


# Safety Weight Enforcement Facility (SWEF) and Virtual Weigh-In-Motion (VWIM) Implementation Plan

Wisconsin Department of Transportation
Roadside Facilities Needs Study

Volume 3

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# Executive Summary

Given Wisconsin's aging highway infrastructure, constraints on highway construction and maintenance resources at the state and local level relative to emerging needs, Wisconsin's extensive inventory of bridges and paved roads on the secondary highway system, and an expected increase in truck-borne freight in the coming decades, Wisconsin's highway users are well-served by the Wisconsin Department of Transportation (DOT) taking a fresh look at its commercial motor vehicle (CMV) safety and weight enforcement facilities and related resources.

CMV safety and weight enforcement in Wisconsin has two main goals:

- *To ensure public safety* by enforcing equipment standards (brakes, tires, lights, load securement), carrier performance standards (operating authority, vehicle registration, corporate safety record), and driver fitness standards (licensure, physical/medical fitness, hours of service); and,
- *To protect public investment in highway infrastructure* (pavements, bridges, railroad crossings, tunnels) by enforcing state size and weight laws for CMVs.

This is a daunting task considering there are about 112,000 miles of public roadway in Wisconsin, carrying nearly 60 billion vehicle miles of travel annually (or about 163,000,000 VMT per day). Over 11,750 miles of roadway comprise WisDOT's State Trunk Highway (STH) system (i.e., numbered Interstate, US and State highways), and of the 14,100 roadway bridges in Wisconsin, about 4,600 are on the STH system. Although the STH system represents less than 11% of all public roadway centerline mileage in Wisconsin, it carries about 61% of the total VMT.

According to the third, and most recent, iteration of the USDOT's Freight Analysis Framework (FAF)[1]:

- The majority of freight moved to and from Wisconsin is borne by trucks.
- Freight trucks represent nearly one-third of all truck-related vehicle miles of travel (VMT) in the state.
- Between 2012 and 2040, freight ton-miles to Wisconsin is expected to grow by 44 percent and ton-miles from Wisconsin is expected to grow by 26 percent.

There has been a statewide investment in commercial vehicle enforcement since the 1950's. In the 1980s, the federal Motor Carrier Safety Assistance Program (MCSAP) was created, providing states with financial assistance to conduct more safety inspections of CMVs and their drivers, as well as motor carriers, to reduce the number and severity of CMV-involved crashes, fatalities, injuries, and hazardous material incidents. Wisconsin continues to participate in this program annually to the extent that federal funding allows.

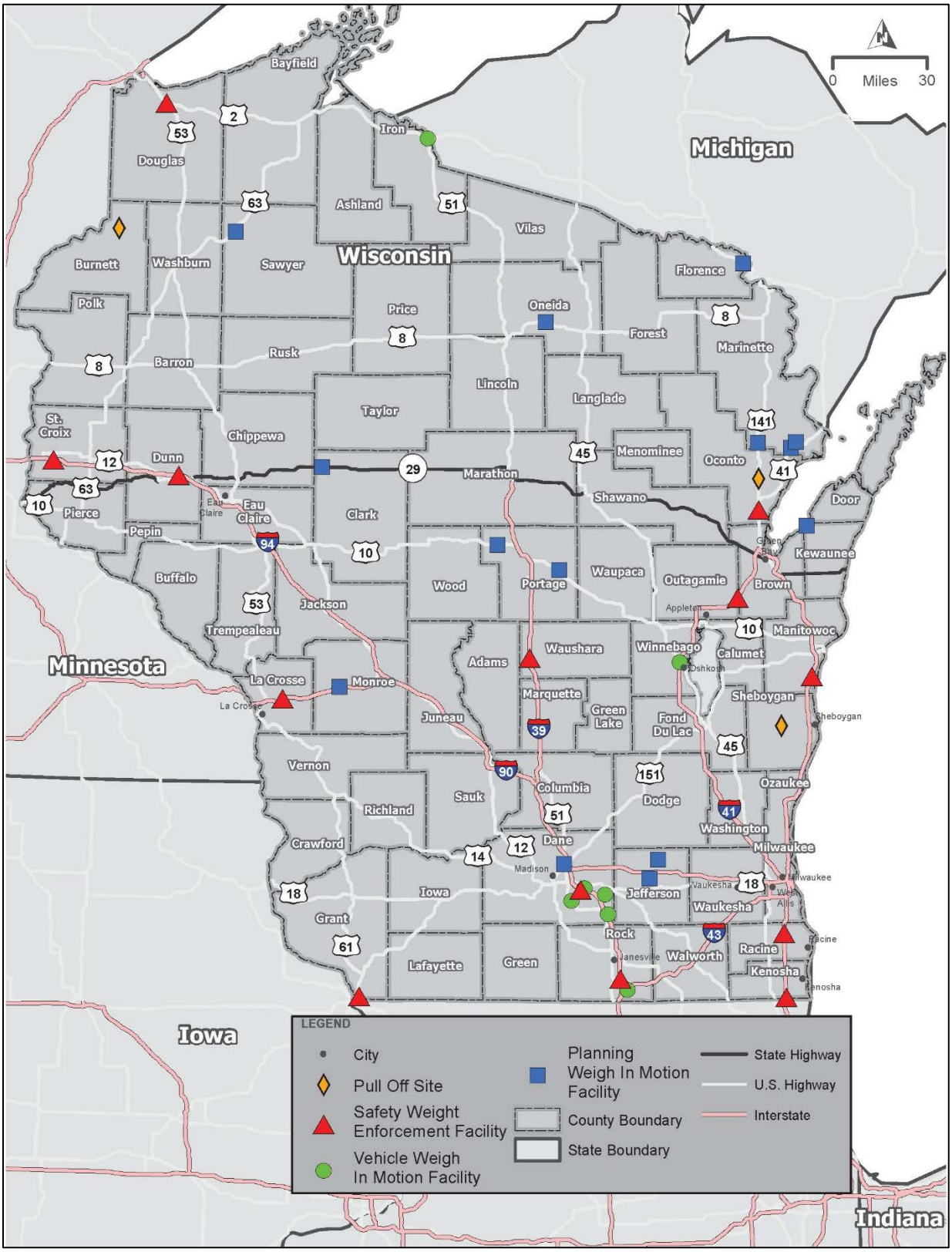
[1] *(FAF) integrates data from a variety of sources to provide a portrait of freight movement between states and major metropolitan areas by all modes of transportation – i.e., truck, rail, water, air, pipeline, and multiple mode*s. *State-specific profile tables from FAF version 3 are available at:* http://faf.ornl.gov/fafweb/FUT.aspx

Commercial motor vehicles are inspected by Wisconsin Division of State Patrol (DSP) Motor Carrier Enforcement Inspectors at permanent roadside facilities commonly referred to in Wisconsin as Safety and Weight Enforcement Facilities (SWEF). These facilities are primarily located at points of entry into the state to intercept illegal-sized loads and unsafe drivers and vehicles before they proceed across Wisconsin in support of the dual goals of *ensuring public safety* and *protecting public investment in highway infrastructure*.

Virtual Weigh-In-Motion (VWIM) sites have been installed by WisDOT to support DSP and local law enforcement agencies' efforts to deter and detect overweight, unsafe, or improperly credentialed CMV's on suspected SWEF bypass routes or to monitor commercial vehicles on intrastate mainline roads. In Wisconsin, unlike Minnesota and some other states, CMV safety and weight enforcement is done almost exclusively by designated State Patrol sworn personnel.

The locations of WisDOT's existing SWEF and VWIM sites are shown in Figure E-1.

Figure E-1. Existing WisDOT SWEF, Pull Off, VWIM and WIM Facilities




Source: Wisconsin DOT

This study addresses needs and potential strategies for providing a statewide network of SWEF and VWIM that protect Wisconsin's transportation infrastructure. Key sections of this study include:

- Section 2 of this volume is an overview of the Department's existing approach to CMV safety and weight enforcement, including descriptions of the techniques employed to deter and detect violations and the allocation of CMV enforcement personnel.
- Section 3 is an assessment of needs for SWEF and VWIM and its CMV enforcement personnel staffing.
- Section 4 contains prioritization analysis of SWEF and VWIM locations and associated SWEF Staffing Model Analysis.
- Section 5 includes strategies and recommendations for future SWEF improvements and VWIM installations, as well as for related staffing and data management initiatives.

Methodology tools were created to prioritize SWEF and VWIM locations, and analyze how improvements or closures of SWEF would affect DSP enforcement of CMV. Criteria were developed for each tool and using a point system each SWEF and VWIM were "graded" to indicate level of priority.

Ten specific criteria were evaluated for SWEF and VWIM using a point system that sorted each criterion into three tiers (Upper, Middle, and Lower). Each tier was assigned a data range, determined from a review of source data, for each criterion. A weighting factor was assigned to each criterion based on input from DSP and WisDOT Division of Transportation System Development (DTSD). This factor was used to determine the minimum and maximum tier point value for each criterion. All ten criteria scores were combined to determine the overall priority of the SWEF and VWIM locations. The sum of the weighting factors for all criteria equaled 100, so that the overall priority score (a value between 0 and 100) could be used to compare SWEF's and VWIM's to each other in the analysis results.

Two SWEF site analysis scenarios were evaluated to represent an Unconstrained (based on location) and Constrained (based on location and costs) prioritization, and the results of the analysis are shown in Table E-1. The Unconstrained analysis only assigned weighting factors to three criteria; present truck AADT, future truck AADT, and location. The Constrained analysis assigned weighting factors to all ten criteria which included present and future AADT, location, current facility condition, maintenance costs, and reconstruction costs.

Table E-1. SWEF Analysis Results

| Name | Corridor | Unconstrained Priority | Constrained Priority |
|---|---|---|---|
| 21 Kenosha | I-41/94 WB | 100 | 90 |
| 19 Beloit | I-39/90 NB | 80 | 78 |
| 61 Hudson | I-94 EB | 80 | 67 |
| 22 Racine | I-41/94 EB | 76 | 62 |
| 16 Madison | I-39/90 SB | 72 | 68 |
| 63 Menomonie | I-94 WB | 60 | 51 |
| 53 West Salem | I-90 EB | 58 | 52 |
| 34 Wrightstown | I-41 NB | 54 | 47 |
| 44 Coloma | I-39 NB/SB | 48 | 42 |
| 71 Superior | US 2/53 NB/SB | 46 | 55 |
| 35 Newton | I-43 SB | 46 | 43 |
| 41 Abrams | US 41 NB/SB | 43 | 42 |
| Future Dodgeville | US 18/151 NB | 38 | 42 |
| 11 Dickeyville | US 61/151 NB/SB | 33 | 33 |

Fifty potential VWIM sites were evaluated, and the top rated locations are shown in Table E-2. All ten criteria were assigned weighting factors based on input from DSP and DTSD for the VWIM analysis.

Table E-2. VWIM Analysis Results

| Region | Location | Corridor | Overall Priority |
|---|---|---|---|
| SW | Beloit Bypass | US 51 NB | 80 |
| NW | Stillwater, MN (Planned) | WIS 64 EB | 80 |
| SW | West Salem (Sparta)(Bypass) (Planned) | WIS 16 EB | 79 |
| NE | Green Bay (East of WIS 32) | WIS 29 EB/WB | 75 |
| SW | Dickeyville Bypass | WIS 11 EB | 75 |
| SE | Kenosha Bypass | WIS 31 NB | 74 |
| SW | Beloit Bypass | WIS 140 NB | 74 |
| SE | Kenosha Bypass | US 45 NB | 74 |
| SE | Kenosha Bypass | WIS 32 WB | 72 |
| NC | Colby, WI (W. of WIS 13) | WIS 29 EB/WB | 71 |
| NW | Hager City | US 63 EB | 71 |
| NC | Between Wausau & Stevens Point | I-39 NB/SB | 70 |
| SE | Racine Bypass | US 45 SB | 70 |
| NW | Menomonie Bypass | WIS 29 WB | 70 |

The staffing implications for these recommendations were analyzed. It is proposed to shift staff assigned to Wrightstown (two active Inspectors), Menomonie (two active Inspectors), and Dickeyville (two active Inspectors) to mobile enforcement near the new VWIM installations. As shown in Table E-3, the results suggest there would not be a negative impact to the total number of inspections performed if Wrightstown, Menomonie and Dickeyville SWEF were closed and converted to weight validation sites with VWIM mobile enforcement with all staff vacancies filled.

## Table E-3. Staffing Analysis Results

| Fill All Vacant Staff Positions and Convert Three Facilities | | Staffing | | Baseline Conditions | | Forecast Results | |
|---|---|---|---|---|---|---|---|
| Region | Assignment | # Active Inspector | # Vacant Inspector | Baseline Inspections | Baseline % Trucks Inspected | Inspections | % Trucks Inspected |
| **North Central (Wausau)** | Mobile Enforcement | 7 | 0 | 1,537 | | 2,688 | |
| | 44 Coloma | 4 | 0 | 1,562 | 0.230% | 1,564 | 0.230% |
| **Northeast (Fond Du Lac)** | Mobile Enforcement | 11 | 0 | 2,434 | | 3,828 | |
| | 34 Wrightstown | 0 | 0 | 984 | 0.101% | 0 | 0.000% |
| | 35 Newton | 2 | 0 | 1,385 | 0.247% | 1,386 | 0.247% |
| | 41 Abrams | 3 | 0 | 1,066 | 0.099% | 1,065 | 0.098% |
| **Northwest (Eau Claire)** | Mobile Enforcement | 9 | 0 | 2,178 | | 3,267 | |
| | 61 Hudson | 5 | 0 | 1,556 | 0.085% | 2,595 | 0.142% |
| | 63 Menomonie | 0 | 0 | 965 | 0.073% | 0 | 0.000% |
| | 71 Superior | 6 | 0 | 1,236 | 0.215% | 3,708 | 0.644% |
| **Southeast (Waukesha)** | Mobile Enforcement | 4 | 0 | 1,666 | | 1,668 | |
| | 21 Kenosha | 8 | 0 | 2,154 | 0.054% | 2,872 | 0.072% |
| | 22 Racine | 4 | 0 | 991 | 0.025% | 1,320 | 0.034% |
| **Southwest (DeForest)** | Mobile Enforcement | 9 | 0 | 4,997 | | 4,995 | |
| | 11 Dickeyville | 0 | 0 | 614 | 0.275% | 0 | 0.000% |
| | 16 Madison | 8 | 0 | 1,822 | 0.087% | 2,080 | 0.100% |
| | 19 Beloit | 8 | 0 | 2,277 | 0.115% | 2,600 | 0.131% |
| | 53 West Salem | 4 | 0 | 1,087 | 0.165% | 1,088 | 0.166% |
| | Totals | 92 | 0 | 30,511 | | 36,724 | |

Tables E-4 and E-5 summarize recommendations for each SWEF and high priority VWIM sites.

Table E-4. SWEF Recommendations

| Site Number | Name | Highway | Traffic Direction | Recommended Strategies [*Year Scheduled*] | Estimated Cost to Implement | 10 Year Program Cost | Capital Improvement Savings | Annual Operating Cost Savings (Based on 2012-2014 Ave. O&M) |
|---|---|---|---|---|---|---|---|---|
| 11 | Dickeyville/ Dodgeville | US 61/ 151 | NB | (1) Abandon Dickeyville site<br>(2) Install two new mainline VWIM on US 151 NB in Grant County<br>*(3) Install one new VWIM on a bypass route in the future (WIS 11 EB) (Not included in Estimated Cost)*<br>*(4) Co-located Weight Validation Site and Rest Area (Not included in the Estimated Cost)*<br>[2021 or later] | $1.0 Million | $9.0 Million (to build new SWEF near Dodgeville after 2023) | $8.0 Million | $8908 per year saved in O&M costs after the site is abandoned and the VWIM is installed<br><br>Shift two Inspectors to mobile enforcement |
| 16 | Madison | I-39/90 | SB | No Planned Changes | | | | |
| 19 | Beloit | I-39/90 | NB | *(1) Install two new VWIM on a bypass route in the future (US 51 NB and WIS 140 NB) (Not included in Estimated Cost)* | | | | |
| 21 | Kenosha | I-41/94 | WB | (1) Upgrade mainline WIM<br>(2) Install E-Screening<br>*(3) Install three new VWIM on bypass routes in the future (US 45 NB, WIS 31 NB, and WIS 32 NB) (Not included in Estimated Cost)*<br>[2019-2020] | $1.5 Million | $1.5 Million | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 22 | Racine | I-41/94 | EB | (1) Reconstruct to modern standards at a new location<br>(2) Install mainline WIM and E-Screening<br>(3) Repurpose existing site for truck only parking<br>*(4) Install one new VWIM on a bypass route in the future (US 45 SB) (Not included in Estimated Cost)*<br>[2023 or later] | $16.0 Million | $10.5 Million (to build new SWEF with mainline WIM and PrePass) | -$5.5 Million (based on Kenosha installation costs and right of way needed this facility will likely cost more in the future than programmed) | |
| 34 | Wrightstown | I-41 | NB | (1) Repurpose as a weight validation site<br>(2) Install two new mainline VWIM on I-41 NB/SB<br>[2017-2018] | *Committed $1.5 Million* | $13.0 Million (to build temporary ramps 2017, install a VWIM in 2018, and reconstruct the SWEF in 2021) | $11.5 Million | $7336 per year saved in O&M costs after the site is repurposed and the VWIM is installed<br><br>Shift two Inspectors to mobile enforcement |
| 35 | Newton | I-43 | SB | No Planned Changes | | | | |
| 41 | Abrams | I-41 | NB/SB | No Planned Changes | | | | |
| 44 | Coloma | I-39 | NB/SB | No Planned Changes | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 53 | West Salem/ Sparta | I-90 | EB | (1) Reconstruct to modern standards on I-90 EB in Monroe County near Sparta, WI with training center<br>(2) Install mainline WIM and E-Screening<br>(3) Repurpose existing site for truck only parking<br>(4) Install one new VWIM on a bypass route (WIS 16)<br>[2016-2017] | *Committed $10.6 Million* | $10.6 Million (to remove old SWEF, install VWIM and reconstruct the SWEF in 2016-2017) | | |
| 61 | Hudson | I-94 | EB | (1) Reconstruct to modern standards at current site and co-locate with welcome center<br>(2) Upgrade mainline WIM and E-Screening<br>[2022 or later] | $16.0 Million | $16.0 Million (to build new SWEF and TIC facility in 2022 or later) | | |
| 63 | Menomonie | I-94 | WB | (1) Repurpose as a weight validation site, field office and salt storage area<br>(2) Install one new mainline VWIM on I-94 WB<br>*(3) Install one new VWIM on a bypass route in the future (WIS 29 WB) (Not included in Estimated Cost)*<br>[2019] | $1.5 Million | $1.5 Million (to install a VWIM and salt storage facility in 2019) | | $7002 per year saved in O&M costs after the site is repurposed and the VWIM is installed<br><br>Shift two Inspectors to mobile enforcement |
| 71 | Superior | US 2/53 | SB/NB | No Planned Changes- New facility open in February 2016 | | | | |
| | | | | Total Estimated Cost | $48.1 Million | $62.1 Million | $14.0 Million | |

Table E-5. VWIM Recommendations

| SWEF Number | Nearest SWEF Location | Highway | Traffic Direction | Recommended Strategies for Bypass Routes | Estimated Cost |
|---|---|---|---|---|---|
| 11 | Dickeyville | WIS 11 | EB | Install VWIM when existing site is repurposed. [2021 or later] | $0.5 Million |
| 19 | Beloit | US 51 | NB | Install VWIM after roadway projects are completed on US 51. [2021 or later] | $0.5 Million |
| 19 | Beloit | WIS 140 | NB | Install VWIM after roadway projects are completed on WIS 140. [2017 or later] | $0.5 Million |
| 21 | Kenosha | US 45 | NB | Install VWIM after roadway projects are completed on US 45. [2018 or later] | $0.5 Million |
| 21 | Kenosha | WIS 31 | NB | Install VWIM when mainline WIM and E-screening are installed at Kenosha SWEF. [2020 or later] | $0.5 Million |
| 21 | Kenosha | WIS 32 | NB | Install VWIM after roadway projects are completed on WIS 32. [2016 or later] | $0.5 Million |
| 22 | Racine | US 45 | SB | Install VWIM when existing SWEF site is repurposed. [2020 or later] | $0.5 Million |
| 63 | Menomonie | WIS 29 | WB | Install VWIM when existing SWEF site is repurposed. [2021 or later] | $0.5 Million |
| | | | | Total Estimated Cost | $4.0 Million |

| Region | Location | Highway | Traffic Direction | Recommended Strategies for Mainline Locations | Estimated Cost |
|---|---|---|---|---|---|
| NE | Green Bay, WI | WIS 29 | EB/WB | Install VWIM after roadway projects are completed on WIS 29. [2016 or later] | $1.0 Million |
| NW | Colby, WI | WIS 29 | EB/WB | Install VWIM after roadway projects are completed on WIS 29. [2017 or later] | $1.0 Million |
| NC | Between Wausau, WI and Stevens Point, WI | I-39 | NB/SB | Install VWIM when budget allows. [2016 or later] | $1.0 Million |
| | | | | Total Estimated Cost | $3.0 Million |

Based on recent research performed by the Iowa Department of transportation in 2015, VWIM cost approximately $500,000 per direction. (Source: Iowa Department of Transportation Virtual Weigh Station (VWS) Cost Summary, June 22, 2015).

Several recommendations are offered to make more efficient and more effective use of Wisconsin's fixed-site and VWIM enforcement facilities and staffing resources, including:

- Develop a “dashboard” for SWEF and VWIM activity monitoring (e.g., hours of operation, Inspector hours worked, vehicles weighed, vehicles exceeding legal weight limits, citations issued, out of service orders issued, MCSAP inspections conducted).
- Analyze available CMV traffic volume data (e.g., by time of day, day of week, month of year) upstream from SWEF sites to confirm scheduled hours of operation are optimal relative to trends in CMV traffic patterns.
- Reallocate Inspectors to other CMV field enforcement operations, where needed, following future closure/repurposing of SWEFs.
- Shift some annual or as-needed vehicle inspection duties (i.e., school buses, human service/ specialized transit vehicles, salvage title vehicles) to civilian personnel where operationally appropriate and staffing resources permit.
- Increase the operational value of VWIM technology by expanding the number of DSP troopers in high truck volume corridors and by storing portable scales in secure enclosures in WisDOT-owned truck pull-off sites.
- Continue to encourage local law enforcement agencies to remain active and proficient in CMV safety and weight enforcement in high truck volume corridors, where local resources and interest permit, thru DSP-led training and information sharing, and if appropriate, thru equipment sharing and joint operational deployments.

# 1 Introduction

The Roadside Facilities Needs Study is a three-part project to assess a diverse array of roadside facilities provided and maintained by WisDOT. Volume 1 of the project report provides an overall summary of the statewide roadside facilities and Volume 2 of the project report address needs and alternative strategies for the agency's statewide network of public rest areas and seasonal waysides.

This volume includes an assessment of the Department's commercial motor vehicle (CMV) safety and weight enforcement facilities and staffing resources and addresses needs and potential strategies for providing a statewide network of roadside motor carrier safety and weight enforcement sites. Volume Three is divided into four parts:

- Existing System – An overview of commercial motor vehicle (CMV) safety and weight laws, regulations and technologies, as well as Wisconsin's existing enforcement techniques and staffing.
- Needs Assessment – An assessment of Wisconsin's use and deployment of fixed-site roadside platform scales and in-pavement virtual weigh-in-motion sites, as well as related staffing needs.
- System Evaluation – A system-level evaluation Wisconsin's array of roadside facilities and staffing for determining compliance with CMV safety and weight laws and regulations.
- Strategies – Recommended strategies for improvements in the deployment of roadside facilities and related staffing resources.

Given Wisconsin's aging highway infrastructure, constraints on highway construction and maintenance resources at the state and local level relative to emerging needs, Wisconsin's extensive inventory of bridges and paved roads on the secondary highway system, and an expected increase in truck-borne freight in the coming decades, Wisconsin's highway users are well-served by WisDOT taking a fresh look at its CMV safety and weight enforcement facilities and related resources.

This report is not a detailed inventory or physical condition assessment of every SWEF building, platform scale deck/mechanism, utilities, pavement/sidewalks, or entrance/exit ramps. Separate efforts in that regard have been undertaken by the WisDOT Division of Transportation System Development (DTSD), Bureau of Highway Maintenance (BHM). Nor does this report include a detailed assessment of the data management system used by WisDOT to collect, store, integrate, and transmit safety and weight enforcement data collected during Wisconsin Division of State Patrol (DSP) field operations.

## Approach and Methodology

Safety and weight enforcement data analyzed in this task were provided by the Division of State Patrol. The DSP is responsible for statewide motor carrier safety and weight enforcement field operations. Additional insight and information was collected through interviews with DSP personnel and with CMV enforcement personnel in other states. Basic information about CMV safety and weight laws, regulations, and enforcement methodologies was derived from a scan of relevant North American governmental and academic literature.

## Purpose and Organization

Section 2 of this volume is an overview of the Department's existing approach to CMV safety and weight enforcement, including descriptions of the techniques employed to deter and detect violations and the allocation of CMV enforcement personnel.

Section 3 is an assessment of needs for the Department's two CMV enforcement facility types and its CMV enforcement personnel staffing.

Section 4 is a system-level evaluation of the Department's CMV enforcement facilities and related staffing.

Section 5 is a series of recommended strategic alternatives for roadside enforcement facilities and deployment of enforcement personnel.

Section 6 is a series of appendices with detailed information on several related issues, including:

- A – Summary of federal size and weight limits
- B – Summary of Wisconsin size and weight limits for Class A highways
- C – Peer State Comparisons – Iowa, Minnesota, and Wisconsin
- D – Descriptive summary of WisDOT's 13 existing SWEFs

# 2 Existing System

## 2.1 Overview of Commercial Motor Vehicle Safety and Weight Enforcement

Across the US, the on-highway operation of commercial motor vehicles (CMVs) is monitored by enforcement personnel in all states to ensure compliance with both federal and state-specific truck weight, size and safety regulations. These regulations have evolved over the past 100 years[2] in pursuit of two public policy goals:

- *To ensure public safety* thru equipment standards (brakes, tires, lights, load securement), carrier performance standards (operating authority, vehicle registration, corporate safety record), and driver fitness standards (licensure, physical/medical fitness, hours of service).
- *To protect public investment in highway infrastructure* (pavements, bridges, railroad crossings, tunnels) by limiting the weight and size (length, width, height) of CMVs

It is not practical for federal or state authorities to subject every CMV to a safety and weight inspection on every trip. However, every CMV on every trip on any public roadway in the US is legally subject to being stopped by authorized federal, state and other authorized public agency personnel to assess compliance with safety and weight regulations. Each state is responsible for designing and deploying an array of facilities, personnel and tactics to both detect and deter non-compliance with federal and state safety and weight regulations that best fits its unique system needs and resources.

### US Commercial Motor Vehicle Safety and Weight Regulations

Federal axle weight and gross vehicle weight (GVW) limits, as well as federal Bridge Formula weight limits, apply only on the Interstate highway system.[3] On public roadways off the Interstate system, only state-enacted weight limits apply. Several federal vehicle dimension limits (i.e., maximum length of combination vehicles, minimum trailer lengths, maximum width) apply to all 200,000 miles of roadway on the National Network of highways (i.e., all Interstate highways, plus highways certified by each state as adequately accommodating larger CMV's). *See Appendix A for more details.*

Federal weight limits for Interstate CMV operation have not changed appreciably since they were enacted in the mid-1950s, but there is growing interest in Congress and the trucking industry to create a higher maximum GVW limit for semi-tractor trailer combinations (e.g., allow higher GVW for six-axle configurations). This interest is being driven, in large part, by a desire for more efficient and more profitable CMV operations in the short run, while at the same time not accelerating the rate of pavement and bridge deterioration of the Nation's Interstate highway system. It is also being driven by concern

[2] *The first state-specific truck weight limits were enacted in 1913 by ME, MA, PA and WA.*

[3] *Some former state and US highways that have been re-designated as part of the Interstate highway system remain subject to state-defined weight limits under "grandfather" agreements*

for more efficiently accommodating a projected nearly 29 percent increase in truck freight volume nationwide by the year 2026.[4]

In the 1980s, the federal Motor Carrier Safety Assistance Program (MCSAP) was created, providing states with financial assistance to conduct more safety inspections of CMVs and their drivers, as well as motor carriers, to reduce the number and severity of CMV-involved crashes, fatalities, injuries, and hazardous material incidents. MCSAP funding is also intended to assist states increase CMV-related traffic enforcement, conduct motor carrier compliance reviews, improve CMV-related data systems, and expand public education and awareness efforts.

Also in the 1980s, a North American non-profit organization of state, provincial, local, and federal motor vehicle safety officials and motor carrier industry representatives was created, called the Commercial Vehicle Safety Alliance (CVSA). The organization's mission is to provide leadership to motor carrier safety enforcement agencies, the motor carrier industry, and policymakers by promoting uniformity, compatibility and reciprocity across jurisdictional lines for CMV inspection and enforcement activities. To this end, CVSA developed the North American Standard Inspection Program (SIP), as well as the North American Out-of-Service Order Criteria (OOSC). CVSA-specified training is now required for state and local motor carrier enforcement personnel to become certified – and to remain certified – in the various levels of the SIP. As a requirement to receive MCSAP funding, each state agrees to employ the SIP and OOSC.

In addition to MCSAP "Basic/Incentive" grant funds, MCSAP "High Priority" discretionary funding grant funding is also available to states. This is a competitive grant process based on the merits of their applications, to support special emphasis enforcement details (e.g., to focus additional/overtime enforcement resources in areas with high rates of CMV-involved crashes or on commodity-specific motor carrier operations suspected of high numbers of unsafe vehicles or drivers).

Each year, states submit to the Federal Highway Administration (FHWA) a Size/Weight Enforcement Plan and a certification of accomplishment of previously planned CMV safety and weight enforcement activities. Failure to do so, or failure to adequately enforce state laws related to maximum size/weight on federal-aid highways, will result in a 10% reduction of all federal-aid highway funds due to the state in the next federal fiscal year. In addition, the state must also meet a variety of federally-prescribed criteria to maintain eligibility for continued MCSAP basic grant funding, including certain data quality parameters and maintenance of effort in non-federally funded CMV enforcement operations.

## Safety and Weight Enforcement Methods

Every state is free to choose their statewide concept of operations for CMV safety and weight enforcement. Nearly every state employs a network of roadside facilities for safety/weight enforcement field operations, but the design, function, staffing, hours of operation, number, and location of these facilities varies considerably among and within states. Also, there is some variation among states in terms of criteria defining types of large non-commercial vehicles are required (under state law) to stop at roadside weight

[4] *"U.S. Freight Transportation Forecast to 2026", American Trucking Association (July 2015)*

enforcement facilities when open (e.g., minimum GVW, farm vehicles, trailers, motor homes, recreational vehicles). This makes it difficult to draw conclusive "apples-to-apples" comparisons between states or even between regions within states in terms of the level of effort and the effectiveness of their CMV enforcement activities.

Simply put, most states rely on a blend of two different CMV enforcement facility concepts of operations:

- Scales – Fixed-site roadside facilities that are equipped with a certified axle weight measurement device, usually a static platform scale, sometimes supplemented with vehicle pre-sorting technology such as weigh-in-motion sensors or electronic credential screening devices. When the facility is open for business, under state law, trucks above a certain GVW (or meeting other criteria) approaching the facility are required to exit the highway, approach the scale, and unless directed to return immediately to the mainline, stop as directed on the static scale mechanism for axle weight and GVW determination. Even if no vehicle weight violation is detected, the CMV driver can be directed to park the vehicle and submit to a credential review and possibly to a vehicle safety inspection.
- Mobile Operations – Sworn law enforcement personnel patrol the highways in vehicles equipped with portable certified axle weight measurement devices. In most states, CMV enforcement officers are authorized to intercept any CMV, even without reasonable articulable suspicion that a violation has occurred, and direct the CMV to an appropriate off-road location for axle weight and GVW determination, and possibly for a driver credential review and vehicle safety inspection.

In response to the USDOT imperative to protect the Interstate system infrastructure, states tend to focus greatest CMV enforcement attention on their Interstate highway corridors. In doing so, many states focus their enforcement presence near the state line on the inbound direction of Interstate highways, while some also choose to invest enforcement resources in mid-state corridors, far distant from the state line. Some states also choose to give high priority to protecting major non-Interstate highway corridors or highways serving regions with high numbers of year-round or seasonal heavy CMV loads (e.g., seaports, agricultural areas, mining or forest product extraction areas). Some states attempt to interdict nearly every inbound CMV at roadside facilities on major highways at or near the state line (i.e., the so-called "Port of Entry" model), either to enforce state-specific CMV credential regulations (e.g., proof of operating authority, insurance requirements, mandatory fuel purchases) or to protect high value state agricultural interests (e.g., livestock, fruit and vegetable crops) from invasive species or diseases.

In addition to each state's deployment of fixed-site scales and mobile operations, several technologies are also commonly deployed to augment their efficiency and effectiveness, including:

- Weigh-in-Motion (WIM) – These are permanent, in-pavement sensors usually designed to use the piezoelectric effect to estimate the dynamic weight of each axle

as the vehicle passes.[5] WIM sensors that meet ASTM Standard E1318-09 Type III criteria can be installed in one traffic lane or multiple traffic lanes of the mainline to capture weight readings at highway speed, or they can be installed in the entrance ramp of a roadside scale to capture weight estimates at low speed. The WIM installation can be augmented with a roadside camera to capture an image of each vehicle to visually identify suspected over-weight CMV's. When used at or in advance of a fixed-site scale, the dynamic weight readings of suspected overweight vehicles must be verified on the certified static scale before enforcement action can be taken[6].

- Virtual Weigh-in-Motion (VWIM) – When WIM are used in stand-alone installations (i.e., on the mainline, but not at or in advance of a fixed-site scale facility), suspected overweight vehicles are identified in real-time, with digital images of the vehicles and details of the suspected weight violations relayed to mobile enforcement personnel monitoring the location. The suspect vehicles are then intercepted by the officers and directed to roadside pull-off areas to verify the suspected overweight WIM readings using certified portable scales (or in some cases, directed to a nearby static platform scale). These installations are commonly referred to as "Virtual Weigh-in-Motion" (VWIM) sites or "Virtual Weigh Stations" (VWS).
- Electronic Screening (E-Screening) – There is a variety of vehicle identification and carrier credential screening systems in use in North America. E-Screening technology is most commonly deployed in combination with fixed-site roadside scales. A common E-Screening application involves an array of optical character recognition (OCR) devices, mounted roadside or overhead at or in advance of the scale; the OCR device isolates and "reads" the vehicle license plate number on the front of the CMV or the USDOT number on the side of the vehicle[7]; these numbers are then used for a real-time electronic data base query against state and federal motor carrier safety information data bases. Another increasingly common E-Screening application involves proprietary in-vehicle electronic communication devices (e.g., on-board transponders or cellular devices) that identify the vehicle and carrier to enable similar real-time queries against state and federal motor carrier safety data bases.
- Dimension Measurement – A variety of roadside or overhead-mounted sensors can be used to detect over-height, over-length, or over-width vehicles. These technologies can be installed at roadside weigh scales to check every vehicle, but these scale-based installations are relatively uncommon in the US. The more common application is an installation upstream from site-specific, vulnerable, limited-

[5] *Many variables can affect WIM sensor performance, durability and reliability, including type of installation (i.e., there are three types of piezoelectric sensors), pavement condition (e.g., slope, roughness), and environmental factors (e.g., temperature extremes).*

[6] *ASTM standards have been established for four WIM classes, differentiated by purpose of the weight estimate. Types I and II are for traffic mix data purposes only, and Type III is the only pre-enforcement screening WIM class used in the US. Type IV is a concept-only WIM class for direct enforcement applications (i.e. issuing citations for weight overloads based solely on WIM readings); if/when deployed, Type IV will only be used at weight enforcement scales to detect weight limit violations by vehicles moving at 2 to 10 mph.*

[7] *Many variables can affect the performance of license plate and USDOT number readers, such as salt film from snow/ice control and obscured/missing/misplaced license plates or USDOT numbers.*

dimension highway infrastructure (e.g., low overhead/narrow traffic lane tunnels, low clearance overpasses, narrow travel lanes in remote regions).

## CMV Safety and Weight Regulation and Enforcement in Wisconsin

Nearly four decades after the federal Motor Carrier Regulatory Reform and Modernization Act of 1980, which removed a host of anti-competitive entry and pricing controls, many operational elements of the motor carrier industry are still highly regulated at both the federal and state level. A complex, diverse array of Wisconsin laws and administrative rules still apply to CMV drivers and motor carriers, the precise details of which are beyond the scope of this report. These regulations vary depending on type of operation (e.g., interstate vs. intrastate, private operation vs. for-hire). Wisconsin has formally adopted the Federal Motor Carrier Safety Regulations (FMCSR) for CMV and motor coach operations in both interstate and intrastate commerce. In addition, under state law, a commercial driver's license (CDL) is required for anyone driving any of the following sizes or types of vehicles:

- Vehicles weighing more than 26,000 pounds (determined by registered weight, actual weight, or manufacturer's gross vehicle weight rating)
- Vehicles transporting hazardous material in a quantity requiring a placard under federal law
- Passenger vehicle designed or used to carry 16 or more persons (including the driver)

By state law, CMV drivers must have a copy of their operating credentials and present them upon request of law enforcement. These credentials include, but are not be limited to, vehicle registration, fuel tax license, driver license, medical card, proof of insurance (for-hire carriers), and special permits (e.g., oversize or overweight load trip permits).

As noted above, maximum vehicle weights on all Interstate system highways in the US are established in federal law. However, for non-Interstate highways, every state sets its own weight limits, often enacting a variety of weight limit exemptions or variances specific to the intrastate transport of certain commodities. For non-Interstate highways in Wisconsin, maximum weights are established by statute in Wis. Stats. 348.15(3). CMVs are restricted to a maximum overall GVW, which varies based on axle spacing, and are restricted as well as to maximum axle weights (i.e., 20,000-lbs for a single axle, and 34,000-lbs for tandem axle). Like many states, Wisconsin has enacted a variety of exceptions to state-specific weight limits for non-Interstate highways, which apply to certain vehicle types, commodities, or times of the year. Under state law, WisDOT, as well as counties and municipalities, have authority to place lower weight limits (either permanent or temporary) on bridges on highways under their jurisdiction to protect vulnerable infrastructure. In addition, CMVs are also subject to non-weight dimension limits under state law (i.e., height, length, width). *See Appendix B for more details on Wisconsin weight and other dimension limits.*

In Wisconsin, any state or local sworn law enforcement officer has legal authority to take enforcement action upon observing traffic law violations committed by CMV operators, as well as when detecting violations of driver licensing, vehicle registration, and vehicle equipment and size/configuration laws.

In Wisconsin, as in most states, MCSAP "Basic/Incentive" grant funding is used primarily to support roadside safety inspections of CMVs and their drivers. The most commonly performed MCSAP inspections are the first three SIP levels:

- *Level III* – Driver credentials only (license, medical certificate, record of duty status, vehicle inspection reports)
- *Level II* – All Level III elements, plus walk-around visual inspection of the vehicle (e.g., lights, tires, coupling devices, load securement, brake system warning devices, test of air loss rate, steering wheel lash)
- *Level I* – All Level II elements, plus physical inspection of steering axle and under-carriage inspection of all other axles, and check of brake adjustment

In addition to "Basic/Incentive" grant funds, in recent years, Wisconsin has also applied for and received MCSAP "High Priority" grant funds. This funding has been used to support special emphasis enforcement details in counties with high rates of CMV-involved crashes. In addition, with the recent rapid growth in mining of sand in west central and northwest Wisconsin for use in so-called "fracking" operations in oil-producing states, MCSAP incentive grant funding has also been used to support special emphasis enforcement details in counties with frac sand mining to insure the dramatic increase in related CMV operations is being conducted with safe vehicles by properly qualified drivers.

## 2.2 Existing Safety and Weight Enforcement Techniques

Pursuit of the dual goals of CMV safety/weight enforcement – *to protect public investment in infrastructure, and to ensure public safety* – is a daunting task considering there are about 112,000 miles of public roadway in Wisconsin, carrying nearly 60 billion vehicle miles of travel annually (or about 163,000,000 VMT per day). Over 11,750 miles of roadway comprise WisDOT's State Trunk Highway (STH) system (i.e., numbered Interstate, US and State highways). Of the 14,100 roadway bridges in Wisconsin, about 4,600 are on the STH system. Although the STH system represents less than 11% of all public roadway centerline mileage in Wisconsin, it carries about 61% of the total VMT.

The STH system includes 750 miles of Interstate highways, which are subject to federally-prescribed weight limits, with a few exceptions for segments that were added to the Interstate system in the past few decades but remain subject to previously-enforced state-specified weight limits (so-called "grandfather" limits).

USDOT's Freight Analysis Framework (FAF) integrates data from a variety of sources to provide a portrait of freight movement between states and major metropolitan areas by all modes of transportation – i.e., truck, rail, water, air, pipeline, and multiple modes. According to the third, and most recent, iteration of the FAF[8]:

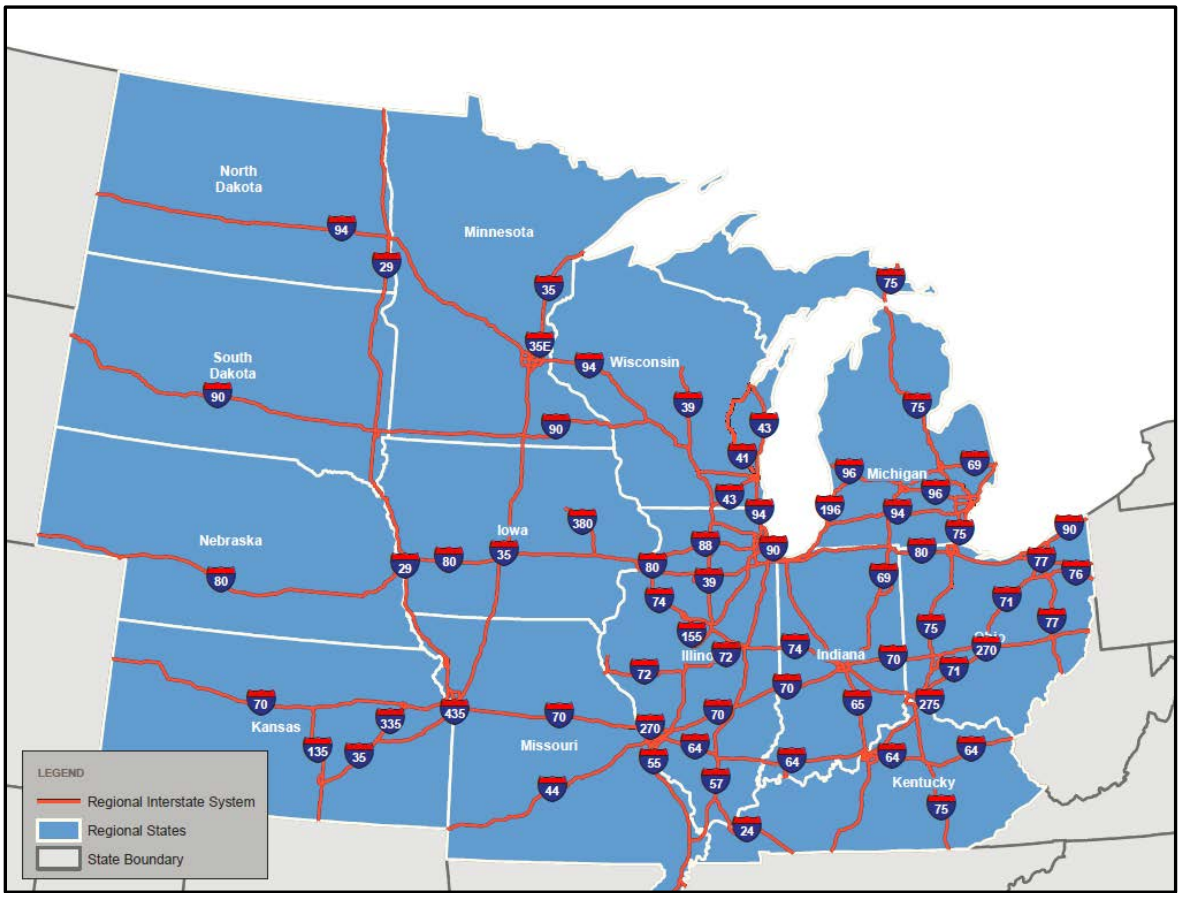
- The majority of freight moved to and from Wisconsin is borne by trucks.
- Freight trucks represent nearly one-third of all truck-related vehicle miles of travel (VMT) in the state.

[8] *State-specific profile tables from FAF version 3 are available at:* http://faf.ornl.gov/fafweb/FUT.aspx

- Between 2012 and 2040, freight ton-miles to Wisconsin are expected to grow by 44 percent and ton-miles from Wisconsin is expected to grow by 26 percent.

As shown in Figure 2-1, Wisconsin occupies a strategically important position in the Midwest regional network of Interstate highways, providing a link via I-90 and I-94 from the Chicago metro area to Minneapolis-St. Paul and to the Dakotas and beyond.

Figure 2-1. Midwest Interstate Highway Routes




## Fixed-Site Safety and Weight Enforcement Facilities in Wisconsin

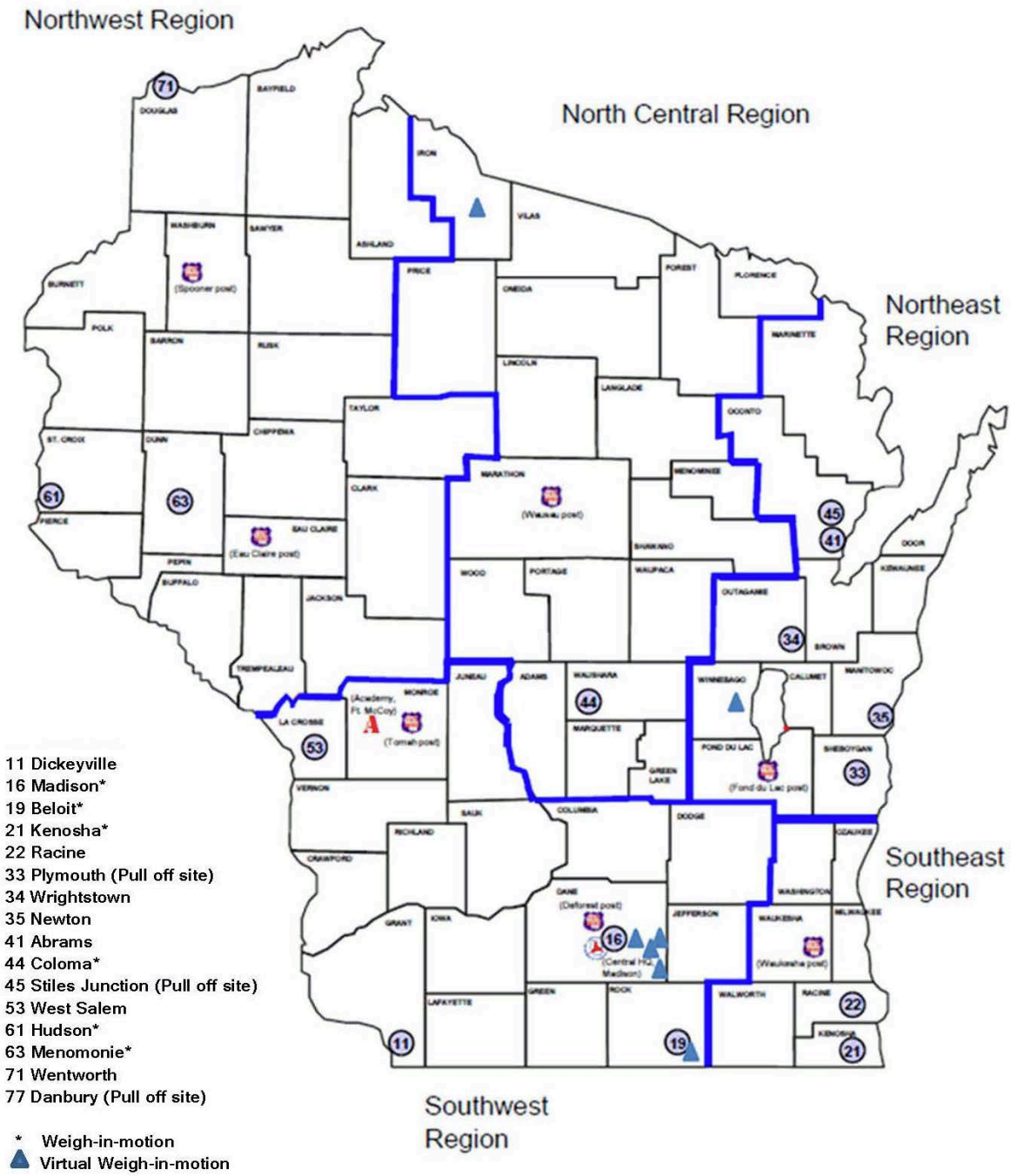
Permanent roadside facilities with static platform scales are commonly referred to in Wisconsin as Safety and Weight Enforcement Facilities (SWEF). They are staffed by Wisconsin State Patrol motor carrier enforcement Inspectors. About 60% of all DSP Inspectors are permanently assigned to SWEF operations.

When a SWEF is open for operations, all trucks over 10,000-lbs GVW are required to enter the facility, as directed by lighted signs facing approaching traffic.

The locations of WisDOT's 13 Safety and Weight Enforcement Facilities (SWEF) and three designated Pull-Off Sites are shown in Figure 2-2. Note that six of the SWEF's are also equipped with WIM technology (for pre-screening), plus there are seven VWIM sites in operation.

Ten of the existing 13 SWEF's are located on Interstate corridors. These 10 SWEF's can be divided into three concept of operations groupings based on traffic flow relative to the borders of the state (*"Outbound" defined as being within 30 minutes' drive time to the state line*), as shown in Table 2-1. In addition, there are two Virtual Weigh-in-Motion (VWIM) installations on Interstate facilities: (a) a "Mid-state" site on I-41 NB and SB near Oshkosh, and (b) an "Inbound" site on I-43 NB and SB near Beloit.

Figure 2-2. Wisconsin DOT SWEF's and Pull-Off Sites




Source: Wisconsin DOT (http://wisconsindot.gov/Documents/dmv/com-drv-vehs/mtr-car-trkr/mc-safety/swefmap.pdf)

Table 2-1. Existing Interstate SWEF Locations

| Traffic Flow | Site # | County | Name | Highway | Traffic Direction | WIM | E-Screening |
|---|---|---|---|---|---|---|---|
| Inbound | 19 | Rock | Beloit | I-39/90 | NB | Mainline/Ramp | Yes |
| | 21 | Kenosha | Kenosha | I-41/94 | WB | Ramp | |
| | 53 | La Crosse | West Salem | I-90 | EB | | |
| | 61 | St. Croix | Hudson | I-94 | EB | Mainline/Ramp | Yes |
| Mid-state | 16 | Dane | Madison | I-39/90 | SB | Mainline/Ramp | Yes |
| | 34 | Outagamie | Wrightstown | I-41 | NB | | |
| | 35 | Manitowoc | Newton | I-43 | NB | | |
| | 44 | Waushara | Coloma | I-39 | NB/SB | Ramp | |
| | 63 | Dunn | Menomonie | I-94 | WB | Ramp | Yes |
| Outbound | 22 | Racine | Racine | I-41/94 | EB | | |

Source: WisDOT Guide to Wisconsin Safety and Weight Enforcement Facilities

Location details for the three non-Interstate SWEF's, as well as the three Pull-Off sites and six VWIM sites, are provided in Table 2-2. All of the non-Interstate SWEF's monitor CMV traffic on divided highways, but each is positioned to accommodate CMV's approaching from either direction. Specifically, the Dickeyville SWEF is located on WIS 11/35 just east of the interchange with US 61/151, and DSP Inspectors working the scale are able to remotely operate lighted signs facing both directions of US 61/151 traffic to instruct trucks over 10,000-lbs GVW to exit and proceed to the SWEF when lit; and, the Abrams and Superior SWEF's are both located in the highway median and have entrance ramps (from the leftmost travel lanes) from both directions.

Table 2-2. Existing Non-Interstate SWEF Locations and Pull-Off Sites

| Type | Site # | County | Name | Highway | Traffic Direction | WIM |
|---|---|---|---|---|---|---|
| SWEF | 11 | Grant | Dickeyville | US 61/151<br>WIS 11/35 | NB<br>EB | |
| | 41 | Oconto | Abrams | US 41 | NB/SB | Ramp |
| | 71 | Douglas | Superior | US 2/53 | NB/SB | |
| Pull-Off Site | 33 | Sheboygan | Plymouth | WIS 57 | NB/SB | |
| | 45 | Oconto | Stiles Junction | US 41 | NB/SB | |
| | 77 | Burnett | Danbury | WIS 77 | EB/WB | |

Source: WisDOT Guide to Wisconsin Safety and Weight Enforcement Facilities

Table 2-3 provides facility age, available truck parking spaces, annual hours of operation (CY 2014), and weigh deck and load cell details for each SWEF and Pull-off Site.

Tables 2-4 and 2-5 provide average daily traffic, average daily truck traffic, and truck percentage, both current (2016) and projected (2040), respectively, for each existing

SWEF and Pull-off Site. Abrams, Coloma, Superior, Plymouth, Stiles Junction, and Danbury AADT is for both directions of traffic.

Table 2-3. SWEF and Pull-Off Site Details

| Site Number | Name | Year Opened | CMV Parking Spaces | Annual Hours Open (CY2014) | Weigh Decks | Load Cells |
|---|---|---|---|---|---|---|
| 11 | Dickeyville | 1981 | 10 | 732 | 1 | 4 |
| 16 | Madison | 2007 | 17 | 1,815 | 3 | 16 |
| 19 | Beloit | 2008 | 20 | 2,096 | 3 | 16 |
| 21 | Kenosha | 2003 | 24 | 2,128 | 3 | 14 |
| 22 | Racine | 1981 | 8 | 162 | 3 | 12 |
| 33 | Plymouth | 1990 | 0 | 0 | 0 | 0 |
| 34 | Wrightstown | 1991 | 5 | 1,047 | 1 | 1 |
| 35 | Newton | 1982 | 10 | 636 | 1 | 4 |
| 41 | Abrams | 1987 | 20 | 873 | 1 | 4 |
| 44 | Coloma | 1985 | 12 | 1,075 | 1 | 4 |
| 45 | Stiles | 2001 | 0 | 0 | 0 | 0 |
| 53 | West Salem | 1987 | 15 | 819 | 1 | 4 |
| 61 | Hudson | 1992 | 18 | 1,505 | 1 | 4 |
| 63 | Menomonie | 1985 | 10 | 1,256 | 3 | 3 |
| 71 | Superior | 1969 | 10 | 1,909 | 1 | 4 |
| 77 | Danbury | 2011 | 0 | 0 | 0 | 0 |

Source: WisDOT Guide to Wisconsin Safety and Weight Enforcement Facilities

Table 2-4. Existing (2016) Average Daily Traffic (ADT) Near SWEF's and Pull-Off Sites

| Site Number | Name | Highway/ Direction | Total ADT | Truck ADT | Trucks as Percentage of Total Traffic |
|---|---|---|---|---|---|
| 11 | Dickeyville | US 61/151 NB | 5,874 | 858 | 15% |
| 16 | Madison | I-39/90 SB | 28,710 | 8,039 | 28% |
| 19 | Beloit | I-39/90 NB | 26,115 | 7,626 | 29% |
| 21 | Kenosha | I-41/94 WB | 51,253 | 15,376 | 30% |
| 22 | Racine | I-41/94 EB | 49,845 | 15,003 | 30% |
| 33 | Plymouth | WIS 57 NB/SB | 13,320 | 1,359 | 10% |
| 34 | Wrightstown | I-41 NB | 25,935 | 3,735 | 14% |
| 35 | Newton | I-43 SB | 12,685 | 2,156 | 17% |
| 41 | Abrams | US 41 NB/SB | 28,500 | 4,161 | 15% |
| 44 | Coloma | I-39 NB/SB | 16,420 | 2,611 | 16% |
| 45 | Stiles Junction | Old US 41 SB | 11,710 | 1,686 | 14% |
| 53 | West Salem | I-90 EB | 13,030 | 2,528 | 19% |
| 61 | Hudson | I-94 EB | 25,495 | 7,037 | 28% |
| 63 | Menomonie | I-94 WB | 17,815 | 5,059 | 28% |
| 71 | Superior | US 2/53 NB/SB | 15,160 | 2,213 | 15% |
| 77 | Danbury | WIS 77 WB/EB | 1,980 | 224 | 11% |

Source: Wisconsin DOT, 2016 AADT Meta Manager

Table 2-5. Projected (2040) Average Daily Traffic (ADT) Near SWEF Locations and Pull-Off Sites

| Site Number | Name | Highway/ Direction | Total ADT | Truck ADT | Trucks as Percentage of Total Traffic |
|---|---|---|---|---|---|
| 11 | Dickeyville | US 61/151 NB | 7,127 | 1,040 | 15% |
| 16 | Madison | I-39/90 SB | 36,135 | 10,118 | 28% |
| 19 | Beloit | I-39/90 NB | 32,300 | 9,432 | 29% |
| 21 | Kenosha | I-41/94 WB | 65,980 | 19,794 | 30% |
| 22 | Racine | I-41/94 EB | 61,785 | 18,597 | 30% |
| 33 | Plymouth | WIS 57 NB/SB | 17,289 | 1,764 | 10% |
| 34 | Wrightstown | I-41 NB | 36,085 | 5,196 | 14% |
| 35 | Newton | I-43 SB | 15,890 | 2,701 | 17% |
| 41 | Abrams | US 41 NB/SB | 34,630 | 5,056 | 15% |
| 44 | Coloma | I-39 NB/SB | 21,030 | 3,344 | 16% |
| 45 | Stiles Junction | Old US 41 SB | 18,854 | 2,715 | 14% |
| 53 | West Salem | I-90 EB | 16,505 | 3,202 | 19% |
| 61 | Hudson | I-94 EB | 39,070 | 10,783 | 28% |
| 63 | Menomonie | I-94 WB | 22,495 | 6,389 | 28% |
| 71 | Superior | US 2/53 NB/SB | 18,340 | 2,678 | 15% |
| 77 | Danbury | WIS 77 WB/EB | 4,747 | 536 | 11% |

Source: WisDOT TAFIS AADT forecasts for 2040; WisDOT 2016 Meta Manager truck percentages

## Virtual Weigh-in-Motion Sites in Wisconsin

Seven VWIM sites – sometimes also called Virtual Weigh Stations (VWS) – have been installed by WisDOT to support DSP and local law enforcement agency efforts to deter and detect overweight, unsafe, or improperly credentialed CMV's on suspected SWEF bypass routes or to monitor commercial vehicles on intrastate mainline roads where a SWEF installation is not feasible economically or geographically. WisDOT's current array of seven VWIM sites is summarized in Table 2-6.

Table 2-6. VWIM Installation Details

| County | Location | Roadway | Travel Direction | Year Built | Function |
|---|---|---|---|---|---|
| Dane | Town of Pleasant Springs | County N | NB/SB | 2007 | Bypass |
| Dane | Town of Dunn | US 51 | SB | 2007 | Bypass |
| Dane | Town of Albion | WIS 73 | NB | 2014 | Bypass |
| Dane | Town Of Christiana | WIS 73 | SB | 2014 | Bypass |
| Iron | Hurley | US 2/53 | WB/EB | 2009 | Mainline |
| Rock | Town of Turtle | I-43 | NB | 2009 | Bypass |
| Winnebago | Oshkosh | I-41 | NB/SB | 2013 | Mainline |

Source: Wisconsin DOT Interactive SWEF Map & Information (http://dotnet/dtid_bho/pavement/swefmap.htm)

Ideally, a VWIM and a weight validation site are paired together to provide a safe location for the commercial vehicle to park and space for DSP staff to perform size/weight and safety inspections. Weight validation sites can be flat areas at SWEFs, pull off sites, rest areas, waysides, parking lots, or pavement areas adjacent to the roadway. Weigh-in-motion sensors and other remote monitoring technology deployed at a VWIM site allows, at minimum, the monitoring and screening of commercial vehicles by weight, plus a camera for image capture of the suspect vehicle.[9] Figure 2-3 shows the roadside hardware associated with the VWIM installation on WIS 73 in Dane County.

[9] *As noted in Section 2earlier, ASTM has defined a concept-only Type IV WIM class for direct enforcement to be deployed only if/when the technology and enforcement protocols have advanced to provide the accuracy and reliability in detecting/confirming weight overloads sufficient to issue citations without verification at static scales; and even then, Type IV WIM's will only be used to weigh vehicles moving at 2 to 10 mph, which means they will not be deployed in the mainline. Use of Type IV WIM's may also require enabling legislation at the state level to affirm their use in direct enforcement.*

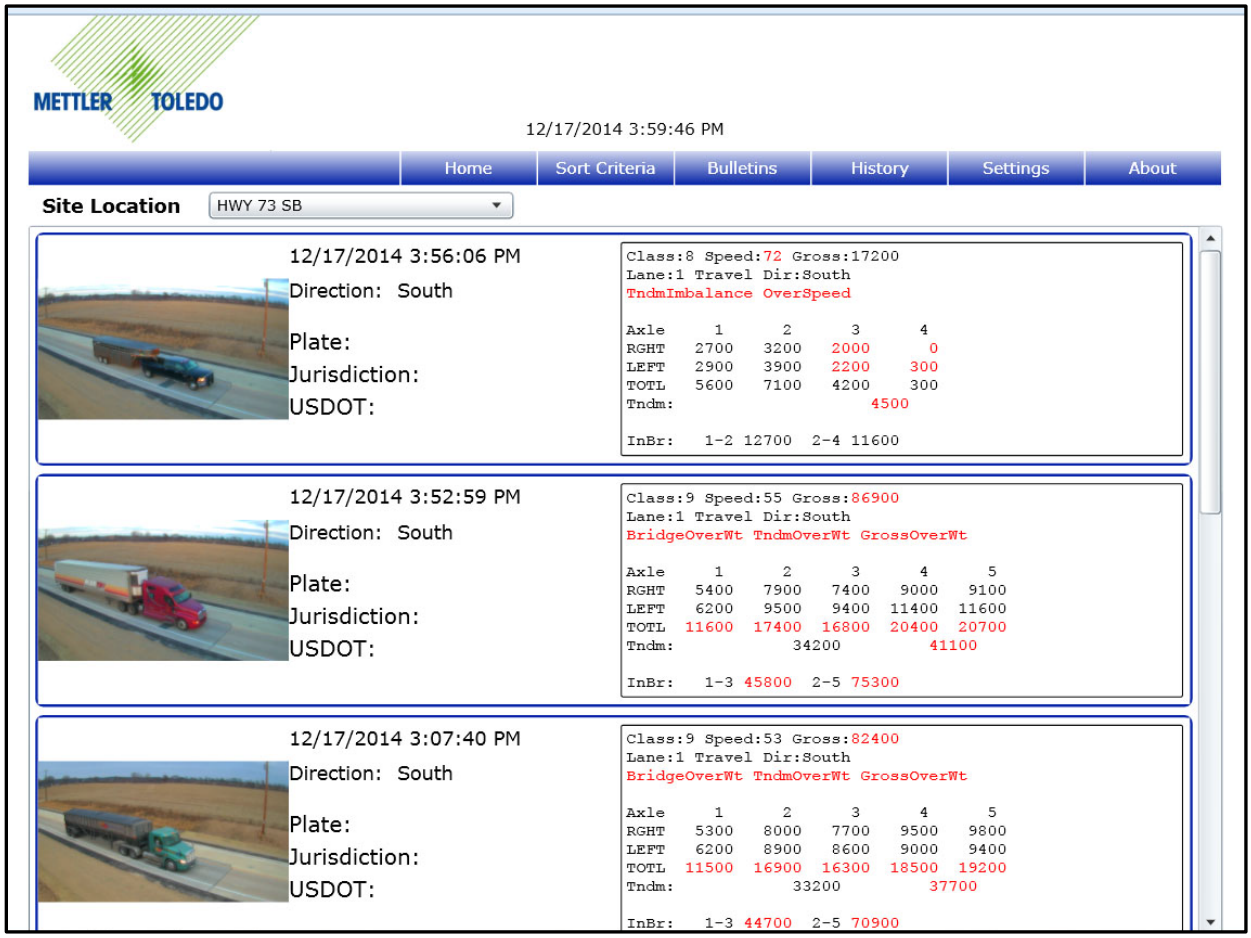
Figure 2-3. Town of Christiana/Dane County (WIS 73 SB) VWIM Installation

Source: Wisconsin DOT Stock Photo

Optional technology for a VWIM site includes optical character recognition (OCR) to "read" license plate and USDOT numbers, and sensors to determine vehicle speed and configuration; however, OCR technology is not currently deployed at any of WisDOT's VWIM sites. In certain applications, VWIM sites can be used to improve the effectiveness of commercial vehicle selection methods at downstream fixed-site scale facilities, by pre-screening CMV's to determine which ones should be signaled to enter the scale for weight validation or for more detailed credential screening. Data collected by a VWIM site can also be used to determine what days and times are best to monitor the roadway.

Currently, DSP Inspectors employ a manual enforcement process, in which they receive the data transmitted wirelessly from the VWIM, displayed on a laptop computer in their cruiser (*see Figure 2-4*), which enables identification of suspect vehicles prior to interception and inspection at a weight validation site or nearby SWEF.

Figure 2-4. VWIM Software Interface Used by DSP Inspectors to Screen Commercial Vehicles




Source: Wisconsin DOT

## Mobile CMV Enforcement Operations in Wisconsin

In addition to operations conducted at DSP's 13 fixed scale SWEF facilities, about 40% of all DSP Inspectors are permanently assigned to mobile operations. They carry sets of certified, Haenni® portable scales in their assigned vehicles (*see Figure 2-5*), which can be deployed in virtually any public area that has flat, safe, adequate space for safe truck access/egress (e.g., waysides, rest areas, park and ride lots). Three permanent roadside facilities without static platform scales, but designed for intermittent use by DSP Inspectors engaged in mobile operations (known as Pull-Off Sites), have been constructed around the state.

The mobile operations are conducted not only on suspected SWEF bypass routes, but also in high population counties and on selected high truck volume highway corridors. The accuracy of these portable scales is certified, which means citations for overweight violations may be issued based on the weights obtained by their use.

Figure 2-5. Portable Scales Used for Mobile Enforcement

Source: Wisconsin DOT Stock Photo

## Safety and Weight Enforcement in States Bordering Wisconsin

In addition to very active statewide mobile CMV safety and weight enforcement operations, three of the four states that border Wisconsin employ one or more fixed-site safety/weight enforcement facilities inbound from Wisconsin near their state line, as follows:

- Illinois – All CMV safety and weight enforcement on the 286-miles of the Illinois Tollway System (Chicago metro area to Rockford, IL) is conducted via mobile operations, but Illinois DOT intermittently operates three fixed-site enforcement scales on lower volume arterial highways near the IL-WI state line:
    - Rosecrans – US 41 SB in Lake County, approximately 1.8-miles south of the IL-WI state line (about 0.8-mile south of I-94 Tollway Exit 1B)
    - Harvard – US 14 in McHenry County, approximately 3-miles south of the IL-WI state line

- Richmond – US 12 in McHenry County, approximately 1,000- feet south of the IL-WI state line (*see Figure 2-6*)

Figure 2-6. Illinois DOT/Richmond Enforcement Scale (US 12, McHenry County)


Source: Google Earth

- Iowa – There is no enforcement scale on any major highway leading into Iowa from Wisconsin (i.e., US 18, US 20, US 151); the only Iowa DOT enforcement scale serving traffic likely to originate in Wisconsin is on I-80 WB in Jasper County (east of Des Moines, IA), approximately 190-miles from the IA-WI state line (at Dubuque).
- Michigan – Michigan DOT intermittently operates a fixed-site enforcement scale in the Upper Peninsula on US 41 at the junction with US 2 in Menominee County, approximately 42-miles inbound from the MI-WI state line. (*See Figure 2-7*)

Figure 2-7. Michigan DOT/Powers Enforcement Scale (US 2/41, Menominee County)


Source: Google Earth

- Minnesota – Minnesota DOT has a pull-off site for weight enforcement on I-90 WB. However, MNDOT does operate an enforcement scale Monday through Friday on I-94 WB in Washington County, east of Minneapolis-St. Paul, approximately 1-mile inbound from the MN-WI state line (*see Figure 2-8*), and also operates an

enforcement scale on US 2 at the junction with MN 33 in Saint Louis County (west of Duluth), approximately 20-miles inbound from the MN-WI state line.

Figure 2-8. Minnesota DOT/St. Croix Enforcement Scale (I-94, Washington County)


Source: Google Earth

Almost every state, including Wisconsin, has an array of WIM installations scattered across their state highway system for the primary purpose of collecting vehicle data (e.g., volume, speed, classification) to monitor system use for highway planning purposes. Some states, including several that border Wisconsin, have also invested in VWIM technology to deter and detect overweight/unsafe/improperly credentialed CMV's. For example, Minnesota has equipped 12 of their 17 data-collection WIM sites around the state with cameras and communication software to enable VWIM-based enforcement operations. In contrast, although Iowa has over 30 data-only WIM sites scattered across their state highway system collecting data for planning purposes, Iowa DOT has not yet invested in any VWIM technology for enforcement purposes.[10]

## 2.3 Existing Motor Carrier Enforcement Staffing

Currently, all DSP Inspector positions are assigned to either fixed-site SWEF operations (about 60% of Inspector positions) or to mobile operations (the remaining 40% of Inspector positions), as shown in Table 2-7. The work schedules of all Inspectors, regardless of SWEF or mobile operations assignment, are based on analyses of CMV crash data and traffic patterns, the net effect of which focuses their efforts primarily between 6 AM and 6 PM on weekdays. Over the course of a 4-week work schedule an inspector must work a minimum of 10 afternoon shifts, the start times of which vary between 10 AM and 3 PM. Work shifts outside these primary hours of expected coverage are assigned when justified by public complaints or availability of overtime funding.

[10] *Iowa DOT is planning to install VWIM technology (WIM sensors, cameras, OCR license plate readers, and e-screening) in the mainline upstream from two existing fixed-site scale facilities on I-80 near Des Moines.*

Table 2-7. DSP Inspector Assignments (as of August 2015)

| DSP Region | Assignment | Number of Authorized Positions |
|---|---|---|
| North Central (Wausau) | *Mobile* | 7 Inspectors (Marathon, Oneida, Portage, Price, Waupaca, Wood Counties) |
| | SWEF 44 (Coloma) | 4 Inspectors + 1 Sergeant[11] |
| Northeast (Fond du Lac) | *Mobile* | 9 Inspectors (Brown, Fond du Lac, Outagamie, Sheboygan, Winnebago Counties) |
| | SWEF 34 (Wrightstown) | 3 Inspectors + 0.5 Sergeant |
| | SWEF 35 (Newton) | 1 Inspectors + 1 Sergeant |
| | SWEF 41 (Abrams) | 3 Inspectors + 0.5 Sergeant |
| Northwest (Eau Claire) | *Mobile* | 7 Inspectors (Ashland, Barron, Buffalo, Chippewa, Eau Claire, Polk, Sawyer Counties) |
| | SWEF 61 (Hudson) | 4 Inspectors + 0.5 Sergeant |
| | SWEF 63 (Menomonie) | 3 Inspectors + 0.5 Sergeant |
| | SWEF 71 (Superior) | 6 Inspectors + 1 Sergeant |
| Southeast (Waukesha) | *Mobile* | 4 Inspectors (Kenosha, Milwaukee, Waukesha Counties) |
| | SWEF 21 (Kenosha) | 8 Inspectors + 1 Sergeant |
| | SWEF 22 (Racine) | 4 Inspectors + 1 Sergeant |
| Southwest (DeForest) | *Mobile* | 7 Inspectors (Columbia, Dane, Dodge, Monroe, Rock, Sauk, Vernon Counties) |
| | SWEF 11 (Dickeyville) | 2 Inspectors + 0.5 Sergeant |
| | SWEF 16 (Madison) | 8 Inspectors + 1 Sergeant |
| | SWEF 19 (Beloit) | 8 Inspectors + 1 Sergeant |
| | SWEF 53 (West Salem) | 4 Inspectors + 0.5 Sergeant |
| Motor Carrier Investigation Unit | *10 Multi-County Area Assignments* | 2 Inspectors + 8 Motor Carrier Investigators (non-sworn) + 1 Sergeant |
| **STATEWIDE TOTALS** | Inspectors | 92 |
| | Civilian Motor Carrier Investigators | 9 |
| | Sergeants (Supervisors) | 11 |
| | Command Staff (Madison/Hill Farms) | 1 Captain + 2 Lieutenants |

Source: Wisconsin DOT, Division of State Patrol (DSP) memorandum

[11] *DSP Motor Carrier Sergeants serve primarily a supervisory function, but also occasionally perform field enforcement duties alongside the Inspectors that they supervise.*

# 3 Needs Assessment

## 3.1 Safety and Weight Enforcement Facilities

Six of the WisDOT SWEF's are scheduled for significant changes within the next decade. A summary of planned changes is shown in Table 3-1.

Table 3-1. Planned Changes to Existing SWEF's

| Site Number | County | Name | Highway | Traffic Direction | Planned Change [*Year Scheduled*] |
|---|---|---|---|---|---|
| 11 | Grant | Dickeyville / Dodgeville | US 61/151 | NB | Replace with new SWEF on US 18/151 NB in Iowa County; repurpose existing site [*2023 or later*] |
| 21 | Kenosha | Kenosha | I-41/94 | WB | Upgrade existing mainline WIM & E-Screening [*2023 or later*] |
| 22 | Racine | Racine | I-41/94 | EB | Reconstruct; upgrade existing mainline WIM & E-Screening [*2023 or later*] |
| 34 | Outagamie | Wrightstown | I-41 | NB | Construct temporary ramps; VWIM Installation; Reconstruct SWEF [*2017, 2018, 2021*] |
| 53 | La Crosse | West Salem / Sparta | I-90 | EB | Replace with new SWEF on I-90 EB in Monroe County; repurpose existing site [*2016-2017*] |
| 61 | St. Croix | Hudson | I-94 | EB | Reconstruct; upgrade existing mainline WIM & E-Screening [*2022 or later*] |
| 63 | Dunn | Menomonie | I-94 | WB | Remove platform scale; install mainline VWIM [*2019*] |

Source: Wisconsin DOT Roadside Facilities 10-Year Program, FY 2016-2025 (10/29/2015)

## 3.2 Virtual Weigh-in-Motion Sites

Virtual Weigh in Motion (VWIM) installations – sometimes called Virtual Weight Stations (VWS) – are used to address the problem of commercial vehicles bypassing fixed weigh stations or used to enforce commercial vehicle laws in space limited areas where fixed weigh stations may be too large and costly to install. DSP staff recently identified suspected scale bypass routes used by CMV drivers to avoid each SWEF location, as shown in Table 3-2.

## Table 3-2. Suspected Bypass Routes

| SWEF Location | | | Region | Potential Bypass Route | Present Truck AADT | Present % Trucks | VWIM Present | Neighboring State Enforcement Present | WIM Present at SWEF | E-Screening Present at SWEF |
|---|---|---|---|---|---|---|---|---|---|---|
| 11 | Dickeyville | US 61/151 NB/SB | SW | WIS 11 EB | 339 | 14.6 | No | No | No | No |
| | | | | WIS 35 NB | 183 | 14.6 | No | No | No | No |
| 16 | Madison | I-39/90 SB | SW | US 51 NB | 648 | 10.2 | Yes | N/A | Yes | Yes |
| | | | | WIS 73 NB/SB | 341 | 11.3 | Yes | N/A | Yes | Yes |
| | | | | County N NB/SB | 275 | 6.4 | Yes | N/A | Yes | Yes |
| 19 | Beloit | I-39/90 NB | SW | I-43 NB | 1434 | 18.6 | Yes | IL Tollway ME (I-90 NB & SB) | Yes | Yes |
| | | | | US 51 NB | 573 | 10.2 | No | | Yes | Yes |
| | | | | WIS 140 NB | 235 | 11.3 | No | | Yes | Yes |
| 21 | Kenosha | I-41/94 WB | SE | US 45 NB | 553 | 11.3 | No | IL Tollway ME (I-94 NB & SB); US 41 NB & SB near IL 173 | Yes | No |
| | | | | US 31 NB | 789 | 10.2 | No | | Yes | No |
| | | | | US 32 WB | 575 | 10.2 | No | | Yes | No |
| | | | | WIS 83 NB | 437 | 10.2 | No | | Yes | No |
| | | | | County H NB | 235 | 10.2 | No | | Yes | No |
| | | | | County U NB | 97 | 10.2 | No | | Yes | No |
| 22 | Racine | I-41/94 EB | SE | US 45/WIS 20 SB | 637 | 14.6 | No | N/A | No | No |
| | | | | County V & K SB | 1467 | 32.6 | No | N/A | No | No |
| 34 | Wrightstown | I-41 NB | NE | WIS 47 NB | 578 | 14.6 | No | N/A | No | No |
| | | | | WIS 55 NB | 225 | 11.3 | No | N/A | No | No |
| | | | | County J NB | 45 | 11.3 | No | N/A | No | No |
| | | | | County N NB | 170 | 11.3 | No | N/A | No | No |
| | | | | County S EB | 187 | 11.3 | No | N/A | No | No |
| 35 | Newton | I-43 SB | NE | US 151 WB | 702 | 10.2 | No | N/A | No | No |
| | | | | WIS 42 EB/WB | 421 | 17.7 | No | N/A | No | No |
| | | | | County C EB/WB | 173 | 10.2 | No | N/A | No | No |
| | | | | County X EB/WB | 47 | 10.2 | No | N/A | No | No |
| 41 | Abrams | US 41 NB/SB | NE | WIS 32 EB/WB | 501 | 11.3 | No | N/A | Yes | No |
| | | | | County J NB/SB | 332 | 10.2 | No | N/A | Yes | No |
| | | | | Cross Road NB/SB | 510 | 10.2 | No | N/A | Yes | No |
| 44 | Coloma | I-39 NB/SB | NC | | | | No | N/A | Yes | No |
| 53 | West Salem (Sparta) | I-90 EB | SW | WIS 16 EB | 804 | 10.2 | No | Winona, MN US 61 NB/SB | No | No |
| 61 | Hudson | I-94 EB | NW | US 10 EB/WB | 495 | 11.3 | No | St. Croix, MN I-94 W | Yes | Yes |
| | | | | US 12 EB | 160 | 11.3 | No | St. Croix, MN I-94 W | Yes | Yes |
| | | | | WIS 35 SB | 250 | 2.6 | No | St. Croix, MN I-94 W | Yes | Yes |
| 63 | Menomonie | I-94 WB | NW | US 10 EB/WB | 495 | 11.3 | No | St. Croix, MN I-94 W | Yes | Yes |
| | | | | WIS 29 WB | 335 | 11.3 | No | St. Croix, MN I-94 W | Yes | Yes |
| 71 | Superior | US 2/53 NB/SB | NW | WIS 13 NB/SB | 202 | 11.5 | No | Saginaw, MN US 2 & MN 33 | Yes | Yes |
| | | | | County E NB/SB | 86 | 11.3 | No | Saginaw, MN US 2 & MN 33 | Yes | Yes |

Sources: Wisconsin DOT 2016 AADT Meta Manager; Wisconsin DOT Guide to Wisconsin Safety and Weight Enforcement Facilities

In addition to scale bypass routes, there are several points of entry and intrastate roadways that have been identified by DSP and DTSD staff as locations where VWIM would likely be beneficial for enforcement of commercial vehicle laws (*see Table 3-3*). These points of entry are not Interstate highway corridors, but they do have more than 10% truck traffic, and most also have relatively high truck AADT.

Table 3-3. Potential Additional Mainline VWIM Locations

| Location | | Region | Existing Truck AADT | Percent Trucks |
|---|---|---|---|---|
| ***Points of Entry*** | | | | |
| Monroe/Green County (IL Border) | WIS 69 NB | SW | 351 | 10.2 |
| Hager City/Pierce County (MN Border) | US 63 EB | NW | 920 | 14.6 |
| Nelson /Buffalo County (MN Border) | WIS 25 EB | NW | 398 | 14.6 |
| Houlton/St. Croix County (MN Border) ***Planned VWIM*** | WIS 64 EB | NW | 2308 | 10.2 |
| Bluff Siding/Trempealeau County (MN Border) | WIS 54 EB | NW | 672 | 11.3 |
| Danbury/Burnett County (MN Border) ***Existing Pull Off Site*** | WIS 77 EB | NW | 112 | 11.3 |
| ***Intrastate Roadways*** | | | | |
| Wrightstown/Outagamie County (East of WIS 47) | I-41 NB | NE | 4625 | 14.4 |
| Wrightstown/Brown County (North of County S) | I-41 SB | NE | 3796 | 14.4 |
| Green Bay/Brown County (East of WIS 32) | WIS 29 EB/WB | NE | 2617 | 10.2 |
| Plymouth/Sheboygan County ***Existing Pull Off Site*** | WIS 57 NB/SB | NE | 1359 | 10.2 |
| Stiles Junction/Oconto County ***Existing Pull Off Site*** | US 141 NB/SB | NE | 1686 | 14.4 |
| Colby/Clark County (West of WIS 13) | WIS 29 EB/WB | NC | 2475 | 19.1 |
| Knowlton/Marathon County (Between Wausau and Stevens Point) | I-39 NB/SB | NC | 4233 | 15.9 |

Source: Wisconsin DOT 2016 AADT Meta Manager

## 3.3 Staffing Needs

The Wisconsin Division of State Patrol currently has 92 Inspector positions allocated for motor carrier enforcement that actively inspect commercial vehicles at SWEF's and in mobile operations on roadways. Each DSP region is allocated Inspectors for those specific roles, as shown in Table 3-4. The efforts of these Inspectors are supplemented by eight civilian Motor Carrier Investigators, 11 supervisory Sergeants, four motor carrier command staff, and 40 MCSAP-certified local law enforcement personnel, as well as 399 State Patrol troopers.

The number of Inspectors assigned to an individual SWEF reflects not only the volume of truck traffic flowing past the facility, but also the interior and exterior space limitations of the facility itself, e.g., the amount of indoor counter space for conducting driver interviews, number of truck parking spaces, entrance ramp length, number of weight decks, and number of enclosed inspection bays (*some of these details were shown in Table 2.3*). The smaller SWEF's (Coloma, Newton, Abrams, Racine, Dickeyville, Wrightstown, Hudson, West Salem, and Menomonie) can only accommodate up to three Inspectors, while the larger SWEF's (Beloit, Madison, Kenosha, and Superior) can accommodate up to six Inspectors.

Table 3-4. Regional DSP Motor Carrier Enforcement Section Personnel Allocation

| Region | Mobile Inspection Staff | SWEF Inspection Staff |
|---|---|---|
| North Central | 7 | 4 |
| Northeast | 9 | 7 |
| Northwest | 7 | 13 |
| Southeast | 4 | 12 |
| Southwest | 7 | 22 |
| **TOTAL** | **34** | **58** |

Source: Wisconsin DOT, Division of State Patrol staff numbers

Although Table 3-4 shows the distribution of authorized positions, at present 16 inspector positions (out of the 92) are vacant due to personnel departures since the most recent DSP Academy class graduated in December 2014. The most common reasons cited by motor carrier command staff for Inspector departures have been retirement, promotion, or resignation (e.g., to take more lucrative positions with local law enforcement agencies or with the FMCSA as federal motor carrier investigators). Normally, a limited number of inspector positions (typically fewer than five) are expected to be filled each year from the DSP Academy class. There is a need to fill all authorized Inspector positions as soon as possible to meet CMV enforcement duty demands.

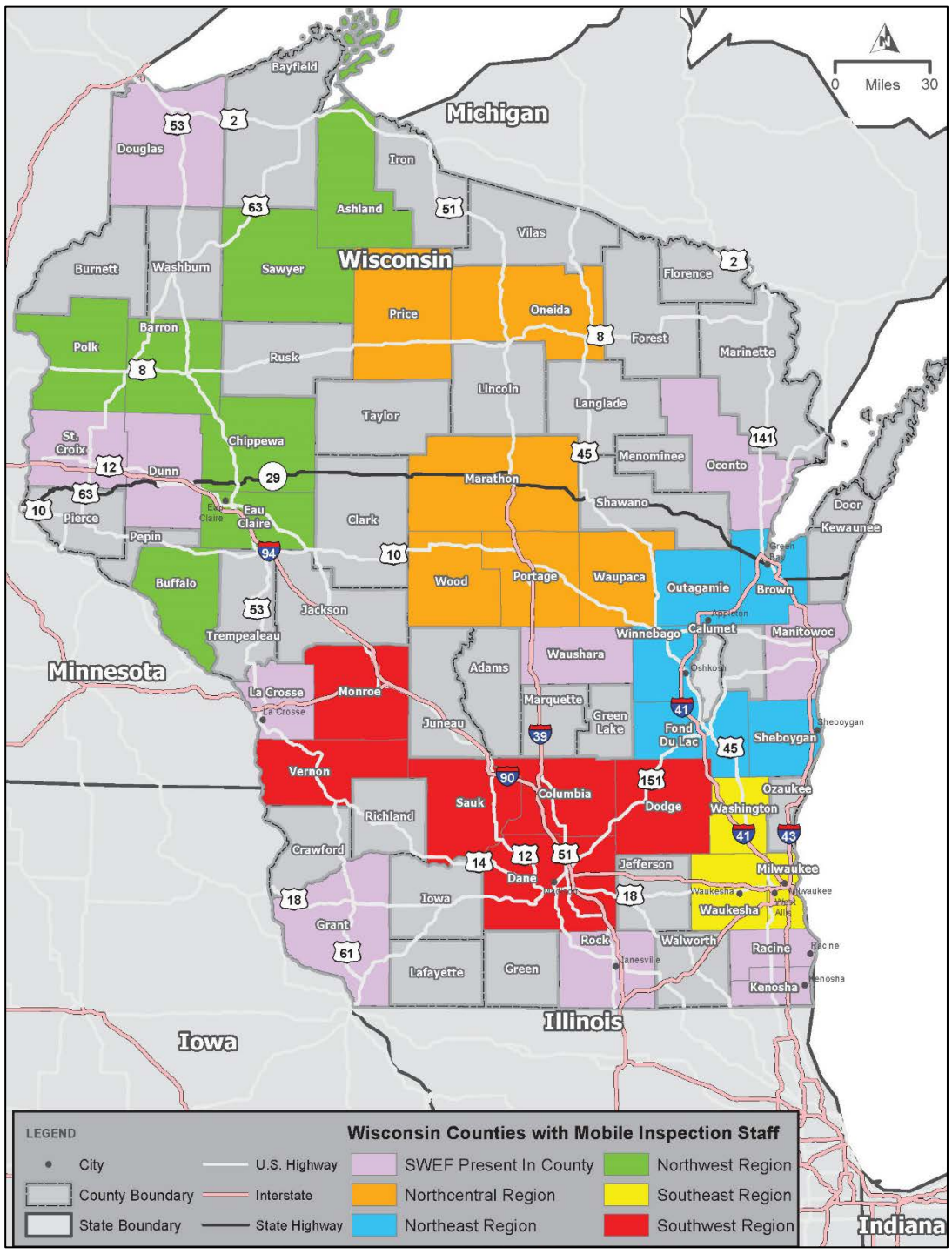
The assignment of Inspectors to mobile enforcement operations in each region reflects not only the number of commercial vehicles operating in certain counties, but also the demand for other annually-required specialized vehicle inspection services, such as school buses, motor coaches, and human service/specialized transit vehicles, as well as salvage vehicle inspections (as a prerequisite to titling). Currently, Inspectors are assigned to mobile enforcement in 38 counties, as shown in Figure 3-1.

The majority of counties with Interstate highway corridors are covered by mobile inspection staff, with some exceptions, including:

- Ozaukee County (I-43, Southeast Region)
- Walworth County (I-43, Southeast Region)
- Jefferson County (I-94, Southwest Region)
- Juneau County (I-94, Southwest Region)

- Jackson County (I-94, Northwest Region).

Figure 3-1. Wisconsin Counties with State Patrol Mobile Inspection Staff




Source: Division of State Patrol

Several Jackson County roadways (I-94, WIS 95, WIS 54, and WIS 27) have been identified as routes that merit a greater enforcement presence. Also counties in the North Central and Northwest regions are currently understaffed due to growing truck

volume generators, such as timber production, frac sand mines and processing plants, ethanol plants, grain terminals, and large-scale dairy farms.

In the opinion of Motor Carrier Enforcement command staff, several key points of entry from Minnesota to Wisconsin merit a greater enforcement presence by mobile inspection staff. Border crossings of interest include:

- US 10 crossing at Prescott (Pierce County)
- US 63 crossing at Hager City (Pierce County)
- WIS 25 crossing at Nelson (Buffalo County)
- WIS 54 crossing at Bluff Siding (Trempealeau County)
- WIS 64 crossing at Houlton (St. Croix County)

It should be noted that at least twice in recent State biennial budget cycles DSP has requested authorization for 26 additional Inspector positions, but each time the request was denied. Additional Inspector positions, if approved, would be used to expand mobile enforcement operations to certain counties not currently assigned an Inspector, patrolling key points of entry from MN and IL, and staffing several currently space-limited SWEF's (i.e., West Salem, Hudson, Wrightstown, Racine) that are planned for expansion/ reconstruction within the next 5-10 years and will be able to accommodate additional on-site Inspectors. DSP has no plans to reduce the number of authorized Inspector positions.

# 4 System Evaluation

## 4.1 Fixed-Site Safety and Weight Enforcement Facilities

WisDOT's 13 Safety and Weight Enforcement Facilities (SWEF) were evaluated to identify candidates that should be considered for reconstruction, rehabilitation, relocation, or closure/re-purposing. The evaluation was based on a methodology developed specifically for WisDOT, which used information about each individual SWEF across ten different attributes. An overall prioritization score was calculated for each facility. These overall scores were based on the individual criterion scores for each SWEF and the relative weights that applied to each criterion. Different criteria weighting schemes can produce different scores, which can change the perceived importance/value of each SWEF.

### SWEF Evaluation Criteria

Evaluation criteria were developed using data provided by DSP, DTSD, and FHWA to identify WisDOT's most critically important SWEF installations. Ten criteria were used in the analysis. All data sets were averaged over three years (2012 thru 2014) to provide an average annual value for inclusion in the analysis. The criteria, data sources and descriptions are described in Table 4-1.

Table 4-1. SWEF Evaluation Criteria

| |
|---|
| **(1) Trucks Weighed (Annual)**<br>***Data Source:*** WisDOT Motor Carrier Safety Trends at SWEF FFY 2012-2014; Annual Three Year Average (2012, 2014, 2014)<br>***Description:*** Number of trucks weighed at the facility per year. Larger counts receive higher scores in the analysis. |
| **(2) Existing Truck Volume (AADTT)**<br>***Data Source:*** WisDOT AADT Meta Manager 2016; GIS Shapefiles containing planning AADTT numbers<br>***Description:*** Existing truck volume near or approaching the facility. High existing truck volumes receive higher scores in the analysis. |
| **(3) Future Truck Volumes (AADTT)**<br>***Data Source:*** *WisDOT TAFIS 2040 AADT;* WisDOT AADT Meta Manager 2016 GIS Shapefiles containing planning AADTT percentage numbers<br>***Description:*** Freight volumes were calculated by applying the WisDOT Meta Manager truck percentages to TAFIS 2040 AADT. High future truck volumes receive higher scores in the analysis. |
| **(4) Cost to Enhance ($)**<br>***Data Source:*** WisDOT Roadside Facilities 10-Year Program, FY 2016-2025<br>***Description:*** Costs to rebuild and/or add enhancements to the current facility. Greater costs receive lower scores in the analysis. |

**(5) Annual Operation Costs ($)**
***Data Source:*** State Patrol SWEF Annual Reports FFY 2012, 2013, and 2014; Annual Three Year Average (2012, 2014, 2014)
***Description:*** Annual costs to operate and maintain the current facility. Greater operating costs receive lower scores in the analysis.

**(6) Overweight Trucks Per Day (Annual)**
***Data Source:*** WisDOT AADT Meta Manager 2016 (5% of AADTT); Annual Three Year Average (2012, 2014, 2014)
***Description:*** Potential overweight trucks per day. Based on a conservative estimate that 5% of trucks traveling on Wisconsin roadways are overweight.[12] Locations that have a larger number of potential overweight trucks receive higher scores in the analysis.

**(7) Enforcement Actions Per Inspection (Annual)**
***Data Source:*** WisDOT Motor Carrier Safety Trends at SWEF FFY 2012-2014; Annual Three Year Average (2012, 2014, 2014)
***Description:*** The average number of enforcement actions (citations and warnings) that are issued per inspection for each year. Locations that perform a larger number of enforcement actions per inspection receive higher scores in the analysis.
***Note:*** *Inspection totals do not include post-crash inspections.*

**(8) Visibility (Rating)**
***Data Source:*** Google Maps to verify SWEF location and layouts
***Description:*** Rated (Good, Fair, and Poor) based on: (a) easy access to the facility for truck drivers; (b) safe inspection area for enforcement personnel, and (c) the location is a deterrent for trucks to violate laws.

**(9) Highway Type (Class)**
***Data Source:*** Google Maps to verify roadway classification and location
***Description:*** The current geographical location of the facility: (a) SWEFs that are near ports of entry (inbound) from other states receive a higher score in the analysis; (b) Roadways classified as Interstates receive a higher score than US Highways and State roads in the analysis.
*Upper Tier: Inbound Interstate and Inbound Non-Interstate*
*Middle Tier: Mid-State Interstate and Mid-State Non-Interstate*
*Lower Tier: Outbound Interstate and Outbound Non-Interstate*

**(10) Facility Condition (Rating)**
***Data Source:*** Rating system developed by recent assessment of SWEF facility conditions (to be published in early 2016)
***Description:*** Rating is based on the overall rated condition of the building and scale (1 = Very Good and 4= Poor). Lower numbers (indicating a better condition) receive a higher score in the analysis.

## SWEF Evaluation Methodology

The ten SWEF criteria were evaluated using a point system that sorted each criterion into three tiers (Upper, Middle, and Lower). Each tier was assigned a data range for each criterion. The data ranges were determined from a review of the source data. In the example shown below, the highest Existing Truck AADT among all the SWEF locations was 12,000 vehicles per day, so that number established the highest value in the Upper tier. The following tables represent actual portions of the methodology tool.

| | Upper Tier | | Middle Tier | | Lower Tier | |
|---|---|---|---|---|---|---|
| Existing Truck AADT | 15,376 | 8001 | 8000 | 2001 | 2000 | 0 |

A weighting factor was assigned to each criterion based on input from DSP and DTSD. This factor was used to determine the minimum and maximum point value for the

[12] *CY2014 data for the VWIM site on I-41 NB near Oshkosh indicated 5.2% of single-unit trucks and 7.4% of multi-unit trucks may have been illegally overweight, for a composite estimate that 7.2% of all single- and multi-unit trucks may have been overweight at that location.*

criterion. Changing the weighting factor affects the minimum/maximum tier point value for each criterion.

| | Upper Tier | | Middle Tier | | Lower Tier | | Weight Factor |
|---|---|---|---|---|---|---|---|
| Existing Truck AADT | 15,376 | 8001 | 8000 | 2001 | 2000 | 0 | |
| Max/Min Score | 15 | 10.5 | 10.35 | 4.65 | 4.5 | 0 | 15 |

All criteria scores were combined to determine the overall priority of the SWEF locations. The sum of the weighting factors for all criteria equaled 100, so that the overall priority score (a value between 0 and 100) could be used to compare SWEF's to each other in the analysis results.

| Overall Priority | |
|---|---|
| 100 to 70 | High |
| 69 to 50 | Medium |
| 49 to 40 | Low |

## SWEF Site Analysis

Two SWEF site analysis scenarios were evaluated to represent an Unconstrained and Constrained prioritization, based on different criteria weighting.

### A. Unconstrained Prioritization

In the Unconstrained scenario, criteria were evaluated as if there was no SWEF installation at the current location. All locations would be potential new facilities, with no operating cost, staffing or maintenance history. Only three criteria were used to evaluate hypothetically brand new SWEF installations, including: Existing Truck AADT, Future Truck AADT, and Highway Type (Class).

Table 4-2 shows the prioritization results from applying the Unconstrained scenario weighting factors.

Table 4-3 shows the criteria weighting factors used for the Unconstrained scenario. (The higher the Overall Priority rating, the more important the location would be, with a rating of 70 or higher required to be in the "High" priority category and a rating less than 50 required to be in the 'Low" priority category.)

Table 4-2. Unconstrained Prioritization Results

| Name | Corridor | Overall Priority |
|---|---|---|
| 11 Dickeyville | US 61/151 NB/SB | 33 |
| 16 Madison | I-39/90 SB | 72 |
| 19 Beloit | I-39/90 NB | 80 |
| 21 Kenosha | I-41/94 WB | 100 |
| 22 Racine | I-41/94 EB | 76 |
| 34 Wrightstown | I-41 NB | 54 |
| 35 Newton | I-43 SB | 46 |
| 41 Abrams | US 41 NB/SB | 43 |
| 44 Coloma | I-39 NB/SB | 48 |
| 53 West Salem | I-90 EB | 58 |
| 61 Hudson | I-94 EB | 80 |
| 63 Menomonie | I-94 WB | 60 |
| 71 Superior | US 2/53 NB/SB | 46 |
| *Future Dodgeville* | US 18/151 NB | 38 |

## Table 4-3. Unconstrained Prioritization Analysis

| | Upper Tier | | Middle Tier | | Lower Tier | | Weight Factor |
|---|---|---|---|---|---|---|---|
| **Annual Trucks Weighed** | 1,914,340 | 100,001 | 100,000 | 20,001 | 20,000 | 0 | |
| **Max/Min Score** | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Existing Truck AADT** | 15,376 | 8001 | 8000 | 2001 | 2000 | 0 | |
| **Max/Min Score** | 34 | 23.8 | 23.46 | 10.54 | 10.2 | 0 | 34 |
| **Future Truck AADT** | 19,794 | 8001 | 8000 | 2001 | 2000 | 0 | |
| **Max/Min Score** | 33 | 23.1 | 22.77 | 10.23 | 9.9 | 0 | 33 |
| **Cost to Enhance** | 0 | 1,000,000 | 1,000,001 | 3,000,000 | 3,000,001 | 16,000,000 | |
| **Max/Min Score** | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Annual Operation Costs** | 0 | 100,000 | 100,001 | 200,000 | 200,001 | 355,602 | |
| **Max/Min Score** | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Overweight Trucks Per Day** | 769 | 451 | 450 | 201 | 200 | 0 | |
| **Max/Min Score** | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Enforcement Actions Per Inspection** | 5.0 | 4.0 | 3.9 | 2.0 | 1.9 | 1.0 | |
| **Max/Min Score** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 |
| **Visibility** | Good | | Fair | | Poor | | |
| **Max/Min Score** | 0 | | 0 | | 0 | | 0 |
| **Highway Type** | Inbound IH | Inbound Non-IH | Mid-State IH | Mid-State Non-IH | Outbound IH | Outbound Non-IH | |
| **Max/Min Score** | 33 | 23.1 | 22.77 | 10.23 | 9.9 | 0 | 33 |
| **Facility Condition Rating** | 1.0 | 1.9 | 2.0 | 2.9 | 3.0 | 4.0 | |
| **Max/Min Score** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 |
| | | | | | | | 100 **<--Must Equal 100** |

| Overall Priority | |
|---|---|
| 100 to 70 | High |
| 69 to 50 | Medium |
| 49 to 40 | Low |

### B. Constrained Prioritization

In the Constrained scenario, criteria were evaluated for all existing SWEF installations. All ten criteria were used to evaluate the existing relative importance of each SWEF.

Table 4-4 shows the prioritization results from applying the Constrained scenario weighting factors.

Table 4-5 shows the criteria weighting factors used for the Constrained scenario.

Figure 4-1 represents the Constrained scenario results on a map.

Table 4-4. Constrained Prioritization Results

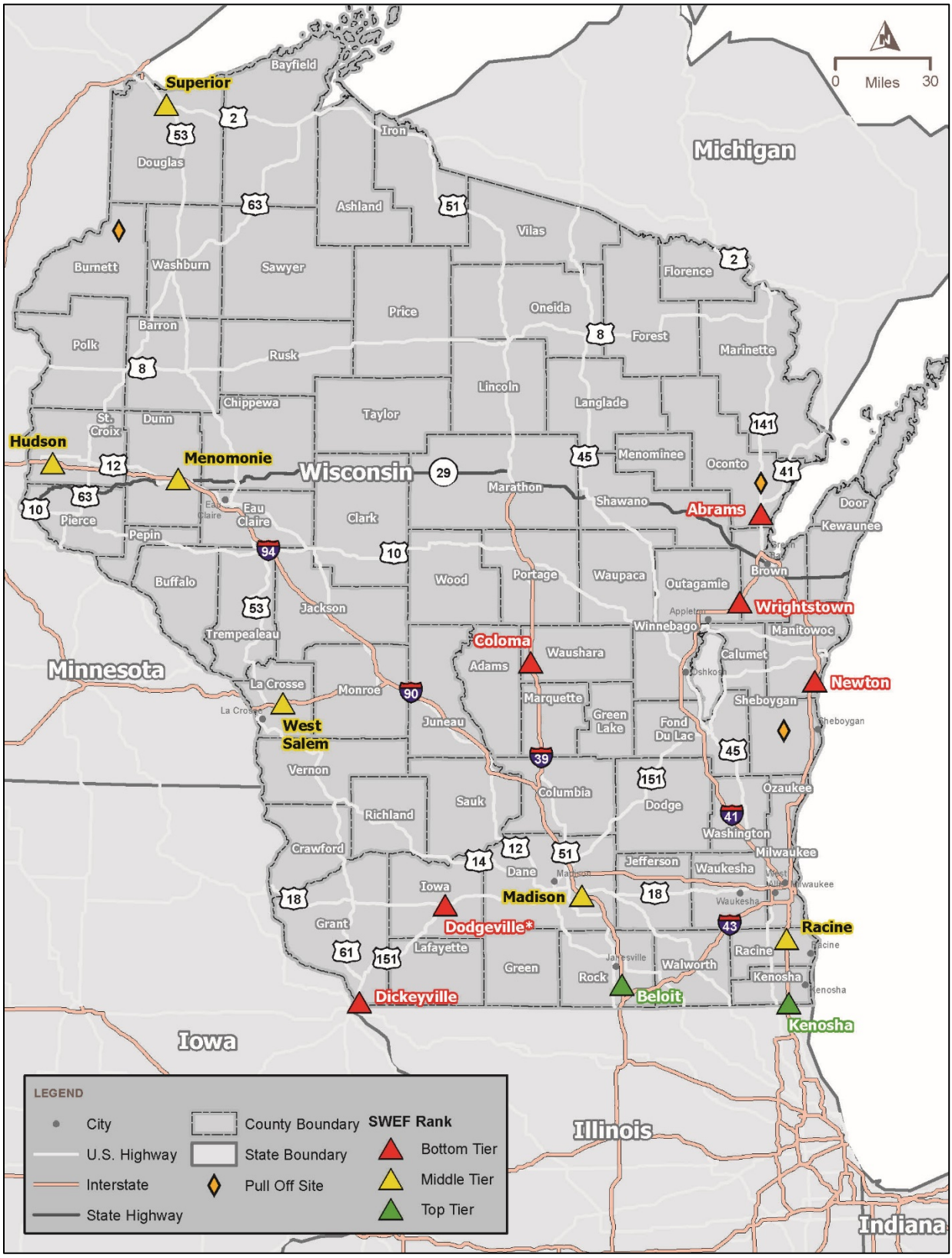
| Name | Corridor | Overall Priority |
|---|---|---|
| 11 Dickeyville | US 61/151 NB/SB | 33 |
| 16 Madison | I-39/90 SB | 68 |
| 19 Beloit | I-39/90 NB | 78 |
| 21 Kenosha | I-41/94 WB | 90 |
| 22 Racine | I-41/94 EB | 62 |
| 34 Wrightstown | I-41 NB | 47 |
| 35 Newton | I-43 SB | 43 |
| 41 Abrams | US 41 NB/SB | 42 |
| 44 Coloma | I-39 NB/SB | 42 |
| 53 West Salem | I-90 EB | 52 |
| 61 Hudson | I-94 EB | 67 |
| 63 Menomonie | I-94 WB | 51 |
| 71 Superior | US 2/53 NB/SB | 55 |
| *Future Dodgeville* | US 18/151 NB | 42 |

## Table 4-5. Constrained Prioritization Analysis

| | Upper Tier | | Middle Tier | | Lower Tier | | Weight Factor |
|---|---|---|---|---|---|---|---|
| **Annual Trucks Weighed** | 1,914,340 | 100,001 | 100,000 | 20,001 | 20,000 | 0 | |
| **Max/Min Score** | 5 | 3.5 | 3.45 | 1.55 | 1.5 | 0 | 5 |
| **Existing Truck AADT** | 15,376 | 8001 | 8000 | 2001 | 2000 | 0 | |
| **Max/Min Score** | 15 | 10.5 | 10.35 | 4.65 | 4.5 | 0 | 15 |
| **Future Truck AADT** | 19,794 | 8001 | 8000 | 2001 | 2000 | 0 | |
| **Max/Min Score** | 15 | 10.5 | 10.35 | 4.65 | 4.5 | 0 | 15 |
| **Cost to Enhance** | 0 | 1,000,000 | 1,000,001 | 3,000,000 | 3,000,001 | 16,000,000 | |
| **Max/Min Score** | 5 | 3.5 | 3.45 | 1.55 | 1.5 | 0 | 5 |
| **Annual Operation Costs** | 0 | 100,000 | 100,001 | 200,000 | 200,001 | 355,602 | |
| **Max/Min Score** | 5 | 3.5 | 3.45 | 1.55 | 1.5 | 0 | 5 |
| **Overweight Trucks Per Day** | 769 | 451 | 450 | 201 | 200 | 0 | |
| **Max/Min Score** | 15 | 10.5 | 10.35 | 4.65 | 4.5 | 0 | 15 |
| **Enforcement Actions Per Inspection** | 5.0 | 4.0 | 3.9 | 2.0 | 1.9 | 1.0 | |
| **Max/Min Score** | 10.00 | 7.00 | 6.90 | 3.10 | 3.00 | 0.00 | 10 |
| **Visibility** | Good | | Fair | | Poor | | |
| **Max/Min Score** | 10 | | 7.5 | | 5 | | 10 |
| **Highway Type** | Inbound IH | Inbound Non-IH | Mid-State IH | Mid-State Non-IH | Outbound IH | Outbound Non-IH | |
| **Max/Min Score** | 15 | 10.5 | 10.35 | 4.65 | 4.5 | 0 | 15 |
| **Facility Condition Rating** | 1.0 | 1.9 | 2.0 | 2.9 | 3.0 | 4.0 | |
| **Max/Min Score** | 5.00 | 3.50 | 3.45 | 1.55 | 1.50 | 0.00 | 5 |
| | | | | | | | 100 **<--Must Equal 100** |

| **Overall Priority** | |
|---|---|
| 100 to 70 | High |
| 69 to 50 | Medium |
| 49 to 40 | Low |

Figure 4-1. SWEF Locations - Constrained Prioritization




Source: SWEF prioritization determined thru analysis by Lakeside Engineers

Under either scenario, the relative prioritizations become clear for each location. As shown in Table 4-6, two SWEF's serving high volume inbound interstate routes (i.e., Kenosha and Beloit) rate as "High" priority under either scenario. Three SWEF's serving Interstate routes near a point of entry (i.e., Hudson, Racine, Madison) rate as a "High" priority under the unconstrained scenario and as "Medium" under the constrained scenario. Two SWEF's serving Interstate routes near a point of entry (i.e., Menomonie and West Salem) rate "Medium" under either scenario. Wrightstown and one SWEF on a non-interstate route but near a point of entry (Superior) rate as "Medium" under one scenario and "Low" under another. Four other existing SWEF's (Newton, Coloma, Dickeyville and Abrams) and a proposed SWEF location near Dodgeville, rate as "Low" under both scenarios. Even though the current Dickeyville SWEF and a future SWEF location near Dodgeville on US 151 NB rank "Low", this is a key CMV enforcement zone for trucks carrying loads from Iowa to Wisconsin.

Table 4-6. Unconstrained and Constrained Prioritization Results

| Name | Corridor | Unconstrained Priority | Constrained Priority |
|---|---|---|---|
| 21 Kenosha | I-41/94 WB | 100 | 90 |
| 19 Beloit | I-39/90 NB | 80 | 78 |
| 61 Hudson | I-94 EB | 80 | 67 |
| 22 Racine | I-41/94 EB | 76 | 62 |
| 16 Madison | I-39/90 SB | 72 | 68 |
| 63 Menomonie | I-94 WB | 60 | 51 |
| 53 West Salem | I-90 EB | 58 | 52 |
| 34 Wrightstown | I-41 NB | 54 | 47 |
| 44 Coloma | I-39 NB/SB | 48 | 42 |
| 71 Superior | US 2/53 NB/SB | 46 | 55 |
| 35 Newton | I-43 SB | 46 | 43 |
| 41 Abrams | US 41 NB/SB | 43 | 42 |
| Future Dodgeville | US 18/151 NB | 38 | 42 |
| 11 Dickeyville | US 61/151 NB/SB | 33 | 33 |

## 4.2 Virtual Weigh-in-Motion Sites

WisDOT's seven existing and one planned Virtual Weigh-in-Motion (VWIM) sites, as well as 12 candidate VWIM sites nominated by DSP field personnel and 30 candidate VWIM sites on suspected SWEF bypass routes identified by DSP field personnel, were evaluated to locations at which a VWIM installation would be most beneficial. The evaluation was based on a methodology developed specifically for WisDOT, which used information about current or candidate VWIM locations across ten different attributes. An overall prioritization score was calculated for each location. These overall scores were based on the individual criterion scores for each location and the relative weights that applied to each criterion. Different criteria weighting schemes can produce different scores, which can change the perceived importance/value of each VWIM location.

## VWIM Evaluation Criteria

VWIM evaluation criteria were developed using data provided by DSP, DTSD, and FHWA to identify potential VWIM locations. Ten criteria were used in the analysis, as shown in Table 4-7. All data sets were averaged over three years (2012 thru 2014) to provide an average annual value in the analysis.

### Table 4-7. VWIM Analysis Criteria

**(1) Existing Truck Volume (AADTT)**
***Data Source:*** WisDOT AADT Meta Manager 2016; GIS Shapefiles containing planning AADTT numbers
***Description:*** Existing truck volume near or approaching the facility. High existing trucks volumes receive higher scores in the analysis.

**(2) Future Truck Volumes (AADTT)**
***Data Source:*** *WisDOT TAFIS 2040 AADT;* WisDOT AADT Meta Manager 2016 GIS Shapefiles containing planning AADTT percentage; 1.56% increase in truck traffic per year for county roads that do not have future forecasts available in TAFIS
***Description:*** Freight volumes were calculated by applying the WisDOT Meta Manager truck percentages to TAFIS 2040 AADT. Freight volumes for county roads where TAFIS data was unavailable were predicted by increasing truck traffic by 1.56% each year until 2040. High future truck volumes receive higher scores in the analysis.

**(3) Highway Freight Factor (Score)**
***Data Source:*** Wisconsin's Multimodal Freight System map
***Description:*** How important a segment is to freight movement in Wisconsin - defined by tonnage, value, or economic importance. Larger values receive higher scores in the analysis.

**(4) Bypass Route**
***Data Source:*** DSP personnel interviews identifying suspected bypass routes at each SWEF
***Description:*** Monitoring of roadways adjacent to fixed SWEF locations that trucks use to circumvent the port of entry. VWIM located on a bypass route receive a higher score in the analysis.

**(5) Intrastate Significant Route**
***Data Source:*** Wisconsin's Multimodal Freight System map
***Description:*** Routes not located at a port of entry but are significant state roads for movement of freight. VWIM located on a significant route receive a higher score in the analysis.

**(6) Repurpose Opportunity/Static Weight Validation Site**
***Data Source:*** DTSD personnel interviews for locations, and WisDOT list of pull off facilities
***Description:*** An existing pull off site or abandoned roadside facility that has the potential to be repurposed for enhanced mobile enforcement. Easy access for truck drivers and a safe inspection area for officers. VWIM located near these sites receive a higher score in the analysis.

**(7) Power and Communication**
***Data Source:*** Google Maps to locate nearby power sources. Verizon communication map. State patrol radio coverage map.
***Description:*** Availability of nearby power and communication needed for the VWIM to function. Sites with better availability and less expensive costs receive higher scores in the analysis.

**(8) Road System Health (Rating)**
**Data Source:** WisDOT pavement condition reports and bridge structural ratings
***Description:*** VWIM located on roadways with anticipated permitted freight traffic that impacts pavement and bridges receive higher scores in the analysis.

**(9) Highway Type (Class)**
***Data Source:*** Google Maps to verify roadway and location
***Description:*** The current geographical location of the VWIM. VWIM that are near ports of entry (inbound) from other states receive a higher score in the analysis.
*Upper Tier: Inbound Interstate and Inbound Non-Interstate*
*Middle Tier: Mid-State Interstate and Mid-State Non-Interstate*
*Lower Tier: Outbound Interstate and Outbound Non-Interstate*

**(10) Staffing Proximity**
***Data Source:*** Google Maps to verify distance between SWEF location and VWIM location
***Description:*** Staff available for mobile enforcement operations. Sites that have existing SWEF staff available to patrol near the VWIM receive higher scores in the analysis.

## VWIM Evaluation Methodology

The ten VWIM criteria were evaluated using a point system that sorted each criterion into three tiers (Upper, Middle, and Lower). Each tier was assigned a data range for each criterion. Range thresholds were determined from a review of the source data. In the example shown below, the highest Existing Truck AADT among all the VWIM locations was 9,628 vehicles per day, so that number established the highest value in the Upper tier. The following tables represent actual portions of the methodology tool.

| | Upper Tier | | Middle Tier | | Lower Tier | |
|---|---|---|---|---|---|---|
| **Existing Truck AADT** | 9628 | 2001 | 2000 | 501 | 500 | 0 |

A weighting factor was assigned to each criterion based on input from DSP and DTSD. This factor was used to determine the minimum and maximum point value for the criterion. Changing the weighting factor affects the minimum/maximum tier point value for each criterion.

| | Upper Tier | | Middle Tier | | Lower Tier | | Weight Factor |
|---|---|---|---|---|---|---|---|
| **Existing Truck AADT** | 9628 | 2001 | 2000 | 501 | 500 | 0 | |
| Max/Min Score | 10 | 8 | 7.9 | 3.1 | 3 | 0 | 10 |

All criteria scores were combined to determine the overall priority of the VWIM locations. The sum of the weighting factors for all criteria equaled 100, so that the overall priority score (a value between 0 and 100) could be used to compare VWIM locations to each other in the analysis results.

| **Overall Priority** | |
|---|---|
| 100 to 80 | High |
| 79 to 65 | Medium |
| 64 to 40 | Low |

## VWIM Site Analysis

Three different VWIM site groups, totaling 50 existing or candidate VWIM locations, were evaluated for this site analysis, including:

- 8 existing and one planned VWIM sites
- 12 candidate VWIM sites nominated by DTSD and DSP field personnel
- 30 candidate VWIM sites on suspected SWEF bypass routes identified by DSP field personnel

All ten VWIM rating criteria were used for each group to evaluate the existing relative importance of each location. Table 4-8 shows the criteria weighting factors that were used. (The higher the Overall Priority rating, the more important the location would be, with a rating of 80 or higher required to be in the “High” priority category and a rating less than 65 required to be in the ‘Low” priority category.)

## Table 4-8. VWIM Prioritization Analysis

| | Upper Tier | | Middle Tier | | Lower Tier | | Weight Factor |
|---|---|---|---|---|---|---|---|
| **Existing Truck AADT** | 9628 | 2001 | 2000 | 501 | 500 | 0 | |
| Max/Min Score | 10 | 8 | 7.9 | 3.1 | 3 | 0 | 10 |
| **Future Truck AADT** | 12133 | 2001 | 2000 | 501 | 500 | 0 | |
| Max/Min Score | 10 | 8 | 7.9 | 3.1 | 3 | 0 | 10 |
| **Highway Freight Factor** | 170-130 | | 129-73 | | 72-0 | | |
| Max/Min Score | 10 | | 7.5 | | 5 | | 10 |
| **Bypass Route** | Yes | | No | | | | |
| Max/Min Score | 15 | | 7.5 | | | | 15 |
| **Intrastate Significant Route** | Yes | | No | | | | |
| Max/Min Score | 10 | | 5 | | | | 10 |
| **Repurpose Opportunity** | Significant Opportunity | | Limited Opportunity | | | | |
| Max/Min Score | 10 | | 5 | | | | 10 |
| **Power and Communication** | Easy | | Some Issues | | Difficult | | |
| Max/Min Score | 5 | | 3.75 | | 2.5 | | 5 |
| **Road System Health** | Very Good to Excellent (100-85) | | Good (85-70) | Fair (70-55) | Poor (55-40) | Very Poor (40-0) | |
| Max/Min Score | 0 | | 3 | 6 | 8 | 10 | 10 |
| **Highway Type** | Inbound | | Mid-State | | Outbound | | |
| Max/Min Score | 10 | | 7.5 | | 5 | | 10 |
| **Staffing Proximity** | Nearby | | Moderate Distance | | Significant Distance | | |
| Max/Min Score | 10 | | 7.5 | | 5 | | 10 |
| | | | | | | | 100 |

<--Must Equal 100

| Overall Priority | |
|---|---|
| 100 to 80 | High |
| 79 to 65 | Medium |
| 64 to 40 | Low |

### A. Existing and Planned VWIM

Table 4-9 shows the prioritization results for the eight existing and one planned VWIM locations. Two existing locations (i.e., Town of Turtle and Town of Dunn) and the planned VWIM site (i.e., St. Croix County) rank as "High" priority; at the other extreme, two existing locations (i.e., Hurley and Town of Christiana) rank as "Low" priority.

Table 4-9. VWIM Prioritization Results for Existing and Planned Locations

| Region / Location | | Corridor | Overall Priority |
|---|---|---|---|
| | **EXISTING AND PLANNED VWIM** | | |
| NW | Hurley (Existing) | US 2 WB/EB | 62 |
| NW | Stillwater, MN (Planned) | WIS 64 EB | 80 |
| NE | Oshkosh (Existing) | I-41 NB/SB | 76 |
| SW | Turtle (Existing) (Bypass) | I-43 NB | 90 |
| SW | Pleasant Springs (Existing) (Bypass) | County N NB/SB | 71 |
| SW | Dunn (Existing) (Bypass) | US 51 NB/SB | 80 |
| SW | Albion (Existing) (Bypass) | WIS 73 NB | 67 |
| SW | Christiana (Existing) (Bypass) | WIS 73 SB | 62 |

### B. VWIM Mainline Site Candidates Recommended by DSP and DTSD

Twelve candidate mainline locations were nominated by DTSD and DSP field personnel for a variety of reasons, such as: (a) non-interstate points of entry with heavy truck traffic; (b) close to an existing DSP Pull-Off Site; or, (c) intrastate corridors with heavy truck traffic. Table 4-10 shows the prioritization results for the 12 candidate locations. None of them rank as "High" priority, while four sites rank as "Low" priority.

Table 4-10. VWIM Prioritization Results for Mainline Locations

| Region / Location | | Corridor | Overall Priority |
|---|---|---|---|
| | **SITE CANDIDATES SUGGESTED BY DSP** | | |
| NC | Colby, WI (W. of WIS 13) | WIS 29 EB/WB | 71 |
| NE | Wrightstown (North of County S) | I-41 SB | 72 |
| NE | Wrightstown (East of WIS 47) | I-41 NB | 74 |
| NE | Green Bay (East of WIS 32) | WIS 29 EB/WB | 75 |
| NW | Hager City | US 63 EB | 71 |
| NW | Nelson | WIS 25 EB | 58 |
| NW | Winona, MN | WIS 54 EB | 66 |
| SW | Monroe | WIS 69 NB | 57 |
| NE | Plymouth (Existing Pull Off) | WIS 57 NB/SB | 68 |
| NW | Danbury (Existing Pull Off) | WIS 77 EB | 58 |
| NE | Stiles Junction (Existing Pull Off) | US 141 NB/SB | 62 |
| NC | Between Wausau & Stevens Point | I-39 NB/SB | 70 |

### C. SWEF Bypass Routes

A total of 30 candidate locations are on highways identified by DSP field personnel as suspected bypass routes around existing SWEF sites. Table 4-11 shows the prioritization results for the 30 candidate locations. Only one site (i.e., Beloit SWEF Bypass on US 51 NB) ranks as "High" priority, while 17 sites rank as "Low" priority.

Table 4-11. VWIM Prioritization Results for Bypass Routes

| Region / Location | | Corridor | Overall Priority |
|---|---|---|---|
| | **SWEF BYPASS ROUTES IDENTIFIED BY DSP** | | |
| SW | Dickeyville Bypass | WIS 11 EB | 75 |
| SW | Dickeyville Bypass | WIS 35 NB | 61 |
| SW | Beloit Bypass | US 51 NB | 80 |
| SW | Beloit Bypass | WIS 140 NB | 74 |
| SE | Kenosha Bypass | US 45 NB | 74 |
| SE | Kenosha Bypass | US 31 NB | 74 |
| SE | Kenosha Bypass | US 32 WB | 72 |
| SE | Kenosha Bypass | WIS 83 NB | 65 |
| SE | Kenosha Bypass | County H NB | 57 |
| SE | Kenosha Bypass | County U NB | 55 |
| SE | Racine Bypass | US 45 SB | 70 |
| SE | Racine Bypass | County V SB | 63 |
| NE | Wrightstown Bypass | WIS 47 NB | 68 |
| NE | Wrightstown Bypass | WIS 55 NB | 61 |
| NE | Wrightstown Bypass | County J NB | 55 |
| NE | Wrightstown Bypass | County N NB | 55 |
| NE | Wrightstown Bypass | WIS 96 | 55 |
| NE | Wrightstown Bypass | County S | 56 |
| NE | Newton Bypass | WIS 42 NB/SB | 64 |
| NE | Abrams Bypass | WIS 32 EB/WB | 55 |
| NE | Abrams Bypass | County J NB/SB | 56 |
| NE | Abrams Bypass | Cross Road NB/SB | 59 |
| SW | West Salem (Sparta)(Bypass) (Planned) | WIS 16 EB | 79 |
| NW | Hudson Bypass | US 10 EB | 64 |
| NW | Hudson Bypass | US 12 EB | 64 |
| NW | Hudson Bypass | WIS 35 SB | 62 |
| NE | Menomonie Bypass | US 10 WB | 65 |
| NE | Menomonie Bypass | WIS 29 WB | 70 |
| NW | Superior Bypass | WIS 13 NB/SB | 67 |
| NW | Superior Bypass | County E NB/SB | 57 |

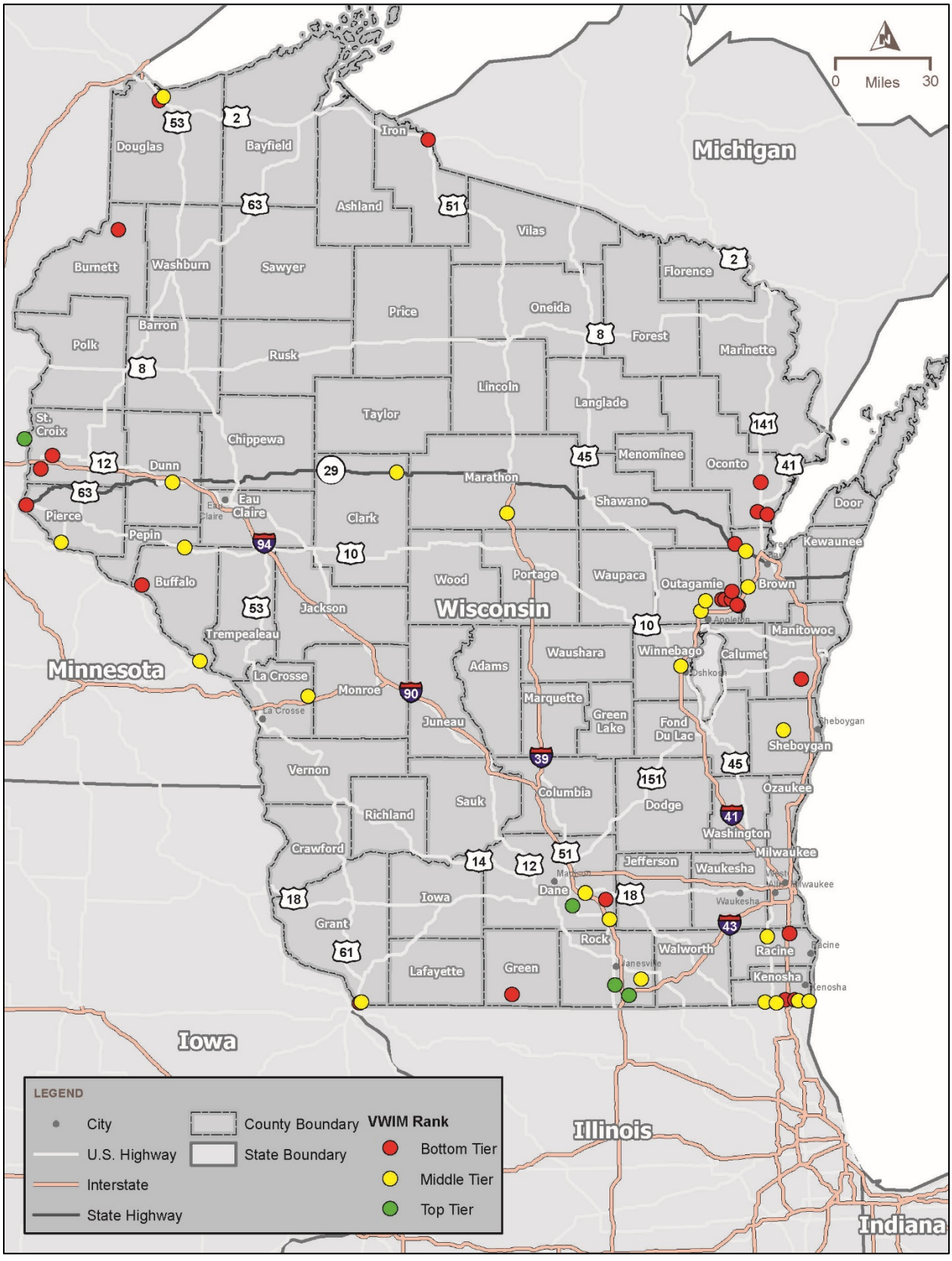
### Top VWIM Candidate Locations

From among the one planned VWIM location, 12 mainline VWIM candidate locations, and 30 bypass VWIM candidate locations, the 14 highest ranked locations not part of a SWEF replacement recommendation are shown in Table 4-12. Only two candidate locations (i.e., Beloit SWEF Bypass on US 51 NB, and the planned VWIM site on WIS 64 in the Town of Houlton east of the Stillwater Bridge in St. Croix County) are rated as "High" priority. Figure 4-2 shows all VWIM prioritizations on a map.

Table 4-12. Top VWIM Priorities

| Region | Location | Corridor | Overall Priority |
|---|---|---|---|
| SW | Beloit Bypass | US 51 NB | 80 |
| NW | Stillwater, MN (Planned) | WIS 64 EB | 80 |
| SW | West Salem (Sparta)(Bypass) (Planned) | WIS 16 EB | 79 |
| NE | Green Bay (East of WIS 32) | WIS 29 EB/WB | 75 |
| SW | Dickeyville Bypass | WIS 11 EB | 75 |
| SE | Kenosha Bypass | WIS 31 NB | 74 |
| SW | Beloit Bypass | WIS 140 NB | 74 |
| SE | Kenosha Bypass | US 45 NB | 74 |
| SE | Kenosha Bypass | WIS 32 WB | 72 |
| NC | Colby, WI (W. of WIS 13) | WIS 29 EB/WB | 71 |
| NW | Hager City | US 63 EB | 71 |
| NC | Between Wausau & Stevens Point | I-39 NB/SB | 70 |
| SE | Racine Bypass | US 45 SB | 70 |
| NW | Menomonie Bypass | WIS 29 WB | 70 |

Figure 4-2. VWIM Prioritizations




Source: VWIM prioritization determined thru analysis by Lakeside Engineers

## 4.3 Staffing

In addition to routine onsite motor carrier inspections and mobile enforcement operations, many DSP Inspectors are also assigned to a variety of other duties each year, such as school bus inspections (required annually), motor coach inspections (required annually), and salvage vehicle inspections (required prior to issuance of a title by DMV). These inspection duties can collectively consume as much as 25% of available Inspector hours in some DSP regions, as shown in Table 4-13.

Table 4-13. Inspection Staff Duties (FFY 2012 – 2014)

| Region | 2014 Staffing | 3 Year Average (2012 – 2014) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | # Active Inspectors | Onsite Insp. Staff Hrs. | Onsite % | Mobile Insp. Staff Hrs. | Mobile % | School Bus Insp. Staff Hrs. | School Bus % | Motor Bus Insp. Staff Hrs. | Motor Bus % | Salvage Insp. Staff Hrs. | Salvage % |
| North Central (Wausau) | 8 | 3,619 | 30% | 6,287 | 51% | 1,392 | 11% | 241 | 2% | 725 | 6% |
| Northeast (Fond Du Lac) | 14 | 6,691 | 31% | 11,735 | 55% | 2,509 | 12% | 327 | 2% | 198 | 1% |
| Northwest (Eau Claire) | 13 | 8,854 | 42% | 10,602 | 50% | 1,270 | 6% | 224 | 1% | 244 | 1% |
| Southeast (Waukesha) | 13 | 10,869 | 51% | 5,100 | 24% | 3,560 | 17% | 433 | 2% | 1,462 | 7% |
| Southwest (DeForest) | 29 | 15,591 | 47% | 12,825 | 39% | 3,028 | 9% | 597 | 2% | 1,115 | 3% |
| Totals | 77 | 45,624 | | 46,549 | | 11,759 | | 1,822 | | 3,744 | |

Source: Staffing hours provided by WisDOT, Division of State Patrol financial system summaries for FY 2012, 2013, and 2014

For purposes of the staff analysis, the miscellaneous inspection assignments are excluded, since the focus of the analysis is to assess the potential impacts of modifications in the field assignments of DSP motor carrier Inspectors that would be attributed to future hypothetical changes in SWEF and VWIM operations. For example, changing the normal operating hours of a SWEF, permanently or temporarily closing a SWEF, or adding a VWIM result in adjustments to DSP region personnel allocations. These adjustments also affect annual statewide and regional motor carrier enforcement statistics. For the analysis of Inspector staffing, four components were assessed, including:

- Staff hours spent on inspection activities
- Number of inspections performed
- Number of trucks weighed at each SWEF location annually
- Number of trucks passing each SWEF location annually

The first step in the staffing analysis was to determine how many hours are spent on fixed facility enforcement and mobile enforcement in each DSP region. Actual Inspector staff hours worked in the field were determined from an analysis of DSP charge codes

for Mobile Enforcement (code 542), Fixed Facility Enforcement (code 563), and individual SWEF locations based on FFY 2012, FFY 2013, and FFY 2014 DSP personnel accounting records. The 3-year averages for the time period are summarized in Table 4-14.

Table 4-14. Average Inspection Staff Hours per Region

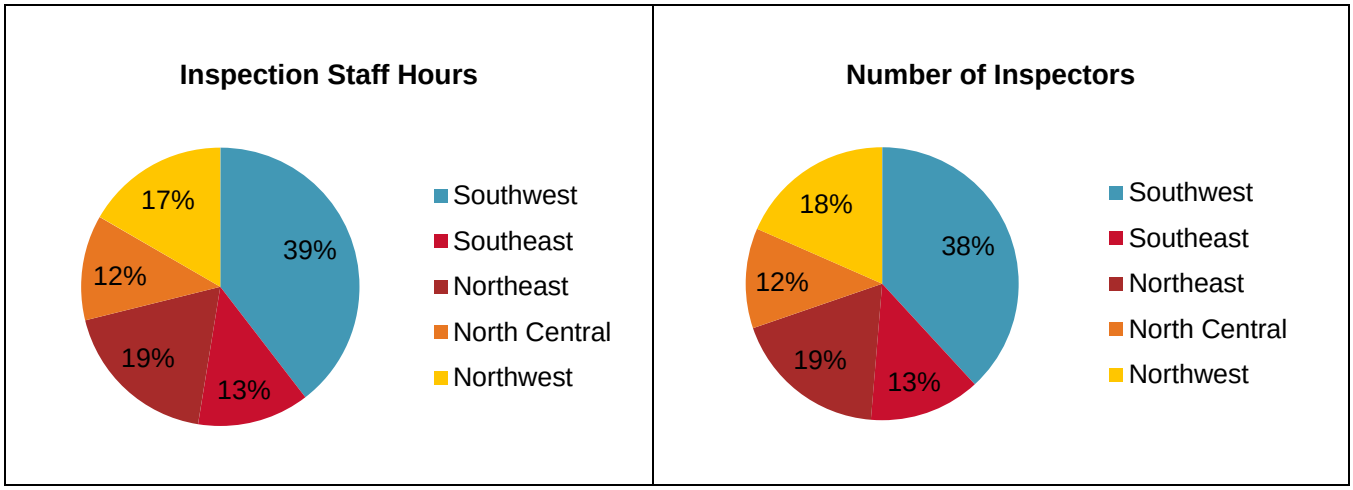
| Region | Location | 2014 Staffing | | 3 Year Average (2012 to 2014) | | | |
|---|---|---|---|---|---|---|---|
| | | # Active Inspector | # Vacant Inspector | Onsite Inspection Staff Hours | Mobile Inspection Staff Hours | Total Region Staff Hours | Percentage |
| **North Central (Wausau)** | Mobile Enforcement (542) | 4 | 3 | | 6,287 | 9,906 | 63% |
| | Region Fixed Facility (563) | | | 1,371 | | | 14% |
| | 44 Coloma | 4 | 0 | 2,248 | | | 23% |
| **Northeast (Fond Du Lac)** | Mobile Enforcement (542) | 7 | 2 | | 11,735 | 18,426 | 64% |
| | Region Fixed Facility (563) | | | 3,036 | | | 16% |
| | 34 Wrightstown | 2 | 1 | 792 | | | 4% |
| | 35 Newton | 2 | 0 | 1,454 | | | 8% |
| | 41 Abrams | 3 | 0 | 1,409 | | | 8% |
| **Northwest (Eau Claire)** | Mobile Enforcement (542) | 6 | 1 | | 10,602 | 19,456 | 54% |
| | Region Fixed Facility (563) | | | 2,957 | | | 15% |
| | 61 Hudson | 3 | 1 | 2,576 | | | 13% |
| | 63 Menomonie | 2 | 1 | 1,860 | | | 10% |
| | 71 Superior | 2 | 1 | 1,462 | | | 8% |
| **Southeast (Waukesha)** | Mobile Enforcement (542) | 4 | 0 | | 5,100 | 15,969 | 32% |
| | Region Fixed Facility (563) | | | 2,591 | | | 16% |
| | 21 Kenosha | 6 | 2 | 5,567 | | | 35% |
| | 22 Racine | 3 | 1 | 2,710 | | | 17% |
| **Southwest (DeForest)** | Mobile Enforcement (542) | 9 | 0 | | 12,825 | 28,416 | 45% |
| | Region Fixed Facility (563) | | | 4,446 | | | 16% |
| | 11 Dickeyville | 2 | 0 | 1,106 | | | 4% |
| | 16 Madison | 7 | 1 | 3,228 | | | 11% |
| | 19 Beloit | 7 | 1 | 4,090 | | | 14% |
| | 53 West Salem | 4 | 0 | 2,721 | | | 10% |
| | Statewide Totals | 77 | 15 | 45,624 | 46,549 | 92,173 | |

Source: Staffing hours provided by WisDOT, Division of State Patrol financial system summaries for FFY 2012, 2013, and 2014

The Inspector hours worked at each location as a percent of total hours worked in each DSP region was also calculated to show the split of time between onsite fixed facility enforcement and mobile enforcement operations. In general, mobile enforcement hour percentages are higher than for onsite fixed facility hours in most DSP regions because staff assigned to fixed facilities typically spend a percentage of their time conducting mobile enforcement and those hours are applied to the mobile enforcement charge code.

The number of inspection hours worked in each DSP region is directly related to the number of field staff assigned to the region. The pie charts shown in Figure 4-3 show the percentages for inspection staff hours for each DSP region and the number of Inspectors assigned to each region (average of FFY 2012-2014). Not surprisingly, the Southwest region had substantially more inspection hours logged than the other regions since 38% of all Inspectors were assigned to this region.

Figure 4-3. Inspection Staff Hours Compared to Number of Inspectors (FFY2012 – 2014)




Source: Staffing hours provided by WisDOT, Division of State Patrol financial system summaries for FY 2012, 2013, and 2014; Staff numbers from DSP

The second step in the staffing analysis was to determine the number of motor carrier inspections performed, the number of trucks weighed, and the volume of trucks passing each SWEF in each DSP region. Inspections and number of trucks weighed are tallied for each federal fiscal year by State Patrol for publication in the *Motor Carrier Safety Trends at Safety Weight Enforcement Facilities Report*. Truck AADT was obtained from the *WisDOT 2016 AADT Meta Manager*, and annual truck volume was determined by multiplying the 2016 truck AADT by 260 days to account for weekday truck volumes since SWEF are only open on weekdays for inspections. For the inspections and trucks weighed analysis, the 3-year average (FFY 2012-2014) totals were calculated and are shown in Table 4-15.

## Table 4-15. Average Inspections, Trucks Weighed and Truck Volumes per Region

| Region | Location | 2014 Staffing | | 3 Year Average (2012 to 2014) | | | 2016 | |
|---|---|---|---|---|---|---|---|---|
| | | # Active Inspector | # Vacant Inspector | Inspections Performed Annually | WIM Present | Trucks Weighed Annually | Truck AADT | Annual Weekday Truck Volume (260 Days) |
| **North Central (Wausau)** | Mobile Enforcement (542) | 4 | 3 | 1,537 | | | | |
| | Region Fixed Facility (563) | | | | | | | |
| | 44 Coloma | 4 | 0 | 1,562 | Ramp | 13,642 | 2,611 | 678,860 |
| **Northeast (Fond Du Lac)** | Mobile Enforcement (542) | 7 | 2 | 2,434 | | | | |
| | Region Fixed Facility (563) | | | | | | | |
| | 34 Wrightstown | 2 | 1 | 984 | | 27,273 | 3,735 | 971,100 |
| | 35 Newton | 2 | 0 | 1,385 | | 19,168 | 2,156 | 560,560 |
| | 41 Abrams | 3 | 0 | 1,066 | Ramp | 61,006 | 4,161 | 1,081,860 |
| **Northwest (Eau Claire)** | Mobile Enforcement (542) | 6 | 1 | 2,178 | | | | |
| | Region Fixed Facility (563) | | | | | | | |
| | 61 Hudson | 3 | 1 | 1,556 | Main/Ramp | 297,744 | 7,037 | 1,829,620 |
| | 63 Menomonie | 2 | 1 | 965 | Ramp | 236,511 | 5,059 | 1,315,340 |
| | 71 Superior | 2 | 1 | 1,236 | | 55,059 | 2,213 | 575,380 |
| **Southeast (Waukesha)** | Mobile Enforcement (542) | 4 | 0 | 1,666 | | | | |
| | Region Fixed Facility (563) | | | | | | | |
| | 21 Kenosha | 6 | 2 | 2,154 | Ramp | 204,092 | 15,376 | 3,997,760 |
| | 22 Racine | 3 | 1 | 991 | | 12,564 | 15,003 | 3,900,780 |
| **Southwest (DeForest)** | Mobile Enforcement (542) | 9 | 0 | 4,997 | | | | |
| | Region Fixed Facility (563) | | | | | | | |
| | 11 Dickeyville | 2 | 0 | 614 | | 24,449 | 858 | 223,080 |
| | 16 Madison | 7 | 1 | 1,822 | Main/Ramp | 1,914,340 | 8,039 | 2,090,140 |
| | 19 Beloit | 7 | 1 | 2,277 | Main/Ramp | 722,520 | 7,626 | 1,982,760 |
| | 53 West Salem | 4 | 0 | 1,087 | | 19,114 | 2,528 | 657,280 |
| | Statewide Totals | 77 | 15 | 30,511 | | 3,607,482 | | 19,864,520 |

Source: Wisconsin DOT, Motor Carrier Safety Trends at Safety Weight Enforcement Facilities Report for FY 2012, 2013, and 2014; Wisconsin DOT, 2016 AADT Meta Manager

For the third step in the staffing analysis, a number of rates were determined, as shown in Table 4-16. These included:

- Inspections per Active Inspector
- Inspections per Staff Hour
- Percent of Trucks Inspected at each SWEF
- Percent of Trucks Weighed at each SWEF

The percent of trucks inspected was not analyzed for mobile enforcement in each region because the actual truck AADT for mobile enforcement varies depending on routes patrolled.

The rates were calculated as follows:

**(1) Inspections per Active Inspector:** The number of inspections per site, divided by the number of active inspectors.

*North Central Region Example: For Onsite Location 44 Coloma, the 3-year average number of inspections performed was 1562 and the number of active inspectors was 4, so 1562/4 = 391 inspections per active inspector. For Mobile Enforcement, the average number of inspections performed was 1537 and the number of active inspectors was 4, so 1537/4 = 384 inspections per active inspector.*

**(2) Inspections per Staff Hour:** The number of inspections performed, divided by the number of onsite (or mobile) inspection staff hours.

*North Central Region Example: For Onsite Location 44 Coloma, the 3-year average number of inspections performed was 1562 and the average onsite staffing hours was 3619, so 1562/3619 = 0.432 inspections per staff hour. For Mobile Enforcement, the average number of inspections performed was 1537 and the average number of mobile enforcement hours were 6287, so 1537/6287 = 0.244 inspections per staff hour.*

**(3) Percent of Trucks Inspected at each SWEF:** The total annual number of inspections performed at each SWEF, divided by the annual weekday truck volume that passed by the SWEF.

*North Central Region Example: For Onsite Location 44 Coloma, the 3-year average number of inspections performed was 1562 and the annual truck volume (only factoring in weekdays) for 2016 was 678,860, so 1562/678,860 = 0.23% of trucks that passed by the SWEF were inspected.*

**(4) Percent of Trucks Weighed at each SWEF**: The total annual number of trucks weighed at each SWEF, divided by the annual weekday truck volume that passed by the SWEF.

*North Central Region Example: For Onsite Location 44 Coloma, the 3-year average number of trucks weighed at the SWEF was 13,642 and the annual truck volume (only factoring in weekdays) for 2016 was 678,860, so 13,642/678,860 = 2.01% of trucks that passed by the SWEF were weighed.*

Table 4-16. Staffing Analysis per Region (FFY 2012 – 2014)

| Region | Location | 2014 Staffing | | Analysis | | | |
|---|---|---|---|---|---|---|---|
| | | # Active Inspector | # Vacant Inspector | # Inspections Per Active Inspector | Inspections Per Staff Hour | % Trucks Inspected at SWEF | % Trucks Weighed at SWEF |
| **North Central (Wausau)** | Mobile Enforcement (542) | 4 | 3 | 384 | 0.244 | | |
| | Region Fixed Facility (563) | | | | | | |
| | 44 Coloma | 4 | 0 | 391 | 0.432 | 0.23% | 2.01% |
| **Northeast (Fond Du Lac)** | Mobile Enforcement (542) | 7 | 2 | 348 | 0.207 | | |
| | Region Fixed Facility (563) | | | | | | |
| | 34 Wrightstown | 2 | 1 | 492 | 0.703 | 0.10% | 2.81% |
| | 35 Newton | 2 | 0 | 693 | 0.519 | 0.25% | 3.42% |
| | 41 Abrams | 3 | 0 | 355 | 0.406 | 0.10% | 5.64% |
| **Northwest (Eau Claire)** | Mobile Enforcement (542) | 6 | 1 | 363 | 0.205 | | |
| | Region Fixed Facility (563) | | | | | | |
| | 61 Hudson | 3 | 1 | 519 | 0.449 | 0.09% | 16.27% |
| | 63 Menomonie | 2 | 1 | 483 | 0.351 | 0.07% | 17.98% |
| | 71 Superior | 2 | 1 | 618 | 0.526 | 0.21% | 9.57% |
| **Southeast (Waukesha)** | Mobile Enforcement (542) | 4 | 0 | 417 | 0.327 | | |
| | Region Fixed Facility (563) | | | | | | |
| | 21 Kenosha | 6 | 2 | 359 | 0.295 | 0.05% | 5.11% |
| | 22 Racine | 3 | 1 | 330 | 0.278 | 0.03% | 0.32% |
| **Southwest (DeForest)** | Mobile Enforcement (542) | 9 | 0 | 555 | 0.390 | | |
| | Region Fixed Facility (563) | | | | | | |
| | 11 Dickeyville | 2 | 0 | 307 | 0.369 | 0.28% | 10.96% |
| | 16 Madison | 7 | 1 | 260 | 0.420 | 0.09% | 91.59% |
| | 19 Beloit | 7 | 1 | 325 | 0.396 | 0.11% | 36.44% |
| | 53 West Salem | 4 | 0 | 272 | 0.284 | 0.17% | 2.91% |
| | Statewide Totals | 77 | 15 | 415 | | 0.15% | 18.16% |

The final step of the staffing analysis used these rates to predict how changes in staff hours would affect the number of inspections performed and the percent of trucks inspected in each region. Factors that can be controlled in the analysis for different scenarios include: (1) the number of active and vacant staff assigned per location, and (2) the number of staff hours assigned to onsite and mobile enforcement in each region.

Three different staffing scenarios were analyzed, including:

- Scenario A: Close three SWEF facilities and maintain current staffing levels
- Scenario B: Fill all vacant staff positions
- Scenario C: Fill all vacant staff positions and close three SWEF facilities

**Scenario A: Reduce the number of SWEF facilities**

In this scenario, the total number of staff hours and number of active Inspector positions per region would remain the same as the existing condition (*as shown in Table 4-14 above*). It is assumed that specific SWEF- assigned staff would be onsite 90% of the time and conducting mobile enforcement 10% of the time while performing enforcement duties. Three existing SWEF locations (Wrightstown, Menomonie, and Dickeyville) would be converted to VWIM sites. It is assumed Inspector staff hours from the converted locations would be reallocated to mobile enforcement and to other SWEF locations in the region. The results of the staffing analysis for this scenario are shown in Table 4-17.

The results for Scenario A show that if three SWEF facilities were converted to VWIM sites, with mobile enforcement and current staff reallocated to other locations in the region, the net result would be close (30,393) to the average yearly number of inspections (30,511) from the baseline condition. (*The baseline condition is the 3-year average numbers from Table 4-15*.)

**Scenario B: Fill all vacant staff positions**

In this scenario, all vacant positions would be filled. It is assumed SWEF staff would be onsite 90% of the time and conducting mobile enforcement 10% of the time while performing enforcement duties. Staff hour figures assume the average Inspector spends 1,314 hours each year on enforcement duties. The results of the staffing analysis for this scenario are shown in Table 4-18.

The results for Scenario B show there would be an increase in the number of inspections from the baseline condition when all staff positions are filled, from 30,511 to 36,519. (*The baseline condition is the 3-year average numbers from Table 4-15.)*

**Scenario C: Fill all vacant staff positions and reduce SWEF facilities**

In this scenario, all vacant positions would be filled. It is assumed assigned SWEF staff would be onsite 90% of the time and conducting mobile enforcement 10% of the time while performing CMV enforcement duties. Three SWEF locations (Wrightstown, Menomonie, and Dickeyville) would be converted to VWIM sites. Staff hour figures assume that the average Inspector spends 1,314 hours each year on enforcement

duties. It is assumed staff hours from the converted locations would be reallocated to mobile enforcement and to other SWEF locations in the region. The results of the staffing analysis for this scenario are shown in Table 4-19.

The results for Scenario C show there would be a similar increase (compared to Scenario B) in the number of inspections from the baseline condition. The increase for Scenario B is 30,511 to 36,519 and the increase for Scenario C is 30,511 to 36,724. (*The baseline condition is the 3-year average numbers from Table 4-15.)*

## Table 4-17. Staffing Analysis Scenario A: Reduce the Number of SWEF Facilities

**Staffing Analysis**

**Assumptions:**

**1) Keep staff levels and staff hours the same as the baseline for each region**
**2) Convert 34 Wrightstown, 63 Menomonie, and 11 Dickeyville to Weight Validation Sites with VWIM**
**3) Rates used to forecast inspections and percentage of trucks inspected are from the existing staff analysis**
**4) SWEF assigned staff will be onsite 90% and conducting mobile enforcement 10% of the time**

| Scenario A: Close Three Facilities | | Staffing | | Staff Hours | | | | Baseline Conditions | | | | Forecast Results | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | Assignment | # Active Inspector | # Vacant Inspector | Onsite Inspection Staff Hours | Mobile Inspection Staff Hours | Total Region Staff Hours | Percentage | Baseline Inspections | Baseline Inspections per Active Inspector | Annual Weekday Truck Volume | Baseline % Trucks Inspected | Inspections | % Trucks Inspected | Inspection Difference | % Trucks Inspected Differences at SWEF |
| **North Central (Wausau)** | Mobile Enforcement | 4 | 3 | | 6,287 | 9,906 | 63.5% | 1,537 | 384 | | | 1,536 | | 1 | |
| | 44 Coloma | 4 | 0 | 3,619 | | | 36.5% | 1,562 | 391 | 678,860 | 0.230% | 1,564 | 0.230% | | 0.000% |
| **Northeast (Fond Du Lac)** | Mobile Enforcement | 9 | 2 | | 12,527 | 18,426 | 68.0% | 2,434 | 348 | | | 3,132 | | -286 | |
| | 34 Wrightstown | 0 | 0 | 0 | | | 0.0% | 984 | 492 | 971,100 | 0.101% | 0 | 0.000% | | -0.101% |
| | 35 Newton | 2 | 1 | 2,972 | | | 16.1% | 1,385 | 693 | 560,560 | 0.247% | 1,386 | 0.247% | | 0.000% |
| | 41 Abrams | 3 | 0 | 2,927 | | | 15.9% | 1,066 | 355 | 1,081,860 | 0.099% | 1,065 | 0.098% | | 0.000% |
| **Northwest (Eau Claire)** | Mobile Enforcement | 8 | 1 | | 12,462 | 19,456 | 64.1% | 2,178 | 363 | | | 2,904 | | -238 | |
| | 61 Hudson | 3 | 2 | 4,054 | | | 20.8% | 1,556 | 519 | 1,829,620 | 0.085% | 1,557 | 0.085% | | 0.000% |
| | 63 Menomonie | 0 | 0 | 0 | | | 0.0% | 965 | 483 | 1,315,340 | 0.073% | 0 | 0.000% | | -0.073% |
| | 71 Superior | 2 | 1 | 2,940 | | | 15.1% | 1,236 | 618 | 575,380 | 0.215% | 1,236 | 0.215% | | 0.000% |
| **Southeast (Waukesha)** | Mobile Enforcement | 3 | 1 | | 5,100 | 15,969 | 31.9% | 1,666 | 417 | | | 1,251 | | -86 | |
| | 21 Kenosha | 6 | 2 | 6,864 | | | 43.0% | 2,154 | 359 | 3,997,760 | 0.054% | 2,154 | 0.054% | | 0.000% |
| | 22 Racine | 4 | 0 | 4,005 | | | 25.1% | 991 | 330 | 3,900,780 | 0.025% | 1,320 | 0.034% | | 0.008% |
| **Southwest (DeForest)** | Mobile Enforcement | 11 | 0 | | 13,931 | 28,416 | 49.0% | 4,997 | 555 | | | 6,105 | | 491 | |
| | 11 Dickeyville | 0 | 0 | 0 | | | 0.0% | 614 | 307 | 223,080 | 0.275% | 0 | 0.000% | | -0.275% |
| | 16 Madison | 7 | 1 | 4,711 | | | 16.6% | 1,822 | 260 | 2,090,140 | 0.087% | 1,820 | 0.087% | | 0.000% |
| | 19 Beloit | 7 | 1 | 5,572 | | | 19.6% | 2,277 | 325 | 1,982,760 | 0.115% | 2,275 | 0.115% | | 0.000% |
| | 53 West Salem | 4 | 0 | 4,203 | | | 14.8% | 1,087 | 272 | 657,280 | 0.165% | 1,088 | 0.166% | | 0.000% |
| | Totals | 77 | 15 | 41,866 | 50,307 | 92,173 | | 30,511 | | 19,864,520 | | 30,393 | | | |

## Table 4-18. Staffing Analysis Scenario B: Fill All Vacancies

**Staffing Analysis**

**Assumptions:**

**1) Fill all current staff vacancies, average inspector works 1314 hours per year on enforcement**
**2) Do not close any SWEF facilities**
**3) Rates used to forecast inspections and percentage of trucks inspected are from the existing staff analysis**
**4) SWEF assigned staff will be onsite 90% and conducting mobile enforcement 10% of the time**

| Scenario B: Fill All Vacant Staff Positions | | Staffing | | Staff Hours | | | | Baseline Conditions | | | | Forecast Results | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | Assignment | # Active Inspector | # Vacant Inspector | Onsite Inspection Staff Hours | Mobile Inspection Staff Hours | Total Region Staff Hours | Percentage | Baseline Inspections | Baseline Inspections per Active Inspector | Annual Weekday Truck Volume | Baseline % Trucks Inspected | Inspections | % Trucks Inspected | Inspection Regional Differences | % Trucks Inspected Differences at SWEF |
| **North Central (Wausau)** | Mobile Enforcement | 7 | 0 | | 9,724 | 14,454 | 67.3% | 1,537 | 384 | | | 2,688 | | 1153 | |
| | 44 Coloma | 4 | 0 | 4,730 | | | 32.7% | 1,562 | 391 | 678,860 | 0.230% | 1,564 | 0.230% | | 0.000% |
| **Northeast (Fond Du Lac)** | Mobile Enforcement | 9 | 0 | | 12,746 | 21,024 | 60.6% | 2,434 | 348 | | | 3,132 | | 497 | |
| | 34 Wrightstown | 3 | 0 | 3,548 | | | 16.9% | 984 | 492 | 971,100 | 0.101% | 1,476 | 0.152% | | 0.051% |
| | 35 Newton | 1 | 0 | 1,183 | | | 5.6% | 1,385 | 693 | 560,560 | 0.247% | 693 | 0.124% | | -0.123% |
| | 41 Abrams | 3 | 0 | 3,548 | | | 16.9% | 1,066 | 355 | 1,081,860 | 0.099% | 1,065 | 0.098% | | 0.000% |
| **Northwest (Eau Claire)** | Mobile Enforcement | 7 | 0 | | 10,906 | 26,280 | 41.5% | 2,178 | 363 | | | 2,541 | | 3839 | |
| | 61 Hudson | 4 | 0 | 4,730 | | | 18.0% | 1,556 | 519 | 1,829,620 | 0.085% | 2,076 | 0.113% | | 0.028% |
| | 63 Menomonie | 3 | 0 | 3,548 | | | 13.5% | 965 | 483 | 1,315,340 | 0.073% | 1,449 | 0.110% | | 0.037% |
| | 71 Superior | 6 | 0 | 7,096 | | | 27.0% | 1,236 | 618 | 575,380 | 0.215% | 3,708 | 0.644% | | 0.430% |
| **Southeast (Waukesha)** | Mobile Enforcement | 4 | 0 | | 6,833 | 21,024 | 32.5% | 1,666 | 417 | | | 1,668 | | 1049 | |
| | 21 Kenosha | 8 | 0 | 9,461 | | | 45.0% | 2,154 | 359 | 3,997,760 | 0.054% | 2,872 | 0.072% | | 0.018% |
| | 22 Racine | 4 | 0 | 4,730 | | | 22.5% | 991 | 330 | 3,900,780 | 0.025% | 1,320 | 0.034% | | 0.008% |
| **Southwest (DeForest)** | Mobile Enforcement | 7 | 0 | | 12,089 | 38,106 | 31.7% | 4,997 | 555 | | | 3,885 | | -530 | |
| | 11 Dickeyville | 2 | 0 | 2,365 | | | 6.2% | 614 | 307 | 223,080 | 0.275% | 614 | 0.275% | | 0.000% |
| | 16 Madison | 8 | 0 | 9,461 | | | 24.8% | 1,822 | 260 | 2,090,140 | 0.087% | 2,080 | 0.100% | | 0.012% |
| | 19 Beloit | 8 | 0 | 9,461 | | | 24.8% | 2,277 | 325 | 1,982,760 | 0.115% | 2,600 | 0.131% | | 0.016% |
| | 53 West Salem | 4 | 0 | 4,730 | | | 12.4% | 1,087 | 272 | 657,280 | 0.165% | 1,088 | 0.166% | | 0.000% |
| | Totals | 92 | 0 | 68,591 | 52,297 | 120,888 | | 30,511 | | 19,864,520 | | 36,519 | | | |

## Table 4-19. Staffing Analysis Scenario C: Fill All Vacancies and Close Three Facilities

**Staffing Analysis**

**Assumptions:**

**1) Fill all current staff vacancies, average inspector works 1314 hours per year on enforcement**
**2) Convert 34 Wrightstown, 63 Menomonie, and 11 Dickeyville to Weight Validation Sites with VWIM**
**3) Rates used to forecast inspections and percentage of trucks inspected are from the existing staff analysis**
**4) SWEF assigned staff will be onsite 90% and conducting mobile enforcement 10% of the time**

| Scenario C: Fill All Vacant Staff Positions and Close Three Facilities | | Staffing | | Staff Hours | | | | Baseline Conditions | | | | Forecast Results | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | Assignment | # Active Inspector | # Vacant Inspector | Onsite Inspection Staff Hours | Mobile Inspection Staff Hours | Total Region Staff Hours | Percentage | Baseline Inspections | Baseline Inspections per Active Inspector | Annual Weekday Truck Volume | Baseline % Trucks Inspected | Inspections | % Trucks Inspected | Inspection Regional Differences | % Trucks Inspected Differences at SWEF |
| **North Central (Wausau)** | Mobile Enforcement | 7 | 0 | | 9,724 | 14,454 | 67.3% | 1,537 | 384 | | | 2,688 | | 1153 | |
| | 44 Coloma | 4 | 0 | 4,730 | | | 32.7% | 1,562 | 391 | 678,860 | 0.230% | 1,564 | 0.230% | | 0.000% |
| **Northeast (Fond Du Lac)** | Mobile Enforcement | 11 | 0 | | 15,111 | 21,024 | 71.9% | 2,434 | 348 | | | 3,828 | | 410 | |
| | 34 Wrightstown | 0 | 0 | 0 | | | 0.0% | 984 | 492 | 971,100 | 0.101% | 0 | 0.000% | | -0.101% |
| | 35 Newton | 2 | 0 | 2,365 | | | 11.3% | 1,385 | 693 | 560,560 | 0.247% | 1,386 | 0.247% | | 0.000% |
| | 41 Abrams | 3 | 0 | 3,548 | | | 16.9% | 1,066 | 355 | 1,081,860 | 0.099% | 1,065 | 0.098% | | 0.000% |
| **Northwest (Eau Claire)** | Mobile Enforcement | 9 | 0 | | 13,271 | 26,280 | 50.5% | 2,178 | 363 | | | 3,267 | | 3635 | |
| | 61 Hudson | 5 | 0 | 5,913 | | | 22.5% | 1,556 | 519 | 1,829,620 | 0.085% | 2,595 | 0.142% | | 0.057% |
| | 63 Menomonie | 0 | 0 | 0 | | | 0.0% | 965 | 483 | 1,315,340 | 0.073% | 0 | 0.000% | | -0.073% |
| | 71 Superior | 6 | 0 | 7,096 | | | 27.0% | 1,236 | 618 | 575,380 | 0.215% | 3,708 | 0.644% | | 0.430% |
| **Southeast (Waukesha)** | Mobile Enforcement | 4 | 0 | | 6,833 | 21,024 | 32.5% | 1,666 | 417 | | | 1,668 | | 1049 | |
| | 21 Kenosha | 8 | 0 | 9,461 | | | 45.0% | 2,154 | 359 | 3,997,760 | 0.054% | 2,872 | 0.072% | | 0.018% |
| | 22 Racine | 4 | 0 | 4,730 | | | 22.5% | 991 | 330 | 3,900,780 | 0.025% | 1,320 | 0.034% | | 0.008% |
| **Southwest (DeForest)** | Mobile Enforcement | 9 | 0 | | 14,454 | 38,106 | 37.9% | 4,997 | 555 | | | 4,995 | | -34 | |
| | 11 Dickeyville | 0 | 0 | 0 | | | 0.0% | 614 | 307 | 223,080 | 0.275% | 0 | 0.000% | | -0.275% |
| | 16 Madison | 8 | 0 | 9,461 | | | 24.8% | 1,822 | 260 | 2,090,140 | 0.087% | 2,080 | 0.100% | | 0.012% |
| | 19 Beloit | 8 | 0 | 9,461 | | | 24.8% | 2,277 | 325 | 1,982,760 | 0.115% | 2,600 | 0.131% | | 0.016% |
| | 53 West Salem | 4 | 0 | 4,730 | | | 12.4% | 1,087 | 272 | 657,280 | 0.165% | 1,088 | 0.166% | | 0.000% |
| | Totals | 92 | 0 | 61,495 | 59,393 | 120,888 | | 30,511 | | 19,864,520 | | 36,724 | | | |

# 5 Strategies

There are several strategies available to maximize the potential CMV enforcement for each existing SWEF location. As shown in Table 5-1, the strategies fall into three categories: physical improvements, technology improvements, and staffing.

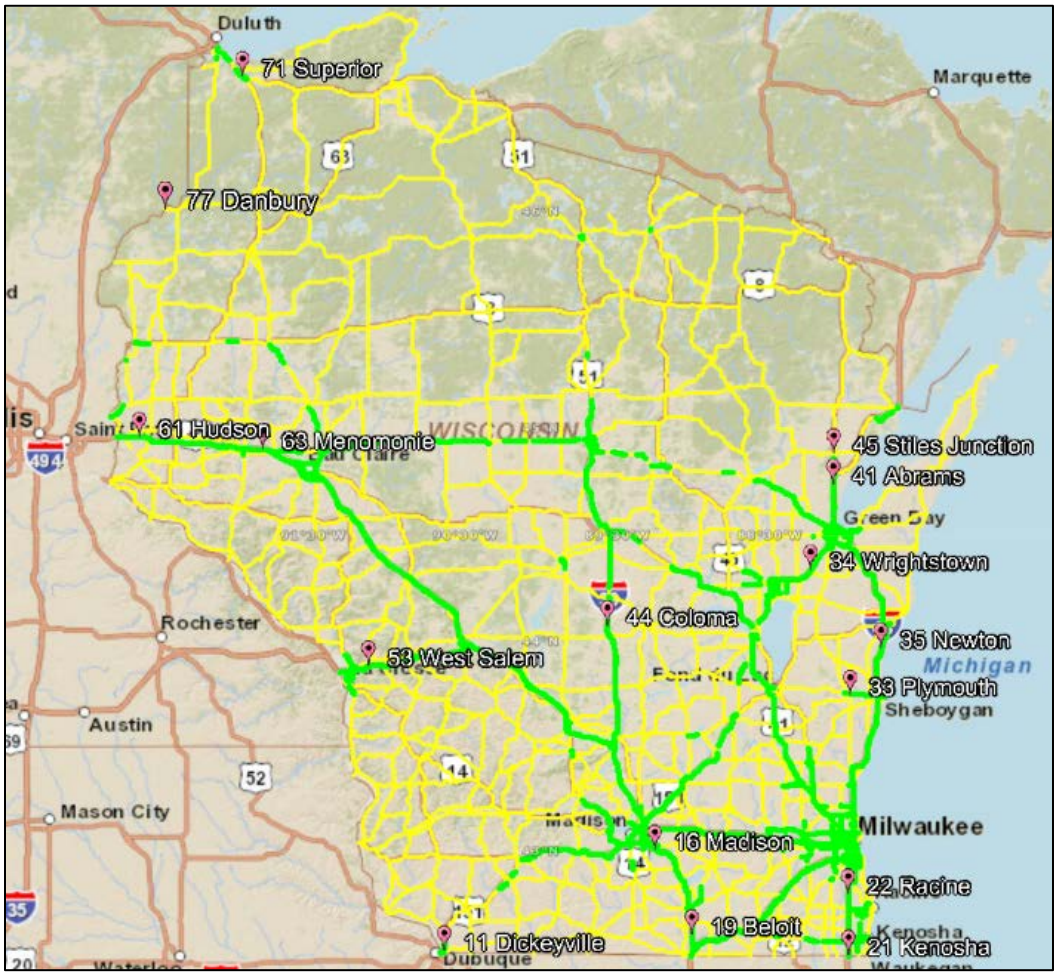
Table 5-1. Safety and Weight Enforcement Facilities (SWEF) Potential Strategies

| Physical Improvements | Technology Improvements | Staffing |
|---|---|---|
| • Reconstruct to modern standards at new location (Consolidate Rest Area and SWEF services)<br>• Reconstruct to modern standards at current site<br>• Remodel existing facilities<br>  • Building and storage<br>  • Increase building counter space<br>  • Resurface pavement/minor parking expansion<br>  • Extend mainline ramps<br>• Repurpose<br>  • Salt storage/Maintenance staging area<br>  • Weight Validation Site with pre-positioned portable scales and inspection pit (in coordination with upstream VWIM)<br>  • Training Facility<br>  • Truck Only Parking (including OSOW accommodations)<br>  • Weight Validation Sites at existing facilities (Park and Ride Lots or Rest Areas)<br>• Abandon and maintain land (maintain State Patrol comm. facilities)<br>• Abandon and sell land | • Location specific upgrades<br>  • Static Scale Upgrade<br>  • WIM (Ramp and Mainline)<br>  • VWIM (WIM + cameras)<br>  • E-screening (PrePass, Drivewyze)<br>  • License Plate Readers/USDOT Number Readers<br>  • Height Detectors<br>  • Infrared brake detection<br>  • Ramp queue length detection<br>• Use DTIM planning data-only WIM sites to enhance enforcement activities (Improve situational awareness)<br>• Maintain roadside asset condition database | • Adjust SWEF hours of operation if analysis of traffic data indicates significant overweight violations occur outside normal hours of operations<br>• Close SWEF and reallocate personnel to other operations<br>• Shift some annual vehicle inspection duties to non-sworn personnel<br>• Optimize mobile and SWEF staffing to maximize the effective use of available MCSAP funding |

Every existing SWEF is located on a major truck corridor and are therefore important to the continued protection of Wisconsin's transportation infrastructure. Using the strategies most appropriate for each SWEF will enhance functionality and maximize resources

necessary to prepare for projected increases in truck volumes. Figure 5-1 illustrates the most heavily used truck corridors in Wisconsin in terms of traffic volume.

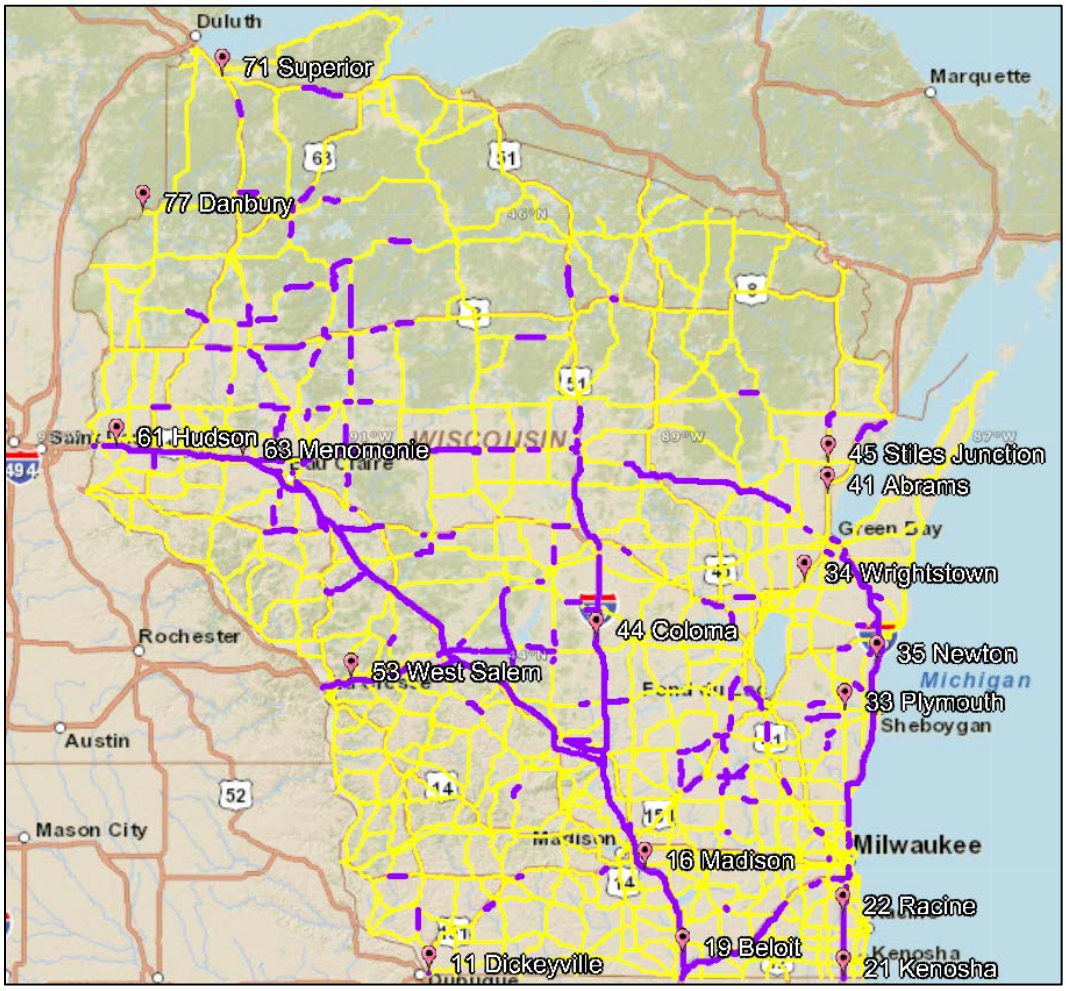
Figure 5-1. Existing Truck AADT Greater than 2000 (Green Lines)




Source: Wisconsin DOT, 2016 AADT Meta Manager

Figure 5-2 shows the most heavily used truck corridors in terms of trucks as a percentage of total traffic volume. All but four of WisDOT's existing SWEF's are located on a highway with a traffic stream comprised of more than 15% heavy trucks.

Figure 5-2. Existing Truck Percentage Greater than 15% (Purple Lines)




Source: Wisconsin DOT, 2016 AADT Meta Manager

## 5.1 Safety and Weight Enforcement (SWEF) Recommended Strategies

The SWEF analysis described in Section 4 determined location priorities, as shown in Table 4-6 (*repeated below*). The priorities were considered when determining a recommendation for each individual SWEF.

**Table 4-6 [*Repeat*] – Unconstrained and Constrained Prioritization**

| Name | Corridor | Unconstrained Priority | Constrained Priority |
|---|---|---|---|
| 21 Kenosha | I-41/94 WB | 100 | 90 |
| 19 Beloit | I-39/90 NB | 80 | 78 |
| 61 Hudson | I-94 EB | 80 | 67 |
| 22 Racine | I-41/94 EB | 76 | 62 |
| 16 Madison | I-39/90 SB | 72 | 68 |
| 63 Menomonie | I-94 WB | 60 | 51 |
| 53 West Salem | I-90 EB | 58 | 52 |
| 34 Wrightstown | I-41 NB | 54 | 47 |
| 44 Coloma | I-39 NB/SB | 48 | 42 |
| 71 Superior | US 2/53 NB/SB | 46 | 55 |
| 35 Newton | I-43 SB | 46 | 43 |
| 41 Abrams | US 41 NB/SB | 43 | 42 |
| Future Dodgeville | US 18/151 NB | 38 | 42 |
| 11 Dickeyville | US 61/151 NB/SB | 33 | 33 |

Recommendations for each SWEF are described in narrative form below and summarized in Table 5-2 (following the narratives).

### SWEF Location 11-Dickeyville/Future Dodgeville

The recommendation is to abandon the existing facility located on WIS 11/WIS 35.

It is also recommended to install two VWIM on US 61/151 between the Iowa/Wisconsin state line and Dodgeville to monitor CMV traffic. This is the primary point of entry into Wisconsin from Iowa (and vice versa for Iowa). Truck AADT in this corridor is highest on the bridge from Dubuque, IA across the Mississippi River into Grant County, so there may be an opportunity to share resources with Iowa DOT to install VWIM technology on/near the bridge to collect real-time CMV weight data that is beneficial to enforcement efforts in both states.

It is recommended to assign mobile enforcement inspectors to Grant County to patrol US 61/151 and nearby bypass locations (WIS 11 and WIS 35). Inspectors will need a suitable pull-off location to safely inspect CMVs along US 61/151, so there is potential to construct a combined use Weight Validation/Rest Area site in the future on this corridor.

*Timeline - 2021 or later; no planned roadway improvements on US 61/151 from 2016-2021*
*Estimated Cost - $1.0 Million (Install two VWIM)*

### SWEF Location16-Madison

No improvements or changes are needed in the near future for this SWEF. A modern facility was constructed in 2007, with three weigh decks, 17 truck parking spaces, mainline WIM, and Drivewyze/Pre-Pass E-Screening. Four VWIM were installed on nearby bypass routes (US 51, County N, and WIS 73) to augment enforcement. Eight inspection staff are currently assigned to this facility. The facility's 17 spaces are available for use during off-hours, but are underutilized, probably due to CMV operators' hesitancy to park where they may be subject to an inspection when the facility re-opens.

This site should be re-evaluated in 2022 to determine any needed improvements.

### SWEF Location 19-Beloit

No improvements or changes are needed in the near future for this SWEF. A modern facility was constructed in 2008, with three weigh decks, 20 truck parking spaces, mainline WIM, Drivewyze/Pre-Pass E-Screening, and an enclosed inspection building with two bays. Eight inspection staff are currently assigned to this facility. The facility's 20 spaces are available for use during off-hours, but are underutilized, probably due to CMV operators' hesitancy to park where they may be subject to an inspection when the facility re-opens.

This site should be re-evaluated in 2022 to determine any needed improvements.

Because of the high potential for trucks to bypass this facility, it is recommended that VWIM be installed in the future on US 51 NB and WIS 140 NB in Rock County to aid mobile enforcement efforts.

### SWEF Location 21-Kenosha

The recommendation is to install a mainline WIM and Pre-Pass E-Screening upstream as part of a planned resurfacing project on I-94 in 2019-2020. Mainline WIM and E-Screening would be useful tools at this very high truck volume location to screen out CMVs that should bypass the inspection process (i.e., drivers, vehicles and carriers with good safety inspection records), which would allow DSP inspection personnel to focus on drivers and vehicles that are likely to have safety and weight issues, and also minimize travel delay for many CMV operators.

A modern facility was constructed in 2003, with three weigh decks, 24 truck parking spaces, ramp WIM, and an enclosed inspection building with two bays. Eight inspection staff are currently assigned to this facility. The facility's 24 spaces are available for use during off-hours, but are underutilized, probably due to CMV operators' hesitancy to park where they may be subject to an inspection when the facility re-opens.

This site should be re-evaluated in 2022 to determine any needed improvements.

Because of the high potential for trucks to bypass this facility, it is recommended that VWIM be installed in the future on US 45 NB, WIS 31 NB, and WIS 32 NB in Kenosha County to aid mobile enforcement.

*Timeline – 2019-2020; planned resurfacing project on I-94 from 2019-2020*
*Estimated Cost - $1.5 Million (Install mainline WIM and E-Screening)*

### SWEF Location 22-Racine

The recommendation is to build a new SWEF, including mainline WIM and E-Screening, at a nearby location on I-41/94 and to repurpose the existing facility as a truck parking only site that could accommodate OSOW trip-permitted vehicles waiting to pass into Illinois.

Built in 1981, the current facility has eight truck parking spaces and three weigh decks, and is assigned four inspection staff. Due to geometric constraints of the County G interchange to the north, the proximity of the frontage road to the west of the current facility, nearby residential and commercial development, and past public opposition to locating a SWEF along the freeway Racine County, the Racine site has never been expanded to allow for additional ramp and parking storage space needed to inspect the estimated 15,000 trucks that pass by this facility each weekday. Currently, DSP Inspectors must close the entrance ramp into the facility soon after the platform scale is open because there is insufficient ramp length for multiple CMVs to wait in queue for an inspection. If left open too long, the queue backs up onto the busy freeway, creating a potentially hazardous situation.

Mainline WIM and E-Screening would be useful tools at this very high truck volume location to screen out CMVs that should bypass the inspection process (i.e., drivers, vehicles and carriers with good safety inspection records), which would allow DSP inspection personnel to focus on drivers and vehicles that are likely to have safety and weight issues, and also minimize travel delay for many CMV operators.

With a new expanded facility, which could remain open 0600 to 1800 on weekdays, inspection staffing could be increased to eight Inspectors.

*Timeline – 2023 or Later; planned reconstruction and resurfacing projects on I-41/94 from 2019-2020*
*Estimated Cost - $16 Million (Reconstruct new facility at a new location (on I-41/94 SB and repurpose the existing facility for truck parking) (Cost based on Kenosha SWEF construction costs and costs to acquire right of way for a new location)*

### SWEF Location 34-Wrightstown

The recommendation is to repurpose the existing facility located on I-41 NB to a weight validation site for mobile enforcement operations on the corridor. The existing SWEF location built in 1991 has five truck parking spaces, one weigh deck, and no recent upgrades to the platform scale or buildings. The cost to reconstruct a facility in the same location to modern standards is estimated to be $13 million based on Roadside Facilities 10 year program estimates. The staffing analysis concluded that closing the SWEF and reassigning staff to mobile enforcement would not adversely affect the number of inspections performed.

It is also recommended to install two VWIM on I-41 (one SB south of WIS 47 and the other one NB north of County S) to aid in monitoring CMV traffic in the corridor. The majority of existing bypass routes (WIS 47, WIS 55, WIS 96, County J, County N, and County S) are between these two proposed VWIM locations. Inspectors could use the

cameras at these VWIM locations to monitor trucks using the bypass routes. Instead of staffing a fixed SWEF location, Inspectors would be assigned to perform mobile enforcement on I-41 and nearby bypasses.

*Timeline - 2017 or later; planned roadway and bridge improvements on I-41 from WIS 55 to DePere, WI from 2016 to 2017*
*Estimated Cost - $1.5 Million (Install two VWIM and repurpose existing facility)*

### SWEF Location 35-Newton

The recommendation is to keep the current facility open as is. The building and grounds that were constructed in 1982 received an average rating of 3 (meaning “OK”) during a recent WisDOT detailed site evaluation. The static scale, with a single weigh deck, was replaced in 2012. Routine annual maintenance activities should be sufficient to maintain systems in the building, site landscaping, and the static scale for at least five years. One Inspector is currently assigned to this facility, but it is recommended that two more Inspectors be assigned to maximize enforcement potential of the SWEF.

This site should be re-evaluated in 2022 to determine if reconstruction of the buildings or pavement is warranted.

### SWEF Location 41-Abrams

The recommendation is to keep the current facility open as is. The building and grounds that were constructed in 1987 received an average rating of 3 (meaning “OK”) during a recent WisDOT detailed site evaluation. The static scale, with a single weigh deck, and two ramp WIM were replaced in 2014. Routine annual maintenance activities should be sufficient to maintain systems in the building, the landscaping, and the static scale for at least five years. Three Inspectors are currently assigned to this facility.

This site should be re-evaluated in 2022 to determine if reconstruction of the buildings or pavement is warranted.

### SWEF Location 44-Coloma

The recommendation is to keep the current facility open as is. The building and grounds that were constructed in 1985 received a good rating of 2.6 (meaning somewhere between “GOOD” and “OK”) during a recent WisDOT detailed site evaluation. The static scale, with one weigh deck, and two ramp WIM were replaced in 2013. Routine annual maintenance activities should be sufficient to maintain systems in the building, the landscaping, and the static scale for at least five years. Four Inspectors are currently assigned to this facility.

This site should be re-evaluated in 2022 to determine if reconstruction of the buildings or pavement is warranted.

### SWEF Location 53-West Salem / Sparta

No improvements or changes are needed in the near future for the existing SWEF at the West Salem location since a new enforcement facility will be built near Sparta on I-90 EB in 2016/2017. The new SWEF will feature standard inspection buildings, mainline WIM, E-Screening, and a training room that can be used by Inspectors, troopers, and DSP

Academy staff. In addition, VWIM will be installed on WIS 16 as part of the Sparta SWEF project to monitor CMV traffic on this bypass route. The current staff level at West Salem is four Inspectors, but this number should be increased to six after the new facility is open to maximize enforcement potential.

An increase in CMV traffic in the I-90 corridor beginning in 2016 is anticipated due to completion of MNDOT reconstruction of the I-90 Dresbach Bridge, which connects LaCrosse, WI to Winona County, MN (*See: http://www.dot.state.mn.us/dresbachbridge/*). This bridge improvement may also allow more OSOW trip-permitted vehicles to enter Wisconsin on I-90 from Minnesota.

There is a WisDOT planning-purpose WIM detector located east of Sparta on I-90 WB that could be an opportunity for use in screening trucks as they head west towards the SWEF. This would be a pilot project to test real-time data-sharing of WIM installations for both planning and enforcement purposes.

*Timeline – 2016 to 2017; planned facility on I-90 EB near Sparta, WI*
*Estimated Cost - $10.6 Million (Construct new facility and one VWIM on WIS 16)*

### SWEF Location 61-Hudson

The recommendation is to build a modern SWEF with mainline WIM and E-Screening at a current location in 2020/2021 to coincide with funding that will be available from planned construction projects in this portion of the I-94 corridor. The new SWEF facility will be co-located with modern Wisconsin Department of Tourism travel center, at an estimate cost of $19 million.

The current staff level at the Hudson SWEF is four Inspectors, but it is recommended this number be increased to six after the new facility is open to maximize enforcement potential at the SWEF and to help patrol CMV traffic using the new WIS 64 border crossing from Stillwater, MN into St. Croix County.

*Timeline – 2020 to 2021; planned road improvements on I-94 during this timeframe*
*Estimated Cost - $16 Million (Construct new SWEF and travel information center)*

### SWEF Location 63-Menomonie

The recommendation is to repurpose the existing facility on I-90 WB to a weight validation site for mobile enforcement operations, a field office for highway maintenance staff, and a salt storage area for the Dunn County Highway Department. It is also recommended that one VWIM be installed on I-94 WB upstream from the existing facility to monitor CMV movements. Inspectors would be assigned to patrol I-94 and nearby bypass roads.

The existing SWEF location built in 1985 has 10 truck parking spaces, three weigh decks, mainline WIM, and E-Screening. There have been no recent upgrades to the scale or buildings. The mainline WIM and E-Screening should be maintained so that data can be sent to DSP personnel on mobile enforcement duty, to the SWEF at Hudson, and to WisDOT planning staff in Madison.

The cost to reconstruct a facility in the same location to modern standards is estimated to be $14 million based on similar new SWEF constructions in Superior and Kenosha. The staffing analysis concluded that closing the SWEF and reassigning staff to mobile

enforcement would not adversely affect the number of inspections performed, citations issued, or warnings issued in the region.

*Timeline – 2020 to 2021; planned road improvements on I-94 during this timeframe*
*Estimated Cost - $1.5 Million (Install one VWIM and repurpose existing facility)*

### SWEF Location 71-Superior

No improvements or changes are needed in the near future for this SWEF. A modern facility was constructed at the existing location this past year and is scheduled to open February 1, 2016. Six inspection staff are currently assigned to this facility.

This site should be re-evaluated in 2022 to determine if any enforcement technology improvements are warranted.

Table 5-2. Proposed Changes to Existing SWEF Locations

| Site Number | Name | Highway | Traffic Direction | Recommended Strategies [*Year Scheduled*] | Estimated Cost |
|---|---|---|---|---|---|
| 11 | Dickeyville/ Dodgeville | US 61/151 US 18/151 | NB | (1) Abandon Dickeyville SWEF<br>(2) Install two new mainline VWIM on US 151 NB in Grant County<br>(3) *Install one new VWIM on a bypass route in the future (WIS 11 NB) (**Not included in SWEF cost estimate**)*<br>(4) *Co-located Weight Validation Site and Rest Area (**Not included in SWEF cost estimate**)*<br>[*2021 or later*] | $1.0 Million |
| 16 | Madison | I-39/90 | SB | ***No Proposed Changes*** | |
| 19 | Beloit | I-39/90 | NB | (1) *Install two new VWIM on a bypass route in the future (US 51 NB and WIS 140 NB) (**Not included in SWEF cost estimate**)* | |
| 21 | Kenosha | I-41/94 | WB | (1) Upgrade mainline WIM<br>(2) Install E-Screening<br>(3) *Install three new VWIM on bypass routes in the future (US 45 NB, WIS 31 NB, and WIS 32 NB) (**Not included in SWEF cost estimate**)*<br>[*2019-2020*] | $1.5 Million |
| 22 | Racine | I-41/94 | EB | (1) Reconstruct to modern standards at a new location<br>(2) Install mainline WIM and E-Screening<br>(3) Repurpose existing site for truck only parking<br>(4) *Install one new VWIM on a bypass route in the future (US 45 SB) (**Not included in SWEF cost estimate**)*<br>[*2023 or later*] | $16.0 Million (based on Kenosha construction costs and land purchase costs) |
| 34 | Wrightstown | I-41 | NB | (1) Repurpose as a weight validation site<br>(2) Install two new mainline VWIM on I-41 NB/SB<br>[*2017 or later*] | *Committed*<br>*$1.5 Million* |
| 35 | Newton | I-43 | SB | ***No Proposed Changes*** | |
| 41 | Abrams | US-41 | NB/SB | ***No Proposed Changes*** | |

| | | | | | |
|---|---|---|---|---|---|
| 44 | Coloma | I-39 | NB/SB | ***No Proposed Changes*** | |
| 53 | West Salem/ Sparta | I-90 | EB | (1) Reconstruct to modern standards on I-90 EB in Monroe County near Sparta, WI with training center<br>(2) Install mainline WIM and E-Screening<br>(3) Repurpose existing site for truck only parking<br>(4) Install one new VWIM on a bypass route (WIS 16)<br>[*2017-2018*] | *Committed*<br>*$10.6 Million* |
| 61 | Hudson | I-94 | EB | (1) Reconstruct to modern standards at current site and co-locate with travel information center<br>(2) Upgrade mainline WIM and E-Screening<br>[*2022 or Later*] | $16.0 Million |
| 63 | Menomonie | I-94 | WB | (1) Repurpose as a weight validation site, field office and salt storage area<br>(2) Install one new mainline VWIM on I-94 WB<br>(3) *Install one new VWIM on a bypass route in the future (WIS 29 WB)*<br>*(**Not included in SWEF cost estimate**)*<br>[*2019*] | $1.5 Million |
| 71/72 | Wentworth/ Superior | US 2/53 | EB/WB | ***No Proposed Changes** New facility to open February 2016* | |
| | | | | **Total Estimated SWEF Costs** | **$48.1 Million** |

## 5.2 VWIM Recommended Strategies

The VWIM candidate location evaluation determined the top locations most likely to be beneficial for CMV safety and weight enforcement, as shown in Table 4-12 (*repeated below*). Most of the locations are associated with SWEF bypass routes.

**Table 4-12 [*Repeat*] – Top VWIM Priorities**

| Region | Location | Corridor | Overall Priority |
|---|---|---|---|
| SW | Beloit Bypass | US 51 NB | 80 |
| NW | Stillwater, MN (Planned) | WIS 64 EB | 80 |
| SW | West Salem (Sparta)(Bypass) (Planned) | WIS 16 EB | 79 |
| NE | Green Bay (East of WIS 32) | WIS 29 EB/WB | 75 |
| SW | Dickeyville Bypass | WIS 11 EB | 75 |
| SE | Kenosha Bypass | WIS 31 NB | 74 |
| SW | Beloit Bypass | WIS 140 NB | 74 |
| SE | Kenosha Bypass | US 45 NB | 74 |
| SE | Kenosha Bypass | WIS 32 WB | 72 |
| NC | Colby, WI (W. of WIS 13) | WIS 29 EB/WB | 71 |
| NW | Hager City | US 63 EB | 71 |
| NC | Between Wausau & Stevens Point | I-39 NB/SB | 70 |
| SE | Racine Bypass | US 45 SB | 70 |
| NW | Menomonie Bypass | WIS 29 WB | 70 |

Recommendations for VWIM locations described in narrative form below and summarized in Table 5-3 (following the narratives). Recommendations are also provided for VWIM operations and data management.

### Install VWIM with a Nearby SWEF Improvement

The optimum time to install VWIM on bypass routes is when the nearby SWEF is improved, as is the case with the planned VWIM installation in Sparta, WI. It is recommended that VWIM on bypass routes be implemented when the following five SWEF locations are improved:

- 11 Dickeyville – WIS 11 EB
- 19 Beloit – US 51 NB and WIS 140 NB
- 21 Kenosha – US 45 NB, WIS 31 NB, and WIS 32 NB
- 22 Racine – US 45 SB
- 63 Menomonie – WIS 29 WB

### Install VWIM as Part of a Roadway Improvement Project

Two recommended VWIM locations currently have WisDOT roadway improvement projects planned at or very near the VWIM installation sites. It is recommended that

DTSD determine if these VWIM installations could be funded as part of the planned roadway projects. If VWIM cannot be fiscally integrated with the roadway improvement projects, then VWIM should be funded through the DTSD roadside facilities annual capital improvements budget after all roadwork is completed to avoid any installation conflicts. The two locations include:

- Green Bay, WI – WIS 29 EB/WB just west of Green Bay (planned project in 2016)
- Colby WI – WIS 29 EB/WB just west of Colby (planned project in 2017)

### Install VWIM as a Stand Alone Project

One of the recommended VWIM locations is not near an existing SWEF nor is it on a section of roadway scheduled for improvements by WisDOT. This proposed location is in the I-39 corridor between Stevens Point and Wausau and already has very high truck traffic. This location should be incorporated into the DTSD roadside facilities annual capital improvements program.

### Assess Current VWIM Locations

Each existing VWIM location should have a suitable nearby weight validation site where CMVs can be pulled over for inspection.

### VWIM Data Management

Vehicle weight data collected at each VWIM (i.e., number of vehicles in Classes 5 thru 13 that exceeded legal limits for axles, axle groupings, GVW, or Bridge Formula) should be archived for periodic analysis by DTSD and DSP staff to identify time of day, day of week, and month of year patterns in suspected overweight CMV operations.

### VWIM Installation Costs

Based on recent research performed by the Iowa Department of transportation in 2015, a VWIM installation costs approximately $500,000 per travel direction. (*Source: Iowa Department of Transportation Virtual Weigh Station (VWS) Cost Summary, June 22, 2015*).

Table 5-3. Proposed VWIM Installations

| SWEF Number | Nearest SWEF Location | Highway | Traffic Direction | Recommended Strategies for Bypass Routes [*Year Scheduled*] | Estimated Cost |
|---|---|---|---|---|---|
| 11 | Dickeyville | WIS 11 | EB | Install VWIM when existing site is repurposed. [*2021 or later*] | $0.5 Million |
| 19 | Beloit | US 51 | NB | Install VWIM after roadway projects are completed on US 51. [*2021 or later*] | $0.5 Million |
| 19 | Beloit | WIS 140 | NB | Install VWIM after roadway projects are completed on WIS 140. [*2017 or later*] | $0.5 Million |
| 21 | Kenosha | US 45 | NB | Install VWIM after roadway projects are completed on US 45. [*2018 or later*] | $0.5 Million |
| 21 | Kenosha | WIS 31 | NB | Install VWIM when mainline WIM and E-screening are installed at Kenosha SWEF. [*2020 or later*] | $0.5 Million |
| 21 | Kenosha | WIS 32 | NB | Install VWIM after roadway projects are completed on WIS 32. [*2016 or later*] | $0.5 Million |
| 22 | Racine | US 45 | SB | Install VWIM when existing SWEF site is repurposed. [*2020 or later*] | $0.5 Million |
| 63 | Menomonie | WIS 29 | WB | Install VWIM when existing SWEF site is repurposed. [*2021 or later*] | $0.5 Million |

| Region | Location | Highway | Traffic Direction | Recommended Strategies for Mainline Locations [*Year Scheduled*] | Estimated Cost |
|---|---|---|---|---|---|
| NE | Green Bay, WI | WIS 29 | EB/WB | Install VWIM after roadway projects are completed on WIS 29. [*2016 or later*]. Install for both directions of traffic. | $1.0 Million |
| NW | Colby, WI | WIS 29 | EB/WB | Install VWIM after roadway projects are completed on WIS 29. [*2017 or later*]. Install for both directions of traffic. | $1.0 Million |
| NC | Between Wausau, WI and Stevens Point, WI | I-39 | NB/SB | Install VWIM when budget allows. Install for both directions of traffic. [*2016 or later*] | $1.0 Million |
| | | | | **Total Estimated VWIM Cost** | **$7.0 Million** |

## 5.3 Staffing Recommended Strategies

WisDOT has several opportunities to make more efficient and more effective use of its fixed-site and VWIM enforcement facilities and staffing resources. These include:

**SWEF/VWIM Data Management** – It is recommended that a user-friendly data summary or "dashboard" be developed for DSP management to monitor SWEF and VWIM enforcement activity data (e.g., SWEF hours of operation, Inspector hours worked, vehicles weighed, vehicles exceeding legal weight limits, number of citations issued, number of out of service orders issued by type, MCSAP inspections conducted by level).

**Confirm SWEF Hours of Operation with Periodic Traffic Data Analysis** – At least once every three years analyze available CMV traffic volume data (e.g., by time of day, day of week, month of year) upstream from SWEF sites to confirm that scheduled hours of operation are optimal relative to trends in traffic patterns.

**Reallocate Inspectors Following Future Closure/Repurposing of SWEFs** – As selected SWEFs are closed or repurposed in coming years, sworn personnel currently assigned to those locations should be reallocated to other CMV field enforcement operations, where needed.

**Shift Some Annual Vehicle Inspection Duties to Civilian Personnel** – Where operationally appropriate and where qualified staffing resources permit, shift some annual or as-needed vehicle inspection duties (i.e., school buses, human service/ specialized transit vehicles, salvage title vehicles) to new or re-assigned non-sworn civilian DSP personnel. This does NOT include CMV safety/weight inspections conducted at SWEFs or on mobile enforcement operations, which should continue to be performed by sworn DSP Inspectors.

**Make Greater Use of VWIMs** – Increase the potential operational value of past and future investments in VWIM technology by expanding the number of DSP troopers in high truck volume corridors and by storing joint-use portable scales in permanent secure enclosures in WisDOT-owned truck pull-off sites.

**Encourage Local Involvement in CMV Safety/Weight Enforcement** – In high truck volume corridors, where local resources and interest permit, DSP should continue to encourage local law enforcement agencies to remain active and proficient in CMV safety and weight enforcement thru DSP-led training and information sharing, and if deemed appropriate, thru equipment sharing and joint operational deployments.

### Staffing Analysis of Recommended SWEF Strategies

The staffing analysis tool was used to calculate projected regional inspections, citations, and warnings if Wrightstown, Dickeyville, and Menomonie SWEFs were closed and converted to weight validations sites for mobile enforcement operations. As shown in Table 5-4, the results were positive, indicating that closing these fixed SWEF sites would not decrease the amount of inspections if all current staff vacancies are filled.

## Table 5-4: Staffing Analysis of SWEF Recommended Strategies

**Staffing Analysis**

**Assumptions:**

**1) Fill all current staff vacancies, average inspector works 1314 hours per year on enforcement**
**2) Convert 34 Wrightstown, 63 Menomonie, and 11 Dickeyville to Weight Validation Sites with VWIM**
**3) Rates used to forecast inspections and percentage of trucks inspected are from the existing staff analysis**
**4) SWEF assigned staff will be onsite 90% and conducting mobile enforcement 10% of the time**

| Fill All Vacant Staff Positions and Close Three Facilities | | Staffing | | Staff Hours | | | | Baseline Conditions | | | | Forecast Results | | Inspection Regional Differences | % Trucks Inspected Differences at SWEF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | Assignment | # Active Inspector | # Vacant Inspector | Onsite Inspection Staff Hours | Mobile Inspection Staff Hours | Total Region Staff Hours | Percentage | Baseline Inspections | Baseline Inspections per Active Inspector | Annual Weekday Truck Volume | Baseline % Trucks Inspected | Inspections | % Trucks Inspected | | |
| **North Central (Wausau)** | Mobile Enforcement | 7 | 0 | | 9,724 | 14,454 | 67.3% | 1,537 | 384 | | | 2,688 | | 1153 | |
| | 44 Coloma | 4 | 0 | 4,730 | | | 32.7% | 1,562 | 391 | 678,860 | 0.230% | 1,564 | 0.230% | | 0.000% |
| **Northeast (Fond Du Lac)** | Mobile Enforcement | 11 | 0 | | 15,111 | 21,024 | 71.9% | 2,434 | 348 | | | 3,828 | | 410 | |
| | 34 Wrightstown | 0 | 0 | 0 | | | 0.0% | 984 | 492 | 971,100 | 0.101% | 0 | 0.000% | | -0.101% |
| | 35 Newton | 2 | 0 | 2,365 | | | 11.3% | 1,385 | 693 | 560,560 | 0.247% | 1,386 | 0.247% | | 0.000% |
| | 41 Abrams | 3 | 0 | 3,548 | | | 16.9% | 1,066 | 355 | 1,081,860 | 0.099% | 1,065 | 0.098% | | 0.000% |
| **Northwest (Eau Claire)** | Mobile Enforcement | 9 | 0 | | 13,271 | 26,280 | 50.5% | 2,178 | 363 | | | 3,267 | | 3635 | |
| | 61 Hudson | 5 | 0 | 5,913 | | | 22.5% | 1,556 | 519 | 1,829,620 | 0.085% | 2,595 | 0.142% | | 0.057% |
| | 63 Menomonie | 0 | 0 | 0 | | | 0.0% | 965 | 483 | 1,315,340 | 0.073% | 0 | 0.000% | | -0.073% |
| | 71 Superior | 6 | 0 | 7,096 | | | 27.0% | 1,236 | 618 | 575,380 | 0.215% | 3,708 | 0.644% | | 0.430% |
| **Southeast (Waukesha)** | Mobile Enforcement | 4 | 0 | | 6,833 | 21,024 | 32.5% | 1,666 | 417 | | | 1,668 | | 1049 | |
| | 21 Kenosha | 8 | 0 | 9,461 | | | 45.0% | 2,154 | 359 | 3,997,760 | 0.054% | 2,872 | 0.072% | | 0.018% |
| | 22 Racine | 4 | 0 | 4,730 | | | 22.5% | 991 | 330 | 3,900,780 | 0.025% | 1,320 | 0.034% | | 0.008% |
| **Southwest (DeForest)** | Mobile Enforcement | 9 | 0 | | 14,454 | 38,106 | 37.9% | 4,997 | 555 | | | 4,995 | | -34 | |
| | 11 Dickeyville | 0 | 0 | 0 | | | 0.0% | 614 | 307 | 223,080 | 0.275% | 0 | 0.000% | | -0.275% |
| | 16 Madison | 8 | 0 | 9,461 | | | 24.8% | 1,822 | 260 | 2,090,140 | 0.087% | 2,080 | 0.100% | | 0.012% |
| | 19 Beloit | 8 | 0 | 9,461 | | | 24.8% | 2,277 | 325 | 1,982,760 | 0.115% | 2,600 | 0.131% | | 0.016% |
| | 53 West Salem | 4 | 0 | 4,730 | | | 12.4% | 1,087 | 272 | 657,280 | 0.165% | 1,088 | 0.166% | | 0.000% |
| | Totals | 92 | 0 | 61,495 | 59,393 | 120,888 | | 30,511 | | 19,864,520 | | 36,724 | | | |

# 6 Appendices

# 6.1 Appendix A: Federal Size and Weight Limits

With creation of the Interstate Highway System by Congress in 1956, the US Bureau of Public Roads (later re-organized as the Federal Highway Administration) established 73,280-lbs as the maximum permissible GVW limit for vehicles operating on the new system, consistent with recommendations from the American Association of State Highway Officials (AASHO, later re-named AASHTO).[13] This limit was increased to 80,000-lbs in 1974.

Today, federal law [*23 U.S.C. 127*] limits weights for single axles (i.e., one or more axles with centers no more than 40 inches apart) to no more than 20,000-lbs, and tandem axle groups (i.e., one or more axles whose centers are more than 40 inches but not more than 96 inches apart) are limited to 34,000-lbs.[14] In addition, the maximum GVW of any vehicle on the Interstate System is limited to 80,000-lbs, unless the Bridge Formula dictates a lower weight limit. States may set their own CMV axle weight and GVW limits for all public roadways off the Interstate Highway System.

In the mid-1970s, Congress enacted the federal Bridge Formula, which was designed to limit the weight-to-length ratio of motor vehicles crossing a bridge. Compliance with the Bridge Formula can be accomplished in two ways: (1) spreading weight over additional axles, or (2) increasing the distance between axles. Bridge Formula weight limits are determined by the following equation:

$$W = 500 [(LN / N-1) + 12N + 36]$$

where,

W = overall gross vehicle weight on any group of 2 or more consecutive axles to the nearest 500-lbs

L = distance (in feet) between the outer axles of any group of 2 or more consecutive axles

N = number of axles in the group under consideration

The maximum permissible GVW loads for vehicles in regular operation per the federal Bridge Formula are shown in Table 6-1.

In addition to maximum weight limits, several federal maximum vehicle dimension limits apply to the roughly 200,000-mile National Network of highways. The Network includes: (1) all Interstate System highways, and (2) highways certified by states to USDOT as capable of safely accommodating larger commercial motor vehicles.[15] These dimension limits include:

- Overall Vehicle Length: While there is no federal limit for overall vehicle length for most categories of vehicles, on the National Network, combination vehicles (i.e.,

[13] *When the federal Interstate axle and GVW limits were established in 1956, and amended in 1974, states were allowed to retain or "grandfather" state-enacted weight limits that were higher.*

[14] *Federal rules provide an exception (up to 400 pounds) to these legal maximum weight limits for vehicles equipped with operational auxiliary power units (APU).*

[15] *Non-Interstate highways included in the National Network were formerly classified as Primary System routes.*

truck tractor, plus trailer or semi-trailer) that are designed and used to carry automobiles or boats in specially-designed racks may not exceed 65-feet in overall length or 75-feet depending on the type of connection between tractor and trailer

- Trailer Length: No state is allowed to impose a length limit less than 48-feet (or longer if provided for by "grandfather" rights) on a semi-trailer operating in a truck tractor/semi-trailer combination on the National Network; plus, no state can impose a length limit less than 28-feet on a semi-trailer or trailer operating in a truck tractor/twin-trailer combination on the National Network
- Vehicle Width: No state can impose a width limit of more or less than 102-inches on the National Network; safety devices (e.g. mirrors, handholds) necessary for safe and efficient operation of motor vehicles cannot be included in the width calculation
- Vehicle Height: There is no federal limit for vehicle height; typical maximum state limits range from 13-ft 6-in to 14-ft 6-in

Table 6-1. Maximum Permissible Gross Vehicle Weight per Federal Bridge Formula

| | **Based on Weight Formula W = 500 [(LN / N-1) + 12N + 36]** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ***Maximum Gross Vehicle Weight (in pounds) that can be carried on any group of 2 or more consecutive axles (W)*** | | | | | | | |
| Distance in feet between axle centers (L) | Number of Consecutive Axles (N) | | | | | | | |
| | 2-axles | 3-axles | 4-axles | 5-axles | 6-axles | 7-axles | 8-axles | 9-axles |
| 4 | 34,000 | | | | | | | |
| 5 | 34,000 | | | | | | | |
| 6 | 34,000 | | | | | | | |
| 7 | 34,000 | | | | | | | |
| 8 | 34,000 | 34,000 | | | | | | |
| More than 8/Less than 9 | 38,000 | 42,000 | | | | | | |
| 9 | 39,000 | 42,500 | | | | | | |
| 10 | 40,000 | 43,500 | | | | | | |
| 11 | | 44,000 | | | | | | |
| 12 | | 45,000 | 50,000 | | | | | |
| | | | | | | | | |
| 16 | | 48,000 | 52,500 | 58,000 | | | | |
| | | | | | | | | |
| 20 | | 51,000 | 55,500 | 60,500 | 66,000 | | | |
| | | | | | | | | |
| 24 | | 54,000 | 58,000 | 63,000 | 68,500 | 74,000 | | |
| | | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 28 | | 57,000 | 60,500 | 65,500 | 71,000 | 76,500 | 82,000 | |
| | | | | | | | | |
| 32 | | 60,000 | 63,500 | 68,000 | 73,000 | 78,500 | 84,500 | 90,000 |
| | | | | | | | | |
| 34 | | | 64,500 | 69,000 | 74,500 | 80,000 | 85,500 | 91,000 |
| | | | | | | | | |
| 40 | | | 68,500 | 73,000 | 78,000 | 83,500 | 89,000 | 94,500 |
| | | | | | | | | |
| 43 | | | 70,500 | 75,000 | 80,000 | 85,000 | 90,500 | 96,000 |
| | | | | | | | | |
| 50 | | | 75,500 | 79,000 | 84,000 | 89,000 | 94,500 | 100,000 |
| 51 | | | 76,000 | 80,000 | 84,500 | 89,500 | 95,000 | 100,500 |
| | | | | | | | | |
| 56 | Interstate GVW Limit is 80,000 lbs ➔ | | 79,500 | 83,000 | 87,500 | 92,500 | 98,000 | 103,000 |
| 57 | | | 80,000 | 83,500 | 88,000 | 93,000 | 98,500 | 104,000 |
| | | | | | | | | |
| 60 | | | | 85,500 | 90,000 | 95,000 | 100,500 | 105,500 |

Source: USDOT/Federal Highway Administration, Bridge Formula Weights: Permissible Gross Loads for Vehicles in Regular Operation – http://ops.fhwa.dot.gov/Freight/publications/brdg_frm_wghts/index.htm#table

## 6.2 Appendix B: Wisconsin Size and Weight Limits

The maximum permissible GVW and group axle loads for single-unit trucks operating on Class "A" highways (i.e., all Interstate highways, plus all state highways, non-Interstate federal highways, and any local road not otherwise designated as a Class "B" highway) are shown in Table 6-2. (NOTE: Weight limits on Class B highways are 60 percent of the weight limits for Class A highways.)

Table 6-2. Wisconsin Maximum GVW/Group Axle Limits: Single-Unit Trucks on Class "A" Highways

| Distance (in feet) between axles | 2-axles | 3-axles | 4-axles | 5-axles | 6-axles | 7-axles | 8-axles |
|---|---|---|---|---|---|---|---|
| 4-ft thru 6-ft | 34,000 | | | | | | |
| 7-ft | 34,000 | 37,000 | | | | | |
| 7.5-ft to 8-ft | 35,000 | 38,500 | | | | | |
| 8-ft 1-in to 8-ft 4-in | 38,000 | 42,000 | | | | | |
| 9 | 39,000 | 43,000 | | | | | |
| 10 | 40,000 | 43,500 | | | | | |
| 11 | 40,000 | 44,500 | | | | | |
| 12 | 40,000 | 45,000 | 55,500 | | | | |
| 13 | 40,000 | 46,000 | 60,000 | | | | |
| 14 | 40,000 | 46,500 | 60,500 | | | | |
| 15 | 40,000 | 47,500 | 61,500 | | | | |
| 16 | 40,000 | 48,000 | 62,000 | 64,200 | | | |
| 17 | 40,000 | 49,000 | 63,000 | 71,700 | | | |
| 18 | 40,000 | 49,500 | 63,500 | 72,200 | | | |
| 19 | 40,000 | 50,500 | 64,500 | 73,000 | | | |
| 20 | 40,000 | 51,500 | 65,000 | 73,000 | 73,000 | | |
| 21 | 40,000 | 52,200 | 66,000 | 73,000 | 73,000 | 73,000 | |
| 22 | 40,000 | 52,900 | 66,500 | 73,000 | 73,000 | 73,000 | |
| 23 | 40,000 | 53,600 | 67,500 | 73,000 | 73,000 | 73,500 | |
| 24 | 40,000 | 54,300 | 68,500 | 73,000 | 73,000 | 74,000 | |
| 25 | 40,000 | 55,000 | 69,000 | 73,000 | 73,000 | 74,500 | |
| 26 | 40,000 | 55,700 | 69,500 | 73,000 | 73,000 | 75,000 | |
| 27 | 40,000 | 56,500 | 70,500 | 73,000 | 73,000 | 76,000 | |
| 28 | 40,000 | 57,100 | 71,300 | 73,000 | 73,000 | 76,500 | 80,000 |
| 29 | 40,000 | 58,000 | 72,000 | 73,000 | 73,000 | 77,000 | 80,000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 30 | 40,000 | 58,500 | 72,700 | 73,000 | 73,000 | 77,500 | 80,000 |
| 31 | 40,000 | 59,500 | 73,000 | 73,000 | 73,000 | 78,000 | 80,000 |
| 32 | 40,000 | 60,000 | 73,000 | 73,000 | 73,000 | 78,500 | 80,000 |
| 33 | | | | | | 79,500 | 80,000 |
| 34-ft or More | | | | | | 80,000 | 80,000 |

Source: Wisconsin DOT, Wisconsin Trucker's Guide (2007)
http://wisconsindot.gov/Documents/safety/enforcement/TruckersGuideFinal.pdf

The maximum permissible GVW and group axle loads for multiple unit combination trucks operating on Class "A" highways are shown in Table 6-3.

In general, the maximum weight limits are:

- Any one wheel or wheels supporting one end of an axle: 11,000-lbs
- Truck tractor steering axle: 13,000 lbs.
- Single axle: 20,000 lbs.
- Maximum GVW of all axles: 80,000 lbs.

Table 6-3. Wisconsin Maximum GVW/Group Axle Limits: Combination Trucks on Class "A" Highways

| Distance (in feet) between axles | 2-axles | 3-axles | 4-axles | 5-axles | 6-axles | 7-axles | 8-axles |
|---|---|---|---|---|---|---|---|
| 4-ft thru 6-ft | 34,000 | | | | | | |
| 7-ft | 34,000 | 37,000 | | | | | |
| 7.5-ft to 8-ft | 35,000 | 38,500 | | | | | |
| 8-ft 1-in to 8-ft 4-in | 38,000 | 42,000 | | | | | |
| 9 | 39,000 | 43,000 | | | | | |
| 10 | 40,000 | 43,500 | 48,500 | | | | |
| 11 | 40,000 | 44,500 | 49,500 | | | | |
| 12 | 40,000 | 45,000 | 50,000 | | | | |
| 13 | 40,000 | 46,000 | 50,500 | | | | |
| 14 | 40,000 | 46,500 | 51,500 | 62,500 | | | |
| 15 | 40,000 | 47,500 | 52,000 | 62,500 | | | |
| 16 | 40,000 | 48,000 | 52,500 | 62,500 | | | |
| 17 | 40,000 | 49,000 | 53,500 | 62,500 | 64,000 | | |
| 18 | 40,000 | 49,500 | 54,100 | 64,400 | 65,000 | | |
| 19 | 40,000 | 50,500 | 55,100 | 65,000 | 65,500 | | |
| 20 | 40,000 | 51,500 | 56,000 | 65,700 | 66,000 | | |
| 21 | 40,000 | 52,200 | 57,600 | 66,900 | 66,900 | 73,000 | |
| 22 | 40,000 | 52,900 | 57,600 | 67,700 | 67,700 | 73,000 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 23 | 40,000 | 53,600 | 58,400 | 68,900 | 68,900 | 73,500 | |
| 24 | 40,000 | 54,300 | 59,200 | 70,000 | 70,000 | 74,000 | |
| 25 | 40,000 | 55,000 | 60,000 | 71,000 | 71,000 | 74,500 | 80,000 |
| 26 | 40,000 | 55,700 | 60,800 | 72,000 | 72,000 | 75,000 | 80,000 |
| 27 | 40,000 | 56,500 | 61,600 | 72,800 | 72,800 | 76,000 | 80,000 |
| 28 | 40,000 | 57,100 | 62,400 | 73,000 | 73,000 | 76,500 | 80,000 |
| 29 | 40,000 | 58,000 | 63,200 | 73,000 | 73,000 | 77,000 | 80,000 |
| 30 | 40,000 | 58,500 | 64,000 | 73,000 | 73,000 | 77,500 | 80,000 |
| 31 | 40,000 | 59,500 | 64,000 | 73,000 | 73,000 | 78,000 | 80,000 |
| 32 | 40,000 | 60,000 | 64,000 | 73,000 | 73,000 | 78,500 | 80,000 |
| 33 | | 60,000 | 64,000 | 73,000 | 74,000 | 79,500 | 80,000 |
| 34 | | 60,000 | 64,500 | 73,000 | 74,500 | 80,000 | 80,000 |
| 35 | | 60,000 | 65,500 | 73,000 | 75,000 | 80,000 | 80,000 |
| 36 | | 60,000 | 66,000 | 73,000 | 75,500 | 80,000 | 80,000 |
| 37 | | 60,000 | 66,500 | 73,000 | 76,000 | 80,000 | 80,000 |
| 38 | | 60,000 | 67,500 | 73,000 | 77,000 | 80,000 | 80,000 |
| 39 | | 60,000 | 68,000 | 73,000 | 77,500 | 80,000 | 80,000 |
| 40 | | 60,000 | 68,500 | 73,000 | 78,000 | 80,000 | 80,000 |
| 41 | | 60,000 | 69,500 | 73,500 | 78,500 | 80,000 | 80,000 |
| 42 | | 60,000 | 70,000 | 74,500 | 79,000 | 80,000 | 80,000 |
| 43 | | 60,000 | 70,500 | 75,000 | 80,000 | 80,000 | 80,000 |
| 44 | | 60,000 | 71,500 | 75,500 | 80,000 | 80,000 | 80,000 |
| 45 | | 60,000 | 72,000 | 76,000 | 80,000 | 80,000 | 80,000 |
| 46 | | 60,000 | 72,500 | 77,000 | 80,000 | 80,000 | 80,000 |
| 47 | | 60,000 | 73,500 | 77,500 | 80,000 | 80,000 | 80,000 |
| 48 | | 60,000 | 74,000 | 78,000 | 80,000 | 80,000 | 80,000 |
| 49 | | 60,000 | 74,500 | 78,500 | 80,000 | 80,000 | 80,000 |
| 50 | | 60,000 | 75,500 | 79,500 | 80,000 | 80,000 | 80,000 |
| 51-ft or More | | 60,000 | 76,000 | 80,000 | 80,000 | 80,000 | 80,000 |

Source: Wisconsin DOT, Wisconsin Trucker's Guide (2007)
http://wisconsindot.gov/Documents/safety/enforcement/TruckersGuideFinal.pdf

As a practical matter, CMV operators face the possibility of added weight on a particular wheel, axle or group of axles due to operational issues, such as accumulation of snow, ice, mud or dirt, or minor load shifts. However, these factors do not exempt a CMV from the maximum allowable weights shown in Table 6-2 and Table 6-3. A variety of weight exceptions do exist in Wisconsin statutes, but they apply only under seasonal or special circumstances, and do not apply on portions of the Interstate highway system not subject

to federal "grandfathering" of pre-Interstate designation weight limits.[16] These exceptions include:

- During officially declared energy emergences, CMVs carrying certain commodities (e.g., energy resources, fuel, milk, propane, heating oil)
- Truck tractor steering axle may exceed 13,000-lbs if the manufacturer's rated capacity of the axle and tires are sufficient to carry the weight, but not to exceed 20,000-lbs
- During harvest season (September thru December), CMV's carrying certain agricultural products (e.g., corn, soybeans, potatoes, vegetables, or cranberries) from the field to storage facilities, or manure to or from a farm
- During the "frozen road" season, vehicles transporting peeled or unpeeled forest products cut crosswise, or abrasives or salt for highway winter maintenance
- With WisDOT-issued annual or consecutive month trip permits, CMVs transporting raw forest products, fruits, vegetables, bulk potatoes for processing, seed potatoes, scrap metal, or (within 5 miles of the Michigan state line) grain, coal or iron ore.

Other dimensions limits in Wisconsin, with some exceptions depending on vehicle type or configuration, include:

- Vehicle Length:
  - Single vehicle, plus load: 40-feet
  - Combination of two vehicles, plus load: 65-feet
  - Combination tractor and semi-trailer on STH system: 75-feet
  - Drawbar length: 12-feet
- Vehicle Width: 8-ft 6-in (102-in); not included in the width calculation are rear view mirrors, turn signal lamps, hand holds for cab entry/egress, splash/spray suppressant devices, or load-induced tire bulge, and (provided they do not extend more than 3-inches on each side of the vehicle) door hardware, load tie-down devices, and toe holds or retractable steps
- Vehicle Height: 13-ft 6-in

Noteworthy exceptions to these dimension limits include:

- Height: There is no height limitation for implements of husbandry operated temporarily on a highway
- Length:
  - No limit for implements of husbandry temporarily operated on a highway
  - No overall length limit for a tractor-semi-trailer combination, a double bottom, or an automobile haul-away when operated on a designated highway

[16] *"Grandfather" weight limits apply to I-39 between US 51 and I-90/94 and to the I-41 corridor north of Milwaukee*

- 48-feet for a semi-trailer or trailer operated as part of a 2-vehicle combination
- 28-feet 6-inches for a semi-trailer or trailer operated as part of a double bottom
- 53-feet for a semi-trailer whose length from kingpin to axle does not exceed 43-feet and that is operated as part of a 2-vehicle combination on a designated highway
- 66-feet for an automobile haul-away plus an additional overhang of 4-feet to the front of the vehicle and 5-feet to the rear of the vehicle
- Length limits (and limits on the number of vehicles in combination) do not apply to a combination of vehicles in an emergency towing operation in which:
  - The towing vehicle is being used to remove a stalled or disabled vehicle or combination of vehicles from the highway to the nearest adequate place for repair; or
  - The towing vehicle is an emergency truck tractor temporarily substituted for a stalled or disabled truck tractor.

The penalty for violating weight limits includes a base deposit (i.e., forfeiture, plus all penalty surcharges, assessments, and court costs associated with nearly every statutory violation), and if the excess weight is more than 1,000-lbs, an additional statutory fee is imposed, on a sliding scale based on the amount of excessive weight, as shown in Table 6-4. (NOTE: If the excessive weight is 2,000-lbs or less, and the load can be reloaded within the normal load carrying area so that all wheels, axles or axle groups are then with statutory limits, the CMV operator has the option to reload and, if they do so, then no forfeiture is imposed.) Higher penalties are imposed for weight limit violations involving combination vehicles transporting raw forest products, as shown in Table 6-5.

Table 6-4. Wisconsin Penalties: Violating Weight Limits

| Amount Over Limit | 1st Violation | 2nd or Subsequent within 12 months |
|---|---|---|
| 1000-lbs or Less | $200.50 | $263.50 |
| More than 1000-lbs | **$200.50** plus Statutory Fee for Each Pound of Excess: | **$263.50** plus Statutory Fee for Each Pound of Excess: |
| 1001 to 2000-lbs | $0.01/lb | $0.02/lb |
| 2001 to 3000-lbs | $0.03/lb | $0.05/lb |
| 3001 to 4000-lbs | $0.05/lb | $0.08/lb |
| 4001 to 5000-lbs | $0.08/lb | $0.12/lb |
| 5000-lbs or More | $0.15/lb | $0.18/lb |

Source: Wisconsin Statutes, Chapter 348.21(2) – https://docs.legis.wisconsin.gov/statutes/statutes/348/III/21/3/a

Table 6-5. Wisconsin Penalties: Violating Weight Limits While Transporting Raw Forest Products

| Amount Over Limit | 1st or 2nd Violation within 12 months | 3rd or Subsequent within 12 months |
|---|---|---|
| | **$389.50** plus Statutory Fee for Each Pound of Excess: | **$767.50** plus Statutory Fee for Each Pound of Excess: |
| Less than 2000-lbs | $0.06/lb | $0.20/lb |
| 2001 to 2999-lbs | $0.08/lb | $0.20/lb |
| 3000 to 3999-lbs | $0.09/lb | $0.22/lb |
| 4000 to 4999-lbs | $0.10/lb | $0.22/lb |
| 5000-lbs or More | $0.11/lb | $0.23/lb |

Source: Wisconsin Statutes, Chapter 348.21(3g) – https://docs.legis.wisconsin.gov/statutes/statutes/348/III/21/3/a

# 6.3 Appendix C: Peer State Comparison: Iowa/Minnesota/Wisconsin

Iowa and Minnesota were selected to serve as a basis for comparing Wisconsin's effort and concept of operations for commercial motor vehicle (CMV) safety and weight enforcement. Although each of these three states relies on a network of DOT-owned and maintained fixed-site roadside facilities for CMV violations detection and deterrence field operations, their choices of facility design, vehicle screening/detection/weighing technology, staffing, hours of operation, and location vary.

Likewise, each state also utilizes mobile enforcement operations, with similarities in choice of equipment and roadside inspection protocols, but with variations in staffing and choice of location. Any comparison of the relative level of CMV safety and weight enforcement activity among these states must recognize their similarities and differences in terms of authority, organization and resources, as well as in terms of population and population distribution, and roadway system attributes.

## Authority, Organization and Resources

**Iowa:** The Iowa Department of Transportation Office of Motor Vehicle Enforcement (MVE) is a work unit in the agency's Motor Vehicle Division and includes a cadre of 127 sworn law enforcement personnel.[17] Of these, 95 MVE Officers are assigned to the 12 fixed-site roadside safety and weight enforcement scales owned and maintained by Iowa DOT on main highway corridors across the state. MVE Officers are also responsible for mobile safety and weight enforcement operations away from the roadside scales, as well as motor carrier compliance reviews and new entrant audits. Although Iowa DOT has an array of 34 weigh-in-motion (WIM) installations around the state for planning-related data collection purposes, the agency has no camera-equipped vehicle weigh-in-motion (VWIM) sites available for mobile enforcement operations. Iowa DOT owns one designated pull-off site for mobile enforcement operations.

MVE Officers are not responsible for school bus inspections (which are performed twice a year by the Iowa Department of Education with assistance from Iowa State Patrol). Nor are MVE Officers responsible for ambulance or human service/specialized transit vehicle inspections (which are not explicitly required by state law) or for salvage title vehicle inspections in compliance with the federal Truth in Mileage Act of 1986 (which can be performed by any local peace officer certified to do so).

The Iowa State Patrol (ISP) is a work unit in the Iowa Department of Public Safety, which is a separate state agency from Iowa DOT. Although ISP does not assign sworn personnel to focus solely on motor carrier safety and weight enforcement at Iowa DOT's roadside scales, the agency does have a small number of troopers who maintain certification to perform MCSAP inspections. Plus, all 377 ISP troopers are authorized to enforce all traffic laws to which CMV operators and owners are subject, including

[17] *Much of the information about Iowa CMV enforcement authority, organization and resources was provided by Maj. Lance Evans, Iowa Department of Transportation, Office of Motor Vehicle Enforcement*

licensing, vehicle registration, rules of the road, equipment, size and weight.[18] Likewise, certified peace officers employed by local law enforcement agencies are authorized to enforce all traffic laws to which CMV operators and owners are subject, but very few, if any, local agencies have officers focused on CMV safety and weight enforcement.

*Recent Noteworthy Events in Iowa CMV Enforcement Efforts*:

- In 2011, Iowa DOT's first – and to date, only – designated CMV enforcement pull-off site was constructed as part of the US 20 expansion to a divided freeway.
- In 2012, Iowa DOT explored the feasibility of moving the Office of MVE to the Iowa DPS; the proposal was not implemented.
- In 2013-15, Iowa MVE engaged a consultant to:
  - Identify best practices in safety/weight enforcement operations in the US
  - Assess Iowa DOT's safety/weight enforcement facilities and related technology
  - Develop a CMV travel demand basis for on-going and future investments in safety/weight enforcement facilities, technology, and related resources
  - Recommend guiding principles for safety/weight enforcement operations and short-term revisions and investments in those operations
  - Develop a deployment strategy to implement recommendations

**Minnesota:** CMV safety and weight enforcement is accomplished thru an aggressive and progressive partnership between the Minnesota Department of Transportation (MNDOT) and the Minnesota State Patrol (MSP).[19] MNDOT has 23 civilian staff in the Office of Freight and Commercial Vehicle Operations, who conduct, motor carrier compliance reviews, new entrant safety audits, motor coach inspections, and hazmat inspections. MNDOT Division of Motor Vehicles civilian staff conduct salvage title vehicle inspections. MNDOT owns and maintains six fixed-site roadside scales across the state.

The MSP is a work unit in the Minnesota Department of Public Safety, which is a separate state agency from MNDOT. The MSP Commercial Vehicle Enforcement Division (also known as "District 4700") is a statewide work unit with responsibility for regularly scheduled CMV safety and weight enforcement at five of MNDOT's six fixed-site roadside scales[20], as well as mobile operations away from the scales. The majority of these personnel work 0800 to 1600, Monday thru Friday. MNDOT has an array of 17 planning-related data collection WIM installations around the state, 12 of which have been enhanced with cameras to function as VWIM sites for mobile enforcement operations. MNDOT owns four designated pull-off sites for mobile enforcement operations.

MSP's CMV safety and weight enforcement mission is accomplished by the agency's 24 civilian (non-sworn) Commercial Vehicle Inspectors who work at the roadside scales[21] and by 32 sworn personnel (troopers) whose primary focus is CMV inspections based on

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[18] *Iowa MVE officers and Iowa State Patrol troopers can only cite for violations of Iowa Code*

[19] *Much of the information about Minnesota CMV enforcement authority, organization and resources was provided by Capt. Jonathan Olsen, Minnesota State Patrol, Commercial Vehicle Enforcement Division*

[20] *One of MNDOT's fixed-site scales is used only intermittently by MSP for deterrence purposes since it has a short single-axle platform scale and is located on a low truck-volume corridor that serves primarily short-trip local traffic.*

[21] *Minnesota is one of at least 13 states that have civilian non-sworn State personnel working at roadside weight enforcement scales; the other 12 states are CA, CO, DE, FL, ID, IL, MO, MT, OH, PA, SD and WY.*

driver behavior (e.g. hours of service, impairment, qualifications).[22] Their efforts are supplemented by 11 MCSAP Level 1-certified troopers who are assigned to MSP district offices around the state[23]. Included in these staffing numbers are 30 certified motor coach inspectors.

All 535 MSP troopers are authorized to enforce all traffic laws to which CMV operators and owners are subject, including licensing, vehicle registration, rules of the road, equipment, size and weight. Likewise, certified peace officers employed by local law enforcement agencies are authorized to enforce all traffic laws to which CMV operators and owners are subject, but there are only 15 local law enforcement officers statewide who are MCSAP Level 1-certified.

Under Minnesota law, all CMV's and motor coaches are subject to annual state-certified inspection, but these inspections are conducted by private sector civilians who have been certified by MSP; therefore, MSP has four troopers assigned to the CMV inspection training and certification program. MSP troopers are responsible for state-required annual school bus inspections and human service/specialized transit vehicle inspections; therefore, MSP has 19 troopers assigned to the school bus inspection program.[24] However, MSP troopers are not responsible for ambulance inspections (which are discretionary and are performed by Minnesota EMS Regulatory Board personnel).

*Recent Noteworthy Events in Minnesota CMV Enforcement Efforts*:

- In 2011, Minnesota State government shut down temporarily due to a budget impasse in the Legislature; as a consequence, all civilian MNDOT and MSP employees engaged in CMV enforcement activities were laid off for 20 days.
- In 2012, MSP lost a lawsuit in federal court [*OOIDA v. Dunaski, et al*] regarding the agency's protocol being used to detect fatigued drivers at roadside scales; the cost of the litigation resulted in a temporary hiring freeze.
- In 2012, MNDOT engaged a consultant to evaluate CMV pre-clearance (E-Screening) technologies in use in North America and to make recommendations.
- In 2014, MSP lost a lawsuit in state appellate court [*State of Minnesota v. Stall*] that ended the use of non-sworn civilian motor vehicle inspectors in making traffic stops.

**Wisconsin:** The Division of State Patrol (DSP) is a work unit in the Wisconsin Department of Transportation (WisDOT).[25] Within the DSP, the Motor Carrier Enforcement Section has primary responsibility for statewide CMV safety and weight enforcement. The Section has 115 sworn Inspectors (including supervisors), who not only operate13 fixed-site roadside scales owned and maintained by WisDOT, but also perform mobile operations away from the scales. Their efforts are supplemented by fewer than 10 MCSAP-certified troopers in the Bureau of Field Operations, who work out of DSP posts around the state. The Section also has nine non-sworn civilian staff in the

[22] *Minnesota State Patrol troopers can only cite for violations of Minnesota state statutes.*

[23] *A minimum 120 annual Level 1 inspections are required for MSP troopers or local law enforcement officers to remain MCSAP-certified in the MSP program.*

[24] *Not included in the assignment breakdown are 14 sworn supervisory personnel in MSP's District 4700.*

[25] *Much of the information about Wisconsion CMV enforcement authority, organization and resources was provided by Capt. Brian Ausloos, Lt. Michael Klingenberg, and Lt. Karl Mittelstadt, Wisconsin DOT, Division of State Patrol, Motor Carrier Enforcement Section*

Motor Carrier Investigation Unit, who conduct motor carrier compliance reviews and new entrant safety audits.

WisDOT has fewer than 10 planning-related data collection WIM installations around the state. In addition, the agency owns seven VWIM installations for mobile enforcement operations. WisDOT also owns three designated pull-off sites for mobile enforcement operations.

All 399 troopers in the DSP Bureau of Field Operations are authorized to enforce all traffic laws to which CMV operators and owners are subject, including licensing, vehicle registration, rules of the road, equipment, size and weight.[26] Likewise, certified peace officers employed by local law enforcement agencies are authorized to enforce all traffic laws to which CMV operators and owners are subject, but there are only 39 local law enforcement officers statewide who are MCSAP Level 1-certified.

DSP Inspectors are also responsible for state-required annual school bus inspections, as well as annual human service/specialized transit vehicle inspections. A few specially-trained DSP Inspectors and troopers perform most of the salvage title vehicle inspections conducted in the state.[27] DSP is responsible for state-required ambulance inspections, but this function is accomplished by a non-sworn civilian.

*Recent Noteworthy Events in Wisconsin CMV Enforcement Efforts*:

- In 2011, for four months, public protests at the State Capitol over the state budget bill led to the temporary reassignment of some DSP Inspectors to other enforcement duties; as a consequence, there was a significant decline in CMV-related inspection and enforcement activities.
- In 2013, WisDOT constructed a designated CMV enforcement pull-off site on STH 77; in 2014, another designated pull-off site was constructed on STH 73; in 2014, WisDOT installed a VWIM site on I-41 as part of the Lake Butte des Morts causeway/bridge reconstruction.
- In 2015, the DSP Motor Carrier Enforcement Section was administratively reorganized from the Bureau of Transportation Safety (where it had been for nearly a decade) back into the Bureau of Field Operations.

### Population and Population Distribution

As shown in Table 6-6, at 3.1 million residents, Iowa has the smallest population of the three states, as well as the lowest population density (55 persons per square mile). In terms of land area (excluding inland bodies of water), at just over 54,000 square miles, Wisconsin is the smallest of the three states. Wisconsin's population (5.7 million) is slightly higher than Minnesota's (5.4 million), but Wisconsin has a much higher population density (106 vs. 68 persons per square mile).

[26] *Wisconsin State Patrol troopers and inspectors can only cite for violations of Wisconsin state statutes*

[27] *Only 18 local law enforcement agencies in Wisconsin have specially-trained personnel able to conduct salvage title vehicle inspections.*

Table 6-6. Population – Iowa/Minnesota/Wisconsin

| ATTRIBUTE | | IOWA | MINNESOTA | WISCONSIN |
|---|---|---|---|---|
| Population (*2014*) | | 3,107,126 | 5,457,173 | **5,757,564** |
| Land Area (square miles) | | 55,857 | 79,627 | **54,158** |
| | Population Density (persons/square mile) | 55.6 | 68.5 | **106.3** |
| | Population of Largest Metro Area *(2014)* | 611,549 (Des Moines) | **3,459,146** (Twin Cities) | 1,572,545 (Milwaukee) |
| | % of State Population in Largest Metro Area | 19.7% | **63.4%** | 27.3% |

Source: US Bureau of the Census
http://quickfacts.census.gov/qfd/states/19000.html
http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk

The distribution of population is dramatically different among the three states, with Minnesota having 63% of the state's population living in its largest metropolitan area (Minneapolis-St. Paul-Bloomington). This implies Minnesota has a more geographically concentrated center of economic activity than does Iowa or Wisconsin, and by implication, Minnesota has a more concentrated geographic focus of CMV operations than either Iowa or Wisconsin.

### Vehicle Miles of Travel

As shown in Table 6-7, annual vehicle miles of travel (VMT) per person in the three states are very similar, within a narrow range of 10,183 miles per year per person in Iowa to 10,440 in Minnesota. Total annual VMT, as well the rural/urban distribution of VMT, in the three states is relatively proportionate to their population totals and distribution shown in Table 6-7. Over half of the VMT in Iowa (57%) is on rural highways; in Wisconsin, the rural-urban VMT split is nearly even; while nearly 60% of the VMT in Minnesota occurs on urban roadways.

Table 6-7. Vehicle Miles of Travel – Iowa/Minnesota/Wisconsin

| ATTRIBUTE | IOWA | MINNESOTA | WISCONSIN |
|---|---|---|---|
| Vehicle Miles of Travel (*2013*) | | | |
| Total VMT *(millions)* | 31,641 | 56,974 | 59,486 |
| VMT per Person *(miles/year)* | 10,183 | 10,440 | 10,332 |
| Rural VMT *(millions)* | 18,198 | 23,318 | 30,753 |
| % Rural | **57.5%** | 40.9% | **51.7%** |
| Urban VMT *(millions)* | 13,443 | 33,656 | 28,733 |
| % Urban | 42.5% | **59.1%** | 48.3% |

Source: USDOT, Federal Highway Administration, Highway Statistics 2013, Table VM-2
https://www.fhwa.dot.gov/policyinformation/statistics/2013/vm2.cfm

## Roadway System Attributes

As shown in Table 6-8, total highway mileage and roadway density (road miles per square mile of land area) in Iowa and Wisconsin are very similar; while Minnesota has about 20% more highway miles, its road network is about 20% less dense (only 1.7 centerline miles per square mile). Wisconsin has the highest proportion of urban highway miles among the three states (20%), as well as the largest number of rural Interstate and other freeway highway centerline miles (653).

Overweight CMVs can pose a particular threat to both bridges and railroad crossings. Iowa has nearly twice as many bridges (24,300) as Minnesota and 72% more bridges than Wisconsin; plus, one in five bridges in Iowa (20%) is rated “structurally deficient”, compared to fewer than 1 in 10 bridges in Minnesota (6%) and Wisconsin (8%). The three states have similar numbers of public at-grade railroad crossings, within a narrow range of 4,016 in Wisconsin to 4,362 in Minnesota.

Table 6-8. Roadway System Attributes – Iowa/Minnesota/Wisconsin

| ATTRIBUTE | IOWA | MINNESOTA | WISCONSIN |
|---|---|---|---|
| **Centerline Highway Mileage** *(2013)* | | | |
| Total C/L Miles | 114,429 | **138,767** | 115,145 |
| C/L Miles per Square Mile Land Area | 2.05 | **1.74** | 2.13 |
| Rural C/L Miles | 101,755 | 116,560 | 91,567 |
| % Rural C/L Miles | 88.9% | 84.0% | 79.5% |
| Urban C/L Miles | 12,654 | 22,208 | **23,578** |

| | | | |
|---|---|---|---|
| % Urban C/L Miles | 11.1% | 16.0% | **20.5%** |
| Rural IH & Other Freeway C/L Miles | 610 | 598 | **653** |
| **Bridges & Railroad Crossings** | | | |
| Total Number of Bridges *(2014)* | **24,300** | 12,961 | 14,109 |
| # of Bridges Structurally Deficient | **5,022** | 830 | 1,212 |
| % Bridges Structurally Deficient | **20.7%** | 6.4% | 8.6% |
| # Public At-Grade Railroad Crossings *(2015)* | 4,331 | 4,362 | 4,016 |

Sources: USDOT, Federal Highway Administration, Highway Statistics 2013, Table HM-10
https://www.fhwa.dot.gov/policyinformation/statistics/2013/hm10.cfm
USDOT, Federal Highway Administration, Deficient Bridges by State and Highway System 2014
https://www.fhwa.dot.gov/bridge/nbi/no10/defbr14.cfm
USDOT, Federal Railroad Administration, Highway-Rail Crossing Inventory 2015
http://safetydata.fra.dot.gov/OfficeofSafety/publicsite/Downloaddbf.aspx

Table 6-9 summarizes Iowa, Minnesota and Wisconsin CMV enforcement activities by state and local agencies, as reported to the USDOT Federal Motor Carrier Safety Administration for Federal Fiscal Year 2015. In terms of total MCSAP inspections, Iowa had the most aggressive level of effort among the three states, conducting over 59,000 inspections – 83% more than Minnesota and 88% more than Wisconsin; however, nearly half (48%) of Iowa's total were Level III (Driver Only) inspections, compared to only 26% and 27% Level III inspections in Minnesota and Wisconsin, respectively.

Driver out-of-service (OOS) rates were comparable among the three states, ranging from 6.5% in Minnesota to 8.7% in Iowa; in contrast, the national driver OOS rate was only 5.0% in FFY 2015. Likewise, vehicle OOS rates were comparable among the three states, ranging from 24.4% in Minnesota to 27.2% in Wisconsin; all three states were higher than the 20.3% vehicle OOS rate nationally. HazMAT OOS rates were higher in Iowa (10.4%) and Minnesota (12.2%) than in Wisconsin (7.4%); all three states were higher than the 4.0% national HazMAT OOS rate.

In terms of CMV traffic enforcement interventions, Iowa had the most aggressive level of effort among the three states, with over 11,000 traffic enforcement actions – 111% more than Minnesota and 80% more than Wisconsin. Whereas 75% of the CMV traffic enforcement interventions in both Iowa and Wisconsin involved moving traffic violations, only 57% of Minnesota's traffic enforcement interventions involved moving traffic violations.

Table 6-9. CMV Enforcement Activities – Iowa/Minnesota/Wisconsin

| ENFORCEMENT ACTIVITY | IOWA | MINNESOTA | WISCONSIN |
|---|---|---|---|
| **Roadside Inspections** *(FFY 2015)* | | | |
| Total MCSAP Inspections | **59,211** | 32,363 | 31,478 |
| Level I (Full) | 9,437 | 6,540 | 7,744 |
| Level II (Walk-Around) | 21,469 | 15,655 | 14,919 |
| Level III (Driver Only) | **28,133** | 8,439 | 8,466 |
| Level IV (Special Study) | 0 | 544 | 241 |
| Level V (Terminal) | 172 | 1,185 | 108 |
| Level VI (Radioactive Material) | 0 | 0 | 0 |
| Driver Out-of-Service Rate | 8.7% | 6.5% | 8.0% |
| Vehicle Out-of-Service Rate | 26.4% | 24.4% | 27.2% |
| HazMAT Out-of-Service Rate | 10.4% | 12.2% | **7.4%** |
| **Traffic Enforcement Actions*** *(FFY 2015)* | | | |
| # of Traffic Enforcement Actions | **11,263** | 5,338 | 6,275 |
| With Moving Violations | 8,437 | **3,021** | 4,697 |
| With Drug/Alcohol Violations | 42 | 15 | 11 |
| With Railroad Crossing Violations | 3 | 6 | 2 |
| With Non-specified State Law & Miscellaneous Violations | 3,151 | 2,480 | 1,814 |

Source: Federal Motor Carrier Safety Administration, Motor Carrier Management Information System (MCMIS) data snapshot as of 12/28/15, Analysis & Information Online: Roadside Inspections – http://ai.fmcsa.dot.gov/SafetyProgram/RoadsideInspections.aspx

* Traffic enforcement actions by type of violation do not add up to the total number of traffic enforcement actions since a single traffic stop can reveal violations in more than one category.

All three states allow local units of government to engage in CMV enforcement activities and, with a few exceptions, to enact and enforce local ordinances that conform to comparable state statutes. To understand the fiscal incentives for local law enforcement to actively engage in CMV safety and weight enforcement efforts in these three states, it is important to acknowledge variations in the formulas for allocating revenues collected from traffic violators upon conviction. The following is a summary of relevant elements:

**Iowa:** All persons convicted of a traffic offense must pay:

- Scheduled Fine: Amount varies by type of offense
- Surcharge: 35% of the Scheduled Fine (5% goes to the city or county in which the offense occurred; 95% goes to the State, of which 83% is deposited in the State General Fund and 17% goes to the Victim Compensation Fund)
- Court Cost: $60.00
- County Enforcement Surcharge: $5.00 (only if the citation is issued by the county sheriff for a county ordinance violation)

The allocation of Scheduled Fine revenue depends on how the violation was cited:

- State Statute: 100% to the State General Fund
- County Ordinance: 100% to the county, EXCEPT:
  - Speeding violations: 100% to State General Fund
  - **Vehicle weight violations**: 100% to State Road Use Tax Fund
  - Any violation also penalized under State law: 100% to State General Fund
- City Ordinance: 90% to the city; 10% to the State General Fund

**Minnesota:** All persons convicted of a traffic offense must pay:

- Base Fine: Amount varies by type of offense
- Surcharge: $75.00 (except $12.00 for parking violations)
- County Law Library Fee: Varies by county from $10 to $12 (does not apply to parking violations)

The allocation of Base Fine revenue depends on who issued the citation, who prosecuted the case, and where the offense occurred:

- If the offender was apprehended by the Minnesota State Patrol, one of three allocation formulas applies to the distribution of the Base Fine:
  - In general:
    - 3/8 to the State General Fund
    - 5/8 to the Trunk Highway Fund
  - If the offender is prosecuted by a city attorney:
    - 1/3 to the State General Fund
    - 1/3 to the municipality
    - 1/3 to the Trunk Highway Fund
  - If the violation involves motor vehicle weights
    - 3/8 to the State General Fund
    - 5/8 to the Highway User Tax Distribution Fund

- If the offender was prosecuted by a County Attorney (unless the County Attorney was working under contract to the city) and was NOT apprehended by the Minnesota State Patrol, 100% of the Base Fine goes to the State General Fund.

- If the offender was NOT prosecuted by a County Attorney and was NOT apprehended by the Minnesota State Patrol, then the allocation varies depending in which county the offense occurred:

- In Hennepin County (including the City of Minneapolis):[28]
  - 80% to the local unit of government
  - 20% to the State General Fund
- In Ramsey County (excluding the City of St. Paul):
  - 50% to the local unit of government
  - 50% to the State General Fund
- In all other counties or the City of St. Paul:
  - 2/3 to the local unit of government
  - 1/3 to the State General Fund

**Wisconsin:** All persons convicted of a traffic offense must pay:

- Base Deposit: Amount varies by type of offense
- Penalty Surcharge: 26% of the Base Deposit
- Jail Surcharge: $10.00 or 1%, whichever is higher
- Crime Lab Drug Surcharge: $13.00
- Justice Information System Surcharge: $21.50 ($25.00 in Milwaukee County)
- Court Support Services: $68.00
- Circuit Court Costs: $25.00 (Municipal court costs vary from $15 to $38)

In addition, penalties for traffic offenses committed by a commercial driver license holder while operating a CMV include an $8.00 Truck Drivers Education Fee.

The allocation of Base Deposit revenue depends on how the violation was cited:

- State Statute: 50% to the State Common School Fund; 50% to the county in which the offense occurred
- Municipal Ordinance: 100% to the municipality (county, city, village, town) whose law enforcement agency issued the citation

[28] *Per Minn. Stat. §487.87, in Hennepin County, the County Attorney shall prosecute any arrest made by officers of the Hennepin County Sheriff or the Minnesota State Patrol*

# 6.4 Appendix D: Wisconsin Safety and Weight Enforcement Facilities

**Site No. 11 – Dickeyville**


| | |
|---|---|
| County | *Grant* |
| Township | *Jamestown* |
| Highway | *US 61/151; WIS 11/WIS 35* |
| Location | *0.6-mi East of US 61/151* |
| Date Opened | *1981* |
| Truck Parking | *10 Spaces* |
| Mainline ADT | *5,874* |
| WIM | *No* |
| Pre-Pass | *No* |
| Weigh Decks | *1* |
| Load Cells | *4* |
| Notes | *Travel distance from US 61/151 NB (Exit 1) is about 3,400-ft; travel distance from US 61/151 SB (Exit 1) is about 4,950-*ft |

**Site No. 16 – Madison**


| | |
|---|---|
| **County** | ***Dane*** |
| Township | *Pleasant Springs* |
| Highway | *I-39/90 SB* |
| Location | *Milepost 145.5* |
| Date Opened | *2007* |
| Truck Parking | *17 Spaces* |
| Mainline ADT | *28,710* |
| WIM | *Mainline/Ramp* |
| Pre-Pass/ Drivewyze | *Mainline* |
| Weigh Decks | *3* |
| Load Cells | *16* |
| Notes | *Augmented with VWIM installations on US 51, WIS 73 and County N* |

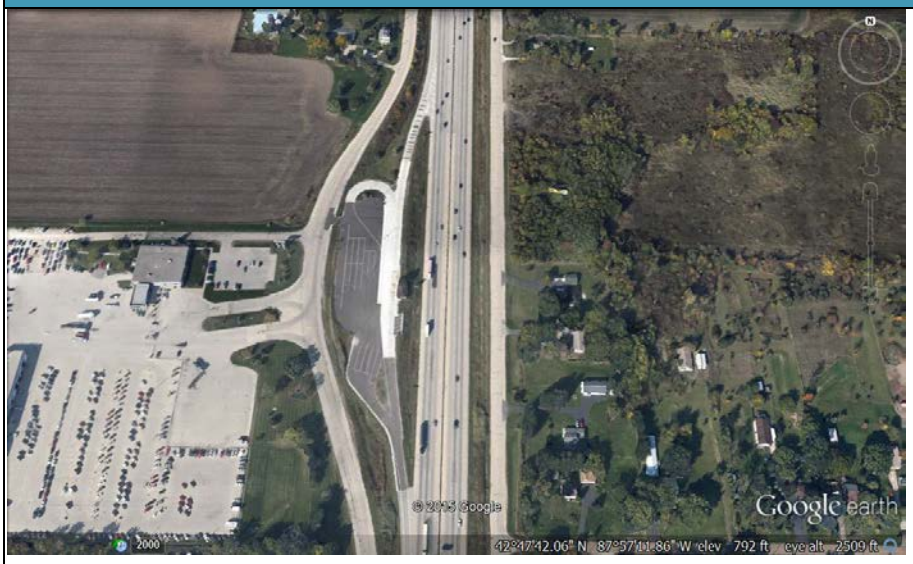
## Site No. 19 – Beloit


| | |
|---|---|
| County | *Rock* |
| Township | *LaPrairie* |
| Highway | *I-39/90 NB* |
| Location | *Milepost 180* |
| Date Opened | *2008* |
| Truck Parking | *20 Spaces* |
| Mainline ADT | *26,115* |
| WIM | *Mainline/Ramp* |
| Pre-Pass/ Drivewyze | *Mainline* |
| Weigh Decks | *3* |
| Load Cells | *16* |
| Notes | *Enclosed inspection building (2 bays)* |

## Site No. 21 – Kenosha


| | |
|---|---|
| County | *Kenosha* |
| Municipality | *Pleasant Prairie* |
| Highway | *I-41/94 WB* |
| Location | *Milepost 349.8* |
| Date Opened | *2003* |
| Truck Parking | *24 Spaces* |
| Mainline ADT | *51,253* |
| WIM | *Ramp Only* |
| Pre-Pass | *No* |
| Weigh Decks | *3* |
| Load Cells | *14* |
| Notes | *Enclosed inspection building (2 bays)* |

## Site No. 22 – Racine




| | |
|---|---|
| County | *Racine* |
| Township | *Raymond* |
| Highway | *I-41/94 EB* |
| Location | *Milepost 327.3* |
| Date Opened | *1981* |
| Truck Parking | *8 Spaces* |
| Mainline ADT | *49,845* |
| WIM | *No* |
| Pre-Pass | *No* |
| Weigh Decks | *3* |
| Load Cells | *12* |
| Notes | |

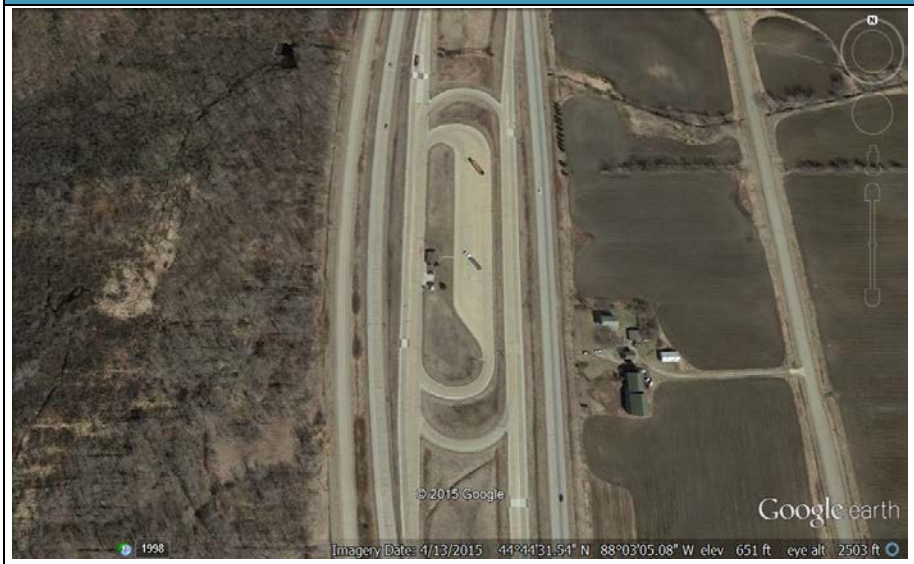
## Site No. 34 – Wrightstown


| | |
|---|---|
| County | *Outagamie* |
| Township | *Kaukauna* |
| Highway | *I-41 NB* |
| Location | *Milepost 153* |
| Date Opened | *1991* |
| Truck Parking | *5 Spaces* |
| Mainline ADT | *25,935* |
| WIM | *No* |
| Pre-Pass | *No* |
| Weigh Decks | *1* |
| Load Cells | *1* |
| Notes | |

## Site No. 35 – Newton


| | |
|---|---|
| County | *Manitowoc* |
| Township | *Centerville* |
| Highway | *I-43 SB* |
| Location | *Milepost 141* |
| Date Opened | *1982* |
| Truck Parking | *10 Spaces* |
| Mainline ADT | *12,685* |
| WIM | *No* |
| Pre-Pass | *No* |
| Weigh Decks | *1* |
| Load Cells | *4* |
| Notes | |

## Site No. 41 – Abrams




| | |
|---|---|
| County | *Oconto* |
| Township | *Little Suamico* |
| Highway | *US 41 NB/SB* |
| Location | *1.5-mi South of CTH D* |
| Date Opened | *1987* |
| Truck Parking | *20 Spaces* |
| Mainline ADT | *28,500* |
| WIM | *Ramp Only (2)* |
| Pre-Pass | *No* |
| Weigh Decks | *1* |
| Load Cells | *4* |
| Notes | *Located in median to cover traffic in both directions* |

## Site No. 44 – Coloma


| | |
|---|---|
| County | *Waushara* |
| Township | *Hancock* |
| Highway | *I-39 NB/SB* |
| Location | *Milepost 127* |
| Date Opened | *1985* |
| Truck Parking | *12 Spaces* |
| Mainline ADT | *16,420* |
| WIM | *Ramp Only (2)* |
| Pre-Pass | *No* |
| Weigh Decks | *1* |
| Load Cells | *4* |
| Notes | *Located in median to cover traffic in both directions* |

## Site No. 53 – West Salem


| | |
|---|---|
| County | *LaCrosse* |
| Township | *Hamilton* |
| Highway | *I-90 EB* |
| Location | *Milepost 10.6* |
| Date Opened | *1987* |
| Truck Parking | *15 Spaces* |
| Mainline ADT | *13,030* |
| WIM | *No* |
| Pre-Pass | *No* |
| Weigh Decks | *1* |
| Load Cells | *4* |
| Notes | |

## Site No. 61 – Hudson


| | |
|---|---|
| County | *St. Croix* |
| Township | *Warren* |
| Highway | *I-94 EB* |
| Location | *Milepost 8* |
| Date Opened | *1992* |
| Truck Parking | *18 Spaces* |
| Mainline ADT | *25,495* |
| WIM | *Mainline & Ramp* |
| Pre-Pass/ Drivewyze | *Yes* |
| Weigh Decks | *1* |
| Load Cells | *4* |
| Notes | |

## Site No. 63 – Menomonie


| | |
|---|---|
| County | *Dunn* |
| Township | *Red Cedar* |
| Highway | *I-94 WB* |
| Location | *Milepost 48.3* |
| Date Opened | *1985* |
| Truck Parking | *10 Spaces* |
| Mainline ADT | *17,815* |
| WIM | *Mainline* |
| Pre-Pass/ Drivewyze | *Yes* |
| Weigh Decks | *3* |
| Load Cells | *3* |
| Notes | |

## Site No. 71 – Wentworth/Superior

***Note: Photo and description are for the OLD Superior SWEF***


| | |
|---|---|
| County | *Douglas* |
| Township | *Parkland* |
| Highway | *US 2/53 NB/SB* |
| Location | *2-mi East of WIS 13* |
| Date Opened | *1969* |
| Truck Parking | *10 Spaces* |
| Mainline ADT | *15,160* |
| WIM | *No* |
| Pre-Pass | *No* |
| Weigh Decks | *1* |
| Load Cells | *4* |
| Notes | *Located in median to cover traffic in both directions*<br><br>*New facility opened in 2016* |