Michigan Department of Transportation Project Coordination on the I-94 Corridor

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 project coordination in the I-94 corridor by Michigan DOT. ***Project coordination is the proactive planning and management of construction 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.*** The Michigan DOT 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 Michigan DOT regions and covered by nine transportation service centers (TSCs) across nine different counties. With each of these jurisdictions focusing exclusively on the various goals and responsibilities for their area, I-94 corridor travelers paid the price. In 2010, 19 different work zones were in place, creating a great deal of delay to travelers driving the full length of the corridor.

I-94 Corridor Operations Partnership mission statement:
Improve traffic operations and system reliability along the I-94 corridor statewide.

Early buy-in from agency leadership provided a catalyst to form an I-94 corridor partnership across Michigan DOT regions for project collaboration. This group was empowered to establish goals and metrics, and modify work zone design and implementation accordingly to a more traveler-oriented focus.

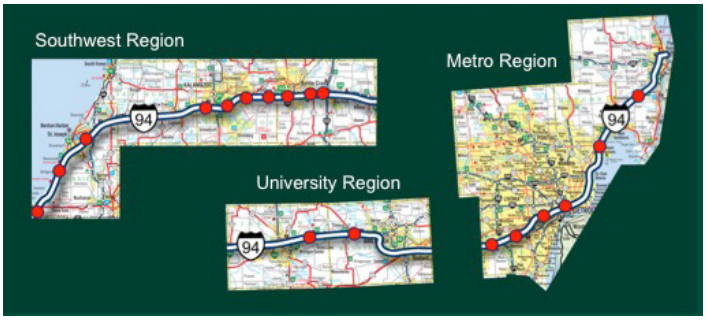

Figure 1: In 2010, the three Michigan DOT regions independently managed 19 projects on the I-94 corridor. *Source: Michigan DOT*

Early Leadership Initiative and Support

The idea for project coordination along Michigan's I-94 corridor was initiated by the Michigan DOT Director's experience sitting in nearly two hours of delay due to the multiple work zones situated along the corridor. The Director's determination to alleviate future lengthy delays to the traveling public led to the top-down momentum for management buy-in and support necessary for project coordination along the I-94 corridor.

This support was critical since project coordination can be a challenging culture shift. Sustained project coordination requires dedicated long-term staff time and resources for pre-planning. Construction cost increases will also result from balancing project expediency with traveler mobility, as the work plan and schedules for lane closures and work activities change to times that reduce impacts to the traveling public. Additionally, management buy-in was crucial for shifting the agency's focus from a project-oriented focus to a more operations-oriented focus, which allowed for the purchase of additional intelligent transportation system (ITS) infrastructure to collect data needed to measure performance and meet mobility goals.

Establishing Goals and Performance Measures

In 2011, a Corridor Operations Partnership (COP) was formed to develop a plan for project coordination on the I-94 corridor. The first activity for the COP was to create a mission statement. Once their mission statement was in place, the COP established goals for enhancing travel time reliability through a maximum acceptable travel time delay and user delay cost on the three main segments of I-94 based on the 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). These goals are consistent with the Michigan DOT Strategic Plan to improve traffic operations and system reliability along freeways, optimize the department's organizational effectiveness, and produce results that satisfy customer needs and expectations for a high quality transportation system and travel experience.

The working group established performance measures that seemed reasonable based on available information. Delays caused by recurring and non-recurring congestion (i.e., work zones, weather, traffic incidents) were analyzed. This included a three-year average of probe data and some 2010 measurements of work zone delay on the corridor.

The creation of corridor-wide performance measures encouraged communication within and between the regions. Rather than using the Michigan DOT regional boundaries, the project team decided on the three segments in Figure 2 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. This traveler-oriented segmentation of the corridor also allowed regions to "borrow" excess tolerable delay for a major project, if needed, across the DOT regional boundaries, while continuing to meet the established corridor-wide 40-minute delay and user delay cost goals.

Implementing Project Coordination

Planning Ahead. Michigan DOT developed a Gantt Chart to schedule all construction and maintenance projects on I-94 in order to have a clear understanding of the magnitude of work along the corridor and ensure that the established delay thresholds would not be exceeded. During the design process, the Michigan DOT uses CO3 software to estimate work zone user delay costs and calculate incentives or

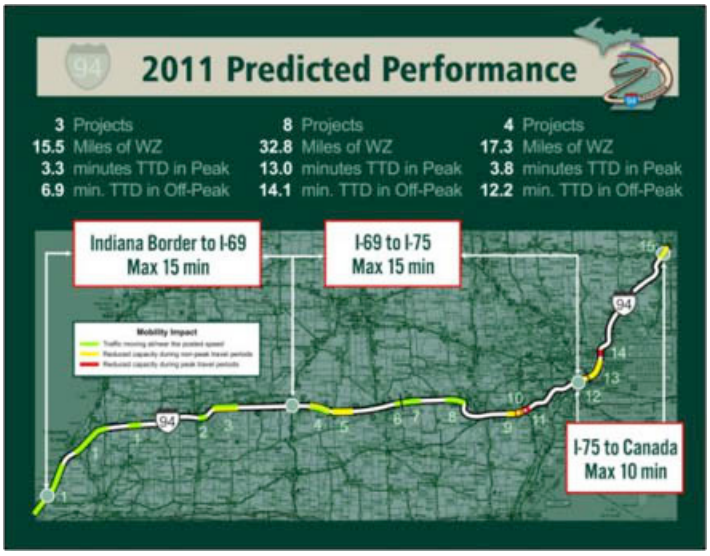

Figure 2: Michigan DOT established goals for the tolerable travel time delay travelers would experience in each of the three segments of I-94, with a maximum total delay of 40 minutes, based on the work zones planned for 2011. *Source: Michigan DOT*

disincentives for construction contracts, e.g., how much any fines should cost, and justify the value of any additional costs incurred. These costs need to be justified as they can increase the cost of the project, due to the increased risk that is placed on the contractor. Other changes have included adding towing provisions in contracts to minimize delay when crashes or vehicle breakdowns occurred, increased incentives for using ITS for diversion, and incentives for reducing closure time or scheduling work during off-peak times. The return on investment for these added costs includes improved quality on projects and improved traffic flow, leading to higher customer satisfaction which is a Michigan DOT goal.

Since introducing project coordination into the project development process by designing projects to minimize delay, Michigan DOT has confirmed that delays have been reduced. Because performance is now measured, construction staff have begun to ask designers additional questions about anticipated delays during project reviews, which represents a major culture change at Michigan DOT.

Coordination Meetings. Multiple meetings for Michigan DOT traffic engineers, construction engineers, communication representatives, and traffic operations center representatives, as well as consultants and contractors are held to discuss the impacts of planned and ongoing projects. Specifically, the agency set a goal to conduct weekly maintenance of traffic (MOT) huddles for 90 percent of the weeks with active work zones both at the regional level with all TSCs for each region, and also corridor-wide across all regions. These

discussions allowed communication between operations and construction personnel about maintenance, permits, and construction work zones every week. Discussions covered strategies to reduce delay to meet the threshold by:

- Reducing work zone incidents;
- Improved incident response strategies;
- Communications mechanisms to inform motorists;
- Better signage and traffic control; and
- Minimum and preferred lane and paved shoulder widths.

These discussions led to corridor-level standards and improved the consistency of work zones along the corridor.

Monitoring and Modifications. Michigan DOT's approach to track the established time and cost performance measures through the construction season has greatly improved since 2011. As better data was acquired by Michigan DOT, analysis efforts were updated to improve how the performance measures were calculated. Initially, a basic stopwatch/probe vehicle approach was used to track travel delay. Later, Michigan DOT began making screenshots of Google Traffic or the state traveler information website MiDrive and calculating estimated travel delay by hand for speeds under 20 mph, in 2011 for 124 miles and in 2012 for all of the I-94 corridor. These early performance measurement efforts helped to justify the purchase of better software. In 2013, Michigan DOT began using the Regional Integrated Transportation Information System (RITIS), which uses probe data. RITIS is able to provide an automated value of delay and an enhanced measure of user delay cost, which includes delays attributable to the work zone, as well as delays due to weather, incidents, and other events.

I-94 Corridor Performance Measures

- Project-based time performance measure of a maximum of 10 minutes of delay per project,
- Corridor-based time performance measure of a maximum delay of 40 minutes for travelers driving the length of the I-94 corridor, and
- User delay cost performance measure calculated from traveler delay.

The user delay cost performance measure is now tracked on an hourly, weekly, and year-to-date basis, and is used to create an internal scoreboard to evaluate how well the goals are being met. The goal for the user delay cost performance measure is updated annually, but is still based on the maximum 40 minute corridor-wide delay goal. For example, in 2013, the goal for maximum allowable user delay cost was set at $108 million for the I-94 corridor.

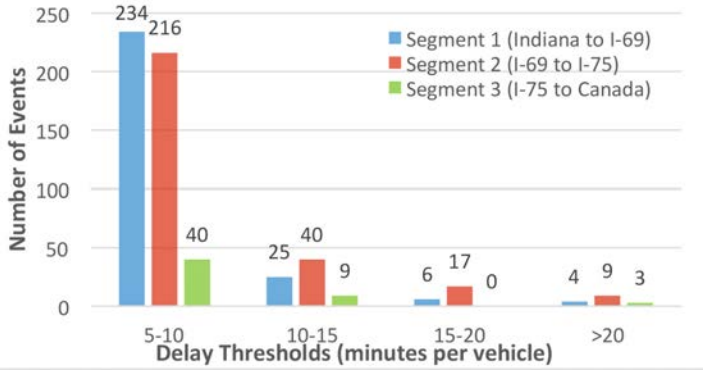

Figure 3: 2011 tracking summary I-94 corridor delays due to work zones. *Source: Michigan DOT*

Tracking performance can result in modifications to the project during construction. When traveler delay or user delay costs are exceeded, Michigan DOT now responds by making modifications to the work zones in the field, as necessary. For example, when a project in Kalamazoo was exceeding the project-based delay threshold during the day, Michigan DOT determined that a $205,000 cost to modify the construction contract to do night work would reduce calculated user delay costs by $860,000. This modification resulted in a calculated 4:1 return on investment.

Institutionalizing Project Coordination

Project coordination on the I-94 corridor has paved the way to changes in Michigan DOT's approach to work zones. Prior to this coordination effort, the DOT's focus was largely deadline-based project completion. Since the I-94 corridor, the DOT has shifted 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.

This cultural shift has removed DOT staff reluctance for changing project schedules, and enhanced the relationships and communication lines open between neighboring jurisdictions in the I-94 corridor. Each TSC along the I-94 corridor conducts bi-weekly meetings to discuss planned and ongoing work zones and projects in their areas to make sure that, for example, two adjacent bridges are not planned to be closed simultaneously. These meetings always include a DOT communication representative to then disseminate that information about planned work zones to the traveling public.

Kalamazoo I-94		# Hours 2x the Avg:	10				# Days 2x the Avg:	0																
User Delay Cost ($)	Daily Total	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
4/15/13	$ 7,722	274	83	7	60	39	775	661	378	404	105	43	64	256	105	296	128	362	128	686	587	388	1305	301	287
4/16/13	$ 6,355	199	156	153	142	56	111	317	143	408	295	292	91	0	120	944	178	272	5	286	496	915	252	328	196
4/17/13	$ 8,768	155	102	220	65	119	107	758	553	719	257	426	200	41	290	31	56	662	196	668	1075	254	638	749	427
4/18/13	$ 7,233	159	132	125	211	353	180	757	94	266	0	330	267	359	213	475	133	277	293	173	56	586	149	632	1013
4/19/13	$ 10,692	186	226	230	209	72	367	593	236	330	51	60	91	102	132	78	143	344	292	0	90	327	1468	4077	988
4/20/13	$ 3,655	13	80	27	26	141	123	121	94	467	447	141	100	0	60	432	36	187	150	205	245	342	131	87	0
4/21/13	$ 2,658	16	0	0	29	0	0	0	59	13	50	0	113	17	0	101	109	0	29	0	464	694	182	248	534
Hourly Totals	$ 47,083	1002	779	762	742	780	1663	3207	1557	2607	1205	1292	926	775	920	2357	783	2104	1093	2018	3013	3506	4125	6422	3445
Annual Hourly Avg	$ 16,117	225	124	126	74	92	304	863	1187	1120	842	754	765	706	675	751	848	970	1445	1201	852	690	603	540	360
2x the Avg	$ 32,234	450	248	252	148	184	608	1726	2374	2240	1684	1508	1530	1412	1350	1502	1696	1940	2890	2402	1704	1380	1206	1080	720

Figure 4: Weekly tracking example of I-94 user delay costs by hour and day in the southwest Michigan DOT region compared to the annual hourly average. *Source: Michigan DOT*

While Michigan DOT notes that pulling all of the information together for a two-week outlook can take a lot of time, their ongoing commitment to doing so demonstrates the benefits of project coordination in the I-94 corridor.

Further, given the success of project coordination along I-94, Michigan DOT is working to develop similar practices for the I-75 corridor. Currently, goals and measures have not been so formally established, but the new agency culture and operations-oriented focus has enabled staff to begin tracking mobility and begin looking at the issues occurring in the corridor, and informally communicate with neighboring jurisdictions about planned and existing work zones to coordinate activities and schedules. As project coordination expands throughout the Michigan DOT, staff at adjacent TSCs are meeting to coordinate about projects on other corridors, which was not happening before.

Conclusions

This case study illustrates one example of project coordination that is corridor-based. Project coordination does not entail a one-size-fits-all approach. Michigan DOT initiated a culture shift with project coordination by focusing on an entire primary corridor through the state, however other agencies should examine their existing practices, needs, and identify ways to best coordinate projects. Agencies may consider utilizing the FHWA Work Zone Capability Maturity Framework (CMF) for guidance in identifying specific areas and ways to improve business processes and collaboration.

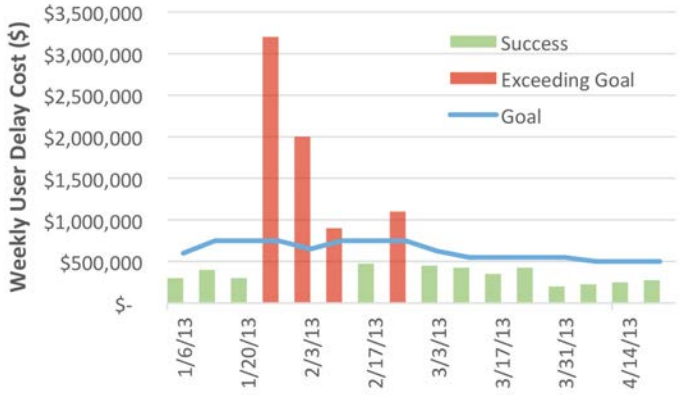

Figure 5: Weekly tracking of actual vs. targeted I-94 user delay costs in the southwest Michigan DOT region. *Source: Michigan DOT*

Key takeaways from this case study include the need for:

- An agency culture change to shift the focus from work zone-centric to traveler-centric operations.
- Buy-in from management to support the potential need for additional staff and resources.
- Established goals and performance measures to track and use to justify additional expenditures, as needed.
- Project coordination to plan future work zones and monitor existing work zones.
- Modifying the project coordination approach based on lessons learned and as better information becomes available, and then expanding proven approaches for project coordination agency-wide.

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.

U.S. Department of Transportation
Federal Highway Administration

www.fhwa.dot.gov/everydaycounts