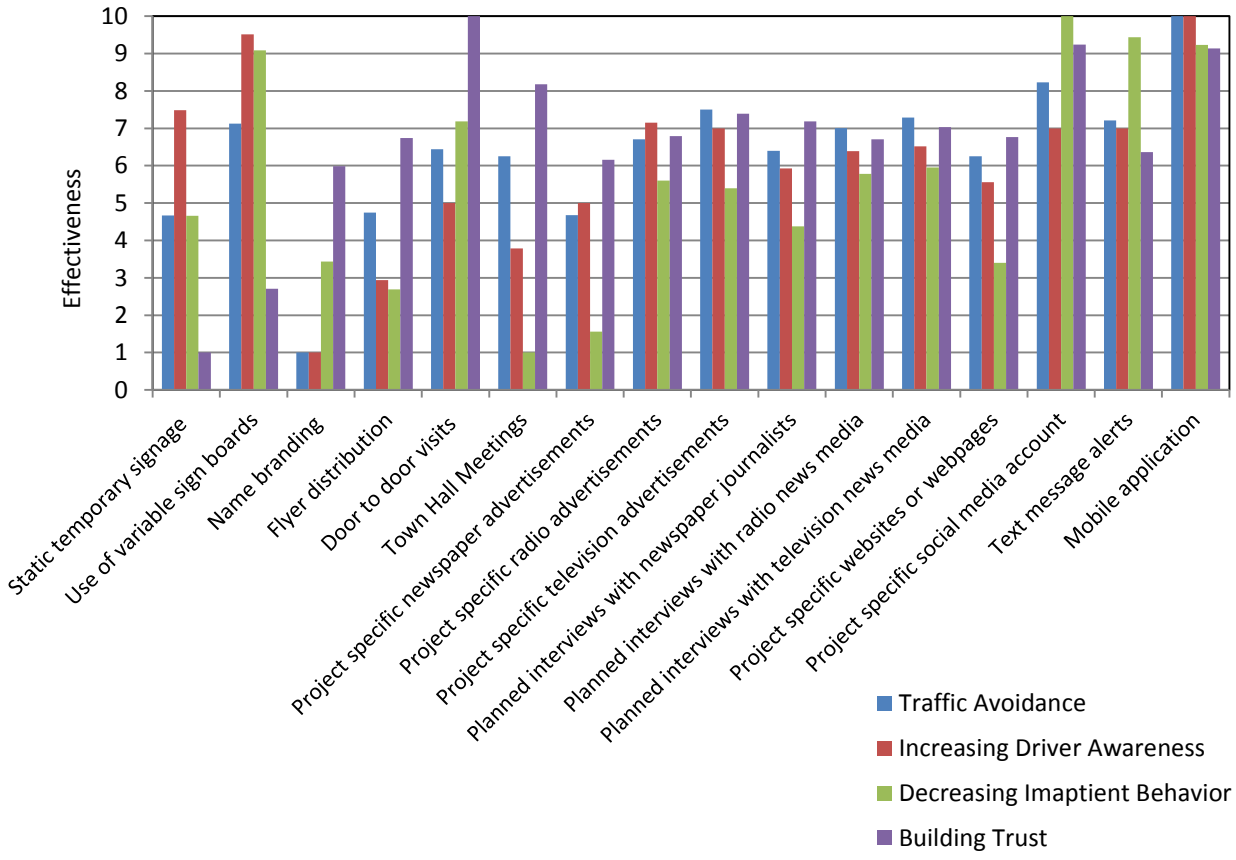


Figure 18: Effectiveness of Outreach Tools to Address Different Communication Goals

Project Characteristics and Outreach Strategies

This section provides a framework to suggest outreach tools and strategies according to project characteristics. Two factors of mobility, impact time and levels of closure, are considered in categorizing accelerated highway construction projects.

According to FHWA, the mobility impact time is any period of time that the traffic flow of transportation network is reduced due to on-site construction activities. This metric is classified into five tiers:

- Tier 1 (T1): Traffic impacts within 1 to 24 hours
- Tier 2 (T2): Traffic impacts within 3 days
- Tier 3 (T3): Traffic impacts within 2 weeks
- Tier 4 (T4): Traffic impacts within 3 months
- Tier 5 (T5): Overall project schedule is significantly reduced by months to years (Culmo, 2011)

The types of closure caused by accelerated highway construction projects can vary greatly as well. In this study, we developed the following levels of highway closure:

- Level 1: Loss of single shoulder
- Level 2: Loss of both shoulders
- Level 3: Loss of less than 50% of total travel lanes (typically 1 lane)
- Level 4: Loss of more than 50% of total travel lanes (typically 2-3 lanes)
- Level 5: Nighttime closure (single incidence)
- Level 6: Nighttime closures (multiple incidences)
- Level 7: Full closure (less than one week duration)
- Level 8: Full closure (1 week to 1 month duration)
- Level 9: Full closure (1 to 3 month duration)
- Level 10: Full closure (greater than 3 month duration)

STAs were asked to select which tools that they use to address projects with different characteristics mentioned above. The survey results were classified based on both an overall effectiveness score and a frequency of usage in order to provide a coherent framework for recommending outreach tools for different project types. Overall effectiveness score was calculated by taking the average score of effectiveness of each tool to address the four different goals. By using median for both effectiveness and frequency of usage, the space is divided into four sections, so for each project type, outreach tools and strategies are presented in a matrix. Figure 19 illustrates the matrix for a project with T4 traffic impact. The matrices for all project types are presented in Appendix B.

Three tier strategies are defined for each project type: Tier 1: strategies with high effectiveness and high frequency; Tier 2: strategies with either high effectiveness and low frequency or low effectiveness and high frequency; and Tier 3: strategies with low effectiveness and low frequency. The summary of the results for different project characteristics are shown in tables 1, and 2. For the levels of highway closure, the analysis of the results allowed us to reduce capacity loss of ten categories to five:

- L1: Loss of single or both shoulders
- L2: Loss of part of travel lanes
- L3: Nighttime closure
- L4: Full closure less than one month
- L5: Full closure more than one month

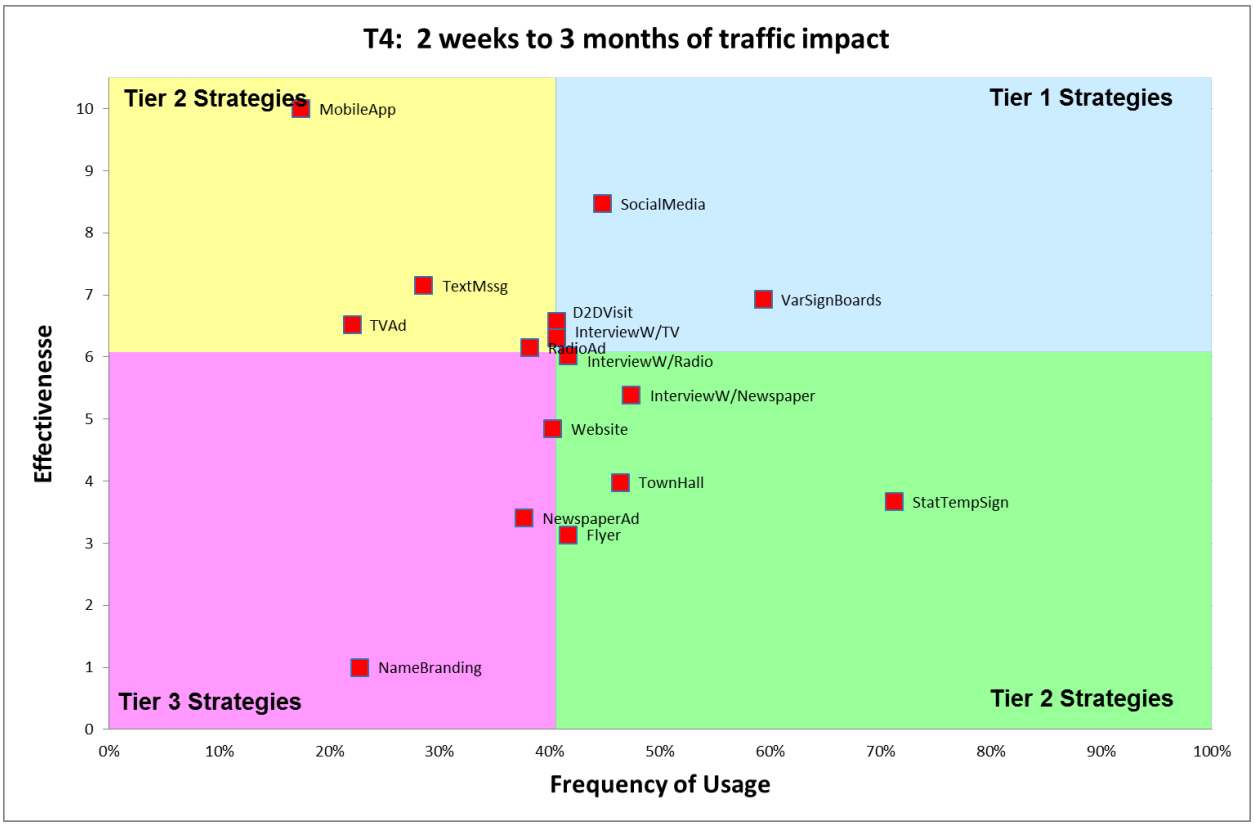


Figure 19: Example of Effectiveness – Frequency of Usage Matrix for a Project with T4 Traffic Impact

Table 1: Outreach Tools and Strategies for Various Project Traffic Impact

Project Traffic Impact	Outreach Tools & Strategies		
	Tier1	Tier2	Tier3
T1:1 to 24 Hours of Traffic Impact	Variable Sign Boards	Interview with Radio	Interview with Newspaper
	Social Media	TV Ad	Website
	Text Message	Door to Door Visit	Newspaper Ad
	Interview with TV		Flyer
	Radio Ad		Name Branding
	Mobile App		Town Hall Meeting
	Static Temporary Signage		
T2: 1 to 3 Days of Traffic Impact	Variable Sign Boards	Interview with Radio	Website
	Social Media	Interview with Newspaper	Newspaper Ad
	Text Message	Mobile App	Flyer
	Interview with TV	TV Ad	Name Branding
	Radio Ad	Door to Door Visit	Town Hall Meeting
	Static Temporary Signage		
T3: 4 Days to 2 Weeks of Traffic Impact	Variable Sign Boards	Interview with Newspaper	Newspaper Ad
	Interview with TV	Interview with Radio	Flyer
	Social Media	Door to Door Visit	Website
	Text Message	Mobile App	Town Hall Meeting
	Radio Ad	TV Ad	Name Branding
	Static Temporary Signage		
T4: 2 Weeks to 3 Months of Traffic Impact	Variable Sign Boards	Interview with Newspaper	Website
	Social Media	Town Hall Meeting	Newspaper Ad
	Door to Door Visit	Interview with Radio	Name Branding
	Interview with TV	Flyer	
	Static Temporary Signage	Radio Ad	
		Text Message	
		TV Ad	
		Mobile App	
T5: More than 3 Months of Traffic Impact	Social Media	Website	Newspaper Ad
	Variable Sign Boards	Town Hall Meeting	
	Interview with TV	Name Branding	
	Static Temporary Signage	Interview with Newspaper	
		Flyer	
		Interview with Radio	
		Door to Door Visit	
		Radio Ad	
		Text Message	
		TV Ad	
		Mobile App	

Notes:

Tools in in each tier are sorted based on frequency of usage.

Static temporary signage was categorized in tier 2 based on the data, but strategies since it is mandatory, we have to categorize it in tier 1.

Table 2: Outreach Tools and Strategies for Various Levels of Capacity Loss

Level of Capacity Loss	Outreach Tools & Strategies		
	Tier1	Tier2	Tier3
L1: Loss of Single or Both Shoulders	Variable Sign Boards	Website	Interview with Radio
	Social Media	Flyer	Name Branding
	Text Message	Newspaper Ad	Interview with Newspaper
	Mobile App	Door to Door Visit	Town Hall Meeting
	Radio Ad	TV Ad	
	Static Temporary Signage	Intrview with TV	
L2 : Loss of Part of Travel Lanes	Variable Sign Boards	Website	Newspaper Ad
	Social Media	Interview with Radio	Flyer
	Text Message	Mobile App	Town Hall Meeting
	Radio Ad	Door to Door Visit	Name Branding
	Interview with TV	TV Ad	
	Static Temporary Signage	Interview with Newspaper	
L3: Nighttime Closure	Variable Sign Boards	Website	Newspaper Ad
	Social Media	Interview with Newspaper	Name Branding
	Text Message	Interview with Radio	Town Hall Meeting
	Radio Ad	Flyer	
	Static Temporary Signage	Interview with TV	
		Mobile App	
		TV Ad	
		Door to Door Visit	
L4: Full Closure Less than One Month	Variable Sign Boards	Interview with Newspaper	Flyer
	Interview with TV	Interview with Radio	Town Hall Meeting
	Social Media	Website	Newspaper Ad
	Radio Ad	Text Message	Name Branding
	Static Temporary Signage	Door to Door Visit	
		Mobile App	
		TV Ad	
L5: Full Closure More than One Month	Variable Sign Boards	Website	Newspaper Ad
	Interview with TV	Town Hall Meeting	Name Branding
	Social Media	Interview with Newspaper	
	Static Temporary Signage	Flyer	
		Interview with Radio	
		Door to Door Visit	
		Radio Ad	
		Text Message	
		TV Ad	
		Mobile App	

Notes:

Tools in in each tier are sorted based on frequency of usage.

Static temporary signage was categorized in tier 2 based on the data, but strategies since it is mandatory, we have to categorize it in tier 1.

Target Audience and Outreach Strategies

In addition to addressing project characteristics in relation to project impact and capacity loss, the study also examined 87 percent of the responding agencies reported that they considered types of travelers (commuter, non-commuter, and commercial trucks) when they thought about outreach tools they wanted to use. Commuters are more likely to be informed about travel but they are less flexible about different aspects of their trip. By contrast, non-commuters are usually harder to access but more likely to react to the messages about changing the timing of a trip and their destination. Finally, commercial drivers have different needs regarding work zone information because of their tight schedule, transportation of oversize or hazardous materials, and overnight travel (Mallett et al., 2005).

The matrix approach has been used to classify outreach tools and strategies relevant to different types of travelers. Figure 20 shows this classification for commuters as one type of travelers. In this study, we did not find any significant difference in outreach tools and strategies used for commuters and non-commuters. So, we grouped them into "passenger vehicles." Table 3 summarized the results for all types.

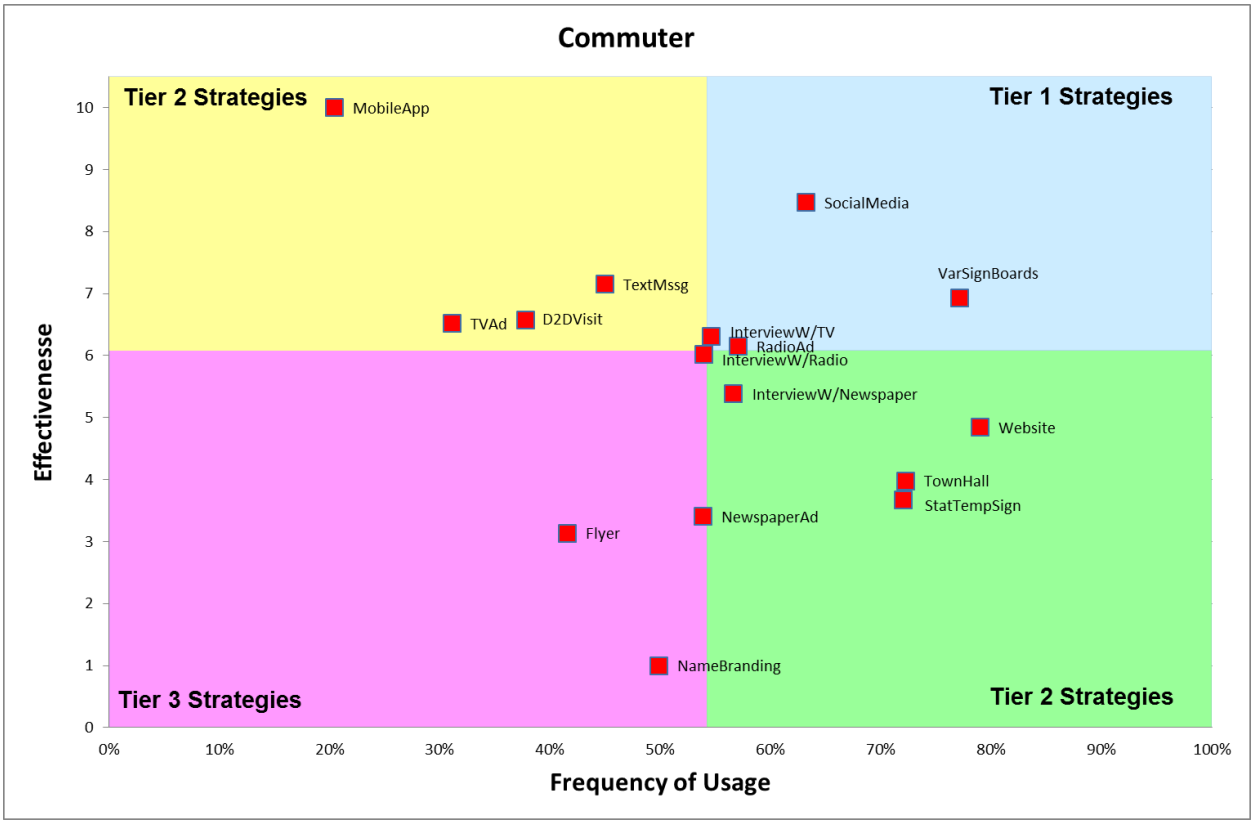


Figure 20: Example of Effectiveness – Frequency of Usage Matrix for Commuters

Table 3: Outreach Tools and Strategies for Various Types of Travelers

Types of Travelers	Outreach Tools & Strategies		
	Tier1	Tier2	Tier3
Passenger Vehicles	Variable Sign Boards	Website	Interview with Radio
	Social Media	Town Hall Meeting	Newspaper Ad
	Radio Ad	Interview with Newspaper	Name Branding
	Interview with TV	Text Message	Flyer
	Static Temporary Signage	Door to Door Visit	
		TV Ad	
		Mobile App	
Commercial Trucks	Variable Sign Boards	Website	Newspaper Ad
	Social Media	Interview with Radio	Town Hall Meeting
	Radio Ad	Interview with Newspaper	Name Branding
	Interview with TV	TV Ad	Flyer
	Text Message	Mobile App	
	Static Temporary Signage	Door to Door Visit	

Notes:

Tools in in each tier are sorted based on frequency of usage.

Static temporary signage was categorized in tier 2 based on the data, but strategies since it is mandatory, we have to categorize it in tier 1.

Outreach Strategies' Plan for Accelerated Highway Construction Projects

The goal of this section is to recommend a process for formulating outreach strategies during the construction phase of accelerated highway projects. Figure 21 illustrates the process.

Figure 21: Recommended Process for Selecting Outreach Tools

1 – Reviewing the project description and goals:

Understanding overall project goals is perhaps the most critical aspect of creating an effective outreach effort. Project attributes and goals should determine the goals of outreach activities and selecting appropriate outreach tools and strategies. Typically, teams can categorize project goals into three to five categories. Appendix A provides forms (Form 1 and 2) to help the outreach team to document the main project attributes and goals.

2 – Defining goals of community outreach activities:

As was discussed earlier, there are four general outreach goals during the construction phase: (1) reducing traffic demand; (2) increasing driver awareness; (3) decreasing driver impatient behaviors; and (4) building trust with the public. Each project will likely have more specific goals for its outreach activities. Form 3 in the Appendix A can help outreach team to define the project communication goals.

3 – Identifying project stakeholders:

Stakeholders refer to the individuals, groups, and organizations that project may directly or indirectly affect. The goals of identifying and working with stakeholders include: (1) establishing lines of communication; (2) distributing information; (3) improving outreach activities by considering stakeholders' perspectives; (4) and sharing the costs of communication strategies (Maryland State Highway Administration, 2006). Form 4 helps to identify possible stakeholders. Inclusiveness of the list of stakeholders is dependent on project characteristics, work zone location, and business and residential environment.

4 – Identifying project characteristics and the types of travelers:

Project characteristics and travelers' types are key factors in selecting the most appropriate outreach tools. Project characteristics, traffic impact, and the types of closure that construction causes are important factors. Different levels of traffic impact and capacity loss were previously defined, as were various types of travelers (passenger vehicles and commercial trucks), which are targeted for communication.

5 – Develop outreach strategies:

When the outreach team identifies project characteristics and the types of travelers, it can use tables 1, 2, and 3 to get the recommended strategies. As an example, one may be interested in knowing the recommended strategies for a project with T3 traffic impact, L3 capacity loss, and primary passenger vehicles traffic. Table 5 shows the portions of the tables that relate to this specific project. Table 5 unites different sets of strategies in 3 tiers. We used a conservative approach in placing tools, which means that in cases where one tool belonged to two different tiers, it was placed in the higher tier. In this example, town hall meeting is in both tier two and three, but it was classified in tier two strategies.

Table 4: Selected Parts from the Tables 1, 2, and 3

T3: 4 Days to 2 Weeks of Traffic Impact	Variable Sign Boards	Interview with Newspaper	Newspaper Ad
	Interview with TV	Interview with Radio	Flyer
	Social Media	Door to Door Visit	Website
	Text Message	Mobile App	Town Hall Meeting
	Radio Ad	TV Ad	Name Branding
	Static Temporary Signage		
L3: Nighttime Closure	Variable Sign Boards	Website	Newspaper Ad
	Social Media	Interview with Newspaper	Name Branding
	Text Message	Interview with Radio	Town Hall Meeting
	Radio Ad	Flyer	
	Static Temporary Signage	Interview with TV	
		Mobile App	
		TV Ad	
		Door to Door Visit	
Passenger Vehicles	Variable Sign Boards	Website	Interview with Radio
	Social Media	Town Hall Meeting	Newspaper Ad
	Radio Ad	Interview with Newspaper	Name Branding
	Interview with TV	Text Message	Flyer
	Static Temporary Signage	Door to Door Visit	
		TV Ad	
		Mobile App	

Table 5: Three-Tier Strategies for a Project with T3 Traffic Impact, L3 Capacity Loss, and Primary Passenger Vehicles Traffic

Outreach Tools & Strategies		
Tier1	Tier2	Tier3
Interview with TV	Door to Door Visit	Name Branding
Radio Ad	Flyer	Newspaper Ad
Social Media	Interview with Newspaper	
Static Temporary Signage	Interview with Radio	
Text Message	Mobile App	
Variable Sign Boards	Town Hall Meeting	
	TV Ad	
	Website	

It should be noted that Tier 1 strategies are highly effective and are most frequently used based on the survey data. They are highly recommended to be applied for the accelerated projects. Tier 2 strategies are either highly effective or most common, but using them in different projects needs a more thorough analysis. Factors such as outreach goals, budget, internal and external resources, and work zone location may influence the decision to employ them.

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Appendix A: Forms

Form-1: Project Description

Project Attributes
Project Name:
Location:
Estimated Budget:
Estimated Project Delivery Period:
Required Delivery Date (if applicable):
Source(s) of Project Funding:
Project Corridor:
Major Features of Work – pavement, bridge, sound barriers, etc.:
Major Schedule Milestones:
Major Project Stakeholders:
Major Obstacles (as applicable)
With Right of Way, Utilities, and/or Environmental Approvals:
During Construction Phase:
Main Identified Sources of Risk:
Safety Issues:
Sustainable Design and Construction Requirements:

Form-2: Project Goals

Project goals can be defined in three to five items and need to be reviewed here. Example goals are provided below, but the report should include project-specific goals. These goals should remain consistent over the life of the project.

Project-Specific Goals
Goal #1:
Goal #2:
Goal #3:
Goal #4:
Goal #5:

General Project Goals (for reference)

Schedule

- Minimize project delivery time
- Complete the project on schedule
- Accelerate start of project revenue

Cost

- Minimize project cost
- Maximize project budget
- Complete the project on budget
- Maximize the project scope and improvements within the project budget

Quality

- Meet or exceed project requirements
- Select the best team
- Provide a high quality design and construction constraints
- Provide an aesthetically pleasing project

Functional

- Maximize the life cycle performance of the project
- Maximize capacity and mobility improvements
- Minimize inconvenience to the traveling public during construction
- Maximize safety of workers and traveling public during construction

Form-3: Project Outreach Goals

Outreach Goals
Goal #1:
Goal #2:
Goal #3:
Goal #4:
Goal #5:

Examples of Outreach Goals

- Informing the public regarding traffic delay at adjacent intersections, corridors, and travelling routes
- Providing information regarding alternative traveling routes
- Changing travel habits to decrease traffic congestion near work zone
- Increasing driver awareness of work zone safety issues
- Encourage drivers to maintain appropriate driving behavior in construction zone
- Alerting the public of special traffic and safety conditions such as heavy truck traffic, steep grades, bad weather, and planned special events
- Increasing public awareness and understanding of the project
- Promoting support across different stakeholders in society

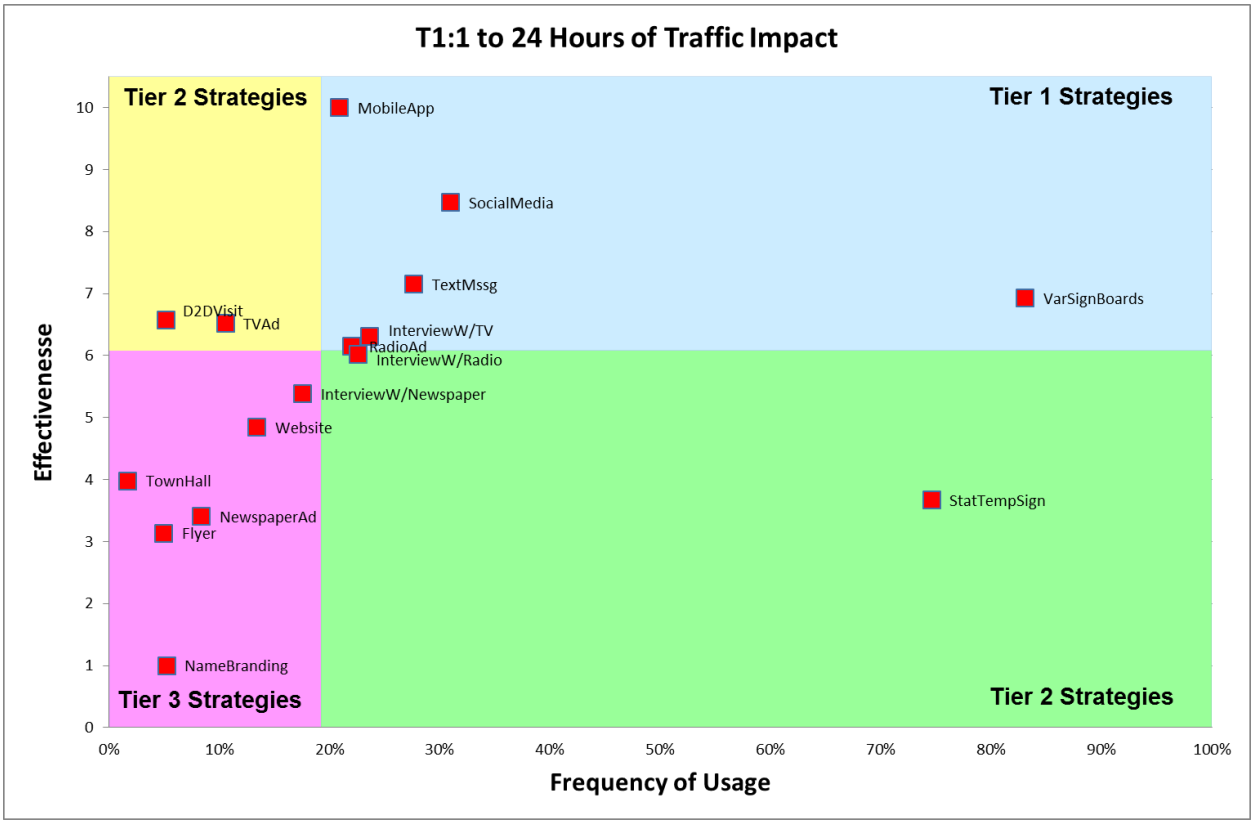
Form-4: Possible Stakeholders of the Project

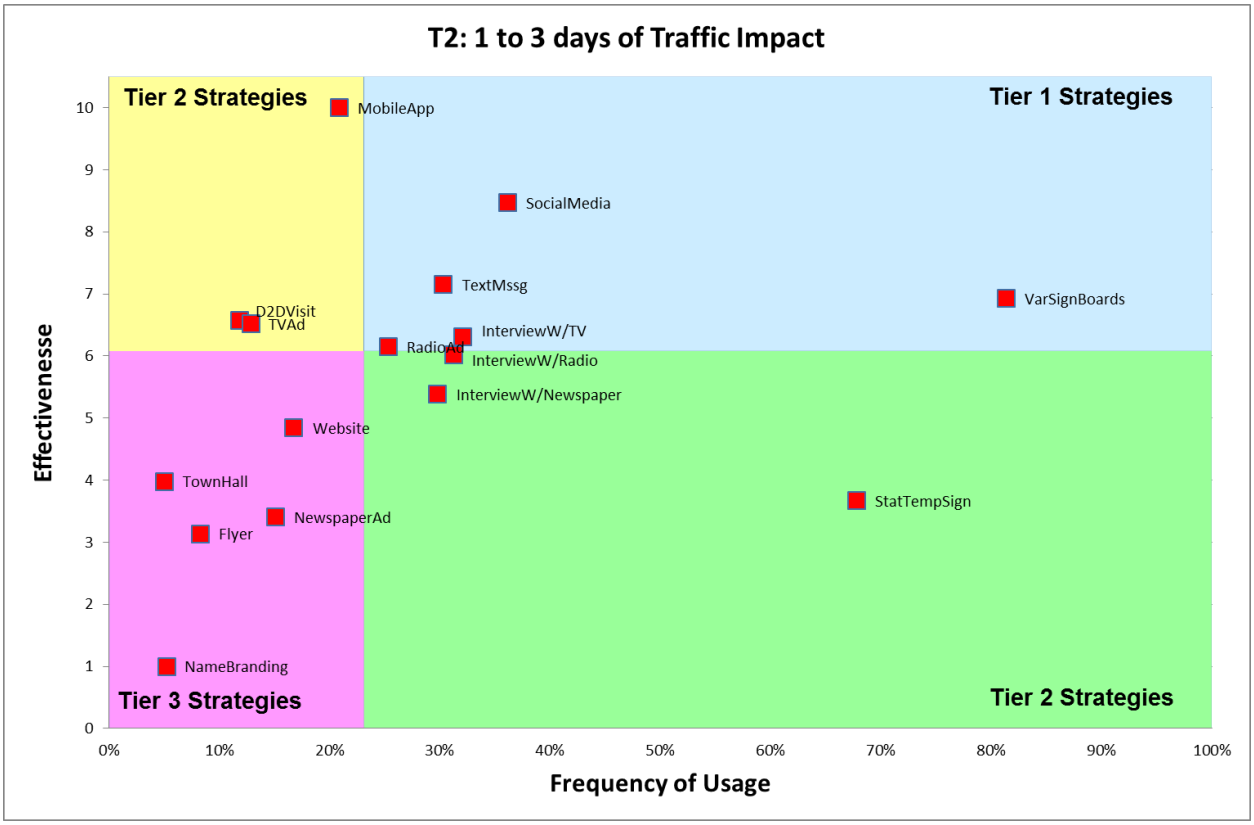
Possible Stakeholders and Interested Parties*
Community residents(e.g. people living in the neighborhood)
Elected officials/city, county and regional governments/commissions
Emergency service providers(e.g. law enforcement agencies and fire departments)
Internal partners (e.g. office of communications and district public information rep.)
Jurisdictional partners(e.g. city agencies, transit providers and school districts)
Local business community
Property owners and property residents affected by the project
Shipping/freight industry(e.g. trucking industry, ports and railroads)
Special interest groups(e.g. motor truck association and bicycle associations)
Travel information providers(e.g. radio, television and newspaper)
Work zone personnel(e.g. contractors and traffic control providers)
Other possible stakeholders

* Maryland State Highway Administration (2006)

Appendix B: Frequency – Effectiveness Matrices

Traffic Impacts




T2: 1 to 3 days of Traffic Impact
Tier 2 Strategies
Tier 1 Strategies
Tier 3 Strategies
Tier 2 Strategies
MobileApp
SocialMedia
TextMssg
VarSignBoards
D2DVisit
TVAd
InterviewW/TV
RadioAd
InterviewW/Radio
InterviewW/Newspaper
Website
TownHall
StatTempSign
NewspaperAd
Flyer
NameBranding
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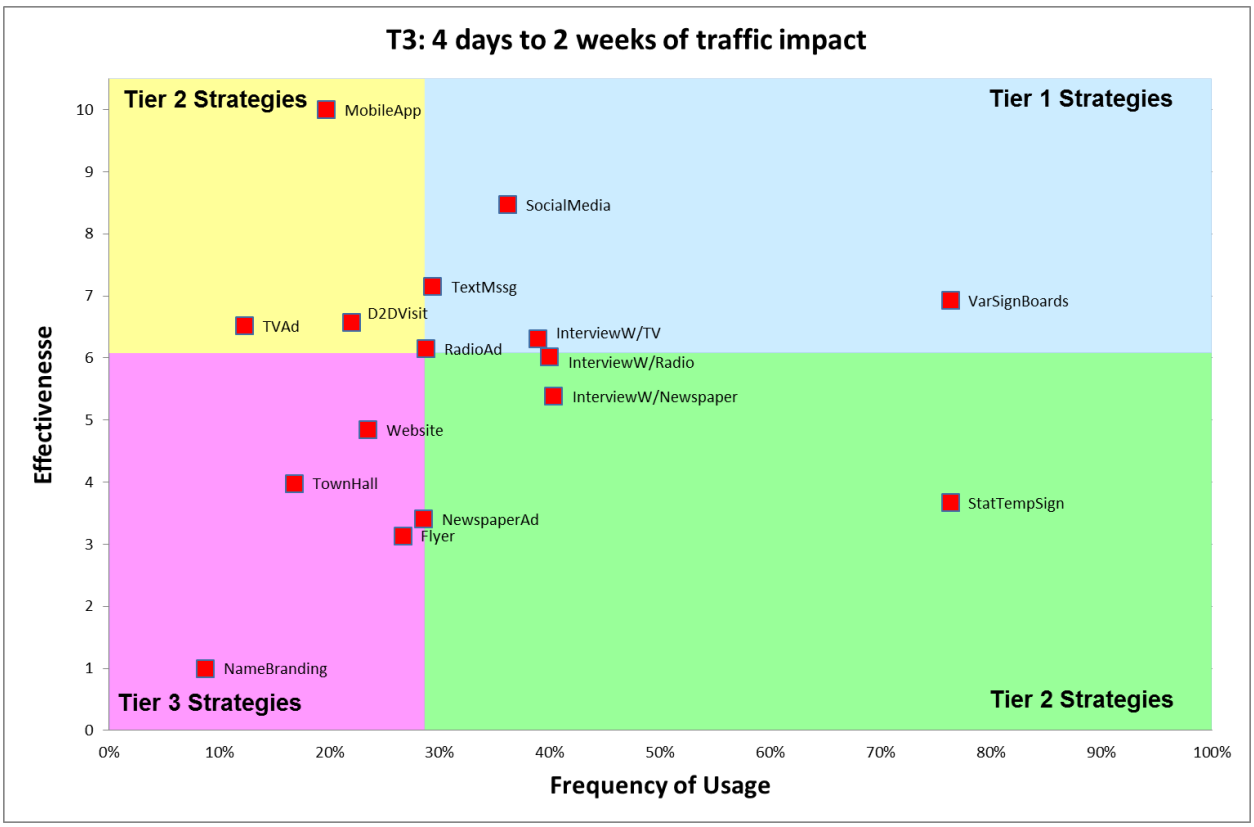
T3: 4 days to 2 weeks of traffic impact
Tier 2 Strategies
Tier 1 Strategies
Tier 3 Strategies
Tier 2 Strategies
MobileApp
SocialMedia
TextMssg
VarSignBoards
TVAd
D2DVisit
InterviewW/TV
RadioAd
InterviewW/Radio
InterviewW/Newspaper
Website
TownHall
StatTempSign
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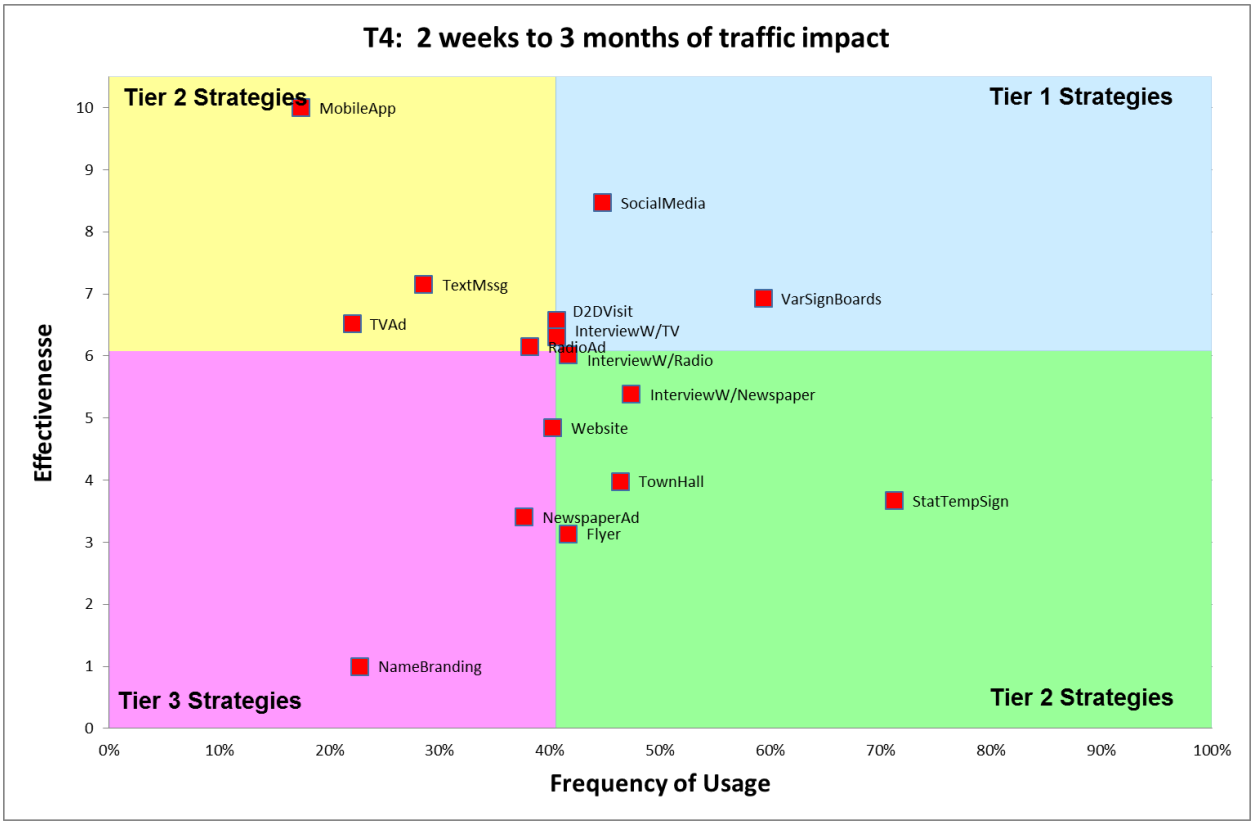
T4: 2 weeks to 3 months of traffic impact
Tier 2 Strategies
Tier 1 Strategies
Tier 3 Strategies
Tier 2 Strategies
MobileApp
SocialMedia
TextMssg
VarSignBoards
TVAd
D2DVisit
InterviewW/TV
RadioAd
InterviewW/Radio
InterviewW/Newspaper
Website
TownHall
StatTempSign
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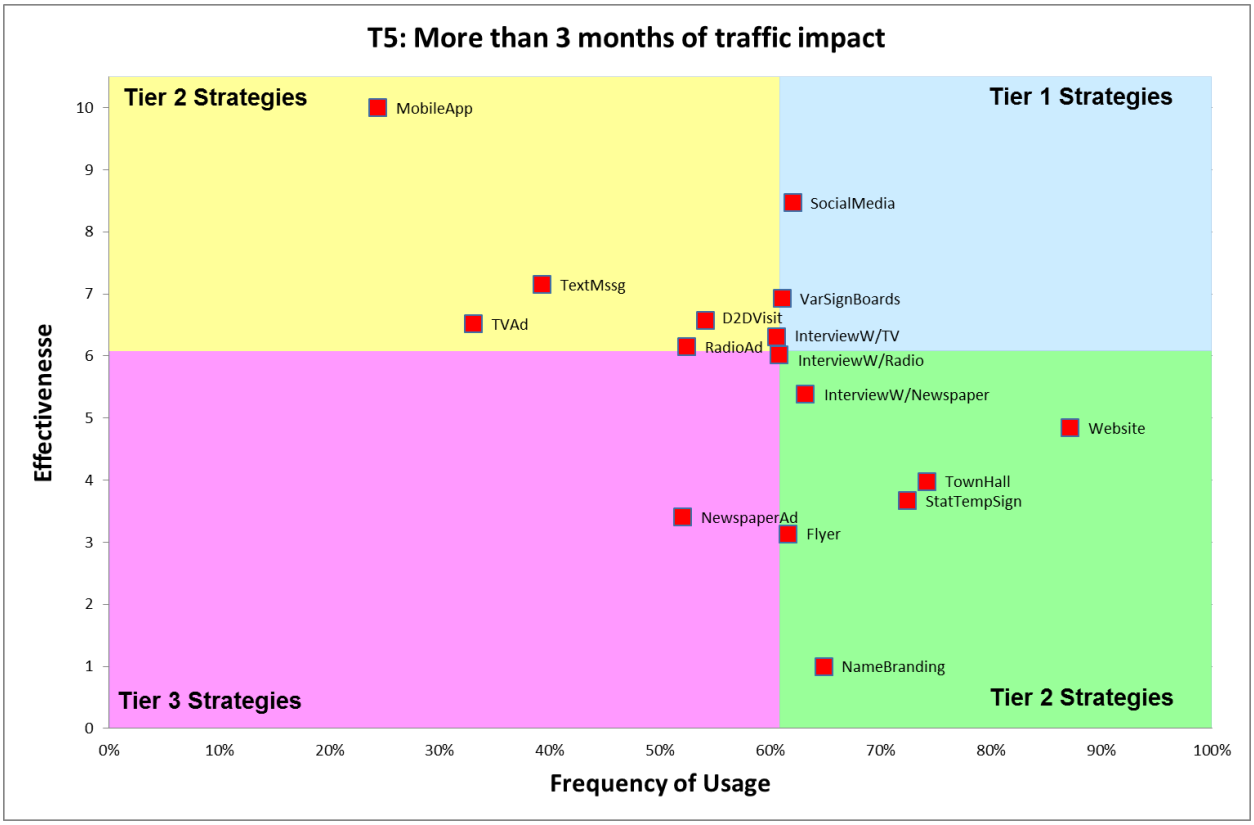
T5: More than 3 months of traffic impact
Tier 2 Strategies
Tier 1 Strategies
Tier 3 Strategies
Tier 2 Strategies
MobileApp
SocialMedia
TextMssg
VarSignBoards
TVAd
D2DVisit
InterviewW/TV
RadioAd
InterviewW/Radio
InterviewW/Newspaper
Website
TownHall
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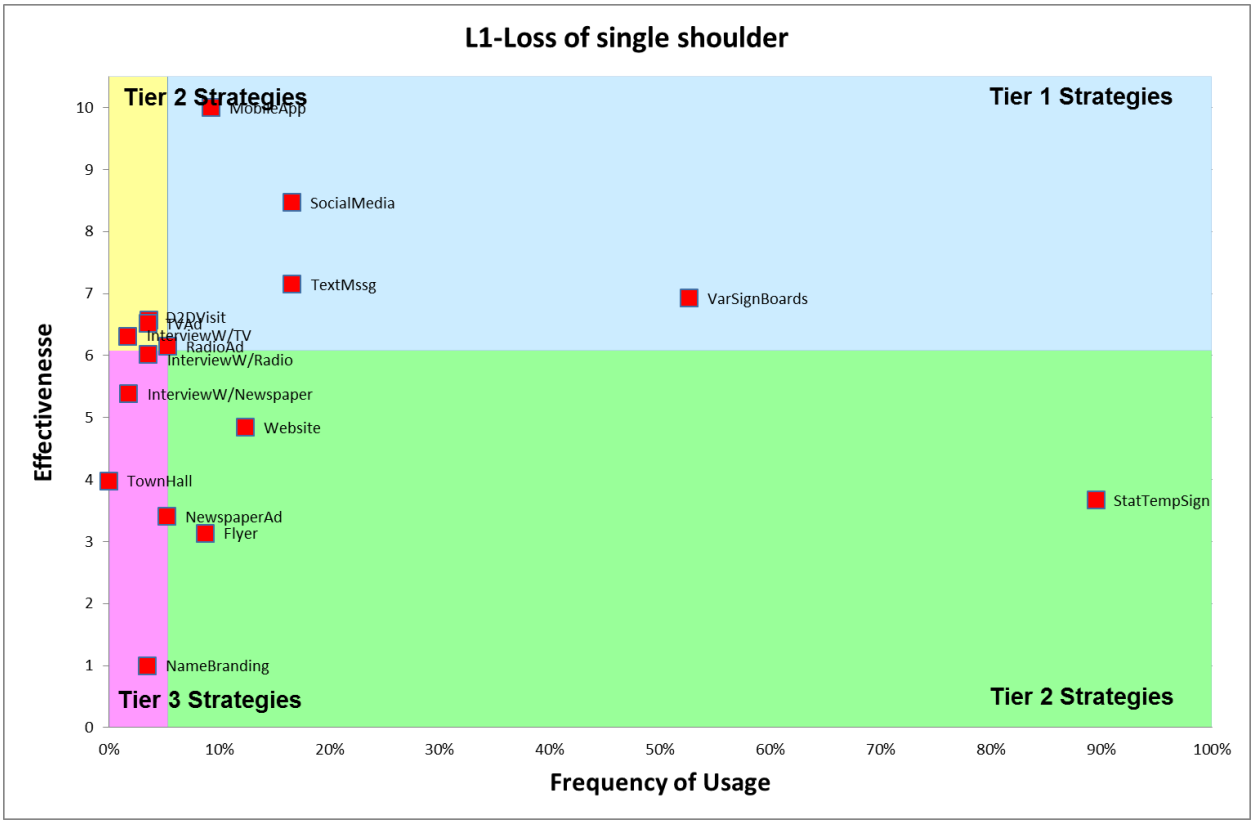
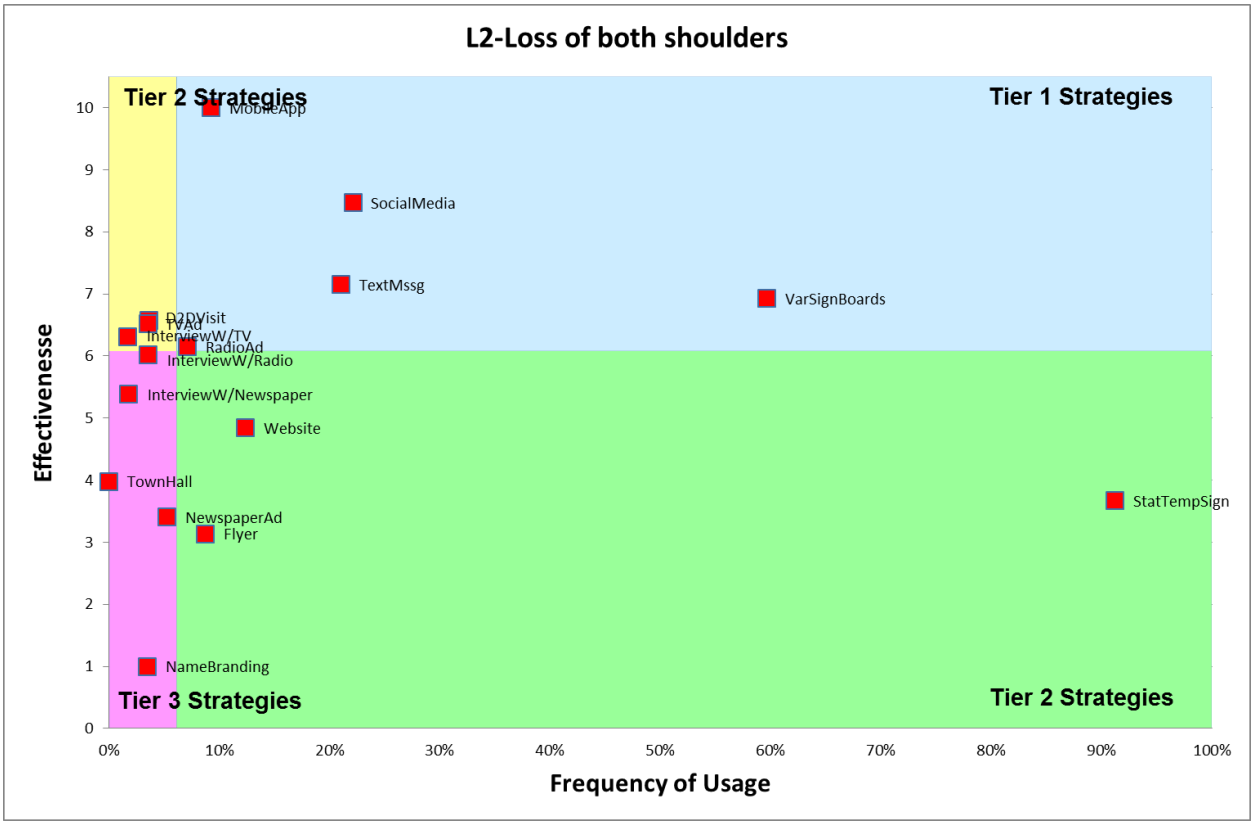
Capacity Loss




L2-Loss of both shoulders
Tier 2 Strategies
Tier 1 Strategies
Tier 3 Strategies
Tier 2 Strategies
MobileApp
SocialMedia
TextMssg
VarSignBoards
D2DVisit
TVAd
InterviewW/TV
RadioAd
InterviewW/Radio
InterviewW/Newspaper
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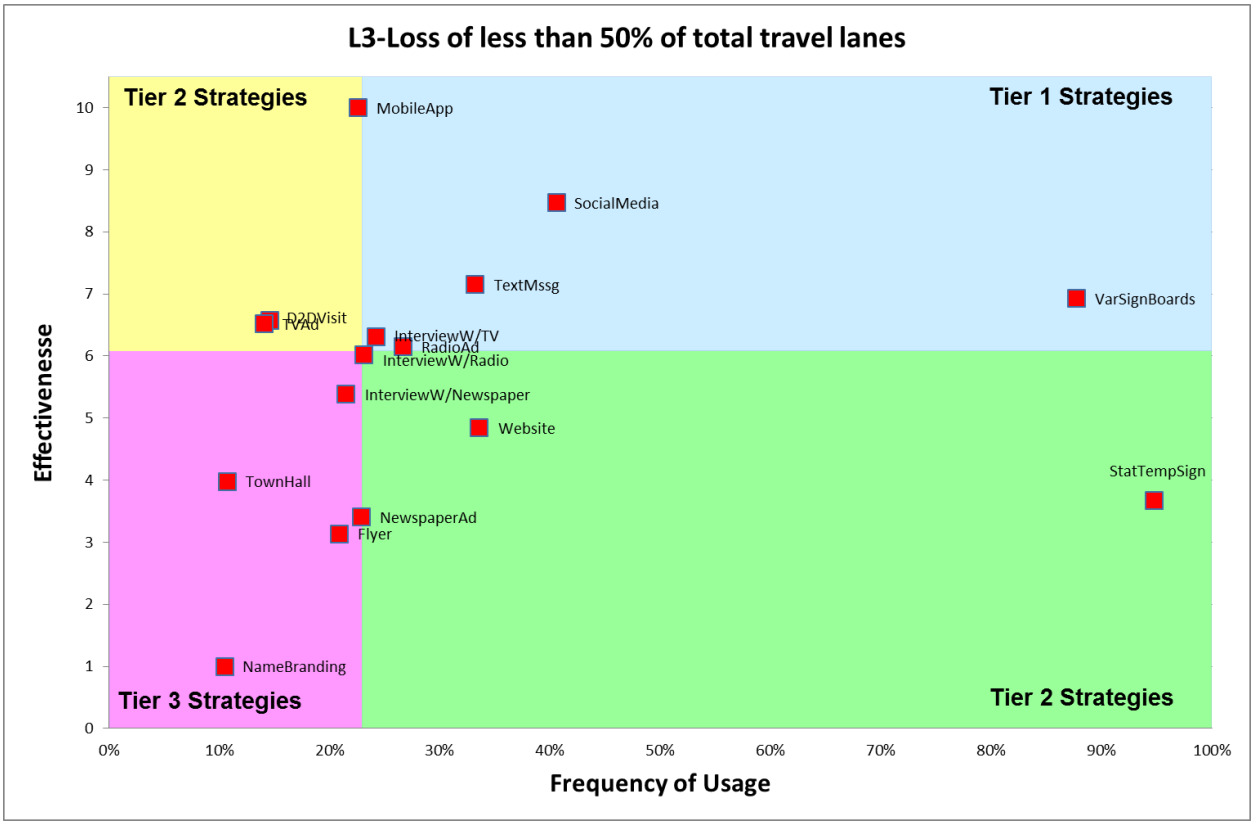
L3-Loss of less than 50% of total travel lanes
Tier 2 Strategies
Tier 1 Strategies
Tier 3 Strategies
Tier 2 Strategies
MobileApp
SocialMedia
TextMssg
VarSignBoards
D2DVisit
TVAd
InterviewW/TV
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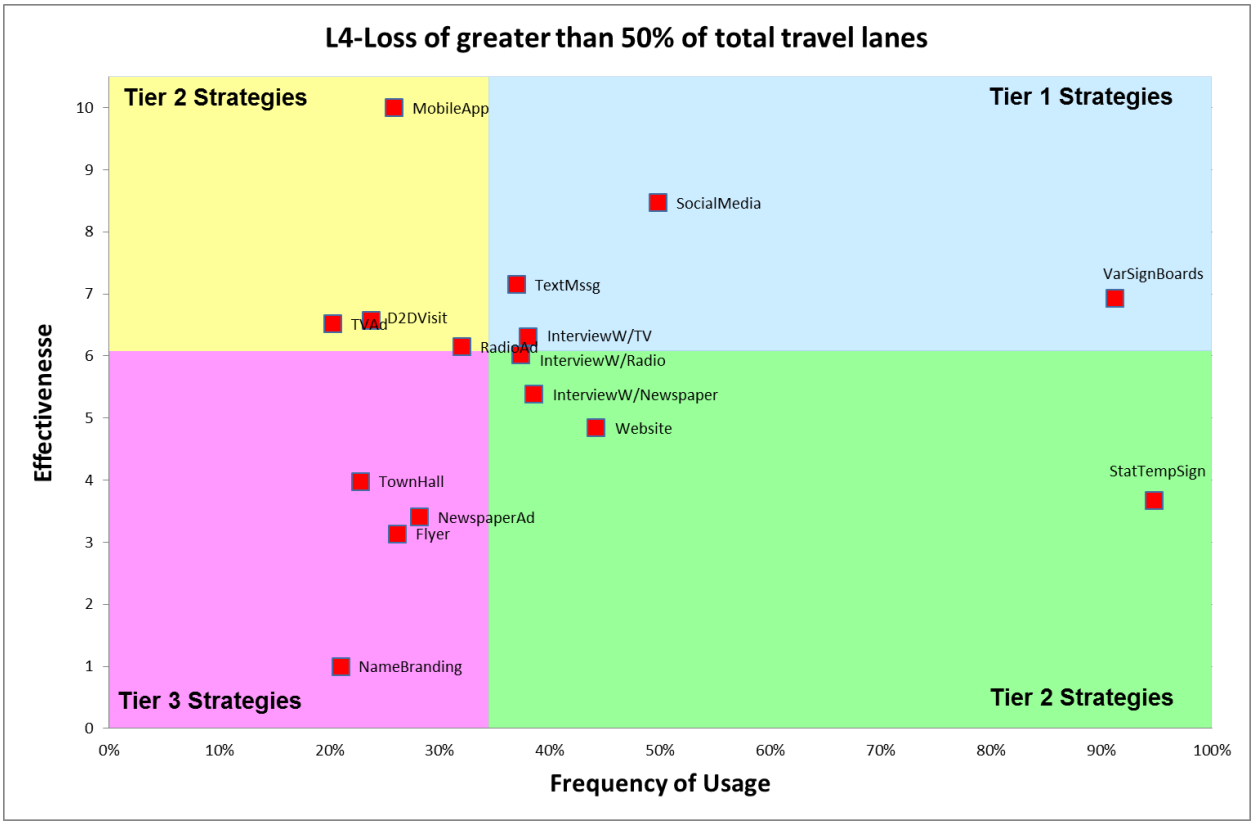
L4-Loss of greater than 50% of total travel lanes
Tier 2 Strategies
Tier 1 Strategies
Tier 3 Strategies
Tier 2 Strategies
MobileApp
SocialMedia
TextMssg
VarSignBoards
TVAd
D2DVisit
InterviewW/TV
RadioAd
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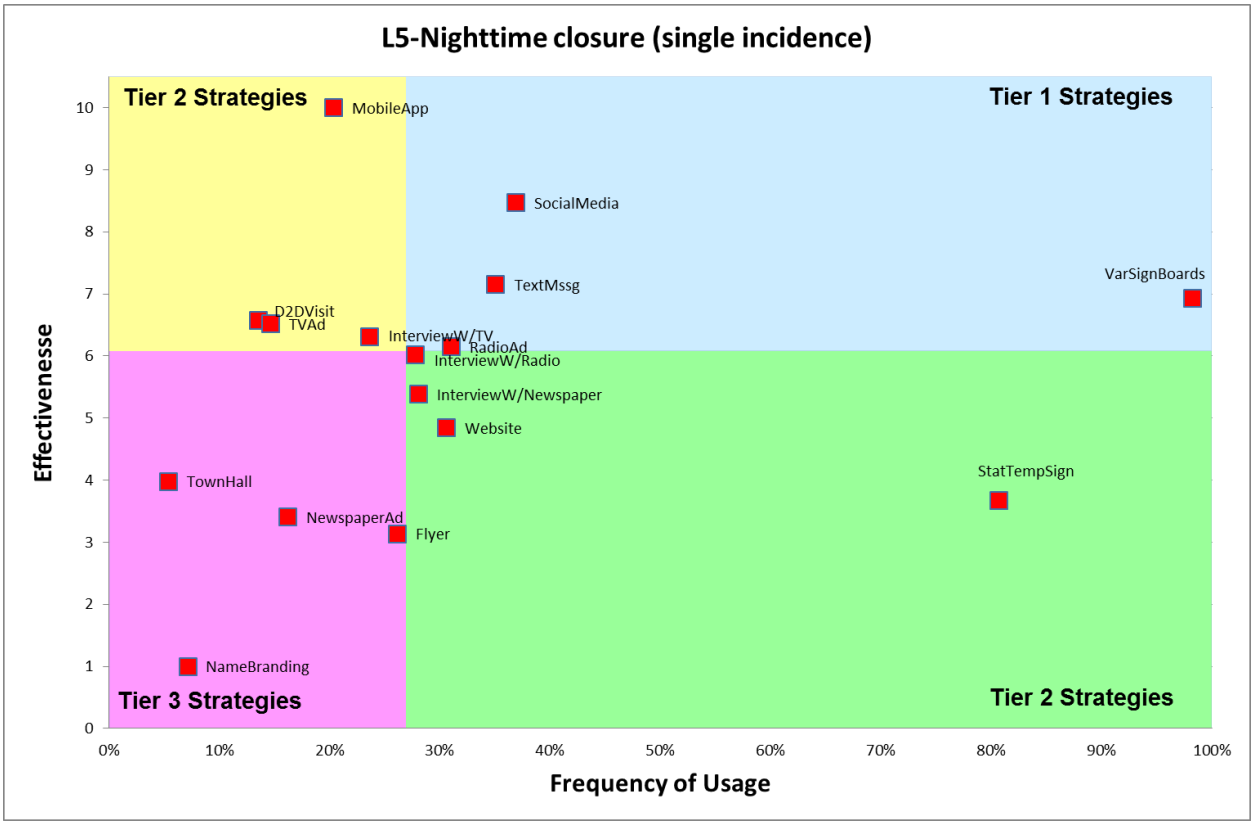
L5-Nighttime closure (single incidence)
Tier 2 Strategies
Tier 1 Strategies
Tier 3 Strategies
Tier 2 Strategies
MobileApp
SocialMedia
TextMssg
VarSignBoards
D2DVisit
TVAd
InterviewW/TV
RadioAd
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InterviewW/Newspaper
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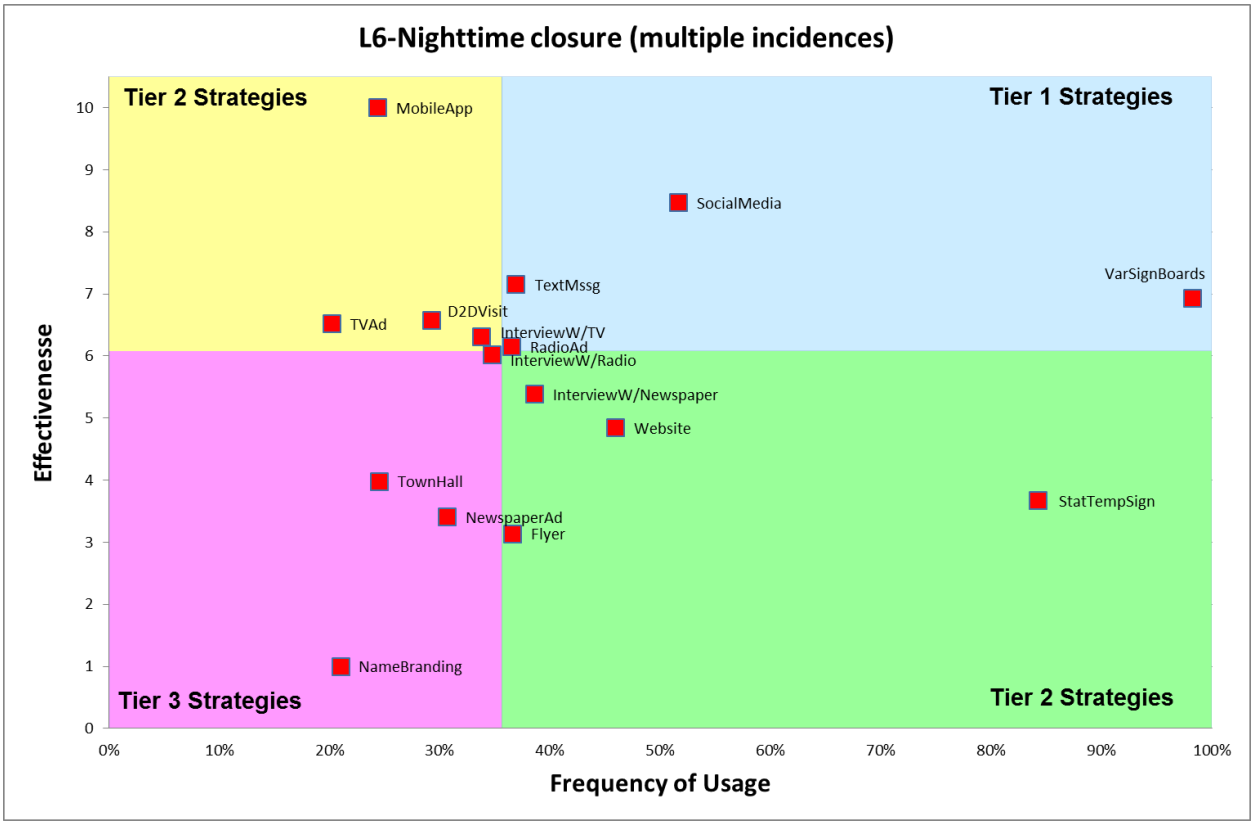
L6-Nighttime closure (multiple incidences)
Tier 2 Strategies
Tier 1 Strategies
Tier 3 Strategies
Tier 2 Strategies
MobileApp
SocialMedia
VarSignBoards
TextMssg
D2DVisit
TVAd
InterviewW/TV
RadioAd
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InterviewW/Newspaper
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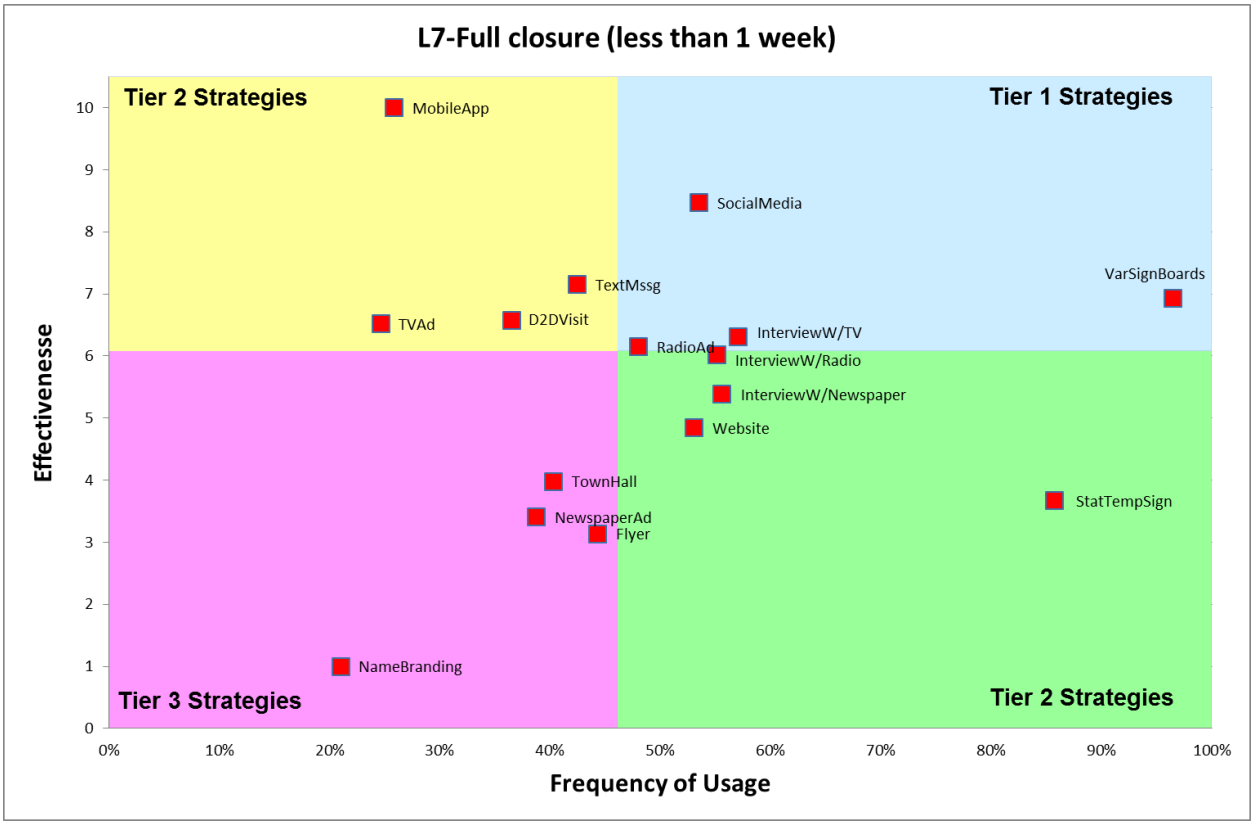
L7-Full closure (less than 1 week)
Tier 2 Strategies
Tier 1 Strategies
Tier 3 Strategies
Tier 2 Strategies
MobileApp
SocialMedia
VarSignBoards
TextMssg
TVAd
D2DVisit
InterviewW/TV
RadioAd
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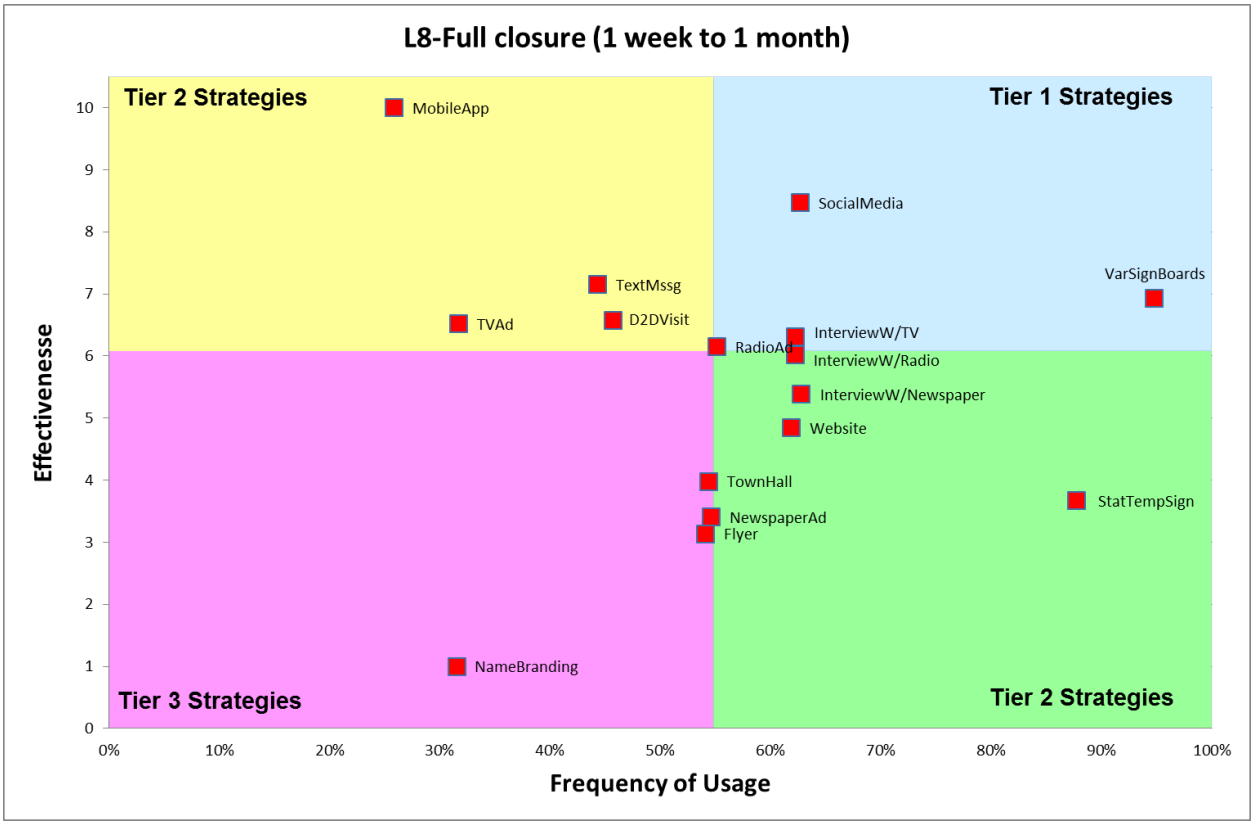
L8-Full closure (1 week to 1 month)
Tier 2 Strategies
Tier 1 Strategies
Tier 3 Strategies
Tier 2 Strategies
MobileApp
SocialMedia
VarSignBoards
TextMssg
TVAd
D2DVisit
InterviewW/TV
RadioAd
InterviewW/Radio
InterviewW/Newspaper
Website
TownHall
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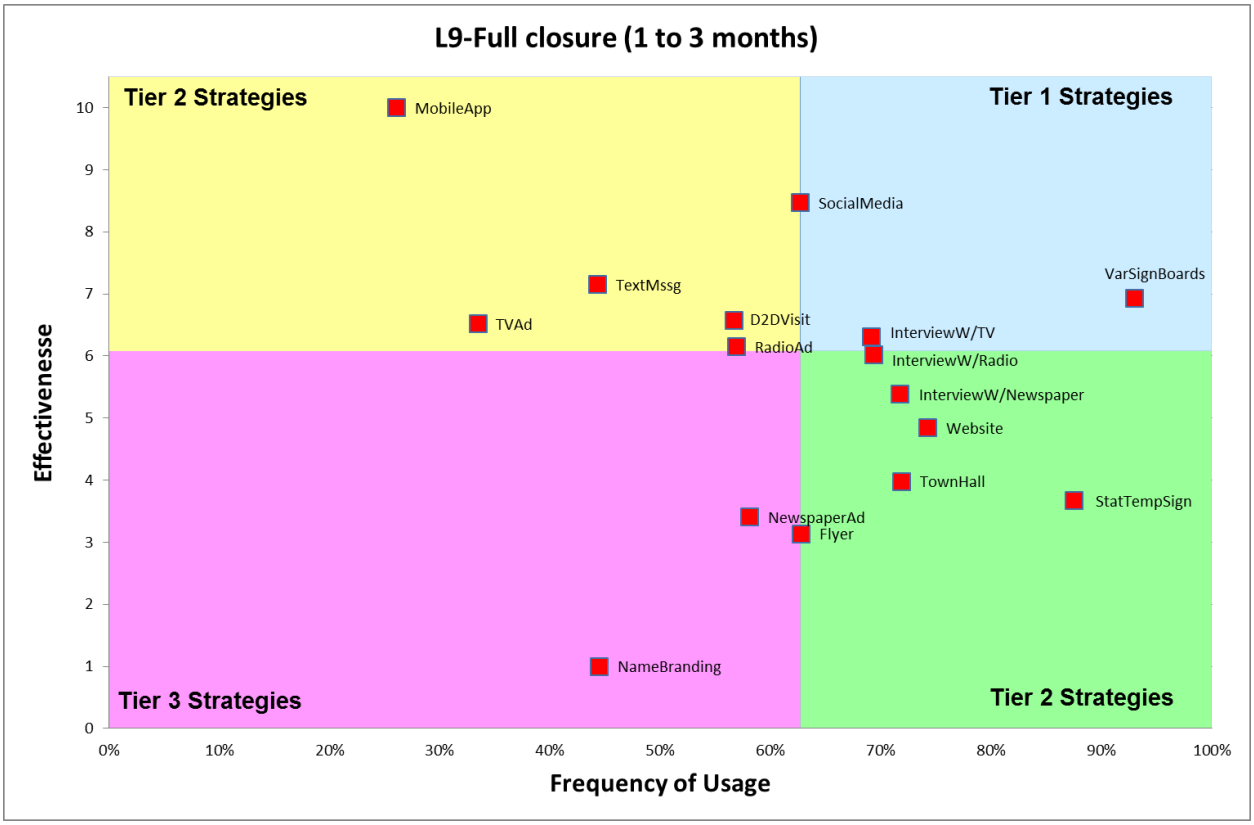
L9-Full closure (1 to 3 months)
Tier 2 Strategies
Tier 1 Strategies
Tier 3 Strategies
Tier 2 Strategies
MobileApp
SocialMedia
VarSignBoards
TextMssg
TVAd
D2DVisit
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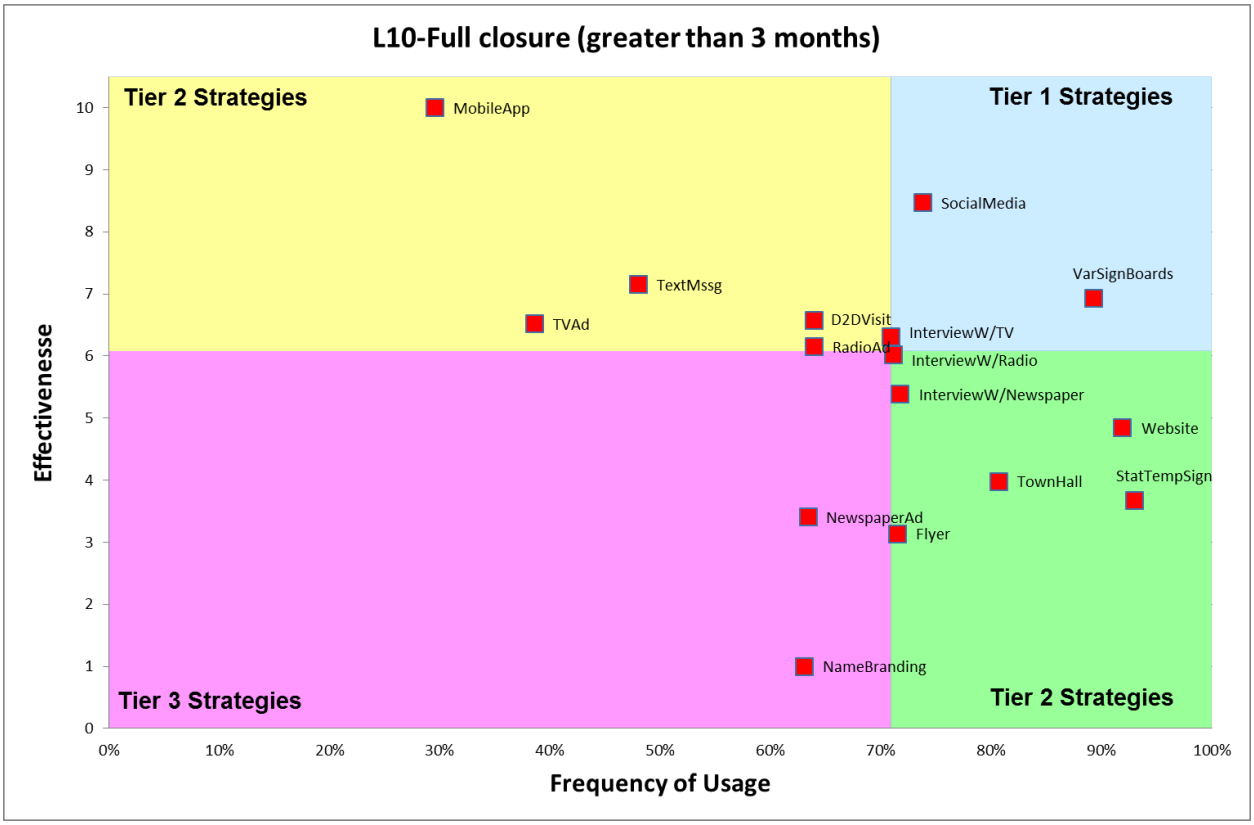
L10-Full closure (greater than 3 months)
Tier 2 Strategies
Tier 1 Strategies
Tier 3 Strategies
Tier 2 Strategies
MobileApp
SocialMedia
VarSignBoards
TextMssg
TVAd
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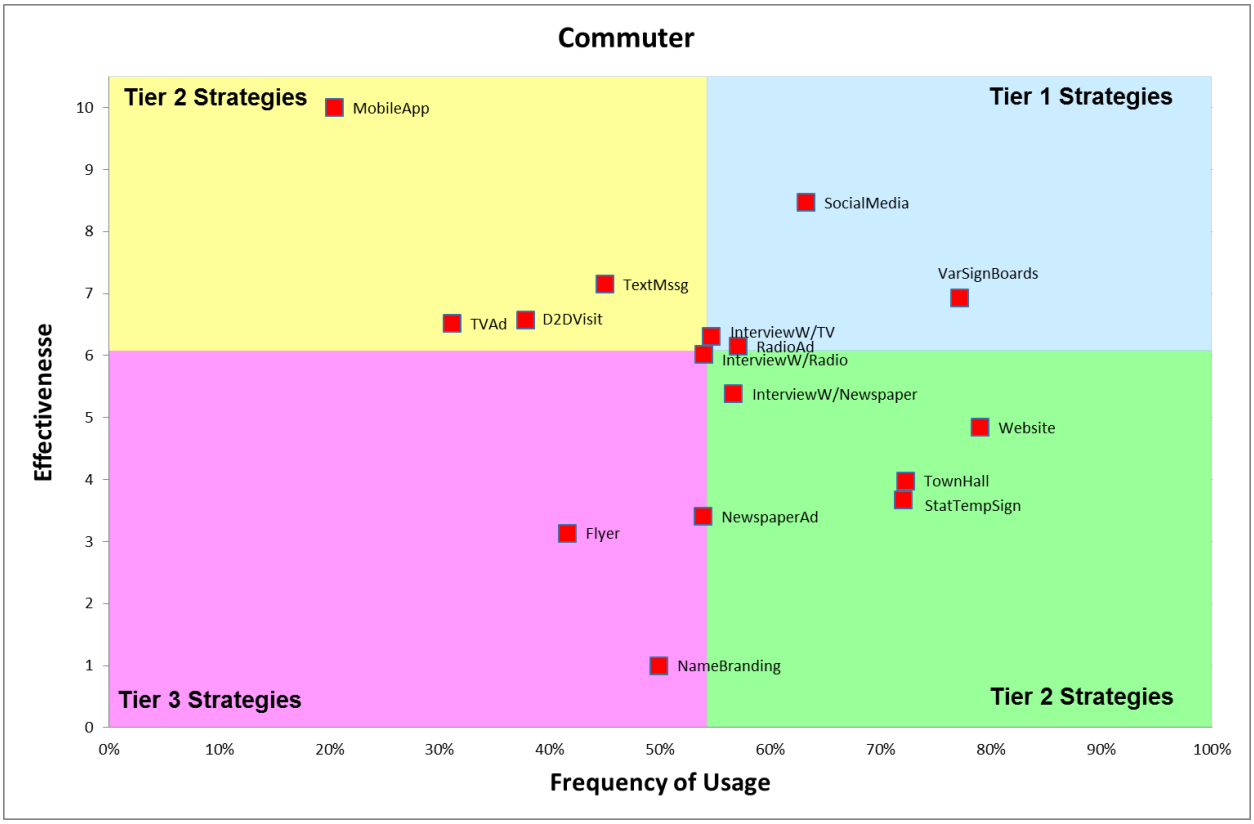
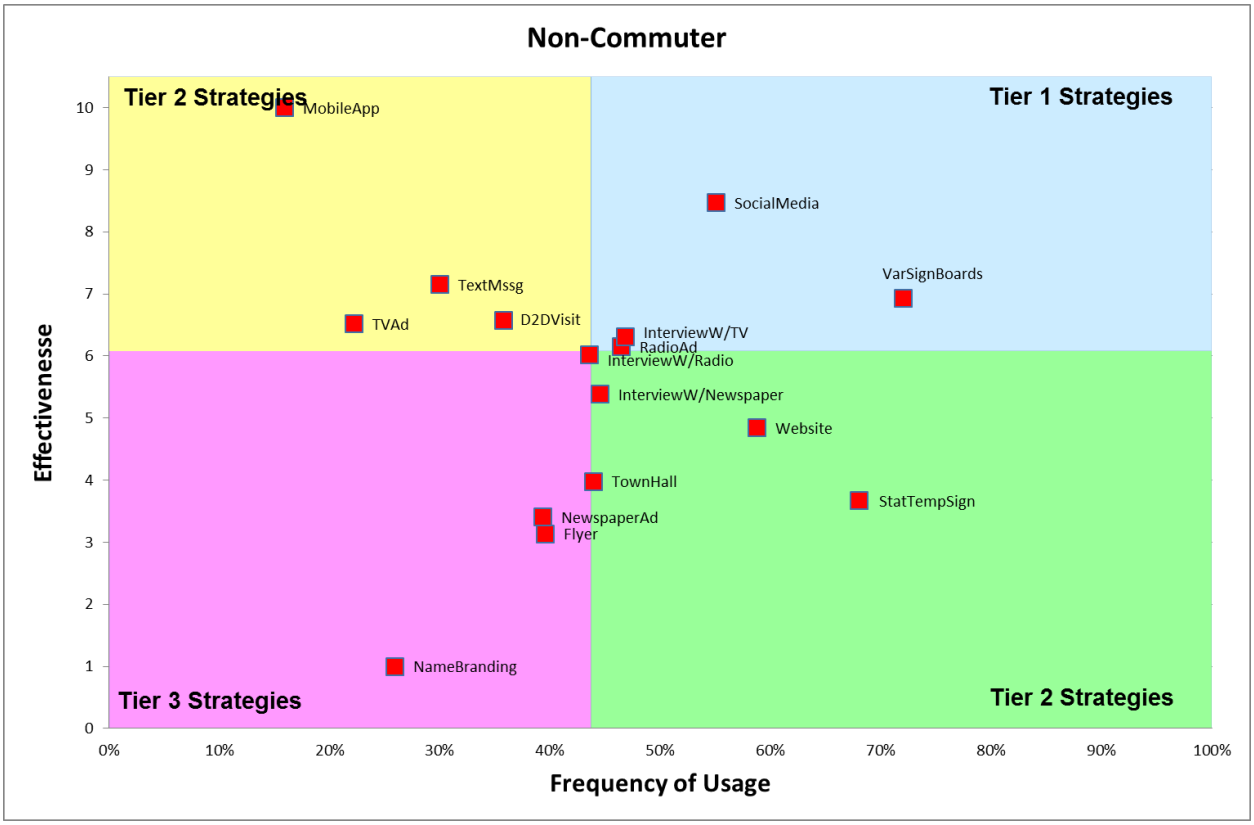
Types of Travelers




Non-Commuter
Tier 2 Strategies
Tier 1 Strategies
Tier 3 Strategies
Tier 2 Strategies
MobileApp
SocialMedia
VarSignBoards
TextMssg
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D2DVisit
InterviewW/TV
RadioAd
InterviewW/Radio
InterviewW/Newspaper
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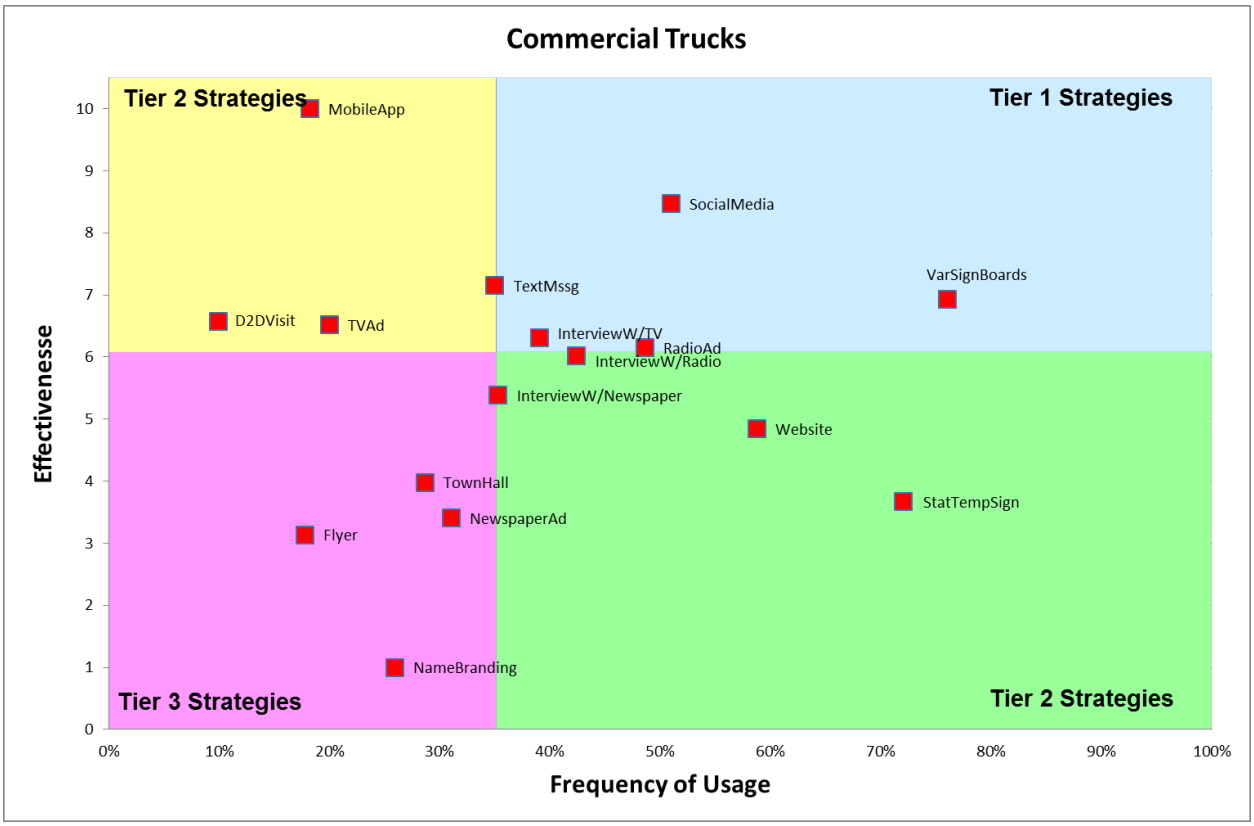
Commercial Trucks
Tier 2 Strategies
Tier 1 Strategies
Tier 3 Strategies
Tier 2 Strategies
MobileApp
SocialMedia
VarSignBoards
TextMssg
D2DVisit
TVAd
InterviewW/TV
RadioAd
InterviewW/Radio
InterviewW/Newspaper
Website
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Appendix C: Survey Questionnaire

Intro

Welcome to the Survey on Community Outreach Best Practices Guide for Accelerated Highway Construction Projects

The primary purpose of this survey is to document what tools are most commonly used on accelerated highway construction projects, when they are the most effective, and to correlate cost with effectiveness.

Given your experience, we need your input! Your input will help characterize the current state of practice for community outreach and can help improve the effectiveness of outreach efforts in the future. We realize that your time is extremely valuable and sincerely appreciate any input that you can provide us.

We anticipate this survey to take you approximately 20-30 minutes. Your participation is voluntary and your responses are confidential. Your responses will not be reported in any manner which can be associated with any specific individual, organization, agency, program, or project.

If you have questions about this study you can contact Farzad Minooei or Paul Goodrum (both of the University of Colorado at Boulder) at farzad.minooei@colorado.edu or paul.goodrum@colorado.edu.This research is sponsored by Federal Highway Administration (FHWA) Transportation Management pooled funds.

Will you voluntarily participate in this survey? Your participation is voluntary and you can opt out of participation at any time. By choosing "Yes" you will be entering the survey. By choosing "No" you will be opting out of the survey.

- Yes
- No

Please enter your name and the organization that you represent.

Name

Organization

INSTRUCTIONS

In the next section you will be presented with a few questions on which tools you have used in the past to communicate with the public during the construction phase of highway projects.

Definitions:
By construction we mean the point in time when the Notice to Proceed is given to the contractor to the point in time is when a Notice of Substantial Completion is issued.

Tools of communication include everything from "Construction Ahead" signs to project specific webpages and Twitter accounts.

Highway construction can be:
- in either urban or rural settings.
- can include all scopes of work ranging from greenfield construction (new construction) to full closure of existing highways.

CARRY FORWARD - TOOL SELECTION

Which of the following community outreach tools does your agency or company currently use for communicating with the public during the construction phase of accelerated highway projects? (*Please check all that apply*)

- Static temporary signage (such as "Construction Ahead" or "Entering a Construction Zone")
- Use of variable sign boards (such as installed electronic signage)
- Name branding for the construction project
- Flyer distribution
- Door to door visits by project personnel
- Town Hall Meetings
- Project specific newspaper advertisements
- Project specific radio advertisements
- Project specific television advertisements
- Planned interviews with newspaper journalists
- Planned interviews with radio news media
- Planned interviews with television news media
- Project specific websites or webpages
- Project specific social media account (such as Facebook and Twitter)
- Text message alerts (recipients must voluntarily sign up for text message service)
- Mobile application
- Other 1 (please describe)
- Other 2 (please describe)
- Other 3 (please describe)

Main Questions

Tools used to communicate with the public during the construction phase of accelerated highway projects can be used to address many goals. In this section of the questionnaire we are attempting to determine which tools address what goals most effectively. In the matrix below, please select which tools you used to address which goals. (*Check all that apply*)

You will be asked about the effectiveness of the tool in addressing individual goals later in the questionnaire.

	Traffic Avoidance (reduced demand)	Increasing Driver Awareness of Potential Hazards (work zone safety)	Decreasing Impatient Driver Behaviors (speeding and road rage)	Building trust with the public (competency, efficiency, innovation)
» Static temporary signage (such as "Construction Ahead" or "Entering a Construction Zone")	☐	☐	☐	☐
» Use of variable sign boards (such as installed electronic signage)	☐	☐	☐	☐
» Name branding for the construction project	☐	☐	☐	☐
» Flyer distribution	☐	☐	☐	☐
» Door to door visits by project personnel	☐	☐	☐	☐
» Town Hall Meetings	☐	☐	☐	☐
» Project specific newspaper advertisements	☐	☐	☐	☐
» Project specific radio advertisements	☐	☐	☐	☐
» Project specific television advertisements	☐	☐	☐	☐
» Planned interviews with newspaper journalists	☐	☐	☐	☐
» Planned interviews with radio news media	☐	☐	☐	☐
» Planned interviews with television news media	☐	☐	☐	☐
» Project specific websites or webpages	☐	☐	☐	☐
» Project specific social media account (such as Facebook and Twitter)	☐	☐	☐	☐
» Text message alerts (recipients must voluntarily sign up for text message service)	☐	☐	☐	☐
» Mobile application	☐	☐	☐	☐
» Other 1 (please describe)	☐	☐	☐	☐
» Other 2 (please describe)	☐	☐	☐	☐
» Other 3 (please describe)	☐	☐	☐	☐

In this question we are attempting to determine how effective each individual tool is at achieving each communication goal. In the matrix below, please tell us how effective each tool is at **reducing traffic demand** in the area of an accelerated highway construction project. (*Choose only one answer per tool*)

	Very Ineffective	Somewhat Ineffective	Neutral	Somewhat Effective	Very Effective
» Static temporary signage (such as "Construction Ahead" or "Entering a Construction Zone")					
» Use of variable sign boards (such as installed electronic signage)					
» Name branding for the construction project					
» Flyer distribution					
» Door to door visits by project personnel					
» Town Hall Meetings					
» Project specific newspaper advertisements					
» Project specific radio advertisements					
» Project specific television advertisements					
» Planned interviews with newspaper journalists					
» Planned interviews with radio news media					
» Planned interviews with television news media					
» Project specific websites or webpages					
» Project specific social media account (such as Facebook and Twitter)					
» Text message alerts (recipients must voluntarily sign up for text message service)					
» Mobile application					
» Other 1 (please describe)					
» Other 2 (please describe)					
» Other 3 (please describe)					

In this question we are attempting to determine how effective each individual tool is at achieving each communication goal. In the matrix below, please tell us how effective each tool is at **increasing driver awareness of potential hazards** in the area of an accelerated highway construction project. (*Choose only one answer per tool*)

	Very Ineffective	Somewhat Ineffective	Neutral	Somewhat Effective	Very Effective
» Static temporary signage (such as "Construction Ahead" or "Entering a Construction Zone")					
» Use of variable sign boards (such as installed electronic signage)					
» Name branding for the construction project					
» Flyer distribution					
» Door to door visits by project personnel					
» Town Hall Meetings					
» Project specific newspaper advertisements					
» Project specific radio advertisements					
» Project specific television advertisements					
» Planned interviews with newspaper journalists					
» Planned interviews with radio news media					
» Planned interviews with television news media					
» Project specific websites or webpages					
» Project specific social media account (such as Facebook and Twitter)					
» Text message alerts (recipients must voluntarily sign up for text message service)					
» Mobile application					
» Other 1 (please describe)					
» Other 2 (please describe)					
» Other 3 (please describe)					

In this question we are attempting to determine how effective each individual tool is at achieving each communication goal. In the matrix below, please tell us how effective each tool is at **decreasing impatient driver behaviors (e.g. speeding or road rage)** in the area of an accelerated highway construction project. (*Choose only one answer per tool*)

	Very Ineffective	Somewhat Ineffective	Neutral	Somewhat Effective	Very Effective
» Static temporary signage (such as "Construction Ahead" or "Entering a Construction Zone")					
» Use of variable sign boards (such as installed electronic signage)					
» Name branding for the construction project					
» Flyer distribution					
» Door to door visits by project personnel					
» Town Hall Meetings					
» Project specific newspaper advertisements					
» Project specific radio advertisements					
» Project specific television advertisements					
» Planned interviews with newspaper journalists					
» Planned interviews with radio news media					
» Planned interviews with television news media					
» Project specific websites or webpages					
» Project specific social media account (such as Facebook and Twitter)					
» Text message alerts (recipients must voluntarily sign up for text message service)					
» Mobile application					
» Other 1 (please describe)					
» Other 2 (please describe)					
» Other 3 (please describe)					

In this question we are attempting to determine how effective each individual tool is at achieving each communication goal. In the matrix below, please tell us how effective each tool is at building **building trust with the public (e,g demonstrating competency, efficiency, or highlight innovative construction methods)** in the area of an accelerated highway construction project. (*Choose only one answer per tool*)

	Very Ineffective	Somewhat Ineffective	Neutral	Somewhat Effective	Very Effective
» Static temporary signage (such as "Construction Ahead" or "Entering a Construction Zone")					
» Use of variable sign boards (such as installed electronic signage)					
» Name branding for the construction project					
» Flyer distribution					
» Door to door visits by project personnel					
» Town Hall Meetings					
» Project specific newspaper advertisements					
» Project specific radio advertisements					
» Project specific television advertisements					
» Planned interviews with newspaper journalists					
» Planned interviews with radio news media					
» Planned interviews with television news media					
» Project specific websites or webpages					
» Project specific social media account (such as Facebook and Twitter)					
» Text message alerts (recipients must voluntarily sign up for text message service)					
» Mobile application					
» Other 1 (please describe)					
» Other 2 (please describe)					
» Other 3 (please describe)					

Accelerated highway construction projects cause a variety of delays. This questionnaire will use the different categories of "mobility impact time" for highway construction projects (after FHWA):

- Tier 1: Traffic Impacts within 1 to 24 hours
- Tier 2: Traffic Impacts within 3 days
- Tier 3: Traffic Impacts within 2 weeks
- Tier 4: Traffic Impacts within 3 months
- Tier 5: Overall project schedule is significantly reduced by months to years

In the matrix below, please select which tools you use to address projects with different traffic impact duration. (*Check all that apply*)

	Tier I: 1 to 24 Hours of Traffic Impact	Tier II: 1 to 3 days of Traffic Impact	Tier III: 4 days to 2 weeks of traffic impact	Tier IV: 2 weeks to 3 months of traffic impact	Tier V: Greater than 3 months of traffic impact
» Static temporary signage (such as "Construction Ahead" or "Entering a Construction Zone")	☐	☐	☐	☐	☐
» Use of variable sign boards (such as installed electronic signage)	☐	☐	☐	☐	☐
» Name branding for the construction project	☐	☐	☐	☐	☐
» Flyer distribution	☐	☐	☐	☐	☐
» Door to door visits by project personnel	☐	☐	☐	☐	☐
» Town Hall Meetings	☐	☐	☐	☐	☐
» Project specific newspaper advertisements	☐	☐	☐	☐	☐
» Project specific radio advertisements	☐	☐	☐	☐	☐
» Project specific television advertisements	☐	☐	☐	☐	☐
» Planned interviews with newspaper journalists	☐	☐	☐	☐	☐
» Planned interviews with radio news media	☐	☐	☐	☐	☐
» Planned interviews with television news media	☐	☐	☐	☐	☐
» Project specific websites or webpages	☐	☐	☐	☐	☐
» Project specific social media account (such as Facebook and Twitter)	☐	☐	☐	☐	☐
» Text message alerts (recipients must voluntarily sign up for text message service)	☐	☐	☐	☐	☐
» Mobile application	☐	☐	☐	☐	☐
» Other 1 (please describe)	☐	☐	☐	☐	☐
» Other 2 (please describe)	☐	☐	☐	☐	☐
» Other 3 (please describe)	☐	☐	☐	☐	☐

Accelerated highway construction projects cause a variety of clousures. This questionnaire will use the following levels of highway closure as measurements:

- Loss of single shoulder
- Loss of both shoulders
- Loss of less than 50% of total travel lanes (typically 1 lane)
- Loss of more than 50% of total travel lanes (typically 2-3 lanes)
- Nighttime closure (single incidence)
- Nighttime closures (multiple incidences)
- Full closure (less than one week duration)
- Full closure (1 week to 1 month duration)
- Full closure (1 to 3 month duration)
- Full closure (greater than 3 month duration)

In the matrix below, please select which tools you use to address projects with different levels of capacity loss or closure. (*Check all that apply*)

	Loss of single shoulder	Loss of both shoulders	Loss of 50% or less of total travel lanes	Loss of greater than 50% of total travel lanes	Nighttime closure (single incidence)	Nighttime closure (multiple incidences)	Full closure (less than 1 week)	Full closure (1 week to 1 month)	Full closure (1 to 3 months)	Full closure (greater than 3 months)
» Static temporary signage (such as "Construction Ahead" or "Entering a Construction Zone")	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Use of variable sign boards (such as installed electronic signage)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Name branding for the construction project	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Flyer distribution	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Door to door visits by project personnel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Town Hall Meetings	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Project specific newspaper advertisements	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Project specific radio advertisements	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Project specific television advertisements	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Planned interviews with newspaper journalists	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Planned interviews with radio news media	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Planned interviews with television news media	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Project specific websites or webpages	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Project specific social media account (such as Facebook and Twitter)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Text message alerts (recipients must voluntarily sign up for text message service)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Mobile application	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Other 1 (please describe)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Other 2 (please describe)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
» Other 3 (please describe)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Does your organization consider geographic and demographic characteristics when considering which outreach tool to use? (*Please only choose only one response*)

- ○ YES
- ○ NO

Which elements of population demographics do you consider when choosing the proper outreach tool? (*Check all that apply*)

- Urban/Rural Area
- Age
- Disability
- Education
- Language
- Race/Ethnicity
- Other 1 (please describe)
- Other 2 (please describe)

Communication tool corresponds with different geographic/demographic characteristics during accelerated highway construction projects. In the matrix below, please select if tool is affected by each geographic/demographic category. (*Check all that apply*)

	» Urban/Rural Area	» Age	» Disability	» Education	» Language	» Race/Ethnicity	» Other 1 (please describe)	» Other 2 (please describe)
» Static temporary signage (such as "Construction Ahead" or "Entering a Construction Zone")								
» Use of variable sign boards (such as installed electronic signage)								
» Name branding for the construction project								
» Flyer distribution								
» Door to door visits by project personnel								
» Town Hall Meetings								
» Project specific newspaper advertisements								
» Project specific radio advertisements								
» Project specific television advertisements								
» Planned interviews with newspaper journalists								
» Planned interviews with radio news media								
» Planned interviews with television news media								
» Project specific websites or webpages								
» Project specific social media account (such as Facebook and Twitter)								
» Text message alerts (recipients must voluntarily sign up for text message service)								
» Mobile application								
» Other 1 (please describe)								
» Other 2 (please describe)								
» Other 3 (please describe)								

Does your organization consider types of travelers (commuters, non-commuters, and commercial trucks) when considering which outreach tool to use? (*Please only choose only one response*)

- Yes
- No

In the matrix below, please select if tool is affected by each travelers' type. (*Check all that apply*)

	Commuters	Non-Commuters	Commercial Trucks
» Static temporary signage (such as "Construction Ahead" or "Entering a Construction Zone")			
» Use of variable sign boards (such as installed electronic signage)			
» Name branding for the construction project			
» Flyer distribution			
» Door to door visits by project personnel			
» Town Hall Meetings			
» Project specific newspaper advertisements			
» Project specific radio advertisements			
» Project specific television advertisements			
» Planned interviews with newspaper journalists			
» Planned interviews with radio news media			
» Planned interviews with television news media			
» Project specific websites or webpages			
» Project specific social media account (such as Facebook and Twitter)			
» Text message alerts (recipients must voluntarily sign up for text message service)			
» Mobile application			
» Other 1 (please describe)			
» Other 2 (please describe)			
» Other 3 (please describe)			

RESPONDENT DEMOGRAPHICS

What description best describes the type of organization you work for?

- Federal Transportation Agency
- State Transportation Agency (State DOT)
- Regional Transportation Agency (MPO)
- Municipal Transportation Agency
- Private contractor/consultant
- Other (please explain)

In what state is your organization (e.g. Texas, California, Nebraska, etc.)?

Note: Individual results will not be reported by state. We are only interested in the geographic coverage of responses from this survey.

How many accelerated highway construction projects have you participated in, worked with, or overseen the communications aspects of?

How many years of experience do you have with communications/public outreach on highway projects?

Would you be willing to be contacted in for a follow-up interview about your responses to the questions posed? (*Please only choose only one response*)

- Yes
- No

Please enter the preferred point of contact for you (email address, phone number, or both)

Note: The contact information that you provide is confidential and will not be shared with anyone. At the conclusion of this study it will be deleted permanently.

END

Your participation in this study is complete! Thank you very much for participating.
We realize that your time is valuable! Your participation is sincerely appreciated!

Please press next to submit your answers.