

Research Links Speed Increases With Increased Accidents and Accident Severity, Though Lower Speed Increases Only Effect Crashes Marginally

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KEY SEARCH TERMS:

Traffic Speed

Speeding

Speed Limits

Accident Severity

Accidents

Accident Data

Research Synthesis Bibliography No. 16

Research Synthesis Bibliographies (RSBs) are distillations of relevant transportation research on current topics of interest to researchers, engineers, and policy/decision makers. Sources cited are available for loan (or available through Interlibrary Loan) to VDOT employees through the VDOT Research Library.

Changing Speed Limits On Low Speed Roads Has Little Or No Effect On Crashes

Relationships between speed limit increases, accident rates and accident severity are complex and have not always been clearly understood in the past—especially due to countless other variables that can influence crash rates and severity, including: highway design, vehicle design, speed enforcement, environmental attributes, weather conditions, and characteristics of the driving population.

After forty years of research there is still no consensus about the implications of raising speed and accident severity among studies that only explore only accident fatalities. In addition, few studies to date have provided adequate control of many other factors that can influence the findings of a before-after evaluation. However, the “ordered probit” model of evaluation is considered by some to be a legitimate approach to studying the effects of speed limit changes on crash injury severity.

Seemingly simple questions regarding speed and accidents have proven difficult to answer. Do increases in speed limits at lower or higher speed levels result in increases in severity or crashes or of injuries suffered in those crashes? What are the implications for such speed increases on Virginia’s secondary or rural roads where “low-speed increases” from 25-35 mph or 35-45 mph might be considered? A thorough literature search from the 1960s to the present reveals some widely held beliefs about speed limits and safety that may seem obvious, but are worth considering:

- Increases in speed (both absolute and relative among vehicles) lead to an increase in crash severity. (Renski, 1999)
- Accident-involvement, injury, and injury severity are highest at very low speeds, lowest at about the average speed of all traffic, and increase again at very high speeds, particularly at night. Thus the greater the variation in speed of any vehicle from the average speed of all traffic, the greater its chance of being involved in an accident. (Solomon, 1966)
- The difference between the design speed and the posted speed limit for a roadway has a significant effect on speed variance.(Garber, 1988)
- Speed variance is minimal when the difference between the design speed and the posted limit is between 5 and 10 mph (Garber, 1988).
- Driver compliance with posted speed limits is poor, especially for limits lower than 45 mph (Special Report 254, 1998).
- On rural or two-lane roads, a large proportion of accidents are initiated by vehicles turning left off the main road or by those entering from numerous access points, thus it becomes more important to review design standards so that left-turn lanes, intersection design and proper traffic control are in place to minimize the likelihood of accident involvements of this type (RTI, 1970).
- On average, current speed limits on many roadways are set too low to be accepted as reasonable by a majority of drivers, and speeds zones are posted 8-12 mph below the prevailing travel speed and as much as 15 mph below the maximum safe speed (Tignor, 1990)

Solomon (1964) found a relationship between vehicle speed and crash incidence that is illustrated by a U-shaped curve. In that curve, crash rates were lowest for travel speeds near the mean speed of traffic (not the posted speed, but the speeds most commonly traveled by drivers on the roadways measured), and increased as it deviated above and below the mean. Estimated travel speed from accident records were compared to the speeds measured at representative sites within each study section and comparisons showed that crash-involved drivers were over-represented in both high- and low- speed categories of the

speed distribution. That graph is illustrated at the following Web site, "Synthesis of Safety Research Related To Speed And Speed Limits" online at: <http://www.tfsrc.gov/safety/speed/speed.htm>

This report comes closest to answering the question of whether moderate speed increases at lower speeds results in more or worse accidents. It states: ***"In general, changing speed limits on low and moderate speed roads appears to have little or no effect on speed and thus little or no effect on crashes. This suggests that drivers travel at speeds they feel are reasonable and safe for the road and traffic regardless of the posted limit. However, on freeways and other high-speed roads, speed limit increases generally lead to higher speeds and crashes. The change in speed is roughly one-fourth the change in speed limit. Results from international studies suggest that for every 1 mi/h change in speed, injury accidents will change by 5 percent (3 percent for every 1km/h). However there is limited evidence that suggests the net effect of speed limits may be positive on a system wide basis."***

In general, speed limits appear to be on the rise. The year after the 1995 repeal of the National Maximum Speed Limits (NMSLs), half of all U.S. states had raised speed limits on rural interstates. In 1997 North Carolina raised speed limits on non-Interstate highways, focusing on what were considered "safe" roadway segments as determined primarily by roadway design and crash history. In most cases speeds were increased by 5 or 10 mph. No specific research has been located on the effects of increasing lower speeds (like 25 or 35 mph) to moderate speeds (like 35 or 45 mph), however a 1999 Transportation Research Record article explored North Carolina's experience and single-vehicle accidents (Renski, 1999). That research indicated:

- On roadway segments where speed limits were increased from 55 to 60 mph or 55 to 65 mph there was an increase in the probability of being injured in a crash, and an increase in the probability of sustaining Class A, B, or C injuries.
- No significant changes in injury severity were found for the comparison segments or for highway segments where speed limits were raised from 65 to 70 mph.
- Higher crash severity was observed when vehicles struck the face of a guardrail after limits were increased. The main suggestion with this observation is that guardrails may not be as adept at preventing injuries of higher speed crashes. The authors did recommend that due to this observed effect, decision makers consider the presence of guardrails, in addition to other existing criteria, for evaluating whether speed limits should be raised on a road segment.

Finally, it may be useful to consult the following online web sites from the Minnesota Department of Transportation, which can be found online at: <http://www.dot.state.mn.us/speed/index.html>

- **Minnesota Speed Monitoring Program** (See: <http://www.dot.state.mn.us/speed/monitorreport.html>)
- **Speed Trends on Minnesota Roadways** (See: <http://www.dot.state.mn.us/speed/spdtrend02-c.pdf>)
- **5 State Speed Comparison** (See: <http://www.dot.state.mn.us/speed/spdtrend02-c.pdf>)

--- Ken Winter, MLIS

DATABASES SEARCHED FOR THIS RSB

TRIS Online
Research In Progress (RiP)
WorldCat
TLCat
TransCat Plus
Research Needs Statements (RNS)
Transportation Research Record Online

OVERVIEW

Research Synthesis Bibliographies (RSBs) are selected lists of resources on current topics of interest to VDOT employees or divisions. When available, links to online documents are provided.

RSBs are “selective listings,” organized and distilled from the larger universe of research materials to save the researcher’s time. Selection criteria used by library staff include authority, relevance, and timeliness.

GETTING RESOURCES LISTED HERE

Full text copies of most resources listed in this document are available in the VDOT Research Library’s collections, or through Interlibrary loan, through the Library. In many cases, the Library owns both virtual and hard copies of documents, as well as formats such as CD-ROM.

Library staff is available Monday-Friday 8:00-5:00. Please contact us if you have a reference question, a question about our lending policies, or need any other kind of help.

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INITIAL READING

The following resources (listed in alphabetical order by title) provide a logical place for initial exploration the relationship of speed to safety. It seems clear that researchers starting in the 1960 have defined many of the key issues and some possible solutions for balancing speed with safety. It would be prudent to explore these items in greater depth. All are either available for loan through the VDOT Research Library or can be acquired through Interlibrary Loan.

55: A Decade of Experience

CITATION: Edythe Traylor Crump, National Research Council (U.S.) and Transportation Research Board. , 1984. Pg. 262. Note: vii; ill. ; 23 cm.; Note(s): Includes bibliographies.; Other Titles: Fifty-five, a decade of experience.; Responsibility: [edited for TRB by Edythe Traylor Crump].

ABSTRACT: To assist Congress in setting policy on the 55 mph national maximum speed limit, the conclusions of the Committee for the Study of Benefits and Costs of the 55 mph National Maximum Speed Limit are summarized as follows: 1. Findings of the committee about the effect of the 55 mph speed limit on safety, energy, travel time, and taxpayer costs; 2. Recommendations of the committee for continuation of the 55 mph speed limit and the mechanism by which state compliance is measured, and; 3. Unresolved issues that surround the appropriate speed limit for selected roads.

ACCESS: Available at the VDOT Research Library, Call Number: TA 1001.5 .S6 no. 204

Accidents on Main Rural Highways Related to Speed, Driver, and Vehicle

CITATION: David Harris Solomon and United States. Bureau of Public Roads. , 1964.

ABSTRACT: Summarizes the principal findings of what is still considered to be the benchmark study of the relationship between speed, characteristics of drivers and vehicles, and accidents in regard to highway traffic operations and safety. Describes the results of a study involving 11 states (including Virginia) and the Bureau of Public Roads on accident involvements related to characteristics of normal traffic on 600 miles of main rural highways in the U.S. Accident records of nearly 10,000 drivers, speed observations, and interviews with 290,000 drivers using these highways provided the basic data for analysis in the study, which became a report to Congress. A critical component of this study was the inclusion of speed of the traffic stream of a potential mediating factor.

Because of the care taken in examining speed aspects and because this was the first such study, and arguably still the most detailed and comprehensive study of this nature, its essential design features are described before its findings and conclusions are reported.

ACCESS: Available at The VDOT Research Library, Call Number: HE 5614.2 .A45 1964

ONLINE AT: <http://digitalarchive.oclc.org/request?id%3Ddoclnum%3A1198962>

Applying The Ordered Probit Model to Injury Severity in Truck-Passenger Car Rear-End Collisions

CITATION: Duncan, C S Khattak, A J Council, F.M. , Transportation Research Record No. 1635, p. 63-71.

ABSTRACT: Collisions between heavy trucks and passenger cars are a major concern because of the severity of injuries. This research has two objectives. One is to examine the impact of various factors on injuries to passenger car occupants involved in such collisions. Due to the complex interaction of factors influencing injury levels in truck-car collisions, the ordered probit model is used to identify specific variables significantly influencing levels of injury in two-vehicle rear-end involvements on divided roadways.

Another objective is to demonstrate the use of the ordered probit in this complex highway safety problem. A set of vehicle, occupant, roadway, and environmental factors expected to influence injury severity was developed. Given two-vehicle passenger car-truck rear-end collisions, the variables that increase passenger vehicle occupant injury severity include darkness; high speed differentials; high speed limits; grades, especially when they are wet; being in a car struck to the rear (as opposed to being in a car striking a truck to the rear); driving while drunk; and being female. The interaction effects of cars being struck to the rear with high speed differentials and car rollovers were significant. Variables decreasing severity include snowy or icy roads, congested roads, being in a station wagon struck to the rear (as opposed to a sedan), and using a child restraint. With injuries ordered in five classes from no injury to fatalities, the marginal effects of each factor on the likelihood of each injury class are reported.

ACCESS: Available at the VDOT Research Library, Call Number: TA 1001.5 .T71 no. 1635
ONLINE AT: <http://dx.doi.org/10.3141/1635-09>

Changes in Motor Vehicle Occupant Fatalities After Repeal of the National Maximum Speed Limit

CITATION: C. M. Farmer. , Richard A Retting, Adrian K Lund, Accident analysis and prevention. Vol. 31, no. 5 (Sept. 1999), p. 537-543.

ABSTRACT: Trends in motor vehicle occupant deaths over 8 years were studied for 24 states that raised interstate speed limits and seven states that did not following the 1995 repeal of the US National Maximum Speed Limit. Fatalities on interstates increased 15% in the 24 states that raised speed limits. After accounting for changes in vehicle miles of travel, fatality rates were 17% higher following the speed limit increases. Similar increases were reported following the 1987 speed limit increases on rural interstates. Deaths on roads other than interstates were essentially unchanged.

ACCESS: Available at the VDOT Research Library, periodicals section.

Changes in Speed and Speed Adaptation Following Increase in National Maximum Speed Limit

CITATION: Casey, S. M., Adrian K. Lund. Journal of Safety Research. Vol. 23, no. 3 (Fall 1992), p. 135-146.

ABSTRACT: This study replicates a 1985 study showing that drivers adapted to freeway speeds travel faster on roads connecting with the freeways than do other drivers on the same roads. In addition, the study indicates that travel speeds on these freeways were faster in 1988 even though they had retained the 55 mph (88 km/h) limit and were distant from highways authorized for the 65 mph (105 km/h) limits. These findings suggest that allowing higher speeds on some highways not only causes higher speeds on local, connecting roads through speed adaptation, but also may cause higher speeds on other, unconnected and distant roads through some indirect process of speed generalization.

ACCESS: Available at the VDOT Research Library, periodicals section.

Driver Speed Behavior on U.S. Streets and Highways

CITATION: Samuel C. Tignor and Davey Warren. , ITE Compendium of Technical Papers, 1990. Pg. 83.

ABSTRACT: Not available.

ACCESS: Available at the VDOT Research Library, Call Number: CD-ROM TA 1001 .I58 2001

ONLINE AT: <http://www.ibiblio.org/rdu/sl-irre0.html>

Effect of Speed Limit Increases on Crash Injury Severity: Analysis of Single-Vehicle Crashes on North Carolina Interstate Highways

CITATION: Renski, H Khattak, A J Council, F.M. , Transportation Research Record No. 1665,

ABSTRACT: The recent congressional action revoking the national maximum speed limits has rekindled the debate over safety and travel time tradeoff. The effect of speed limit increases on the most severe occupant injury in a crash is analyzed here. Single-vehicle crashes on Interstate highways in North Carolina (N=2729) are examined. Two analysis methods are used: a paired-comparison analysis and an ordered probit model. Increasing speed limits from 88.5 to 96.6 km/h (55 to 60 mph) and from 88.5 to 104.6 km/h (55 to 65 mph) increased the probability of sustaining minor and nonincapacitating injuries, but increasing speed limits from 104.6 to 112.7 km/h (65 to 70 mph) did not have a significant effect on crash severity. There were too few fatal crashes to draw conclusive results for this category of injury severity. Crashes involving the face of a guardrail were more severe on segments where the speed limit was raised than on comparison segments or study segments before the limits were increased. These findings may be conservative because study segments with good safety records were chosen for the speed limit increases.

ACCESS: Available at the VDOT Research Library, Call Number: TA 1001.5 .T71 no. 1665
ONLINE AT: <http://dx.doi.org/10.3141/1665-14>

The Effectiveness of the 55 Mph National Maximum Speed Limit as a Life Saving Benefit

CITATION: P. Johnson, United States, National Highway Traffic Safety Administration, et al. , 1980.

ABSTRACT: Not available.

ACCESS: Available to VDOT employees through InterLibrary Loan.

Effects of Raising and Lowering Speed Limits on Selected Roadway Sections

CITATION: Martin R. Parker, United States, Federal Highway Administration, et al. , 1997. Pg. 166.

ABSTRACT: The objective of this research was to examine the effects of raising and lowering posted speed limits on driver behavior for urban and rural nonlimited access highways. Sites selected for study were furnished by the participating States. The study was conducted during the period from October 1985 to September 1992, when the maximum speed limit was 55 mi/h (89 km/h) on nonlimited access highways. During this period, the States and localities lowered and raised posted speed limits on short roadway segments, typically less than 2 mi (3.2 km) in length. The general types of sites included in the study were short sections, i.e., 0.5-mi (0.8-km) segments in rural communities, 1-mi (1.6-km) sections in urban and rural communities, and 2- to 12-mi (3- to 19-km) rural sections where speed limits were raised. The study included the collection of driver behavior and crash data in 22 States. The data were collected at 100 sites on nonlimited access highways, consisting of 172 mi (277 km) where speed limits were either lowered or raised, and at 83 comparison sites, consisting of 132 mi (213 km) where no changes in the posted speed limits were made. Changes in the posted speed limits ranged from lowering the speed limit by 5, 10, 15, or 20 mi/h (8, 16, 24, or 32 km/h) to raising the speed limit by 5, 10, or 15 mi/h (8, 16, or 24 km/h). Only one change in the posted speed limit was made at each site during the study. There is statistically sufficient evidence in this dataset to reject the hypothesis that driver speeds do not change when posted speed

limits are either raised or lowered. However, the differences in speeds, less than 1.5 mi/h (2.4 km/h), are not sufficiently large to be of practical significance, and are due primarily to large sample sizes. Although the changes in vehicle speeds were small, driver violations of the speed limits increased when posted speed limits were lowered. Conversely, violations decreased when speed limits were raised. This does not reflect a change in driver behavior, but a change in how compliance is measured, i.e., from the posted speed limit. There is not sufficient evidence in this dataset to reject the hypothesis that crash experience changed when posted speed limits were either lowered or raised.

ACCESS: Available at the VDOT Research Library, Call Number: HE 5620 .S6 P36 1997

Effects of the 65 Mph Speed Limit Through 1990: A Report to Congress

CITATION: U.S. Dept. of Transportation, National Highway Traffic Safety Administration, 1992, 19 p.

ABSTRACT: The 1987 Surface Transportation and Uniform Relocation Assistance Act granted states the authority to increase the speed limit on designated portions of the rural Interstate system to no more than 65 mph. The objective of this analysis was to examine the changes in fatalities that have occurred on rural Interstates on which the posted speed limit was increased to 65 mph. Of the 44,529 fatalities occurring in 1990, slightly more than 5% occurred on rural Interstates with a speed limit of 65 mph. Compared to 1989, nationwide rural Interstate fatalities in 1990 declined about 2%, an amount equal to the change experienced in total motor vehicle crash fatalities. This decline occurred in spite of increases in vehicle miles traveled (VMT) estimated at 2%. Urban Interstate fatalities were about 2% higher than in 1989. Major findings included the following: The 2,336 fatalities that occurred in 1990 on rural Interstates in those 38 states that increased their speed limits to 65 mph in 1987 is 30% greater than might have been expected based on historical trends. This variation from the estimated trend projection is the same that occurred in 1988 and 1989. This suggests the fatality effect of the 65 mph speed limit has stabilized. The 1990 fatality rate for those states with a 65 mph speed limit, which includes the effect of the additional VMT on the rural Interstate system, has returned to the 1.4 fatalities per 100 million VMT level that existed in 1986, the last year of the 55 mph speed limit. While it is evident that rural Interstate fatalities have increased with implementation of the 65 mph speed limit, the rural Interstate remains the safest component of our nation's highway system. Rural Interstate fatalities represented only 6% of total traffic fatalities for 1990, numbering 2,701 nationally. The fatality rate on the rural Interstate system in 1990 was 1.3 per 100 million VMT, compared to 2.1 for the nation as a whole. Based on speed data for 65 mph roadways, which are only available from 18 of the 40 states with increased speed limits, the average travel speed on rural Interstates is estimated to have increased from 60.6 mph in the fourth quarter of 1986 to 64.0 mph in the fourth quarter of 1990. That is, the average speed of drivers exceeded the posted 55 mph limit in 1986 by 5.6 mph, while in 1990 the average speed was one mph below the posted limit. However, the percent of vehicles exceeding 70 mph for this same time period has clearly increased from approximately 6% when the posted speed limit was 55 mph to 19% when the posted speed limit was 65 mph. Note: Description: 23 p.; Figures(4); Tables(7); Document Source: National Highway Traffic Safety Administration.

ACCESS: Available to VDOT employees through Interlibrary Loan.

The Effects of the New 65 Mile-Per-Hour Speed Limit on Rural Highway Fatalities: A State-By-State Analysis

CITATION: S. Graham, Garber J. D. , Accident Analysis & Prevention, Vol. 22, No. 2, p.

137-149.

ABSTRACT: This paper examines the effects of the new 65 mile-per-hour (mph) speed limit on U.S. rural highway fatality counts. Separate analyses are conducted for each of the 40 states that had adopted the new (higher) limit by mid-1988. Using monthly Fatal Accident Reporting System (FARS) data from January 1976 through November 1988, time-series regression equations--including policy variables, seasonal variables, and surrogate exposure variables--are estimated for each state. The results suggest that the new laws have increased fatalities on both rural interstate and rural noninterstate highways in most states, but also that these effects differ substantially across the states. For rural interstate fatalities the estimates suggest a median (among the 40 states) effect of the increased speed limit of roughly 15 percent more fatalities; the median estimates for rural noninterstates suggest a 5 percent increase in fatalities due to the increased speed limits. Estimates such as those reported here should be revised as more information becomes available. Note: Description: p. 137-149; Figures; References; Tables; TRIS Files: HRIS; HSL.

ACCESS: Available at the VDOT Research Library, periodicals section.

Fatal Accidents on the Rural Interstates Of South Carolina: Effects of the Speed Limit Increase

CITATION: South Carolina Department of Highways and Public Transportation ; prepared by the Highway Safety Office, 11 p..

ABSTRACT: A study was conducted in South Carolina of the fatal accident data for the period July 17, 1987 through December 31, 1987 on the rural interstate highways. The speed limit at this time was 65 mph. The data were compared with the same period in 1986 when the speed limit was 55 mph. The leading probable cause of fatal rural interstate accidents in both six month periods was running off the road. This occurred in 7 out of the 15 accidents in 1986 and in 6 out of 21 for 1987. In 1986 the majority of vehicles (57.9%) involved in fatal accidents were driven at speeds under 55. For 1987, 43.6% of the vehicles were traveling at speeds less than 55, with another 35.9% traveling between 56 and 65 mph. The number of fatal accidents as a percentage of all fatal accidents increased from 3.0% in the 1986 period to 4.0% in the 1987 period. Using three statistical inference techniques, this increase was shown not to be statistically significant.

ACCESS: Available to VDOT employees through Interlibrary Loan.

Managing Speed: Review of Current Practice for Setting and Enforcing Speed Limits

CITATION: Washington, D.C. : Transportation Research Board, National Research Council, National Academy Press, TRB Special Report, No. 254, 1998, 427 p.

ABSTRACT: The primary objective of this study--requested and funded by the National Highway Traffic Safety Administration, the Federal Highway Administration, and the Centers for Disease Control and Prevention--was to review current practice for setting and enforcing speed limits on all types of roads. The study was conducted by a Transportation Research Board committee of experts in traffic engineering, highway design, traffic operations and highway safety, vehicle design and biomechanics, human factors, public health, traffic enforcement, highway users, economics, statistics, political science, and public policy. In addition to reviewing current practice in setting and enforcing speed limits, guidance is provided to state and local governments on appropriate methods of setting speed limits and related enforcement strategies. Following an executive summary, the report is presented in six chapters and five appendices. Chapter 1 provides an

introduction. In Chapter 2 the relationship between speed and safety is investigated in depth to help identify the role of speed in crash causation and injury severity. The relationship of speed to travel time and vehicle operating costs is also considered because drivers make tradeoffs among safety, travel time, and other trip-related costs in deciding what speed to travel. Having laid the groundwork for the importance of speed on traffic safety and travel efficiency, Chapter 3 is focused on speed limits--the primary method for managing speed addressed in this study. The theoretical justification for speed limits is elaborated, the strengths and weaknesses of the primary methods of setting speed limits are described, and what is known about the effects of speed limits on driving speeds and safety is summarized. Speed enforcement and adjudication issues are examined in Chapter 4, including the relevance of deterrence theory for speed enforcement and the potential for application of automated enforcement technologies to augment traditional enforcement methods. In Chapter 5, other speed management strategies are discussed briefly, including highway design and infrastructure approaches, highway- and vehicle-related technologies, and interventions for special driver populations. Finally, the committee's guidance on appropriate strategies for both setting and enforcing speed limits is provided in Chapter 6. Appendix A presents a formal treatment of how drivers make tradeoff decisions in selecting driving speeds. Appendices B, C, and D contain literature reviews commissioned to inform the committee deliberations. These papers are entered individually in the TRIS data base. Appendix E is a glossary.

ACCESS: Available at the VDOT Research Library, Call Number: TA 1001.5 .S6 no. 254
ONLINE AT: <http://gulliver.trb.org/publications/sr/sr254.pdf>

Predicting the Severity of Motor Vehicle Accident Injuries Using Models of Ordered Multiple Choice

CITATION: O'Donnell, C J, Connor, D.H. , Accident Analysis & Prevention, Vol. 28, No. 6, p. 739-753.

ABSTRACT: This paper presents statistical evidence showing how variations in the attributes of road users can lead to variations in the probabilities of sustaining different levels of injury in motor vehicle accidents. Data from New South Wales, Australia, is used to estimate two models of multiple choice which are reasonably commonplace in the econometrics literature: the ordered logit model and the ordered probit model. Our estimated parameters are significantly different from zero at small levels of significance and have signs which are consistent with our prior beliefs. As a benchmark for comparison, we consider the risks faced by a 33-year-old male driver of a 10-year-old motor vehicle who is involved in a head-on collision while traveling at 42 km/h (26 mi/h). We estimate that this benchmark victim will remain uninjured with a probability of almost zero, will require treatment from a medical officer with a probability of approximately 0.7, will be admitted to hospital with a probability of approximately 0.3, and will be killed with a probability of almost zero. We find that increases in the age of the victim and vehicle speed lead to slight increases in the probabilities of serious injury and death. Other factors which have a similar or greater effect on the probabilities of different types of injury include seating position, blood alcohol level, vehicle type, vehicle make and type of collision.

ACCESS: Available at the VDOT Research Library, periodicals section.

Rural and Urban Crashes -- A Comparative Analysis

CITATION: Tessmer, Joseph M., National Highway Traffic Safety Administration, 151 p., 1996.

ABSTRACT: Data from several sources were used to examine the similarities and differences in the characteristics of crashes occurring in rural areas vs. those occurring in urban areas. Data from the Fatal Accident Reporting System (FARS) for the period 1975-1993 were used to examine the characteristics of rural fatal crashes, contrasted with the characteristics of urban fatal crashes. For crashes of lower severity, data from three of the state files maintained by the National Center for Statistics and Analysis (NCSA), i.e., Illinois, Pennsylvania, and New Mexico for the period 1989-1993, were examined. Finally, data from the Crash Outcome Data Evaluation System (CODES) were used to contrast safety belt use and medical costs for persons injured in rural crashes vs. those injured in urban crashes. For the comparisons of rural and urban crashes using the FARS data, the study found that while there are approximately 40% more fatal crashes occurring in rural areas compared to urban areas, there are fewer vehicle miles traveled (VMT) in rural areas. In addition, rural fatal crashes more often involve more trucks, have severe vehicle damage, and involve more head-on collisions and ejected persons, and the time for emergency medical services (EMS) to reach the crash scene is longer in rural areas than in urban areas. Findings were similar for the comparisons of crashes from the state data files. Findings for the CODES data indicate that the benefit of using safety belts, in medical dollars spent, is smaller for rural crashes.

ACCESS: Available at the VDOT Research Library, Call Number: HE 5614.2 .T47 1996

ONLINE AT: <http://www.nhtsa.dot.gov/people/ncsa/pdf/ruralnot.pdf> or <http://ntl.bts.gov/lib/000/800/805/00326.pdf>

Speed and Accidents

CITATION: Research Triangle Institute, United States and National Highway Safety Bureau. , 1970. Note: 2 v. : illus. 28 cm.; Note(s): "Prepared by the Research Triangle Institute for the U.S. Dept. of Transportation National Highway Safety Bureau, under Contract no. FH-11-6965."

ABSTRACT: The major findings of this investigation of involvement rate as a function of speed deviation of the accident-involved vehicle from the mean traffic speed are given in this 2-volume publication. The primary result is the likelihood of involvement as a function of speed deviation is a U-shaped relationship. The likelihood of involvement is estimated to be greater by a factor of about 6 to 21, depending on the type of road, for large speed deviations as opposed to small speed deviations and ignoring the accidents involving turning maneuvers. The latter include about 44% of all of the observed accidents.

Volume I contains a brief statement of the objectives, plan of research, a summary of the results, recommendations and conclusions. In addition the pertinent single page tables and figures from Volume II are included and an example page is given of the long table.

ACCESS: Available at the VDOT Research Library, Call Number: HE 5614.2 .D87 1970.

Speed Variance and Its Influence on Accidents

CITATION: Nicholas J. Garber, Ravi Gadirau and AAA Foundation for Traffic Safety. , 1988. Pg. 56.

ABSTRACT: Safety should be one of the major factors considered when the speed limit is being selected for a particular stretch of highway. The level of safety on any highway is however related to certain characteristics of the traffic stream and the geometrics of the roadway. The geometric characteristics of a section of highway, e.g., maximum grade, minimum curvature, etc. are based mainly on the design speed. But in many cases, speed limits are posted without adequate consideration given to these characteristics. An important traffic characteristic which has been found to influence safety is speed variance,

but currently little is known about the factors that affect variance of vehicle speeds in a traffic stream. The objective of this study was to investigate the traffic engineering factors that influence speed variance and to determine to what extent speed variance affects accident rates. Detailed analyses were carried out to relate speed variance with posted speed limit, design speeds and other traffic variables. The major factor identified is the difference between the design speed of the highway and the posted speed limit. It was determined that speed variance will be minimum, if the posted speed limit is between 6 and 12 mph lower than the design speed, and outside this range, speed variance increases with increasing difference between the design speed and the posted speed limit. Other findings are that: 1. Drivers tend to go at increasing speeds as roadway geometric characteristics improve regardless of the posted speed limit, and; 2. Accident rates do not necessarily increase with increase in average speed, but do increase with increase in speed variance.

ACCESS: Available at the VDOT Research Library, Call Number: HE 5620 .S6 G37 1988

Synthesis of Safety Research Related to Speed and Speed Limits

CITATION: United States, Federal Highway Administration and Turner-Fairbank Highway Research Center. , 1998.

ABSTRACT: This web site provides a very sound overview of research exploring the relationship between speed and safety done during the past 4 decades. This document provides a review of safety research related to speed and speed management. This review builds upon a similar synthesis prepared in 1982. This synthesis highlights the relationships among vehicle speed and safety; factors influencing speeds; and the effects on speed and crashes of speed limits, speed enforcement, traffic calming and other engineering measures intended to manage speed. In general, changing speed limits on low and moderate speed roads appears to have little or no effect on speed and thus little or no effect on crashes. This suggests that drivers travel at speeds they feel are reasonable and safe for the road and traffic regardless of the posted limit. However, on freeways and other high-speed roads, speed limit increases generally lead to higher speeds and crashes. The change in speed is roughly one-fourth the change in speed limit. Results from international studies suggest that for every 1 mi/h change in speed, injury accidents will change by 5 percent (3 percent for every 1km/h). However there is limited evidence that suggests the net effect of speed limits may be positive on a system wide basis. More research is needed to evaluate the net safety effect of speed limit changes.

ONLINE AT: <http://www.tfsrc.gov/safety/speed/speed.htm>

Velocity Change and Fatality Risk in a Crash--A Rule Of Thumb

CITATION: H. C. Joksch. , Accident Analysis and Prevention, Vol. 25, No. 1, Feb. 1993, p. 103-104.

ABSTRACT: The author examines the relationship between risk of vehicle occupant death and injury and crash severity, measured by velocity change (Δv), in car-car collisions. He uses nationally representative data from the National Accident Sampling System (NASS) for passenger cars of model years 1980 and later involved in accidents from 1980 through 1986. He concludes that, as a rule of thumb, the exponent 4 may reasonably reflect the relation between the fatality risk and Δv .

ACCESS: Available at the VDOT Research Library, periodicals section.

SECONDARY READING

The following citations (listed alphabetically, by title) show the range of research that has been conducted on speed limit changes and safety, and may be helpful for determining steps state DOTs can take balance the two.

A Study of Motor Vehicle Speeds on Primary and Secondary State Highways in Central And Eastern Washington

CITATION: Anonymous , 1952.

ABSTRACT: Not available.

ACCESS: Available to VDOT employees through Interlibrary Loan.

Accidents, Speed Deviation and Speed Limits

CITATION: L. B. West Jr and J. W. Dunn. , Traffic Engineering, Vol. 41, No. 10, July 1971, p. 52-55.

ACCESS: Available at the VDOT Research Library, periodicals section.

Assessment of Current Speed Zoning Criteria

CITATION: David L. Harkey, Henry Douglas Robertson and Scott E. Davis. , Transportation Research Record No. 1281, 1990, Pg. 40-51.

ABSTRACT: Not available.

ACCESS: Available at the VDOT Research Library, Call Number: TA 1001.5 .T71 no. 1281

Data Analysis of the Speed-Related Crash Issue

CITATION: Bowie, N., Walz, M., National Highway Traffic Safety Administration, The Thirteenth International Technical Conference On Experimental Safety Vehicles, November 4-7, 1991, Paris, France. Volume I. 1993/07. p. 57-62.

ABSTRACT: Excessive speed has been recognized for decades as both a significant and complex highway safety issue. Using the most recent data available, this paper examines the size of the "speed problem" in the United States and identifies characteristics most often associated with speed-related crashes. Data from the National Accident Sampling System, the Fatal Accident Reporting System, the Crash Avoidance Research Data File, the National Crash Severity Study, and the Indiana Tri-Level Study were utilized in conducting the analysis. Information pertaining to crash avoidance, crash severity and related crash characteristics (for example alcohol, vehicle type, roadway condition) were examined. Of particular interest is the use of an innovative methodology to estimate the economic impact of speed-related crashes on society.

ACCESS: Available to VDOT employees through Interlibrary Loan.

The Effects of Implementation of 50 Km/H in Urban Areas

CITATION: U. ENGEL. , Living and moving in cities : actes du congres, Paris 29-31 Janvier 1990, 1990. Pg. 238-42.

ABSTRACT: With effect from 1 October 1985, the general 60kph speed limit in built-up areas in Denmark was reduced to 50kph. This paper discusses the results in terms of accidents and speeds. The accident analysis was performed on the available quarterly accident data as a before-and-after study with a control group. The 'before' period consisted of the 39 quarters from January 1976 to September 1985; the 'after' period ran for the 9 quarters from October 1985 to December 1987. The control group consisted of accident data from Danish rural areas. It was found that fatalities were reduced by 24.1% and personal injury accidents decreased by 8.7%. Mean speeds fell by 3kph to 4kph. The

paper includes several tables and charts of trends in accident statistics.
ACCESS: Available to VDOT employees through Interlibrary Loan.

Effects of Reduced Speed Limits in Rapidly Developing Urban Fringe Areas (Abridgment)

CITATION: Ullman, G L Dudek, C.L. , Transportation Research Record No. 1114, 1987 p. 45-53;

ABSTRACT: Speed zoning on the basis of the 85th percentile speed in rapidly developing urban fringe areas usually results in the posting of 55 mph speed limits. Although these areas have some urban-like characteristics, no differentiation in speed limits is made between highways in these areas and those in rural locations. Speed zoning below the 85th percentile may be beneficial to drivers in rapidly developing areas, indicating that the area requires additional attention and caution. Presented in this paper are the results of field studies conducted at six urban fringe highway sites in Texas where speed limits were currently 55 mph and rapid urban development was occurring. Speed zones of 45 mph were installed at these sites even though the 85th percentile speed did not warrant the lower speed zones. Spot speed, speed profile, and accident data were collected before and after the speed zones were implemented. No significant changes occurred in speeds, speed distributions, or speed-changing activity at the sites. Likewise, accident rates remained unchanged. It appears that the lower speed zones were not effective in improving safety at these sites.

ACCESS: Available at the VDOT Research Library, Call Number: TA 1001.5 .T71 no. 1114

An Evaluation of the Default 50 km/h Speed Limit in Victoria

CITATION: Effie Newstead, Hoareau Stuart. , Pg. 56.

ABSTRACT: Victoria introduced a state-wide default 50 km/h speed limit in built-up areas (except where otherwise signed), on January 22, 2001. The purpose of this legislation was to reduce the incidence and severity of crashes involving unprotected road users. The effectiveness of the initiative has been evaluated under a quasi-experimental design framework at various intervals with the last covering a period of almost three years. Results of the final evaluation are presented in this report. Results of the evaluation demonstrate that implementation of the Victorian default 50 km/h urban speed limit was associated with reduced casualty crashes in aggregate by around 12% with the reductions sustained over the entire post implementation study period. However, the results also indicate that the program has been more successful in reducing minor injury crashes than in reducing fatal and serious injury crashes. Whilst there was some suggestion of the program being effective in reducing the high severity crashes in the 5 months immediately after program implementation, analysis was unable to identify these effects being sustained over the longer term. Reasons for the lack of measured program effects on high severity crashes were not able to be established from analysis of the limited speed monitoring data available for the evaluation. Assessment of program crash reduction effects for particular road user sub-groups was also carried out in the evaluation. They showed that the change in default speed limit was associated with a sustained reduction in fatal and serious injury crashes involving pedestrians of between 25% and 40%. Effects on crashes involving young drivers were consistent with the overall crash analysis results whilst no significant effects on crashes involving older drivers were measured.

ONLINE AT: <http://www.monash.edu.au/muarc/reports/muarc261.pdf>

How Traveling Speed Relates to the Risk of Crash Involvement

CITATION: C. MCLEAN KLOEDEN J. , ITE Journal, Vol. 68, No. 9, : p. 16-17.

ABSTRACT: Research commissioned by the Federal Office of Road Safety and undertaken by the National Health and Medical Research Council Road Accident Research Unit provides new evidence about the risks associated with speeding in urban areas. This study examined casualty crashes over a 2-year period in zones where the speed limit was 60 km/h in the Adelaide, Australia, metropolitan area. The speeds of cars involved in crashes were compared with incident-free traveling speed: the speeds of cars passing each crash location at the same time of day and day of week that the crash occurred. The study found that cars involved in casualty crashes were generally traveling faster than cars that were not involved in a crash: 68% of casualty-crash-involved cars were exceeding 60 km/h compared with 42% of those not involved in a crash. The difference was even greater at higher speeds. A study of the relationship between incident-free traveling speed and the driver's blood alcohol concentration (BAC) showed that higher BAC levels were associated with slightly higher traveling speeds although the average difference in speed was less than 3 km/h. The research indicates that if the BAC is multiplied by 100 and the resulting number is added to 60 km/h, the risk of involvement in a casualty crash associated with that incident-free traveling speed is almost the same as the risk associated with the BAC. Hence, the risk is similar for 0.05 and 65, 0.08 and 68, 0.12 and 72, and so on.

ACCESS: Available at the VDOT Research Library, periodicals section.

Identification and Analysis of Speed Related Accidents on Highways

CITATION: Liu, G.X. Proc., Canadian Multidisciplinary Road Safety Conference X, Toronto, Ontario, Canada, June 8-11, pp. 65-74.

ABSTRACT: Not available.

ACCESS: Available to VDOT employees through Interlibrary Loan.

Investigation of Traffic Speeds and Accidents on Urban Roads

CITATION: Traffic Management and Road Safety. Proceedings Of Seminar J Held At The 22nd PTRC European Transport Forum, University Of Warwick, England, September 12-16, 1994. Vol. P381. 1994/09. p. 219-230.

ABSTRACT: This paper describes a study by the Transport Research Laboratory (TRL), which aims to increase knowledge about speed distributions and provide a better understanding of the speed-accident relationship for urban roads in the UK. In 1992, TRL commissioned Wootton Jeffreys Consultants to collect data on speeds and speed distributions on urban roads in 100 randomly selected locations, 94 of which were in 30mph speed zones and six in 40mph zones. Speed data were collected separately in each of two directions, and analysed statistically, using non-hierarchical cluster analysis and linear discriminant analysis. As a result, the links were classified into: (1) highly congested town roads; (2) typical inner city link roads; (3) suburban link roads; and (4) country (fast) link roads. The mean link speeds of these classes were 20.7mph, 24.5mph, 28.7mph and 33.1mph, respectively. A well-fitting statistical model was developed, that provided some remarkable insights into the relationship between speed and accidents. Further research is needed, to understand this relationship well enough to develop practical strategies for accident reduction.

ACCESS: Available to VDOT employees through Interlibrary Loan.

Is Speed Variation, Not Speed Itself, the Real Problem?

CITATION: Insurance Institute for Highway Safety, Accident Reconstruction Journal; Vol.

3, No. 6, 1991: 16 p.

ABSTRACT: Not available.

ACCESS: Available to VDOT employees through Interlibrary Loan.

Proceedings ; Forum on 55

CITATION: National Safety Council. , 1985. Pg. 96.

ABSTRACT: Not available.

ACCESS: Available at the VDOT Research Library, Call Number: HE 5620 .S6 N37 1985

Proceedings of The Conference Road Safety in Europe, Birmingham, United Kingdom, September 9-11, 1996

CITATION: Transport Research Laboratory (Great Britain), Forum of European Road Safety Research Institutes, et al. , 1996.

ABSTRACT: Pt. 1. Research into vulnerable road users. Attitudes and values concerning road safety. -- Pt. 2. Technical solutions for the alcohol and drugs problem in traffic. Traffic safety management systems. Data and road safety targets. -- Pt. 3. Road safety education and driver training. Road safety in Central and Eastern European countries. -- Pt. 4. Roadway and roadside design for improved safety. Advanced telematics for an enhanced road safety.

ACCESS: Available to VDOT employees through Interlibrary Loan.

Reducing Traffic Injuries Resulting From Excess and Inappropriate Speed

CITATION: European Transport Safety Council. , 1995. Pg. 35.

ABSTRACT: Not available.

ACCESS: Available to VDOT employees through Interlibrary Loan.

Reduction in the Speed Limit From 110 Km/H to 90 Km/H During Summer 1989: Effects on Personal Injury Accidents, Injured and Speeds

CITATION: G. Nilsson. , 1990. Pg. 18.

ABSTRACT: The effect of the reduced speed limit during summer 1989 was analyzed. The reduction in the 110 km/h during summer 1989 on 5500 km of roads led to lower speeds than in 1988 not only on the road sections involved but also on other main roads. Summing up, the traffic safety situation on rural roads during summer 1989 improved in relation to the corresponding period in 1988. As expected, the improvement was greatest on those roads where the speed limit was reduced from 110 km/h to 90 km/h, particularly on motorways. The reduction in speed was also greatest on motorways. Note: Description: 37 p.

ACCESS: Available to VDOT employees through Interlibrary Loan.

The Relation Between a Driver's Speed and His Accident Rate

CITATION: Munden, J.W., Road Research Laboratory, Crowthorne, England, Report LR 88, 1967.

ABSTRACT: Not available.

ACCESS: Available to VDOT employees through Interlibrary Loan.

Relationship of 65-Mph Limit To Speeds and Fatal Accidents

CITATION: A. James McKnight and Terry M. Klein. , Transportation Research Record No. 1281, 1990, Pg. 71-77.

Note: charts ; 28 cm; (OCoLC)1259379; Note(s): Includes bibliographical references.;

Responsibility: A. James McKnight and Terry M. Klein.; Entry: 19910411; Update: 19950602.

ACCESS: Available at the VDOT Research Library, Call Number: TA 1001.5 .T71 no. 1281

A Review of Rural Speed Limits in Australia

CITATION: J. E. Cowley. , 1980. Pg. 88.

ABSTRACT: Not available.

ACCESS: Available to VDOT employees through Interlibrary Loan.

Review of Traffic Calming Schemes in 20 Mph Zones

CITATION: David C. Webster, Archie M. Mackie, Transport Research Laboratory (Great Britain), et al. , 1996. Pg. 41.

ABSTRACT: Not available.

ACCESS: Available to VDOT employees through Interlibrary Loan.

Safety Effects Of 30 Km/H Zones in the Netherlands

CITATION: A. A. Vis and M. Slop. , Accident Analysis and Prevention, 1992. No. 1, Pg. 75-86.

ABSTRACT: Since 1983, Dutch municipal authorities can institute a maximum speed of 30 km/h on roads or in zones within built-up areas. The safety effects of 30 km/h zones are supposed to be positive. In order to be sure about this, the Ministry of Transport has stimulated 15 municipalities to implement a 30 km/h zone and set up an evaluation of the safety effects of these zones. The evaluation research is coordinated by the Institute for Road Safety Research (SWOV). The evaluation concerns the changes in traffic flows, opinions of residents, conflicts, and accidents. This paper gives the results of the evaluation.

ACCESS: Available at the VDOT Research Library, periodicals section.

Safety Effectsof Speed Reducing Measures in Danish Residential Areas

CITATION: Ulla Engel and Lars K. Thomsen. , Accident analysis and prevention, Vol. 24, No. 1, February 1992, Pages 17-28

ABSTRACT: On May 1, 1977 a new code was introduced into the Danish Road Traffic Act. The result was a change in layout and speed limits in a great number of residential streets; in most cases the streets were transformed into 30 km/h streets and in few cases into 15 km/h streets. In addition to speed signs, both types of streets were equipped with speed reducing measures. Based on experiences from a selection of experimental streets, mostly 30 km/h streets, different, but very positive effects were found. Overall there was a reduction in the mean speed in these areas of 11 km/h. On the 223 km, 30 km/h streets there was a reduction of 77 accidents and 88 casualties within a period of three years. These reductions were caused by the implementation of speed signs, speed reducing measures, and a reduction in traffic. On the basis of 44 experimental streets, where traffic was recorded both before and after the changes, the reduction in risk of casualties, i.e. the number of casualties per road user km, was 72%, while the risk of accidents seemed to be unchanged. Considering serious injuries alone, a very high reduction of 78% was found. Accidents included in the study consist of all police reported accidents, i.e. accidents with personal injury as well as damage only accidents.

ACCESS: Available at the VDOT Research Library, periodicals section.

Safety, Speed & Speed Management : A Canadian Review

CITATION: V. Knowles, B. Persaud, M. Parker, et al. , 1997.

ABSTRACT: Speed control aimed at encouraging drivers to travel at an appropriate speed for prevailing conditions encompasses engineering techniques, education and enforcement. The purpose of this study was to review the contribution of non-enforcement measures to speed control and the suitability of these measures for implementation in Canadian jurisdictions. The study involved an extensive review of relevant international literature and a questionnaire survey of Canadian jurisdictions. Based on the considerable evidence reviewed by the study team, it cannot be decisively concluded that changing the posted speed limit will result in a change in collisions. Data from Canadian and U.S. jurisdictions indicate that drivers' speeds may change when speed limits are raised or lowered, but that the changes are often not large enough to be of practical significance and that they are not large enough to automatically imply an effect on safety. The significant amount of speed-related information across Canada that was uncovered during this study suggests the need for developing a mechanism for sharing work to contribute to the knowledge base.

ACCESS: Available to VDOT employees through Interlibrary Loan.

Speed Behavior and Drivers' Attitude to Speeding

CITATION: Fildes, B.N., G. Rumbold, and A. Leening. Report 16. Monash University Accident Research Center, Monash, Victoria, Australia, 1991.

ABSTRACT: Not available.

ACCESS: Available to VDOT employees through Interlibrary Loan.

Speed Enforcement and Speed Choice

CITATION: E. Hauer, & F. J. Ahlin, J. S. Bowser., ,Accident Analysis and Prevention, Vol.14, No. 4, 1982, p. 267-278.

ABSTRACT: A rational approach to practical problems of speed enforcement requires an understanding of the manner in which enforcement affects speed choice. In this report, four experiments are described. Each experiment consisted of measuring speeds of vehicles before, during and after enforcement took place, accompanied by a control section to which no speed enforcement was applied. The four experiments differ in the number of days of enforcement. During experiments 1 and 2 considerable attrition of data occurred. Therefore, conclusions are based mainly on data obtained during experiments 3 and 4. The data base contains some 116,000 speed observations. For some experiments, the license plate record of vehicles was coded. This allows the tracing of the same vehicle day after day. Analysis leads to several conclusions. When enforcement is in place, the average speed of the traffic stream is reduced at the site of enforcement, upstream and downstream of it. At the site of speed limit enforcement, the average speed of the traffic stream is around the posted speed limit. This reduction in average speed decays (exponentially) with distance downstream. There is a distinct time halo effect. That is, the average speed is depressed from its pre-enforcement level after enforcement has been removed. For a single application of enforcement, the effect seems to vanish after 3 days. When the speed limit at a site is enforced for 5 consecutive days, the average speed remains depressed at least for 6 days after the last day of enforcement. In two of the experiments, enforcement was related to a reduction in the "width" of the speed distribution. In one experiment no such reduction occurred. When individual vehicles are traced day after day, it appears that repeated exposure to enforcement does not induce larger reductions in the speed of travel. It is also found that habitually fast and habitually

slow drivers reduced their speed somewhat more than those driving at the average traffic stream speed.

ACCESS: Available at the VDOT Research Library, periodicals section.

The Speed Review: Road Environment, Behaviour, Speed Limits, Enforcement and Crashes

CITATION: B. N. Fildes and S. J. Lee. , 1993. Pg. 158.

ABSTRACT: Not available.

ACCESS: Available to VDOT employees through Interlibrary Loan.

Speed Vs. Speed Limits in California Cities

CITATION: S. Spitz. , ITE Journal., Vol. 54, No. 5, 1984, p. 42-45.

ABSTRACT: There is a great emphasis on speed and speed control relative to traffic safety, particularly by the general public. Whether that emphasis is justified is not the objective of this article. Unfortunately much of the emphasis is on the establishment, and posting, of speed limits in the questionable assumption that there is a real control of speed inherent in the posting of speed limits.

ACCESS: Available at the VDOT Research Library, periodicals section.

Speed, Speed Limits and Accidents

CITATION: D. J. Finch, Great Britain, Dept. of Transport, et al., TRL Project Report 58, 1994. Pg. 24.

ABSTRACT: This paper reviews the available research evidence for the effect of speed and speed limits on road accidents. It is structured to reflect the evidence currently available on: (i) the effect of speed limits on mean traffic speeds and proportion of speeding drivers; (ii) the effect of speed limits on accidents; and (iii) the relationship between speed and accident risk.

ACCESS: Available to VDOT employees through Interlibrary Loan.

Synthesis Of Safety Research Related to Traffic Control and Roadway Elements

CITATION: United States, Federal Highway Administration and Offices of Research, Development, and Technology. , 1982.

ABSTRACT: Not available.

ACCESS: Available at the VDOT Research Library, Call number: TE 203 .U5 1982

Synthesis of Speed Zoning Practices

CITATION: Martin R. Parker, United States, Federal Highway Administration, et al. , 1985. Pg. 55.

ABSTRACT: Not available.

ACCESS: Available to VDOT employees through Interlibrary Loan.

Travelling (sic) Speed and the Risk of Crash Involvement. Vol. 1: Findings

CITATION: Kloeden, CN, Mclean, AJ, Moore, VM, Australia. Office of Road Safety, 1997.

ABSTRACT: The relationship between free travelling speed and the risk of involvement in a casualty crash in a 60 km/h speed limit zone was quantified using a case control study design. The 151 case vehicles were passenger cars involved in crashes in the Adelaide metropolitan area which were investigated at the scene by the NHMRC Road Accident Research Unit at Adelaide University and reconstructed using the latest computer aided crash reconstruction techniques. The 604 control vehicles were passenger cars matched to

the cases by location, direction of travel, time of day, and day of week and their speeds were measured with a laser speed gun. It was found that the risk of involvement in a casualty crash doubled with each 5 km/h increase in free travelling speed above 60 km/h. Hypothetical speed reductions applied to the case vehicles indicated large potential safety benefits from even small reductions in travelling speed, particularly on arterial roads.
ACCESS: Available to VDOT employees through Interlibrary Loan.

Vehicle Speed and Risk of a Severe Crash

CITATION: V. M. Moore, A. J. Woodward and J. Dolinis. , *Epidemiology*, Vol. 6, No. 3, May 1995, p. 258-262.

ABSTRACT: Not available

ACCESS: Available to VDOT employees through Interlibrary Loan.