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president’s message

Speed - A New Era Rises

Since my birth, nearly three-quarters of a million people in the United States have perished using our transportation system due to excessive speeding. We all do it. Our culture and our siloed approach to this topic makes it nearly impossible for anyone to get their hands around the issue and tackle it to the ground. One would think with the amount of studies and research involving vehicle operating speed and speed limits, and the billions of dollars in infrastructure created using speed-based criteria, we would have solved this. But we’ve learned through research that engineering alone, education alone, enforcement alone, adjudication alone, or the public alone will not solve this issue. Those same efforts completely united under common guiding principles produce a vector of substantial proportion—contributing to Vision Zero.

Vision Zero will not happen without prioritizing safety outcomes—data show large fatality groupings associated with arterial streets and rural highways. Conflating issues doesn’t help—such as stating that speed kills related on limited access facilities when arterials have greater fatalities; using the 85th percentile away from high-speed facilities and claiming it to be the gold standard; replacing speed signs, or building wide neighborhood streets rather than investing in speed management and being surprised by high operating speeds. These approaches divide us and distract from our common purpose. Here are three areas that we can advance collaboratively:

1. Let’s be leaders in setting speed limits properly by using context and science. Let’s consider all road users in our decisions and stop using simplistic “one size fits all” approaches. Montana and Texas are not Hawaii or New York. Use emerging research (such as NCHRP 17-76) and National Committee on Uniform Traffic Control Devices (NCUTCD) recommendations. Consider broadening the use of statutory maximum speed limit designations and use of default-citywide urban speeds.

2. Let’s engage judicial, enforcement, engineering, and the users together, not in silos. Collaboration is hard and time consuming. Judges who enable law enforcement to feel like they cannot make tickets “stick” unless they write them many mph over the posted maximum speed is no more right than setting speed limits too low or too high relative to road context. We can work together—other countries have (see feature article on page 32 on safety efforts in Oslo, Norway).

3. Let’s set clear policy on the application of automated enforcement. The Governors Highway Safety Association, AAA, and so many others know of its proven safety effectiveness. If we’re committed to Vision Zero, then we must be committed to zero entrapment, zero undue enrichment, zero privacy invasion, and zero inequity in its application. PERIOD. If we commit to this together, then the barriers and fears preventing its application can be broken.

I jumped in with both feet to the speed topic a few years ago with the NCUTCD on establishing appropriate speed limits. What I learned is this issue evokes a lot of emotion. ITE and our profession have many resources on this topic, and a feature article on page 26 describes the Safe System approach and ITE’s efforts in this arena. We can meaningfully help shape our communities, but only if we work together—now more than ever.
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COVID-19

So much has changed in the world, the United States, and within ITE in the last month, it is hard to know where to begin. COVID-19 is having a devastating human and economic toll. Things are evolving and changing so rapidly, much of what I write now in April will likely be rendered meaningless when you read this in May. So I will try to focus my thoughts around ITE and how we are reacting to events at-hand and continue to bring value to our members.

ITE staff moved into fully remote operations on Wednesday, March 18. This process was aided by our existing telework policy and the experience that most of our staff had in working remotely, at least occasionally. However, as I’m sure many of you have experienced, working remotely full-time and maintaining social distance with family at home is a much different environment. For others who are alone, it can be quite isolating. We have all had to try to adjust to our new normal. We recognize the different situations our employees find themselves in and are working to provide a supportive environment that works for each individual.

From a business standpoint, we are bringing a business-as-usual mentality to a situation that is anything but usual. That means not just working remotely, but adapting our business practices to this new environment and implementing new practices to compensate for the lack of physical contact. Technology has been key. Like many of you, we are relying heavily on tools like Go-To-Meeting, Zoom, and Slack, etc. The videoconference features on these tools have helped create a personal connection that is not possible via email, text, or even voice.

We are working hard to continue to support our International, District, Section and Chapter leadership. An early focus was on helping people navigate through meeting cancellations and postponements. We are now shifting our attention to helping local leadership use these virtual tools to assist members in connecting at a distance. With the support from the Coordinating Council leadership and volunteers, we continue to advance a wide range of technical products and professional development opportunities.

We are also working with our International Leadership to bring information and resources to help you understand and react to what is happening. The e-Community is one such resource for insightful discussions and posts. I am trying to add helpful information and articles, not only on the immediate impacts of COVID-19, but on what some of the lasting effects might be.

We have created our new ITE Virtual Drop-In sessions to help fill the void of professional networking, allowing members to engage on interesting topics. I encourage you to volunteer to convene a discussion, sign up for a session, or check out a recording. We will also be doing longer form engagement, such as our Big Data/Data Analytics Brainstorming Series, designed to fill the void that was created when similar sessions planned for the District Annual Meetings had to be cancelled.

This is new territory for all of us. As we work hard to adapt to our new “abnormal,” if there is something we can do to help you, please don’t hesitate to reach out to me or one of the ITE staff. We wish you and your family good health. As always, you can find me at jpaniati@ite.org or on Twitter: @PaniatiITE.
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Member Updates
Edward W. Hanscom, P.E., MSCE (M) recently received the David H. Stevens Award for transportation excellence. The annual award was presented at the 69th Maine Transportation Conference in Augusta, ME, USA. Mr. Hanscom is head of the Transportation Systems Analysis Division at the Maine Department of Transportation.

Obituaries
ITE recently learned of the passing of the following members and a former ITE employee. We recognize them for their contributions to ITE and the profession, and send condolences to their families.

John N. LaPlante, P.E., PTOE (F) of Chicago, IL, USA, passed away on March 21, 2020 at the age of 80 from COVID-19, surrounded by his family.

A Fellow and Life Member of ITE, John was a fixture at ITE Annual Meetings and technical conferences throughout his 58 years of service to the organization. He was generous with both his time and his means, having regularly contributed to ITE’s Legacy Fund, supporting students and younger members. He won the prestigious Theodore M. Matson Memorial award in 2010 for his advancement of the profession through outstanding contributions in the field of traffic engineering.

After receiving his degrees from the Illinois Institute of Technology and Northwestern University and a stint in the Air Force, John began working for Chicago as a traffic engineer in 1965, and eventually served as the first commissioner of the Chicago Department of Transportation.

A pioneer in the area of complete streets and a well-known champion for pedestrian and bicycle safety, John is remembered by colleagues as working “tirelessly” on behalf of these causes before their importance was widely recognized. He received the Lifetime Achievement Award in 2005 from the Association of Pedestrian and Bicycle Professionals (APBP), “for his uniring energy and commitment to ‘complete’ streets that have resulted in great improvements to transportation policy and design,” according to the organization. Noted as a “visionary” and “mentor” in professional circles, John was principal author of the American Association of State Highway and Transportation Officials (AASHTO) Pedestrian Guide.

John was highly involved in many of ITE’s Committees and Councils through the years, including the Roundabout Task Force; Complete Streets Council Executive Committee; Pedestrian and Bicycle Council Executive Committee; and the ITE Delegation to National Committee on Uniform Traffic Control Devices. Prior to these modern committees, John served on the Career Guidance Committee; U.S. Legislative Committee; Bicycle Facility Planning Guidelines Committee; among many other past ITE groups.

He is survived by his wife Linda of 58 years; his daughter Leslie LaPlante and her husband Tim Decker; and two grandchildren, Elias and Sara.

Peter W. Frentz of Keedysville, MD, USA passed away on March 31, 2020. Pete served as an employee of ITE for 45 years until his retirement in June 2014. Pete was the recipient of the 2006 Burton W. Marsh Distinguished Service Award, one of ITE’s most prestigious honors. He was beloved by ITE members and coworkers alike, and is remembered for his kind and humorous spirit, his commitment to ITE, and a willingness to help others. At ITE meetings throughout the years, many members were fortunate to get to know Pete and his wife Donna of 54 years, along with their two daughters. Pete was hired to work in the ITE mail room while attending law school. When he decided to leave law school, he continued on at ITE, becoming the office manager. There were less than a dozen staff at the time. In the early years he also served as the advertising manager, and during his tenure the revenue became diversified and the number of transactions grew exponen-
Eventually, as did the membership. He retired in 2014 as the Deputy Executive Director for Finance and Administration. Pete was a long time member of the American Radio Relay League, the National Association of Amateur Radio, and a strong supporter of the Colonial Williamsburg Foundation. He is survived by his wife, Donna Frentz; their daughters Chrissy Underwood, (Nate) and Bobbie Larkin (David) and four grandchildren: Drew, Ellie, Katie and Andrew.

Ronald A. Doubek, P.E. of Phoenix, AZ, USA passed away peacefully on March 26, 2020 while in hospice care, with his family by his side. He fought a brave battle after having a lung transplant five years ago. He left a great legacy with his son, Stephen Doubek (M), following in his footsteps as a transportation engineer and ITE member.

Memorial contributions can be made to the ITE Legacy Fund in honor of those who have passed. At the request of many of John and Pete’s friends, we have also established the John LaPlante and Pete Frentz Memorial Donation funds. These fund support programs that are helping to grow the next generation of transportation leaders and ITE members. To donate, visit http://bit.ly/ITELegacyFund.
New Members
ITE welcomes the following new members who recently joined our community of transportation professionals.

**Canadian**
- Michael Price

**Florida Puerto Rico**
- Steve Bernard Logan

**Global**
- Yousef Abdulaziz Alammar
- Sultan Aljahdli
- Abdullah Abdulrahman Al Mallahi
- Khalid Alotaibi
- Abdulaziz Ali Alsuhaibani
- Eric C. Keys

**Great Lakes**
- Erich Reedy, P.E.
- Theodore Beidler, P.E.
- Brian Bradley
- Michelle Chaney, P.E.
- Greg Channel, P.E.
- Bryan Corne, P.E.
- Eric Davis, P.E.
- Kevin R. Duemmel, P.E.
- Charles Fisher, P.E.
- Marc Grake, P.E.
- Keith D. Hamilton, P.E.
- Dave Holstein, P.E.
- Adam Kiess, P.E.
- Charlie Laughery, P.E.
- Scott Ockunzi, P.E.
- Josh Otwort, P.E.
- Benjamin Palevsky
- Joe Parisi, P.E.
- Teri Scanlon, P.E.
- Derrick Schierloh, P.E.
- Michael Simpkins, P.E.
- Alex Weinandy, P.E.
- Jason Yeray, P.E.
- Justin Yoh, P.E.

**Mid-Colonial**
- John Irish
- Jaleh Moslehi
- Mi Young Park
- Bryce Perry
- Richard Smith

**Midwestern**
- Barry M. Bergman
- Tricia Bohler
- John Brendel
- Michael D. Busch, P.E., PTOE
- Ryan Cerniglia
- Monica Cheney
- Nikki Conley
- Heath Copeland
- Diana Decker
- Christopher Denbow
- James Dietzel
- Shelley Dietz
- Casey Eckert
- Emily Eisenbacher
- Dan Fauke
- Lisa Frankovic
- Barbara Frost
- Ray Gawlik
- Brian Gettinger
- Allison Graves
- Dalton Gregory
- Scott Gruben
- Scott Halter
- Damian Hamielec
- Martin Hamm
- Glenn Henninger
- John J. Hicks, PTP
- John Hock
- Lesley Hoffarth
- Dale Houdeshell
- John P. Huebbe
- Mark Huebbe
- Jason Jarvie
- Karen Jones
- John Klein
- James Knoll
- Joe Krypcia
- Joseph Kulessa
- Stephanie Leon Streyer
- Jonathan Loeppe
- William Long
- Gregory Marshall
- Ted Medler
- Jaclyn Miller
- Thomas Montes-De-Oca
- Kori Neely
- Timothy Nittler
- Chase Null
- Andrew O'Connor
- Debbie Page
- Chris Pflasterer
- Alyssa Purdy
- Melissa Retig
- Jennifer Riley
- James Ritter
- Kendra Rogers
- Kyle Sant
- Christina Sfreddo
- Tarig Shihada
- John Shrewsbury
- Cindy Simmons
- Adam Spector
- Kandi Sprague
- William Stevens
- Charles Thien
- Douglas S. Tiemann
- Luiu Tu
- Deanna Venker
- Stephen Walter
- Lawrence Welty
- Don Wichern
- Gregg Wilhelm
- Rachel Wilhelm
- Paul Wojciechowski
- Debbie Wright
- Graham Zieba

**Mountain**
- Lisa Corrado
- Thomas Davy
- Trenton Essex
- Scott Keller
- Edward McGuire
- Andrew Powell
- Dan S. R.
- Juan Rael
- Andrew Roether
- Daniel T. Schoenecke
- Lewis Venard
- David Warnock

**Southern**
- Steven Cox
- Danielle Diehl
- Matthew R. Harvey
- Matthew LeShure
- Samia Makoi

**Texas**
- James Andrews
- Jesse Brown
- Tom Estes
- Dale Gray
- Christopher Low
- Marc Olliphant
- Terry Patterson
- Mike Reeder
- Nathan Michael Shay
- Scott Wilson

**Western**
- Adi Amaro-Zurita
- Phil Armand
- Christian Asuncion
- Danielle Bischoff
- Gary Carlin
- Abraham Carmona
- Jeff Carter
- Jeremy Finkle
- Russel Gingras
- Logan Ham
- Travis Hargitt
- Eden Havens
- Andy Jeffrey
- Scott Christopher Johnson, AICP
- Clayton Lam
- Alfred B. Lee, P.E.
- Zachary Lee
- Raoul Maltez, P.E.
- Nick Mangkalakiri
- Kelsey Moore
- Emily Nathan
- Justin Navrocki
- Jennifer Nyrick
- Lisa S. Patterson
- Jeff Petry
- Dax Ramsey
- Himabindu Samudrala, P.E.
- Justin Santos
- Andy Skinner
- Daniel Stumpf
- Alison Tanaka
- Ted Tepianer
- Chon Wong
- Monica K. Wooster, P.E.
- Loon F. Yee
- William Yeung, P.E.
- Sabrina Young
- Cole Zacharias

Letters in parentheses after individuals’ names indicate ITE membership status: S - Student Member; IA - Institute; M - Member; F - Fellow; R - Retired Member; and H - Honorary Member.
Information reported here is based on news releases and other sources. If you have news of yourself or the profession that you would like considered for publication, please send it to Holly Stowell, hstowell@ite.org.
CELEBRATING NATIONAL ENGINEERS WEEK

During National Engineers Week in February, several ITE members shared blogs about how they found their career passion and how they envision the future of transportation.

Our industry is already moving in the right direction of preparing the infrastructure to smoothly transition into the new era of greener, smarter, and connected transportation system.

Angela Kitali
Graduate Research Assistant, Florida International University - College of Engineering & and Computing

We rely on those who help keep moving the industry onward in innovative ways with the resources available. The future looks bright, with data, micromobility, equity, and more shaping the way we think about the world of transportation. There’s more to come, and I’m excited for the future.

Tyler Krage, P.E., PTOE
Traffic Engineer, Alliant Engineering, Inc.

That’s one of the reasons I love transportation; the work we do has a direct impact on how people get to work, to school and to the doctor and thus their quality of life.

Alyssa Rodriguez
Director, Information Technology, City of Henderson, NV, USA
ITE International Vice President

As engineers, we get to be the ones who tackle these complex issues head-on. Honestly, how much cooler of a profession is there than that? We stare challenge and complexity in the face and say: ‘Bring it on.’

Jennifer Warner Hayman, P.E.
Civil Engineer - Traffic, Michael Baker International

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ITE NEWS

Community Corner
Community Corner highlights the efforts of ITE members to not only encourage transportation education among our youth, but to improve the daily lives of people in their community beyond transportation through acts of service.

ITE and the Future Cities Competition
ITE sponsored a Special Award at the 2020 Future City Competition (FCC) finals titled “Best Transportation System for the Community.” FCC is one of the nation’s leading engineering education programs and has received national recognition and acclaim for its role in encouraging middle school students to develop their interest in science, technology, engineering and math (STEM).

ITE Talks Transportation Podcast
New from the MaaS/MOD Series
Emerging Trends in Mobility with Annie Chang, SAE International
Annie Chang, head of New Mobility at SAE and director of the Mobility Data Collaborative, joins the ITE Talks Transportation podcast to discuss the mobility landscape and her research in the mobility as a service/mobility on demand (MaaS/MOD) field. She also shares the challenges and potential solutions regarding safety around micromobility, and talks about the shared taxonomy for mobility recently released by SAE International.

The winning team from Arizona that competed in Washington, DC at the Future City Finals and won a Special Award sponsored by ITE.

The FCC finals took place in Washington, DC, USA in February 2020. In its 28th year of competition, Future City welcomed 40 teams from two countries, with 1,150 people in attendance. More than 20,000 viewers from 43 countries joined the livestream. This year’s theme, Clean Water: Tap Into Tomorrow, challenged students to identify an urban water system threat and develop a futuristic solution to ensure a reliable supply of clean drinking water.

ITE judges Abraham Lerner, P.E. (M) and Jennifer Warner (M) ultimately chose the

We want to hear from you!
Have you, your Section, or Chapter taken on a community project or provided assistance to a non-profit organization? Large or small, we want to hear about it! Please send photos (300 dpi or higher) along with a write-up (no more than 200 words) to Pam Goodell, pgoodell@ite.org for inclusion in a future issue of Community Corner.
A team from Maricopa Wells Middle School from the Arizona region. The team’s project focused on Salt Lake City.

ITE is also involved with FCC at the regional level. At the Arizona ITE/IMSA Spring Conference in Phoenix, AZ in February, a regional Future City team was honored by ITE members and ITE International President Randy McCourt, P.E., PTOE (F). The winning team from 2020 Arizona FCC for Best Multimodal Transportation System from Esmond Station K-8 school in Tucson, AZ was invited by Kohinoor Kar, Ph.D., P.E., PTOE (M), who has been leading the AZ ITE judges. The students brought their physical model (made of recycled materials) to the meeting and gave an excellent presentation followed by Q&A.

Kohinoor Kar poses with students and the mentoring teacher from Esmond Station who won the ITE award at the Arizona Future City Competition and was invited to the AZ ITE-ISMA Spring Conference.

Sign Up Today for the Matson and Hammond Mentoring Program

“On surface, being a mentor is a way of giving back. But it’s also a powerful way to help someone work from their personal strengths and to find a new confidence. It becomes a rewarding experience for both and often leads to a long term relationship. For me, I’m always reminded to keep stretching as I listen and reflect on how I’ve used my own strengths to land opportunities.”

Jen Malzer,
City of Calgary & Canadian District Director

“My favorite part of being a mentor is watching the transformations take place as a result of personal and professional growth. However, I want to stress that the growth takes place for both the mentees and the mentors! This growth is a result of the participants learning new information, new skills and being exposed to a diversity of ideas.”

Jennifer Toth,
Maricopa County
Department of Transportation & ITE Public Agency Council Chair

Learn from the Experience of Others & Share Your Experience with Others

Get involved: https://community.ite.org/mentoring/how-to-get-started

(ITE membership log-in required)
Fred Jones, AICP (M) has nearly 20 years of public and private sector experience for a variety of community planning and mobility projects. He shares with ITE Journal his thoughts on how complete streets and safety are inextricably linked, and the role transportation professionals can play in making their communities safer.

**ITE JOURNAL:** Your professional bio says that “urban planning is anthropology.” How does that sentiment come into play when planning and designing our communities?

**JONES:** Given that so much of the focus of urban planning is understanding the dynamic relationship between humans and their environment and how to address the challenges facing our communities—from housing affordability, to mobility access, to resiliency and public health—the multidisciplinary, “systems-level” nature of anthropology is well suited to contemporary urban planning and engineering. Looking at the long arc of the human condition lends a unique perspective when it comes to engaging with the public and understanding the broader cultural context in which such habits, needs, and wants are framed. Much of people’s identity has an intrinsic link to the local community. Understanding the not-so-obvious tension between space, geography, available resources, and the local inhabitants enables you to develop a more complete story about a particular community, improving the likelihood of success when proposing planning or design solutions. People are at the core of planning. The location, design and programming of streets, buildings, parks, schools and other infrastructure can’t be performed in a vacuum. Taking a page from the anthropological handbook can create a better connection to people, experience, and future desires.

**ITEJ:** How are “complete streets” and safety inextricably linked?

**JONES:** By definition, a “complete street” is one that is planned, designed, implemented, operated, and maintained to enable safe access and mobility for all users. This basis for complete streets is fundamentally rooted in safety with the recognition that for the past 60 years transportation infrastructure has largely supported the needs of the car. While there are undoubtedly benefits and freedoms offered by the automobile, the drawbacks are obvious. Ever-growing traffic congestion, climate issues, preventable diseases, increasing rates of pedestrian and cyclist injuries and fatalities, as well as housing and neighborhood inequities can be tied to unfettered suburban growth patterns and unsafe street design focused solely on moving cars. Complete streets shift the focus to people, correcting the imbalance of the past. There’s no one-size-fits all prescription, but typical ingredients may include sidewalks, bike lanes, accessible transit stops, safe crossings and pedestrian signals, curb extensions, and more. The complete streets approach is centered upon creating better places, balancing the safety and convenience interests of many types of users. Ultimately, how we design streets reflects how we feel about people!

**ITEJ:** What advice would you give other transportation professionals when working with local, state, and national leaders to achieve these measures and greater accountability in their communities?

**JONES:** The real message is to prioritize people and quality of place. For far too long, our traditional transportation policy and investments have centered around high-speed, high-capacity roadways over other modes of transportation. The few additional seconds of convenience to motorists has come at the expense of the many lives lost walking, cycling, or taking transit, particularly in lower-income and communities of color. Future transportation investments need to make safety the focus for moms walking strollers, the elderly, those who bike or take transit to work, the people. This needs to be communicated to leadership at all levels. We should be incentivizing vulnerable road user safety. So, my advice is: Continue to be a champion. Ask yourself why you got into this industry and how you can utilize your expertise to make your community—you world—a better place.
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Over the past decade, bike share systems have become relatively common in U.S. cities. Many of those systems have been making efforts to ensure that bike share is accessible to all residents, particularly those who have the fewest resources or were underserved in the past. Meanwhile, the mobility landscape in 2020 is rapidly changing, with dockless bike share, e-bike and e-scooter systems, along with ride-hailing services like Uber and Lyft, contributing to a new and uncharted urban transportation scene. In order to compete in this changing landscape, particularly with regard to providing equitable service, bike share systems need to be able to better understand and document the outcomes of their programs so that they can articulate and replicate successes, and to identify and adapt when programs aren’t working. Portland State University (PSU) recently completed a project looking at how bike share systems are approaching equity programming, with the goal of providing a resource to help cities tackle these challenges.

**Background**

Many bike share systems have been launched in central city areas and neighborhoods with demonstrated or anticipated support for bicycling programs. These areas have tended to be disproportionately white and higher-income. 1, 2 Bike share users have also been disproportionately white, higher-income, young, educated, and male. 3, 4

Prior research found that even when bike share stations are placed in lower-income communities of color, white and higher-income residents use the systems disproportionately. 5 Physical access to a bike share station or bike was one of many barriers that we observed for underserved residents. In addition to the financial burden of membership, which may cost $100 USD or more per year, lower-income residents are also less likely to have a credit card or smartphone, which are key components to many bike share systems. Even when they have a credit card, some people may not want to use it for fear that they’ll be charged more than they expect due to overage fees or bike damage. Language barriers or the lack of ability to ride a standard bike share bike also prevent some people, while many others don’t think their local streets are safe for bicycling. Further, many residents in lower-income communities and communities of color are less likely to have friends and family who use bike share, are less likely to have used it themselves, know less about how the system works, and often do not know about available discounts even when they do exist. 5

These facts demonstrate the formidable challenge cities and bike share operators face when seeking to make bike share a valuable resource to lower-income and minority residents. However, there is also research that suggests that lower-income people and people of color generally like the idea of having bike share in their communities, and once signed up, are just as likely to be active bike share users. 6, 7

With funding from the Better Bike Share Partnership (BBSP), a “collaboration funded by The JPB Foundation to build equitable and replicable bike share systems,” we set out to document the breadth of approaches, challenges, and successes that were underway across the country to make bike share better for everyone. This article draws from the 2019 National Scan of Bike Share Equity Programs report, and discusses how the intertwined needs for better data and more consistent funding underlie sustainable equity programming. Findings are based on a questionnaire of bike share operators, cities, and community partners. We received at least one response from bike share systems in 70 cities across 34 states. From those responses, we received information on 105 different equity programs (some systems had more than one program).

**The Current State of Bike Share Equity Programming**

The survey found that the smallest cities were much less likely to be actively working on addressing equity. Of the 18 systems with fewer than 150 bikes that responded to our survey, less than half had implemented any sort of equity effort. However, the vast majority of systems over that threshold are actively working to address equity, with 73 percent of larger systems having specific equity programs, and most of the rest having equity work infused in their efforts.

For each program described by survey respondents, we asked which population(s) the program was designed to serve (multiple responses were allowed).
The 103 reported programs were most often targeted toward: low-income individuals (56 percent), specific neighborhoods or geographic areas (34 percent), specific racial or ethnic groups (22 percent), people of all abilities (15 percent), and other populations, including unbanked residents, people without smartphones or credit cards, and veterans or students (16 percent).

Programs focused on addressing cost and payment barriers were most common (84 percent of systems with specific equity programs, and 62 percent of all systems, had such a focus), followed by programs focused on education or facilitated enrollment (53 percent of systems with equity programs and 39 percent of all systems); service areas and station siting (51 percent and 38 percent); and marketing, information, and materials (49 percent and 36 percent).

You can’t evaluate what you don’t measure. Common sources of data for many systems—periodic member surveys and usage data—may not be enough to measure progress toward equity goals. Challenges include limited funding to plan and execute data collection efforts, and finding staff or partners with the skills to collect and analyze data. Further, the brief life cycle of most equity programming (programs often last just one season or year) makes it hard to gather consistent data over time.

About 61 percent of the equity efforts described by responding cities and systems included some data collection component. For certain popular program types, though, data collection was absent or too limited to provide much guidance—only 34 percent of marketing campaigns and 39 percent of ambassador programs included any data gathering effort. Many programs reported collecting only simple frequency data, such as number of events, stations, sign-ups, or trips, which may not be robust enough to translate into adequate program effectiveness measures. While a number of systems indicated using qualitative feedback (stories, examples, etc.) to gauge program effectiveness, they often do not have systems in place to collect that data in a regular or systematic way.

Because of the issues and barriers of collecting better data, it is important for operators and cities to work together to strategically determine what they need to measure and why. Setting short-term and long-term goals and outcomes can help provide guidance and focus to data collection, especially for organizations with limited funds and resources. By linking data and evaluation to equity policies, organizations can then manage their resources appropriately and collect the data needed to evaluate programs and to tell stories about their efforts. Figure 1 shows how linking outreach activities to memberships and ridership can eventually link to program outcomes that are meaningful to the community, funders and decision makers. Often you will need to collect additional information and data, such as community-based intercept surveys, to give a more holistic picture of use and impact.
Programming needs funding. Securing and maintaining funding was the top challenge for equity programming cited by cities and operators in our survey. Funding may be needed to subsidize riders or memberships, purchase equipment, hire staff, support community partner organizations, fund marketing campaigns, and more. Many bike share systems are already struggling to find revenue sources to cover both their capital and operating costs. Grants and foundation-based funding were the most common sources of funding, especially for small and mid-sized systems, but these sources were also generally less than $100,000 USD and limited in duration, leaving systems to figure out how to incorporate equity programming into their operating budgets, seek new sources of external funding, or scale back programming. As bike share programs mature, systems will need to grapple with how to secure sustainable funding streams for equity work.

Next Steps
The challenges for bike share systems are numerous, including limited funding, short contracts, and a changing mobility landscape with the threat of both the arrival and departure of new mobility companies. There is an increasing need for coordination between cities and bike share operators, and the dedication of resources to making bike share systems equitable. Cities and operators will also need better data to ensure their programs are achieving equity targets (or to change course), and to make the public case for funding such efforts. Pushing for public resources for bike share programming runs counter to much of the history of bike share in America to date, which is often premised on being “free” for cities, with support coming from sponsorships. However, that model may not be adequate if bike share is to become sustainably equitable.

References
2020 EVENTS

60TH ANNIVERSARY INTERMOUNTAIN SECTION MEETING
May 14–16 | Jackson, WY, USA

SOCAL ITE ANNUAL BUSINESS MEETING/JOINT MEETING WITH ITS-CA
June 17 | Monterey Park, CA, USA

2020 JOINT WESTERN & MOUNTAIN DISTRICTS ANNUAL MEETING
June 29–July 1 | Honolulu, HI, USA

JOINT ITE INTERNATIONAL AND SOUTHERN DISTRICT ANNUAL MEETING AND EXHIBITION
August 9–12 | New Orleans, LA, USA

TEXAS DISTRICT ANNUAL MEETING
September 16–18 | Denton, TX, USA

MOVITE FALL MEETING
September 23–25 | Lincoln, NE, USA

TRANSPO 2020/FLORIDA PUERTO RICO DISTRICT ANNUAL MEETING
October 11–14 | Bonita Springs, FL, USA

MET SECTION ANNUAL MEETING
November 12 | Astoria, NY, USA

WHERE IN THE WORLD?

Can you guess the location of the “Where in the World?” photo in this issue? The answer is on page 50. Feel free to send in your own photos to hstowell@ite.org. Good luck! itej
Midwestern District Administrator

T. E. “Tom” Campbell, P.E. (F)
Retired Assistant State Traffic Engineer – Minnesota Department of Transportation (1962-2014)

Education
Bachelor of Civil Engineering – University of Minnesota

Professional Affiliations
ITE Member since 1966; Fellow since 2003
Minnesota Surveyors and Engineers Society (MSES) – Served as the 100th president in 2000

ITE Awards and Achievements
NCITE Distinguished Member, 1998
NCITE Transportation Professional of the Year, 2008
Midwestern District Distinguished Member, 2018

ONE ITE Involvement
Campbell plays an active part of the six-member ONE ITE Transition team, melding the Midwestern District (minus the MOVITE Section) into the new Great Lakes District.

“In more than four decades, Tom has made numerous contributions to ITE at all levels, including dedicating his time to serve as the Midwestern District’s Administrator since 1999. He has done an outstanding job advising the Midwestern Board in its governance of the District, and I have enjoyed learning from him and working alongside him over the last four years on the board.”

– Martin M. Gugel, P.E., PTOE (F), Midwestern District Immediate Past President

In celebration of its 90th anniversary, ITE is recognizing each of its District Administrators throughout the year in a series of profiles. Each month this column will also feature historical facts and figures on the various Districts, including important dates and people throughout their history.

Tom Campbell has the singular distinction of serving the longest term of any of ITE’s District Administrators—22 years and counting. He fondly recalls to ITE Journal how it came to fruition.

“Since I didn’t have to attend our District board meeting in Branson, MO, USA in June of 1999—I previously attended board meetings while I was the District Director from 1995-1997—I was able to participate in the District meeting golf event. Upon completing the 18th hole, our foursome walked directly into the scheduled ‘conference ice breaker.’ Doug Differt, who was part of the board at the time, walked up to me and said, ‘TC, have I got a deal for you!’ He always greeted me that way when he wanted me to be part of the LAC of some type of conference, committee, or important meeting, so I knew something was up that meant ‘extra work’.”

He continues, “It was a five-year commitment that could be terminated by either the board or myself or extended by the board.” That was more than 21 years ago, and Campbell has been the only administrator the District has had.

Speaking to him about ITE and the Midwestern District, one gets the impression that he doesn’t necessarily want to talk about things, so much as he wants to make them happen. At that 1999 board meeting, the board decided that they needed a non-voting administrator that would be required to attend all board meetings.

“I am not the guy that wants to stand in the front of the room with a microphone; I like to work in the background to help put all of the pieces together to get things done,” Campbell said.

His first order of business was to update the bylaws, which have been amended and updated over the years due to the evolving structure of the District and ITE. Campbell recalls a big change that occurred in 2004-2005. Up until 2004, all four officers—treasurer, secretary, vice chair and chair—were appointed on a Sectional rotation basis (four Sections) and served for one year. In 2005, the District developed an election process where it voted for the entry position of secretary/treasurer (on a Sectional rotation basis). That person then moved up to vice president, president, then past president, effectively serving for four continuous years.

Campbell believes that was a pivotal moment for the District. “That was the start of our conversion from a strong Section/weak District to a strong Section/strong District,” he notes.

More changes occurred in 2018. The workload involved in the secretary/treasurer “entry” position seemed to be a lot of work for one person, so they split the secretary/treasurer into two separate offices. Now, officers serve on the District Board for five years, further enhancing the continuity of leadership.

Campbell attends all meetings as a parliamentarian and provides past historical information and institutional knowledge. Throughout the year, he keeps in close contact with the board and, on top of the various officer duties, answers or finds answers to
questions asked by the board members. He also helps keep the webmaster up-to-date on information that should be on the Midwestern District website. He is authorized to do banking and make purchases, such as awards, on behalf of the District. Shortly after he started as administrator, it became apparent that the banking wasn’t working, so he moved the banking from Chicago, IL, USA to a bank close to his house in Minnesota so he could just walk in the door and get things done quickly.

Campbell worked for 42 years for the Minnesota Department of Transportation. Upon graduating, he knew he liked structures and thought that working in the bridge department would be his career. But the Minnesota Highway Department had a rotation program for newly hired engineers—for the first two years, they were rotated every six months through different offices. His rotation through the traffic engineering department sold him on the importance of traffic engineering, and he never looked back.

He remembers wondering in 1983 why anyone would ever want the position of ITE District director, simply because of the amount of work. In 1995, his District asked him to run. After much thought and encouragement, he agreed. “That was probably the best decision of my career. Those three years were a fantastic experience getting to know many super people all around the ITE community,” he says. “I can’t emphasize enough that everyone should take the opportunity to network at all the ITE meetings. My recommendation to people is to help and volunteer—if asked, say ‘YES!’”

Getting to Know ITE’s Midwestern District

Sections
Illinois Section of ITE (ILITE)
Missouri Valley Section of ITE (MOVITE)
North Central Section of ITE (NCITE)
Wisconsin Section of ITE (ITEWisconsin)

U.S. States Covered
Illinois
Arkansas
Iowa
Kansas
Missouri
Nebraska
Minnesota
North Dakota
South Dakota
Wisconsin
Oklahoma

Members
Approximately 1,600 members, which includes 135 students.

Student Chapters: 24

District Leadership
President – Chad Hammerl, P.E., PTOE (M)
Vice President – Mike McCarthy, P.E., RSP1 (M)
Treasurer – Scott Poska, P.E., PTOE (F)
Secretary – Carissa McQuiston, P.E. (M)
Immediate Past President – Martin Gugel, P.E., PTOE (F)
ILITE Representative – Brian Roberts, P.E., PTOE (M)
MOVITE Representative – Lonnie Burklund, P.E., PTOE (M)
NCITE Representative – Jeff Preston, P.E. (M)
ITEWisconsin Representative – Allan Pacada, P.E. (M)
International Director – Kristi Sebastian, P.E., PTOE (F)

Did You Know?
The Midwestern District has nine chapters, the most of any ITE District. All nine Chapters are part of the MOVITE Section. Due to ONE ITE, most of these nine Chapters will become Sections in the new MOVITE District. The remainder of the Midwestern District Sections will join Indiana, Michigan, and Ohio to form the new Great Lakes District.

Historical Perspective
• The Midwestern District began in 1947 as the Midwest Section. The Chicago-area membership represented approximately 10 percent of the national membership at the time, and a group of traffic engineers met on the 38th floor of the Opera Building in the Electrical Club to discuss the organization of a Section.
• Membership included the following states: Illinois, Wisconsin, Minnesota, Iowa, Kansas, Nebraska, Missouri, North Dakota, South Dakota, and Indiana. The ITE Board of Direction approved the Charter and Bylaws on June 19, 1947.
• As the membership of ITE grew, it became apparent that the Midwest Section included too large a geographical area to be a section. The Section was eventually reorganized in 1951 and split into other groups, including the Indiana Section and the MOVITE Section. Indiana became part of District 3. The MOVITE Section continued to be part of Midwestern District. Arkansas and Oklahoma joined the District in 1961 and 1962, respectively, as part of MOVITE. The Wisconsin and Illinois Sections were originally organized in 1962, but not chartered as Sections of Midwestern District until 1966. The NCITE Section was organized and chartered in 1963.
• Since its formation in 1947, the Midwestern District has hosted the ITE Annual Meeting 12 times.
Looking Back: Transportation through the Decades

In celebration of ITE’s 90th anniversary, throughout 2020 ITE Journal will feature a monthly snapshot of the transportation industry by decade, beginning with the turn of the 20th century through present day. These are the technologies, events, and key players that transformed transportation to bring us where we are today.

1960s

With the creation of the U.S. Department of Transportation in 1967, the government further institutionalized federal oversight of transportation in the 1960s.

ITE Growth Soars

National transportation legislation in the early 1960s opened up a vast area of employment to potential Institute members. According to ITE historical documents, “The federal interstate program had been geared up and the comprehensive transportation planning activities were mandated in all major urban regions of the United States; the membership grew by leaps and bounds as practitioners in those newly related fields were acknowledged to be truly professionals and were rapidly admitted to ITE ranks.”

View of Nashville, TN, USA, 1963: “The attached picture gives a view looking easterly along Interstate Route 40 approaching Nashville from the west. Due to the hilly terrain and the built-up suburban characteristics, requiring a number of separations at cross-roads, the construction costs of this 5.0 mile section was approximately one million dollars per mile. The 1975 projected traffic is 20,100 vehicles per day. A twenty-mile continuous section west of Nashville from US-70 north to SR-96 was opened to traffic in December 1962.” – from Material for Public Roads Annual Report, Fiscal Year 1963. Tennessee Project: I-40-3(14)196, Davidson County.

First Female Federal Highway Engineer – 1962

Beverly Cover becomes the first woman highway engineer to join the Bureau of Public Roads, the predecessor of the Federal Highway Administration.
Traffic Signs and Signals

MUTCD 1961 Edition
The 1961 Edition of the Manual on Uniform Traffic Control Devices (MUTCD) was the first new edition to come out since 1948.

The 1961 edition “provided greater uniformity by eliminating many of the alternatives permitted in the previous edition and by replacing them with a single standard.” The Bureau of Public Roads also required that all traffic control devices used on federal-aid highways should conform to the new manual, marking the first time compliance with MUTCD standards was tied to receiving federal highway funds.

Although the National Joint Committee wanted to minimize changes in the appearance of traffic control devices, the 1961 MUTCD had several important changes in content and format:

• Signs: Though no new symbols were introduced, the 1961 MUTCD featured several changes to existing signs, including increasing sign sizes.
• Pedestrian Signals: Required pedestrian signals to be rectangular in shape and display messages “Walk” in green or white, and “Don’t Walk” in red and orange.
• Markings: Established a solid yellow line to the right of a white center line as the standard for marking no-passing zones.

Signs from the 1961 MUTCD.4
**ITE Presidents – 1960s**

**George W. Howie**  
1963

**Alexander L. Hutchinson**  
1966

**Edmund R. Ricker**  
1967

**David M. Baldwin**  
1968

**Marble J. Hensley Sr.**  
1969

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**Urban Mass Transit Act – January 1, 1964**

This act creates the Urban Mass Transit Administration, providing federal subsidies to public transit agencies for mass transit projects for the first time.

**Department of Transportation Act – 1967**

On October 15, President Johnson signs the Department of Transportation Act, which creates the new cabinet-level department. The new Department begins full operations on April 1, 1967, immediately becoming the fifth largest department in the federal government.

**Pioneer in Transportation: E.H. (Ted) Holmes**

In 1962, as director of research of the Bureau of Public Roads, Ted Holmes fathered the development of the National Cooperative Highway Research Program. The program funnels federal funds through the states to the National Academy of Science’s Transportation Research Board providing steady financial support for essential research.2

**Freedom Riders: The Fight for Civil Rights**

Though segregation on public buses was deemed unconstitutional by the Supreme Court in 1946, many states and communities in the South continued the practice. In 1961, civil rights activists called Freedom Riders rode interstate buses to challenge local laws or customs that enforced seating according to race. Freedom Fighters faced resistance and arrest during their first ride; during later rides, they suffered violent attacks. These activists called national attention to the disregard for federal law, and bolstered the credibility of the American Civil Rights Movement.3

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Communicating Technical Topics to Non-Technical Audiences
In-Person and Virtually
An ITE Online Interactive Workshop powered by Shelley Row, P.E., CSP (F)

Shelley Row and ITE have updated this series sessions to include information that is helpful to communicate with non-technical audiences virtually!

The World Has Gone Virtual! Learn to Design Impactful, Brain-Friendly Webinars That Stick
Wednesday, May 13

Know Your Audience: Who Are They Really and What Do They Care About
Thursday, July 16

Asking Powerful Questions and Listening to for the Answers that Really Matter
Thursday, September 17

Top Management Skills for Technical Managers – a Ten-Part Webinar Series

ITE is proud to partner with Shelley Row, PE, CSP to provide you with access to this valuable webinar series. When you register, be sure to use the special codes specifically for ITE.

Take advantage of working from home to grow your management skills so that your management competence equals your technical competence. Shelley created this webinar series to include the top ten skills she had to learn when she became a manager. Because, let’s face it, technically skilled professionals don’t have the best reputation as managers. It’s time to change that.

Each webinar includes a live interactive event, recording of the webinar, worksheet, and supplemental articles to support your learning. And the series is priced to be affordable for all. The complete list of all webinars is available at https://ilinstitute.teachable.com/.

Upcoming Blended Learning Course from the Consortium for Innovative Transportation Education

ITE members receive significant discounts on registration for this course:

Traffic Signal Operations
Friday, May 15, 2020–June 30, 2020

Upcoming Live Webinars

Guidance for Crash Modification Factor (CMF) Selection and Application 1.5 PDH Credits
Tuesday, May 5, 2:00-3:30 p.m. ET

Truck Trip Generation 1.5 PDH Credits
Tuesday, May 12, 2:00-3:30 p.m. ET

Transportation Career Paths and Opportunities 1.5 PDH Credits
Tuesday, May 19, 2:30-4:00 p.m. ET

Introduction to the New Highway-Rail Grade Crossing Handbook, 3rd Edition 1.5 PDH Credits
Wednesday, June 24, 2:00-3:30 p.m. ET

Smart City Webinar Series
In partnership with the City of Columbus Smart Columbus Program Management Office, ITE hosted a webinar series on various Smart City-related topics. Previously held webinars are available on-demand via the ITE Topics include:
• Demonstration Site Map & Installation Schedule
• Safety Management Plan Final Plan, Smart Mobility Hubs Interface Control and System Design Documents
• Presentation of the Linden AV Shuttle Deployment
• Safety Management Plan Final Plan
• Connected Vehicle Environment Webinar on System Design and Interface Control Document Review

Visit http://bit.ly/ITEwebinars for more information on how to access and stream these webinars.

ITE Professional Development Response to COVID-19
We are in unprecedented times with many of us working remotely due to COVID-19. ITE recognizes the limits afforded to everyone and we want to provide you with discounted learning opportunities to continue your professional development. In response, ITE is making all at-cost live webinars only in May 2020 available at the flat rate of $49.00 for members and $99.00 for non-members per webinar (with the exception of our Workshop Series and Certification Courses). We hope that this will allow our fellow transportation professionals the opportunity to participate and stay connected to the latest trends to continue performing your significant work.

Pricing Announcement

ITE Journal

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The Road to Zero: Taking a Safe System Approach

By Sarah Abel (M), Jeffrey A. Lindley, P.E. (F) and Jeffrey F. Paniati, P.E. (F)
“Imagine that, in 2050, not a single person in the United States dies in a traffic crash.”

This powerful—but hard-to-imagine-scenario—is the premise behind a comprehensive stakeholder effort captured in the RAND report for the Road to Zero (RTZ) Coalition titled, The Road to Zero: Achieving Zero Deaths by 2050. The report further describes what a future 2050 could look like:

Given that it’s impossible to eliminate human error entirely, planners and engineers began thinking of ways to design roads and vehicles to accommodate human error to make the entire system safer. This was paired with efforts toward creating a “Safety Culture” that emphasizes the value of safety in every decision made by every person. Safety has become a shared responsibility among those who use the system and those who design and operate the system. A whole generation is now using these approaches.

But how is this scenario possible—especially 30 years in the future, at a time when the U.S. population is estimated to soar above 400 million? In 2019, an estimated 38,000 people lost their lives on U.S. roadways, according to the National Safety Council (NSC). While this figure represents a slight decline in fatalities from the previous two years, the number of pedestrian deaths has risen, and the amount of people lost to these preventable crashes has been deemed unacceptable by transportation professionals everywhere.

ITE firmly believes that getting to zero by 2050, as described in the RAND report, should be our goal, and is achievable with the right set of actions. That is why ITE has joined the RTZ effort to prevent crashes by adopting best practices and utilizing technology that can change the way our roads are used, and how users are affected.

This article will describe the Road to Zero Coalition, ITE’s role in this Coalition’s efforts, and the Safe System Framework that can help guide changes in practice by infrastructure owners and operators that can support this effort to reach zero roadway fatalities by 2050.

Road to Zero Coalition
The Road to Zero (RTZ) Coalition was established in 2016 through the leadership of the US Department of Transportation and the NSC. The RTZ Coalition’s purpose is to bring together a broad coalition of organizations in support of the goal of achieving zero roadway deaths in the United States by 2050. The Coalition is managed by the NSC and is made up of more than 1,500 professional associations, business and industry associations, safety groups, government agencies, and non-profit organizations. ITE is a member of the RTZ Steering Committee and a founding member of the Coalition. Other partners that make up the RTZ Coalition are federal, state, and local officials; auto manufacturers and technology developers; emergency medicine and trauma academics, practitioners, and advocates; safety researchers and advocates; business community and fleet owners, and more. All RTZ stakeholder groups are providing leadership within their industries and greater communities, prioritizing achieving zero roadway fatalities by 2050.

To help the RTZ Coalition work to achieve zero deaths by 2050, NSC commissioned the RAND Corporation to help the RTZ Coalition create an overall vision and strategy. Three intensive workshops were held in 2017 to discuss the group’s vision, goals, approaches, potential obstacles, and strategies. As a result, three interrelated approaches were determined.

1. Double Down on What Works – draw on the accumulated body of evidence-based countermeasures and network of professionals who can deploy them;
2. Accelerate Advanced Technology – identify and prioritize both existing and emerging safety applications and maximize their potential in a 30-year timeframe;
3. Prioritize Safety – focus on methods to facilitate change including creating a Safety Culture and adopting a Safe System approach (discussed in detail below).

ITE has been an instrumental part of the Coalition since its founding. Jeff Paniati, ITE Executive Director and CEO, has been an active contributor to the RTZ Steering Committee and provided support for many of its early efforts. ITE was a recipient of a RTZ grant focused on speed management for safety. ITE Chief Technical Officer Jeff Lindley and Technical Programs Manager Sarah Abel led this effort (see sidebar on page 29).

After the completion of the RAND report, the RTZ Coalition transitioned its efforts from vision and strategy to implementation. National leaders were identified to serve as champions for each of the three approaches identified in the RAND report. ITE under the leadership of Jeff Paniati is guiding the effort to advance the Prioritizing Safety approach.

Under ITE’s leadership, a Prioritizing Safety Steering Committee and two working groups were formed—one on Safety Culture and a second on Safe System. More than two dozen leading national transportation and safety organizations and technical experts, including the Federal Highway Administration and the National Highway Traffic Safety Administration are participating in this effort. ITE is coordinating the overall effort and leads the Safe System work group. David Yang, executive director of the AAA Foundation for Traffic Safety, is guiding the Safety Culture work group. The efforts focus on supporting implementation by increasing the understanding and application of Safe System and Safety Culture concepts and practices in North America, identifying key tools and references, creating case studies from leading jurisdictions, and finding ways to integrate knowledge into practice.
Resources. The Prioritizing Safety efforts have already produced a number of resources including Safety Culture and Safe System recorded webinars, identification of key resources applicable in the North America, and an initial Safe System resource webpage, an explanation and framework. More information can be found on the Road to Zero webpage hosted by the National Safety Council at https://www.nsc.org/road-safety/get-involved/road-to-zero. The Safe System related material is also on the ITE website under https://www.ite.org/technical-resources/topics/safe-systems/.

RTZ 2.0 – Prioritizing Safety
As described in the RAND report, “prioritizing safety requires methods to facilitate change. Key among these are creating a safety culture and adopting a Safe System approach. A pervasive safety culture is an essential ingredient for reaching zero roadway deaths and can be nurtured through awareness, education, and constant reinforcement.”

Safe System. A Safe System approach can help us get to zero fatalities through the aggressive use of roadway design and operational changes, shared responsibility for transportation safety, and protecting all users (pedestrians, bicyclists, older, younger, disabled, etc.) of the transportation system. Sweden was the first country to enact a Vision Zero policy as a formal goal to reduce roadway deaths and serious injuries to zero in 1997 (more information at http://www.welivevisionzero.com/vision-zero). This marked a fundamental shift to a shared responsibility and system based approach to improving safety, with increased attention on the design and designers of the roadway to prevent crashes and limit their severity. Following the introduction of Vision Zero in Sweden, numerous countries (Canada, Australia, New Zealand Sweden, The Netherlands, and the United Kingdom) and international organizations (i.e., World Road Association [PIARC/WRA], Organisation for Economic Cooperation and Development [OECD], World Resources Institute [WRI], World Health Organization [WHO], World Bank, FIA Foundation, International Road Federation) have explored and applied below principles and experienced success through a Safe System. The concepts that underpin the Safe System approach are:

- Human beings can make mistakes that can lead to road crashes.
- The human body by nature has a limited ability to sustain crash forces.
- It is a shared responsibility among stakeholders (road users, road managers, vehicle manufacturers, etc.) to take appropriate actions to ensure that road crashes do not lead to serious or fatal injuries.
- All parts of the system must be strengthened so that if one part fails, road users are still protected.
- A proactive approach should be taken to making the mobility system safe, rather than waiting for events to occur and reacting.

- No death or serious injury should be accepted in the mobility system, and lack of safety should not be a trade-off for faster mobility.
- It is critical that the key risk factors that contribute significantly to crashes are identified and understood.

Safety Culture. As demonstrated in the Prioritizing Safety Wheel (Figure 1), Safety Culture must surround all we do and be advanced in parallel with the adoption of a Safe System approach to achieve maximum benefit. Safety Culture is defined as “the broad set of attitudes and beliefs that underlie people’s decisions,” according to the Road to Zero report. “Safety culture affects judgment about priorities in individual behavior and support for collective decisions about what is most important in our communities. Getting to zero deaths will involve countless individual and collective decisions, and a strong safety culture is an essential prerequisite.” Safety culture must be advanced both within organizations responsible for protecting public safety and within the community itself.

Safe System Framework
A Safe System framework for achieving zero deaths by 2050 marks a shift in the way transportation professionals think about road-related crashes, injuries, and fatalities. Traditionally, responsibility has been placed largely on the user for driving safely (or walking, or biking, etc.), unimpaired and without distractions. In a Safe System approach, specific roadway and vehicle design techniques
can be used to help prevent crashes, or at least reduce the severity of injuries should a crash occur. Embracing a Safe System does not mean absolving the user of responsibility. Rather, it recognizes the important role that the planning, design and operation of the infrastructure can play. Two key Vision Zero concepts underpin the application of the Safe System framework by infrastructure owners and operators:

Reducing Human Error. Humans are fallible and will make errors. Safe System designs anticipate and reduce the likelihood of errors.

Accommodating Human Injury Tolerance. The human body has a limited ability to absorb energy. Safe System designs reduce or eliminate opportunities for crashes resulting in forces beyond human endurance.

The Safe System framework takes these two concepts and attempts to provide the practitioner with a methodology for applying them in practice.

Reducing Human Error

To reduce the likelihood of human error, there are three principles that transportation professionals can put into place.

**Separating users in space.** Creating separate spaces for different users creates physical separation enhancing safety. Elements such as separated bike lanes, pedestrian refuge islands, and protected left-turns physically separate cars from vulnerable users helping reduce the likelihood of a crash and injury/death.

Providing space for recovery is also key in the Safe System approach, particularly in rural areas. Studies have found that shoulder width and clear zones can lead to an increase in safety. Separating users in time allows different users to use the same space at different times. For example, a pedestrian scramble phase at a traffic signal provides pedestrians with exclusive use of the intersection and ensures that pedestrians are not crossing at the same time cars are turning.

Improving user awareness, attentiveness, and performance.

Improving the performance of all road users increases the likelihood of safety, and can be achieved through these measures:

1. **Increase pedestrian/bicyclist visibility** (and other non-motorist users). Seventy percent of pedestrian fatalities occur at night, according to the National Highway Traffic Safety Administration. Increased visibility can be achieved through designs that place pedestrians in a more visible position to drivers at intersections, encouraging pedestrians to wear reflective colors at night, increased lighting, etc.

2. **Increase attentiveness by limiting distractions for all users** (cell phones use when driving and walking, other in-car activities not related to driving). To decrease distractions, applications and programs that incentivize and reward...
safe behaviors should be developed. For example, the Texas A&M Transportation Institute is working on a program that provide rewards for users who do not access their phone during a trip. In-vehicle systems that help prevent use of cell phones while the vehicle is moving to minimize distraction.

3. Decrease impairment by all users. The use of alcohol and drugs—prescription or illicit—is known to cause fatal and serious crashes. Increased enforcement alone will not prevent users from getting behind the wheel when they should not. Data linkage is one promising strategy, which pulls together driving records, adjudication, and citations to show the community and law enforcement who should not be behind the wheel.

Accommodating Human Injury Intolerance
In the Safe System framework, accommodating human injury intolerance is the second key element. Two principles are at play in helping humans survive a crash and limit their injuries: reducing speed, and limiting impact forces. Reducing speed in the presence of vulnerable users is a key Safe System strategy.

Reduce Speeds. The laws of physics dictate that greater harm will occur at high speed, and that, the greater the mass of a vehicle the more harm that it will inflict on others. Reducing speed in the presence of vulnerable road users is a key Safe System strategy. In urban areas this strategy starts will reassessing speed limits and moving toward the use of context-specific target speeds in lieu of the 85th percentile speed for speed limit setting. The use of traditional or automated enforcement is also a key tool to support lower speeds. However, lower speed limits and enforcement along are unlikely to result in sustained decreases without accompanying changes in the infrastructure. These changes can include narrowing the width of the traveled lanes and introducing horizontal alignment changes to reduce free flow speeds, using traffic calming treatments, or implementing traffic signal timing changes to minimize high speed flow.

Reduce Impact Forces. A variety of methods can increase crash survivability by reducing impact forces. Traditionally, this has been accomplished by protecting the user inside a vehicle by improving the crashworthiness of the vehicle, advocating the use of restraint systems and through mitigation devices such as air bags. Similarly, roadside hardware has been designed to improve crashworthiness through the use of guardrails and crash cushions to protect drivers from hazards and breakaway devices to lessen impact forces.

The angle of a vehicle also has an influence on crash impact. At 90 degrees, there is a large amount of kinetic energy transferred between the vehicle and the colliding object. That kinetic energy drops off as the angle decreases, so transportation professionals can reduce the severity of a crash by employing designs that lessen speed and angle. The roundabout is one of the most common and impactful ways to reduce both these elements.

This framework represents starting point for the development of a Safe System toolbox that can aid practitioners in the implementation of design and operational treatments that will save lives and reduce serious injuries. Additional development of this framework is needed to fully incorporate lessons learned from other countries that are applicable to the United States. The development and trial of novel or innovative techniques needs to be encouraged and expanded so there are more tools available to address the wide

Figure 3. Vehicle impact speed and a pedestrian’s chances of survival.
range of roadway environments and users found across the United States. The Safe System approach is a work in progress, and it will take the dedication and commitment of transportation leaders and those in other industries to help fully realize zero deaths by 2050.

Next Steps

Currently, the Prioritizing Safety Steering Committee and the Safe System and Safety Culture working groups are developing a Prioritizing Safety Roadmap and Action Plan that will guide RTZ efforts in the coming years. This Roadmap and Action plan seeks to identify near term (within one year), mid-term (two to five years) and long-term (five-plus years) efforts that could be undertaken by the RTZ Coalition, its members or others. The goals of this Roadmap and Action plan are to make safety a priority in the United States, to increase the adoption of safety culture at the organizational and community levels, and to advance the practice of Safe System techniques. More information on the Roadmap and Action Plan and near term efforts to be undertaken by the RTZ Coalition will be available later this year. *itej*

References


How Oslo Achieved Zero Pedestrian and Bicycle Fatalities in 2019, and How Other Cities Can Apply What Worked

By Anders Hartmann and Sarah Abel (M)
In 2015 the City of Oslo, Norway made a commitment to reduce car traffic, to prioritize the safety of people on foot and bicycles, and the environment, which came after years of increasing transportation injuries. Unlike in the United States, where transportation fatalities are often viewed as unavoidable, the government of Norway made a strong commitment to Vision Zero nationally, and has worked towards this vision for nearly two decades. Over the last 10 years (2010-2019), Oslo had an average of five to seven traffic fatalities a year. Some U.S. cities of similar size to Oslo, where the population in 2018 was 693,491, have more than double the traffic fatalities in a given year.¹

In 2015, political climate and public will in the City of Oslo changed the tone on accepting continued surface transportation fatalities. The mayor, city council, and transport division staff all supported a shift in roadway decision-making from car-centric to people-centric. Reductions in serious injury and fatal crashes in Oslo’s downward trend shift around 2015 coincided with several important changes made that year:

- The city government set a goal to reduce car traffic by one-third by 2030, in effect doing away with the regime of “predict and provide,” meaning that road safety measures could largely be implemented without traffic studies even if they were believed to cause congestion or slow down traffic.
- The authority to designate bus lanes, bike lanes, one way traffic and close streets to traffic was transferred from the police to the city government, allowing swift transformation of parking lanes to bike lanes and closure of cut through streets.
- The city implemented a bicycle strategy, with an aim to increase the bicycle mode to 25 percent by 2025.
- The city launched a smart phone app for children in school, where they can report traffic hazards and request road safety measures directly to the road authority. It is used by children at 98 schools (more than half of all schools in the city), and has gathered more than 60,000 reports from children so far.
- Oslo received attention in 2015 when it announced that it would make the city center car-free by 2019. In the end, the project has led to a removal of all regular street parking in the city center, and the center has been closed to through traffic.

Oslo also relies on national road safety efforts, especially when it comes to vehicle standards, driver education, and enforcement of road rules. Vision Zero was adopted in Norway in 2002, and is currently one of the safest countries for road users in the world.

Figure 1. The City Ring Road used to have four lanes for cars. It was upgraded after five fatal crashes and 13 serious injuries in the 10 years from 2008 to 2017. There has only been one serious injury since the upgrade. It now has a raised, curb-separated bike lane; bus lanes; and just one lane for cars in each direction. Images show before and after of pedestrian and bicycle improvements to City Ring Road.
The Norwegian Public Roads Administration was also shifting goals and metrics nationally at the same time as Oslo, with plans like the National Cycling Strategy, which was a factor in driving decision making in the Norwegian capital of Oslo. The National Cycling Strategy in Norway had one goal, to make it safer and more attractive to cycle. 2

Then, in June 2016, the City of Oslo released Oslostandarden for sykkeltilrettelegging, or The Oslo Standard for Bicycle Facilities, which prioritized safety and mode share for bicycles through rigorous design standards and exceptions to accommodate bicyclists in a safe manner on all road types. The Oslo Standard for Bicycle Facilities was the city’s effort to figure out the best possible bicycle infrastructure that could be implemented within the boundaries set by the national laws and regulations. Contraflow cycling has been one of the measures most widely implemented, to allow cyclists to choose the safest possible route. Before 2015, when the city gained authority to allow contraflow cycling, it was only allowed on two streets. Today, contraflow cycling is allowed on most one-way streets in Oslo.

The City of Oslo also prioritized safety in road design and road user decisions from 2015 to present for vulnerable road users. The Norwegian Public Roads Administration transferred the authority of traffic-controlling signage and markings from the police to the cities. Additionally, there was a citywide shift of installing dedicated

![Figure 2. Transportation fatalities and serious injury data in the City of Oslo by year. Note: 2019 numbers are preliminary.](image)

![Figure 3. Left: The standard contraflow bike lane layout. Right: Contraflow cycling can be allowed on single lane streets if the roadway width is at least 13 feet.](image)

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bus lanes, restricting traffic on light rail corridors, and installing bicycle lanes in lieu of on-street parking on high mode split streets, and where increased transit and bicycle riding was needed and encouraged. Formerly, the city had to apply to the police or the national road authority to install bike lanes, bus lanes or close streets to traffic, often through formal planning proposals involving consultations and hearings, often delaying projects for years. With the authority to place traffic control signs and markings, the city can now implement such measures in a matter of weeks. This change has helped the city increase the rate of bike lane implementation ten-fold, from an average of 1.5 km (1 mile) per year, to more than 15 km (9 miles) in 2019.

Another driver in reducing roadway fatalities in the City of Oslo is a goal set by the city government in 2015 to reduce car traffic by one third by 2030. To reach this goal, the city has implemented a congestion charge, increased the number of road toll gates, and increased the tolls. While data indicate traffic has started falling, the main takeaway of this goal so far is not reduced traffic. Instead, it is that many measures can now be implemented even if they cause congestion or delays to car traffic. This has enabled more bus lanes, bike lanes, and speed humps to be installed quickly.

Another big shift for the City of Oslo was closing some streets to car traffic, either at peak pedestrian and bicyclist times, or permanently. The city also looked at streets with high pedestrian and bicycle crashes in the selection of converting car streets to people streets. Oslo quickly found that separating vulnerable road users from car traffic would be an effective road design priority toward achieving zero. While some of Oslo’s achieving zero pedestrian and bicycling fatalities in 2019 is circumstance, a major factor was prioritizing safety across the city.

Every time a fatal crash happens, an accident analysis investigation is conducted by the Norwegian Public Roads Administration, with input from the police investigation, where they look at factors that contributed to the crash and its severity. Such investigation reports in Norway regularly include recommendations for road improvements, both at the crash site, and general improvements to prevent similar crashes elsewhere. The accident analysis investigation reports also provide recommendations to ensure similar crashes are avoided on similar roads. For example, a single fatal cyclist crash in 2018 led to the redesign of four bus stops, four intersections, and widened bike lanes over a distance of 1 km that included signal timing and separated junctions for cyclists at similar intersections to
where the fatal crash occurred. These reports also give transportation professionals an understanding of crash causation, a concept of a Safe System approach to transportation safety.

The City of Oslo also looked at certain land uses, such as schools and high-density mixed-use areas, that may cause pedestrians and bicyclists to be particularly vulnerable in making roadway decisions. On a city-wide scale, city officials put safety standards around schools, including limiting speeds to 30 kilometers per hour (km/hr) (18 miles per hour [mph]), installing speed humps to slow speeds, and reducing pedestrian crossing distances to 8 meters (m) (26 feet [ft.]). In high density mixed-use areas with many pedestrians and bicyclists present where closing streets to cars is not an option, the City of Oslo considers approaches such as limiting speeds through roadway interventions, or limiting traffic by implementing one-way streets. Roadway interventions the City of Oslo considers include narrowing and shifting lanes with vertical elements, installing tight curb radii requiring drivers to turn at intersections more slowly, ensuring streets have separated bicycle facilities wherever possible, and designing wide sidewalks to allow many pedestrians to walk. Transportation experts in Oslo have found that these interventions make for a more complex street environment where drivers are forced to pay attention, drive slower, and be cautious of pedestrians and bicyclists.

The City of Oslo owns the vast majority of roadways with [within] in city limits. Having clear ownership makes it easier for Oslo officials to evaluate safety and make design decisions. However, City of Oslo officials must also still work under Norwegian policies and standards, such as the Norwegian Public Roads Administration Handbook 300 which sets the rules for uniform traffic control devices, much like the Manual on Uniform Traffic Control Devices (MUTCD) in the United States. But Oslo maintains its own road, street, and bicycle infrastructure design handbooks. In the last revision, the standard sidewalk width was increased from 2.5 to 3 m (8 to 10 ft.), to accommodate increasing pedestrian traffic. From a local goal-setting standpoint, owning the majority of right-of-ways in Oslo also makes it easier to set aggressive targets for safety and mobility. Oslo has a modal share of 31 percent for walking, and seven percent for cycling (2018), but aims for a cycling modal share of 25 percent in 2025.³ Oslo has a well-functioning public transit system, with a 29 percent modal share.

Oslo implemented a congestion charge in 2018 and installed 52 new toll gates in a system that emulates road pricing. The road tolls finance a larger part of the investments and operations in walking, cycling, public transit, and road safety. Most road safety measures are implemented by the Agency of Urban Environment directly, without having to get political approval of funding for smaller individual projects, including replacing parking with bike lanes, lowering speed limits, and building bump outs and speed humps.

Norwegian law prioritizes pedestrians having the right of way on all pedestrian crossings, andjaywalking is not considered a punishable offence in Norway. On city streets, most drivers will expect pedestrians to start crossing on unsignalized crossings without even looking for a car. The City of Oslo goes above and beyond to ensure pedestrians can always be seen. Intersections are a key area where transportation professionals in Oslo make design decisions based on pedestrian visibility, such as installing bump outs at intersections where parked cars or turning lanes obstruct sight lines. Oslo also requires high visibility ladder style crosswalks at all pedestrian crossings. Often, the City of Oslo will take a step-wise approach typically in two to three stages, such as starting with temporary contraflow bike lanes on a one way street, then removing parking to install a permanent one-way separated cycle track.

While the city has the authority to set speed limits as it sees fit, it prioritizes control of vehicle speeds by physical measures rather than enforcement.
Figure 7. Speed limit breakdown by road length in the City of Oslo, Norway, allows other cities to compare the prevalence of different speed limits.
than enforcement. In most cases, the city combines revision of speed limits with measures such as speed humps, tighter curb radii and bulb outs, to ensure that an acceptable share of drivers adhere to the new speeds. Arterials are typically posted at 50 km/hr (31 mph), smaller streets with bus traffic are posted at 40 km/hr (25 mph) and local streets at 30 km/hr (19 mph). One factor influencing both traffic, speeds and safety is that few city streets or roads have more than one lane for cars in each direction. Most streets that used to have three or four lanes have had bus lanes or bike lanes installed, so that they now only have one lane for cars. This helps limit traffic, but also makes the act of crossing the street less complex. With only one lane for cars, pedestrians have an easier time placing their attention, and vehicles are less likely to obscure people when crossing.

Since 2015, the city has implemented 50 km (31 miles) of bike lanes, removed parking spaces equivalent to 4,250 cars from its streets, installed around 500 speed humps, and lowered speed limits on many streets. This led to almost two-thirds of the road network now having a speed limit of 30 km/hr (19 mph). The city government has vowed to make 30 km/hr the standard citywide speed limit in the future.

Below are some statistics that further elaborate Oslo’s success focusing on Vision Zero, and the road safety strides recently achieved.

- No vulnerable road users died in 2019, and only one car driver died.5
- No school children have died in traffic in decades. There are no records of children between 6 and 15-years-old dying in traffic since digital records began in 1999.6
- The risk of fatal or serious road traffic injuries, on a trip-by-trip basis, has fallen 47 percent for cyclists, 41 percent for pedestrians, and 32 percent for drivers between 2014 and 2018. The average number per 1 million trips for cyclists was reduced from 3.19 to 1.7, pedestrians from 0.74 to 0.44, and car occupants from 1.67 to 1.14.7

In Norway in 2019, no children died in traffic crashes, and there were only two fatal injuries per 100,000 inhabitants, compared to a death rate of 11.4 per 100,000 inhabitants in the United States.

Now that transportation professionals know it is possible to achieve zero, learning from cities like Oslo and Helsinki, we must all strive to achieve the same goal. We have an obligation to protect all road users, especially vulnerable road users. With a common goal of zero, political priorities, and aggressive standards like Oslo, we can ensure the pedestrian and bicyclists are no longer vulnerable in our cities. We must start now—as Oslo has been prioritizing safety of pedestrians and bicyclists for decades—and decide that even single digit fatalities are not acceptable. Transportation professionals should take these lessons and apply them all over the world so no motorist, pedestrian, or bicyclist need to risk their life just to get from point a to point b. Itel

References


Anders Hartmann is an urban planner based in Oslo, Norway. He is currently an adviser on walking, cycling, and road safety at the Oslo Department of Transportation and Environment. Formerly, he helped develop the Oslo Standard for Bicycle Facilities. In the summer of 2020, he will join the consultancy firm Asplan Viak as a senior adviser on urban transportation and planning. He holds a master’s degree in Architecture from The Oslo School of Architecture and Design.

Sarah Abel (M) is a technical programs manager with ITE working in transportation planning, complete streets, safety, Vision Zero, and health. Prior to joining ITE, Sarah was the planning director for the Town of St. Michaels, MD, USA and the community design manager/director at the ESLC Center for Towns on the Eastern Shore of Maryland. She is a former president of the Association for Community Design and a certified professional in Social Economic Environmental Design (SEED).
Guidelines for Determining Traffic Signal Change and Clearance Intervals

ITE has published guidance on yellow change and red clearance intervals for signalized intersections. The goal of this guidance is to create a consensus methodology for calculating and evaluating traffic signal change intervals that can be consistently implemented by transportation agencies. The recommendations presented should yield reasonable times for the yellow change and red clearance intervals for traffic signals, assisting transportation professionals in enhancing intersection safety, maintaining reasonable traffic flow, and providing for movement of vehicles, bicycles, and pedestrians.

PURCHASE INFORMATION

Electronic Format:
 Member $75
 Non-Member $150

Print Format – price of electronic format plus $20 shipping and handling


Trip Generation Manual, 10th Edition Supplement

The supplement adds walk, transit, and bicycle trip generation data for 53 land uses and truck trip generation data for 50 land uses.

For pricing and purchasing information for the supplement, visit http://bit.ly/TripGenSupplement
Long-Term Effectiveness of Radar Speed Feedback Signs for Speed Management

By Matthew J. Jue, P.E., PTOE (M) and James T. Jarzab
Speed limit violations are a major public concern, especially along streets near schools and parks where substantial pedestrian/bicycle-to-vehicle conflicts are experienced. To compensate for limited staff and budget resources, public agencies have turned to radar speed feedback signs that measure driver speed compliance with posted speed limits. Roadside equipment like radar speed signs are used to supplement or substitute for enforcement staff.

The City of Campbell, CA, USA is comprised of 43,000 residents and spans six square miles. The city uses radar speed feedback signs to manage traffic speeds. The “conventional wisdom” is that radar signs are effective when first installed, but over time the signs lose their effectiveness. Therefore, the hypothesis of this study is that radar signs do not maintain their effectiveness over time.

**Literature Review**

In a paper titled “Speed feedback signs as a tool to manage demand for lower residential speeds,” lead author Churchill states, “Results indicated that average speed during…trailer deployment reduced by 1.59 kilometers per hour [km/hr] [1 mile per hour (mph)] to 5.64 km/hr [3.5 mph] depending on the location, compared to before installation period.” This study adds, “The speed level was back to the before installation level after four weeks of [sign] installation.” Churchill cites the paper “Long Term Effectiveness of Radar Speed Display Boards Used in School Zones” authored by Hildebrand et al, which evaluated the long term effectiveness of speed display boards on speed reduction through school zones; one week, two months, one year and four years after the installation. Before-after study results indicated that sustained and statistically significant reduction in the average speeds ranging from 5-14 km/hr (3.1-8.7 mph) were achieved, dependent mostly on the degree of excessive speeding prior to installation. Mean speeds were reduced consistently to 36-37 km/hr (22.4-23.0 mph) on a 30 km/hr (18.6 mph) zone. It was concluded that speed display boards have a statistically significant long-term effect on reducing motorist speeds through school zones.4

In a paper entitled “Effective Deployment of Radar Speed Signs” lead author Veneziano cites the results of past research including permanent radar sign sites in school zones and additional locations.5 For school zones, Veneziano noted six studies with mean speed changes ranging between 1 and 7 mph (1.6 and 11.3 km/hr) apparently within 12 months of sign deployment. For residential, commercial, speed transition zones, Veneziano mentions two studies in speed transition zones where mean speed changes included a 6-8 mph (9.7-12.9 km/hr) reduction in one study, and 1-3.4 mph (1.6-5.5 km/hr) reduction in another, after 12 months of deployment. It was unclear whether any of the past research went beyond 12 months after sign deployment.

**Test Set-up**

This study is a longitudinal analysis of posted speed limit compliance over a five-year period. The speeds of mixed traffic were measured for various corridors in Campbell, CA. Note: street segments in this study were not targeted for speed enforcement, and should be treated as a stochastic influence on observed speeds.

Radar speed signs (30 inches [in.] x 42 in.) with 26.5 in. x 20 in. displays were installed per manufacturer specifications at 10 different locations. The radar speed signs varied in number of lanes, street classification, adjacent land uses, and speed limits, and were mounted away from stop signs or traffic signals to capture the attention of motorists at their top speeds. The signs fall under the U.S. Federal Communications Commission (FCC) Part 15 rules and are permanently accurate to within one mph as factory-calibrated.

Approach speeds of almost all vehicles are recorded on each subject street. For vehicles traveling close to each other or hidden behind another vehicle the signs record only one vehicle and speed. The signs record the last speed of a vehicle before they begin displaying the speed of another vehicle. Campbell streets surveyed in this study are flat and straight; the equipment detects vehicle speeds up to a range of 700 ft. (213 meters [m]). When a sign is set up and positioned to aim the radar gun inside the sign in the direction specified by the manufacturer’s instructions, a sign will detect and display the two closest lanes at the same distance; a third lane over may start displaying at a closer distance. The closest lane will stop recording and displaying speed approximately 50 feet (ft.) (15 m) earlier.

Table 1 summarizes the setting of each surveyed street. Study streets were selected to represent a range of street classifications and number of lanes. Figure 1 shows the sign locations.
Procedure and Data Analysis
Each sign records date- and time-stamped speed data retrieved, periodically, by city staff. For the “before” survey period signs were operated in “stealth mode” (i.e., data collected but speeds not displayed) so that recorded vehicle speeds would not be influenced by the signs. For the “after” survey periods signs were operated in “active mode” (i.e., speeds displayed).

Data were edited to eliminate various types of data artifacts. Average speeds for each “before” and “after” survey period were calculated for each street.

Findings
Table 2 and Figure 2 show average speeds for each sign location at various times from September 2013 (”before”) and increments “after”—three months, six months, one year, three years, and five years (“after”). The “before” mean speed was 25.6 mph for the street segments. The following summarizes changes in mean speed in mph and percentage difference relative to “before” speeds when signs operated in “stealth mode” (i.e., data collected but speeds not displayed) so that recorded vehicle speeds would not be influenced by the signs).

After 3 months, mean speeds averaged a 0.5 mph (0.8 km/hr) decrease with mean speed changes ranging between a 1.2 mph (1.9 km/hr) decrease and a 0.0 mph increase. Percentage differences averaged a 1.9 percent decrease and ranged between a 4.6 percent decrease and a 0.2 percent increase; after 6 months mean speeds averaged a 0.4 mph (0.6 km/hr) decrease and ranged between a 0.1 and 1.1 mph (0.1 and 1.8 km/hr) decrease. Percentage differences averaged a 1.8 percent decrease and ranged between a 0.2 and 5.6 percent decrease. Streets experiencing an immediate impact were eastbound McCoy Avenue and both directions of Victor Avenue. Both streets are 40 ft. (12 m) wide with on-street parking in each

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Table 1. Summary of Surveyed Streets.

<table>
<thead>
<tr>
<th>Street</th>
<th>Direction</th>
<th>No. of Lanes/Dir</th>
<th>Street Classification</th>
<th>Land Use</th>
<th>Speed Limit</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Avenue</td>
<td>Northbound Southbound</td>
<td>1</td>
<td>Local</td>
<td>Single-family Residential</td>
<td>25</td>
<td>36’ to 40’ wide with on-street parking</td>
</tr>
<tr>
<td>Civic Center Drive</td>
<td>Westbound</td>
<td>1</td>
<td>Minor arterial</td>
<td>Public use, Single-family Residential, and Office</td>
<td>25</td>
<td>32’ wide with on-street parking on one side</td>
</tr>
<tr>
<td>Hamilton Avenue</td>
<td>Eastbound Westbound</td>
<td>3</td>
<td>Major arterial</td>
<td>Multi-family Residential and Commercial</td>
<td>35; 25 when children are present</td>
<td>100’ wide with on-street parking on one side, bike lane on other side</td>
</tr>
<tr>
<td>McCoy Avenue</td>
<td>Eastbound</td>
<td>1</td>
<td>Collector</td>
<td>Single-family Residential</td>
<td>25</td>
<td>40’ wide with on-street parking</td>
</tr>
<tr>
<td>Victor Avenue</td>
<td>Northbound Southbound</td>
<td>1</td>
<td>Local</td>
<td>Single-family Residential</td>
<td>25</td>
<td>40’ wide with on-street parking</td>
</tr>
<tr>
<td>Virginia Avenue</td>
<td>Northbound Southbound</td>
<td>1</td>
<td>Collector</td>
<td>Single-family Residential</td>
<td>25</td>
<td>40’ wide with on-street parking, bike route</td>
</tr>
</tbody>
</table>

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Figure 1. Radar Speed Feedback Sign Locations.

Figure 2. Radar Speed Feedback Signs Before/After Average Speeds.
direction and have a school located on them. The mean speed of Eastbound McCoy Avenue decreased 1.2 mph (1.9 km/hr) (4.6 percent). At three months northbound and southbound Victor Avenue mean speeds decreased 1 and 1.2 mph (1.6 and 1.9 km/hr) (3.9 percent and 4.9 percent), respectively. At six months, the mean speed of eastbound McCoy Avenue decreased 0.8 mph (3.2 percent). Northbound and southbound Victor Avenue mean speeds decreased 1.1 and 1.4 mph (1.8 and 2.25 km/hr) (4.4 percent and 5.6 percent), respectively.

After one year mean speeds averaged a 0.8 mph (1.3 km/hr) decrease and ranged between a 0.3 and 2.3 mph (0.5 and 3.7 km/hr) decrease. Percentage differences averaged 2.9 percent decrease and ranged between a 1.1 and 7.9 percent decrease. Eastbound Hamilton Avenue showed the largest decreases in mean speed with 2.3 mph (3.7 km/hr) decrease (7.9 percent). Streets experiencing the next largest speed decreases were again eastbound McCoy Avenue and both directions of Victor Avenue. The mean speed of Eastbound McCoy Avenue decreased 0.9 mph (1.4 km/hr) (3.4 percent). Northbound and southbound Victor Avenue mean speeds decreased 0.9 and 1.2 mph (1.4 and 1.9 km/hr) (3.6 percent and 4.7 percent), respectively.

After five years mean speeds averaged a 0.2 mph (0.3 km/hr) decrease and ranged between a 1 mph (1.6 km/hr) decrease and a 1 mph increase. Percentage differences averaged 0.9 percent decrease and ranged between a 4.1 percent decrease and a 3.4 percent increase. Westbound Hamilton Avenue experienced a 0.3 mph (0.5 km/hr) (1.1 percent) increase in mean speed. Streets experiencing the next largest speed decreases were eastbound McCoy Avenue and both directions of Victor Avenue. The mean speed of Eastbound McCoy Avenue decreased 0.9 mph (1.4 km/hr) (3.4 percent). Northbound and southbound Victor Avenue mean speeds decreased 0.9 and 1.2 mph (1.4 and 1.9 km/hr) (3.6 percent and 4.7 percent), respectively.

Speeds generally decreased and did not creep back to the original “before” speed. Exceptions are northbound Virginia Avenue, a collector street, and westbound Hamilton Avenue, a major arterial. Of all the study street segments northbound Virginia Avenue and westbound Hamilton Avenue showed both mean speed decreases and increases over the duration of the study. Westbound Hamilton Avenue experienced speed increases three and five years after sign deployment.

Table 2. Speed Survey Results in miles per hour.

| Date  | Average | Minor Arterial | Minor Arterial | Major Arterial | Collector | Local | Local | Collector | Local | Collector | Local | Collector | Major Arterial | Collector | Collector | Collector | Collector | Collector | Collector | Collector | Collector | Collector | Collector | Collector | Collector | Collector | Collector | Collector |
|-------|---------|---------------|---------------|---------------|-----------|-------|-------|-----------|-------|-----------|-------|-----------|---------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Before Sep-13 | 25.6 | 24.0 | 29.3 | 26.2 | 23.3 | 25.1 | 25.3 | 24.1 | 23.4 | 24.1 | 23.9 | 30.9 | 23.6 |
| After Dec-13 | 25.1 | 23.9 | 29.0 | 25.0 | 22.8 | 23.4 | 24.1 | 23.9 | 23.9 | 23.9 | 24.1 | 23.9 | 30.9 | 23.6 |
| After Mar-14 | 25.1 | 23.8 | 29.0 | 25.4 | 23.2 | 24.0 | 23.3 | 23.9 | 24.0 | 23.9 | 24.0 | 30.8 | 23.7 |
| After Jun-14 | 25.1 | 23.7 | 29.3 | 25.4 | 23.1 | 24.1 | 23.3 | 24.2 | 23.7 | 31.0 | 23.6 |
| After Oct-14 | 24.8 | 23.8 | 27.0 | 25.1 | 22.9 | 23.0 | 24.0 | 24.2 | 23.7 | 30.6 | 23.6 |
| After Jan-16 | 25.0 | 23.7 | 28.4 | 25.7 | 23.1 | 24.3 | 22.9 | 23.8 | 23.8 | 30.9 | 23.6 |
| After Nov-16 | 25.1 | 23.8 | 28.6 | 25.3 | 23.1 | 24.2 | 22.9 | 24.1 | 24.1 | 31.3 | 23.6 |
| After Dec-17 | 25.1 | 24.0 | 28.6 | 25.3 | 23.2 | 24.2 | 23.1 | 23.9 | 24.2 | 31.3 | 23.7 |
| After Aug-18 | 25.4 | 23.8 | 29.0 | 25.8 | 23.0 | 24.6 | 23.5 | 24.3 | 23.9 | 32.0 | 23.7 |
| Ave. | -0.9 % | -1.0 % | -1.0 % | -1.7 % | -1.4 % | -1.9 % | 0.5 % | -4.1 % | -0.7 % | 3.4 % | -0.8 % |
| Up/ Down | Down | Down | Down | Down | Up | Down | Down | Down | Down | Down | Down | Down

NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound

NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound
Eastbound Hamilton experienced a steep speed decrease one year after sign deployment. Westbound Hamilton Avenue experienced both decreases and increases in mean speed with speed increases three and five years after sign deployment. Civic Center Drive consistently showed speed decreases in each of the “after” surveys. At best, the speed changes on multi-lane arterials may be described as mixed and inconclusive.

Overall, speed change percentage differences for each of the surveyed streets are statistically significant. In terms of absolute speed changes in miles per hour, speeds did not change markedly. The maximum change for any sign location was a one mph increase or decrease.

Based on street classification, all local streets experienced speed change decreases and only one collector experienced a speed change increase after five years. The local and collector streets are all 40 ft. (12 m) wide, two-lane streets with on-street parking and sidewalks where the detectors reflect speeds of only one approach lane of traffic; the source for the vehicle speed being displayed is clear.

The sign facing Westbound Hamilton Avenue displays speeds for three lanes of approaching traffic; motorists may be less clear on whose speed is being displayed. The radar sign may be outside of the cone of vision of motorists who are traveling in the lanes furthest from the sign.

**Conclusion and Recommendations for Additional Research**

The results of this study indicate that continuous use of radar speed feedback signs provides prolonged speed management where applied. The use of radar speed feedback signs resulted in mean speed changes that were statistically significant five years after sign deployment. Streets that experienced the greatest speed reductions were 40 ft. (12 m) wide, two-lane local streets with on-street parking on both sides. The three segments (eastbound McCoy Avenue and both directions of Victor Avenue) that experienced consistently decreased speeds had schools located along the street. Perhaps motorists traveling on these street segments feel obligated to slow down near schools. Based on the data, perhaps the best results for decreasing speeds occur when radar signs are installed on local streets with one-lane approaches and signs are within a motorist’s cone of vision.

Speed changes on surveyed multi-lane arterials varied. One street segment experienced both speed decreases and increases over time with the last two time periods showing speed increases. It is questionable whether signs are effective on wider streets with multiple approach lanes of traffic.

Overall, speed decreases were lower than observed in other studies. This distinction may reflect the short-term nature of previous studies except for Hildebrand et al. The other studies appeared to include data that were collected within 12 months of sign deployment. And though the speed changes are statistically significant, to the average member of the public a speed change of one mph may be perceived as immaterial. It is therefore a matter of public policy to determine if the magnitude of speed change shown is of sufficient importance to warrant the deployment of radar speed feedback signs.

Finally, whereas the scope of this study focuses on the effectiveness of radar speed feedback signs on speed reduction over time, the authors acknowledge that the relationship between speed and crash risk should be studied to determine whether speed reductions resulting from the deployment of radar speed feedback signs translate into quantified reductions in injury crashes.  

**Acknowledgements**

Thanks to Doris Quai Hoi and Srilakshmi Sakhamuri for downloading the data used in this study and David Mooso and Armando Herrera for maintaining the radar speed feedback signs on behalf of the City of Campbell.

The contents of this paper reflect the views of the authors, who are solely responsible as individuals for the accuracy of the facts and conclusions presented herein. These views do not necessarily reflect those of the City of Campbell.

**References**


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i

n recent years, the Federal Highway Administration (FHWA) and the states have invested millions of dollars in research on the safety performance of different measures at intersections. Much of this research has been cataloged in an easy-to-use website called the “Crash Modification Factors Clearinghouse” maintained by the FHWA. The Clearinghouse contains thousands of crash modification factors (CMFs), which are defined as the ratio of the estimated crash frequency after an intervention to the crash frequency before the intervention. A CMF below one thus means the intervention helped. Happily, researchers have rated the quality of each CMF in the Clearinghouse, on a scale of zero stars (poor or unknown quality, result should not be trusted) to five stars (excellent quality, trustworthy result), so that consumers of the information do not have to make that judgment. The library of CMFs, each with a quality rating, is a tremendous resource.
However, the library of safety research results is rarely used during transportation improvement program (TIP) projects to improve intersections. During those projects, teams typically use site crash data to justify the project and then use physics-based nominal design standards. Only in a few states with comprehensive intersection control evaluation (ICE) policies do project teams typically use the available CMFs.

To help intersection project teams use the available CMFs more often and effectively, the author assembled tables showing the safest feasible intersection design (SaFID) for each combination of size and demand on the major and minor streets. The tables should be easy to use. Project teams should start their investigations of alternatives with the design that the research shows to be the safest, and then examine other factors that are meaningful in a design decision. If project teams end up choosing an alternative that is not the safest according to the research, they should have to document why. Starting with consideration of the SaFID should mean that agencies end up building safer intersections. The objectives of this paper are to show the SaFID tables, provide background on how they were developed, and discuss how they should be used.

Sources
With two notable exceptions, the CMFs in the SaFID tables are from the Clearinghouse. The author used only CMFs with three stars or better. The documentation in the Clearinghouse had to be clear on the before condition, the after condition, and the context in which the crash data were collected. This effort used CMFs for a generic four-legged intersection. In some cases, the author averaged CMFs to create an overall CMF. For example, if a study had separate CMFs for urban roads and for rural roads, the author averaged those to get an overall CMF. For example, if a study had separate CMFs for urban roads and for rural roads, the author averaged those to get an overall CMF for that design.

Table 1 shows the references from the Clearinghouse used to assemble the SaFID tables and the corresponding average CMF values. Note that a reduced conflict intersection (RCI) is also known as a restricted crossing U-turn (RCUT) intersection, superstreet, or J-turn.

The author considered two sources of CMFs not in the Clearinghouse in constructing the SaFID tables. First, the FHWA median U-turn (MUT) guidebook (20) contains a review of the safety research on that design and implies average CMFs for the conversion from a conventional signal to a MUT of 0.85 for all crashes and 0.7 for injury crashes. Second, a 2015 research report for the Utah DOT (21) showed a CMF of 0.88 for all crashes for the conversion of a conventional intersection to a partial continuous flow intersection (CFI). The report did not provide a result for injury crashes. The analysis looks to be of relatively good quality. The partial CFIs examined in Utah had two left turn crossovers at each site.

The available set of CMFs described above captures most four-legged intersection designs used in the US as of 2020. In the FHWA CAP-X tool, the only other four-legged intersection designs listed are full CFI (four left turn crossovers), quadrant, bowtie, and split. None of these is common. The only other common intersection types that the author could think of are jughandle and offset intersections. While jughandles are common in a few states, in North Carolina they are not considered to be a competitive design as they require more right-of-way than a partial CFI while delivering only a fraction of the delay-saving benefits. Meanwhile, on offset intersections a recent literature review conducted by the NCDOT did not provide any studies with trustworthy CMF values, and the Clearinghouse does not mention them. Overall, with the possible exception of offset intersections, it looks like we have a pretty full set of CMFs for common and feasible intersection designs.

To construct the SaFID tables, the author also considered the feasibility of the various designs with the following rules:

- All-way stop control (AWSC) is viable on two-lane roads with demands less than 7,500 vehicles per day (VPD) on each road.
- Based on the latest national guide, a single-lane roundabout can handle up to 25,000 VPD total and a two-lane roundabout can handle up to 45,000 VPD total.

<table>
<thead>
<tr>
<th>Changing from…</th>
<th>Changing to…</th>
<th>All crashes</th>
<th>Injury crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Average CMF</td>
<td>References</td>
</tr>
<tr>
<td>Two-way stop control</td>
<td>All-way stop control</td>
<td>0.32</td>
<td>2</td>
</tr>
<tr>
<td>Conventional signal</td>
<td>0.81</td>
<td>4-8</td>
<td>0.74</td>
</tr>
<tr>
<td>One-lane roundabout</td>
<td>0.51</td>
<td>10-13</td>
<td>0.16</td>
</tr>
<tr>
<td>Unsignalized RCI</td>
<td>0.58</td>
<td>14-16</td>
<td>0.42</td>
</tr>
<tr>
<td>Conventional signal</td>
<td>One-lane roundabout</td>
<td>0.74</td>
<td>17</td>
</tr>
<tr>
<td>Two-lane roundabout</td>
<td>0.89</td>
<td>12 and 17</td>
<td>0.54</td>
</tr>
<tr>
<td>Signalized RCI</td>
<td>0.85</td>
<td>19</td>
<td>0.78</td>
</tr>
</tbody>
</table>
Based on the FHWA guidebook, a signalized RCI can handle up to 25,000 VPD on the minor street. Twenty-four Two-lane minor streets should be signalized in RCIs at demands ranging from 3,000 to 11,000 VPD based on NCDOT research. Twenty-five Because RCIs have superior signal progression and are not as vulnerable to driver confusion, MUTs and CFIs only become feasible at minor street demands above 25,000 VPD. Agencies often make exceptions to these rules, but they should serve well to start.

One other technique needed to construct the SaFID tables is the ability to chain CMFs. If we have a CMF for the conversion of condition a to b, and a CMF for the conversion of b to c, multiplying the CMF for a to b by the CMF for b to c should provide the CMF for a to c without losing much accuracy. For example, for all crashes the conversion of an intersection from a signal to a two-way stop has an average CMF of 1/0.81 = 1.23 and from a two-way stop to all-way stop has an average CMF of 0.32, so the CMF for converting from a signal to an all-way stop should be 1.23 * 0.32 = 0.4.

SaFID Tables
Table 2 shows the SaFID table based on all crashes, while Table 3 shows the SaFID table based on injury crashes. Both tables show the SaFID for any combination of major street and minor street number of through lanes and vehicle demand. The demands are in terms of average annual daily traffic, or AADT, in VPD. The CMFs displayed are for the conversion of a conventional signalized intersection to the design named in the cell.

Tables 2 and 3 are dominated by four design types, including AWSC, roundabouts, RCIs, and MUTs. A TWSC is never the generally safest choice. A conventional signal only shows up in a small sliver of each table, at the highest demand levels handled with two-lane major and minor streets where a roundabout is not feasible. Though the partial CFI did not appear in Table 2, it did not miss by much. The CMF for all crashes for a MUT is 0.85, Twenty while the CMF for a partial CFI is 0.88. Twenty-one Especially at high demands with six-lane or eight-lane roads, a partial CFI may be a worthy choice for capacity without losing too much safety benefit.

Using the Tables
In view of the importance of safety, the author urges highway agencies to adopt the SaFID as the default choice during intersection improvement projects. Conventional TWSC and signal intersections are not generally the safest feasible options and should therefore not be the default designs during projects. There are many reasons why an agency may not be able to build the SaFID in any particular project, including cost, impacts, delays, and effects on non-motorized travelers. However, in all cases agencies ought to be prepared to say why they did not end up building the SaFID. Entering the project development process with the SaFID as the default should shift the burden of proof to advocates of generally less-safe designs, where the burden should lie.

Project teams can use Table 2 or Table 3 or both in their processes. In some cells the tables have the same entry, indicating that a design is generally safest using either all crashes or injury crashes. However, in some cells the two tables have different entries, so agencies and project teams will have to choose which type of crash is more important.

One of the reasons not to choose the SaFID during a project is that the research justifying the design as the safest does not apply to the case in question. Indeed, there are many places where the existing research reflected in Tables 2 and 3 is out of scope. Tables 2 and 3 apply to four-legged intersections, for example, and may not apply to a project improving a three-legged junction. Those claiming that their project site is out of scope of the research underlying Tables 2 and 3 ought to be careful not to stretch that argument too far. Just because the research has not been done on three-legged RCIs, for example, does not mean that those designs are less safe than conventional designs.

Project teams should use Tables 2 and 3 early in the process in conjunction with a couple other tools that support quick judgments on different designs. For capacity, CAP-X helps analysts quickly judge which alternatives promise greater efficiency. Twenty-two For the quality of pedestrian and bicyclist service at intersection alternatives, the guidebook from NCHRP project 7-25, to be published in 2020, should provide a quick but helpful look at any intersection design. Together, the SaFID tables, CAP-X, and the forthcoming NCHRP 7-25 guidebook provide a powerful suite of early intersection design filters.

Follow-Up Work
Tables 2 and 3 will hopefully prove helpful to intersection design teams, but they could be improved with several types of additional research. First, more research on some designs already in the tables would be welcome. Second, we could use research on designs not in these tables, including offset and quadrant intersections, that likely will be considered more in the next few years. Third, we need research on the validity of combining CMFs, so that project teams can evaluate the safety of hybrid designs. Fourth, we have no CMFs and almost no safety research on grade-separated intersections (the junction of two non-freeways using a bridge), while many of these relatively high cost solutions are being proposed. Fifth, researchers should begin to derive CMFs for interchanges so an interchange SaFID table may be assembled. Finally, work should continue on adequate crash surrogates to help designers estimate the crash potential of designs that have not been built yet.

A recent paper based on research sponsored by the NCDOT (26) provided a start in this direction. itej

www.ite.org May 2020 47
### Table 2. Safest feasible intersection design (SaFID) based on all crashes.

<table>
<thead>
<tr>
<th>Major street</th>
<th>Number through lanes</th>
<th>Low AADT: 0</th>
<th>5,000</th>
<th>7,500</th>
<th>10,000</th>
<th>15,000</th>
<th>20,000</th>
<th>25,000 and above</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low AADT:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High AADT:</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High AADT:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Safest** through lanes:
  - 2: All-way stop
  - 4: Two-lane roundabout
- **CMF:**
  - 0.7
  - 0.8
  - n/a

*One-lane roundabouts are generally feasible if the combined AADT is less than 25,000. If a one-lane roundabout is infeasible a signal is the safest feasible design.*

### Table 3. Safest feasible intersection design (SaFID) based on injury crashes.

<table>
<thead>
<tr>
<th>Major street</th>
<th>Number through lanes</th>
<th>Low AADT: 0</th>
<th>5,000</th>
<th>7,500</th>
<th>10,000</th>
<th>15,000</th>
<th>20,000</th>
<th>25,000 and above</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low AADT:</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High AADT:</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>High AADT:</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Safest** through lanes:
  - 2: All-way stop
  - 4: Two-lane roundabout
- **CMF:**
  - 0.7
  - 0.8
  - n/a

*One-lane roundabouts are generally feasible if the combined AADT is less than 25,000. If a one-lane roundabout is infeasible a signal is the safest feasible design.*

**Two-lane roundabouts are generally feasible if the combined AADT is less than 45,000. If a two-lane roundabout is infeasible a median u-turn is the safest feasible design.**
Acknowledgements
The author appreciates helpful comments from colleagues on early versions of the tables and support from the NCDOT administration. The author also appreciates the engineers in North Carolina and elsewhere who put their careers and reputations on the line to get alternative designs built so that we might be able to develop CMFs from them. The views and opinions in this paper are the author’s and do not necessarily represent the views, opinions, policies, or practices of the NCDOT.

References

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Answer to “Where in the World?” on page 19: Čertovka, Prague, Czech Republic. Photo courtesy of Doug Keys, PTP (M).
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