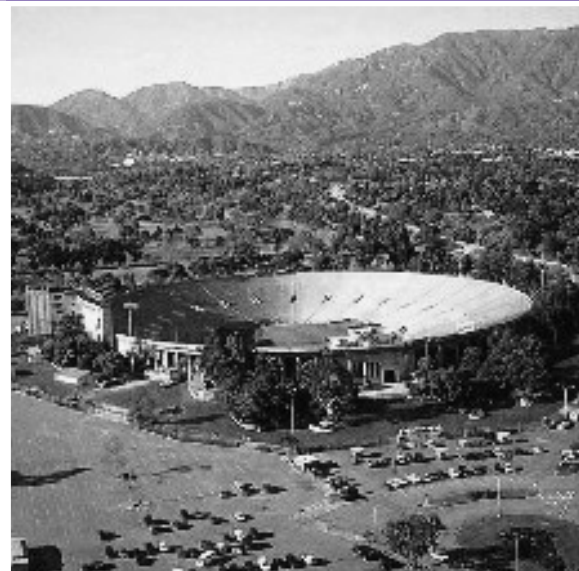


Intelligent Transportation Systems for Planned Special Events:

A CROSS-CUTTING STUDY



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Foreword

Dear Reader:

We are committed to providing our state and local partners the knowledge they need to lead their communities into the future. We scanned the country to bring together the collective wisdom and expertise of transportation professionals implementing Intelligent Transportation Systems (ITS) projects across the United States.

This document is one in a series of products designed to help you provide ITS solutions that meet your local and regional transportation needs. This information will prove helpful to you as you set out to plan, design, and deploy ITS in your communities.

- **Benefits Brochures** let experienced community leaders explain in their own words how specific ITS technologies have benefited their areas.
- **Cross-Cutting Studies** examine various ITS approaches that can be used to meet your community's goals.
- **Case Studies** provide in-depth coverage of specific approaches being taken in communities across the United States.
- **Implementation Guides** serve as "how to" manuals to assist your project staff in the technical details of implementing ITS.

The inside back cover contains details on the documents in this series, as well as sources to obtain additional information. We hope you find these documents useful tools for making important transportation investment decisions.

Sincerely,



Shelley Row, P.E., PTOE
Director
ITS Joint Program Office



Jeffrey Lindley, Associate Administrator for
Operations
Federal Highway Administration

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- Rose Bowl Stadium: City of Pasadena Department of Transportation
- Dynamic message sign: City of Pasadena Department of Transportation
- Crowded street scene: iStockphoto International, Inc.

Figures 1, 2, and 3: Montgomery County Department of Public Works and Transportation

Figures 4 and 5: Boston Transportation Department

Figures 6 and 7: City of Anaheim Traffic and Transportation Division

Figures 8, 9, and 10: City of Pasadena Department of Transportation

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Executive Summary

Agencies across the country must contend with the transportation implications of hosting planned special events. Events can be large or small; they can be scheduled only once or repeat on a regular basis. All planned special events present challenges to host communities. ITS, which include equipment to sense current traffic conditions, to control traffic flow and to inform travelers of what to expect, as well as centers to bring all these functions together, can help agencies meet these challenges.

This cross-cutting study examines how six agencies in five states used and continue to use ITS to reduce congestion generated by planned special events, thereby reducing crashes, increasing travel time reliability, and reducing driver frustration.

Six locations were selected for in-depth examination in this cross-cutting study:

- Montgomery County, Maryland
- Boston, Massachusetts
- Anaheim, California
- Pasadena, California
- Daytona Beach, Florida
- Dutchess County, New York.

Overall, the transportation officials interviewed found that the use of ITS helps to ease the congestion and frustration that accompany many planned special events. ITS benefit all types of agencies that host planned special events in all types of locations from large urban areas that host many events throughout the year, to small rural areas that host only one or two events annually. Transportation officials in localities around the country have recognized the important role ITS technologies play in the success of their planned special events. Many of these individuals also recognize that without those technologies, efficiently managing the transportation needs of both event attendees and local citizens would be a much more challenging proposition.

The use of ITS technologies themselves can, however, offer challenges. Many systems use sophisticated communications or networking applications that require operator training prior to deployment. Systems that are newly acquired by a locality may also experience glitches or difficulties associated with initial deployment that require maintenance or remediation from the manufacturer. Other technologies or systems, while potentially effective, are cost-prohibitive for smaller communities and rural areas with more limited budgets. In addition, local factors can have a significant impact on the usefulness of a technology solution. For example, an event with significant use of radio frequency (RF) bandwidths at the event venue may make wireless communication with equipment via cellular phone difficult or impossible.

Executive Summary

All agency staff interviewed, however, agreed that the benefits of a technology that is effective and robust clearly outweigh the initial challenges of finding and deploying the right solution.

The following are lessons learned derived from the six study sites about the use of ITS technologies for managing traffic during planned special events. These lessons are divided into three categories, corresponding to phases in planned special event management: event planning and coordination, day of event, and after-action/post-event.

Event Planning and Coordination

- Hold regular coordination meetings in advance among stakeholders.
- Understand that each agency operates in a manner that is consistent with its own goals and operational concepts.
- When planning for a regularly held event, have a fluid plan and be open to change.
- Coordinate with construction programs at the state, county, and local levels to ensure that there are no planned construction projects scheduled to occur on the day of event.
- When planning, remember the needs of local citizens as well as event attendees.
- When developing a traffic plan, consider establishing detours for commercial vehicles and other non-event-related vehicles around the area of the event venue.
- Put portable dynamic message (DMSs) signs in place several days prior to the start of a planned special event to inform motorists of the event and give them sufficient time to find and become familiar with alternate routes.
- Test equipment thoroughly before the day of event.

Day of Event

- While the event is actually underway and plans are being executed, have the same core members of the planning group available to modify the plan as necessary.
- Use the local media to publicize special events and advise the population of the region about alternate routes and diversions.
- Have agency staff or field technicians conduct on-site observations during large special events.
- Use state or regional motorist assistance vehicles to patrol the roadways around events, borrowing from other agencies if necessary.

After-Action/Post-Event

- Develop an after-action review of each special event, both to identify shortcomings as well as to determine what works well so successful practices can be expanded or repeated for other events.

Introduction

Thousands of planned special events occur throughout the United States on any given day. Planned special events embrace a multitude of activities across a very broad range of geographic areas, including both urban and rural environments. Planned special events can take the form of major one-time events, such as a political party's national convention, the Olympic Games, or the Super Bowl. However, many planned special events occur on a cyclical basis, such as football games, National Association for Stock Car Auto Racing (NASCAR) races, and the annual Rose Parade in Pasadena, California. Both football games and NASCAR races represent major cyclical events that occur in a variety of cities and rural areas around the country where intense periods of attendee arrival and departure often overwhelm the local street system. Regardless of the size, type, or location of the planned special event, the accompanying roadways, transit systems, and parking lots must be capable of handling the increase in traffic volume that typically accompanies these events. One way to improve the efficiency of available roadways and parking facilities is through the use of ITS technologies.

ITS are defined as the integrated application of advanced sensor, computer, electronics, and communications technologies and management strategies to increase the safety and efficiency of the surface transportation system.¹ By consistently integrating different system components and technologies, the benefits of increased mobility can be achieved. ITS can be applied in a variety of environments—rural and urban, freeway and arterial—through the use of interconnected traffic signals, area-wide traveler information services, and other technologies and systems. A key aspect of ITS is that these technologies will provide a core communications network, transportation system monitoring, and advanced information processing capabilities that can act as a foundation for the coordinated operation of the transportation system. These key elements make ITS potentially a powerful tool for localities that host planned special events.

Many urban planned special event venues are host to multiple large and small events throughout the year; most larger urban areas have venues that fall into this category. New York City and Los Angeles host around 5,000 planned special events annually while Philadelphia, with a smaller regional population, hosts 4,500 planned special events annually.² Traffic movements associated with annual parades, sports complexes, vibrant downtown areas, and ethnic and neighborhood celebrations often blend in with the normal congestion that typically occurs in populous areas on a day-to-day basis. Cities with thousands of planned special events have adapted to the additional traffic and trip patterns associated with these events.

¹ Meyer, M. (1997). *A Toolbox For Alleviating Traffic Congestion And Enhancing Mobility*.

² Radow, L. (July 11, 2005). *Managing Travel for Planned Special Events*. Presentation to the Transportation Research Board (TRB) 2005 Summer Conference, Boston, Massachusetts, July 10-12, 2005.

Introduction

Some urban areas, however, have taken a more proactive approach in the direction and control of planned special event-generated trip patterns. Montgomery County, Maryland—a densely populated suburb of Washington, DC—and Boston, Massachusetts are implementing advanced signal systems and arterial surveillance to improve monitoring and control capabilities. Areas with less developed local infrastructure that host less frequent events, such as Daytona Beach, Florida, and Dutchess County, New York, have historically relied on interagency cooperation and relationships with neighboring localities and state agencies to access additional personnel and equipment to manage the large influx of visitors for planned special events.

Throughout the duration of any planned special event, one of the primary goals of transportation agencies is to reduce the amount of travel time for motorists to and from the event. In addition, agencies must minimize the disruption of traffic flow for local motorists who may be passing through the same area or using the same roadways. To this end, many agencies have developed innovative methods and technologies to help improve planned special event traffic management, including making use of the ITS already installed to manage daily operations and incidents. In addition, the efficiency and effectiveness of traffic operations during planned special events has been shown to be significantly improved by communication and coordination among participating agencies and event stakeholders.

Site Study Descriptions

The planned special event operations of six locations in five states are profiled in this section. These sites represent the wide range of size and scope of planned special events (e.g., large vs. small, one-time vs. cyclical, etc.). Specifically, each site represents at least one of the following characteristics:

- Large urban or suburban areas with thousands of planned events each year involving crowd sizes in excess of a million
- Small urban or suburban areas with hundreds of planned events each year involving crowd sizes in the hundreds of thousands
- Non-urban areas with up to a hundred planned events each year, but with less developed infrastructure
- Rural areas with limited numbers of planned special events and less developed infrastructure.

Transportation officials from prospective jurisdictions were interviewed and literature reviews conducted to determine which locations in the United States fit the criteria listed above. The following six sites were selected:

- Montgomery County, Maryland
- Boston, Massachusetts
- Anaheim, California
- Pasadena, California
- Daytona Beach, Florida
- Dutchess County, New York.

The site studies are presented in the following sections. The sections are organized in descending order by population size of the sites studied, progressing from large urban through small urban or non-urban areas, and concluding with a rural site.

Montgomery County, Maryland is a part of the Washington, DC metropolitan area. The county has a population of just under 1 million,³ many of whom take to the roads to attend local county events or travel to nearby counties or jurisdictions to participate in regional events. The county itself hosts a range of special events each year, including large-scale golf tournaments such as the Kemper Open, the FBR Open, the U.S. Open, and the annual AT&T National Tournament, an event hosted by Tiger Woods that has drawn crowds in excess of 100,000.⁴ The county is also home to a variety of other traffic-generating events such as the annual Montgomery County Agricultural Fair, the county's Ramadan festival, the Pike's Peek foot

³ U.S. Census Bureau Website (2008). <http://www.census.gov>.

⁴ Boswell, T. (July 8, 2007). "Golf Has Never Looked So Much Like Us." The Washington Post. <http://www.washingtonpost.com/wp-dyn/content/article/2007/07/07/AR2007070701243.html>.

Montgomery County, Maryland

Site Study Descriptions

Approach

race, and multiple 4th of July celebrations held simultaneously in different areas of the county. The Montgomery County Department of Public Works and Transportation (DPWT) manages traffic operations throughout the county and has a long history of special event management using ITS.

Montgomery County's goal for planned special events management is to provide for safe, convenient access to and from events while also providing an acceptable level of service for other transportation system users. To achieve this goal, the county uses an advanced traffic management system, the hub of which is the county's traffic management center (TMC), shown in Figure 1.



Figure 1. Montgomery County's Traffic Management Center

The TMC is the central location for monitoring and controlling traffic and sharing information about transportation conditions in and around special events. As part of the public safety communications center, the TMC enables representatives from police, fire, 9-1-1, and the emergency operations center to be co-located at the facility. Planned special events are operated out of the TMC, which also oversees central communications for Ride-On, Montgomery County's transit service. Periodically, the command center functions for a special event will be moved to a satellite location where ITS equipment within the event's vicinity are remotely monitored and controlled, leaving the TMC to manage the rest of the county's transportation system. ITS technologies that are used for operations management at the TMC include:

- **Portable dynamic message signs.** These portable signs are deployed to strategic locations on arterial and local roads in advance of a special event. Figure 2 shows one of the signs in use during a planned special event in Montgomery County. Messages are pre-programmed, but may be changed in real time as conditions warrant. The signs may be moved to different locations as needed during an event, an advantage over permanent dynamic message signs.



Figure 2. Portable Dynamic Message Sign Redirecting Event Attendees to Available Parking

- **Traffic surveillance cameras.** Cameras are used to monitor traffic flow in and around the event area, and are provided to the public on the Internet and cable TV during the event. The county currently has 185 cameras in place, but hopes eventually to acquire a total of 220 to 250, although available funding limits the deployment to about ten new cameras per year. While not all cameras are located near event venues, many are placed so that roads affected by event traffic can be monitored and, if necessary, controlled.
- **Computerized traffic signal system.** DPWT staff use this system extensively in special event operations to accommodate unusual traffic demands at local intersections and corridors. Transportation management technicians in the county's TMC or at a remote command post actively make timing plan changes as conditions change.
- **Vehicle detection systems.** When these systems are operated within a special event area, they provide the TMC with insights into traffic

Site Study Descriptions

Montgomery County leverages two particular congestion-fighting tools that are unusual in planned special event operations: the county's aerial surveillance aircraft and the motorist assistance patrol, which operates on major arterial roads rather than the freeways.

flow. The computerized signal system is capable of responding to inputs from the detection system and modifying signal timing to alleviate congestion.

- **Regional Integrated Transportation Information System (RITIS).** The RITIS collects, consolidates, and disseminates TMC data from Virginia, Maryland, and the District of Columbia. This information is available to public agencies and to the traveling public, enabling all parties to learn about incidents or other transportation issues that may affect trips in the area of planned special events and react accordingly.
- **Alert paging system.** This paging system works with the Maryland State Police and the Maryland Department of Transportation's (MDOT) Coordinated Highways Action Response Team (CHART) system. CHART is a joint effort of MDOT, the Maryland Transportation Authority (an independent agency responsible for managing and operating the state's toll facilities), and the Maryland State Police, in cooperation with other federal, state, and local agencies. CHART's mission is to improve real-time operation of Maryland's highway system through teamwork and technology.

The county is currently completing the design for a new \$30 million distributed signal system to replace its centralized 1970s-era system. The county, which will begin construction on the new system in 2008, expects that the new system will help with incident management at planned special events. In addition to traffic signal prioritization for emergency vehicles and buses, the new construction will involve building servers and networks, developing a new telecommunications plan, and eventually transferring all the old traffic signals to the new system. This new, state-of-the-practice system will allow operators to exert greater control over the traffic signal system through the expanded ability to use multiple timing plans, new responsive/adaptive traffic control mechanisms, and access to more detailed status information from the signal controller. Distributed control of intersections will also reduce the potential for single-point failures. In addition, unlike the older system it is replacing, the new system has the capacity to expand, allowing operators to incorporate additional ITS technologies in the future.

DPWT officials know the importance of getting information out to travelers who may not be familiar with local roads, or who have not attended a particular event previously. To this end, the county uses a comprehensive set of traveler information tools to assist motorists with information about their trips to and from the venues that host planned special events. These tools include the following:

- **Cable TV.** During special events, the TMC offers a cable TV program that provides audio from the traveler's advisory radio system, scrolling text with traffic and incident information, and video feeds from traffic cameras. This same type of show is used daily and for peak traffic periods seven days a week.

- **Traveler's advisory radio system.** Twelve (12) transmitters are placed throughout the county and simulcast travel information is recorded by transportation management technicians in the county TMC. The information includes any conditions related to a special event that need to be relayed to the public.
- **Internet.** Travel conditions are regularly updated on the Internet to provide up-to-the-minute conditions for the entire transportation system in general and special event conditions in specific. In the case of events that have large attendance, such as golf tournaments and the county fair, DPWT typically creates customized pages specifically for those events. Smaller events, however, are covered on the agency's current incidents page.⁵
- **Media sharing.** The TMC regularly shares information with the broadcast media, and the media have access to the TMC's traffic camera system.

Montgomery County leverages two congestion-fighting tools that are unusual in planned special event operations: the county's aerial surveillance aircraft and the motorist assistance patrol, which operates on major arterial roads rather than the freeways.

Aerial Surveillance

Aerial surveillance is used frequently during special events of various types in Montgomery County. With radios for county and state police, county and state DOTs, fire and rescue, and the broadcast media, the county's airplane (shown in Figure 3) is in a unique position to provide overall incident management in a highly mobile platform. The plane's aerial perspective provides valuable real-time input to the computerized traffic signal system operators (transportation engineers or technicians) as well as to incident commanders on the ground. Equipment on the plane can feed video images simultaneously to the mobile command center on the ground as well as to the TMC, showing



Figure 3. Montgomery County's Aerial Surveillance Aircraft

⁵ Montgomery County, Maryland Website (2008). <http://www.montgomerycountymd.gov/content/dpwt/operations/tmc/getincidents.asp>.

Best Practices

Site Study Descriptions

“Keep regular contact with your other agency contacts. You can’t develop those relationships in the heat of the battle. If you don’t know the people beforehand, gaining confidence and cooperation is a much more difficult process when the heat is on.”

– Michael Kinney
Montgomery County
Department of Public
Works and Transportation

operators a high-level view of what is happening in various places on the ground virtually simultaneously. Access to this “big picture” allows TMC operators to react quickly to incidents and to monitor and address event-related traffic buildup as it occurs.

The presence of aerial surveillance also assists with parking management at events. One of the plane’s day-of-event assignments is to fly over event parking areas at regular intervals and provide a visual estimate of available parking capacity. These estimates allow the TMC staff to anticipate when primary lots will become full so operators can make informed decisions about when to begin redirecting traffic to satellite parking areas.

Arterial Service Patrol

DPWT also operates a motorist assistance patrol on the county’s arterial roads, making Montgomery County one of the few jurisdictions to offer this service on arterial streets rather than on freeways. The arterial service patrol is typically used to respond to disabled vehicle calls and traffic incidents, both during normal daily operations and during planned special events. The program’s focus is on safely removing vehicles from travel lanes as soon as possible. The responding patrol vehicle is used to relocate damaged or disabled vehicles to nearby parking lots or to side streets near the point of the incident where drivers may safely wait for a privately arranged tow truck to move vehicles to their ultimate destinations. An added benefit of using these patrols during special events is that they can be deployed as probe vehicles in and around the special event area to identify incidents or problems, support aerial parking lot surveillance with visual assessments, and relay information back to the command center. The drivers are also available to relocate or change messages on portable dynamic message signs as necessary during events.

Local and Regional Cooperation

The Montgomery County DPWT has a more than 30-year history of working with other agencies within the county, with state agencies, and with other jurisdictions. Although there is no special events planning committee per se, DPWT is one of a team of special events operations and planning staff that includes representatives from police, fire and rescue, the Maryland State Highway Administration, and others, as needed, who work closely on operational planning and execution for planned special events.

Montgomery County boasts a number of recurring annual planned special events. Because the agency representatives who coordinate planned special events are frequently in discussions about upcoming events with each other, there is a strong foundation for regular communication and coordination among them. This regular interaction translates into an informal process for holding post-event debriefings (“hot washes”) to discuss lessons learned from those events in which problems arise.

In addition to developing good working relationships within all levels of government within the county, DPWT also participates extensively in efforts involving cooperation with neighboring jurisdictions. Being a part of the National Capital Area, Montgomery County representatives frequently work with their counterparts from the Virginia Department of Transportation (VDOT) and the District of Columbia Department of Transportation (DDOT). During planned special events that are expected to draw large crowds or affect traffic in adjacent areas, there is frequent communication between county staff and their colleagues in these adjacent jurisdictions. DPWT lays the foundation for successful day-of-event operations by establishing strong relationships well in advance.

In the National Capital Area, many state and local agencies are located in close proximity to one another, which leads to increased opportunities for regional involvement and interaction.

Despite this geographic proximity, points out Michael Kinney of the Montgomery County Department of Public Works and Transportation, it is an important part of the planning and execution process **to understand that each agency operates in a manner that is consistent with its own goals and operational concepts.** The key, Kinney says, is to learn what these goals are and keep them in mind when moving forward with an event. When agencies each have an understanding of what their partners' plans are, the participants come to know what to expect during the actual planned special event operations. An agency knows what its counterparts are doing because it knows not only what their counterparts' plans call for, but also what their goals are and how their peers plan to achieve these goals operationally. This understanding on both the institutional and the individual level contributes to well-coordinated planning for special events on a regional as well as local level.

Boston, Massachusetts is a harbor city of more than half a million residents⁶ that plays host to more than 12 million visitors each year, many of them attending annual events such as the Boston Harborfest, the city's famous St. Patrick's Day Parade, the Boston Marathon, and thousands of smaller art and cultural events. The city is also home to a variety of sporting events, including games played by Boston's Red Sox baseball team, Celtics basketball team, and Bruins hockey team.

The City of Boston's efforts to manage the many planned special events it holds each year have been complicated since the early 1990s by the ongoing road construction work surrounding the Central Artery Project (often called "The Big Dig"), a huge, multi-billion dollar project to replace the six-lane elevated highway that previously ran through the

Lessons Learned

Boston, Massachusetts

Approach

⁶ U.S. Census Bureau Website (2008). <http://www.census.gov>.

Site Study Descriptions

Best Practices

BTD has worked with the Massachusetts Department of Conservation and Recreation and the Massachusetts Port Authority to gain the authority to control signals owned by these state entities within the city of Boston. These signals are now connected to the city's traffic control center, and their timings are controlled centrally by the City of Boston.

center of the city with an eight-to-ten-lane underground expressway directly beneath the existing road. The new expressway terminates at its northern limit in a 14-lane, two-bridge crossing of the Charles River. The project also included extending the Massachusetts Turnpike from its former terminus south of downtown Boston through a tunnel beneath South Boston and Boston Harbor to Logan Airport.

The Central Artery Project was completed in 2007. Consequently, the ITS elements are now operational. The city intends to leverage those ITS assets to monitor and improve traffic flow in and around event areas. ITS infrastructure in this area includes dynamic message signs, traffic cameras (some owned by state agencies such as the Massachusetts Turnpike Authority) and 80 rebuilt signalized traffic intersections that are integrated with the city's TMC.

The Boston Transportation Department (BTD) participates in the city's special events committee, which is hosted by the Boston Police Department (Boston PD). The committee has representatives from many city departments, including, among other agencies, the parks department, fire and rescue, and emergency medical services (EMS). The committee uses a formal meeting process with regularly scheduled full committee meetings. The committee also schedules special meetings to discuss large planned special events, such as the Major League Baseball's World Series and the annual Harborfest celebration, which is attended by nearly 2 million people. When planning for Harborfest, the special events committee spins off a separate committee and invites state representatives from the Massachusetts Port Authority to participate in the event planning.

Central Access to Video Images

In addition to various department representatives working together as a closely knit team, BTD uses a TMC to gather information and oversee traffic operations from a central location. From the TMC, BTD controls traffic cameras, the traffic signal system, and dynamic message signs; BDT also works with its other agency partners to respond to incidents and traffic events as necessary.

BTD has a tri-party agreement to share video feeds among the BTD, the Boston PD, and the Massachusetts Highway Department. This agreement came about in part as a result of installation of numerous closed-circuit television (CCTV) cameras as part of the Central Artery Project. The cameras in the vicinity of the work zones have been increasingly helpful to BTD and the Boston PD as the project has neared completion. Although the Massachusetts Turnpike Authority is the owner of the new roadway and the ITS equipment installed on it, the agency has agreed to continue allowing the BTD access to the cameras' feeds for daily operations.

Traffic Signal Control

In addition to centralized video feeds, BTS has the authority to control signals that are owned by other entities within the city of Boston. For example, certain intersections are equipped with traffic signals that are owned by the Massachusetts Department of Conservation and Recreation, which is responsible for state parks within the greater Boston area. Other intersections, particularly around the harbor, may be equipped with signals owned by the Massachusetts Port Authority. BTS worked with these state agencies to have their signals connected to the city's traffic control center, where signal timing can be controlled centrally in response to special events congestion or traffic incidents.

While it remains the owning agencies' responsibility to perform maintenance and upkeep on their respective traffic signals, the BTS is able to control the timing on these signals as necessary to improve traffic flow.



Figure 4. Boston's Fleet Center

Local and Regional Cooperation

One of the largest special events held in Boston in recent years was the Democratic National Convention (DNC) in 2004, held at Boston's Fleet Center (Figure 4). Planning for the convention began more than a year in advance, before the city and DNC planners had even signed a formal agreement. Planning efforts included not only local and state agencies, but also the Department of Homeland Security (DHS) and the U.S. Secret Service.

Due to the large number of federal, state, regional, and local agencies involved and the lack of a single person having final authority and responsibility for overall planning, in late 2003, the DNC Host

Site Study Descriptions

“The impacts of special events can certainly be harnessed, or at least mitigated significantly, with good use of technology. There are a lot of moving parts to many of the special events in the city, and by having cameras to monitor and signals to adjust traffic flows, we’re able to minimize the negative disruptions on the public when these special events take place.”

– Jim Gillooly, Deputy
Commissioner,
Boston Transportation
Department

Committee began convening weekly meetings that included all transportation and security officials whose agencies had an interest in the event. Attendees were decision-makers and heads of operations for the various agencies. Ultimately, a solid working relationship among the BTM, the Boston PD, other emergency services providers, the state police, the Massachusetts Highway Department, the Massachusetts Port Authority, and other state agencies with jurisdiction over affected roadways developed during this process. This relationship among state and local agencies continues to characterize the BTM’s approach to planned special events.

From the BTM’s perspective, the most challenging part of the process was determining how to close I-93, the vital central artery that runs through the city’s downtown area, in a way that did not create gridlock on the surface streets. When the day of the event arrived and implementation of the shutdown began, the city’s access to the extensive CCTV system played a vital role in the process, enabling operations managers to watch road crews placing cones as they closed lanes in advance of the full closure of I-93. Because operators had the benefit of monitoring what was happening 15 to 20 miles outside of Boston, they were able to judge traffic conditions with a great degree of accuracy. As a result, BTM was able to keep the roadways open for several hours longer than had been planned because impacts were immediately apparent. Keeping the roadways open longer resulted in improved mobility for travelers as well as improved public safety, because roadways were open for use by emergency responders for a longer period.

Despite all the effort that went into creating the plan, however, perhaps the most important aspect of the operation was that it was dynamic. Due to the ability of operators to view conditions in real-time, TMC operators were able to judge the flow of traffic moving in the area of the event and were able to determine that a delay in the planned lane closures was appropriate. As a result, the public had the benefit of an additional four hours of open roadways. In addition, the public outreach campaign was extremely valuable. Knowing in advance which roads would be closed and for how long encouraged fewer Bostonians to attempt to reach areas of the city with restricted access, as shown in Figure 5, reducing the overall transportation demand.

BTM’s future goals related to enhancing transportation operations for planned special events include upgrading the Department’s permitting system, improving coordination with the Executive Office of Transportation and Public Works, installing more variable message signs (both fixed and portable), sharing data and video, and implementing traffic signal prioritization for buses and emergency vehicles with the Massachusetts Bay Transit Authority.



Figure 5. Lane Restrictions on I-93 during the DNC

BTD staff members feel that it is vital to hold advance meetings to review all details associated with each event and to establish contingencies. While the event is actually underway, it is also important **to have the same core members of the planning group available to modify the plan as necessary.** For example, during the 2004 DNC event, BTD attributes much of the event's success to Massachusetts State Police leadership. If the state police had to respond to an emergency, they were proactive in sharing the information with the other stakeholders. If there was time to have a discussion about any necessary changes due to an emergency or unexpected event before the actual change to the plan was made, calls were made to other agency representatives. When possible, the police made every effort to discuss the changes to determine any other potential impacts that could result from their modifications.

The greatest benefit of the regularly held pre-event meetings is to keep the players working together throughout the event. The level of commitment shown by the participating agencies to pre-planning, integration, and teamwork is the best indicator of a successful operation when the day of the event arrives.

The City of Anaheim's Traffic and Transportation Division has taken an active approach to managing planned special events throughout the city. A large part of the city's success with transportation operations for planned special events can be attributed to two factors: increased coordination activities and the utilization of ITS applications.

In addition to normal highway traffic operations, the Anaheim TMC is responsible for managing traffic for thousands of planned

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special events every year. The City of Anaheim has a population of approximately 350,000 residents,⁷ a number that often doubles to more than 700,000 any time there are multiple events at the Anaheim Convention Center, the Disneyland® Park, Knott's Berry Farm amusement parks, or the area's sports arenas. Anaheim is home to the Disneyland® Park and receives visitor overflow from the nearby Knott's Berry Farm theme park in nearby Buena Park. Disneyland® and Knott's Berry Farm rank second and 13th, respectively, in popularity among North American amusement parks. Together, the two parks drew more than 18 million visitors in 2007.⁸ In addition, the Anaheim Convention Center holds hundreds of planned special events every year, including major sporting events, musical concerts, auto shows, and conferences. The convention center, which covers more than 800,000 sq. ft., boasts that it is the newest and largest facility of its kind on the West Coast, as well as being one of the largest convention centers in the world.⁹ Downtown Anaheim is also home to several athletic arenas, including the Honda Center (Anaheim Ducks) and Angel Stadium of Anaheim (formerly known as Anaheim Stadium and Edison International Field).

On many occasions, two or more major planned special events occur simultaneously and in close proximity to one another. For example, there may be concurrent sporting events at the Honda Center and Angels Stadium, which are located approximately two miles apart. (The close proximity of Angel Stadium of Anaheim and the Honda Center can be seen in Figure 6.) Managing traffic operations during simultaneous events is a major challenge for the Anaheim TMC because there are a limited number of roadways that can be used to aid with traffic flow before or after an event.

Due to the large number of events throughout the area, transportation officials from the Anaheim TMC have taken a proactive approach to planned special event management. In addition, the City of Anaheim relies heavily on ITS applications to help handle the increased traffic volumes and congestion often associated with planned special events. The Anaheim Traffic and Transportation Division has invested more than \$58 million in updating its TMC and ITS infrastructure.

Elements of the ITS infrastructure include dynamic message signs, closed-circuit television cameras, enhanced communication systems, and the Split, Cycle, and Offset Optimizer Technique (SCOOT) traffic signal control system.¹⁰ There are also more than 300 signalized intersections

⁷ U.S. Census Bureau (2008). <http://www.census.gov>.

⁸ Themed Entertainment Association/Economics Research Associates (2008). Attraction Attendance Report 2007. <http://www.connectingindustry.com/downloads/pwteaerasupp.pdf>.

⁹ Anaheim Convention Center Website (2008). <http://www.anaheimconventioncenter.com/section.cfm?id=13>.

¹⁰ City of Anaheim, California Website (2008). <http://www.anaheim.net/article.asp?id=1095>.



Figure 6. Aerial Photo of Honda Center and Angels Stadium

located throughout the city. During planned special events, the TMC advises the California Department of Transportation (Caltrans) where to have commuters exit the highway if an alternate route is necessary as a result of heavy traffic or incidents.

Coordination and Planning

Improved coordination is a vital part of managing planned special events. In many instances, there are several agencies or organizations involved in the planning, operation, and management of the planned special event. As a result, it is imperative that all event stakeholders work together to meet their desired goals. To that end, the Anaheim TMC holds weekly coordination meetings to discuss upcoming events. The coordination meetings are often attended by representatives from Disneyland® Park, Anaheim Department of Public Works, Anaheim Police Department, local utility and construction companies, event generators, and parking facility operators. The focus of the meetings is to discuss upcoming event details and identify any activities that may disrupt traffic operations. Some of the key topics typically covered during the meetings include the following:

- Size, duration, and location of upcoming events
- Current and upcoming construction and maintenance activities
- Parking alternatives
- Traffic routes or road closures.

During the weekly coordination meetings, representatives from the Anaheim TMC serve as the facilitators among participating agencies. In addition to discussing the details for upcoming planned special events, the coordination meetings provide a forum for participants to conduct debriefings to share lessons learned, both positive and negative, from

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“Continuing weekly coordination meetings between event generators, law enforcement, parking venue operators, and traffic management staff is a key factor toward successful planned special event management in Anaheim.”

– John Thai, Principal Traffic Engineer
 Anaheim Traffic and Transportation Division

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Putting portable dynamic message signs in place several days prior to the start of the planned special event enables motorists to find and become familiar with alternate routes.

past events. In addition, the debriefings are used to identify new activities or strategies that can aid in future planned special events. City staff found the weekly coordination meetings to be a powerful tool for improving traffic operations during planned special events. The meetings enabled transportation agencies to better prepare for upcoming events and greatly increase the levels of coordination between event stakeholders, resulting in improved traffic operations for planned special events.

Traveler Information

During planned special events, the Anaheim TMC often uses dynamic message signs to help disseminate traveler information and improve driver awareness. The signs are often used to share information on event details, optimal routes, road closures, and parking information. One of the unique practices of the Anaheim TMC is to put the dynamic message signs in place several days prior to the start of the planned special event. The intent of this placement is to warn motorists of the upcoming event and provide them with enough time to find and become familiar with alternate routes. As a result, motorists from local communities are less likely to use the same roadways that serve the planned special event if they have already identified alternate routes, helping to reduce roadway congestion and traffic delays.



Figure 7. A Permanent Dynamic Message Sign in Anaheim

At present, the Anaheim TMC has a combined total of 13 permanent and portable dynamic message signs. Prior to the planned special event, TMC staff members place the portable dynamic message signs at strategic locations or on high-capacity roadways to help increase the level of motorist awareness. One of Anaheim's permanent dynamic message signs is shown in Figure 7.

If pre-event messages are too long to be displayed on the dynamic message signs, the city uses the highway advisory radio (HAR) system

to broadcast live or pre-programmed messages relating to the planned special event. These messages are also broadcast several days prior to the event, allowing motorists to find alternate routes. Over the past several years, the Anaheim TMC has also made a greater commitment to improving its dynamic message signs information management activities. Specifically, TMC staff members work closely with planned special event stakeholders to review the quality, accuracy, and impact of pre-event message content. While examining message content, TMC staff members also carefully evaluate the messages' impact on local communities or neighborhoods. Message content planning is a critical component of the Anaheim TMC planned special event traffic management activities.

Traffic Surveillance

The City of Anaheim has a sophisticated traffic surveillance system that is often leveraged to aid with planned special events. Several TMC staff reported that they felt that the CCTV surveillance was the most important element of the city's planned special event management. Currently, the Anaheim TMC manages more than 65 CCTV cameras located at strategic points throughout the city. In the near future, the city is expected to increase the number of cameras to more than 100. During planned special events, Anaheim TMC staff use cameras to observe traffic operations or flow. In addition, many of the traffic cameras are used to monitor the ingress and egress operations at several sporting venues, including roadways located near Angel Stadium and the Honda Center. The cameras are constantly monitored to observe traffic conditions, including local streets and major arterials. TMC staff have the ability to make adjustments to traffic signal timings to mitigate congestion and improve traffic flow among vehicles arriving at or leaving an event. If heavy traffic persists, the TMC may coordinate with Caltrans to identify alternate routes or exits that aid with planned special event traffic operations.

Weekly **coordination meetings among stakeholders** in Anaheim provide the opportunity to review past events, coordinate upcoming events, and cement relationships among the agencies that participate in the meetings. Organized meetings where the participants get to know each other and learn how to work together set the stage for day-of-event activities. Knowing what colleagues are doing and how they are responding to events within the context of their roles enables each party to make the best decisions possible for promoting public safety and the smooth flow of vehicles in the event area.

One of Anaheim's best practices is to **put portable dynamic message signs in place several days prior to the start of a planned special event** to inform motorists of the event and give them sufficient time to find and become familiar with alternate routes. This practice reduces the number of local motorists who are using the roadways that serve the event and contributes to decreased congestion and traffic delays

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associated with the event. TMC staff members work closely with event stakeholders to review the quality, accuracy, and impact of pre-event message content, and the TMC takes special care to assess the impact of event traffic on local communities or neighborhoods. Message content planning is an important aspect of how Anaheim prepares for planned special events.

The City of Pasadena, population 150,000,¹¹ is located in Southern California, approximately ten miles northeast of Los Angeles. The Pasadena Department of Transportation (DOT) is responsible for actively managing traffic operations throughout the city, including major highways and local roadways. The Pasadena TMC is also responsible for managing hundreds of planned special events throughout the area, including downtown Pasadena and surrounding areas. These events, which range in size from major recurring events to small one-time occasions, often result in increased traffic flow and congestion throughout the area.

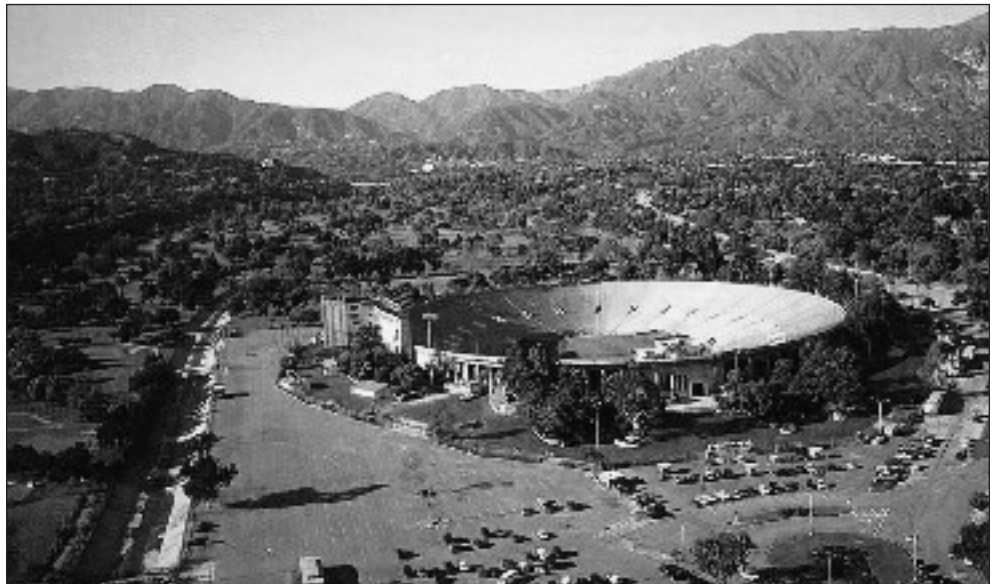


Figure 8. Rose Bowl Stadium

The largest annual event in the Pasadena area is the Rose Parade, which draws approximately 1 million visitors, as estimated by the Pasadena Police Department.¹² During the parade, roadways throughout the Pasadena area are closed to accommodate the parade route and provide sufficient capacity for spectators. In addition to the Rose Parade, Pasadena also hosts several major collegiate sporting events throughout the year. Every January, the Rose Bowl collegiate football game is played in the Rose Bowl Stadium (Figure 8), which

¹¹ U.S. Census Bureau Website (2008). <http://www.census.gov>.

¹² Pasadena Tournament of Roses Website (2008). <http://www.tournamentofroses.com/roseparade/paradefaq.asp>.

has a capacity of more than 91,000. The University of California, Los Angeles (UCLA), also plays its home football games at Rose Bowl Stadium. The traffic associated with these events can cause major congestion on Pasadena's roadways and lead to driver frustration.

To manage planned special events effectively throughout the Pasadena area, the TMC has implemented several ITS applications and employs various methodologies to help mitigate traffic congestion that may occur in the areas around planned special events venues. The TMC also uses these ITS applications and methodologies to improve the services it provides both to event attendees and local residents.



Figure 9. Inside the Pasadena TMC

The Pasadena TMC, shown in Figure 9, is used to monitor and control traffic operations throughout the city. The TMC is comprised of a computerized traffic signal control system that monitors Pasadena's traffic signals 24 hours per day. The system also collects traffic data that may be used by TMC staff members to make signal timing adjustments, helping improve traffic flow during both day-to-day operations and planned special events.¹³ The TMC also actively manages the ITS devices that have been deployed throughout the area. The following key components comprise Pasadena's ITS infrastructure:

- More than 300 signalized intersections
- Twenty (20) pan-tilt-zoom CCTV traffic surveillance cameras
- Ten (10) dynamic message signs
- Three intersections equipped with red light camera systems
- Video detection (loop emulators) at 50 intersections.

¹³ City of Pasadena, Department of Transportation Website (2008). http://www.cityofpasadena.net/trans/trafficoperations/pdf/Traffic_Signal.pdf.

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The purpose of this ITS infrastructure is two-fold: to provide event attendees with accurate and timely traveler information and to enable the TMC to make changes in the traffic plan in a timely, proactive manner.

For the duration of a planned special event, the Pasadena DOT serves as the lead agency responsible for managing traffic operations throughout the area. Although the Pasadena Police Department is in charge of lane or roadway closures prior to an event, all closures are based on coordination with and direction from the Pasadena DOT. TMC staff members also work closely with representatives from Caltrans to identify optimal traffic routes and divert roadway traffic during planned special events.

Over the past several years, technical advances in ITS applications and improved coordination activities have greatly improved the Pasadena DOT's ability to manage traffic operations associated with planned special events. The following sections discuss some of the key methods and ITS components that have helped improve planned special event traffic management throughout the Pasadena area.

Best Practices

Coordination, Planning and After-Action Reports

Pre-event coordination meetings are a key element to the planning and management of planned special events in the Pasadena area. Representatives from the Pasadena DOT conduct monthly coordination meetings with the Pasadena Police Department. In addition, weekly coordination meetings are held with event generators, venue sponsors, and other stakeholders. The intent of these meetings is to discuss the details of upcoming events, including the venue size and type, available parking facilities, stakeholder participation, traffic routes, lane closures, and agency roles.

The Pasadena DOT also has a dedicated special event planning unit with the mission of providing a comprehensive review of upcoming events and associated traffic management activities. Prior to major planned special events, the planning unit works in conjunction with TMC staff members to develop inbound and outbound traffic plans. In addition, routine plans are developed and implemented for recurring events such as football games or parades.

At the conclusion of most planned special events, the Pasadena DOT and participating agencies conduct debriefings to identify best practices and lessons learned. Through these debriefings, the Pasadena DOT is able to identify both positive and negative activities that took place during a previous planned special event. The lessons learned from this analysis enable the Pasadena DOT to improve future planned special event management activities and levels of coordination.

Traveler Information

The Pasadena DOT relies on dynamic message signs to improve driver awareness and provide the motoring public with traffic information. The

dynamic message signs are used for day-to-day operations and during planned special events to provide motorists, including venue attendees, with the latest traffic updates or event details. Key types of information displayed on the dynamic message signs include the following:

- Route/exit information
- Road closures
- Parking details/availability
- Traffic alerts
- Speed limits.

Currently, the 10 dynamic message signs the DOT employs have been strategically located along major arterials throughout the city. An example is shown in Figure 10.



Figure 10. A Pasadena Dynamic Message Sign

During major planned special events, such as the annual Rose Parade, dynamic message signs are a critical tool for providing informational updates or alerts to a large number of motorists. Pasadena uses dynamic message signs to provide informational updates to motorists during major planned special events such as the annual Rose Bowl.

These informational updates improve traffic flow and reduce congestion levels. The updates enable motorists to find alternate routes that may reduce pressure on primary roadways. Dynamic message signs enable traffic engineers to provide quick and efficient updates to motorists who rely on this information during planned special events.

TMC staff identify and travel to problem areas based on video images collected at the TMC. The combination of CCTV cameras and dedicated traffic personnel on site to deal with issues helps maintain continuity of traffic operations throughout a planned special event.

Lessons Learned

Traffic Surveillance

The Pasadena DOT's traffic surveillance system is a key component for managing planned special events throughout the city. Currently, the system is comprised of 20 CCTV traffic cameras that are linked directly to the TMC. The cameras are located at strategic points along Pasadena's roadways. In addition, three intersections are equipped with red light cameras. All video images are continuously monitored on the TMC video wall. During planned special events, staff members observe traffic operations, including points of congestion, traffic flow, and incidents. These observations improve the capabilities of TMC staff to manage planned special events. For example, video images enable the TMC staff to monitor arterial roadways and make proper signal timing adjustments during events such as the Rose Bowl. These timing modifications often improve traffic flow at ingress and egress routes during the event.¹⁴

During special events held at Rose Stadium, TMC staff members often conduct field observations and assist with any incidents that may arise. Staff members identify and travel to problem areas based on video images collected at the TMC. The combination of CCTV cameras and dedicated traffic personnel helps maintain continuity of traffic operations throughout a planned special event.

The City of Pasadena's TMC staff found that **monthly coordination meetings and the weekly meetings that include the Pasadena DOT, police, event generators, venue sponsors, and other stakeholders are especially valuable.** These coordination meetings assist the city's transportation planners in determining the details of upcoming events and allowing them to assess and set up plans for resolving potential problems associated with available parking facilities, traffic routes, signal timing, and lane closures.

Another practice that Pasadena has adopted is to **have TMC staff members conduct field observations during large special events.** City transportation planners have found that it is helpful for staff members to identify problem areas based on video images collected at the TMC and travel to those areas to provide on-site assistance and real-time communication with the TMC. The City of Pasadena has found that the combination of CCTV cameras and dedicated traffic personnel helps maintain continuity of traffic operations throughout a planned special event.

The City of Daytona Beach is a medium-sized city with a population of approximately 68,000.¹⁵ The city hosts between 55 and 60 planned special events each year, of which 12 draw crowds in excess of

¹⁴ City of Pasadena, Department of Transportation Website (2008). http://www.cityofpasadena.net/trans/trafficoperations/pdf/Traffic_Signal.pdf.

¹⁵ U.S. Census Bureau (2008). <http://www.census.gov>.

100,000. Some of the larger events include the Turkey Rod Run in November, one of the largest antique car shows in the country; the 10-day Daytona Bike Week event held each spring; the family-oriented Biketoberfest in October; Daytona Spring Break for college students in late March and early April; and NASCAR's famous Speed Week, which kicks off the racing season with the Daytona 500 in February. A second NASCAR race, the Coke Zero 500, is also held each July at the Daytona International Speedway. Figure 11 shows the Speedway and the surrounding area. Figure 12 shows a pedestrian walkway leading to the Speedway.

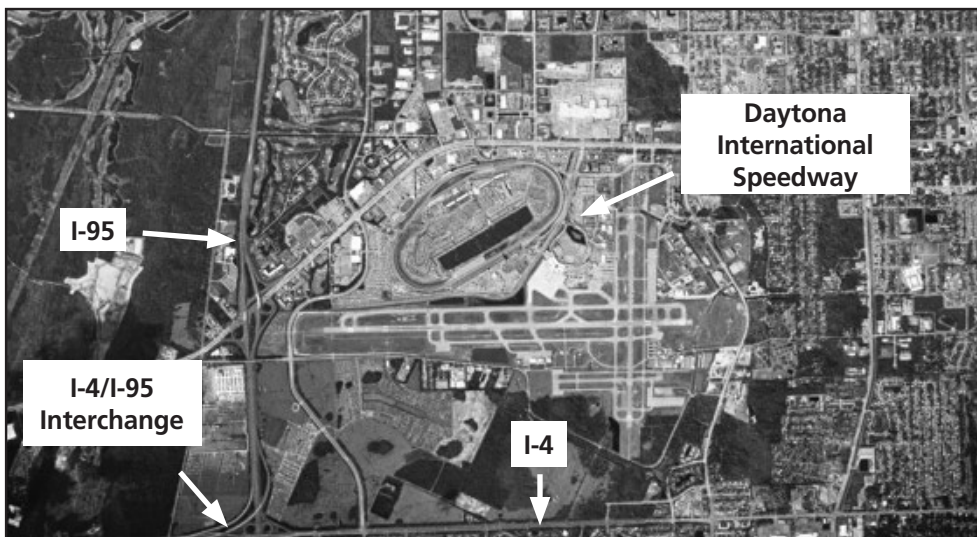


Figure 11. The Daytona International Speedway and Surrounding Roadways



Figure 12. Pedestrian Walkway Leading to the Daytona International Speedway

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Approach

The City of Daytona Beach has a unique approach to planned special events transportation management on the day of the event: maximum utilization of all the roadways to accommodate the huge influx of traffic for large events. The influx of 100,000 people or more for large events, on top of the existing population, is a substantial drain on an infrastructure that normally needs to accommodate far fewer motorists. ITS applications help Daytona Beach maximize the capacity of its limited infrastructure.

ITS infrastructure in the area includes 58 miles of fiber optic cable within the city limits, 66 video surveillance traffic cameras, microwave connections to remote cameras that are critical to operations, and 141 traffic signals within the city, 112 of which are interconnected and managed with a signal control system linked into the city's TMC. The city also makes use of the state's 511 Information system as well as highway advisory radio to disseminate information to incoming travelers on event day.

An additional resource the city is able to tap into is the Florida Department of Transportation (FDOT) District 5 regional TMC. The city is well integrated with the regional TMC. On large event days, Daytona Beach has an FDOT District 5 representative on site at the Daytona Beach TMC who has a direct link to the regional TMC. This person has the authority to operate about 40 permanent dynamic message signs on I-4 and I-95 and within the city on state arterial routes.

Best Practices

Local and Regional Cooperation

One of the City of Daytona Beach's best practices in managing transportation during planned special events is communication with other agencies. The city has hosted several traditional, large-scale annual events over the course of more than 50 years, such as the 50th running of the Daytona 500 in 2008, which drew crowds in excess of 230,000, and Daytona's Bike Week, which began in 1937 and has grown to become an event that draws more than half a million attendees each year. (Figure 13 shows Bike Week by night.) As a result of the experience of holding these increasingly large events every year for so many years, the city agencies have developed excellent relationships among themselves and with representatives from larger county and state transportation and law enforcement agencies.

Limited in size and resources, the Daytona Beach Traffic Engineering Department relies on its close, longstanding relationship with the Daytona Beach Police Department as well as fire, rescue, the Florida Highway Patrol (FHP), Volusia County Traffic Engineering Division, the state's Road Ranger motorist assistance service, FDOT, and other agencies to meet the requirements for manpower, equipment, planning, and coordination for the huge special events it hosts. The city also coordinates with event planners and the Daytona International Speedway well in advance of events to maximize pre-event preparedness.



Figure 13. Bike Week by Night

Although there is no special events committee per se in Daytona Beach, every spring the city's special event stakeholders, including the Chamber of Commerce, which coordinates task forces and vendor permitting for many events, meet with their county and state agency peers to review each large planned special event that was held over the past year. The focus of this annual meeting is to examine each event individually and identify what worked as planned, what worked less well, and what issues that arose that should be addressed in the planning for the next year's event.

Notably, this after-action review seeks inputs from the Speedway and local citizens as well as the people in the field, such as the traffic supervisors and police. NASCAR also solicits feedback from event attendees and forwards comments and suggestions (both positive and negative) to the city.

Remote Video Access, Signal Control, and Dynamic Message Signs

Two tools that the city finds particularly useful are its traffic surveillance cameras and traffic signal control system. The city's traffic cameras are full pan-tilt-zoom with a 360-degree panoramic view capability. This wide range of motion enables operators at the TMC to monitor traffic flows and respond quickly if a problem occurs.

During past NASCAR races at the Daytona International Speedway, the city used a 100-foot tower to perform visual observations of nearby traffic conditions. However, the view was limited to the area in front of the Speedway. Now, however, the city has access to FDOT's Daytona Area Smart Highway (DASH) system, which provides traffic information through video surveillance throughout Volusia County and the surrounding region, including the I-4 and I-95 corridors. This wide-area surveillance shows how much traffic is on its way to Daytona Beach,

Not only is the Daytona Beach signal system interconnected and accessible through the city's TMC, it can also be accessed remotely, allowing traffic managers to view video feeds and operate the signal control system from desktops in other locations. Whether remote or onsite, operators can select pre-programmed timing modifications or modify timing manually in real time.

Through its partnership with FDOT, Daytona Beach has access to an integrated ITS system that gives the city information about what's happening a county and a half away, much of it through FDOT's Daytona Area Smart Highway (DASH) system.

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enabling operators to prepare for traffic influxes, backups, and other problems related to traffic spillover.

The city's traffic signal system, which is interconnected with the traffic surveillance system, is accessible remotely. Traffic managers can access both video feeds and the signal control system from desktops in other locations and select pre-programmed timing modifications or modify timing manually in real time.



Figure 14. An FDOT Permanent DMS on a State Arterial Directing Event Traffic

Furthermore, FDOT District 5 operates dynamic message signs on I-4, I-95, and state arterials in and around Daytona Beach. (Figure 14 shows an example sign.) The city finds these signs useful enough that it is hoping to add some of its own on major arterials and around event areas, since Daytona Beach has both a fiber optic backbone in place and the switches to implement some of the signs when they are acquired. At present, the city is looking at placing permanent dynamic message signs around the city's Ocean Center Complex, a central municipal area that contains a convention center and auditorium for shows and entertainment events. The complex is currently undergoing expansion, and the city believes that adding signage for major events at that facility would promote the steady flow of traffic on event day.

The city is also assessing whether to deploy ITS solutions such as parking directional signs or small, portable dynamic message signs in select locations that would direct motorists to parking during special events. While it has a few portable dynamic message signs, rather than expand its small inventory, the city generally prefers to place signs at known problem areas within the local jurisdictional roads. These permanent dynamic message signs can also be leveraged for hurricane evacuations on the east side and along the coastline. This potential

added benefit helps to justify the expense and effort of adding the new devices to the city's assets.

The Communications Challenge

The City of Daytona Beach has found that one of its greatest challenges in effectively managing operations for planned special events involves wireless communications. In the past, the city has attempted to use different wireless solutions, but found that none of them was robust enough to meet its needs. The city has found that some solutions appear to work well prior to an event, but on the day of the event, they turn out to be less capable than expected. This limitation is particularly true during NASCAR races, which generate a great deal of radio frequency (RF) interference due to cellular phones, media transmissions, and participant utilization of RF bandwidth for team communications during the race.

The wireless challenge has also extended to the city's portable dynamic message signs, contributing to the city's desire to stick with permanent signs that can be hardwired into the current communications system. At one time, the city used cell phones to communicate with its trailer-mounted dynamic message signs. That solution did not work very well, however, according to Michael Marcum, the city's Transportation Division Administrator. "When you've got 200,000 people out there at the Speedway and they're all trying to talk on their cell phones, you can forget about talking to your equipment," he explains.

The goal of having a robust wireless communication system is to avoid having to send a field unit to the dynamic message signs' location to verify that the units are showing the intended messages. As a temporary solution, the city has located its portable dynamic message signs close to locations that have video surveillance so the traffic center operators can confirm the messages are correct through video observation. However, the city continues to look for an affordable wireless solution that will work as well on event day as it does during the period leading up to the event.

Measures of Success

The City of Daytona Beach examines safety and delay metrics to gauge the success of its planned special events management. The city has a perfect record of no pedestrian incidents at the Speedway, which is remarkable considering the number of vehicles that move in and around the area. For the 50th running of the Daytona 500, the city deployed 10,000 ft. of snow fencing to keep people out of major roadways. The fencing also helped to channel pedestrians to intersections or mid-block crossings that were operated by law enforcement and coordinated through the traffic division.

The city has two mobility goals for NASCAR races: to get all spectators into the Speedway in time for the start of the race and to get all the spectators out of the Speedway two and a half hours after the

“When you’ve got 200,000 people out there at the Speedway and they’re all trying to talk on their cell phones, you can forget about talking to your equipment [via cellular phone].”

– Michael Marcum,
City of Daytona Beach,
Transportation Division
Administrator

Lessons Learned

conclusion of the race. Based on observations from the TMC, Marcum estimates that the city is able to achieve this goal about 90 percent of the time.

Similarly, in planning for Daytona's Bike Week, which is attended by 400,000 to 600,000 people, the city works to identify areas where there have been crashes in the past. By studying crash reports, city staff attempt to identify issues related to each crash and alleviate those issues for future events whenever possible.

The most important factor in planned special events management, suggests Marcum, is to **have a fluid plan and be open to change**. In any growing community, infrastructure changes from year to year, businesses enter (or leave) the community, roadways are built, and signals are added and need to be coordinated. These changes are all in addition to the normal operational changes that occur in a community. Plans must be flexible enough to take all changes into account.

One of the City of Daytona's best practices is its **annual spring after-action review of all of the previous year's planned special events**. During these reviews, the city seeks to accomplish three key tasks: (1) identify significant changes in traffic generators (such as local businesses), road infrastructure, and installed equipment; (2) review field reports from on-site staff and stakeholders from previous events; and (3) identify any underutilized capacity and consider ways to better employ that capacity for the upcoming events.

Marcum points out that it is also important to **remember the needs of the local citizens** as well as the individual attendees. The City of Daytona Beach recognizes the need to keep event participants out of local neighborhoods by closing off those streets at the main event corridors, so there is little or no encroachment of event traffic into local neighborhood areas. In addition, Marcum notes that traffic planners should take into account that local citizens, as well as event participants, need to move through the city during events. A measure of success for any event, according to Marcum, is how many residents indicate that they are able to move around the event areas and get where they are going with minimal delay.

Dutchess County, New York

Located halfway between New York City and the state capital of Albany, Dutchess County is comprised of approximately 300,000 residents.¹⁶ The county is bordered on the east by the state of Connecticut and on the west by the Hudson River. Dutchess County is famous within the region for hosting an annual agricultural fair that generates more than 500,000 visitors over the course of the six-day event, making it the second largest agricultural fair in New York State, the largest scheduled traffic event in the region, and the primary

¹⁶ U.S. Census Bureau Website (2008). <http://www.census.gov>.

traffic-generating event this rural county experiences each year. Despite its proximity to urban areas, the county is rural in nature and has a limited infrastructure, with much of the county characterized by rural roads and a few heavily traveled two-lane state routes. The county is a busy traffic area, however, with some intersections and state roadways operating at or near capacity on normal, non-event days.

In the late 1990s, the State of New York embarked on a program to fund several different ITS investments, including a new Hudson Valley Transportation Management Center for the Hudson Valley-Westchester region, of which Dutchess County is a part. At the time, the New York State Police (NYSP) and the New York State Department of Transportation (NYSDOT) entered into a partnership to develop transportation and incident management solutions that used a combination of teamwork and technology. NYSP and NYSDOT had several goals for the program, including finding an event they could use to demonstrate the value of new technologies, determining the reliability and robustness of the technologies, and training operators to use these new technologies in a real-world environment. As a planned special event, the Dutchess County Agricultural Fair provided an ideal opportunity to accomplish these goals.

Although the fair is a county event, the principal roads leading to the fairground are state roads. As a result, NYSP had primary authority over the traffic plan. In conjunction with NYSDOT, NYSP observed the 1999 fair in order to identify problems that might be resolved or mitigated through the use of the state's new ITS equipment. Once this list of possible improvements was compiled, planning began for the 2000 fair.

In its observations of the 1999 fair, NYSP identified the principal challenge as being the state road leading to the fairground. This simple two-lane road with two signalized intersections north and south of the fairground was already operating at capacity on most non-event days. Due to the volume of attendees seeking to enter and depart the fairgrounds, the effects of the backup at these points were staggering, resulting in congestion that affected two towns and one village, overflowed across one of the bridges over the Hudson River, and blocked access to a local hospital. This traffic was exacerbated by the presence of commercial vehicles trying to navigate through the traffic to reach non-fair-related destinations.

The NYSP's primary approach to resolving this congestion was to use portable ITS equipment in conjunction with a proactive traffic plan to reduce the bottleneck at the fairground entrance/exit point, and to eliminate commercial vehicles on the fairground access road. To accomplish these goals, the NYSP traffic plan used a combination of traffic signal control, traveler information updates, Highway

Approach

Best Practices

Emergency Local Patrol (HELP) service vehicles, and communications system improvements.

Traffic Signal Control

Planners knew in advance that being able to control the signals at the two intersections immediately to the north and south of the fairground would be critical to the success of the traffic plan. During a pre-deployment evaluation, observers determined that each signal had unique characteristics. The intersection to the south was a village intersection that supported both pedestrian and vehicular traffic. The crosswalk at this location was very popular, and the intersection typically operated at capacity on most non-event days. Consequently, the plan had to optimize traffic flow, yet prevent a green phase from lasting so long that pedestrians would become impatient and cross against the signal. As a result, the plan included microwave detectors to maximize vehicle throughput while minimizing the effect on pedestrian traffic.

To the north of the fairground, the main state road leading to the fairground intersected another state road at a large signalized intersection; much of the traffic approaching the event came through this intersection. During peak periods, nearly all traffic exiting the fairgrounds passed through this intersection as well. Observers determined that most of the significant northbound traffic backups were attributable to this signal being unable to handle the necessary volume to keep traffic moving. To mitigate the volume constraints, planners put a CCTV camera at that location and tied it into software that allowed NYSP to control the signal. Figure 15 shows the signal control cabinet for the intersection.



Figure 15. CCTV Camera and Signal Control Software Installation

The result was that the intersection was under constant surveillance by operators at a mobile command center that was set up at the fairgrounds to oversee management activities for the traffic plan. Without traffic management oversight during peak periods, vehicle demand could have potentially caused a severe backup as travelers attempted to move northward. Due to the signal control software installation, however, command center operators were able to extend the green phase to meet demand, prevent backups, and accommodate pedestrians at the intersection. Planners attribute the elimination of much of the delay seen in previous years to the effectiveness of the technology that enabled them to manage the intersection with CCTV and signal control software in real time.

Traveler Information

A primary goal of the NYSP traffic plan involved adding capacity to the two-lane route in front of the fairground. This goal was achieved by using traffic cones to create a center lane and pushing the northbound and southbound lanes onto the shoulder, as shown in Figure 16, effectively creating a three-lane pattern. This pattern was designed to facilitate ingress and egress by keeping incoming and outgoing traffic separate. Because the traffic plan called for all egress traffic to be directed to the northbound lanes, however, there was concern that there would be confusion among attendees who wished to head south at the exit to the fairgrounds. Consequently, traveler information needed to be disseminated both in advance of the event and during the event so travelers who were unfamiliar with the new traffic patterns would not attempt to turn against the flow of traffic or make dangerous U-turns.



Figure 16. Service Patrol Trucks Monitor Modified Traffic Pattern on Fairground Access Road

Site Study Descriptions

“A comprehensive strategy, with good pre-planning and cooperation across disciplinary lines, will ensure that the ITS technologies deployed are successful. Police, fire, EMS, transportation agencies, highway maintenance and construction supervisors, event planners, emergency management organizations, and the media all need to be included.”

– Henry DeVries,
I-95 Corridor Coalition

As part of its traveler information strategy, NYSP not only disseminated fair access and diversion route information to local and regional media, but also utilized 10 solar-powered portable dynamic message signs that were pre-programmed with instructions and information for travelers along the fair routes. These signs were programmable via cellular phone, so operators could update the displayed messages depending on time of day or traffic conditions. Since there are a limited number of roadways that can be utilized to traverse the county, signs were placed on roads as far south as Poughkeepsie, nearly 20 miles away, to enable drivers to take alternate routes.

Because the presence of commercial vehicles inadvertently being caught in fair traffic had been a contributor to congestion in previous years, an important goal of the traffic plan was to keep commercial vehicles away from the fairground access roads. To accomplish this goal, NYSP created messages directing commercial vehicles in the region to alternate routes that would detour them around the fairgrounds without significant delay.

Pre-fair deployment and testing revealed some problems. Two of the dynamic message signs would not hold their charge, and others experienced connectivity difficulty with their cellular modems. Due to coordination between maintenance personnel and the sign vendor, who had staff on site during deployment, these issues were quickly resolved prior to the first day of the fair and event operations were not affected.

In conjunction with the portable dynamic message signs, a portable HAR was used to disseminate diversion route information and incident notification messages. Like the dynamic message signs, the HAR was solar-powered and programmable via cellular phone, so that pre-recorded messages could be selected from the mobile command center. Figure 17 shows how the dynamic message signs and HAR systems worked together.

Like the dynamic message signs, deploying the portable HAR also presented challenges. The portable unit was set up and tested one week prior to the event and broadcast well over a three-mile radius. During the weekend preceding the fair, however, the unit’s batteries failed. Fortunately, since the HAR was co-located on the portable cellular tower site provided by NEXTEL, the HAR was mounted to the tower with the help of the local fire department, and service was restored.

These ITS tools and the NYSP’s proactive dissemination of diversion route information throughout the region were effective beyond planners’ expectations in managing the traffic coming into the area. According to Henry DeVries of the I-95 Corridor Coalition, who created the traffic plan and managed the annual ITS deployment from 2000-2003 for the NYSP, there were virtually no trucks or buses traveling on the fairground access roads during the deployments.



Figure 17. Portable DMS and Portable HAR Unit at the Dutchess County Fairground

Communication and Coordination

As with any planned special event, communication and coordination were keys to success for the Dutchess County Fair Rural ITS Demonstration Project. A long list of stakeholders including law enforcement, emergency responders, transportation agencies, highway maintenance and construction supervisors, event planners, local representatives, state agencies, emergency management organizations, and the media all had important roles to play in ensuring the traffic plan's success.

Most of the spring of 2000 was spent in coordination and communication among the state, local, and private stakeholders whose cooperation contributed to the success of the ITS demonstration project. For example, once the Mayor of Rhinebeck, the village where the fairgrounds are located, became involved during the planning stage, he was persuaded to accompany NYSP representatives on door-to-door visits with the owners of local shops that were located on the main street affected by the traffic plan. These visits and face-to-face interactions garnered the shopkeepers' support for eliminating on-street parking during the fair—something they had refused to agree to in previous years.

Another important aspect to this proactive communications plan was the effort made to coordinate with construction programs at the state, county, and local levels to ensure that there were no planned construction projects scheduled to occur in conjunction with the county fair. In 2000, there was one major construction project underway on the Kingston Rhinecliff Bridge, one of the three area bridges across the Hudson River.

*“You can’t beat
face-to-face
communications.”*

– Henry DeVries
I-95 Corridor Coalition

Site Study Descriptions

The Kingston Rhinecliff Bridge is controlled by the New York State Bridge Authority and, at the time, was undergoing a multi-year rehabilitation and resurfacing project. Due to the fact that road shoulders had been removed from the bridge and the travel lanes had been constricted by concrete barriers, planners quickly determined that a lane closure or incident on the bridge during the peak exit period would lead to a gridlock situation. After several discussions with the Bridge Authority, the construction management consultant, and the contractor for the project, NYSP was able to reach an agreement whereby construction would be suspended during the fair's peak period (noon to 11 p.m.) each day. The Bridge Authority also agreed to have a HELP traveler assistance truck patrol the Bridge and provide immediate service to disabled vehicles along the span.

The county and local village police, fire, rescue, and emergency medical services were given access and input to the traffic plan, as was the county's 9-1-1 center. This inclusionary approach was a critical link in the process due to the proximity of the hospital to the fairgrounds. As a result of these discussions, NYSP implemented a communications link with the county 9-1-1 system through the ITS regional TMC. With the link in place, when a medical emergency occurred and an ambulance needed immediate access to the hospital, the county's 9-1-1 system would immediately advise the NYSP operations center, which would then inform the mobile operations center about the emergency. The mobile operations center at the fair could then respond by holding certain lanes open or clearing a path for the emergency vehicles in advance of their arrival in the area of the fair.

Aside from individual emergency events, pre-event planning also extended to discussions about disaster planning in the event of a weather emergency, terrorist attack, or malfunction of major fair equipment. Plans were developed that outlined how state police and emergency response organizations would respond to different types of emergency incidents, how they might quickly adjust HAR messages to facilitate an evacuation of the facility, and with whom individuals would need to coordinate in the communications infrastructure.

The Wireless Challenge

Wireless technologies were vital to event-day communications and posed the biggest challenge to the successfully managing the 6-day event. At the time, the Hudson Valley TMC, including NYSDOT and NYSP staff, all HELP vehicles, and selected state and county police dispatch centers used two-way digital cellular devices carried by NEXTEL. However, cellular towers in this rural area were virtually unknown at the time, meaning that operators would be unable to communicate during the event.

NYSP planners contacted NEXTEL in the spring of 2000 to ensure that the cellular communications signals could be extended to cover the fair area. The carrier offered to provide a portable cellular tower



Figure 18. Eighty-Foot Tall “Cellular on Wheels” Tower

(“cellular on wheels”) that provided digital cellular connectivity within a three-mile radius (Figure 18). During the planning process, workers at Verizon Communications, the telephone carrier responsible for the T-1 connection used by the portable tower, went on strike. NYSP and NYSDOT worked diligently to convince the carrier of the public safety benefit that this connection represented, and their efforts resulted in success. Verizon complied with the request and provided the necessary service to activate the portable cellular tower despite the strike.

Measures of Success

Event organizers point to the elimination of delay as their primary measure of success. In prior years, delay for vehicles exiting the parking lot at times exceeded four and a half hours. During the 2000-2003 period, planners were able to eliminate that delay entirely. In addition, there was no fair-related traffic congestion in the surrounding villages as there had been in previous years, access to the hospital was at no time blocked by traffic queues, and the presence of non-fair-related commercial vehicles was virtually eliminated.

During the 2000 deployment, in an attempt to keep track of how many vehicles were exiting the fairgrounds, what the vehicle gaps were, and what the vehicle speeds were, organizers affixed computerized magnetic traffic counters at the exit points. Traffic count data was

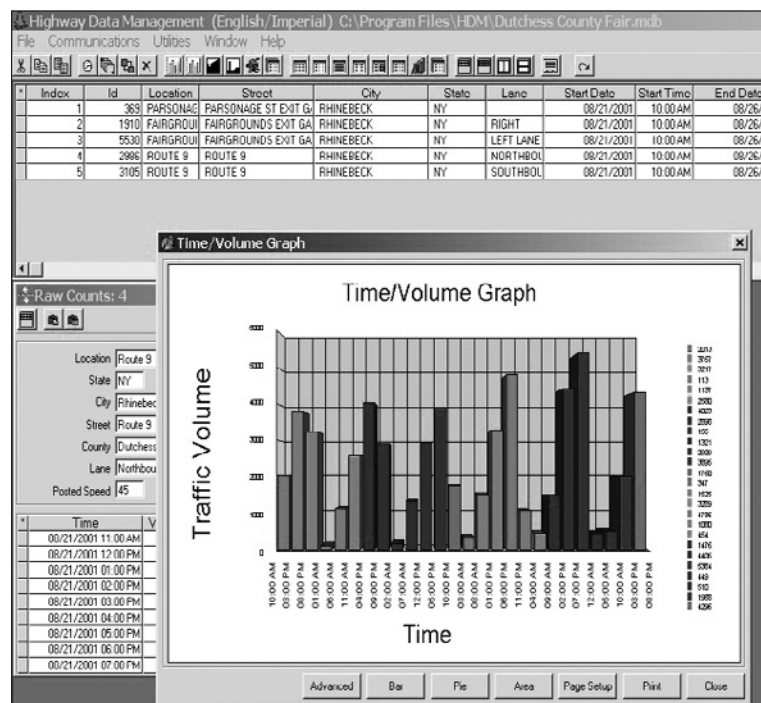


Figure 19. Traffic Volume Data Downloaded from Acoustic Traffic Counters in 2001

downloaded each night to allow planners to determine traffic volume. The following year, planners opted to use acoustic detectors instead. Figure 19 shows a screenshot of a traffic volume data download from acoustic traffic counters in 2001. Upon comparing the two systems, it was determined that the data provided was of comparable quality, that there were no significant discrepancies in the traffic counts, and that there was no appreciable benefit in using one system over the other.

The Dutchess County Agricultural Fair ITS Demonstration Project concluded in 2003. Due to the costs involved in deploying the full range of ITS equipment used by the NYSP and NYSDOT planners, the state was unable to continue to fund the annual deployment. The

county also determined it was unable to fund the continued use of the complete set of ITS tools available. Although the county does borrow dynamic message signs to warn area drivers and direct incoming traffic, it no longer uses the HAR station. The county also continues to utilize the traffic plan designed by the NYSP that prevents gridlock at the entrance to the fairgrounds. Because many fair attendees return each year, people have become familiar with the modified entrance and exit routes, which eliminates much of the confusion attendees experienced during the first implementation of the modified traffic pattern.

As with most large-scale events, NYSP noted that the importance of communication and coordination with state, county, and local organizations cannot be overstated. In rural areas, **planners should take into account the inputs and needs of small businesses, which play an important role in the economy of many rural areas.** Planners should be willing to make time to consider business owners' concerns and make every attempt to address those concerns and accommodate their needs.

Efforts should also be made to **coordinate with construction programs at the state, county, and local levels to ensure that there are no planned construction projects scheduled to occur on the day of event.** Unanticipated roadwork in a rural area with limited access routes could have a significant negative impact on an otherwise well-prepared traffic plan on the day of event.

It is also important for rural areas that have the use of only a limited number of roadways for event traffic to **consider rerouting commercial vehicles and other non-event-related vehicles around the area of the event venue.** Communicating with neighboring localities and counties and working with them as necessary to establish alternate routes is also important. Placing dynamic message signs on roadways leading into event areas to help provide decision points for travelers who wish to avoid these areas can improve ease of travel throughout the region of the event. Publicizing these events and advising the region's population about alternate routes and diversions through media outlets will also help eliminate unnecessary use of roadways in the vicinity on event day.

In terms of technology, it is important to plan ahead. **If a new piece of equipment will be used for an event, it is important to set it up and test it in advance of the event,** so that any problems or failures can be worked around or resolved ahead of time. Older equipment should also be checked prior to deployment to ensure it is in reliable working condition.

Lessons Learned

Lessons Learned

In planned special events, the value of ITS is often directly proportional to the commitment of the stakeholders. When planning is characterized by communication and active participation of stakeholders, the value of ITS tends to increase because there are more people who benefit from the wider access to timely and accurate information that ITS make possible. As a result, most of the lessons that successful planners have taken from their experiences with planned special events focus not so much on the technologies that work best for them, but the aspects of coordinating, planning, and implementing a transportation plan that lends value and usefulness to the information the technologies provide.

This section summarizes the lessons learned at the six sites profiled in this study. Some lessons were reported at multiple sites, while other lessons represent the experience of only one location. Interviewees were eager to share their lessons with others, to help make it easier to plan, design, implement, and maintain ITS technology for planned special events in the future. Lessons are divided into three categories that correspond to phases in planned special event management: event planning and coordination, day of event, and after-action/post-event.

Event Planning and Coordination

- **Hold regular coordination meetings in advance among stakeholders.** Coordination meetings provide the opportunity not only to coordinate upcoming events, but also to cement relationships among the agencies and groups that participate in the meetings. Organized meetings where the participants get to know each other and learn how to communicate and work together set the stage for day-of-event activities.
- **Understand that each agency operates in a manner that is consistent with its own goals and operational concepts.** It is important to learn what these goals are and keep them in mind when moving forward with an event. Developing understanding on both the institutional and the individual levels contributes to well-coordinated planning for special events on both regional and local bases.
- **When planning for a regularly held event, have a fluid plan and to be open to change.** In any growing community, infrastructure changes from year to year, businesses enter or leave the community, roadways are built, and signals are added and need to be coordinated. These changes are all in addition to the normal operational changes that occur in a community and need to be considered during the event planning stage.
- **Develop a contingency plan for evacuation of the venue.** Pre-planning evacuation-related messages for dynamic message signs and pre-recording HAR messages are components of an evacuation plan. It is also important to know the chain of command and plan for communication among emergency responders in the event that contingency measures need to be implemented.

Lessons Learned

- **Coordinate with construction programs at the state, county, and local levels to ensure that there are no planned construction projects scheduled to occur on the day of event.** Unanticipated roadwork in venue areas with limited access routes could have a significant negative impact on an otherwise well-prepared transportation plan on the day of event.
- **When planning, remember the needs of local citizens as well as event attendees.** It is important to recognize the importance of keeping event participants out of local neighborhoods by closing off streets in residential areas. It is also important to remember that local citizens may need to move around the venue area during events. The needs of both event attendees and local residents should be considered when adjusting signal timing plans.
 - **Pay attention to feedback from local citizens.** An intangible measure of success for any event is how many residents indicate that they are able to move around the event areas and get where they are going with minimal delay.
 - **Take into account the inputs and needs of small businesses, which play an important role in the economy of smaller towns and rural areas.** Planners should be willing to make time to speak with local business owners and attempt to address their concerns and accommodate their needs when developing traffic plans.
- **When developing a traffic plan, consider establishing detours for commercial vehicles and other non-event-related vehicles around the area of the event venue.** This pre-planning is particularly valuable in rural areas and in localities where there are a limited number of roadways for event traffic to use. Commercial vehicle drivers will benefit in reduced fuel and travel time by avoiding event-related traffic.
 - **Communicate with neighboring localities and counties and coordinate with them as necessary to establish alternate routes in their jurisdictions.**
 - **Consider approaching other localities or state agencies about borrowing dynamic message signs or other equipment.**
- **Put portable dynamic message signs in place several days prior to the start of a planned special event to inform motorists of the event and give them sufficient time to find and become familiar with alternate routes.** This practice can reduce the number of local motorists who are using the roadways that serve the event and contribute to decreased traffic delays associated with the event.
 - **Place dynamic message signs on outlying roadways that lead into event areas to provide a decision-point strategy for travelers who wish to avoid the event area.** This placement can improve ease of travel throughout the region on the day of event.
 - **Take time to plan message content.** By reviewing the quality, accuracy, and impact of pre-event message content on the travel patterns of a community, planners can craft messages

that maximize the value of the signs to both local and visiting motorists.

- **Test equipment thoroughly before the day of event.** If a new piece of equipment will be used for an event, it is important to set it up and test it in advance of the event so that any problems or failures can be resolved ahead of time. Older equipment should also be checked prior to deployment to ensure it is in reliable working condition.

Day of Event

- **While the event is actually underway and plans are being executed, have the same core members of the planning group available to modify the plan as necessary.** The greatest benefit of the regularly held pre-event meetings is to keep the stakeholders working together as a seamless team through the implementation, so having these same people on hand for the event is vital. The level of commitment shown by the participating agencies to pre-planning, integration, and teamwork is the best indicator of a successful operation when the day of the event arrives.
- **Use the local media to publicize special events and advise the population of the region about alternate routes and diversions.** This kind of outreach may be especially valuable for venues in rural areas, areas with smaller populations and areas with less developed infrastructure.
- **Have agency staff or field technicians conduct on-site observations during large special events.** Transportation planners find that it is helpful for staff members to identify problem areas and then travel to those areas to provide on-site assistance and real-time communication with the transportation operation managers. The combination of CCTV cameras and dedicated personnel on site can be very effective in helping to maintain continuity of traffic operations throughout a planned special event.
- **Use state or regional motorist assistance vehicles to patrol the roadways around events, borrowing from other agencies if necessary.** Motorist assistance patrols are particularly valuable in areas where video surveillance is not available. These vehicles are equipped to move people and disabled vehicles out of the roadway quickly and safely. Operators can quickly apprise managers of incidents, speeding response and recovery. Assistance patrols often garner enthusiastic praise from stranded motorists, helping agencies maintain the good will of the traveling public.

After-Action/Post-Event

- **Develop an after-action review of each special event, both to identify shortcomings as well as to determine what worked well so successful practices can be expanded or used for other events.** An after-action or post-event review provides an opportunity to receive feedback from people involved in all facets of a planned special event, from on-site field staff, to TMC staff, to the general public. Such reviews also enable event planners to identify any underutilized capacity and think about how to utilize that capacity to its fullest for the next event.

Conclusion

The use of ITS helps to ease the congestion and frustration that accompany many planned special events. ITS offer benefits to all types of agencies that host planned special events, from large urban areas that host special events throughout the year to small rural areas that host only one or two events annually. Transportation officials in localities around the country have recognized the important role ITS technologies play in the success of their planned special events. Many of these individuals also recognize that without these technologies, managing the transportation needs of both event attendees and local citizens would be a much more challenging proposition.

A key component to a successful event is not only the integration of different traffic management system components and technologies, but also the integration of the stakeholders themselves into a coordinated and cohesive team. Without a well-established line of communication and a strong sense of coordination among transportation agencies, law enforcement and public safety agencies, emergency responders, event planners, the media, and interested local parties, ITS technologies are simply expensive tools sitting in a toolbox.

No matter the type of event or its size, the most important element is having a well-prepared plan and executing it with the full cooperation of all of the organizations involved.

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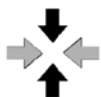
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“The impacts of special events can certainly be harnessed, or at least mitigated significantly, with good use of technology.”

—Jim Gillooly, Deputy Commissioner, Boston
Transportation Planning Department

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