Data-Driven Work Zone Process Reviews Case Study: Iowa Department of Transportation

September 2021

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16. Abstract
Federal regulations in 23 CFR part 630 subpart J require State highway agencies to conduct a Work Zone Process Review (WZPR) every 2 years to evaluate work zone processes and procedures, as well as identify systematic improvements to current and future projects. The Federal Highway Administration now encourages agencies to use a data-driven approach to make WZPRs more outcome- and performance-driven, while bringing about more of a continuum mindset to WZPRs, as opposed to isolated point-in-time reviews. This type of approach incorporates analysis and use of quantitative data including exposure, safety, mobility, and inspection data, as well as analysis and use of qualitative information for inclusion in WZPRs. This case study is one of a series of resources on data-driven WZPRs. It was developed in collaboration with the Iowa Department of Transportation and focuses on three major performance areas: safety, mobility, and field reviews. Anonymized data from crash reports, traffic sensors, probe vehicles, work zone field reviews, and work zone project tracking were used to conduct the analyses, derive metrics and trends, and identify key issues. The case study used data from 2018 through 2020. This case study demonstrates how Iowa DOT successfully uses crash, traffic, field review, and construction data to streamline its WZPRs and provide a repeatable quantitative basis for more systematic reviews that extend across multiple process review cycles.

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List of Abbreviations and Acronyms

CMF	Capability Maturity Framework
DOT	Department of Transportation
FHWA	Federal Highway Administration
SAB	Smart arrow board
TCP	Traffic critical project
TSMO	Transportation System Management and Operations
VHT	Vehicle hours traveled
VMT	Vehicle miles traveled
WZ	Work zone
WZM	Work zone management
WZPR	Work Zone Process Review

Introduction

Federal regulations in 23 CFR part 630 subpart J require State highway agencies to conduct a Work Zone Process Review (WZPR) every 2 years to evaluate work zone (WZ) processes and procedures, as well as identify systematic improvements to current and future projects.[1] WZPRs apply to all project development and implementation phases, including planning, preliminary engineering, impact assessment, design, implementation/construction, and performance monitoring and management. Recognizing the importance of data for effective WZPRs, Federal Highway Administration (FHWA) incorporated another provision in Subpart J requiring States to use available data, observations, and information to manage WZ impacts of individual projects, as well as to continually pursue broader improvement of WZ processes and procedures through WZ data analysis (e.g., crash/safety data, mobility data, construction metrics, operational metrics).[2]

The FHWA published guidance in April 2015 to assist State highway agencies in conducting effective WZPRs.[3] That guidance document recommends a nine-step approach for performing a WZPR, as shown in figure 1. In the guidance document, FHWA also emphasizes the importance of using data and performance measures in WZPRs to make the process reviews more comprehensive, actionable, and effective.

Suggested Process Review Steps in FHWA's Guidance for Conducting Effective Work Zone Process Reviews (2015 Publication)

1. Assemble a multidisciplinary team
2. Develop a review plan
3. Conduct review
4. Analyze and interpret results
5. Develop inferences, recommendations, and lessons learned
6. Prioritize recommendations and lessons learned
7. Develop an action plan to implement the prioritized recommendations
8. Present findings
9. Initiate the action plan

Source: FHWA

Figure 1. List. Suggested Process Review Steps in FHWA's Guidance for Conducting Effective Work Zone Process Reviews

However, State departments of transportation (DOTs) have found it challenging to include data consistently and effectively in their WZPRs due to a lack of awareness and access to data, as well as limited resources for conducting streamlined, data-driven process reviews. A renewed focus on performance-based work zone management (WZM), new industry paradigms, and the emerging data sources from connected, autonomous, and probe vehicles present State DOTs with many new opportunities to leverage data in their WZPRs. A data-driven WZPR approach will enable agencies to make WZPRs more outcome- and performance-driven,

[1] 23 CFR part 630 subpart J. https://www.ecfr.gov/current/title-23/part-630/subpart-J.
[2] 23 CFR part 630 subpart J § 630.1008. https://www.ecfr.gov/current/title-23/chapter-I/subchapter-G/part-630/subpart-J/section-630.1008.
[3] FHWA. Guidance for Conducting Effective Work Zone Process Reviews (2015). https://ops.fhwa.dot.gov/publications/fhwahop15013/index.htm.

while bringing about more of a continuum mindset to WZPRs, as opposed to isolated point-in-time reviews.

This Iowa DOT case study was developed by FHWA to demonstrate a data-driven, systematic, and comprehensive approach to conducting WZPRs. It provides examples of how State DOTs can leverage existing data sources and performance assessment findings to incorporate data into steps two to five of the nine-step WZPR approach (shown in figure 1). It does not represent FHWA guidance or an example WZPR report and is not intended to replace the WZPR report format that State DOTs follow. As presented in figure 2, the data integration approach comprises identifying data needs for each performance area, conducting data analyses, identifying trends for issues and best practices, collecting contextual information about trends identified, selecting action plans based on trends, developing metrics to assess action items, implementing continuous data collection, and analyzing the impacts of implemented action items on program outcomes.

Iowa DOT conducted its previous WZPRs by focusing on select strategies implemented during the process review cycle. The discussions in those WZPRs were driven by qualitative observations with limited focus on quantitative data assessments of WZM outcomes. Although data were not included in prior WZPRs, Iowa DOT has been routinely collecting WZ-related data as part of Iowa DOT's internal performance management efforts. This presents a significant opportunity for Iowa DOT to use these data resources to make its WZPRs more data-driven, with the goal of using quantifiable benchmarks for performance management.

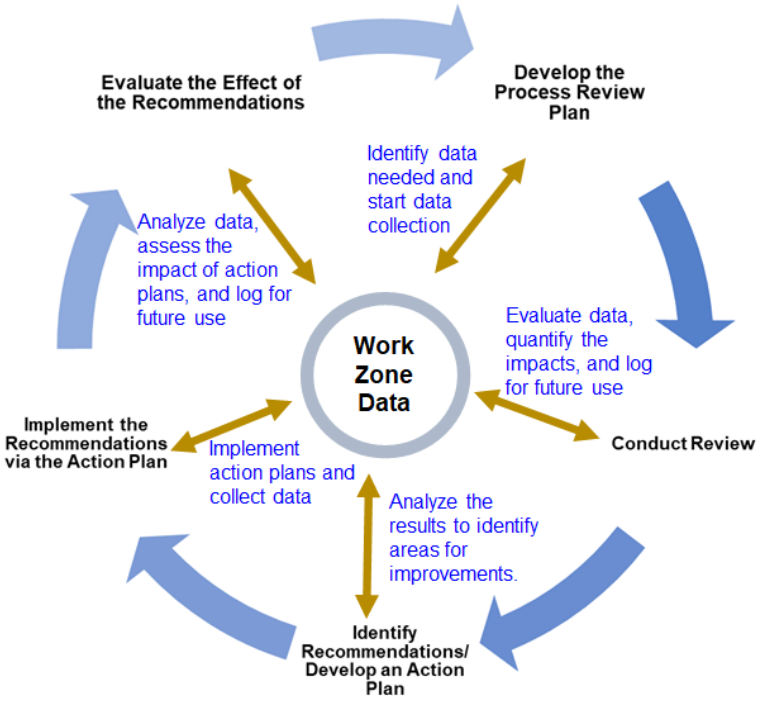

Figure 2. Diagram. Incorporating Data into the Continuous Review Cycle – An Integrated Approach for Data-Driven Work Zone Process Reviews
Source: FHWA

Performance Areas Selected for the Work Zone Process Review Case Study

> Iowa DOT defines traffic critical projects as key construction projects that may cause significant safety or mobility issues to the traveling public.

The project team chose safety, mobility, and field reviews as the three main WZ performance areas for this WZPR case study. Anonymized data from crash reports, traffic sensors, probe vehicles, WZ field reviews, and WZ project tracking are used to conduct the analyses, derive metrics and trends, and identify key issues. The safety and field review assessments cover all WZ projects implemented by Iowa DOT, while the mobility assessment is limited to projects designated as traffic critical projects (TCPs).[4] For the safety and mobility performance areas, Iowa DOT provided the project team with data from 2018, 2019, and 2020 to use in the case study. Similarly, for the WZ field reviews performance area, the team used data from 2018 through 2019. WZ crash data for 2020 was not available at the time this case study was conducted. The project team did not perform any statistical significance testing due to inconsistencies in data availability. Data were aggregated by the roadway facility type including interstates, U.S. highways, Iowa highways, farm-to-market routes, and local routes. Findings from the case study for each performance area are presented in the following sections. The discussion starts with an overview of the WZ exposure data that Iowa DOT tracks, which provides a basis for assessing performance based on the volume of WZ activity.

Work Zone Exposure Data

A comprehensive data-driven WZPR allows comparison of WZ performance across multiple years, as well as normalization of WZ performance by the volume of WZ activity (i.e., WZ exposure) in any given year. WZ exposure data include metrics such as the number of WZs, mileage of construction/maintenance activity, project duration, lane closure hours, and traffic volume affected by WZs. Iowa DOT does not track and digitize WZ exposure information for all WZ projects because its primary focus is on TCPs. The only WZ exposure metric that Iowa DOT tracks is the number of TCPs, which is the primary exposure metric for this case study.

Exposure Data Used in Case Study

Source: Iowa State University's Real-Time Analytics of Transportation Data Lab

Metrics: Traffic Critical Projects

In 2020, Iowa DOT implemented 42 WZ projects classified as TCPs, an increase of more than 50 percent compared to 2018 and 2019 (figure 3). The increase in WZ activity in 2020 was primarily due to reduced traffic demand during the COVID-19 pandemic conditions, which enabled Iowa DOT to accelerate road maintenance and construction.

[4] TCPs are expected to have the most pronounced mobility impacts. Iowa DOT applies its major WZ mobility management focus on TCPs. https://iowadot.gov/design/dmanual/09e-01.pdf

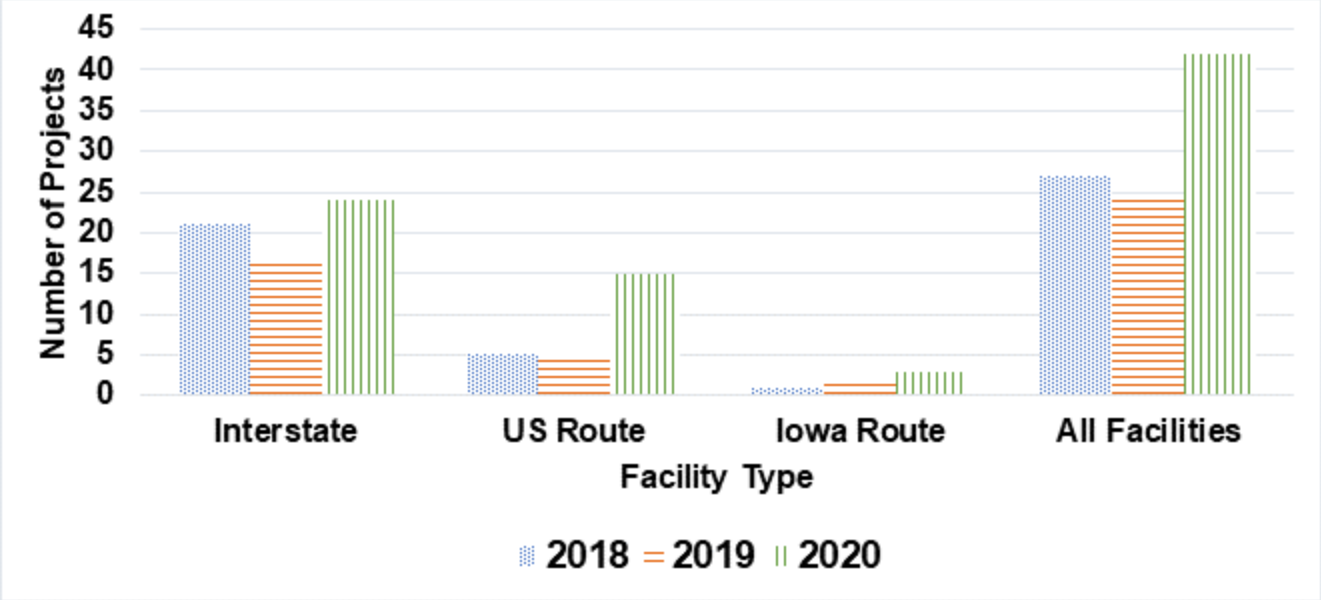

Figure 3. Chart. Total number of traffic-critical projects
Source: Iowa DOT

Key Findings and Observations for Data-Driven WZPRs

- Iowa DOT implemented 50 percent more TCPs in 2020 compared to previous years.
- Iowa DOT accelerated its road projects in 2020 to take advantage of reduced traffic demand due to COVID-19 pandemic conditions.
- From a WZPR standpoint, Iowa DOT should consider tracking additional WZ exposure metrics including number of work zones, mileage affected, duration, lane closure hours, and traffic volume metrics such as vehicle miles traveled (VMT) and vehicle hours traveled (VHT). Having these data will allow Iowa DOT to get a complete picture of WZ exposure as well compare, contrast, and normalize WZ performance trends and conduct more comprehensive WZPRs.

Performance Area 1 – Work Zone Safety

Total Number of Work Zone Crashes

Safety Data Used in Case Study

Source: Iowa Crash Analysis Tool

Metrics: Number of WZ crashes, Number of WZ crashes per TCP

The project team analyzed WZ-related crash data from all facility types to assess the safety performance of WZs implemented in Iowa (figure 4). The crashes included in the analysis are those that were coded on crash reports as being associated with a WZ. Overall, there was a 12-percent reduction in WZ crashes in 2020 compared to 2019. Compared to the 2018-2020 3-year average, 2020 WZ crashes were lower by 4.3 percent. Similar trends were also observed for Possible/Suspected Injury and Property Damage Only crashes across the years.

The above decrease in WZ crashes in 2020 may be attributable to lower overall travel in 2020 due to the COVID-19 pandemic. One way to verify this is to compare the total WZ VMT across the years. However, Iowa DOT does not currently collect and record VMT through WZs. Therefore, to get a relative measure of VMT variation across the years, the project team compared total VMT across the years. As expected, the total VMT in Iowa dropped in 2020 by 2.7 billion miles, a 12.7-percent reduction compared to 2019 as a result of reduced travel due to the COVID-19 pandemic. Expectedly, total crashes (both WZ and non-WZ crashes) saw a reduction in 2020 compared to 2019 (an 18.3-percent drop). Given the reduction in overall VMT and crashes, the reduction in WZ crashes in 2020 may also be attributable to reduced travel in 2020 due to the COVID-19 pandemic. For future WZPRs, tracking WZ VMT on an ongoing basis will allow Iowa DOT to better track and compare WZ safety performance across years.

The project team also looked at fatal WZ crashes. There were seven fatal crashes each in 2019 and 2020, and four in 2018. While these data do not provide any specific trending information, a further investigation indicated no recurring fatal crashes in any given location.

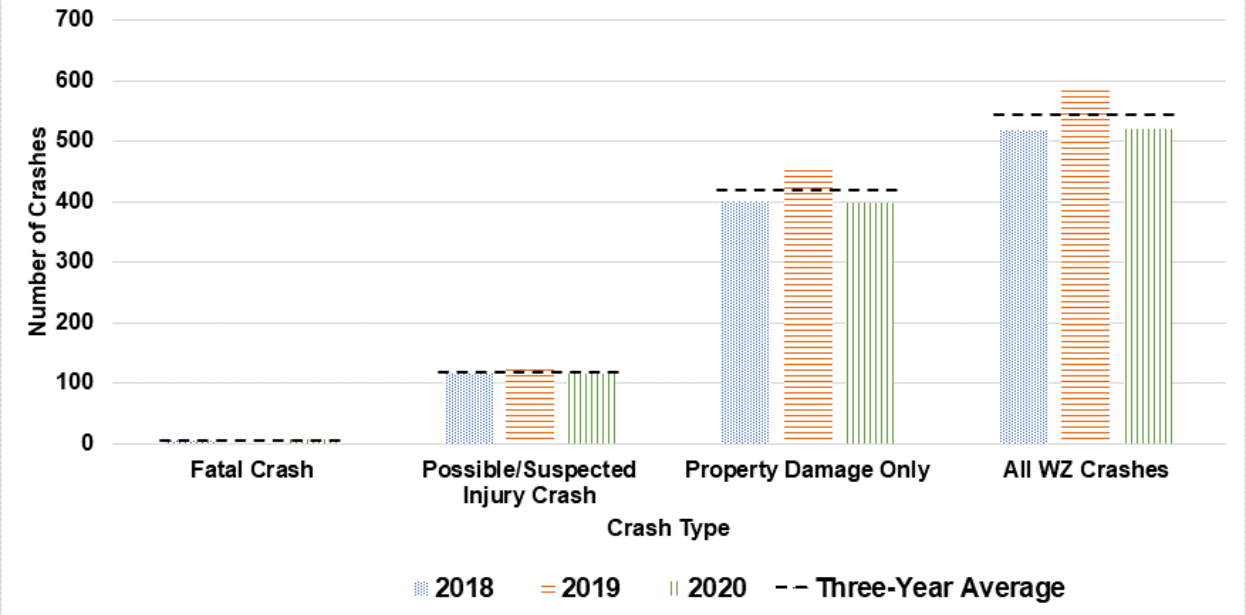

Figure 4. Chart. Total number of crashes in Iowa work zones by crash type
Source: Iowa DOT

The project team also compared WZ crashes across different facility types to investigate WZ safety performance trends and patterns across different facility types (figure 5). Though there is some variation in the number of crashes across the years, it is not possible to compare trends and assess variation across the different facility types due to lack of WZ exposure data (e.g., WZ mileage, VMT, VHT). As mentioned previously, tracking such WZ exposure data will allow Iowa DOT to conduct more comprehensive WZPRs that lead to meaningful trend, pattern, and causation analyses.

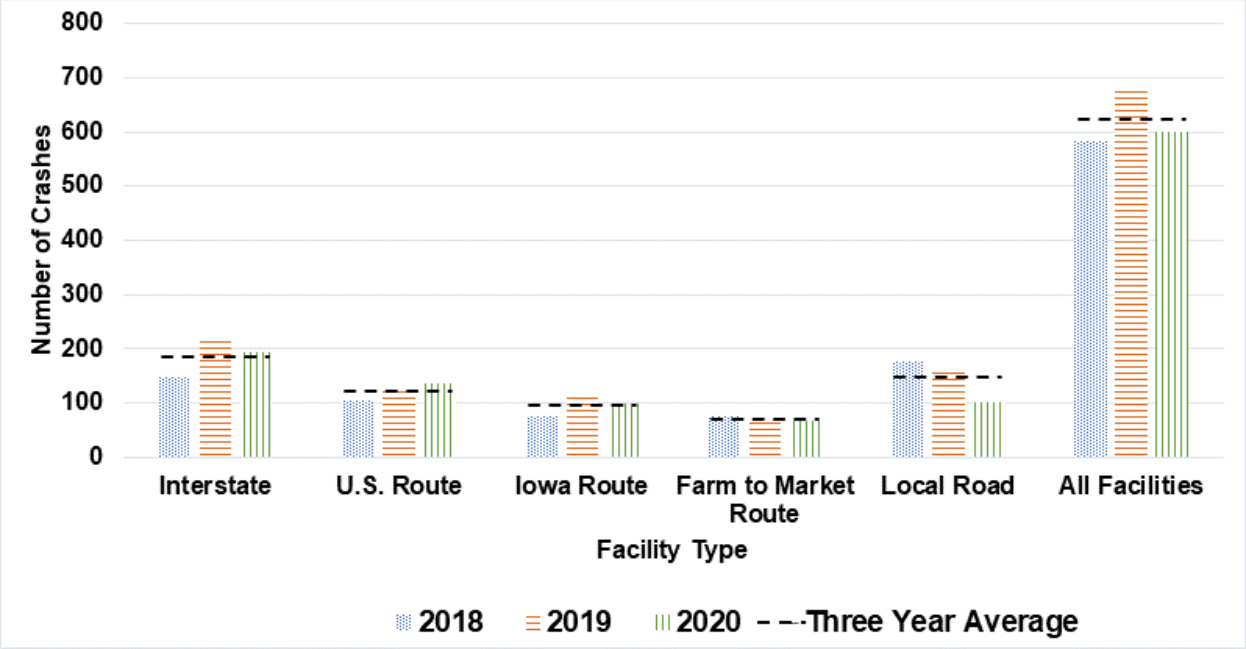

Figure 5. Chart. Number of crashes in Iowa work zones by facility type
Source: Iowa DOT

Number of Work Zone Crashes at Traffic Critical Projects

The project team further analyzed WZ crashes at TCPs across the 3 years. For TCPs, Iowa DOT determines the number of WZ crashes by identifying all crashes within a 0.1-mile buffer of the TCP. This approach helps to avoid underrepresentation of crashes that are related to the WZ. One of the challenges the project team faced is that Iowa DOT does not keep track of accurate start and end dates for the TCPs, specifically when the WZs are active. Crashes may be assigned to the TCP even if the WZ may have not been active. This is especially relevant to multi-year projects, which usually do not have any WZ activity during the winter months (i.e., October to February). To filter out crashes that may have been inaccurately attributed to TCPs, the project team used a default timeframe of March to September to filter the crashes. Therefore, some of the crashes included in the analysis may have occurred when the WZs were not active. This is another example of the need for exposure data tracking, including information on when WZs and lane closures are active.

The number of crashes associated with TCPs increased by 25 percent in 2019 and 160 percent in 2020, when compared to 2018 (figure 6). When the crashes are normalized by the number of TCPs implemented each year, the average number of crashes per TCP were 10 in 2018, 20 in 2019, and 14 in 2020 (figure 7). The increase in crashes per TCP in 2019 could be attributable to actual WZ VMT, which if available would provide additional context. The reduction in crashes per TCP in 2020 could be attributable to reduced overall VMT due to the COVID-19 pandemic.

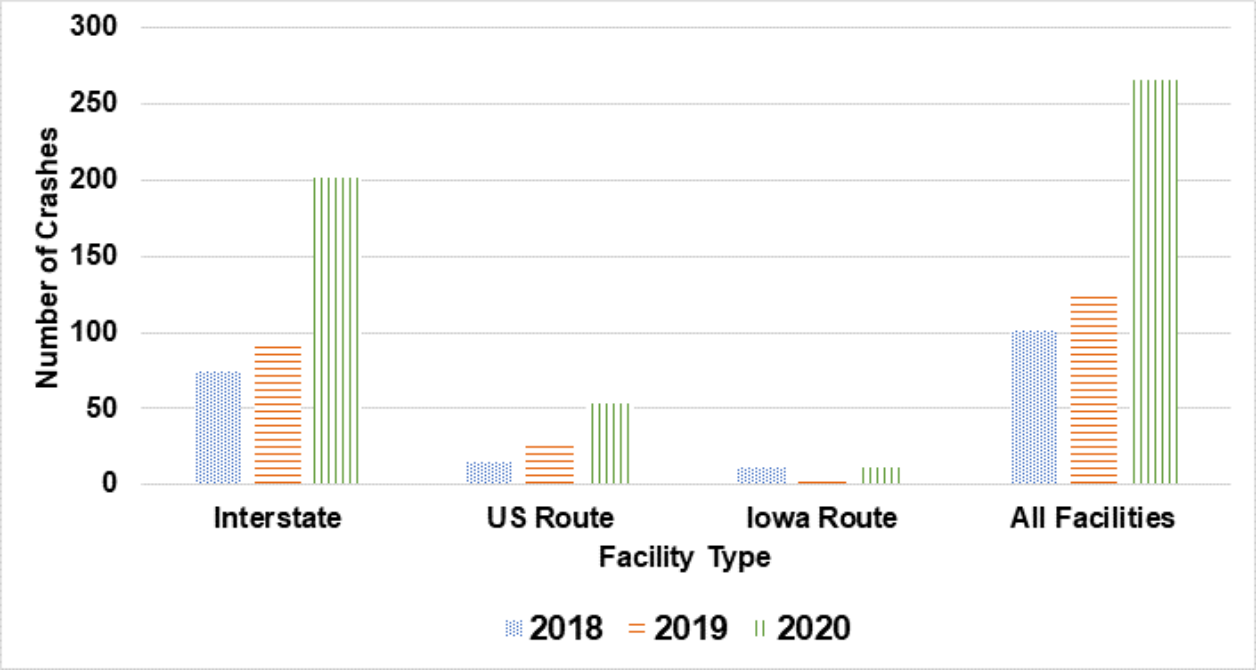

Figure 6. Chart. Number of work zone crashes within 0.1-mile proximity of traffic critical projects
Source: Iowa DOT

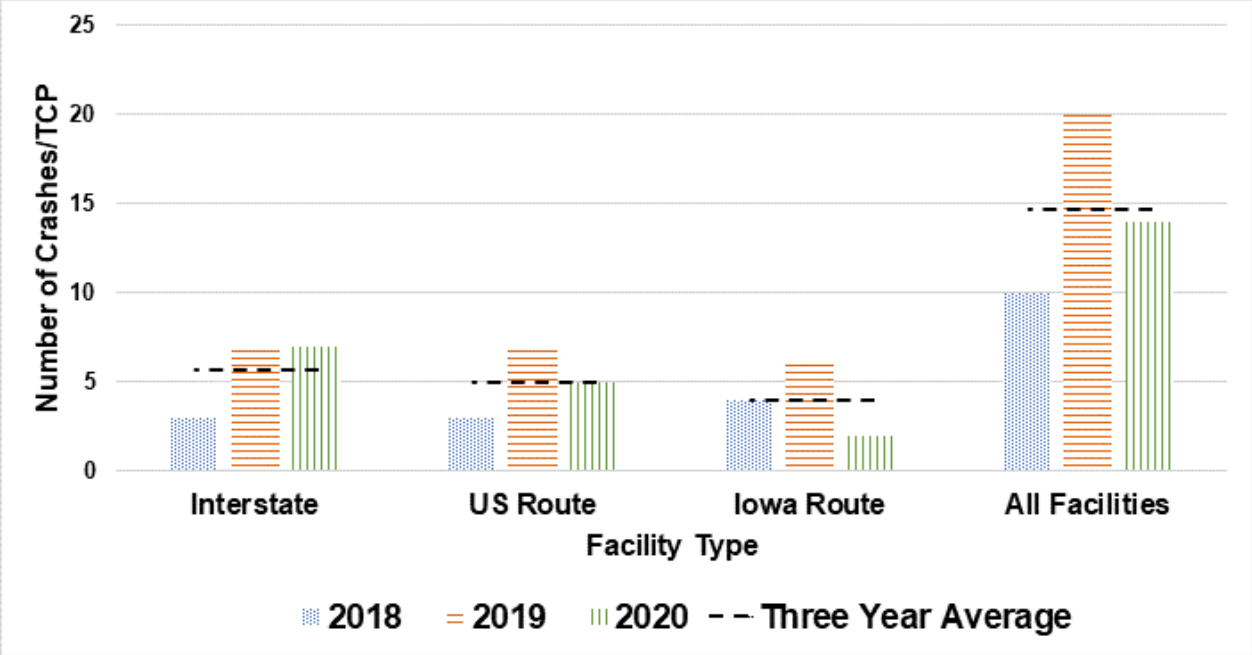

Figure 7. Chart. Number of work zone crashes per traffic critical project
Source: Iowa DOT

Key Findings and Observations for Data-Driven WZPRs

- Iowa DOT experienced fewer overall and WZ-related crashes in 2020 compared to the 2018-2020 3-year average. This reduction of crashes is likely a result of reduced traffic demand in 2020 due to the COVID 19 pandemic.
- Compared to 2018, the number of crashes at TCPs increased in 2019 and 2020. The 2020 increase may be partially attributable to the higher number of TCPs implemented in 2020. Normalizing crash data against WZ VMT will shed more light on the actual crash trends and potentially explain the dramatic increase in average crashes per TCP in 2019.
- Iowa DOT tracks the number of TCPs, which is a good start towards collecting WZ exposure data. Tracking additional exposure information such as WZ VMT, VHT, mileage, lane closure/activity hours, number of lanes closed, percent capacity reduced, etc. will be very helpful in providing a common frame of reference to measure WZ performance across years and incorporate those findings into WZPRs.
- Incorporating additional analyses into WZPRs (e.g., investigating the crash type distribution—rear-end, sideswipe, head-on) and their root causes (e.g., queuing backend crashes, infrastructure/fixed object crashes) can provide significant insights into improving WZM processes and procedures.

Performance Area 2 – Work Zone Mobility

Mobility Data Used in Case Study

Source: Iowa State University's Real-Time Analytics of Transportation Data Lab

Metrics: Number of work zone traffic congestion events, Duration of events, Queue length, and Percent of traffic encountering a queue

Due to limited availability of data, the mobility data presented in this study focuses only on projects designated as TCPs.

According to Iowa DOT WZPR Team, Iowa DOT is developing guidance that defines four minutes of delay per vehicle as a measure to assess the mobility impact of WZs on travelers.[5] This four-minute threshold was established by determining the 95th percentile of delay in WZs when delay is present. It will be applied for lane closure planning and daily WZM. Iowa DOT deploys sensors to collect speed and travel time data in its TCPs, as well as utilizes probe vehicle data obtained from third-party providers. Metrics calculated using the speed and travel time data include number of WZ traffic congestion events, duration of events, queue length, and percent of traffic encountering a queue.

[5] FHWA-Iowa DOT conference calls May 2021 to September 2021.

Number of Work Zone Traffic Congestion Events

> Iowa DOT defines WZ traffic congestion events as slow or stopped traffic conditions in a WZ (i.e., any time a sensor measures either slow or stopped condition for more than 5 minutes).

This metric provides the number of WZ traffic congestion events (hereinafter "events") that occurred at TCPs. Iowa DOT defines events as slow or stopped traffic conditions in a WZ (i.e., any time a sensor measures either slow or stopped condition for more than 5 minutes). Slow and stopped traffic conditions are identified based on a machine-learning algorithm that incorporates speed and occupancy data from all sensors associated with a WZ. The total number of events increased from 3,462 in 2019 to 4,005 in 2020 (an increase of 16 percent). However, after normalizing by the number of projects implemented each year, a 34-percent reduction was observed in the number of events per project (figure 8) in 2020 when compared to 2019. This likely is due to lower VMT in 2020 due to the COVID-19 pandemic. Normalizing the events with WZ VMT will allow Iowa DOT to compare trends and variability of WZ events across multiple years, as well as assess the impact of WZ exposure on the number of events.

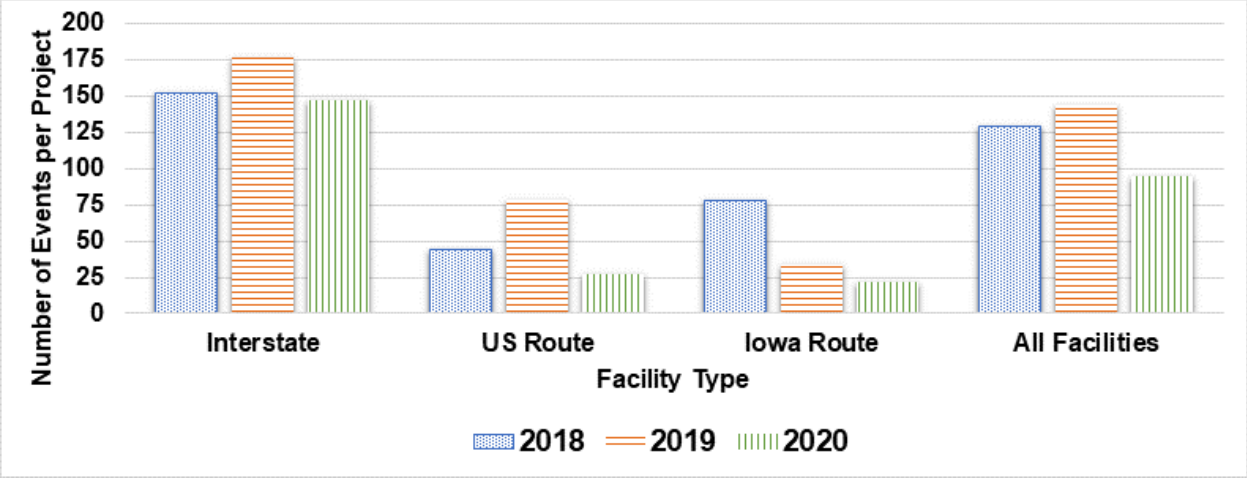

Figure 8. Chart. Number of work zone traffic congestion events per Traffic Critical Project
Source: Iowa DOT

Referring to figure 8, a point to note is that more than 40 percent of the events in 2018, 2019, and 2020 occurred on the "I-74 Mississippi River Bridges and Approaches" project. This $1 billion project is a four-mile-long bridge construction project that began in 2017 and was completed in late 2021.

Average Duration and Queue Length of Work Zone Traffic Congestion Events

The Average Event Duration is the average duration of time a WZ event lasted. In comparison to 2018, the average duration of events in WZs across all facility types increased by 43 percent in both 2019 and 2020 (figure 9). It is likely that this could be due to higher WZ VMT in 2019 and 2020 compared to 2018. Other exposure metrics that may help explain the difference include WZ type and lane closure and/or work hours. Interstates experienced a 56-percent and 53-percent increase in average event duration in 2019 and 2020, respectively, compared to 2018, while U.S.

routes saw a 43-percent and 31-percent reduction in 2019 and 2020, respectively. The number of WZ events on interstates (see figure 8) are the major contributors to the overall increase in the average event duration. On U.S. routes, long duration slowdowns during peak hours with high traffic demand and reduced number of lanes on four projects led to about 75 and 45 percent higher average event durations in 2018 compared to 2019 and 2020, respectively.

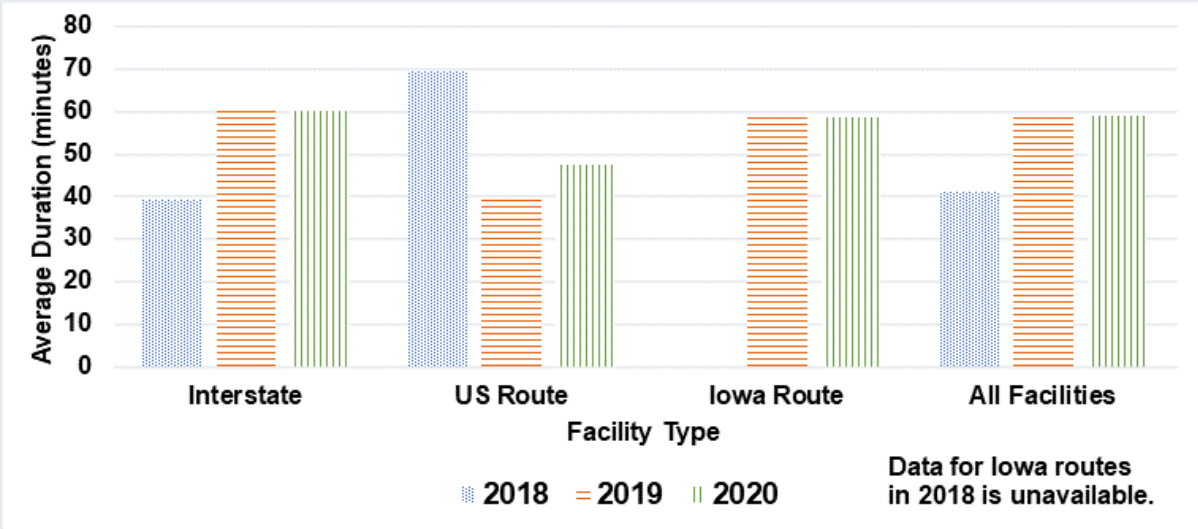

Figure 9. Chart. Average duration of events at Traffic Critical Projects
Source: Iowa DOT

Work Zone Queue Length is the length of queues experienced by travelers traversing through WZs during events. Travelers in Iowa WZs experienced an average queue length of 1.1 miles in 2018 and 0.8 miles in both 2019 and 2020 (figure 10). The reduction in average queue length may be a result of fewer TCPs implemented in 2019 and reduced travel demand in 2020 due to COVID-19 pandemic conditions. Normalizing the queue lengths with WZ VMT will help validate this possibility. Other exposure metrics including event type, percent of truck traffic, and lane closure hours will help assess key issues and contributing factors for long queues.

The average queue length at interstate TCPs dropped from 1 mile in 2018 to 0.6 miles and 0.75 miles in 2019 and 2020, respectively. In the case of U.S. routes, the queue length increased from 1.5 miles in 2018to 2 miles in 2019 and then dropped to about 1.75 miles in 2020. Travelers in TCPs on Iowa routes experienced an average queue length of 1.3 miles in both 2019 and 2020. While the average queue length per TCP provides generalized information on queue lengths that travelers may experience, it is also useful to examine the distribution of queue lengths. Figure 11 contains a box plot showing the distribution of queue lengths at TCPs located on limited access freeways. Such a chart may be used to compare the variability of queue lengths—the range, the percentiles, and the extent to which high, low, or average queue lengths are experienced by travelers.

Combining the Average Duration of WZ Events with the Average Queue Length allows State DOTs to get a generalized sense of the mobility impacts of their WZs. For example, by combining data from figure 8, figure 9, and figure 10, it can be deduced that on average, every

TCP in 2020 experienced about 100 congestion events, which lasted about 60 minutes, with an average queue length of 0.8 miles. Such data, when combined with WZ exposure data and WZ traffic management practices and trends, can yield valuable insights towards identifying both effective and ineffective WZ processes and procedures and incorporating those findings into WZPRs.

Iowa DOT does not have a WZ queue length threshold. Many State DOTs use queue length thresholds as policy and guidance for designing WZ traffic control and managing WZ performance (e.g., 1.5-mile queue for 15 minutes or more). Similar to the WZ delay threshold that Iowa DOT is currently considering, a queue length threshold would provide an additional quantitative basis for decisionmaking related to their WZPRs.

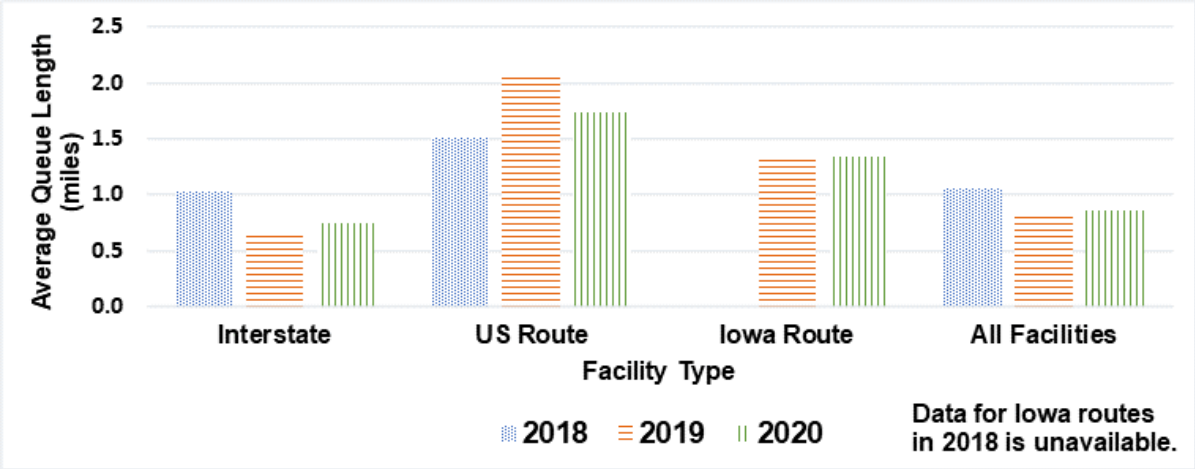

Figure 10. Chart. Average queue length at Traffic Critical Projects
Source: Iowa DOT

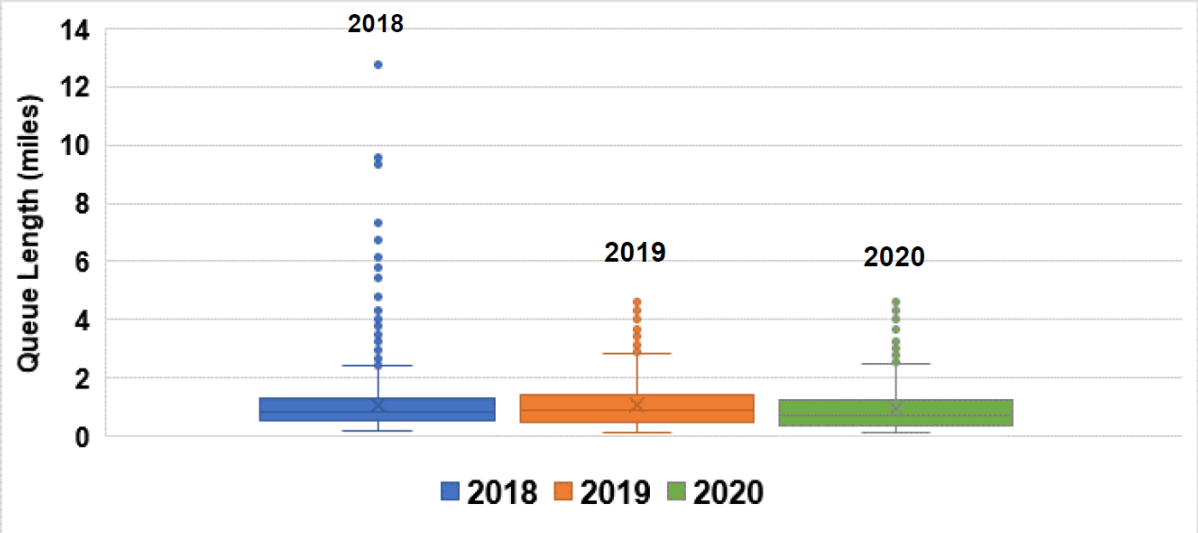

Figure 11. Chart. Queue length distribution at Traffic Critical Projects
Source: Iowa DOT

Percent of Traffic Encountering a Queue

Percent of traffic encountering queues is the ratio of the amount of traffic that encounters a queue by the total traffic traversing through the WZ. This metric presents the percentage of total traffic traveling through a WZ that encounters a queue resulting from WZ events. Overall, in comparison to 2018, the percent of traffic encountering queues increased by a small margin in 2019 and 2020 (figure 12). From a facility-level variation perspective, Interstates and Iowa routes saw a small increase, but U.S. routes saw a 250-percent and 300-percent increase in 2019 and 2020, respectively compared to 2018. This significant increase could potentially be attributed to potentially higher WZ VMT on U.S. routes. Normalizing the percentage of traffic encountering a queue with WZ VMT may provide additional context on the variation across the years. Due to limited data availability, the project team could not perform this normalization for the case study.

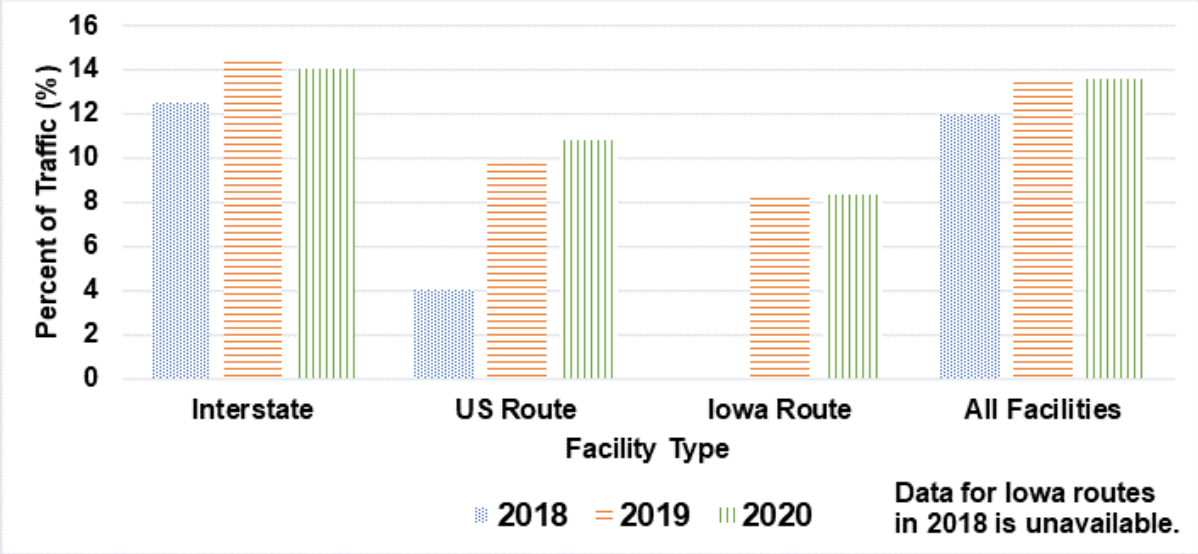

Figure 12. Chart. Percentage of traffic encountering a queue
Source: Iowa DOT

Key Findings and Observations for Data-Driven WZPRs

- Iowa DOT is developing guidance that defines 4 minutes of delay per vehicle as a measure to assess the mobility impact of WZs on travelers. Iowa DOT plans to apply this 4-minute delay threshold for lane closure planning and daily WZM.
    - To support this mobility assessment, Iowa plans to collect and evaluate WZ delay data at TCPs for its upcoming WZPRs.
    - After application of this policy, Iowa DOT will be able to identify projects that exceed the threshold and identify the project- and/or process-specific factors that contribute to underperformance, and appropriately identify improvement actions in their WZPRs.
    - Iowa DOT could also consider a queue-length threshold similar to other State DOTs (e.g., 1.5-mile queue length sustained over 15 minutes).
- For all TCPs, Iowa deploys sensors to collect speed and travel time data and supplements these metrics with third-party probe vehicle travel time and speed data. These data collection and performance measurement practices demonstrate Iowa's initiative to quantitatively measure and manage their WZ mobility performance. Iowa DOT tracks the following WZ mobility metrics:
    - Number of work zone traffic congestion events
    - Average duration and queue length of work zone traffic congestion events
    - Percent of traffic encountering a queue
- Combining the above WZ mobility performance metrics, Iowa DOT can paint a cohesive picture of the number and duration of WZ congestion events and the associated queue lengths, as well as the percent of traffic affected. This information can provide a strong initial foundation for using mobility performance data to drive the focus areas and actions in WZPRs.
- Across the years 2018, 2019, and 2020, Iowa DOT saw some variation in the different WZ mobility metrics (e.g., higher or lower event duration, queue length).
    - This may be partly attributed to the number of TCPs implemented in each year, and the change in overall VMT between the years—specifically, a COVID-19-induced reduction in 2020 VMT. Additional project-specific information available from Iowa DOT allowed the project team to attribute some of the variation to specific projects—for example the I-74 Mississippi River Bridges and Approaches project, a 4-mile-long, multi-year $1 billion project that contributed a significant portion of the WZ congestion events across the 3 years.
    - However, one of the challenges the project team experienced is the lack of adequate WZ exposure metrics (e.g., WZ VMT, VHT, mileage, and lane closure/activity hours) to get a true comparison of WZ performance across projects, facilities, and timeframes. Good WZ exposure metrics, specifically, WZ VMT will provide a common frame of reference to measure WZ performance across projects and years, as well as provide a better basis for identifying trends and actions in WZPRs.

Performance Area 3 – Work Zone Field Reviews

Field reviews, traffic control safety reviews, and WZ safety and mobility audits are valuable information sources that provide both qualitative and quantitative assessments of WZ performance, along with individual project-level practices, procedures, and circumstances that may be contributing to the performance.

Work Zone Field Reviews Data Used in Case Study

Source: Iowa DOT traffic control field review reports for 2018 and 2019

Metrics: Number of reviews, WZ traffic control strategies ratings

This case study presents data from Iowa DOT's WZ field reviews conducted in 2018 and 2019. The project team did not have access to 2020 field review data. In 2018, Iowa DOT conducted 41 Traffic Control Field Reviews covering 33 projects across all road facility types. Iowa DOT uses four rating classes including exceptional, acceptable, marginally acceptable, and undesirable to rate the field reviewed projects. Iowa DOT defined the rating criteria for each rating class in their internal WZ field review guidance document. The project team collected and analyzed the ratings from these reviews to identify the WZ areas that fall into each rating class. WZ categories with marginally acceptable and undesirable ratings for more than 25 percent of the reviews for each facility type in 2018 and 2019 are presented in table 1. Specific findings regarding marginally acceptable and undesirable rated categories include:

- Most categories related to lane closures received undesirable or marginally acceptable ratings in 2018 and 2019 across all facility types. Iowa DOT should examine the lane closure design and implementation processes to understand root causes for repeated underperformance of lane closure traffic control strategy. Iowa DOT should emphasize location/spacing, positive control, and proper signage aspects of the lane closures.
- On interstates, channelizing device and traffic barrier categories received marginally acceptable or lower ratings in 2018, whereas pavement marking and pedestrian accessibility categories received marginally acceptable or lower ratings in 2019. During WZPR meetings with district staff, Iowa DOT should gather qualitative feedback on traffic control strategies' performance improvements and declines. Some example questions include:
    - What factors contributed to improved performance with channelizing devices in 2019? Can we identify the practices that worked well and incorporate them into the WZM processes for future WZs?
    - What factors contributed to pavement markings receiving marginally acceptable or lower ratings in 2019? What worked well in 2018? Can we identify and repeat the processes that worked well in 2018?
- Interstate projects that received lower pedestrian accessibility ratings in 2019 included I-29 and I-74 construction and I-80/I-35/IA-141 construction. These projects included overpass work, which is where pedestrian traffic came into play.

- On U.S. and Iowa routes, categories relating to arrow boards received marginally acceptable or lower ratings in 2018 and 2019. For arrow boards, the Iowa DOT WZPR team should work with the traffic management center and design teams to assess the causes for inaccuracies in arrow board placements and information displayed.
- On county roads, the majority of the categories with marginally acceptable or undesirable ratings in 2018 were tied to channelizing devices and traffic management, whereas in 2019, the majority of the categories with marginally acceptable or undesirable ratings were tied to flagging and transition areas.
- On city roads, underperforming strategies included channelizing devices, dynamic message signs (DMS), pavement markings, pedestrian accessibility, road, and construction zone maintenance, traffic barriers, transition area, and traffic management in both 2018 and 2019.
- With a considerable number of WZ traffic control strategies on county and city roads receiving marginally acceptable or lower ratings, Iowa should examine the differences in WZM processes applied on county and city roads versus interstates, U.S. routes, and Iowa routes. Based on the findings, Iowa DOT can tailor the best practices from other facilities to suit the traffic conditions and configurations on county and city roads.
- Overall, county and city roads had more WZ review areas with marginally acceptable or lower ratings than the interstates, U.S. routes, and Iowa routes.

Table 1. Work Zone Traffic Control Strategies receiving a Marginally Acceptable or Undesirable rating for more than 25 percent of reviews

Work Zone Traffic Control Strategy	Category	Interstate		U.S. and Iowa Route		County Road		City Road	
		2018	2019	2018	2019	2018	2019	2018	2019
Lane Closure	Location/Spacing		✓	✓	✓	✓	✓	✓	✓
	Positive Closure		✓	✓		✓	✓	✓	✓
	Proper Signage	✓	✓	✓	✓	✓	✓	✓	✓
	Retroreflectivity	✓							
	Sheeting	✓				✓	✓		
	General Condition			✓				✓	✓
Dynamic Message Sign	Warranted		✓				✓		
	Appropriate Messages							✓	
	Display								✓
	Location							✓	✓
	Proper Operation			✓	✓				
	Warranted		✓				✓		

Table 1. Work Zone Traffic Control Strategies receiving a Marginally Acceptable or Undesirable rating for more than 25 percent of reviews (continued)

Work Zone Traffic Control Strategy	Category	Interstate		U.S. and Iowa Route		County Road		City Road	
		2018	2019	2018	2019	2018	2019	2018	2019
Channelizing Device	Alignment/Spacing				✓				✓
	Cleanliness		✓		✓		✓		
	General Condition			✓	✓				
	Retroreflectivity	✓							
	Proper Usage					✓			
	Location	✓		✓		✓		✓	
	Sheeting	✓				✓		✓	✓
Detour	Pavement Markings		✓						
Flag	Flagger Apparel						✓		
	Flagger Communication						✓		
	Flagger Location						✓		
	Flagging Technique						✓		
	Rumble Strips			✓	✓	✓	✓		
	Stop/Slow Paddle						✓		
Pavement Marking	Retroreflectivity		✓						
	Visibility	✓	✓						
	Dimensions							✓	✓
	Conflicting Marking Removal							✓	✓
	General Condition							✓	✓
Mobile Work Zone	Warning Signs						✓		
Arrow Board	Display			✓	✓				
	Location			✓	✓				
Road	Drop-off Treatment							✓	✓
	Lack of Dirt/Debris							✓	✓
	Materials Storage						✓	✓	✓
	Surface Smoothness							✓	
	Protected Excavations						✓	✓	✓
	Unattended Equipment					✓	✓	✓	✓

Table 1. Work Zone Traffic Control Strategies receiving a Marginally Acceptable or Undesirable rating for more than 25 percent of reviews (continued)

Work Zone Traffic Control Strategy	Category	Interstate		U.S. and Iowa Route		County Road		City Road	
		2018	2019	2018	2019	2018	2019	2018	2019
Pedestrian	Continuous Travel Path		✓					✓	
	Curb Ramps		✓					✓	
	Proper Delineation		✓					✓	✓
	Protected Hazards		✓					✓	
	Sidewalk Closures			✓	✓			✓	✓
	Overall Operation								
	Proper Warning							✓	
Sign	Sheeting							✓	
	Mounting Height	✓				✓		✓	
Temporary Traffic Signal	Timing/Operation						✓		
Traffic Barrier	Warranted								✓
	Glare Screening Offset	✓							
	Delineation	✓							
	Proper Length							✓	✓
Traffic Management	Overall Operation					✓	✓		✓
	Positive Guidance					✓	✓		✓
Transition Area	Buffer Spaces					✓	✓		
	Overall Operation			✓			✓	✓	✓
	Transition Lengths						✓	✓	✓

Source: Iowa DOT

WZ categories with exceptional and acceptable ratings in 2018 and 2019 for more than 75 percent of the reviews for each road facility type are presented in table 2. Specific findings regarding exceptional and acceptable rated categories include:

- Most categories related to implementation of WZ signs, pavement markings, and traffic barriers received exceptional ratings for both years across all facility types.
    - Iowa DOT should identify and document the WZM practices and processes that contributed to the exceptional performance of these WZ traffic control strategies. Iowa DOT should also look for opportunities to implement or adopt similar best practices to improve other underperforming WZ traffic control strategies.

- For the WZ traffic control strategies that performed well in 2018 and underperformed in 2019, Iowa DOT should look for any changes in WZM practices from 2018 to 2019 that might have contributed to the underperformance. WZ traffic control strategies that saw a performance decline in 2019 are:
    - Road categories on interstates
    - Lane closures, channelizing devices, flaggers, and transition area strategies on county roads
    - Pedestrian categories on city roads
- On the contrary, for WZ traffic control strategies that underperformed in 2018 and received exceptional ratings in 2019, Iowa DOT should examine the changes in WZM practices and traffic conditions that contributed to the improved performance. Iowa DOT can use the findings to document the best practices, incorporate the practices into staff training, and continue to implement those strategies for future WZs. WZ traffic control strategies that displayed improved performance in 2019 include:
    - Detour and traffic management on interstates
    - DMS on county roads
- For WZ traffic control strategies that only displayed exceptional performance on one of the facility types across both years, Iowa DOT should explore the differences in WZM practices and processes applied to each facility type. Based on the findings, Iowa DOT can explore opportunities to tailor and adapt similar WZM practices on other facility types with different traffic configurations and conditions. For example, flagging operations on U.S. and Iowa routes received exceptional ratings, while flagging on other facilities did not. By assessing the differences in flagging practices and implementation between different facility types (and different projects), Iowa DOT can explore the opportunities to improve WZ flagging on interstates, county, and city routes. WZ traffic control strategies that performed well across both years on only one facility type include:
    - Arrow boards, dynamic message signs, transition area, and WZ maintenance areas on interstates
    - Road, flagging, and channelizing devices on U.S. and Iowa routes
    - Sign and temporary traffic signal on county roads
    - Arrow boards on city roads
- Overall, WZs on interstates and U.S. and Iowa routes performed better compared to county and city roads.

Table 2. Work Zone Traffic Control Strategies receiving an Exceptional or Acceptable rating for more than 75 percent of reviews

Work Zone Traffic Control Strategy	Category	Interstate		U.S. and Iowa Route		County Road		City Road	
		2018	2019	2018	2019	2018	2019	2018	2019
Lane Closure	Ballasting	✓	✓	✓	✓	✓	✓	✓	✓
	Cleanliness	✓	✓	✓	✓	✓	✓	✓	✓
	Crashworthiness	✓	✓	✓	✓	✓	✓	✓	✓
	Sheeting		✓	✓	✓			✓	✓
	Positive Closure	✓							
	Location/Spacing	✓							
	General Condition		✓	✓			✓		
	Retroreflectivity			✓	✓	✓			
Dynamic Message Sign	Appropriate Messages						✓		
	Display		✓	✓	✓		✓	✓	✓
	Lateral Offset	✓	✓	✓	✓		✓	✓	✓
	Location	✓	✓	✓	✓		✓		
	Proper Operation		✓				✓	✓	✓
	Visibility	✓	✓	✓	✓		✓		
	Warranted	✓		✓	✓			✓	✓
Channelizing Device	Alignment		✓						
	Cleanliness	✓		✓		✓		✓	✓
	General Condition		✓				✓	✓	✓
	Location	✓							
	Retroreflectivity					✓			
	Ballasting	✓	✓			✓		✓	✓
	Sheeting	✓	✓			✓			
	Proper Usage	✓	✓	✓	✓	✓	✓	✓	✓
Detour	Pavement Markings			✓	✓			✓	✓
	Traffic Capacity		✓	✓	✓			✓	✓
	Roadway Dimensions		✓	✓	✓			✓	✓
	Advisory Speeds			✓	✓			✓	✓
	Curve Sharpness		✓	✓	✓				
	Pavement Condition		✓	✓	✓			✓	✓

Table 2. Work Zone Traffic Control Strategies receiving an Exceptional or Acceptable rating for more than 75 percent of reviews (continued)

Work Zone Traffic Control Strategy	Category	Interstate		U.S. and Iowa Route		County Road		City Road	
		2018	2019	2018	2019	2018	2019	2018	2019
Flag	Flagger Conduct				✓				
	Stop/Slow Paddle				✓	✓			
	Flagging Apparel			✓	✓	✓			
	Communication			✓	✓	✓			
	Pilot Car			✓		✓			
	Flagger Location			✓	✓	✓			
	Flagging Technique			✓	✓	✓			
Pavement Marking	Alignment	✓	✓	✓	✓	✓	✓	✓	✓
	Color	✓	✓		✓	✓	✓	✓	✓
	Retroreflectivity	✓		✓			✓		
	Conflicting Marking Removal	✓	✓	✓	✓	✓			
	Dimensions	✓	✓	✓	✓	✓	✓		
	General Condition			✓	✓		✓		
	Visibility	✓		✓	✓	✓	✓	✓	✓
Mobile Work Zone	Truck Mounted Attenuator			✓	✓				
	Vehicle Lighting			✓	✓				
	Vehicle Spacing			✓	✓				
	Warning Signs	✓	✓	✓	✓				
Arrow Board	Display	✓	✓					✓	✓
	Lateral Offset	✓	✓	✓	✓			✓	✓
	Location	✓	✓					✓	✓
	Proper Operation	✓	✓	✓	✓			✓	✓
	Visibility	✓	✓	✓	✓				
Road	Lack of Dirt/Debris	✓	✓			✓			
	Drop-off Treatment	✓							
	Protected Excavations	✓							
	Materials Storage	✓							
	Unattended Equipment	✓							
	Surface Smoothness	✓	✓	✓	✓		✓		
Pedestrian	Continuous Travel Path							✓	
	Proper Delineation			✓	✓			✓	

Table 2. Work Zone Traffic Control Strategies receiving an Exceptional or Acceptable rating for more than 75 percent of reviews (continued)

Work Zone Traffic Control Strategy	Category	Interstate		U.S. and Iowa Route		County Road		City Road	
		2018	2019	2018	2019	2018	2019	2018	2019
Sign	Cleanliness	✓	✓	✓	✓	✓	✓	✓	✓
	Crashworthiness	✓	✓	✓	✓	✓	✓	✓	✓
	Legends/Symbols	✓	✓	✓	✓	✓	✓	✓	✓
	Legibility	✓	✓	✓	✓	✓	✓	✓	✓
	Location/Spacing	✓	✓	✓	✓	✓	✓	✓	✓
	Retroreflectivity	✓				✓			
	Mounting Height		✓	✓	✓		✓	✓	✓
	Necessity	✓	✓	✓	✓	✓	✓	✓	✓
	Sheeting			✓	✓		✓		
Temporary Traffic Signal	Distance Between Stop Bars			✓	✓	✓			
	Equipment Condition			✓	✓	✓	✓		
	Location of Stop Bar			✓	✓	✓			
	Timing/Operation			✓	✓	✓			
	Vertical Clearance			✓	✓	✓	✓		
	Visibility			✓	✓	✓	✓		
Traffic Barrier	Alignment	✓	✓	✓	✓	✓		✓	✓
	Approach Flare	✓	✓	✓					
	Delineation	✓	✓	✓	✓			✓	✓
	General Condition		✓	✓	✓	✓			
	End Treatment	✓	✓	✓	✓	✓		✓	✓
	Offset from Traveled Way	✓	✓	✓	✓	✓		✓	✓
	Proper Length	✓	✓	✓	✓	✓			
	Unit Connections	✓	✓	✓	✓	✓		✓	✓
	Warranted		✓		✓				
Traffic Management	Appropriate Speed Limits		✓		✓				
	Overall Operation		✓	✓	✓				
	Positive Guidance		✓	✓					
	Traffic Capacity	✓	✓	✓	✓				

Table 2. Work Zone Traffic Control Strategies receiving an Exceptional or Acceptable rating for more than 75 percent of reviews (continued)

Work Zone Traffic Control Strategy	Category	Interstate		U.S. and Iowa Route		County Road		City Road	
		2018	2019	2018	2019	2018	2019	2018	2019
Transition Area	Buffer Spaces		✓	✓	✓				
	Lane Widths	✓	✓	✓	✓	✓	✓	✓	✓
	Transition Lengths	✓	✓	✓	✓	✓			
	Transition Location	✓	✓	✓	✓	✓		✓	✓
Worker	Conduct			✓	✓				
	Hats			✓	✓				
	Pants			✓	✓				
	Vests			✓	✓				

Source: Iowa DOT

Iowa DOT Work Zone Field Review Dashboard

In 2019, Iowa DOT began development of a dashboard for visualizing and analyzing Work Zone Field Review data.[6] Once completed, this dashboard will allow the Iowa WZ management team and other State and local employees (e.g., engineers, managers, planners) to gain a quick overview of the WZ implementation, as well as assess the impacts of proposed policy changes on macro-, meso-, and micro-level performance of WZs. Using this dashboard, Iowa DOT will be able to adjust the granularity of the field review performance from a State to county/district to project level. They can use this geographic filter to compare the WZ traffic control strategies before and after policy changes are implemented. Also, planners look at strategies such as detours and lane closures to assess the efficiency of their planning strategies, as well as identify gaps between planning and implementation. Because of the different dimensions of impact that a change in policy has, this dashboard will provide staff the ability to easily perform comparative analyses and communicate the effects of the potential changes.

Figure 13 shows a screenshot from the dashboard, which has multiple pages for each WZ traffic control strategy (e.g., traffic signs, channelizing devices, traffic barriers). On each page, the dashboard provides a summary of scores for each category. The screenshot of the dashboard in figure 13 shows average scores for categories associated with channelizing devices. As shown in the screenshot, the average score for "Proper Usage" is 1.65. The chart on the right shows the individual scores for different Iowa counties. The level of granularity can be adjusted from county to city and from city to project as needed. In addition, on the left side of the dashboard there are filters that help users select specific types of WZ traffic control strategies.

[6] FHWA-Iowa DOT conference calls May 2021 to September 2021.

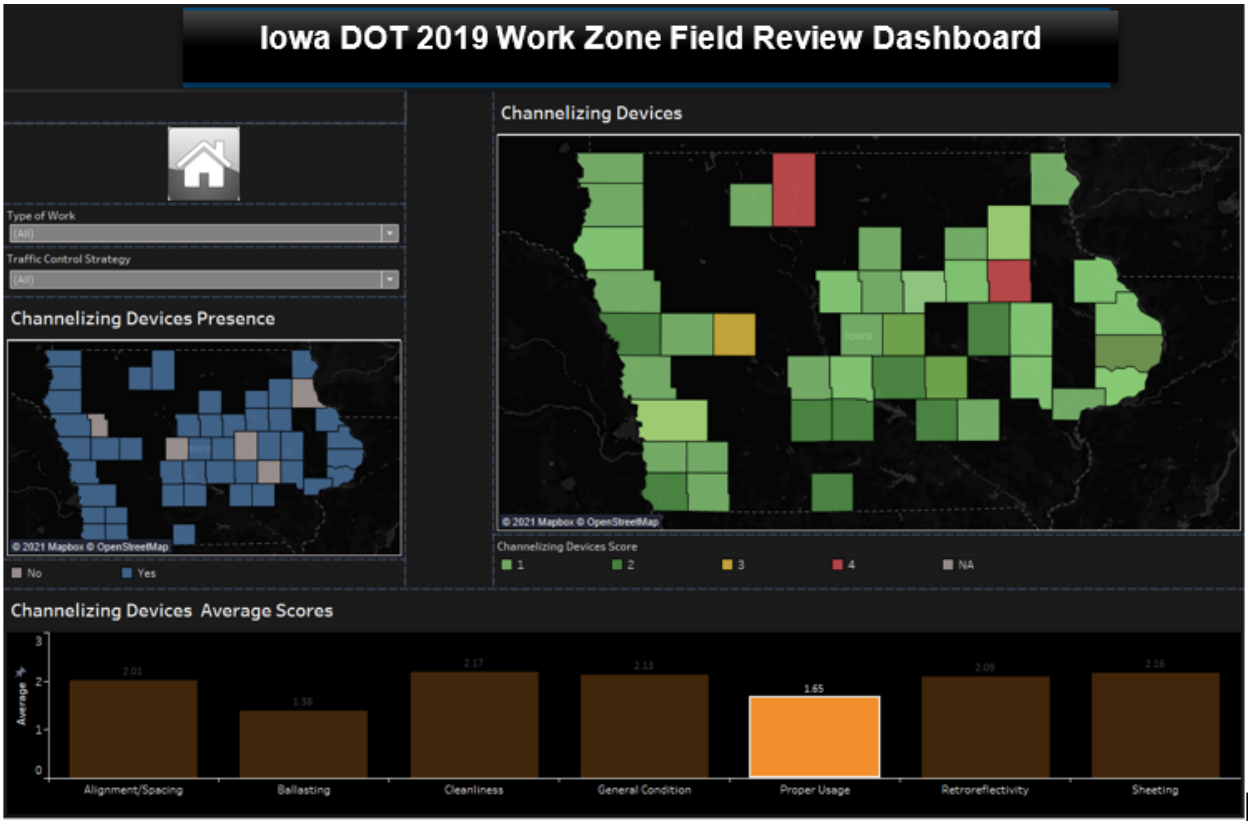

Figure 13. Screenshot. Iowa Department of Transportation Work Zone Field Review Dashboard
Source: Iowa DOT

Key Findings and Observations for Data-Driven WZPRs

- Field reviews, traffic control safety reviews, and WZ safety and mobility audits are valuable information sources that provide both qualitative and quantitative assessments of WZ performance. Iowa DOT collects and digitizes quantitative and qualitative feedback from field reviews of randomly selected WZ projects. These field review data allow Iowa DOT to evaluate the efficiency and effectiveness of WZM practices and processes from time to time. Iowa DOT is planning to expand its performance driven assessment of WZ processes by increasing the number of field reviews conducted annually.

Key Findings and Observations for Data-Driven WZPRs (continued)

- Iowa DOT should follow up on the findings from the field reviews and incorporate next steps and actions in its WZPR to identify mitigations for underperforming areas, and to further leverage and expand practices and procedures that contribute to high performance. Potential items to address include:
  - Identifying and mitigating the root causes that led to repeated underperformance of certain WZ traffic control strategies.
  - Identifying the underlying practices and procedures that contributed to exceptional performance of certain traffic control strategies and applying those practices and lessons across other traffic control strategies.
  - Investigating why performance went down in certain areas while it went up in others between 2018 and 2019, as well as the variability in performance of the same traffic control strategies across facility types. The results of the investigation may be used to identify issues and trends (e.g., issues specific to different facility/project types, variation in practices across districts) and improve WZ processes and procedures.
- Iowa DOT's WZ field review dashboard is a valuable tool not just for visual presentation and analysis of the field review data but also for saving the data and tracking patterns and trends over time and using lessons learned to improve WZ practices and procedures.

Application of Case Study Results to Future Work Zone Process Reviews

Results of the quantitative analyses conducted for the three performance areas provide Iowa DOT with a basis to make decisions on how to focus efforts for future work zone process reviews. Iowa DOT has formed a team that will use these results, supplemented by qualitative data and additional quantitative data sources, to implement a new approach for conducting work zone process reviews, as well as other follow-up activities.

Qualitative Data

Iowa DOT established a new Work Zone Management and Operations group, which comprises staff from all areas of WZM. The core members of this group also contributed to Iowa DOT's WZM Capability Maturity Framework (CMF) assessment process. With the help of this group, Iowa DOT plans to improve its qualitative data collection practices by conducting more outreach meetings with district staff and identifying their key issues. The qualitative data collected will include field observations, staff surveys, and customer feedback, and will provide additional context to supplement the quantitative data trends and further help identify the factors contributing to those trends.

The Iowa DOT Work Zone Council, which is composed of managers and district operations personnel, oversees the Work Zone Management and Operations group. The Work Zone Council and related committees commissioned an improved WZ safety and mobility process review program for Iowa DOT that encompasses all WZM dimensions in order to meet or exceed all federal requirements. The existing process focuses on meeting federal requirements by performing Work Zone Field Reviews to identify improvements in WZ safety and mobility efforts. While it does help to improve WZM practices, the existing process does not provide comprehensive data-driven support for the assessment of WZ safety and mobility efforts contained in the Transportation Systems Management and Operations (TSMO) Work Zone Management Service Layer plan. Participation in this FHWA Data-Driven WZPR case study provided Iowa DOT the opportunity to leverage the experience of experts from different WZM areas to develop an improved WZPR approach, as presented in figure 14.

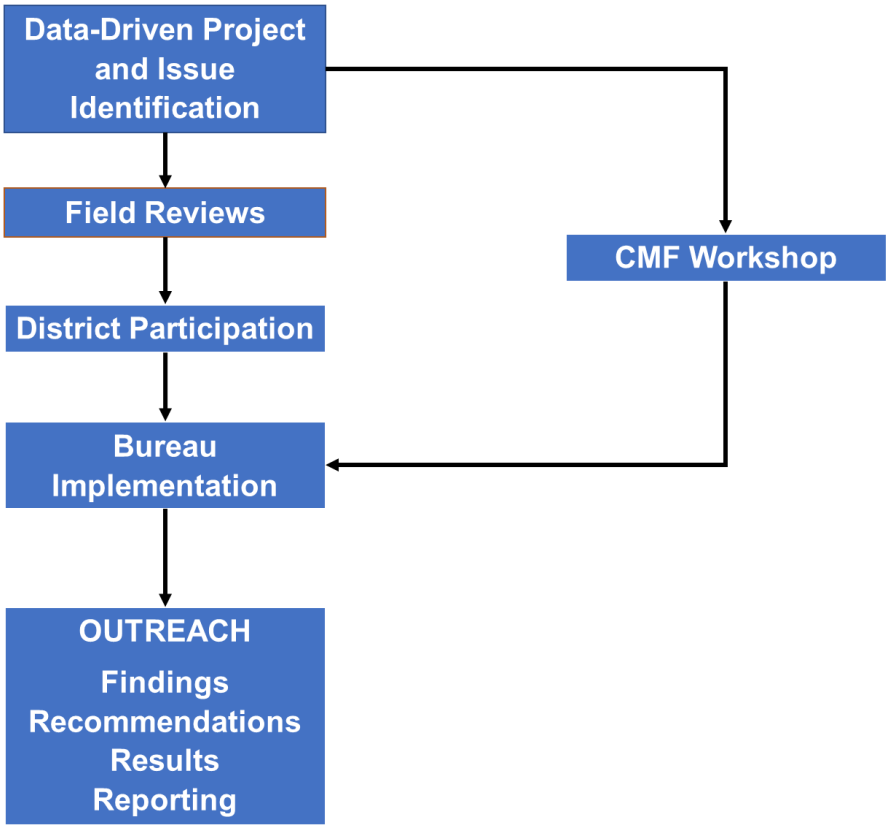

Figure 14. Diagram. Workflow of Iowa DOT's newly implemented work zone process review
Source: Iowa DOT

The new WZPR procedures include:

- Emphasizing the inclusion of design, maintenance, and motor vehicle enforcement representatives.
- Incorporating data-driven metrics and processes.
- Continuing Work Zone Field Reviews.
- Increasing district management and field operations participation.
- Conducting and communicating the results of WZ CMF workshops.
- Working with different bureaus including Traffic Operations, Traffic and Safety, Design, Construction and Materials, and Motor Vehicle Enforcement to implement recommended guidelines, standards, procedures, and techniques.
- Including results and recommendations in an improved outreach program.

Previously, Iowa DOT used a random approach for selecting projects for field reviews based on time of field review and presence of active projects. Upon completion of the reviews, Iowa DOT identified key issues by following an ad hoc process of various committees and group activities. Using the new WZPR procedures, Iowa DOT will leverage available WZ data to perform a more focused and proactive selection of projects and issues for the WZPR team to address. These will include large and small projects, maintenance operations, and local system projects.

Additional Data Collection for Upcoming Work Zone Process Reviews

Iowa DOT WZPR team members stated that Iowa DOT started deploying smart arrow boards (SABs) on interstate projects in Spring 2021. Iowa DOT plans to start installing SABs on every lane closure on interstates and expressways by Spring 2022. SABs will track lane closures both spatially and temporally. Iowa DOT will be able to use the information from the SABs to get more complete and more accurate data on lane closures, compare daytime vs. nighttime lane closures, and evaluate lane closure-related crash data. Iowa DOT also is working on defining the specifications and requirements for Connected Temporary Traffic Signals. The intent for these devices is to provide real-time 511 information to travelers about WZ traffic conditions and incidents.

Follow-Up Work Zone Process Review Activities

Iowa DOT will leverage the findings from this case study to conduct follow-up WZPR activities, including:

- Establishing processes to calculate the metrics selected for data-driven process reviews and identifying thresholds.
- Identifying undesirable trends in each performance area and projects contributing to the trends.
- Identifying and applying lessons learned and best practices from WZM successes.
- Conducting WZ committee and district meetings to collect contextual information (e.g., root cause identification, correlating factors, issue identification) behind the trends.
- Selecting and prioritizing issues to be addressed during the next WZPR cycle.
- Identifying action items for addressing the prioritized issues.

These activities are not an extensive or exhaustive list, nor are required under any FHWA regulation. Iowa DOT will tailor and conduct the activities to suit their WZPR goals and objectives.

Lessons Learned

Lessons learned from the Iowa DOT case study include:

- **State DOTs have access to data resources for different performance areas through their intra-agency data collection efforts.** A comprehensive data inventory of all data resources will enable State DOTs to select their internal performance measures for various WZ strategies and performance assessments based on available data sources.
- **Combining quantitative data trends with qualitative contextual information will lead to better root cause identification.** Neither quantitative trends nor qualitative contextual information alone depict a complete picture of WZ issues. When synthesized together, these two classes of data provide stronger and more precise identification of root causes and potential solutions to issues.
- **Developing quantifiable metrics will enable continuous performance tracking of WZ processes and procedures.** Developing and implementing metrics for different WZM outcome areas will enable States to quantify the impact of identified issues through qualitative data assessments. Depending on the level of impact, States can prioritize addressing the most pressing issues. Further, these metrics will help States to assess the impact of implemented action items in resolving the targeted issues.
- **Iowa DOT's proactive approach to mobility data collection for its TCPs (i.e., project-specific sensor-based speed and travel time data combined with third-party probe data) enabled the project team to establish repeatable and consistent methodologies for mobility performance assessments.** As the data collection strategies are standardized into its WZM business processes, Iowa DOT can perform frequent assessments of WZ mobility impact with minimal analysis support.
- **Field reviews, traffic control safety reviews, and WZ safety and mobility audits are valuable information sources that provide both qualitative and quantitative assessments of WZ performance.** Iowa DOT's systemized data collection process for field inspections via its Work Zone Field Review dashboard sets a strong foundation for continuous assessment of implemented WZ strategies. The granularly digitized data enabled the project team to conduct analyses and identify key issues, as well as best practices for various aspects of WZ planning and implementation. The findings from the field inspections also provide both qualitative and quantitative bases for conducting WZPRs.
- **Iowa DOT currently applies limited focus on collecting WZ exposure data (e.g., WZ VMT, VHT, mileage, and lane closure/activity hours).** This posed a challenge for the project team when attempting to normalize the mobility and safety metrics across years and across project and facility types. Standardizing practices for collecting exposure data will improve the context of data assessment. Exposure data will be very valuable in normalizing WZ-related data for different focus areas. This will also aid in establishing correlations between performance areas (e.g., how does mobility performance affect safety and vice-versa). At the very least, tracking WZ VMT and lane closure hours will provide a strong foundation for WZ exposure data.

Appendix: Case Study Team and Follow-Up Activities

Work Zone Process Review Case Study Team

In its 2015 WZPR guidance document, FHWA recommends that State DOTs include representatives from various WZM areas in their WZPR teams (figure 15). Iowa DOT brings together a team of experts from multiple WZM disciplines to conduct its WZPRs, which ensures that all aspects of WZM are covered in the WZPRs. This WZPR team also connects with district-level staff and field personnel to collect qualitative feedback on their experiences and issues during the design, planning, and implementation of WZs.

Recommended Division/Office Representatives to Include on Work Zone Process Review Team

Planning
Occupational (Worker) Safety
Construction Administration
Roadway/Project Design
Materials
Traffic Operations/Management
Traffic Safety
Permitting
Maintenance
District Staff (Resident, Areas, and District Engineers)
Training/Workforce Development
Public Information Office
Design Consultants
FHWA Division Office

Source: FHWA

Figure 15. List. Recommended Division/Office Representatives to include on Work Zone Process Review Team

Planning
Occupational (Worker) Safety
Construction Administration
Roadway/Project Design
Materials
Traffic Operations/Management
Traffic Safety
Permitting
Maintenance
District Staff (Resident, Areas, and District Engineers)
Training/Workforce Development
Public Information Office
Design Consultants
FHWA Division Office
Source: FHWA

Follow-Up From 2019 Work Zone Process Review

During its 2019 WZPR, Iowa DOT identified action items to digitize the field review data and make it accessible for sharing with intra-agency and district staff as well as field review groups. After completion of data collection, Iowa DOT planned on analyzing the field review data and conducting a debrief meeting with district staff to share the findings. Iowa DOT also planned to address the variability of field review scoring by developing a binder with pictures describing each rating to help aid in the reviews. These binders would be leveraged for annual staff training and new personnel onboarding.

As of May 2021, Iowa DOT was able to digitize WZ field review data by establishing an online mechanism for field review groups to submit and share their findings electronically. In preparation for the 2021 WZPR, Iowa DOT analyzed the field review data and identified the performing and underperforming WZ control strategies and respective categories. Iowa DOT plans to use the findings from this analysis to coordinate with district staff and field personnel to identify recommended action items to minimize underperformance in subsequent years. Iowa DOT also initiated the process of developing a WZ field review binder. Iowa DOT will include

this new binder in the training materials for field reviewers and anticipates using it during the Summer 2022 field reviews.

For more information on FHWA's Work Zone Management Program, please visit: https://ops.fhwa.dot.gov/wz and https://workzonesafety.org/topics-of-interest/smart-work-zones/

The FHWA is engaging with State DOTs and conducting research to incorporate data-driven practices into work zone process reviews. The information will be used to increase awareness on data, tools, and methods for State DOTs to use to prepare effective work zone process reviews. Topics of interest include analysis and use of quantitative data including exposure, safety, mobility, and inspection data, as well as analysis and use of qualitative data for inclusion in work zone process reviews. This case study is one of a series of resources on work zone process reviews.

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