Investigation of Illegal Weigh Station Bypassing

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Kentucky Transportation Center
College of Engineering, University of Kentucky, Lexington, Kentucky

in cooperation with
Kentucky Transportation Cabinet
Commonwealth of Kentucky

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University of Kentucky

Research Report
KTC-23-07/SPR22-617-1F

Investigation of Illegal Weigh Station Bypassing

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16. Abstract

This study recommends best practices to curb illegal weigh station bypassing by commercial motor vehicles (CMVs). Analysis of historical data collected by Kentucky State Police – Commercial Vehicle Enforcement (KSP-CVE) for 2017-2021 revealed that CMV drivers were charged with illegally bypassing weigh stations 2,616 times. Drivers were charged with an average of two other violations when cited for illegal bypassing — most often violations related to credentialing, vehicle safety, or driver safety. Site visits to three permanent weigh stations in Kentucky revealed that CMVs regularly bypass weigh stations illegally, including those authorized to use preclearance systems (Drivewyze and PrePass). A survey distributed to law enforcement officials in U.S. and Canadian jurisdictions found that 49% of the responding jurisdictions have seen a recent uptick in illegal bypasses. Most participating jurisdictions (70%) have conducted enforcement details to tamp down illegal bypassing, which indicates it is a widespread problem. Every illegal bypass likely results in jurisdictions missing out on revenues and increases the likelihood of poor safety outcomes. The safety and financial implications of illegal bypasses are substantial enough to warrant swift, comprehensive action to mitigate them.

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Executive Summary

In recent years, the number of commercial vehicles observed illegally bypassing Kentucky weigh stations has increased significantly. Some vehicles shadow a PrePass or Drivewyze truck with bypass clearance as it passes the station — a practice known as ghosting. Others simply bypass on the mainline despite having no authority to do so. Still others pull into weigh stations only to disregard signage when directed to stop for inspection. This problem has been precipitated by a severe reduction in the number of commercial vehicle enforcement (CVE) personnel. Staffing has also been shifted away from weigh stations to focus on traffic enforcement and roadside inspections. And inspectors who staff weigh stations are not authorized to pursue vehicles whose drivers do not comply with weigh station signage. The working assumption underlying this project was that most — if not all — commercial vehicle drivers who illegally bypass weigh stations do so to avoid being cited for safety or tax violations. Violations result in Kentucky and other states losing out on revenue and increase the risk of other drivers being involved in an crash with a commercial vehicle.

To understand the full scope of the problem, Kentucky Transportation Center (KTC) researchers analyzed Kentucky State Police (KSP) historical data from quarterly inspection reports for 2017-2021. Researchers also conducted three site visits at permanent weigh stations in Kentucky, two of which were enforcement details. KTC administered a survey to document the experiences of law enforcement officials throughout the United States and Canada with illegal bypassing.

KSP's 2017-2021 data indicates that 2,616 instances of illegal bypassing by commercial vehicles occurred in Kentucky. Seventy-three percent of those resulted in a citation. Every instance of illegal bypassing was accompanied by an average of two other violations — most often related to credentialing, driver safety, and vehicle safety.

Site visits revealed that illegal bypassing is a persistent problem that cannot be addressed with KSP-CVE personnel alone. Because inspection times range from 30 minutes to an hour, it is highly unlikely that sworn officers at fully staffed weigh stations would be able to curb illegal weigh station bypassing. Troublingly, commercial vehicles authorized to use preclearance systems such as Drivewyze and PrePass also regularly ignored notifications to pull into the weigh station.

The law enforcement survey was sent to 66 jurisdictions and resulted in a 56% response rate. Nearly half of respondents (49%) said their jurisdiction had seen an uptick in illegal weigh station bypassing. Many jurisdictions (70%) had previously conducted enforcement details to deter drivers from illegally bypassing weigh stations.

Based on historical data analysis, weigh station site visits, and the law enforcement survey, KTC developed 10 best practices to mitigate illegal weigh station bypassing. Some can be implemented by the Kentucky Transportation Cabinet, but others require legislative action by the Kentucky General Assembly. These best practices are:

- Ensure that a sworn officer is at every permanent weigh station location.
- Improve signage in advance of permanent weigh stations.
- Establish a standard length for future weigh station ramps. Lengthen existing ramps to meet this standard.
- Increase the number of cameras at permanent weigh stations used to identify vehicles that illegally bypass.
- Employ the use of technology to issue citations remotely and automatically to drivers that illegally bypass permanent weigh stations.
- Improve preclearance system notifications (Drivewyze and PrePass).
- Increase the penalty in Kentucky for illegally bypassing weigh stations.
- Standardize pull-in rates.
- Resolve data reporting discrepancies, eliminate duplicate records, and obtain missing PrePass/ Drivewyze records.

Chapter 1 Introduction

1.1 Project Purpose

Kentucky State Police-Commercial Vehicle Enforcement (KSP-CVE) officers and inspectors have noticed a growing issue with illegal weigh station bypasses in recent years, as have administrators in the Kentucky Transportation Cabinet (KYTC) Division of Motor Carriers. KYTC commissioned this study to determine the significance of the illegal weigh station bypass problem; safety, tax and other compliance issues; the significance of the issue in other jurisdictions and how those jurisdictions approach the issue; and best practices to reduce the frequency of illegal bypassing at Kentucky weigh stations.

The primary objectives of this study were to:

- Collect data on illegal bypasses at weigh station locations around the state
- Investigate tax, credentialing, and safety issues for carriers who illegally bypass weigh stations
- Analyze the statewide impact of illegal bypassing
- Research potential solutions to reduce the number of illegal bypasses
- Develop best practices and an implementation plan

1.1.1 Background

According to Kentucky law, all vehicles over 10,000 lbs. must enter every open weigh station on the path to their destination. Unless a vehicle has obtained a special exemption, no vehicle traveling on interstate highways should exceed 80,000 lbs., according to the US Department of Transportation (USDOT). But special exemptions are available at the state level for multiple kinds of vehicles. For instance, weight limits do not apply to government-owned vehicles in the state of Kentucky. This includes trucks, semitrailers, or trailers owned by federal, state, county, or city governments (KRS §189.280). Fifteen additional states have similar exemptions. Other state exemptions include those for vehicles transporting agricultural or farm products, construction equipment, fire trucks, snowplows, and tow trucks (United States Department of Transportation, 2019).

Once a commercial vehicle enters the weigh station, it is weighed. Most weigh stations have both weigh-in-motion (WIM) and static scales. Once a vehicle is weighed and verified to weigh as being under 80,000 lbs., the vehicle is granted a green light to exit the station and continue on. A vehicle may be given a *Stop* or *Park* signal if an issue is detected. Inspectors may also conduct periodic roadside inspections at their discretion.

Currently there are 680 weigh stations in operation in the US. Weigh stations provide periodic checkpoints across the continental US to ensure commercial vehicles weighing more than 10,000 lbs. do not exceed weight limits. According to the American Trucking Associations (ATA), commercial vehicles traveled more than 300 billion miles in 2019. Due to the wear and tear they put on the nation's highways, as well as related costs for maintaining and repairing roadways, weigh stations are necessary to ensure roadway integrity is maintained for as long as possible. Weigh stations also let DOT and commercial vehicle enforcement ensure that carriers adhere to state and federal safety and credentialing requirements. This is done through inspections and issuing citations for safety or credentialing infractions.

1.1.2 Inspections

Should commercial vehicle enforcement choose to inspect a commercial vehicle, eight different levels of inspection could be carried out, but Levels I – VI are most common. Roadside inspections must be done in accordance with the North American Standard Driver/Vehicle Inspection Levels (FMCSA 2012) Every commercial vehicle must be inspected every 12 months by a qualified inspector (FMCSA, 2022). Table 1.1 outlines inspection levels as described by the Commercial Vehicle Safety Alliance (CVSA) (Commercial Vehicle Safety Alliance, 2022).

Table 1.1 Levels of Commercial Vehicle Inspections

Inspection Levels
Level I – North American Standard Inspection

Inspection Levels
Level II – Walk-Around Driver/Vehicle Inspection
Level III – Driver/Credential/Administrative Inspection
Level IV – Special Inspections
Level V – Vehicle-Only Inspection
Level VI – North American Standard Inspection for Transuranic Waste and Highway Route Controlled Quantities (HRCQ) of Radioactive Material
Level VII – Jurisdictional Mandated Commercial Vehicle Inspection
Level VIII – North American Standard Electronic Inspection

1.1.2.1 Inspection Levels

The Federal Motor Carrier Safety Administration (FMCSA) specifies eight levels of inspection, although in terms of KSP-CVE activities most inspections conducted are Level I, Level II, or Level III.

- A Level I inspection is the most comprehensive. It includes an examination of both the driver and vehicle. The driver's commercial driver's license (CDL), Medical Examiner's Certificate, Skill Performance Evaluation (SPE) (if applicable), driver's record of duty, and hours of service are all checked to verify they are up to date and valid. Additionally, inspectors will check for the presence or use of drugs or alcohol. Additionally, the driver's seatbelt use is documented, and previous inspection reports checked, as applicable. All parts of the vehicle are inspected, including but not limited to, brake systems, cargo securement, exhaust systems, windshield wipers, lighting devices (headlamps, tail lamps, stop lamps, turn signals), and tires. Passenger vehicles are checked for emergency exits, electrical cables in the engine and battery, and seating.

- A Level II inspection includes most of the components of a Level I inspection, but inspectors do not physically get under the vehicle. Drivers should still have all relevant documents for the inspector to check. A Level II inspection is typically less exhaustive than a Level I but goes more smoothly if the truck is in good working condition.

- A Level III inspection only focuses on the driver's credentials and the following are thoroughly inspected: record of duty status (RODS), CDL, hours of service, seat belt use, vehicle inspection reports, carrier ID and status, medical examiner's certificate, and skill performance evaluation certificate. If applicable, traffic violations are included in a Level III inspection.

- A Level IV inspection is considered a special inspection. A Level IV inspection includes a single assessment of one specific vehicle feature. This is most common as a request from the USDOT to track commonly reported violations or probable trends.

- A Level V inspection is a vehicle-only inspection that includes all vehicle-related components examined in a Level I inspection. Additionally, the driver is not present for the inspection. This type of inspection occurs after an accident or arrest (Mrozek, 2019).

- A Level VI inspection is an Enhanced NAS Inspection. This type of inspection is meant for commercial vehicles carrying Highway Route Controlled Quantities (HRCQ) or radioactive materials. Starting on January 1, 2005, USDOT began regulating all vehicles transporting these materials and mandates that each vehicle pass a Level VI inspection.

- A Level VII inspection is meant for vehicles that participate only in intrastate travel, such as school buses, limousines, and hotel courtesy shuttles. These inspections are conducted by CVSA-certified inspectors or other individuals approved by the respective jurisdiction. Because these inspections can be carried out by inspectors that are not CVSA-certified, the vehicle receives a jurisdiction-specific decal signifying that a Level VII has been conducted.

- A Level VIII inspection is a fully electronic inspection and is conducted while the vehicle is in motion. A Level VIII inspection must include the vehicle location (GPS coordinates), a description of who is operating the vehicle, as well as other credentials such as vehicle endorsements, CDL status, medical examiner's certificate, SPE certificate, the

driver's RODS, hours-of-service, USDOT National Safety Council number, power unit registration, operating authority, Unified Carrier Registration (UCR), and federal out-of-service orders (FOOS).

1.1.3 Inspection Decals

When a commercial vehicle passes a Level I, Level V, or Level VI inspection, a CVSA decal is applied to the vehicle. Only certified inspectors can place an inspection decal on the vehicle. Further, the CVSA decal only applies to the vehicle and not the driver. For instance, a driver who is out of service but has a vehicle in good working condition may still qualify for the decal even if they are not qualified to operate the vehicle (CVSA, 2022). Figure 1.1 shows the CVSA decals.

Figure 1.1 CVSA Inspection Decals

Decal color corresponds to the month of issuance. Green decals are issued in January, February, or March. Yellow decals are issued in April, May, or June. Orange decals are issued in July, August, or September, and white decals are issued in October, November, or December (CVSA, 2022). Figure 1.2 shows the process by which CVSA-certified inspectors use to determine if a vehicle qualifies for a CVSA decal.

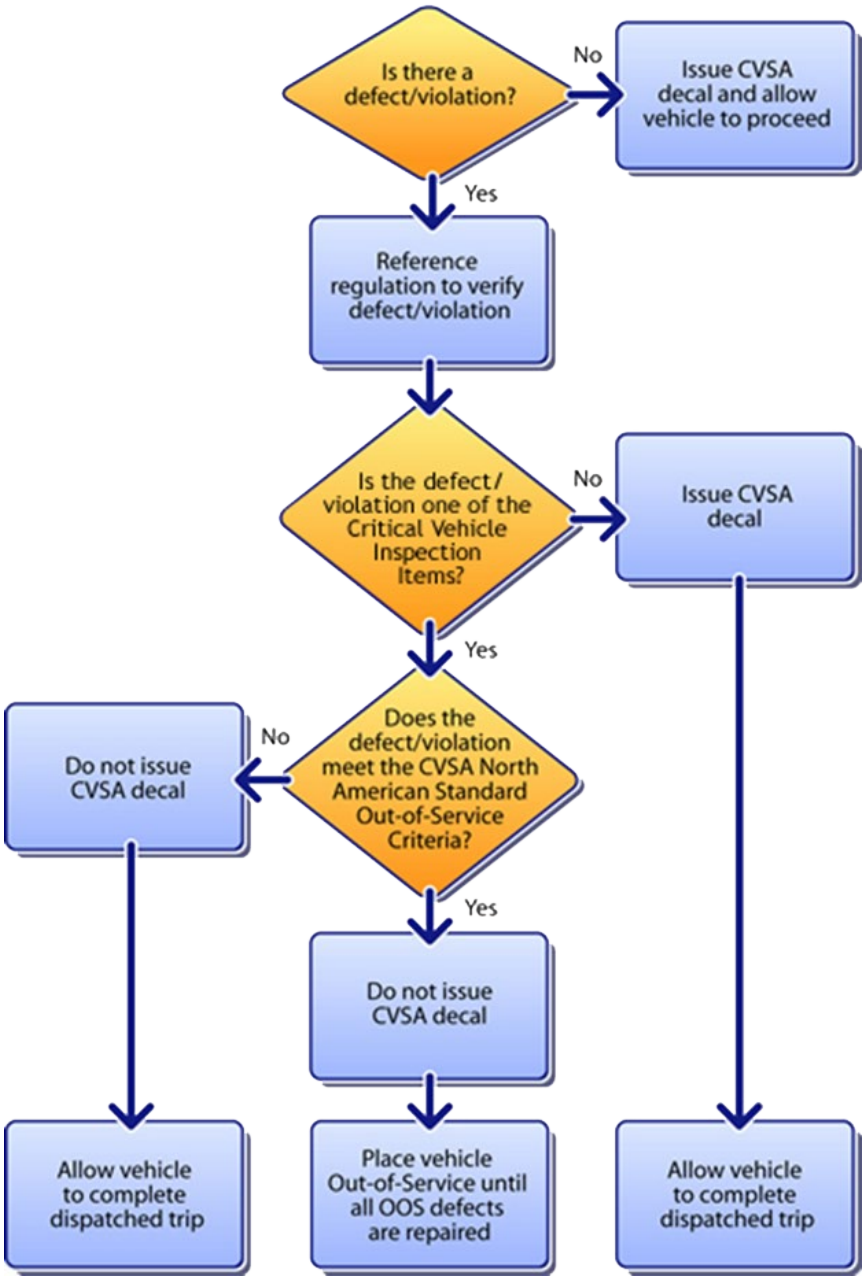

Figure 1.2 Decal Qualification Chart

If a vehicle qualifies for a decal, an inspector affixes one to the vehicle. The vehicle is then allowed to complete the trip. A vehicle that does not qualify for a decal but does not meet out-of-service criteria is not granted a decal but is allowed to complete the trip. However, a vehicle that meets the out-of-service criteria will be labeled as *Out-of-Service* until documented problems have been fixed.

1.1.4 Citations

If a commercial vehicle driver does not enter an open weigh station, a commercial vehicle enforcement officer has the authority to pursue the vehicle and require the driver to return to the weigh station. Depending on the reasoning the driver provides to the enforcement officer for bypassing the weigh station, a citation may be issued. Further, the officer will determine if there is sufficient cause to conduct a Level I, Level II, or Level III inspection. If an inspection turns up multiple safety and credentialing violations, some could end up as formal charges on a citation.

1.2 Weigh Stations in Kentucky

Fourteen permanent (fixed) weigh stations currently operate in Kentucky (Figure 1.3).

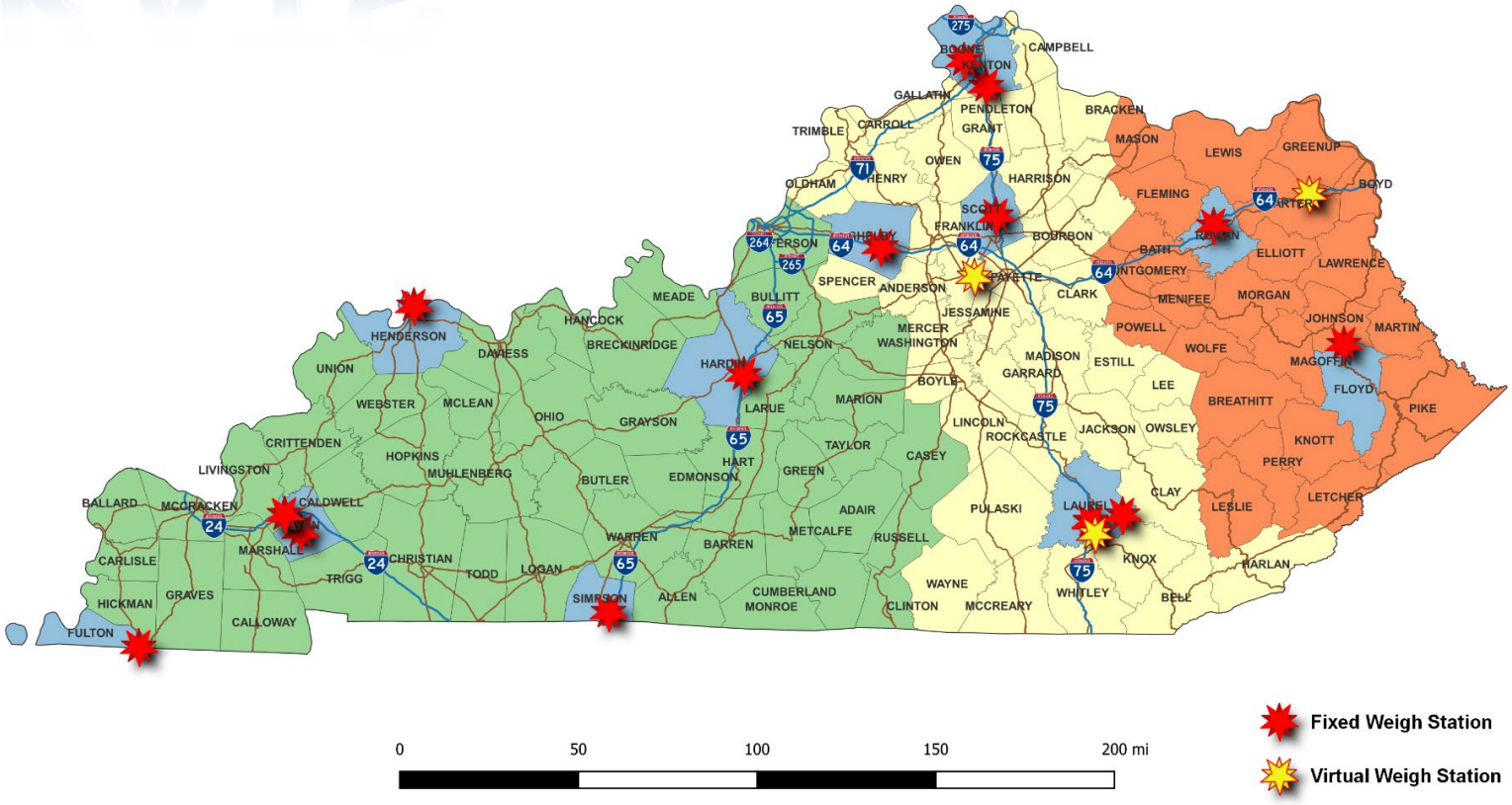

Figure 1.3 Permanent and Virtual Weigh Stations in Kentucky

Table 1.2 summarizes weigh station data, including location, the number of weigh stations in each county, and the highway they are located on. Two counties have more than one permanent weigh station. In both Laurel County and Lyon County, there are permanent weigh stations directly across the interstate from one another that monitor commercial vehicle traffic in either direction. In every other county there is only one weigh station.

Table 1.2 Permanent Weigh Stations in Kentucky

Map Label	County	No. of Weigh Stations	Highway
1	Boone	1	I-71 SB
2	Floyd	1	US-23 NB
3	Fulton	1	US-51 NB
4	Hardin	1	I-65 SB
5	Henderson	1	US-41 SB
6	Kenton	1	I-75 SB
7	Laurel	2	I-75 NB/I-75 SB
8	Lyon	2	I-24 EB/I-24 WB
9	Rowan	1	I-64 WB
10	Scott	1	I-75 NB
11	Shelby	1	I-64 EB
12	Simpson	1	I-65 NB

1.3 Statutes

Both state and federal statutes give commercial vehicle enforcement officers the authority to ensure all commercial vehicles adhere to laws and regulations set forth by each respective jurisdiction.

1.3.1 Federal Statutes

The federal statute commonly used by commercial vehicle enforcement is 49 CFR §392.2. This section states: “Every commercial motor vehicle must be operated in accordance with the laws, ordinances, and regulations of the jurisdiction in which it is being operated. However, if a regulation of the Federal Motor Carrier Safety Administration imposes a higher standard of care than that law, ordinance or regulation, the Federal Motor Carrier Safety Administration regulation must be complied with.”

1.3.2 State Statutes

A Kentucky statute (KRS 189.227) authorizes commercial vehicle enforcement to administer rules and regulations aimed at commercial vehicles. This statute states: “The Department of Kentucky State Police is authorized to employ commercial motor vehicle inspectors and such other employees as may be necessary to operate any scales erected or established, and commercial motor vehicle inspectors employed under this section shall have the authority of peace officers for the purpose of enforcing KRS 189.221 to 189.228, and other statutes relating to motor vehicles, and for no other purpose.”

1.4 Kentucky Preclearance Services

In Kentucky, commercial vehicles that comply with weight, safety, and credentialing requirements can legally bypass weigh stations. These services allow fleets to reduce travel time, save fuel, and more easily meet delivery window expectations. Kentucky currently uses two of these systems: Drivewyze and PrePass. Each platform is described below.

1.4.1 Drivewyze

Drivewyze is a mobile app that can be used on a mobile device or tablet and, at no cost, alerts commercial vehicles of approaching weigh stations (Drivewyze, 2022). For a monthly fee, carriers can enroll in Drivewyze PreClear, which lets vehicles legally bypass weigh stations and provides notifications of upcoming weigh stations. Drivewyze is available at all 14 weigh stations in Kentucky.

Prior to beginning a trip, the driver should launch the Drivewyze app. Once the app is launched, Drivewyze requires no further inputs from the driver and remains running until the operator closes it. When a driver is two miles away from a weigh station participating in Drivewyze or an inspection site, the driver receives a notification that a weigh station is upcoming. A similar notification appears when the driver is one mile from the weigh station. Figure 1.4 shows the progression of notifications a driver would receive when approaching a weigh station.

Figure 1.4 Drivewyze Driver Notifications

At the top of the notification screen, the driver is told if the approaching weigh station is a Drivewyze site. In the example presented in Figure 1.4, the approaching site is a Drivewyze site. The two images in Figure 1.4 represent the notifications that drivers see and hear as they approach a Drivewyze-supported weigh station. Once drivers are one mile from the weigh station, they receive one of three notifications (Figure 1.5).

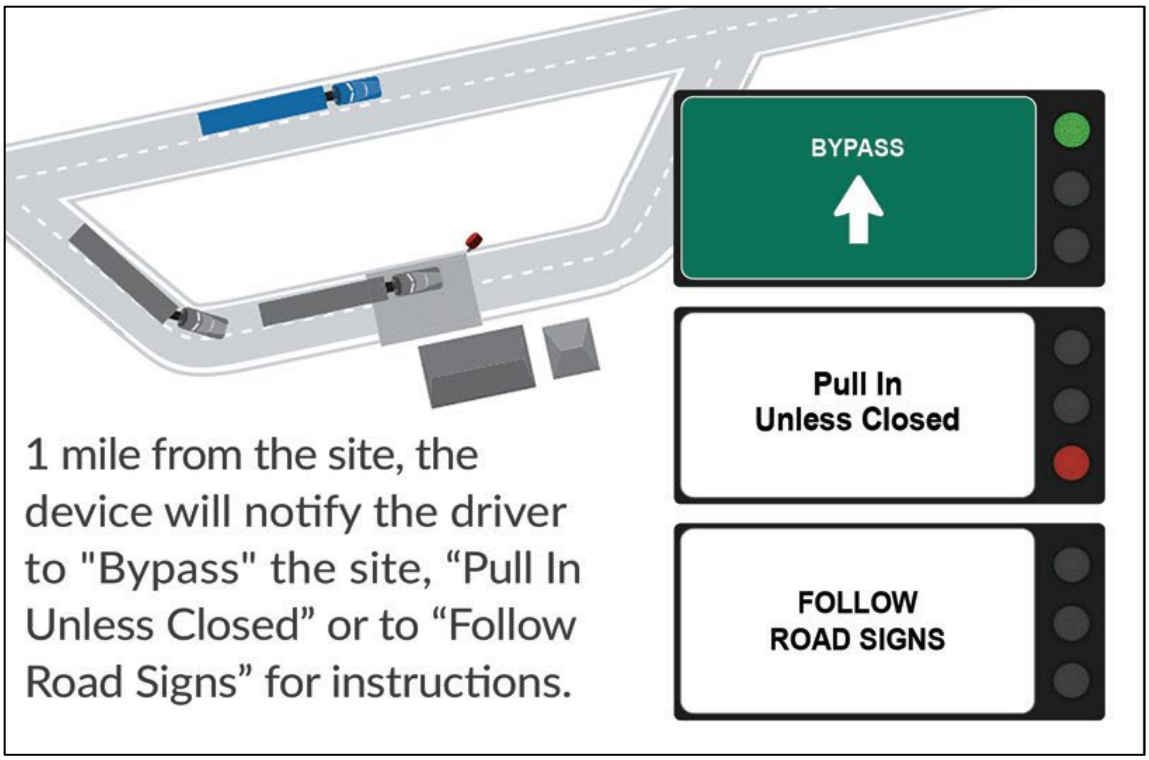

Figure 1.5 Drivewyze Weigh Station Driver Instructions

Drivers receive one of the three notifications shown in Figure 1.5. The first notification to bypass the scales tells the driver that they may legally bypass the weigh station. The *Bypass* screen has a green light and the *Pull In Unless Closed* screen has a red light. Whether a vehicle receives a *Bypass* screen is determined by several factors, including screening rules set forth by local law enforcement and carrier driving records. If a weigh station is closed, the driver receives the *Bypass* notification. At weigh stations with integrated electronic road signs, drivers receive the two-mile and one-mile notifications, but are shown the bottom image in Figure 1.5. In those cases, integrated road signs provide instructions on how to proceed instead of the Drivewyze app.

1.4.2 PrePass

PrePass is the other platform Kentucky offers that commercial vehicle drivers can use to legally bypass weigh stations. Currently, PrePass is integrated with 13 of the 14 weigh stations in Kentucky (the weigh station in Floyd County along US-23 Northbound the only exception). Figure 1.6 outlines the process carried out at PrePass weigh stations.

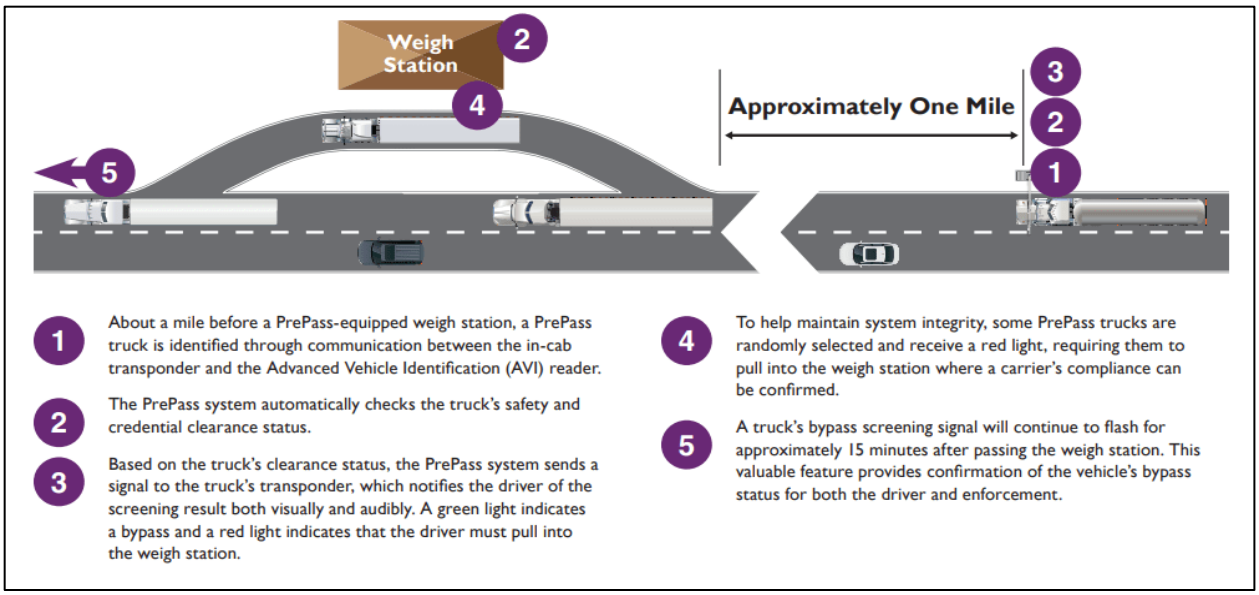

Figure 1.6 PrePass Weigh Station Bypass Process

The process by which trucks are allowed to bypass or instructed to pull into the weigh station is very similar to that of Drivewyze. While Figure 1.6 mentions the use of an in-cab transponder to communicate with the Advanced Vehicle Identification (AVI) reader near a weigh station, there is also the option to have the PrePass app. Drivers can also choose to have both the transponder and the app. The vehicle location likely determines which type of PrePass equipment is needed. For instance, Oklahoma, Iowa, Virginia, Washington, Oregon, Idaho, South Dakota, and New York operate using PrePass transponders only. Conversely, most other states permit the use of the transponder and/or phone app.

Drivers that have the PrePass app in Driving Mode receive similar notifications to those produced by Drivewyze when a weigh station is approaching (PrePass, 2022). Figure 1.7 is a screenshot of what drivers would see if using an Android device.

Figure 1.7 PrePass App Screenshot Signaling Upcoming Weigh Station (Android)

The next notification the driver receives instructs them to pull into the weigh station or bypass it. Figure 1.8 shows what both notifications look like to the driver using the PrePass App on an Android device.

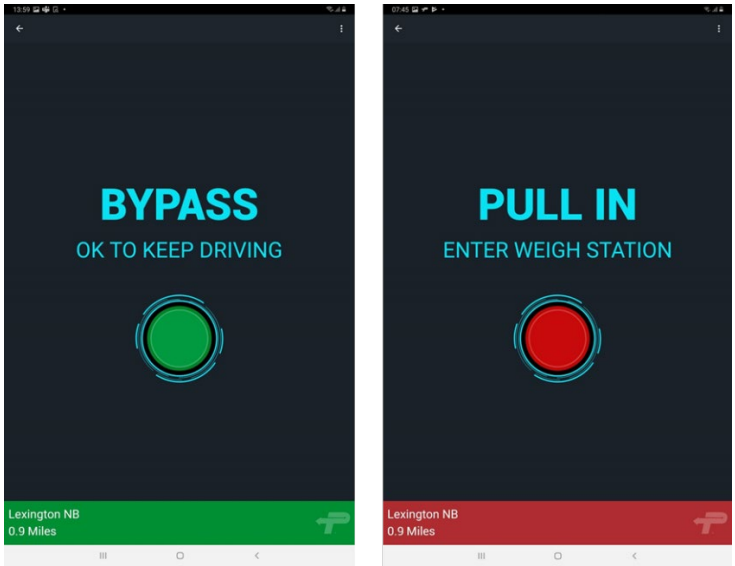

Figure 1.8 PrePass App Weigh Station Instructions (Android)

1.5 Illegal Bypassing of Weigh Stations

Although systems are in place with mechanisms that let commercial vehicles legally bypass weigh stations, commercial vehicle drivers who opt to illegally bypass risk the possibility of getting caught by enforcement officers. While there are documented cases of drivers reporting bypassing weigh stations by accident, historical data from

KSP-CVE revealed that many vehicles caught illegally bypassing also presented several other safety and credentialing violations for both the driver and vehicle. KSP-CVE officers identified three ways that drivers attempt to illegally bypass: ghosting, ignoring traffic signs, or flagrant bypassing.

1.5.1 Ghosting

Ghosting occurs when a commercial vehicle driver illegally bypasses by aligning their vehicle near another commercial vehicle that is known to have preclearance capabilities. By keeping the vehicle in the lane farthest from the weigh station, but aligned with the compliant vehicle, the driver intending to illegally bypass hopes to remain undetected by obscuring their vehicle and its markings from view. This practice is well-documented.

1.5.2 Ignoring Traffic Signs

After a commercial vehicle passes through a weigh station, it is either cleared and allowed to continue on its way or instructed to pull into the weigh station. If a vehicle is cleared, it is given a green light and/or a sign reading *Go* or *Keep Driving*. If a truck is flagged for pull-in, the driver is given a red light and/or a sign reading *Stop* or *Park*. Drivers flagged for pull-in do not have physical barriers preventing them from leaving the weigh station, so they can simply ignore the signage and risk being caught by an enforcement officer.

1.5.3 Flagrant Bypassing

Flagrant bypasses are the most common type of bypass; there are two types. In one instance, a driver may select an alternative route that lets them bypass the weigh station altogether even though there is no legitimate commercial interest for using that route. The other option for drivers is to drive past the weigh station, never intending to stop.

1.6 Consequences of Illegally Bypassing Weigh Stations

Commercial vehicles illegally bypassing has many consequences, including excessive wear and tear on roadways, uncorrected safety issues, and uncollected revenue due to credentialing lapses and unpaid carrier taxes and/or fees. If caught, carriers' safety and compliance scores can be negatively impacted.

1.6.1 Jurisdictions

Jurisdictions suffer multiple consequences from illegal bypassing. The most alarming is the possibility of increased crashes involving a commercial vehicle due to undetected and uncorrected safety issues with the vehicle and/or driver. Assuming drivers who illegally bypass weigh stations do so because of safety or credentialing issues, it increases the risk that commercial vehicles will cause a crash.

Jurisdictions are also impacted financially by illegal bypassing. Unpaid fuel and state taxes take away from revenue that jurisdictions depend on for administrative duties and data management. A single vehicle choosing to illegally bypass a weigh station may not result in much lost revenue, but widespread infractions could result in significant losses over time.

1.6.2 Carriers

Carriers also face consequences if vehicles in their fleets are caught illegally bypassing. Although some commercial vehicle drivers bypass weigh stations in error, others do so because of unresolved safety or credentialing issues. If a driver with these issues is caught by KSP-CVE, they will likely be discovered. Violations discovered by KSP-CVE are reported to FMCSA's Safety Measurement System (SMS). These violations negatively impact the Compliance, Safety, and Accountability (CSA) score, which also can be reflected on the safety record of the driver and/or carrier (FMCSA, 2021).

1.6.3 Drivers

Drivers, in addition to jurisdictions and carriers, face consequences for illegally bypassing weigh stations. Once a driver has been formally cited and convicted of illegal bypassing, they will be fined and are often required to appear in court in the state where the citation was issued. This means the driver will incur court fees and may have points taken away from their CDL. As mentioned, these violations can negatively impact a driver's safety score. Illegal bypassing is considered *Dangerous Driving* and carries a severity weight of 5. Violation severity rates range between

1 and10, with 1 being the least dangerous and 10 the most (FMCSA, 2021). A violation is entered into the SMS where it is used by law enforcement to examine CMV driver performance as part of CSA investigations (FMCSA, 2015).

1.7 Challenges to Preventing Weigh Station Bypasses

Given the severe consequences of illegal bypassing, it is a top priority for KSP-CVE. However, there are obstacles to KSP-CVE efforts, including staffing issues and communications among commercial vehicle drivers. These issues consistently undermine enforcement details and should be noted as areas of focus to improve future enforcement efforts.

1.7.1 Staffing Issues

Having enough staff to adequately run weigh stations remains a challenge across Kentucky. Uncompetitive wages combined with less interest in law enforcement positions have resulted in a general shortage of both KSP-CVE officers and certified inspectors. While most weigh stations aim to operate at peak hours, staffing issues largely dictate operating hours. The fewer hours weigh stations operate, the fewer opportunities there are for enforcement. Figure 1.9 shows the nine KSP-CVE regions as they were drawn in 1993.

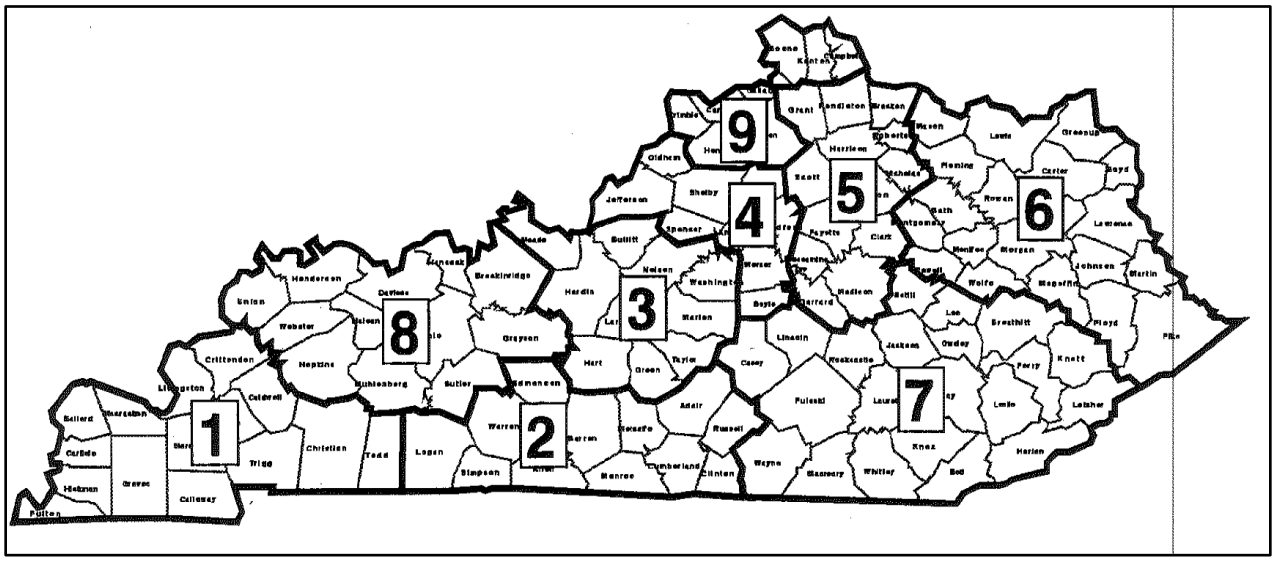

Figure 1.9 Kentucky Motor Vehicle Enforcement Regions – 1993

Figure 1.10 shows the six regions as they were drawn in 2009. With only six regions, the responsibilities of officers in each region increased.

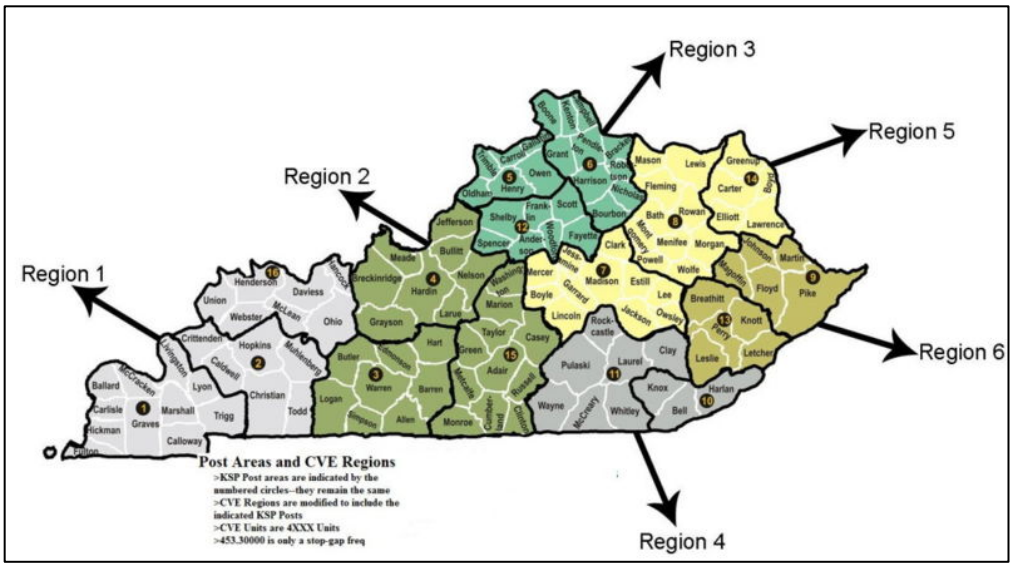

Figure 1.10 Kentucky Commercial Vehicle Enforcement Regions – 2009

Figure 1.11 shows the current Kentucky Commercial Vehicle Enforcement regions. As of January 2022, there are three regions.

Figure 1.11 Kentucky Commercial Vehicle Enforcement Regions – 2022

Table 3 lists which counties are part of each CVE region.

Table 1.3 Kentucky Counties Covered by CVE Regions

CVE Region	Counties Covered
CVE West (1)	Adair, Allen, Ballard, Barren, Breckenridge, Bullitt, Butler, Caldwell, Calloway, Carlisle, Casey, Christian, Clinton, Crittenden, Cumberland, Daviess, Edmonson, Fulton, Graves, Grayson, Green, Hancock, Hardin, Hart, Henderson, Hickman, Hopkins, Jefferson, Livingston, Lyon, Larue, Logan, Marion, Marshall, McCracken, McLean, Meade, Metcalfe, Monroe, Muhlenberg, Nelson, Ohio, Russell, Simpson, Taylor, Todd, Trigg, Union, Warren, Washington, Webster
CVE Central (2)	Anderson, Bell, Boone, Bourbon, Bracken, Campbell, Carroll, Clay, Harlan, Fayette, Franklin, Gallatin, Grant, Harrison, Henry, Kenton, Knox, Laurel, McCreary, Nicholas, Oldham, Owen, Pendleton, Pulaski,

CVE Region	Counties Covered
	Robertson, Rockcastle, Scott, Shelby, Spencer, Trimble, Wayne, Whitley, Woodford
CVE East (3)	Bath, Breathitt, Boyd, Carter, Elliott, Floyd, Greenup, Johnson, Knott, Lawrence, Leslie, Letcher, Lewis, Magoffin, Martin, Mason, Montgomery, Morgan, Perry, Pike, Rowan, Wolfe

1.7.2 Inspection Times

Commercial vehicle inspections can take between 30 minutes and an hour, depending on the level of inspection. This means one officer is occupied until the inspection they are conducting is complete. Even the most fully staffed weigh stations face enforcement challenges due to the inspection process.

1.7.3 Communication Among Drivers

Enforcement is also impacted by commercial vehicle drivers communicating with one another. It is not uncommon for drivers to warn those behind them on the same route of upcoming enforcement activities. This reduces the chances that commercial vehicles will attempt to bypass the weigh station.

Chapter 2 Literature Review

2.1 Introduction

Given the long history of weigh stations in the United States, commercial vehicles illegally bypassing weigh stations is not a new phenomenon. Prior studies have been conducted, but the most recent study is from 2002. Previous research has shown commercial vehicles are prone to illegally bypassing weigh stations under certain conditions, including in Kentucky. Other states that have conducted similar research include Wisconsin, Florida, and Oregon.

2.1.1 1988 Wisconsin Study

One aim of the Wisconsin study was to quantify how many commercial vehicles were avoiding scales along westbound I-94 in northwestern Wisconsin, including the number of overweight trucks, and equivalent single axle loads (ESALs) (Southgate et al., 1993). Research was conducted in four phases over four weeks. During Phase 1, the Rusk scale was closed and there was no enforcement detail present. This served as the baseline. During Phase 2, the Rusk scale was open, but no enforcement details were set up on bypass routes. (Note: It is generally legal for trucks to use most bypass routes if there is a valid commercial purpose, or if it is to obtain access to food, lodging or a rest area within a reasonable distance of the primary route. Operations beyond the scope of commerce or driver health exceptions, or operations on restricted routes, are illegal in most cases). During Phase 3, the scale remained open with enforcement present on the major bypass route. During Phase 4, the scale remained open and enforcement was set up on the major bypass route as well as the ancillary bypass routes. During this period, 60,000 trucks were monitored. Table 2.1 shows the findings from each phase, starting with Phase 2. All outcomes presented relative to Phase 1 observations.

Table 2.1 Wisconsin Study Phases and Outcomes

Phase	Outcome(s)
2	• Mainline truck traffic declined 15% • Truck traffic on major bypass route increased 32% • Trucks returned to the mainline after bypassing the scale • The percentage of overweight trucks on main bypass increased from 4% at baseline to 18% • Mainline ESALs dropped 16% and more than tripled on main bypass route
3	• Truck traffic on the mainline fell 18% • Truck traffic on the bypass increased 18% • Truck traffic on the most distant bypass route was up 18% • The percentage of overweight trucks on bypass routes was 7%; the mainline overweight truck percentage of dropped to 10% • Mainline ESALs decreased 23%
4	• Truck traffic on the mainline was down 17% • Truck traffic on the major bypass was down 51% • Volume of trucks using secondary bypass routes increased

Several key findings emerged from the study. First, enforcement details with portable weighing devices are necessary for bypass routes given the number of vehicles using bypass routes. Second, the greater the enforcement efforts, the longer the distance trucks will travel to avoid a weigh station. Third, there was an estimated two-year reduction in pavement life on the major bypass, but a one-year extension in pavement life on the main route. Fourth, 87% of trucks using the bypass route had major violations — 51% had safety violations, 24% had driver violations, 8% had weight violations, and 4% had registration violations. Trucks using the bypass routes were eight times more likely to have weight violations, 65% more likely to have driver violations, 14% more likely to have safety violations, and only 1/3 as likely to have no violations compared to trucks using the main travel route.

2.1.2 1989 Kentucky Study

Researchers sought to determine if inspection activities at permanent weigh stations affect the routes commercial vehicles drivers selected. Researchers used the terms *large trucks* and *heavily laden*. Large trucks were defined as those with three or more axles, and heavily laden referred to vehicles exceeding limits determined by bridge formulas.

Research was done at three permanent weigh stations: Scott County, Laurel County, and Shelby County (Pigman and Deacon, 1989). Scott County and Laurel County are situated on I-75 and Shelby County on I-64. Data collection took place on the main route and bypass routes during hours when the weigh station was open and closed. Researchers counted and classified vehicles manually, but also used historical automatic vehicle classification (AVC) data and WIM data. Four hypotheses were tested using the data:

1. Large trucks are more active on bypass routes when the mainline station is open than when it is closed.
2. Large trucks make up a higher proportion of all vehicles using bypass routes when the mainline station is open.
3. Heavily laden large trucks represent a higher proportion of all large trucks using bypass routes when the mainline station is open.
4. Along a corridor, the proportion of large trucks that use bypass routes is greater when the mainline inspection station is open.

Analysis found that heavier and/or larger trucks used bypass routes to avoid open weigh stations. In Shelby County, an open weigh station resulted in approximately four more trucks per hour taking the bypass route. Heavily laden vehicles on bypass routes increased from 11% to 45%. Researchers concluded that open weigh stations often result in commercial vehicles using bypass routes to avoid them.

2.1.3 1992 Florida Study

The objective of the Florida study was to assess the weigh station avoidance problem (Southgate et al., 1993). Further, researchers wanted to determine if bypass traffic was local, regional, or inter-regional. To conduct the research, I-95 was chosen and focused on two permanent weigh stations and four bypass routes. Four enforcement strategies were used during the research:

- Strategy A: Scales open and no citations being issued
- Strategy B: Scales open with no enforcement patrol on bypass routes, but citations issued at weigh stations
- Strategy C: Scales open with normal patrol and enforcement activities on bypass routes
- Strategy D: Scales open with maximum enforcement on bypass routes and some rest stops

Weight data were collected by WIM systems or static scales, with AVC data collected at weigh stations. Observations were conducted for one-hour periods at each site for each strategy. Several major findings, conclusions, and recommendations emerged (Table 2.2).

Table 2.2 Key Findings, Conclusions, and Recommendations from 1992 Florida Study

Key Findings	
1.	The percentage of overweight trucks decreased when enforcement increased.
2.	The number of ESALs per truck decreased at all sites during study period.
3.	Violations at the weigh station were minor while those on bypass routes were more severe.
4.	Most vehicles caught on the bypass routes were local and very overweight. Most trucks in violation at permanent stations were traveling interstate and less than 5% were overweight.
5.	More enforcement on I-95 led to decreased truck volumes at the permanent weigh stations.
6.	ESALs per truck were highest when scales were open, and no citations were being issued.
7.	The percentage of ESALs passing through the permanent weigh stations was lowest under Strategy D.
8.	Under Strategy D, ~60% of citations were issued at permanent weigh stations. Eight percent of the trucks were overweight at the weigh stations, while 19% were overweight on bypass routes. Additionally, trucks cited on the bypass routes were 1,000 pounds more than those issued tickets at the weigh stations.

Conclusions
1. Trucks evade enforcement more often than Florida enforcement personnel assumed.
2. The overweight truck problem is challenging to address without the presence of permanent data collection equipment.
Recommendations
1. An area of influence should be established for each weigh station, which includes a data collection cordon.
2. Consider Title 23 reporting requirement for bypass enforcement.
3. Install permanent WIM scales on bypass routes and use data to develop strategic enforcement efforts.
4. Recreate activities used under Strategy D to identify a point of diminishing return.
5. Assign additional positions to weigh stations and increase patrol on bypass routes.

2.1.4 1993 Kentucky Study

Beginning in May 1990, research was conducted to address the problem of trucks bypassing Kentucky weigh stations (Southgate et al. 1993). The objectives were to:

- Determine the extent of trucks bypassing weigh stations
- Review bypass studies from other states to determine if national pattern exists
- Use collected data to determine if current enforcement programs should be changed
- Evaluate the cost-effectiveness of increased enforcement to improve safety outcomes and increase revenue collection efforts

Primary data collection occurred in September and October of 1990 on Northbound I-65 in Simpson County. WIM and AVC equipment were installed on I-65 as well as three additional bypass routes (US 31W, US 31E, and US 431). AVC and WIM equipment collected data over a three-week period and the weigh station at Simpson County remained open throughout data collection. During the first week, no enforcement activities took place, establishing a baseline. During the second week, temporary inspection sites were set up along the bypass routes, and trucks were stopped for inspections, credentials checked, and a study-specific survey completed by researchers. At the end of the second week, enforcement stopped. Week three data collection took place with no enforcement on the bypass routes.

The second period of data collection took place in October 1991 along I-75 in Kenton County. Data were collected over a two-week period using AVC equipment at some locations and WIM at others. Data collected from the AVC equipment on I-65 revealed that bypass enforcement efforts may have diverted drivers to bypass routes farther away than those being studied. Further, traffic along the bypass routes had more trucks during the first week than the second when enforcement details were ongoing. Data did not support the theory that significant numbers of trucks use bypass routes to avoid inspection.

Analysis of WIM data revealed the percentage of overweight trucks on bypass routes was significantly higher than on I-65. However, given the variation in overweight trucks on all bypass routes during the data collection period, researchers could not conclude that enforcement on bypass routes had any effect on the percentage of overweight trucks that traveled them. Researchers confirmed, however, that axle weight limits were violated four times as frequently as bridge formula limits and eight times as often as gross weight limits.

Enforcement officers conducted 400+ truck inspections on three bypass routes during the second week of data collection, with all inspections documented. Trucks traveling bypass routes consistently had safety violations. For example, 60% of the trucks inspected had at least one violation. Further, 30% had violations that resulted in the truck being placed out of service (OOS), or were prevented from continuing the trip until issues were corrected.

Of the 240 inspection reports analyzed, 148 trucks had violations. There were 295 violations, or about two violations per vehicle. Vehicle violations involving braking systems, tires, vehicle lights, or signals were the most common. Driver violations were the next most common.

During data collection, 285 citations were written by enforcement personnel. There were 140 citations written for all three bypass routes, including 193 violations. The most common reason enforcement personnel issued a citation was for failing to provide a valid Kentucky ID, followed by issues related to licensing, registration, and identification.

Statewide WIM data were analyzed to determine if there was a relationship between the attractiveness of the route as a bypass route and the characteristics of truck traffic, specifically average truck weight and percentage overweight. Regression found a strong, positive relationship between the attractiveness of a route as a bypass route and the percentage of trucks exceeding weight limits ($R^2 = 0.68$).

Data were also analyzed to determine if there was a relationship between the distance to a weigh station and average truck weight and percentage overweight. Contrary to expectations, sites within three miles of a weigh station had higher truck weights and percentages of trucks overweight than those 10+ miles from enforcement sites.

The final component of the study involved determining if increased enforcement can reduce bypassing. Estimates found that the cost of bypass enforcement would be covered by the revenue generated from the citations issued. Table 2.3 summarizes the study's key conclusions and recommendations.

Table 2.3 Conclusions and Recommendations from 1993 Kentucky Study

Conclusions	
1.	There is no indication that trucks change routes based on enforcement activity on bypass routes.
2.	Average truck weights were somewhat higher on bypass routes than on interstate routes near weigh stations; the percentage of trucks weighing more than posted limits was significantly higher than on interstate routes.
3.	Most trucks on the bypass routes presented legitimate reasons for using the routes.
4.	A high percentage of trucks inspected on bypass routes had violations.
5.	The most common violations were safety related, including issues with breaks, tires, lighting, and signals.
6.	Temporary enforcement can be effective for inspection efforts to identify safety issues, and these activities can be self-sustaining because of the additional revenue collected.
Recommendations	
1.	A statewide plan should be created that addresses enforcement efforts on truck bypass routes.
2.	Adding technology to expedite enforcement processes should be considered so weigh station personnel can patrol non-interstate routes.
3.	Enforcement efforts on bypass routes should be random and take place for no more than 24 hours at a time.
4.	Measures should be developed to determine the effectiveness of enforcement efforts.
5.	Statewide WIM data in Kentucky should be evaluated and guidelines/limitations for appropriate use created and publicized.
6.	Explore the use of statewide WIM data to identify problems and dictate enforcement efforts. The effort should be carried out by a partnership between the Division of Planning and Division of Motor Vehicle Enforcement.

2.1.5 2002 Oregon Study

Oregon researchers conducted an intervention to determine the extent of illegal weigh station bypassing (Strathman and Theisen, 2002). The intervention took place at a closed weigh station along I-5 NB in Woodburn. Collected data included vehicle weights and counts from WIM scales at the I-5 weigh station as well as from two nearby bypass routes. Data was collected before, during and after closure of the weigh station. This let researchers analyze changes in volumes and weights of trucks along I-5 and the bypass routes.

To determine if there was a relationship between illegal bypassing and enforcement efforts, data were collected from three WIM locations (I-5, Highway 51, and Ehlen Road) over four months in 2001. Data collected from those sites included vehicle speed, vehicle class, gross vehicle weight (GVW), axle counts and weights, length, and distance between axles. Data were also collected from the I-5 NB scale on participants in the Green Light program, a preclearance system like Drivewyze or PrePass specific to the state of Oregon.

Beginning on May 19, 2001, the I-5 NB weigh station was closed and barricaded. The in-ground WIM scale located at the I-5 station continued to collect data. The weigh station remained closed until July 31 while construction crews paved the off-ramp. On August 1, 2001, the NB I-5 station reopened and data were collected through August 18, 2001. Roughly 5,000 trucks passed over the WIM scales every day, which generated 600,000 data points for analysis.

Data analysis included three approaches: looking at changes in truck volume, changes in truck weights, and changes in the proportion of overweight trucks. Changes in truck volume varied greatly. While truck traffic along Highway 51 exhibited a downward trend throughout the course of data collection, traffic on Ehlen Road continued upward after an initial dip. During the study, I-5 truck volumes increased 7%. Like the truck volumes, changes in mean GVWs were not consistent across sites. Researchers found that:

- From the baseline to the closure of the weigh station along I-5, the mean GVW of vehicles on Highway 51 fell. After the scale reopened, mean GVW decreased further.
- Mean GVW along I-5 increased 0.4% from the baseline to closure and decreased 1.2% after the weigh station reopened.
- Mean GVW increased 5.2% on Ehlen Road when the scale was closed. After the scale reopened, it increased an additional 12%.

The proportion of overweight trucks varied across the three sites. On I-5, the proportion of overweight trucks prior to weigh station closure was 2.27%. While the station was closed, that percentage increased to 3.67%. Once the station reopened, the percentage of overweight vehicles decreased to 3.19%. These results were anticipated. Data from the WIM scale on Highway 51 indicated there were no overweight vehicles during the study period. On Ehlen Road, 3.35% of vehicles were overweight prior to closure of the station. During the station closure, 5.52% of vehicles were overweight. This increased to 7.25% once the station reopened. Green Light program participants were less likely to be overweight during scale closures than vehicles not participating in the program. However, two classes of vehicle (four-axle 3S-1 and five-axle S1-2) showed a more pronounced shift toward overloading when the scale was closed. Researchers also noted that weight violations on I-5 did not return to pre-study numbers after the weigh station reopened.

Overall, researchers found that enforcement curbed truck overloading. There was a statistically significant shift in the percentage of overweight trucks on I-5, demonstrating that truckers are motivated to change routes when enforcement activities take place. Even so, researchers suggested further work was warranted to determine what enforcement strategies would have the maximum effect, appropriate penalties that deter truck overloading and reflect damages done to roadways, compliance issues associated with Extended Weight permits, and ideal investment of state resources.

2.2 Conclusions

Except for the 1993 Kentucky study, researchers concluded that illegal weigh station bypassing warrants further study and action to curb it. While the results of these studies must be taken into consideration when determining the scope of illegal weigh station bypassing, every study was conducted at least 20 years ago. Earlier research focused on the illegal use of bypass routes, which while important obfuscates the importance of the more flagrant illegal bypassing on primary routes that has become a more significant issue in recent years. Since these studies were published, advances in transportation technology have changed many processes and improved enforcement and inspection efforts. Vehicle and driver requirements, tax systems, and inspection standards have also evolved since these studies were published. More up-to-date research is necessary to determine if illegal bypassing of weigh stations by commercial vehicles is currently a problem in Kentucky.

Chapter 3 Historical Data Collection and Analysis

3.1 Collecting Historical Enforcement Data 2017-2021

We used historical data from KSP's repository to evaluate the severity of illegal weigh station bypassing in Kentucky from 2017 to 2021. All warnings and citations given by KSP-CVE officers were compiled into a single dataset. Several pieces of information were used to sort data, including the Inspection ID Number, Federal Violation Code, Violation Description, Supplemental Description, County Name, and Citation Number. The Inspection ID number is a unique, chronological number created when an enforcement officer conducts a stop and/or inspection of a commercial vehicle. The Federal Violation Code is used to specify which laws were broken at the time of the traffic stop. The Violation Description is a generic description of the violation directly associated with a state or federal statute used to justify the stop. For instance, the federal statute violation code of 392.2 reads "Every commercial motor vehicle must be operated in accordance with the laws, ordinances, and regulations of the jurisdiction in which it is being operated" (49 CFR §392.2). Because that statute is broad and includes all violations, the supplemental description provides further detail about the nature of the violation and reason for the stop. The County Name was used to discern where the violations occurred, and the Citation Number was used to determine if a citation or warning had been issued. If a Citation Number was present, we assumed a citation was issued. If no citation number appeared, we assumed no citation was issued and a warning had been given instead.

3.1.1 Cleaning Enforcement Data

KSP-CVE officers generated 387,168 records from 2017 to 2021. To pinpoint warnings and citations handed out due to illegally bypassing weigh stations, several rounds of data cleaning were necessary. Those steps are outlined below.

First, we extracted all records with the word "scale," "Scale," or "SCALE" in the Supplemental Description. Stata software used for the analysis is case-sensitive, and because the Supplemental Description is filled in by an officer and not automatically populated, there are several iterations of the word "scale." Due to inconsistencies in the structure of written descriptions, only including one iteration would have eliminated several records that should have been included. Many records retrieved were not necessarily what we wanted and included several records with descriptions such as "Came through scale facility not wearing seatbelt" or "Sped through scale at 45 mph."

Next, we searched for more specific terms such as "scale installation," "running scale," and "bypassing scale facility." This eliminated several records unrelated to the search and reduced the records by enough that a manual search of the remaining ones could be conducted. With duplicate records removed, 2,616 records with a violation for illegally bypassing a weigh station remained. A simplified version of the search process is outlined in Figure 3.1.

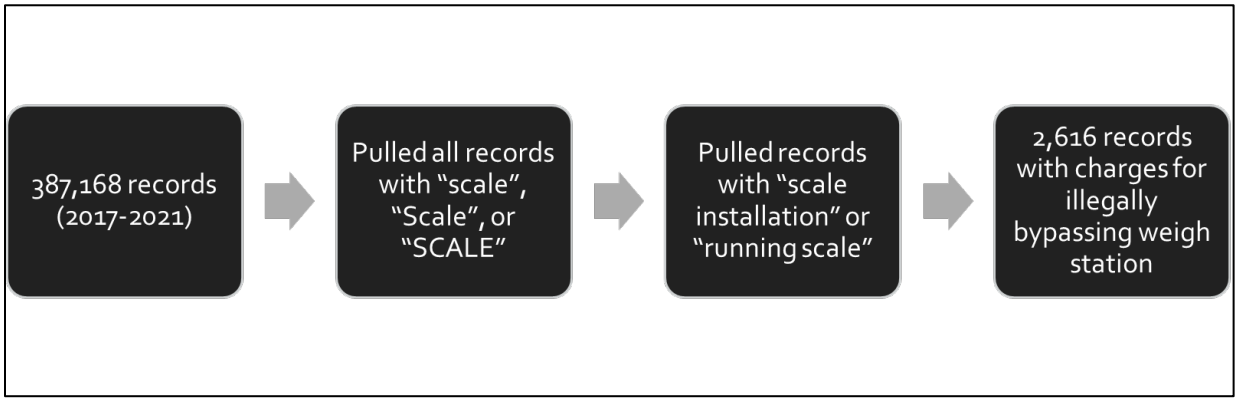

Figure 3.1 Search Process for Records with Violation for Illegally Bypassing Weigh Station

3.1.2 Coding Data

Although there were records indicating drivers had only been warned/cited solely due to illegal bypassing, often other violations documented by KSP-CVE officers appeared in the inspection report. As such, coding the data was necessary to ensure accurate representation. We decided on the following categories for coding data: "run_scale,"

"kyu," "ifta," "foos," "irp," "KIT," "other_credential," "driver," "vehicle," and "ow_od." Each abbreviation is defined below.

- run_scale – illegal bypass of weigh station
- kyu – violation of Kentucky weight-distance tax
- ifta – IFTA compliance issue
- foos – Federal Out of Service order issued
- irp – IRP compliance issue
- KIT – violation of fuel consumption tax
- other_credential – violation not related to IFTA, IRP, KIT, KYU (issues with insurance, bill of laden, lease agreements, etc.)
- driver – driver safety issue
- vehicle – vehicle safety issue
- ow_od – vehicle is overweight or overlength

Each cell of every inspection report was coded as a "0" or "1." A "0" indicated there was no such violation and "1" indicated there was a violation. Each line of data per record equaled 1, meaning that each line had one "1" and the rest "0." Table 3.1 exemplifies the coding strategy.

Table 3.1 Example of Data Coding Strategy

inspid	run_scale	kyu	ifta	foos	irp	KIT	other_credential	driver	vehicle	ow_od
xxxxxxx	1	0	0	0	0	0	0	0	0	0
xxxxxxx	0	0	0	0	0	0	0	1	0	0
xxxxxxx	0	0	0	0	0	0	0	1	0	0

3.2 Weigh Station Observations

To fully understand the issue of illegal weigh station bypassing in Kentucky, it was necessary for us to visit multiple weigh stations. Not all weigh stations in Kentucky handle similar truck volumes, but preliminary decisions about potential site visits were based on weigh stations that experienced regular, high-volume traffic throughout the week.

Weigh station observation locations were determined based on previous research efforts conducted by the Kentucky Transportation Center. Our plans were approved by Lieutenant Derek Cundiff, an enforcement officer assigned to the CVE Central Region. A preliminary visit to the Laurel County NB weigh station took place on December 16, 2021, to meet with enforcement personnel and to establish a plan for data collection.

3.2.1 Laurel County NB

The first site visit took place on December 16, 2021, in Laurel County at the I-75 NB weigh station. We set up in the weigh station office and along I-75 on a nearby access road. A simultaneous enforcement blitz was conducted during the observation period with additional enforcement officers brought in to pull over trucks illegally bypassing the weigh station. The two preclearance systems — Drivewyze and PrePass — were also adjusted to ensure all trucks enrolled in those programs pulled in during the data collection period; thus all trucks would be required to enter the weigh station regardless of preclearance status. Researchers and an inspector monitored the Open/Close sign. The Open/Close sign automatically toggles to *Close* if the bypass ramp gets backed up, so the sign control in the scale house was monitored continuously to ensure that trucks passing through when the station sign was set to *Close* were not counted as illegal bypasses.

The Laurel County NB scale house (Figure 3.2) requires drivers to exit the interstate via an offramp that leads them over a sorter-lane WIM scale (B). Once the vehicle has been weighed, the driver is instructed to either continue through the weigh station and return to the interstate or is directed to the static scale located behind the scale house for a more accurate weight check (C). If the truck is not overweight and the enforcement team does not think an inspection is warranted, the truck is allowed to leave the scale house. Should an inspection be required, drivers are given a *Park* or *Stop* sign and are required to enter the inspection shed (E).

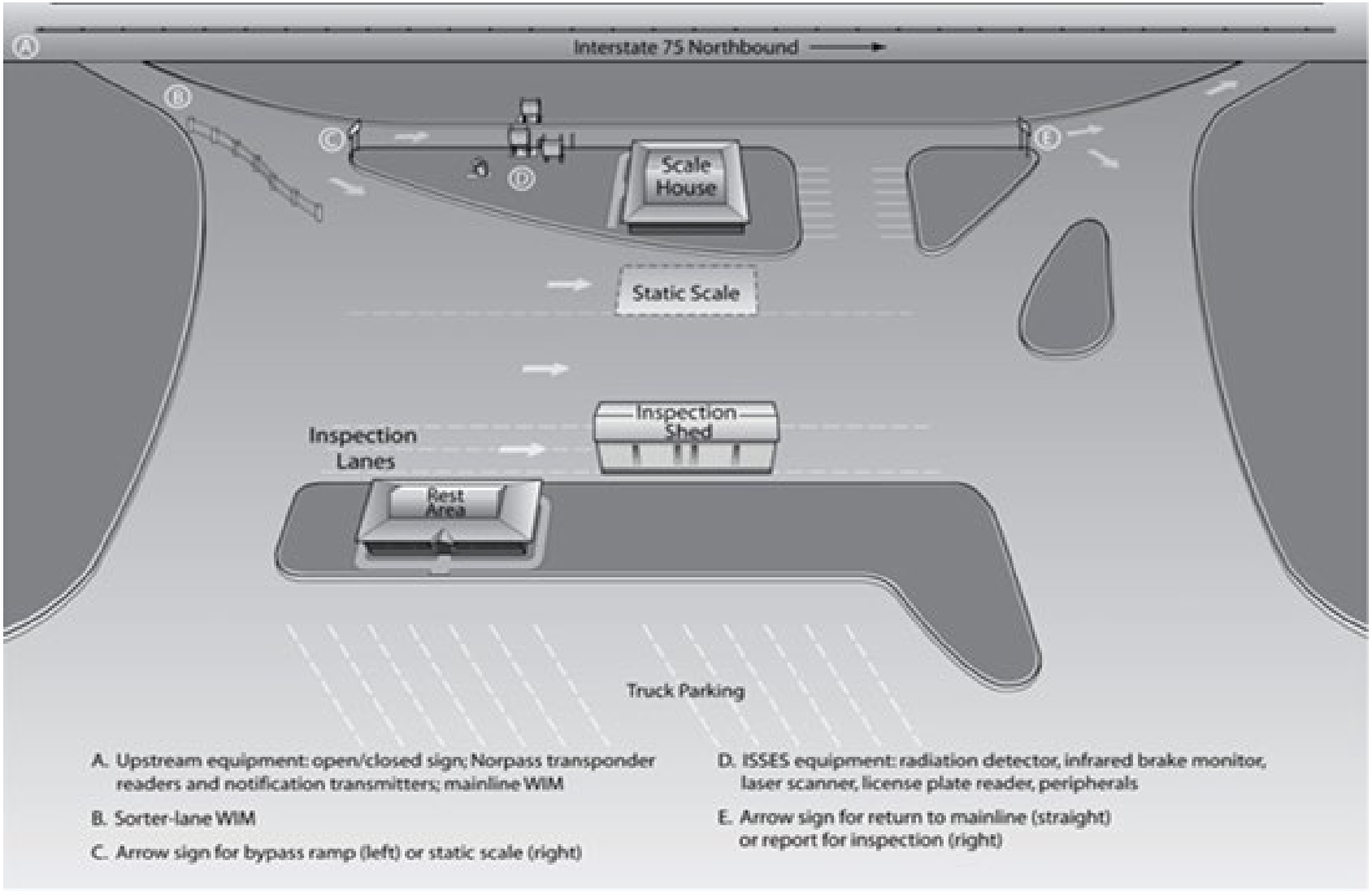

Figure 3.2 Laurel County NB Weigh Station Layout

Two members of our research team were situated in the scale house, while another member was situated across I-75 behind the SB weigh station on the opposite side of the interstate. An access road connecting the two weigh stations provided a unique vantage point for the member outside the scale house to determine if trucks were in the appropriate lane (inside lane) with the intention to go through the scale. Trucks still in the bypass lane (outside lane) were noted and the information was passed along to the researchers inside the scale house via radio correspondence. Enforcement officers were notified and, if available, an officer pursued the offending vehicle and conducted an inspection if necessary. We received copies of inspection reports for documentation purposes. The enforcement blitz took place for two hours in the morning and two hours in the afternoon. The blitz plan is summarized below.

1. Extra enforcement officers scheduled at Laurel NB/SB to apprehend more illegally bypassing trucks.
2. Drivewyze and PrePass disabled.
3. Research team notified enforcement officers when a truck bypassed an *Open* scale sign.
4. Research team documented instances of illegal bypassing.
5. Officers stopped bypassing vehicles and conducted inspections.
6. Copy of inspection report was to research team for documentation.

3.2.2 Laurel County SB

We conducted a second site visit at the Laurel County SB scales on March 16, 2022. Although most aspects of the two weigh stations are similar, there was one major difference. The static scale on the NB side is behind the scale house and the static scale on the SB is in front of the scale house in a lane beside the WIM scale lane. This difference did not affect data collection.

The blitz enforcement plan remained the same for the second site visit, but due to the placement of the Laurel County SB scale house there was no advantage in having a research team member outside of the scale house. Two researchers attended the Laurel County SB blitz and collected data for two hours in the morning and two hours in the afternoon.

3.2.3 Scott County NB

The final site visit took place on April 28, 2022, at the Scott County NB weigh station on I-75. Two researchers visited the site to observe normal operations without any enforcement detail. Previous visits by KTC researchers to the Scott County NB scale revealed that trucks often dismiss the *STOP* light directing them to pull in for an inspection. Because this issue had been previously noted, the original intent of the April 28 site visit was to determine how often trucks run the *STOP* light. In addition to the one inspector working, another KSP-CVE officer from a different location was present to assist if necessary. With only two law enforcement personnel present there were no random inspections and not enough staff to check the pre-clearance systems and pursue trucks in violation. For the *STOP* light to be lit at the end of the weigh station ramp, an officer would have to physically push the button.

Due to personnel constraints, our team instead monitored the pre-clearance systems and the *Open/Close* sign to determine the frequency of illegal bypasses. Drivewyze and PrePass were operating normally, meaning that compliant trucks could legally bypass the station and random pull-ins were set to their default rate. One research team member monitored the PrePass screen and the other monitored Drivewyze. Trucks that pulled into the ramp were not monitored as closely, but if the research team identified a truck with a KYU violation and there was an officer present, the truck was presented with the STOP light to pull into the parking lot for further inspection.

The pre-clearance systems identified approaching vehicles more than a mile away, which gave ample time for researchers to identify and cross-reference non-compliant trucks. If a truck was not cleared for bypass according to Drivewyze or PrePass, the research team documented the bypass as illegal. Data collection took place during two intervals: 9:30am-11:30am and 12:30pm-2:30pm.

3.3 Analyzing Historical Data 2017-2021

Data revealed several patterns and trends. First, we assessed how KSP-CVE officers handled drivers who illegally bypassed in terms of issuing warnings or citations. Of the 2,616 instances in which a driver was stopped for illegally

bypassing, a citation was issued 73.1% of the time. Except for 2018, CVE officers issued significantly more citations than warnings. In 2018, there were 326 instances of illegal bypassing. Of those, more than half (51.2%) resulted in a warning and 48.8% in citations. Figure 3.3 summarizes warning and citation data for the study period.

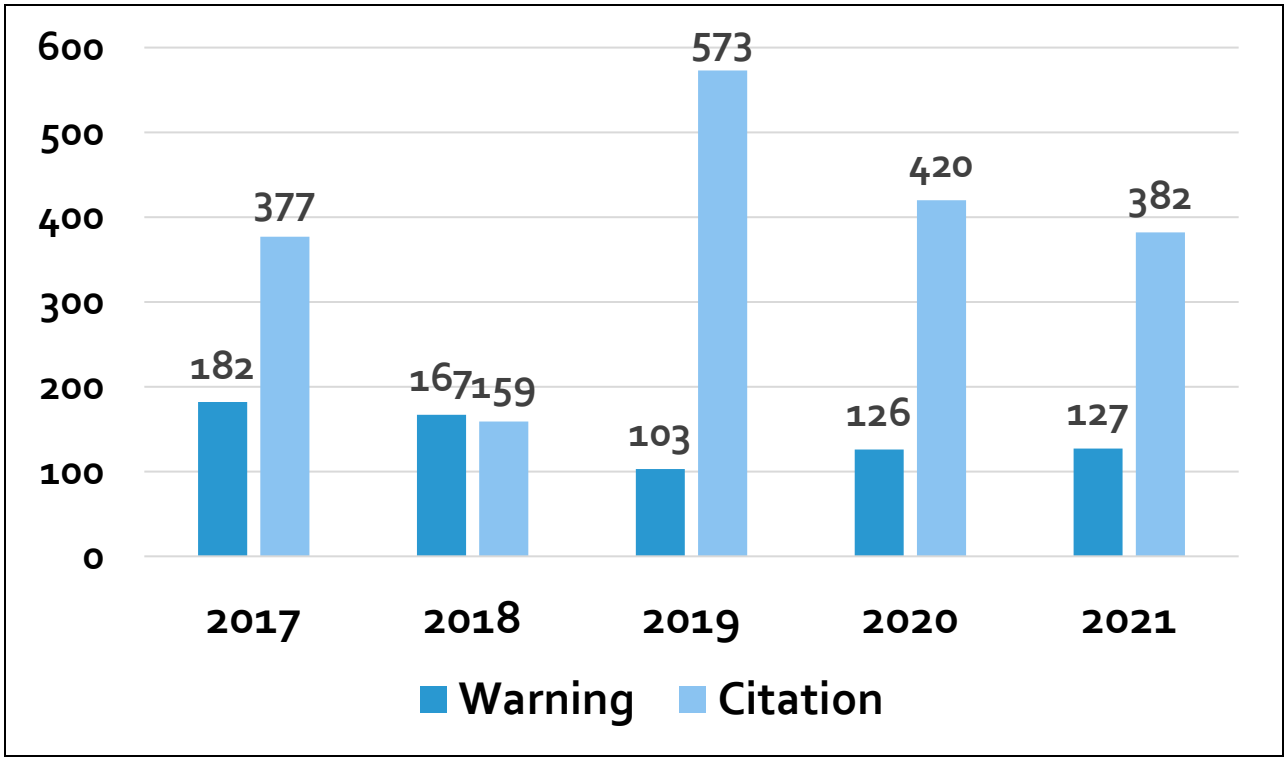

Figure 3.3 Warnings vs. Citations for Running Scales in Kentucky, 2017-2021

It was also critical to determine where citations were issued to establish if there are locations experiencing higher rates of illegal bypassing. Lyon County issued the most citations for illegal bypasses (807). Shelby County had the next highest number of citations issued (609). Henderson County issued the third largest number of citations at 267, while Laurel County (263) and Floyd County (180) rounded out the top five., Several counties in which citations were issued for illegal bypasses do not have permanent weigh stations (Figure 3.4). These counties (e.g., Fayette, Madison, Rockcastle) are on the I-75 corridor. Based on Supplemental Descriptions in driver/vehicle examination reports, citations issued in counties without weigh stations were done so by officers who pursued vehicles across county lines before making the stop. Citations issued in Livingston, McCracken, and Marshall counties all stemmed from running the scales in Lyon County.

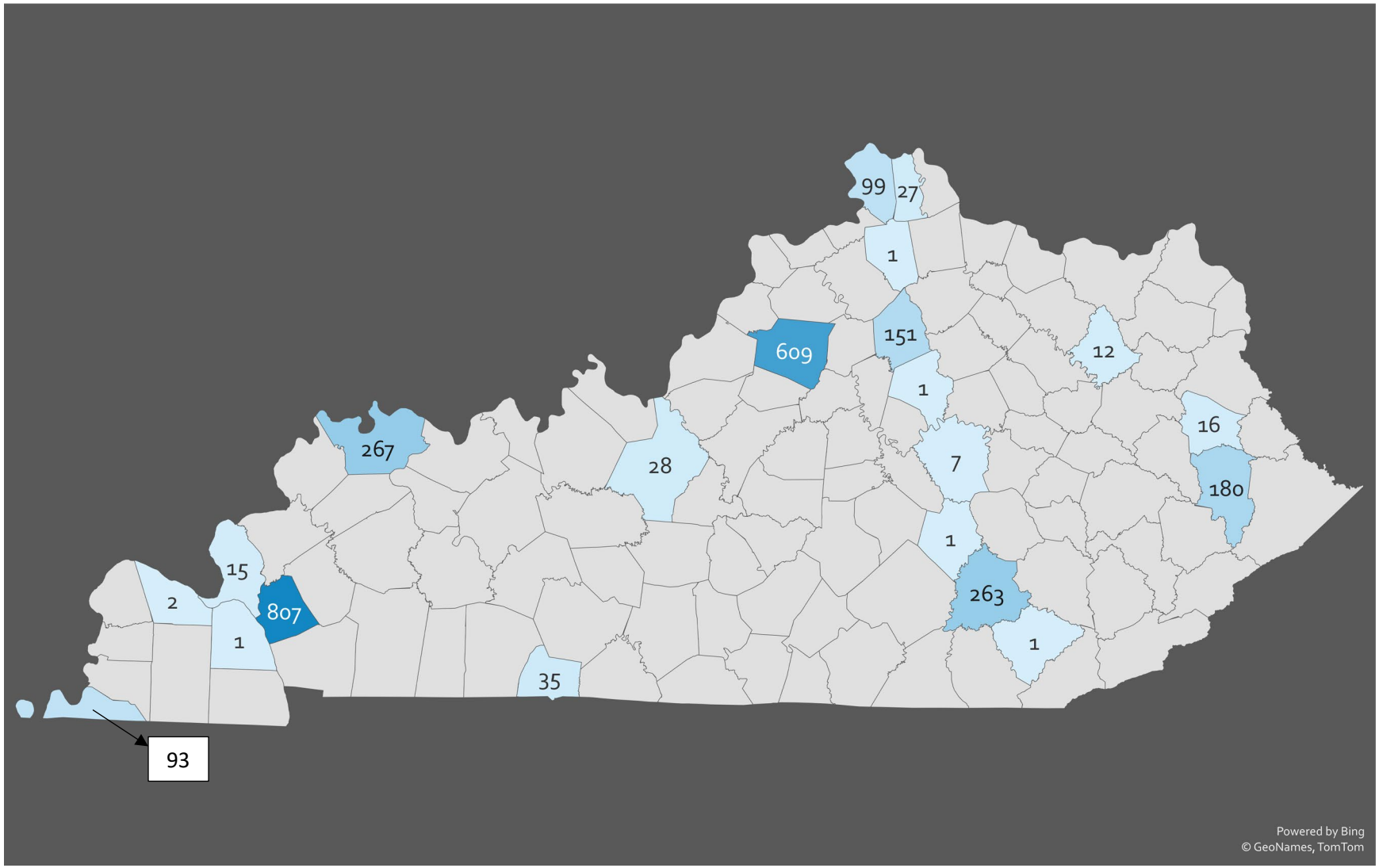

Figure 3.4 Total Citations Issued for Illegally Bypassing Scales in Kentucky (2017-2021)

There is great variation across the state in terms of how many citations were issued between 2017 and 2021. Factors that likely contributed to this variation include weigh station hours of operation, priorities of agency officials, and staffing issues. For example, Lyon County (807) and Shelby County (609) issued significantly more citations than other locations. Lyon County has two permanent weigh stations, which might account for higher instances of illegal weigh station bypassing. However, Laurel County also has two permanent weigh stations and only issued a fraction of the citations that Lyon County did.

To focus on counties with permanent weigh stations, we looked at the percentages of warnings and citations for illegal bypasses between. Not all counties were consistent in issuing citations. Some counties (e.g., Floyd, Kenton, Scott) issued more warnings than citations. Conversely, Fulton County issued citations 90.3% of the time, Henderson issued citations 88.8% of the time, and Shelby County issued citations 82.6% of the time. Figure 3.5 includes percentages for citations and warnings for all counties with permanent weigh stations.

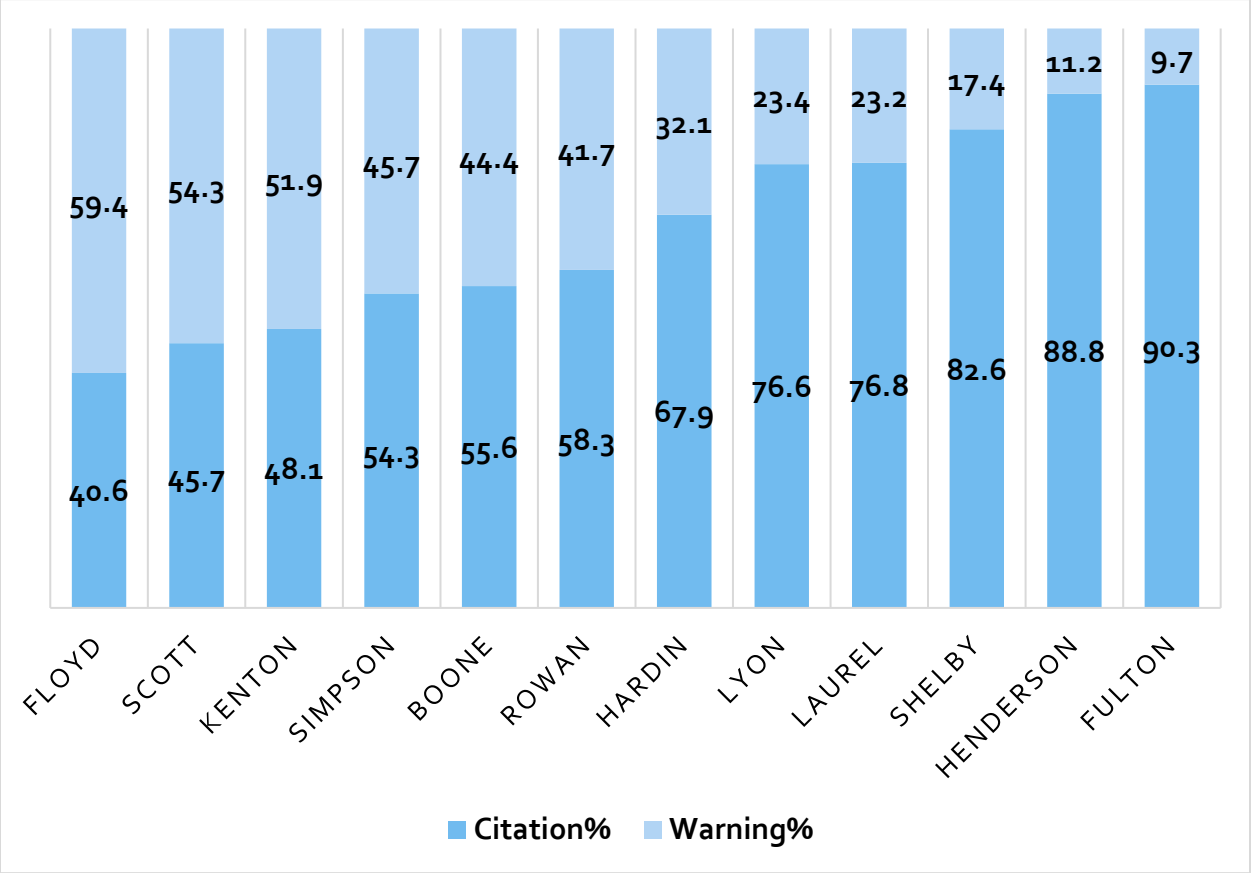

Figure 3.5 Warning vs. Citation % for Running Scales in Kentucky 2017-2021 By County

The most likely explanation for variation in citation practices is the lack of staff to inspect commercial vehicles. According to a KSP-CVE officer in Laurel County, a single stop can take between 30 minutes and an hour depending on the severity of the alleged offenses. Issuing a warning instead of a citation reduces the number of steps and paperwork that must be completed as part of the stop.

Often, drivers cited for illegal bypassing were cited for additional offenses and/or violations. A common offense is related to what we termed “Other Credential” issues. Examples of these include no proof of insurance, operating the vehicle without proof of periodic inspection, failing to register with FMSCA to obtain a USDOT number, not displaying the carrier name or USDOT number as required, not having lease agreement for the vehicle on board, and failure to pay the yearly Unified Carrier registration fee determined by the Unified Carrier Registration Plan and Agreement.

The third most common type of violation related to driver safety, including not wearing a seatbelt, using a handheld cellular device while driving, operating a commercial vehicle without a proper CDL, not having a record of the driver's duty status, lacking a medical certificate, having an expired medical certificate, driving beyond the eight-hour limit, inability to speak and/or understand English, and possession of drugs and/or alcohol.

After driver safety issues, the most common offense was carrier failure to pay the weight-distance tax required for all carriers with a combined license weight greater than 59,999 pounds traveling on Kentucky roadways. The current tax rate is $0.0285 cents per mile (Kentucky Division of Motor Carriers, 2022). Figure 3.6 shows the average percentage of each violation that occurred in each county from 2017 to 2021.

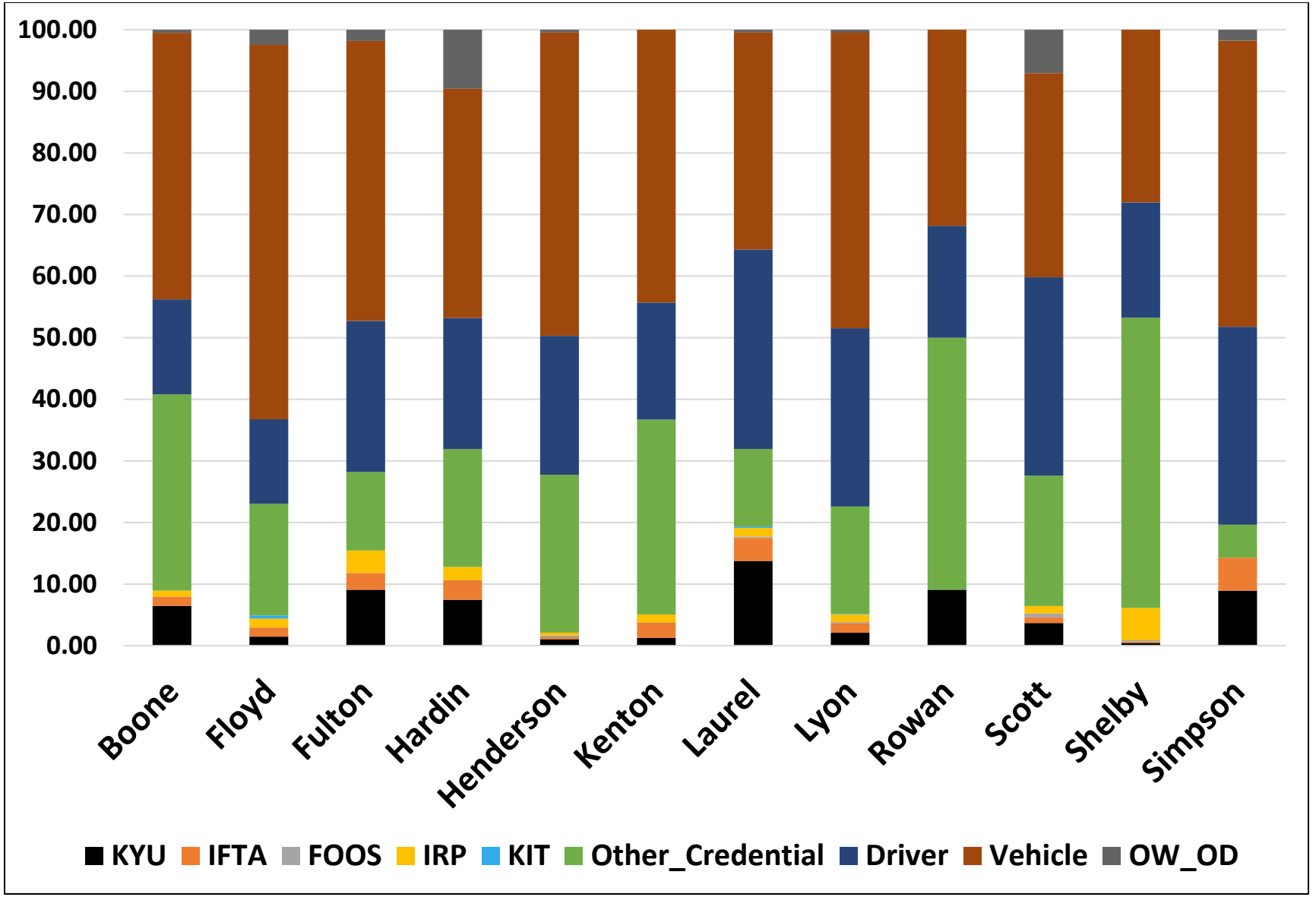

Figure 3.6 Average Percentage of Violation Type Per Kentucky County, 2017-2021

As with the other components of historical data, there was great variation in the types of violations seen in each county. However, vehicle safety issues, “other” credentialing issues, and driver safety issues accounted for most of the violations recorded by law enforcement officers.

3.4 Weigh Station Observations

3.4.1 Laurel County NB

During the site visit to the Laurel County NB weigh station, we gathered data by watching traffic patterns near the weigh station and communicating with KSP-CVE officers who participated in the enforcement blitz. The research team members situated across the interstate from the Laurel County NB scale house during the enforcement blitz had a unique vantage point that let them snap pictures of carriers that illegally bypassed the weigh station. These pictures served as proof of the violation while also providing additional information — in some cases — about the carrier involved. Figure 3.7 shows a few of the pictures taken that day.

Figure 3.7 Pictures of CMV Illegally Bypassing Weigh Station

During our visit, we also counted how many vehicles bypassed the facility. At the conclusion of the visit, the number of trucks that came through the weigh station was provided by officers at the station. Based on those numbers, we determined actual and approximate rates of bypassing.

We started collecting data at 9:30 am and continued until 11:30 am. Observation resumed at 1:30 pm and continued until 3:30 pm. Data collection was scheduled this way to determine if truck traffic and bypass patterns varied based on time of day.

Table 3.2 provides a breakdown of activity for the day. Between 9:30 am and 11:30 am, 619 trucks entered the scales and 38 illegally bypassed (5.8%). Between 1:30 pm and 3:30 pm, 548 trucks entered the scales, and 12 trucks ran the scales (2.1%). In total, 1,168 trucks entered the scales and 50 illegally bypassed (4.1%). Data for the entire day was extrapolated to estimate the number of vehicles that ran the scales. Assuming an illegal bypass rate of 4.1%, this amounted to 194 trucks.

Table 3.2 Laurel County NB Data Collection

Time Period	Entered Scales	Ran Scales	Total Vehicles	% Illegal Bypass	Observed/Estimated
9:30-11:30 am	619	38	657	5.8%	Observed
1:30-3:30 pm	548	12	560	2.1%	Observed
Total for Observation Period	1,168	50	1,218	4.1%	Observed
Day	4,527	194	4,721	4.1%	Estimated

Of the 50 trucks that illegally bypassed in the morning, nine were box/straight trucks. We excluded some box trucks (e.g., U-Hauls) and focused more attention on those from companies that typically rent trucks to individuals for commerce and should have presumably gone through the scales. The remaining trucks that ran the scales included tractors/trucks with trailers, flat beds, auto haulers, and dump trucks. Because student CDL testing was being done during observation hours, trucks used for CDL testing were excluded. In the afternoon hours, 12 trucks ran the scales including one box truck.

Because extra KSP-CVE officers were available to pursue trucks that illegally bypassed the scales, there was enough personnel to go after some offenders. In total, nine citations and one warning were issued. The warning was written for a PrePass-compliant driver who was confused about PrePass being disabled while data were being collected.

3.4.2 Laurel County SB

We visited the Laurel County SB weigh station on March 16, 2022. The enforcement blitz plan remained the same and data collection took place for two hours in the morning and two hours in the afternoon. Data collection started at 9:40 am and went until 11:40 am and resumed in the afternoon from 1:15 pm to 3:20 pm. An enforcement detail was present to pursue violators. PrePass and Drivewyze were disabled to ensure all trucks were instructed to enter the scale facilities. Data collection was extended for five minutes in the afternoon due to a truck sitting on the shoulder of the weigh station ramp, resulting in truck traffic unnecessarily being diverted away from the weigh station. A KSP-CVE officer directed the truck off the ramp and data collection continued as normal.

Table 3.3 provides a breakdown of activity for the day. From 9:40 am to 11:40 am, 469 trucks entered the scales, and 25 illegally bypassed (5.1%). From 1:15 pm to 3:20 pm, 435 trucks entered the scales and 58 ran the scales (11.8%). During the four-hour observation period, 904 trucks entered the scales and 83 ran the scales (8.4%). Data for the entire day was extrapolated to estimate the number of vehicles that ran the scales. Assuming an illegal bypass rate of 8.4%, this amounted to 285 trucks.

Table 3.3 Laurel County SB Data Collection

Time Period	Entered Scales	Ran Scales	Total Vehicles	% Illegal Bypass	Observed/Estimated
9:40-11:40 am	469	25	494	5.1%	Observed
1:15-3:20 pm	435	58	493	11.8%	Observed
Total for Observation Period	904	83	987	8.4	Observed
Day	3,100	285	3,385	8.4%	Estimated

KSP-CVE officers issued 10 citations during the four-hour data collection period. Four citations were written during the morning hours and the remainder of the citations were issued in the afternoon. Copies of the citations/inspection reports were collected from the officers and retained for documentation.

3.4.3 Scott County NB

Data collection in Scott County differed in two ways from data collection in Laurel County. First, the enforcement detail was not present. Second, the PrePass and Drivewyze systems operated normally, and we monitored both systems to ensure trucks receiving a bypass did not get counted as an illegal bypass. We altered our method to evaluate whether the illegal bypass rate was different during more typical operations.

During the four-hour data collection period on April 28, 2021, 43 trucks illegally bypassed the weigh station and two trucks were stopped for KYU violations. During the morning, 495 trucks entered the scales and 19 illegally bypassed (3.7%). In the afternoon, 472 trucks entered the scales and 24 ran them (4.8%). During the hours of observations, the illegal bypass rate was 4.3%. It is possible that more trucks were missed due to a backup along the weigh station ramp, tripping the *Open* sign to *Close* temporarily. Our team determined when to resume checking compliance status once the weigh station reopened. Table 3.4 outlines the numbers calculated for the day.

Table 3.4 Scott County Data Collection

Time Period	Entered Scales	Ran Scales	Total Vehicles	% Illegal Bypass	Observed/Estimated
9:30-11:30 am	495	19	514	3.7%	Observed
1:30-3:30 pm	472	24	496	4.8%	Observed
Total for Observation Period	967	43	1,010	4.3%	Observed
Day	1,905	85	1,990	4.3%	Estimated

3.5 Statewide Projections for Illegal Weigh Station Bypassing

We used our extrapolated findings from the Laurel County and Scott County weigh stations to estimate the prevalence of illegal weigh station bypasses statewide. To estimate illegal bypasses by weigh station, we started with sample characteristics for each enforcement detail. Table 3.5 displays the standard deviation[1], sample size, and confidence intervals for each enforcement detail, illegal bypass rates, and 95% confidence intervals for each sample.[2] Sample 1 and Sample 3 have similar illegal bypass rates and standard deviations, and comparable sample sizes; therefore, the 95% confidence intervals overlap significantly. A means test confirmed the two samples are not statistically different. Sample 2 has a much larger illegal bypass rate and standard deviation, which results in a wider confidence interval. The confidence interval for Sample 2 does not overlap with the confidence intervals of Sample 1 or Sample 3, which makes it statistically different. It is not clear what produced the difference. Potential influences include local traffic patterns (albeit Sample 1 and Sample 2 were taken at parallel weigh stations on opposite sides of I-75 in Laurel County), seasonal effects, composition of the sample (i.e., what kind of trucks/carriers came through that day), highway design features (e.g., the visibility of the open/close sign at a distance), weigh station sorting ramp backups, and the number of PrePass/Drivewyze trucks. More research is needed to understand station, carrier, truck, or driver-level predictors of illegal weigh station bypasses.

[1] The standard deviation is calculated as $\sigma = \sqrt{\frac{\sum(x-mean)^2}{n}}$

[2] The confidence interval is calculated as

$$CI = \bar{\chi} \pm z\frac{s}{\sqrt{n}}$$

Table 3.5 Illegal Bypass Rates and Sample Characteristics for Enforcement Details

Illegal Bypass Rate by Date			
Detail #	**1**	**2**	**3**
Date	12/21/2021	3/16/2022	4/28/2022
Confidence Level	0.05	0.05	0.05
Std. Deviation	0.198	0.278	0.202
Sample Size	1218	987	1010
Confidence Interval	1.1%	1.7%	1.2%
Illegal Bypass Rate	4.1%	8.4%	4.2%
Low (95%)	3.0%	6.7%	3.0%
High (95%)	5.2%	10.1%	5.4%

The illegal bypass rate and sample characteristics were critical for projecting illegal weigh station bypasses statewide. Equally important was a count of the number of trucks passing through Kentucky. To determine total truck counts, we downloaded all 2021 vehicle screening records archived from the KATS, PrePass, and Drivewyze systems. When a weigh station is open, KATS screens all trucks unless they are given a green light to pass by PrePass or Drivewyze preclearance systems or the truck bypasses the scale illegally. Trucks that legally bypass when a station is closed are not screened except at the Shelby County weigh station, which has a KATS system located on the interstate mainline instead of on the bypass lane. We also identified duplicate records by first tagging records that matched on plate, state, USDOT number, date, and location. Next, we differentiated between those with exact timestamp matches and those whose timestamps were close enough to associate based on time discrepancies of 5 minutes or less. In the case of Western Kentucky stations, we also allowed matches with within 57-64 minutes as it became obvious from the counts that the discrepancies were due to different zones being used for archival data (i.e., the KATS, PrePass and Drivewyze systems used some combination of Central and Eastern time instead of a single time zone). These two variables were used to screen out duplicate records while maintaining the appropriate number of records if a truck passed through the station more than once on a calendar day. Overall, we identified 264,940 trucks. After screening out those records, counts were subset by station.

Table 3.6 lists the total number of vehicles screened by all systems in 2021. Numbers are broken down by KATS and the preclearance systems. Overall, 7,680,775 vehicles were screened, with totals ranging from 42,283 at the Floyd County facility to 1.6 million at the Shelby County facility. Variation in these numbers stems from station hours, available personnel, traffic levels, and whether there were intermittent issues with Drivewyze or PrePass equipment as specific locations. No Drivewyze records exist for Scott County, and no PrePass records exist for Floyd, Fulton or Laurel NB, for all of 2021. All Drivewyze record reporting to KYTC ended on August 16, 2021, so these numbers likely undercount the number of vehicles screened by Drivewyze at each site.

Table 3.6 Total Trucks Screened by Location (2021)

Weigh Station Name	All Trucks	KATS	Drivewyze/PrePass
Boone Scale I-71 S	407,132	201,556	205,576
Floyd Scale US 23 N	42,283	39,232	3,051
Fulton Scale US 51	365,292	341,437	23,855
Hardin Scale I-65 S	493,090	200,746	292,344
Henderson Scale US 41	252,600	187,108	65,492
Kenton Scale I-75 S	395,257	215,263	179,994
Laurel Scale I-75 N	576,149	439,064	137,085
Laurel Scale I-75 S	488,805	312,661	176,144

Weigh Station Name	All Trucks	KATS	Drivewyze/PrePass
Lyon Scale I-24 E	605,918	399,226	206,692
Lyon Scale I-24 W	570,612	328,346	242,266
Rowan Scale I-64 W	294,589	232,422	62,167
Scott Scale I-75 N	478,379	327,603	150,776
Shelby Scale I-64 E	1,602,607	1,326,457	276,150
Simpson Scale I-65 N	1,108,062	833,964	274,098
Total	7,680,775	5,385,085	2,295,690

Our projections also accounted for trucks given a valid preclearance signal and therefore were not required to pull into a weigh station. Table 3.7 shows the summary activity for PrePass trucks operating in Kentucky during 2021. The table displays pull-ins, bypasses, and the total number of trucks passing through stations when they were open. It also includes the number of trucks passing stations while they were closed as well as total activity. The open percentage is the number of trucks passing through the weigh station divided by total activity. The pull-in percentage is the number of pull-ins divided by the open total. Trucks that receive a bypass signal from PrePass or Drivewyze should not be factored into the estimate as they can legally pass a weigh station without stopping. To eliminate trucks allowed to bypass legally, the total number of PrePass and Drivewyze records were multiplied by the corresponding PrePass pull-in percentage to derive the total number of PrePass and Drivewyze vehicles required to enter the weigh station bypass lane at each weigh station. The PrePass pull-in rate was applied to both PrePass and Drivewyze records because Drivewyze bypass rates were not immediately available. A large discrepancy exists between PrePass record counts in KYTC's Business Objects database and annual totals reported by PrePass. The Business Objects data for 2021 show 831,594 PrePass trucks, while the annual PrePass data show 2.28 million. Several potential explanations account for this discrepancy, including missing PrePass records not found in Business Objects, duplicate screening records counted twice by PrePass whereas all duplicate records were removed from the Business Objects data, station-specific screening system malfunctions, or other data quality issues. Further research is needed to resolve such issues, but as of this report pull-in rates from PrePass represent the best method available to estimate non-exempt PrePass and Drivewyze vehicles.

Table 3.7 PrePass Station Activity Reports with Pull-in Rates (2021)

Site	Pull-Ins	Bypasses	Open Total	Closed Total	Total Activity	Open %	Pull-In %
Boone SB	34,703	58,975	93,678	691,014	784,692	11.94%	37.0%
Fulton NB	4	9	13	56	69	18.84%	30.8%
Hardin SB	78,831	86,866	165,697	886,621	1,052,318	15.75%	47.6%
Henderson SB	39,622	31,646	71,268	154,858	226,126	31.52%	55.6%
Kenton SB	33,914	57,141	91,055	442,929	533,984	17.05%	37.2%
Laurel NB	419	0	419	2,151	2,570	16.30%	100.0%
Laurel SB	116,970	44,865	161,835	220,597	382,432	42.32%	72.3%
Lyon EB	122,545	118,631	241,176	523,684	764,860	31.53%	50.8%
Lyon WB	93,049	155,817	248,866	512,071	760,937	32.71%	37.4%
Rowan WB	89,996	23,498	113,494	99,468	212,962	53.29%	79.3%
Scott NB	116,134	39,271	155,405	424,902	580,307	26.78%	74.7%
Shelby EB	155,883	242,035	397,918	58,905	456,823	87.11%	39.2%
Simpson NB	448,417	97,658	546,075	562,201	1,108,276	49.27%	82.1%
Total	**1,330,487**	**956,412**	**2,286,899**	**4,579,457**	**6,866,356**	**33.31%**	**58.2%**

We used total truck counts in Table 3.7 and PrePass bypass rates to estimate the total number of illegal bypasses throughout Kentucky in 2021. This estimate is for trucks that illegally bypass weigh stations on the mainline — it is not inclusive of trucks whose drivers take alternate routes to avoid weigh stations on the mainline. Here we estimate illegal bypasses at low, medium, and high levels to provide a range of possible evasion levels (Table 3.8). The medium and high levels are based on the observed evasion rates in Samples 1 and 2 (4.1% and 8.4%, respectively). The low level of 1% was used to construct a lower limit to develop a lower estimate that corrects for potential biases in the other ranges. Medium and high estimates are based on details conducted on busy stretches of I-75, which may not be representative of evasion levels in other parts of the state with less traffic, different weigh station attributes (e.g., ramp length, signage clarity), enforcement tactics, staffing levels, and motor carrier composition. Statewide evasion estimates range from 67,207 to 564,538 trucks. Given the available data the medium estimate has the most empirical support, with an estimated 275,548 trucks illegally bypassing Kentucky scales in 2021. If the Sample 1 confidence intervals were used to create low and high evasion estimates — at 3% and 5.2%, respectively — the total number of trucks illegally bypassing is estimated between 201,621 and 349,476.

Table 3.8 Illegal Weigh Station Evasion Projection for Kentucky (2021)

Weigh Station Name	Low (1%)	Medium (4.1%)	High (8.4%)
Boone Scale I-71 S	2,777	11,386	23,328
Floyd Scale US 23 N	392	1,609	3,295
Fulton Scale US 51	3,488	14,300	29,297
Hardin Scale I-65 S	3,398	13,933	28,546
Henderson Scale US 41	2,235	9,164	18,776
Kenton Scale I-75 S	2,823	11,574	23,713
Laurel Scale I-75 N	5,761	23,622	48,397
Laurel Scale I-75 S	4,400	18,039	36,958
Lyon Scale I-24 E	5,042	20,674	42,357
Lyon Scale I-24 W	4,189	17,176	35,190
Rowan Scale I-64 W	2,817	11,550	23,664
Scott Scale I-75 N	4,403	18,051	36,983
Shelby Scale I-64 E	14,346	58,820	120,510
Simpson Scale I-65 N	10,590	43,421	88,960
Total	**67,207**	**275,548**	**564,538**

Secondary violations and charges also stem from citations issued when a truck illegally bypasses a weigh station, is pursued by a KSP-CVE officer, and is inspected. Historical data on violations can be used to forecast potential violations resulting from enforcement actions. Table 3.9 estimates numbers for different violation types based on historical violation rates for KYU, IFTA, FOOS, IRP, KIT, other credentials, driver issues, vehicle issues, and overweight/over-dimensional (OW/OD). The rate is the number of violations divided by the total number of enforcement actions. Each column represents a hypothetical number of enforcement actions, starting at 500 and going up to 2,500. Assuming enforcement actions are taken annually, the column with the target number of enforcement actions corresponds to the predicted number of violations for each category. For example, 500

citations/warnings are issued for illegal weigh station bypassing each year, we can assume officers will identify 33 KYU charges, 261 driver violations, and 440 vehicle safety violations. Projections implicitly assume a similar split of citations and violations as in the historical data (73% citation rate); a comparable distribution of Level 1, Level 2, and Level 3 inspections; and similar propensity for carriers to commit the specific violations as during 2017-2021.

Table 3.9 Projected Violation Counts at Varying Levels of Enforcement

Historical Violations and Totals, 2017-2021		Annual Number of Illegal Bypass Citations/Warnings					
Violation	**Totals**	**Rate**	**500**	**1000**	**1500**	**2000**	**2500**
KYU	171	0	33	65	98	131	163
IFTA	76	0	15	29	44	58	73
FOOS	11	0	2	4	6	8	11
IRP	100	0	19	38	57	76	96
KIT	4	0	1	2	2	3	4
Other Credentials	1,291	0	247	494	740	987	1,234
Driver	1,368	1	261	523	784	1,046	1,307
Vehicle	2,300	1	440	879	1,319	1,758	2,198
OW/OD	57	0	11	22	33	44	54

To understand why illegal bypassing is ubiquitous, we quantified the ratio of uncited-to-cited drivers and the odds of carriers receiving a citation for illegal bypassing. Projections in Table 3.10 use estimated evasion rates and account for how those estimates would interact with different enforcement levels. Table 3.10 shows the ratio of trucks that illegally bypass without enforcement action taken if a given number of citations are issued as well as the odds of receiving a citation. For example, under the medium enforcement scenario, if 500 citations are issued in a year, for each driver cited 551 trucks whose driver illegally bypasses a weigh station do so without legal consequences, The uncited-to-cited ratio of 551-to-1 corresponds to citation odds of just .18%. In each scenario, the odds of a given driver being cited are small, which provides some evidence for why CMV drivers choose to illegally bypass.

Table 3.10 Ratio and Odds of Uncited Illegal Weigh Station Bypasses (2021)

Annual Citations	Ratio of Uncited-to-Cited Drivers			Citation Odds		
	Low (1%)	**Medium (4.1%)**	**High (8.4%)**	**Low (1%)**	**Medium (4.1%)**	**High (8.4%)**
500	134	551	1,129	0.74%	0.18%	0.09%
1000	67	276	565	1.49%	0.36%	0.18%
1500	45	184	376	2.23%	0.54%	0.27%
2000	34	138	282	2.98%	0.73%	0.35%
2500	27	110	226	3.72%	0.91%	0.44%

Another way to examine the logic of illegal bypassing is by calculating the expected cost of the behavior. Expected cost is the probability that an event will occur multiplied by the value, or cost, of the event ($P(x)*n$). In the driver's case the event is something that would happen a single time (receiving multiple citations for the same offense is possible but extremely unlikely), so we calculate n as the cost of receiving a citation. The fine for ignoring a traffic control device is $25 plus court fees. Court fees vary by county, and in Kentucky range from $130 to $145.[3] Court costs are $143 in 74 of 120 Kentucky counties, so that was the amount used in estimates. We also noticed that individuals cited for illegal bypasses on average had two additional violations on their citations. For simplicity, we assumed those fines averaged an additional $50. The additional fine assumption may be modest, but nearly half of the additional violations are in the vehicle safety category — those are rarely included on the actual citation because they are routinely dismissed.[4] Overall, the total estimate is $218, which includes court fees and fines but not vehicle

[3] Court fees are based on Kentucky Administrative Office of the Courts data provided in April 2021 and are subject to change.

[4] Court dismissals of vehicle safety charges on citations can cause additional issues. Once dismissed, a carrier may petition to have violations removed from their vehicle safety inspection history, which artificially enhance their CSA scores. FMCSA created these scores to identify carriers that present a higher safety risk. Court dismissals and scrubbing of violations from a carrier's inspection history can mask safety compliance issues. Such an outcome impedes the ability of law enforcement to accurately identify carriers that present a safety risk. To prevent such an outcome, the standard practice is to note vehicle safety violations on the inspection

repair costs, lost productivity, impounds, or other secondary costs. Table 3.11 reports the expected cost of illegally bypassing the weigh station after accounting for the odds reported in Table 3.10 and breaks down expected cost by annual enforcement levels. If 500 citations are issued annually for illegal bypassing across the entire state, in the medium evasion scenario the expected cost is only 40 cents. Depending on the evasion scenario and enforcement level, the expected cost ranges from 19 cents to $8.11. Current enforcement levels are most consistent with estimates in the *500 citations* row of the table. That places the expected cost between 19 cents and $1.62. This analysis reaffirms there are not sufficient disincentives for some drivers to avoid illegal weigh station bypassing.

Table 3.11 Expected Cost of Illegal Weigh Station Bypassing with Current Penalty

Citations	Low (1%)	Medium (4.1%)	High (8.4%)
500	$1.62	$0.40	$0.19
1000	$3.24	$0.79	$0.39
1500	$4.87	$1.19	$0.58
2000	$6.49	$1.58	$0.77
2500	$8.11	$1.98	$0.97

To modify expected costs and incentivize greater compliance, KYTC and KSP administrators will either need to lobby for greater penalties, take more enforcement actions against violators, or both. Table 3.12 provides hypothetical expected costs for illegal bypassing using the assumptions of $143 in court fees and two additional charges with $50 in total fines. However, we increased the fine for illegal bypassing from $25 to $500. Given those assumptions, the total cost to a driver is $693. If additional enforcement details, actions, and personnel alone are insufficient to stem illegal bypassing, an additional financial penalty may offer a viable policy solution. It would increase the expected cost of illegal bypassing nearly threefold, which should help reduce the illegal bypass rate.

Table 3.12 Expected Cost of Illegal Weigh Station Bypassing with Alternative Penalty

Citations	Low (1%)	Medium (4.1%)	High (8.4%)
500	$5.16	$1.26	$0.61
1000	$10.31	$2.51	$1.23
1500	$15.47	$3.77	$1.84
2000	$20.62	$5.03	$2.46
2500	$25.78	$6.29	$3.07

3.6 Conclusions

Based on historical data analysis, site visits to three permanent weigh stations in Kentucky, and a law enforcement survey sent out to jurisdictions across North America (see Chapter 4), it is highly probable that illegal bypassing is a widespread problem. Data show that lack of enforcement personnel makes it exceedingly difficult to address illegal bypassing in a comprehensive manner. Given the length of time needed to conduct inspections, as well as the variation in normal operating hours at permanent weigh stations, jurisdictions cannot rely solely on staff to address illegally bypassing.

Our analysis found that many drivers caught and cited for illegal bypassing were cited for several other safety violations. With commercial vehicle crashes and fatalities on the rise, additional measures must be taken to help CVE officers clamp down on illegal bypassing. The safety of all those who travel on North America highways is in jeopardy, and additional resources should be used to improve safety outcomes and reduce crashes and fatalities.

Illegal bypassing is common in Kentucky. Each enforcement detail revealed dozens of illegal bypasses in our four-hour observation periods. We calculated illegal bypass rates of 4.1%, 8.4% and 4.2%, respectively, for the three sites we visited. Using the illegal bypass rates from the first two enforcement details, a more conservative illegal bypass rate of 1%, and 2021 truck screening numbers for each weigh station, we estimated that statewide the number of

report but not include them on the citation. This prevents the removal of those violations from the vehicle safety inspection history at a later time.

illegal bypasses was between 67,207 and 564,538, with most evidence pointing toward the mid-tier evasion rate of 4.1% (or 275,548 trucks). Regardless of the rate used, Kentucky has a widespread problem with trucks illegally bypassing permanent weigh stations and lacks sufficient enforcement resources to catch even a sizable percentage of violators. Projections also indicate that other compliance issues likely go unaddressed when trucks illegally bypass weigh stations. The low odds of being chased down, inspected, and cited have made illegal bypassing attractive for some drivers, particularly those with a history of compliance issues. Meaningfully changing the expected costs of illegal bypassing will require increased enforcement and increased penalties for violating drivers and/or carriers.

Chapter 4 Law Enforcement Survey

4.1 Survey Development

To identify recommendations/best practices to curb illegal weigh station bypasses, we administered a survey to law enforcement agencies across North America whose jurisdictions have permanent weigh stations. We developed a set of questions and presented those to the Study Advisory Committee (SAC) for feedback. The final survey contained 11 questions and addressed topics such as patterns of illegal bypassing; statutes used to cite illegal bypassing; enforcement efforts; technology used to identify, cite, and/or deter illegal weigh station bypassing; and the location of their post. After gaining SAC approval, we compiled contact information from the CVSA website (CVSA, 2022). An initial email invitation to participate in the survey was distributed on April 19, 2022. A follow-up email was sent on May 3, 2022, to increase the response rate. We distributed the survey to 66 law enforcement officials across the United States and Canadian provinces and territories. Survey questions are listed below:

1. Have law enforcement officers in your jurisdiction recently noticed a rising number of trucks illegally bypassing fixed scale locations (i.e., failing to depart the main line to enter the scale bypass lane when the weigh station is open)?
2. Have law enforcement officers in your jurisdiction recently noticed a rising number of trucks running the "PARK" light or equivalent traffic control device at the end of fixed scale facility bypass ramps?
3. Have law enforcement officers in your state recently noticed truck drivers practicing “ghosting” – which is where drivers will often position their trucks alongside a carrier or vehicle known to utilize preclearance services (e.g., Drivewyze or PrePass) – in an effort to avoid being visually identified and/or screened at fixed weigh stations?
4. What is the applicable statute in your jurisdiction used to cite truck drivers who illegally bypass weigh stations?
5. What is the penalty and/or fine in your jurisdiction when carriers are cited for illegally bypassing the weigh station? Are there additional court costs? Enter your answers in the appropriate boxes below. If your jurisdiction does not have one of the following sanctions, please write "N/A".
6. Has your jurisdiction conducted any enforcement details focused on illegal weigh station bypasses or failure to obey traffic control devices?

a. Please provide additional information about the enforcement details conducted in your jurisdiction to combat illegal weigh station bypasses.

7. Does your jurisdiction utilize any cameras, sensors or other technology to detect drivers who illegally bypass a weigh station?

a. Please provide additional information about the technology used in your jurisdiction to detect drivers who illegally bypass a weigh station.

8. Do statutes or regulations in your jurisdiction permit commercial vehicle enforcement or law enforcement agencies to issue a remote or automated citation for illegal weigh station bypasses?

a. Is this enforcement mechanism currently practiced in your jurisdiction?

9. Do you have any other processes, procedures or best practice recommendations for other law enforcement agencies that may reduce incidences of illegal weigh station bypassing?
10. Is there any additional information you want to share about illegal weigh station bypassing in your jurisdiction?
11. Please provide your state/jurisdiction and post (e.g., Kentucky State Police - CVE East).

4.2 Survey Results

Law enforcement officials from 37 jurisdictions responded to the survey, including Washington, D.C. We received six responses from Canadian jurisdictions — Newfoundland and Labrador, Prince Edward Island, the Northwest Territories, Alberta, Nova Scotia, and Ontario. Figure 4.1 indicates which jurisdictions responded. We excluded a response from Kentucky law enforcement from the study results

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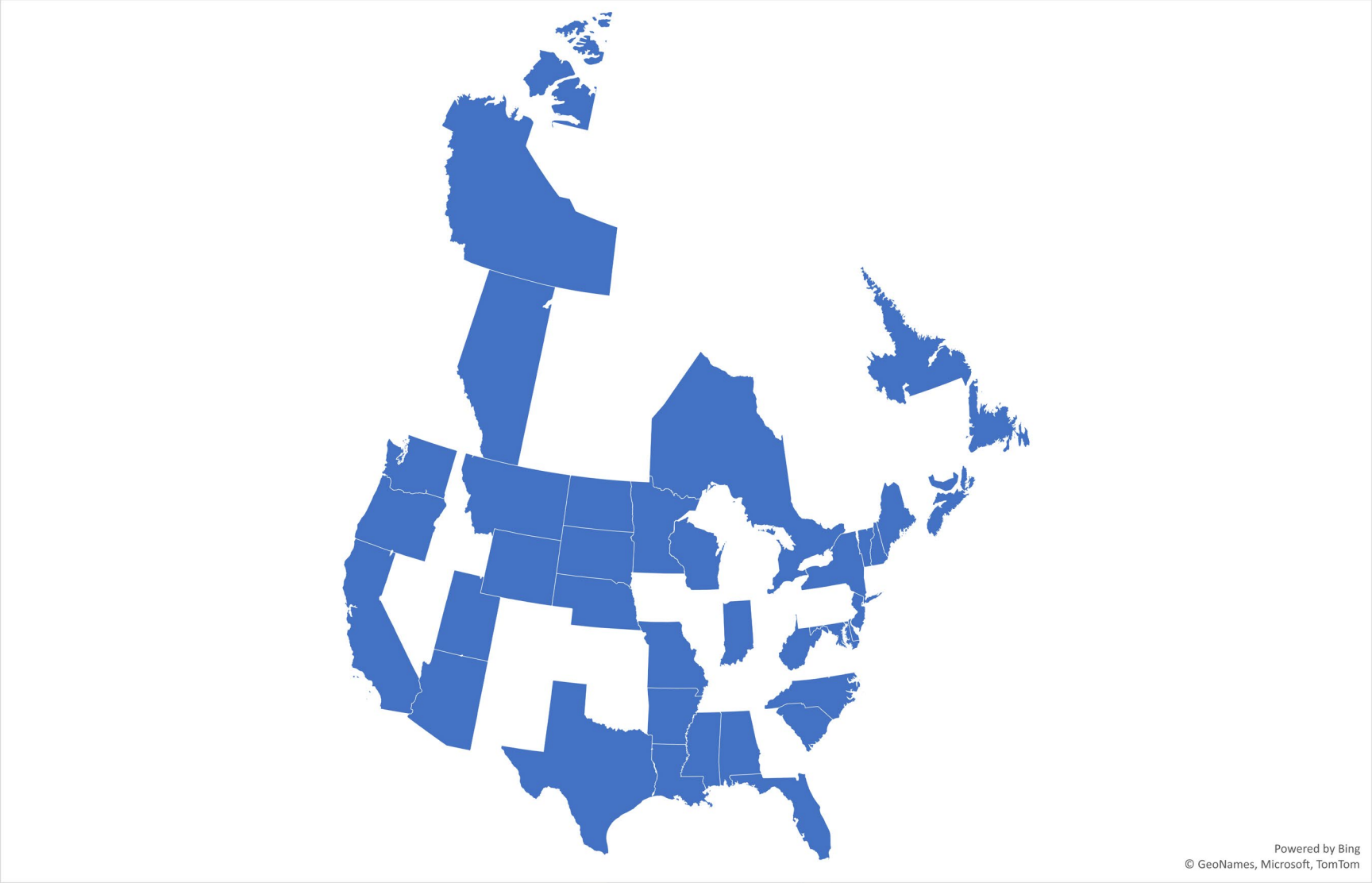

Figure 4.1 Jurisdictions Represented in Law Enforcement Survey

The first survey question asked law enforcement officials if they had seen an uptick in illegal bypasses in their jurisdictions. Of the 37 responses, 18 respondents answered *Yes* (49%) and 19 respondents said *No* (51%) (Figure 4.2).

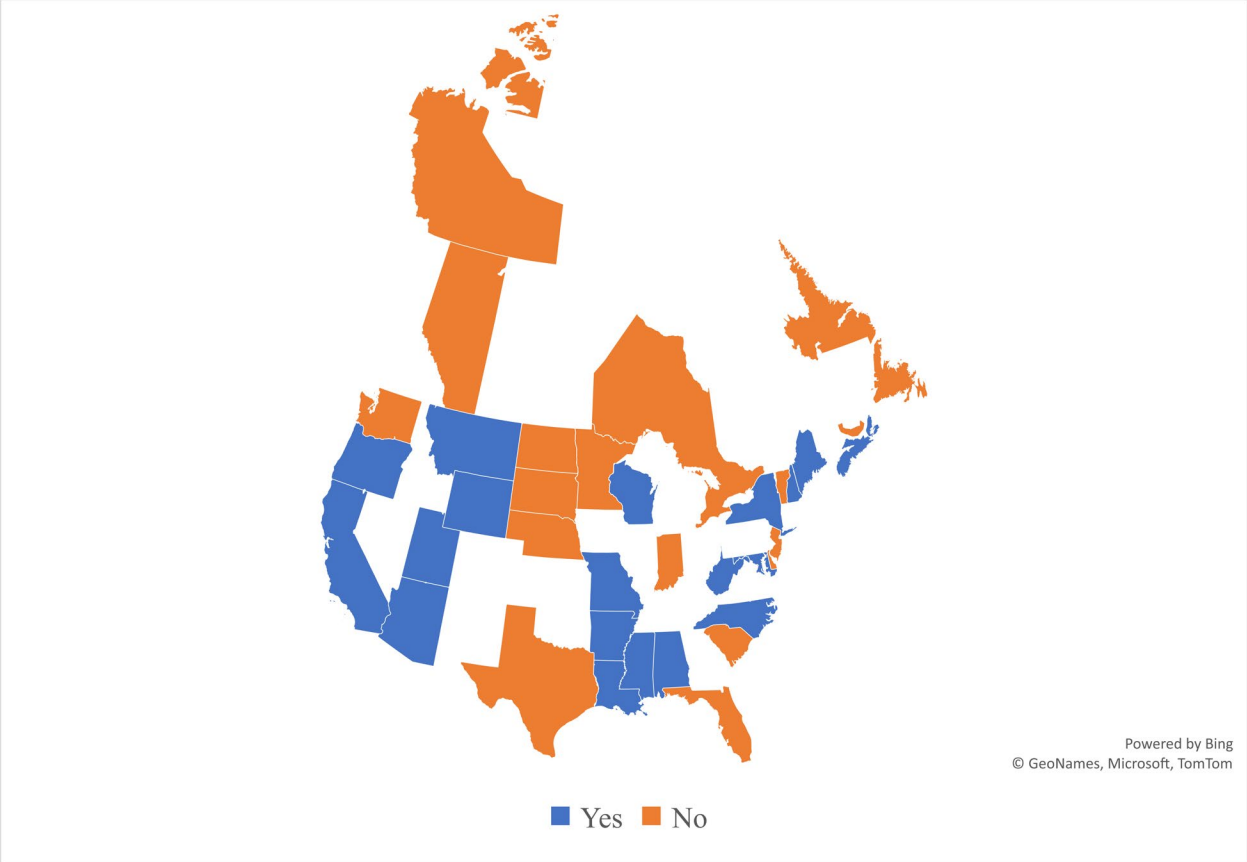

Figure 4.2 Geographical Breakdown of Reported Uptick in Illegal Weigh Station Bypassing

Question #2 asked respondents if law enforcement have noticed commercial vehicles running the *PARK* light on scale facility bypass ramps. Ten of the 37 respondents answered *Yes* (27%), while the remainder said *No* (73%) (Figure 4.3).

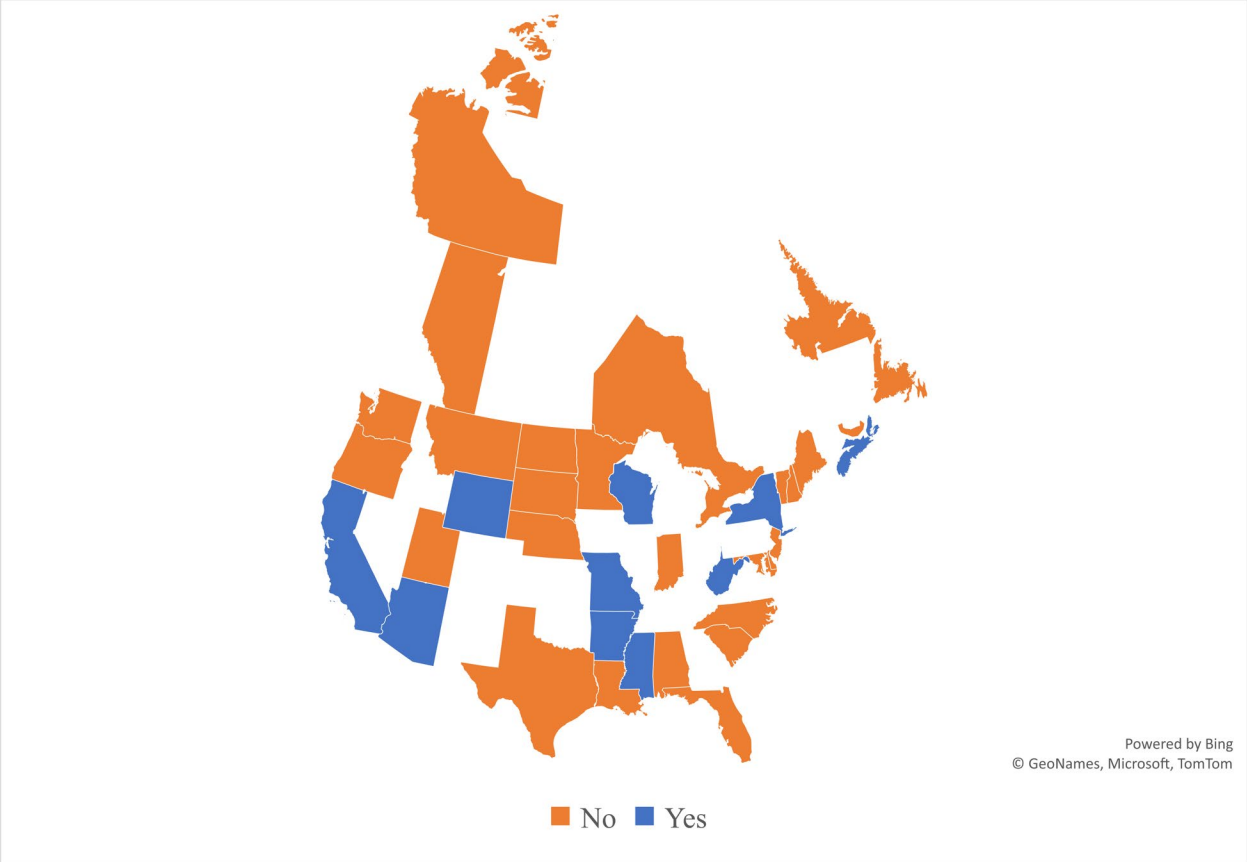

Figure 4.3 Geographical Breakdown of CMV Running "Park" Light on Weigh Station Ramps

Question #3 asked law enforcement officials if they have noticed commercial vehicles ghosting. Of the 36 responses, 26 answered *No* (70%) and 10 answered *Yes* (28%) (Figure 4.4).

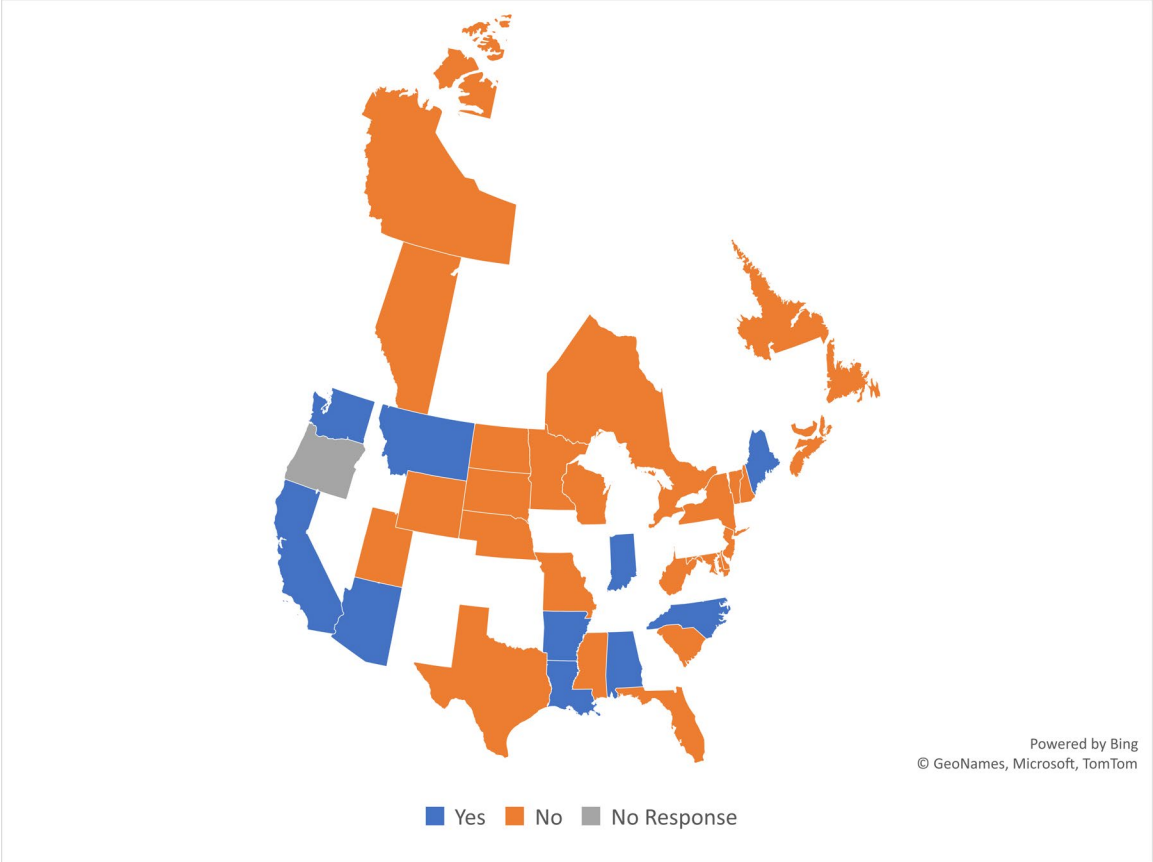

Figure 4.4 Geographical Breakdown of CMV "Ghosting" Practices

Forty-three percent of jurisdictions answered *Yes* or *No* to all of the first three questions. Five of six (83%) Canadian jurisdictions answered *No*, suggesting illegal bypassing is uncommon. The representative from Nova Scotia indicated the province had seen more illegal bypasses but was aware of no issues related to commercial vehicles running the *PARK* light or ghosting. Representatives from Arizona, Arkansas, and California answered *Yes* to each of the first three questions. Table 4.1 lists all responses for the first three survey questions.

Table 4.1 Jurisdictions Answering Yes or No to First Three Questions of Law Enforcement Survey

Jurisdiction	Q1 Uptick in Illegal Weigh Station Bypasses	Q2 CMV Running "PARK" signs	Q3 CMV Practicing "Ghosting"
Alberta	No	No	No
Arizona	Yes	Yes	Yes
Arkansas	Yes	Yes	Yes
California	Yes	Yes	Yes
District of Columbia	No	No	No
Delaware	No	No	No
Florida	No	No	No
Minnesota	No	No	No
Newfoundland and Labrador	No	No	No
Northwest Territory	No	No	No
Ontario	No	No	No
Prince Edward Island	No	No	No
South Carolina	No	No	No
South Dakota	No	No	No
Texas	No	No	No
Vermont	No	No	No

Question #4 asked respondents about statutes that authorize the issuance of warnings and/or citations for illegal bypassing. Respondents from North Carolina and Missouri reported two statutes are in place, while the remaining respondents cited a single statute. Appendix A provides details on state statutes.

Question #5 asked respondents about court costs, fines and/or penalties commercial vehicle drivers are subject to if caught for illegal bypassing. Amounts vary greatly by jurisdiction. Penalties included receiving points off a CDL or being charged with a moving violation. Fines range from $20 to $1,000, with an average fine of $227.87.

Question #6 asked if jurisdictions have conducted enforcement details to curb illegal bypassing. Of the 37 respondents, 26 responded they had (70%) (Figure 4.5). Enforcement efforts included soliciting help from state enforcement officers, always having officers at permanent weigh stations whose primary purpose is to pursue vehicles that illegally bypass, and using dummy patrol cars or empty patrol cars as a form of deterrence.

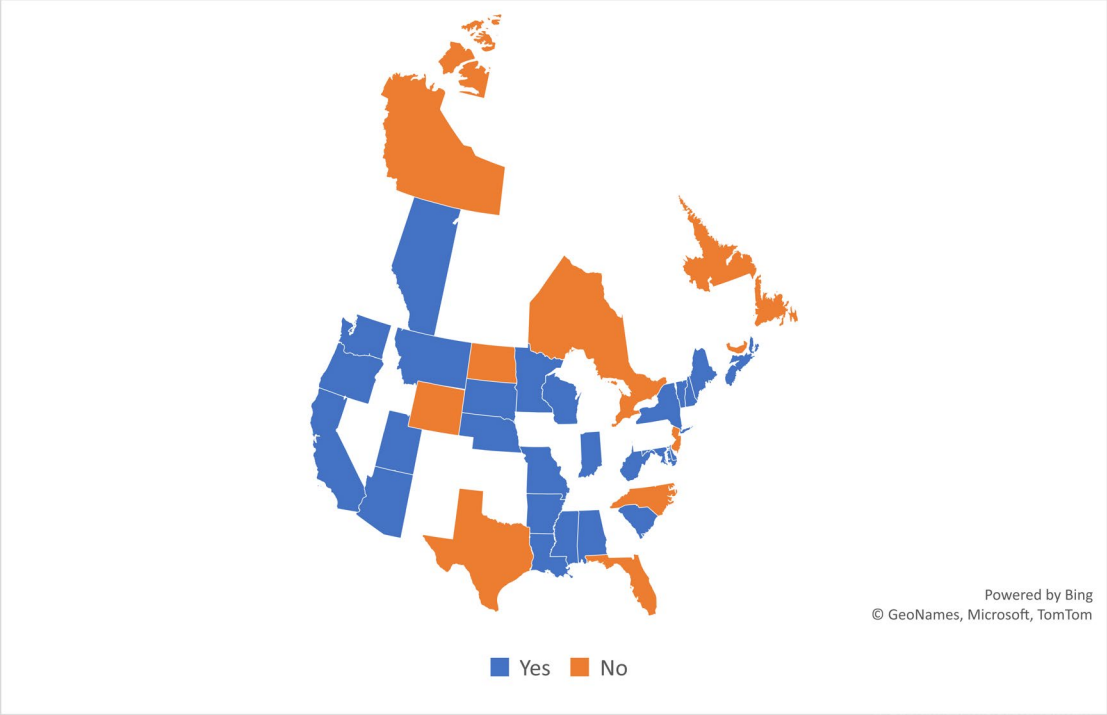

Figure 4.5 Geographical Breakdown of Enforcement Details Conducted

Question #7 asked about using technology to detect vehicles that illegally bypass. Twenty-five of 37 jurisdictions (68%) reported implementing such technology. Several states cited adopting preclearance systems (e.g., PrePass and Drivewyze). Other technologies included security cameras and weigh-in-motion cameras that alert law enforcement of illegal bypasses. One jurisdiction is installing updated camera systems that will capture truck and carrier information so law enforcement can contact the carrier and request trucks return to the weigh station.

Question #8 asked if statutes or regulations let commercial vehicle enforcement issue automatic and/or remote tickets for illegal bypassing. Only one jurisdiction answered *Yes* but mentioned that this practice is not currently used.

Question #9 asked respondents to share other processes, procedures, or best practice recommendations to reduce illegal bypassing. Table 4.2 provides some of their answers.

Table 4.2 Recommendations to Reduce Illegal Weigh Station Bypassing

“You can post a " Dummy" patrol car at the entrance of the weigh station to look like a chase car to act as a deterrence if manpower is low.”
“Regular patrol of known problem areas. Patrol officers being aware of routes that bypass scales and setting up operations in those areas.”
“Upgrade in interstate signage and lighting systems.”
“Stay on them, never let it get out of hand.”
“Aggressive enforcement of violations.”
“Mobile enforcement around known bypass routes.”
“Leverage tech to note in erods anytime a truck bypasses illegally.”
“High visibility patrols on by-pass routes.”
“We have started to place fully marked vehicles at the scales to use as chase cars when CMVs bypass the weigh stations.”
“Working along with our road stations on the interstate to call out by-passers, assists with enforcing the weigh station regulations by doubling efforts. LPR's would be beneficial for those carriers that do not subscribe to by-pass systems which may then lend to the ability to enforce this statute with remote citations.”
“Must have mainline LPR's flag all vehicle not just the legally bypassed vehicles.”
“Clear signage. Active enforcement - word gets out regarding locations that go out and "chase" the runners. Our signboards have flashing lights when trucks are required to enter. We have installed lights on the back of the signboard that can be seen from the officers’ location to better confirm the lights were working and active to assist with court evidence.”
“We do cite the carrier if they refuse to help in getting the drivers information. We have to witness the bypass, but our roadside cameras will serve as a viable argument for "in whose presence" and will stand up in court. Our cameras date and time stamp the image and we are also able to match up the WIM crossing with the bypass enforcement. Our MC officers are civilian, so we do not pursue the bypasser via policy. Only our law enforcement partners are pursuing and pull over or direct to return to scale.”
“A conspicuous presence of law enforcement generally deters bypassing.”
“If officers routinely enforce bypassing, word-of-mouth will reduce bypassing.”
“Patrol.”
“The best way to deter this activity is to focus on enforcement and citing the drivers that do not stop. The word will get around if you fail to stop you get ticketed. We are finding consistent OOS violations of HOS problems, no CDLs etc. on these carriers.”

Question #10 asked respondents to share further information about illegal bypassing in their jurisdictions. While few officials had information to share, Table 4.3 provides responses we received.

Table 4.3 Additional Information Provided About Illegal Weigh Station Bypassing

“For early morning hours and night shift talking about ghosting, I have seen on more than one occasion a driver turning off their lights trying to ghost by then flip them back on just as they reach the exit ramp of the weigh station.”

"Other violations often occur in conjunction with scale bypassing, including speeding, out of lane, operating authority, vehicle marking, HOS, and driver licensing."
"We have decided to only have one preclearance system at our fixed scale sites. I believe it is nearly impossible for a law enforcement officer to try and monitor more than one preclearance system, plus all the other state systems we have running on one small squad car laptop."
"I believe this is a nationwide problem because drivers know most states have limited resources when it comes to chasing down bypass violators. We had one driver tell us running the scales is the price of doing business."
"I believe using drone technology would be useful in certain areas that have access roads around the scale facility to monitor that flow of traffic and possibly utilize to assist law enforcement in calling out violator locations."
"Every state, and even weigh stations within a state, have different rules for entering or bypassing a weigh station. There should be uniform and easy to understand signs that tell vehicle to or not to enter."
"We keep it under wraps without getting to far out of hand with the placement of mobiles near the compliance stations."
"It is definitely a problem with some areas experiencing up to 20% non-compliance. Our state police are shorthanded and currently do not have the resources to assist as much as possible. Our new camera system will help greatly in enforcement efforts. Ideally, a system that auto issues a citation would make a huge impact but would also require legislation."

4.3 Conclusions

The high survey response rate (56%) was surprising and is likely due to illegal bypassing being an issue law enforcement officials confront at all permanent weigh stations across North America. While roughly half of the jurisdictions reported a rise in illegal bypasses, this is not necessarily a reflection of how often it is happening, and more likely related to the way the question was phrased. Because it was a simple *Yes* or *No* question, respondents had no opportunity to elaborate on their answers. Based on respondent comments, it is more likely that many jurisdictions view illegal bypassing as a perpetual problem rather than a new one. Additionally, 70% of jurisdictions reported conducting an enforcement detail to curb illegal bypassing. This indicates that most jurisdictions have determined this is an issue that needs to be resolved. In addition, 68% of jurisdictions reported using technology to detect drivers who illegally bypass. This, again, highlights the fact that illegal bypassing is a significant problem for jurisdictions across North America and needs sufficient action to curb it.

Chapter 5 Best Practices to Combat Illegal Weigh Station Bypassing

5.1 Best Practices and Underlying Rationale

To reduce illegal weigh station bypasses and support commercial vehicle enforcement officer needs, we are proposing 10 best practices.

1. **Ensure that a sworn officer is at every permanent weigh station location.**
   While inspectors are necessary to conduct routine inspections on commercial vehicles and can often alleviate state commercial vehicle enforcement officer workloads, they lack the legal authority to pursue trucks that illegally bypass. Although not sufficient, this is a necessary measure that will let each weigh station pursue some trucks that illegally bypass. If there are sworn officers at permanent weigh stations that can pursue vehicles in violation, drivers will likely communicate to one another that officers are pursuing violators. This can serve as a deterrent.

2. **Improve signage in advance of permanent weigh stations.**
   To ensure that drivers are aware of impending permanent weigh stations, it is imperative that they be able to see advance signage. Many vehicles use preclearance systems such as Drivewyze and PrePass, which alert drivers of downstream weigh stations. But these systems are not required and are not used by all carriers. Signage at the ends of weigh station ramps should help drivers understand they are being asked to pull into the weigh station for an inspection. Sufficient signage is a low-cost method to help drivers see that they are approaching a weigh station.

3. **Establish a standard length for future weigh station ramps. Lengthen existing ramps to meet this standard.**
   Ramp lengths at permanent weigh station ramps in Kentucky vary greatly. The longest ramp is .36 miles (Lyon County WB), and the shortest ones are .15 miles (Scott County, Rowan County, and Shelby County). Longer ramps allow for more trucks to queue up and prevent weigh stations from temporarily closing due to high volume. When weigh stations are closed, trucks can bypass them. Although this practice is technically legal, lengthening weigh station ramps will help jurisdictions minimize the number of trucks allowed to bypass during regular operating hours. Establishing a standard length for permanent weigh station ramps will likely require additional research and may vary based on traffic trends within each jurisdiction. Construction costs, facility layout, shoulder clearance, land ownership, utility connections, and other design factors will impact the feasibility. Nevertheless, standardization of ramp specifications is a worthwhile goal.

4. **Increase the number of cameras at permanent weigh stations to identify vehicles that illegally bypass.**
   Additional cameras can help identify vehicles that illegally bypass, especially when law enforcement cannot pursue violators and escort them back to the weigh station. Capturing identifying information is crucial for law enforcement's efforts to deter drivers from illegally bypassing — and the possibility of photographs being taken serves as a deterrent. This also gives law enforcement an opportunity to contact the carrier. Having additional cameras can improve data collection and help establish patterns of noncompliance.

5. **Employ technology to issue citations remotely and automatically to drivers that illegally bypass permanent weigh stations.**
   Law enforcement officials cannot issue citations to all trucks that illegally bypass. Adopting new technology that can remotely and automatically issue citations will help law enforcement curb illegal bypasses. One application of this technology is the use of red-light cameras at traffic signals. Typically, these cameras capture photos of vehicles that run stoplights. Multiple pictures are taken of the offending driver and a citation is issued. Speed cameras can also be used to deter speeding. Speed cameras collect data on vehicle speed, license plate number, date, time, and location. If the driver is speeding, a citation is issued either to the owner of the vehicle or the driver, depending on jurisdiction-specific legislation (Bates and Oren, 2020). An Insurance Institute for Highway Safety (IIHS) study found that cameras placed at red lights reduced fatal crashes in large cities by 21% (Hu and Cicchino, 2017). Another study conducted by IIHS in 2016 also found a 62% decrease in the number of drivers who reported exceeding the speed limit by more than 10 mph on a roadway with a speed camera (Hu and

McCartt, 2016). Because of its success in reducing fatal crashes, this technology should be tailored to deter commercial vehicles from illegally bypassing permanent weigh stations. To address potential concerns of legislators about the scope of such activities, KYTC may wish to advocate for narrowly crafted legislation that authorizes automated citations solely for commercial vehicle enforcement purposes.

6. **Improve preclearance system notifications (Drivewyze and PrePass).**
   During our visit to the I-75 NB weigh station in Scott County, drivers using preclearance systems illegally bypassed the weigh station routinely despite being given instructions to pull in. As is the case in Scott County, often drivers do not have a clear view of an upcoming weigh station, which prevents them from getting into the appropriate lane in a timely manner. Efforts to improve communications delivered to drivers through the preclearance systems should focus on strengthening the quality of information so compliance rates increase.

7. **Increase the penalty in Kentucky for illegally bypassing weigh stations.**
   Trucks that illegally bypass weigh stations pay just $25. This is insufficient to boost compliance with state and local laws related to weigh station facilities (see Section 3.5). A higher penalty will greatly increase the expected cost of non-compliance and discourage trucks from illegally bypassing weigh stations. Used in tandem with greater enforcement, this tool can help reduce lawbreaking without significant investments in technology, infrastructure, or the scope of law enforcement methods.

8. **Standardize pull-in rates.**
   Drivewyze and PrePass data indicate that Kentucky's permanent weigh stations have varying pull-in rates. Standardizing these rates ensures fairness for all carriers and drivers using preclearance services regardless of their region of operation. It would clarify driver expectations in terms of the probability of getting a green light or pull-in and is something KSP-CVE could discuss as a potential protocol for weigh station operations. Efforts may be tempered to some degree by station personnel levels, traffic levels, bypass ramp length (and ramp congestion), regional/local non-compliance issues, inspection activity, and other factors.

9. **Resolve data reporting discrepancies, eliminate duplicate records, and obtain missing PrePass/ Drivewyze records.**
   We uncovered significant reporting discrepancies in PrePass and Drivewyze records. The PrePass record count for CY 2021 in KYTC's Business Objects database was 831,594 trucks, but the PrePass annual report showed 2.28 million trucks. A discrepancy this large requires immediate attention. We recommend KYTC information technology analysts work with KTC researchers and PrePass analysts to determine the root cause of the problem and resolve it. KTC used the Cabinet's number for its projections. Insofar as this data quality issue causes errors in the statewide illegal bypass projections shown in Section 3.5, it would create a conservative downward bias (i.e., the projections may be too low). We also noticed that no records have been uploaded to Business Objects from Drivewyze since 8/6/2021, so there are 4.5 months of missing Drivewyze records, which is already creating a potential downward bias in statewide estimates. KYTC information technology analysts should work with Drivewyze to ensure historical screening records for trucks operating in Kentucky are regularly sent to KYTC. Both PrePass and Drivewyze had duplicate records in the database — removed for our analysis — that should be permanently stricken from all commercial vehicle screening databases. Analysts should regularly screen for duplicate records to ensure accurate reporting and sound data quality principles.

10. **Investigate potential probation or sanctions for violators using preclearance services.**
    KSP-CVE and KYTC should meet with PrePass and Drivewyze to discuss the possibility of probation or sanctions for carriers enrolled in these services if they have drivers who illegally bypass despite the systems instructing them to pull into a weigh station. While these carriers are less likely to commit violations, we documented several instances where an illegal bypass was committed by PrePass or Drivewyze carriers. Specifics would need to be hashed out through negotiations with each service, but something like a two-week probation for the first offense, a month probation for a second offense, and disenrollment from the service for three or more offenses should motivate carriers to reiterate the importance to their drivers of following the system's instructions as these services let carriers save both time and fuel costs. Implementation would be relatively simple. KYTC

currently sends CVIEW status files to Drivewyze and PrePass for all Kentucky credentials. It would be straightforward to add one more field that indicates whether a carrier is eligible for bypasses in Kentucky.

5.2 Conclusions

Illegal weigh station bypassing is a problem that warrants immediate action. Failing to improve the current system places all motorists on North America's highways at undue risk. In addition to the safety implications, jurisdictions are missing out on collecting revenues necessary to fund operational costs. Commercial vehicle enforcement officers are doing what they can to deter drivers from engaging in this behavior, but often cannot keep up due to staffing shortages and require additional resources. Even fully staffed jurisdictions still cannot handle this problem with sheer manpower. The best practices outlined in this chapter can be adopted individually, or in conjunction with one another, depending on the resources available to the jurisdictions.

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Appendix A: State Statutes and Descriptions

Jurisdiction	Statute	Description
Alabama	AL Code §32-5A-31 (2020)	Failure to Obey Traffic Control Device
Alberta	Traffic Safety Act cT-6.4 §110 (2000)	When a vehicle inspection station sign indicates that the vehicle inspection station is in operation and directs that a commercial vehicle or class of commercial vehicles is to be taken to the vehicle inspection station, the driver of a vehicle that is subject to that direction shall, for purposes of enabling an inspection to take place under section 136
Arizona	ARS §28-644 (A)(1) (2005)	Failure to obey a traffic control device (Civil)
Arkansas	A.C.A.§27-52-103 (2010)	Disobey Traffic Control Device
California	CA Veh Code §2813 (1981)	Every driver of a commercial vehicle shall stop and submit the vehicle to an inspection of the size, weight, equipment, and smoke emissions of the vehicle at any location where members of the California Highway Patrol are conducting tests and inspections of commercial vehicles and when signs are displayed requiring the stop. Every driver who fails or refuses to stop and submit the vehicle to an inspection when signs are displayed requiring that stop is guilty of a misdemeanor.
	CA Veh Code §21461 (2011)	It is unlawful for a driver of a vehicle to fail to obey a sign or signal defined as regulatory in the federal Manual on Uniform Traffic Control Devices, or a Department of Transportation approved supplement to that manual of a regulatory nature erected or maintained to enhance traffic safety and operations or to indicate and carry out the provisions of this code or a local traffic ordinance or resolution adopted pursuant to a local traffic ordinance, or to fail to obey a device erected or maintained by lawful authority of a public body or official.
Washington, D.C.	D.C. §18-2000.4 (2017)	The driver of any vehicle shall obey the instructions of any official traffic control device applicable to the vehicle which has been placed in accordance with the provisions of this subtitle, unless otherwise directed by a police officer, subject to the exceptions granted the driver of an authorized emergency vehicle in this chapter.
Delaware	DE Code 21 § 4506 (2021)	Fail to obey traffic control devices erected to enforce this chapter;
Florida	Florida Statute §316.074 (2019)	Failure to obey a traffic control device.

Jurisdiction	Statute	Description
Indiana	IC § 9-21-8-41 (2018)	A person who drives a vehicle may not disobey the instructions of an official traffic control device placed in accordance with this article unless otherwise directed by a police officer.
Louisiana	LA Rev Stat § 32:388 (2021)	All commercial vehicles rated one ton or greater, except automobiles, private passenger pickup trucks, private passenger vans, recreational vehicles, buses, utility vehicles convoying to or from emergency service restoration due to a natural disaster, and tow trucks unless the tow truck has a gross vehicle weight rating in excess of twenty-six thousand pounds or is hauling or carrying a vehicle not exempt from the provisions of this Section, shall be required to stop at a stationary weight enforcement scale location.
Maine	Title 29-A § 2358 (1993)	A state police officer may require a motor vehicle or combination of vehicles described in this chapter to stop and submit to weighing. The following provisions apply to the weighing of vehicles.
Maryland	MD. Transportation Code Ann. § 21-201 (a)(1) (2020)	Subject to the exceptions granted in this title to the driver of an emergency vehicle, the driver of any vehicle, unless otherwise directed by a police officer, shall obey the instructions of any traffic control device applicable to the vehicle and placed in accordance with the Maryland Vehicle Law
Minnesota	M.S. §169.06(4)(a) (2021)	The driver of any vehicle shall obey the instructions of any official traffic-control device applicable thereto placed in accordance with the provisions of this chapter, unless otherwise directed by a police officer or by a flagger authorized under this subdivision, subject to the exceptions granted the driver of an authorized emergency vehicle in this chapter.
Mississippi	MS Code § 63-3-313 (2013)	No driver of a vehicle shall disobey the instructions of any official traffic-control device placed in accordance with the provisions of this chapter, unless at the time otherwise directed by a police officer.
Missouri	MO Rev Stat § 304.230 (2021)	Refuse to Weigh CMV
	MO Rev Stat § 304.235 (2021)	Failed to weigh CMV

Jurisdiction	Statute	Description
Montana	MT Code § 61-10-141 (2019)	A peace officer, officer of the highway patrol, or employee of the department of transportation may weigh any vehicle regulated by 61-10-101 through 61-10-104 and 61-10-106 through 61-10-110, except recreational vehicles, travel trailers, or motor homes, by means of either portable scales used on an engineered site or stationary scales. The peace officer, officer of the highway patrol, or employee of the department of transportation may require that the vehicle be driven to the nearest stationary scales or engineered site for use of portable scales if those stationary scales or an engineered site is within 2 miles.
Nebraska	NE Code § 60-1308 (2021)	Failure to stop at weighing station or portable scale; violation; penalty.
New Hampshire	NH Rev Stat § 265:9 (2018)	Failure to obey a traffic control device
New Jersey	NJ Rev Stat § 39:3-84.3 (2013)	Measurement, weighing to determine compliance; fines for operating on prohibited routes
New York	NYS Vehicle and Traffic Law § 1110a (2021)	Failure to Obey a traffic device
Newfoundland & Labrador	Highway Traffic Act c33 § 106(1)	Except when a traffic officer directs otherwise, drivers and pedestrians shall obey the instructions of a traffic-control signal or traffic-control device prescribed by the Minister of Works, Services and Transportation in accordance with this Part.
North Carolina	NC GS §20-118.1 (2005)	Officers may weigh vehicles and require overloads to be removed. A law enforcement officer may stop and weigh a vehicle to determine if the vehicle's weight is in compliance with the vehicle's declared gross weight and the weight limits set in this Part
	NC GS §20-176 (2005)	Penalty for misdemeanor or infraction.
North Dakota	39-10-01.1 (2016)	Failed to obey traffic control device.
Northwest Territory	Large Vehicle Control Regulations §30(9) (2020)	Failure to report to weigh scales when so directed by officer or traffic control device
Nova Scotia	MVA R.S., c.293, §191(1)(a)	Subject to the approval of the Governor in Council, the Ministry may make regulations governing the weight of any vehicle or class of vehicle which may be operated on a highway, the weight of the load which may be carried by such vehicle and the combined weight of any such vehicle, and the load carried by it, and the ascertaining of the weight of such load and the vehicle

Jurisdiction	Statute	Description
Ontario	Highway Traffic Act § 216.1(2)(2022)	Any officer appointed for carrying out the provisions of this Act, in the lawful execution of his or her duties and responsibilities, including for the purpose of an examination under subsection (1), may direct, by signals or otherwise, the driver of any commercial vehicle or road-building machine driven on a highway to stop, and the driver, upon being so directed, shall stop the vehicle.
Oregon	ORS §825.400(1)(a) (2021)	Rules for establishment of motor carrier education program; contents of program; fees.
Prince Edward Island	Roads Act §49(5)(a) (2017)	Disobeying sign or signal of peace officer to stop vehicle
South Carolina	SC Code § 56-5-1900 (2012)	Disregarding Traffic Control Device. Official traffic-control devices may be erected directing specified traffic to use a designated lane or designating those lanes to be used by traffic moving in a particular direction regardless of the center of the roadway and drivers of vehicles shall obey the directions of every such device
South Dakota	SD Codified L § 32-33-17 (2019)	Failure to stop at state weighing station--Misdemeanor. The driver of any single or combination vehicle weighing in excess of ten thousand pounds gross vehicle weight, who fails to stop at or who knowingly passes or bypasses any state weighing station, upon any public highway, when the station is open and being operated by law enforcement officers or motor carrier inspectors, is guilty of a Class 2 misdemeanor. This section does not apply to any recreational vehicle as defined in subdivision 32-3-1(18). For purposes of this section, a combination vehicle is any vehicle consisting of two or more units including a truck, tractor, or towing vehicle, and one or more trailers.
Texas	TX Transp Code § 544.004 (2019)	Fail to obey official traffic control device
Utah	UT Code § 72-9-502 (2021)	Except under Subsection (3), a motor carrier operating a motor vehicle with a gross vehicle weight of 10,001 pounds or more shall stop at a port-of-entry as required under this section.
Vermont	23 V.S.A. §1021 (2012)	The driver of any vehicle shall obey the instructions of any official traffic-control device applicable to him or her placed in accordance with this chapter unless otherwise directed by an enforcement officer, subject to the exceptions granted in this chapter.

Jurisdiction	Statute	Description
Washington	RCW § 46.44.105.3 (2007)	It is unlawful for the driver of a vehicle to fail or refuse to stop and submit the vehicle and load to a weighing, or to fail or refuse, when directed by an officer upon a weighing of the vehicle to stop the vehicle and otherwise comply with the provisions of this section. It is unlawful for a driver of a commercial motor vehicle as defined in RCW 46.32.005, other than the driver of a bus as defined in RCW 46.32.005(3) or a vehicle with a gross vehicle weight rating or gross combination weight rating of 7,257 kilograms or less (16,000 pounds or less) and not transporting hazardous materials in accordance with RCW 46.32.005(4), to fail or refuse to stop at a weighing station when proper traffic control signs indicate scales are open. However, unladen tow trucks regardless of weight and farm vehicles carrying farm produce with a gross vehicle weight rating or gross combination weight rating of 11,794 kilograms or less (26,000 pounds or less) may fail or refuse to stop at a weighing station when proper traffic control signs indicate scales are open.
West Virginia	WVC §17C-17-10(c) (2021)	Officers may weigh, measure or examine vehicles and require removal or rearrangement of excess loads.
Wisconsin	Administrative Code Transportation Rule Trans § 312.04 (2014)	Whenever the operator of a truck having a gross weight in excess of 10,000 pounds approaches an open weigh station, the operator shall stop the truck at the open weigh station and shall permit the truck and its load to be weighed, measured or inspected.

Jurisdiction	Statute	Description
Wyoming	WY Stat §31-18-301(c) (2017)	A copy of the current authority shall upon demand, be presented by the driver of the vehicle to any of the field investigators of the department, members of the state highway patrol or authorized personnel of the department at its ports of entry. Investigators, troopers, and authorized personnel may compel the driver to stop and submit the vehicle to an inspection by signs directing commercial vehicles or the motor carrier to stop at ports of entry or other locations designated by the department or by warning devices on vehicles of investigators, troopers, or authorized personnel. All ports of entry shall post signs or signals indicating when the facility is open and directing commercial vehicles or motor carriers to stop for inspection. Notwithstanding the provisions of this section, a vehicle that is properly registered, has a proper fuel license, valid authority and is legal in size and weight, upon approval by the department, may be authorized to bypass a port of entry unless specifically directed to stop by investigator, trooper, or authorized personnel or by a sign or signal specifically requiring those vehicles to stop. These vehicles may, however, be required to slow to the designated speed and use the directed traffic lane for size and weight screening purposes.