Differential Speed Limit on Rural Multilane Highways: Survey of Practice

Requested by
Scott White, District 2, Office of System Planning
Jeremiah Pearce, Office of ITS Engineering and Support
Philip Graham, District 9, Traffic Operations

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Executive Summary

Background

The 1987 Surface Transportation and Uniform Relocation Assistance Act (STURAA) permitted states to raise speed limits from the previously mandated national speed limit of 55 mph to 65 mph on rural interstate highways. In response to this legislation, some states uniformly raised speed limits for passenger cars and heavy trucks while other states raised the speed limit for passenger vehicles only, creating a differential speed limit for cars and heavy trucks traveling on the same roadway. In 1995, the national maximum speed limit was repealed, allowing states to set their own speed limits and investigate the effectiveness of both speed limit policies.

In 2017 the California Department of Transportation (Caltrans) published a Transportation Concept Report (TCR) that evaluated current roadway operational conditions and identified potential highway improvements for US 395. During the development of the TCR, members of the public and elected officials commented on the perceived negative operational impact of the differential speed limit (55 mph for trucks, 65 mph for other vehicles), noting that the differential speed limit between trucks and other vehicles creates adverse operational and safety conditions on state highways. Limited research had been done about the comparative benefits of these speed limit policies on rural two-lane highways, which somewhat supported the use of uniform speed limits, and virtually all states have reduced or eliminated the use of differential speed limits. As a result, the TCR included a recommendation to evaluate the potential benefit of a universal speed limit for US 395.

Recently, Caltrans evaluated the impact of adopting a uniform speed limit policy on rural two-lane highways to determine potential operational and safety benefits of this policy. Building on the findings of this study, Caltrans is seeking additional information from other state transportation agencies about current and best practices with truck speed limits on rural multilane highways.

To assist Caltrans in this information-gathering effort, CTC & Associates conducted an online survey of state transportation agencies that examined their experience with using differential and uniform truck speed limits on rural multilane highways. A literature search identified publicly available sources of national and state policy and guidance to supplement survey findings.

Summary of Findings

This Preliminary Investigation presents information in two areas:

- Survey of state practice.
- Related research and resources.

Survey of State Practice

An online survey was distributed to members of the American Association of State Highway and Transportation Officials (AASHTO) Committee on Traffic Engineering who were expected to have knowledge of or experience with differential truck speed limits on rural multilane highways and developing and implementing a uniform speed limit policy. For the purposes of the survey and this Preliminary Investigation, these speed limits were defined as follows:

- *Differential speed limit*: Lower maximum speed limit is set for heavy trucks and other vehicles with three or more axles.
- *Uniform speed limit*: Maximum speed limit is the same for all vehicles.

Fourteen state transportation agencies responded to the survey.

- Departments of transportation (DOTs) from two states—Illinois and Virginia—have changed from a differential speed limit to a uniform speed limit on rural multilane highways. Illinois DOT made this change based on state legislation, not agency consideration. Virginia DOT adopted a uniform speed limit in 1994. Rather than specifically identifying the factors contributing to the speed limit change, the respondent cited two publications that examined the safety impact of the differential speed limit while it was in place and after its removal.
- Idaho Transportation Department has not formally approached the topic of changing its speed limit policy since eliminating the differential speed limit in this state would require legislative action.
- Two agencies—Michigan and Utah DOTs—are not considering changing from a differential speed limit to a uniform speed limit. In Michigan, a differential truck speed limit is state law on freeways posted above 65 mph. The maximum truck speed is 65 mph. The Utah DOT respondent noted that in areas of extreme grade, differential speed limits have been shown to be beneficial.
- In North Carolina, state law does not allow differential truck speed limits except where there is a documented safety issue. According to the North Carolina DOT respondent, there are fewer than 10 locations statewide where differential speed limits for trucks are in place.
- The remaining eight state transportation agencies reported that they have never applied differential truck speed limits on rural multilane highways.

Survey results are summarized below in two categories:

- Adopting a uniform speed limit.
- Maintaining a differential speed limit.

Adopting a Uniform Speed Limit

Illinois Department of Transportation

In Illinois, the differential speed limit was eliminated after state legislation was introduced to increase the maximum speed limit for trucks to match the speed limit for other vehicles. According to the Illinois Vehicle Code, current lawful speed limits in nonurban areas is 65 mph for all or part of highways that are designated by the agency, have at least four lanes of traffic and have a separation between the roadways moving in opposite directions, and 55 mph for “all other highways, roads and streets.”

The Illinois DOT respondent provided three recommendations for other agencies considering the elimination of speed differentials on rural multilane highways:

- Consider keeping the speed differential in major urban areas.

- Consider the cost to highway departments for changing and/or removing speed limit signs.
- Track crashes on multilane highways to determine any positive or negative effects of speed differential elimination.

Virginia Department of Transportation

In 1994, Virginia DOT removed the differential speed limit for trucks on rural interstate highways, changing the speed limit of 65 mph for cars and 55 mph for trucks to a uniform speed limit of 65 mph. Current truck speed limits in Virginia are not differentiated statutorily except on noninterstate, nonprimary roads where it is 45 mph versus 55 mph for passenger cars.

The respondent recommended review of two publications that considered the safety impacts of the differential speed limit. A 1994 Virginia DOT study examined Virginia's experience with raising the maximum speed limit on rural interstate highways from 55 mph to 65 mph during the period 1989 to 1992. Researchers also considered the differential speed limit in effect during the study period and reported the following conclusions regarding the frequency of crashes:

- There is conflicting evidence concerning whether differential speed limits for trucks and cars have had an impact on the frequency of crashes in states maintaining such differential limits.
- Suspected increases in crashes involving passenger vehicles and trucks due to differential speed limits on rural interstates did not occur during the study.
- Although there was a slight increase (2.3) in fatal rear-end crashes in which a nontruck struck a truck, which is the configuration expected from a differential speed limit, this increase was not significant.
- The majority of the increase in fatal crashes involved single vehicles running off the road, which is not likely the result of a differential speed limit.

A second publication examined the impact of Virginia DOT's change from a differential to uniform speed limit. A 2003 conference paper described research findings that are more fully detailed in an October 2005 Federal Highway Administration (FHWA) publication. Both publications examined speed limit policies for rural interstate highways in 10 states during the period 1991 to 2000, segregating states into four policy groups:

- Group 1: Maintained uniform speed limit (Arizona, Iowa, Missouri and North Carolina).
- Group 2: Maintained differential speed limit (Illinois, Indiana and Washington).
- Group 3: Changed from uniform to differential speed limit (Arkansas and Idaho).
- Group 4: Changed from differential to uniform speed limit (Virginia).

The 2003 conference paper's authors noted that "[s]tudies conducted during the early 1990s to compare the safety impacts of USL [uniform speed limit] and DSL [differential speed limit] were constrained because of the limited data available at that time," and FHWA requested a "longitudinal study" that focused on states that had changed their speed limits from uniform speed limit to differential speed limit or vice versa.

Researchers found that "[n]o consistent safety effects of DSL as opposed to USL were observed within the scope of the study." Highlighted below are other key study findings:

- Speed characteristics were generally unaffected by a differential versus uniform speed limit policy.
- Crash rates did not show an obvious relationship to the type of speed limit chosen.
- Measurable variation within speeds and crash rates by year and by state may confound any statistical tests employed.
- Removal of sites with high and low average daily traffic (ADT) made it easier to detect significant differences between before and after periods, suggesting that ADT does influence crash trends. Researchers further noted that the effect of ADT on crash rate is not clear, and the study "simply suggests that, through different mechanisms not yet proven by investigators, change in ADT may have disproportionate changes in crash rates."

According to the Virginia DOT respondent, other agencies considering the elimination of speed differentials on rural multilane highways should keep in mind that removing differential speed limits is consistent with the findings of many studies.

Maintaining a Differential Speed Limit

Idaho Transportation Department

Idaho Transportation Department has not formally approached the issue of eliminating the differential speed limit for trucks because the differential speed limit is set in Idaho law and cannot be changed without legislative action. A department-commissioned study was conducted in 2012 to examine the topic, and legislation has been introduced periodically to eliminate the differential speed limit, but no bill has been successful to date. The respondent noted that neighboring states do not have differential speed limits "seemingly without issue."

The agency tracks passenger vehicle and truck speeds, including the speed differential. Current lawful truck speed limits on interstate highways in nonurban areas require that vehicles with five or more axles and a gross weight of more than 26,000 pounds shall not exceed 10 mph less than vehicles with less than five axles and a gross weight of 26,000 pounds or less.

Related Research and Resources

A literature search of recent publicly available research identified a number of publications and resources related to differential truck speed limits on rural multilane highways.

Among the national guidance is a National Cooperative Highway Research Program (NCHRP) project in progress that is establishing guidance for setting speed limits. The preliminary findings from Phase II of this project are summarized in a 2019 NCHRP presentation. A 2015 journal article provides a comparison of rural interstate fatalities in relation to speed limit policies in several states. Investigators found that both overall and truck-involved fatalities increased with maximum speed limits. States with differential speed limits had marginal differences in total fatalities as compared with states with uniform speed limits. However, truck-involved fatalities were significantly lower in states with differential limits. Another 2015 journal article examines the travel speed characteristics of passenger vehicles, trucks and buses in states with different speed limit policies to determine the effects of differential speed limits and uniform speed limits for large vehicles.

A 2020 University of California Institute of Transportation Studies report assesses the impact of raising truck speed limits on traffic safety. Modeling results suggest that increasing the truck speed limit toward 65 mph to a uniform speed limit in rural areas will not likely increase the frequency of fatal crashes. Other research into traffic safety and mobility issues related to speed limits includes a 2019 Indiana DOT report that indicated a limited effect on mobility and safety in intermediate traffic conditions on rural freeways. Results suggest that replacing the differential speed limit (70 mph/65 mph) on Indiana rural roads with the uniform speed limit of 70 mph may be beneficial for both safety and mobility. A 2017 literature review conducted by Louisiana Department of Transportation and Development evaluated the implications of implementing differential speed limits. Investigators noted that most of the research on this topic "has not been able to conclusively determine which speed limit system is safer, a uniform speed limit or a differential speed limit." Several Oregon DOT resources provide a preliminary analysis of the impact of speed limit changes in eastern Oregon.

Gaps in Findings

Only 14 DOTs responded to the survey and among these agencies, only two had experience transitioning from a differential speed limit to a uniform speed limit on rural multilane highways. Neither agency conducted a recent assessment or study to determine whether to eliminate the differential speed limit for trucks. Instead, legislation was enacted in one state to change the speed limit policy; the other agency changed its policy based on research conducted in the 1990s and early 2000s. Reaching out to nonresponding state transportation agencies to potentially identify additional states that have considered or have already changed to a uniform speed limit for rural multilane highways could provide useful information.

Next Steps

Moving forward, Caltrans could consider:

- Reaching out to nonresponding DOTs, particularly those agencies that participated in the companion study of rural two-lane highways, to gain further guidance and perspectives about speed policies on rural multilane highways.
- Reviewing the speed limit legislation and other resources provided by Idaho Transportation Department, Illinois DOT and Virginia DOT.
- Examining the guidance and analyses of implementing differential and uniform speed limits provided in the literature search for this Preliminary Investigation.

Detailed Findings

Background

The 1987 Surface Transportation and Uniform Relocation Assistance Act (STURAA) permitted states to raise speed limits from the previously mandated national speed limit of 55 mph to 65 mph on rural interstate highways. In response to this legislation, some states uniformly raised speed limits for passenger cars and heavy trucks while other states raised the speed limit for passenger vehicles only, creating a differential speed limit for cars and heavy trucks traveling on the same roadway. In 1995, the national maximum speed limit was repealed, allowing states to set their own speed limits and investigate the effectiveness of both speed limit policies.

In 2017, the California Department of Transportation (Caltrans) District 2 developed a Transportation Concept Report (TCR) for US 395 that evaluates the operational conditions of roads and identifies potential highway improvements. The plan comprises several planning considerations, including trends in development and growth, land uses and local road connections.

Input from members of the public and elected officials during the development of the TCR included the perceived negative operational impact of the differential speed limit (55 mph for trucks, 65 mph for other vehicles). The differential speed limit between trucks and other vehicles on multilane state highways is perceived to create adverse operational and safety impacts. In response to these comments, investigators reviewed 18 studies that compared other state practices and policies using differential speed limits and uniform speed limits on two-lane and multilane highways. In general, changing from a differential speed limit policy to a uniform speed limit policy was considered to have a positive effect, and virtually all states have reduced or eliminated the use of differential speed limits. Based on these findings, the TCR included a recommendation to evaluate the potential benefit of a universal speed limit for US 395.

Recently, Caltrans evaluated the impact of adopting a uniform speed limit policy on rural two-lane highways to determine the operational and safety benefits of this practice. Building on the findings of this study, Caltrans is seeking additional information from other state transportation agencies about current and best practices with truck speed limits on rural multilane highways.

To assist Caltrans in this information-gathering effort, CTC & Associates summarized the results of an online survey of state departments of transportation (DOTs) that examined their experience with using differential truck speed limits on rural multilane highways and lessons learned from the implementation of a uniform speed limit. In addition, a literature search was conducted to identify publicly available sources of national and state policy and guidance related to this issue. Findings from these efforts are presented in this Preliminary Investigation in two topic areas:

- Survey of state practice.
- Related research and resources.

Survey of State Practice

An online survey was distributed to members of the American Association of State Highway and Transportation Officials (AASHTO) Committee on Traffic Engineering who were expected to have experience using differential truck speed limits on rural multilane highways and developing

and implementing a uniform speed limit policy. For the purposes of the survey and this Preliminary Investigation, these speed limits were defined as follows:

- *Differential speed limit*: Lower maximum speed limit is set for heavy trucks and other vehicles with three or more axles.
- *Uniform speed limit*: Maximum speed limit is the same for all vehicles.

Appendix A provides the survey questions. The full text of survey responses is presented in a supplement to this report.

Summary of Survey Results

Fourteen state transportation agencies responded to the survey:

- Alabama.
- Idaho.
- Illinois.
- Iowa.
- Kansas.
- Kentucky.
- Michigan.
- Nevada.
- North Carolina.
- Rhode Island.
- South Dakota.
- Utah.
- Virginia.
- Wisconsin.

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Among these agencies, implementation of a differential speed limit or a uniform speed limit on rural multilane highways varied considerably:

- Two agencies—Illinois and Virginia DOTs—indicated that they have changed from a differential speed limit to a uniform speed limit on rural multilane highways. Illinois DOT made this change based on state legislation, not agency consideration. Virginia DOT's change to a uniform speed limit on rural multilane highways dates back to 1994. The respondent cited research conducted before and after the change that examined the safety impacts of the state's speed limit policies.
- Idaho Transportation Department has not formally approached the topic of changing from a differential speed limit to a uniform speed limit, but recognizes that neighboring states do not have differential speed limits "seemingly without issue." The agency currently tracks passenger vehicle and truck speeds, including the speed differential. Eliminating the differential speed limit in this state would require legislative action.
- Two agencies—Michigan and Utah DOTs—are not considering changing from a differential speed limit to a uniform speed limit. In Michigan, a differential truck speed limit is state law on freeways posted above 65 mph. The maximum truck speed is 65 mph. The Utah DOT respondent noted that in areas of extreme grade, differential speed limits have been shown to be beneficial.
- In North Carolina, state law does not allow differential truck speed limits except where there is a documented safety issue. According to the North Carolina DOT respondent, there are fewer than 10 locations statewide where differential speed limits for trucks are in place. He added that completely removing differential speed limits for trucks is not preferred from a safety perspective. Removal is allowed, but there must be a documented reason for this action. In these situations, truckers can challenge the decision. The respondent noted that if the agency needed to lower the speed for trucks but not all vehicles, then artificially lowering the speed limit would "likely create situations where there is less compliance than we already have."
- The remaining eight state transportation agencies reported that they have never applied differential truck speed limits on rural multilane highways.

None of the agencies participating in the survey was aware of related research in this area that is currently in progress or is planned for future study. All of these agencies except Michigan DOT are available for follow-up conversations regarding their states' truck speed limit policies.

Below are survey results from Idaho Transportation Department, Illinois DOT and Virginia DOT, the three agencies that considered changing or have changed from a differential to a uniform speed limit on rural multilane highways.

Survey results are presented in the following categories:

- Adopting a uniform speed limit.
- Maintaining a differential speed limit.

Adopting a Uniform Speed Limit

Two agencies—Illinois DOT and Virginia DOT—reported that their agencies have changed from a differential truck speed limit to a uniform speed limit on rural multilane highways. In Illinois, the speed limit change was not an agency decision but the result of state legislation. Virginia DOT adopted a uniform speed limit in 1994. Information received from these agencies is summarized below. Following the discussion of these agencies' practices are recommendations to other agencies that may be considering the elimination of speed differentials on rural multilane highways.

Illinois Department of Transportation

Illinois DOT did not conduct a study or assessment to determine whether to eliminate the differential speed limit for trucks. Instead, the differential speed limit was eliminated after state legislation was introduced to increase the maximum speed limit for trucks to match the speed limit for other vehicles.

According to the Illinois Vehicle Code (see *Supporting Documents* below), current lawful speed limits in nonurban areas is 65 mph for all or part of highways that are designated by the agency, have at least four lanes of traffic and have a separation between the roadways moving in opposite directions; and 55 mph for "all other highways, roads and streets."

Recommendations

The Illinois DOT respondent provided three recommendations for other agencies considering the elimination of speed differentials on rural multilane highways:

- Consider keeping the speed differential in major urban areas.
- Consider the cost to highway departments for changing and/or removing speed limit signs.
- Track crashes on multilane highways to determine any positive or negative effects of speed differential elimination.

Supporting Documents

§625 ILCS 5/ Illinois Vehicle Code, Illinois Compiled Statutes, July 2012. https://ilga.gov/legislation/ilcs/ilcs4.asp?DocName=062500050HCh%2E+11+Art%2E+VI&ActID=1815&ChapterID=49&SeqStart=122400000&SeqEnd=123900000
From the code:

> (d) Unless some other speed restriction is established under this Chapter, the maximum speed limit outside an urban district for any vehicle is (1) 65 miles per hour for all or part of highways that are designated by the Department, have at least 4 lanes of traffic, and have a separation between the roadways moving in opposite directions and (2) 55 miles per hour for all other highways, roads and streets.
>
> > (d-1) Unless some other speed restriction is established under this Chapter, the maximum speed limit outside an urban district for any vehicle is (1) 70 miles per hour on any interstate highway as defined by Section 1-133.1 of this Code which includes all highways under the jurisdiction of the Illinois State Toll Highway Authority; (2) 65 miles per hour for all or part of highways that are designated by the Department, have at least 4 lanes of traffic, and have a separation between the roadways moving in opposite directions; and (3) 55 miles per hour for all other highways, roads and streets. The counties of Cook, DuPage, Kane, Lake, Madison, McHenry, St. Clair and Will may adopt ordinances setting a maximum speed limit on highways, roads and streets that is lower than the limits established by this Section.
>
> (e) In the counties of Cook, DuPage, Kane, Lake, McHenry and Will, unless some lesser speed restriction is established under this Chapter, the maximum speed limit outside an urban district for a second division vehicle designed or used for the carrying of a gross weight of 8,001 pounds or more (including the weight of the vehicle and maximum load) is 60 miles per hour on any interstate highway as defined by Section 1-133.1 of this Code and 55 miles per hour on all other highways, roads and streets.

Virginia Department of Transportation

In 1994, Virginia DOT removed a differential speed limit for trucks on rural interstate highways, changing the differential speed limit of 65 mph for cars and 55 mph for trucks to a uniform speed limit of 65 mph. The respondent noted that Virginia's experience with differential truck speed limits is "very dated" and "somewhat limited" by the availability of data due to the time period (1990s) when the differential speed limit was in place. The most recent examination of Virginia's speed limit policies was conducted in the early 2000s.

While the respondent did not describe how the agency made its decision to remove the speed differential in 1994 or the factors contributing to it, he recommended review of two publications examining speed limit policies in Virginia and other states. Highlighted below are findings from those publications and others sourced through a literature search (see *Supporting Documents* below).

Research Before the Change to a Uniform Speed Limit

A 1994 Virginia DOT study examined Virginia's experience with raising the maximum speed limit on rural interstate highways from 55 mph to 65 mph during the period 1989 to 1992. The 1994 study also considered the differential speed limit in effect during the study period. Researchers reported the following conclusions specific to the frequency of crashes associated with a differential speed limit:

- There is conflicting evidence concerning whether differential speed limits for trucks and cars have had an impact on the frequency of crashes in states maintaining differential speed limits.
- Suspected increases in crashes involving passenger vehicles and trucks due to differential speed limits on rural interstates did not occur during the study.
- Although there was a slight increase (2.3) in fatal rear-end crashes in which a nontruck struck a truck, which is the configuration expected from a differential speed limit, this increase was not significant.
- The majority of the increase in fatal crashes involved single vehicles running off the road, which is not likely the result of a differential speed limit.

Research After the Change to a Uniform Speed Limit

In a 2003 conference paper that preceded a more comprehensive presentation of findings in an October 2005 Federal Highway Administration (FHWA) publication, researchers compared the safety effects of a uniform speed limit for all vehicles as opposed to a differential speed limit for cars and heavy trucks. The 2003 conference paper's authors noted that "[s]tudies conducted during the early 1990s to compare the safety impacts of USL [uniform speed limit] and DSL [differential speed limit] were constrained because of the limited data available at that time," and FHWA requested a "longitudinal study" that focused on states that had changed their limits from uniform speed limit to differential speed limit or vice versa.

Researchers examined crash, speed and volume data obtained from 10 states for rural interstate highways for the period 1991 to 2000. The states were divided into four policy groups based on the type of speed limit employed during the study period:

- Group 1: Maintained uniform speed limit (Arizona, Iowa, Missouri and North Carolina).
- Group 2: Maintained differential speed limit (Illinois, Indiana and Washington).
- Group 3: Changed from uniform to differential speed limit (Arkansas and Idaho).
- Group 4: Changed from differential to uniform speed limit (Virginia).

Highlighted below are some of the researchers' key findings:

- No consistent safety effects of a differential speed limit as opposed to a uniform speed limit were observed within the scope of the study. The mean speed, 85th percentile speed, median speed and crash rates tended to increase over the 10-year period, regardless of the type of speed limit.
- Speed characteristics were generally unaffected by a differential versus uniform speed limit policy.
- Crash rates did not show an obvious relationship to the type of speed limit chosen.
- Measurable variation within speeds and crash rates by year and by state may confound any statistical tests employed.
- Removal of sites with high and low average daily traffic (ADT) made it easier to detect significant differences between before and after periods, suggesting that ADT does influence crash trends. Researchers further noted that the effect of ADT on crash rate is not clear, and the study "simply suggests that, through different mechanisms not yet proven by investigators, change in ADT may have disproportionate changes in crash rates."

State Laws and Regulations

Truck speed limits are not differentiated statutorily except on noninterstate, nonprimary roads where it is 45 mph versus 55 mph for passenger cars (see Section 46.2-870 of the Code of Virginia in *Supporting Documents* below). Virginia laws allow reducing truck versus car speed limits (see Sections 46.2-1104 and 33.2-238 of the Code of Virginia in *Supporting Documents* below).

Recommendations

According to the Virginia DOT respondent, other agencies evaluating the elimination of speed differentials on rural multilane highways should consider that removing differential speed limits is consistent with the findings of many studies.

Supporting Documents

§ 46.2-870 Maximum Speed Limits Generally, Code of Virginia, undated.
https://law.lis.virginia.gov/vacode/title46.2/chapter8/section46.2-870/#:~:text=generate%20your%20report.-,%C2%A7%2046.2%2D870.,and%20all%20state%20primary%20highways
From the code: Except as otherwise provided in this article, the maximum speed limit shall be 55 miles per hour on interstate highways or other limited access highways with divided roadways, nonlimited access highways having four or more lanes, and all state primary highways.

The maximum speed limit on all other highways shall be 55 miles per hour if the vehicle is a passenger motor vehicle, bus, pickup or panel truck, or a motorcycle, but 45 miles per hour on such highways if the vehicle is a truck, tractor truck, or combination of vehicles designed to transport property, or is a motor vehicle being used to tow a vehicle designed for self-propulsion, or a house trailer.

Notwithstanding the foregoing provisions of this section, the maximum speed limit shall be 70 miles per hour where indicated by lawfully placed signs, erected subsequent to a traffic engineering study and analysis of available and appropriate accident and law-enforcement data, on (i) interstate highways; (ii) multilane, divided, limited access highways; and (iii) high-occupancy vehicle lanes if such lanes are physically separated from regular travel lanes. The maximum speed limit shall be 60 miles per hour where indicated by lawfully placed signs, erected subsequent to a traffic engineering study and analysis of available and appropriate accident and law-enforcement data, on U.S. Route 17, U.S. Route 23, U.S. Route 29, U.S. Route 58, U.S. Alternate Route 58, U.S. Route 301, U.S. Route 360, U.S. Route 460, U.S. Route 501 between the Town of South Boston and the North Carolina state line, State Route 3, and State Route 207 where such routes are nonlimited access, multilane, divided highways.

Related Resources:

> **§ 46.2-1104 Reduction of Limits by Commissioner of Highways and Local Authorities; Penalties,** Code of Virginia, undated.
> https://law.lis.virginia.gov/vacode/46.2-1104/
> *From the code*: The Commissioner of Highways, acting through employees of the Department of Transportation, may prescribe the weight, width, height, length, or speed of any vehicle or combination of vehicles passing over any highway or section of highway or bridge constituting a part of the interstate, primary, or secondary system of highways. Any limitations thus prescribed may be less than those prescribed in this title whenever an

engineering study discloses that it would promote the safety of travel or is necessary for the protection of any such highway.
….
In all instances where the limits for weight, size, or speed have been reduced by the Commissioner of Highways or the weights have been reduced by local authorities pursuant to this section, signs stating the weight, height, width, length, or speed permitted on such highway shall be erected at each end of the section of highway affected and no such reduced limits shall be effective until such signs have been posted.

§ 33.2-238 Closing Highways for Safety of Public or Proper Completion of Construction; Injury to Barriers, Signs, Etc., Code of Virginia, undated.
https://law.lis.virginia.gov/vacode/33.2-238/
From the code: If it appears to the Commissioner of Highways necessary for the safety of the traveling public or for proper completion of work that is being performed to close any highway under his jurisdiction to all traffic or any class of traffic, the Commissioner of Highways may close, or cause to be closed, the whole or any portion of such highway deemed necessary to be excluded from public travel and may exclude all or any class of traffic from such closed portion. While any such highway or portion thereof is so closed, or while any such highway or portion thereof is in process of construction or maintenance, the Commissioner of Highways, or contractor under authority from the Commissioner of Highways, may erect, or cause to be erected, suitable barriers or obstructions thereon, may post, or cause to be posted, conspicuous notices to the effect that the highway or portion thereof is closed and may place warning signs, lights, and lanterns on such highway or portion thereof.

The Safety Impacts of Differential Speed Limits on Rural Interstate Highways, Nicholas J. Garber, John S. Miller, Bo Yuan and Xin Sun, Federal Highway Administration, October 2005.
https://www.fhwa.dot.gov/publications/research/safety/05042/05042.pdf
From the abstract: To compare the safety effects of a uniform speed limit (USL) for all vehicles as opposed to a differential speed limit (DSL) for cars and heavy trucks, detailed crash data, speed monitoring data, and traffic volumes were sought for rural interstate highways in 17 [s]tates for the period 1991 to 2000. Conventional statistical tests (analysis of variance, Tukey's test, and Dunnett's test) were used to study speed and crash rate changes in the four policy groups. A modified empirical Bayes formation was used to evaluate crash frequency changes without presuming a constant relationship between crashes and traffic volume.

No consistent safety effects of DSL as opposed to USL were observed within the scope of the study. The mean speed, 85th percentile speed, median speed, and crash rates tended to increase over the 10-year period, regardless of whether a DSL or USL limit was employed. When all sites within a [s]tate were included in the analysis, temporal differences in these variables were often not significant. Further examination suggests that while these data do not show a distinction between DSL and USL safety impacts, the relationship between crashes and traffic volume cannot be generalized but instead varies by site within a single [s]tate. Because application of the modified empirical Bayes methodology suggested that crash risk increased for all four policy groups, a mathematical model that predicts sharp changes in crash rates based only on ADT does not appear valid at the statewide level.

Any study that relies on historical data will be subject to the limitations of incomplete data sets, and to that extent, additional data collection may shed insights not available from an examination of 1990s data alone. Because the investigators believe that accurate mathematical models may require extensive calibration data, a future effort may be more productive if

resources are focused on a small group of [s]tates over a period of several years, so that speed variance information and crash information may be obtained by individual roadway segment.

Related Resources:

"The Safety Impacts of Differential Speed Limits on Rural Interstate Highways," Nicholas Garber, John Miller, Bo Yuan and Xin Sun, *TRB 2003 Annual Meeting CD-ROM*, 2003.
http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.570.7578&rep=rep1&type=pdf
This conference paper highlights findings described in greater detail in the study cited above, including the following:

- Speed characteristics were generally unaffected by a differential versus uniform speed limit policy.
- Crash rates, when compared using conventional statistical methods, did not show an obvious relationship to the type of speed limit chosen.
- Measurable variation within speeds and crash rates by year and by state may confound any statistical tests employed.
- Removal of sites with high and low ADT made it easier to detect significant differences between before and after periods, suggesting that ADT does influence crash trends.

Determining the Safety Effects of Differential Speed Limits on Rural Interstate Highways Using Empirical Bayes Method, Xin Sun and Nicholas J. Garber, Mid-Atlantic Universities Transportation Center, May 2002.
http://www.mautc.psu.edu/docs/UVA-2000-11.pdf
From the abstract: A differential speed limit is defined as being one limit for automobiles and a different limit for commercial motor vehicles ("trucks") whereas a uniform speed limit is defined as a single limit for cars and trucks. Because states enact differential speed limit (DSL) solely in order to improve safety, assessment of DSL's safety impacts is of significant importance to the transport community.
….

This study used data from seven states [including Virginia], which either kept the same speed limit strategy since 1990, or changed their strategy at least once. Six types of crashes (total number of crashes, total number of fatal crashes, total number of rear-end crashes, total number of crashes with truck involved, total number of fatal crashes with truck involved, total number of rear-end crashes with truck involved) were selected for analysis. The evaluations of DSL implementation was then carried out by comparing the predicted "would have been" crash counts and the actual crash counts of the after treatment period.

A nonlinear relationship was found between crash counts and section length, and between crash counts and AADT [average annual daily traffic]. The results vary for different types of crashes through different states. The results, however, generally showed that as time passed, the actual total numbers of crashes for the after period were greater than the predicted "would have been" after total numbers of crashes. Whether this difference was caused only by the policy change of DSL or other factors that contribute to differing safety conditions is therefore not conclusive.

Impact of the 65 mph Speed Limit on Virginia's Rural Interstate Highways: 1989-1992, Jack Jernigan, Sarah Strong and Cheryl Lynn, Virginia Department of Transportation, November 1994.
http://www.virginiadot.org/vtrc/main/online_reports/pdf/95-r7.pdf
From the abstract:

> In April of 1987, Congress passed the Surface Transportation and Uniform Relocation Assistance Act (STURAA), which permitted states to raise their maximum speed limit on rural interstate highways to 65 mph. Virginia's 65 mph speed limit went into effect on July 1, 1988, for passenger vehicles and on July 1, 1989, for commercial buses. This is the final report in a series to examine the 65 mph speed limit in Virginia, and it summarizes Virginia's experience with the 65 mph speed limit from 1989 through 1992. Following the implementation of the 65 mph speed limit, average and 85th percentile speeds increased on Virginia's rural interstates, and fatal crashes and fatalities increased significantly. On Virginia's urban interstates, on which the speed limit remained at 55 mph, there was a smaller increase in average and 85th percentile speeds, but there was a slight, nonsignificant decrease in fatal crashes and fatalities. Absolute numbers of fatal crashes and fatalities were used in this analysis rather than rates because traffic volume increases on interstates are averaged for both rural and urban systems. Thus, if volumes increased more on rural interstates, comparisons of relative rates would be misleading. The data in this report clearly show that speeds, fatal crashes and fatalities increased on Virginia's rural interstates after the implementation of the 65 mph speed limit. However, these increases appear to have plateaued in the last two years of the study. Reports from other states and from national studies reflect a general increase in travel speeds and fatal crashes on rural interstates, but there is conflicting evidence on whether the 65 mph speed limit is the cause. Likewise, there is conflicting evidence concerning whether differential speed limits for trucks and cars have had an impact on the frequency of crashes in states maintaining such differential limits.

Maintaining a Differential Speed Limit

Idaho Transportation Department

Idaho Transportation Department has not formally approached the issue of eliminating the differential speed limit for trucks because the differential speed limit is set in Idaho law and cannot be changed without legislative action. A department-commissioned study was conducted in 2012 to examine the topic (see *Supporting Documents* below), and legislation has been introduced periodically to eliminate the differential speed limit, but no bill has been successful to date. The respondent noted that neighboring states do not have differential speed limits "seemingly without issue."

The agency tracks passenger vehicle and truck speeds, including the speed differential. Current lawful truck speed limits on interstate highways in nonurban areas requires that vehicles with five or more axles and a gross weight of more than 26,000 pounds shall not exceed 10 mph less than vehicles with less than five axles and a gross weight of 26,000 pounds or less (see *Supporting Documents* below).

§49-654 Basic Rule and Maximum Speed Limits, Idaho Statutes, 2020.
https://legislature.idaho.gov/statutesrules/idstat/title49/t49ch6/sect49-654/#:~:text=49%2D654.,and%20potential%20hazards%20then%20existing
From Section 3 of the code: For vehicles with five (5) or more axles operating at a gross weight of more than twenty-six thousand (26,000) pounds the maximum lawful speed limit on interstate highways in nonurban areas shall not exceed ten (10) miles per hour less for vehicles with less than five (5) axles and operating at a gross weight of twenty-six thousand (26,000) pounds or less, and in urban areas the maximum lawful speed limit on interstate highways for such vehicles shall not exceed sixty-five (65) miles per hour.

"Long Term Impact of Differential Speed Limits on Rural Freeways in Idaho," Sherief Elbassuoni, Michael Dixon and Ahmed Abdel-Rahim, *TRB 94th Annual Meeting Compendium of Papers*, Paper #15-5844, 2015.
Citation at https://trid.trb.org/view/1339447
From the abstract: The main focus of this research is to evaluate the long-term operation and safety impact of [d]ifferential [s]peed [l]imits (DSL) on rural freeways in Idaho. The analysis of speed data covered three periods: [P]eriod 1: January 1992 - April 1996 ([u]niform [s]peed [l]imit (USL) of 65 mph); Period 2: April 1996 - June 1998 (with a USL of 75 mph); and Period 3: July 1998 - December 2011 (with a DSL of 75 mph for passenger cars and 65 mph for commercial truck vehicles). The analysis showed that since the implementation of the DSL policy, Idaho's speed trends have stabilized with no sizable change. The mean speed for trucks and passenger vehicles [is] very close to their respective posted speed limits. The 85th percentile speeds have also stabilized at about [5] mph above the respective speed limits. DSL implementation also visibly improved the compliance rate of truck speed limit. The considerable reduction in the 85th percentile and the pace speeds for trucks and the improved speed limit compliance rate indicate that the DSL policy favorably impact truck driver behavior by reducing the most extreme truck speeds. Implementation of the DSL policy has contributed to the improved safety conditions on rural freeways in Idaho. Crash rate analysis showed that DSL favorably affects safety. Crash rates for all crash types were highest during the period 1996 to 1998 with a USL of 75 mph. When DSL policy was implemented in 1998, the crash rates decreased considerably and continued to decline since then.

Evaluation of the Impacts of Differential Speed Limits on Interstate Highways in Idaho, Michael Dixon, Ahmed Abdel-Rahim and Sherief Elbassuoni, Idaho Transportation Department, October 2012.
https://rosap.ntl.bts.gov/view/dot/25335
From Chapter 5, Conclusions and Recommendations, which begins on page 25 of the report (page 41 of the PDF): In this research, an evaluation of the impacts of differential speed limits on rural interstate highways in Idaho was completed. The main purpose for this research was to determine if there were any speed or safety effects after enacting the DSL. Regarding the effects of DSL on speed, it was found that passenger car and truck speeds stabilized since the DSL policy implementation date. More specifically, the DSL policy correlated with [a] reduced truck mean speed of 65.6 mph and less variability. In addition, DSL may also have contributed to increased speed limit compliance.

DSL favorably affects safety. Highways experienced higher crash rates prior to DSL implementation. In addition to DSL's speed influence, this demonstrates DSL's influence towards improving vehicle safety on rural freeway segments. The difference in speeds caused by Idaho's DSL policy did have the potential to increase crash rates, but it appears that the opposite is true. However, other factors, such as more sophisticated braking systems and

improved highway design, may also have acted to reduce the Idaho crash rates. This research was only able to control for highway design improvements. Based on the statistical analysis of speeds, different crash types, and the Empirical Bayes method analysis, the data strongly suggest that the type of influence a DSL policy has improves traffic safety.

Related Research and Resources

A literature search of recent publicly available resources identified publications that are organized into three topic areas:

- National research.
- State research and practices.
- Related research.

National Research

Note: Although the completion date for the following project has passed, the status is listed as active with the anticipated completion of Phase II as fourth quarter 2019. A presentation of the preliminary findings of Phase II follows the project description.

Project in Progress: NCHRP 17-76: Guidance for the Setting of Speed Limits, start date: October 2016; completion date: April 2019.
Project description at https://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=4052
From the project description: The objectives of this research are to (1) identify and describe factors that influence operating speed and (2) provide guidance to make informed decisions related to establishing speed limits on roadways. The guidance should address the following, at a minimum: 1. An approach for determining the relationship between operating, design, posted and statutory speeds and how the differences among them impact safety performance. This may also include quantitative and/or qualitative models to predict the safety performance associated with the differences between operating, posted, statutory and design speeds. [2.] Identification and classification of nationwide data including, but not limited to, geometric design, access density, signal density, traffic volume characteristic, and enforcement practices that may impact operating speed. 3. An analysis of the 85th percentile speed and other statistical measures and factors as appropriate methods for setting speed limits. 4. Implications of setting a speed limit lower than those recommended using the factors identified above. The focus of the research should be on roadway functional classifications of minor arterials and higher as defined by AASHTO.

Related Resources:

NCHRP 17-76: Guidance for the Setting of Speed Limits, Texas A&M Transportation Institute, Michigan State University, *AASHTO Meeting*, June 2019.
https://traffic.transportation.org/wp-content/uploads/sites/26/2019/07/NCHRP-17-16-Guidelines-for-the-Setting-of-Posted-Speed-Limits.pdf
This presentation summarizes the preliminary findings of the second phase of this study. The focus of this phase is to provide guidance and tools for making informed decisions related to establishing speed limits primarily for urban and suburban roads.

State Research and Practices

Multiple States

"Longitudinal Analysis of Rural Interstate Fatalities in Relation to Speed Limit Policies," Amelia Davis, Elizabeth Hacker, Peter T. Savolainen and Timothy J. Gates, *Transportation Research Record 2514*, Issue 1, pages 21-31, January 2015.
Citation at https://journals.sagepub.com/doi/10.3141/2514-03
From the abstract: This study aimed to inform the continuing debate regarding the safety impacts of speed limits by comparing states with various speed limit policies. The study included a longitudinal comparison of state-level rural [i]nterstate fatalities in the United States from 1999 through 2011. In addition to an examination of differences in traffic fatalities as a function of maximum speed limits, comparisons were also made between states with differential limits for truck and buses. Random parameter negative binomial models were estimated for annual total and truck-involved fatalities. A random parameter framework allowed for consideration of temporal correlation in annual fatality counts within states as well as for unobserved heterogeneity across states. The results of this study provided further evidence that both overall and truck-involved fatalities increased with maximum speed limits. States with differential speed limits were found to have marginal differences in total fatalities as compared with states with uniform speed limits. However, truck-involved fatalities were significantly lower in states where differential limits were in place. The effects of speed limit policies as well as other covariates were found to vary significantly across states. The random parameter models demonstrated significantly improved goodness of fit as compared with standard Poisson and negative binomial models.

"Vehicle Speed Characteristics in States With Uniform and Differential Speed Limit Policies: Comparative Analysis," Brendan J. Russo, Emira Rista, Peter T. Savolainen, Timothy J. Gates and Sterling Frazier, *Transportation Research Record 2492*, pages 1-9, January 2015.
Citation at https://journals.sagepub.com/doi/10.3141/2492-01
From the abstract: The purpose of this study was to examine the travel speed characteristics of passenger vehicles, trucks and buses in states with different speed limit policies, primarily to ascertain the effects of differential speed limits (DSLs) versus those of uniform speed limits (USLs) for large vehicles. Spot-speed studies were conducted in the neighboring states of Indiana, Michigan and Ohio; these studies permitted examination of speed characteristics under several speed limit settings along the same freeways. The sites included urban and rural locations, with speed limits at individual locations that varied from 55 to 70 mph. These sites included USLs and DSLs, with 5 mph differentials on rural freeways in Indiana and 10 mph differentials at rural locations in Michigan. Spot-speed data were collected at 157 freeway sites in the three states along flat, tangent segments. Regression models were estimated to ascertain differences in the mean speeds, the 85th percentile speeds and the standard deviation in speeds across locations. The results showed passenger vehicle speeds to be quite consistent across the three states where a common 70 mph limit was in effect. Speeds varied more at locations with lower posted limits and between trucks and buses. Speeds were most consistent in Ohio at locations with higher USLs. The variability in travel speeds for all vehicles was found to be highest on freeways with DSLs, followed by urban freeways with USLs of 55 mph.

"Empirical Analysis of Truck and Automobile Speeds on Rural Interstates: Impact of Posted Speed Limits," Steven Johnson and Daniel Murray, *TRB 89th Annual Meeting Compendium of Papers DVD*, Paper #10-0833, 2010.
https://pdfs.semanticscholar.org/483d/8da741cdb5d3add40abca87fe15b2ecbe336.pdf?_ga=2.117937289.1254500543.1594673015-1720802262.1594673015
From the summary on page 12 of the PDF: This study is part of an ongoing effort to evaluate the impact of maximum speeds and speed differentials between heavy trucks and other vehicles (cars) on rural interstates. The goal of this portion of the effort was to provide empirical data on the speed distributions of trucks and cars to describe the actual speed behavior of traffic on rural interstates with different speed limit configurations. Posted speed limits for trucks vary from 55 mph in some states (e.g., California) to 75 mph in many of the Midwest and Western states. Speed data were collected at 19 rural interstate sites across the United States that had posted speed limits of 55, 60, 65, 70 and 75 mph for trucks and 65, 70 and 75 mph for cars. Speed data were collected at sites with speed differentials of zero (uniform), 5, 10 and 15 mph. The report provides graphs of the speed distributions and summary statistics for trucks and cars at each site. The summary statistics include: average (mean) speeds, 85th percentile speeds, compliance and observed speed differentials. A number of conclusions can be drawn from the results of the study. First, both the average and the 85th percentile speeds for cars are relatively unaffected by the posted speed limits on rural interstates. For example, the observed compliance rate of cars on interstate in Illinois with a 55 mph speed limit was seven (7) percent. The corresponding observed compliance rate for trucks on the same Illinois interstate that had a 55 mph posted limit for trucks was zero (0) percent. The compliance rate for trucks on rural interstates with a uniform 75 mph posted limit was 96 percent; however, the compliance rate for cars on these higher speed interstates was still only 49 percent. Although average truck speed did increase with each increase in the posted limit, the 20 mph range for the posted truck speed limits (55 to 75 mph) resulted in only a 7 mph increase in the average speed for trucks (61.7 to 68.8 mph). The final conclusion of the study is that, although the cost of fuel does alter the speed distributions for both trucks and cars to some extent, the reduction in average speed was relatively small (1 mph for trucks and 0.5 mph for cars).

California

Assessing the Impact of Raising Truck Speed Limits on Traffic Safety, Sarder Rafee Musabbir and Michael Zhang, University of California Institute of Transportation Studies, January 2020.
https://escholarship.org/content/qt8h09c504/qt8h09c504.pdf?t=qa5txn
From the abstract: This project used statewide crash and traffic data to develop four statistical models to determine the safety impacts of increasing speed limits for trucks and cars on California highways. The models examined whether various factors about crashes—including average traffic speed, involved vehicle type, weather, etc.—correlated with other crash characteristics of particular policy relevance: namely, fatal crash, truck-related crash, speeding-related crash and crash severity. The fatal crash model was then used to predict the probability of fatal crashes in urban and rural areas under four possible speed limit policies: (A) maintaining the existing speed limits of 65 mph for cars and 55 mph for trucks; (B) increasing each of these by 5 or 10 mph; (C) increasing the current truck speed limit to equal the car speed limit of 65 mph; (D) following policy C and then increasing the uniform 65 mph speed limit by 5 or 10 mph. The obtained probabilities were then used to forecast the number of fatal crashes under these policies. For the cases with speed limit increases (B-D), the corresponding increases in the predicted number of fatal crashes are small in rural areas and are far less than in urban areas. This suggests that increasing the truck speed limit towards 65 mph to a uniform speed limit (Policy C) in rural areas will not likely increase the frequency of fatal crashes. For urban areas, all speed limit increases are likely to increase the number of fatal crashes in comparison to

Policy A (the current policy), but the increase in fatal crashes with Policy C (65 mph for trucks and cars) over Policy A is 1%. Policy C, therefore, is considered the best choice in balancing safety and mobility for both rural and urban areas in California.

Indiana

Predicting the Impact of Changing Speed Limits on Traffic Safety and Mobility on Indiana Freeways, Andrew P. Tarko, Raul Pineda-Mendez and Qiming Guo, Indiana Department of Transportation, May 2019.
https://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=3233&context=jtrp
From the abstract:

> After repeal of the National Maximum Speed Limit Law, states were allowed to set individual speed limits on their interstate roads. Several states opted for a uniform speed limit while others implemented differential speed limits. The current speed limit on Indiana rural freeways limits speed of passenger cars to 70 mph and restricts to 65 mph speed of vehicles with a gross weight of 26,000 pounds or more. Indiana's speed limit on urban freeways is mostly 55 mph, but varies from 50 mph on certain downtown sections to 65 mph on some suburban sections. Previous studies comparing uniform and differential speed limit settings as to safety and mobility produced inconclusive or conflicting results.
>
> This study evaluates the safety and mobility effects of alternative speed limit scenarios on Indiana interstate freeways. Differences in travel time, vehicle operation and traffic safety were used to compare the speed-limit scenarios. The effect of speed limit was evaluated in hourly periods. The traffic conditions in these periods were classified as uncongested, intermediate and congested, and the speed limit effects were analyzed in relation to these conditions. Rural and urban freeways were analyzed separately and distinct speed models were developed for cars and trucks. Safety was estimated by probability of crash and the conditional probability of crash injury severity.
>
> Speed limit was found to affect mobility and safety mostly in non-congested traffic conditions, while no significant effects were found in congested conditions. A limited effect was detected in intermediate traffic conditions on rural freeways. Results indicate that replacing the differential 70/65 mph speed limit on Indiana rural roads with the uniform speed limit of 70 mph may be beneficial for both safety and mobility. Increasing speed limits on urban interstates is confirmed to be beneficial for mobility but detrimental to safety.

The report's conclusions, which begin on page 27 of the report (page 34 of the PDF), describe study limitations:

> The mobility and safety effects of changing the speed limits on Indiana freeways were estimated using a what-if analysis. The evaluation criteria included differences in travel time (mobility), vehicle operating costs and the cost of crashes (safety). A lack of suitable data prevented this study from estimating the safety effect of replacing the current 70/65-mph differential speed limit on rural interstates with a uniform 65-mph speed limit setting, but a uniform setting of 70 mph was evaluated. The results suggest a non-beneficial economic performance with the uniform speed limit, but consideration of the comprehensive costs of crashes justify this alternative.
>
> Limitations must be noted, however, in the use of both Illinois and Indiana DSL data. Each state has a separate speed limit policy that only overlaps on certain urban freeway segments, which led to some state-to-state differences in the estimated safety effects on rural freeways. To overcome this issue, urban safety models were calibrated with a state

indicator variable. The estimated state coefficient in the urban model was applied to the rural model in order to address the possible bias caused by the difference between Indiana and Illinois.

Related Resource:

Impacts to Traffic Safety and Mobility of Changes in Speed Limits for Indiana Freeways, Raul A. Pineda and Andrew P. Tarko, Center for Road Safety, Joint Transportation Research Program, Purdue University, 2017.
https://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=4158&context=roadschool
This poster presents findings of the study cited above that investigated the use of differential speed limits and uniform speed limits in Indiana. Among the safety effects compiled through a literature review were:

- Differential speed limits have two opposite effects: They slow trucks down but they increase the speed variation.
- Although differential speed limits may increase rear-end crashes, they may also reduce other types of crashes.
- Joint application of differential speed limits and truck lane restrictions is beneficial.
- Differential speed limits used around ramp intersections increase unsafe interactions between trucks and nontrucks.

Louisiana

Literature Review of the Implications of Differential Speed Limit Implementation, Haggai Davis III, Ravindra Gudishala, Kirk Zeringue, Chester Wilmot, Julius Codjoe and Matthew Roberts, Louisiana Transportation Research Center, Louisiana Department of Transportation and Development, December 2017.
https://www.ltrc.lsu.edu/pdf/2018/17-01-TA-SS_print%20ready.pdf
From the executive summary: This report addresses the matter of differential and uniform speed limits and their application at the state level. It was prepared in response to a request in the 2017 session of the Louisiana House of Representatives where the Louisiana Department of Transportation and Development (DOTD) was asked to "study the safety and operational impacts of differential speed limits on interstate highways" (House Concurrent Resolution 112 [HCR 112]). Thus, the purpose of this study is to inform the Louisiana Legislature about the documented various benefits and costs of a differential speed limit for passenger cars versus larger vehicles specifically with regards to the topics of Safety, Mobility and Operations, Fuel Consumption and Emissions, and Truck Determination as outlined in HCR 112.

The majority of research into this topic has not been able to conclusively determine which speed limit system is safer, a uniform speed limit (USL) or a differential speed limit (DSL). There is uncertainty amongst the literature as to which is better, USL or DSL. The uncertainty is due to several factors that work against each other. Changes in observed speed are usually less than the changes in the posted speed, which dulls the impact of a DSL. If the posted speed limit is too low, many drivers will ignore it leading to low compliance rates. A slower speed reduces the severity of crashes; however, a greater speed variance increases the opportunity for crashes. Almost 75% of the nation's truck fleet cannot travel above a preset speed because they have speed limiters built in. In other countries, the limiter is mandatory, but no study has attempted to quantify the safety. In America, the current trend has states moving toward a USL. Passenger car drivers tend to prefer a DSL, but less strongly than truck drivers prefer a USL. The time and cost to fully implement a speed limit regime change can be substantial.

With the lack of strong evidence in the existing published research in either direction, this paper cannot conclude which method is better than the other. Further research (on a much larger scale than this literature review) would be necessary to conclude which speed limit arrangement is better.

"Traffic Behavior and Compliance to Truck-Restriction Policies on Four-Lane Rural Freeways," Yan Qi, Sherif Ishak, Brian Wolshon and Ciprian Alecsandru, *Journal of Transportation Safety and Security*, Vol. 4, Issue 2, pages 160-177, June 2012.
Citation at https://trid.trb.org/view/1222946
From the abstract: This study examined the overall traffic characteristics and truck compliance behavior under truck-lane-restriction and differential speed limit policies on an 18-mile rural four-lane elevated segment of I-10. Traffic data was collected at four different sites along the freeway corridor and analyzed using statistical methods. The results show that the overall traffic speed decreased as the percentage of trucks in the traffic stream increased and that trucks had the tendency to increase their speed in the absence of other types of vehicles. The results also showed a compliance rate of 60% to 80% to the truck-lane restriction. Linear regression models showed significant differences in speed between the right and left lane at each site, implying some compliance to the reduced speed limit by trucks. In addition, the pairwise comparison results indicated that for mixed traffic conditions truck speeds were within a 5-mph range above the imposed truck speed limit on the right lane and 5 mph above the truck speed limit on the left lane. The study concluded that the truck compliance to both policies seemed somewhat acceptable, but higher compliance rates could be attained by increasing the level of enforcement along the corridor.

"Freeway Truck Lane Restriction and Differential Speed Limits: Crash Analysis and Traffic Characteristics," Murat Korkut, Sherif Ishak and Brian Wolshon, *Transportation Research Record 2194*, Issue 1, pages 11-20, January 2010.
Citation at https://journals.sagepub.com/doi/10.3141/2194-02
From the abstract: Over the past decade, several fatal truck-related crashes have occurred on the elevated freeway over the Atchafalaya Basin segment of Interstate 10 in southern Louisiana. In an attempt to reduce the crash rates, the Louisiana Department of Transportation and Development has implemented two policies to regulate the truck traffic on this rural section of freeway. These policies restrict truck traffic to the right lane and reduce the maximum truck speed limit to 55 mph while maintaining passenger car speed limits at 60 mph. To investigate potential relationships between compliance with these policies and crash rates, traffic and crash data were collected for the segment while the policies were in force. Relationships between hourly observations of crash rates and compliance rates were sought at the .05 significance level with multiple linear regression. The traffic characteristics that might affect such a relationship were also incorporated into the regression models. These characteristics included difference between truck and car speeds, speed variance, truck volume, and lane occupancy. The regression models were performed with SAS software. Confidence intervals on the means of the explanatory variables were constructed to understand the variability in the values of the traffic characteristics over different days of the data collection period. The results showed that violation of the lane restriction and truck speed limits, truck speed variance, differences between car and truck mean speeds, and lane occupancy were positively correlated with crash rates. The findings suggested that prohibiting trucks from traveling in the left lane and setting a truck speed limit of 55 mph and a car speed limit of 60 mph on a four-lane elevated rural freeway can offer traffic safety benefits.

"Trucker Perceptions of Lane Restriction and Differential Speed Limit Policies on Freeways," Brian Wolshon, Sherif Ishak, Yan Qi, Murat Korkut, Xiaoduan Sun and Ciprian Alecsandru, *Journal of Transportation Safety and Security*, Vol. 1, Issue 2, pages 101-120, May 2009.
Citation at https://doi.org/10.1080/19439960902776430
From the abstract: To improve the efficiency and safety of traffic flow on freeways, several states have implemented truck lane restriction and differential speed limit policies. The State of Louisiana introduced such restrictions on an 18 mile elevated four lane rural segment of Interstate 10 (I-10) in response to an 11 vehicle crash in September 2003. The new control policies, implemented in 2003, have restricted trucks to the right lane only and reduced their speed limit to 55 mph. At the same time the speed limit for passenger cars was also reduced from 70 mph to 60 mph. This article summarizes the findings of a survey to assess truck drivers' perceptions and opinions of these restrictive policies. Another objective of the survey was to solicit ideas and input for other potential strategies that could be useful to the drivers. Overall, the results showed that the truckers were not in favor of the restrictions and did not feel that a significant safety benefit was being gained from these restrictions.

Michigan

Evaluating the Impacts of Speed Limit Policy Alternatives, Peter Savolainen, Timothy Gates, Elizabeth Hacker, Amelia Davis, Sterling Frazier, Brendan Russo, Emira Rista, Martin Parker, Fred Mannering and William Schneider, Michigan Department of Transportation, July 2014.
https://www.michigan.gov/documents/mdot/RC-1609_478401_7.pdf
From the abstract:

> This study involved a comprehensive state-of-the-art review of prior research on the relationships between traffic speed, safety and crash risk. A survey was conducted of state agency practices with respect to speed limit establishment and another survey was conducted to obtain feedback on proposed changes from the trucking industry. National fatality data were collected and analyzed to ascertain the effects of speed limit policies on traffic fatalities, with specific emphasis on maximum speed limits and the effects of uniform vs. differential limits on urban and rural interstates. Further analyses were conducted at the disaggregate level to examine crash trends on Michigan freeways. These results were supplemented by the analysis of field speed data that were collected on freeways in Michigan, Indiana and Ohio. Differences in mean speeds, 85th percentile speeds and the standard deviation in speeds among passenger cars, trucks and buses were examined with respect to the speed limit policies in place at each of 160 roadway locations. Based upon the results of the fatality and speed data analyses, a benefit–cost analysis of the proposed speed limit change was conducted in consideration of both road user and agency costs. Recommendations were presented to aid in decision-making related to speed limit policies.

A discussion of differential speed limits versus uniform speed limits for trucks and buses begins on page 19 of the report (page 36 of the PDF). As the authors noted, the "salient findings" from a review of "a rich body of research literature that has assessed the effects of speed and speed limit policies on traffic safety" included a summary of findings addressing the effects of differential speed limits. *From page 31 of the report (page 48 of the PDF)*:

> The literature is largely mixed with regard to the effects of differential speed limits. While no consensus has developed with respect to prospective safety impacts, the majority of states have gone toward uniform speed limits. Uniform limits have been shown to reduce the variance in travel speeds, which in turn is expected to reduce the risk of traffic crashes and resultant injuries/fatalities. Responses from the trucking industry survey suggest that

trucking companies are receptive to increasing the maximum truck/bus limit, though the use of speed limiting devices and economic considerations suggest there is a practical upper limit.

Oregon

Preliminary Analysis of Speed Limit Changes in Eastern Oregon, Christopher Monsere, Sirisha Kothuri and Jason Anderson, Oregon Department of Transportation, November 2018.
https://www.oregon.gov/odot/Engineering/Docs_TrafficEng/PSU-Report_Prelim-Analysis-Speed-Limit-Changes-Oregon.pdf
From the introduction:

> This report is the summary of a preliminary analysis of the speed and crash performance changes for Oregon highways and interstates where speed limits were increased by the Oregon legislature effective March 1, 2016. This action raised speed maximum speed limits for cars and trucks on approximately 1,400 miles of highways and interstates in Eastern Oregon. Posted speed limits were increased to 70 mph (cars) and 65 mph (trucks) and 65 mph (cars) and 55 mph (trucks).

Key findings from the analysis are presented in Chapter 4 (beginning on page 42 of the report, page 47 of the PDF) and include the following:

- Speeds have increased on the highways where the posted speed limits were increased.
- Total crashes have increased at a rate higher than both the traffic volume and the crash performance change on control sections than the control sections might suggest.
- Total truck-involved crashes have increased at a rate higher than both the total traffic volume and the truck-related crash performance change on the control sections.

Related Resource:

> **"Preliminary Analysis of Speed Limit Changes in Eastern Oregon,"** Chris Monsere, *Oregon Transportation Commission Meeting*, January 2019.
> https://www.oregon.gov/odot/Engineering/Docs_TrafficEng/PSU-Summary_Prelim-Analysis-Speed-Limit-Changes-Oregon.pdf
> Highlights of the preliminary analysis are provided in this presentation.

Update to Issues Report for Interstate Speed Changes, Christopher Monsere, Sirisha Kothuri and Ali Razmpa, Oregon Department of Transportation, June 2017.
http://www.oregon.gov/ODOT/Engineering/Docs_TrafficEng/Truck-Speed-PSU-Issues-Report-2017.pdf
From the introduction: Currently, the Oregon Department of Transportation is investigating the potential for increasing the truck speed limit from 55 to 60 mph in segments where the current speed limit is 65 for cars/light vehicles and 55 mph for trucks. This report summarizes the literature on the operational and safety impacts of raising speed limits, the effect of uniform versus differential speed limit policies, and truck equipment and work zone policies.

This report updates select topics from a previously published report "Impacts and Issues Related to Proposed Changes in Oregon's Interstate Speed Limits" by Monsere et al. (2004). New topics, including impacts of different prevalent strategies in work zones and truck equipment on vehicle speeds and safety, were reviewed.

Related Research

Note: The Transportation Concept Report (TCR) referred to below is the basis for this Preliminary Investigation.

Appendix P: Speed Differential—Literature Review, United States Route 395 Transportation Concept Report, District 2, California Department of Transportation, December 2017.
http://20kjas4dkce22gtkr446kqbc.wpengine.netdna-cdn.com/wp-content/uploads/2018/03/US395TCR_PublicDraft_ReducedSize.pdf
Appendix P of the report (beginning on page 184 of the report, page 192 of the PDF) includes a recommendation to establish a research project to evaluate the potential benefit of a universal speed limit for US 395.

"The Effect of State Regulations on Truck-Crash Fatalities," Grant W. Neeley and Lilliard E. Richardson, *American Journal of Public Health*, Vol. 99, Issue 3, pages 408-415, March 2009.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2661438/
From the abstract: To improve traffic safety, states limit truck length and weight, and some set lower speed limits for trucks than for other vehicles. We examined the impact of truck-specific restrictions and general traffic-safety policies on fatality rates from crashes involving large trucks.

We used state-level data from 1991 to 2005 with a cross-sectional time-series model that controlled for several policy measures. We found that higher speed limits for cars and trucks contributed to higher fatality rates, but differential speed limits by vehicle type had no significant impact.

Truck-length limitations reduced fatalities in crashes involving large trucks. Our model estimates suggested that if all states had adopted a speed limit of 55 miles per hour for all vehicles in 2005, an additional 561 fatalities would have been averted.

"Analysis of Heavy-Truck and Automobile Speed Distributions for Uniform and Differential Speed Limit Configurations on Rural Interstate Highways," Steven L. Johnson and Naveen Pawar, *TRB 86th Annual Meeting Compendium of Papers CD-ROM*, Paper #07-2949, January 2007.
Citation at https://trid.trb.org/view/802489
From the abstract: The topic of differential speed limits for heavy trucks and automobiles on rural interstate highways is an issue currently facing many state legislatures and commercial trucking organizations. There has been a significant amount of research on the topic; however, the results and conclusions are often conflicting or do not provide definitive conclusions. One of the reasons for the inconsistency of the results is that the research does not address the separate distributions of truck and automobile speeds. In addition to lower posted speed limits in some states, truck speed is often limited by company policies. Most commercial fleets use speed limiters on their trucks' engines to restrict the maximum speed. Therefore, even in states that do not have a posted speed limit differential, there is actually a "virtual" differential due to truck speed limiters that are set below the posted speed limits. The objective of this paper is to present the results of a research effort that analyzed the distributions of truck and automobile speeds under four different speed limit configurations. Two of the sites that were investigated had uniform speed limits (70 mph and 75 mph) and two had speed differentials (70/65 and

65/55 mph). The empirical speed distributions for the different configurations are presented in the context of both absolute truck and automobile speed and speed variances. In addition, a computer simulation was used to evaluate the number of vehicle interactions (passing and being passed) under the different speed limit configurations.

Contacts

CTC contacted the individuals below to gather information for this investigation.

State Agencies

Alabama

Kerry NeSmith
Deputy State Maintenance Engineer, Maintenance Bureau
Alabama Department of Transportation
334-242-6777, nesmithk@dot.state.al.us

Idaho

Ryan Lancaster
Standards Engineer, Design/Traffic Services
Idaho Transportation Department
208-334-8528, ryan.lancaster@itd.idaho.gov

Illinois

Kyle Armstrong
Engineer, Bureau of Operations
Illinois Department of Transportation
217-782-2076, kyle.armstrong@illinois.gov

Iowa

Tim Crouch
State Traffic Engineer, Traffic and Safety Bureau
Iowa Department of Transportation
515-239-1513, tim.crouch@iowadot.us

Kansas

Brian D. Gower
Chief, Transportation Safety and Technology
Kansas Department of Transportation
785-296-7431, brian.gower@ks.gov

Kentucky

Jeff Wolfe
Director, Traffic Operations
Kentucky Transportation Cabinet
502-229-2810, jeff.wolfe@ky.gov

Michigan

Mark Bott
Engineer, Traffic and Safety
Michigan Department of Transportation
517-335-2625, bottm@michigan.gov

Nevada

Rodney D Schilling
Assistant Chief, Traffic Operations
Nevada Department of Transportation
775-888-7863, roschilling@dot.nv.gov

North Carolina

Kevin Lacy
State Traffic Engineer, Transportation Mobility and Safety
North Carolina Department of Transportation
919-814-5100, jklacy1@ncdot.gov

Rhode Island

Steven Pristawa
Traffic Safety Engineer
Rhode Island Department of Transportation
401-563-4207, steve.pristawa@dot.ri.gov

South Dakota

Christina Bennett
Operations Traffic Engineer, Division of Operations
South Dakota Department of Transportation
605-773-4759, christina.bennett@state.sd.us

Utah

Robert Miles
Director, Traffic and Safety
Utah Department of Transportation
801-910-2070, robertmiles@utah.gov

Virginia

Mike Nichols
Highway Operations Manager, Traffic Engineering
Virginia Department of Transportation
804-786-5709,
michael.nichols@vdot.virginia.gov

Wisconsin

Bill McNary
State Traffic Engineer, Division of Transportation System Development
Wisconsin Department of Transportation
608-266-1260, william.mcnary@dot.wi.gov

Appendix A: Survey Questions

The following survey was distributed to state transportation agencies expected to have knowledge of or experience with differential truck speed limits on rural multilane highways.

Differential Truck Speed Limit on Rural Multilane Highways

Note: The response to the question below determines how a respondent is directed through the survey.

(Required) Has your agency **considered reducing** or **eliminating** the use of **differential truck speed limits** on rural multilane highways and adopting a uniform speed limit? For purposes of this survey, these speed limits are defined as follows:

- **Differential Speed Limit**: Lower maximum speed limit is set for heavy trucks and other vehicles with three or more axles.
- **Uniform Speed Limit**: Maximum speed limit is the same for all vehicles.

Response options:

- No. Our agency has never applied differential truck speed limits on rural multilane highways. (Directs the respondent to the **Wrap-Up** section of the survey.)
- No. While our agency does apply differential truck speed limits on rural multilane highways, we're **not considering** changing to a uniform speed limit. (Directs the respondent to the **Agencies Not Considering a Uniform Speed Limit** section of the survey.)
- Yes. Our agency **has considered** changing a differential speed limit to a uniform speed limit or **has already made that change** on rural multilane highways. (Directs the respondent to the **Background** section of the survey and the sections that follow it.)

Agencies Not Considering a Uniform Speed Limit

Please briefly describe the benefits of maintaining a differential truck speed limit on these highways, including the safety and operational impacts.

Note: After responding to the question above, the respondent is directed to the **Wrap-Up** section of the survey.

Background

1. Please briefly describe the events or issues that prompted your agency to consider eliminating the differential speed limit for trucks.
2. What was your approach to defining the problem?
3. Please describe your state's current laws, codes or regulations on truck speeds.
4. (Required) Did your agency conduct a study or assessment to determine whether to eliminate the differential speed limit for trucks?
    - No (Skips the respondent to **Implementation and Assessment**.)
    - Yes

Studying the Issue

1. What safety and operational data or information was needed for the study? Select all that apply.
    - Crash frequency
    - Crash severity
    - Other safety data
    - Travel speed/speed limits
    - Road geometry
    - Economic benefits (such as reduced traffic delay)
    - Cost (such as fuel consumption)
    - Other (Please describe.)
2. Did your agency conduct any outreach campaigns to potential stakeholders when examining the speed limit policy?
    - No (Please skip to Question 3.)
    - Yes (Please respond to Question 2A below.)

2A. Please identify the stakeholders that were contacted during the study. Select all that apply.

- Trucking industry
- State or local government or political leaders
- Automobile clubs and associations (such as AAA)
- Tourism industry
- State travel associations
- Traveling public
- Other (Please describe.)

3. Please describe the findings or data that supported your state's elimination of the speed differential.
4. Please describe the findings or data that did not support elimination of the speed differential in your state.
5. What additional data or information needs were identified during and after the study?
6. What stakeholders (individuals and organizations) supported the study findings? Select all that apply.
    - Trucking industry
    - State or local government or political leaders
    - Automobile clubs and associations (such as AAA)
    - Tourism industry
    - State travel associations
    - Traveling public
    - Other (Please describe.)
7. What stakeholders (individuals and organizations) did not support the study findings? Select all that apply.
    - Trucking industry
    - State or local government or political leaders
    - Automobile clubs and associations (such as AAA)
    - Tourism industry
    - State travel associations

- Traveling public
- Other (Please describe.)

8. What do you wish you had done differently during the study?

Implementation and Assessment

1. What decision did your agency reach?
    - Retained the differential speed limit for trucks
    - Adopted a uniform speed limit
    - Decided to revisit the issue later
    - Other (Please describe.)
2. What outcomes did you anticipate?
3. What outcomes didn't you anticipate?
4. What are your top three recommendations for other agencies considering the elimination of speed differentials on rural multilane highways?
5. Please provide links to documents associated with your agency's truck speed limit policy (other than those you have already provided). Send any files not available online to carol.rolland@ctcandassociates.com.

Wrap-Up

1. Are you available for follow-up conversations regarding your state's truck speed limit policies?
    - No
    - Yes
2. Are you aware of other related research in this area that is currently underway or is planned for future study?
    - No
    - Yes (Please briefly describe this research and provide links to documentation or contact information related to the study. Send any files not available online to carol.rolland@ctcandassociates.com.)
3. Please use this space to provide any comments or additional information about your previous responses.