AMERICAN TRAFFIC SAFETY SERVICES ASSOCIATION

SMARTER WORK ZONES

PROJECT COORDINATION AND TECHNOLOGY APPLICATIONS

ATSSA

SAFER ROADS SAVE LIVES

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U.S.Department of Transportation
Federal Highway Administration

Produced as a joint effort with the
Federal Highway Administration (FHWA)

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Overview

Aging roadway infrastructure and increasing highway congestion mean additional road work, resulting in greater work zone impact on the motoring public. Based on 2013 crash statistics, an average of 131 injuries and 1.6 fatalities occur in highway work zones every day. Additionally, work zones are estimated to account for 10 percent of all congestion. Proactive management of work zone traffic operations is necessary to ensure motorist and worker safety, minimize travel delay, maintain access to local businesses and residences, and ensure timely completion of road work.

The Federal Highway Administration's (FHWA's) Smarter Work Zone (SWZ) initiative was developed to promote innovative strategies for safe and operationally efficient work zones by emphasizing Project Coordination – the proactive management of road construction to reduce the collective impacts of work zones from multiple projects and Technology Applications – the integration of technology to facilitate data-driven operations and performance management in highway work zones.

The following case studies illustrate examples of agencies using SWZs through Project Coordination and Technology Applications for improved management of work zone impacts and associated improvements in safety, mobility, and construction time and cost savings.

This publication was developed as a result of a partnership between the American Traffic Safety Services Association (ATSSA) and the FHWA Center for Accelerating Innovation, FHWA's Work Zone Management Program, and the Every Day Counts (EDC-3) Smarter Work Zones Implementation Team. ■

Overview Figure: Smart Work Zone/ITS systems have shown that they can reduce or completely eliminate rear-end collisions by reducing queuing, congestion and confusion by giving motorists information far upstream, away from the actual work. On this Texas roadway, a large truck reduces speed after the driver receives a warning of stopped traffic ahead. (Source: TxDOT)

Smarter Work Zones (SWZ) is an initiative under FHWA's Every Day Counts program to promote innovations that improve safety and mobility in work zones. Technology Applications is an SWZ innovation that involves deployment of Intelligent Transportation Systems (ITS) for dynamic management of work zone traffic operations.

Case Study 1: Iowa DOT Intelligent Work Zone Deployments

Background

To address traffic safety and mobility challenges in work zones, the Iowa Department of Transportation (DOT) initiated the Traffic Critical Projects (TCP) program in 2014. The program identified key construction work zones that required enhanced Transportation Management Plan (TMP) components to achieve well-defined, measurable goals for improved mobility and safety.

One approach to minimizing work zone mobility and safety impacts in TCPs was to deploy intelligent work zone (IWZ) systems.[1] Iowa DOT managed their deployment of IWZ based on the six-step process outlined in FHWA's *Work Zone ITS Implementation Guide*.

Step 1 - Assessment of Needs

Iowa DOT relies on operational thresholds to determine the qualification of individual projects as a TCP. Identification of a TCP triggers initial coordination with several stakeholder groups, including personnel from various Iowa DOT offices, support consultants, and equipment vendors. The stakeholders work cohesively to develop, improve, and accomplish the goals and objectives of the project. Based on the specific safety and mobility concerns of a given TCP, a variety of mitigation strategies (work day restrictions (day of week / seasonal), night work / limited work hours, innovative contract provisions such as lane rental, traffic incident management plans, or IWZ systems) may be considered for implementation. During the 2014 construction season, 14 work zones were identified as TCPs.

Step 2 - Concept Development

A concept of operations for the IWZ system was developed based on discussions with each Iowa DOT district. The general concept included traffic surveillance, incident warning and notification, and end-of-queue warnings to drivers, but was flexible based on the specific needs at

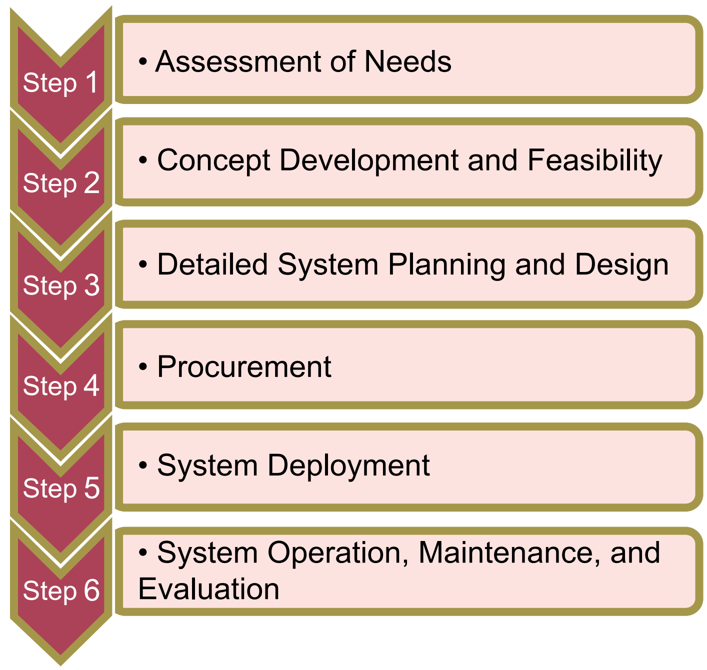

Figure 1: The Work Zone ITS Implementation Guide six-step process. (Source: Publication FHWA-HOP-14-008)

each work zone. The IWZ system consisted of the following components:

- Side-fire radar traffic speed and volume sensors
- Closed circuit television (CCTV) cameras
- Portable changeable message signs (PCMS)

Step 3 - System Design

The Iowa DOT undertook a system design process for implementing the necessary components based on the specific work zone area and existing technology infrastructure. The IWZ system was designed to expand on each site's existing traffic management capabilities and incident response technologies. In addition, all of the IWZ deployments in 2014 were designed to be integrated into the statewide Traffic Operations Center (TOC) via existing traffic management software.

1 - This case study is largely derived from "Traffic Critical Projects Program 2014 Evaluation Final Report." Iowa Department of Transportation; January 14, 2015.

Figure 2: Map of 2014 IWZ deployments in Iowa. (Source: Iowa DOT)

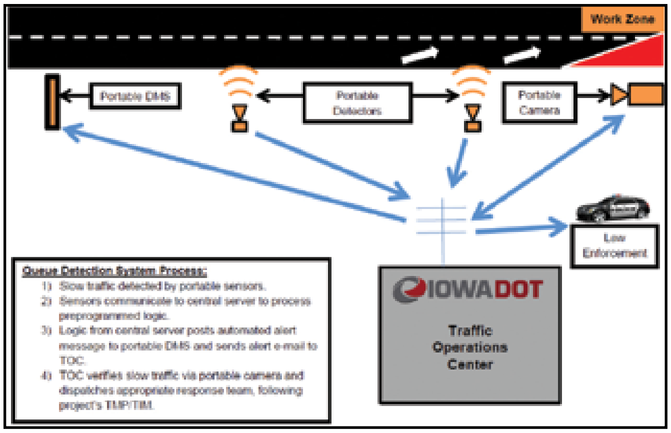

Figure 3: Queue Detection System. (Source: Iowa DOT)

Step 4 - Procurement

Following consideration of various options for procurement, Iowa DOT determined that a standalone, qualification-based procurement contract for an IWZ device vendor would provide the greatest benefit at lowest cost to meet TCP program goals. Three separate contracts allowed for smaller geographic area and reduced equipment needs than a single statewide contract. Contract language for the IWZ vendor responsibilities included:

- Coordinating IWZ integration with existing advanced traffic management system (ATMS) software;
- Monitoring the health of IWZ systems to provide uninterrupted service;
- Maintaining and updating IWZ equipment;
- Coordinating with project and construction personnel;
- Deploying, troubleshooting, and relocating equipment, as requested.

A standalone IWZ vendor contract separate from construction contracts was employed to ensure the vendor had the required technical expertise, to allow quicker and easier response to system operations, and for flexibility to add or remove IWZs to projects not initially identified on the original TCP list.

Step 5 - System Deployment

For system deployment, planned IWZ device locations were first verified and marked in the field for optimal visibility and to maintain state and federal sign spacing recommendations. The IWZ vendor would then bring the equipment on site, placing devices at the marked locations in the corridor, and provide device details for software integration. Software integration involved entering the IWZ equipment into the existing traffic management software and incorporating alert processing logic required for end-of-queue warning systems. This also included adding the IWZ PCMS and cameras to the public 511 website and mobile application.

Step 6 - System Operation and Evaluation

When messages were posted on PCMS about stopped traffic conditions, TOC staff received e-mail alerts. TOC staff then verified slow traffic using cameras, speed probe data (INRIX and Google Traffic) and TOC software to identify queues. When an incident was identified, the TOC dispatched a response team, as needed per the project TMP and traffic incident management plan.

In addition to real-time monitoring of device communications, the support consultant passively monitored sensor data consistency. Reports were created and run daily for the previous day's operations on all IWZ sensors.

Central operations of all equipment at the statewide TOC provided a major advantage in leveraging existing resources, while the TOC operators' ability to actively monitor traffic vastly increased the IWZ accuracy and value to the traveling public.

Following IWZ deployments, the Iowa DOT TCP project team and the Institute for Transportation Research at Iowa State University conducted a system evaluation and review. The team assessed the IWZ systems' ability to mitigate work zone mobility, assessed safety impacts using performance data, and identified lessons learned.

Conclusion

The Work Zone ITS Implementation Guide provided a framework for IWZ system deployments, which were a key contributor to the success of the Iowa DOT's 2014 TCP program that resulted in substantial improvements in traffic safety and mobility on construction projects across the state.

Lessons Learned

- A standard operating procedure to establish authority, responsibility and formal processes for device deployment should be developed for performance, reporting, operating and monitoring the equipment.
- Detailed performance specifications are a necessity for work zone technology applications.
- The integration of existing technology infrastructure into the temporary work zone system can avoid duplicating roadside equipment and reduce cost.
- A statewide work zone technology applications program should engage relevant stakeholders, including DOT offices and district staff, consultants, and equipment vendors.
- Construction project contracts should include provisions to coordinate with other vendors deploying technology applications.
- The location of all deployed devices must be accurate—preferably GPS location information via cellular modems.
- The device vendor should provide communications to facilitate device integration and provide reliable communication for system operations.
- Simulated and actual field-testing should be completed on each deployment using set test thresholds and pre-determined test messaging.
- Monitoring device health improves overall system performance.

Additional Resources and Information

Additional resources on SWZ technology application strategies can be found at: https://www.workzonesafety.org/swz/main

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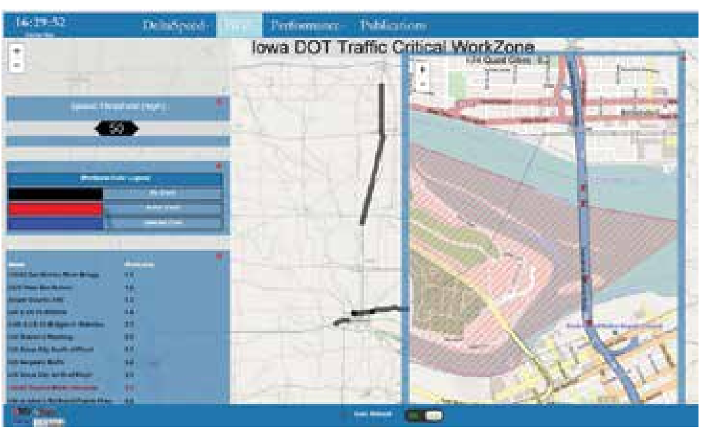

Figure 4: Real-time IWZ monitoring at the TOC to locate queues. (Source: Iowa DOT)

Figure 5: The percentage of missing data was calculated for all IWZ sensors. (Source: InTrans)

Case Study 2: Indiana DOT Use of Third-Party Data for Work Zone Management

Background

The Indiana Department of Transportation (INDOT) began experimenting with third-party data in 2011 when structural issues prompted a five-month emergency closure of the I-64 Sherman Minton Bridge over the Ohio River, a chief commerce route between Indiana and Kentucky. Major detours onto neighboring routes resulted in INDOT's need for data to monitor traffic conditions.

For this effort, INDOT contracted with a third-party data provider specifically to monitor conditions and make operational changes as conditions warranted. Soon after, INDOT decided to acquire third-party data for statewide traffic management activities to gain better coverage and penetration for monitoring conditions on roadways where sensors do not exist and are cost-prohibitive.

Using Third-Party Data to Plan, Assess and Modify Work Zone Operations

Managing Congestion During an Unplanned Closure: I-65 at Wildcat Creek

A major, unexpected bridge closure on I-65 over Wildcat Creek in August 2015 resulted in a month-long, 60-mile detour for interstate traffic. Limited field sensor information was available to understand the impacts along the detour route. To address this lack of operational data, INDOT requested a third-party data provider obtain traffic information for the detour route. The availability of third-party data eliminated the cost of installing additional field sensors and provided sufficient coverage and resolution for assessing operations along the typically lesser-traveled route.

Leveraging Existing Resources

INDOT did not procure third-party data specifically for work zone management. Third-party data was already in use for signal re-timing, decisions on bypass construction, and calculating user delays across the road network. It is easier for work zone programs to access third-party data if the agency already has a relationship with a vendor and can leverage existing resources.

Modifying Construction Schedules: I-94 and I-65

Third-party data can be used to verify that changing construction windows will help maintain mobility.

When a construction project on I-94 east of Chicago exhibited unused capacity, based on third-party data, the DOT took advantage of the unused capacity and expanded construction hours. This allowed an earlier completion and decreased project cost.

On a freeway expansion and bridge rehabilitation project on I-65 in Seymour, Indiana, third-party data was used to determine that delays were longer than originally forecast. INDOT reduced construction hours during the periods where congestion was most pronounced to increase mobility.

Leveraging Relationships

The Joint Transportation Research Program (JTRP) is an established research partnership between INDOT and Purdue University (http://www.in.gov/indot/2700.htm). Purdue University researchers and INDOT traffic management officials collaboratively analyze third-party data and investigate innovative applications. The third-party data provider contributes to the effort by modifying the format of datasets as needed to use in developed tools.

Assessing a Work Zone Traffic Control Plan: I-65 Overpass at US-231

A different work zone project involved an assessment of the traffic control plan for I-65 overpass work at US-231. Due to construction activities, traffic would not be able to use the overpass. Because the construction was at an interchange, it was possible to re-route traffic to the off-ramp upstream of the overpass, across US-231, and back onto the freeway (downstream of the construction site) using the on-ramp. Two lanes were maintained on the ramps, access to US-231 was restricted, and the speed limit was reduced to 35 mph. Historical third-party data was used to assess the feasibility of the re-route to maintaining mobility, and third-party data was used to later confirm that no drastic reduction of speeds were experienced during construction.

Conclusion

Third-party data is becoming an integral part of INDOT business practices. Since first procuring it in 2011, INDOT has successfully used it for a variety of applications that have demonstrated value to justify continued and expanded use for work zone management.

Lessons Learned

- Have clear expectations on needs and have the proper tools to handle the data in place once third-party data feeds are activated.
- Leverage existing resources: third-party data is used for other agency purposes.
- Leverage existing relationships with research programs to identify and develop innovative solutions for program needs and gaps.

Additional Resources and Information

Additional resources on SWZ technology application strategies can be found at:
https://www.workzonesafety.org/swz/technology_application

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Case Study 3: Leveraging Permanent ITS for Work Zone Traffic Management in Las Vegas, Nev.

Background

The transportation management system in Las Vegas, Nevada, is termed the Freeway and Arterial System for Transportation (FAST). FAST includes a freeway group and an arterial street group. Local agencies handle the basic maintenance needs of the arterial system components (signals, cameras for signal detection), and FAST handles the management and maintenance of closed-circuit television (CCTV) cameras, freeway traffic sensors, ramp metering and changeable message signs (CMS).

Using FAST for Work Zone Management

From a technology perspective, FAST comprises many of the components that are commonly used to manage traffic in a metropolitan area, but the ability to coordinate both arterial street and freeway operations gives FAST an advantage that few transportation management centers across the U.S. possess.

Components of the FAST system provide a wide range of tools to help address construction and maintenance activity-related impacts, both proactively when advanced notification of upcoming lane closures is provided, and reactively when visual monitoring of traffic conditions picks up on impacts from construction activity (i.e. utility work) not communicated to the FAST operators. Coordination extends beyond normal day-to-day lane closure notification to work zone planning, programming, and design decisions to integrate communications for work zone ITS deployments with FAST. FAST operators exercise dynamic control of traffic through manual control of CMS messaging, traffic signal and ramp metering systems.

One example of the capabilities of FAST to manage work zone traffic operations was a 5.5-mile crumb rubber overlay on I-15 in 2011. For this project, travel on I-15 was restricted to two lanes per direction between Sunday evening and Thursday morning for four consecutive weeks. A continuous paving operation was also required on one weekend to complete the job.

FAST personnel monitored cameras and flow detectors throughout the network during the project and used Google Maps to assess conditions on the key arterials where they lacked surveillance coverage.

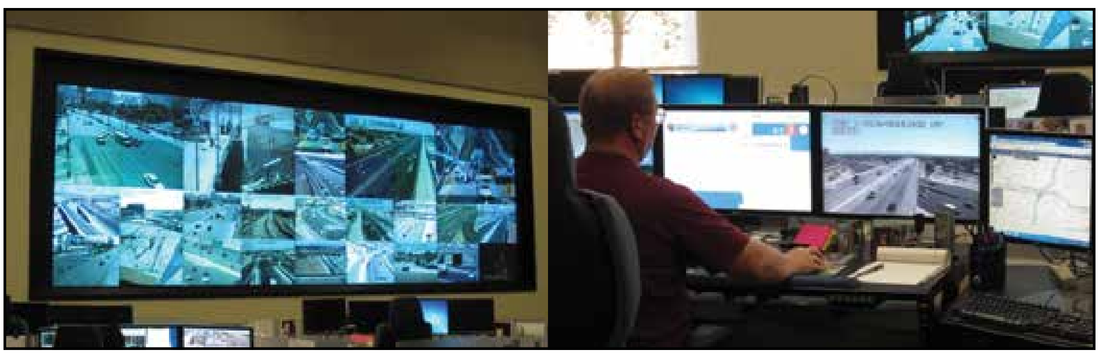

Figure 6. Photo. The Las Vegas FAST Control Room. (Source: FHWA)

I-15 RESTRICTIONS
CHARLSTN TO TROP
SUN 7PM - THUR 7AM

(a) Prior to the work activity

I-15 LANE CLOSURES
EXPECT DELAYS
USE ALTERNATE ROUTES

(b) During the work activity

Figure 7. Illustration. Examples of CMS warning messages posted by FAST personnel for work activity on I-15. (Source: G.C. Wallace, Inc.)

Figure 8. Map. Location of I-15 crumb rubber overlay project, Fall 2011. (Source: Texas A&M Transportation Institute)

The reduced capacity of I-15 caused significant diversion to the arterial street system. The amount of diversion varied day-to-day and hour-to-hour, presumably due to the effects of drivers learning and experimenting with various diversion alternatives. FAST personnel implemented numerous changes in existing signal timing plans over the course of the project, but found it difficult to establish an optimum timing plan due to the continuously changing travel patterns.

A primary goal was to minimize “demand starvation” at any of the signals due to upstream intersection traffic signal timing problems. FAST personnel strove to minimize impacts on other movements at selected intersections upstream, within, or downstream of the project. In some cases, operators increased signal cycle lengths. In others, they adjusted timing offsets and splits.

Conclusion

The potential effectiveness of the operational changes made on the crumb rubber overlay project was evaluated through post-hoc traffic simulation analyses, which showed that the changes did improve operations slightly over what would have otherwise occurred. Overall, the changes were determined to have reduced delays by nine percent and stops by 11 percent in the morning peak period. The benefits in the afternoon peak period were less pronounced, reducing stops by three percent but increasing delays by 15 percent relative to a no change condition.

Lessons Learned

- Engage permanent ITS personnel early in the work zone planning process.
- Work zone crash risk is highest during the first few days of a project, so advance notification of changes in lane configurations or other temporary traffic control conditions is important.
- Lane shifts and other changes during a work zone project require timely re-calibration of detectors.
- A better understanding is needed of how traffic-related messages on CMS and other devices affect driving decisions and behavior.
- Establishing and maintaining a good relationship with the media can help maximize ITS effectiveness.
- Organize the incoming data from a ITS deployments in a logical way.

Additional Resources and Information

Additional resources on SWZ technology application strategies can be found at:
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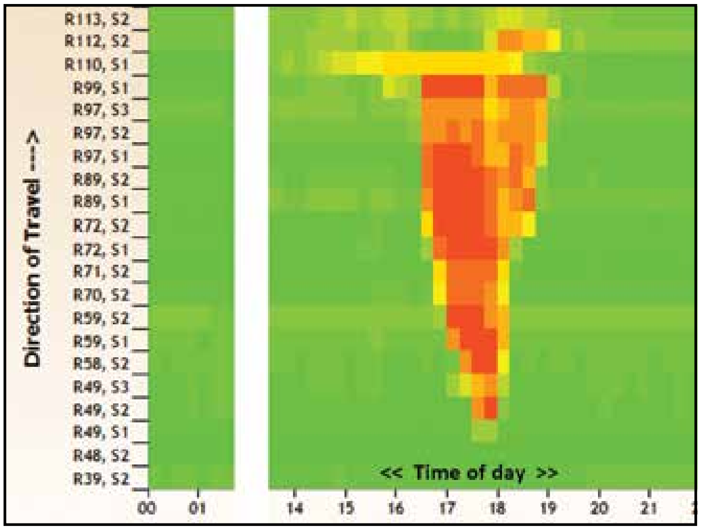

Figure 9. Chart. Example of a speed contour map generated using FAST data. (Source: FAST)

Figure 10. Map. Example of FAST crash performance dashboard. (Source: FAST)

Case Study 4: Traffic Mobility Performance Specification Monitoring Using ITS: Bangerter Highway, Utah

Background

The Utah Department of Transportation (UDOT) is moving toward performance-based specifications for projects, including performance specifications related to work zone traffic control. A performance-based specification establishes key safety and mobility requirements and thresholds that must be met and allows the contractor to determine how best to complete the project within the constraints of performance requirements specified by the agency.

While this approach can reduce costs and encourage innovation by allowing the contractor additional flexibility, it also requires the agency to monitor the work zone operations and determine if the contractor is not meeting requested performance specifications. A design-build project on the Bangerter Highway (SH 154) in Salt Lake City, Utah, offered an opportunity to test the potential of using a traffic mobility performance-based specifications, deploying ITS to monitor performance, and assigning liquidated damages according to contractor performance.

Performance Measurement for Work Zone Mobility

The Bangerter Highway project involved constructing three continuous flow intersections (CFIs) and one grade-separated interchange from August 2011 to April 2012. The intersections served a significant amount of traffic (56,000 vehicles per day on Bangerter Highway and between 18,000 and 31,000 vehicles per day on the cross-streets at each of the intersections).

UDOT bid the project with traditional prescriptive requirements for traffic control in terms of restrictions on hours of allowable lane closures and the maximum number of lanes that could be closed. UDOT also developed a hypothetical performance specification and tracked it during the project so as to compare the liquidated damages that arose due to violations of the prescriptive traffic control requirements with those that would have arisen if the performance-based specification had been used.

To track the performance-based specification, UDOT assessed baseline delay, determined reasonable performance thresholds, monitored traffic conditions, and assessed what amount of measured delay was due to construction-related impacts.

Existing permanent intelligent transportation systems (ITS) in the corridor included cameras and coordinated traffic signal timing, but these were not adequate to monitor movements. Ultimately, a Bluetooth solution was selected because current infrastructure did not allow accurate measurement of cumulative delay through the project segment, which had many access points.

The Bluetooth antennas were either solar or battery powered and included both GPS and cellular communication capabilities. The detectors were installed by securing them to roadside infrastructure. The antenna transmitted data at regular intervals to a server that matched Bluetooth addresses detected at successive antennas and computed the elapsed time between them.

Conclusion

The system worked as intended and yielded significant benefits to both UDOT and the contractor. UDOT and the contractor monitored both travel times directly computed from the Bluetooth system and the corresponding average speeds on the various segments and movements of interest. Over time, it was possible to establish confidence intervals around the average travel times and distinguish between

Figure 11: Map. Location of the Bangerter Highway Project. (Source: Google Maps, altered by Texas A&M Transportation Institute)

Figure 12: Photo. Example of a bluetooth antenna installation. (Source: JUB Engineers, Inc.)

normal day-to-day fluctuations in traffic conditions and truly unusual conditions that warranted attention and remedial actions.

Lessons Learned

- Ensure that the level of monitoring effort matches the needs of the project.
- Adequate advance time is needed between Bluetooth detector installation and project start.
- Bluetooth reader placement and settings will affect monitoring accuracy on routes with many access points for businesses.
- A significant traffic simulation effort is needed to establish realistic and acceptable thresholds.
- An ability to identify and document non-construction related impacts is important.

Additional Resources and Information

Additional resources on SWZ technology application strategies can be found at:
https://www.workzonesafety.org/swz/technology_application

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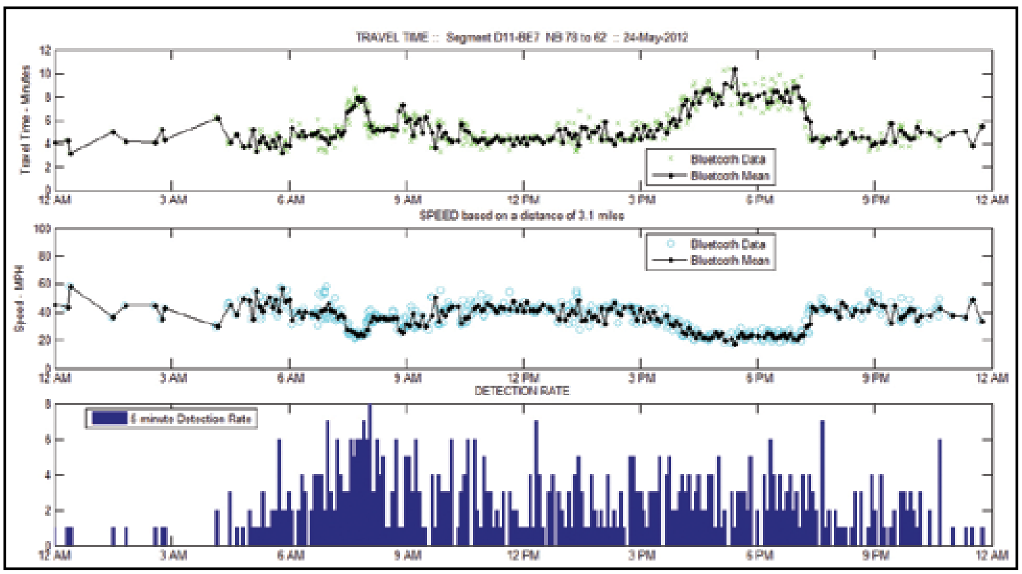

Figure 13: Graph. Example of travel time and average segment speed plots by time of day. (Source: JUB Engineers, Inc.)

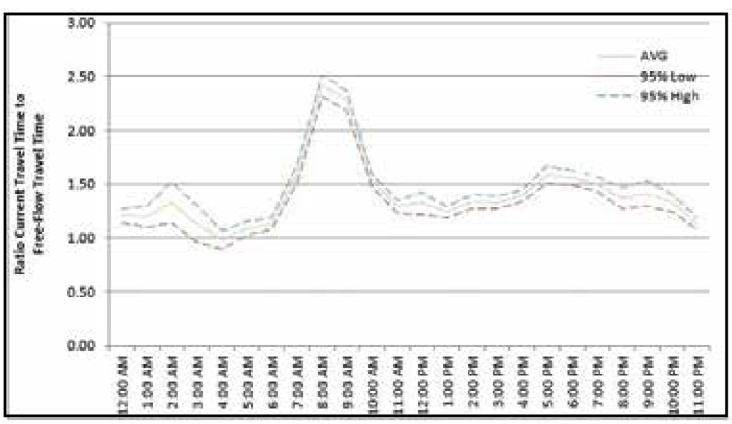

Figure 14: Graph. Example of a travel time confidence interval plot by time of day. (Source: JUB Engineers, Inc.)

Case Study 5: North Carolina DOT Collecting and Using Data from Manual Flagging Operations

The North Carolina Department of Transportation (NCDOT) is using an SWZ technology application to collect data at rural flagging operations for performance measurement. By employing k-band radar Doppler to collect data, NCDOT is monitoring mobility and adjusting operations for better work zone management.

Background

The Work Zone Safety and Mobility Rule[2] requires collection of work zone traffic operations data to better manage resulting safety and mobility impacts in work zones. Many technologies are available for work zone data collection, and recent innovations have made the practice easier and less expensive. Temporary data collection technologies, such as side-fire radar, side-fire microwave radar sensor and k-band radar Doppler, can be used in the field throughout a work zone's duration to support a variety of applications, including queue warning systems, traveler information and performance measurement.

Work Zone Mobility Assessment in North Carolina

NCDOT currently uses Kband Doppler devices to evaluate performance criteria for manual flagging operations for its Statewide Rural Surfacing/Resurfacing program. NCDOT partners with a traffic control company to collect and assess the devices' data.

At flagger stations in single-lane work zones, NCDOT uses wait time as the performance measure. While there are many different potential methods of assessing work zone mobility (such as queue length, travel time, and delay), wait time was selected because it relates to driver experience and is a value that the general public and elected officials can understand.

Figure 15: Manual flagging operations on low-volume two-lane roadways can have negative mobility impacts. (Source: FHWA)

For this application, a k-band Doppler device is placed at manual flagging stations to detect when vehicles are stopped (waiting). At the project's conclusion, the contractor removes the devices and assists NCDOT in processing the collected data. For every 15-minute period during active construction, a score is assigned based on the total amount of vehicle wait time at the flagger station (Table 1).

A daily score is devised by averaging the scores from all 15-minute periods when work zone operations are active, and a project's overall mobility performance rating is determined by averaging these daily scores (Table 2). Project duration ranges from one to 30 days.

At the project's conclusion, NCDOT examines instances of poor mobility for indications of events that may have resulted in a low mobility rating, for example, a paver or a plant breaking down or whether there were insufficient incentives for the contractor to maintain a certain mobility level.

If decreasing mobility is noted, NCDOT can take action to rectify the issue on future projects. The mobility measure provides a good starting point for conversations between NCDOT and divisions regarding division-level lane-closure decisions that will improve mobility in work zones.

Expanding Work Zone Data Collection Practices

NCDOT is tracking mobility performance project-by-project, and once enough data is collected, will develop a statewide mobility rating for rural work zones. The plan is to continue using k-band radar Doppler devices to assess wait time on rural flagging projects and eventually leverage third-party data sources to devise mobility performance measures on more heavily traveled routes. A goal is to be able to predict the number of 15-minute periods where poor mobility is expected in a work zone for a planned project, providing support for restricting lane closures during certain times. NCDOT also envisions eventually posting mobility data to a dashboard in real-time for managing work zone operations.

2 - 23 CFR 630, Subpart J.

Table 1. Average Wait Time Categorization System used by NCDOT	
Wait time	**Mobility Score**
<5 minutes	1
5-10 minutes	2
10-15 minutes	3
>15 minutes	4

Table 2. NCDOT Develops Average Daily and Project Mobility Score for Work Zones	
Daily/Project Average Mobility Score	**Mobility Performance Rating**
1.0	Excellent
1.1 - 2.0	Expected
2.1 - 3.0	Below Expected
> 3.1	Poor

Conclusion

NCDOT has developed a method for collecting data and assessing mobility for manual flagging projects on its Statewide Rural Surfacing/Resurfacing program. The mobility measure program is an example of a successful SWZ initiative that is currently undergoing expansion into other types of work zones.

Additional Resources and Information

Additional resources on SWZ technology application strategies can be found at: https://www.workzonesafety.org/swz/technology_application

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Case Study 6: Massachusetts Callahan Tunnel

This case study details the use of SWZ Technology Applications for the Callahan Tunnel Rehabilitation Project by the Massachusetts Department of Transportation (MassDOT). Technology Applications involved deployment of an ITS for dynamic management of work zone traffic impacts to improve motorist and worker safety and mitigate work zone-related congestion.

Background

MassDOT conducted an accelerated construction project that closed the Callahan Tunnel in Boston to all traffic from December 2013 to March 2014 displacing 30,000 vehicles per day. To address this challenge, MassDOT followed a systems engineering process outlined in the Federal Highway Administration *Work Zone ITS Implementation Guide* (FHWA-HOP-14-008).

MassDOT conducted a large-scale coordination effort with partner agencies to develop a transportation management plan. Partner agencies included the Massachusetts Port Authority (Logan Airport and Maritime Port), the Massachusetts Bay Transit Authority, City of Boston Transportation Department, law enforcement and first responders. The plan included three goals:

- Minimize congestion by monitoring queues, managing delays and encouraging traffic diversion to alternate routes with available capacity.
- Minimize the frequency and severity of crashes, injuries and fatalities on the alternate routes.
- Collect operations data to develop performance reports, allocate enforcement patrols, refine allowable working hours and evaluate throughput capacity.

System Design, Procurement and Deployment

Unlike traditional construction projects that establish a set detour route, MassDOT identified three alternate routes to navigate travelers to areas served by the Callahan Tunnel, including East Boston and Logan Airport. MassDOT also conducted early action items including:

- Removal of a median barrier to increase queue storage along a key alternate route.
- Evaluation of existing operations at 25 signalized intersections, equipment upgrade and implementation of new timing plans to improve traffic progression along the alternate routes.

MassDOT hired a consultant to provide work zone safety support and leveraged that contract for writing the ITS specifications on this project. The traffic monitoring and management component included 15 portable cameras, 11 camera and/or changeable message sign units and a vehicular probe sensor to collect data from the alternate routes. The ITS equipment and technology cost $950,000 which represents five percent of the full contract value. While costs will vary for every contract, equipment mobilization and calibration can require significant resources and represent a lower proportion of the cost when spread out over a longer duration than this four-month project.

MassDOT used a system dashboard to provide a quick snapshot of traffic conditions via a map view. Color codes on the map reflected the current traffic conditions. Operations personnel could access real-time cameras and view the corresponding message to ensure that it correlated to the conditions displayed on the map view. Additionally, the work zone ITS vendor created a dedicated website that provided easy access to the 21 cameras that were strategically placed around metropolitan Boston. This allowed MassDOT's partner agencies to have access to the project cameras to monitor conditions and react as necessary to better manage operations of their networks and equipment.

Conclusion

MassDOT's experience with ITS resulted in several lessons learned:

- The expected project impact on traffic operations should drive the agency's needs and goals for mitigating impacts to traffic operations.
- The use of portable ITS technology can be a valuable component of traffic operations management to be considered in developing the TMP.
- Development of a concept of operations early in the design process verifies that the mitigation strategy will address stakeholder needs and provides a clear understanding of the project requirements necessary to conduct a detailed system design.
- Detailed performance specifications are an absolute necessity for work zone ITS. Clearly specify the equipment, how the system should operate and what data are required in deliverables.
- A qualified technician in the field to quickly address maintenance concerns is extremely beneficial.
- Capture the data collected through the work zone ITS and generate performance measures in a report to share with stakeholders and improve system deployments.

Additional Resources and Information

Additional resources on SWZ technology application strategies can be found at:
https://www.workzonesafety.org/swz/main

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Part II: Road Project Coordination

Road Project Coordination is a Smarter Work Zones innovation that involves the proactive planning of roadwork to reduce the cumulative impact of multiple work zones on traffic. It may involve a single project or multiple projects within a corridor, network, or region and possibly across agency jurisdictions.

Case Study 7: Great Lakes Regional Transportation Operations Coalition

This study focuses on project coordination by the Michigan DOT (MDOT) in the I-94 corridor. The MDOT embraced a cultural shift from a project focus to an operations focus with statewide coordination along the I-94 corridor.

Background

The 275-mile I-94 corridor running from east to west across Michigan is overseen by three MDOT regions and covered by nine transportation service centers across nine counties. With each of these jurisdictions focusing exclusively on the various goals and responsibilities for their area, I-94 corridor travelers paid the price. There were 19 simultaneous work zones in 2010, creating a great deal of delay to travelers driving the full length of the corridor.

Early buy-in from agency leadership provided a catalyst to form an I-94 corridor partnership across MDOT regions for project collaboration. This group was empowered to establish goals and metrics and modify work zone design and implementation with the traveler in mind.

The idea for project coordination along Michigan's I-94 corridor began when MDOT's director experienced a two-hour delay due to multiple work zones along the corridor. The director's determination to alleviate future lengthy delays for the traveling public led to top-down momentum for management buy-in and support necessary for project coordination along the I-94 corridor.

Establishing Goals and Performance Measures

In 2011, a Corridor Operations Partnership (COP) was formed to develop a plan for project coordination. First the COP created a mission statement. Then the group established a maximum acceptable travel time delay and user delay cost on the three main segments of I-94 based on active and planned construction projects. The user delay cost measure provides a dollar value more easily used as justification to implement higher-cost changes to work zones (e.g., shifting daytime work to nighttime, adding work zone ITS to reduce mobility impacts, or adding towing incentives).

The creation of corridor-wide performance measures encouraged communication within and between the regions. Rather than using the MDOT regional boundaries, the project team decided on three segments based on decision points where travelers frequently enter and exit the corridor or divert to an alternate route. Creating segments with a traveler focus rather than an agency focus helped to foster collaboration between regions, encouraging neighboring regions that shared a segment to work together.

Implementing Project Coordination

Initially, MDOT developed a Gantt chart to schedule all construction and maintenance projects on I-94 and to avoid exceeding thresholds. During the design process, MDOT used CO^3 software to estimate work zone user delay costs and calculate incentives or disincentives for construction contracts, such as the cost of fines and towing provisions. The return on investment for these added costs includes improved project quality and traffic flow.

MDOT and its stakeholders meet weekly to discuss active work zones both at the regional level with all TSCs for each region and also corridor-wide across all regions. Discussions cover strategies to reduce delays and meet the threshold, work zone incidents and responses and ways to keep travelers informed. MDOT established corridor-level standards for consistent lane closure applications, signage and traffic control, minimum and preferred lane and paved shoulder widths and incident response strategies.

Initially, a basic stopwatch/probe vehicle approach was used to track travel delay. Later, MDOT made screenshots of Google traffic or the state traveler information website, MiDrive and calculated travel delay by hand for speeds under 20 mph. In 2013, MDOT began using the Regional Integrated Transportation Information System, which uses probe data and is able to provide an automated delay cost. User delay cost is now tracked on an hourly, weekly and annual basis and is used to create an internal scoreboard to evaluate how well the goals are being met.

Institutionalizing Project Coordination

Since the I-94 corridor, MDOT has shifted from a deadline-based project completion focus to an operations focus, tracking mobility impacts on the corridor, seeing whether the cause of delays are incident- or work zone-related and taking a second look at the projects that are causing congestion. This cultural shift required management buy-in for the changes to be made agency-wide. Given the success of project coordination along I-94, MDOT is working to develop similar practices for the I-75 corridor.

Additional Resources and Information

Additional resources on SWZ project coordination strategies can be found at:
https://www.workzonesafety.org/swz/project_coordination

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Case Study 8: Texas DOT I-35 Corridor Project Coordination

Background

In Texas, Interstate 35 is a major corridor stretching from the City of Laredo on the border with Mexico to the Oklahoma state line. Traffic volumes range from 55,000 to 111,000 vehicles per day along this route, with over 30 million travelers per year using the corridor. It is heavily used by large trucks, which typically comprise 25 to 35 percent of the traffic volume. Truck traffic volumes can be as high as 80 percent at night. Approximately two-thirds of the traffic is through-traffic, meaning that both the origin and destination of these vehicles are located outside of the Waco District segment.

Starting in 2011, the Texas Department of Transportation (TxDOT) embarked on a $2.1 billion project to widen I-35 to six lanes from Hillsboro to a location just south of Salado. Construction is expected to continue through 2018. The project includes 17 construction projects in this 96-mile segment in the Waco District. With numerous lane and freeway closures anticipated for the widening and related reconstruction of bridges, TxDOT assumed a proactive role by managing construction impacts along the corridor.

Program Coordination Efforts

To better coordinate project activities and reduce potential traffic impacts, TxDOT uses mobility coordinators whose primary function is to watch for potential traffic mobility issues and find ways to resolve them before they occur.

To accomplish this, a system was established for contractors to submit advance notification of plans to close one or more freeway lanes. An overall Construction Traveler Information System (CTIS) was designed and implemented for this construction effort. It included a subsystem (termed the Planned Closure Notification System) that allowed contractors, TxDOT staff, and mobility coordinators to enter lane closure information into a database.

For each lane closure submitted, the CTIS performs an analysis of expected traffic impacts. This occurs within a subsystem termed the Lane Closure Assessment System (LCAS).

For each lane closure in the database, an LCAS report is generated. The LCAS output includes expected queue lengths and delays for individual lane closures.

Because traffic volumes and work zone capacity can vary from expected values on a given day, a “worse-case” scenario is also computed using a 10 percent increase in traffic volume and a 10 percent decrease in work zone capacity. The impacts of any other lane closures anticipated each night are calculated in a similar manner.

TTI staff developed an automated system to calculate corridor travel time by direction for various departure points and times each day or night. The system accounts for travel time between lane closures and estimates the expected delay associated with each lane closure corresponding to the calculated arrival times.

A threshold value of 30 minutes was selected for the maximum allowable corridor delay. Mitigation plans are used when corridor delays in excess of 30 minutes are expected. A contractor may be asked to begin work later in the evening or reschedule for another night. When several lane closures are requested, consideration is given to the type of work planned, duration, distance between closures, the critical nature or priority of the planned work, and the order requests were received.

This approach gives TxDOT a tool to better manage traffic operations through multiple lane closures and to take corrective measures when projected delays exceed acceptable thresholds. Overall, the mobility-monitoring program is an effective means of fostering project coordination between many projects on I-35.

Figure 16: Map of I-35 construction limits. (Source: Texas DOT)

Conclusion

TxDOT initiated clear, well-defined, yet flexible processes to coordinate project tasks. This reduces the maximum mobility impacts that travelers experience and keeps traffic flowing during construction. This case study includes the following best practices:

Delegate decision-making authority - Decision-making occurs more quickly if it is made at the field level (i.e., between contractors and TxDOT project managers). TxDOT successfully avoided the need to run routine decisions through a hierarchical chain of command by empowering resolutions at lower levels.

Establish explicit procedures to collect, analyze and act upon needed project data - While TxDOT construction contracts on the I-35 corridor did not include specific requirements for contractors to coordinate with adjacent projects, they are required to submit requests in advance for planned lane closures. Collecting that data and automating the analysis process of the lane closure requests was needed in order to identify potential working nights of project overlap and coordination requirements.

Apply sufficient resources to accomplish project coordination objectives - TxDOT had dedicated mobility coordinators to encourage collaboration between stakeholders. For complex and high-visibility projects, it is helpful to have the same individuals follow the project process from beginning to end.

Keep communication lines open - TxDOT held regular meetings between project decision makers (project engineers, contractors, subcontractors, etc.) so they could report upcoming activities and discuss the potential impacts. This allowed stakeholders to address potential problems and develop required mitigation plans sooner.

Additional Resources and Information

Additional resources on SWZ project coordination strategies can be found at:
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Case Study 9: Oregon DOT Project Coordination for Statewide Bridge Rehabilitation

Background

Under the Oregon Transportation Investment Act III State Bridge Delivery Program, the Oregon Department of Transportation (ODOT) planned to repair or replace more than 300 bridges over eight years at a cost of over $1.3 billion. The Bridge Delivery Program began in 2004.

Due to the age and weight limits of Oregon's bridges, freight mobility would be significantly impacted if the sequencing of these projects was not coordinated. To avoid major economic impacts, the Oregon Bridge Delivery Partners (OBDP), a private management firm, was formed to manage mobility. OBDP worked closely with ODOT and other stakeholders to address mobility impacts through project coordination strategies.

OBDP took a two-fold approach to project coordination by first assessing physical restrictions (primarily for freight) and second from a traffic delay standpoint (for the traveling public).

To maximize mobility from a physical restriction standpoint, OBDP required the capacity of each network segment to handle permit loads (i.e., overweight, overwidth, overheight and overlength trucks). In some cases, the terrain limited viable detours naturally, but the goal was to accommodate freight along corridors by identifying the significance of physical restrictions to each segment required by the necessary bridge projects.

To maximize mobility from a traffic delay standpoint, OBDP broke the roadway network into corridors and segments. With known pre-construction travel times, they calculated and aggregated the estimated delays anticipated during construction. The results of the delay analyses were used to make decisions about the choice of construction staging strategies and the construction schedule. The key corridors were divided into smaller segments. Delay and travel time thresholds were established for each segment. These thresholds were enforced 24 hours per day, 365 days per year.

Physical Restriction Analysis

Approximately 75 percent of freight movement in Oregon is accomplished by truck. Collaboration with the trucking industry was critical during project development to ensure the design and staging solutions met the needs of the trucking industry and ODOT. With limited options for detours, keeping existing roads open was crucial.

Based on a detailed analysis of the aging bridges in Oregon, a prioritization strategy was recommended by the ODOT Economic and Bridge Options Team. The team strongly supported the concept of staging the bridge projects by starting with freight corridor alternatives in central and eastern Oregon and leaving the interstates for later.

Traffic Delay Analysis

The processes established for maintaining mobility were developed and published in a document now known as the *Mobility Procedures Manual*. Delay was defined as the additional time required to travel from one point to another as a result of work zone activities. Establishing the delay

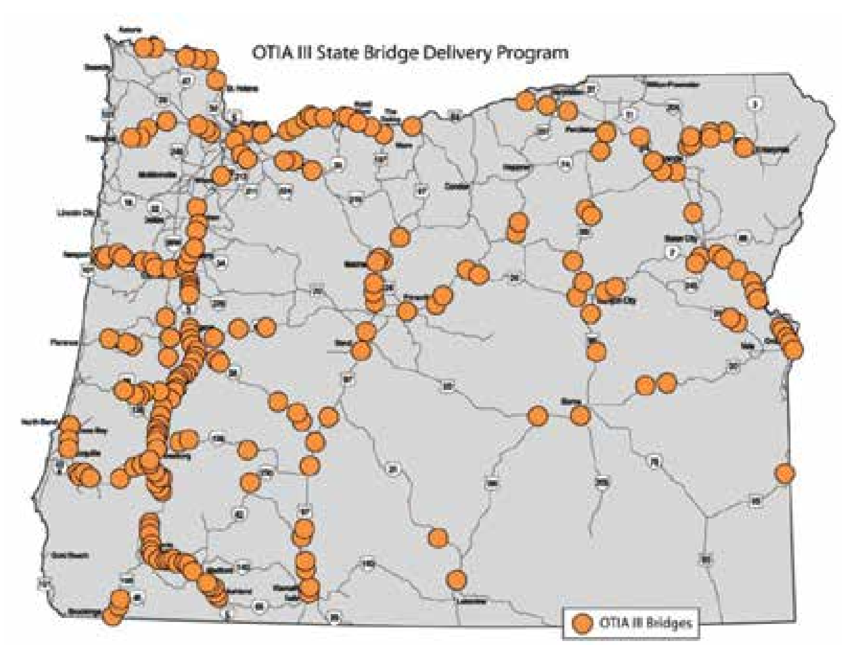

Figure 17: Location of bridges in the state Bridge Delivery Program. (Source: Oregon DOT)

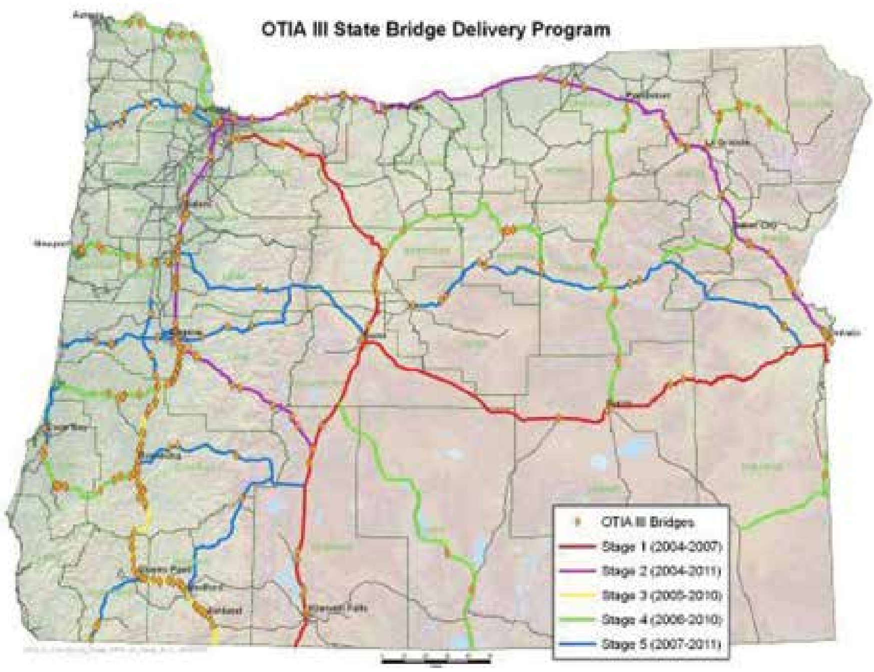

Figure 18: OBDP construction stages for corridors. (Source: Oregon DOT)

thresholds early was important because the designers were required to consider them when developing the staging of their projects. To accomplish this, the corridors were broken into segments and each segment was assigned a delay threshold. For each of the three projects, the expected delay was computed using ODOT's Work Zone Traffic Analysis tool.

Each project was assessed to determine if changes to the schedule were possible. In this case, potential conflicts with a limited, in-water work window would have been created, so a schedule shift was not possible.

After careful consideration, a diversion structure in the median was the chosen solution. All three projects were reconsidered to determine which project could more readily accommodate the temporary diversion structure. That outcome was incorporated into the project's construction plans. The expected cumulative delay under the new scenario was less than seven minutes.

Conclusion

Overall, the Oregon Transportation Investment Act III State Bridge Delivery Program is a good example of project coordination. OBDP used clear, well-defined, flexible processes to minimize mobility impacts and keep traffic flowing during construction for ODOT and the freight industry.

ODOT's Smarter Work Zone project coordination efforts are beneficial because they:

- Minimize delays and provide better evaluations of the mobility trade-offs between project alternatives.
- Coordinate work on parallel routes.
- Help communicate delays.
- Improve collaboration with the freight industry.

Additional Resources and Information

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Case Study 10: Project Coordination Using GIS for Municipal Agencies

Background

Good project coordination requires the collection and sharing of timely, accurate project data. Stakeholders should also have an understanding of the potential impacts of each project and have a defined, well thought-out coordination process in place. This will help stakeholders meet project objectives, improve work zone safety and lessen delay impacts.

Tools for Collecting and Sharing Project Data

Some agencies use consolidated databases that help them track project data across different regions or districts. These databases may be developed internally or purchased from a commercial vendor. In many cases, this information is used for internal coordination and may not be as readily available to stakeholders outside of the agency. In other cases, multiple agencies may share a single database, which allows them to upload their project data and view project data from other organizations.

Internet Databases

Florida Department of Transportation Utility Coordination Website

District 4 of the Florida Department of Transportation maintains a utility coordination website for three regions within the district: Broward County, Palm Beach County, and Treasure Coast (Indian River, Martin, and St. Lucie counties). Utility conflicts are determined for each project and listed according to the responsible utility company under the contractor-DOT tab. Once the utility conflict is resolved, the line item is deleted from the website.

Internet Geographic Information System (GIS) Databases

Geographic Information System (GIS) databases are similar in structure to the simpler internet database described above, but with the ability to allow users to visualize project locations on a base map. This is particularly useful when considering the relative position of projects and their potential impacts to traffic flow. Several cities are using GIS-based software to track projects and reduce the number of pavement cuts required for planned utility work.

City of Baltimore

To encourage better coordination and communication for infrastructure projects, the City of Baltimore implemented a software-based project coordination system to track all capital and maintenance activities. Each project is mapped via GIS data points. A clickable map then provides key details such as location, timeline, scope, schedule, cost and points of contact for each project.

District Department of Transportation

Similar to the City of Baltimore, the District Department of Transportation is using proprietary software to coordinate road projects—specifically to reduce pavement cuts. DDOT created an ordinance in September 2010 requiring all utilities operating in the public right-of-way to use the online map-based service.

City of Palo Alto, Calif.

A 2006 audit of the City of Palo Alto, California street maintenance program found that street excavations degrade and shorten the life of the city streets.

In response to the audit, the Public Works Department developed an in-house, GIS-based program to coordinate right-of-way construction. The software provides the agency the opportunity to enact processes to develop estimates of project impacts and business rules to guide coordination efforts should proposed project schedules result in estimates of excessive impacts to travelers.

Tools for Assessing Work Zone Mobility Impacts

A variety of tools are available for assessing work zone mobility impacts. FHWA has compiled this information online in a series of Traffic Analysis Toolbox volumes. Several of these documents focus on analysis of work zones.

Work Zone Traffic Analysis Tool

The Oregon Department of Transportation developed the Work Zone Traffic Analysis tool as a GIS-based project data repository with an analytical component that allows for traffic impact assessment. The spreadsheet requires minimal input from the analyst to develop lane closure restrictions and estimated project delay. The spreadsheet was later transformed to allow online access and GIS mapping of projects.

Work Zone Impacts and Strategies Estimator (WISE) Software

The Work Zone Impacts and Strategies Estimator (WISE) software tool was developed through the SHRP2 program to evaluate the impacts of various highway projects and compare alternatives. An open-source tool available from FHWA, WISE is intended to help agencies optimize the sequencing of renewal projects and analyze the cost-effectiveness of strategies for the minimization, management and mitigation of road user costs from safety or operational perspectives.

Additional Resources and Information

Additional resources on SWZ project coordination strategies can be found at:
https://www.workzonesafety.org/swz/project_coordination

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Case Study 11: Washington, D.C. Citywide Transportation Management Plans

Background

The District of Columbia Department of Transportation (DDOT) developed a comprehensive Work Zone Project Management System (WZPMS) after the agency realized that numerous road and major construction projects in D.C. along New York Avenue, the Nationals Park area and the convention center had interconnected impacts to travelers. DDOT developed the software-based WZPMS to integrate planned roadway, utility and developer construction activities and to identify and mitigate conflicts in the public right-of-way.

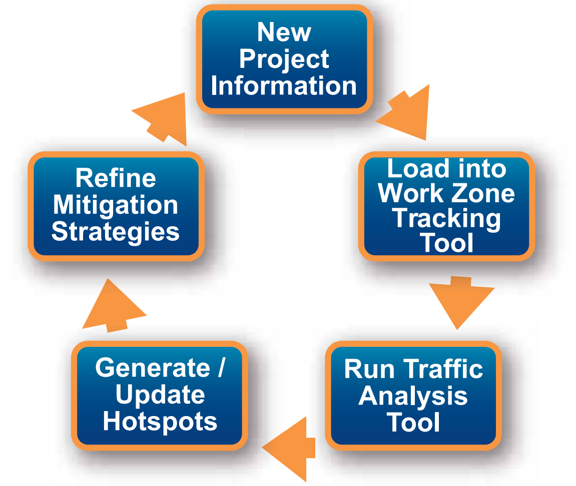

Figure 19: The Iterative Work Zone Project Management System Process. (Source: DDOT)

Establishing Goals and Processes for an Integrated Project Coordination Tool

The WZPMS was originally envisioned as an open system for stakeholders to view all planned and ongoing construction activities and conflicts. However, DDOT personnel were concerned that not all stakeholders would understand the tool's outputs or its purpose. In order to eliminate these concerns, DDOT opted to only use the tool in-house.

Another challenge was determining how traffic control plans should be entered into the tool and by whom. Because the DDOT Project Development & Environment Division is responsible for work zone reviews, right-of-way management and approval of traffic control plans, it was a logical choice for this office to populate the WZPMS.

DDOT established the following goals for WZPMS:

- Avoid work zone location conflicts
- Identify and minimize cumulative work zone impacts
- Identify corridor-area work zone mitigation strategies
- Improve safety and mobility in work zones

Development efforts for the WZPMS focused on the following four components:

- Work zone tracking tool
- Traffic analysis tool
- Cumulative transportation management planning
- Implementation and monitoring program

Implementing Project Coordination

Work Zone Tracking Tool – Information Gathering
The web-based Work Zone Tracking Tool is used to enter information for all utility, developer and roadwork activities occurring at least partially within the right-of-way and which are planned to begin anytime between three months and five years in the future.

The WZPMS does not contain a record of all utility, developer and roadwork activities. Projects with fewer traffic impacts can be filtered out using specific thresholds based on permit categories, the type of roadway and the type of closure occupancy (e.g., a dumpster). The DDOT staff examines each conflict individually and analyzes them as soon as they are entered.

The tool can send an email to the respective project engineers to alert them of potential conflicts between their projects. Users can also use this interface to review impacts from other related projects based on regional significance, lane control inconsistencies/conflicts, related traffic diversion irregularities and potential project scheduling conflicts.

Traffic Analysis Tool – Quantifying Impacts and Eliminating Conflicts
The Traffic Analysis Tool was built on a GIS database platform and was developed by DDOT to simulate cumulative impacts. Conflicts identified in the Work Zone Tracking Tool are examined by the Traffic Analysis Tool component to quantify traffic impacts related to closures and trip diversions. The cumulative traffic impacts of all projects are analyzed daily to generate outputs, including a series of level of service maps.

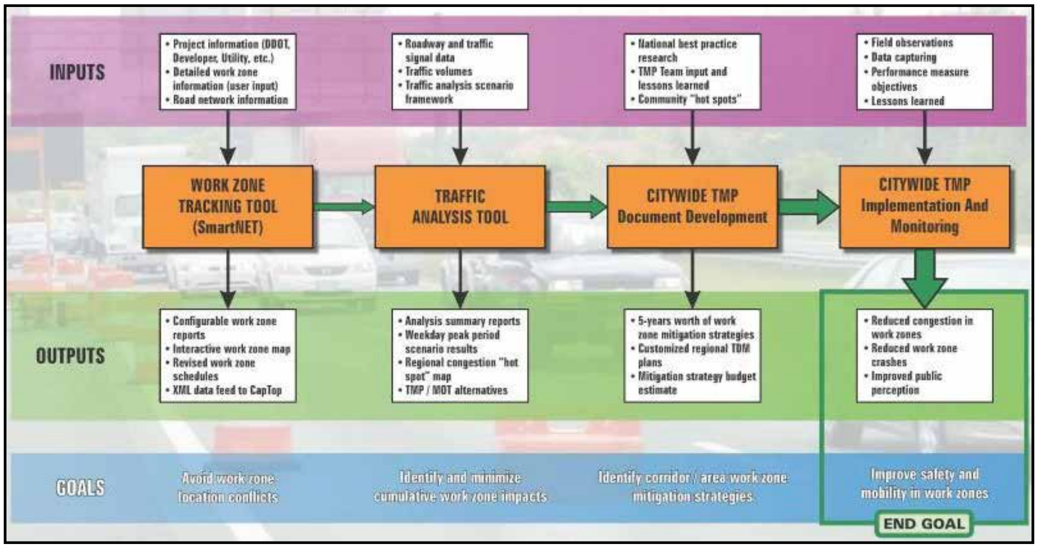

Figure 20: Overview of the DDOT Work Zone Project Management System. (Source: DDOT)

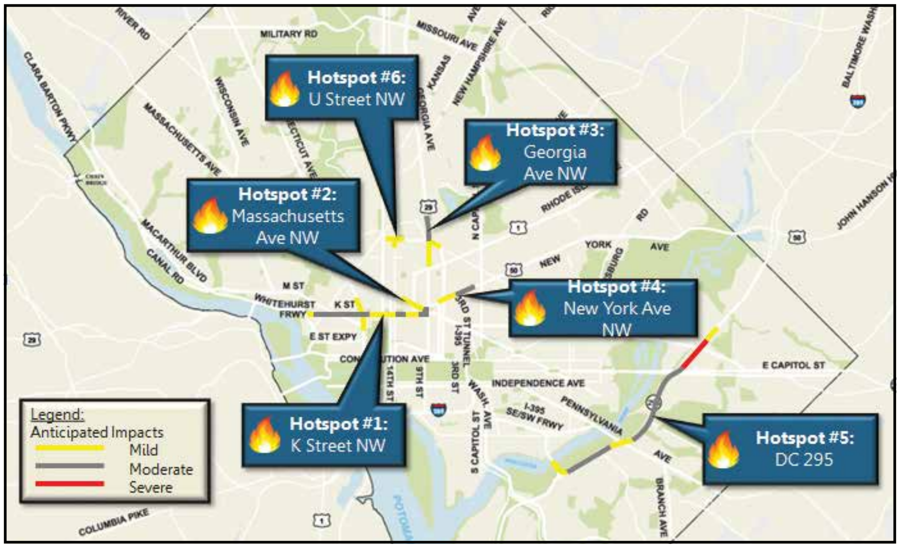

Figure 21: The project coordination tool generates maps that depict anticipated hotspots and impacts. (Source: DDOT)

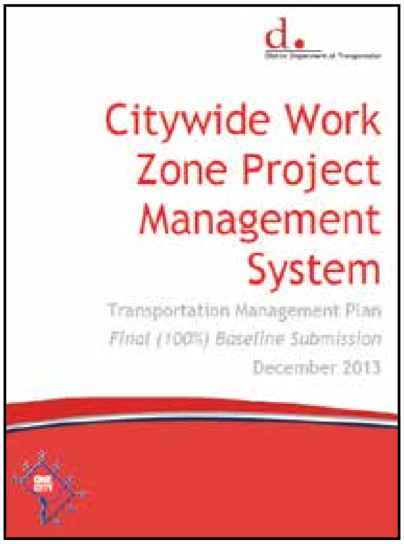

Figure 22: DDOT generates a citywide transportation management plan. (Source: DDOT)

Various reports can be generated by intersection, segment, region, or citywide, including what lanes are closed. These outputs are used in discussions with the project engineers to identify mitigation strategies.

Citywide Transportation Management Plan (TMP) – Mitigating Cumulative Impacts
These tools offer DDOT a means to track and analyze the cumulative impacts of all construction projects in DC for a moving five-year period, including road, utility and developer work zones. Mitigation strategies identified in the cumulative TMP to minimize impacts include:

- Launching a Citywide Work Zone Project Management website
- Updating existing DDOT work zone policies
- Reviewing project-specific TMPs
- Considering schedule changes for overlapping projects
- Developing signal timing adjustments
- Developing transportation demand management plans for critical areas
- Conducting regional public outreach
- Implementing transit incentive programs

Institutionalizing Project Coordination

Since it was first developed, the WZPMS continues to evolve. The success of the WZPMS has created ongoing support and funding from DDOT, which is critical to keeping the WZPMS updated with the latest information. Through these project coordination efforts, DDOT mitigated conflicts between various utility, developer and roadwork activities.

Additional Resources and Information

Additional resources on SWZ project coordination strategies can be found at:
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Case Study 12: Washington DOT Regional Project Coordination

Background

The Puget Sound region of Washington State, which contains two-thirds of the state's population, encompasses the cities of Seattle, Tacoma, Olympia and Everett. The region includes an extensive transportation network with many planned and ongoing construction activities overseen by the Olympic and Northwest WSDOT regions and many local transportation agencies. With each of these agencies independently focusing on many projects, scheduling construction activities became increasingly difficult.

Early Leadership Initiative and Support

Early funding support from WSDOT leadership led to the development and implementation of the Construction Impact Analysis (CIA) project coordination tool. The CIA tool is a mapping and database device that helps identify conflicts between construction activities and formalized multi-agency project coordination in the Puget Sound region.

Leadership support was critical since project coordination can be a challenging culture shift. Management buy-in helped encourage internal and external stakeholders to undertake a communications shift. They were encouraged to provide tentative, but specific, construction closure information, sometimes two years in advance and often before project design was completed.

Establishing Goals and Collaborative Relationships

WSDOT dedicated additional staff and resources to support project coordination to reduce the potential for conflicting lane and road closures, and used the CIA tool outputs as a basis for recurring meetings with various stakeholders to minimize traffic impacts. This was intentionally done to ensure interaction and collaboration between otherwise separate stakeholder groups.

In order to make the CIA tool useful, collaborative relationships with many stakeholders in the Puget Sound region were leveraged for gathering and distributing information, including cities, counties, transit agencies, ports and the freight community. Internal marketing at WSDOT was also important to garner and maintain support.

Implementing Project Coordination

Information Gathering

Because the CIA tool is used for medium- to long-term coordination, it was updated on a quarterly basis. An e-mail request for information on construction activities was sent to approximately 200 individuals from various project teams in eight counties within the two WSDOT regions and the local jurisdictions in the Puget Sound region. These construction activities included longer-term projects that are planned for up to two years in the future. Requested inputs included the specific location of the construction area and projected dates for each closure. Information on special events is also compiled for the CIA tool.

Tool Outputs

Outputs from the tool were distributed on a quarterly basis to approximately 400 interested stakeholders and included detailed maps and Gantt charts detailing the specifics of upcoming projects.

Hot spot and watch list areas were identified before the summer construction season, primarily on the basis of engineering judgment. Considerations for these area designations included the number of projects in close proximity, and the types, frequency and duration of impacts that could incur cumulative traffic impacts.

Recurring Coordination Meetings

Annual meetings are held with a wide variety of interested stakeholders, including WSDOT, local road and transit agencies, and the private freight sector comprising both trucking and port representatives to discuss projects taking place in upcoming construction seasons. This meeting provides an opportunity for stakeholders to be aware of planned construction activities in order to make adjustments for conflicting activities. More frequent coordination meetings are conducted for specific hot spots.

Figure 24: WSDOT generates and distributes maps showing construction activities planned by quarter for each identified hot spot with links to the project websites. (Source: WSDOT)

Figure 23: The Olympic and Northwest WSDOT regions needed a better way to program and organize all of the funded construction activities within a pre-defined timeframe with minimal impacts to traffic. (Source: WSDOT)

Figure 25: The WSDOT construction traffic management team analyzed impacts of highway and local road projects for 2015 through 2016 and identified three hot spots and two watch list areas in the Puget Sound region (Everett watch list area not pictured). (Source: WSDOT)

WSDOT also schedules shorter-duration but impactful maintenance activities like cleaning storm drains and inspecting bridges using the CIA tool outputs as a reference. These efforts sometimes allow maintenance staff to perform activities during already-planned closures to expedite work, reduce traffic impacts and save money.

Institutionalizing Project Coordination

Stakeholders' relationships have developed over time and so has their use of the CIA tool. There are no requirements that stakeholders submit construction activity inputs, but it is in everyone's best interest to do so to minimize congestion impacts in their local jurisdictions.

Internal marketing was required to help alleviate initial stakeholder concerns that they would be held accountable to the dates provided about projected impacts. On the contrary, receiving more detailed information sooner is very beneficial to other stakeholders, even if these estimated impacts are later modified.

Conclusion

Project coordination is not a one-size-fits-all approach. WSDOT initiated a project coordination communications and culture shift by taking a comprehensive view of all planned WSDOT and local agency work zones in the Puget Sound region. However, other agencies should examine their existing practices, needs and identify ways to best coordinate projects.

Project coordination efforts in the Puget Sound region:

- Reduced potential for conflicting lane and road closures.
- Enhanced traveler information resources.
- Increased communication efforts to reach more stakeholders in affected areas with better information.

Additional Resources and Information

Additional resources on SWZ project coordination strategies can be found at:
https://www.workzonesafety.org/swz/project_coordination

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Figure 26: WSDOT generates Gantt charts that list projects and expected daily impacts. (Source: WSDOT)

SAFER ROADS SAVE LIVES

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