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Noteworthy Speed Management Practices



A Community of Transportation Professionals



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16. Abstract Speeding contributes to over a quarter of all road trauma and is a persistent driving behavior that brings harm both to the vehicle occupants as well as other more vulnerable road users. In 2018, speeding related crashes resulted in 9,378 deaths which is a staggering 26 percent of all crash fatalities. Agencies who want to address speeding are often faced with a lack of resources in setting appropriate speeds for conditions, pushback on changing speed limits, a lack of resources for countermeasures or enforcement, and restrictions or opposition to alternate long-lasting enforcement options such as safety cameras. This report provides another avenue of information for practitioners in that it summarizes eight case studies which highlight noteworthy practices over a range of speed management issues.			
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Source: Getty Images

Background

Speeding contributes to approximately one-third of all road trauma and is a persistent driving behavior that brings harm both to the vehicle occupants as well as other more vulnerable road users. In 2018, speeding-related crashes resulted in 9,378 deaths which is a staggering 26 percent of all crash fatalities¹. Speeding is often also accompanied by distracted driving and driving under the influence. For example, between midnight and 3 a.m., 68 percent of speeding drivers involved in fatal crashes had been drinking². Some suggest that progress on the issue of speeding is limited at best.

Agencies who want to address speeding are often faced with a lack of resources in setting appropriate speeds for conditions, pushback on changing speed limits, a lack of resources for countermeasures or enforcement, and restrictions or opposition to automated enforcement.

Several recent documents have supported understanding speeding issues and offering well thought-out ways agencies can advance the state of speed management addressing enforcement, education, engineering, and cultural realities³. In addition, the National Highway Traffic Safety Administration offers a Speed Management Program course to State and local jurisdictions, the Federal Highway Administration (FHWA) offers a course on Speed Management through the National Highway Institute, and FHWA and the Institute of Transportation Engineers (ITE) have a number of Speed Management resources for practitioners⁴.

The report provides another avenue of information for practitioners in that it summarizes eight case studies which highlight noteworthy practices from across the U.S. over a range of speed management issues.

Summary of Case Studies

This document highlights eight noteworthy speed management practices across a range of areas from advocacy to countermeasures. A brief summary of the noteworthy practices is provided in the table below.

Title	Noteworthy Practice	Takeaways
Strategic Speed Management Program	The City of Austin, TX identified speeding as a key factor in 24% of fatal crashes. The area population is expected to double in 30 years and vulnerable road users are overrepresented in fatal crash statistics.	<ul style="list-style-type: none"> • Integrated Vision Zero • Developed a speed management program • Established key indicators and targeted achievement metrics • Integrated approach including enforcement
Self-Enforcing Roadways	The City of Golden, CO was faced with rebuilding a critical urban arterial where the 85 th percentile speeds were 48 mph and the posted speed limit was 35 mph. They also had to address a high number of pedestrian and bicycle crashes and selected a self-enforcing roadway design which includes roundabouts and a center median.	<ul style="list-style-type: none"> • Self-enforcing speeds through new design • Resulting lower speeds • Improved safety for vehicles, pedestrians, and bicyclists • Improved public spaces and positive impact on businesses
Setting Credible Speed Limits	New Hampshire DOT is working to promote “reasonable and safe” speeds for conditions and in a number of instances found that raising the existing speed limit was the appropriate solution.	<ul style="list-style-type: none"> • Setting credible speed limits through alignment with roadway context • Working together with enforcement • Support for local agencies
High Visibility Enforcement	The Oro Valley Police Department created a High Visibility Enforcement program designed to target intersections that have high crash rates. The program is conducted as an educational initiative for motorists in contrast to a traditional enforcement detail.	<ul style="list-style-type: none"> • Enforcement through transparency and using an “educational” initiative rather than a strict enforcement detail • Publishing future deployment dates through television, print, radio, and social media • 27% crash reduction for two urban intersections
Successful Strategies for Adoption of Safety Cameras	Adoption of safety cameras is often difficult due to legislative and public concerns. New York City used a data-driven and comprehensive approach to implement safety cameras in school zones.	<ul style="list-style-type: none"> • Use of a data-driven approach demonstrated their focus on safety • Safety cameras were one of many solutions to address the safety of pedestrians and other road users • Advocacy groups played a significant role
Targeted Reporting of Speeding-Related Crashes	Arizona updated crash form coding instructions to distinguish between speeding-related violations and those more appropriately defined as impaired.	<ul style="list-style-type: none"> • Focused on addressing crashes by identifying contributing factors • Countermeasures can be targeted to the cause of crash (speeding versus impairment) allowing better allocation of resources • Changing coding instructions provided consistency
Consistent Speed Limits for Vulnerable Road Users	Provides an overview of how six agencies set consistent speed limits to address vulnerable road users.	<ul style="list-style-type: none"> • All agencies used a data-driven approach to setting speed limits • Advocacy was a successful strategy for several agencies • Agencies addressed safety using a comprehensive approach which included other countermeasures • Consistent speed limits address driver expectancy
Network Approach to Setting Speed Limits	Discusses New Zealand’s network-wide approach to developing speed limits which assigns speed limits based on characteristics such as roadway type, alignment, roadside hazards, land use, etc.	<ul style="list-style-type: none"> • Developed network based speed limits that were evidence-based and nationally consistent • Uses a measure of safety risk which can be communicated to stakeholders and the public • Used outreach and education

1 *Speed*. Insurance Institute for Highway Safety. www.iihs.org/topics/speed. Accessed April 2020.

2 *Stop Speeding Before It Stops You*. Traffic Safety Marketing. National Highway Traffic Safety Administration. US Department of Transportation. www.trafficsafetymarketing.gov/get-materials/speed-prevention/stop-speeding-it-stops-you. Accessed April 2020.

3 *Speeding Away from Zero: Rethinking a Forgotten Traffic Safety Challenge*. Governors Highway Safety Association. January 2019.

4 *Speed Management for Safety*. Institute for Transportation Engineers. www.ite.org/technical-resources/topics/speed-management-for-safety. Accessed April 2020.

Strategic Speed Management Program

CITY OF AUSTIN, TEXAS

ISSUE	STRATEGIES	TAKEAWAYS
<ul style="list-style-type: none">➤ Speeding is the top contributing factor in fatal crashes➤ Vulnerable road users are overrepresented in severe crashes➤ Austin is experiencing significant population growth	<ul style="list-style-type: none">➤ Adopted a citywide vision zero goal➤ Identified leading causes of fatal and serious injuries➤ Defined High Injury Network➤ Engaged community➤ Established speed management program	<ul style="list-style-type: none">➤ Comprehensive speed management activities➤ Developed key indicators and targeted achievement metrics➤ Integrated effort including enforcement

Background

The City of Austin became a Vision Zero city in 2015 with the goal of zero traffic-related fatalities for this rapidly growing, diverse, and active community. Identifying a High Injury Network (HIN) exposed that the majority of fatal and serious injury crashes were occurring on collector and arterial streets. This perspective helped focus their program beyond neighborhoods and onto the more complex roadways which made up their HIN¹.

Addressing speed limits on the HIN required consideration of the Texas Transportation Code which emphasizes an 85th percentile method be used for setting speed limits with allowances for other considerations, such as crash history and high driveway density. The city determined that these considerations should be applied to roadways on the HIN based on their urban settings and operations; therefore, the city will be using USLIMITS2 extensively to support setting new speed limits on collector and arterial roadways. This moment represents a paradigm shift in how the city approaches transportation planning, codifying in city policy the preservation of human life as the paramount priority for Austin's transportation network. Citizens are asking for their transportation network to be safe, accessible, and inclusive for all members of the community. The city is determined to achieve this by promoting a culture of safety education, focusing on behaviors that cause traffic injuries and fatalities, and through integrating safe design principles across their multimodal infrastructure¹.



Interior of speeding vehicle. Source: Getty Images

In addition, the Austin Police Department is using a data-driven approach towards enforcement strategies. This includes participating in a Fatality Review Board, which meets monthly to review all fatal crashes, and then meets quarterly to review overall crash statistics and serious injury crashes².



Austin's busy multimodal roadways. Image Source: Neal Hawkins

The Challenges

Speeding – In Austin, speeding was recorded as the primary contributing factor in 24 percent of traffic crashes resulting in death from 2013 to 2017. Speeding is the leading contributor to fatal crashes with the top four being speeding, failure to yield, distraction, and driving while intoxicated. On average, more than 70 people lose their lives on Austin area streets each year, another 450 suffer life-altering injuries, and countless other crashes and near-misses are unreported.

Vulnerable Road Users – The city found that vulnerable road users make up a disproportionate share of severe crashes. The proportion of all serious injury and fatal crashes by mode are 61 percent motor vehicle, 17 percent pedestrian, 16 percent motorcycle, and 6 percent bicycle. Austin's African-American population is also overrepresented given that their 7 percent share of the population makes up 16 percent of the serious injury and fatal crashes¹.

Significant Growth – Since the last transportation plan was adopted in 1995, Austin has added more than 450,000 people and the region's population is slated to double in the next 30 years.

Developing a Speed Management Program

The objective of the Austin Transportation Department (ATD) speed management program is to improve safety and enhance the livability of Austin streets through context-appropriate speed reduction strategies². ATD developed a framework for their new Speed Management Program through several actions including a workshop with ITE and the Vision Zero Network in February 2019 and in researching best practices from national studies and other leading cities. This framework relies on objective criteria, informed by community and policy objectives, to prioritize streets with the most serious speeding problems for targeted speed mitigation strategies³. The seven key Speed Management Program elements are as follows:

1. Data and information
2. A toolkit of engineering countermeasures
3. Methods for setting speed limits
4. Holistic approach with education and enforcement
5. Coordination with other programs
6. Equity
7. Evaluation

Strategic Speed Management Program

This approach provides different tools and strategies by roadway contextual factors applied to street levels including the following:

- Street Levels 1 & 2 (neighborhood and collector streets)
- Street Levels 3 & 4 (minor and major arterial roadways)



Images of several physical engineering countermeasures used are shown above: Rain Garden Bulb Out (top left), Median and Speed Cushions (top right), and Mountable Traffic Circles (bottom). *Source: City of Austin*

Key Takeaways and Lessons Learned

- **Community Engagement** – The final measures and criteria used for the new speed management program framework included community conversations from three open houses, seven public meetings, and an online survey that received more than 1,100 responses.
- **High Injury Network** – While all streets should function with safe speeds, some streets have egregious and more persistent speeding problems than others. Given limited resources, ATD will prioritize how and where to apply speed management strategies.
- **Behavior** – Crash locations change but driver behaviors are constant. The city identified the top four behaviors contributing to serious injury and fatal crash and is focused on coordinating education and enforcement strategies to influence change. City policy seeks to advance innovative approaches toward enforcing traffic regulations and aligning penalties for traffic violations with the severity of the offense.
- **Target Speeds** – Austin’s approach to speed management begins with selecting safe target speeds for all streets based on their context. Target speed refers to the speed at which the city want cars to drive on the street. Surrounding land uses, street width, traffic volumes, and alternate transportation activity all affect the appropriate target speed. Target speed informs the design speed which is specific to geometric features or the elements of a roadway necessary to achieve the target speed. Staff uses design criteria that are at or below the target speed of a given roadway. The posted speed limits are set to help communicate and reinforce target speeds. After setting the target speed, and implementing design speeds, staff analyze operating speed, which refers to the observed speed of motorists using the roadway. Using target instead of operating speeds to influence the design speed allows the community to prioritize safety and the agency to design for safety in support of the goal to reduce the likelihood that any crash will result in a fatal or serious injury.
- **Indicators and Targets** – The city has established specific measures to gauge achievement. For example, the indicator to “Reduce serious injury and fatal crashes at locations where major capital improvement projects have been implemented” is matched with a target to “Achieve at least 40% reduction over a five-year period, on average.”
- **Enforcement** – Speeding is likely substantially underreported as a contributing factor given the difficulty in determining the actual travel speed of a vehicle after a crash has occurred. Austin seeks to promote driver adherence to posted speed limits through coordinated education campaigns, targeted enforcement, and policy reforms around use of automated enforcement tools. In addition, police officers can assign one or more contributing factors to a crash in their crash report. This information provides valuable insights into some of the human behaviors that most frequently contribute to crashes. As an example, the rise in the use of alternative transportation modes, such as electric scooters, creates a new data demand for traditional crash forms. Austin Police are working with TxDOT to consider adding “scooter” as a vehicle type on their crash form to quantify crash experience, target enforcement, and to support selection of potential safety improvements³.

1 Austin Strategic Mobility Plan. [Report]. Retrieved December 28, 2019 from <http://app.box.com/s/7aiksxmwwgymalsty0lm21wingk0slug>

2 Miesse, Eric (July 21, 2019). *Speed Management: Law Enforcement Perspective* [Presentation]. Noteworthy Speed Management Practices, ITE Annual Meeting, Austin, TX.

3 Spillar, Robert (June 24, 2019). *Speed Management Program - Draft Framework* [Memorandum]. City of Austin, TX. <http://www.austintexas.gov/edims/pio/document.cfm?id=322565>

CITY OF GOLDEN, CO

ISSUE	STRATEGIES	TAKEAWAYS
<ul style="list-style-type: none">➤ Major community corridor with speeding and safety issues➤ Safety concerns for pedestrian and bicycles➤ Businesses were concerned with the impact of road modifications especially with roundabouts	<ul style="list-style-type: none">➤ Strategic approach with specific goals for all road users➤ Self-enforcing design including roundabouts and center median	<ul style="list-style-type: none">➤ Reduced speeding➤ Improved safety for vehicles, pedestrians, and bicyclists➤ Improved public spaces and positive impact on businesses

Background

A self-enforcing road is a roadway that is planned and designed to encourage drivers to select operating speeds in harmony with the posted speed limit. Properly designed self-enforcing roadways can be effective in producing speed compliance and may contribute to less severe crash outcomes¹.

The City of Golden, Colorado is located west of Denver at the base of the Rocky Mountains. It is both a residential community as well as home to the Coors Brewery and Colorado School of Mines. South Golden Road is one of the major arterials in town with a long-standing history of being a major thoroughfare².

In 1999, plans for a new shopping center along South Golden Road elevated citizens' concerns about traffic speeds as well as pedestrian and bicycle safety along the corridor (see South Golden Road photo).

In response, the city rebuilt South Golden Road using design elements to address speeding, access, and overall safety. The self-enforcing design replaced traffic signals with roundabouts and addressed vulnerable road user safety³.



South Golden Road before improvements.
Source: Dan Hartman, City of Golden, CO.



South Golden Road after improvements.
Source: Dan Hartman, City of Golden, CO.



Golden, Colorado. Source: Getty Images

The Challenge

Prior to improvement - South Golden Road was a very wide (80 foot) street to cross and consisted of four through lanes plus a center turn lane. The corridor was capable of handling the 20,000 vehicles per day, however, the frequent points of access from business and side streets created operational and safety issues. The half-mile section of South Golden Road included two signalized intersections at Johnson Road and Ulysses Street and two stop-controlled intersections at Lunnonhaus Drive and Utah Street. The corridor was experiencing a number of issues including speeding between intersections, traffic conflicts at intersections for vehicles, pedestrians, and bicycles, and significant delays especially at Utah Street. Prior to improvement, the posted speed limit was 35 mph and the measured 85th percentile speed was 48 mph. The corridor experienced an average of four crashes per month with at least one of these involving an injury³.

Community Input - The city initiated a study that included community input to identify the most viable alternatives for improvement. The study established the following goals for South Golden Road:

- Reduce speed through the intersection
- Improve aesthetics
- Improve access for businesses and residential neighborhoods
- Improve safety
- Create a pedestrian-friendly environment

Design Process – The city considered a range of improvement options, researched roundabout design opportunities, and then gained feedback from the community through public meetings, discussions with businesses, and at public hearings with City Council. The resulting two design options were the following:

- **Option 1:** Traditional traffic signals with center medians and restricted left turns. This option faced issues as it restricted access to several businesses. In addition, the large intersections were not advantageous for pedestrian and bike crossings.
- **Option 2:** Modern roundabout section with four roundabouts, narrower roads through using center medians, and restricted left turns. This option was shown to provide improved access for both businesses and vulnerable road users.

The city's efforts led to the ultimate choice for Option 2 (roundabouts) where the design supports speed compliance even with a 25 mph speed limit in addition to enhancing access, operations, and safety for all users. The roundabouts were constructed in 1998 - 1999 and were fully operational in late 1999 (see South Golden Road after improvements photo).

Key Takeaways and Lessons Learned

Once constructed, the city was pleased to report that the new design was in fact supporting speed compliance as well as safety as noted by several metrics.

- **Reduced Vehicle Speeds** – Reduction of 85th percentile speed from 48 to 33 mph.
- **Less Delay** – Reduction in average delay—the time it takes to drive the half-mile—is lower even with a 15 mph speed reduction. The design also helped to eliminate the large queues experienced from adjacent parking lots.
- **Reduction in Crashes** – Both crash frequency and severity were lowered even with increased traffic from the new shopping center. The improvement reduced total crashes per month by 36 percent and injuries per month by 97 percent (analysis included 36 months before and 42 months after the improvement).
- **Improved Pedestrian Access** – Pedestrian safety was improved through reduced crossing times with few conflicts. Given that traffic only comes from one direction, smaller gaps are required due to reduced vehicle speeds, and the elimination of conflicts with turning traffic (see improved pedestrian access photo).
- **Bicycle Safety** – The corridor improvements did not include separate bike lanes; however, there was a significant reduction in bike related crashes going from 78 crashes over the 5 years

before to just four crashes over 3.5 years after construction.

- **Positive Impact on Businesses** – The evaluation found that the new design positively impacted the adjacent business community in terms of fostering new development, redevelopment, and increased traffic volumes⁴.
- **Enhanced Community Space** – The project provided an opportunity to aesthetically enhance the corridor through the removal of the sea of asphalt. The roundabout design provides space for fountains, statues, landscaped medians, and community art.
- **Important Educational Component** – The city developed an educational brochure that was mailed to every resident and placed in racks within businesses stressing how to navigate a roundabout for both vehicles, pedestrians, and bicyclists.

The City of Golden established corridor goals that resulted in eliminating a very wide, high-speed roadway that was experiencing safety and mobility issues. Instead of adding more traffic signals and stepping up police enforcement due to increasing vehicle speeds, they chose a roadway redesign including roundabouts and medians which was found to not only improve both operations and safety but to also provide a showcase community space which is aesthetically pleasing and has continued to accommodate all users in terms of traffic growth and safety.

1 Donnell, Eric., Kersavage, Kristin., Fontana Tierney, Lisa. *Self-Enforcing Roadways: A Guidance Report* (Report No. FHWA-HRT-17-098). McLean, VA: U.S. Department of Transportation, Federal Highway Administration, January 2018.

2 City of Golden. *South Golden Road Neighborhoods Plan*. Planning Commission Resolution No. PC15-01, 2016. <https://www.cityofgolden.net/media/SouthGoldenRoadPlan.pdf>

3 Hartman, Dan. *Roundabouts – Safety, Business Impact and Growth* [Presentation], June 2013.

4 Ariniello, A. J. *Are Roundabouts Good for Business?* In Transportation Research Board National Roundabout Conference, Vail Colorado, December 2004.

NEW HAMPSHIRE DOT

ISSUE	STRATEGIES	TAKEAWAYS
<ul style="list-style-type: none"> Legacy speed limits Setting credible speed limits Supporting local agencies 	<ul style="list-style-type: none"> Coordination between DOT and local agencies Engineering, enforcement, and educational approach Team effort 	<ul style="list-style-type: none"> Alignment of speed limits with roadway context Working together with enforcement Support for local agencies

Background

New Hampshire DOT (NHDOT) is working to promote “reasonable and safe” speed limits for conditions and in a number of instances found that raising the existing speed limit was the appropriate solution.

Establishing and managing credible speed limits impacts safety. Community safety often suffers when we reduce speed limits in reaction to an event without considering the context and operations of the roadway. Educating the public one town or one highway segment at a time takes a lot of effort and it is not always received well. However, when explaining why a speed limit should fit the character of the roadway, the NHDOT has been pleasantly surprised by the number of people that seem to “get it.” (B. Lambert, interview with the author, December 30, 2019).

The Challenge

There is a general consensus that where traffic speeds are a concern, lowering the speed limit is the perceived solution even if it is understood that the requested speed limit value is well below what is considered “reasonable and safe” for conditions.

Decades of questionable speed limit practice have resulted in a network of speed limits that are not always credible with respect to actual conditions thus contributing to a culture that treats the speed limit as a minimum, not a maximum value.

This culture is often reinforced through the actions of the courts where law enforcement is rumored to be forced to include a tolerance of as much as 10-15 mph over the posted speed limit to secure speeding convictions. (B. Lambert, letter to DOS/Chiefs of Police, November 5, 2019).

NHDOT has worked with a number of communities to address locations where posted speed limits were out of character for the conditions thus creating both safety and enforcement concerns. Table 1 shows the excessive speeds observed where posted speeds were ultimately increased.

Table 1. Spot speed study examples

Roadway	Speeds (mph)		
	Posted	85th Percentile	Difference
US Route 3 at NH Route 28	40	58	18
Wakefield NH 153	35	49	14
Wakefield NH 153	35	46	11
Wakefield NH 153	35	47	12
Hancock, US Route 202	45	55	10
Hancock, US Route 202	40	56	16
Candia, NH Route 27	35	48	13

Setting Credible Speed Limits



Curve warning signage in Wakefield, NH.

Image Source: Bill Lambert, NHDOT

When NHDOT presents this information to communities, they also show how speed limits have a relationship with other traffic control devices. For example, required passing sight distance and curve warning signage are a function of the posted speed limit and mid-block crosswalks are not allowed where posted speed limits are greater than 40 mph (see Curve warning signage photo).

NHDOT also emphasizes to communities that speed limits need to be credible for the character of the road, including horizontal and vertical geometry, lane widths, on-street parking, roadside amenities, adjacent land uses, and all roadway users.

A credible speed limit should result in voluntary compliance by the majority of drivers based on these criteria. They note that if there is a desire to have lower speeds, it can only be achieved if the character of the road is also changed.

Working with Communities

One thing that NHDOT always points out to communities is that by recommending an increase in the speed limit, they are not advocating that traffic speeds be increased beyond existing conditions, they are advocating that speed limits reflect the true nature of the segment so they are more likely to be respected as a reasonable and safe maximum.

NHDOT has reviewed—and where appropriate—increased speed limits within a number of communities based on traffic and engineering investigations. For example, within the communities of Wakefield and Candia, the posted speeds were changed from 35 to 45 mph.

Specific to Candia, records indicated that the 35 mph speed limit was established at approximately the same time as when traffic signals were installed (roughly 1967). Current practice would not consider the presence of a traffic signal as a reason for reducing the speed limit. The Bureau of Traffic conducted an engineering and traffic investigation with the MUTCD practice for determining credible speed limits being that they are set within 5 mph of the measured 85th percentile speed. NHDOT also used a web-based program produced by FHWA, USLIMITS2, to compare the results. This considered several other factors, including traffic volume, road character, and crash history to determine a recommended speed limit.

On review of the engineering and traffic investigation with enforcement, there was agreement that increasing the posted speed limit through the traffic signal controlled intersection to 45 mph would be more credible, and therefore more enforceable, than the current 35 mph speed limit. The new 45 mph posted speed required that the nearby traffic signals adjust for “dilemma zone” protection.

In Wakefield, the local police chief struggled to enforce the 35 mph speed limit. If motorists were stopped and ticketed at 45-50 mph, they were essentially penalized for traveling at a speed that was reasonable and safe for conditions; however, if they were stopped and ticketed at 60-65 mph, a speed that was considered marginally excessive, they were required to appear in court and faced a much stiffer penalty due to the fact that they were stopped at 25 mph over the posted speed limit. The DOT worked cooperatively with local police to complete an engineering and traffic investigation that supported increasing the speed limit to 45 mph.

Prior to replacing the speed limit signs, the DOT evaluated the horizontal alignment signing and passing zones based on the proposed speed limit and determined that an additional 200 horizontal alignment signs were added over approximately 12 miles, arguably providing additional safety information for the majority of drivers¹.

Key Takeaways and Lessons Learned

- **Legacy Speed Limits** – There is a lot of attention given to highway speed and related safety concerns. In some cases, agencies are faced with legacy speed limits which were lowered in reaction to a safety event without consideration of motorists' compliance, the roadway setting, and multiple years of crash history.
- **Culture** – The collective challenge is to develop a culture where the posted speed limit is recognized and respected as the maximum safe and reasonable speed for the subject highway segment, especially when there are examples of locations where that is not the case.
- **Engineering** – The effort begins with engineering as speed limits need to be credible for the character of the road, including horizontal and vertical geometry, lane widths, on-street parking, roadside amenities, and adjacent land uses. Enforcement presents a different set of challenges. Speed studies completed by the Department of Transportation routinely demonstrate that the majority of motorists operate at speeds in excess of the posted speed limit. Education may be the broadest category and the least defined as there are a number of areas where education can be applied to address speed management.
- **Team Effort** – NHDOT recommends that effective speed management be a joint effort between the State DOT, Office of Highway Safety, Division of Motor Vehicles and Public Safety, and the New Hampshire Chiefs of Police with a focus on engineering, enforcement, and especially education. There may be additional highway safety advocates that could also be effective partners in this effort, many of whom are identified as stakeholders in the state Strategic Highway Safety Plan.

1 Lambert, William. *Speed Limits and Setting State Speed Zones: Selectmen's Meeting* [Presentation]. Candia, NH, November 14, 2016.

CITY OF ORO VALLEY, ARIZONA

ISSUE	STRATEGIES	TAKEAWAYS
<ul style="list-style-type: none"> ➤ High crash urban intersections ➤ Repeated distracted driver behavior leading to avoidable crashes ➤ Negative public view of enforcement actions 	<ul style="list-style-type: none"> ➤ High visibility enforcement advertised in advance ➤ Educational messaging with every stop ➤ Constant dialogue with media and citizens 	<ul style="list-style-type: none"> ➤ 27% crash reduction for two urban intersections ➤ Media partnership ➤ Public transparency ➤ Significant educational awareness

Background

The Oro Valley Police Department (OVPD) has created a data-driven initiative to improve traffic safety in the town of Oro Valley, Arizona. The program is called “HiVE” or High Visibility Enforcement, designed to target intersections that have high crash rates. HiVE is described as an “educational” initiative rather than a strict enforcement detail with the following two primary components:

1. OVPD publishes HiVE’s future deployment dates and times to television, print, radio, and social media. This is to alert the community about the increased visibility of law enforcement and to improve communications between the police and citizens. Partnering with local media is a key component of the HiVE.
2. During scheduled deployments, OVPD places six motorcycle officers in and around the targeted intersections. Motorcycle officers actively enforce traffic violations during peak travel times. The graphic below shows the HiVE logo developed for communications and program identification.

OVPD reminds motorists not to engage in distracted driving or other driving behaviors that contribute to avoidable injury or fatal vehicle crashes.

The Challenge

When injury crashes reached an all-time high in Oro Valley, the Police Department held its first series of HiVE deployments for its motorcycle officers with the goal of increasing awareness and safety. At that time, two intersections, see Table 1 accounted for roughly 20 percent of all injury-related crashes so the department sought to change driving behavior by implementing the following¹:

- Raising awareness by bringing attention to the problem
- Having law enforcement present and highly visible to the public



HiVE enforcement using motorcycles.
Image Source: ORO Valley Police



HiVE logo used for communications.
Source: Oro Valley Police

- Demonstrating intent to educate and train versus holding a punitive “ticket writing campaign”
- Showing transparency by warning the public about deployments and publishing the police deployment actions

Enforcement Actions

Over a 3-year period, OVPD conducted 142 HiVE deployments resulting in 4,005 traffic stops. Given the focus on education, this resulted in only 1 in 5 drivers receiving a moving violation citation. OVPD made a concerted effort to be transparent in the results of each deployment and in providing a 3-year analysis of crashes since the program began.

Key Takeaways and Lessons Learned

OVPD is working hard to show transparency to the public and to work with media outlets on the HiVE program. However, since this is a continuous program, it takes repeated efforts to ensure that messaging is consistent and that it accurately reflects the program’s intent. Several lessons learned include the following:

Diligent Messaging – Do not let the media change the message. The police department has to be diligent in avoiding negative messaging such as:

- “Oro Valley police officers working speed zones.”
- “Speed-trap at Oracle and Magee today.”
- “OVPD looking for speeders this morning.”

When these messages appear OVPD works with the media outlets to make sure citizens are informed well ahead of any deployments and to stress the education components, (see example public message months in advance of deployment²).

The Oro Valley Police Department (OVPD) will be conducting its “High Visibility Enforcement” (HiVE) efforts during the months of April and May on Oracle Road and Magee. OVPD hopes to increase awareness and reduce collisions related to speed, inattention, following too close, and failing to yield to other drivers.

OVPD will deploy motorcycle officers on the following dates:

Tuesday, April 16, 2019	7:00 a.m. to 10:00 a.m.
Thursday, May 2, 2019	4:00 p.m. to 7:00 p.m.
Tuesday, May 14, 2019	7:00 a.m. to 10:00 a.m. (distracted driving deployment)
Wednesday, May 29, 2019	7:00 a.m. to 10:00 a.m.

Motorists are asked to be aware of the additional enforcement activity and drive safely. If you have any questions about this release or traffic related issues in Oro Valley, please contact (Officer Name, Phone Number).

Example public message in advance of enforcement actions.

Data Driven – OVPD conducted a study, measuring crashes before and during the HiVE program as shown in Table 1. On average, these two signalized intersections experienced 25 fewer crashes each year. A comparison of injury related crashes showed a 42 percent reduction at Oracle Road and Suffolk Drive and 15 percent reduction at Oracle Road and Magee Road.

Long Term Focus – OVPD continues to operate the HiVE program and believe that it is making a difference increasing awareness and reducing avoidable crashes related to speed, inattention, following too close, and failing to yield to other drivers.

Table 1. Crash frequency comparison before and during HiVE

Intersection	Pre-HiVE (2010-2012)	HiVE (2013-2015)	Crash Reduction
Oracle Rd. at Suffolk Dr.	124	72	-42%
Oracle Rd. at Magee Rd.	144	123	-15%
Intersections Combined	268	195	-27%

1 Sharp, Daniel. *High Visibility Enforcement* [Presentation]. Noteworthy Speed Management Practices webinar. ITE, June 13, 2019.

2 *High Visibility Enforcement (HiVE) April and May Deployments*, Town of Oro Valley, 10 April 10, 2019. <https://www.orovalleyaz.gov/Government/News/High-Visibility-Enforcement-HiVE-August-Deployment>

NEW YORK CITY, NEW YORK

ISSUE	STRATEGIES	TAKEAWAYS
<ul style="list-style-type: none"> ➤ Adoption of safety cameras is often difficult due to legislative and public concerns 	<ul style="list-style-type: none"> ➤ Data-driven approach ➤ Advocacy ➤ Comprehensive approach 	<ul style="list-style-type: none"> ➤ 63% decrease in speed ➤ 55% decrease in fatalities ➤ 60% decrease in violations



Safety Camera. Source: Getty Images

Background

Speed is a persistent traffic safety issue; particularly in areas with high pedestrian and/or bike users. One effective enforcement strategy that has been utilized is Automated Speed Enforcement (ASE), more recently termed “safety cameras.”

However, agencies have often struggled with implementing safety cameras due to citizen concerns, legislative resistance, speeding not being perceived as a safety issue, and privacy issues¹. Implementation has also battled the perception that automated enforcement is a “money grab.”

Due to the high number of pedestrians and bicyclists, New York City (NYC) had a particular interest in the use of safety cameras. In 2013, pedestrian and bicyclist crashes accounted for 28 percent of all police reported crashes but made up 65 percent of fatalities in New York City. Additionally, unsafe speed was noted as a contributing factor in 7 percent of all crashes but accounted for 25 percent of fatal crashes².

New York City faced typical oppositions to safety cameras such as legislative restrictions and citizen resistance. They successfully instituted a safety camera program in school zones through several strategies.

Strategies for Success

Data-Driven Approach

The first factor for success in NYC’s adoption of safety cameras and addressing crashes in general was the use of a data-driven approach. For instance, the New York Police Department (NYPD) combats traffic crashes by identifying traffic violations that have the greatest impact on crash severity and then focuses on changing the driver behaviors that contribute to these crashes.

Under Vision Zero, crash data were utilized to identify the following six violations that had the greatest impact on safety³:

- speeding
- failure to yield to a pedestrian
- red light running
- improper turning
- cell phone use
- disobeying signs

Corridors for improvements were identified based on where pedestrian deaths and severe injuries were the most concentrated⁴ and in some cases challenged conventional wisdom about what streets had safety issues. For safety cameras, sites were selected by ranking school zones according to the number of traffic injuries during school hours on school days. Site selection also included the use of speed data, roadway geometry, engineering judgment, and areas identified within Pedestrian Safety Action Plans⁵.

Advocacy and Outreach

Another factor for success was the active participation of advocacy and community organizations. Groups such as *Transportation Alternatives* and *Families for Safe Streets* helped elevate road safety as a priority of the city. Advocacy included events, petitions, use of technical statistics along with personal stories, and even working with faith-based organizations within communities^{5,6}.

Successful Strategies for Adoption of Safety Cameras

Another example was a joint venture between the NYPD and NYDOT to conduct on-street outreach. The Vision Zero Street Teams identify corridors with a significant crash history and pinpoint the types of crashes that occur. Next, the NYPD and NYDOT staff distribute fliers to pedestrians and drivers with safety tips that correspond to the most serious crashes along that corridor. The NYPD also targets enforcement resources to address the violations related to identified crash types³.

Other advocacy and outreach strategies include ads on television, radio, bus stops, and billboards to educate aggressive drivers about the consequences of negative behavior. Results have shown 72 percent of drivers recall having seen the media campaign⁵.

Advocacy was also critical in the initial implementation of the safety cameras. Later when NYC's authority to use safety cameras was set to expire in July 2018 after the state legislature failed to reach a compromise on extension, advocacy groups pushed for a special session to vote on the proposed bill. Advocacy groups directly contacted legislators to encourage them to vote⁷. The bill was ultimately passed.

Comprehensive Approach

Another important factor for success was the use of a comprehensive approach. Safety cameras were one piece of a comprehensive strategy⁴ to address pedestrian and bicyclist safety. For instance, NYC was the first to implement a Vision Zero policy. This included developing a pedestrian safety action plan for each of the City's five boroughs. Safety engineering projects were completed in areas with high rates of severe pedestrian crashes. NYC was able to implement countermeasures at almost 90 percent of priority corridors and intersections and 461 safety engineering projects have been completed⁴.

Engineering strategies have included the installation of Leading Pedestrian Interval (LPI) which gives crossing pedestrians a "head start" before vehicles begin to turn with around 2951 LPIs installed⁴. Left turn speed management was also instituted based on findings of a study of the interaction between left turn speeds and pedestrian safety and included the use of paint, flexible delineators, and rubber speed bumps. Other engineering countermeasures include bus boarding islands, speed cushions, dedicated bike lanes, roadway redesign, raised crosswalks, rubber pedestrian refuge islands offset crossings, and improved lighting^{3,4}.

Enforcement has also played a role. In addition to playing a key role in Vision Zero, NYPD assesses speeding conditions in conjunction with the NYDOT and identifies solutions including increased enforcement.

Implementation of Safety Cameras

New York conducted a safety camera pilot program in 20 school zones starting in 2013, using fixed and mobile cameras. A data-driven approach was used to determine locations. Cameras were placed on streets within a quarter mile of selected schools. The system was specifically targeted to school safety. The cameras operate 1 hour before and 1 hour after school activities and the speed threshold was set at 10 mph over the speed limit. Additionally, data collected from the program cannot be used for unrelated purposes.

The program was expanded to 140 school speed zones in 2014⁵ and will further expand to be the largest urban network of safety cameras in the US (2,000 cameras in 750 areas within a quarter mile of a school)⁸. More recently hours of operation were expanded⁹.

NYC use of safety cameras has shown significant success. A 63 percent decrease in speed in school zones where safety cameras were present has been reported. Additionally, a 15 percent decrease in crashes, a 17 percent reduction in injuries, and a 55 percent reduction in fatalities have occurred in school zones with safety cameras⁵. By 2018, the daily rate of camera violations had decreased by 60 percent and only 19 percent of violations are repeat offenders³.

NYC has also reported success in addressing pedestrian safety overall. From 2008 to 2017 pedestrian fatalities in urban areas nationally increased by around 46 percent. Over that same time period, pedestrian fatalities in NYC dropped 31 percent. Additionally, a 36 percent decline in pedestrian fatalities has occurred at Vision Zero priority locations⁴.

Key Takeaways and Lessons Learned

Data driven – Successful adoption of safety cameras was due to NYC being able to respond to the key concerns about them. One strategy was use of a data-driven approach which highlighted the crash problem and focused on areas where safety issues existed. Camera locations were also selected using a data driven strategy.

Comprehensive strategy – NYC also used a comprehensive approach to address safety from a broad perspective which included utilizing a number of other countermeasures. This demonstrated safety cameras were just one piece of a larger strategy to address safety. Additionally, the use of a comprehensive approach addressed the problem from multiple angles rather than relying on one solution.

Successful Strategies for Adoption of Safety Cameras



School Children crossing a street in NYC. Source: Getty Images

Advocacy – Another key strategy was extensive outreach and advocacy activities. Educating the public helps them understand the problem and get buy-in. Citizen advocates were key since they demonstrated to both legislators and the public that speeding is a concern.

Continued vigilance – Another lesson learned is that continued vigilance is needed. After initial implementation in 2013, NYC’s authority to use safety cameras was set to expire in July 2018 after the state legislature failed to reach a compromise on extension. This required additional effort by the city and advocacy groups to ensure the program stayed active and was ultimately expanded.

Safety camera thresholds – Although not specific to the NYC case study, a general takeaway from the application of safety cameras is the use of thresholds. Most agencies set the system to activate at some threshold over the posted speed limit. This is generally 5 or 10 mph over. In the NYC program, a 10 mph threshold was utilized. Selecting a threshold over the speed limit is a typical approach, since most agencies do not want to ticket drivers right at the speed limit. It also allays concerns that the system is unfairly ticketing drivers and being used for revenue. However, once drivers become aware of the threshold, in reality, the target speed for drivers is likely to be the threshold limit rather than the actual speed limit. As a result, agencies should consider what the target speed is in selecting a threshold.

- 1 Miller, Richard, and J. Scott Osberg, Richard Retting, McKenzie Ballou, Randolph Atkins. *System Analysis of Automated Speed Enforcement Implementation*. National Highway Traffic Safety Administration Office of Behavioral Safety Research. DOT HS 812 257. April 2016.
- 2 *Summary of New York City Motor Vehicle Crashes*, New York State Department of Motor Vehicle Crashes. 2013. <https://dmv.ny.gov/statistic/2013nyc.pdf>
- 3 Vision Zero NYC. *Vision Zero Year 5 Report*. March 2019. www1.nyc.gov/assets/visionzero/downloads/pdf/vision-zero-year-5-report.pdf.
- 4 Vision Zero NYC (2019a). *Borough Pedestrian Safety Action Plans Vision Zero Update*. www1.nyc.gov/html/dot/downloads/pdf/vz-2019-update-city-hall.pdf
- 5 *Automated Speed Enforcement Program Report 2014-2017*. New York City DOT. June 2018. www.nyc.gov/html/dot/downloads/pdf/speed-camera-report-june2018.pdf
- 6 Transportation Alternatives. www.transalt.org/citywide. Accessed December 2019.
- 7 Colon, Dave. “As speed camera deadline looms, advocates turn up heat on New York pols.” *Curbed*, New York. July 20, 2018. ny.curbed.com/2018/7/20/17596566/nyc-speed-camera-legislation-transit-advocates
- 8 Hu, Winnie. “2,000 Cameras Will Be Watching How You Drive in New York City.” *The New York Times*. July 1, 2019. www.nytimes.com/2019/07/01/nyregion/speeding-cameras-nyc.html
- 9 Plitt, Amy. “NYC’s expanded speed camera program to take effect July 11.” *Curbed*, New York. May 24, 2019. ny.curbed.com/2019/5/24/18638686/new-york-speed-camera-program-vision-zero

Targeted Reporting of Speeding-Related Crashes

ARIZONA DOT

ISSUE	STRATEGIES	TAKEAWAYS
<ul style="list-style-type: none">➤ Coding of Speed Too Fast for Conditions on crash forms may include impaired/weather related crashes➤ Situations exist where no speed is safe and may be better addressed by countermeasures other than those targeted to speeding	<ul style="list-style-type: none">➤ Data-driven approach➤ Acknowledged variability in coding crash forms➤ Updated coding instructions to provide more concrete guidance	<ul style="list-style-type: none">➤ Speeding-related locations can be identified➤ Countermeasures can be targeted to the cause of crash (speeding versus impairment) allowing better allocation of resources➤ More consistency in coding

Background

Speed Too Fast for Conditions (STFC) is a field provided on most agency crash forms. The intent is to label scenarios where a driver was traveling below the posted speed limit but the speed at the time of the crash was not appropriate for prevailing environmental conditions and was a contributor to the crash. However, significant variations exist in interpreting the definition of the environment when coding crash forms. As a result, it is often left to the attending officer's interpretation.

The Problem

In Arizona, historically STFC was defined as "Traveling at a speed that was unsafe for the road, weather, traffic or other environmental conditions at the time." In many cases, an officer would include the behavioral or human environment and could interpret driver incapacity (Driving Under the Influence (DUI), impaired, distracted, fatigued) as a condition that would warrant traveling at a lower speed regardless of actual roadway conditions. For instance, a drunk driver on dry daytime roads traveling under the speed limit could be coded as *Speed Too Fast for Conditions* if the officer felt the state of impairment warranted a lower speed. Depending on the attending officer's interpretation, there may be scenarios in which no speed is safe for conditions¹.

While it is important to address these crashes, solutions should focus on the root cause of the crash when feasible. Countermeasures geared specifically towards speeding, such as Dynamic Speed Feedback Signs (DSFS), lane narrowing, or use of landscaping, may be less effective when the driver is impaired. Rather areas with a high number of impaired crashes should be targeted with countermeasures that address the impairment, such as enforcement.



Speeding Vehicle. Source: Getty Images

Around one-third of Arizona fatal crashes were coded as speeding related between 2012 and 2016 and over 53 percent of those fatal crashes were also coded as impaired but below the posted speed limit^{1,2,3}.

Correcting the interpretation of behavioral conditions would have removed crashes such as DUI (53 percent), distracted (4 percent), sleeping or fatigued (3 percent) that were not marked as exceeding the posted limit and where no speed would have otherwise been reasonable. This would have reduced the number of crashes during this period that were coded as speeding related (Speed exceeded the limit and STFC) from over 33 percent down to approximately 11 percent of total fatalities.

As a result, Arizona made the decision to address the issue by providing clear instructions and training that would remove DUI and other impaired crashes from the category of STFC. In this manner locations with actual speeding-related issues can be better targeted¹.

Targeted Reporting of Speeding-Related Crashes



Officer uses driver information to complete a traffic ticket. Source: Getty Images

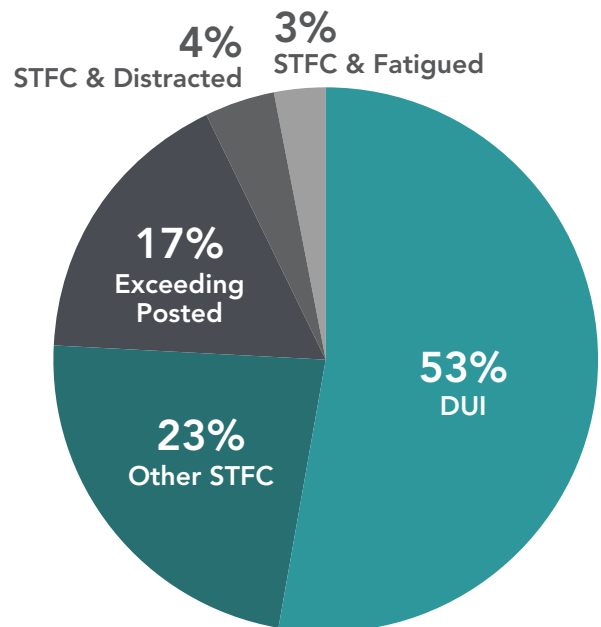
Redefining "Speeding-Related"

Arizona adapted coding instructions for their crash form for the field *Speed Too Fast for Conditions*. The new instructions define STFC as the following:

"Traveling at a speed that was unsafe for the road, weather, traffic or other environmental conditions at the time. This does not include behavioral conditions such as distraction, impairment, fatigue, falling asleep or other violations that would otherwise make any speed unreasonable".

Based on the new instructions, crashes where impairment, fatigue, or other behavioral issues are the main contributor are coded as impairment. Crashes with an impaired driver can still be coded "Exceeding the Posted Speed Limit" when both conditions are met¹.

In the future, officers and agencies will be able to use the data to identify locations with a high number of speeding-related crashes which actually represent a speeding problem. In this manner, automated enforcement and other speeding-related countermeasures can be applied and are expected to be more effective. For instance, ADOT is evaluating speed limit decals on State Route 347 where a review of crash reports indicated drivers were cited as STFC in more than half of crashes along this section of roadway⁴.



Fatal Crashes in Arizona.

Data Source: King, 2018; ADOT, 2016

Percentage of fatal crashes coded as STFC decreased by more than 1/3 after changing the crash form instructions.

Key Takeaways and Lessons Learned

Addressing crash contributing factors to target countermeasures

– Although both *Speed Too Fast for Conditions* and *Exceeded the Posted Speed Limit* represent important safety issues, in most cases they represent two vastly different situations. In many cases, STFCs are either impaired drivers or weather related situations. Since neither scenario is usually tied to a specific roadway section, it is difficult to target site-based countermeasures. More importantly, many speed management countermeasures may not be suited to the problem. For instance, DSFS or safety cameras are set to activate at speed thresholds set for dry conditions. As a result, an impaired driver involved in a crash or a driver traveling too fast for weather conditions could be coded by the attending office as STFC yet be traveling below the thresholds set to activate DSFS or safety cameras. This may lead to utilizing countermeasures which would have no impact on these types of crashes. Other speed management countermeasures, such as lane narrowing or pavement markings, may similarly not be well suited in these situations if drivers are cognitively impaired.

Arizona came to this realization as they considered how speeding-related crashes could be addressed. As a result, they found a solution that allows them to focus on the root cause of the crash when feasible. The ability to parse crashes by situations where speeding-related countermeasures are effective versus situations, such as impaired driving, where countermeasures such as targeted enforcement are effective is important because it allows agencies to better focus resources.

Consistency in coding – Arizona also made the decision to update the crash form rather than relying solely on additional training for officers in how to better code STFC. This was successful since, even with training, significant variation can exist in how officers interpret fields on a crash form. As a result, the updated crash form provides more consistency.

- 1 King, Jeff. *Speeding Related Collision Data: It May Not Be Telling You What You Think* Presentation at the 2018 FHWA Safety Discipline Seminar.
- 2 ADOT. *2015 Motor Vehicle Crash Facts for the State of Arizona* Arizona Department of Transportation, Transportation Systems Management and Operations. June 2016. azdot.gov/sites/default/files/2018/10/2015-crash-facts.pdf
- 3 ADOT. *2018 Motor Vehicle Crash Facts for the State of Arizona*. Arizona Department of Transportation, Transportation Systems Management and Operations. June 2019.
- 4 Giulliano, Tina. *ADOT tests speed limit decals on highway pavement*. AZFamily. Sept 20, 2019. https://www.azfamily.com/traffic/adot-tests-speed-limit-decals-on-highway-pavement/article_eccf35c6-dbfd-11e9-b81f-9b64df3e3fe2.html

Examples from Various Agencies

ISSUE	STRATEGIES	TAKEAWAYS
<ul style="list-style-type: none"> ➤ Ped/bike crashes are a particular safety issue for many cities ➤ Inconsistent speed limits violate driver expectancy 	<ul style="list-style-type: none"> ➤ Data-driven approach which made a case for how lower speed limits would impact vulnerable road users ➤ Advocacy played a key role ➤ Most agencies also addressed speed limits as part of a comprehensive plan that included other speed management solutions 	<ul style="list-style-type: none"> ➤ Comprehensive approach demonstrated reductions were part of larger strategy ➤ Consistent speeds address driver expectancy ➤ Outreach activities were also used

Background

Speed limits are sometimes inconsistent within a jurisdiction for similar roadways. In some cases, this is because speed limits are applied to roadway sections based on characteristics which may not be obvious to the driver. For instance, speed limits on one roadway classified as a collector are set at 35 mph while another collector with similar characteristics is set at 30 mph due to a higher crash history. Since both appear similar to drivers, they are likely to apply the speed they believe is the most suitable to both roadways.

In other cases, as noted by “Methods and Practices for Setting Speed Limits: An Informational Report,” varying levels of experience, use of different procedures, as well as subjective procedures for determining speed limits can lead to inconsistencies in setting speed limits within or between jurisdictions¹. In either case, inconsistency violates driver expectancy and can lead to drivers disregarding speed limits.

Setting Consistent Speed Limits

Consistent speed limits on roadways with similar functions and characteristics assist drivers in developing good driving habits. As a result, drivers understand what is expected when they enter a particular area². Additionally, consistent and credible speed limits can be more easily enforced.

Several agencies have instituted consistent speed limits across a particular type of roadway as described in the following examples. The idea is to provide drivers with a consistent message. In most of the cases highlighted, speed limits were used to address vulnerable road users due to high pedestrian and bicyclist fatalities. As a result, the use of consistent speed limits across a jurisdiction usually resulted in lower speed limits. Although not highlighted in these noteworthy practices, the use of consistent speed limits can include redefining speed limit zone lengths and increasing speed limits along sections where a lower speed was not warranted.



Speed Limit Sign Source: Getty Images

Examples of Successful Applications

The following summarizes examples of agencies that successfully set consistent speed limits. In most cases, changes were made to address pedestrian and bicyclist safety.

Charlotte, North Carolina

Between 2013 and 2017, while pedestrian and bicycling crashes accounted for less than 3 percent of crashes they made up 44 percent of fatalities³ in Charlotte. In response to concerns about traffic speed and pedestrian safety, the City of Charlotte developed a neighborhood traffic management program which is a joint program between the city and residents⁴ as well as adopted the city’s Vision Zero plan.

Consistent Speed Limits for Vulnerable Road Users



Biker along busy roadway. *Source: Getty Images*

As part of those action plans, the city changed the speed limits on streets classified as “local” from 35 mph to 25 mph in November of 2018⁵. The city also adopted other pedestrian-centric measures such as additional sidewalk construction, sidewalk improvements, and upgrades to pedestrian crossings. The Vision Zero action items were a result of a data-driven approach that included engaging with the community, enforcement, and education.

Portland, Oregon

Almost half (47 percent) of fatal crashes in Portland are the result of speeding. Pedestrians account for 31 percent and bicyclists account for 6 percent of motor vehicle fatalities. Further, 57 percent of deadly crashes occur on 8 percent of Portland Streets⁶.

Portland adopted a Vision Zero Action Plan in 2015 to reduce fatal and serious injuries. The plan developed a High Crash Network which identified high crash locations for people walking, biking, and driving. The plan also reviewed how speed limits were set including use of the 85th percentile speed. Their approach shifted away from setting speed limits solely based on drivers to a balanced approach that incorporates all road users. Part of this plan was to achieve speed consistency on local residential streets⁷. State law was successfully amended in 2017 to allow speed limits to be reduced from 25 to 20 mph on all of 3,000 miles of local residential streets. The bill that passed in 2017 was specifically for Portland. More recent legislation may allow the law to expand this option to cities across Oregon⁸. Portland used the marketing theme “20 is plenty” and conducted activities such as distributing yard signs to remind residents⁷. The Vision Zero Action Plan incorporated a range of other activities^{9,10}.

Seattle, Washington

The City of Seattle, Washington experienced around 20 fatalities and 150 serious injury crashes annually. Pedestrian and bicyclist crashes made up 5 percent of all crashes but almost 50 percent of fatalities. Additionally, 9 out of 10 bicycle/pedestrian crashes resulted in injury. Speeding contributed to 25 percent of fatalities citywide and 42 percent of downtown traffic fatalities.

In order to address these and other traffic safety issues, Seattle funded Vision Zero through a 9- year transportation levy. As part of this initiative, Washington State passed legislation in 2013 allowing localities to lower speed limits to 20 mph. As a result, Seattle set consistent speed limits on non-arterials at 20 mph. Additionally, 200 miles of arterial streets were re-signed from 30 mph to 25 mph in 2016¹¹.

Seattle also utilized additional speed management strategies such as lane narrowing, speed cushions, and removing the center line. The process also included focusing on safety corridors with six completed and seven scheduled for 2019. Other safety corridor improvements include use of Leading Pedestrian Intervals (LPI), addition of protected bike lanes, use of more durable and visible pavement markings, lane narrowing, and speed cushions¹². An LPI starts the pedestrian “walk” signal several seconds before the vehicle green phase changes so pedestrians are more visible to drivers making conflicting movements.

Although not solely attributed to changes in the speed limit, fatalities decreased by 26 percent between 2017 and 2018¹³.

Consistent Speed Limits for Vulnerable Road Users



Pedestrians in NYC. Source: Getty Images

New York City, New York

In 2014, pedestrian and bicyclist crashes accounted for 27 percent of all police reported crashes but made up 62 percent of fatalities and 34 percent of injury crashes in New York City (NYC). Additionally, unsafe speed was noted as a contributing factor in 7 percent of all crashes but accounted for 23 percent of fatal crashes¹⁴.

The use of consistent city-wide speed limits was one strategy that NYC felt would be effective given the high pedestrian and bicycle volumes present. However, while State law allowed the city to reduce speed limits on a case by case basis, citywide speed limits could not be lower than 30 mph¹⁵.

NYC used a data driven and comprehensive approach to convince the legislature to pass a measure allowing a default 25 mph speed limit based on overwhelming evidence about pedestrian risk¹⁵. In particular, they used evidence to convince the legislature that a pedestrian's risk of dying is twice as high when struck at 30 mph as it is for being struck by a vehicle at 25 mph. According to Repogle¹⁵, Deputy Commissioner for Policy at the New York City Department of Transportation, they also used the argument that lowering New York City's speed limit was the most logical evidence based safety intervention they could take to save lives. Similar to their activities for safety cameras, the strategy was also part of the NYC Vision

Zero initiative. The default city-wide speed limit was lowered from 30 to 25 MPH in 2014. This included all local streets and most arterials, around 90 percent of the streets in New York's five boroughs. The 30 mph speed limit is still allowed on high traffic arterials¹⁶.

An important part of the process was to ensure the change was communicated to the public. Over 4,700 new 25 mph speed limit signs were posted. In some cases, the city re-evaluated and resigned streets that had speed limits higher than 25. Additionally, speed limit maps were created for citizens to check speed limits along a particular roadway if there were any uncertainties¹⁷.

New York City also implemented other speed management strategies such as eliminating the number of turning movements entering complicated intersections, extending medians at intersections, integrating LPI, better lane designation, adding pedestrian signals, adding crosswalks or pedestrian safety islands, adding speed bumps, addition of bike lanes and paths, and increasing street lighting¹⁸.

Queens Boulevard, which had a higher than average pedestrian fatality rate, had a 3-year period without a single pedestrian or bicyclist fatality after the installation of the 25 mph speed limit and safety cameras¹⁵.



Pedestrians in Boston. *Source: Getty Images*

Boston, Massachusetts

Pedestrian and bicycle crashes accounted for 71 percent of fatal and 30 percent of injury crashes in 2016 in Boston¹⁹. Efforts to change the default speed limit were also part of the city's Vision Zero program. A State law instituting a 25 mph default speed limit was signed in January 2017 through a combined effort of the Boston City Council, Governor, Massachusetts DOT, and the Massachusetts State Legislature²⁰. The default speed limit previously was 30 mph. In conjunction with the effort, they placed 25 mph signs at entrance points and other strategic locations to educate drivers about the change.

Overall fatalities in Boston dropped from 21 in 2016 to 10 in 2018. Pedestrian and bike fatalities decreased from 15 to 7 over the same time period. Pedestrian injury crashes dropped from 893 in 2016 to 680 in 2018, although bicycle crashes were reasonably unchanged (422 to 425)¹⁹.

80% of respondents in the City of Calgary survey felt it was easier to remember a single speed limit and consistent times.

Other Examples

The City of Calgary, Canada has used both playground and school zones to protect vulnerable road users. Efforts to achieve compliance with speed limits in these areas were initially approached using education and enforcement followed by traffic control enhancements and speed management countermeasures. Prior to 2014, school zones and playgrounds in Calgary had different hours and speed limits. A commonly noted concern was uncertainty about the type of zone a driver was entering along with effective hours.

Consistent Speed Limits for Vulnerable Road Users



Playground. Source: Getty Images

School zone and playground zone speed limits were changed by March 2016 to one consistent time (7:30 am to 9:00 pm) and speed limit (30 km/h) which is effective year-round,^{21, 22, 23}.

A study by the City of Calgary and the University of Calgary collected data from 11 playgrounds and 18 school zones and found average speeds decreased from 35.9 to 30.1 km/h. Additionally, the study found the collision rate decreased from 78 percent while injury collisions within playground zones decreased by 33 percent²¹.

Key Takeaways and Lessons Learned

Data-driven approach – All of the agencies highlighted used a data-driven approach to set consistent speed limits which usually resulted in lower speed limits. Agencies were able to demonstrate a significant safety issue for vulnerable road users by underscoring the number of fatalities and injuries sustained by pedestrians and bicyclists. For instance, NYC used evidence about pedestrian risk to convince their legislature to make the change. Portland developed a High Crash Network and reviewed how speed limits were set. Additionally, most of them demonstrated the impact that speed has on the ability of vulnerable road users to survive a crash when educating decision makers and the public.

Advocacy – Advocacy efforts are undertaken by concerned citizens. Advocacy groups are able to reach out and educate their peers to demonstrate the safety issues behind proposed changes on a more personal level than agencies may be able to achieve. Additionally, many advocacy efforts involved groups contacting their legislators which demonstrates widespread acknowledgement of the problem.

Outreach – Most of the agencies spent considerable effort in educating the public about the need for changes and after consistent speed limits were adopted, they ensured the public was aware of the change. This included posting a large number of new speed limit signs, developing speed limit maps to show where changes had occurred, and using marketing campaigns.

Comprehensive approach – Another strategy for success was that in almost all of the cases, agencies also implemented other speed management countermeasures rather than just relying on changing the speed limit. In most cases, the speed limit reduction was part of their Vision Zero plan and was part of a multi-pronged approach to the problem. This helps make a case to the public that the changes are part of a larger plan to address safety.



Adult and child riding in a bike lane. Source: Getty Images

Consistent Speed Limits for Vulnerable Road Users

Addressing driver expectancy – Although most of the agencies reduced the speed limit to address safety concerns, the use of consistent speed limits also provides drivers with a consistent message and expectations. For instance, as noted in the Calgary example, instituting the same speed limits and effective hours for school zones and playgrounds presented

drivers with a consistent message. Consistent speed limits on roadways with similar functions and characteristics assist drivers in developing good driving habits. As a result, drivers understand what is expected when they enter a particular area (WHO, 2008). Additionally, consistent and credible speed limits can be more easily enforced.

- 1 Forbes, Gerald J., Teresa Gardner, Hugh McGee, and Raghavan Srinivasan. *Methods and Practices for Setting Speed Limits: An Informational Report*. Federal Highway Administration, Office of Safety. FHWA-SA-12-004. April 2012. safety.fhwa.dot.gov/speedmgt/ref_mats/fhwasa12004
- 2 *Speed Management: A Road Safety Manual for Decision-Makers and Practitioners*. World Bank, the FIA Foundation and GRSP. February 2008. apps.who.int/iris/bitstream/handle/10665/43915/9782940395040_eng.pdf?sequence=1
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NEW ZEALAND TRANSPORT AGENCY

ISSUE	STRATEGIES	TAKEAWAYS
<ul style="list-style-type: none">➤ Speed limits can be inconsistent➤ In some cases, speed limits did not consider the safety aspect of speed	<ul style="list-style-type: none">➤ Developed network based speed limits that were evidence based and nationally consistent➤ Used outreach and education	<ul style="list-style-type: none">➤ Used a measure of safety risk which can be communicated to stakeholders and the public➤ Data-driven approach provides clarity in selecting speed limits

Background

Speeding is a contributing factor in almost one-third of fatalities and around 20 percent of serious injury crashes in New Zealand^{1,2}. Additionally, roadway fatalities increased from 253 in 2013 to 373 in 2018 while serious injuries increased from 2,020 to 2,836³.

The Problem

Historically speed limits in New Zealand were based on the number of access points and surrounding land use for a particular rather than considering roadway characteristics or safety performance.

Developing Consistent and Evidence Based Speed Limits

To address concerns about speeding-related crashes, the New Zealand Transport agency developed the *NZ Speed Management Guide* which provides speed limits that are nationally consistent and evidence based^{2,4}. The resulting guide is an evidence-based, network-wide approach that recommends speed limits that are safe and appropriate based on road function, design, safety, and land use.

The objectives of the guide are the following⁵:

- Make the roadway system more forgiving of human error
- Reduce force in crashes to a level that is tolerable for the human body to survive without serious injury
- Minimize unsafe road user behavior

Speeding contributes to 1/3 of fatalities in New Zealand and is noted as being on par with drunk driving as their biggest safety problem².

A recommended speed limit for each roadway type is developed based on various characteristics such as geometry, land use, roadside hazards, etc. An Infrastructure Risk Rate (IRR) is developed for each corridor based on the following and an IRR score is given (1 = low to 5 = high risk):

- Roadway type
- Alignment
- Width
- Roadside hazards
- Land use
- Intersection density
- Access density
- Traffic volume



Speeding Vehicle. Source: Getty Images

Network Approach to Setting Speed Limits



Typical rural road in New Zealand. Source: Getty Images

A measure of safety risk (low-to-high) is also assigned based on crash density and crash rate⁶. The IRR score is combined with safety risk and roadway function and a safe and appropriate speed recommended. The guide lays out principles for setting speed limits and applying speed

management measures to ensure they are consistent across similar roadway types in a network⁴. A matrix was developed which recommends safe and appropriate speeds for a particular road class. An example of recommended speeds for a few roadway types is shown in **Table 1**.

Table 1: Example of Recommended Speeds for Select Road Types

Roadway Function	Road Safety Metric	Infrastructure Risk Rating	Safe and Appropriate Speed
<ul style="list-style-type: none"> ➤ ONRC* Class 1 -2 ➤ Rural town 	<ul style="list-style-type: none"> ➤ Personal risk ≤ low to medium** ➤ Collective risk ≤ medium to high** 	<ul style="list-style-type: none"> ➤ Low or Low-medium 	80 km/h
<ul style="list-style-type: none"> ➤ ONRC* Class 1 - 3 ➤ Rural town 	<ul style="list-style-type: none"> ➤ Personal risk ≤ medium** 	<ul style="list-style-type: none"> ➤ Low or Low-medium 	60 km/h
<ul style="list-style-type: none"> ➤ Any ONRC* ➤ Rural town 	<ul style="list-style-type: none"> ➤ Personal risk ≤ medium to high** 	<ul style="list-style-type: none"> ➤ Low or Low-medium 	50 km/h

*One Network Road Classification **Risk is further defined in the NZ Speed Management Guide

Network Approach to Setting Speed Limits

The New Zealand Transport agency develops a map for each Road Controlling Agency, which shows where existing speed limits differ from the recommendations, and identifies where speed management will have the most benefit. Maps are developed using land use, speed limits, current operating speeds, and a measure of risk for the corridor⁴.

The network map is created by comparing existing speed limits against the recommended ones. Corridors with a safety issue and current travel speeds and speed limit above the calculated safe and appropriate speed are identified. The next step is to determine what type of intervention should be done for those corridors. Economically important roads where there is a strong case for investment are targeted for geometric improvements such as by-passes. When corridors do not meet these criteria, discussions are made about lowering the speed limit or employing lower-cost countermeasures. Finally, in locations where current travel speeds are below the current speed limit, lowering the speed limit is recommended to be consistent⁴.

61 percent of fatal crashes were found to occur on roadways where the calculated “safe and appropriate speed” was below the currently posted speed limit.

What Happened Next

The speed management guide was used to develop a tool called “Mega Maps” which assigns speeds within a particular network area based on factors from the NZ Speed Management Guide². Application of the tool for fatal road crashes in 2018 found 61 percent of fatal crash sites had a calculated “safe and appropriate speed” that was below the currently posted speed limit at that site². This information allows agencies to better target speed limits for high-risk roadways.

New Zealand has also announced a \$1.4 billion investment in road safety over the next 3 years with half of the funds allocated to state highways and half allocated for local roads. Improvements include the use of median and side barriers, rumble strips, and should widening³.

In Auckland, around 750 km of roads are being treated. The focus is on the top 10 percent high risk areas⁵.

Key Takeaways and Lessons Learned

Data-driven approach – New Zealand used a data-driven approach that can be replicated by other agencies. Speed limits were assigned based on an assessment of roadway characteristics (i.e., width, volume, and alignment) as well as crash density and rate. A measure of safety risk is assigned. In addition to having a clear metric for assigning speed limits, the concept of risk can be explained to agencies and the public more easily.

Outreach – As NZ began implementing the guide and tool they found some resistance. For instance, the use of the guide and tool resulted in speed limits on a large number of roadways being classified as “too high.” One source reported that 87 percent of speed limits in New Zealand are too high according to the tool with only 5 percent of open roads warranting the current 100 km/h speed limit. Others expressed concerns that blanket reductions could weaken the economy by increasing time for businesses to move freight⁷.

To address these concerns, New Zealand found engagement and outreach were an important part of the process. Their approach and perspective for implementation included the following:

- Focus on “speed management” rather than speed limits
- Engage early with stakeholders
- Gradually build public understanding and support
- Consider the pace of change, resistance occurs when too many things are changed at once

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- Lieutenant Chris Olson | Oro Valley Police Department, AZ



Stakeholder meeting in Arlington, VA.

Image Source: Niloo Parvinashtiani

The efforts to gather potential noteworthy speed management practices consisted of a range of outreach efforts, including three roundtable workshops, as noted below. The objective was to identify agencies who have been involved in engineering, enforcement, education, or advocacy efforts to reduce speeding.

The first workshop was conducted on April 3, 2019, in Arlington, Virginia, concurrently with the Institute of Transportation Engineers Joint Southern and Mid-Colonial District Annual Meeting. The discussion topics included agency speed management practices, policies, countermeasures, setting speed limits, and law enforcement. These discussions were facilitated by subject matter experts along with several guest speakers including Adam Greenstein (WSP), and Eddie Reyes (Director at Prince William County Office of Public Safety).

The second workshop was a webinar conducted on June 13, 2019. Similar to the Arlington workshop, information was shared on agency speed management practices and policies, advocacy, setting speed limits, law enforcement, and countermeasures. The webinar included presentations by subject matter experts along with several guest speakers including Veronica Vanterpool (Deputy Director, National Vision Zero Network) and Chief Daniel Sharp (Police Department for the town of Oro Valley, Arizona). Participants were engaged during the webinar by participating in live polls, using the chat pod, and using a post-webinar evaluation survey.

The third workshop was conducted on July 21, 2019, in Austin, Texas during the Joint ITE International and Texas District 2019 Annual Meeting and Exhibit. These discussions were facilitated by subject matter experts along with several guest speakers including Brian Burk (Senior Engineer with Travis County Public Works, TX), Commander Eric Miesse (Austin Police Department), Randy McCourt (President, DKS Associates), and Sarah Abel (Technical Programs Manager, ITE). Several issues were discussed around the need for outreach, the lack of resources to address speed management, the necessity for a collaborative approach, data collection, and management issues.

Appendix B: Summary of Activities

In addition to these workshops, a number of supplemental outreach efforts were made to seek out speed management practices with an even wider audience including the following:

- Attending relevant national committee meetings or distribution of email to committee members. This included ITE Safety Council, ITE Traffic Engineering Council, ITE Vision Zero Steering Committee, Transportation Research Board (TRB) AHB65- Committee on Operational Effects of Geometrics, TRB ANB20(5)-Traffic Speed and Safety – Cross cutting Issues Joint Subcommittee, Highway Safety Partners Venture Meeting (HSPV), American Association of State Highway Transportation Officials (AASHTO) Traffic Engineering Committee 2019 Annual Meeting, and National Operations Center of Excellence (NOCoe) road weather management peer exchange
- FHWA/ITE Joint Speed Management Workshop during joint ITE/Midwestern and Great Lakes District 2018 Annual Meeting and Exhibit
- Case study online screening form distribution
- ITE membership outreach including ITE e-newsletter (Spotlite), ITE district/Section/Chapter newsletter, and ITE All Member e-community
- Attending other relevant meetings (GHSA-IIHS National Forum on Speeding, 29th Annual Governor's Highway Traffic Safety Conference)
- FHWA and project's Technical Advisory Committee
- Internet search

A total of 93 initial noteworthy practices were identified through the activities described above. The 93 initial noteworthy practices were narrowed to 36 potential noteworthy practices based on the following:

- Available content (initial scan of information to describe what the noteworthy practice is)
- US-based (although international examples were included, more weight was given to US examples)
- Additional information was gathered and the 36 potential noteworthy practices were reviewed. The practices were narrowed again to 15 top priority noteworthy practices based on the following:
 - Representation of a range of practices
 - Sufficient information to pursue a case study
 - MUTCD compliant strategies (if applicable)

Case studies were selected from a cursory review of the information and initial discussions. A final 15 top priority case studies were identified and ultimately a final eight were selected in conjunction with the project TAC for documentation following discussions with individual agencies.

Appendix C: Speed Management Resources

There are a number of speed management resources and examples of agency practices available for practitioners. Information summarized during the course of the project was summarized in five general areas including the following:

- General Guidance on Speed Management
- Setting Speed Limits
- Countermeasures
- Outreach
- Enforcement

General Guidance on Speed Management

Powell, T, and R. Martin. [Speeding Away from Zero: Rethinking a Forgotten Safety Challenge](#). Governors Highway Safety Associate GHSA, January 2019

This report presents speeding-related fatality trends according to data collected by the National Highway Traffic Safety Administration Fatality Analysis Reporting System. This report documents and summarizes information collected from states and reviews policy, programmatic, and cultural trends related to speeding. It provides a discussion on the collection of speeding-related crash data as well as showcases approaches to setting speed limits. The report concludes that the current landscape on speeding reveals a number of the following key findings:

- Progress on the issue of speeding is limited at best. Efforts to combat speeding face political roadblocks
- When it comes to speeding, drivers have a minimal perception of risk

The report recommends that in order to achieve breakthroughs, the transportation community should consider a number of key steps including the following:

- Improve Program Management
- Prioritize Enforcement
- Improve State and Local Policy
- Identify and Deploy a Culture Change Model
- Investigate Future Solutions

Neuner, M., J. Atkinson, B. Chandler, S. Hallmark, R. Milstead, and R. Retting. [Integrating Speed Management Within Roadway Departure, Intersections, and Pedestrian and Bicyclist Safety Focus Areas](#). FHWA-SA-16-017. April 2016.

Speeding—defined as traveling too fast for conditions or in excess of the posted speed limits—, contributes to nearly one-third of all roadway fatalities, and this proportion has remained largely unchanged for the past decade. Practitioners and communities working to reduce speeding-related crashes need the latest information and tools to guide their efforts. Since roadway departure, intersection, and pedestrian and bicycle crashes have been identified by the Federal Highway Administration as the three areas with great potential to reduce fatalities, States are encouraged to integrate speed management into these three safety focus areas. In order to assist agencies with integrating speed management into their policies, practices, and safety plans, this report presents information on national speeding-related crash trends, promotes a speed-related crash data analysis approach, and recommends strategies and initiatives for integrating speed management into both an agency's overall policies as well as its roadway departure, intersection, and pedestrian and bicyclist safety programs.

Bagdade, J., D. Nabors, H. McGee, R. Miller, and R. Retting. [Speed Management: A Manual for Local Rural Road Owners](#). FHWA-SA-12-027. November 2012.

This document provides information on how to develop a speed management program that is tailored to meet the needs of local rural road practitioners. A speed Management program can be effective in lowering the number of speeding crashes and the resulting fatalities and serious injuries on local rural roads. This document describes the various elements of a speed management program, including the principles of setting speed limits appropriate for roads within the jurisdiction and various countermeasures that are effective in mitigating speeding as it relates to roadway safety in rural areas.

Appendix C: Speed Management Resources

Speed Management ePrimer for Rural Transition Zones and Town Centers. FHWA. January 2018. This Speed Management ePrimer for Rural Transition Zones and Town Centers is a free, online resource openly available for public use. The ePrimer presents a review of speeding-related safety issues facing rural communities, along with the basic elements required for data collection, information processing, and countermeasure selection by rural transportation professionals and community decision-makers. The ePrimer is presented in six distinct modules developed to allow the reader to move between each to find the desired information, without a cover-to-cover reading. The ePrimer presents the following:

- A definition of speeding and speed management, its importance, and its relationship to the goals and challenges (e.g., resource constraints) faced by many rural communities
- Illustrations and photographs of 14 types of speed management countermeasures, particularly suited for rural transition zones and town centers
- Considerations for their appropriate application, including effects and design and installation specifics
- Research on the mobility and safety effects of speed management countermeasures for passenger cars and commercial trucks, pedestrians and bicyclists, and agricultural vehicles which frequent roadways in and around many rural communities
- Case studies that cover effective processes used to plan and define a rural community speed management program or project, and assessments of the effects of individual and series of speed management countermeasures.

Speed Management Toolkit. FHWA Safety Program. FHWA0SA015-017. 2017. This speed management resource was developed from the most relevant and up-to-date existing speed management guides, informational resources, and research evidence. The first section is an annotated bibliography that provides a descriptive list of key speed management resources. The bibliography also identifies the primary target audiences who may find the resources most useful. Resources were reviewed as part of the project to identify best speed management practices, and to develop the model speed management Action Plan template.

The second section describes crash- and speed-reducing countermeasures and the effects that might be expected for implementing the listed treatments. The countermeasures included, with potential crash effects or Crash Modification Factors (CMFs), are derived from high quality evaluations.

Several sources were consulted to develop the list of countermeasures with strong evidence of crash or speed-reducing effects. Key among these sources were the *Highway Safety Manual*, the Crash Modification Factors Clearinghouse, and FHWA proven safety countermeasures information. Although only measures that have a high quality of evaluation evidence were included in these lists, other measures may also have crash-reducing effects, but the evidence is not as conclusive. New knowledge emerges continually, so practitioners are encouraged to consult the Crash Modification Factors Clearinghouse and other sources for the most up-to-date information. These CMF effect estimates may be used in cost benefit assessments to help prioritize among alternate countermeasures as described in the Action Plan template. The third section provides tip sheets for communications experts and others involved in supporting the speed management program and countermeasures through education and awareness efforts. The tip sheets provide guidance on developing a locally-tailored communications program. Creating and sustaining an effective speed management program requires the commitment and support of diverse stakeholders, including users of the roadways and effective communications which can help build such support. In addition, safety benefits of specific countermeasures, such as enforcement or new or unfamiliar engineering treatments, may be enhanced with an effective communications program.

Ecola, L., S.W. Popper, R. Silbergliitt, and L. Fraade-Blanar. The Road to Zero: A Vision for Achieving Zero Roadway Deaths by 2050. Rand Corporation. 2018. Summarizes information for achieving vision zero.

Appendix C: Speed Management Resources

Traffic Calming ePrimer. FHWA. February 2017.

The Traffic Calming ePrimer is a free, online resource openly available for public use. The ePrimer presents a thorough review of current traffic calming practices and contains the information needed to understand this complex field. The ePrimer is presented in eight distinct modules developed to allow the reader to move between each to find the desired information, without a cover-to-cover reading. The ePrimer presents the following:

- A definition of traffic calming, its purpose, and its relationship to other transportation initiatives (like complete streets and context sensitive solutions)
- Illustrations and photographs of 22 different types of traffic calming measures
- Considerations for their appropriate application, including effects and design and installation specifics
- Research on the effects of traffic calming measures on mobility and safety for passenger vehicles; emergency response, public transit, and waste collection vehicles; and pedestrians and bicyclists
- Examples and case studies of both comprehensive traffic calming programs and neighborhood-specific traffic calming plans
- Case studies that cover effective processes used to plan and define a local traffic calming program or project and assessments of the effects of individual and series of traffic calming measures

Hallmark, S., S. Knickerbocker, and N. Hawkins. Evaluation of Low Cost Traffic Calming for Rural Communities – Phase II. Iowa Department of Transportation. January 2013.

The study evaluated traffic-calming treatments through small Iowa communities using either single-measure low-cost or gateway treatment that was appropriate for major roads through small rural communities. The project identified small rural communities with speed issues, selected and installed countermeasures, and compared the impact using before and after studies. Thirteen different traffic calming strategies were evaluated in 10 rural communities in Iowa.

Fitzsimmons, E., N. Oney, S. Hallmark, N. Hawkins, and T. Maze. Synthesis of Traffic Calming Techniques in Work Zones. January 2009. Smart Work Zone Deployment Initiative. This project identified and summarized the effectiveness of different traffic calming treatments to reduce speeds in work zones. State of the art and new technologies for speed management in work zones were identified and summarized. A report, summarizing work zone speed management countermeasures was developed.

Hallmark, S. and N. Hawkins. “Traffic Calming on Main Roads through Rural Communities” Tech Brief. FHWA-HRT-08-067. US Department of Transportation, Federal Highway Administration. February 2009. Speed management is a significant challenge for most communities in the United States. This is particularly true for small, rural communities where the main roadway through the town serves a dual role. Outside the town, the roadway provides high-speed travel over long distances; within the built-up area, however, the same roadway accommodates local access, pedestrians of all ages, on-street parking, bicycles, and the many other features unique to the character of a community. This convergence of roadway purposes presents both an enforcement challenge for the community and a potential safety problem for the public.

Addressing the issue through law enforcement alone often leads to temporary compliance at a significant cost. A more permanent way to reinforce the need to reduce speed is to change the look and feel of the road by installing traffic calming treatments that communicate to drivers that the function of the roadway is changing. Traffic calming has been evaluated and used extensively within low-speed urban areas in the United States but less so in rural areas where driver expectations and traffic characteristics are different.

Traffic calming is more common in rural communities in Europe where multiple measures such as colored pavement, physical lane narrowing, signing, and landscaping are often combined. A gateway treatment intended to evoke lower speed on the approach and entrance to the community is usually followed by a series of other measures repeated throughout the community to encourage drivers to maintain appropriate speeds. Speed reductions up to 15 mph from rural traffic calming have been reported in France, Denmark, and the UK, although speed reductions of 5 mph were more typical. Total accidents were reduced by 50 percent and injury accidents by 25 percent or more.

This tech brief summarizes an evaluation of the effects on the speed of low-cost, traffic-calming treatments on main rural highways passing through small, rural communities in Iowa.

Hallmark, S. and H. Isebrands. Toolbox to Address Safety and Operations around Schools in Iowa. Nov. 2005 Case studies around elementary schools in Iowa were conducted to identify common traffic safety issues and best practices. Countermeasures and recommendations were summarized in a toolbox specifically prepared for school officials as well as transportation agencies.

Appendix C: Speed Management Resources

Setting Speed Limits

USLIMITS2. FHWA Office of Safety Programs. January 2018. USLIMITS2 is a web-based tool designed to help practitioners set reasonable, safe, and consistent speed limits for specific segments of roads. USLIMITS2 is applicable to all types of roads ranging from rural local roads and residential streets to urban freeways. However, the tool is not applicable to school zones or construction zones.

User-friendly, logical, and objective, USLIMITS2 is of particular benefit to local communities and agencies without ready access to engineers experienced in conducting speed studies for setting appropriate speed limits. For experienced engineers, USLIMITS2 can provide an objective second opinion and increase confidence in speed limit setting decisions.

Hildebrand, E.D., A. Ross, and K. Robinchaud. **"The Effectiveness of Transitional Speed Zones."** *ITE Journal*. October 2004. pp. 30-38. This study summarizes policies on speed transition zones and summarizes studies which evaluated driver compliance in transition zones.

Rawson, C.T. **Procedures for Establishing Speed Zones.** August 2015. Texas Department of Transportation. These procedures summarize speed management policies in Texas including transition zones.

Sign Installation Policy—Speed Limits. Municipality of Anchorage. Traffic Engineering Department. This is a speed limit policy for Municipality of Anchorage.

Speed Limit Guidelines. Missouri Department of Transportation. October 2019. Guidelines on setting speed limits for Missouri Department of Transportation

Speed Zoning for Highways, Roads, and Streets in Florida. Florida Department of Transportation. Topic #750-010-002. March 2010. This report summarizes bases for setting speed zones.

Speed Limit Guidelines. North Dakota Department of Transportation. September 2015. Describes the North Dakota's DOT process for setting speed limit transitions zones.

Policy for Speed Limit Review/Request. City of Shorewood, Minnesota. June 2015. Describes the City of Shorewood's process for setting speed limit transitions zones.

Forbes, G.J., T. Gardner, H. McGee, and R. Srinivasan. **Methods and Practices for Setting Speed Limits: An Informational Report.** FHWA-SA-12-004. Federal Highway Administration. April 2012. This publication describes primary practices and methods to set speed limits.

Countermeasures

Dixon, K., H. Zhu, J. Ogle, J. Brooks, C. Hein, P. Aklluir, and M. Crisler. **Determining Effective Roadway Design Treatments for Transitioning from Rural Areas to Urban Areas on State Highways.** Oregon Department of Transportation. FHWA-OR-RD-09-02. September 2008. This publication provides a review of countermeasures for rural-to-urban transitions zones using a simulator study.

Bloomberg, R.D. and A.M. Clevon. **Pilot Test of Heed the Speed, a Program to Reduce Speeds in Residential Neighborhoods.** DOT HS 810 648. National Highway Traffic Safety Administration. August 2006. This report discusses a pilot study in Phoenix and Philadelphia.

Hein, C. **Comparison of Effectiveness of Roadway Design Treatments for Transitioning from Rural Areas to Urban Areas Using a Driving Simulator.** Thesis. Clemson University. 2007. This thesis discusses six different countermeasures tested in a driving simulator.

Sandberg, W., T. Schoenecker, K. Sebastian, and D. Soler. **Long-Term Effectiveness of Dynamic Speed Monitoring Displays for Speed Management at Speed Limit Transitions.** This report evaluates dynamic speed feedback sign in transition zones (rural and urban).

Fildes, B., B. Corben, S. Newstead, J. Macaulay, T. Gunatillake, and M. Tziotis. **Perceptual Countermeasures to Speeding.** 49th Annual Proceedings Association for the Advancement of Automotive Medicine. Sept. 2005. This proceedings document evaluates transverse edgelines at the approach to an intersection.

URS. **Traffic Calming Report.** November 2013. United Kingdom and Ireland. This report offers a detailed description of most European style speed management countermeasures.

Traffic Calming. Local Transport Note 1/07. March 2007. Department for Transport, United Kingdom. This report offers a summary table of various countermeasures used in the United Kingdom.

Dutta, N., M.D. Fontaine, R.A. Boateng, and M. Campbell. **Evaluation of the Impact of the I-66 Active Traffic Management System: Phase II.** Report No. VTRC 19-R7. Virginia Department of Transportation. Richmond, Virginia, October 2018.

Appendix C: Speed Management Resources

Outreach

[Wisconsin Statewide Speed Management Guidelines.](#)

Wisconsin Department of Transportation. June 2009.

This document describes guidelines for transitional speed zones in terms of length and characteristics.

[Alabama Speed Management Manual.](#)

Alabama Department of Transportation. October 2015.

This manual provides information on data collection and countermeasures for speed management.

[Guidelines for Traffic Calming.](#)

City of Sparks Public Works, Nevada. January 2007. These guidelines include a methodology for application and approval of countermeasures as well as a summary of countermeasures.

[Brown, D. Effective Application of Traffic Calming Techniques.](#)

Caltrans Division of Research and Innovation. September 2011. This document summarizes traffic calming guidance from several states. The report summarizes background, traffic calming policies, types of treatments, and legal issues.

[Main Streets: Flexibility in Design and Operations.](#)

California Department of Transportation. January 2005.

This booklet includes information on common countermeasures and performance measures; its focus is on developing state highways that are also local main streets.

[Delaware Traffic Calming Design Manual.](#)

Delaware Department of Transportation. 2012. This manual outlines the needs and process for a traffic calming plan.

[Maine DOT Guidelines for Use of Traffic Calming Devices.](#)

This proposed policy includes traffic calming guidelines but does not address data, rural, or transition zones.

[Mass Highway. Traffic Calming and Traffic Management,](#)

Chapter 16. 2006. This chapter includes speed management guidelines.

[Smart Transportation Guidebook.](#)

Pennsylvania and New Jersey Department of Transportation. March 2008. Discusses a section on rural, town, and village neighborhood speed management.

[Traffic Calming Study and Approval Process for State](#)

[Highways.](#) Vermont Agency of Transportation. September

2003. This study includes information about planning, evaluating, and implementation traffic calming projects on state highways in Vermont.

[Traffic Calming Guide for Local Residential Streets.](#)

Virginia Department of Transportation, Traffic Engineering Division.

October 2002, July 2008. This guide describes a speed management process for local streets.

[Pennsylvania's Traffic Calming Handbook.](#)

Pennsylvania Department of Transportation. Pub 383 (7-12). July 2012.

This handbook describes study and approval process, data collection metrics, and speed management countermeasures.

Torbic, D.J., D.K. Gilmore, K.M. Bauer, C.D. Bokenkroger,

D.W. Harwood, L.M. Lucas, R. J. Frazier, C.S. Kinzel,

D.L. Petree, and M.D. Forsberg. **[NCHRP Report 737:](#)**

[Design Guidance for High-Speed to Low-speed Transition](#)

[Zones for Rural Highways.](#) Transportation Research

Board. Washington, DC. 2012. This study developed

design guidance for high to low speed transition zones and

conducted studies on several transition zone treatments.

Additionally, the study summarized international guidelines on

use of treatments.

[Safe Road Design—A Practical Manual, Public Works,](#)

[and Water Management,](#) the Netherlands, September

2005. **[Safe Road Design – A Practical Manual \(World Bank](#)**

[and Dutch Ministry of Transportation, 2005\)](#) This manual

provides a summary on the use of speed reduction measures

in the Netherlands.

Bagdade, J., D. Nabors, H. McGee, R. Miller, and R.

Retting. **[Speed Management: A Manual for Local Rural](#)**

[Road Owners.](#) FHWA Office of Safety. FHWA-SA-12-027.

November 2012. Provides a definition of speed metric:

design speed, operating speed, posted speed. The

process for conducting a speed management program is

also described. The study also has an appendix on how to

conduct speed studies using traffic counters, time-measured

zone, radar LIDAR.

Enforcement

Eccles, K.A., B. Persuad, C. Lyon, and G. Hansen. [*NCHRP Report 729: Automated Enforcement for Speeding and Red Light Running*](#). Transportation Research Board, Washington DC. 2012. The report provides some guidance on the initiation and operation of an automated enforcement program. The guidance was developed based on a survey of agencies, field visits, a literature review, and author experience. It covers planning, enabling legislation, violation enforcement, use of revenue, evaluation, and technology.

Eccles, K.A. [*"Automated Enforcement for Speeding and Red Light Running."*](#) *TR News*. May 2014. Summarizes information from NCHRP 729.

Pedestrian and Bicycle Information Center. [*An Overview of Automated Enforcement Systems and Their Potential for Improving Pedestrian and Bicyclist Safety*](#). Summarizes impacts of speeding and red-light running on pedestrians and bicyclists. Summarizes studies which evaluated automated enforcement programs. Results of 13 studies found a statistically significant reduction in crashes after introduction of automated speed enforcement with an estimated 20 to 25 percent reduction. A study of covert or unmarked enforcement programs in Australia and Canada also found a 20 to 25 percent reduction in crashes. Other studies found ASE reduced mean speeds by 11 mph or more for 65 mph speed limit roads. One study found a speed reduction of 3 to 8 mph in work zones. A study in Canada found reductions crashes for urban arterials with speed limits of 50 km/h (31 mph). The report also summarized methods to enhance effectiveness of automated enforcement including addressing legal issues and public opinion.

[*Speed Enforcement Camera Systems Operational Guidelines*](#). National Highway Transportation Safety Administration, US Department of Transportation. DOT HS 810 916. March 2008. The study provides guidelines for use of speed enforcement cameras. The advantages and disadvantages compared to traditional speed enforcement were highlighted. The report also studies which evaluated the effectiveness of ASE. The report provides guidance on legal/policy authority, planning, identifying a speeding-related issue, developing a strategic plan, selecting a countermeasure, obtaining interagency and community support, selection of equipment, addressing media coverage, setting enforcement thresholds, processing violations, and program evaluation.

Miller, R.J., J.S. Osberg, R. Retting, M. Ballou, and R. Atkins. [*System Analysis of Automated Speed Enforcement Implementation*](#). National Highway Transportation Safety Administration, US Department of Transportation. DOT HS 812 257. April 2016. The study contacted currently operating and recently discontinued ASE to determine whether their programs were consistent with NHTSA guidelines, Speed Enforcement Camera Systems Operational Guidelines. This included a survey of 11 states. The report summarized overall results.