Construction Impacts on Multistate Freight and OSOW Corridors

MID-AMERICA FREIGHT COALITION

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About the Mid-America Freight Coalition (MAFC)

The industries and farms of the Mid-America region can compete in the marketplace only if their products can move reliably, safely and at reasonable cost to market.

State Departments of Transportation play an important role in providing the infrastructure that facilitates movement of the growing amount of freight. The Mid-America Freight Coalition was created to support the 10 states of the Mid America Association of State Transportation Officials (MAASTO) region in their freight planning, freight research needs and in support of multi-state collaboration across the region.

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15. Supplementary Notes This project provides an overview of increased construction spending, additional work zones on multistate freight corridors, and the resultant crashes associated with CMVs. After providing a review of these data trends, a multistate approach to work zone mapping is demonstrated as an addition to the Work Zone Data Exchange and state by state 511 systems. This approach provides data and planning tools suitable for multistate shipments and in recognition of the increasing miles of long-haul shipments. The project concludes with a discussion of CMV work zone best practices cited by work zone professionals, and a call for a regional operations center to track and provide data on work zones, truck parking, emergency services, and trip planning. More attention, research, and action should be focused on reducing work zone crashes, especially those including CMVs.		

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1. INTRODUCTION

The purpose of this project is to assess the scope of potential impacts of an increased number of work zones on multistate freight and oversize overweight (OSOW) load movement in the MAASTO region. This increase in work zones brings potential safety and freight efficiency challenges, especially for truck movement on multistate freight corridors.

There has been an increase in the number of work zones on the nation's major freight corridors related to investments of the Infrastructure Investment and Jobs Act (IIJA) [1]. This increase in work zones has contributed to delays, driver frustration, and work zone crashes. In Wisconsin, there are typically more than 300 highway and bridge projects every year [2]. According to MoDOT, in 2025, Missourians can expect to see 800-1,000 work zones on any given day [3]. In Indiana, more than 1,200 projects are planned this construction season. In Ohio the estimate is at 955, and in Minnesota travelers can expect 180 work zones [4]. For the seven major corridor case studies included in this project (I-35, I-39, I-70, I-75, I-80, I-90, I-94), the number of planned work zones ranges from 36 to 231 over the course of IIJA funding (as documented in Chapter 4).

The safety implications of work zones for large commercial vehicles have been a focus of FHWA and state DOTs. According to the Fatality Analysis Reporting System (FARS), the annual total number of commercial motor vehicle (CMV)-involved fatal work zone crashes increased from 135 crashes in 2012 to 291 crashes in 2021. Further, the proportion of all fatal work zone crashes that involved commercial vehicles increased from 24.2% to over 33% in that period [5].

Concurrent with the increase in the number of work zones on multistate freight corridors, there is also an expected increase in long-haul trucking miles according to the "Freight Facts and Figures" FHWA web publication [6]. Based on 2007 Commodity Flow Data, the average shipment length in 2007 was 187 miles, over 3 times the length defined as long haul [7]. In 2017 the length of shipment increased to 206 miles and in 2022, the average length was 220 miles [8].

Looking forward, "Long-haul freight truck traffic on the National Highway System is projected to increase dramatically … from 311 million miles per day in 2015 to 488 million miles per day by 2045" [6]. Based on 2017 data [9], there were approximately 313 million miles per day.

Similarly, OSOW permit managers across the 10 MAASTO States report that OSOW moves have increased as documented in Chapter 2, Table 4. To demonstrate the magnitude of the permit process across the regions, Table 1 lists the number of OSOW permits reported to the MAASTO SCOHT database by state for 2023, totaling nearly 2 million permits for the region.

The actual number of moves is underreported as permit types and numbers reported are at the discretion of the state. For example, some states operate a multi-trip permit system or a blanket permit that allows a single permit to cover multiple OSOW moves, which leads to an undercount of total OSOW moves. Out of the ten states in MAASTO, only two report that they do not offer blanket or single permits for multiple overweight trips. Those two states are Ohio and Indiana based on reporting in the MAASTO SCOHT webpage at https://www.maasto.net/scoht/.

State	IL	IN	IA	KS	KY	MI	MN	MO	OH	WI
# permits in 2023	258,569	417,092	164,283	92,348	95,958	93,993	167,561	169,770	341,129	75,869
% issued w/out review	99.1	98+	66.4	70.0	50.0	13.0	91.0	75.0	88.0	85.0
MAASTO Total	1,877,572 total permits									

Table 1: Permits by state in 2023 (Source: Compiled from data from MAASTO SCOHT [10]).

Trends in permit numbers are detailed further in the following chapter. The percentage of permits issued without human review reflects the transition to automated permit systems. In automated systems, permitted loads are routed to avoid problematic work zones that may have narrow or low clearances, or geometrics or pavements that do not permit larger and/or heavier vehicles.

An increase in work zones across multiple states on major freight corridors, combined with increased multistate freight movements, requires a broader system planning approach. A systems approach is necessary to frame the issues, understand the safety and efficiency implications, and assess potential responses to conditions associated with continued increases in freight traffic.

With the investments of IIJA, states in the MAASTO region seek to critically assess construction impacts to safe and efficient freight movement on major multistate freight and OSOW corridors. This project also provides an opportunity to explore and advance multistate best practices for work zones and collaboration efforts that support safe and efficient movement of freight at the multistate system level.

State DOTs have significant work zone expertise in their operational areas. To extend that knowledge, this report is directed towards the freight planners, logistics experts, and other operations professionals and decision makers in those agencies. It provides an understanding of multistate freight corridors as continuous rather than limited to the boundaries of a state. The report demonstrates that freight movement is of particular concern to agencies due to the persistence and seriousness of the crash issue. Over 30% of work zone fatalities involve a CMV [5]. Better understanding of the causalities and circumstances leading to these crashes would allow for redesigning or mitigation within or before work zones to reduce these crashes.

This report concludes that increased coordination across work zone experts in MAASTO States is warranted and can provide a focus on CMVs in work zones. The coordination should include a multistate corridor work zone team, and the expansion of WZDx, 511, truck parking, emergency services, and trip planning to a virtual, regional, multistate freight operations center. In addition, the team should convene at least once a year in person to share best practices and innovation, to manage and improve the work zone mapping tool, and to manage the virtual center.

These actions support innovation in work zone safety through development of regional work zone mapping, innovation in work zone design and management, and by leveraging the knowledge and innovation found across these 10 states.

Organization of the Report

This report has been organized to reflect the project's tasks. Chapter 2 reviews national and state data to frame the increase in work zones on multistate freight corridors. This chapter catalogs investments, work zones, increased truck numbers, and safety and crash data.

Chapter 3 provides a review of state and national efforts to ensure safety and traffic efficiency in work zones. These efforts are supplemented by interviews with state work zone practitioners to provide an understanding of practitioner concerns and mitigation strategies for the increased number of work zones combined with increased truck traffic.

Chapter 4 explores seven multistate freight corridors identified for closer examination and outlines the development of the Multistate Freight Corridor Tool (MFCT). MAFC technical representatives and State permit and motor carrier representatives selected seven multistate freight corridors based on their potential for increased levels of construction, as well as the corridor's significance in regional freight movement. State transportation plans were then obtained from each MAASTO state and future construction projects were combined into a geographic related database designed to map work zones by corridor, rather than by state. This effort resulted in the development of the MFCT, which provides a multistate look at work zones across the region along these important freight corridors.

Chapter 5 synthesizes and develops an agenda for greater coordination and awareness of work zones on multistate freight corridors, including state-to-state communication and better planning for truck operations and OSOW loads. Chapter 5 draws on MAASTO to provide a collaborative environment for the states when planning for multistate corridors and freight operations.

Note: All references to funding levels in this report assume nominal dollars unless noted.

2. FACTORS IMPACTING WORK ZONE SAFETY AND CRASH STATISTICS

Chapter 1 introduced the trends of increased construction spending and work zones, increasing multistate truck volumes, and the growing number of permitted OSOW loads. Chapter 2 examines how these factors affect work zone safety and crash statistics.

The concern that an increased number of work zones on multistate freight corridors could lead to safety issues and freight inefficiencies is justified based on data from FHWA. According to Work Zone Facts and Statistics [6], one work zone fatality occurs for every 4 billion vehicle-miles of travel and for every $112 million worth of roadway construction expenditures. In short, absent improvements to work zone safety, more spending means more work zones and more work zone crashes.

Construction Spending

Construction spending is directly correlated to the increase in work zones. According to the St. Louis Federal Reserve (FRED), construction spending on highways and streets demonstrated a marked increase from 2002 through 2024. Figure 1 below tracks total roadway construction spending across the US and is not adjusted for inflation. The spending for 2025 and 2026 is estimated, and spending varies by month, but overall, highway and street construction spending still appears to trend upward.

Figure 1: Total Construction Spending: Highway and Streets in the United States (Source: Federal Reserve Bank of St. Louis. [11]).

However, inflation especially construction cost inflation can reduce the value of these dollars. BTS evaluated a high inflation (based on inflation rates in 2021 and 2022) and modest inflation scenario (based on inflation growth rates in 2019 and 2021) over the course of IIJA spending and determined that the effectiveness of this funding could be reduced by up to 40% due to construction inflation. Figure 2 compares the value of IIJA funds under these scenarios and shows the decreasing buying power.

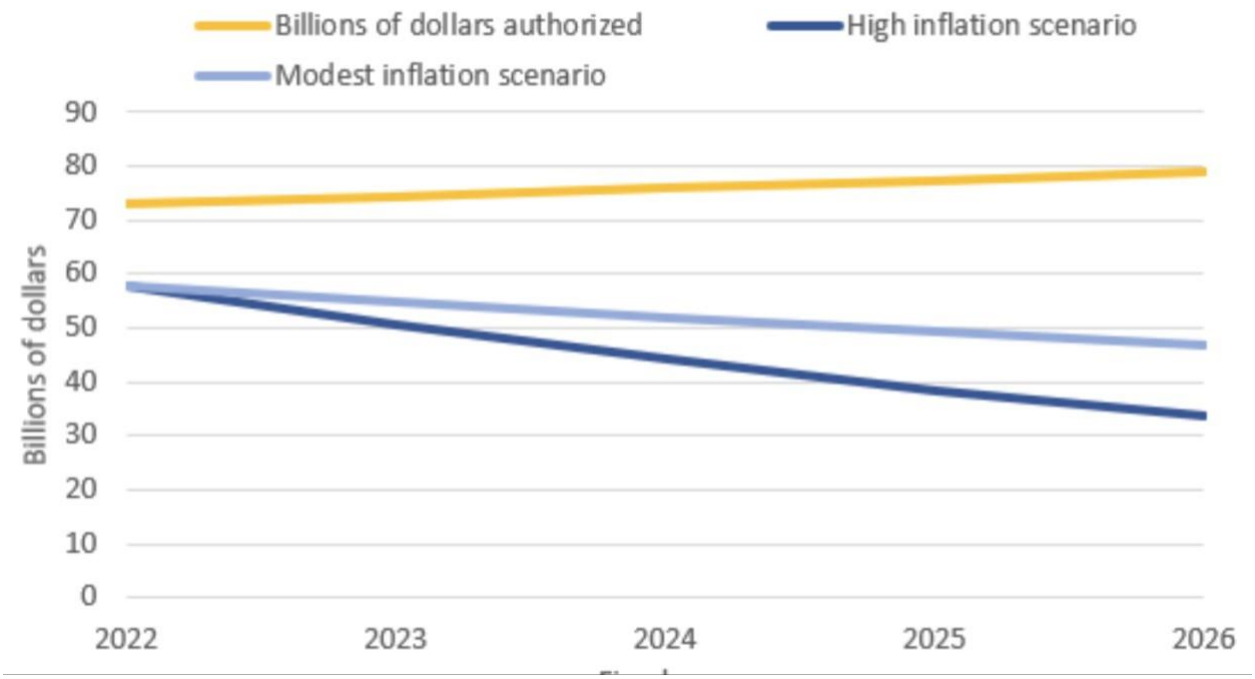


Figure 2: Infrastructure Investment and Jobs Act (IIJA) funds authorized for Highway by fiscal year and amount reduced by construction cost inflation (Source: BTS, [12]).

Under the high inflation scenario, out of the $379.3 billion for highways only $224.2 billion is available. They state, “In other words, only 60% of what could have been bought in 2021, when IIJA was signed, can be bought over the five years from 2022 through 2026; that is a 40% reduction”. Under the modest inflation scenario, $260.5 billion can be purchased with the $379.3 billion for highways due to increased highway construction costs. This results in a 31% decrease in spending power. And as shown in Figure 3 with the National Construction Costs Index (NHCCI), the most aggressive inflation impacts have been in the recent 5 years.

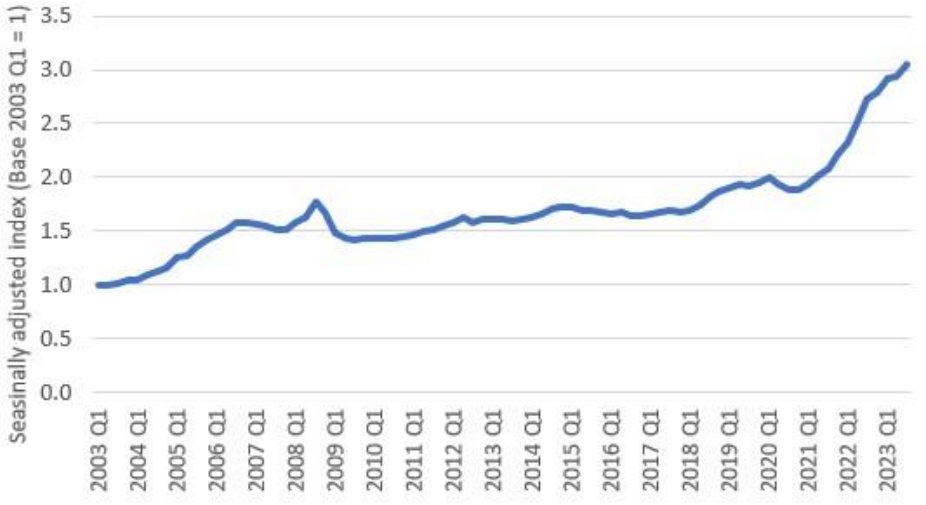


Figure 3: National Highway Construction Cost Index (Source: BTS, [12]).

Looking specifically at the investments made per state with the IIJA, apportionment funding is anticipated to be at record high levels by 2026. Table 2 shows formula apportionments for each MAASTO state for 2022 through 2026, based on FHWA reporting estimates, and does not include other grants, state initiatives, or competitive funding. The following tables are reported in nominal dollars.

State	Actual 2022	Actual 2023	Est. 2024	Est. 2025	Est. 2026	Total	Average 2022-26
IL	2,202,798,566	2,250,129,111	2,288,555,888	2,327,751,005	2,367,730,058	11,436,964,628	2,287,392,926
IN	1,351,621,574	1,383,342,389	1,409,095,921	1,435,364,391	1,462,158,254	7,041,582,529	1,408,316,50
IA	752,097,213	768,458,085	781,741,170	795,289,848	809,109,512	3,906,695,828	781,339,166
KS	551,483,145	564,063,481	574,277,220	584,695,180	595,321,510	2,869,840,536	573,968,107
KY	998,656,077	1,021,128,611	1,039,245,926	1,057,563,088	1,076,512,716	5,193,106,418	1,038,621,284
MI	1,532,773,711	1,567,824,375	1,596,281,349	1,625,307,315	1,654,913,827	7,977,100,577	1,595,420,115
MN	939,132,075	960,840,129	978,464,488	996,441,246	1,014,777,554	4,889,655,492	977,931,098
MO	1,373,497,925	1,405,013,473	1,430,600,353	1,456,698,839	1,483,319,318	7,149,129,908	1,429,825,982
OH	1,919,351,031	1,964,813,284	2,001,420,018	2,038,373,122	2,076,697,098	10,000,654,553	2,000,130,911
WI	1,053,457,774	1,078,506,444	1,098,842,987	1,119,586,158	1,140,744,208	5,491,137,571	1,098,227,514

Table 2: FY 2022 - FY 2023 Actual and FY 2024 - 2026 estimated state-by-state federal-aid highway program apportionments for the MAASTO states (Source: FHWA [13]).

	Total 2016-2020	Total 2022-2026	Yearly average 2016-2020	Yearly average 2022-2026
IL	7,530,044,230	11,436,964,628	1,506,008,846	2,287,392,926
IN	5,046,616,382	7,041,582,529	1,009,323,276	1,408,316,50
IA	2,602,929,364	3,906,695,828	520,585,873	781,339,166
KS	2,001,465,839	2,869,840,536	400,293,168	573,968,107
KY	3,519,035,684	5,193,106,418	703,807,137	1,038,621,284
MI	5,576,378,610	7,977,100,577	1,115,275,722	1,595,420,115
MN	3,453,638,357	4,889,655,492	690,727,671	977,931,098
MO	5,013,959,108	7,149,129,908	1,002,791,822	1,429,825,982
OH	7,099,315,462	10,000,654,553	1,419,863,092	2,000,130,911
WI	3,985,112,707	5,491,137,571	797,022,541	1,098,227,514

Table 3: FAST Act investment compared to IIJA, Total highway program apportionments (Source: FHWA [13]).

IIJA has been a tremendous stimulus for infrastructure projects and therefore has resulted in an increased number of work zones. The related work zone delays, detours, and crashes are unfortunate byproducts. Compared to the 2016-2020 reauthorization of the FAST Act (Fixing America's Surface Transportation Act), IIJA increases funding to every state. Table 3 provides the total and average actual funds invested per state for the previous authorization era compared to the 2022-2026 period.

Based on the FHWA estimates, Illinois had the biggest increase in funding with a nearly $4 billion increase over the previous authorization. On the other end of the spectrum, Kansas increased by over $868 million. The increased investments are expected to improve and expand freight transportation infrastructure and will provide safety, efficiency, and economic benefits.

Contrary to the increases in funding, inflation, and construction inflation specifically can reduce the spending power of the 2021 dollars if the constructions costs exceed those in 2021.

For the latest available data though third quarter 2024, the construction cost index has been at 8.7% as determined by FHWA [14]. That means that highway construction costs were 8.7 times higher than they were when NHCCI started at level 1.0000 in January-March 2003 [15].

According to a Bureau of Transportation Statistics, recent data through the third quarter of 2023 shows continued growth, with construction costs rising 25% from the first quarter of 2022 to the first quarter of 2023 and 5% from the first to the third quarter of 2022 [12]. "The growth in construction costs reduces the amount of highway infrastructure that can be bought today versus what could have been purchased prior to the price increases. In other words, the same construction project today costs more than yesterday and significantly more than in 2021" [13].

Safety, freight efficiency, workforce development, and employment are recognized as immediate and mid-range benefits of these infrastructure investments. The IIJA fact sheet from the White House also identified longer term intended impacts. The bulletin states the IIJA "will create good paying, union jobs. With the President's Build Back Better Agenda, these investments will add, on average, around 2 million jobs per year over the course of the decade, while accelerating America's path to full employment and increasing labor force participation." [16] [15]

The revitalization of infrastructure under IIJA is critical to sustain the functionality and efficiency of the system and the safety of travelers while simultaneously providing direct and indirect economic benefits. Many of the investments will result in construction work zones that impact safety and efficiency and result in re-routing and/or delays. The following section examines work zone trends and statistics to establish an understanding of the impacts from an increased number of work zones, especially those on multistate freight corridors.

Work Zone Trends

According to FHWA,

> A work zone is an area of a trafficway with highway construction, maintenance, or utility-work activities. A work zone is typically marked by signs, channeling devices, barriers, pavement markings, and/or work vehicles. It extends from the first warning sign or flashing lights on a vehicle to the "End of Road Work" sign or the last traffic control device. A work zone may be for short or long durations and may include stationery or moving activities. Inclusions:

- Long-term stationary highway construction such as building a new bridge, adding travel lanes to the roadway, and extending an existing trafficway.
- Mobile highway maintenance such as striping the roadway, median, and roadside grass mowing/landscaping, and pothole repair.
- Short-term stationary utility work such as repairing electric, gas, or water lines within the trafficway. [15]

As noted previously in Work Zone Facts and Statistics [17], one work zone fatality occurs for every 4 billion vehicle-miles of travel and for every $112 million worth of roadway construction expenditures. The authors of IIJA were proactive in acknowledging the possible work zone risks and included funding for safety in all aspects of the investments, including worker safety in active work zones. According to ConstructionDive, the word “safety” appears 711 times in IIJA. Based on a survey of highway contractors conducted by Associated General Contractors of America, those safety investments are critical, “as 60% of highway contractors reported that motor vehicles had crashed into their work zones over the past year.” [18]

The National Work Zone Safety Information Clearing House provides information on work zone crashes and involvement by commercial motor vehicles. The data is based on the FARS, using U.S. DOT 2022 data. Figure 4 below documents 2022 work zone statistics across the nation, including 136 pedestrian fatalities, 282 fatalities involving a commercial motor vehicle, 891 total fatalities, and an estimated 37K work zone injuries. In 2022, there were a total of 96K total work zone crashes. [19]

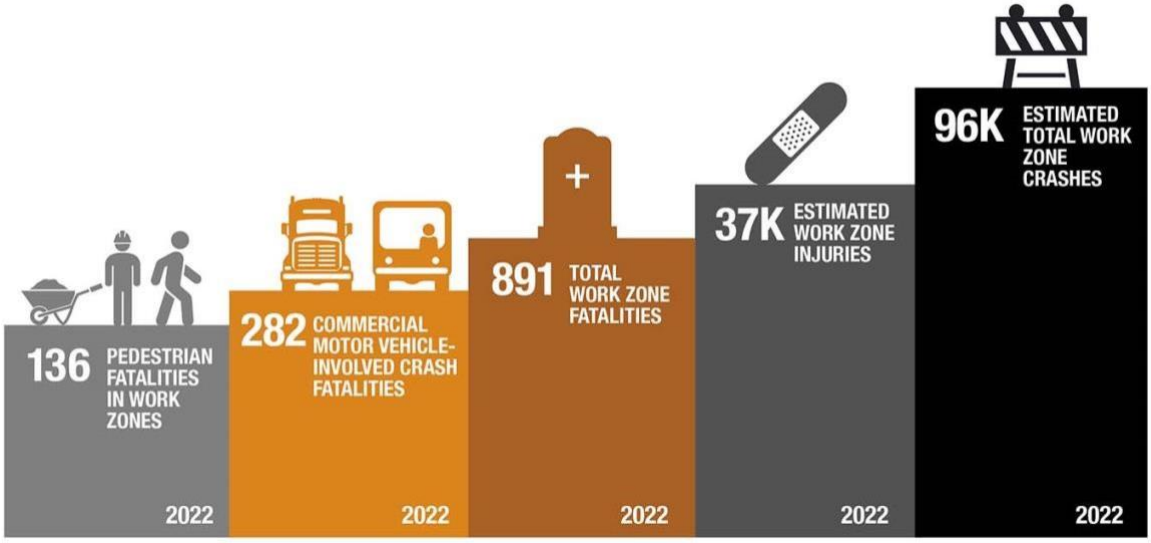


Figure 4: Work Zone safety “At a glance”, 2022 (Source: Fatality Analysis Reporting System (FARS), National Highway Traffic Safety Administration, U.S. Department of Transportation, [19])

The actual number of work zones per year in each state is difficult to track due to the constant turnover of projects. As a result, work zone counts are not tracked like work zone statistics such as crashes and crash severity. To calculate the number of work zones per state, this project uses the construction plans listed in the State Transportation Improvement Plans (STIP) or 6-year plans to identify the construction work zones, projects, and their timing and locations.

Importantly, work zones harbor a higher percentage of fatal crashes than non-work zone crashes on Interstates and principal arterials. This occurs in both rural and urban areas and suggests that the distribution of fatal crashes in both areas are impacted by higher speeds and traffic counts. Figure 5 provides the distribution of the crashes by road type.

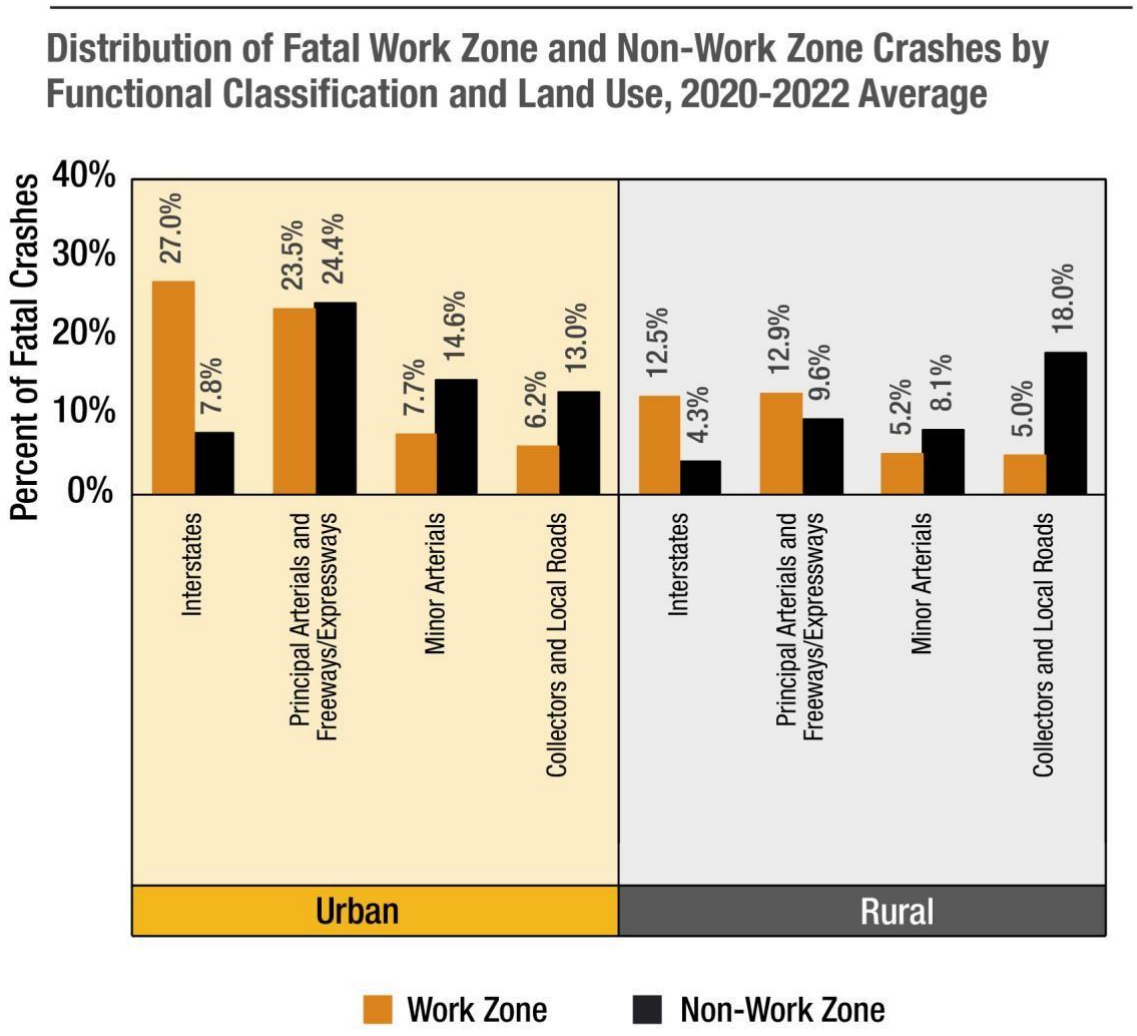


Figure 5: Fatal Work Zone and Non-work Zone crashes by functional class (Source: FHWA, [20]).

CMVs present a special concern within work zones. The size and weight of the CMVs alone renders them more dangerous in a mixed-vehicle and/or work zone crash. The Work Zone Safety Information Clearinghouse lists four possible reasons for overrepresentation of CMVs in work zone fatal crashes [20]:

- more work zones on roadways with more CMVs,
- more CMVs traveling to and from the work zone to deliver and take away materials and equipment,
- work zones are more challenging for CMV drivers to negotiate, or

- driver distraction/inattention results in more frequent rear-end collisions by CMVs and into the rear of CMVs by non-CMVs.

FHWA reports that in 2022, 248 of the 821 fatal crashes in work zones (30.2 percent) involved a CMV [20]. Figure 6 reflects the overall trend in recent years of an increase in CMV-involved fatal work zone crashes and as a percentage of all fatal work zone crashes.

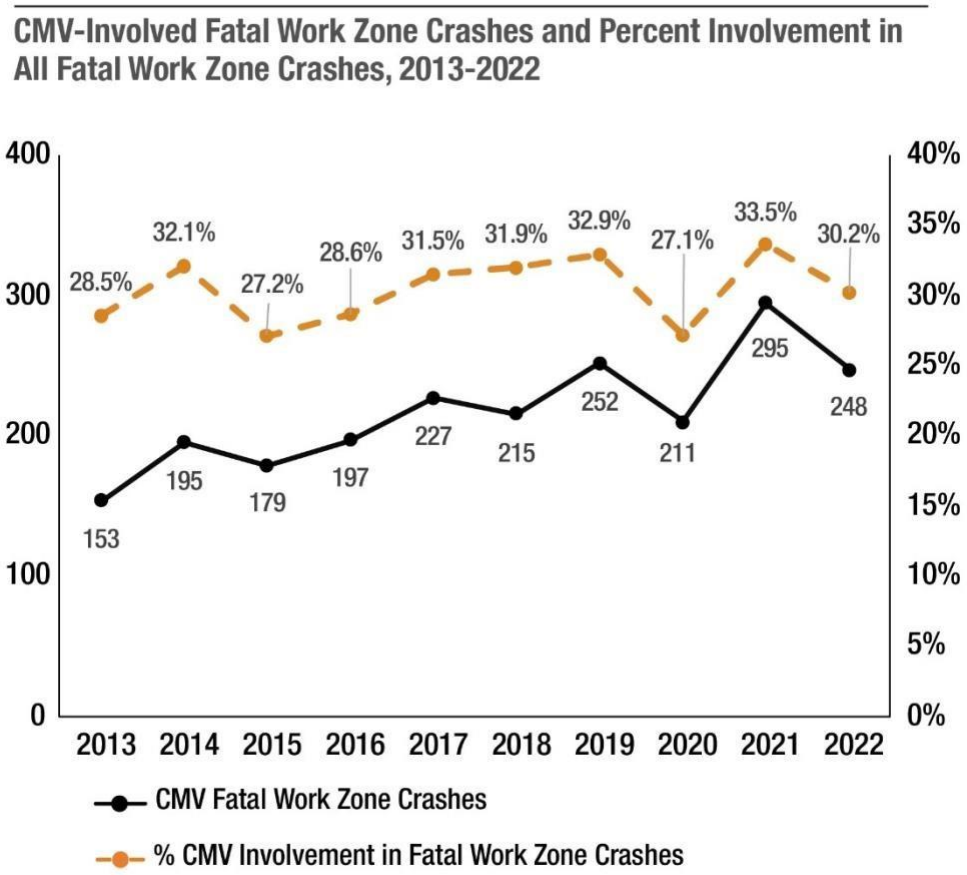


Figure 6: CMV-Involved Work Zone crashes (Source: FHWA, [20]).

Fatalities in work zones involve not only drivers of motor vehicles, but also a range of other potential victims. According to the National Safety Council:

> The majority of deaths in work zones are drivers of motor vehicles in transport. Vehicles involved in fatal crashes include both those engaged in construction activities, as well as those traveling through a construction zone. Work zone deaths by type, from highest to lowest are:
>
> - Drivers of motor vehicles – 584 deaths (65%)
> - Pedestrians – 136 deaths (15%)
> - Passengers of motor vehicles – 158 deaths (18%)
> - Bicyclists – 9 deaths (1%)
> - Other and unknown – 4 deaths (<1%) [20]

Work zone deaths by state and person type can be tracked on the NSC's website [21].
According to FHWA data, CMV fatal crashes in work zones are overrepresented as compared to fatal crashes not in work zones [20]. From 2020 to 2022, over 30 percent of all fatal work zone crashes involved a CMV (Figure 6). Comparatively, CMV involvement in non-work zone fatal crashes has remained constant over time at about 13 percent [22]. Even more pronounced, over 57 percent of fatal work zone crashes on rural interstates involved a CMV, as did more than 36 percent of fatal work zone crashes on urban interstates. This does not indicate that the CMV was the cause of the crash, only that it was involved.

With a continuation of the IIJA investments through 2026, the number of work zones will remain at heightened levels, which may result in more frequent work zone crashes and reduced freight efficiency on multistate corridors. During this period of increased investment, safety in work zones on major multistate freight corridors, along with state-to-state work zone coordination, must be maintained and improved. In Chapter 3, efforts to coordinate and ensure safety in work zones are reviewed. This provides an overview of best practices as well as a baseline to better understand the critical relationship between work zones and CMVs.

Trends in Truck Traffic

Work zones on multistate freight corridors are the focus of this study due to the need for coordination across government entities, the increased construction activities on these corridors under IIJA, and the potential for truck drivers to encounter multiple work zones in different states on the same corridor. According to Freight Facts and Figures, in the notes section of Figure 5 below, long-haul trucking is defined as, "Long-haul freight trucks typically serve locations at least 50 miles apart, excluding trucks that are used in movements by multiple modes and mail" [6]. However, the long-haul data is not consistently provided through Freight Facts and Figures, or various assessments by FHWA. Also, industry has a vastly different definition of long-haul trucking. Industry social media consistently lists long haul trucking as a trip over 250 miles [23]. Given the possible confusion and lack of harmonization between industry and agency definitions, ton-miles by truck, with trips over 100 miles, was also included to assess changes in truck traffic.

As shown in Figure 7 below, there is an inconsistent and gradual growth rate in ton-miles from 2017 through 2030. In 2017, there were 2.398 million ton-miles, in 2021 the ton miles reduced to 2.359 million- ton miles. In 2024 there were 2.408 million ton-miles, and 2.798 million ton-miles estimated for 2030 (Source: FAF5, [24]).

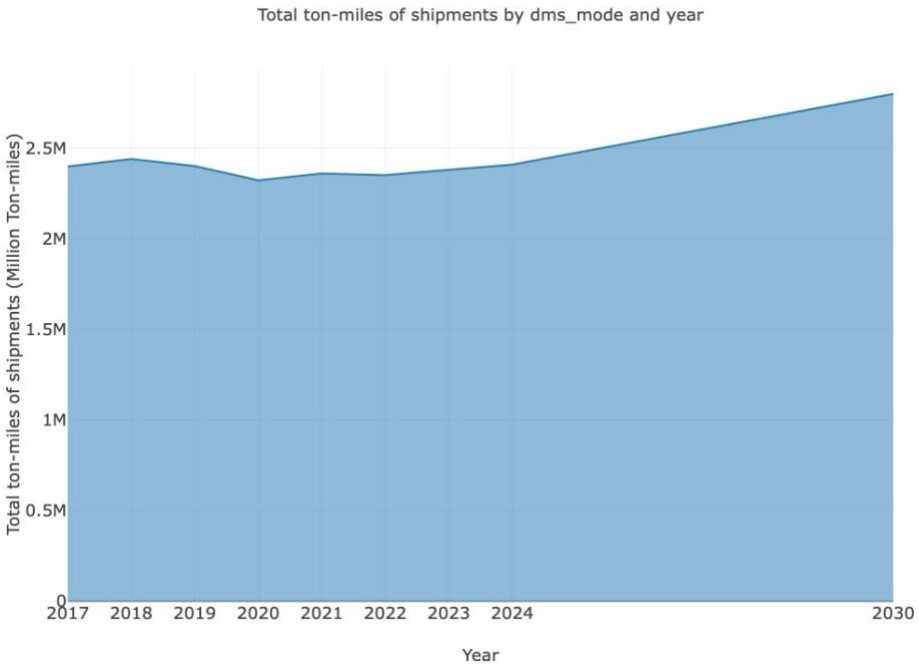


Figure 7: Total ton-miles of shipments over 100 miles by truck by year (Source: FAF5, [24]).

Figure 8 below represents the levels of anticipated freight traffic on National Highway System (NHS) in 2045. It is important to note that the corridor case studies included in this project are all represented on this map. The corridors included in the project are I-35, I-39, I-70, I-75, I-80, I90, and I-94. As discussed in Chapter 4, these corridors were selected by MAFC technical representatives and members of the MAASTO SCOHT. Criteria for selection included the history of truck traffic for the route, the importance of the corridor as a freight lane, the presence of multiple construction zones in different states, and the frequency of permitted loads on the corridor. Changes, or growth in the system after 2019 are not reflected in Figure 8.

The Interstate corridors in blue in Figure 8, especially across the MAASTO region, reflect the importance of freight on these corridors. The trend of increasing truck freight volumes affirms the need for better understanding of the impact of work zones, and the need for planning and mitigation across multiple states for these critical freight corridors.

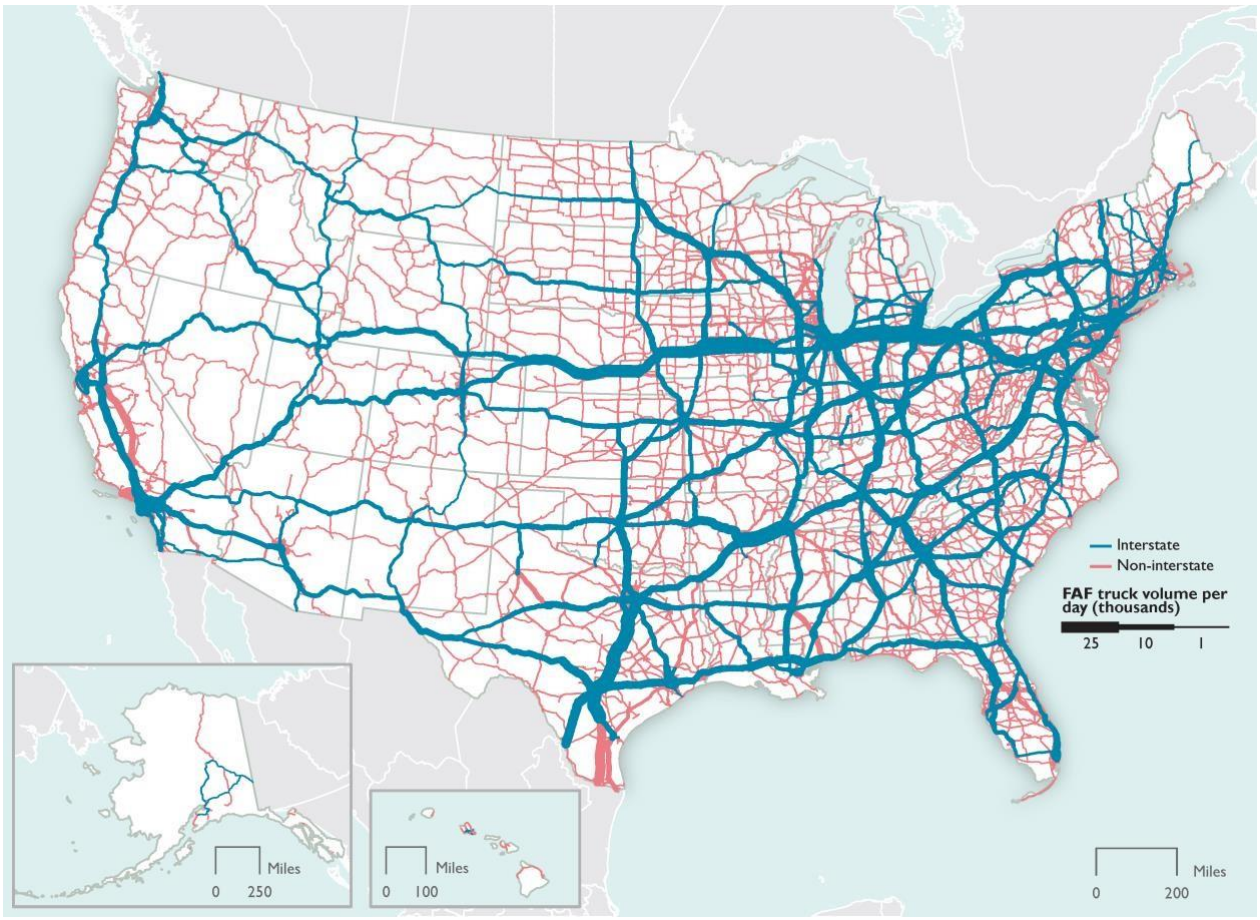


Figure 8: Projected average daily long-haul truck traffic on the National Highway System: 2045. (source: BTS, [12]).

Truck volumes vary along these major corridors. Below, state freight plans are used to identify the critical, highest priority freight corridors for each state. As the Interstate corridors are identified in the state freight plans, the routes included in this project are underlined. Where truck data counts are included in the plan, they are included. The corridors selected for this project are I-35, I-39, I-70, I-75, I-80, I-90, I-94.

In Illinois, the highest truck volumes are in the Chicago region along I-294, I-94, I-80, I-190, and I-90. There are also high volumes of trucks along I-70 near Effingham, I-57 near Mount Vernon, and I-39 near Rockford and Bloomington (Figure 5.4). While the highest volumes of trucks are found in these urban areas, in many cases, the percentage of trucks compared to total traffic is comparatively lower than in rural areas of the State (Illinois 2023 State Freight Plan, [25]).

Indiana's Preferred Freight Corridors in, their network includes Interstates I-64, I-65, I-69, I-70, I74, I-80, I-90, and I-94, as well as related bypasses [26].

In Iowa's Primary Freight System, Interstates 35 and I-80 are both listed. In the Plan narrative, the report states, truck traffic in the state is primarily concentrated on the Interstates and IMFN, with the heaviest being on I-80 between Iowa City and Davenport, I-35/80 through the Des Moines metro area, and I-29/80 through Council Bluffs. [27]

Route	Start Point	End Point	Miles
I-29	I-80	I-80	2.9
I-35	Missouri/Iowa Line	Iowa/Minnesota Line	218.6
I-80	Nebraska/Iowa Line	I-29	0.9
I-80	I-29	I-35	119.4
I-80	I-35	Iowa/Illinois Line	169.0
I-235	I-35	Iowa 28	3.8
I-235	Iowa 163	I-80	3.7
I-280	US 61	I-81	6.5
U.S. 61	IA4R (local)	I-280	1.6
Iowa 28	IA7A (local)	I-235	2.6
Iowa 163	IA9L (local)	I-235	1.4
		Total	**530.4**

Source: U.S. Department of Transportation

Figure 9: Primary Highway Freight System in Iowa (Source: USDOT in Iowa State Freight Plan [27]).

The Kansas State Freight Plan [28] delineates freight corridors of significance and includes segments of I-435, I-35, and I-70. According to the plan, these facilities have eight through lanes and have high concentrations of truck traffic.

Kentucky's highway freight network is divided into 4 tiers as described below (Kentucky Freight Plan [29]):

Tier 1 – National Regional Significance

- USDOT designated Primary Freight Network (PFN)
- Any segment of road (regardless of functional class) that has over 7,000 vehicles in Average Annual Daily Truck Traffic (AADTT)

Tier 2 – Statewide Significance

- All remaining segments of interstate or parkway not on the PFN
- Any segment of road (regardless of functional class) with AADTT of 4,000 to 7,000

Tier 3 – Statewide Regional Significance

- NHS Intermodal connectors recognized by/filed with the Federal Highway Administration (FHWA)
- Arterials and collectors with AADTT of 500 to 4,000
- Manual revisions to ensure regional connectivity

Tier 4 – Local Access Significance

Interstates included in the Tier 1 classification include I-24, I-65, I-69, I-71, and I-75.

Michigan's Mobility 2045 Plan [30] identifies Strategic Multimodal Corridors (SMCs). According to the document, these SMCs represent Michigan's core highway freight network and the critical truck routes. The Interstates listed as SMCs include I-69, I-75, I-90, I-94, and I-96.

Minnesota's Plan identifies I-35 from the Iowa border to the confluence of I-35W and I-35E, I35/I-35W south of I-494, a portion of I-35W south of I-694, I-694 between connections with I-94, I-494 between I-94 and the MSP Airport, the entirety of I-94 from North Dakota to Wisconsin (except for the segment from I-394 to I-694) and I-90 from the South Dakota border to I-35 in Freeborn County). [31]

The Missouri State Freight and Rail Plan identifies Interstates as the highest volume highways for truck traffic. The report states that the median AADTT for the Missouri interstate system was approximately 8,404 trucks, with a maximum of 35,996 on I-70 in St. Louis. Trucks make up from 29% and 72% of total AADT. Interstate crossings at State borders are also listed as areas with higher truck counts. Examples include I-55 near the border of Kentucky, and on I-35, in the northwest corner of the state. [32]

Ohio's State Freight Plan [33] designates a multimodal Strategic Freight System (SFS). The Interstates included in the system are I-70, I-71, I-74, I-75, I-80, I-90, and I-94. And based 2018 FAF5 data, Truck VMT was approximately 17,072,874, or 56% of all vehicles on these routes.

Wisconsin's Primary Highway Freight Network maps the following Interstates, I-39, I-41, I-90, and I-94 (Wisconsin State Freight Plan 2023 [34]). These routes are considered critical to freight flows.

In summary, based on 2018 FAF5 data, all the multistate freight corridors selected for this project are consider critical or significant components within their respective multimodal freight systems. These routes are known to carry the highest levels of truck traffic and provide connectivity across state lines.

Overall Traffic

Overall traffic trends mirror the increase in freight movement. Figure 10 shows overall traffic growth from 2000 to 2024 on all roads across the US. The impacts of the COVID-19 pandemic appear just after 2020. Since then, traffic numbers have reached pre-COVID-19 levels and continue to climb.

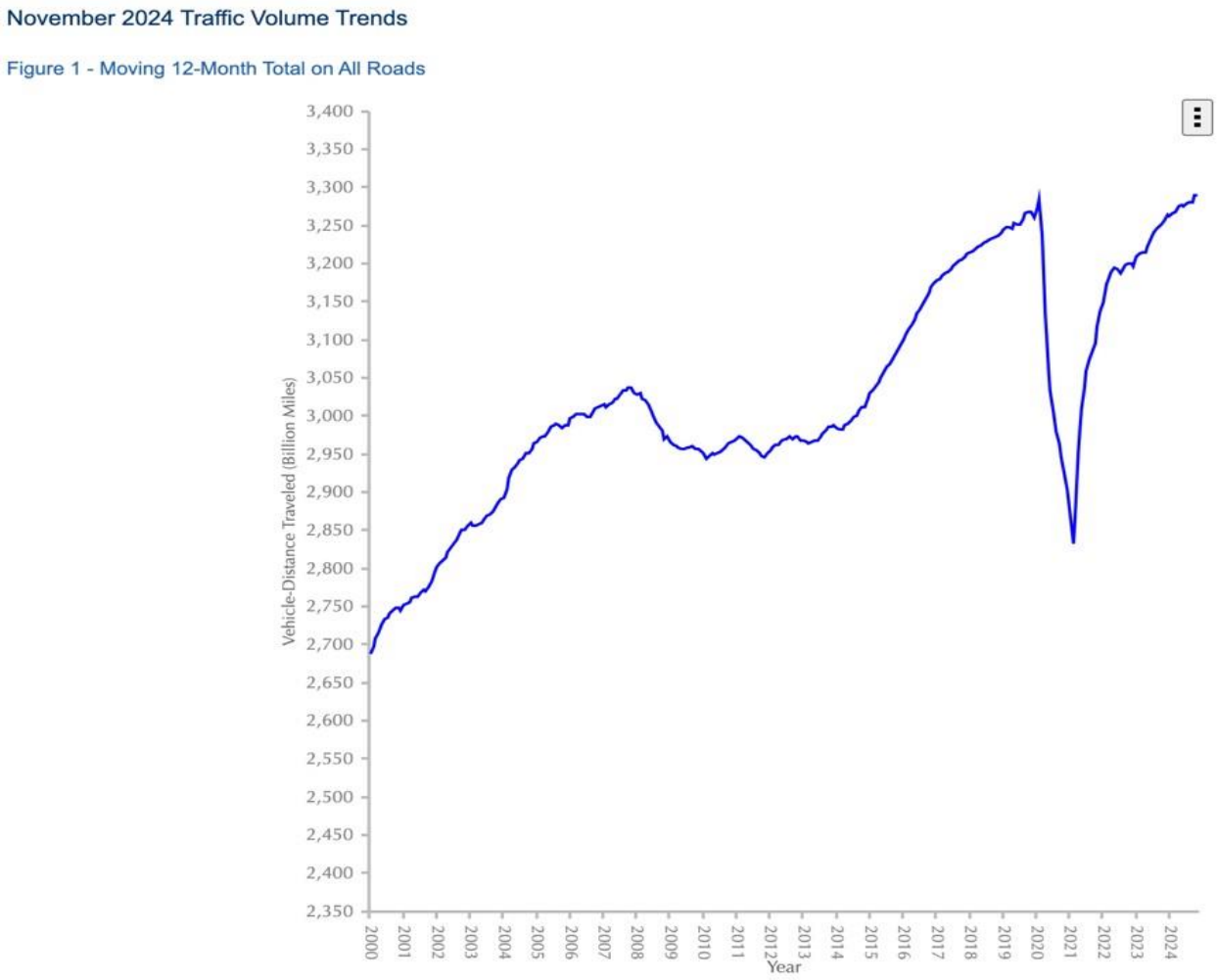


Figure 10: Traffic volume trends – Moving 12-month total on all roads (source: Federal Highway Administration - Office of Highway Policy Information, "Traffic Volume Trends [35]).

Trends in Permitted Loads

Permits for and operations of heavy, high, and wide loads on Interstate Highways have seen increases in several of the MAASTO states. Factors driving OSOW permit requests include wind energy development, general economic growth and related construction, an increased need for heavy construction equipment at the global scale, and natural disasters. To document recent trends, the 10 MAASTO state permit offices were asked to provide the last five years of permit data, covering the period from 2020 to 2024; however, there are inconsistencies in the availability of data. Some data had aged out of the state's data archive, or the information had not been vetted for publication. Further, differences in each state's permitting system excludes some types of permits, or in some cases, multiple trips are covered under a single permit.

As shown in Table 4, over the 5-year period, 7 out of 10 states had an increased number of permits issued. There was variability in the numbers across the 5 years for each state, but the predominant trend reflected an increase in OSOW loads.

State	2020	2021	2022	2023	2024
IL	231921	240979	245683	258569	261999
IA	147466	151115	154644	164246	156658
IN	381142	360976	401932	417052	416541
KS	99048	92778	86554	92348	94295
KY	97119	90861	90494	95972	100840
MI	94118	97186	95133	93993	94237
MN	178165	194822	174115	178277	175976
MO	162163	164102	159582	169770	171192
OH	153370	299590	315154	341118	351400
WI	72227	70407	69513	73633	76744

Table 4: Number of permits by state, 2020 – 2024 (Source: MAFC state DOTs).

With automated permitting, loads are routed based on work zone specifications. If the load fits through the work zone, the permit will include the route in question. If the load will not fit within the work zone, it is rerouted. These diversions are not tracked by the current automated systems.

Based on trends and past data reported, an increased number of work zones and increased trucking – both within limits and OSOW loads – on the nation's interstates could result in additional safety issues and trucking inefficiencies.

Impacts on Freight Operations

Based on discussions with work zone, operations, and permit professionals across the MAASTO states, the increased number of work zones is an issue that results in a significant but unknown amount of rerouting. Currently there is no way to track the rerouting or its impacts. As described by one SCOHT member, with the system automations, "if the customer runs a route and the route fails due to construction, it just gets rerouted along a passing route and those failures are not logged." He added that for the future, the states would need to work with vendors to provide system enhancements to capture rerouting. This information would contribute to understanding the full cost of work zones. It would enable the user to track changes in mileage and time due to the rerouting and calculate the user cost to freight movers for the detour.

In the following chapter, efforts, and resources to improve work zone safety and freight traffic efficiency are discussed, along with opportunities to collaborate across multistate corridors.

Additionally, discussions with work zone and motor carrier experts from the MAASTO states are presented to demonstrate the organizational, multistate, and safety parameters of work zones on multistate freight corridors.

3. WORK ZONE RESOURCES AND BEST PRACTICES

Multistate freight corridors are critical to the trade and economy of the MAASTO region and the U.S. These corridors benefit from coordinated planning, maintenance, and construction across state lines to ensure freight fluidity and efficiency. In this chapter, state, and federal work zone resources are identified, along with state CMV work zone best practices. Additionally, collaboration efforts across the states are documented. These practices, resources, and collaboration processes are directed to ensure work zones provide safe traffic and freight flow across the state borders.

Resources

Critical work zone resources, best practices, and areas of collaboration were identified based on the literature review as well as discussions with state work zone experts. One of the primary resources identified for understanding and tracking work zone information was the National Work Zone Safety Information Clearinghouse. This is a public-private partnership, and according to their website, "The National Work Zone Safety Information Clearinghouse is a project of the American Road and Transportation Builders Association (ARTBA) Transportation Development Foundation. It is operated in cooperation with the U.S. Federal Highway Administration (FHWA) and Texas A&M Transportation Institute." The Clearing house can be accessed at https://www.nwzaw.org.

The site provides a comprehensive review of CMV Work Zone Practices and includes a review of recent work zone data, topics of interest, training, work zone devices, legal issues and regulations, and public awareness. Under topics of interest, the following are addressed:

- Commercial Motor Vehicle Safety
- Smart Work Zones
- Transportation Management Plans
- Accommodating Pedestrians
- Worker Safety and Welfare
- Project Coordination in Work Zones

The FHWA offers similar information on their FHWA Work Zone Facts and Statistics website. The two sites provide and describe a wide range of traffic and safety variables relevant to the understanding of work zone impacts on freight movement and safety.

An additional USDOT resource under construction is the Work Zone Data Exchange (WZDx). Similar to this research project, the WZDx is intended to make work zone data easily available to:

> ...infrastructure owners and operators (IOOs) to make harmonized work zone data available for third party use. The objective is to make travel on public roads safer and more efficient through ubiquitous access to data on work zone activity. Specifically, the project aims to get data on work zones into vehicles to help automated driving systems (ADS) and human drivers navigate more safely [35].

Currently seven of the MAASTO states participate in the WZDx: Iowa, Illinois, Kentucky, Michigan,

Minnesota, Missouri, and Wisconsin. In addition to state participation, WZDx was developed in collaboration with FHWA, Intelligent Transportation Systems Joint Program Office (ITS JPO), BTS, Federal Motor Carrier Safety Administration (FMCSA), and others in the USDOT [36].

The focus of WZDx is on the potential impacts of work zones on multistate freight corridors and how planners, truck operators, and DOT operations professionals can benefit from a whole corridor perspective, rather than only an individual state-by-state perspective. The tools of WZDx place work zone information in the communication and safety systems of vehicles, making the information readily available. [37]

In addition to focusing on the distribution and adoption of the ITS information via the WZDx tool, adding a multistate perspective would enhance the efficacy of the tool. As the WZDx project matures, a regional operations center should be considered to manage this information, as well as other pertinent safety and operations information for multistate freight corridors. A graphic example of the WZDx is provided below (Figure 11).

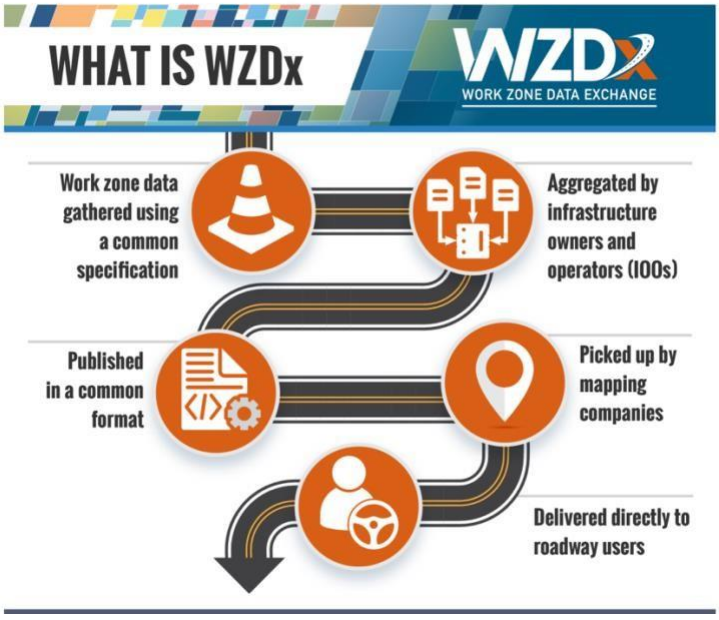


Figure 11: Work Zone Data Exchange (WZDx) (Source: [37]).

Another resource partnership across the MAASTO states is the Midwest States Smart Work Zone Deployment Initiative (MwSWZDI). With the expansion of participants beyond the Midwest, the pooled fund was renamed to the Smart Work Zone Deployment Initiative (SWZDI). Initiated in 1999 by the states of Iowa, Kansas, Missouri, and Nebraska, the pooled fund study is defined as:

> … this pooled-fund study, researchers investigate better ways of controlling traffic through work zones. Their primary objective is to promote and support research and outreach activities that focus on innovative policies, processes, tools, and products that enhance the implementation, safety, and mobility impacts of work zones. [27]

The SWZDI project is part of the FHWA Transportation Pooled Fund Program, Smart Work Zone Deployment Initiative (FY20-FY24) (Study Number TPF-5(438)). The project is managed by Iowa

State University's Institute for Transportation. According to the website, "For more than 20 years, SWZDI has had a proven track record of funding useful work zone-related research and outreach products that has resulted in more than 90 studies, evaluations, and syntheses" [38].

While 'smart' often confers the use of intelligent transportation components, in this case it refers to best practices, not necessarily related to information technology or telecommunications.

Currently 11 states participate in the SWZDI. They are Illinois, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, Texas, Wisconsin, Alaska, and Pennsylvania. Of the 10 MAASTO States, seven are participants and include Illinois, Iowa, Kansas, Michigan, Minnesota, Missouri, and Wisconsin. Completed research studies by the Institute can be found on the TPF website [39]. Nearly 30 practical research projects are published at this site, addressing topics from nighttime work zone lighting systems to development of work zone performance measures, to the impacts of shoulder width on work zone safety. These projects reflect the concerns and efforts of the participant states and provide solutions to everyday work zone safety and efficiency issues.

There is ample availability of references for work zone best practices. FHWA and their Work Zone Management Program offer a broad range of publication and studies. Comparatively there are fewer publications focusing on CMVs in work zones than those focusing on general work zone issues. Fortunately, most practices implemented for work zones generally also accommodate CMVs.

Federal Direction and Best Practices

To better understand the construction and work zone decision making, a review of federal responsibilities and roles provides an outline of the parameters of the state work zone environment.

There are 16 FHWA topical areas that categorize the practices related to work zones. Within the "Best Practices" there are 30 different documents that provide proven work zone practices. The other categories provide similar treatments of the listed subjects. This list of documents was compiled by FHWA and NCHRP. Clicking on each link provides a bibliography of related research.

Best Practices
Construction Strategies
Contracting Strategies
Incident Management
ITS and Technology
Performance Measurement
Project Coordination
Public Information and Outreach
Regulation and Policy
Research
Training
Work Zone and Traffic Analysis
Work Zone Management Capability Maturity Framework (CMF)
Work Zone Safety and Mobility Rule (Subpart J)
Work Zone Traffic Management

Worker Safety

Also at the federal level, work zone guidance for CMVs is well defined in a National Highway Traffic Administration (NHTSA) publication [40]. In the 2023 report, titled "Commercial Motor Vehicle Safety in Work Zones Targeted Action Plan," there are several critical roles suggested for FHWA and FMCSA by NHTSA to reduce work zone crashes, especially crashes involving CMVs. The following suggestions were made in the publication, and, in some cases, these actions can be seen in the everyday work of FHWA and State DOTs.

Action Items for FHWA:

- Continue to provide leadership for initiatives that target and highlight the issue (e.g., symposiums, virtual roundtables, workshops, peer exchanges, and National Work Zone Awareness Week). In coordination with NHTSA and FMCSA, FHWA will aim to:
    - Conduct virtual roundtables with transportation agencies to target individual challenges and needs.
    - Conduct peer exchanges to share best practices.
- Continue to work with FMCSA and NHTSA to enhance CMV safety in work zones.
- Continue to provide resources that aid transportation agencies in training their staff on CMV involved work zone risks and mitigation strategies (e.g., Work Zone Safety Grant products).
    - Deliver webinars on best practices and new tools. ○ Consistent with applicable law, engage with field offices to encourage transportation agencies to:
        - Include specific CMV work zone safety strategies in the State's Strategic Highway Safety Plan (SHSP).
        - Seek innovative work zone design and operation methods that reduce the risk of CMV crashes in work zones.
        - Actively collect, store, and use work zone event data (i.e., information regarding when, where, and how work zones are deployed), so it can be used to better quantify the CMV safety in work zones issue and help agencies focus their mitigation efforts.
- Emphasize the importance of considering the design of temporary traffic control plans and CMV operations in work zones during reviews of transportation management plans.
- Encourage pilot implementation of innovative work zone design and operation methods that reduce the risk of CMV crashes, consistent with applicable law.
- Work with stakeholders to identify data gaps or research needs to better understand the demographic, behavioral, and other characteristics that correlate with CMV crashes in work zones, consistent with applicable law. The research should also identify methods to obtain critical data that are currently missing and make recommendations regarding changes to existing procedures to be able to facilitate missing critical data collection and use.
- Work with AASHTO to raise awareness of and promote design practices to improve CMV safety in work zones. One resource is the Design and Operation of Work Zone Strategies to Improve Large Truck Safety [41] publication that includes practices from leading States. Example practices include:
    - Provide at least one 12-foot lane for trucks in construction projects or a truck-only lane during construction.

- Minimize large design speed reductions for lane shifts, crossovers, or other critical geometric features in work zones.
- Avoid short or no acceleration lane entrance ramps for high CMV traffic.

Action Items for FMCSA:

- Continue to provide resources to aid transportation agencies in training their staff on CMV involved work zone risks and mitigation strategies.
- Continue to encourage transportation agencies to develop innovative solutions and/or demonstrate new technologies to improve CMV safety in work zones (e.g., Motor Carrier Safety Assistance Program [MCSAP] and the High Priority Program).
- Continue to work with FHWA and NHTSA to enhance CMV safety in work zones.
- Encourage State MCSAP lead agencies to work with transportation agencies to identify specific work zone safety issues regarding CMVs and incorporate activities to address these in their Commercial Vehicle Safety Plan (CVSP).
- Partner with the trucking industry to encourage and accelerate the voluntary adoption of in-vehicle safety technologies aimed at reducing CMV work zone crashes (e.g., Advanced Driver Assistance Systems [ADAS], such as forward collision avoidance systems and work zone notification systems).

Evidence of the commitment from federal and state agencies was displayed at the 2025 National Work Zone Awareness Week (NWZAW), held April 21-25 [1]. It was hosted by North Carolina Department of Transportation. This year's theme was "Respect the zone so we all get home." This event is in its 26th year.

The NWZA website provides a history of Work Zone Awareness week. In 1997, a group employees of the Virginia Department of Transportation dedicated a week to raising awareness of work zone safety to fellow employees. Other DOTs joined as the awareness of the event increased, and in 1998 the American Traffic Safety Services Association (ATSSA), the Federal Highway Administration, and AASHTO, signed an agreement to launch a nationwide work zone awareness campaign.

The goals of the agreement included the following.

- Initiate efforts to raise awareness of the need for more caution when driving through work zones to decrease fatalities and injuries;
- Establish and promote a uniform set of safety tips;
- The value of training and importance of best practices in regard to work zone safety would be promoted among individuals in the private sector, industry, and roadway workers;
- Reach out to both roadway workers and contractors to communicate possible effects of motorists' behavior in response to traffic delays, and advise on what steps might possibly be taken to lessen negative behavior; and
- Outreach efforts would be made to work with entities involved with work zone safety and to form partnerships.

The group held the first national event in 2000. The location of the kickoff event varies yearly and rotates between Washington, D.C., and different states. States apply to the organizers to host the kickoff (National Work Zone Awareness Week [42]).

The week-long event not only primes the safety agenda of agency employees for the construction season, but it is also used as a media tool to inform the driving public about the importance of focusing on driving when near and in work zones.

State Best Practices: Expert Interviews

In addition to federal efforts and general resources, each of the MAASTO States have a focus on safety and traffic flow in work zones. To understand the perspectives of work zone and permitting professionals regarding CMVs in work zones, discussions were held with MAASTO State professionals. The MAFC technical representatives were asked to identify the work zone experts for their agency and provided direct contact with or contact information to these experts. Safety and CMV communications personnel were often included in discussions to add their perspectives. A total of 15 interviews were conducted across the states. The discussions focused on the following seven questions:

1. Have there been increases in the number of work zones on multistate freight corridors such as I-35, I-39, I-70, I-75, I-80, I-90, and I-94?
2. Are there any special accommodations for CMVs and permitted loads in your state's work zones?
3. Does your state have any work zone best practices for large trucks you would like to share?
4. Do you track the impacts of detour routes for passenger vehicles or trucks?
5. What do you believe contributes to the over representation of fatal crashes involving CMVs in work zones versus those not in work zones?
6. Are you aware of any data on causation of work zone crashes? For example, if it was a traveling vehicle, was it a car or a CMV?
7. Are there any regional groups you or your agency participate in such as Work Zone pooled funds or regional/national groups?

Responses from work zone and safety professionals representing each of the 10 MAASTO agencies are summarized below.

1. Have there been increases in the number of work zones on multistate freight corridors such as I-35, I-39, I-70, I-75, I-80, I-90, and I-94?

There was a consistent perception across state work zone experts that there are an increased number of construction projects and work zones on major multistate corridors. None of the respondents felt there has been a decrease in projects and work zones. However, recognizing if the projects were related to IIJA funding was less clear. States often have significant non-federal funding.

Most states have marketing or capital programs for major programs such as Illinois, with Rebuild Illinois, Michigan's 5-year plan (5YTP), or Wisconsin's STIP. Projects are more often associated with the state's current transportation plan than with the reauthorization that funded the project. See Chapter 4 for a complete list of the state project data sources.

During discussions with SCOHT and MCC representatives, they also related that the OSOW movers have expressed concern with the number of detours and work zones they are encountering in their moves. The literature supports these conclusions in that more infrastructure investment equates to additional work zones, and unfortunately more delays, diversions, and work zone crashes.

2. Are there any special accommodations for CMVs and permitted loads in your state's work zones?

Safety and work zone professionals list a range of special accommodations for CMVs and permitted loads in work zones. Some examples include providing specialized assistance in designing and managing work zones for trucks through agency website training manuals. Other accommodations are in the work zone and include moving cones or opening a lane for a scheduled OSOW load. One professional indicated that they work to make the work zone as obstacle free and wide as possible and avoid queuing upstream of the work zone and provide alerts if queuing occurs.

Within each agency, the nominal level of coordination for CMVs and work zones occurs between the local agency district, project design, the permit office (or automated system), and the construction office. If construction will constrain a roadway beyond specifications for CMVs, the permit offices generally require 10 days of notice to determine the impacts and allow for preparation of the detours. With automated permit systems, approved loads are routed on the appropriate detour and those with prescribed heavy, wide, or high dimensions are pulled for individual review and processing by personnel. Illinois provides a summary of this process:

- Development of Traffic Management Plans require evaluation of potential traffic impacts, including where alternative routing may be necessary for hazardous materials and oversize/overweight traffic.
- Elements controlling design of work zones are to accommodate multi-unit trucks, including off-tracking, or plan for detours. This includes facilities designated as truck routes that may need to be designed for oversize/overweight vehicles.
- Worksite delivery plan and contractor access are considerations in evaluating constructability, including potential needs for oversize/overweight deliveries.
- Weight, width, or height restrictions are coordinated through the Bureau of Operations using OPER2410 form (see attached).

As another example, Iowa DOT provides a 4-page guide for Oversized Loads in Iowa Work Zones. In the brief, guidance for Oversize Trucks in Work Zones [43] is summarized as:

- Report all measured widths reduced to 18 feet or less to the 511 system.
- Report width restrictions at least one foot less than the actual measured width.
  - Example 1 – measured width: 17' 4"; width reported to 511: 16' 4".
  - Example 2 – measured width: 18' 1"; no need to report to 511 system.
- Objects that create a width restriction may be:

Temporary Barrier Rail, channelizing devices, yellow pavement markings, steel beam guardrail, bridge barrier rail, cable barrier rail, etc.

- Shoulders should not be considered as part of the available width for oversized loads unless:
  - The plans state to include the shoulder as part of the available width.
  - The shoulders are strengthened as part of the construction project.
    - It is not safe for a wide load to overhang into a work zone or an opposing direction of traffic.
    - Length restrictions should be considered when an obstruction is present on the inside of a curve.

This 4-page guide is part of Iowa DOTs complete Work Zone Reference Library (WRL). The website explains the "development of the Work Zone Management Service Layer engaged and enabled Iowa staff to envision the future of work zone management."

The WRL is a direct result of this effort and has been created to centralize all of Iowa's work zone resources and documentation." As indicated, Iowa's reference library centralizes and provides the information in an easy to locate and use format. This approach to organization and communication of work zone resources is a best practice and should be replicated across the states to provide uniform documentation of the resources available.

Other physical accommodations cited by the work zone experts include queue detection and alerts, OSOW detection for work zones on Interstates, designing the work zone as wide as possible, and communication efforts with drivers prior to and during the construction. This communication preferably is provided in-cab and does not require prompting. The experts repeatedly stressed the need for in-cab alerts for work zones, or geo fencing, that cannot be shut off.

With a history of horrific and fatal CMV rear-end crashes due to backed up traffic in a work zone, detection of work zone backups and communication to upstream drivers has proven successful in reducing these crashes and saving lives. Addressing backups at work zones is likely the most significant safety development and accommodation for CMVs in work zones.

3. Does your state have any work zone best practices for large trucks you would like to share?

Work zone best practices produce desirable and repeatable outcomes and can be in the form of a policy, a process or practice, a device, or innovation. The following list and description of best practices were identified by respondents when asked if they had work zone best practices that should be shared across the region. The practices are listed based on their classification as a policy, process or practice, device, or innovation. Note that there is overlap across these categories of best practices.

Policy:

- Work zones should be designed for mobility with as little disruption to traffic flow as possible.
- Avoid designs that cause sudden slowdowns.
- Manage 511 systems with trucker interface to show work zones, rest areas, OSOW maps, and traffic levels.
- Commit to better understanding the safest and most effective means to communicate work zone information with truck operators.

- Conduct peer exchanges focusing on work zones.
- Conduct work zone reviews with internal and external agency professionals.
- Develop state work zone committees to evaluate work zone design and operation; provide continuing education and skills training.
- Develop industry liaison network for work zone committee and include private sector voices and perspectives in work zone assessments, design, and operational changes.
- Develop statewide lane closure communication systems.
- For Interstate work zones, maintain two lanes open to traffic in each direction.
- Design for "0" queue. If there are no backups, there are no rear end crashes.
- Practice '1 touch' approach for all communication and alerts to reduce driver attention needs.

Process/Practice:

- Add available lane widths to lane closure systems.
- Incorporate geofencing to alert drivers of impending work zones.
- Modify crash reports completed by law enforcement to address CMV and work zone involvement. For example, knowing where in the work zone the crash occurred can lead to specific mitigation.
- Modify permit processes to track automated detours.
- Determine the cost of detours for both passenger vehicles and CMVs. This will require the software vendor to modify the system.
- Provide 511 systems with truck driver-specific options.
- Conduct research on CMV involvement in work zone crashes.
- Review crash records for the 10 MAASTO States and identify the initiating event for work zone crashes when trucks are involved. Consider potential data issues with subjectivity of law enforcement in completion of crash reports.
- Add pavement marking messages to support communication efforts.

Innovation:

- Provide a work zone back up detection and alert system.
- Establish a geo fence work zone and add automated alerts directed to the electronic log in cab.
- Participate in Purdue work zone analytics pooled fund Work Zone Analytics (Study Number TPF-5(514)).
- Participate in pooled fund studies and regional and national work zone groups to stay on the leading edge of research and practice. See groups and pooled funds discussed in Chapter 3.
- Conduct research on the most effective and safe means of communicating with CMV operators.
- Use telematics to identify and reduce speed and dangerous driving in and around work zones.

Additional approaches and strategies that were found effective included:

- Improve traffic flow.
- Consider truck-only lanes when detours are not possible.
- Reduce speed differentials.
- Deploy ingress/egress notification systems.

- Incorporate speed feedback displays.
- Improve positive guidance and road user notification.
- Consider transverse rumble strips.
- Increase use of law enforcement.
- Provide education to public and trucking industry.
- Coordinate with communications teams for distracted driving and truck safety campaigns.
- Incorporate smart work zone systems to provide back of queue warnings, implement dynamic merges, and relay travel time information.
- Produce digital work zone data feeds that promote capabilities for in-cab notifications.

The respondents provided an impressive list of work zone best practices. Combined with the work zone best practices provided in National Work Zone Safety Information Clearinghouse or by FHWA, these practices represent a nearly universal list and description of work zone best practices.

4. Do you track the impacts of detour routes for passenger vehicles or trucks?

Of the states who responded, only two calculate user costs for detours and delays in work zones. Most states reported that they did not calculate user cost for delays or detours, or those costs may be estimated or calculated by others in their agency, and they are unaware of the process. Two states incorporate user costs for liquidated damages for delays in project completion, and for projects in their transportation management plan. The information from the SHRP2 product has been used to determine a penalty, the liquidated damages, for late performance on construction.

The SHRP2 Solutions ECON WORKS CO3/C11 was cited as one of the tools used to calculate user cost of work zones. This is product of consultants, in collaboration, directed by AASHTO and Federal Highway Administration. This product, SHRP2 CO3/C11 is designed to identify the user costs associated with highway projects [44]. According to the SHRP2 site, the products were combined because of their technical and subject-matter commonalities based on a review of an executive review committee consisting of AASHTO and FHWA leaders.

If user cost analyses are conducted by a different department within the agency, they should be reviewed for use in development of the detour routes. On major multistate freight corridors, a cumulative account of delays and detours would provide additional information on the impact of Interstate Highway construction projects. As demonstrated in a recent report titled, All-Hazards Assessments of Major Freight Corridors in the MAASTO Region [45], the lack of data and information available to communicate a need and a plan can affect the ability of the issue to rise to the level of attention needed for action. Given the potential costs of delay and rerouting on major, multistate freight corridors, a standardized and reliable way to measure user costs would add significantly to the value of communication.

5. What do you believe contributes to the over representation of fatal crashes involving CMVs in work zones versus those not in work zones?

The work zone, safety, and permit respondents offered several possible explanations for the overinvolvement of CMVs in fatal work zone crashes. Most prominently they point to human factors as the leading causes. Distraction, speed, and inattention were all mentioned as causes by respondents. Illinois professionals cited their crash data from 2022-2024 in the interview that confirms the responses: in Illinois data, the leading causes of accidents were cell phone use, following too closely, improper lane usage, and failure to reduce speed, all human factors that

were common across the vehicles involved in the crash. The size and speed of the CMV was cited as the reason for increased fatalities.

This fatality data does not indicate if the CMV was the cause of the crash. Respondents suggested that a review of crash reports filled out by law enforcement does indicate a cause or instigating event for the crash. However, they also warned of the subjective nature of these responses on the crash forms. They suggested that the crash can be interpreted differently and that the crash may not seem related to the work zone, or it may not be clear what occurred.

Many of the states are actively trying to understand the role of CMVs in work zone crashes through research and participation in pooled fund studies. Research topics include the impact and mitigation for speeding in work zones, precipitating events to the crash, analyzing the location of crashes within work zones, preventing hard braking at the head of the work zone, effective ways to provide backup alerts, and ensuring communications connectivity across work zone elements and drivers. Researchers are also looking into the purchase of dash camera footage from trucking companies. The intent is that the crash report, work zone details, and the videos and photographs will aid in identifying the causes of crashes and the best strategies for mitigation.

Several interviewees recommended a study of state and local government crash report forms and resulting CMV data from across the MAASTO states. The purpose would be to assess the forms and data currently available and determine if the reports can be modified to provide better information on the role of CMVs in work zone crashes and fatalities. The project would require MAASTO support to ensure states participate and make changes as a region. This would result in more uniformity in data, language, and safety improvement strategies. Similarly, the project could provide for harmonization of the forms and other means of data collection across the states to better understand and address CMVs in work zones.

6. Are you aware of any data on causation of work zone crashes? For example, if it was a traveling vehicle, was it a car or a CMV?

Most respondents were not aware of data or trends in the causes of work zone crashes that result in fatalities. Vehicle crashes in work zones are well documented, but there is no consistent data on the leading causes of crashed. While crash forms do contain this information, their validity is questioned by the survey participants due to the challenges of deciphering the differences between forms.

Based on a review of all crash reports in Missouri, one respondent observed that approximately 50% of the crashes on all roads are related to passenger vehicles and around 20% were related to CMVs in general. Single vehicle crashes, unknow cause and limited crash data represent the remaining 30%. They assume the same ratio of fault for work zone crashes. Others assumed a CMV-related work zone fatality crash was caused by the CMV.

Respondents indicated that they do not have the ability to easily filter through work zone crashes involving CMVs. This would be a feature that they would like to see incorporated in the reporting. Another state suggested that smart work zones have decreased the involvement of CMVs in work zone fatalities, especially in rear end crashes.

Some states indicated that with human factors as the leading causes of crashes, rather than geometrics or design speed, they focus on the general nature of work zones rather than specifically designing for CMVs.

7. Are there any regional groups you or your agency participate in such as Work Zone pooled funds or regional/national groups?

MAASTO states are well-known for their success with multistate committees and teams in areas of regional concern such as truck parking, policy development, and agency operations. Efforts and collaboration by members of the Planning committee through the MAFC, and the Strategic Transportation Issues Committee, with the support of the MAASTO Board of Directors are additional examples of successful regional and organizational coordination.

These interactions bring experts from each state together to discuss issues they face, share examples of successes, and in some cases, start conceptualization of multistate projects. In the case of MAFC, the interactions and discussions at the MAFC annual meeting are cited by many of the members as one of the biggest benefits of participation. The education, network development, trust, and professional affiliation created at these meetings are critical to success when working together.

The work zone, safety, and permit experts cited participation in a range of work zone groups and efforts. The groups cited by the respondents are listed below in alphabetical order:

- AASHTO Committee on Construction
- AASHTO Committee on Transportation System Operations
- American Road and Transportation Builders Association
- American Traffic Safety Services Association (ATSA)
- FHWA Work Zone Peer Exchange
- Midwest Work Zone Roundtable
- Transportation Research Board Standing Committee on Traffic Control Devices
- Work zone peer exchanges with adjacent states
- Smart Work Zone Deployment Initiative
- Work Zone Analytics Pooled Fund (Study Number TPF-5(514))

Interestingly, given the importance of work zones, there does not appear to be a single work zone group with membership of all 10 MAASTO agencies. Creating a MAASTO-based work zone peer discussion at MAASTO meetings or organizing quarterly meetings of work zone experts could create innovation and standardize the region's approach to work zone safety and CMVs.

In November 2021 AASHTO charted the Joint Subcommittee on Work Zones. None of the respondents mentioned participating in this group. The committee was created to be a centralized point of work zone information, strategies, and new ideas to address high speed work zone issues.

Respondents emphasized the importance of several of these studies or groups. The most frequently cited group was the MwSWZDI, which, as previously discussed, is now renamed SWZDI and focuses on work zone research and identifying safer work zone practices.

Peer exchanges, either hosted and directed by FHWA, or managed by a state DOT were also mentioned frequently. These were also highly regarded activities that provide for learning, exposure to new innovations and ideas, and enhancing a professional network.

The Work Zone Analytics pooled fund was also cited by several respondents as critical to developing awareness and mitigation for rear end crashes in work zones. Several states have incorporated CMV hard braking data into CMV research and work zone practices.

A tremendous amount of work zone resources are available. There are several clearinghouses of work zone best practices, national and industry collaborations to advance safety in work zones, multistate research partnerships to better understand and prevent these crashes, and state-to state collaboration. However, policies and protocols in each individual agency can vary. Given that safety is always the number one directive, attention to work zones and CMVs is warranted.

Current literature and responses from work zone professionals point to human factors as the primary cause of CMV involved work zone crash fatalities. While it is often not clear if the CMV caused the crash based on the crash form data, the disproportionate impact of large trucks in these crashes should support research that provides focus to better understand and mitigate these crashes.

Every state mentioned the need to alert drivers approaching work zones with in-cab alerts without creating disruption to the driver. States also reported that smart work zones and in-cab alerts have already reduced rear-end crashes and fatalities. Portable rumble strips were also mentioned to 'wake up' drivers. Respondents indicated that signs and arrow boards are not enough.

The need to better understand and document fatal crashes was also a common theme. Crash reporting forms across the region should be reviewed, standardized, and improved to better identify the role of the CMVs in fatal work zone crashes. This harmonization effort could include uniformity in defining the cause of the crash, as well as with construction terminology.

States currently conduct state-by-state reporting on data analytics related to work zones. In the next chapter we present work zones on a multi-state corridor level. This process incorporates state-by-state data to allow users to see additional work zones with potential delays in adjacent states.

Chapter 4 examines seven selected Interstate Highway corridors, displaying work zones by corridor across multiple states. This chapter will discuss tools that intend to facilitate more precise travel planning on multistate corridors, re-enforce the concept of multistate freight movements and planning, allow for calculation of accumulating delays or the avoidance of potential delays, and provide information in one location rather than on a site-specific basis for each state.

4. THE MAFC MULTISTATE FREIGHT CORRIDOR TOOL

This chapter describes the development of a tool that maps work zones across multiple states and demonstrates how that tool can be used to combine projects along a single multistate freight corridor. This tool provides relevant information and perspectives on potential delays for routing for shipments, as well as informing planners and permit experts at the state DOTs. This total corridor perspective allows for travel planning that avoids major road construction and potential delays for multistate trips. Recognizing and quantifying the total delays along a corridor can also be used as a measure of corridor performance for multistate trips.

Additionally, the chapter further demonstrates the importance of a corridor-wide perspective to better understand truck travel on multistate freight corridors. State-by-state online maps are available through 511 services in each state, but most of this mapping is not linked to adjoining state maps nor are they corridor-based. The ability to examine travel impacts along a multistate freight corridor rather than just within one state provides a broader view of expected conditions and allows for longer range planning for oversize loads, as well as more common commercial loads.

The model also defines the trucking environment on the seven selected corridors by cataloging construction zones and their potential impacts to legal weight and OSOW truck traffic. Compared to previous levels of 511 mapping, this function allows planners to anticipate delays and plan for diversions, and/or better coordinate work zones across state lines on multistate corridors.

Data Sources for MFCT

The location of construction, type of construction, and expected timing of the construction are available through disparate sources and formats. An initial effort was made to use the WZDx as the data source. This is a promising tool that, where adopted, provides a standard format for real-time information about the location and status of work zones. However, at the time of writing, a WZDx data feed is only available in six of the MAFC member states (Iowa, Kentucky, Michigan, Minnesota, Missouri, and Wisconsin). Furthermore, the stated goal of this model was to provide a planning tool for future projects, rather than a viewer for current conditions. As WZDx feeds become more widely available, they can be added to the tool as a complement to the future construction project features.

The most consistent source of data across the 10 states was found to be the states' future transportation plans. These plans and features were the source for the data. The name of the transportation plan varies by state. For the STIP, states typically provide planned construction projects on major corridors with spatial features such as lines or in some cases as point data. The information was available for MAFC member states either online or by request and is listed below.

- Illinois ○ Interactive STIP Map
  - Multi-Year Program - Roadway 2025 - 2030
- Indiana ○ Provided 18 months of construction letting data.
  - Data provided by agency.
- Iowa ○ 2025-2029 Five Year Program
  - Interactive map and download

- Kansas ○ winCPMS Project Locations ○ Interactive map and download
- Kentucky ○ Active Highway Plan ○ Features from web service
- Michigan ○ Five-Year Transportation Program 2025-2029
- Minnesota ○ MnDOT 2024-2033 10-Year Capital Highway Investment Plan ○ STIP Pavement Projects 2024-2027 ○ CHIP Pavement Projects 2028-2032
- Missouri ○ Interactive STIP Map ○ Features from web service
- Ohio ○ Transportation Information Mapping System ○ 'Next 4 Fiscal Years Lines'
- Wisconsin ○ Six Year Highway Program - Project information

Comments on the Data

The highway construction planning information received from Indiana is limited to18-months and based on their construction letting data. While this limits longer term planning with the corridor tool, it is expected that there are increases in the accuracy of the project listing with a shorter time frame and known beginning and end dates. Addressing limits to the data and lack of data harmonization in this regional context will require coordination and consideration across and by the states. At the recent summer MAASTO meeting, all states signed a Technology and Safety agreement advancing newer technologies and practices that save lives. The Work Zone Data Exchange is included in the list of viable innovations States should adopt [46].

To address discrepancies and lack of harmonization in data availability across the states, a multistate team should be developed and assigned to support regionalization of the MFCT. The states would identify the appropriate professionals to balance or eliminate differences across the data on a consensus basis. Development and membership of this team is discussed in the closing chapter.

Data Attributes Incorporated into MFCT

While the data sources listed provided spatial features, the available attributes and naming convention varied by data source. The minimum set of common attributes were the state, route (highway) of the project, start and end date, and a project description. Even these limited attributes were sparse for some data sources. The highway segment was often represented with a state specific Route ID, but the associated highway name could be easily identified by proximity to the corridor. The start and end dates were provided in most cases but for others, it was limited to the fiscal year of the project. In cases of the latter, the start and end date were assumed to be the start and end days of the given year for lack of additional information. Some states have very good project descriptions while for others it is very limited, with language such as 'Grade and Pave'.

The full consolidated attributes are as follows:

- State
- Description
- Start Date
- End Date
- Highway
- Unique Identifier

These fields for the region-wide dataset were populated based on provided attribute fields and source dependent concatenations of fields in the case of the project description.

The projects were further limited to only the corridors of interest due to their importance in multiple MAFC member states. The corridors selected for inclusion in this project were:

- I-35 • I-39 • I-70 • I-75 • I-80 • I-90
- I-94

MFCT Web Application

The MFCT web application was developed to illustrate the corridors of interest, while the construction project feature allows interactive visualization of the projects with a user specified date range. Figure 12 shows a screenshot from the MFCT, highlighting the multistate corridors included in this project within the MAASTO region.

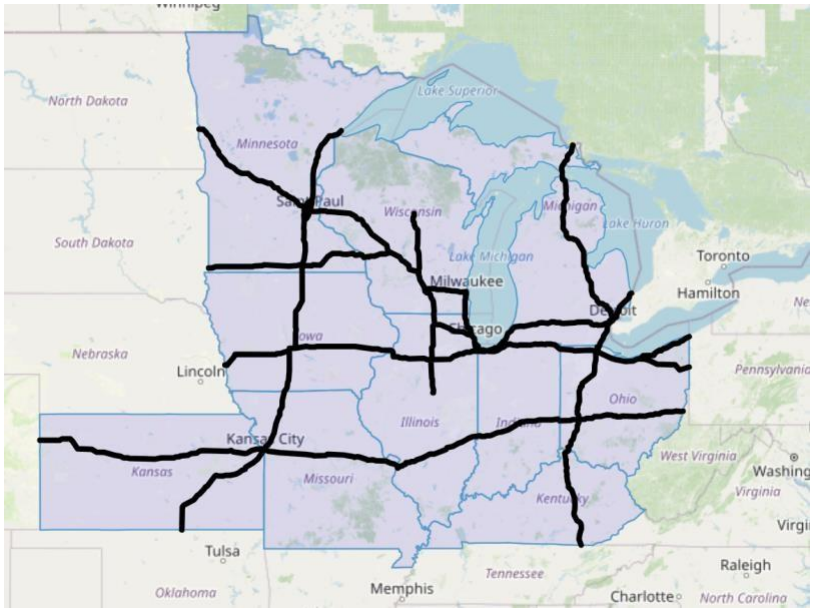
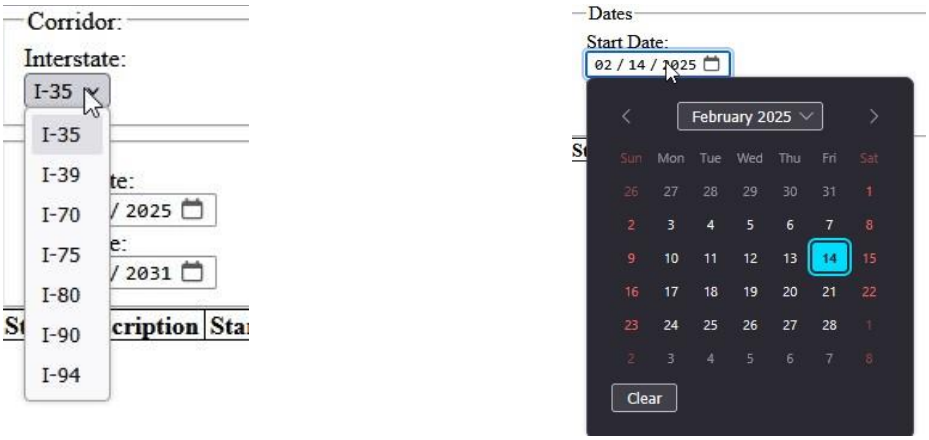


Figure 12: Map of MAASTO region with included corridors highlighted (Source: MFCT).

The following narrative describes the use of the MFCT.

A user first selects the corridor of interest using a dropdown list of corridors, currently populated with the seven corridors included in this study (Figure 13a).

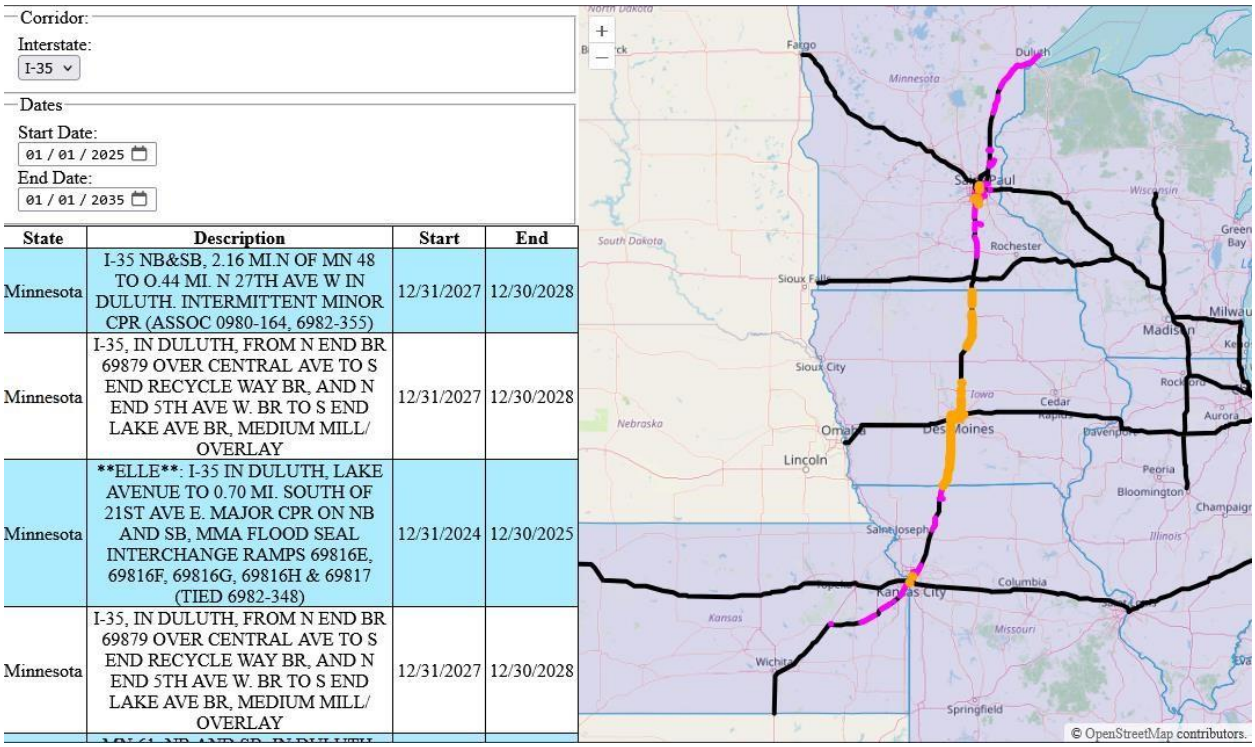
Next, the user selects the start and end dates for the query using a date selection tool (Figure 13b). All projects listed within the date range will be included.



(a) (b)

Figure 13(a) Corridor selection drop-down list; (b) Date selection. (Source: MFCT)

With the corridor and start and end dates selected, a list of all projects on the corridor for the range of dates selected is populated and a map is generated, showing individual construction project attribute information (Figure 14).



State	Description	Start	End
Minnesota	I-35 NB&SB, 2.16 MI.N OF MN 48 TO O.44 MI. N 27TH AVE W IN DULUTH. INTERMITTENT MINOR CPR (ASSOC 0980-164, 6982-355)	12/31/2027	12/30/2028
Minnesota	I-35, IN DULUTH, FROM N END BR 69879 OVER CENTRAL AVE TO S END RECYCLE WAY BR, AND N END 5TH AVE W. BR TO S END LAKE AVE BR, MEDIUM MILL/ OVERLAY	12/31/2027	12/30/2028
Minnesota	**ELLE**: I-35 IN DULUTH, LAKE AVENUE TO 0.70 MI. SOUTH OF 21ST AVE E. MAJOR CPR ON NB AND SB, MMA FLOOD SEAL INTERCHANGE RAMPS 69816E, 69816F, 69816G, 69816H & 69817 (TIED 6982-348)	12/31/2024	12/30/2025
Minnesota	I-35, IN DULUTH, FROM N END BR 69879 OVER CENTRAL AVE TO S END RECYCLE WAY BR, AND N END 5TH AVE W. BR TO S END LAKE AVE BR, MEDIUM MILL/ OVERLAY	12/31/2027	12/30/2028

Figure 14: Sample results generated for I-35 projects in a 10-year period starting Jan 22, 2025. (Source: MFCT)

Table 5 through Table 18 and Figure 15 through Figure 28 below show results for queries performed on each of the 7 corridors selected for the current study for the next 10 years starting January 1, 2025, and ending January 1, 2035, and for a one-week period from June 15 through June 20, 2026. This week was selected as a typical week in summer without a major holiday that would create different travel patterns.

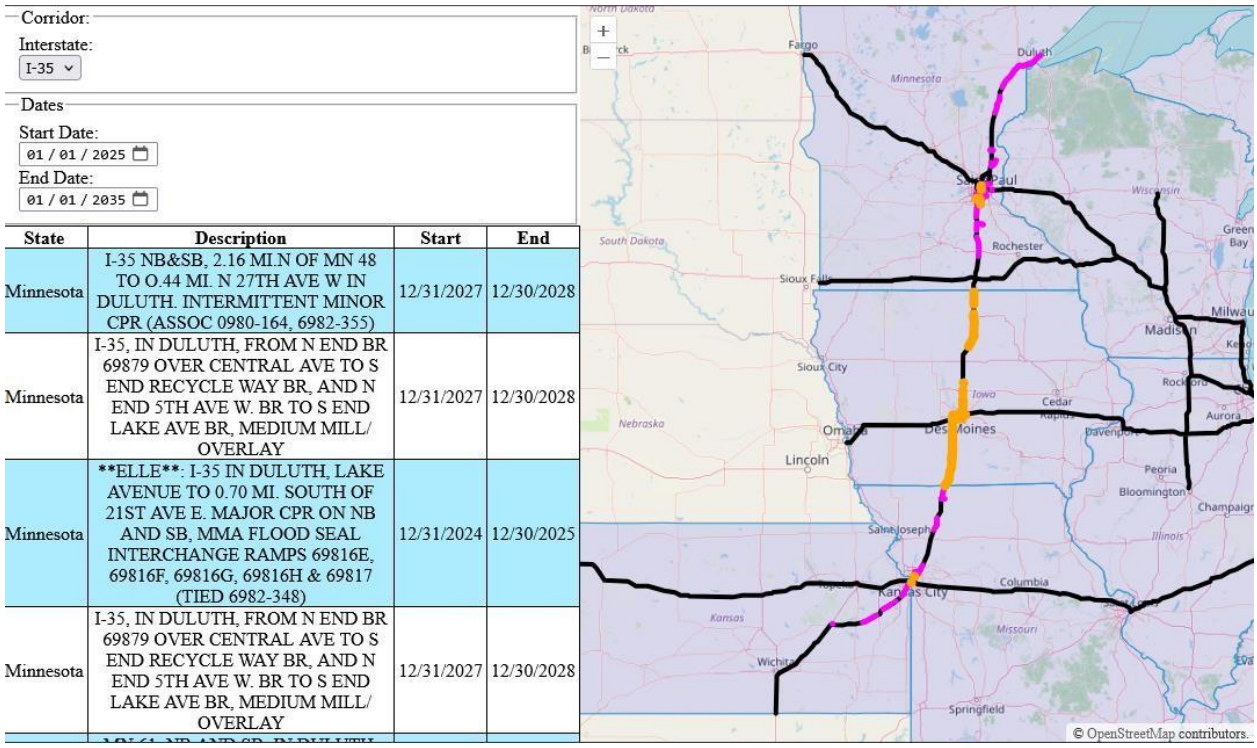
The MFCT demonstrates a multistate corridor perspective on freight corridors and the potential impacts of work zones on seven major freight corridors in the MAASTO region. As rehabilitation of the nation's Interstate highways continues, work zones will remain a predictable element. As noted in Chapter 3, work by states to better define the impact of work zones on safety and freight efficiency are underway.

This multistate approach to understanding the impacts of work zones expands current practices. The focus on illustrating work zones across multistate corridors provides for continuity of planning across states, as opposed to state-by-state illustrations that fail to provide the cumulative impacts of delays beyond individual states. The regional approach also lends itself to multistate operations center to manage and share freight data. The center could support integration and expansion of the WZDx to provide multistate coverage.

I-35 Projects

State	Number of Projects
Iowa	10
Kansas	11
Minnesota	32
Missouri	7
Total	**60**

Table 5: I-35 Projects, 2025-2035. (Source: MFCT).



State	Description	Start	End
Minnesota	I-35 NB&SB, 2.16 MI.N OF MN 48 TO O.44 MI. N 27TH AVE W IN DULUTH. INTERMITTENT MINOR CPR (ASSOC 0980-164, 6982-355)	12/31/2027	12/30/2028
Minnesota	I-35, IN DULUTH, FROM N END BR 69879 OVER CENTRAL AVE TO S END RECYCLE WAY BR, AND N END 5TH AVE W. BR TO S END LAKE AVE BR, MEDIUM MILL/ OVERLAY	12/31/2027	12/30/2028
Minnesota	**ELLE**: I-35 IN DULUTH, LAKE AVENUE TO 0.70 MI. SOUTH OF 21ST AVE E. MAJOR CPR ON NB AND SB, MMA FLOOD SEAL INTERCHANGE RAMPS 69816E, 69816F, 69816G, 69816H & 69817 (TIED 6982-348)	12/31/2024	12/30/2025
Minnesota	I-35, IN DULUTH, FROM N END BR 69879 OVER CENTRAL AVE TO S END RECYCLE WAY BR, AND N END 5TH AVE W. BR TO S END LAKE AVE BR, MEDIUM MILL/ OVERLAY	12/31/2027	12/30/2028

Figure 15: I-35 projects, 2025-2035 (Source: MFCT)

I-35 Projects

State	Number of Projects
Iowa	10
Kansas	1
Minnesota	3
Missouri	1
Total	**15**

Table 6: I-35 Projects, 06/15/2026-06/20/2026. (Source: MFCT).

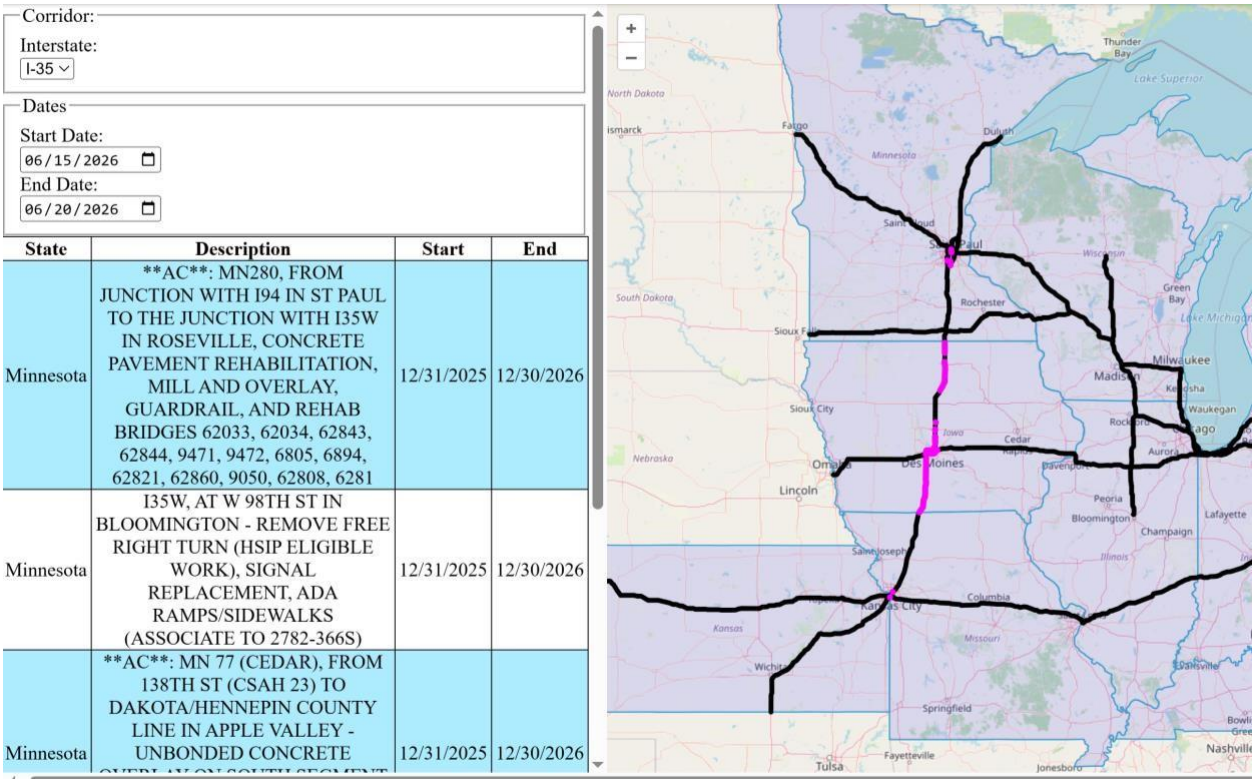


Figure 16: I-35 Projects, 06/15/2026-06/20/2026. (Source: (MFCT)

I-39 Projects

State	Number of Projects
Illinois	5
Wisconsin	17
Total	**22**

Table 7: I-39 Project, 2025-2035. (Source: MFCT).

Corridor:
Interstate:
I-39
Dates
Start Date:
01 / 01 / 2025
End Date:
01 / 01 / 2035

State	Description	Start	End
Wisconsin	To Be Determined	12/31/2028	12/30/2030
Wisconsin	Extend the bridge's service life by replacing the deck and protecting the new deck with a Thin Polymer Overlay.	12/31/2027	12/30/2028
Wisconsin	Extend the life of B-11-57 by replacing the deck.	12/31/2027	12/30/2028
Wisconsin	Replace pavement surface.	12/31/2025	12/30/2026
Wisconsin	To Be Determined	12/31/2028	12/30/2030
Wisconsin	Overlay existing decks with new concrete on various structures.	12/31/2027	12/30/2028
Wisconsin	Replace pavement surface.	12/31/2026	12/30/2027
Wisconsin	Extend the life of life of B-13-438 by replacing the joints and spot painting under the joints. Extend the life of B-13-451 and B-13-452 by replacing the approach slabs and repairing the ends ...more	12/31/2028	12/30/2030
Wisconsin	Repair and overlay both roadways.	12/31/2025	12/30/2026
Wisconsin	Extend the life of the pavement by repairing both roadways.	12/31/2026	12/30/2027
Wisconsin	To Be Determined	12/31/2028	12/30/2030
Wisconsin	Mill and resurface both roadways. Project begins 0.3 miles south of Lien	12/31/2026	12/30/2027

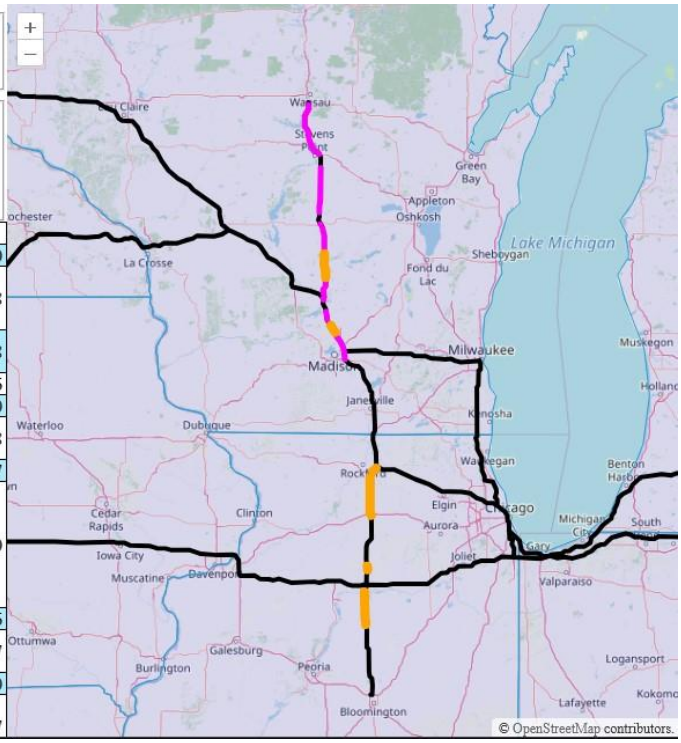


Figure 17: I-39 projects, 2025-2035 (Source: MFCT)

I-39 Projects

State	Number of Projects
Illinois	5
Wisconsin	2
Total	**7**

Table 8: I-39 Projects, 6/15/2026-06/20/2026. (Source: MFCT).

Corridor:

Interstate: I-39

Dates

Start Date: 06/15/2026

End Date: 06/20/2026

State	Description	Start	End
Wisconsin	Replace pavement surface.	12/31/2025	12/30/2026
Wisconsin	Repair and overlay both roadways.	12/31/2025	12/30/2026
Illinois	Additional Lanes	12/31/2024	12/30/2030
Illinois	Ultra-Thin Bnd Wr Course	12/31/2024	12/30/2030
Illinois	Bridge Deck Overlay	12/31/2024	12/30/2030
Illinois	Designed Overlay	12/31/2024	12/30/2030
Illinois	Reconstruction	12/31/2024	12/30/2030

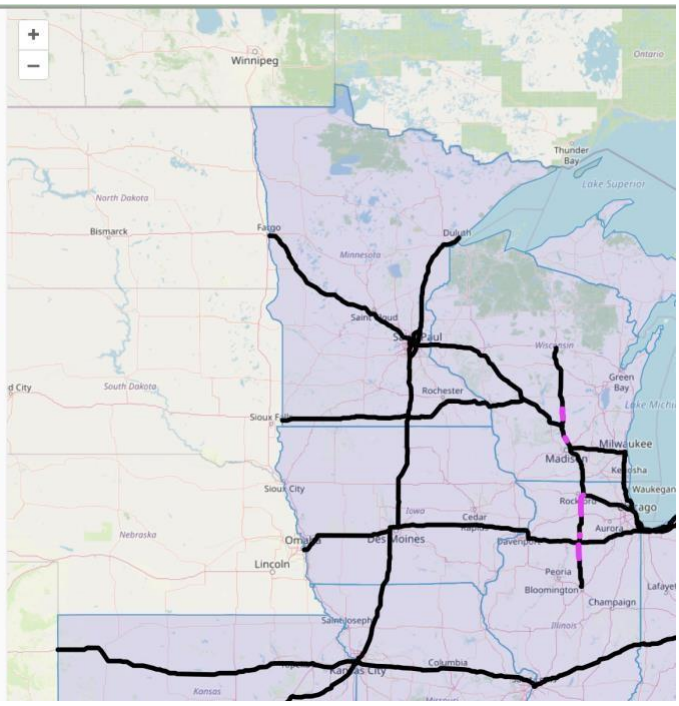
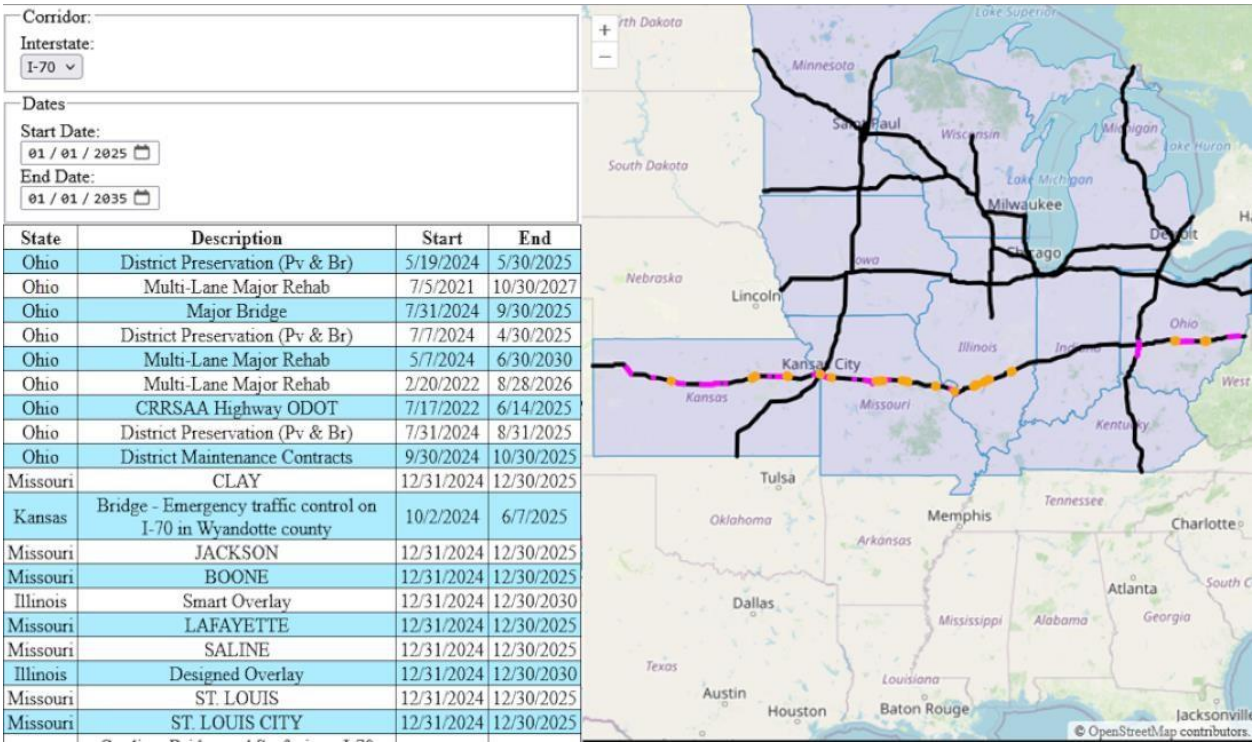


Figure 18: I-39 Projects. 6/15/2026-06/20/2026 (Source: (MFCT)

I-70 Projects

State	Number of Projects
Illinois	2
Kansas	33
Missouri	20
Ohio	9
Total	**64**

Table 9: I-70 Projects, 2025-2035. (Source: MFCT).



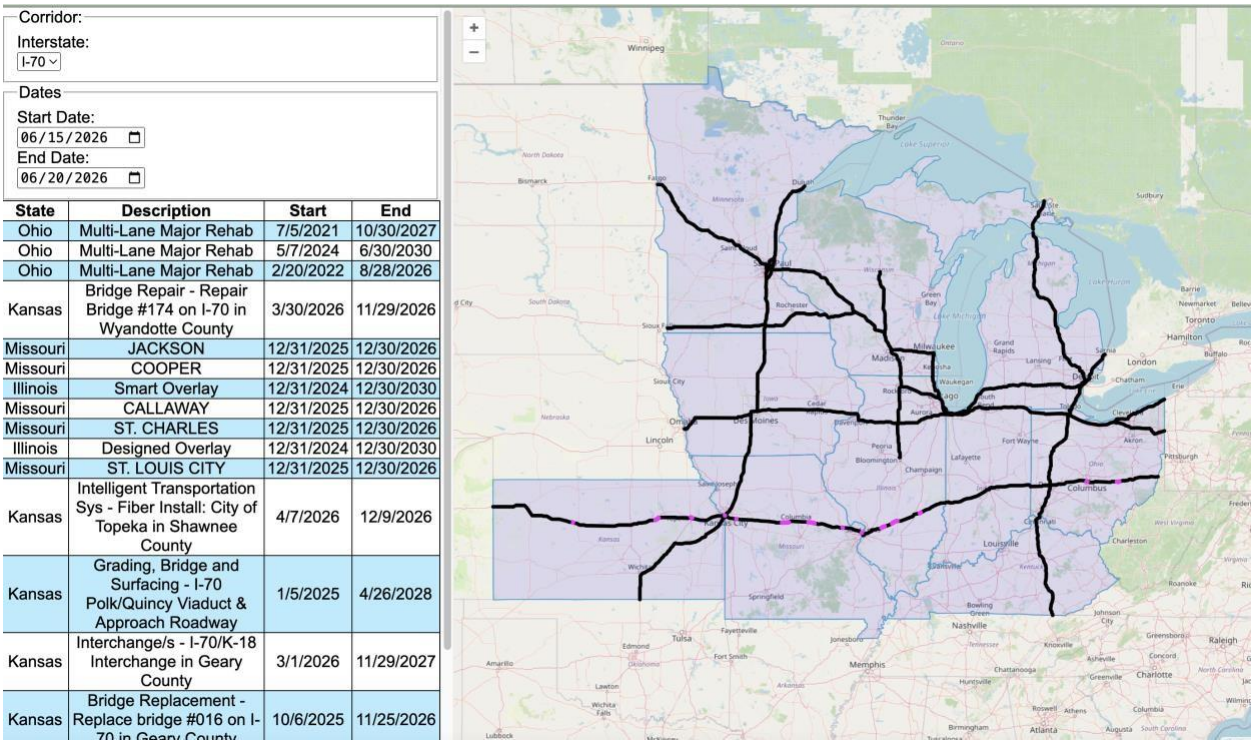
State	Description	Start	End
Ohio	District Preservation (Pv & Br)	5/19/2024	5/30/2025
Ohio	Multi-Lane Major Rehab	7/5/2021	10/30/2027
Ohio	Major Bridge	7/31/2024	9/30/2025
Ohio	District Preservation (Pv & Br)	7/7/2024	4/30/2025
Ohio	Multi-Lane Major Rehab	5/7/2024	6/30/2030
Ohio	Multi-Lane Major Rehab	2/20/2022	8/28/2026
Ohio	CRRSAA Highway ODOT	7/17/2022	6/14/2025
Ohio	District Preservation (Pv & Br)	7/31/2024	8/31/2025
Ohio	District Maintenance Contracts	9/30/2024	10/30/2025
Missouri	CLAY	12/31/2024	12/30/2025
Kansas	Bridge - Emergency traffic control on I-70 in Wyandotte county	10/2/2024	6/7/2025
Missouri	JACKSON	12/31/2024	12/30/2025
Missouri	BOONE	12/31/2024	12/30/2025
Illinois	Smart Overlay	12/31/2024	12/30/2030
Missouri	LAFAYETTE	12/31/2024	12/30/2025
Missouri	SALINE	12/31/2024	12/30/2025
Illinois	Designed Overlay	12/31/2024	12/30/2030
Missouri	ST. LOUIS	12/31/2024	12/30/2025
Missouri	ST. LOUIS CITY	12/31/2024	12/30/2025

Figure 19: I-70 projects, 2025-2035 (Source: MFCT)

I-70 Projects

State	Number of Projects
Illinois	2
Kansas	7
Missouri	5
Ohio	3
Total	17

Table 10: I-70 Projects, 06/15/2026-06/20/2026. (Source: MFCT).



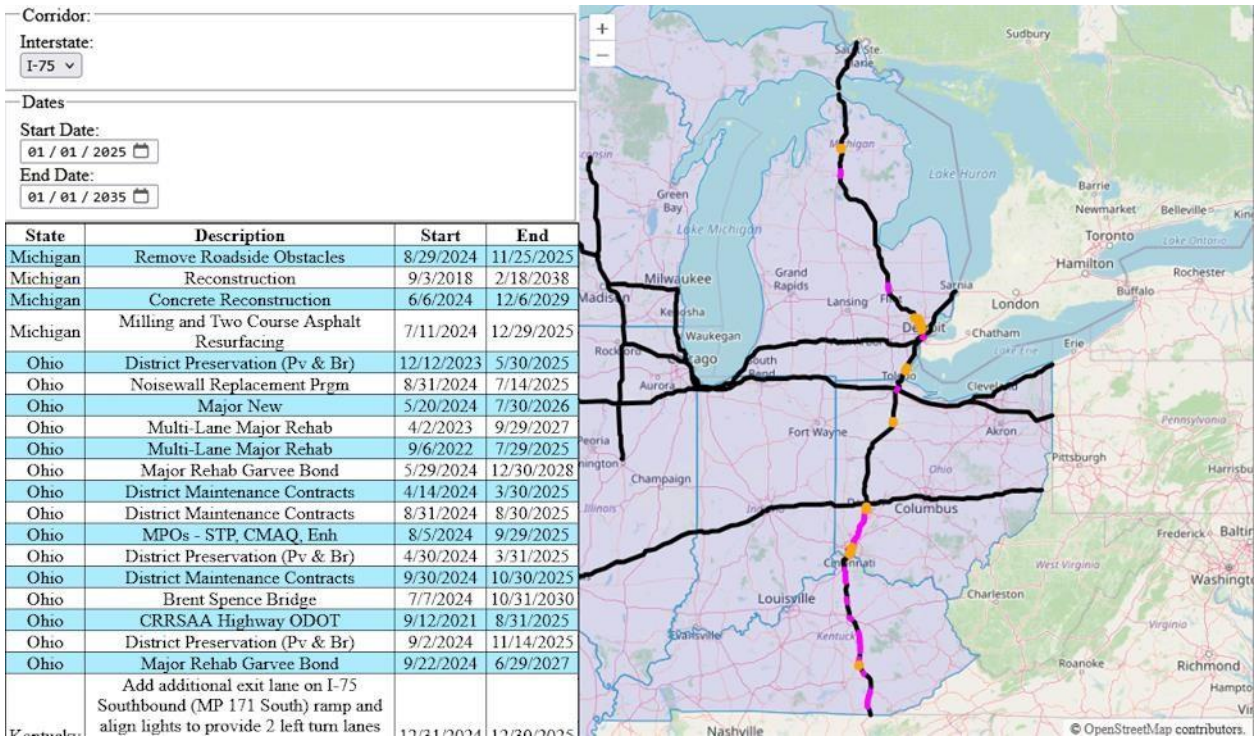
State	Description	Start	End
Ohio	Multi-Lane Major Rehab	7/5/2021	10/30/2027
Ohio	Multi-Lane Major Rehab	5/7/2024	6/30/2030
Ohio	Multi-Lane Major Rehab	2/20/2022	8/28/2026
Kansas	Bridge Repair - Repair Bridge #174 on I-70 in Wyandotte County	3/30/2026	11/29/2026
Missouri	JACKSON	12/31/2025	12/30/2026
Missouri	COOPER	12/31/2025	12/30/2026
Illinois	Smart Overlay	12/31/2024	12/30/2030
Missouri	CALLAWAY	12/31/2025	12/30/2026
Missouri	ST. CHARLES	12/31/2025	12/30/2026
Illinois	Designed Overlay	12/31/2024	12/30/2030
Missouri	ST. LOUIS CITY	12/31/2025	12/30/2026
Kansas	Intelligent Transportation Sys - Fiber Install: City of Topeka in Shawnee County	4/7/2026	12/9/2026
Kansas	Grading, Bridge and Surfacing - I-70 Polk/Quincy Viaduct & Approach Roadway	1/5/2025	4/26/2028
Kansas	Interchange/s - I-70/K-18 Interchange in Geary County	3/1/2026	11/29/2027
Kansas	Bridge Replacement - Replace bridge #016 on I-70 in Geary County	10/6/2025	11/25/2026

Figure 20: I-70 Projects, 06/15/2026-06/20/2026. (Source: MFCT)

I-75 Projects

State	Number of Projects
Kentucky	21
Michigan	7
Ohio	15
Total	**43**

Table 11: I-75 Projects, 2025-2035. (Source: MFCT).



State	Description	Start	End
Michigan	Remove Roadside Obstacles	8/29/2024	11/25/2025
Michigan	Reconstruction	9/3/2018	2/18/2038
Michigan	Concrete Reconstruction	6/6/2024	12/6/2029
Michigan	Milling and Two Course Asphalt Resurfacing	7/11/2024	12/29/2025
Ohio	District Preservation (Pv & Br)	12/12/2023	5/30/2025
Ohio	Noisewall Replacement Prgm	8/31/2024	7/14/2025
Ohio	Major New	5/20/2024	7/30/2026
Ohio	Multi-Lane Major Rehab	4/2/2023	9/29/2027
Ohio	Multi-Lane Major Rehab	9/6/2022	7/29/2025
Ohio	Major Rehab Garvee Bond	5/29/2024	12/30/2028
Ohio	District Maintenance Contracts	4/14/2024	3/30/2025
Ohio	District Maintenance Contracts	8/31/2024	8/30/2025
Ohio	MPOs - STP, CMAQ, Enh	8/5/2024	9/29/2025
Ohio	District Preservation (Pv & Br)	4/30/2024	3/31/2025
Ohio	District Maintenance Contracts	9/30/2024	10/30/2025
Ohio	Brent Spence Bridge	7/7/2024	10/31/2030
Ohio	CRRSAA Highway ODOT	9/12/2021	8/31/2025
Ohio	District Preservation (Pv & Br)	9/2/2024	11/14/2025
Ohio	Major Rehab Garvee Bond	9/22/2024	6/29/2027
	Add additional exit lane on I-75 Southbound (MP 171 South) ramp and align lights to provide 2 left turn lanes		

Figure 21: I-75 projects, 2025-2035 (Source: MFCT)

I-75 Projects

State	Number of Projects
Kentucky	1
Michigan	3
Ohio	5
Total	**9**

Table 12: I-75 Projects, 06/15/2026-06/20/2026. (Source: MFCT).

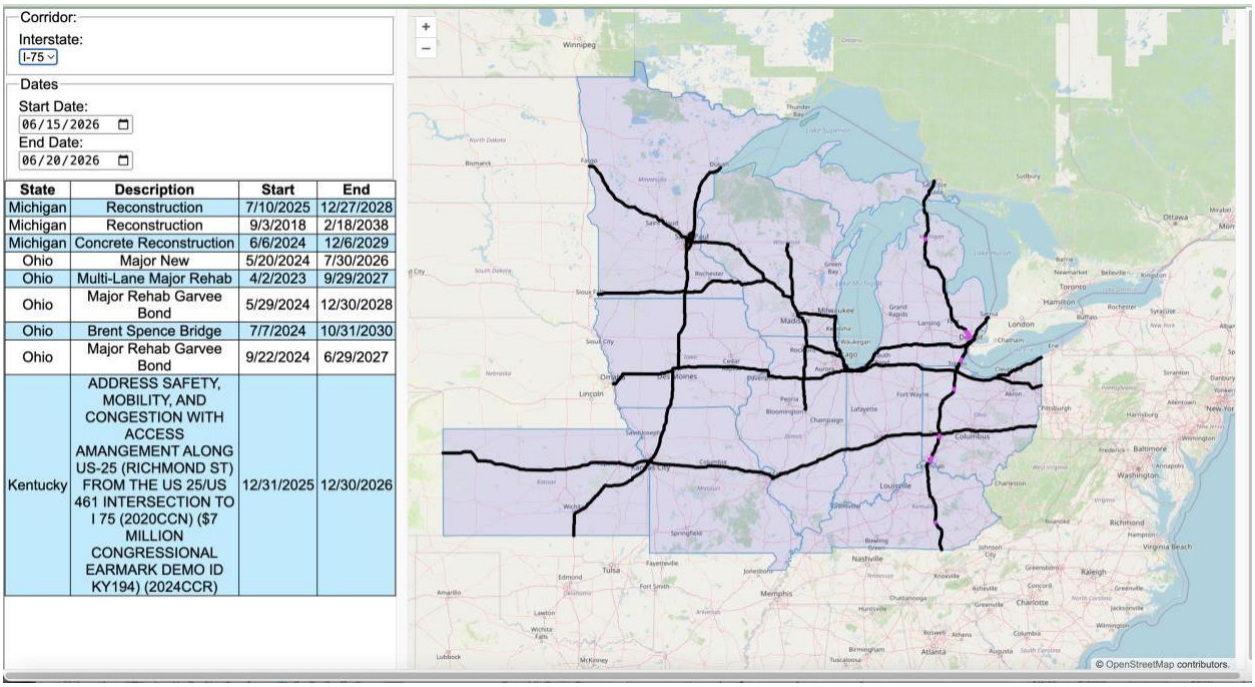


Figure 22: I-75 Projects, 06/15/2026-06/20/2026. (Source: (MFCT)

I-80 Projects

State	Number of Projects
Illinois	4
Iowa	11
Ohio	1
Total	**16**

Table 13: I-80 Projects, 2025-2035. (Source: MFCT).

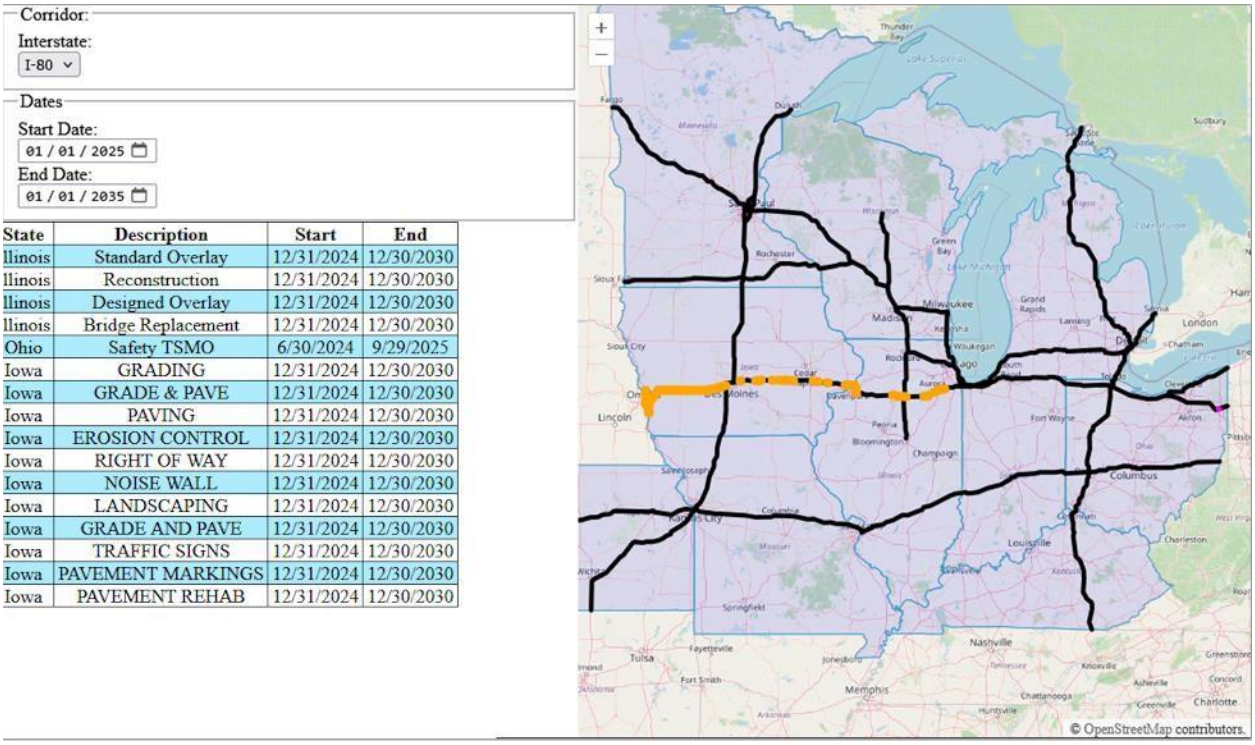
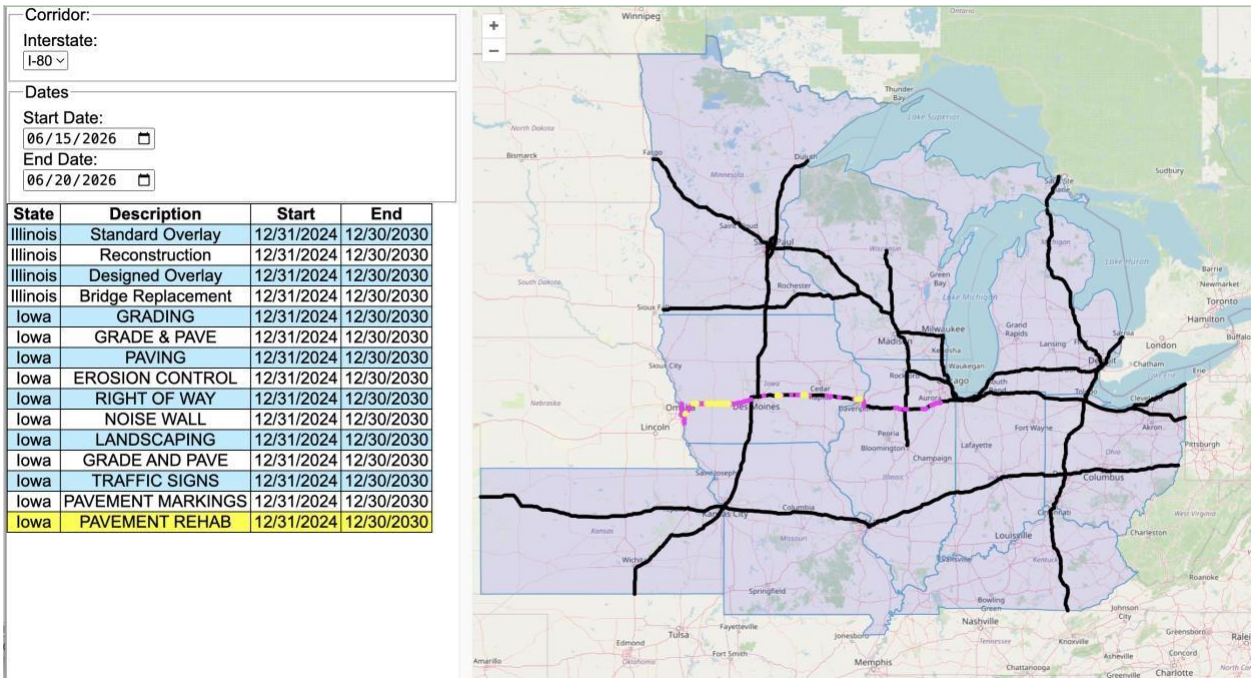


Figure 23: I-80 projects, 2025-2035 (Source: MFCT)

I-80 Projects

State	Number of Projects
Illinois	4
Iowa	11
Ohio	0
Total	**15**

Table 14: I-80 Projects, 06/15/2026-06/20/2026. (Source: MFCT).



State	Description	Start	End
Illinois	Standard Overlay	12/31/2024	12/30/2030
Illinois	Reconstruction	12/31/2024	12/30/2030
Illinois	Designed Overlay	12/31/2024	12/30/2030
Illinois	Bridge Replacement	12/31/2024	12/30/2030
Iowa	GRADING	12/31/2024	12/30/2030
Iowa	GRADE & PAVE	12/31/2024	12/30/2030
Iowa	PAVING	12/31/2024	12/30/2030
Iowa	EROSION CONTROL	12/31/2024	12/30/2030
Iowa	RIGHT OF WAY	12/31/2024	12/30/2030
Iowa	NOISE WALL	12/31/2024	12/30/2030
Iowa	LANDSCAPING	12/31/2024	12/30/2030
Iowa	GRADE AND PAVE	12/31/2024	12/30/2030
Iowa	TRAFFIC SIGNS	12/31/2024	12/30/2030
Iowa	PAVEMENT MARKINGS	12/31/2024	12/30/2030
Iowa	PAVEMENT REHAB	12/31/2024	12/30/2030

Figure 24: I-80 Projects, 06/15/2026-06/20/2026. (Source: (MFCT)

I-90 Projects

State	Number of Projects
Illinois	1
Minnesota	16
Ohio	4
Wisconsin	10
Total	**31**

Table 15: I-90 Projects, 2025-2035 (Source: MFCT).

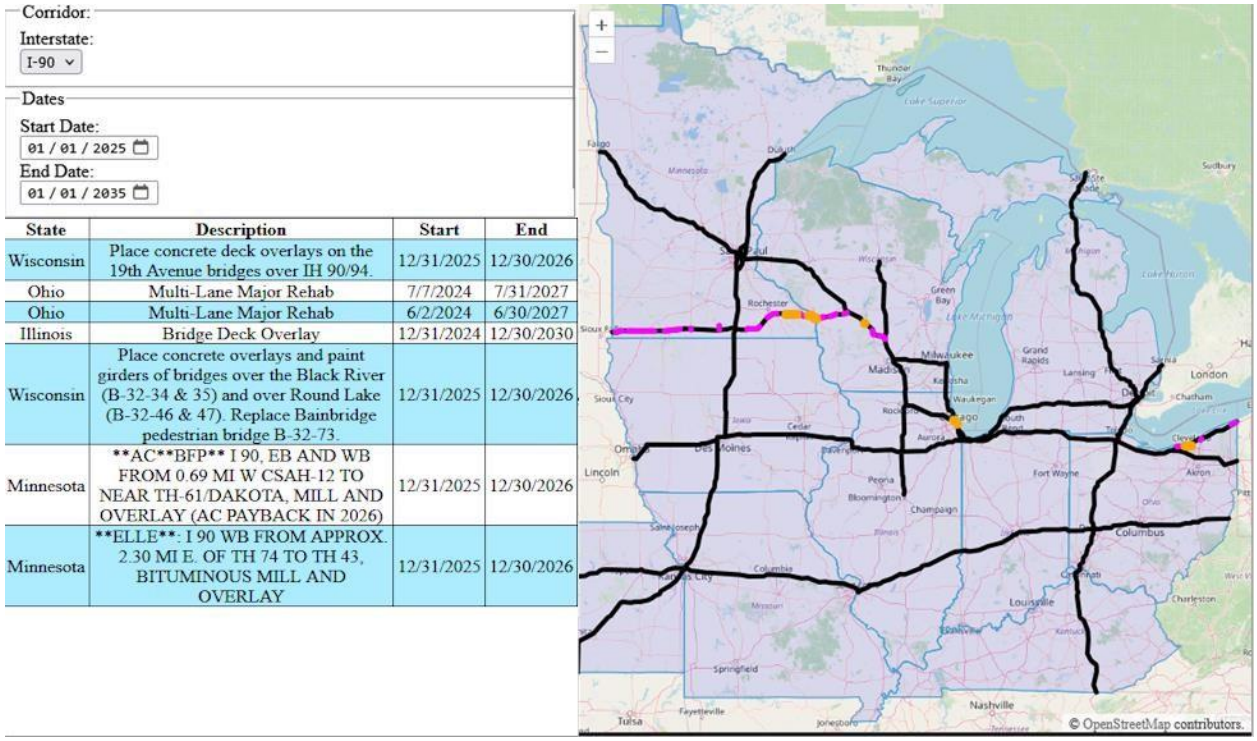


Figure 25: I-90 projects, 2025-2035 (Source: MFCT)

I-90 Projects

State	Number of Projects
Illinois	1
Minnesota	2
Ohio	2
Wisconsin	2
Total	7

Table 16: I-90 Projects, 06/15/2026-06/20/2026. (Source: MFCT).

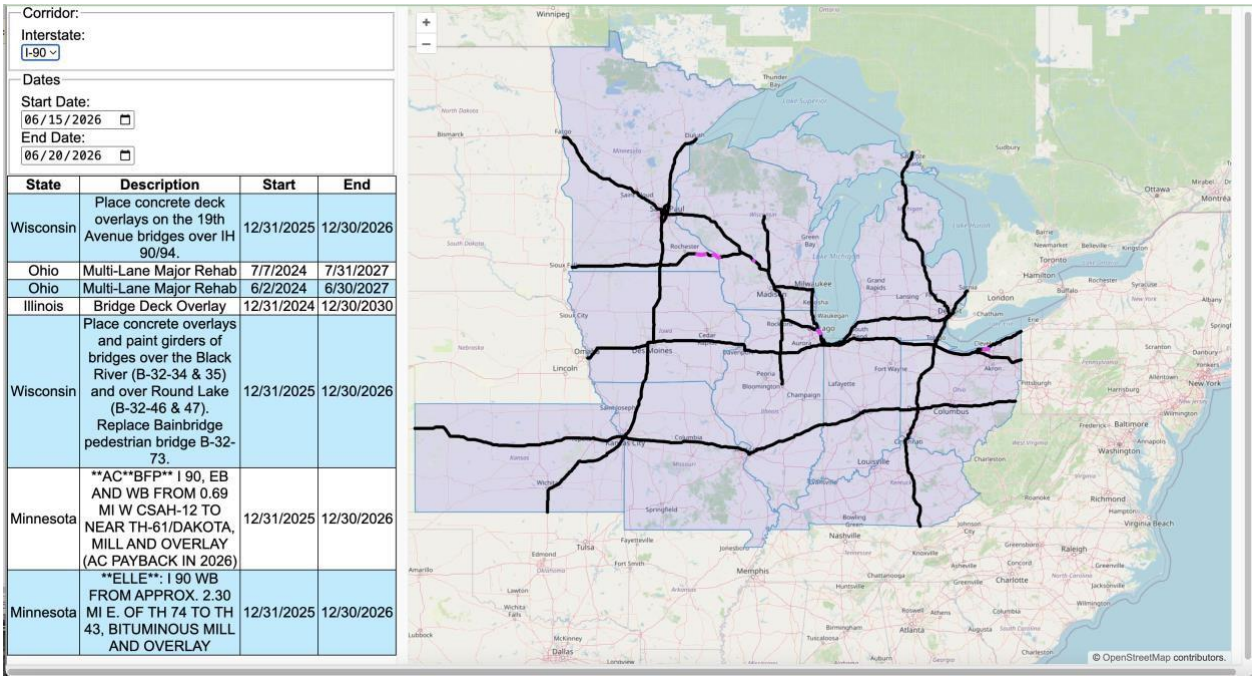
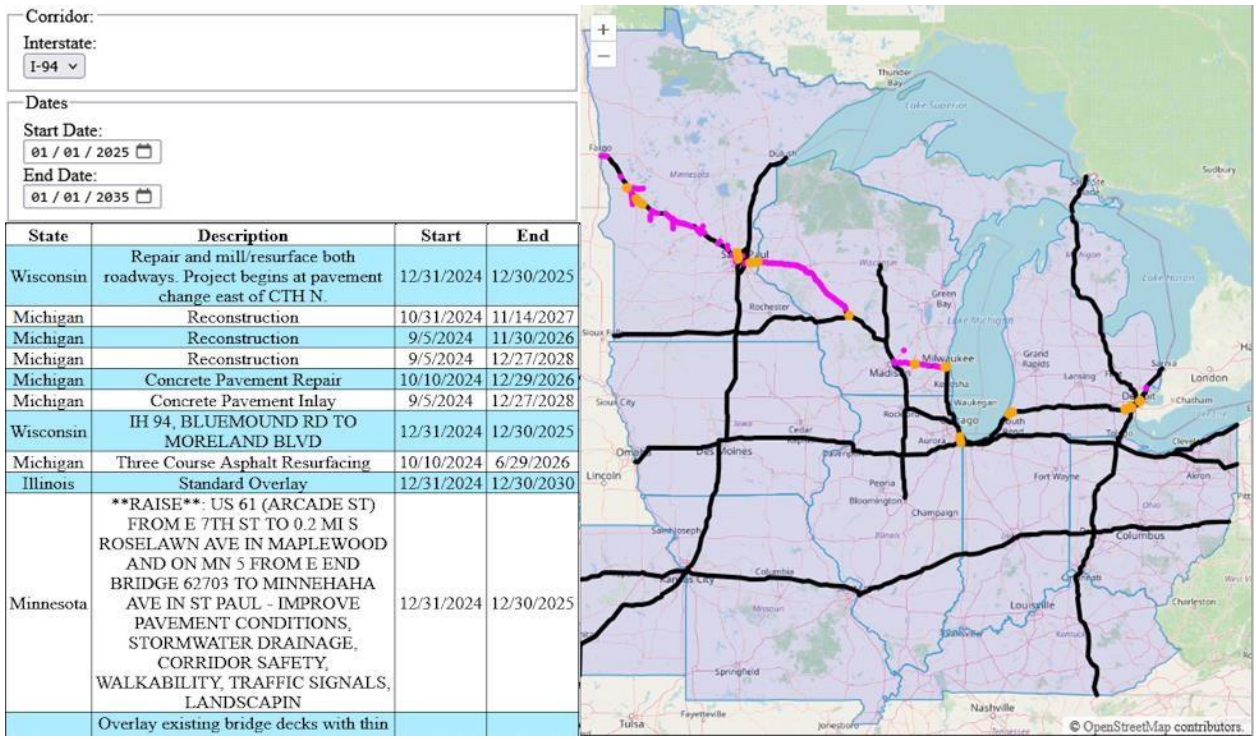


Figure 26: I-90 Projects, 06/15/2026-06/20/2026. (Source: (MFCT)

I-94 Projects

State	Number of Projects
Illinois	1
Michigan	7
Minnesota	35
Wisconsin	28
Total	**71**

Table 17: I-94 Projects, 2025-2035 (Source: MFCT).



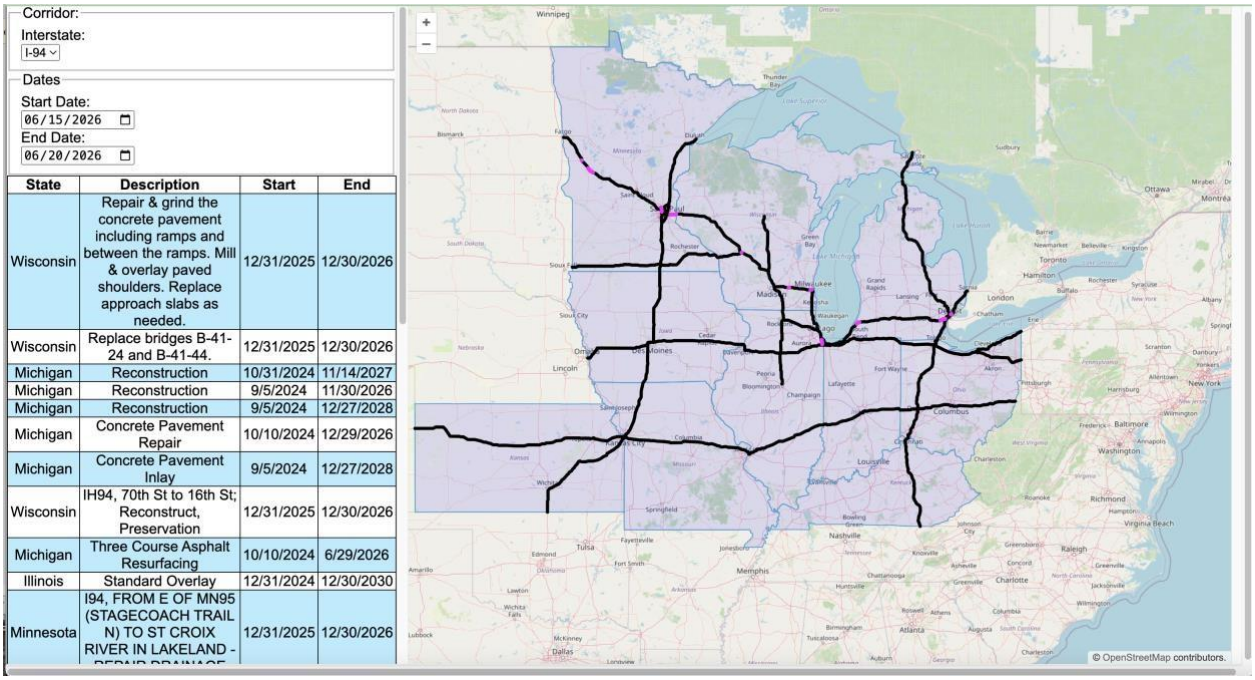
State	Description	Start	End
Wisconsin	Repair and mill/resurface both roadways. Project begins at pavement change east of CTH N.	12/31/2024	12/30/2025
Michigan	Reconstruction	10/31/2024	11/14/2027
Michigan	Reconstruction	9/5/2024	11/30/2026
Michigan	Reconstruction	9/5/2024	12/27/2028
Michigan	Concrete Pavement Repair	10/10/2024	12/29/2026
Michigan	Concrete Pavement Inlay	9/5/2024	12/27/2028
Wisconsin	IH 94, BLUEMOUND RD TO MORELAND BLVD	12/31/2024	12/30/2025
Michigan	Three Course Asphalt Resurfacing	10/10/2024	6/29/2026
Illinois	Standard Overlay	12/31/2024	12/30/2030
Minnesota	**RAISE**: US 61 (ARCADE ST) FROM E 7TH ST TO 0.2 MI S ROSELAWN AVE IN MAPLEWOOD AND ON MN 5 FROM E END BRIDGE 62703 TO MINNEHAHA AVE IN ST PAUL - IMPROVE PAVEMENT CONDITIONS, STORMWATER DRAINAGE, CORRIDOR SAFETY, WALKABILITY, TRAFFIC SIGNALS, LANDSCAPIN	12/31/2024	12/30/2025
	Overlay existing bridge decks with thin		

Figure 27: I-94 projects, 2025-2035 (Source: MFCT)

I-94 Projects

State	Number of Projects
Illinois	1
Michigan	6
Minnesota	5
Wisconsin	3
Total	**15**

Table 18: I-94 Projects, 06/15/2026-06/20/2026. (Source: MFCT).



State	Description	Start	End
Wisconsin	Repair & grind the concrete pavement including ramps and between the ramps. Mill & overlay paved shoulders. Replace approach slabs as needed.	12/31/2025	12/30/2026
Wisconsin	Replace bridges B-41-24 and B-41-44.	12/31/2025	12/30/2026
Michigan	Reconstruction	10/31/2024	11/14/2027
Michigan	Reconstruction	9/5/2024	11/30/2026
Michigan	Reconstruction	9/5/2024	12/27/2028
Michigan	Concrete Pavement Repair	10/10/2024	12/29/2026
Michigan	Concrete Pavement Inlay	9/5/2024	12/27/2028
Wisconsin	IH94, 70th St to 16th St; Reconstruct, Preservation	12/31/2025	12/30/2026
Michigan	Three Course Asphalt Resurfacing	10/10/2024	6/29/2026
Illinois	Standard Overlay	12/31/2024	12/30/2030
Minnesota	I94, FROM E OF MN95 (STAGECOACH TRAIL N) TO ST CROIX RIVER IN LAKELAND -	12/31/2025	12/30/2026

Figure 28: I-94 Projects, 06/15/2026-06/20/2026. (Source: MFCT)

5. CONCLUSIONS

The highest priority for state DOTs is safety – for travelers, for commercial vehicle operators, and for construction workers in work zones. Since 1977, the transportation industry has participated in the Work Zone Awareness Week, which includes daily events or activities that highlight critical transportation safety issues. The following was the 2025 schedule.

- Work Zone Safety Training Day **-** April 21
- National kickoff event **-** April 22
- Go Orange Day **-** April 23
- Social media storm **-** April 24
- Moment of Silence **-** April 25. The moment of silence was started in 2022 to remember the men and women whose lives were lost in a work zone incident.

This is an important annual event for all state DOTs and an opportunity to highlight the critical safety issues of working on the roadway while the facility is open to traffic. Yet, even with the seasonal emphasis on work zones, adding law enforcement in work zones, and other forms of mitigation have failed to end fatal crashes in work zones, including those involving CMVs.

The CMV environment of multistate freight corridors continues to present everchanging challenges. Long-haul trucking is expected to expand to 488 million miles traveled daily by 2045, likely resulting in additional congestion and choke points in the absence of projects to address this traffic growth. Every segment of the Interstate Highway System eventually will require reconstruction and imposition of work zones. Of further concern, permitted OSOW load volumes are on the rise across the region. As stated previously, crash rates and fatal crash rates in work zones have been on the increase since 2012. And according to Work Zone Facts and Statistics, one work zone fatality occurs for every 4 billion vehicle-miles of travel and for every $112 million worth of roadway construction expenditures. [17]

State-by-state work zone mapping and specific routing information for CMVs is available, but a multistate corridor perspective on work zones is not currently available. To illustrate the potential value of such a tool, the MFCT was developed to track work zones by corridors rather than by individual state. The combination of the MFCT and the work zone data exchange could lead to development of a MAASTO regional operations center to address these and other multistate issues. An operations center would provide multistate mobility information and a setting for coordinated regional traffic operations management and incident notification.

Overall, freight demand is expected to increase with population growth in the future. Work zones will continue to be needed, and traffic through work zones is expected to remain a mix of commercial and passenger vehicles sharing the Interstates. With approximately 1/3 of all fatal work zone crashes involving a CMV, additional focus on the interaction of CMVs and work zones is needed.

During interviews with the state work zone experts, the following recommendations were made for improving the work zone safety and decreasing all crash types, especially fatal work zone crashes involving CMVs. The recommendations range from specific work zone design tactics to establishing interagency institutional linkages that encourage and support multistate approaches to understanding and managing multistate CMV traffic.

Organizational and Institutional Recommended Practices

Support expansion of WZDx to all MAASTO states.

As a first step, the work zone data exchange should be adopted by all MAASTO states to ensure the entire region provides and exchanges accurate and timely information on work zones and delays. This was recently emphasized at the 2025 Summer MAASTO Closing Session [46].
Incorporate MFCT into the WZDx to capture travel and work zones in adjacent states.

Expanding the WZDx to capture multistate freight corridors provides for advanced planning for freight movements and a better understanding of the impacts across a multistate corridor. As the application is developed, care should be taken to manage the data inputs to ensure accuracy of the work zone start and stop dates, as well as harmonization of projects definitions, geometrics, approaches, and data collection.

Indiana's practice of providing 18 months of projects at a time to ensure accuracy can reduce uncertainty for earlier stages of the planning tool but limits medium to long term planning. Like other databases created by MAASTO States for permitting and performance measures, the particulars of the construction data and reporting is managed by the states in a collaborative manner. The proposed committee assigned to manage the collaboration would address inconsistencies such as this but ultimately the decision to participate is the responsibility of each state.

Create a multistate freight corridor work zone group to address multiple work zones on a single corridor across multiple states.

Respondents specifically mentioned the potential benefits of additional collaboration for multistate work occurring on I-35. There is a perceived need to standardize work zones for CMVs to ensure consistent and safe travel across multiple states. An assessment of this effort could provide information on the benefits of work zone and communication standardization on multistate freight corridors. A multistate work zone group, potentially a Connected Corridor Subcommittee, could work to harmonize work zone reporting, terminology, and descriptions for more uniform project descriptions and potential impacts. The Connected Corridor Subcommittee would need to develop the scope, execute, and manage the effort.

Create an annual MAASTO peer exchange specifically to address CMV work zone issues.

Creating MAASTO work zone peer discussions with a CMV emphasis at MAASTO meetings (or quarterly meetings of work zone experts) would sharpen the focus on the work zones and provide for more discussions, feedback, and ideas from peers. Currently all MAASTO states participate in multiple working groups or pooled funds. However, not all states participate in a single group. A MAASTO working group or subcommittee would address this deficiency.

Research and Case Studies Needed to Advance the Focus on CMVs

Several states indicated that they were currently participating in research or pooled-fund studies in support of better understanding CMVs in work zones. During discussions with the work zone professionals, the following strategies were suggested:

- Conduct a review of state crash reporting forms, processes, and analytical capabilities.
    - Assess the last 5 years of records and investigate causes of crashes.
    - Review CMV state crash reporting and make recommendations for harmonization of crash reporting forms.

    - Review crash forms for clarity on vehicle location, speed, and environmental conditions for fatal crashes.
- Support efforts in work zone modeling for CMVs to address crash participation rates.
- Encourage all WZDx participants to adopt harmonized descriptions and definitions of work types, project durations, and type of road intrusion.
- Identify the extent of detours and delays due to work zones on multistate freight corridors.
- Identify total delay and costs for traditional and OSOW loads on multistate corridors. While permitted loads are mostly rerouted automatically around problematic work zones, the details, extent and costs of these detours and delays are not available. The states indicated they would need to work with their permitting vendors to provide system enhancements to capture rerouting. This information would contribute to understanding the full cost of work zones. It would enable the users to track changes in mileage and time due to the rerouting then calculate the user cost to freight movers for the detour.
- Conduct research on the locations of crashes within the work zones.
- Consider developing a course on work zone crash triggers for field employees.
- Continue researching the best ways to communicate advance notice of work zones to CMV drivers without introducing a hazard.
- Work with fleets to secure data and videos of pre-crash events for CMVs in work zones.
- Conduct content analysis for causality and chain of events for crashes involving CMVs.

Repeatedly, the work zone professionals called for a way to reach out and remind drivers of the work zone as they approach. All responded indicated that an audible and sensory alert should be connected to work zone geofencing. As the truck crosses the geofence just prior to the work zone, an alert is triggered in the cab to alert the driver of the work zone. Given that inattention was most often cited as the cause of work zone crashes, an in-cab alert system should be provided in CMVs and passenger vehicles as a major safety step and recognition of the dangers of the work. The alert systems can also be linked to work zone back up detection and warning systems to provide advanced warning of stopped traffic.

In addition to these recommendations, a virtual operations center for major multistate freight corridors would support long-haul freight loads and permitted loads. An operations center could be initiated through cooperation with WZDx to expand real time work zone information, especially for multistate corridors.

An operations center could manage information and data for weather events, multistate corridor planning, incident alerts and emergency services, EV charging locations, and truck parking facilities. The project, contracting, and content and output of the center could be the charge of a committee or subcommittee. It is expected state work zone representatives would manage the committee and provide guidance in managing freight corridors, large project management, and freight planning.

Work zone safety has justifiably been a focus of state DOTs. Fortunately, there is also a tremendous professional cadre of work zone professionals and engineers across the MAASTO states that work to ensure safety in work zones for travelers and construction workers. MAASTO states also can rapidly address critical situations in a collaborative manner. A regional data and operations center could provide the base to make strides in the safety of CMVs in work zones.

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