



District of Columbia Department of Transportation Integrated Work Zone Project Management System

SMARTER WORK ZONES PROJECT COORDINATION CASE STUDY

The Federal Highway Administration (FHWA)'s Every Day Counts (EDC) Program aims to accelerate the deployment of innovative practices that focus on reduced project delivery schedules, increased roadway safety, reduced congestion, and/or enhanced environmental sustainability. The Smarter Work Zones (SWZ) initiative is one of the three innovations focused on safety and mobility under round three of the EDC Program. SWZ was developed to promote safe and operationally efficient work zones through project coordination and technology application strategies.

This case study focuses on a project coordination initiative led by the District of Columbia Department of Transportation (DDOT). **Project coordination is the proactive planning and management of road work projects to minimize work zone traffic impacts. Project coordination may involve a single project or multiple projects within a corridor, network, or region, and possibly across agency jurisdictions.** DDOT developed a comprehensive Work Zone Project Management System (WZPMS), which integrated schedules for planned roadway, utility, and developer construction activities in order to identify and mitigate impacts to traffic operations.

Background

The District of Columbia (DC) has a complex transportation network with numerous planned and active utility, developer and road work activities at any given time. The impetus for developing a formal project coordination tool at DDOT came in 2007 when the agency realized that numerous road and major construction projects in DC along New York Avenue, the Nationals Park area, and at the convention center had interconnected impacts to travelers. This started coordination efforts to determine the cumulative traffic impacts of these construction activities and the identification of conflicts. 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.

Establishing Goals and Processes for an Integrated Project Coordination Tool

DDOT dedicates staff and resources to project coordination to reduce the potential for conflicting utility, developer and road work activities. The agency realized that a tool could help streamline and enhance the project coordination process by integrating available resources into a single system. DDOT leadership supported this effort to initiate planning and development of the WZPMS.

From conception to implementation, DDOT encountered challenges that re-shaped the initial vision. The WZPMS



Figure 1: The Iterative Work Zone Project Management System Process. Source: DDOT

was originally envisioned as an open system for all stakeholders to view all planned and ongoing construction activities and conflicts. This would have included the public and interested DC agencies, like the police and fire departments. However, DDOT staff were concerned that not all stakeholders would understand the tool outputs or its purpose. Knowing that DC is a politically-charged environment, stakeholders might misinterpret the identified conflicts as problems that DDOT was not actively managing, and question why DDOT would allow the conflict to occur. In order to eliminate these concerns, DDOT opted to only use the tool in-house.

Another challenge encountered was determining traffic control plans should be entered into the tool and by whom. Initially, the thought was to have individual project engineers enter the information. However, given the organizational structure of DDOT (where design and construction staff are grouped by ward), the difficulty of

adding a new responsibility on top of the other systems these staff already manage, and considerations for managing both unapproved and approved traffic control plans in the system, DDOT realized this might not be the most efficient process. 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 these staff to populate the WZPMS. Staff in this division are also more familiar with work zone design, ensuring high quality inputs to the tool. Other DDOT divisions are in charge of permitting, and so it was necessary to incorporate their existing databases into the WZPMS.

DDOT established the following goals for the WZPMS:

- Avoid work zone location conflicts;
- Identify and minimize cumulative work zone impacts;
- Identify corridor-area work zone mitigation strategies; and
- 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 (TMP) reporting; and
- Implementation and Monitoring Program

Other efforts included the creation of the database for roadway, developer, and utility construction projects and

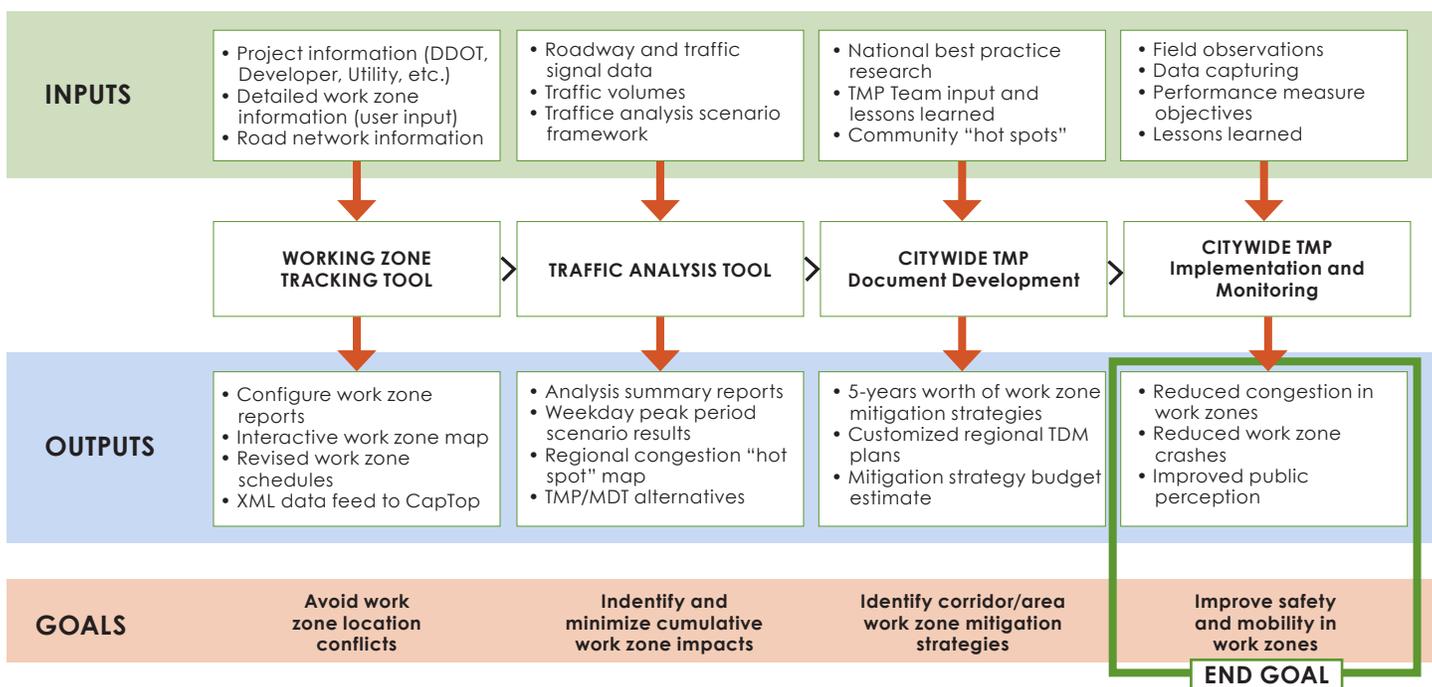
integration of all these tools into existing DDOT Information Technology (IT) Architecture.

Implementing Project Coordination

Work Zone Tracking Tool – Information Gathering. The web-based Work Zone Tracking Tool component is used to enter information for all utility, developer and road work 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. Planned lane, ramp, and shoulder closures are entered as soon as the construction phases are known in order to identify potential conflicts between projects.

Information from project traffic control plans for utility, developer and road work activities are entered as they are reviewed. Major special events are also entered, such as annual marathons and presidential inaugurations. To the greatest extent possible, other databases are used to populate the WZPMS. Information about planned utility work and developer building permits, for example, are drawn into the WZPMS from other databases that are managed by various divisions at DDOT.

Note that the WZPMS does not contain a record of all utility, developer and road work activities. Projects with fewer traffic impacts can be filtered out using specific thresholds based on different permit categories, the type of roadway, and the type of closure occupancy (e.g., a dumpster). DDOT staff then examine each identified conflict individually.



TMP = Transportation Management Plan
TDM = Transportation Demand Management
MDT = Maintenance Down Time

Figure 2: Overview of the DDOT Work Zone Project Management System. Source: DDOT

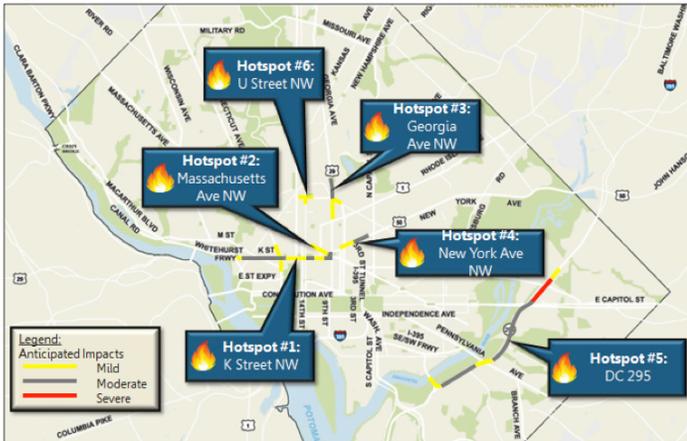


Figure 3: The project coordination tool generates maps that depict anticipated hotspots and impacts. Source: DDOT

Inputs are analyzed as soon as they are entered to identify conflicts. DDOT uses a radius of one-half mile to identify other lane closure or construction activities that may cause a conflict based on their schedules. 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. 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 Traffic Analysis Tool is built on a GIS database platform and was developed by DDOT to simulate cumulative impacts. The cumulative traffic impacts of all projects are analyzed daily to generate outputs, including a series of level of service (LOS) maps. Users can view any day and time period within the coming five-year period. A variety of maps can be generated to examine:

- Morning or afternoon peak periods;
- Weekdays or weekends;
- Particular intersections or road segments;
- Additional delay due to an individual work zone;
- Average delay for an individual work zone;
- Lane, ramp, and shoulder closures; and
- Hotspot areas where multiple work zones severely increase delay and congestion levels, as shown in Figure 3.

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.

Sometimes identified conflicts can inform the decision to approve the project plan. However, this does not always carry weight, depending on the project design stage

of development (e.g., a project plan that is 30 percent complete will have minimal influence on a decision because the plans are not well-defined and more likely to change, but at 65 percent complete there will be a better defined plan).

After conflicts are identified, DDOT arranges for a meeting with the project engineers to find an appropriate solution. This may include schedule adjustments or maintenance of traffic (MOT) changes to the projects. Conversely, DDOT also uses the WZPMS to identify opportunities where minor adjustments to overlapping project schedules might benefit travelers. For example, traffic impacts would be reduced if two adjacent projects that close the same lane on a street occurred at the same time.

DDOT staff also examine a variety of hotspot maps to determine what makes each a hotspot, which may be the result of the cumulative impacts of five projects or a single, major project that disproportionately impacts traffic. DDOT staff can then modify inputs to the WZPMS to apply alternate mitigation strategies and see whether the impacts are reduced.

Because the WZPMS measures a cumulative impact and not just individual project impacts, it is significantly more responsive to specific requests from contractors. DDOT has found this to be beneficial, so contractors can incorporate innovative, alternative ideas into the project plan (e.g., a ramp closure of four days would allow the project to be completed three weeks sooner).

DDOT has not set a threshold for acceptable delay, and works to mitigate traffic impacts to the greatest extent possible based on engineering judgment. Other agencies may decide to implement an acceptable delay threshold to the review process to help determine whether a project plan should be rejected or modified.

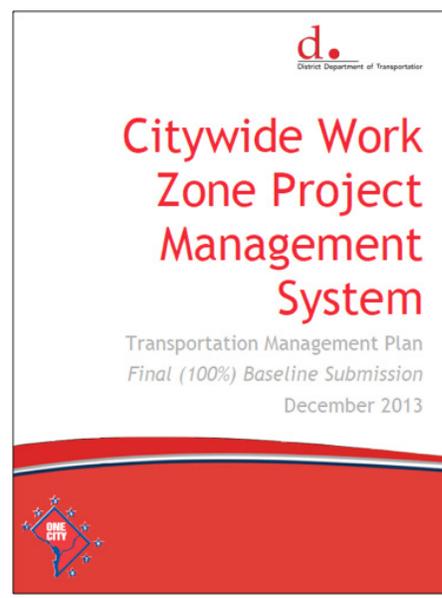


Figure 4: DDOT generates a citywide transportation management plan. Source: DDOT

Citywide Transportation Management Plan (TMP) – Mitigating Cumulative Impacts.

These tools offer DDOT a means to track and analyze the cumulative impacts all construction projects in DC for a moving five year period, including road, utility, and developer work zones. DDOT generates an annual citywide TMP document that examines appropriate work zone mitigation strategies by project, corridor and region for the next five years, which informs an estimated budget for work zone mitigation strategies. These budget estimates are refined as the project timeframes approach and more precise information becomes available. 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 (TDM) plans for critical areas;
- Implementing transit incentive programs.

Institutionalizing Project Coordination

Since it was first developed, the WZPMS continues to evolve, including:

- Expansion from impacts on arterials only to include collector roads, and planned efforts to also incorporate local roadways;
- A link to access the DDOT permitting database to enter that information into the WZPMS.
- Automatic queries linking to other DDOT databases to regularly enter information directly into the WZPMS without manual entry;
- Inclusion of special events and other activities into the Modified thresholds for identifying impacts;
- A feature to generate outputs relevant to Metro transit, as needed;
- Outputs to support development of public outreach efforts and media relations;
- Planned efforts to track mobility, safety, and customer satisfaction performance measures to assess the effectiveness of the WZPMS; and

- Planned efforts to incorporate automated examination of alternate routes for roadway closures, including truck alternate routes.

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.

Conclusions

This case study illustrates one example of project coordination. DDOT developed the WZPMS that integrated planned roadway, utility, and developer construction activities that could impact traffic in order to identify and mitigate conflicts. However, other agencies should examine their existing practices, needs, and identify ways to best coordinate projects.

Through these project coordination efforts, DDOT has mitigated conflicts identified between various utility, developer and road work activities. Key takeaways from this case study include the following:

- Leadership support was helpful for securing funding to develop the WZPMS.
- Understanding your area and stakeholders is important; DDOT decided not to publically share conflicts identified by the WZPMS, knowing that they might be misinterpreted as problems that DDOT was not actively managing.
- To the extent possible, existing databases are used to automatically populate the WZPMS, making it more robust and efficient.
- As a tool expands to include more inputs, it can be challenging to keep up with all of the latest information.
- The WZPMS allows DDOT to recognize and proactively address conflicts, which might have otherwise occurred and not been identified until receiving complaints from travelers.
- Understanding cumulative, citywide work zone impacts for five years into the future helps DDOT identify mitigation strategies and anticipate future budgetary needs.

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

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Every Day Counts (EDC), a State-based initiative of FHWA's Center for Accelerating Innovation, works with State, local and private sector partners to encourage the adoption of proven technologies and innovations aimed at shortening and enhancing project delivery.

